# General-purpose Limit Switch
# D4A-□N

### The Limit Switch with Better Seal, Shock Resistance, and Strength

- A double seal on the head, a complete gasket cover, and other features ensure a better seal (meets UL NEMA 3, 4, 4X, 6P, 12, 13).
- Block mounting method to reduce weight to 290 g.
- Block mounting method also reduces downtime for maintenance.
- Wide standard operating temperature range: –40°C to 100°C (standard type).
- Models with fluoro-rubber available for greater resistance to chemicals.
- DPDT, double-break models available for complex operations.



## Model Number Structure

### ■ Model Number Legend

**D4A-□□□□N**
**1 2 3**

**1. Receptacle Box**
- 1: 1/2-14 NPT conduit (SPDT, double-break)
- 2: 1/2-14 NPT conduit (DPDT, double-break)
- 3: G 1/2 conduit (SPDT, double-break)
- 4: G 1/2 conduit (DPDT, double-break)
- 5: M20 x 1.5 conduit (SPDT, double-break)
- 6: M20 x 1.5 conduit (DPDT, double-break)

**2. Switch Box**
- 1: SPDT, double-break, without indicator
- 3: SPDT, double-break, neon lamp
- A: SPDT, double-break, LED (12 VDC)
- C: SPDT, double-break, LED (24 VDC, leakage current: 4 mA)
- E: SPDT, double-break, LED (24 VDC, leakage current: 1.3 mA)
- G: SPDT, double-break, LED (48 VDC)
- 5: DPDT, double-break, simultaneous operation, without indicator
- 7: DPDT, double-break, sequential operation, without indicator (See note 1.)
- 9: DPDT, double-break, center neutral operation, without indicator (See note 2.)
- L: DPDT, double-break, simultaneous operation, neon lamp
- M: DPDT, double-break, sequential operation, neon lamp (See note 1.)
- N: DPDT, double-break, center neutral operation, neon lamp (See note 2.)
- P: DPDT, double-break, simultaneous operation, LED
- Q: DPDT, double-break, sequential operation, LED (See note 1.)
- R: DPDT, double-break, center neutral operation, LED (See note 2.)

**3. Head**
- 01: Roller lever, standard
- 02: Roller lever, high-sensitivity
- 03: Roller lever, low torque
- 04: Roller lever, high-sensitivity, low torque
- 05: Roller lever, maintained
- 17: Roller lever, sequential operation
- 18: Roller lever, center neutral operation
- 06: Side plunger, standard
- 07-V: Side plunger, vertical roller
- 07-H: Side plunger, horizontal roller
- 08: Side plunger, adjustable
- 09: Top plunger, standard
- 10: Top plunger, roller
- 11: Top plunger, adjustable
- 12: Flexible rod, spring wire
- 14: Flexible rod, plastic rod
- 15: Flexible rod, cat whisker
- 16: Flexible rod, coil spring

**Note: 1.** Use the D4A-0017N Special Head.
**2.** Use the D4A-0018N Special Head.
**3.** Fluoro-rubber sealed type is also available.

# Ordering Information

## ■ List of Models

### SPDT Double-break Switches

| Actuator | 1/2-14NPT conduit | | | | |
|---|---|---|---|---|---|
| | Without indicator | | With neon lamp indicator (AC) | | With LED indicator (DC) |
| | Model | Approved standards | Model | Approved standards | |
| **Roller lever: standard (See note 4.)**  | D4A-1101N | UL, CSA | D4A-1301N | UL, CSA | D4A-1A01N, D4A-1C01N, D4A-1E01N, D4A-1G01N |
| **Roller lever: high-sensitivity (See note 4.)**  | D4A-1102N | UL, CSA | D4A-1302N | UL, CSA | D4A-1A02N, D4A-1C02N, D4A-1E02N, D4A-1G02N |
| **Roller lever: low torque (See note 4.)**  | D4A-1103N | UL, CSA | D4A-1303N | UL, CSA | D4A-1A03N, D4A-1C03N, D4A-1E03N, D4A-1G03N |
| **Roller lever: high-sensitivity/low torque (See note 4.)**  | D4A-1104N | UL, CSA | D4A-1304N | UL, CSA | D4A-1A04N, D4A-1C04N, D4A-1E04N, D4A-1G04N |
| **Roller lever: maintained (See note 4 and 5.)**  | D4A-1105N | UL, CSA | D4A-1305N | UL, CSA | D4A-1A05N, D4A-1C05N, D4A-1E05N, D4A-1G05N |
| **Side plunger**  | D4A-1106N | UL, CSA | D4A-1306N | UL, CSA | D4A-1A06N, D4A-1C06N, D4A-1E06N, D4A-1G06N |
| **Side-roller plunger: vertical roller**  | D4A-1107-VN | UL, CSA | D4A-1307-VN | UL, CSA | D4A-1A07-VN, D4A-1C07-VN, D4A-1E07-VN, D4A-1G07-VN |
| **Side-roller plunger: horizontal roller**  | D4A-1107-HN | UL, CSA | D4A-1307-HN | UL, CSA | D4A-1A07-HN, D4A-1C07-HN, D4A-1E07-HN, D4A-1G07-HN |
| **Side plunger: adjustable**  | D4A-1108N | UL, CSA | D4A-1308N | UL, CSA | D4A-1A08N, D4A-1C08N, D4A-1E08N, D4A-1G08N |
| **Top plunger**  | D4A-1109N | UL, CSA | D4A-1309N | UL, CSA | D4A-1A09N, D4A-1C09N, D4A-1E09N, D4A-1G09N |
| **Top plunger: roller**  | D4A-1110N | UL, CSA | D4A-1310N | UL, CSA | D4A-1A10N, D4A-1C10N, D4A-1E10N, D4A-1G10N |
| **Top plunger: adjustable**  | D4A-1111N | UL, CSA | D4A-1311N | UL, CSA | D4A-1A11N, D4A-1C11N, D4A-1E11N, D4A-1G11N |
| **Flexible rod: Spring wire**  | D4A-1112N | UL, CSA | D4A-1312N | UL, CSA | D4A-1A12N, D4A-1C12N, D4A-1E12N, D4A-1G12N |
| **Flexible rod: Plastic rod**  | D4A-1114N | UL, CSA | D4A-1314N | UL, CSA | D4A-1A14N, D4A-1C14N, D4A-1E14N, D4A-1G14N |
| **Flexible rod: Cat whisker**  | D4A-1115N | UL, CSA | D4A-1315N | UL, CSA | D4A-1A15N, D4A-1C15N, D4A-1E15N, D4A-1G15N |
| **Flexible rod: Coil spring**  | D4A-1116N | UL, CSA | D4A-1316N | UL, CSA | D4A-1A16N, D4A-1C16N, D4A-1E16N, D4A-1G16N |

**Note: 1.** The Switches listed above with an optional G1/2 or M20 x 1.5 conduit can be supplied upon request. To order, change the conduit identifier in the model number as follows:

| 1/2-14NPT | G1/2 | M20 x 1.5 |
|---|---|---|
| D4A-1□□□N | D4A-3□□□N | D4A-5□□□N |

**2.** Switches with fluoro-rubber seals (with an operating temperature range of –10°C to 120°C) may be ordered by adding an "F" suffix to the model number. (Example: D4A-3101N-F for D4A-3101N) Contact your OMRON representative for details.

**3.** Switches with silicon rubber seals that have high weather-proof performance are also available and may be ordered by adding an "T" suffix to the model number. (Example: D4A-3112N-T for D4A-3112N) Contact your OMRON representative for details.

**4.** Levers for Roller Lever Switches are optionally available. Select the lever from those listed in this datasheet (refer to *Levers* on pages 28 and 29) and order.

**5.** "Roller lever: maintained" refers to actuators that possess a lock mechanism for switching operations. Use a Fork Lever Lock (D4A-E□□) as the lever.

## DPDT Double-break Switches

| Actuator | 1/2-14NPT conduit | | | |
|---|---|---|---|---|
| | Without indicator | | With neon lamp indicator (AC) | With LED indicator (DC) |
| | Model | Approved standards | | |
| Roller lever: standard (See note 3.) | D4A-2501N | UL, CSA | D4A-2L01N | D4A-2P01N |
| Roller lever: high-sensitivity (See note 3.) | D4A-2502N | UL, CSA | D4A-2L02N | D4A-2P02N |
| Roller lever: low torque (See note 3.) | D4A-2503N | UL, CSA | D4A-2L03N | D4A-2P03N |
| Roller lever: high-sensitivity/low torque (See note 3.) | D4A-2504N | UL, CSA | D4A-2L04N | D4A-2P04N |
| Roller lever: maintained (See note 3 and 4.) | D4A-2505N | UL, CSA | D4A-2L05N | D4A-2P05N |
| Roller lever: sequential operating (See note 3.) | D4A-2717N | UL, CSA | D4A-2M17N | D4A-2Q17N |
| Roller lever: center neutral operating (See note 3.) | D4A-2918N | UL, CSA | D4A-2N18N | D4A-2R18N |
| Side plunger | D4A-2506N | UL, CSA | D4A-2L06N | D4A-2P06N |
| Side-roller plunger: vertical roller | D4A-2507-VN | UL, CSA | D4A-2L07-VN | D4A-2P07-VN |
| Side-roller plunger: horizontal roller | D4A-2507-HN | UL, CSA | D4A-2L07-HN | D4A-2P07-HN |
| Side plunger: adjustable | D4A-2508N | UL, CSA | D4A-2L08N | D4A-2P08N |
| Top plunger | D4A-2509N | UL, CSA | D4A-2L09N | D4A-2P09N |
| Top plunger: roller | D4A-2510N | UL, CSA | D4A-2L10N | D4A-2P10N |
| Top plunger: adjustable | D4A-2511N | UL, CSA | D4A-2L11N | D4A-2P11N |
| Flexible rod: Spring wire | D4A-2512N | UL, CSA | D4A-2L12N | D4A-2P12N |
| Flexible rod: Plastic rod | D4A-2514N | UL, CSA | D4A-2L14N | D4A-2P14N |
| Flexible rod: Cat whisker | D4A-2515N | UL, CSA | D4A-2L15N | D4A-2P15N |
| Flexible rod: Coil spring | D4A-2516N | UL, CSA | D4A-2L16N | D4A-2P16N |

**Note: 1.** The Switches listed above with an optional G1/2 or M20 x 1.5 conduit can be supplied upon request. To order, change the conduit identifier in the model number as follows:

| 1/2-14NPT | G 1/2 | M20 x 1.5 |
|---|---|---|
| D4A-2□□□N | D4A-4□□□N | D4A-6□□□N |

**2.** Switches with fluoro-rubber seals (with an operating temperature range of –10°C to 120°C) may be ordered by adding an "F" suffix to the model number. (Example: D4A-3101N-F for D4A-3101N) Contact your OMRON representative for details.

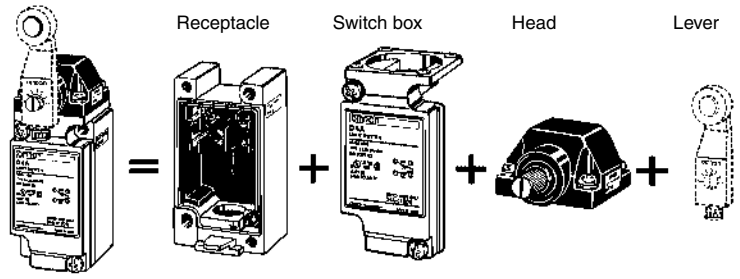
**3.** Levers for Roller Lever Switches are optionally available. Select the lever from those listed in this data sheet (refer to *Levers* on pages 28 and 29) and order.

**4.** "Roller lever: maintained" refers to actuators that possess a lock mechanism for switching operations. Use a Fork Lever Lock (D4A-E□□) as the lever.

# Individual Parts

## Replacement of Parts

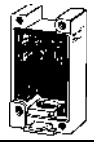
Because the D4A-□N employs block mounting construction, the switch body, receptacle, and operating head may be ordered as a complete assembly or individually as replacement parts.




D4A-1101N D4A-1000N D4A-0100N D4A-0001N

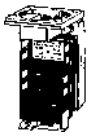
Levers for Roller Lever Switches are optionally available. Select the lever from those listed in this datasheet and order (refer to *Levers* on pages 20 and 21).

## Receptacle Box

| Type | Appearance | 1/2-14NPT conduit (See note 2.) | | G1/2 conduit (See note 1.) | | M20 x 1.5 (See note 1.) | |
|---|---|---|---|---|---|---|---|
| | | Model | Approved standards | Model | Approved standards | Model | Approved standards |
| **SPDT double-break** |  | D4A-1000N | UL, CSA | D4A-3000N | UL, CSA | D4A-5000N | UL, CSA |
| **DPDT double-break** |  | D4A-2000N | UL, CSA | D4A-4000N | UL, CSA | D4A-6000N | UL, CSA |

**Note: 1.** M6-screw mounting (standard mounting)
**2.** 10-32UNF-screw mounting (standard mounting)

## Switch Box

| Type | Appearance | | Without indicator | | With neon lamp indicator (AC) | | With LED indicator (DC) |
|---|---|---|---|---|---|---|---|
| | | | Model | Approved standards | Model | Approved standards | Model |
| **SPDT double-break** |  (Without indicator lamp) | | D4A-0100N | UL, CSA | D4A-0300N | UL, CSA | D4A-0A00N<br>D4A-0C00N<br>D4A-0E00N<br>D4A-0G00N |
| **DPDT double-break** |  (Without indicator lamp) | Simultaneous operation | D4A-0500N | UL, CSA | D4A-0L00N | --- | D4A-0P00N |
| | | Sequential operation | D4A-0700N | UL, CSA | D4A-0M00N | --- | D4A-0Q00N |
| | | Center neutral operation | D4A-0900N | UL, CSA | D4A-0N00N | --- | D4A-0R00N |

## Heads

| Type | Appearance | Approved standards |
|---|---|---|
| **Roller lever (See note 1.)** |  <br>Standard: D4A-0001N<br>High-sensitivity: D4A-0002N<br>Low torque: D4A-0003N (see note 2)<br>High-sensitivity/low torque: D4A-0004N (see note 2)<br>Sequential operation: D4A-0017N (see note 3)<br>Center neutral operation: D4A-0018N (see note 3) | UL, CSA |
| |  <br>Maintained: D4A-0005N | UL, CSA |
| **Side plunger** |     <br>Standard: D4A-0006N<br>Horizontal roller: D4A-0007-HN<br>Vertical roller: D4A-0007-VN<br>Side adjustable: D4A-0008N | UL, CSA |
| **Top plunger** |    <br>Standard: D4A-0009N<br>Roller plunger: D4A-0010N<br>Plunger adjustable: D4A-0011N | UL, CSA |
| **Flexible rod** |     <br>Spring wire D4A-0012N<br>Plastic rod D4A-0014N<br>Cat whisker D4A-0015N<br>Coil spring D4A-0016N | UL, CSA |

**Note: 1.** Levers for Roller Lever Switches are optionally available. Select the lever from those listed in this data sheet and order (refer to *Levers* on pages 28 and 29).

**2.** The D4A-C00 adjustable roller lever is too heavy and long for these heads and it should not be used or mechanical malfunction will result.

**3.** These heads cannot be used for double break operations.

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL/CSA

#### A600

**D4A-□1□□N (SPDT, Double-break, Without Indicator)**

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

#### A300

**D4A-□3□□N (SPDT, Double-break, With Neon Lamp)**

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

#### B600

**D4A-□5□□N (DPDT, Double-break, Simultaneous Operation)**
**D4A-□7□□N (DPDT, Double-break, Sequential Operation)**
**D4A-□9□□N (DPDT, Double-break, Center Neutral Operation)**

| Rated voltage | Carry current | Current | | Volt-amperes | |
|---|---|---|---|---|---|
| | | Make | Break | Make | Break |
| 120 VAC<br>240 VAC<br>480 VAC<br>600 VAC | 5 A | 30 A<br>15 A<br>7.5 A<br>6.0 A | 3 A<br>1.5 A<br>0.75 A<br>0.6 A | 3,600 VA | 360 VA |

# ■ Ratings

| Type | Rated voltage | Non-inductive load | | | | Inductive load | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Resistive load | | Lamp load | | Inductive load | | Motor load | |
| | | NC | NO | NC | NO | NC | NO | NC | NO |
| **SPDT double-break (with/without indicator)** | 125 VAC (See note 5.) | 10 A | 10 A | 3 A | 1.5 A | 10 A | | 5 A | 2.5 A |
| | 250 VAC (See note 5.) | 10 A | 10 A | 2 A | 1 A | 10 A | | 3 A | 1.5 A |
| | 480 VAC | 10 A | 10 A | 1.5 A | 0.8 A | 3 A | | 1.5 A | 0.8 A |
| | 600 VAC | 3 A | 1 A | 1 A | 0.5 A | 1.5 A | | 1 A | 0.5 A |
| | 8 VDC | 10 A | | 6 A | 3 A | 10 A | | 6 A | |
| | 14 VDC | 10 A | | 6 A | 3 A | 10 A | | 6 A | |
| | 30 VDC | 6 A | | 4 A | 3 A | 6 A | | 4 A | |
| | 125 VDC (See note 5.) | 0.8 A | | 0.2 A | 0.2 A | 0.8 A | | 0.2 A | |
| | 250 VDC (See note 5.) | 0.4 A | | 0.1 A | 0.1 A | 0.4 A | | 0.1 A | |
| **DPDT double-break (without indicator)** | 125 VAC | 5 A | | 2 A | | 4 A | | 3 A | |
| | 250 VAC | 3 A | | 1 A | | 2 A | | 1.5 A | |
| | 480 VAC | 1.5 A | | 0.5 A | | 1 A | | 0.8 A | |
| | 600 VAC | 1 A | | 0.4 A | | 0.7 A | | 0.5 A | |
| | 14 VDC | 5 A | | 2 A | | 4 A | | 3 A | |
| | 30 VDC | 3 A | | 1 A | | 2 A | | 1.5 A | |
| | 125 VDC | 0.4 A | | 0.1 A | | 0.4 A | | 0.1 A | |
| | 250 VDC | 0.2 A | | 0.05 A | | 0.2 A | | 0.05 A | |
| **DPDT double-break (with indicator)** | 125 VAC | 5 A | | 2 A | | 4 A | | 3 A | |
| | 250 VAC | 3 A | | 1 A | | 2 A | | 1.5 A | |
| | 12 VDC | 5 A | --- | --- | | --- | | --- | |
| | 24 VDC | 3 A | | | | | | | |
| | 48 VDC | 1 A | | | | | | | |

| Type | | SPDT, double-break | | DPDT, double-break | |
|---|---|---|---|---|---|
| | | Without indicator | With indicator | Without indicator | With indicator |
| **Inrush current** | **Normally closed** | 30 A max. | | | |
| | **Normally open** | 20 A max. | | | |

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

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

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

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

**5.** For those with indicators, refer to the following rated voltages.

## Indicators

| Classification | Indicator | Model | Rated voltage | Carry current | Internal resistance |
|---|---|---|---|---|---|
| **SPDT double-break** | Neon lamp | D4A-0300N | 125 VAC, 250 VAC | Approx. 0.47 mA | 150 kΩ |
| | LED | D4A-0A00N | 12 VDC | Approx. 3.2 mA | 2.2 kΩ |
| | | D4A-0C00N | 24 VDC | Approx. 4 mA | 4.7 kΩ |
| | | D4A-0E00N | 24 VDC | Approx. 1.3 mA | 15 kΩ |
| | | D4A-0G00N | 48 VDC | Approx. 2 mA | 22 kΩ |
| **DPDT double-break** | Neon lamp | D4A-0L00N<br>D4A-0M00N<br>D4A-0N00N | 125 VAC, 250 VAC | Approx. 0.28 mA | 240 kΩ |
| | LED | D4A-0P00N<br>D4A-0Q00N<br>D4A-0R00N | 48 VDC | Approx. 1.4 mA | --- |

# ■ Characteristics

| | |
|---|---|
| **Degree of protection** | IP67 |
| **Durability (See note 3.)** | Mechanical: SPDT, double-break, roller lever: 50,000,000 operations min. (See note 2.)<br>DPDT, double-break, roller lever: 30,000,000 operations min. (See note 2.)<br>Electrical: SPDT, double-break: for 125 VAC, 10 A resistive load: 1,000,000 operations min.<br>DPDT, double-break: for 125 VAC, 5 A resistive load: 750,000 operations min. |
| **Operating speed** | 1 mm to 2 m/s (for D4A-3101N roller lever model) |
| **Operating frequency** | Mechanical: 300 operations/minute<br>Electrical: 30 operations/minute |
| **Rated frequency** | 50/60 Hz |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) between terminals of the same polarity, between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part |
| **Contact resistance** | 25 mΩ max. (initial value) |
| **Temperature rise** | 50°C max. |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min. between terminals of same polarity<br>2,200 VAC, 50/60 Hz for 1 min. between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part (See note 4.) |
| **Pollution degree (operating environment)** | 3 |
| **Protection against electric shock** | Class I (with grounding terminal) |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (See note 5.) |
| **Shock resistance** | Destruction: 1,000 m/s$^2$ min.<br>Malfunction: SPDT, double-break, roller lever: 600 m/s$^2$ min. (See note 5.)<br>DPDT, double-break, roller lever: 300 m/s$^2$ min. (See note 5.) |
| **Ambient operating humidity** | 95% max. (with no icing) |
| **Weight** | Approx. 290 g (for D4A-3101N roller lever model) |

**Note: 1.** The above figures are initial values.

**2.** Excluding maintained models.

**3.** The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

**4.** 1,500 VAC is applied to the indicator lamp type.

**5.** Not including wobble levers (cat whisker, plastic rod, coil spring, and spring wire types).

| Type | Roller lever (See note 5-1.) | Plunger, flexible rod (See note 5-2.) | With indicator | Fluoro-rubber seal |
|---|---|---|---|---|
| Ambient temperature (See note 5-3.) | –40°C to 100°C | –20°C to 100°C | –10°C to 80°C | –10°C to 120°C |

**5-1.** Excluding low-torque and high-sensitivity models.

**5-2.** Including roller lever low-torque and high-sensitivity operating models.

**5-3.** Should not cause icing.

# ■ Operating Characteristics

**Note:** The figures in the parentheses are average values.

## Roller Lever Switches

### SPDT Double-break

| Model | D4A-1□01N | D4A-1□02N | D4A-1□03N | D4A-1□04N | D4A-1□05N |
|---|---|---|---|---|---|
| OF max. | 0.39 N·m | 0.39 N·m | 0.2 N·m | 0.2 N·m | 0.39 N·m |
| RF min. | 0.05 N·m | 0.05 N·m | --- | --- | --- |
| PT max. | 15° (12°) | 7° (6°) | 15° (12°) | 7° (6°) | 65° (60°) |
| OT min. | 70° | 75° | 70° | 75° | 20° |
| MD max. | 5° (4°) | 4° (3°) | 5° (4°) | 4° (3°) | 35° (30°) |

### DPDT Double-break

| Model | D4A-2□01N | D4A-2□02N | D4A-2□03N | D4A-2□04N | D4A-2□05N | D4A-2□17N | D4A-2□18N |
|---|---|---|---|---|---|---|---|
| OF max. | 0.39 N·m | 0.39 N·m | 0.2 N·m | 0.2 N·m | 0.39 N·m | 0.39 N·m | 0.39 N·m |
| RF min. | 0.05 N·m | 0.05 N·m | --- | --- | --- | 0.05 N·m | 0.02 N·m |
| PT max. | 15° (12°) | 7° (6°) | 15° (12°) | 7° (6°) | 65° (60°) | 1-stage: 12° (10°)<br>2-stage: 20° (17°) | 19° (15°) |
| OT min. | 70° | 75° | 70° | 75° | 20° | 65° | 65° |
| MD max. | 7° (6°) | 5° (4°) | 7° (6°) | 5° (4°) | 35° (30°) | 6° (5°) | 5° (4°) |

The figures in the parentheses are average values.

## Side Plunger Switches

| Model | SPDT double-break | | | | DPDT double-break | | | |
|---|---|---|---|---|---|---|---|---|
| | D4A-1□06N | D4A-1□07-HN | D4A-1□07-VN | D4A-1□08N | D4A-2□06N | D4A-2□07-HN | D4A-2□07-VN | D4A-2□08N |
| OF max. | 19.61 N | 19.61 N | 19.61 N | 19.61 N | 19.61 N | 19.61 N | 19.61 N | 19.61 N |
| RF min. | 4.90 N | 4.90 N | 4.90 N | 4.90 N | 4.90 N | 4.90 N | 4.90 N | 4.90 N |
| PT max. | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm |
| OT min. | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm |
| MD max. | 0.6 mm | 0.6 mm | 0.6 mm | 0.6 mm | 1.0 mm | 1.0 mm | 1.0 mm | 1.0 mm |
| OP | 34±0.8 mm | 44±0.8 mm | 44±0.8 mm | 41 to 47.5 mm | 34±0.8 mm | 44±0.8 mm | 44±0.8 mm | 41 to 47.5 mm |

## Top Plunger Switches

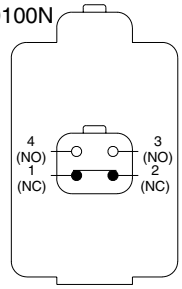
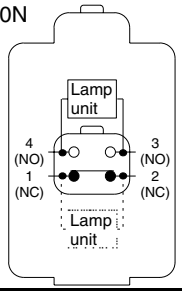
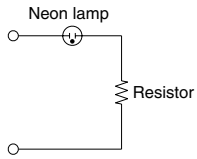
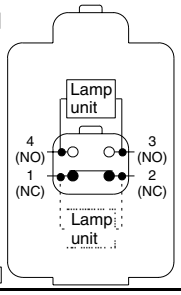
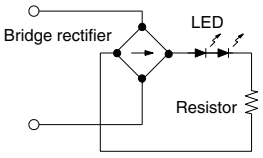
| Model | SPDT double-break | | | DPDT double-break | | |
|---|---|---|---|---|---|---|
| | D4A-1□09N | D4A-1□10N | D4A-1□11N | D4A-2□09N | D4A-2□10N | D4A-2□11N |
| OF max. | 17.65 N | 17.65 N | 17.65 N | 17.65 N | 17.65 N | 17.65 N |
| RF min. | 4.90 N | 4.90 N | 4.90 N | 4.90 N | 4.90 N | 4.90 N |
| PT max. | 1.6 mm | 1.6 mm | 1.6 mm | 1.6 mm | 1.6 mm | 1.6 mm |
| OT min. | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm | 5.1 mm |
| MD max. | 0.4 mm | 0.4 mm | 0.4 mm | 1.0 mm | 1.0 mm | 1.0 mm |
| OP | 46±0.8 mm | 56±0.8 mm | 55.5 to 62 mm | 46±0.8 mm | 56±0.8 mm | 55.5 to 62 mm |

## Flexible Rod Switches

| Model | SPDT double-break | | | DPDT double-break | | |
|---|---|---|---|---|---|---|
| | D4A-1□12N | D4A-1□14N<br>D4A-1□15N | D4A-1□16N | D4A-2□12N | D4A-2□14N<br>D4A-2□15N | D4A-2□16N |
| OF max. | 0.98 N | 1.47 N | | 0.98 N | 1.47 N | |
| PT max. | 15° (5°) | 15° (5°) | | 15° (5°) | 15° (5°) | |

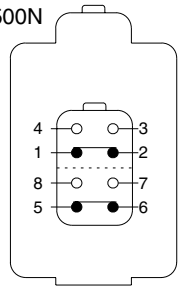
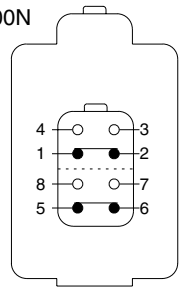
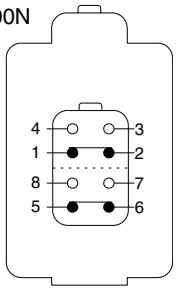
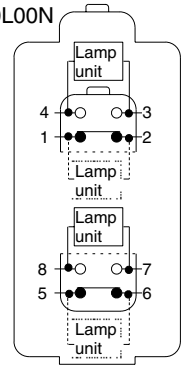
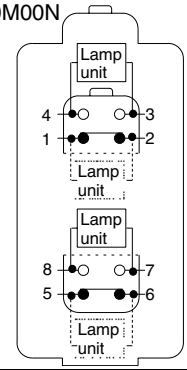
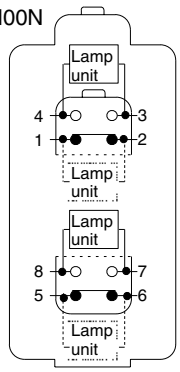
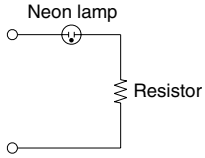
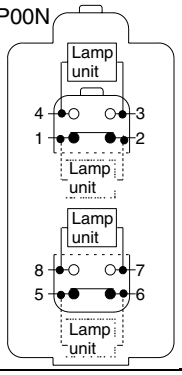
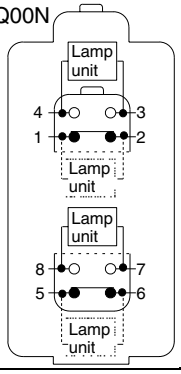
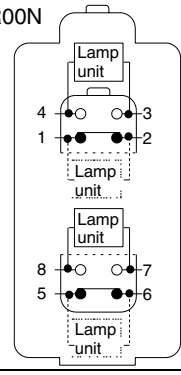
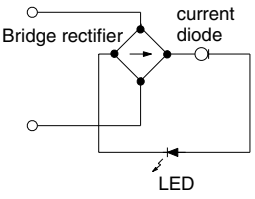
# ■ Contact Form (Switch Box)

## SPDT Double-break Switches

| Without indicator | With neon lamp indicator (See note.) | With LED indicator (See note.) |
|---|---|---|
| D4A-0100N<br>  | D4A-0300N<br>NC-ON<br>  <br>NO-ON<br>Internal circuit<br>  | NC-ON<br>  <br>NO-ON<br>D4A-0A00N, D4A-0C00N,<br>D4A-0E00N, D4A-0G00N<br>Internal circuit<br>  |

**Note:** Indicator setting is made before shipping so that it will light when the Limit Switch is not being operated.

## DPDT Double-break Switches

| Type | Simultaneous operation | Sequential operation | Center neutral operation | Internal circuit of indicator |
|---|---|---|---|---|
| Without indicator | D4A-0500N<br>  | D4A-0700N<br>  <br>(See note 1.) | D4A-0900N<br>  <br>(See note 2.) | --- |
| With neon lamp indicator (See note 3.) | D4A-0L00N<br>  | D4A-0M00N<br>  | D4A-0N00N<br>  | Neon lamp<br>  |
| With LED indicator (See note 3.) | D4A-0P00N<br>  | D4A-0Q00N<br>  | D4A-0R00N<br>  | Constant current diode<br>Bridge rectifier<br>  |

**Note: 1.** Use the D4A-0017N Special Head.

**2.** Use the D4A-0018N Special Head.

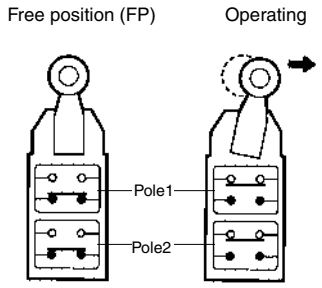
**3.** Indicator lamp setting is made before shipping so that it will light when the Limit Switch is not being operated.

## ■ Contacts

The D4A-□N saves installation space, simplifies wiring methods, and lowers operation costs because only a single D4A-□N is required for the control of the speeds of a factory machine or selection of CW or CCW rotation of a motor, for which two conventional limit switches are required.

### Simultaneous Operation

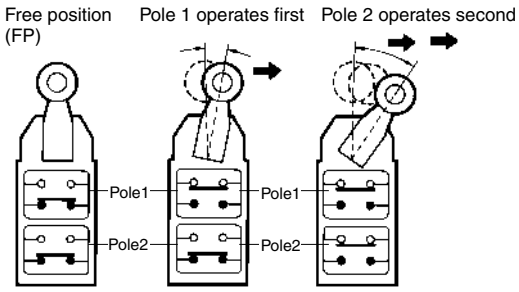
This head is compatible with a SPDT type head.




Pole 1 and pole 2 are actuated simultaneously. Operates either CW, CCW, or both.

### Sequential Operating

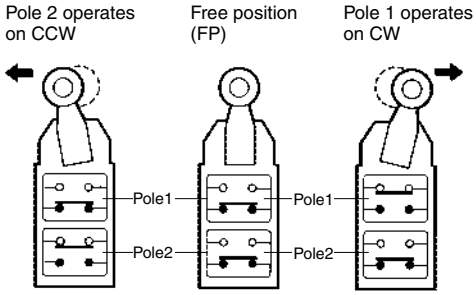
Use the D4A-0017N head.



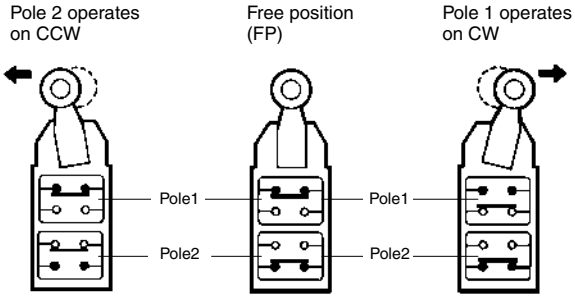

Pole 1 operates first and pole 2 operates second.

### Center Neutral Operating

Use the D4A-0018N head.




Pole 1 operates on CW and pole 2 operates CCW.




D4A-□ center neutral type

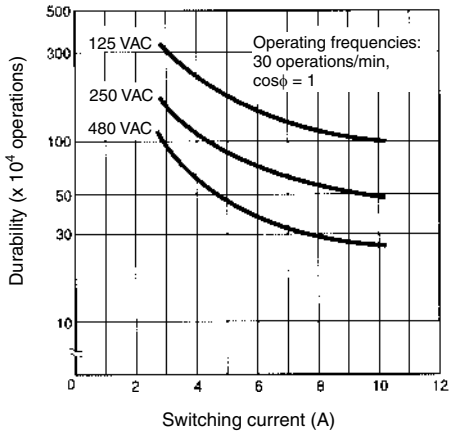
**Note:** The contact configuration of the center neutral operating model is different from that of any other D4A-□ Switch.

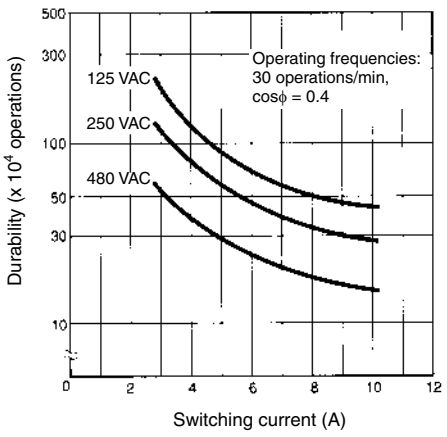


# Engineering Data

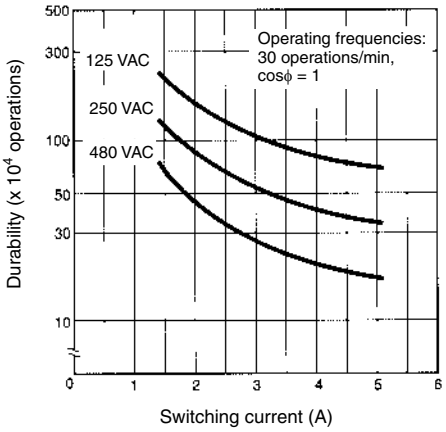
## ■ Electrical Durability (SPDT Double-bread)

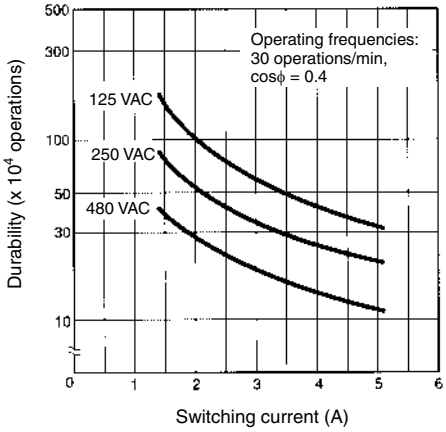
(Ambient temperature: 5°C to 35°C; ambient humidity: 40% to 70%)



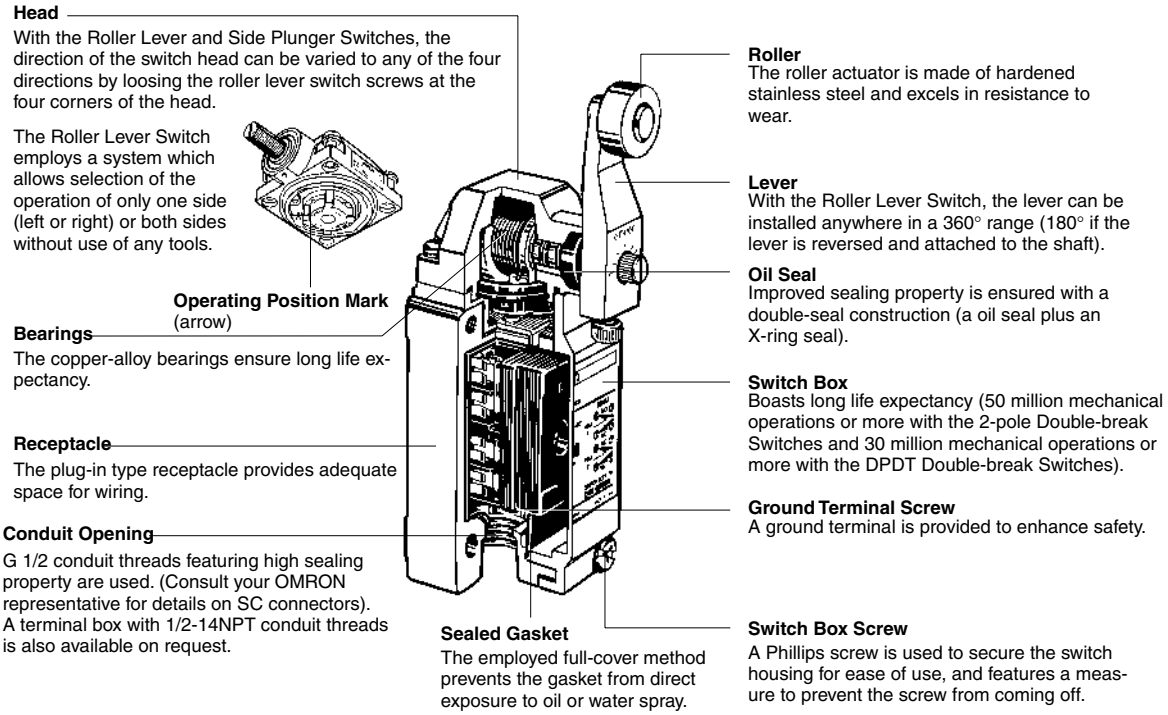
## Electrical Durability (DPDT Double-break)




# Nomenclature

## DPDT Double-break



**Head**
With the Roller Lever and Side Plunger Switches, the direction of the switch head can be varied to any of the four directions by loosing the roller lever switch screws at the four corners of the head.

The Roller Lever Switch employs a system which allows selection of the operation of only one side (left or right) or both sides without use of any tools.

**Operating Position Mark**
(arrow)

**Bearings**
The copper-alloy bearings ensure long life expectancy.

**Receptacle**
The plug-in type receptacle provides adequate space for wiring.

**Conduit Opening**
G 1/2 conduit threads featuring high sealing property are used. (Consult your OMRON representative for details on SC connectors). A terminal box with 1/2-14NPT conduit threads is also available on request.

**Sealed Gasket**
The employed full-cover method prevents the gasket from direct exposure to oil or water spray.

**Roller**
The roller actuator is made of hardened stainless steel and excels in resistance to wear.

**Lever**
With the Roller Lever Switch, the lever can be installed anywhere in a 360° range (180° if the lever is reversed and attached to the shaft).

**Oil Seal**
Improved sealing property is ensured with a double-seal construction (a oil seal plus an X-ring seal).

**Switch Box**
Boasts long life expectancy (50 million mechanical operations or more with the 2-pole Double-break Switches and 30 million mechanical operations or more with the DPDT Double-break Switches).

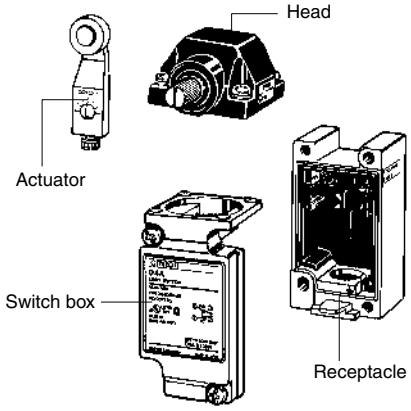
**Ground Terminal Screw**
A ground terminal is provided to enhance safety.

**Switch Box Screw**
A Phillips screw is used to secure the switch housing for ease of use, and features a measure to prevent the screw from coming off.

**Note: 1.** NBR is used in rubber components.
**2.** Fluoro-rubber sealed types use fluoro-rubber.

### Easy-maintenance Block Mounting

Block mounting makes it possible to easily assemble or disassemble the head, switch body, and receptacle of the D4A-□N by tightening or loosening the attached screws.



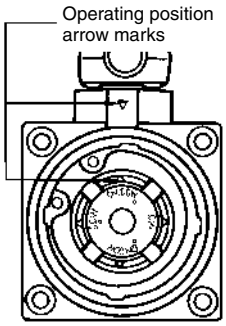

# Installation

## ■ Operation

### Changing the Operating Direction

The head of the side rotary type can be converted in seconds to CW, CCW, or both-way operation. Follow the procedures on the right hand side for conversion (not applicable to the Maintained, Sequential Operating, Center Neutral Operating Switches).

### Operating Part (Rear of Head)



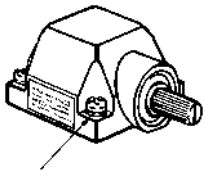

### Procedures

1. Dismount the head by loosening the four screws that secure it.
2. Turn over the head to set the desired operation (CW, CCW, or both). The desired side can be selected by setting the mode selector knob shown in the figure. This knob is factory set to the "CW+CCW" (both-way operation) position.
3. When set to the CW position, the head rotates in clockwise direction.
   When set to the CCW position, the head rotates in counterclockwise direction.
   In either case, be sure to accurately align the arrow mark to the setting position.

## Head and Lever Positions

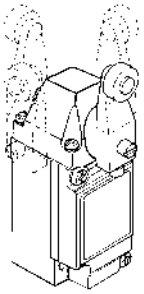
The operating head can be positioned and locked in any of four 90° positions and a lever can lock in any position through 360° around the shaft of the Limit Switch. Furthermore, the lever can be reversed and attached to the shaft (refer to the figures below on the right hand side). Therefore the roller is compatible with a wide movement range of a dog. A Fork Lever Lock can be used with maintained models (D4A-0005N) only.

Remove the head from the Switch by loosening the screws (the screws can be loosened but not removed from the head).

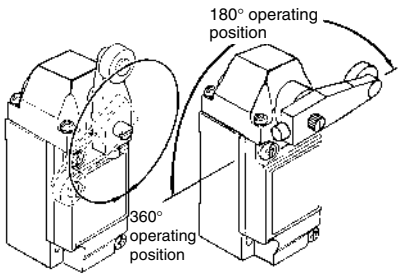


Four, M4 x 12

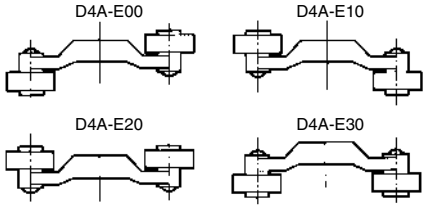
The operating head can be positioned and locked in any of four 90° positions.



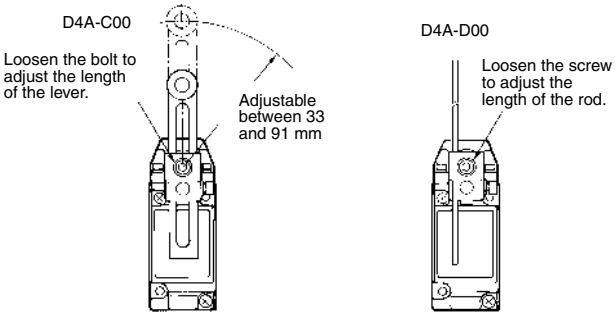
The lever can lock in any position through 360° around the shaft. The lever can be reversed and attached to the shaft, in which case the switching operation should complete in a range of 0° to 180°.




There are four kinds of fork lever locks. The position of each roller is different. It is possible to use D4A-E00 through D4A-E30 levers instead, if they are reversed before attaching. They can be used with D4A-□□05N models only.




By loosening the Allen-head bolt on an adjustable roller lever or rod lever, the length of the lever can be adjusted.

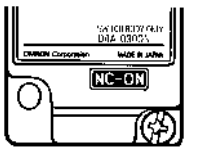


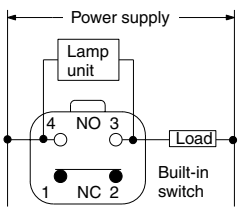

## Lighting Mode Selection of Indicators

The lighting mode of the operation indicator can be changed easily between two modes: lighting when the Switch is operating and lighting when the Switch is not operating.

### Lights When Not Operating

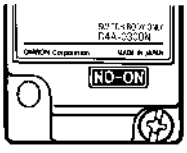
(See note 1.)

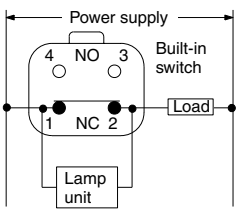



### Lights When Operating

(See note 2.)

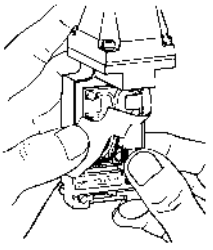


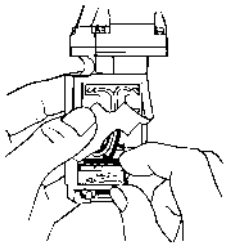

**Note: 1.** The lamp is lit when the actuator is at the free position. The lamp will be off when the contacts of the Limit Switch have been actuated and snapped to each other at the operating position.

**2.** The lamp is lit when the contacts have been released and snapped only from the operating position.

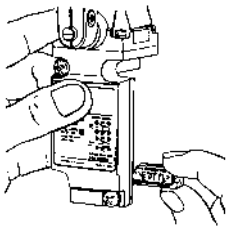
Change the lighting mode as follows:



Push the claw securing the lamp section to the right (do not push strongly).



Remove the lamp section.

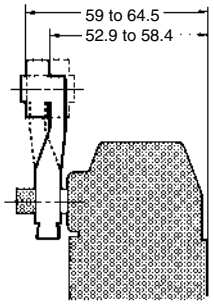


Mount the lamp section so that legend "NC-ON" or "NO-ON" will appear in the display window.

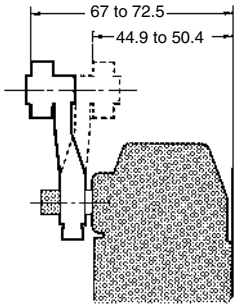
**Note:** In either case, the lamp will not light when the load is ON.

## Lever Position

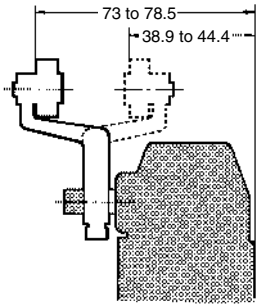
D4A-A00



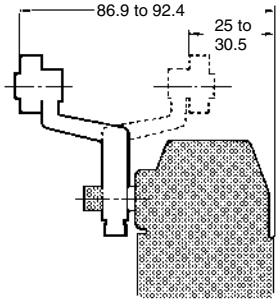

D4A-A10



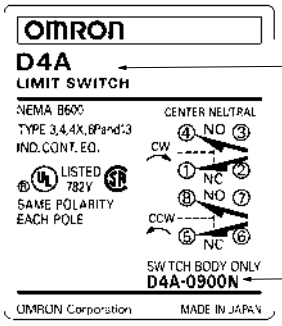

D4A-A20




D4A-A30




## ■ Nameplate

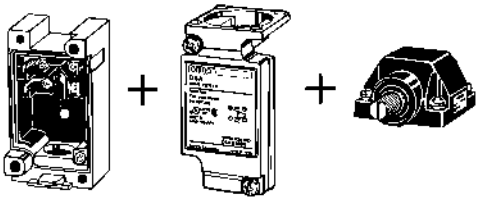



The whole switch model without lever is printed.

The type of switch box is printed. (The type is also indicated on the head and receptable.)

## ■ Compatibility with D4A-□

The D4A-□N is compatible with the D4A-□ when the following accessories are attached to the D4A-□N.



D4A-□
Receptacle box

D4A-□N
Switch box

D4A-□N
Head

**Note:** The D4A-□N without the above accessories is not compatible with the D4A-□.

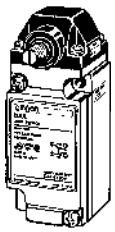
# Dimensions

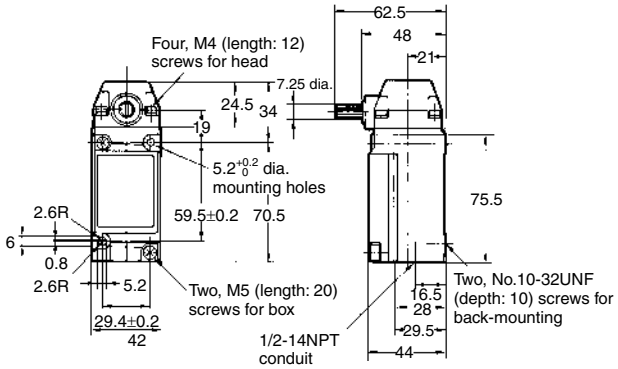
**Note: 1.** All units are in millimeters unless otherwise indicated.
**2.** Insert the model number code in □ for the switch body.
**3.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

## Roller Lever Switches

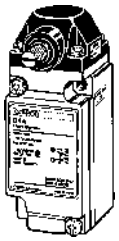
**Note:** Levers of the side rotary type are optionally available.

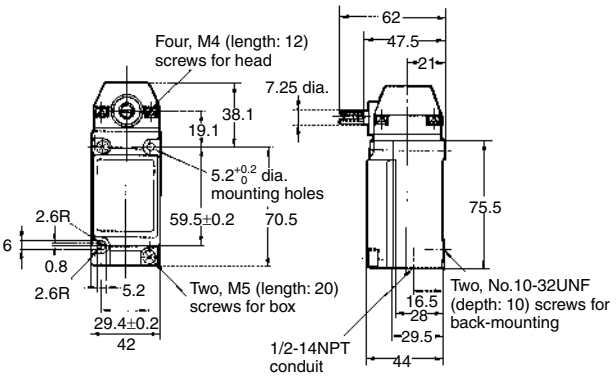
**Standard**
**D4A-1□01N, D4A-2□01N**
**High-sensitivity**
**D4A-1□02N, D4A-2□02N**
**Low Torque**
**D4A-1□03N, D4A-2□03N**
**High-sensitivity/Low Torque**
**D4A-1□04N, D4A-2□04N**
**Sequential Operation**
**D4A-2□17N**
**Center Neutral Operating**
**D4A-2□18N**





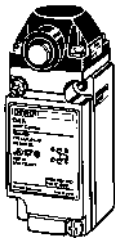

**Maintained**
**D4A-1□05N, D4A-2□05N**

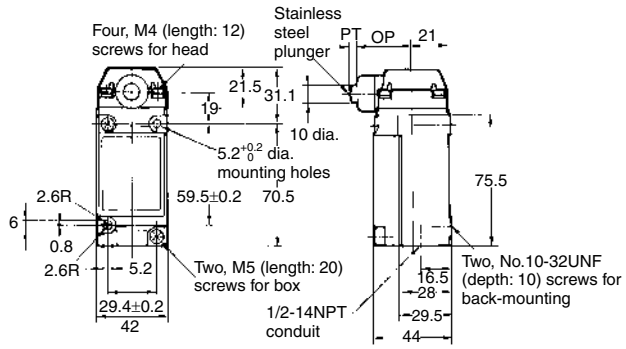




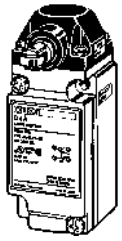
# Side Plunger Switches

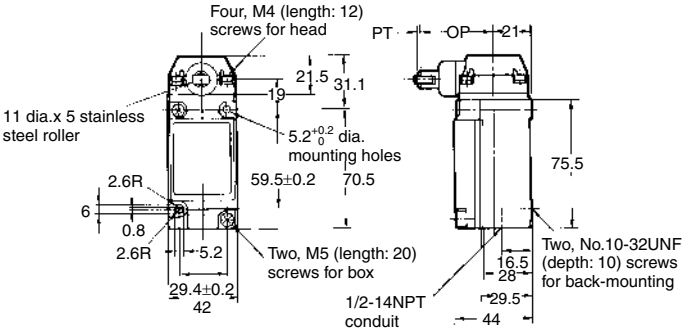
**Standard**
**D4A-1□06N, D4A-2□06N**



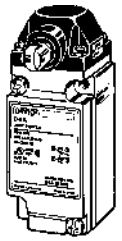


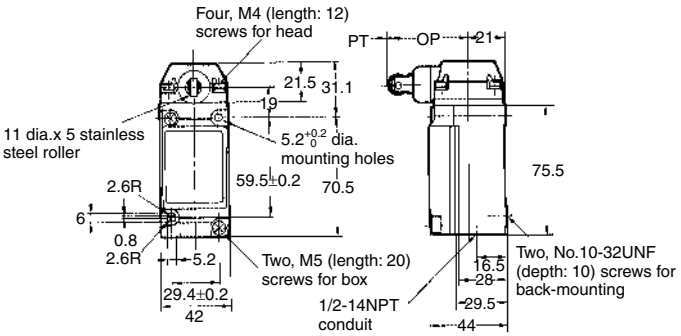

**Horizontal Roller**
**D4A-1□07-HN, D4A-2□07-HN**



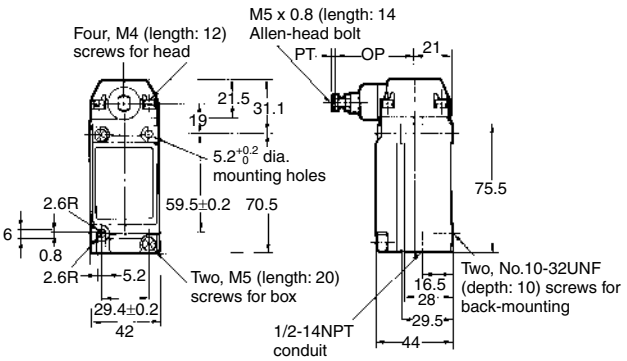



**Vertical Roller**
**D4A-1□07-VN, D4A-2□07-VN**



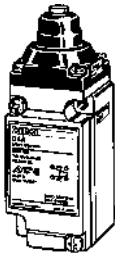


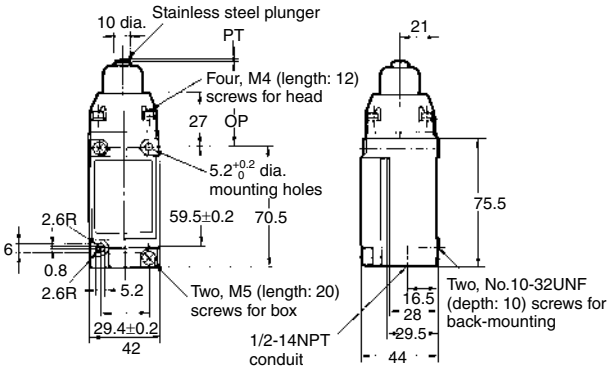

**Adjustable**
**D4A-1□08N, D4A-2□08N**



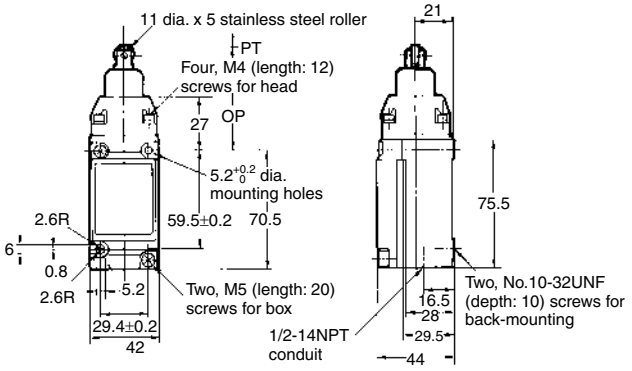
# Top Plunger Switches

**Standard**
**D4A-1□09N, D4A-2□09N**

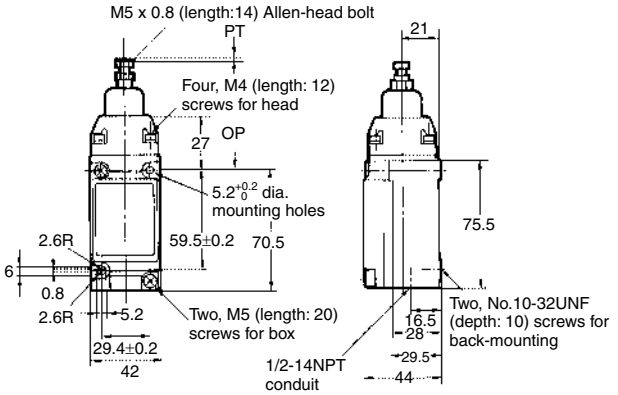





**Roller Plunger**
**D4A-1□10N, D4A-2□10N**

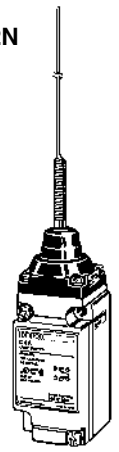


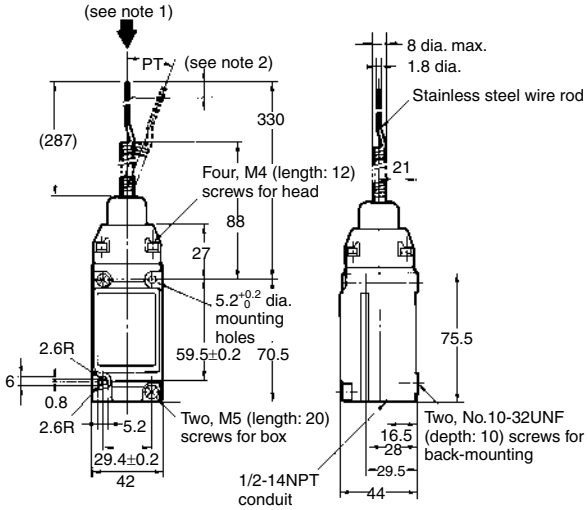

**Adjustable**
**D4A-1□11N, D4A-2□11N**



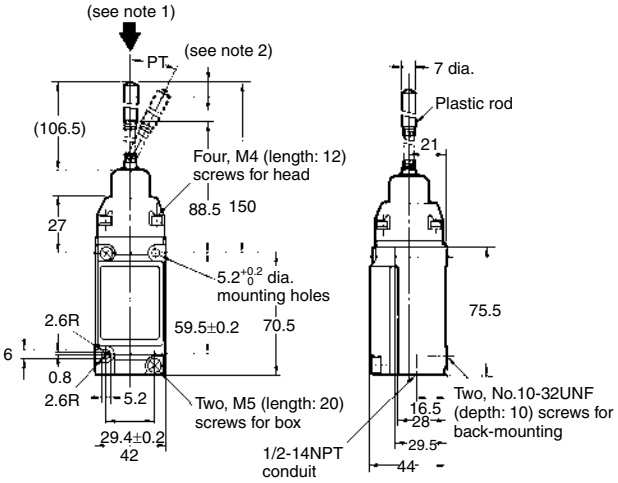
# Flexible Rod Switches

**Spring Wire**
**D4A-1□12N, D4A-2□12N**

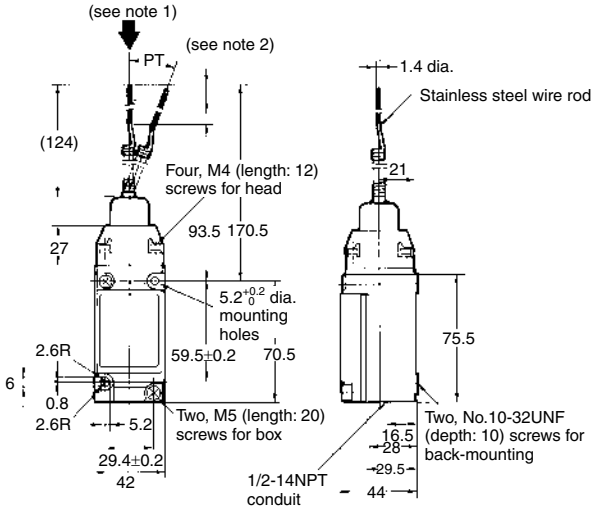





**Plastic Rod**
**D4A-1□14N, D4A-2□14N**



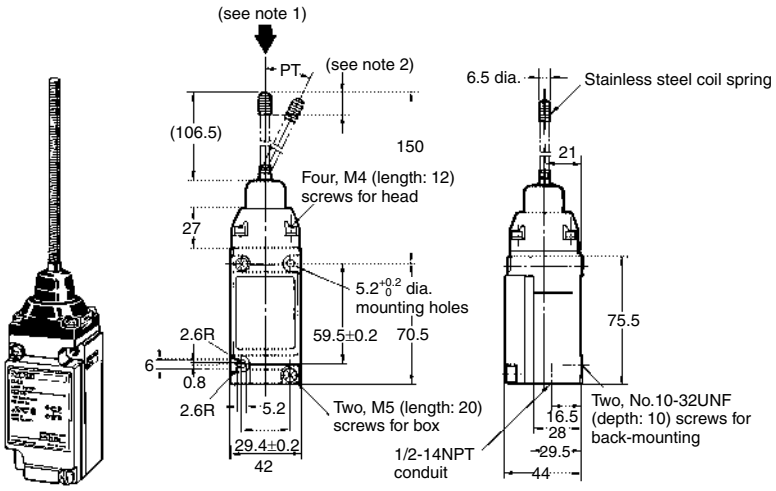

**Cat Whisker**
**D4A-1□15N, D4A-2□15N**




**Note: 1.** The stainless rod can be operated from any direction except the axial direction (i.e., from the top).

**2.** The optimum operating range of the stainless rod is within 1/3 of the entire length from the top end.

**Coil Spring**
**D4A-1□16N, D4A-2□16N**

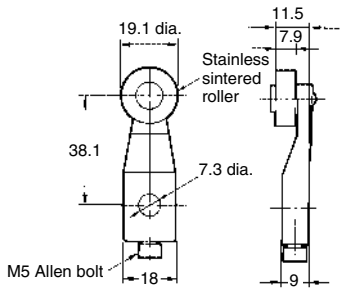



**Note: 1.** The stainless rod can be operated from any direction except the axial direction (i.e., from the top).
**2.** The optimum operating range of the stainless rod is within 1/3 of the entire length from the top end.

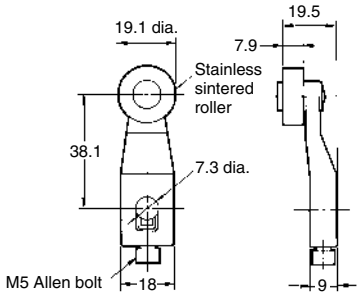
## Levers (for Roller Lever Switches)

**Note:** No D4A-0003N or D4A-0004N head should be used with the adjustable roller lever or mechanical malfunctioning could result because the total weight of the adjustable roller lever is comparatively large. Use a standard-load head (D4A-0001N or D4A-0002N) instead.

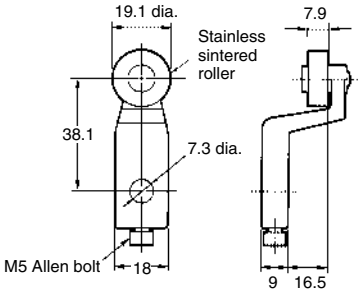
**Roller Lever**
**D4A-A00**



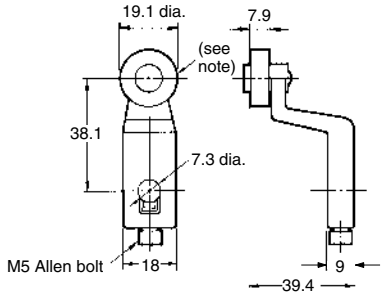

**Roller Lever**
**D4A-A10**




**Roller Lever**
**D4A-A20**

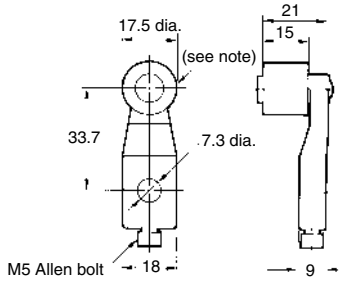



**Roller Lever**
**D4A-A30**



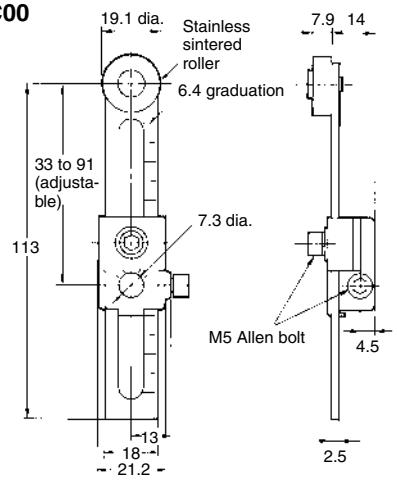

**Note:** Stainless sintered roller

**Roller Lever**
**D4A-B06**

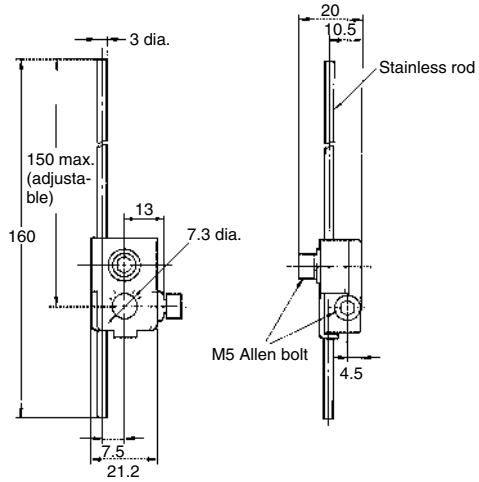



**Note:** Stainless sintered roller

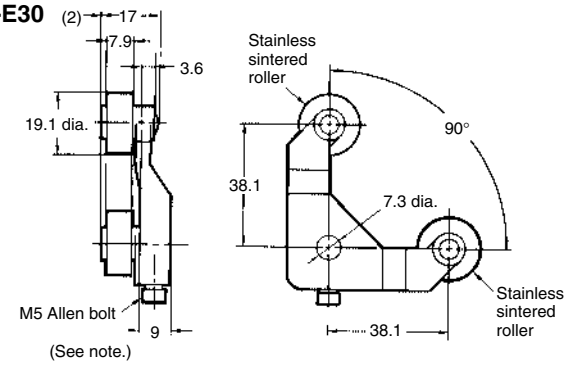
**Adjustable Roller Lever**
**D4A-C00**



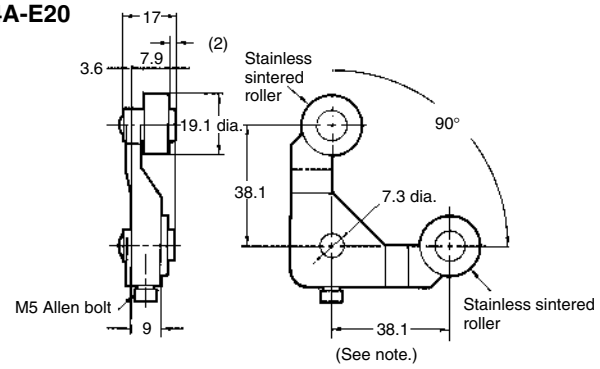

**Adjustable Rod Lever**
**D4A-D00**



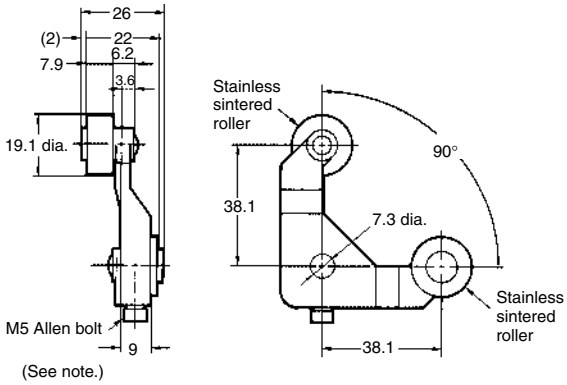

**Fork Lever Lock**
**D4A-E30**



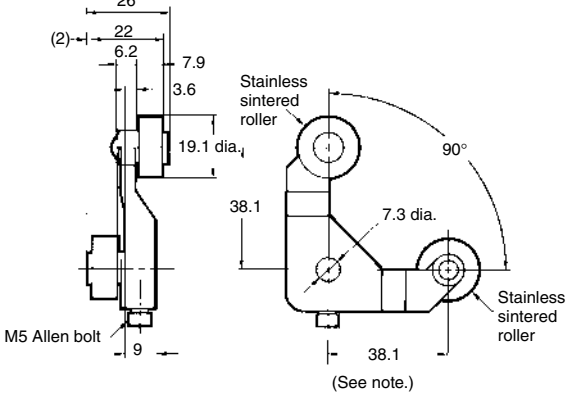

**Fork Lever Lock**
**D4A-E20**



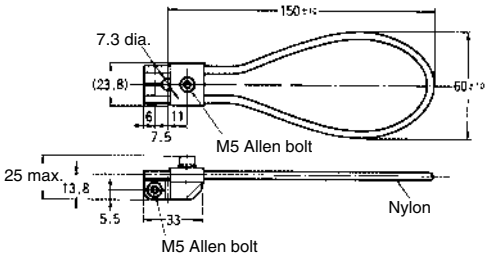

**Fork Lever Lock**
**D4A-E10**




**Fork Lever Lock**
**D4A-E00**




**Nylon Loop Lever**
**D4A-F00**

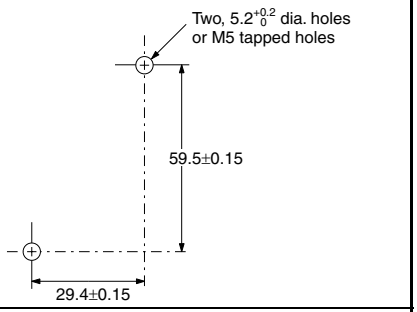
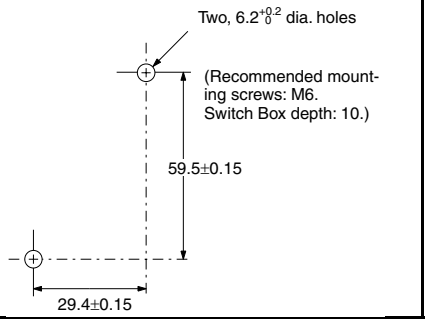



**Note:** A Fork Lever Lock can be used with D4A-□□05N models only.

# Precautions

## ■ Correct Use

### Mounting

| Model | 1/2-14NPT Conduit |
|---|---|
| | D4A-1□□□N<br>D4A-2□□□N |
| Front Mounting |  |
| Rear Mounting (Rear View) |  |

### Tightening Torque

To maintain the high sealing capability of the Limit Switch, tighten the screws for the head and switch body with the following torques:

Head (four 12-mm M4 screws): 1.2 to 1.4 N·m
Switch body (two 20-mm M5 screws): 2.4 to 2.7 N·m

### Solderless Terminals

The D4A-□N with DPDT double-break incorporates solderless terminals.

### Operation

The operating methods, cam and dog shapes, operating frequency, and overtravel (OT) have a significant effect on the service life and accuracy of the Limit Switch. The shape of the cam should be as smooth as possible.

A marginal overtravel (OT) value should be set. The ideal value is the rated OT value x 0.7.

The actuator should not be remodeled to change the operating position.

### Connectors

To satisfy IP67, apply sealing tape to the connector conduit.

Appropriate outer diameter of cables is 5.5 to 14 dia.

Use OMRON's SC-□M Series.

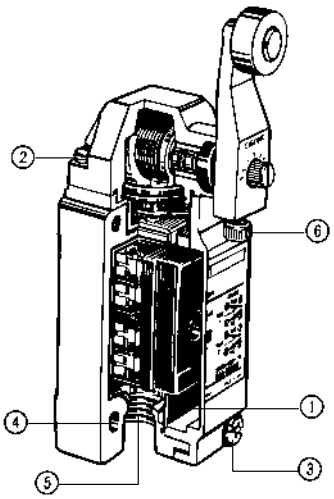
Tighten the Connectors to a torque of 1.8 to 2.2 N·m.

### Maintenance and Repair

The user must not maintain or repair equipment incorporating any D4A-N model. Contact the manufacturer of the equipment for any maintenance or repairs required.

### Tightening Torque

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




| No. | Type | Appropriate tightening torque |
|---|---|---|
| 1 | Terminal screws (M3.5 screws) (including grounding terminals) | 0.78 to 0.88 N·m |
| 2 | Head mounting screws | 1.18 to 1.37 N·m |
| 3 | Switch and box mounting screws | 2.35 to 2.75 N·m |
| 4 | Body mounting screws (See note.) | 4.90 to 5.88 N·m |
| 5 | Connectors | 1.77 to 2.16 N·m |
| 6 | Actuator mounting screws | 2.45 to 2.65 N·m |

**Note:** When using M5 Allen-head bolts, particularly when the head direction has been changed, check the torque of each screw and make sure that the screws are free of foreign substances, and that each screw is tightened to the proper torque.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C092-E1-03

# Enclosed Switch
# D4C

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

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

# Model Number Structure

## ■ Model Number Legend

### Standard Models

**D4C-□□□**
**1 2 3**

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

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

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

**Note 1:** Some combinations of the above may not be supported.
**2:** With standard models, the operation indicator turns OFF when the switch operates. If models with operation indicators that turn ON when the switch operates are required, add "-B" to the end of the model number.

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

**D4C-□0□□-□□□□□□**
**1 2 3 4**

**1. Operation Indicator Lamp**
- 1: Without operation indicator
- 2: 1 A at 125 VAC (with operation indicator)
- 3: 1 A at 30 VDC (with operation indicator)

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

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

**4. Cable length**
- 03: 0.3 m
- 05: 0.5 m
- 10: 1 m

### Wiring Specifications

| Internal switch | Connector |
|---|---|
| COM | 3 |
| NC | 2 |
| NO | 4 |

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

## Weather-resistant Models

**D4C-□□□-P**
**1 2 3**

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

**2. Cable Specifications**
- 2: VCTF oil-resistant cable (3 m)
- 3: VCTF oil-resistant cable (5 m)

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

# Ordering Information

## ■ List of Models

### Standard Models

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

**Note 1.** Cold-resistant models are also available. Order these models with reference to the following example.
D4C-1201 → D4C-1201-C

**2.** Models with viscosity-resistant oil specification (with an oil drain hole) are also available. Order these models with reference to the following example. Applicable only to the plunger models.
D4C-1202 → D4C-1202-M

**3.** Variable roller lever models are also available.

* Oil-resistant vinyl cabtire cables.

** Ordinary vinyl cabtire cables.

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

## Standard Models (Continued)

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

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

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

**Note 1.** The □ contains the length of the cable.
For example: 30 cm → D4C-1001-AK1EJ03

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

## Weather-resistant Models

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

## Individual Parts (Head/Actuator)

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

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

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

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

## Mounting Plates

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

### List of Replaceable Models

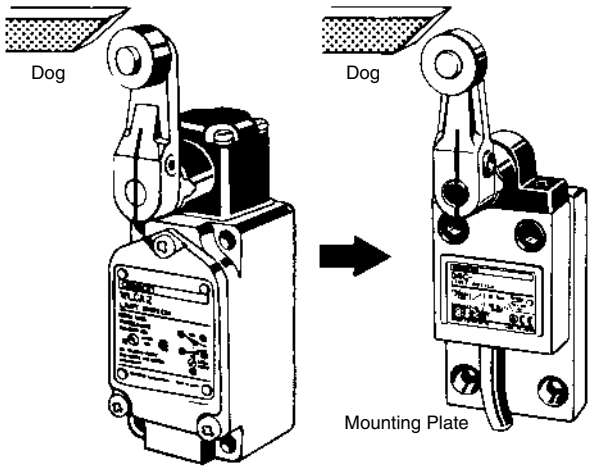
Contact your OMRON representative for the period required for delivery.

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

**Note:** The WL01□ is for micro loads.

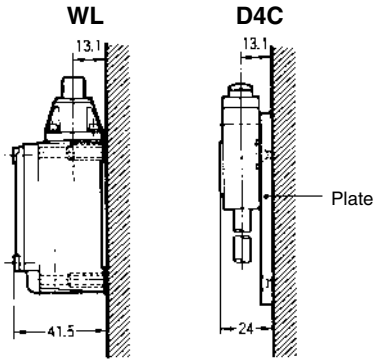
### Application Example

**Note:** The position of the dog remains unchanged.



### Remarks

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




# Specifications

## ■ Approved Standards

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

**Note 1:** Models with VCTF oil-resistant cables only.
**2:** Pre-wired models only.
**3:** SJT(0)-cable models only.

## ■ Approved Standard Ratings

### General Ratings

| Model | Rated voltage | Non-inductive load | | | | Inductive load | | | | Inrush current | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Resistive load | | Lamp load | | Inductive load | | Motor load | | | |
| | | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO |
| **D4C-1□□□** | 125 VAC | 5 A | 5 A | 1.5 A | 0.7 A | 3 A | 3 A | 2.5 A | 1.3 A | 20 A max. | 10 A max. |
| | 250 VAC | 5 A | 5 A | 1 A | 0.5 A | 2 A | 2 A | 1.5 A | 0.8 A | | |
| | 8 VDC | 5 A | 5 A | 2 A | 2 A | 5 A | 4 A | 3 A | 3 A | | |
| | 14 VDC | 5 A | 5 A | 2 A | 2 A | 4 A | 4 A | 3 A | 3 A | | |
| | 30 VDC | 4 A | 4 A | 2 A | 2 A | 3 A | 3 A | 3 A | 3 A | | |
| | 125 VDC | 0.4 A | 0.4 A | 0.05 A | 0.05 A | 0.4 A | 0.4 A | 0.05 A | 0.05 A | | |
| | 250 VDC | 0.2 A | 0.2 A | 0.03 A | 0.03 A | 0.2 A | 0.2 A | 0.03 A | 0.03 A | | |
| **D4C-2□□□** | 125 VAC | 5 A | 5 A | 1.5 A | 0.7 A | 3 A | 3 A | 2.5 A | 1.3 A | | |
| | 125 VDC | 0.4 A | 0.4 A | 0.05 A | 0.05 A | 0.4 A | 0.4 A | 0.05 A | 0.05 A | | |
| **D4C-3□□□** | 30 VDC | 4 A | 4 A | 2 A | 2 A | 3 A | 3 A | 3 A | 3 A | | |
| **D4C-4□□□** | 125 VAC | 0.1 A | 0.1 A | --- | | --- | | | | | |
| | 8 VDC | 0.1 A | 0.1 A | | | | | | | | |
| | 14 VDC | 0.1 A | 0.1 A | | | | | | | | |
| | 30 VDC | 0.1 A | 0.1 A | | | | | | | | |
| **D4C-5□□□** | 125 VAC | 0.1 A | 0.1 A | --- | | --- | | | | | |
| **D4C-6□□□** | 30 VDC | 0.1 A | 0.1 A | --- | | --- | | | | | |

## Ratings for Pre-wired Models

| Rated voltage | Non-inductive load | | | | Inductive load | | | | Inrush current | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Resistive load | | Lamp load | | Inductive load | | Motor load | | | |
| | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO |
| 125 VAC | 1 | 1 | 1 | 0.7 | 1 | 1 | 1 | 1 | 20 A max. | 10 A max. |
| 30 VDC | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |

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

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

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

## UL/CSA Approved Ratings

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

### NEMA B300 (D4C-16□□, -17□□)

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

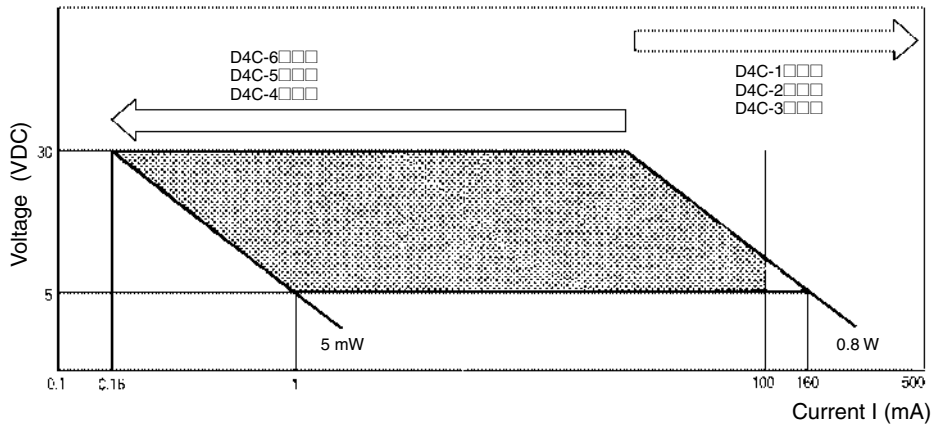
### NEMA B150 (D4C-26□□, -27□□)

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

## TÜV Rheinland Approved Ratings (EN60947-5-1)

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

## Applicable Load Range



# ■ Characteristics

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

**Note 1.** The above figures are initial values.

**2.** The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

# ■ Operating Characteristics

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

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

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

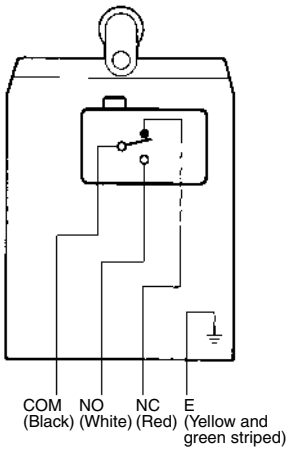
**Note 1.** The values given for D4C-□□27-P and D4C-□□29-P are for when the length of the lever is 38 mm.

**2.** The operating characteristics for M1J□ models are the same as those for □K1EJ□ models.

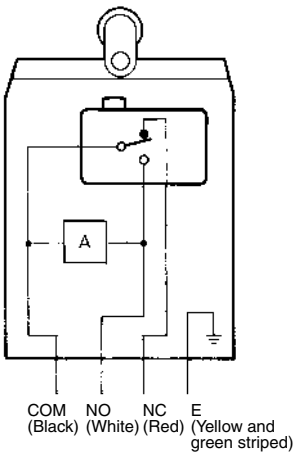
# ■ Contact Form

## Standard Models / Weather-resistant Models

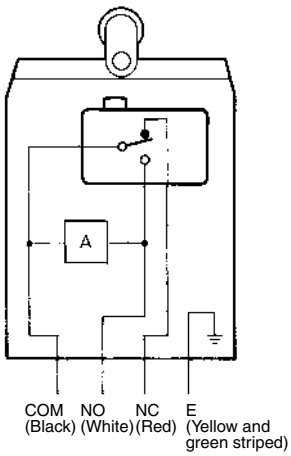
**Without LED Indicator (S-FLEX VCTF Cable)**




**With LED Indicator (S-FLEX VCTF Cable)**

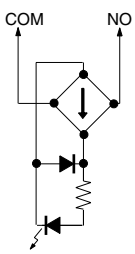



**With LED Indicator (lights when operated)**

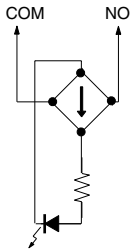



**LED Indicator Circuits**

**100 VAC**




**24 VDC**




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

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

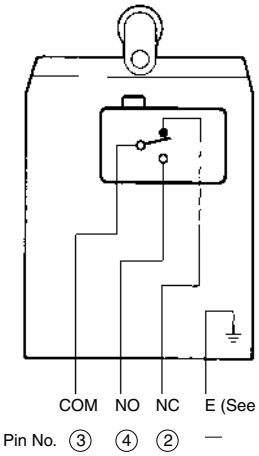
**2.** "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

### Wire Color

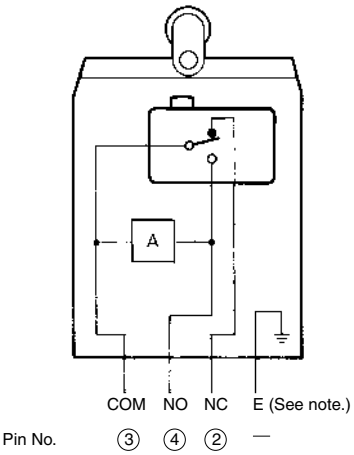
| Cable | Without LED | | | | With LED | | | |
|---|---|---|---|---|---|---|---|---|
| | COM | NO | NC | E | COM | NO | NC | E |
| **VCTF** | Black | White | Red | Green | Black | White | Red | Green |
| **S-FLEX VCTF** | Black | White | Red | Yellow/ Green | Black | White | Red | Yellow/ Green |
| **SJT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

## Pre-wired Models

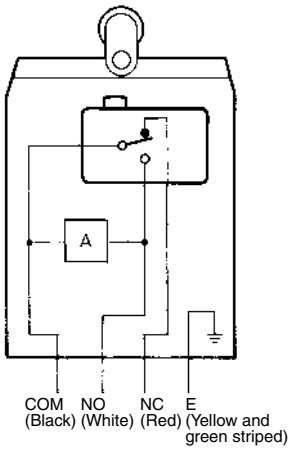
**Without LED Indicator**



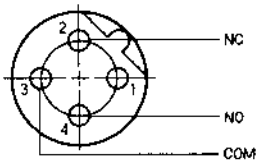

**With LED Indicator (lights when not in operation)**



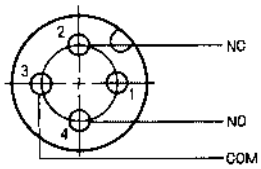

**With LED Indicator (lights when operated)**




**AC**




**DC**




**Note:** Not connected to the ground.

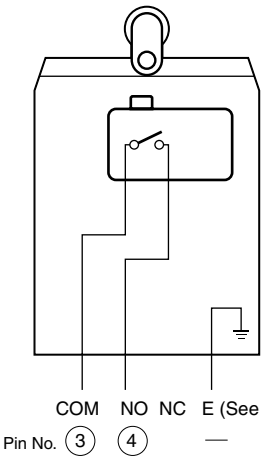
Yellow/green: VCTF resin cable
Green: VCTF
UL/CSA-approved cable SJT(0)

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

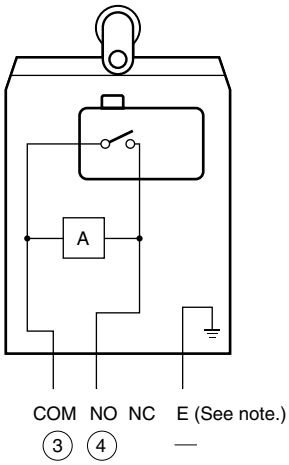
**2.** "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

## Connector Models for ASI Devices

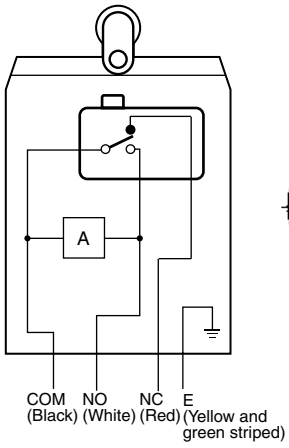
**Without LED Indicator**



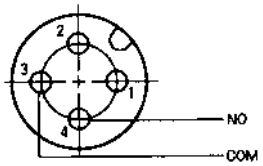

**With LED Indicator (lights when not in operation)**




**With LED Indicator (lights when operated)**




**DC**




**Note:** Not connected to the ground.

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

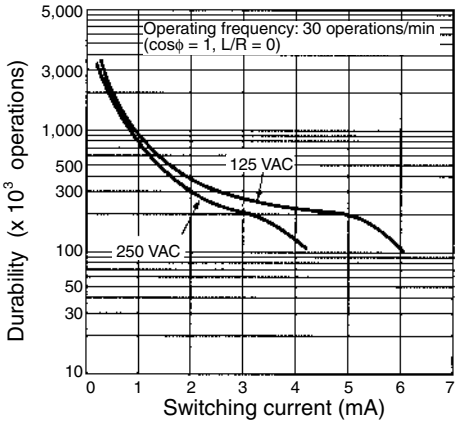
**Note 1.** "Lights when operated" means that when the actuator is turned or pushed and the Limit Switch contact leaves the NC side, the indicator lights.

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

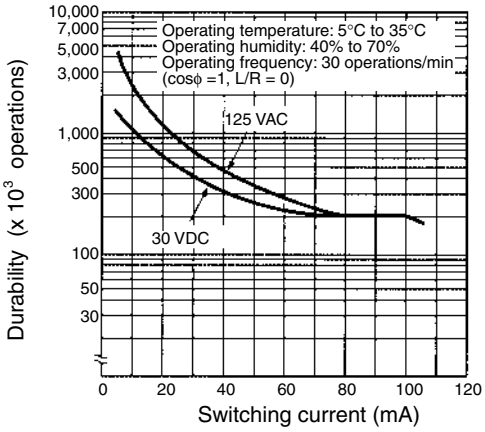
# Engineering Data

## ■ Electrical Durability

**D4C-1□□□, -2□□□, -3□□□**




**D4C-4□□□, -5□□□, -6□□□**



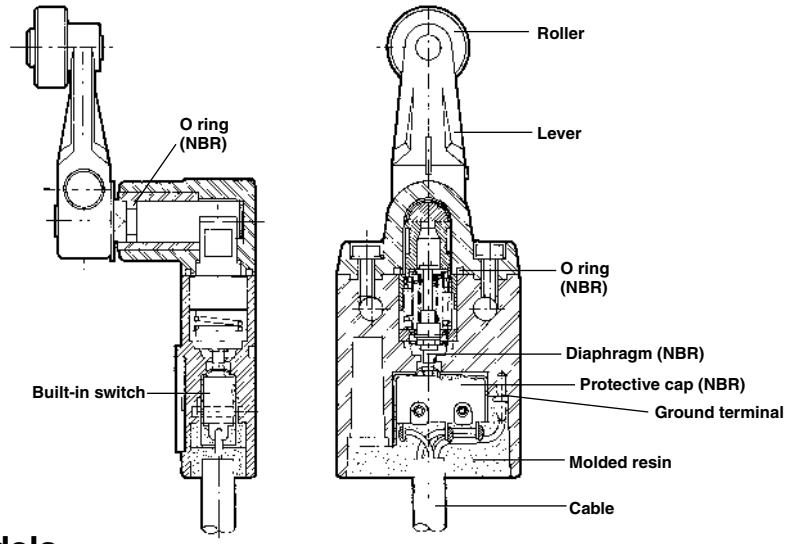

## ■ Leakage Current for LED-indicator Models

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

# Nomenclature

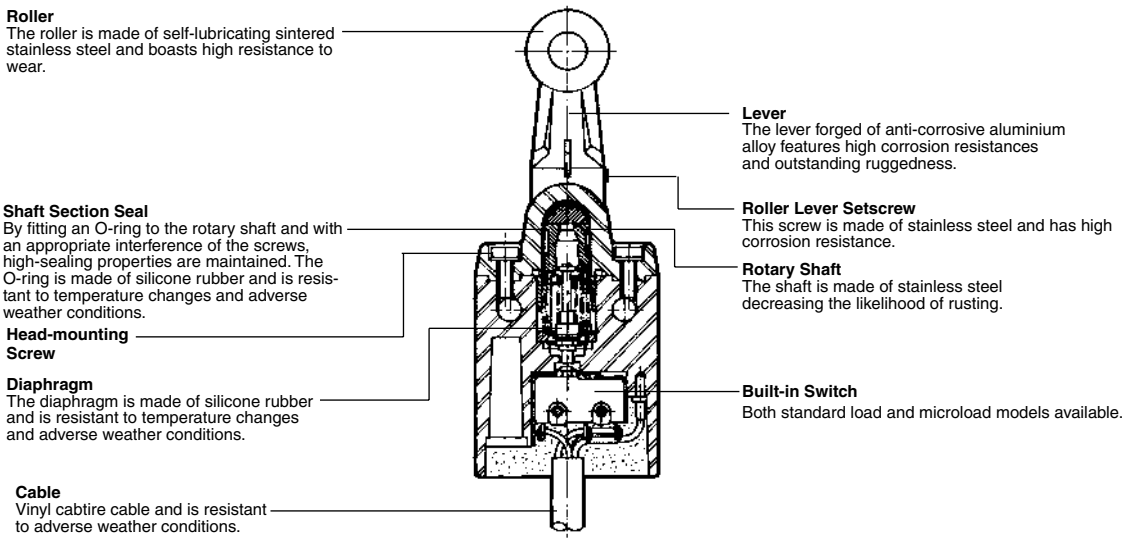
## Standard Models

**Roller Lever Models Without Indicator**




## Weather-resistant Models

**Roller Lever Models Without Indicator**

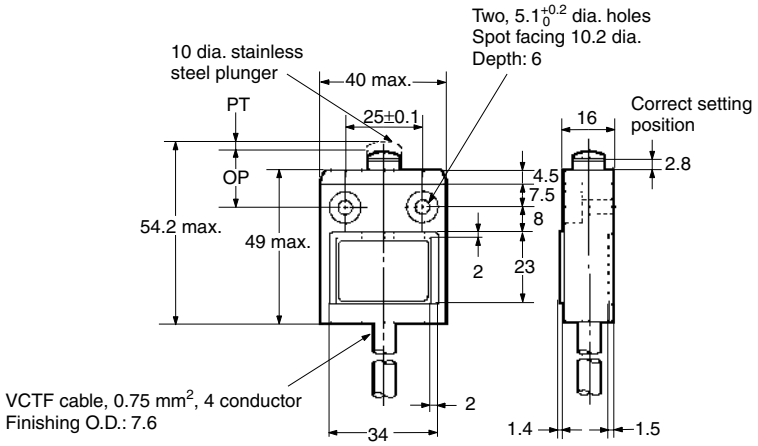


# Dimensions

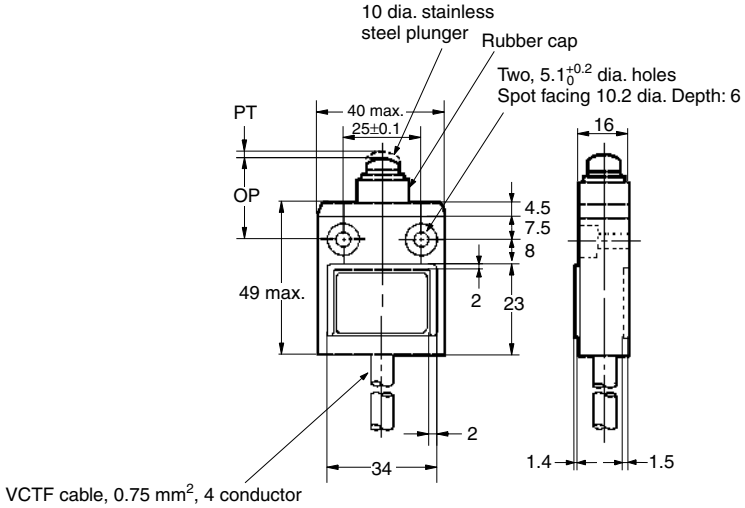
**Note 1.** All units are in millimeters unless otherwise indicated.
**2.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

## Standard Models

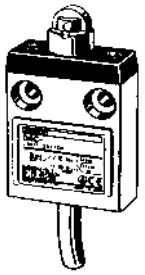
**Pin Plunger**
**D4C-□□01**

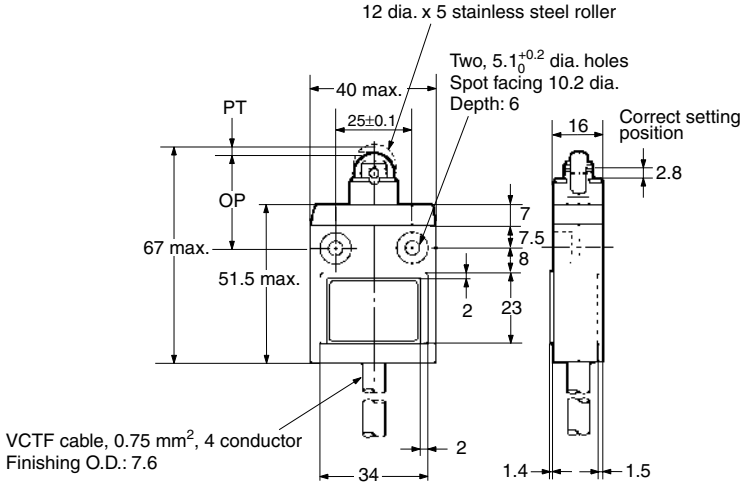



**Sealed Plunger**
**D4C-□□31**

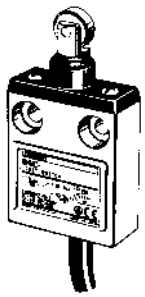


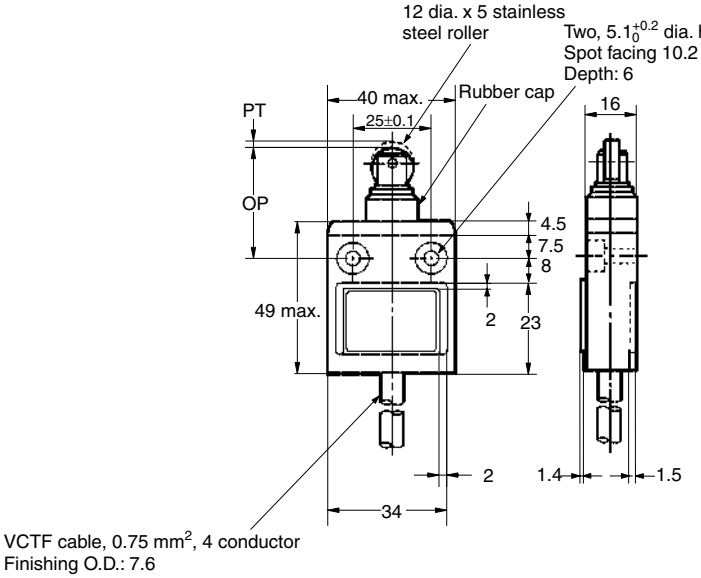

**Roller Plunger**
**D4C-□□02**



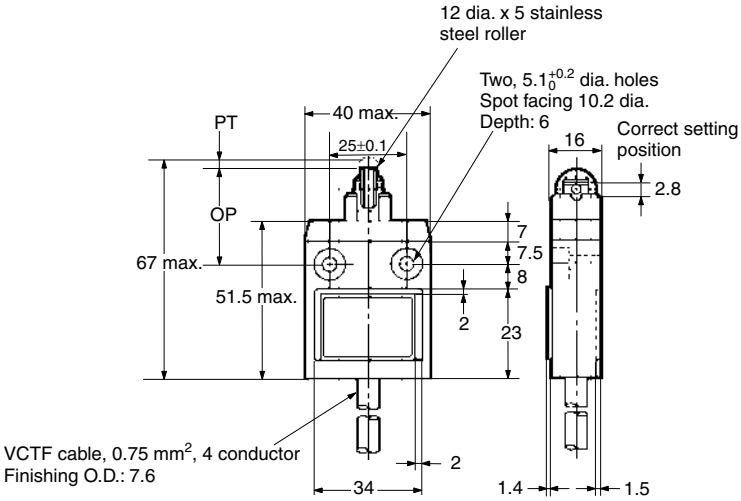


**Sealed Roller Plunger**
**D4C-□□32**

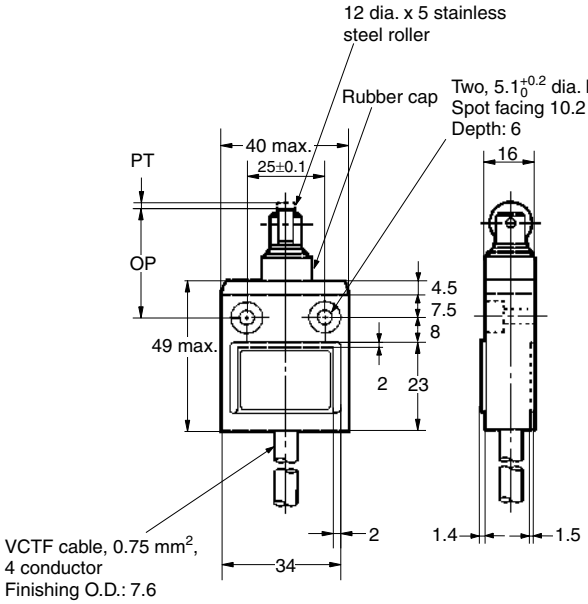





**Crossroller Plunger**
**D4C-□□03**

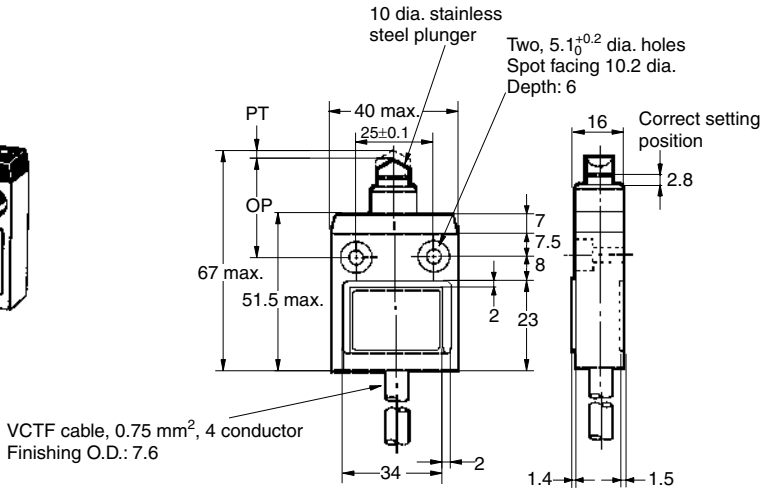



**Sealed Crossroller Plunger**
**D4C-□□33**



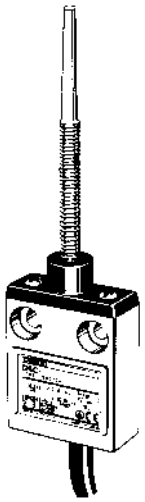
## Bevel Plunger

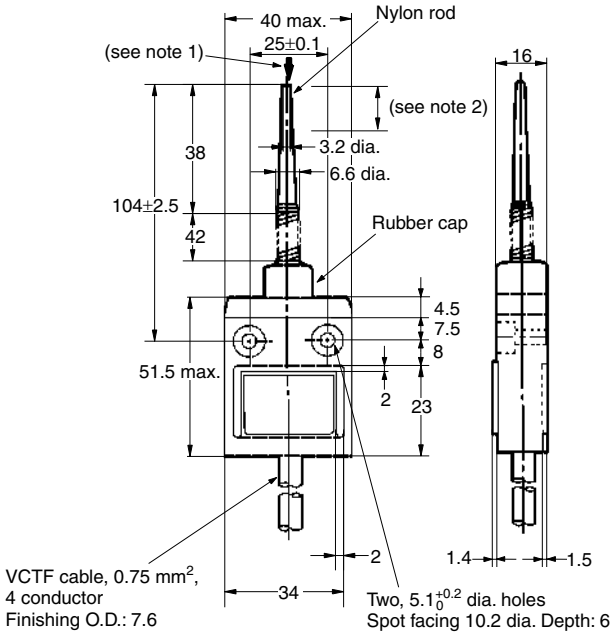
**D4C-□□10**




## Coil Spring

**D4C-□□50**



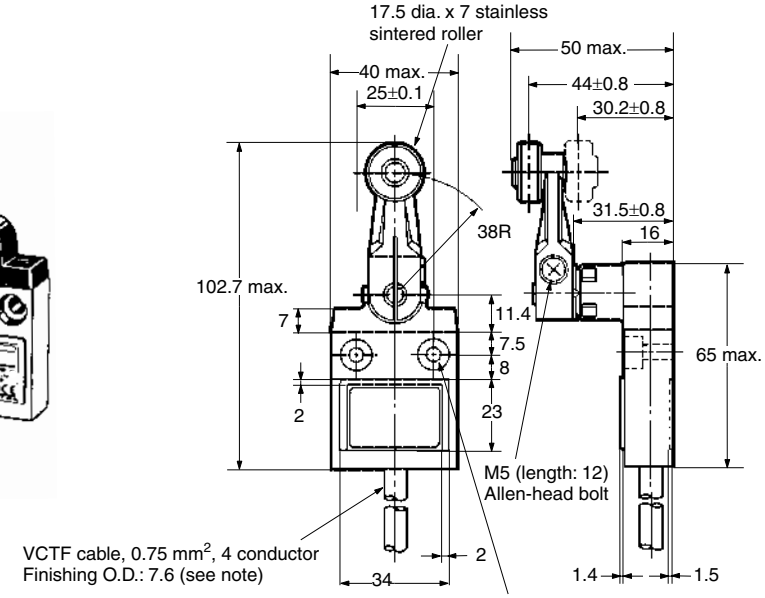



**Note:** **1.** Operation is possible in any direction except in parallel to the axis ↓.

**2.** The ideal range for operation is between the tip of the rod and 1/3 of the length of the actuator.

## Roller Lever

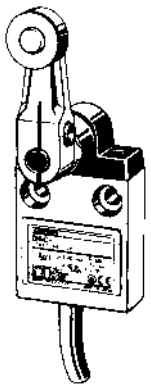
**D4C-□□20**
**D4C-□□20-P**

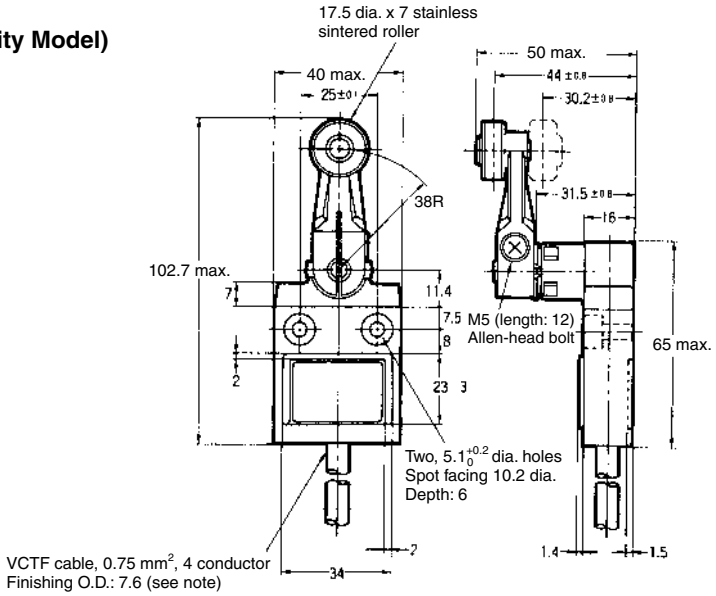



**Note:** S-FLEX VCTF Cables are used for weather-resistant models (D4C-P).

## Roller Lever (High-Sensitivity Model)

**D4C-□□24**
**D4C-□□24-P**

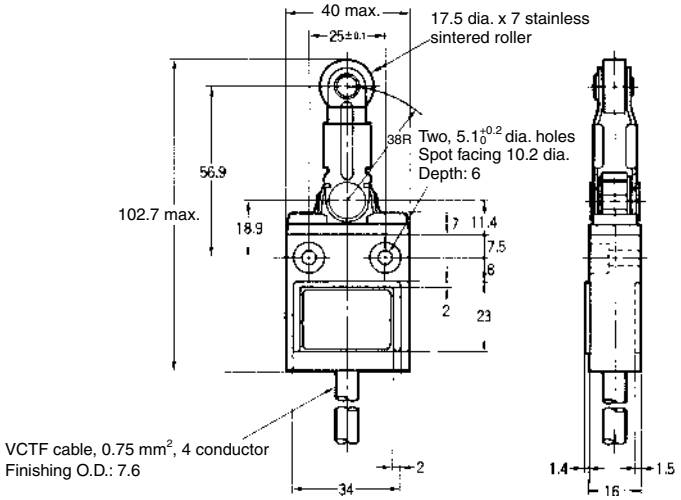




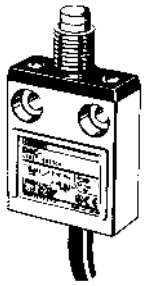

**Note:** S-FLEX VCTF Cables are used for weather-resistant models (D4C-P).

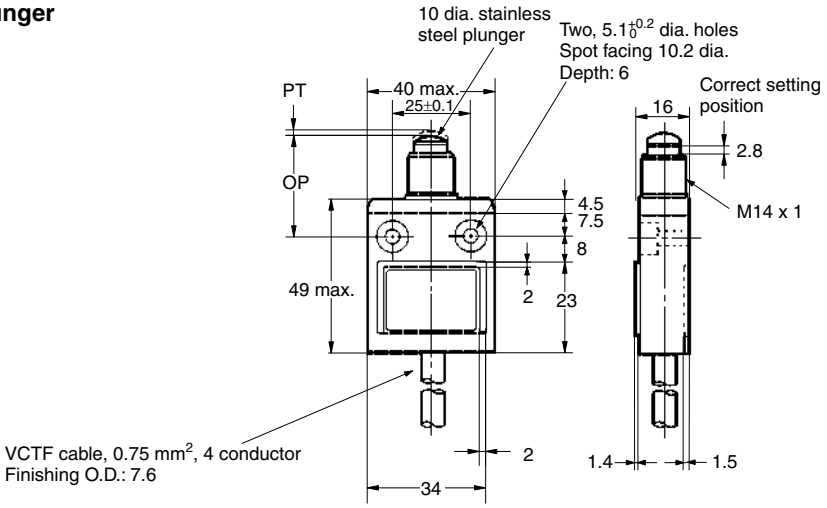
## Center Roller Lever Plunger

**D4C-□□60**

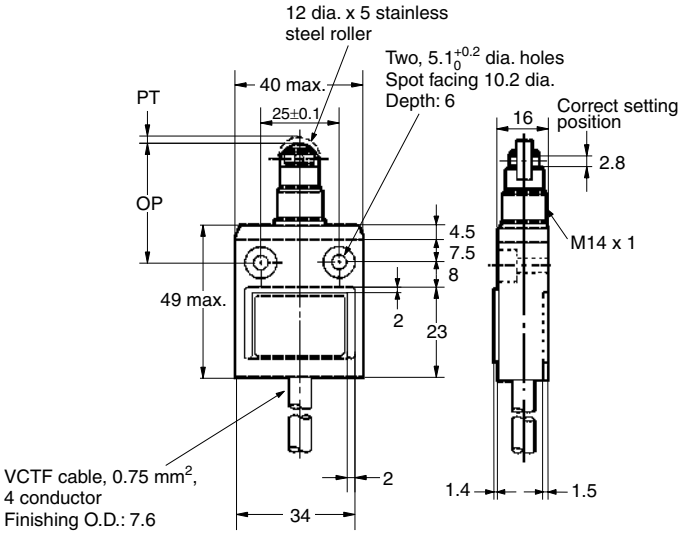


### Panel Mount Pin Plunger
### D4C-□□41

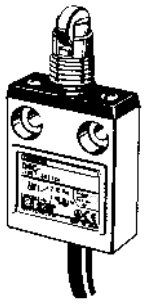


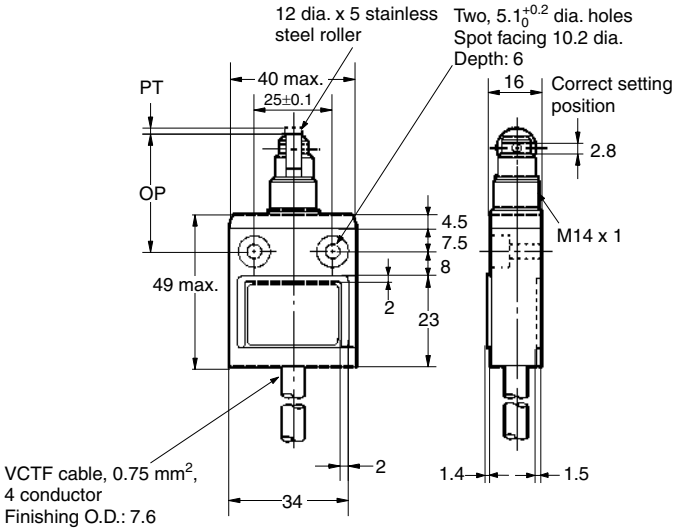



### Panel Mount Roller Plunger
### D4C-□□42




### Panel Mount Crossroller Plunger
### D4C-□□43



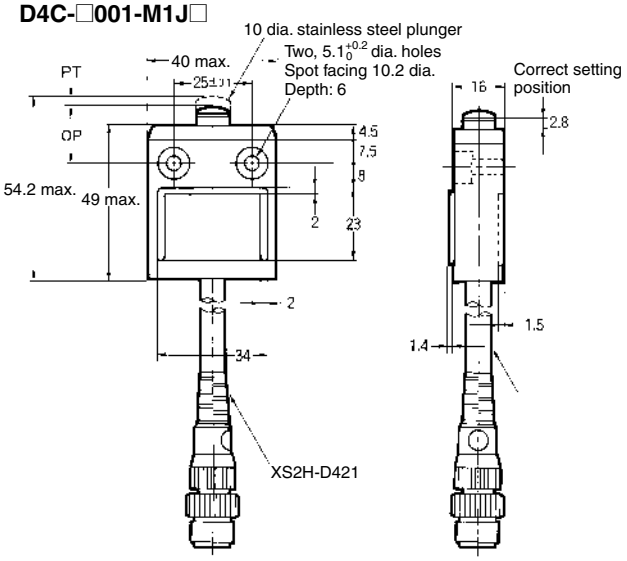



**Note:** Two nuts (thickness: 2.5; distance across: 17) are included with the D4C-□□41, D4C-□□42 and D4C-□□43.

# Pre-wired Models

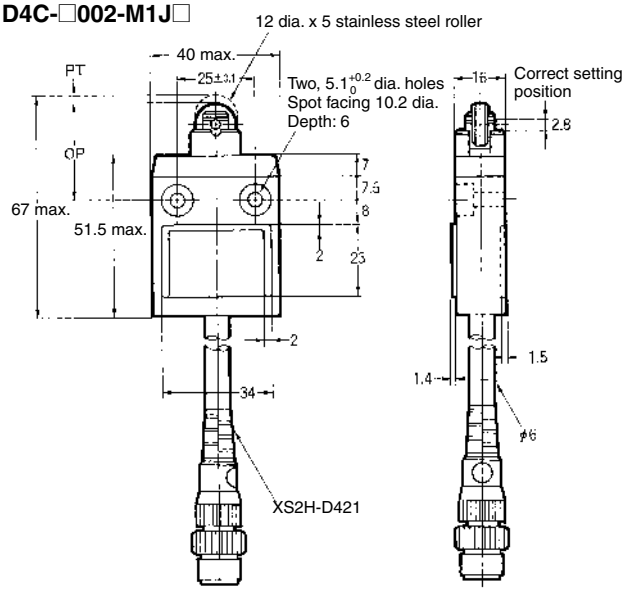
### Pin Plunger

**D4C-□001-□K1EJ□**
**D4C-□001-M1J□**



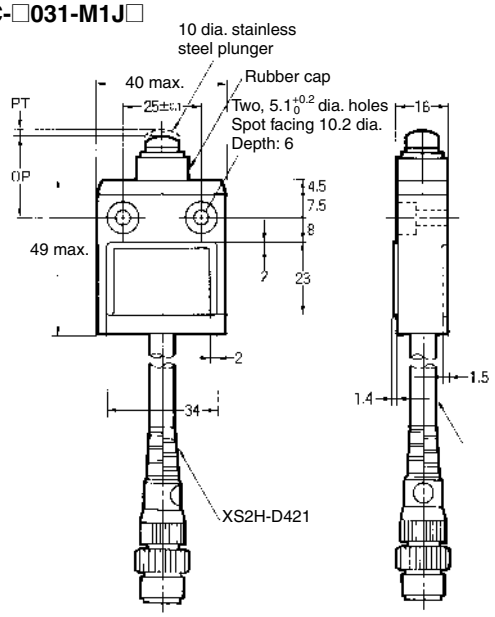

### Roller Plunger

**D4C-□002-□K1EJ□**
**D4C-□002-M1J□**



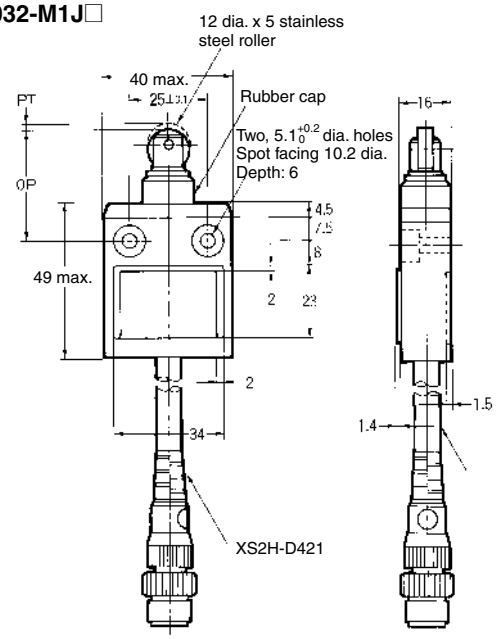

### Sealed Pin Plunger

**D4C-□031-□K1EJ□**
**D4C-□031-M1J□**



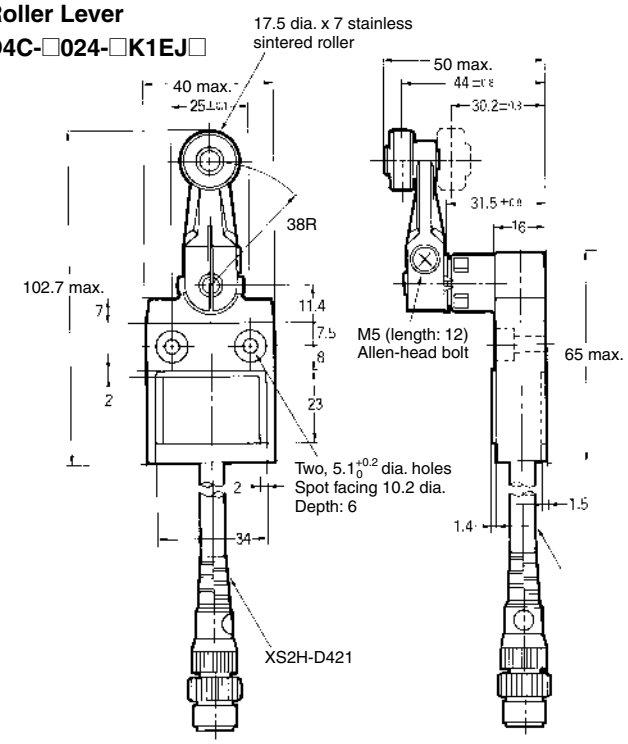

### Sealed Roller Plunger

**D4C-□032-□K1EJ□**
**D4C-□032-M1J□**



**Roller Lever**

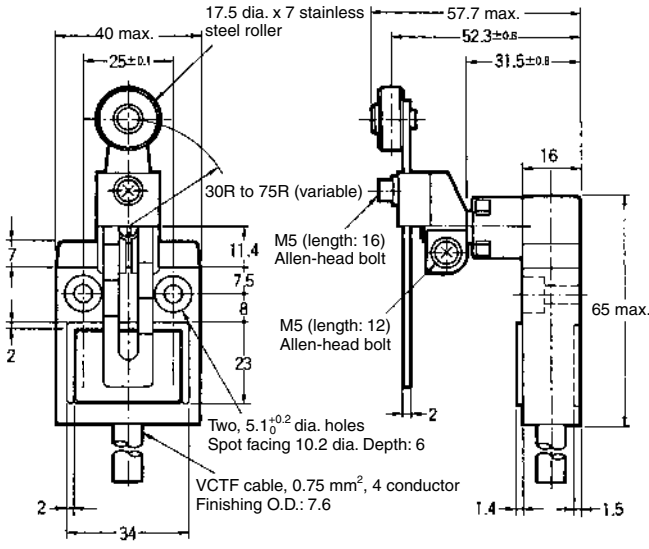
**D4C-□024-□K1EJ□**




## Weather-resistant Models

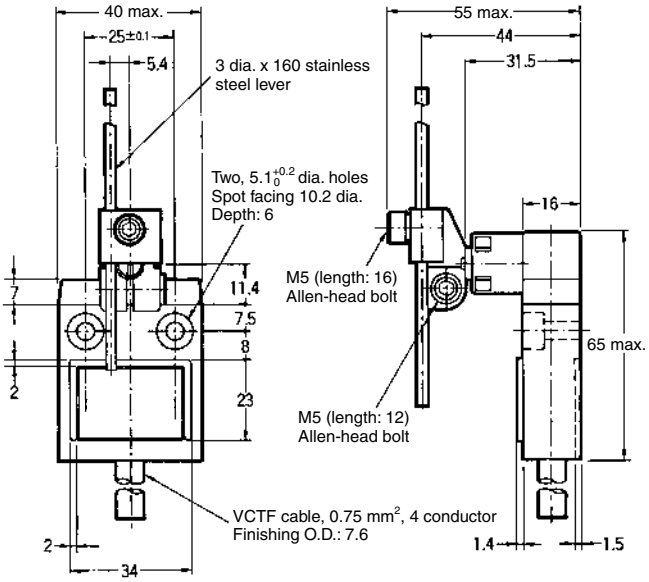
**Adjustable Roller Lever**

**D4C-□□27-P**



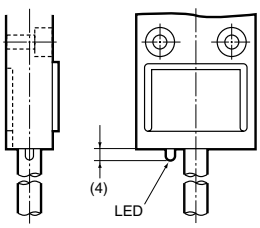

**Adjustable Rod Lever**

**D4C-□□29-P**



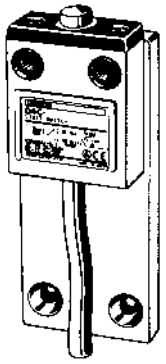

## Models with LED Indicator

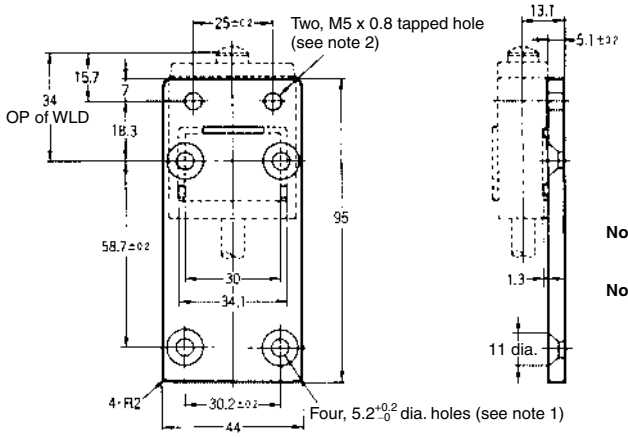
The dimensions of the LED indicator for models equipped with one are shown below.



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

**D4C-P001**



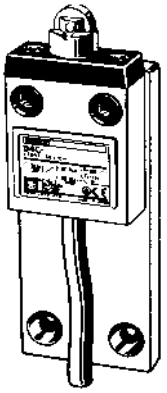


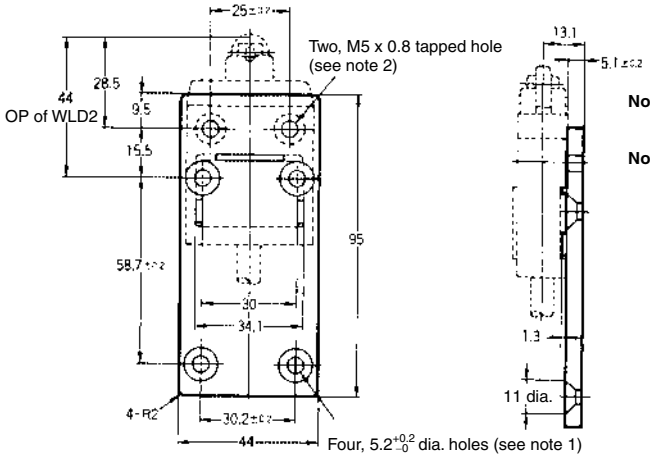

**Note:** Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

**Note:** **1.** Tighten the 5.2 +0.2 0 dia. holes with the M5 x 10 hexagon pan-head screws.

**2.** Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

**D4C-P002**



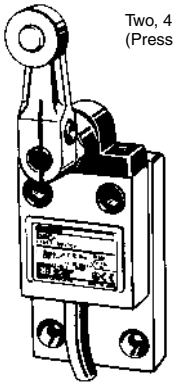


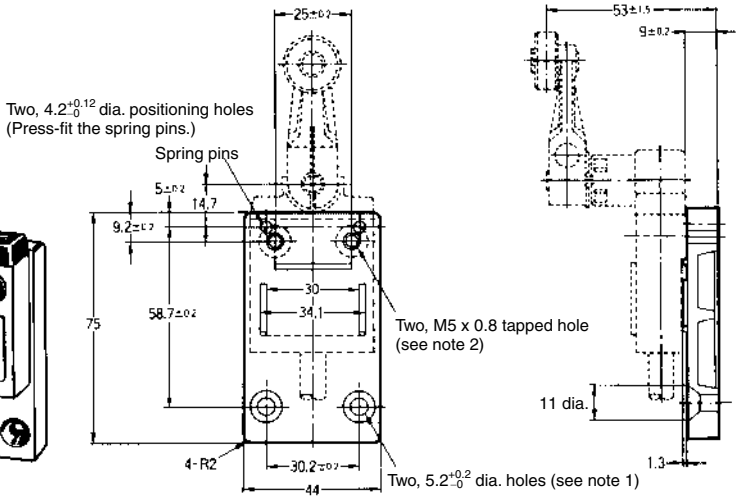

**Note:** Four, M5 x 0.8 hexagon pan-head bolts and two M5 x 0.8 Allen-head bolts are provided.

**Note:** **1.** Tighten the 5.2 +0.2 0 dia. holes with the M5 x 10 hexagon pan-head screws.

**2.** Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

**D4C-P020**






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

**Note:** **1.** Tighten the 5.2 +0.2 0 dia. holes with the M5 x 10 hexagon pan-head screws.
Four, M5 x 0.8 hexagon pan-head bolts, two M5 x 0.8 Allen-head bolts are provided, and two 4 x 14 spring pins are provided.

**2.** Insert the M5 Allen-head bolts into the M5 tapping holes to tighten the Mounting Plate securely.

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

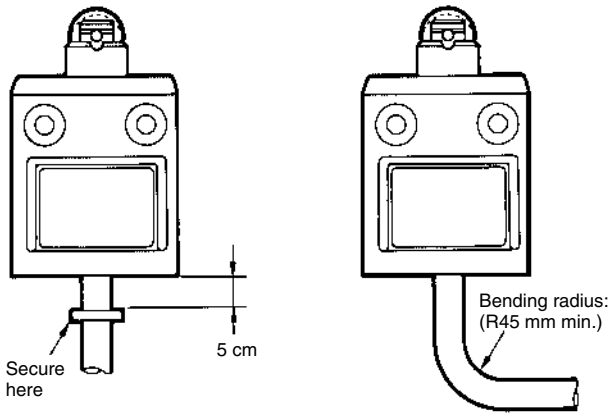
# Precautions

## ■ Correct Use

### Handling

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

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




### Connections

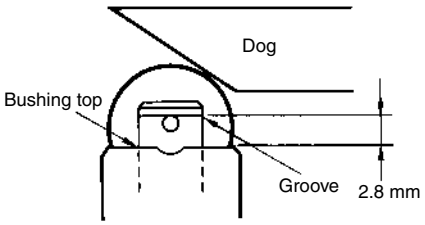
Be sure to connect a fuse with a breaking current 1.5 to 2 times larger than the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.

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

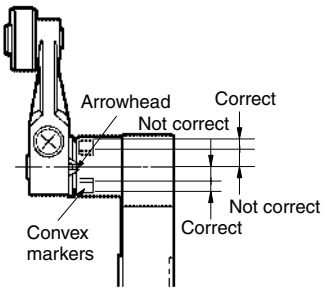
### Operation

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

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



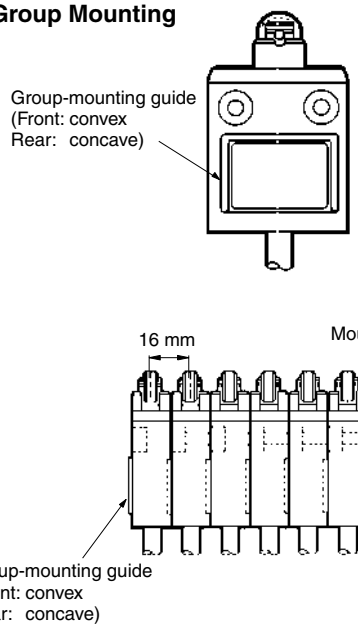

To allow the roller lever-type actuator to travel properly, adjust the dog and cam so that the arrow head is positioned between the two convex markers as shown below.



## Mounting

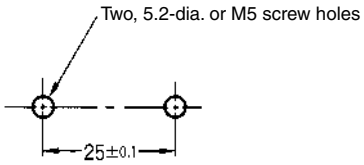
A maximum of 6 Switches may be group-mounted. In this case, pay attention to the mounting direction so that the convex part of the group-mounting guide on one Switch fits into the concave part of the guide on the other Switch as shown in the figure below. For group mounting, the mounting panel must have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

**Group Mounting**




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

**Mounting Holes**




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

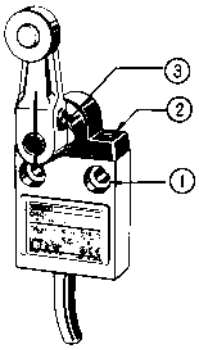
Do not expose the Switch to water exceeding 70°C or use it in steam.

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

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

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

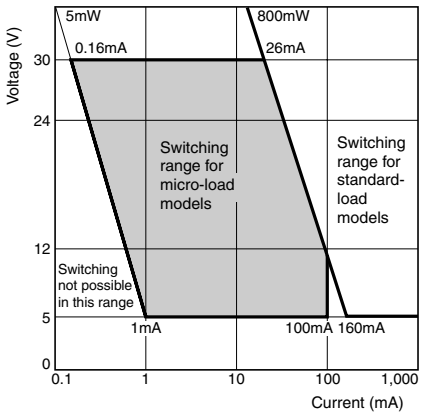
**Note:** By removing the two screws from the head, the head direction can be rotated 180°. After changing the head direction, re-tighten to the torque specified above. Be careful not to allow any foreign substance to enter the Switch.




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

### Switching Range

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




ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C032-E1-08 In the interest of product improvement, specifications are subject to change without notice.

# Miniature Limit Switch
# D4CC

### Many Models Including Roller Lever Switches are Only 16-mm Thick with Connector

- New center roller lever models that enable ganged mounting of up to 6 Switches.
- Cable connectors for easy Switch replacement.
- Triple-seal construction for plungers to provide IEC IP67, UL, and CSA (type 3, 4, 13) degree of protection.
- Operation indicators available for easy monitoring (standard indicator is lit when Switch is not operating).



## Model Number Structure

### ■ Model Number Legend

**D4CC-□0□□**
**1 2**

**1. Rated Load**

(These codes are different from suffix codes of the D4C)

1: 1 A at 125 VAC
2: 1 A at 125 VAC (with LED indicator)
3: 1 A at 30 VDC
4: 1 A at 30 VDC (with LED indicator)

**2. Actuator**

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

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

# Ordering Information

## ■ List of Models

### Limit Switches

| Actuator | 1 A at 125 VAC | | 1 A at 30 VDC | |
|---|---|---|---|---|
| | Without indicator | With indicator | Without indicator | With indicator |
| Pin plunger  | D4CC-1001 | D4CC-2001 | D4CC-3001 | D4CC-4001 |
| Roller plunger  | D4CC-1002 | D4CC-2002 | D4CC-3002 | D4CC-4002 |
| Crossroller plunger  | D4CC-1003 | D4CC-2003 | D4CC-3003 | D4CC-4003 |
| Bevel plunger  | D4CC-1010 | D4CC-2010 | D4CC-3010 | D4CC-4010 |
| High-sensitivity roller lever  | D4CC-1024 | D4CC-2024 | D4CC-3024 | D4CC-4024 |
| Sealed pin plunger  | D4CC-1031 | D4CC-2031 | D4CC-3031 | D4CC-4031 |
| Sealed roller plunger  | D4CC-1032 | D4CC-2032 | D4CC-3032 | D4CC-4032 |
| Sealed crossroller plunger  | D4CC-1033 | --- | D4CC-3033 | D4CC-4033 |
| Panel mount pin plunger  | D4CC-1041 | D4CC-2041 | D4CC-3041 | D4CC-4041 |
| Panel mount roller plunger  | D4CC-1042 | D4CC-2042 | D4CC-3042 | D4CC-4042 |
| Panel mount crossroller plunger  | D4CC-1043 | --- | D4CC-3043 | D4CC-4043 |
| Plastic rod  | D4CC-1050 | D4CC-2050 | D4CC-3050 | D4CC-4050 |
| Center roller lever  | D4CC-1060 | D4CC-2060 | D4CC-3060 | D4CC-4060 |

**Note: 1.** The meaning of suffix codes in the D4CC model numbers is different from that in the D4C model numbers.

**2.** Refer to the following table for cable plugs.

### Accessories (Order Separately)

#### Plugs

| Type | Appearance | No. of conductors | Cable length | Model |
|---|---|---|---|---|
| VAC | Straight  | 4 | 1 m | XS2F-A421-C90-A |
| | | | 2 m | XS2F-A421-D90-A |
| | | | 5 m | XS2F-A421-G90-A |
| | | | 10 m | XS2F-A421-J90-A |
| VDC | | | 1 m | XS2F-D421-C80-A |
| | | | 2 m | XS2F-D421-D80-A |
| | | | 5 m | XS2F-D421-G80-A |
| | | | 10 m | XS2F-D421-J80-A |

**Note:** Please contact your local OMRON sales office for details.

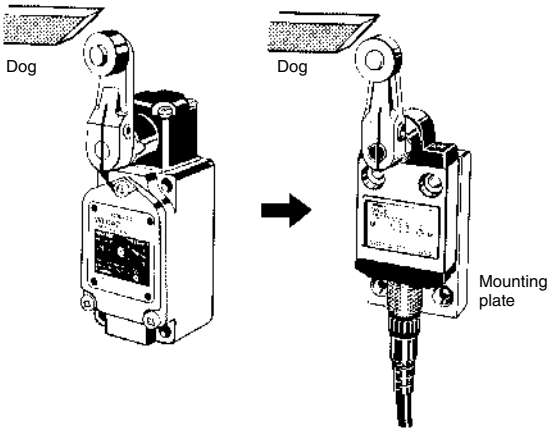
## Special Mounting Plate

It is possible to replace an WL Limit Switch with a D4CC Limit Switch mounted on this plate without changing the position of the dog or cam.

The following is the conversion table:

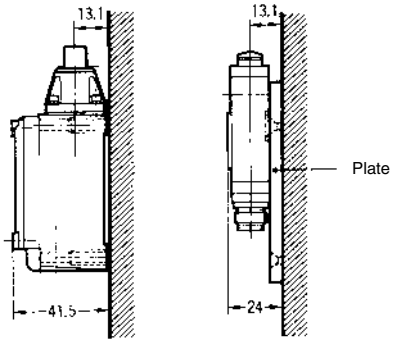
| WL | D4C | Plate model |
|---|---|---|
| Top plunger: WLD | Plunger: D4CC-□001 | D4C-P001 |
| Top roller plunger: WLD2 | Roller plunger: D4CC-□002 | D4C-P002 |
| Roller lever: WLG2 | Roller lever: D4CC-□024 | D4C-P020 |

### Example




## Remarks

There is no difference in mounting pitch between the Mounting Plate and the WL. The mounting depth of the D4CC with the Mounting Plate attached is, however, shorter than that of the panel-mounted WL.






# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL-CSA

**D4CC-1, D4CC-2**
**D150**

| Rated voltage | Carry current | Current | | Volt-amperes | |
|---|---|---|---|---|---|
| | | Make | Break | Make | Break |
| 120 VAC | 1.0 A | 3.6 A | 0.6 A | 432 VA | 72 VA |

## ■ Ratings

| Rated voltage | Non-inductive load | | | | Inductive load | | | |
|---|---|---|---|---|---|---|---|---|
| | Resistive load | | Lamp load | | Inductive load | | Motor load | |
| | NC | NO | NC | NO | NC | NO | NC | NO |
| **125 VAC** | 1 A | 1 A | 1 A | 0.7 A | 1 A | 1 A | 1 A | 1 A |
| **30 VDC** | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A | 1 A |

**Note: 1.** The above current ratings are for steady-state current.
**2.** Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp loads have an inrush current of 10 times the steady-state current.
**4.** Motor loads have an inrush current of 6 times the steady-state current.

### D4CC-3, D4CC-4, 1 A at 30 VDC

| | | |
|---|---|---|
| **Inrush current** | NC | 5 A max. |
| | NO | 2.5 A max. |

# ■ Characteristics

| | |
|---|---|
| **Degree of protection** | IP67 |
| **Durability (see note 2)** | Mechanical: 10,000,000 operations min.<br>Electrical: 200,000 operations min. (1 A at 125 VAC, resistive load) |
| **Operating speed** | Plunger: 0.1 mm to 0.5 m/s<br>Roller lever: 1 mm to 1 m/s |
| **Operating frequency** | Mechanical: 120 operations/min<br>Electrical: 30 operations/min |
| **Rated frequency** | 50/60 Hz |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance (initial)** | 100 mΩ max. |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity<br>1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 3) |
| **Shock resistance** | Destruction: 1,000 $m/s^2$ min.<br>Malfunction: 500 $m/s^2$ min. |
| **Ambient temperature** | Operating: –10°C to 70°C (with no icing) |
| **Ambient humidity** | Operating: 95% max. |
| **Weight** | Approx. 120 g (in the case of D4CC-1002) |

**Note: 1.** The above figures are initial values.

**2.** The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

**3.** Excluding plastic rod models.

## Leakage Current (for Switches with Indicators)

The leakage current and resistance of Switches with indicators are as follows:

| Item | D4CC-2□□□ | D4CC-4□□□ |
|---|---|---|
| **Voltage** | 125 VAC | 30 VDC |
| **Leakage current** | 1.0 mA | 1.0 mA |
| **Resistive value** | 150 kΩ | 30 kΩ |

# ■ Operating Characteristics

| Model | D4CC-□001 | D4CC-□002 | D4CC-□003 | D4CC-□010 | D4CC-□024 |
|---|---|---|---|---|---|
| **OF max.** | 11.77 N | 11.77 N | 11.77 N | 11.77 N | 5.69 N |
| **RF min.** | 4.41 N | 4.41 N | 4.41 N | 4.41 N | 1.47 N |
| **PT max.** | 1.8 mm | 1.8 mm | 1.8 mm | 1.8 mm | 10±3° |
| **OT min.** | 3 mm | 3 mm | 3 mm | 3 mm | 50° |
| **MD max.** | 0.2 mm | 0.2 mm | 0.2 mm | 0.2 mm | 3° |
| **OP** | 15.7±1 mm | 28.5±1 mm | 28.5±1 mm | 28.5±1 mm | --- |

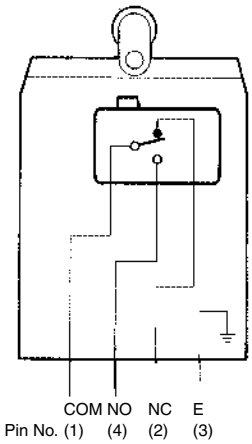
| Model | D4CC-□031 | D4CC-□032 | D4CC-□033 | D4CC-□041 | D4CC-□042 | D4CC-□043 |
|---|---|---|---|---|---|---|
| **OF max.** | 17.65 N | 17.65 N | 17.65 N | 11.77 N | 11.77 N | 11.77 N |
| **RF min.** | 4.41 N | 4.41 N | 4.41 N | 4.41 N | 4.41 N | 4.41 N |
| **PT max.** | 1.8 mm | 1.8 mm | 1.8 mm | 1.8 mm | 1.8 mm | 1.8 mm |
| **OT min.** | 3 mm | 3 mm | 3 mm | 3 mm | 3 mm | 3 mm |
| **MD max.** | 0.2 mm | 0.2 mm | 0.2 mm | 0.2 mm | 0.2 mm | 0.2 mm |
| **OP** | 24.9±1 mm | 34.3±1 mm | 34.3±1 mm | 31.2±1 mm | 36.8±1 mm | 36.8±1 mm |
| **TT (reference value)** | (5) mm | (5) mm | (5) mm | (5) mm | (5) mm | (5) mm |

| Model | D4CC-□050 | D4CC-□060 |
|---|---|---|
| **OF max.** | 1.47 N | 6.67 N |
| **RF min.** | --- | 1.47 N |
| **PT max.** | 15° | 10±3° |
| **OT min.** | --- | 50° |
| **MD max.** | --- | 3° |

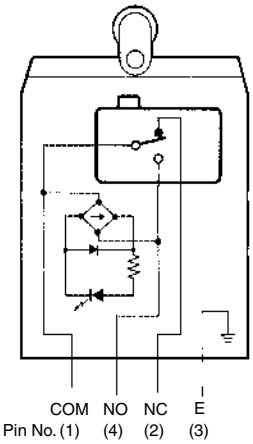
# ■ Contact Form

## AC Switches (D4CC-10□□, 20□□)

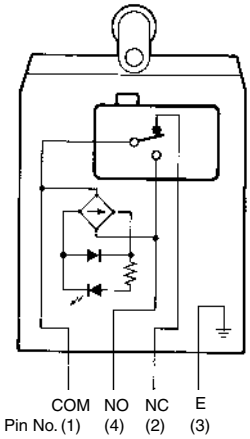
**Without Indicator**

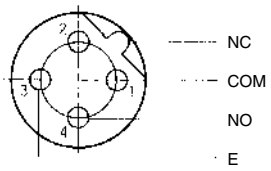



**With Indicator**




**With LED Indicator (lights when operated)**



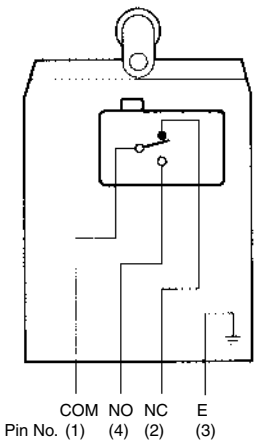

**Note:** The indicators of these models are lit when the Switches are not actuated. When the Switches are actuated, the indicator are off.

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

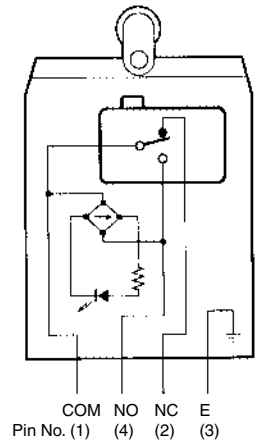
**2.** "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

## DC Switches (D4CC-30□□, 40□□)

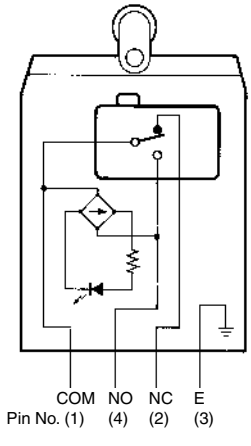
**Without Indicator**

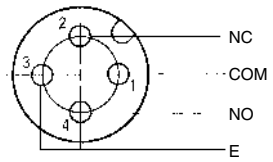



**With Indicator**




**With LED Indicator (lights when operated)**



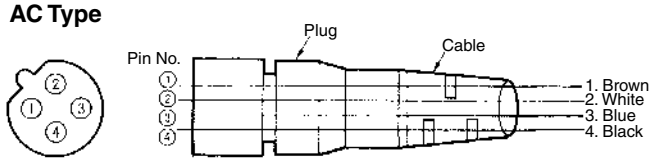

**Note:** The indicators of these models are lit when the Switches are not actuated. When the Switches are actuated, the indicator are off.

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

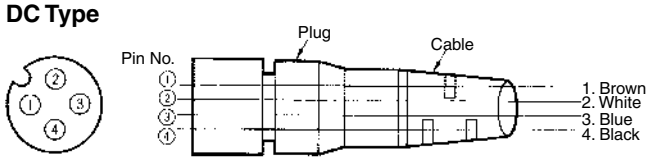
**2.** "Lights when not in operation" means that when the actuator is in the free position, the indicator is lit, and when the actuator is turned or pushed and the contact comes into contact with the NO side, the indicator turns OFF.

## Plugs

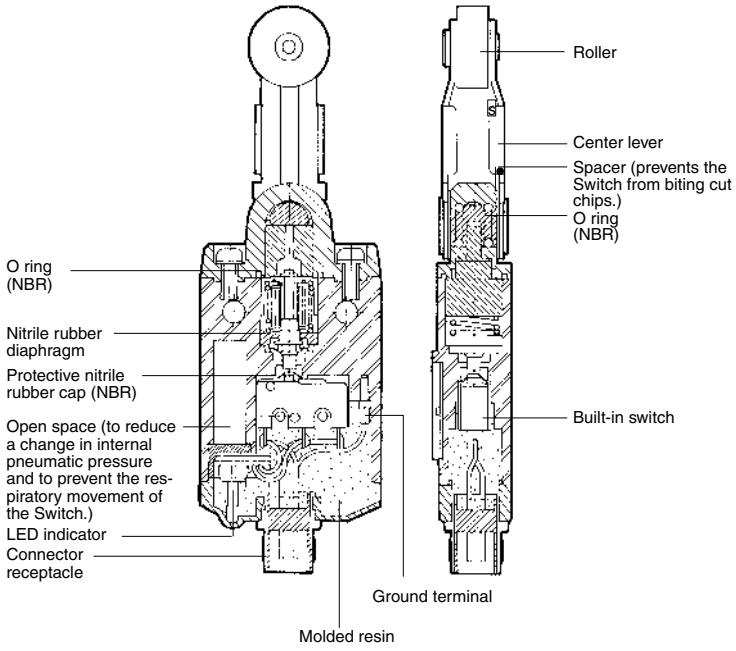
**AC Type**




**DC Type**



# Nomenclature

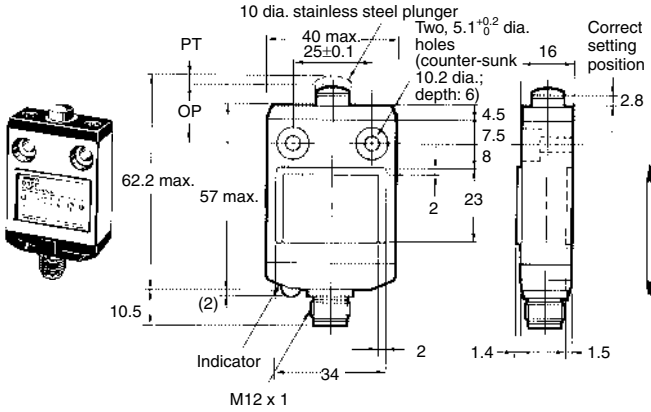


# Dimensions

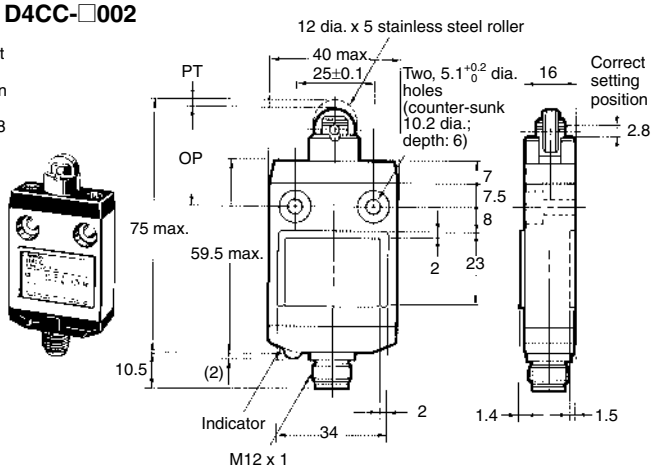
**Note: 1.** All units are in millimeters unless otherwise indicated.
**2.** The □ in each model number is replaced with the code expressing the rated load of the model. Refer to *Ordering Information.*
**3.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

## Limit Switches

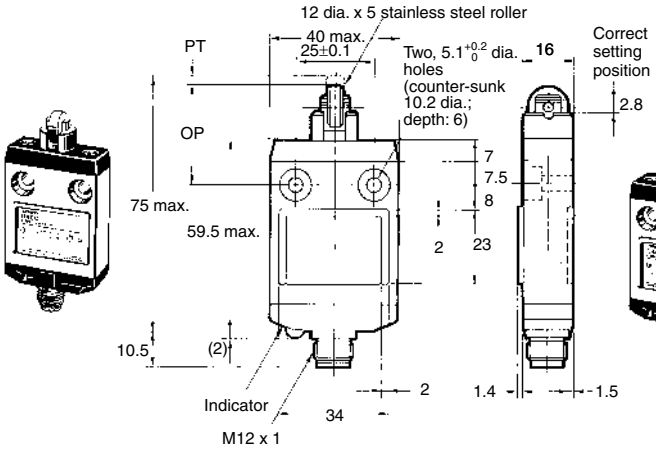
### Pin Plunger
**D4CC-□001**



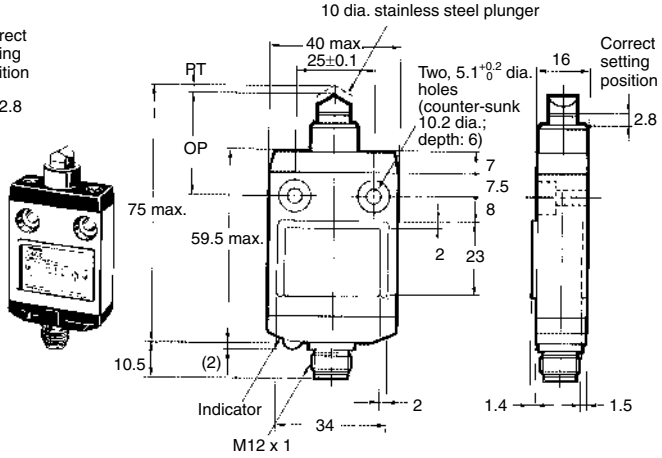

### Roller Plunger
**D4CC-□002**



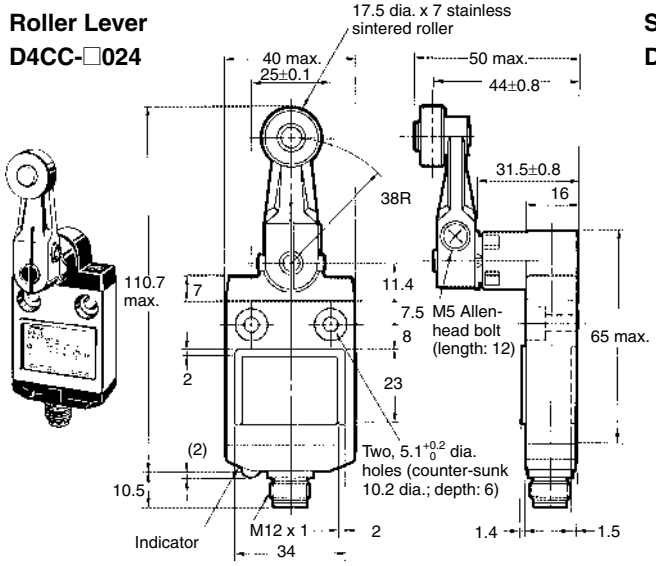

### Crossroller Plunger
**D4CC-□003**



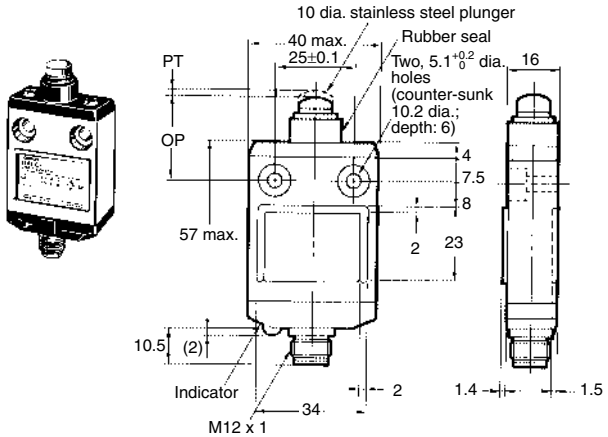

### Bevel Plunger
**D4CC-□010**



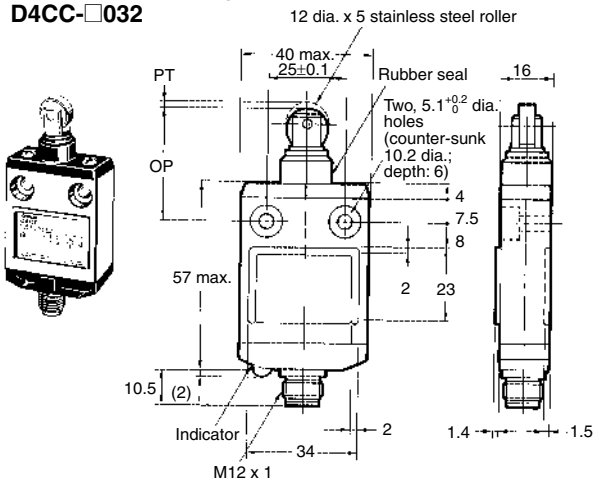

### Roller Lever
**D4CC-□024**



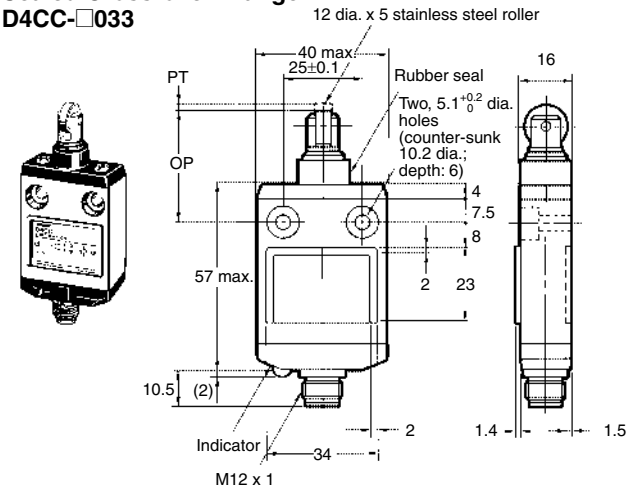

### Sealed Pin Plunger
**D4CC-□031**



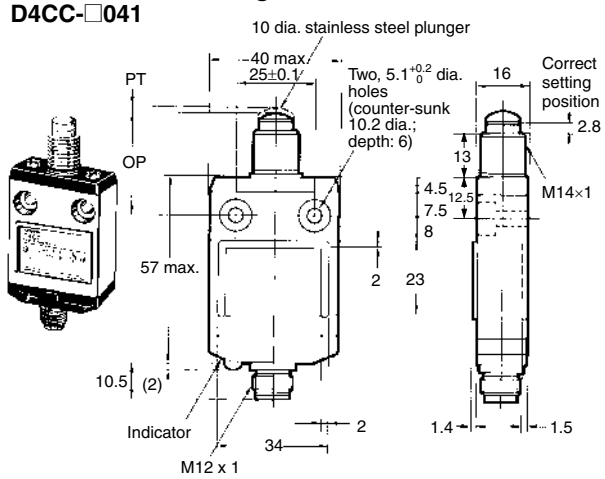
### Sealed Roller Plunger
### D4CC-□032



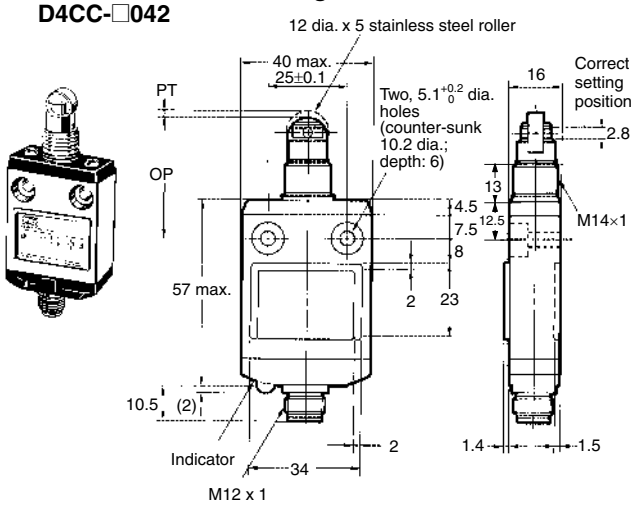

### Sealed Crossroller Plunger
### D4CC-□033



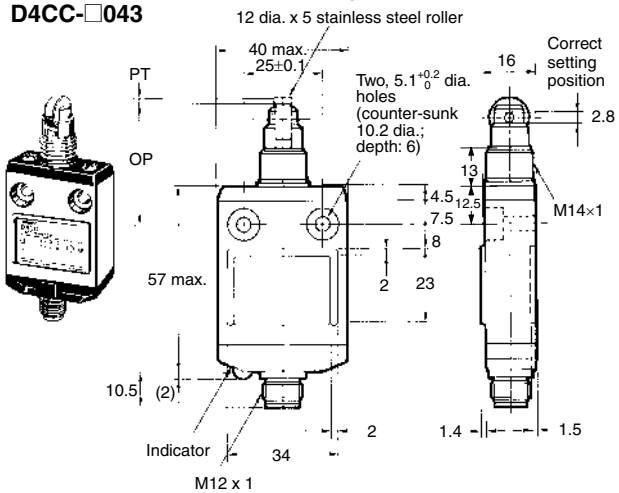

### Panel Mount Pin Plunger
### D4CC-□041



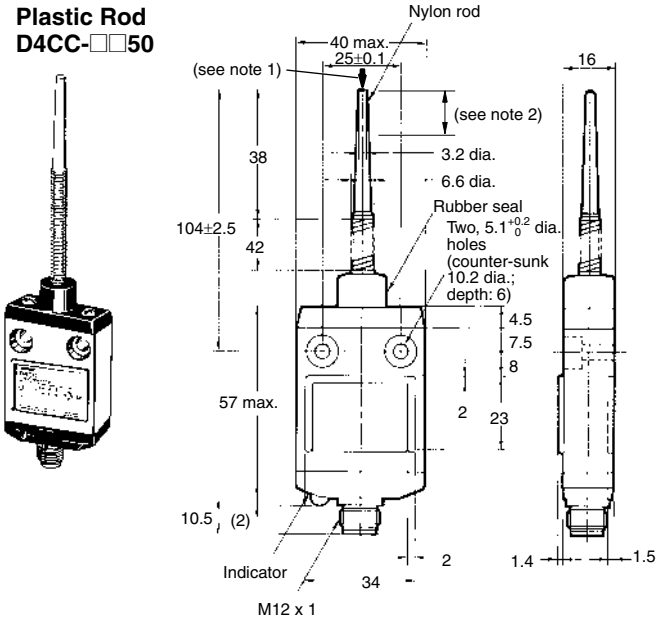

### Panel Mount Roller Plunger
### D4CC-□042




### Panel Mount Crossroller Plunger
### D4CC-□043



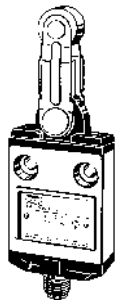

### Plastic Rod
### D4CC-□□50

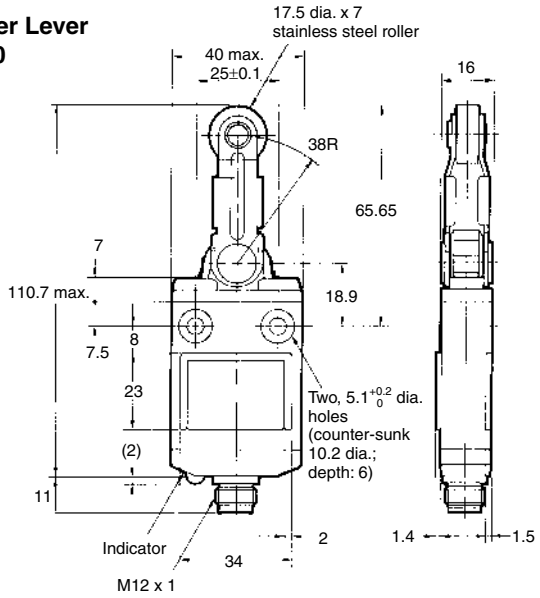



**Note: 1.** Operation is possible in any direction except parallel to the axis ↓.

**2.** The ideal range for operation is between the tip of the rod and 1/3 of the length of the actuator.

**Center Roller Lever**
**D4CC-□□60**

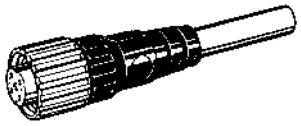


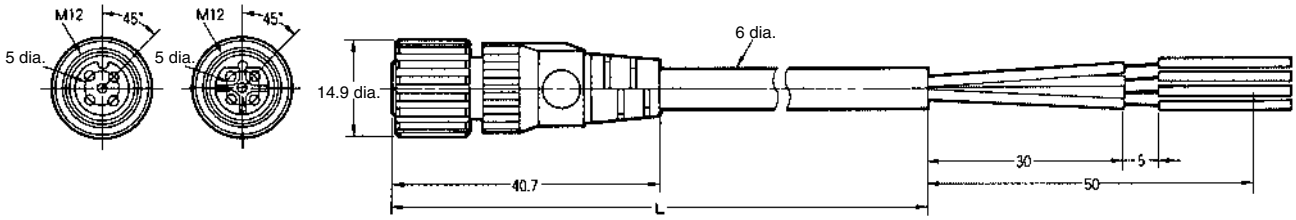



## Plugs

**XS2F-D421-□80-A (DC)**
**XS2F-A421-□90-A (AC)**
**(Straight Type)**

| Model | Cable length (L) |
|---|---|
| XS2F-D421-C□-A | 1 m |
| XS2F-D421-D□-A | 2 m |
| XS2F-D421-G□-A | 5 m |
| XS2F-D421-J□-A | 10 m |

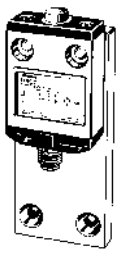


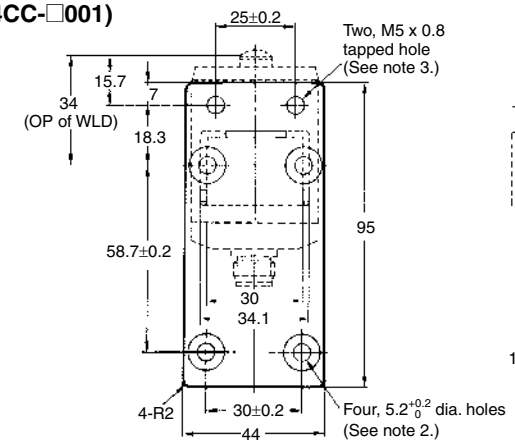


# Special Mounting Plates

## (Limit Switches are not attached to the Plates.)

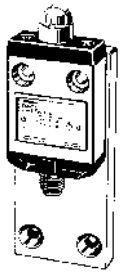
**D4C-P001 (For D4CC-□001)**

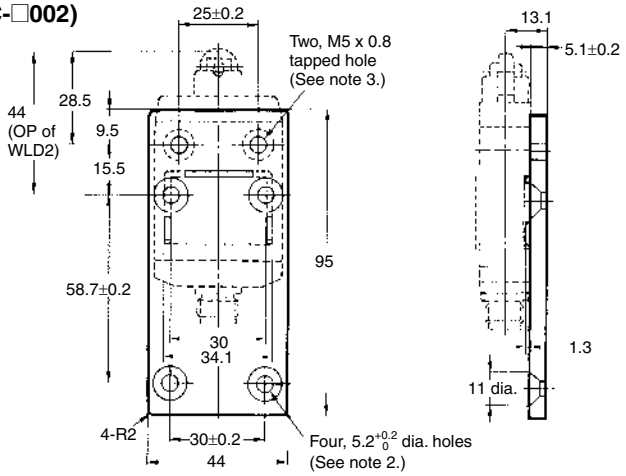





**Note: 1.** Four hexagonal flat head bolts (M5 x 0.8, length: 10) and two Allen-head bolts (M5 x 0.8, length: 15) are included.
**2.** All the holes with $5.2^{+0.2}_{0}$ dia. must be used with M5 x 10 Allen-head bolts.
**3.** All the M5-tapped holes must be used with M5 hexagonal flat head bolts.

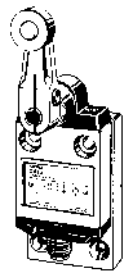
**D4C-P002 (For D4CC-□002)**

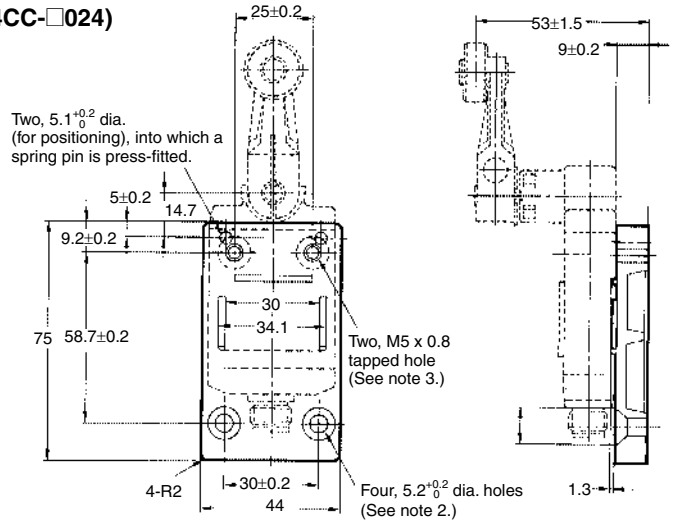





**Note: 1.** Four hexagonal flat head bolts (M5 x 0.8, length: 10) and two Allen-head bolts (M5 x 0.8, length: 15) are included.
**2.** All the holes with $5.2^{+0.2}_{0}$ dia. must be used with M5 x 10 Allen-head bolts.
**3.** All the M5-tapped holes must be used with M5 hexagonal flat head bolts.

**D4C-P020 (For D4CC-□024)**






**Note: 1.** Four hexagonal flat head bolts (M5 x 0.8, length: 10), two Allen-head bolts (M5 x 0.8, length: 15), and two spring pins (4 x 14) are included.
**2.** All the holes with $5.2^{+0.2}_{0}$ dia. must be used with M5 x 10 Allen-head bolts.
**3.** All the M5-tapped holes must be used with M5 hexagonal flat head bolts.

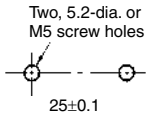
# Precautions

## ■ Correct Use

### Mounting

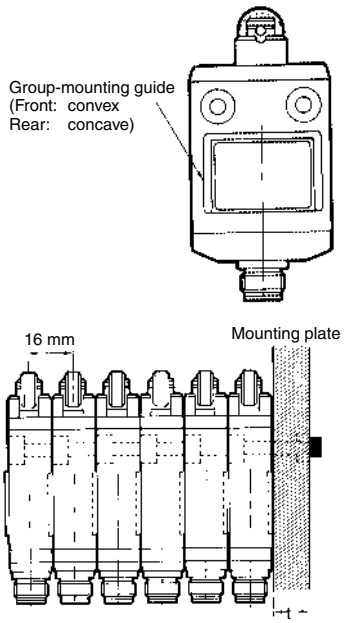
Make sure that the plate to which the D4CC is mounted is flat. If the plate is warped or has protruding parts, the D4CC may not malfunction.

#### Mounting Holes




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

#### Group Mounting

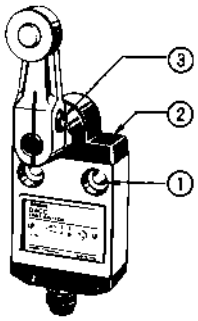



### Tightening Torque

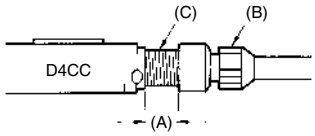
Be sure to tighten each screw to the proper tightening torque as shown in the table.

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

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

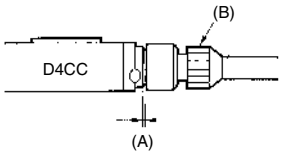



### Plug Tightening




Connect the plug connector (B) to the connector threads of the D4CC. Then firmly turn the plug connector by hand so that the connector threaded portion (C) will be completely covered by the plug connector (B) so that space (A) will be almost 0. Do not use any tools, such as pliers, to tighten the plug connector, otherwise the plug connector may become damaged. Make sure, however, that the plug connector is tightened securely, otherwise the rated degree of protection of the D4CC may not be maintained. Furthermore, the plug connector may be loosened by vibration.

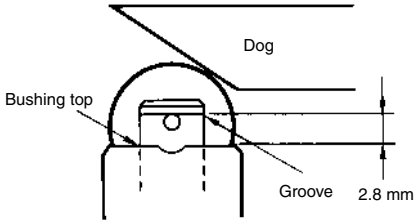
#### Properly Tightened Connector



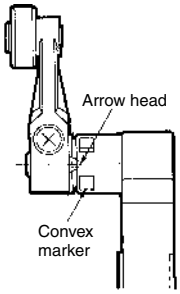
## Operation

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

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




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

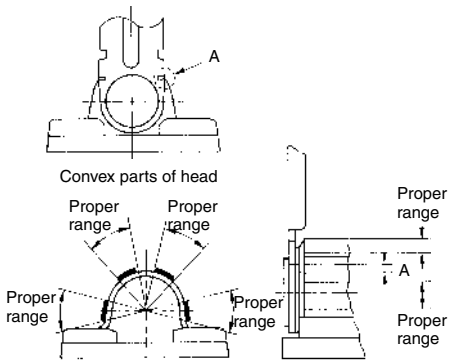



## Others

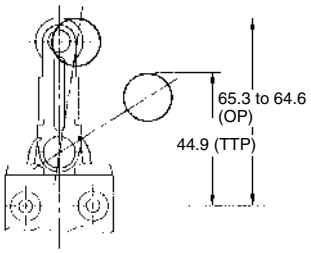
If failures, such as reset failures, in the plunger model are possible, use a model that has a rubber cap.

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

Properly adjust the stroke of the center roller lever along with the dog or cam so that the concave part (A) of the head is located between the convex parts of the head as shown below when the center roller lever is pressed by the dog or cam.




Refer to the following to adjust the stroke of the lever based on the mounting hole level.




ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C116-E1-02

# Small Sealed Switch
# D4E-□N

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

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



# Model Number Structure

## ■ Model Number Legend

**D4E-□□□□□N**
**1 2 3 4**

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

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

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

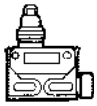
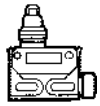
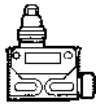
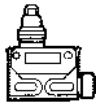
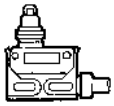
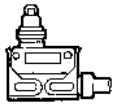
**4. Operation Indicator**
- L: Neon lamp (250 VAC)
- L1: LED (12 VDC)
- L2: LED (24 VDC)
- L3: LED (48 VDC)

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

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

# Ordering Information

## ■ List of Models

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

**Note: 1.** When ordering, specify the current type by replacing the blank box of the model number with 0 for AC connector or 1 for DC connector.

**2.** Approved by UL and CSA.

**3.** For the plunger and lever actuator models, the NC and NO terminal indicators are reversed.

**4.** Cold tolerance specifications are available for actuator models with an A, B, C, G, or H in the model number. When ordering, add C to the model number.
For example: D4E-1A20N → D4E-1A20N-C

## Accessories (Order Separately)

### Plug

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

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL, CSA

#### A300

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

### TÜV (EN60947-5-1)

D4E- 1 G 23 L N
I II III IV

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

**Note: 1.** □: Actuator variation of item II

**2.** AC-14 0.5 A/125 VAC means as follows:
Applicable category: AC-14
Rated operating current ($I_e$): 0.5 A
Rated operating voltage ($U_e$): 125 VAC

## ■ Ratings

| Rated voltage | General-purpose | | | | | | | | Micro load | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Non-inductive load | | | | Inductive load | | | | Non-inductive load | |
| | Resistive load | | Lamp load | | Inductive load | | Motor load | | Resistive load | |
| | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO |
| 125 VAC | 5 (1) A | | 1.5 (1) A | | 3 (1) A | | 2 (1) A | 1 (1) A | 0.1 A | |
| 250 VAC | 5 (1) A | | 1.5 (1) A | | 3 (1) A | | 1 A | 0.5 A | --- | |
| 8 VDC | 5 (1) A | | --- | | 1.5 (1) A | | --- | | 0.1 A | |
| 14 VDC | 5 (1) A | | --- | | 1.5 (1) A | | --- | | 0.1 A | |
| 30 VDC | 5 (1) A | | --- | | 1.5 (1) A | | --- | | 0.1 A | |
| 125 VDC | 0.5 A | | --- | | 0.05 A | | --- | | --- | |
| 250 VDC | 0.25 A | | --- | | 0.03 A | | --- | | --- | |

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

**Note: 1.** The above current ratings are for a standard current and the values in parentheses are for models with a connector.
**2.** Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp load has an inrush current of 10 times the steady-state current.
**4.** Motor load has an inrush current of 6 times the steady-state current.

## ■ Characteristics

| | |
|---|---|
| **Degree of protection** | IP67 |
| **Durability (see note 3)** | Mechanical: 10,000,000 operations min.<br>Electrical: 500,000 operations min. (5 A at 250 VAC, resistive load)<br>5,000,000 operations min. (10 mA at 24 VDC, resistive load) |
| **Operating speed** | 0.1 mm to 0.5 m/sec |
| **Operating frequency** | Mechanical: 120 operations/min<br>Electrical: 30 operations/min |
| **Rated frequency** | 50/60 Hz |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance** | 15 mΩ max. (initial value) |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity<br>1,500 VAC, 50/60 Hz for 1 min/Uimp at 2.5 kV (EN60947-5-1) between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part |
| **Rated insulation voltage (Ui)** | 250 VAC |
| **Switching overvoltage** | 1,000 VAC max. (EN60947-5-1) |
| **Pollution degree (operating environment)** | 3 (EN60947-5-1) |
| **Short-circuit protective device (SCPD)** | 10 A fuse (type gG or gI, IEC269 approved) |
| **Conditional short-circuit current** | 100 A (EN60947-5-1) |
| **Conventional enclosed thermal current ($I_{the}$)** | 5 A (EN60947-5-1) |
| **Protection against electric shock** | Class II (grounding not required with double insulation) |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude |
| **Shock resistance** | Destruction: 1,000 m/s$^2$ min.<br>Malfunction: 300 m/s$^2$ min. |
| **Ambient temperature** | Operating: –10°C to 80°C (with no icing) |
| **Ambient humidity** | Operating: 95% max. |
| **Weight** | Approx. 86 g (in case of roller plunger) |

**Note: 1.** The above values are initial values.
**2.** The above ratings may vary depending on the model. Contact your OMRON representative for further details.
**3.** Durability values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

## ■ Operating Characteristics

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

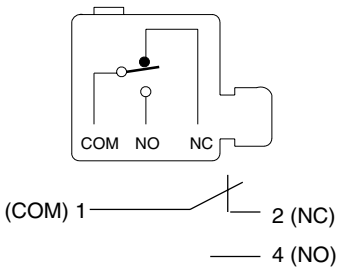
| Model | D4E-1F□□N<br>D4E-2F□□N | D4E-1G□□N<br>D4E-2G□□N | D4E-1H□□N<br>D4E-2H□□N |
|---|---|---|---|
| **OF max.** | 11.77 N | 3.92 N | 3.92 N |
| **RF min.** | 4.90 N | 0.78 N | 0.78 N |
| **PT max.** | 1.5 mm | 2 mm | 2 mm |
| **OT min.** | 3 mm | 4 mm | 4 mm |
| **MD (reference value)** | (0.1 mm)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

**Note:** The values given in parentheses are reference values.

## ■ Contact Form

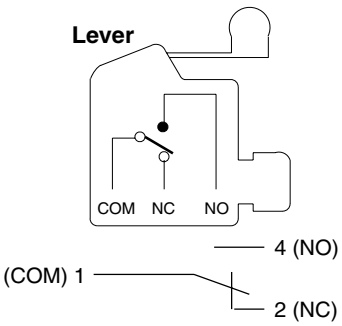
### Screw Terminal Type

**Plunger**




EN60947-5-1

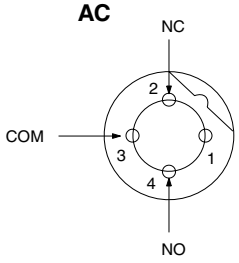
**Lever**



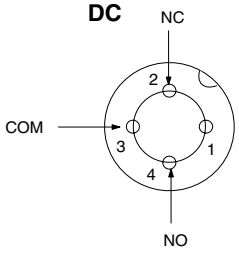

EN60947-5-1

### Connector Type

**AC**



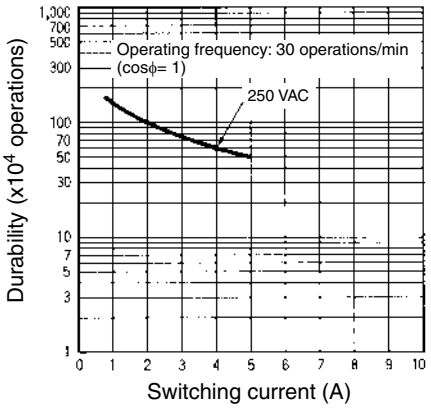

**DC**



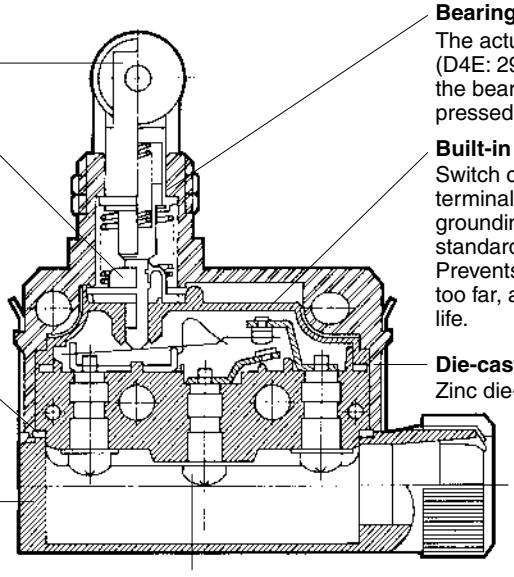

# Engineering Data

## Electrical Durability (cosϕ=1)

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



# Nomenclature



**Movable Plunger**

**Rubber Cap (NBR)**
Rubber cap provides a tight seal and ensures a long service life and smooth reset at low temperatures.

**Seal Packing (NBR)**
Seal packing withstands a pressure of 186 kPa (D4E's seal packing withstands a pressure of 98 kPa).

**Terminal Protection Cover**
D4E-□N has a wide wiring space of 10 mm horizontally (D4E has a space of 7.5 mm horizontally).

**Bearing**
The actuator strength has been increased to 4,903 N (D4E: 294 N) in order to prevent faulty resetting of the bearing, which may occur when the roller is pressed with excessive force.

**Built-in Switch**
Switch cover ensures high insulation between the terminals and die-cast. Double insulation means that grounding is unnecessary. Meets UL, CSA, and EN standards.
Prevents the movable piece from being pushed in too far, and thereby contributes to a longer service life.

**Die-cast Case**
Zinc die-cast case is anti-corrosive and tough.

**Screw Terminal**
Screw terminal incorporates a M3 screw with a toothed washer.

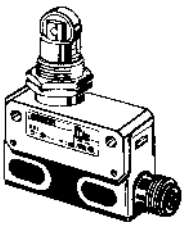
**Wiring Ease**
Wired made easier using (D4CC-type) plug-in connector.

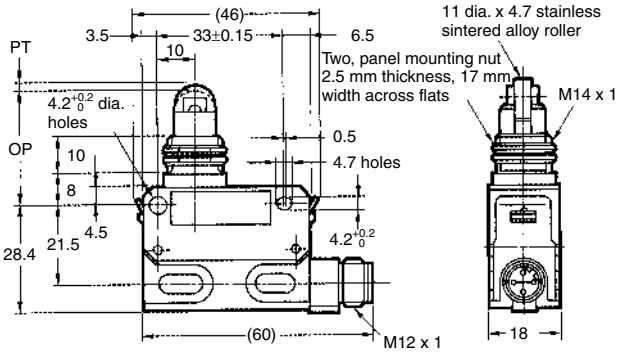
# Dimensions

**Note: 1.** All units are in millimeters unless otherwise indicated.
**2.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
**3.** A 3-m lead wire cable equivalent to the 3-conductor VCTF S-FLEX cable (0.75 $mm^2$, 7 mm in dia.) is provided.
**4.** A 5.8- to 7.6-dia. cable can be applied to the seal rubber for the lead wire outlet.

## Roller Plunger

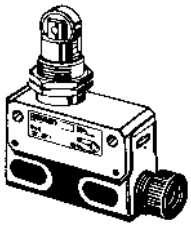
**D4E-1A00N**
**D4E-1A10N**
**D4E-2A00N**
**D4E-2A10N**

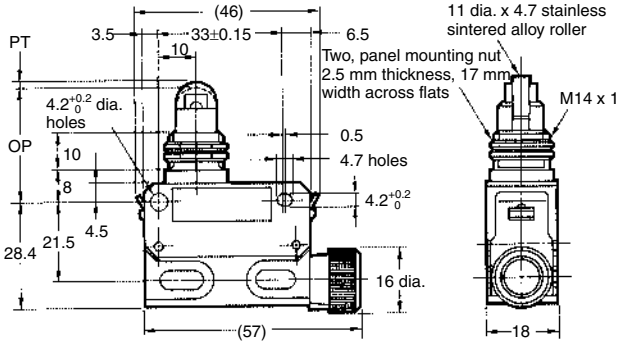





## Roller Plunger

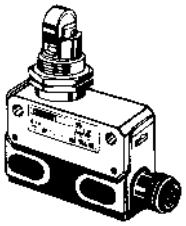
**D4E-1A20N (See note 4.)**
**D4E-2A20N (See note 4.)**
**D4E-1A21N (See note 3.)**
**D4E-2A21N (See note 3.)**

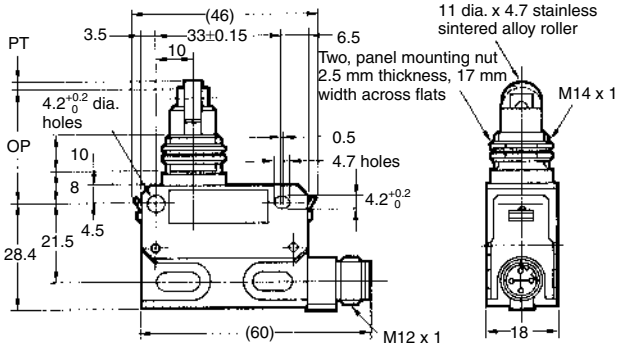





## Cross Roller Plunger

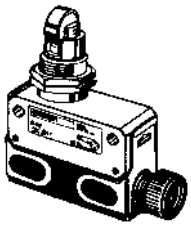
**D4E-1B00N**
**D4E-1B10N**
**D4E-2B00N**
**D4E-2B10N**

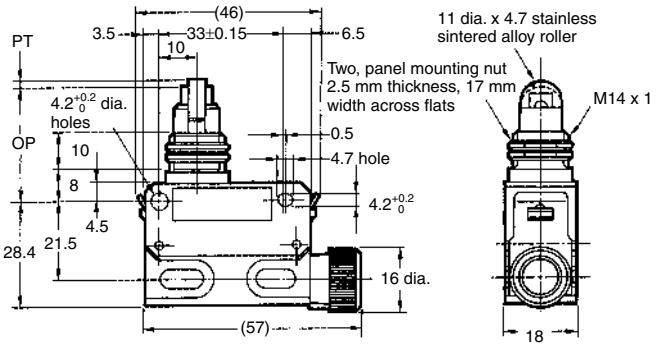





## Cross Roller Plunger

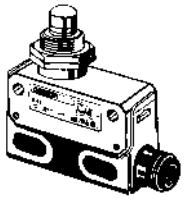
**D4E-1B20N**
**D4E-2B20N**
**D4E-1B21N**
**D4E-2B21N**

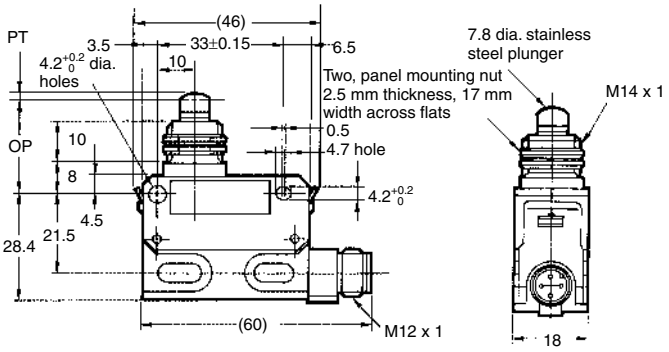




## Plunger

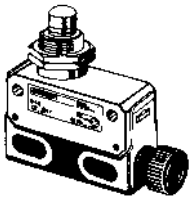
**D4E-1C00N**
**D4E-1C10N**
**D4E-2C00N**
**D4E-2C10N**

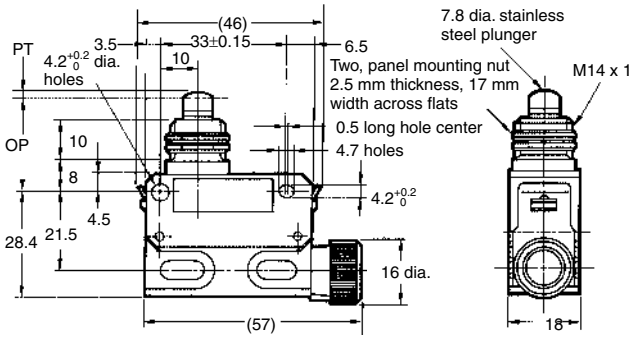





## Plunger

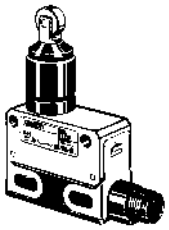
**D4E-1C20N (See note 4.)**
**D4E-2C20N (See note 4.)**
**D4E-1C21N (See note 3.)**
**D4E-2C21N (See note 3.)**

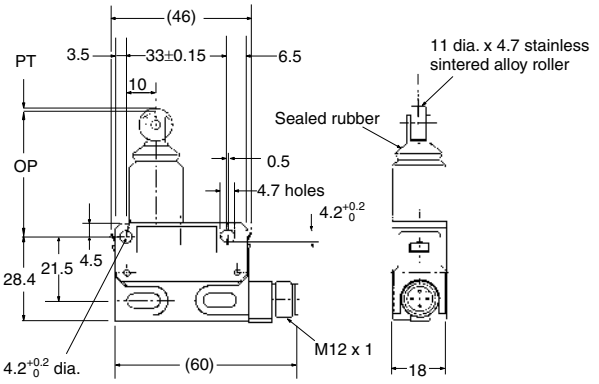





## Sealed Roller Plunger

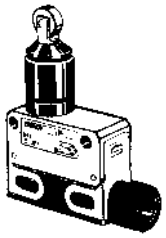
**D4E-1D00N**
**D4E-1D10N**
**D4E-2D00N**
**D4E-2D10N**

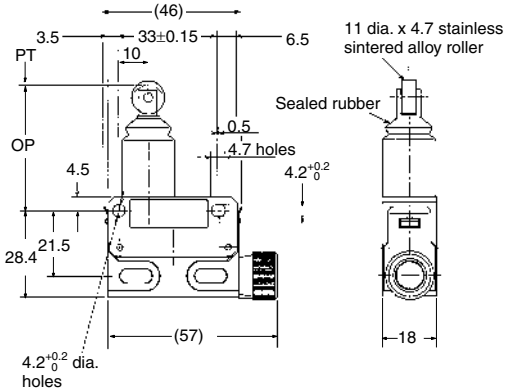





## Sealed Roller Plunger

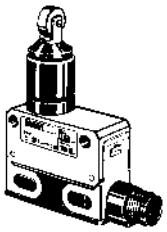
**D4E-1D20N (See note 4.)**
**D4E-2D20N (See note 4.)**
**D4E-1D21N (See note 3.)**
**D4E-2D21N (See note 3.)**

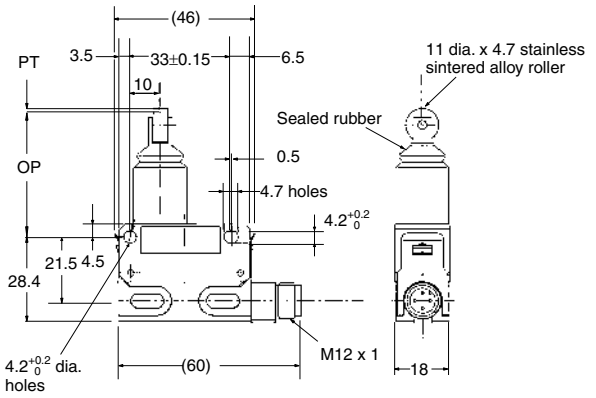




## Sealed Cross Roller Plunger

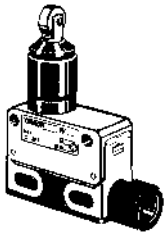
**D4E-1E00N**
**D4E-1E10N**
**D4E-2E00N**
**D4E-2E10N**

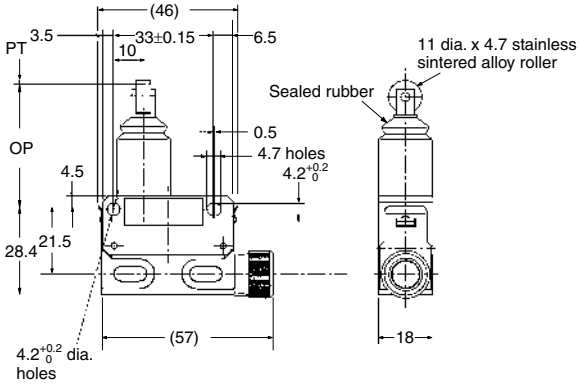





## Sealed Cross Roller Plunger

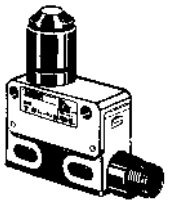
**D4E-1E20N (See note 4.)**
**D4E-2E20N (See note 4.)**
**D4E-1E21N (See note 3.)**
**D4E-2E21N (See note 3.)**

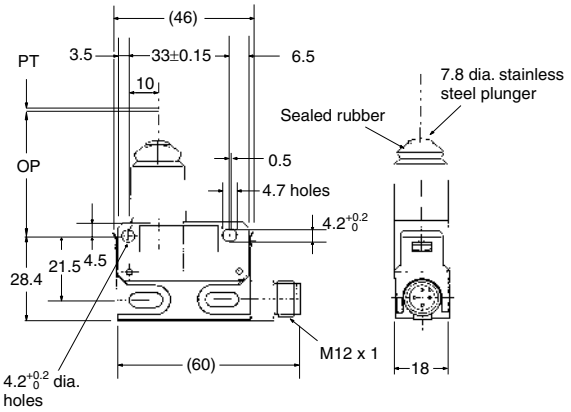





## Sealed Plunger

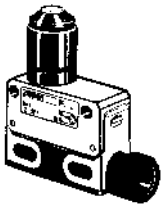
**D4E-1F00N**
**D4E-1F10N**
**D4E-2F00N**
**D4E-2F10N**

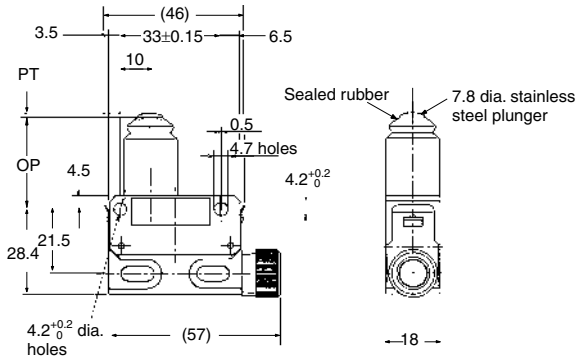





## Sealed Plunger

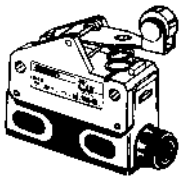
**D4E-1F20N (See note 4.)**
**D4E-2F20N (See note 4.)**
**D4E-1F21N (See note 3.)**
**D4E-2F21N (See note 3.)**

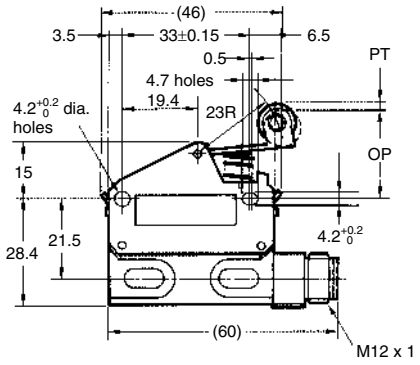




## Roller Lever

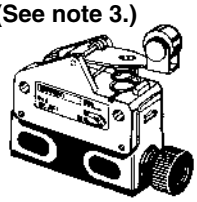
**D4E-1G00N**
**D4E-1G10N**
**D4E-2G00N**
**D4E-2G10N**

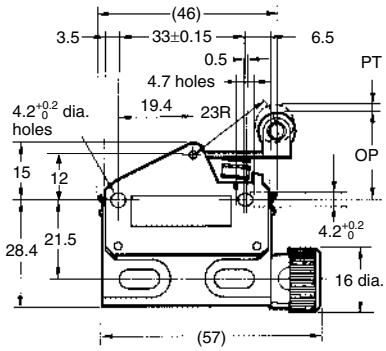





## Roller Lever

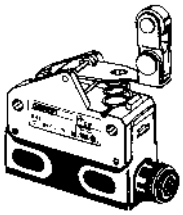
**D4E-1G20N (See note 4.)**
**D4E-2G20N (See note 4.)**
**D4E-1G21N (See note 3.)**
**D4E-2G21N (See note 3.)**

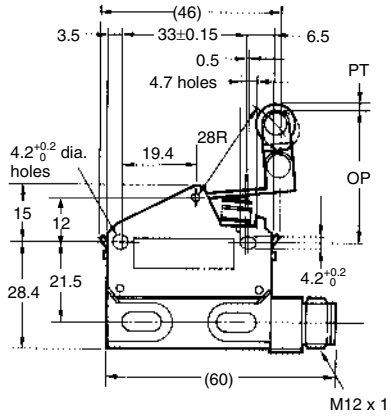





## One-way Action Roller Lever

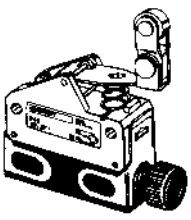
**D4E-1H00N**
**D4E-1H10N**
**D4E-2H00N**
**D4E-2H10N**

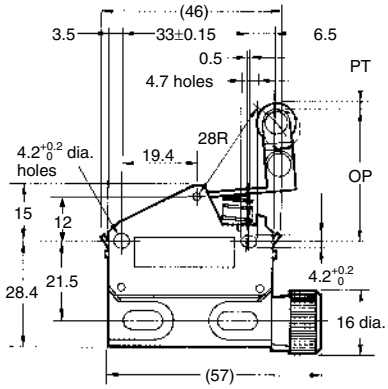



## One-way Action Roller Lever

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

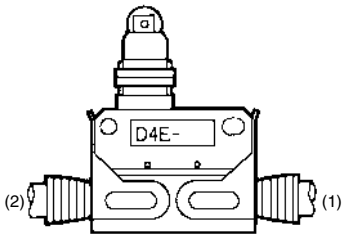


# Molded Terminal Models

## ■ Molded Terminal Models

The molded-terminal model is available with right-hand, left-hand and underside leads and is recommended for use where the Switch is exposed to dust, oil or moisture. It can be used like a screw-terminal model (with a cable), and the dimensions and operating characteristics are the same as for standard models.




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

### Suffix by Location of Lead Outlet

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

### Lead Supplies

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

### Comparison between Old and New Mold Terminal Models

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

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

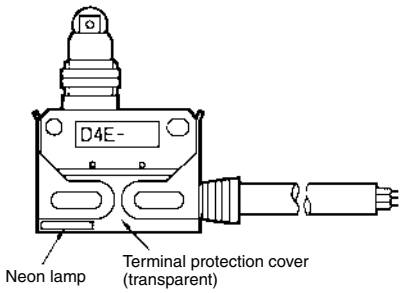
## ■ Operation of Indicator-equipped Models

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

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

### AC Operation

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

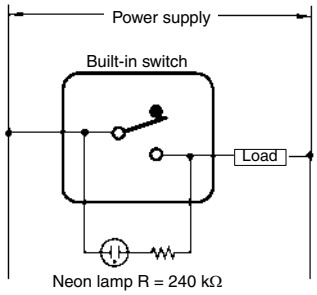



There is no difference in operating characteristics between D4E AC Models and corresponding D4E Standard Models.

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

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

### Internal Circuit

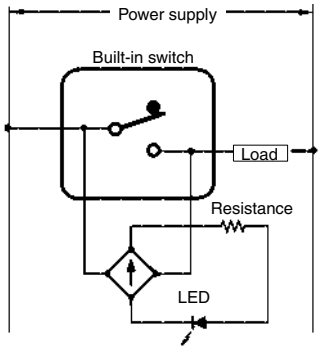


## DC Operation

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

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

### Internal Circuit




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

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

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

# Precautions

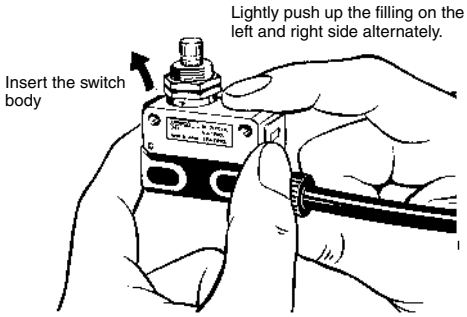
Refer to the *Technical Information for Limit Switches* (Cat. No. C121).

## ■ Correct Use

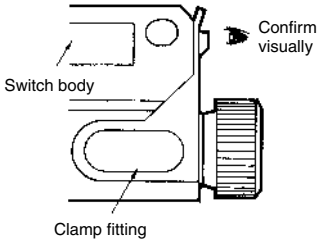
Do not solder the screw terminals.

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

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




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



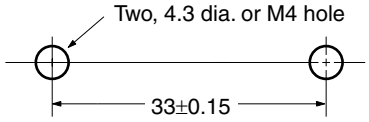

If the clamp is properly inserted up to the full depth, it will not slide out easily. Be sure to carefully confirm all the above items.

Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.
When using the Limit under the EN ratings, use a gI or gG 10-A fuse that conforms to IEC260.

## Mounting

Secure the Switch with two M4 screws and washers. The tightening torque applied to each terminal must be 1.18 to 1.37 N·m. Tighten the screws to the specified torque. An excessive tightening torque may damage the Switch and cause a malfunction.

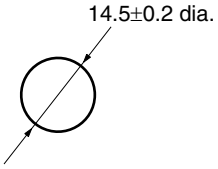
### Mounting Holes




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

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

### Mounting Hole




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

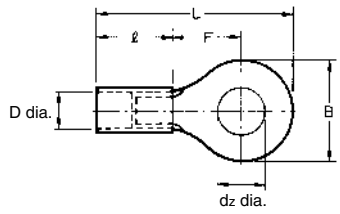
Check that OT has a sufficient margin. The actual OT should be rated OT x 0.7 to 1.

Do not change the operating position by remodeling the actuator.

## Wiring

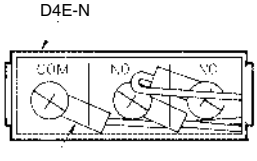
When wiring screw terminals, M3-size round solderless terminals with an insulation tube is recommended. The conductor size should be 0.75 $mm^2$ and cable diameter should be 7 mm.

Refer to the following when wiring.




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

**Wiring Method**

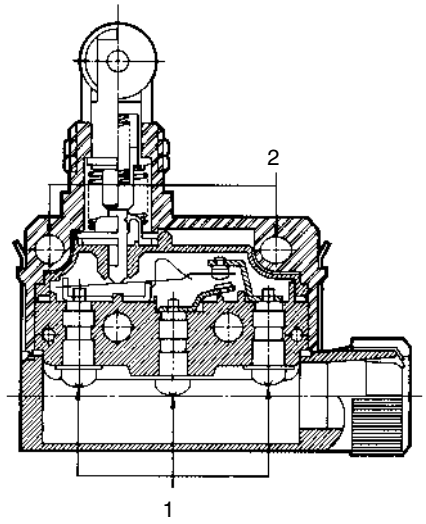



Round solderless terminal

## Tightening Torque

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

| No. | Type | Torque |
|---|---|---|
| 1 | Terminal screw (M3) | 0.24 to 0.44 N·m |
| 2 | Switch mounting screw (M4) | 1.18 to 1.37 N·m |




ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C028-E1-05

# Enclosed Switch
# SHL

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

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



# Model Number Structure

## ■ Model Number Legend

### Standard Models

**SHL-□55-□**
**1 2**

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

**2. Rated Current**
- None: Standard
- 01: Micro Load

**Note:** Refer to page 87 for *Molded Terminal Models.*

# Ordering Information

## ■ List of Models

| Actuator | Standard model | Micro voltage |
|---|---|---|
| **Plunger** | SHL-D55 | SHL-D55-01 |
| **Panel mount plunger** | SHL-Q55 | SHL-Q55-01 |
| **Panel mount roller plunger** | SHL-Q2255 | SHL-Q2255-01 |
| **Panel mount crossroller plunger** | SHL-Q2155 | SHL-Q2155-01 |
| **Short hinge lever** | SHL-W55 | SHL-W55-01 |

| Actuator | Standard model | Micro voltage |
|---|---|---|
| **Hinge lever**  | SHL-W155 | SHL-W155-01 |
| **Short hinge roller lever**  | SHL-W255 | SHL-W255-01 |
| **Hinge roller lever**  | SHL-W2155 | SHL-W2155-01 |
| **One-way action short hinge roller lever**  | SHL-W355 | SHL-W355-01 |
| **One-way action hinge roller lever**  | SHL-W3155 | SHL-W3155-01 |

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL/CSA

#### A300

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

### TÜV Rheinland Approved Ratings (EN60947-5-1)

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

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

## ■ Ratings

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

**Note: 1.** The above figures are for steady-state currents.

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

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

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

## Micro Voltage/Current Load Model

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

# ■ Characteristics

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

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

**2.** The above ratings may vary depending on the model. Contact your OMRON representative for further details.

**3.** The head section of the plunger type SHL-D(Q)□□ is excluded.

**4.** Durability values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

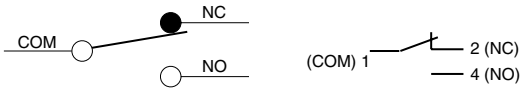
**5.** The values are for the plunger-type models.

# ■ Operating Characteristics

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

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

## ■ Contact Form

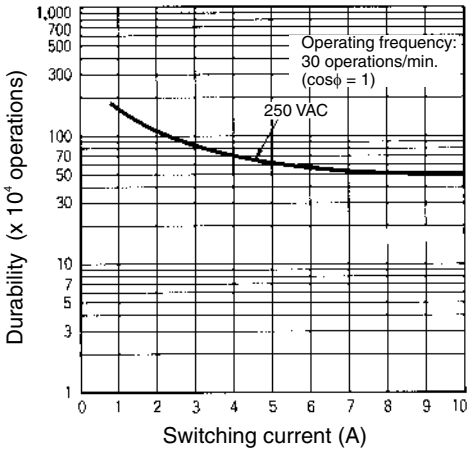



EN60947-5-1

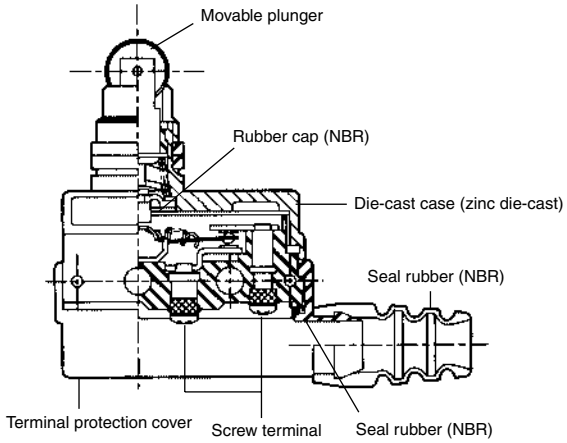
# Engineering Data

## ■ Electrical Durability

Ambient temperature: 5˚C to 35˚C
Ambient humidity: 40% to 50%



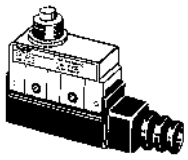

# Nomenclature

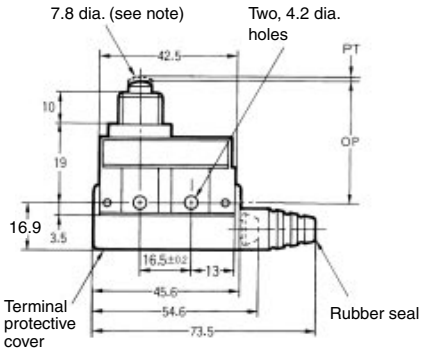


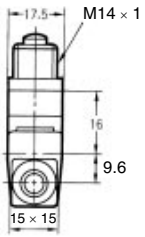
# Dimensions

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

### Plunger
### SHL-D55, SHL-D55-01

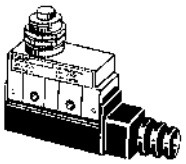


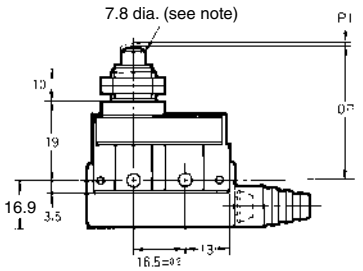


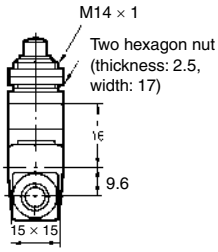




**Note:** Stainless steel pin plunger

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

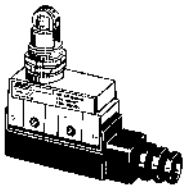


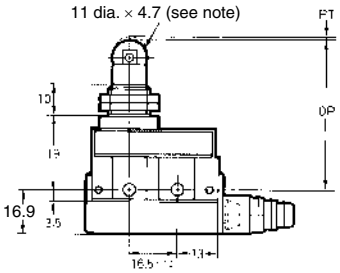


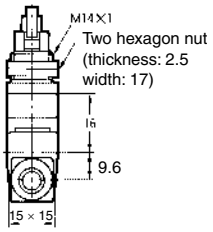




**Note:** Stainless steel pin plunger

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

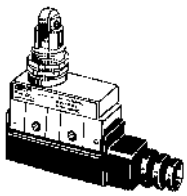


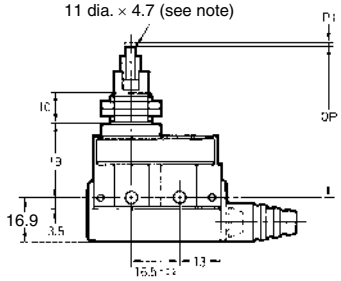


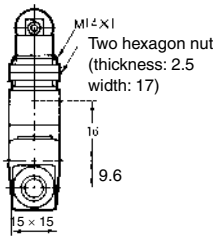




**Note:** Stainless sintered alloy roller

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

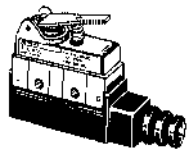


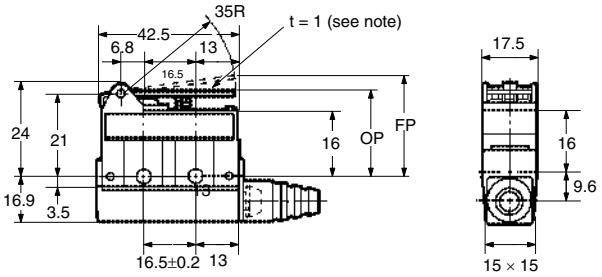



**Note:** Stainless sintered alloy roller

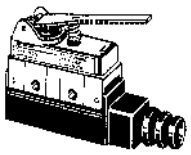
### Short Hinge Lever
### SHL-W55, SHL-W55-01

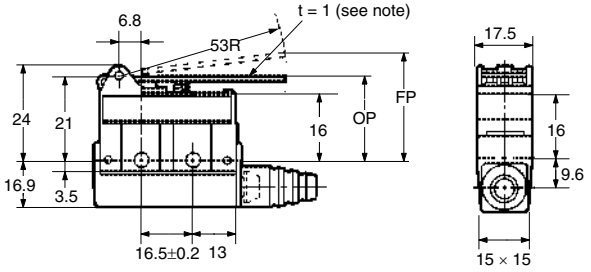





**Note:** Stainless steel lever

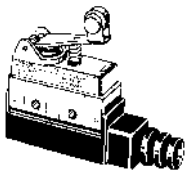
### Hinge Lever
### SHL-W155, SHL-W155-01

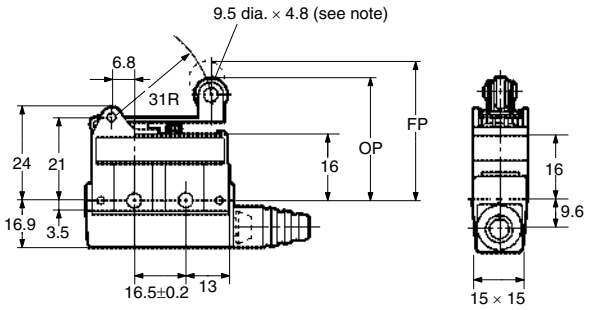





**Note:** Stainless steel lever

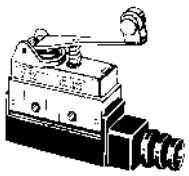
### Short Hinge Roller Lever
### SHL-W255, SHL-W255-01

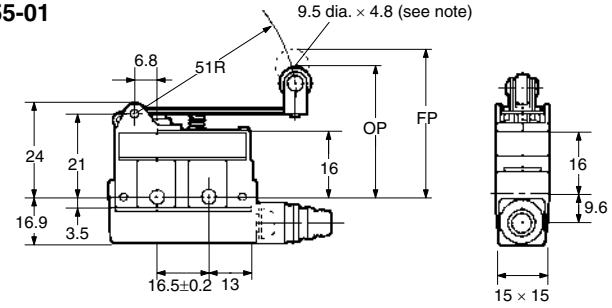





**Note:** Sintered stainless roller

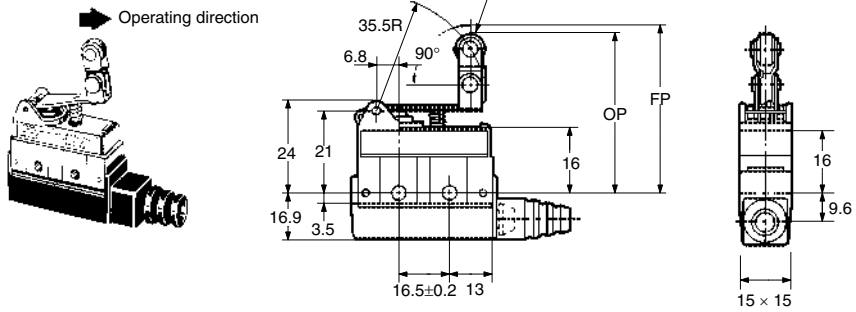
### Hinge Roller Lever
### SHL-W2155, SHL-W2155-01





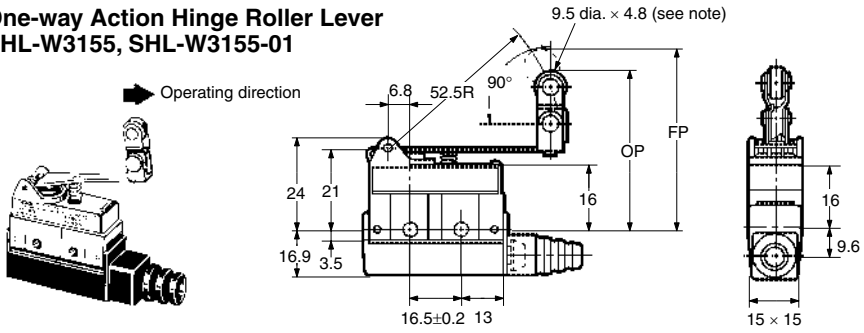

**Note:** Sintered stainless roller

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




**Note:** Stainless sintered roller

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




**Note:** Stainless sintered roller

# Molded Terminal Models

## ■ Model Number Legend

### Molded Terminal Models

**SHL-□55-□□M□**
**1 2 3 4**

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

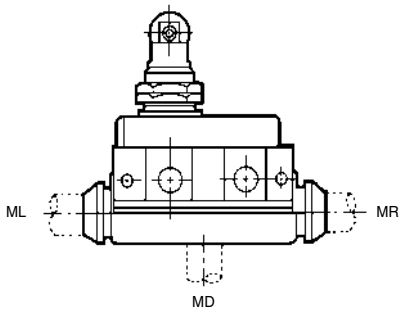
**3. Operation Indicator**

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

**4. Location of Lead Outlet**

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

Use of the molded terminal model is recommended in locations subject to excessive dust, oil drips, or moisture.
All types of SHL Switches can be fabricated into a molded terminal version. In this case, the molded terminal model will have the same dimensions an operating characteristics as the basic model from which the molded terminal model is fabricated.




### Suffix by Location of Lead Outlet

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

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

**Example:**
Basic type: SHL-Q2255
Location of lead outlet: Right-hand
When placing your order for the above Switch specify the model number as SHL-Q2255-MR



### Lead Supplies

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

## ■ Operation Indicator-equipped Models

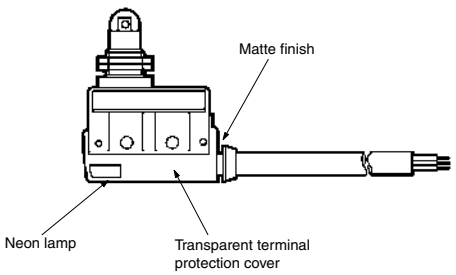
UL, CSA and/or EN (IEC) approved models are available.

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

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

### AC Operation

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

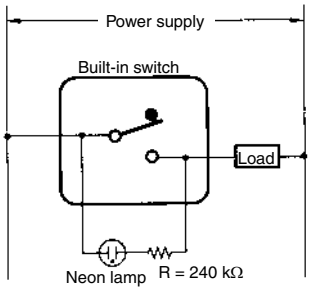



Operating characteristics are the same as the basic model from which the operation indicator equipped model is fabricated.

Dimension are the same as the standard model.

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

### Contact Circuit



## DC Operation

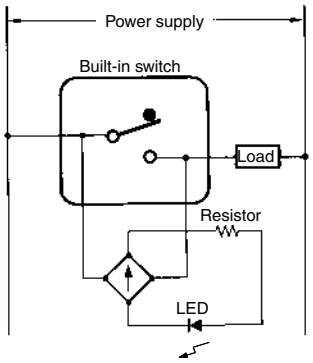
LED indicator is provided.
As a rectifier stack is incorporated, into the unit and no directionality exists for connection of + and –, this type can also be operated on AC.

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

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

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

### Contact Circuit




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

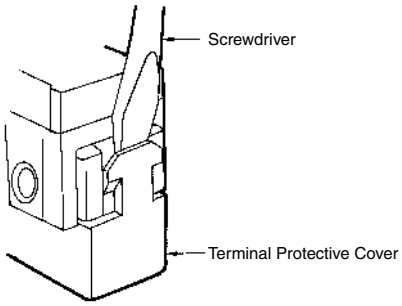
# Precautions

## ■ Correct Use

Be sure to connect a fuse with a breaking current 1.5 to 2 times the rated current to the Limit Switch in series in order to protect the Limit Switch from damage due to short-circuiting.
When using the Limit under the EN ratings, use a gI or gG 10-A fuse that conforms to IEC260.

## Handling

When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



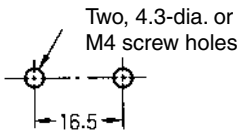

When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.

## Mounting

Secure the Switch with two M4 screws and washers. The tightening torque applied to each terminal must be 1.18 to 1.37 N·m. Tighten the screws to the specified torque. An excessive tightening torque may damage the Switch and cause a malfunction.

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

### Mounting Holes




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

## Tightening Torque

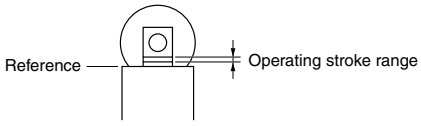
A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

| No. | Type | Torque |
|---|---|---|
| 1 | Terminal screw (M3 screw) | 0.24 to 0.44 N·m |
| 2 | Panel mounting screw (M4 screw) | 1.18 to 1.37 N·m |

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

### Operating Stroke

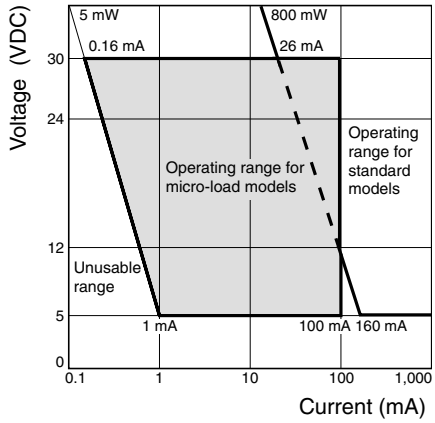
Ensure that the operating stroke for roller plunger models is within the set position display.



## Micro Load Applicable Ranges

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

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




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

## Others

The standard seal rubber for the lead wire outlet is one that allows 6- to 8-dia. cables. The appropriate nominal cross-section of the lead wire is 0.75 $mm^2$. (When the sealing capability is required over a long period of time, use mold specifications.)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C026-E1-09

# Two-circuit Limit Switch
# WL

## Wide Selection of Two-circuit Limit Switches

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



# Model Number Structure

## ■ Model Number Legend

### General-purpose Models/Environment-resistant Models

**WL□□-□□□□□□□□**
**1 2 3 4 5 6 7 8 9 10**

**1. Electrical Rating**

Blank: Standard
01: Micro

**2. Actuator and Head Specifications**

| Symbol | Actuator type | Switches without levers |
|---|---|---|
| CA2 | Roller lever: Standard model (R38) | WLRCA2 |
| CA2-7 | Roller lever: Standard, standard model (R50) | WLRCA2 |
| CA2-8 | Roller lever: Standard, standard model (R63) | WLRCA2 |
| H2 | Roller lever: Overtravel, general-purpose model, 80° | WLRH2 |
| G2 | Roller lever: Overtravel, high-sensitivity, 80° | WLRG2 |
| CA2-2N | Roller lever: Overtravel, 90° | WLRCA2-2N |
| GCA2 | Roller lever: High-precision | WLRGCA2 |
| CA12 | Adjustable roller lever: Standard | WLRCA2 |
| H12 | Adjustable roller lever: Overtravel, general-purpose model, 80° | WLRH2 |
| G12 | Adjustable roller lever: Overtravel, high-sensitivity, 80° | WLRG2 |
| CA12-2N | Adjustable roller lever: Overtravel, 90° | WLRCA2-2N |
| CL | Adjustable rod lever: Standard | WLRCL |
| HL | Adjustable rod lever: Overtravel, general-purpose model, 80°, 25 to 140 mm | WLRH2 |
| HLAL4 | Adjustable rod lever: Overtravel, general-purpose model, 80°, 350 to 380 mm | WLRH2 |
| GL | Adjustable rod lever: Overtravel, high-sensitivity, 80°, 25 to 140 mm | WLRG2 |
| CL-2N | Adjustable rod lever: Overtravel, 90°, 25 to 140 mm | WLRCA2-2N |
| HAL5 | Rod spring lever: Protective, Overtravel, general-purpose model, 80° | WLRH2 |
| CA32-41 | Fork lever lock: Protective, WL-5A100 | WLRCA32 |
| CA32-42 | Fork lever lock: Protective, WL-5A102 | WLRCA32 |
| CA32-43 | Fork lever lock: Protective, WL-5A104 | WLRCA32 |
| D | Plunger: Top plunger | --- |
| D2 | Plunger: Top-roller plunger | --- |
| D28 | Plunger: Sealed top-roller plunger | --- |
| D3 | Plunger: Top-ball plunger | --- |
| SD | Plunger: Horizontal plunger | --- |

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

**3. Environment-resistant Model Specifications**

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

**4. Built-in Switch Specifications**

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

**5. Temperature Specifications**

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

**6. Special Hermetic Model Specifications**

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

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

| | | |
|---|---|---|
| Blank: | G $^1/_2$ | Without ground terminal |
| G1: | G $^1/_2$ | With ground terminal |
| G: | Pg13.5 | With ground terminal |
| Y: | M20 | With ground terminal |
| TS: | $^1/_2$-14NPT | With ground terminal |

**8. Indicator Type**

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

**9. Lamp Wiring**

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

**10. Lever Type**

Blank: Standard lever
A: Double nut lever

**Note: 1.** For information on applicable models, see page 94.
**2.** Switches with ground terminals meet EN/IEC standards (and have the CE marking).

## Ground Terminal Models

**WL□ - □**
**1 2**

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

| Model | Conduit opening size |
|---|---|
| G1 | G $^1/_2$ |
| G | Pg 13.5 |
| Y | M20 |
| TS | $^1/_2$-14NPT |

## Sensor I/O Connector Models

**WL □ □ - □ LD □**
**1 2 3 4**

**1. Electrical Rating**
- Blank: Standard
- 01: Microload

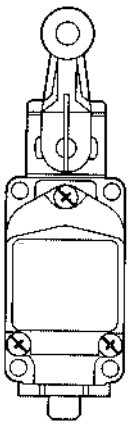
**2. Actuator Type**
- CA2: Roller lever: Standard
- GCA2: Roller lever: High-precision
- H2: Roller lever: Overtravel, general-purpose
- G2: Roller lever: Overtravel, high-sensitivity
- D2: Plunger: Top-roller plunger
- D28: Plunger: Sealed top-roller plunger

**3. Built-in Switch Type**
- Blank: Standard
- 55: Hermetically sealed

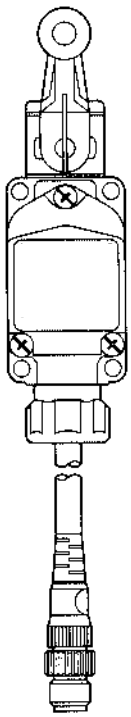
**4. Wiring Specifications**
- K13A: Direct-wired Connector (2-core: AC, NO wiring, connector pins No. 3, 4)
- K13: Direct-wired Connector (2-core: DC, NO wiring, connector pins No. 3, 4)
- K43A: Direct-wired Connector (4-core: AC)
- K43: Direct-wired Connector (4-core: DC)
- -M1J: Pre-wired Connector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

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

Direct-wired Connector



Pre-wired Connector



## Spatter-prevention Models

**WL□ □ - □□S □**
**1 2 3 4 5**

**1. Electrical Rating**
Blank: Standard
01: Microload

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

**3. Built-in Switch Type**
Blank: Standard
55: Hermetically sealed

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

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

**Note:** With 0.3-m cable attached.

# Ordering Information

## ■ Classification

| Specifications | | | Standard | Overtravel | High-precision | Features | Page |
|---|---|---|---|---|---|---|---|
| Actuators | Roller lever | | Yes | Yes | Yes | Five models: Roller lever, adjustable roller lever, adjustable rod lever, fork lever lock, rod spring lever. | 111 to 128<br>96 to 98<br>103, 107 to 109 |
| | Plunger | | Yes | --- | --- | Six models: Top plunger, top-roller plunger, top-ball plunger, horizontal plunger, horizontal-roller plunger, horizontal-ball plunger. | |
| | Flexible rod | | Yes | --- | --- | Two models: coil spring and steel wire. | |
| Load/ contact | Standard load | SPST-NO/ SPST-NC type | Yes | | | Standard models use a two-circuit double-break switch. | |
| | Microload | SPST-NO/ SPST-NC type | Yes | | | Specifications include gold-plated contacts. | |
| Environment-resistant models (See note 3.) | Airtight-seal | WL□-55 | Yes (Cannot be used with heat-resistive and low-temperature models.) | | | Uses an airtight-sealed built-in switch. | 100, 110 |
| | Hermetic seal / Molded terminals | WL□-139 | | | | Lead wires are attached.<br>The case cover and conduit section are molded from epoxy resin to improve sealing performance. | |
| | | WL□-140<br>WL□-141<br>WL□-145 | | | | Lead wires are attached.<br>The case is filled with epoxy resin, to ensure high sealing performance.<br>The Head opening is protected from cutting powder. (WL□-141 and -145 models)<br>Only WLG2, WLCA2, and WLGCA2 can be fabricated. (WL□-141 models.) | |
| | Anti-coolant | WL□-RP40 | | | | The connector can be removed, so it is possible to use flexible wires in the cable. The Head can be removed. | |
| | | WL□-RP60 | | | | Rubber parts are made from fluorine rubber. The Head cannot be removed. | |
| | Spatter-prevention | WL□-S | Yes | | | To improve spatter prevention during welding, a heat-resistant resin is used, and screws and rollers are all made from stainless steel. | 101, 103, 105, 107, 110, 123 |

| Specifications | | | Standard | Overtravel | High-precision | Features | Page |
|---|---|---|---|---|---|---|---|
| Environment-resistant models (See note 3.) | Heat-resistive | WL□-TH | Yes (Cannot be used with airtight, hermetic, low-temperature, corrosion-proof, or lamp-equipped models.) | | | To improve heat resistance, silicone rubber is used for rubber parts and for the built-in switch. The operating temperature range is +5°C to 120°C. | 100 |
| | Low-temperature | WL□-TC | Yes (Cannot be used with airtight, hermetic, heat-resistive, corrosion-proof, or lamp-equipped models.) | | | To improve low temperature resistance, silicone rubber is used. The operating temperature range is –40°C to 40°C. | |
| | Corrosion-proof (See note 4.) | WL□-RP | Yes (Cannot be used with lamp-equipped models.) | | | Diecast parts such as the switch box are made of corrosion-proof aluminum. Rubber-sealing parts are made of fluorine rubber and exposed nuts and screws are made of stainless steel. These all aid in resisting oil, chemicals and adverse weather conditions. | |
| | Outdoor specifications | WL□-P1 | --- (See note 5.) | Yes (See note 6.) | --- | Rotary shafts are made of unquenched (i.e., untreated) stainless steel to improve corrosion resistance. Exposed nuts and screws are made of stainless steel and rubber sealing parts of silicone rubber. These factors all combine to create a product which is resistant to temperature changes and adverse weather conditions. | |
| Lamp-equipped | | WL□-LE | Yes | | | Operating status can be checked at a glance. Lit when operating and not lit when not operating. WL□-LE: 100 VAC/VDC min. WL□-LD: 115 VAC/VDC min. (Refer to page 105 for detailed ratings.) | 98, 106, 107, 109, 120 |
| | | WL□-LD | Yes | | | | |
| Relevant pages | | | Pages 111 to 128 | | | --- | --- |

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

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

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

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

**3.** When ordering, add the suffix for the environment-resistant model or indicator specifications required according to the operating environment and purpose.

**4.** The overtravel model (-2N Series), fork lever lock model (WLCA32-41 to 44), horizontal plunger (WLSD□) model, heat-resistive model, low-temperature model, and lamp-equipped model cannot be used with the corrosion-proof model.

**5.** Outdoor specifications are available for some standard models. Consult your OMRON representative for details.

**6.** Outdoor specifications are only available for general models and high-sensitivity models.

# ■ List of Models

## General-purpose Models

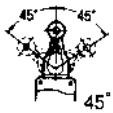
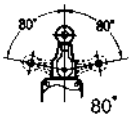
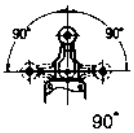
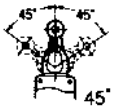
These Limit Switches are two-circuit double-break switches housed in rugged diecast, thus making it an oil-tight, waterproof and dustproof construction (complies with IP67).

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

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

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

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

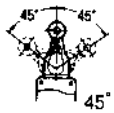
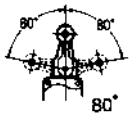
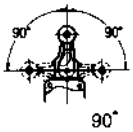
| Type | | Total travel (TT) | Features | Actuator (See note 2.) | | |
|---|---|---|---|---|---|---|
| | | | | WL-1A100 Roller Lever: Short lever (R38)  | WL-1A200 Roller Lever: Medium lever (R50)  | WL-1A300 Roller Lever: Long lever (R63)  |
| Standard | |   | One-side operation is possible. (See note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

**Note: 1.** For the approved standards file numbers, refer to page 103.

**2.** For external dimensions and other information, refer to pages 111 to 128.

**3.** One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 128.

### Adjustable Roller Levers and Adjustable Rod Levers

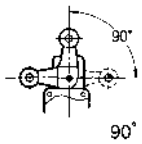
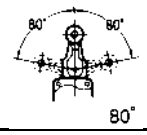
| Type | | Total Travel (TT) | Features | Actuator (See note 2.) | |
|---|---|---|---|---|---|
| | | | | WL-2A100 Adjustable Roller Lever  | WL-4A100 Adjustable Rod Lever (Adjustable length: 25 to 140 mm) WL-3A100 (Adjustable length: 350 to 380 mm)  |
| Standard | |   | One-side operation possible. (See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

**Note: 1.** For the approved standards file numbers, refer to page 103.

**2.** For external dimensions and other information, refer to pages 111 to 128.

**3.** One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. The operating plunger is set for operation on both sides before delivery. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 128. The operational plunger is factory-set to both sides.

### Rod Spring Levers and Fork Lever Locks

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

**Note: 1.** For the approved standard file numbers, refer to page 103.

**2.** For external dimensions and other information, refer to pages 111 to 128.

**3.** One-side operation means that three operational directions can be selected electrically, according to the change in direction of the operating plunger. The operating plunger is set for operation on both sides before delivery. Those models for which one-side operation is impossible can only operate on both sides. For details, see page 128. The operational plunger is factory-set to both sides.

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

### Standard Plungers

| Type | Actuators | Model |
|---|---|---|
| Top | Top Plunger  | WLD |
| | Top-roller Plunger  | WLD2 |
| | | WLD28 (See note.) |
| | Top-ball Plunger  | WLD3 |
| Horizontal | Horizontal Plunger  | WLSD |
| | Horizontal-roller Plunger  | WLSD2 |
| | Horizontal-ball Plunger  | WLSD3 |

**Note:** Sealed roller.

### Standard Flexible Rods

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

### Microload Models

A series of microload models has also been developed for the configurations outlined on pages 96 to 98. The model numbers become WL01□. For example, WLCA2 becomes WL01CA2.

## Lamp-equipped Models

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

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

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

### Ordering Information

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

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

WLCA2 LE
↑ ↑
Standard Lamp specifications

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

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

WLCA2-139 LE 2
↑ ↑ ↑
Standard Lamp specifications Lamp wiring

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

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

## Sensor I/O Connector Models

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

### Ordering Information

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

**Note: 1.** Standard Models: For standard models only one-side operation at an angle of 45° is possible.
Overtravel Models: Only one-side operation at an angle of 80° is possible. One-side operation only is not possible.
High-precision Models: Only one-side operation at an angle of 45° is possible, and pretravel (PT) is 5°, as opposed to 15° for standard models.

**2.** For information other than that listed at the above, contact your OMRON representative.

**3.** The spatter-prevention models are only available as pre-wired connectors.

### Direct-wired Connectors

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

**Note: 1.** In the model number, □ indicates the actuator number. For example, Overtravel Model WLG2-LDK13.

**2.** The lamp is set to "light-ON when not operating" (NO connection).

### Pre-wired Connectors

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

**Note: 1.** In the model number, □ indicates the actuator number. For example, Overtravel Model WLG2-LD-M1J.

**2.** The lamp is set to "light-ON when not operating" (NO connection).

# Environment-resistant Models

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

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

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

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

**2.** Use the SC Connector for the conduit opening.

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

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

## Ordering Information

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

E.g.: For a hermetic model of WLCA2

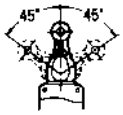
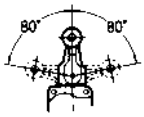
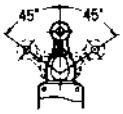
WLCA2 - 55
↑ ↑
Standard Specifications No.

An additional catalog is available for outdoor specifications models.

## Spatter-prevention Models

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

### Standard Models

| Type | | Total travel (TT) | Actuators | Neon lamp | | LED |
|---|---|---|---|---|---|---|
| | | | | 125 VAC | 250 VAC | 10 to 115 VAC/DC |
| | | | | Approx. 0.6 mA | Approx. 1.9 mA | Approx. 0.5 mA |
| Standard | | One-side operation is possible  | Double nut lever  | WLCA2-LEAS | | WLCA2-LDAS |
| | | | Allen-head lever  | WLCA2-LES | | WLCA2-LDS |
| Overtravel | General | One-side operation is impossible  | Double nut lever | WLH2-LEAS | | WLH2-LDAS |
| | | | Allen-head lever | WLH2-LES | | WLH2-LDS |
| | High-sensitivity | | Double nut lever | WLG2-LEAS | | WLG2-LDAS |
| | | | Allen-head lever | WLG2-LES | | WLG2-LDS |
| High-precision | | One-side operation is possible  | Double nut lever  | WLGCA2-LEAS | | WLGCA2-LDAS |
| | | | Allen-head lever  | WLGCA2-LES | | WLGCA2-LDS |

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

### Levers/Lamp-equipped Covers

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

### Switches Without Lever

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

## Head Models

| Actuators | Set model | Head model | Head model without lever |
|---|---|---|---|
| **Roller lever**  | WLCA2 | WL-1H1100 | WLRCA2 |
| | WLGCA2 | WL-1H1100-1 (See note.) | WLRGCA2 |
| | WLG2 | WL-2H1100 | WLRG2 |
| | WLH2 | WL-2H1100-1 (See note.) | WLRH2 |
| | WLCA2-2N | WL-6H1100 | WLRCA2-2N |
| **Adjustable roller lever**  | WLCA12 | WL-1H2100 | WLRCA2 |
| | WLG12 | WL-2H2100 | WLRG2 |
| | WLH12 | WL-2H2100-1 (See note.) | WLRH2 |
| | WLCA12-2N | WL-6H2100 | WLRCA2-2N |
| **Adjustable rod lever**  | WLCL | WL-4H4100 | WLRCL |
| | WLGL | WL-2H4100 | WLRG2 |
| | WLCL-2N | WL-6H4100 | WLRCA2-2N |
| **Top plunger**  | WLD | WL-7H100 | --- |
| | WLD2 | WL-7H200 | |
| | WLD3 | WL-7H300 | |
| | WLD28 | WL-7H400 | |
| **Horizontal plunger**  | WLSD | WL-8H100 | --- |
| | WLSD2 | WL-8H200 | |
| | WLSD3 | WL-8H300 | |
| **Fork lever lock**  | WLCA32-41 | WL-5H5100 | WLRCA32 |
| **Coil spring**  | WLNJ | WL-9H100 | --- |
| | WLNJ-30 | WL-9H200 | |
| | WLNJ-2 | WL-9H300 | |
| | WLNJ-S2 | WL-9H400 | |

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

# Specifications

## ■ Approved Standards

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

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

## ■ Approved Standard Ratings

### General-purpose Models

#### UL/CSA

Standard Models: A600

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

Microload Models:
0.1 A at 125 VAC, 0.1 A at 30 VDC

#### TÜV (EN60947-5-1)

(Only Ground Terminal Models are Approved)

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

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

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

### Spatter-prevention Models

#### UL/CSA

**LE (Neon Lamp) A300**

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

**LD (LED)**

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

# ■ Ratings

## General-purpose Models/Environment-resistant Models

### Standard Load Models

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

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

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

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

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

**5.** For PC loads, use the microload models.

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

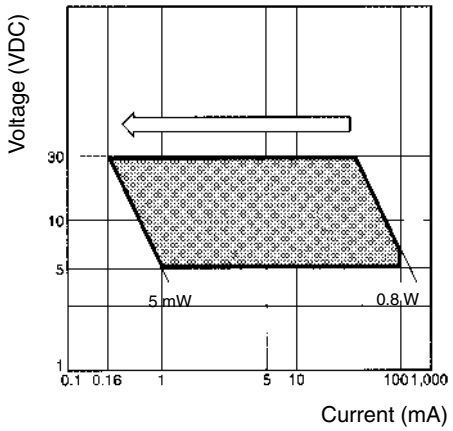
**Note:** Only for high-sensitivity overtravel models.

### Microload Models

| Rated voltage | Resistive load |
|---|---|
| 125 VAC | 0.1 A |
| 30 VDC | |

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

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




### Lamp-equipped Models

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

## Sensor I/O Connector Models

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

**Note: 1.** The above figures are for standard currents.
**2.** Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp load has an inrush current of 10 times the steady-state current.
**4.** Motor load has an inrush current of 6 times the steady-state current.

## Spatter-prevention Models

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

**Note: 1.** The above figures are for standard currents.
**2.** Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp load has an inrush current of 10 times the steady-state current.
**4.** Motor load has an inrush current of 6 times the steady-state current.

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

# ■ Characteristics

## General-purpose Models/Environment-resistant Models

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

**Note: 1.** The above figures are initial values.

**2.** The figures in parentheses for dielectric strength, are those for the overtravel (high-sensitivity) model.

**3.** The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

**4.** 10,000,000 operations min. for general-purpose, high-sensitivity, and flexible rod overtravel models.

**5.** 500,000 operations min. for high-precision and outdoor specifications models. All microload models however, are 1,000,000 operations min.

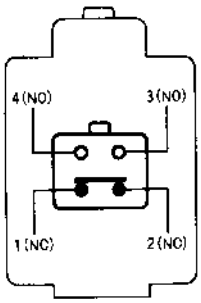
**6.** Except the flexible rod models. The shock resistance (malfunction) for microload models is 200 m/s$^2$ min.

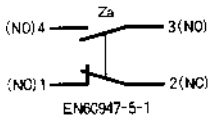
**7.** For low temperature models this is –40°C to 40°C (no icing). For heat-resistive models the range is +5°C to 120°C.

# ■ Contact Form

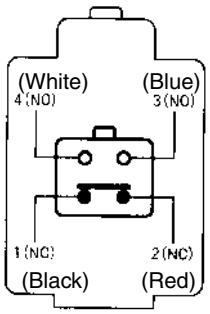
## General-purpose Models

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



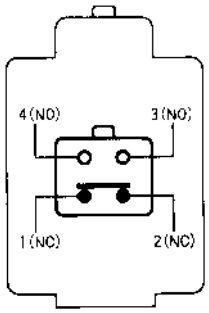




## Environment-resistant Models

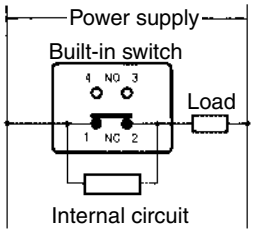
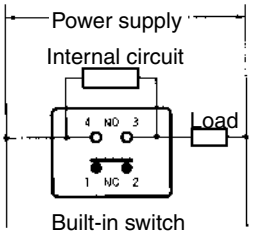



## Spatter-prevention Models

### Standard Model



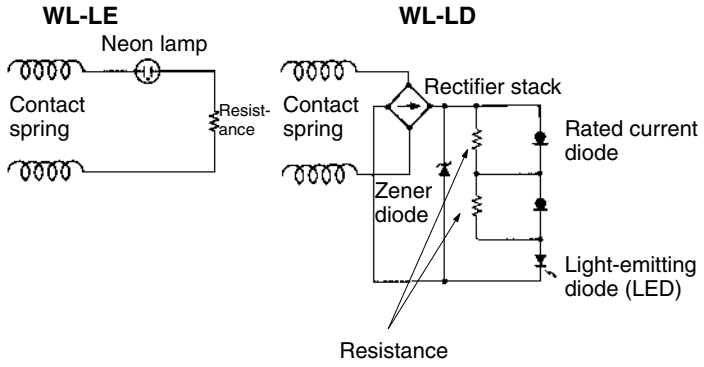

### Lamp-equipped Models

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

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

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

### Internal circuit of Lamp-equipped Models




## ■ Wiring Specifications of Sensor I/O Connector Models

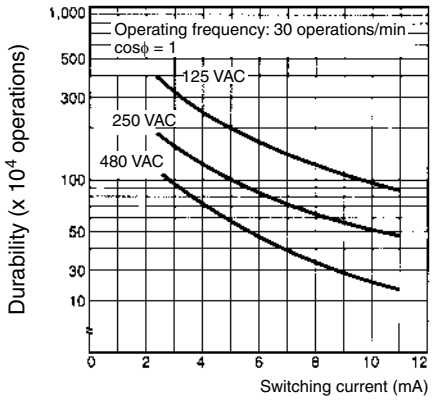
| Direct-wired Connector | | | | Pre-wired Connector | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2-core | | 4-core | | 2-core | | | | | | 4-core | | 3-core | |
| K13 (DC) K13A (AC) | | K43 (DC) K43A (AC) | | M1J (DC) | | M1GJ (DC) | | M1JB (DC) | | DGJ03 (DC) AGJ03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

# Engineering Data

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

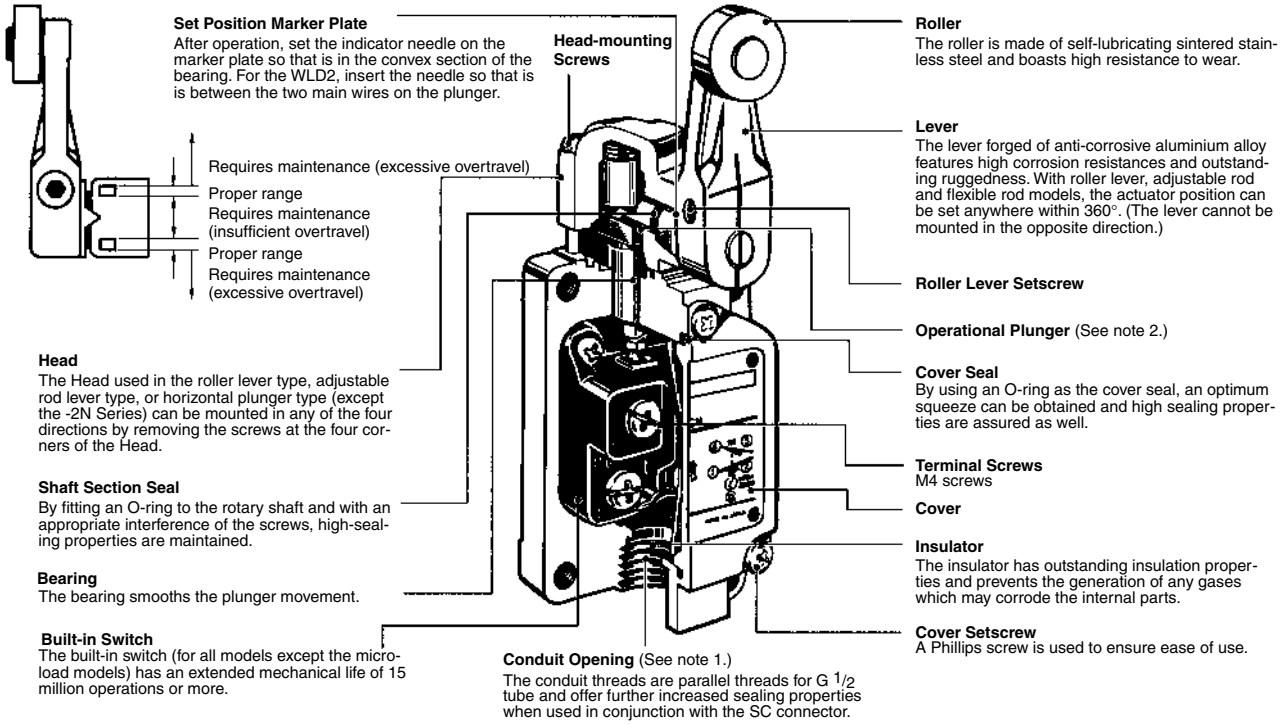
### Electrical Durability

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



# Nomenclature

## ■ General-purpose Models



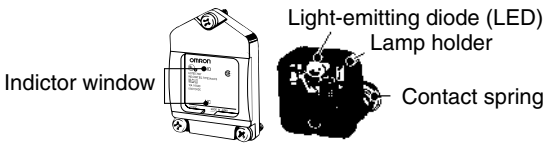

**Note: 1.** The display for conduit threads has changed from PF$^1/_2$ to G$^1/_2$ according to revisions of JIS B 0202. This is only a change in the display, so the thread size and pitch have not changed. (Conduit threads Pg 13.5 and $^1/_2$-14NPT are also available.)

**2.** By changing the orientation of the operational plunger, three operational directions can be selected electrically. (This is only possible with general-purpose roller lever, adjustable roller lever, and adjustable rod lever models. For the overtravel models, only -2N Series models have this function.)

## Lamp-equipped Models

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

Circuit checks and troubleshooting errors are easy done.



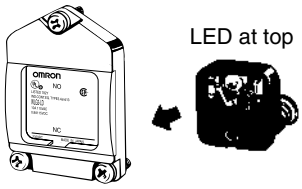

The built-in switch's terminal screws are used to connect the lamp terminal (indicator cover). Since the connection spring (coil spring) is used for this connection, it will not be necessary to connect to the lamp terminal. When a ground terminal is provided however, lead wire method must be used.

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

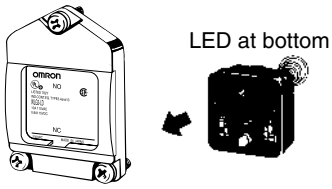
The indicator cover is molded from diecast aluminum and has outstanding sealing properties. Furthermore, regardless of whether the power is connected or not, the operating status is shown (operating or not operating), and indicators can be switched from light-ON when operating and light-ON when not operating,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

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

Light-ON when Operating

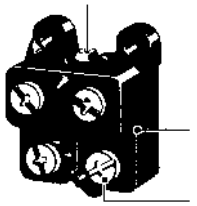



Light-ON when Not Operating



# ■ Environment-resistant Models

**Airtight Built-in Switch**



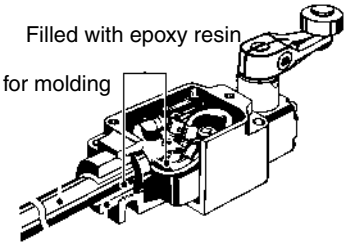
Sealed by the rubber boot of the plunger

Sealed by the resin molded into the case cover

Four, M4 ±terminal screws

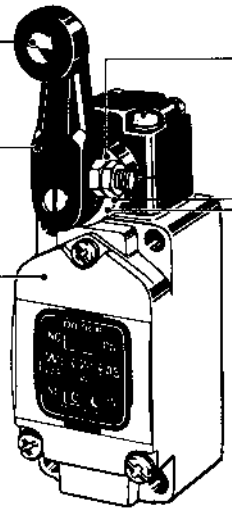
**Hermetic Seal Model**

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




# ■ Spatter-prevention Models

**Double Nut Lever**



**Roller, Roller Axis**
Using stainless steel prevents spatter from adhering.

**Operating Lever**
Melamine sinter-painted, it is easy to peel off the spatter.

**Lamp Cover**
Heat-resistant resin is used for the lamp cover.
By using spherical surface for the display part, it disperses the direction of spatter.

SUS304 is used for double nut.

**Screws**
SUS304 is used, preventing spatter from adhering.

**Head Cap**
Using Teflon prevents spatter from adhering.
**Note:** Spatter means the Zn powder produced when welding.
Adhering spatter to the Limit Switch may cause malfunction of lever or lamp cover.

The lack of gap prevents spatter powder from clogging.

# Dimensions

## ■ General-purpose Models

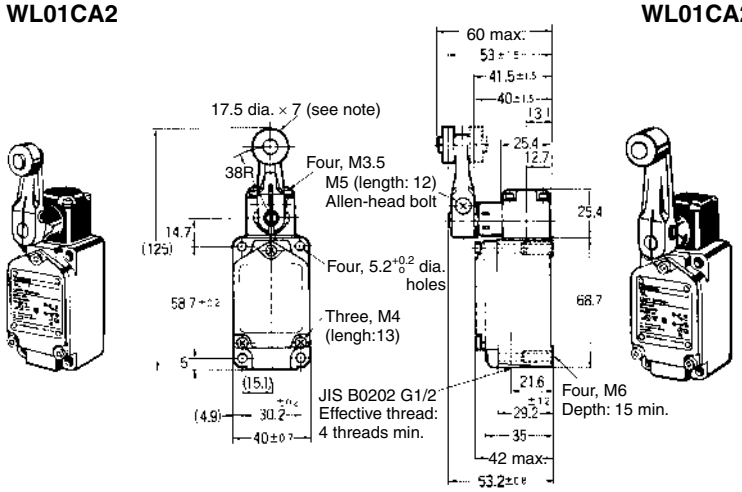
### Standard Models

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

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

#### Roller Lever

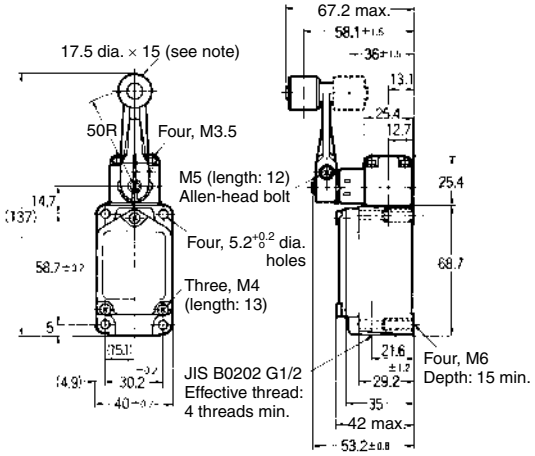
**WLCA2**
**WL01CA2**




**Note:** Stainless sintered roller

#### Roller Lever

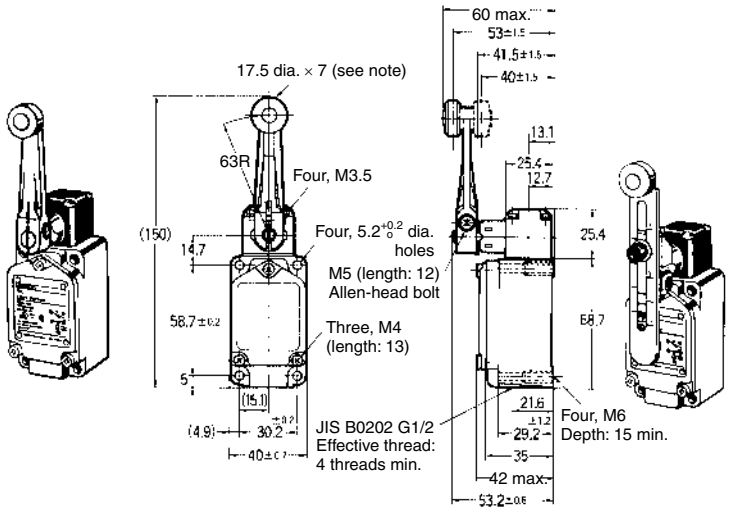
**WLCA2-7**
**WL01CA2-7**




**Note:** Stainless steel roller

#### Roller Lever

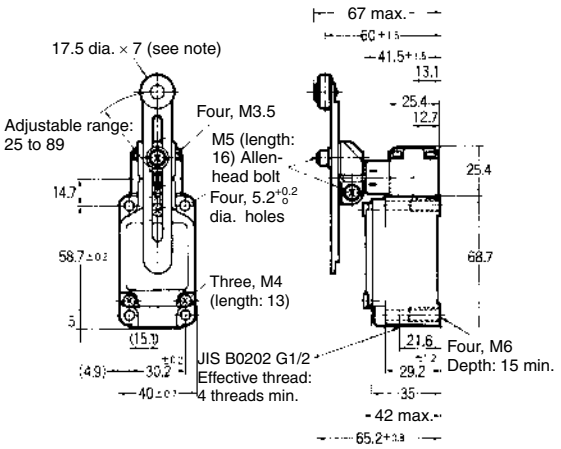
**WLCA2-8**
**WL01CA2-8**




**Note:** Stainless sintered roller

#### Adjustable Roller Lever

**WLCA12**
**WL01CA12**




**Note:** Stainless sintered roller

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

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

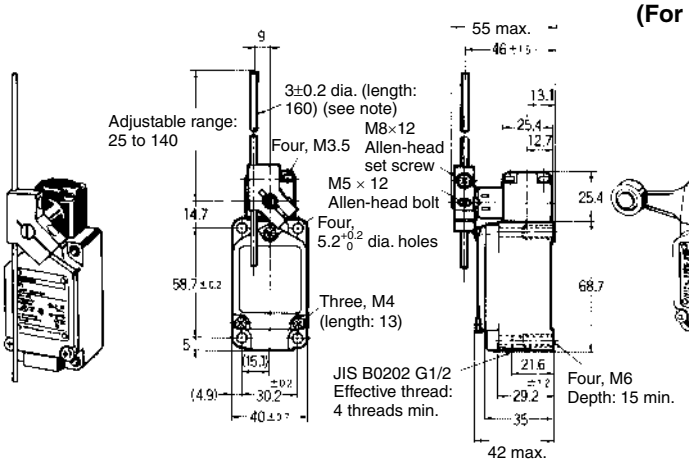
OF and RF for WLCA12, with a lever length of 89 mm.

| Operating characteristics | WLCA12, WL01CA12 |
|---|---|
| **OF** | 5.68 N |
| **RF** | 0.95 N |

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

## Adjustable Rod Lever

**WLCL**
**WL01CL**



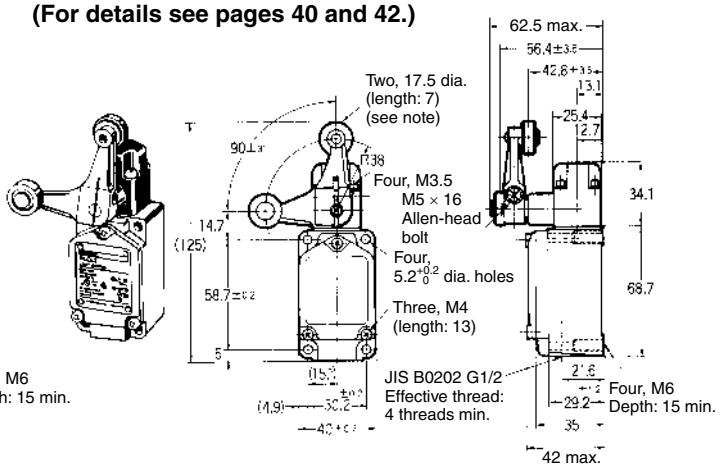

**Note:** Stainless steel rod

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

| Operating characteristics | WLCL, WL01CL |
|---|---|
| **Operating force: OF max.** | 1.39 N |
| **Release force: RF min.** | 0.27 N |
| **Pretravel: PT** | 15±5° |
| **Overtravel: OT min.** | 30° |
| **Movement differential: MD max.** | 12° |

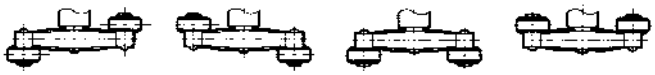
## Fork Lever Lock

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




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

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



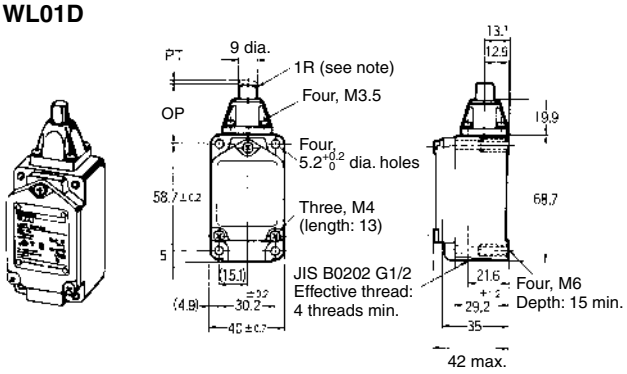
**Note:** The operating characteristics for WLCA12 and WL01CA12 are measured at the lever length of 140 mm.

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

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

## Top Plunger

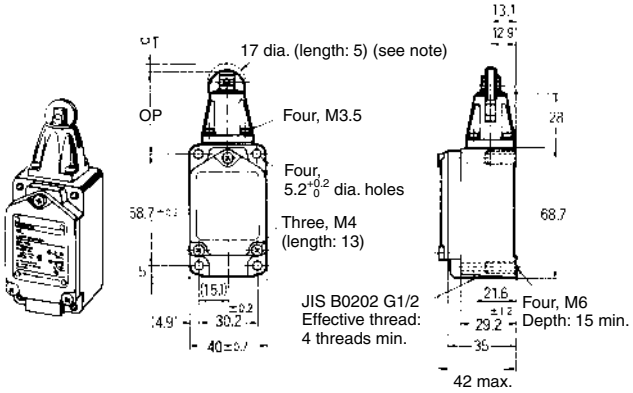
**WLD**
**WL01D**




**Note:** Stainless steel plunger

## Top-roller Plunger

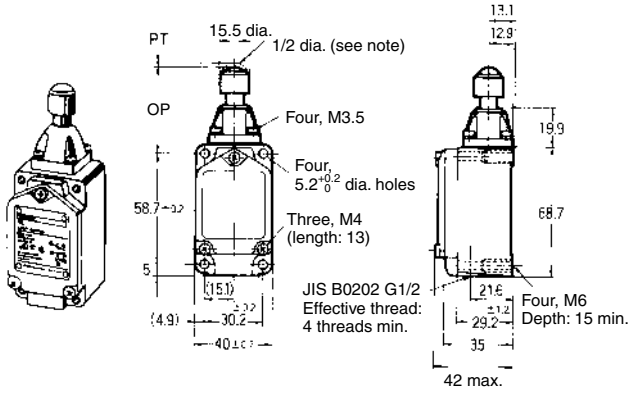
**WLD2**
**WL01D2**




**Note:** Stainless sintered roller

## Top-ball Plunger

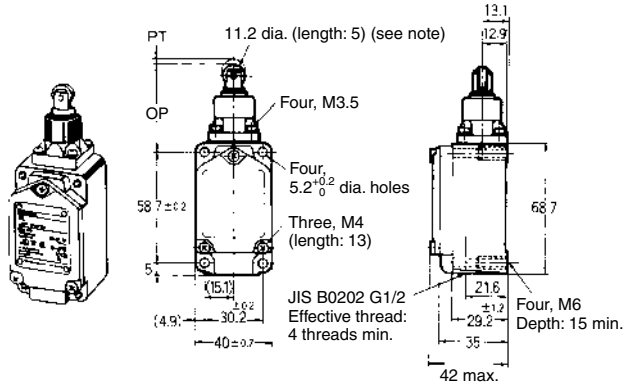
**WLD3**
**WL01D3**




**Note:** Stainless steel ball

## Sealed Top-roller Plunger

**WLD28**
**WL01D28**

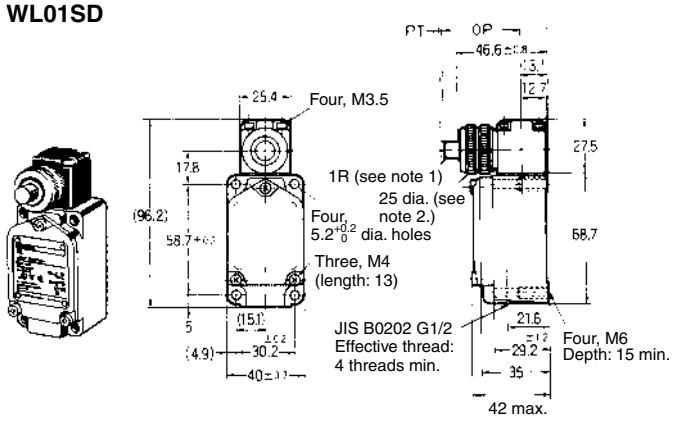



**Note:** Stainless steel roller

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

## Horizontal Plunger

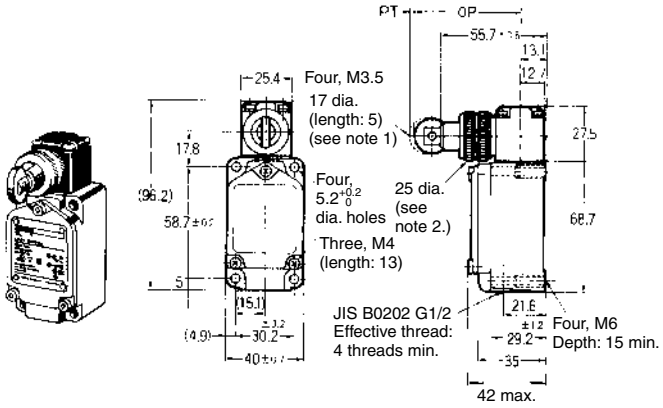
**WLSD**
**WL01SD**




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

## Horizontal-roller Plunger

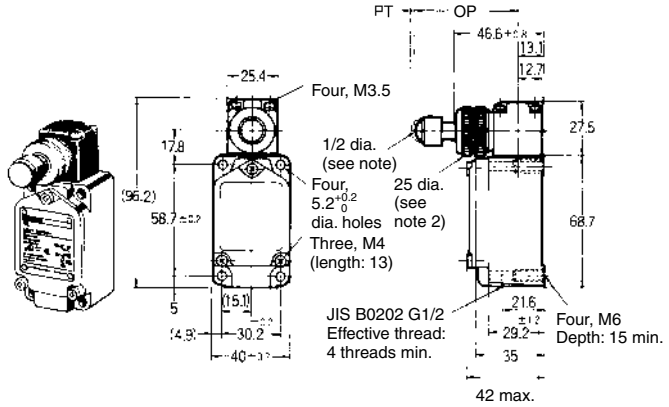
**WLSD2**
**WL01SD2**




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

## Horizontal-ball Plunger

**WLSD3**
**WL01SD3**



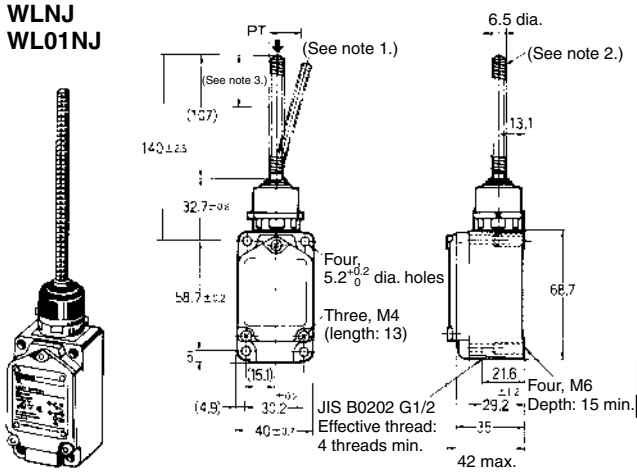

**Note: 1.** Stainless steel ball
**2.** Cosmetic nuts

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

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

## Coil Spring

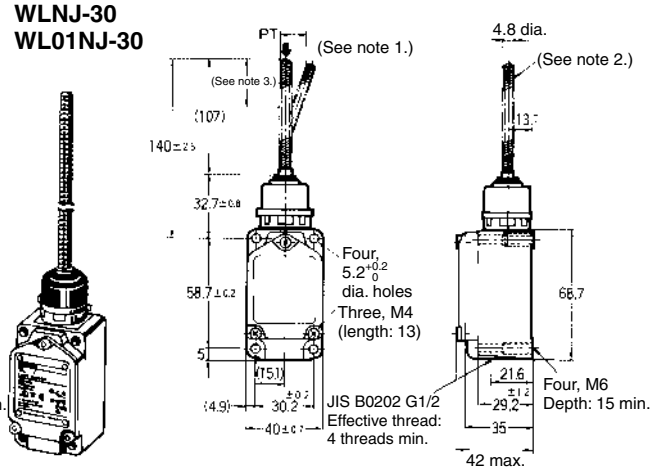
**WLNJ**
**WL01NJ**




**Note: 1.** The coil spring may be operated from any direction except the axial direction (↓).
**2.** Stainless steel coil spring
**3.** Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

## Coil Spring (Multi-wire)

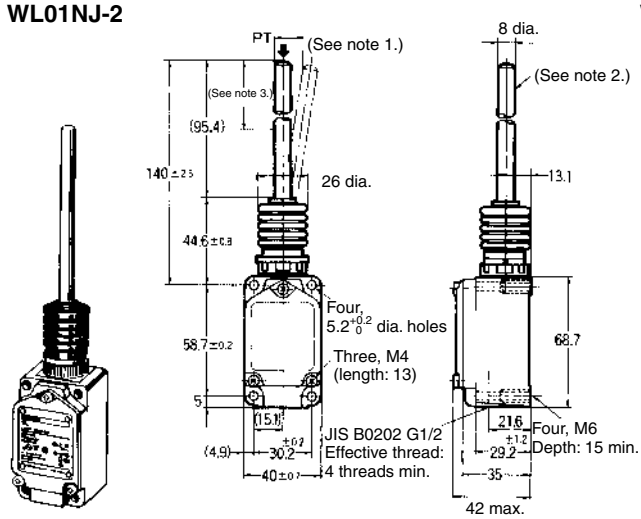
**WLNJ-30**
**WL01NJ-30**




**Note: 1.** The coil spring may be operated from any direction except the axial direction (↓).
**2.** Piano wire coil
**3.** Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

## Coil Spring (Resin Rod)

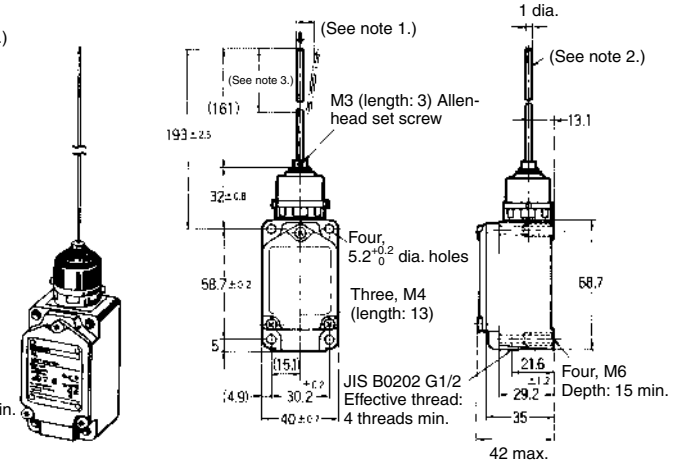
**WLNJ-2**
**WL01NJ-2**




**Note: 1.** The coil spring may be operated from any direction except the axial direction (↓).
**2.** Polyamide resin rod
**3.** Optimum operating range of the rod is within 1/3 of the entire length from the top end.

## Steel Wire

**WLNJ-S2**
**WL01NJ-S2**




**Note: 1.** The coil spring may be operated from any direction except the axial direction (↓).
**2.** Stainless steel wire
**3.** Optimum operating range of the wire is within 1/3 of the entire length from the top end.

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

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

# Overtravel Models

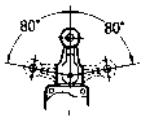
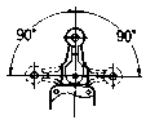
Overtravel models are Limit Switches which are provided with a greater OT to facilitate dog setting.

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

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

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

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

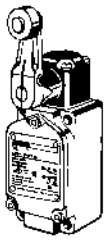
| General-purpose, high sensitivity models | Side-installation models |
|---|---|
|  |  |
| Head can be mounted in any of the four directions.<br>The lever operates on either side at 80°.<br>One-side operation is impossible. | The Head can be mounted in two directions, forward and backward.<br>The lever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

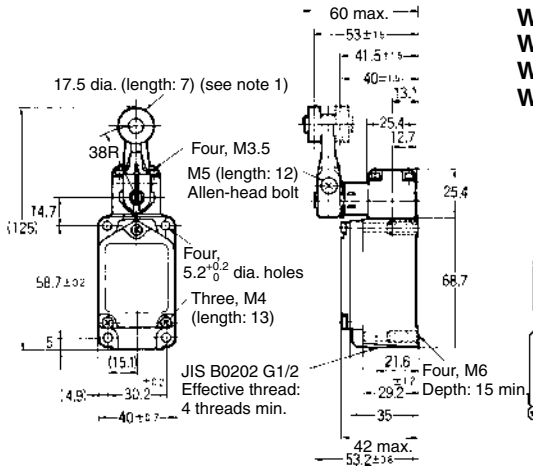
## General-purpose/High Sensitivity Models

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

### Roller Lever

**WLH2**
**WL01H2**
**WLG2**
**WL01G2**

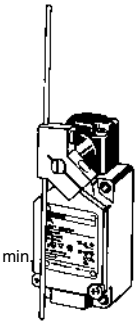


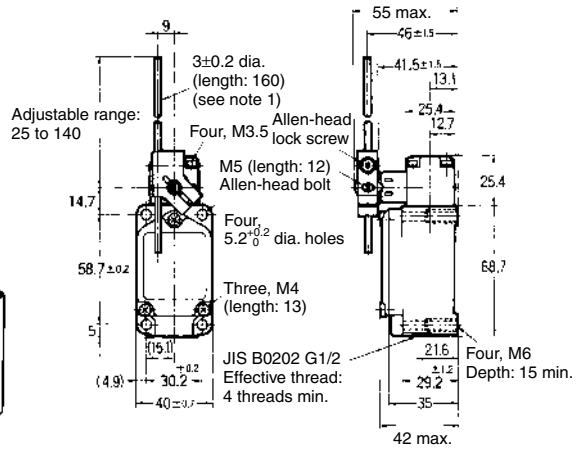



**Note: 1.** Stainless sintered roller
**2.** WL□G2 is identical to other models except in the shape of the set position marker plate.
**3.** The built-in switch for WLH2 is W-10FB3.
**4.** The built-in switch for WLG2 is W-10FB3-8.

### Adjustable Rod Lever

**WLHL**
**WL01HL**
**WLGL**
**WL01GL**

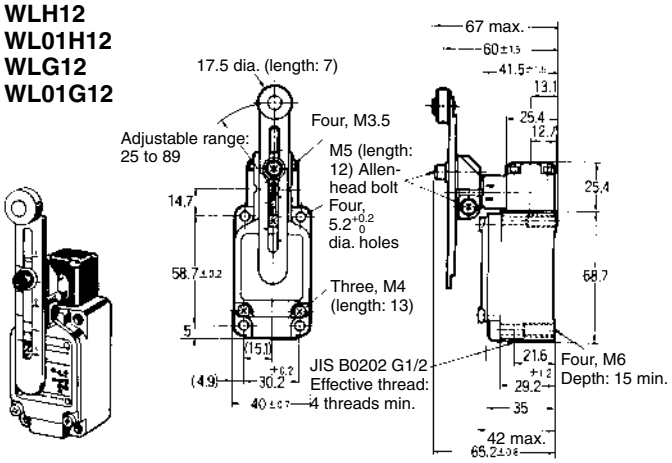





**Note: 1.** WL□GL is identical to other models except in the shape of the set position marker plate.
**2.** The built-in switch for WLHL is W-10FB3.
**3.** The built-in switch for WLGL is W-10FB3-8.

## Adjustable Roller Lever

**WLH12**
**WL01H12**
**WLG12**
**WL01G12**




**Note: 1.** Stainless sintered roller

**2.** WL□G12 is identical to other models except in the shape of the set position marker plate.

**3.** The built-in switch for WLH12 is W-10FB3.

**4.** The built-in switch for WLG12 is W-10FB3-8.

| Operating characteristics | WLH2<br>WL01H2 | WLG2<br>WL01G2 | WLHL<br>WL01HL<br>(See note 2.) | WLGL<br>WL01GL<br>(See note 2.) | WLH12<br>WL01H12<br>(See note 1.) | WLG12<br>WL01G12<br>(See note 1.) |
|---|---|---|---|---|---|---|
| **Operating force: OF max.** | 9.81 N | 9.81 N | 2.84 N | 2.84 N | 9.81 N | 9.81 N |
| **Release force: RF min.** | 0.98 N | 0.98 N | 0.25 N | 0.25 N | 0.98 N | 0.98 N |
| **Pretravel: PT** | 15±5° | $10^{\circ}{}^{+2}_{-1}$ | 15±5° | $10^{\circ}{}^{+2}_{-1}$ | 15±5° | $10^{\circ}{}^{+2}_{-1}$ |
| **Overtravel: OT min.** | 55° | 65° | 55° | 65° | 55° | 65° |
| **Movement differential: MD max.** | 12° | 7° | 12° | 7° | 12° | 7° |

**Note: 1.** The operating characteristics of WLH12, WL01HL12, WLG12, and WL01G12 are measured at the lever length of 38 mm.

**2.** The operating characteristics of WLHL, WL01HL, WLGL, and WL01GL are measured at the rod length of 140 mm.

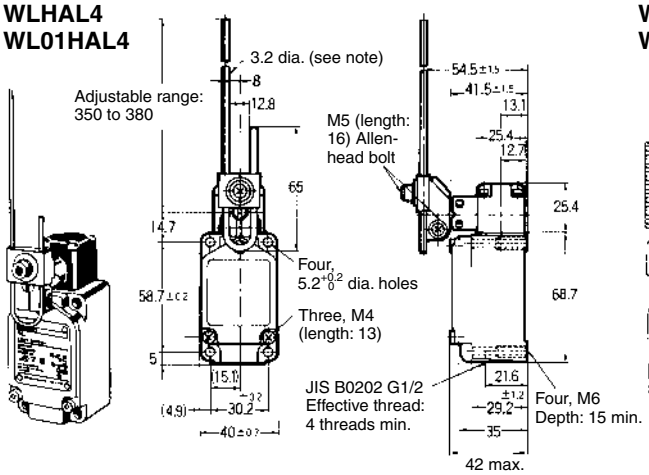
OF and RF for WLH12 and WL01H12, with a lever length of 89 mm.

| Operating characteristics | WLH12,<br>WL01H12 | WLG12,<br>WL01G12 |
|---|---|---|
| **OF** | 4.18 N | 4.18 N |
| **RF** | 0.42 N | 0.42 N |

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

## Adjustable Rod Lever

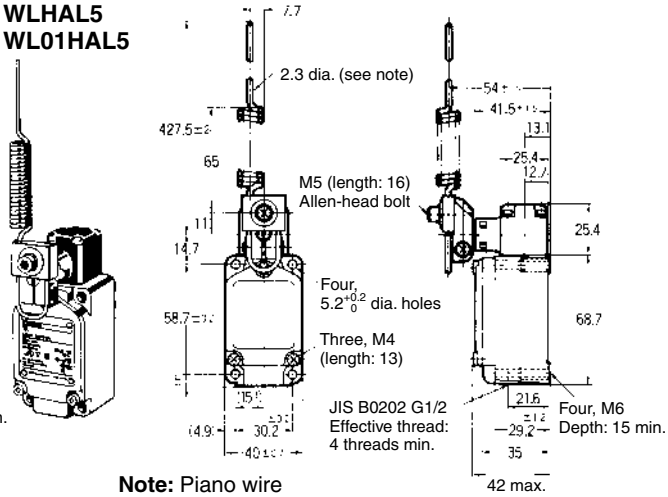
**WLHAL4**
**WL01HAL4**




**Note:** Stainless steel rod

## Rod Spring Lever

**WLHAL5**
**WL01HAL5**




**Note:** Piano wire

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

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

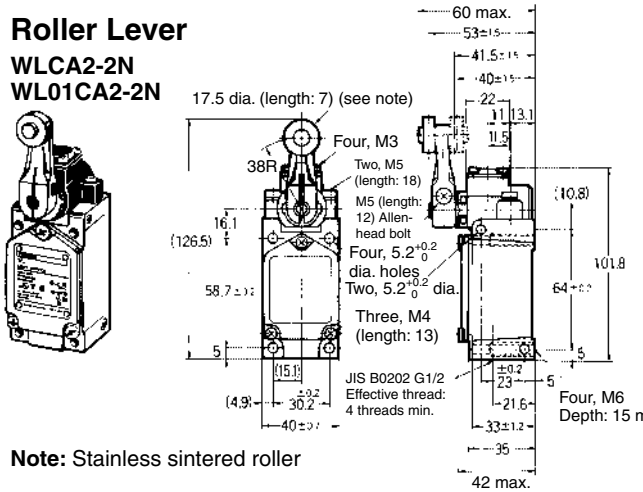
**2.** The operating characteristics of WLHAL4, and WL01HAL4 are measured at the rod length of 380 mm.

## Side-installation Models

90° operation on one side is possible by simply changing the direction of the cam.
**Note: 1.** For all models WL□ indicates a standard model and WL01□ indicates a microload model.
**2.** With the side-installation models, 90° operation on one side is possible by simply changing the direction of the cam.
**3.** Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

## Roller Lever

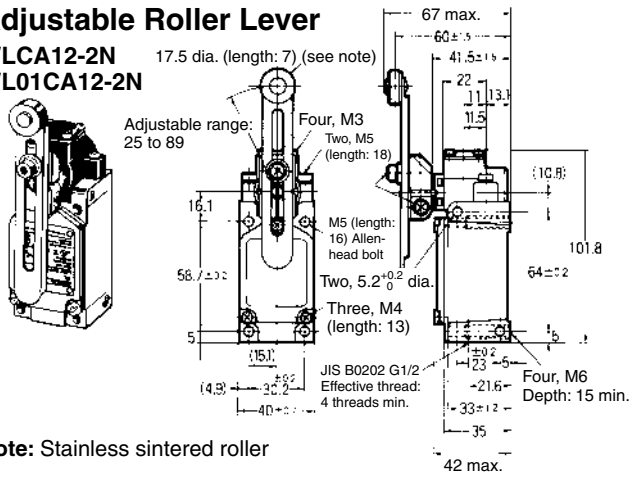
**WLCA2-2N**
**WL01CA2-2N**




**Note:** Stainless sintered roller

## Adjustable Roller Lever

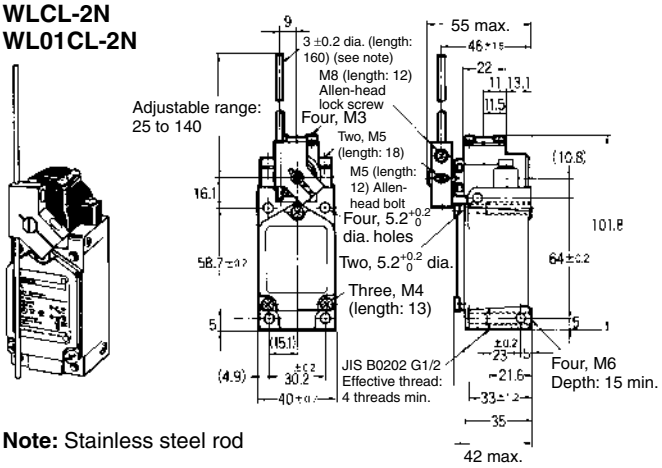
**WLCA12-2N**
**WL01CA12-2N**




**Note:** Stainless sintered roller

## Adjustable Rod Lever

**WLCL-2N**
**WL01CL-2N**




**Note:** Stainless steel rod

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

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

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

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

## High-precision Models

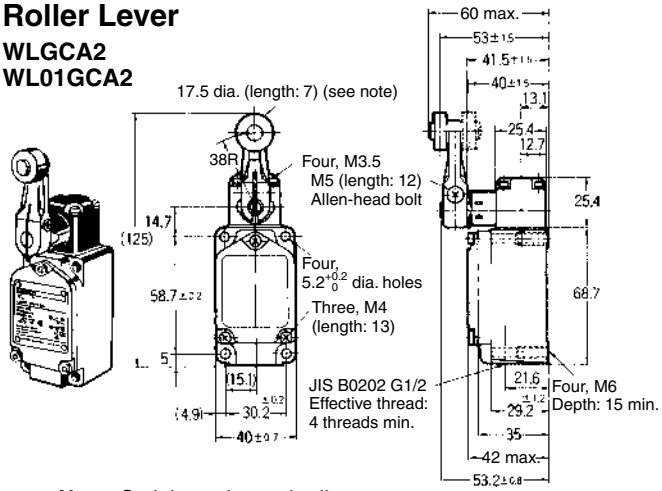
The high-precision models feature a pretravel of 5° (as compared with 15° for the standard models) and a repeat accuracy twice as great as standard models. The high-precision models are ideal for positioning control of machine tools.

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

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

## Roller Lever

**WLGCA2**
**WL01GCA2**



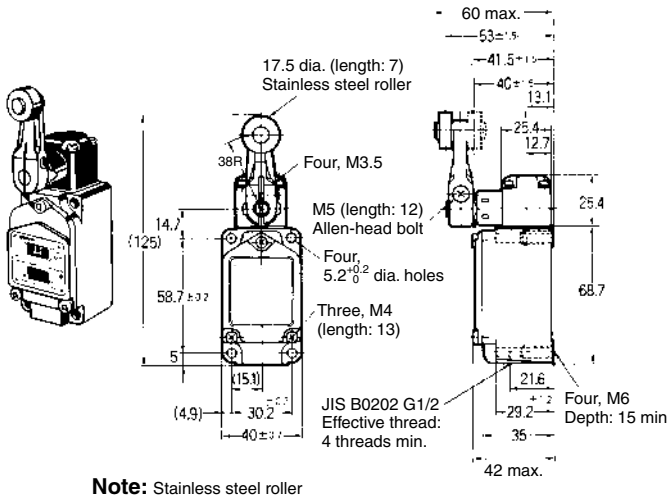

**Note:** Stainless sintered roller

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

# Lamp-equipped Models

## Roller Lever

**WLCA2-LE/LD**
**WL01CA2-LE/LD**




**Note:** Stainless steel roller

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

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

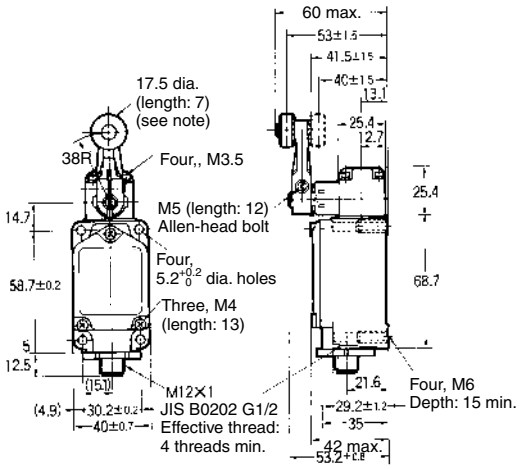
# Sensor I/O Connector Models

## Roller Lever Models

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

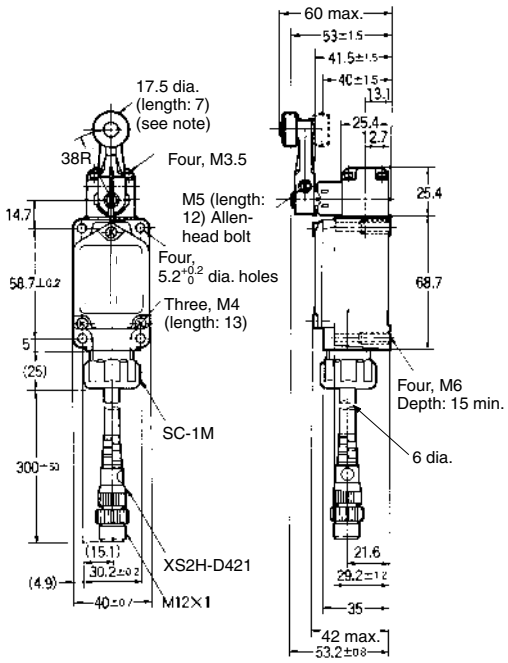
**Note: 1.** For the WLG2 model, only the dimensions for the set position marker plate change.
**2.** Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
**3.** The above diagram is for a lamp-equipped model.

### Direct-wired Connector Models




**Note:** Stainless sintered roller

### Pre-wired Connector Models




**Note:** Stainless sintered alloy roller

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

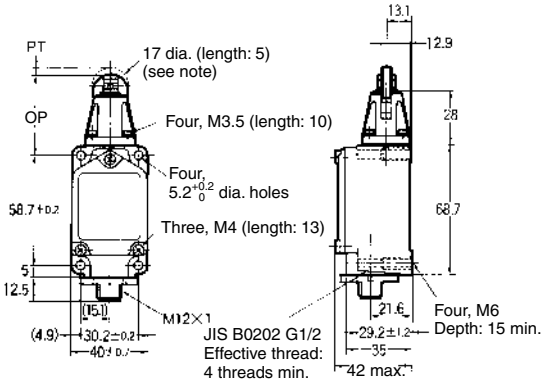
## Top-roller Plunger

### WLD2

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

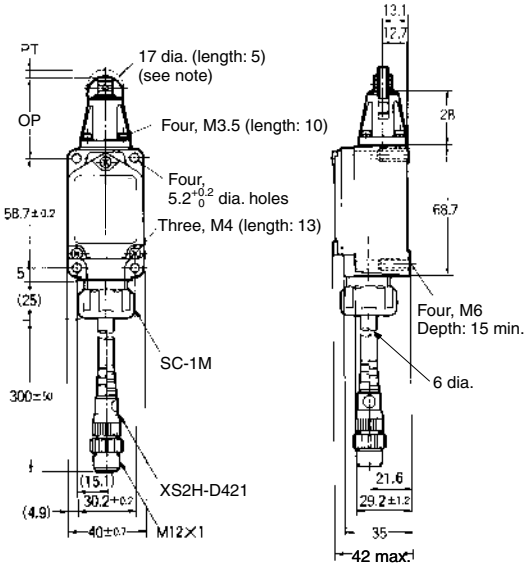
**2.** The above diagram is for a lamp-equipped model.

### Direct-wired Connector Models




**Note:** Stainless sintered roller

### Pre-wired Connector Models




**Note:** Stainless sintered roller

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

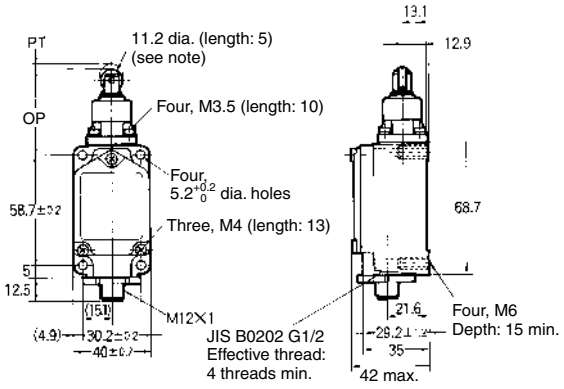
## Sealed Top-roller Plunger

### WLD28

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

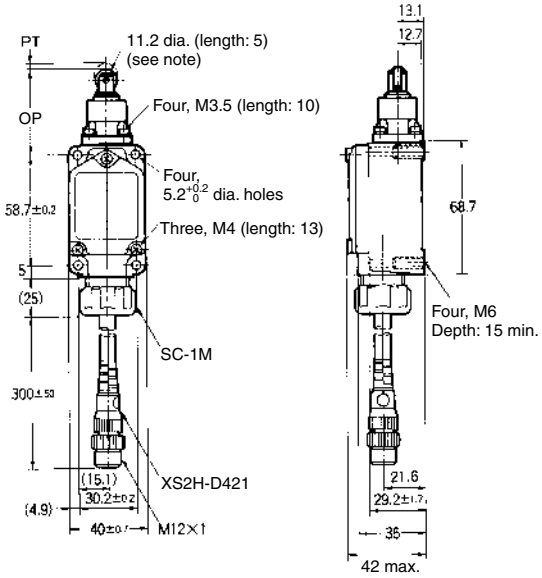
**2.** The above diagram is for a lamp-equipped model.

### Direct-wired Connector Models




**Note:** Stainless sintered alloy roller

### Pre-wired Connector Models




**Note:** Stainless sintered alloy roller

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

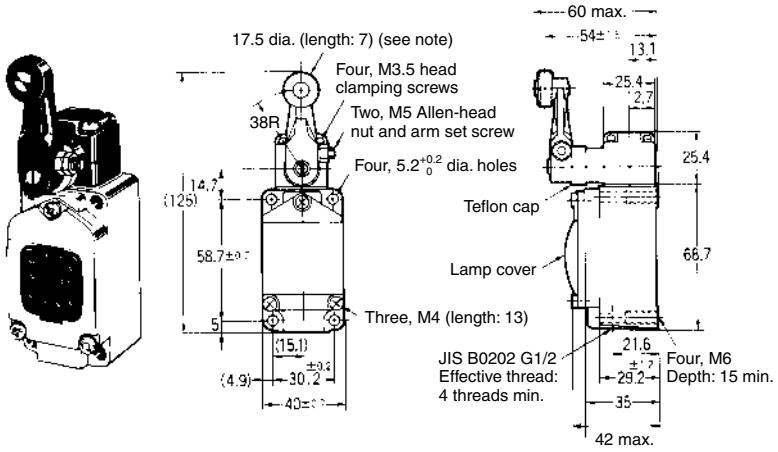
# ■ Environment-resistant Models

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

# ■ Spatter-prevention Models

## Roller Lever (Screw Terminals)

**WLCA2-□S/WL01□-□S**
**WLH2-□S/WLG2-□S**
**WLGCA2-□S**

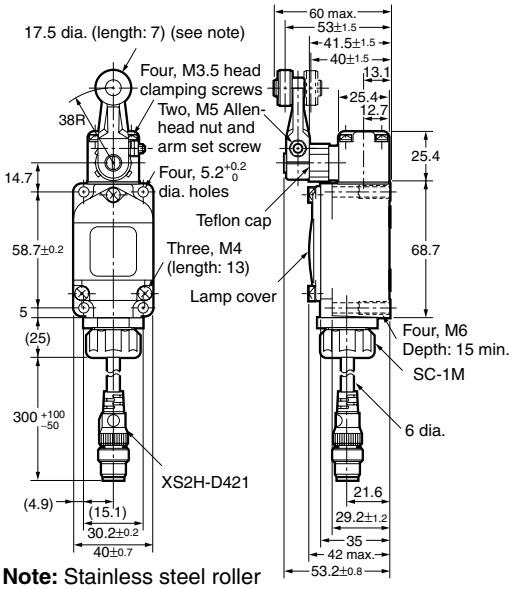



**Note:** Stainless steel roller

## Roller Lever (Pre-wired Connector)

**WLCA2-□S-M1J/WL01□-□S-M1J**
**WLH2-□S-M1J/WLG2-□S-M1J**
**WLGCA2-□S-M1J**

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

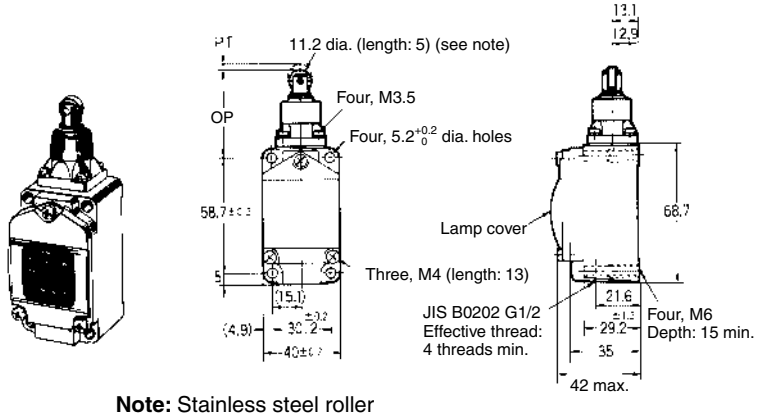



**Note:** Stainless steel roller

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

## Sealed Top-roller Plunger (Screw Terminals)

**WLD28-□S**

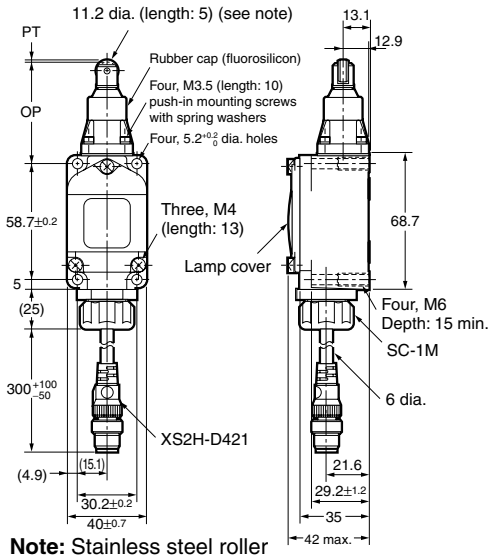



**Note:** Stainless steel roller

## Sealed Top-roller Plunger (Pre-wired Connector)

**WLD28-□S-M1J**

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




**Note:** Stainless steel roller

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

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

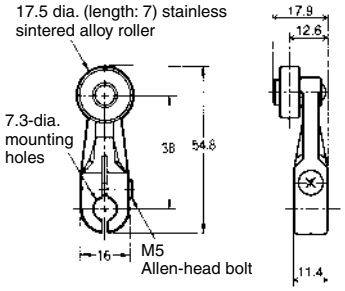
# ■ Actuators (Levers Only)

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

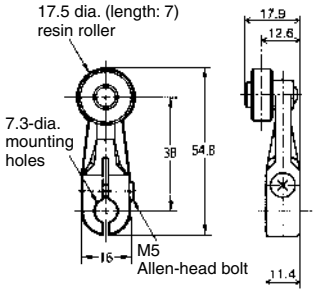
**2.** Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

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

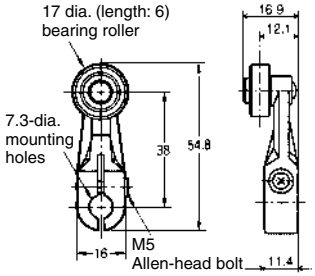
**WL-1A100**
**Standard Lever**



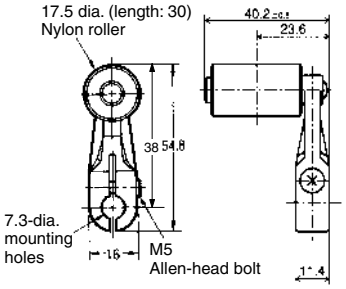

**WL-1A115**
**Resin Roller**



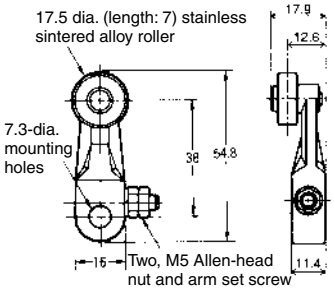

**WL-1A400**
**Bearing Roller**



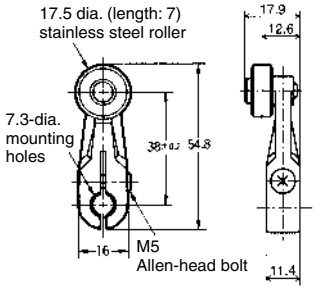

**WL-1A118**
**Nylon Roller:**
**Roller Width: 30 mm**



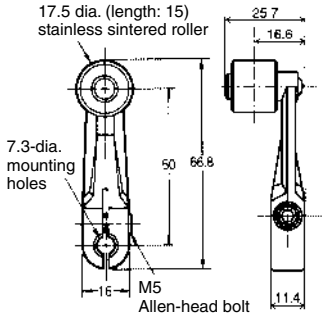

**WL-1A105**
**Double Nut**



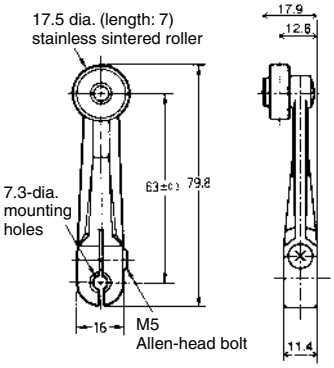

**WL-1A103S**
**Spatter Prevention**



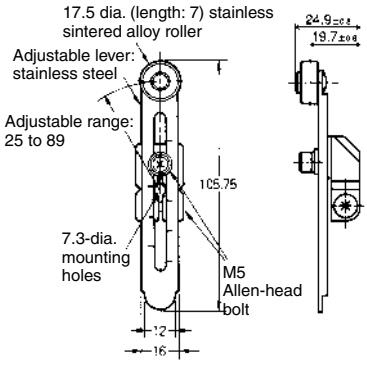

**WL-1A200**
**Lever Length: 50**
**Roller Width: 15**



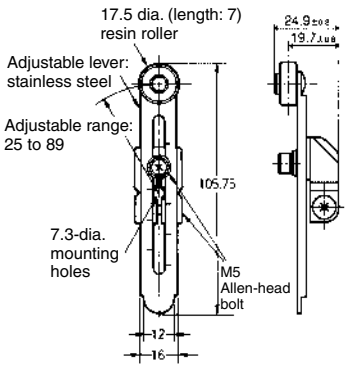

**WL-1A300**
**Lever Length: 63**



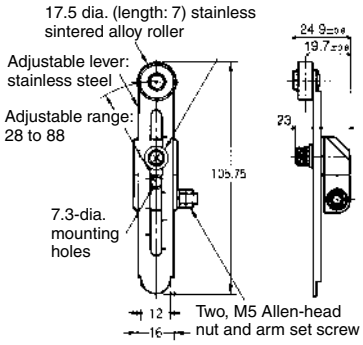

**WL-2A100**



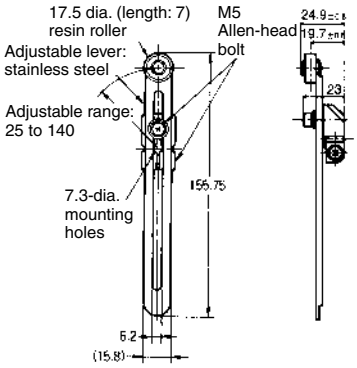
### WL-2A111
### Resin Roller



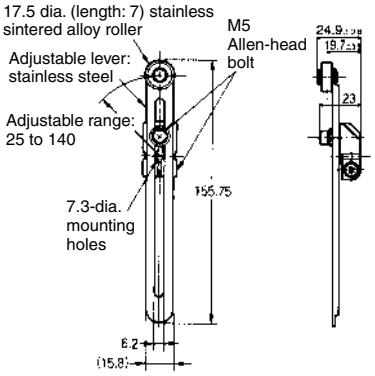

### WL-2A107
### Double Nut



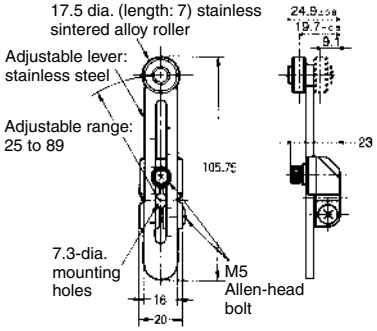

### WL-2A108
### Resin Roller




### WL-2A122

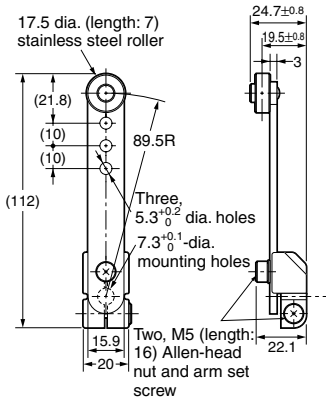



### WL-2A106

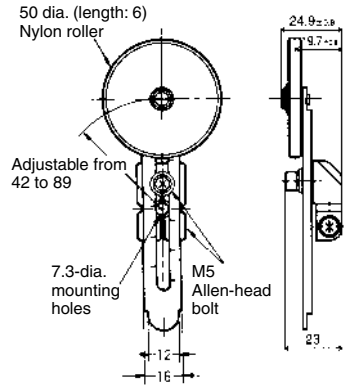



**Note:** Can be installed on the rear side.

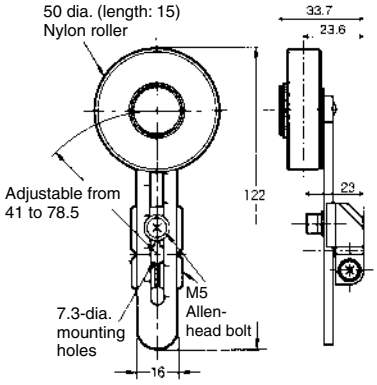
### WL-2A130



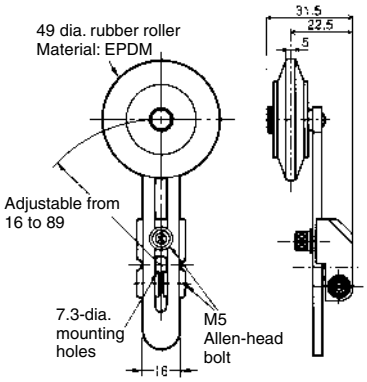

### WL-2A104



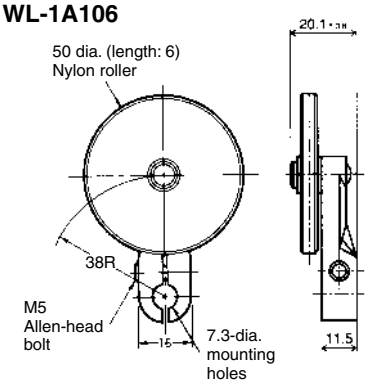

### WL-2A110



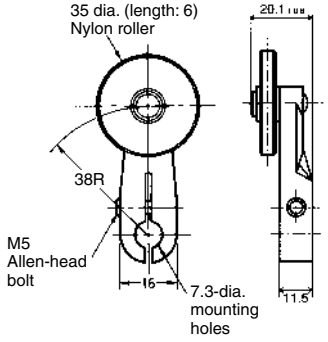

### WL-2A105



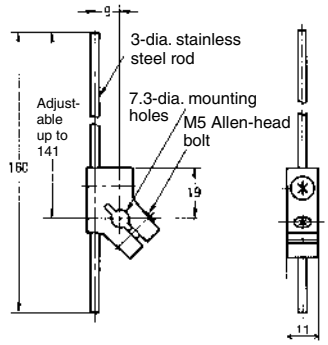
**WL-1A106**



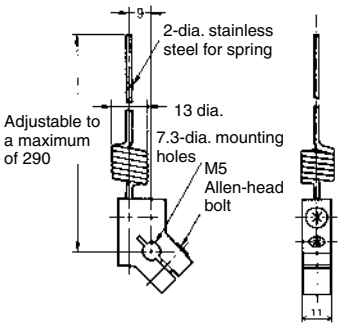

**WL-1A110**



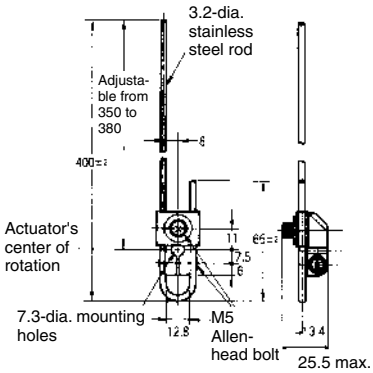

**WL-4A100**



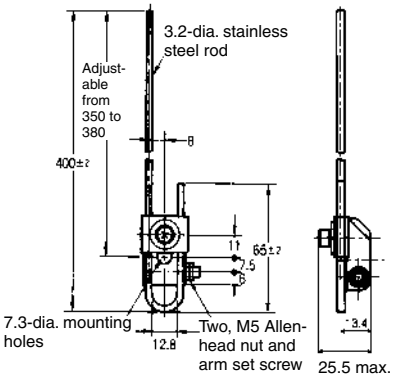

**WL-4A201**



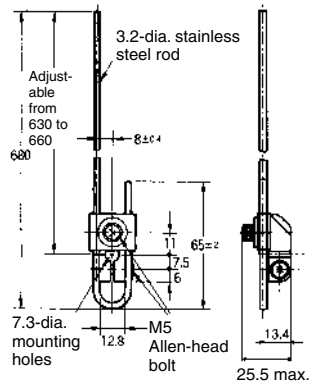

**WL-3A100**



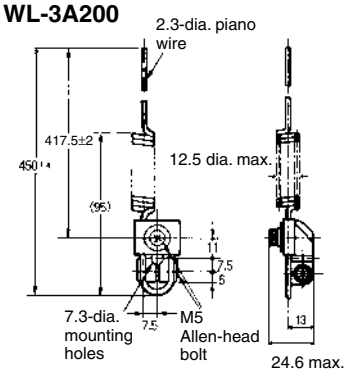

**WL-3A106**
**Double Nut**



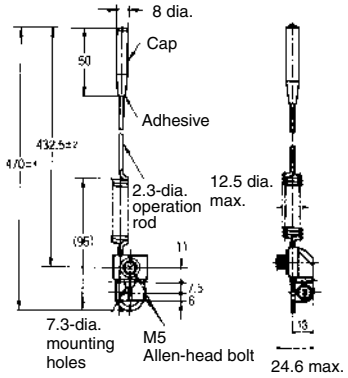

**WL-3A108**



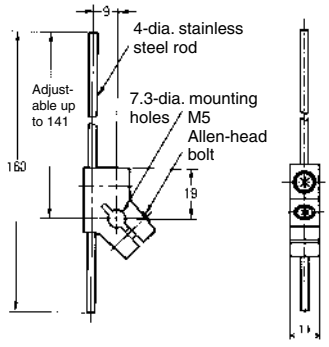

**WL-3A200**



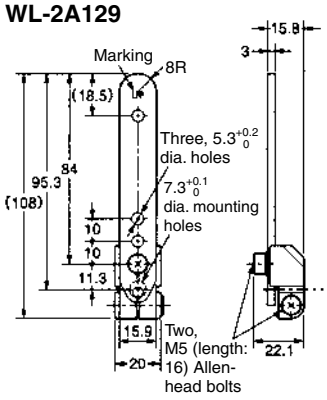

**WL-3A203**



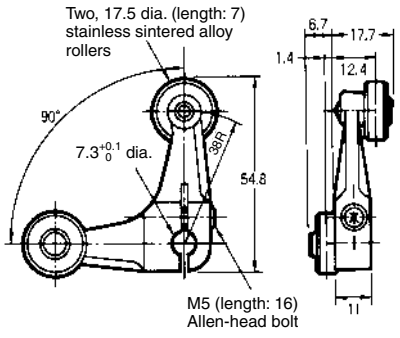

**WL-4A112**




**WL-2A129**

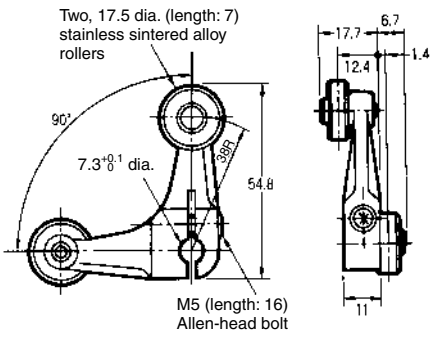


**WL-5A101**



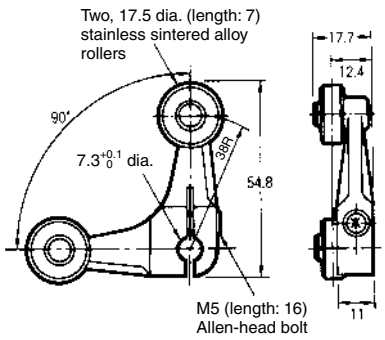

WL-5A100 has a resin roller

**WL-5A103**



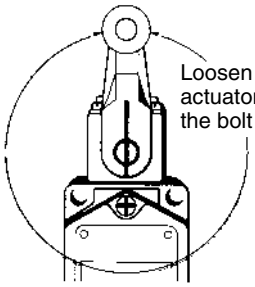
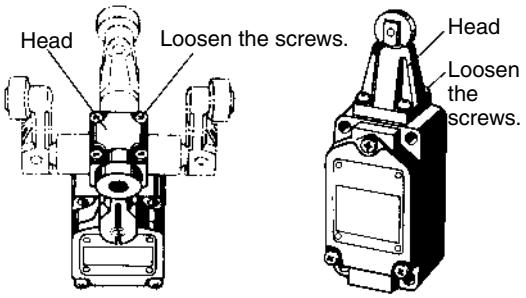

WL-5A102 has a resin roller

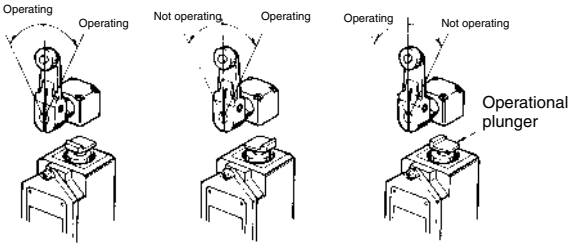
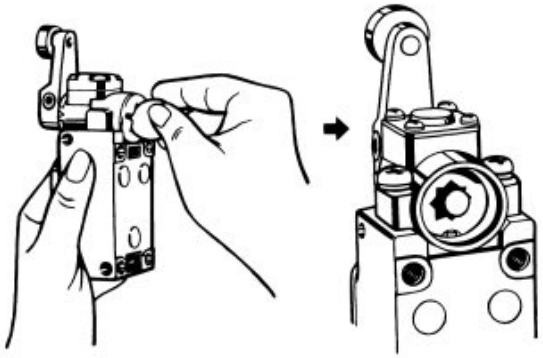
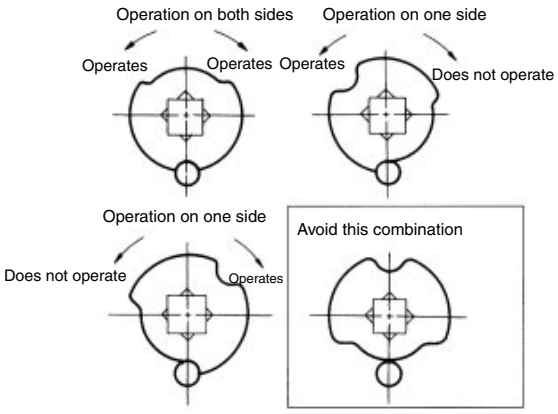
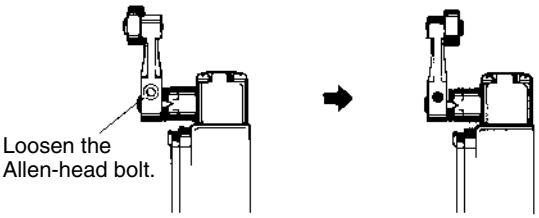
**WL-5A105**

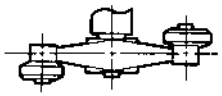
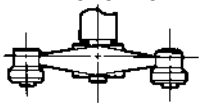
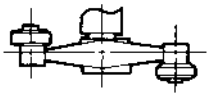
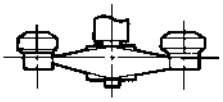
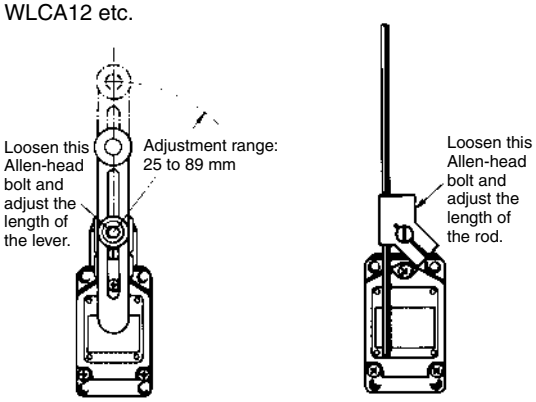



WL-5A104 has a resin roller

# Installation

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

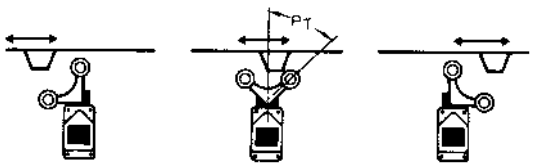
| Item | Appropriate model/actuator | Details |
|---|---|---|
| **Changing the operating direction**<br>By removing the Head on models which can operate on one-side only, and then changing the direction of the operational plunger, one of three operating directions can be selected. In the case of overtravel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

| Item | Appropriate model/actuator | Details |
|---|---|---|
| **Selecting the roller position**<br>There are four types of fork lever lock for use depending on the roller position. | Fork Lever Locks: WLCA32-4□, WL01CA32-4□ | WLCA32-41  WLCA32-43  WLCA32-42  WLCA32-44  **Note:** An explanation of the operation of fork lever locks is provided after this table. |
| **Adjusting the length of the rod or lever**<br>The length of the rod or lever can be adjusted by loosening the Allen-head bolt. | Adjustable Roller Levers: WLCA12, WL01CA12 etc.<br>Adjustable Rod Levers: WLCL, WL01CL, etc. | WLCA12 etc.   |

## ■ Operation of Fork Lever Locks

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

Example



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

# Precautions

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

## ■ Correct Use

When a rod or wired-type actuator is used, do not touch the top end of the actuator. Doing so may result in injury.
Applicable models: WLHAL5 and WL01HAL5 Rod Spring Levers and WLNJ-S2 and WL01NJ-S2 Steel-wire Actuators.

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

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

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

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

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

## Environmental Precautions

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

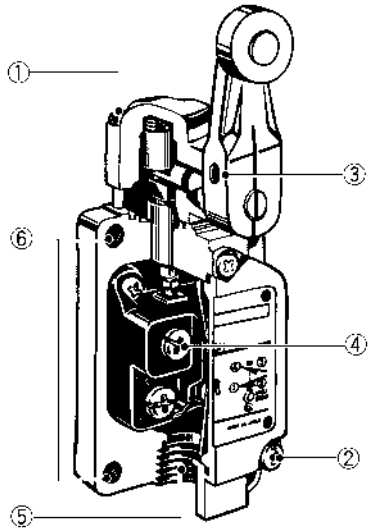
## Built-in Switch

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

## Tightening Torque

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

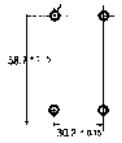
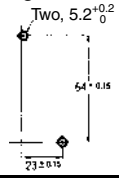
| No. | Type | Torque |
|---|---|---|
| ① | Head mounting screw | 0.78 to 0.88 N·m |
| ② | Cover mounting screw | 1.18 to 1.37 N·m |
| ③ | Allen-head bolt (for securing the lever) | 4.90 to 5.88 N·m |
| ④ | Terminal screw | 0.59 to 0.78 N·m |
| ⑤ | Connector | 1.77 to 2.16 N·m |
| ⑥ | Main Unit screws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




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

## Installing the Switch

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

| Standard/Overtravel model | Overtravel model (side installation) |
|---|---|
| Mounting holes<br>Four, $5.2^{+0.2}_{0}$ dia. holes<br>  | Mounting holes<br>Two, $5.2^{+0.2}_{0}$ dia. holes<br>  |

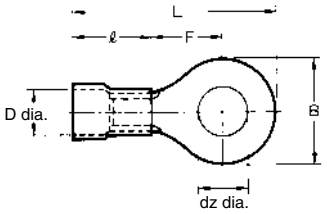
## Connectors

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

## Wiring

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

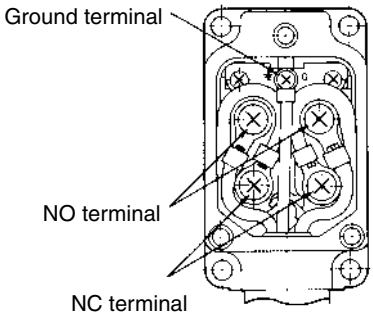
### Crimp Terminal External Dimensions




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

### Wiring Method

Switch Box Section



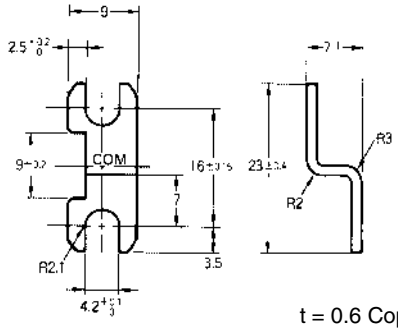

**Note:** The ground terminal is only installed on models with ground terminals.

## Rotating Lever Set Position

All rotating lever models, except the fork lever lock, have a set position marker plate. (See page 109.) After operation, set the indicator needle on the marker plate so that is in the convex section of the bearing.

## Terminal Plate

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




t = 0.6 Copper plate

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C001-E1-13

# Long-life Two-circuit Limit Switch
# WLM□

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

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

## Model Number Structure

### ■ Model Number Legend

**WLM□-LD□**
**1 2**

**1. Actuators**

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

**2. Wiring Specifications**

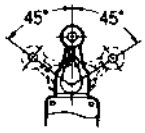
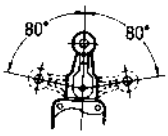
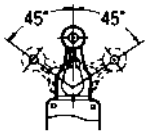
| | |
|---|---|
| Blank: | Screw terminal: G1/2 conduit |
| K13A: | Direct-wired connector: 2-core, AC |
| K13: | Direct-wired connector: 2-core, DC |
| K43A: | Direct-wired connector: 4-core, AC |
| K43: | Direct-wired connector: 4-core, DC |
| -M1J: | Pre-wired connector: 2-core, DC (See note.) |
|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

**Note:** With 0.3-m cable attached.

# Ordering Information

## ■ List of Models

### Roller Lever with LED

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

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

**2.** 0.3-m cable attached.

**3.** One-side operation possible means that, by changing the direction of the operational plunger, one of three operating directions can be selected. One-side operation not possible means that only operation on both sides is possible. See page 140 for details.

### Applicable Cables

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

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

# Specifications

## ■ Ratings

### General-purpose Ratings

Refer to these ratings before using the product.

#### Screw Terminal Models

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

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

**Note:** Only for high-sensitivity overtravel models.

### Direct-wired/Pre-wired Models

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

**Note: 1.** The above figures are for standard currents.
**2.** Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp load has an inrush current of 10 times the steady-state current.
**4.** Motor load has an inrush current of 6 times the steady-state current.

## ■ Characteristics

| | |
|---|---|
| **Degree of protection** | IP67 |
| **Durability (See note 2.)** | Mechanical: 30,000,000 operations min. (10 mA at 24 VDC, resistive load)<br>Electrical: 750,000 operations min. (10 A at 115 VAC, resistive load),<br>but for high-precision models: 500,000 operations min. (10 A at 115 VAC, resistive load) |
| **Operating speed** | 1 mm to 1 m/s (for WLMCA2) |
| **Operating frequency** | Mechanical: 120 operations/minute<br>Electrical: 30 operations/minute |
| **Rated frequency** | 50/60 Hz |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance** | 25 mΩ max. (initial value) |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals. (Except connector models.)<br>2,200 VAC (1,500 V), 50/60 Hz for 1 min between non-current-carrying metal part and ground.<br>2,200 VAC (1,500 V), 50/60 Hz for 1 min between each terminal and non-current-carrying metal part. |
| **Vibration resistance** | 10 to 55 Hz, 1.5-mm double amplitude |
| **Shock resistance** | Destruction: 1,000 $m/s^2$ min.<br>Malfunction: 300 $m/s^2$ min. |
| **Ambient temperature** | Operating: –10°C to 80°C (with no icing) |
| **Ambient humidity** | Operating: 95% max. |
| **Weight** | Approx. 275 g (for WLMCA2) |

**Note: 1.** The figures in parentheses for dielectric strength, are those for overtravel (high-sensitivity) or connector models.
**2.** The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

# ■ Operating Characteristics

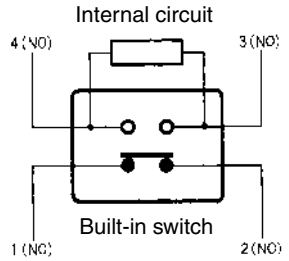
| Operating characteristics | WLMCA2-LD□<br>Standard models | WLMH2-LD□<br>Overtravel models (general-purpose) | WLMG2-LD□<br>Overtravel models (high-sensitivity) | WLMGCA2-LD□<br>High-precision models |
|---|---|---|---|---|
| OF max. | 9.81 N | 9.81 N | 9.81 N | 13.34 N |
| RF min. | 0.98 N | 0.98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

# ■ Contact Form

## Screw Terminal Models

### WLM□-LD

Lamp-equipped: Light-ON when not operating

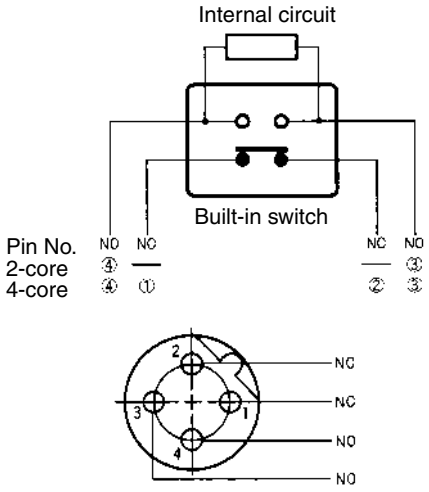



## Direct-wired Connector/Pre-wired Connector Models

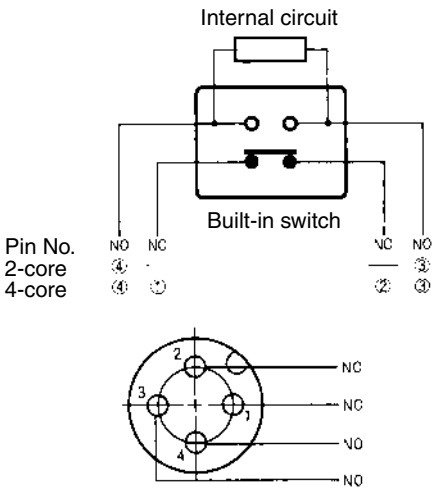
### AC Models: WLM□-LD□□

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

AC model



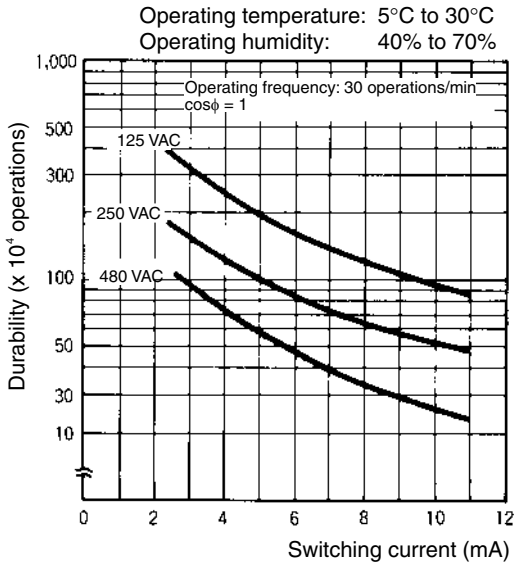

DC model




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

# Engineering Data

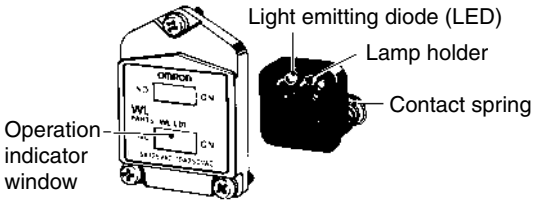
## ■ Electrical Durability: cosϕ = 1




## ■ Lamp-equipped Models

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

Circuit checks and troubleshooting errors are easy done.



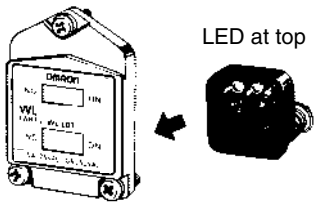

The built-in switch's terminal screws are used to connect the lamp terminal (indicator cover). Since the connection spring (coil spring) is used for this connection, it will not be necessary to connect to the lamp terminal. When a ground terminal is provided however, lead wire method must be used.

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

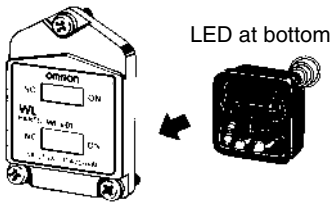
The indicator cover is molded from diecast aluminum and has outstanding sealing properties. Furthermore, regardless of whether the power is connected or not, the operating status is shown (operating or not operating), and indicators can be switched from light-ON when operating and light-ON when not operating,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

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

Light-ON when Operating




Light-ON when Not Operating




### Indicator Lamp and Load Operation

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

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

### Light-ON when Operating

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

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

### Operation

| | | |
|---|---|---|
| LIght-ON when operating (See note 1.) | WL-LD | Power supply<br>Built-in switch<br>4 NO 3<br>1 NC 2<br>Load<br>Internal circuit |
| Light-ON when not operating (See note 2.) | WL-LD | Power supply<br>Internal circuit<br>4 NO 3<br>1 NC 2<br>Load<br>Built-in switch |

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

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

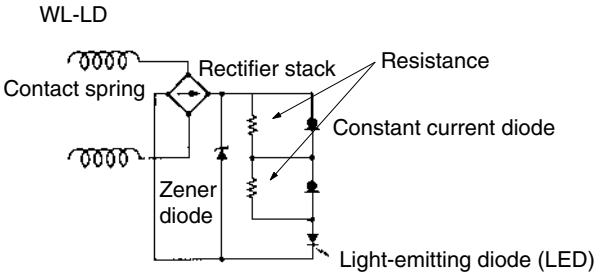
## Models/Ratings

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

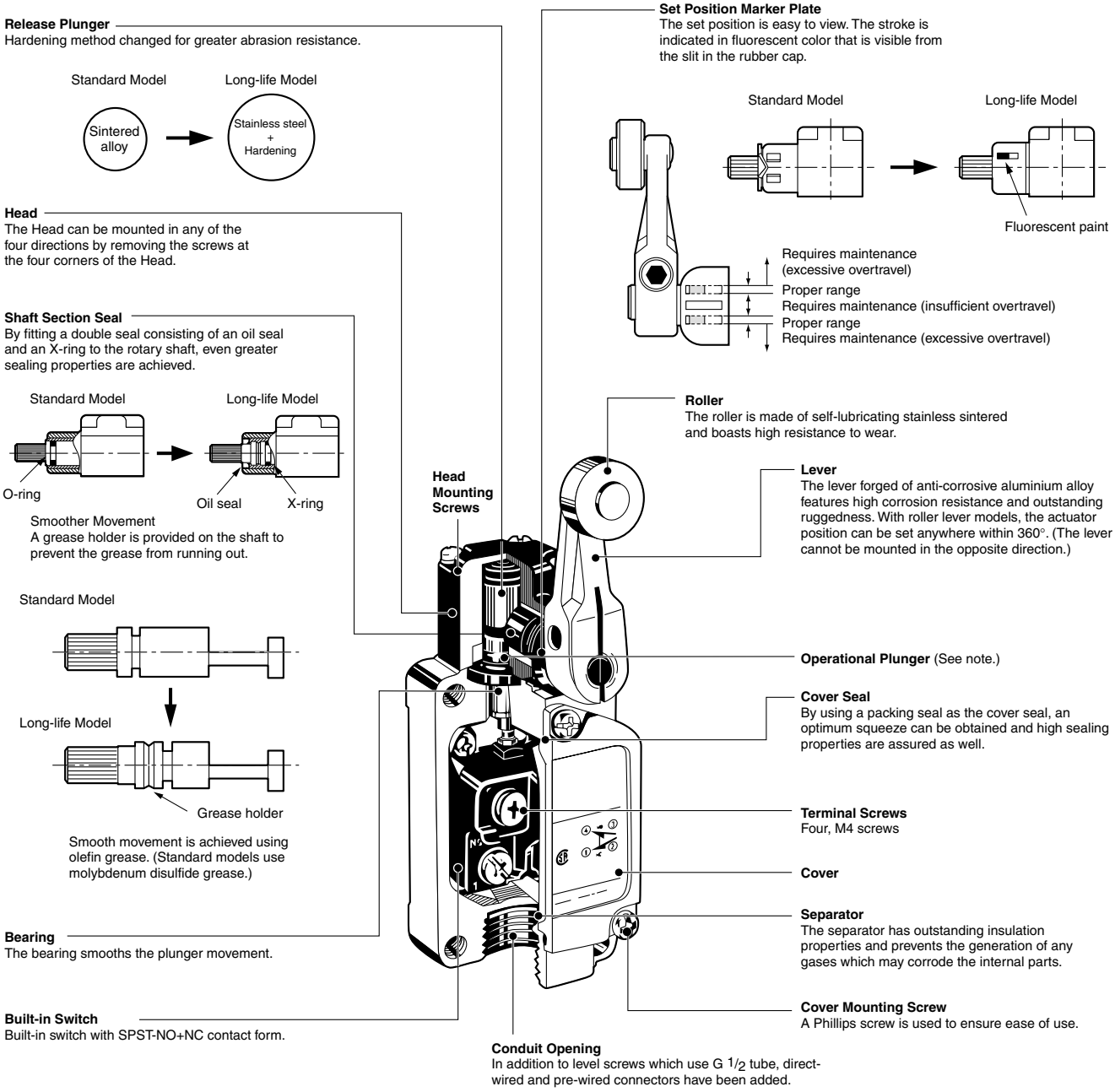
**Note: 1.** In the model number, □ indicates the actuator number. For example, MCA2, etc.

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

## Internal Circuits




# Nomenclature

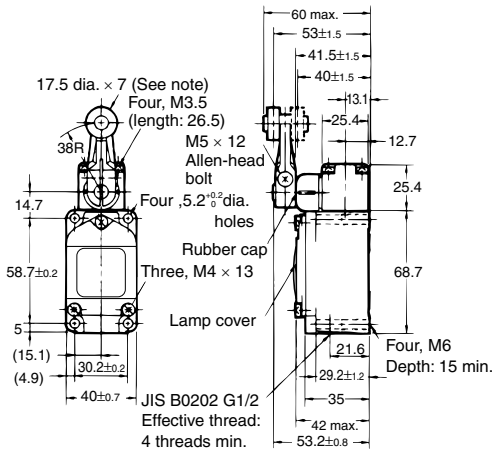



**Note:** By changing the direction of the operational plunger, any one of the three operational directions (both sides, left, or right) can be selected. (Only applicable to the WLMGCA2-□.)

# Dimensions

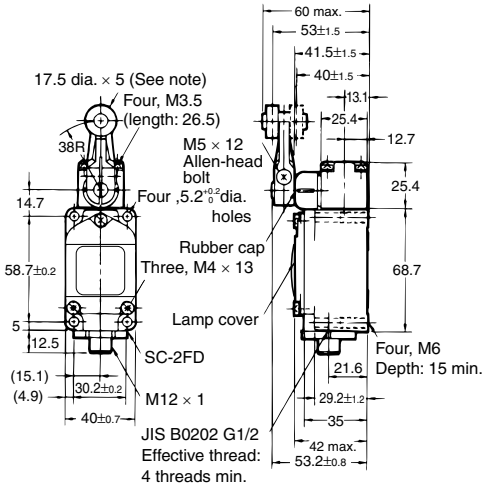
## Rotating Lever Models: Standard

**Screw Terminals**
**WLM□-LD**



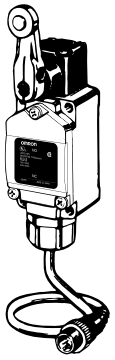

**Note:** Stainless steel roller

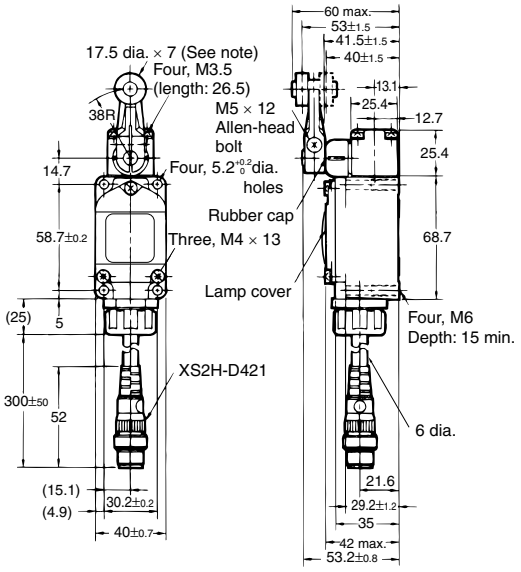
**Direct-wired Connectors**
**WLM□-LD□**




**Note:** Stainless steel roller

**Pre-wired Connectors**
**WLM□-LD□**



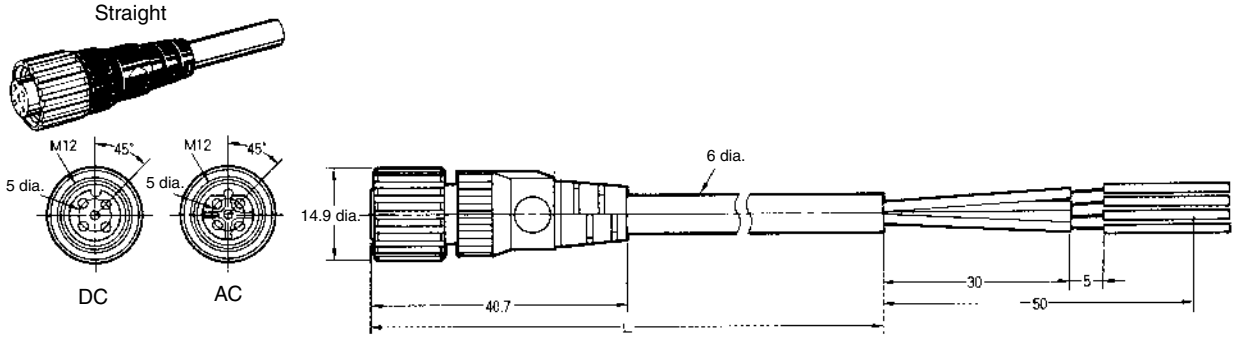



**Note:** Stainless steel roller

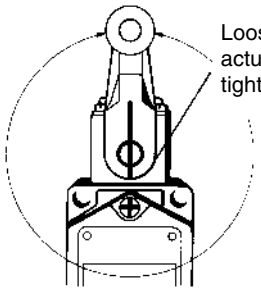
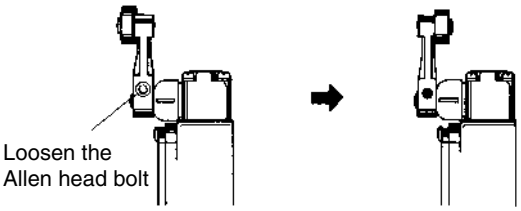
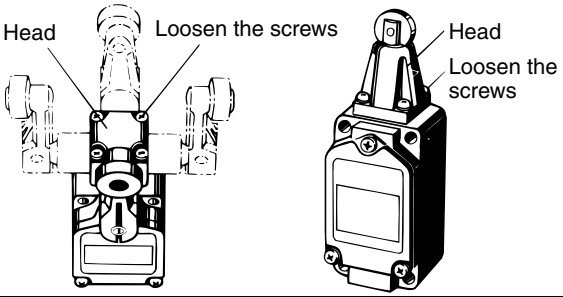
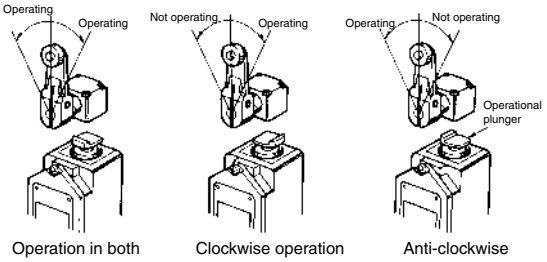
**Note:** Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

## Accessories

**Cable**




# Installation

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

# Precautions

## ■ Correct Use

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

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

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

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

### Environmental Precautions

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

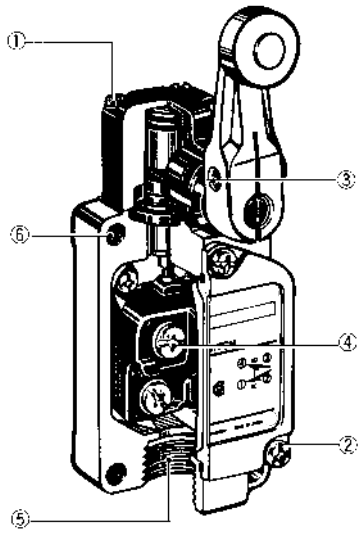
### Built-in Switch

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

### Tightening Torque

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

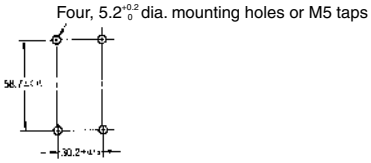
| No. | Type | Torque |
|---|---|---|
| 1 | Head mounting screw | 0.78 to 0.88 N·m |
| 2 | Cover mounting screw | 1.18 to 1.37 N·m |
| 3 | Allen-head bolt (for securing the lever) | 4.90 to 5.88 N·m |
| 4 | Terminal screw | 0.59 to 0.78 N·m |
| 5 | Connector | 1.77 to 2.16 N·m |
| 6 | Main Unit screws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




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

### Installing the Switch

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



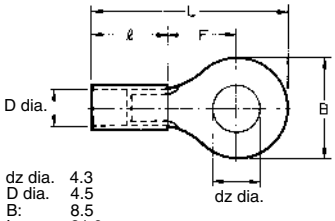

### Connectors

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

## Wiring

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

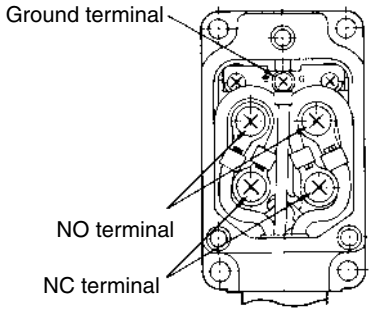
### Crimp Terminal External Dimensions




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

### Wiring Method

Switch Box Section



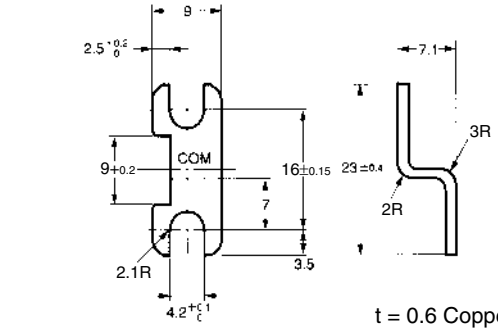

**Note:** Ground terminals are not installed on the standard models.

## Operation Set Position

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

## Terminal Plate

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




t = 0.6 Copper plate

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C112-E1-02

# Enclosed Switch
# ZC-□55

### Small, High-precision Enclosed Switch

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

## Model Number Structure

### ■ Model Number Legend

**ZC-□55**
**1**

**1. Actuator**

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

## Ordering Information

### ■ List of Models

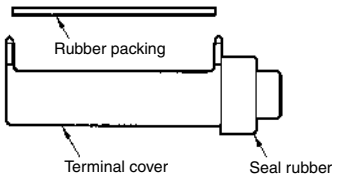
| Actuator | Model | Actuator | Model |
|---|---|---|---|
| **Plunger** | ZC-D55 | **Short hinge lever** | ZC-W55 |
| **Panel mount plunger** | ZC-Q55 | **Hinge lever** | ZC-W155 |
| **Panel mount roller plunger** | ZC-Q2255 | **Short hinge roller lever** | ZC-W255 |
| **Panel mount crossroller plunger**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

**Note: 1.** Use molded terminal models (refer to page 151) when using the Switch under one of the following conditions: a) dusty, b) high amount of dripping oil, or c) high humidity

**2.** Micro-load models are available.
e.g. Standard model: ZC-Q55 Micro-load model: ZC-Q55-01

## Terminal Protective Cover, Seal Rubber, and Rubber Packing

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




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

# Specifications

## ■ Approved Standards

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

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

## ■ Approved Standard Ratings

### UL/CSA

### A300

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

| | |
|---|---|
| Micro load | 0.1 A, 125 VAC<br>0.1 A, 30 VDC |

### TÜV Rheinland

250 V, 10 A (AC12)

## ■ Ratings

| Rated voltage | Non-inductive load | | | | Inductive load | | | |
|---|---|---|---|---|---|---|---|---|
| | Resistive load | | Lamp load | | Inductive load | | Motor load | |
| | NC | NO | NC | NO | NC | NO | NC | NO |
| **125 VAC** | 10 A | | 3 A | 1.5 A | 10 A | | 5 A | 2.5 A |
| **250 VAC** | 10 A | | 2.5 A | 1.25 A | 10 A | | 3 A | 1.5 A |
| **8 VDC** | 10 A | | 3 A | 1.5 A | 6 A | | 5 A | 2.5 A |
| **14 VDC** | 10 A | | 3 A | 1.5 A | 6 A | | 5 A | 2.5 A |
| **30 VDC** | 6 A | | 3 A | 1.5 A | 5 A | | 5 A | 2.5 A |
| **125 VDC** | 0.5 A | | 0.4 A | 0.4 A | 0.05 A | | 0.05 A | 0.05 A |
| **250 VDC** | 0.25 A | | 0.2 A | 0.2 A | 0.03 A | | 0.03 A | 0.03 A |

| | | |
|---|---|---|
| **Inrush current** | NC | 30 A max. |
| | NO | 15 A max. |

**Note: 1.** The above figures are for steady-state currents.

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

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

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

**5.** The above ratings were tested under the following conditions according to JIS C4508.
Ambient temperature: 20±2°C
Ambient humidity: 65±5%
Operating frequency: 20 operations/min

## ■ Characteristics

| | |
|---|---|
| **Degree of protections** | IP67 |
| **Durability** | Mechanical: 10,000,000 operations min.<br>Electrical: 500,000 operations min. |
| **Operating speed** | 0.05 mm to 0.5 m/s (at pin plunger) |
| **Operating frequency** | Mechanical: 120 operations/min<br>Electrical: 20 operations/min |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance** | 15 mΩ max. (initial value) |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals<br>2,000 VAC, 50/60 Hz for 1 min between current-carrying metal part and ground, and between each terminal and non-current-carrying metal parts |
| **Rated insulation voltage ($U_i$)** | 1,000 VAC |
| **Pollution degree (operating environment)** | 3 (IEC947-5-1) |
| **Short-circuit protective device** | 10 A-fuse type gG (IEC 269) |
| **Protection against electric shock** | Class II |
| **PT1 (tracking characteristics)** | 175 |
| **Switch category** | D (IEC335) |
| **Rated operating current (Ie)** | 10 A |
| **Rated operating voltage (Ue)** | 250 VAC |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note) |
| **Shock resistance** | Destruction: 1,000 m/s$^2$ max.<br>Malfunction: 300 m/s$^2$ max. (at pin plunger) (see note) |
| **Ambient temperature** | Operating: –10°C to 80°C (with no icing) |
| **Ambient humidity** | Operating: 35% to 95% |
| **Weight** | Approx. 92 g (in case of ZC-Q22(21)55) |

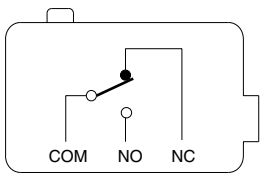
**Note:** Less than 1 ms under a free state at the operating limits.

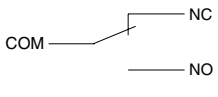
## ■ Operating Characteristics

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

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

## ■ Contact Form

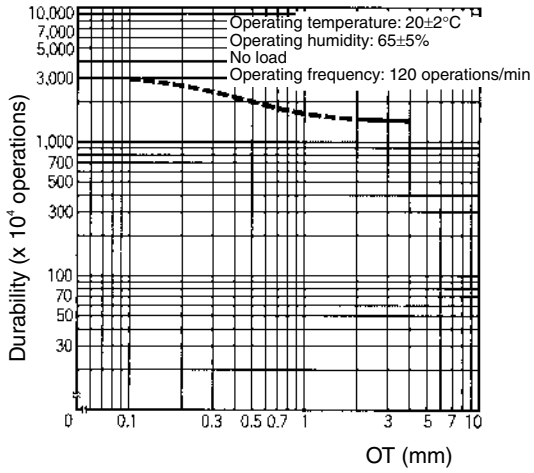


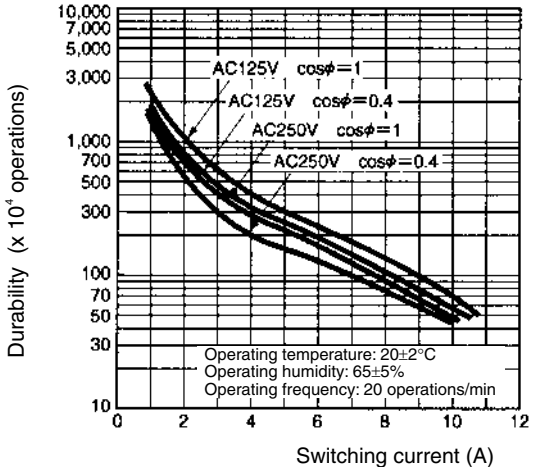

EN60947-5-1

# Engineering Data

## ■ Mechanical Durability (for ZC-Q55)

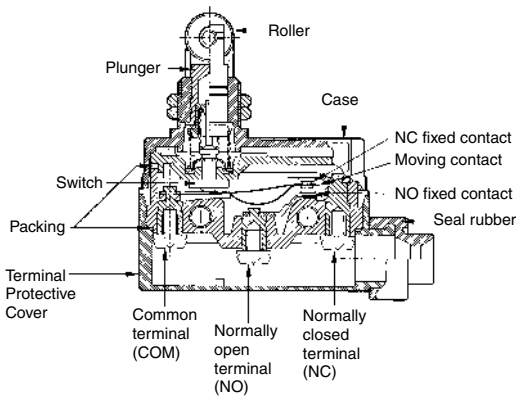



## ■ Electrical Durability




# Nomenclature

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

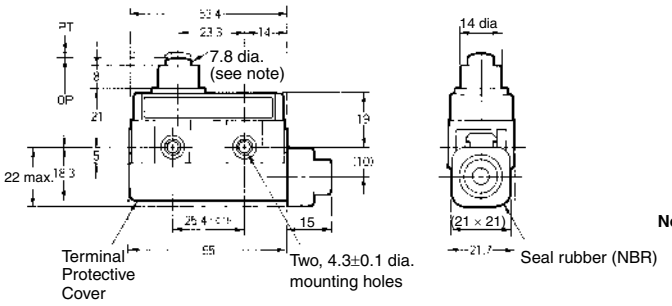



**Note:** M4 binding head screws (with toothed washers) are used as the terminal screws.

# Dimensions

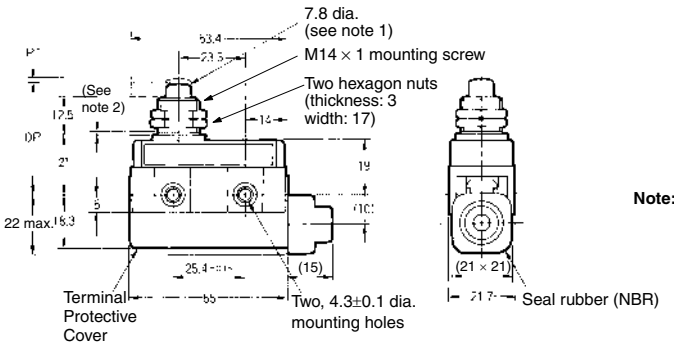
**Note: 1.** All units are in millimeters unless otherwise indicated.
**2.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

**Plunger**
**ZC-D55**



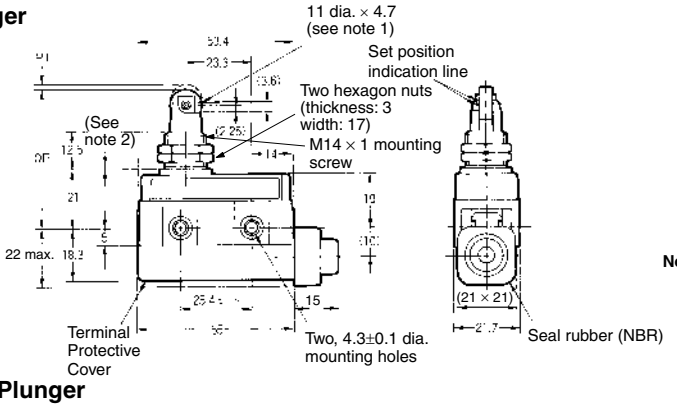

**Note:** Stainless steel plunger

**Panel Mount Plunger**
**ZC-Q55**



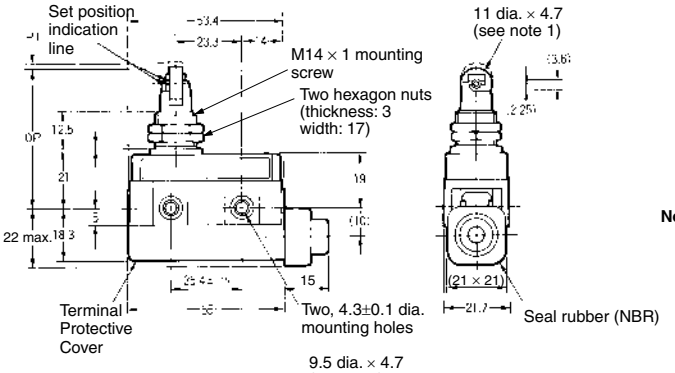

**Note:** **1.** Stainless steel plunger
**2.** The length of the imperfect threads is 1.5 mm maximum.
**3.** Do not use the M14 mounting screw and the case mounting hole at the same time.

**Panel Mount Roller Plunger**
**ZC-Q2255**



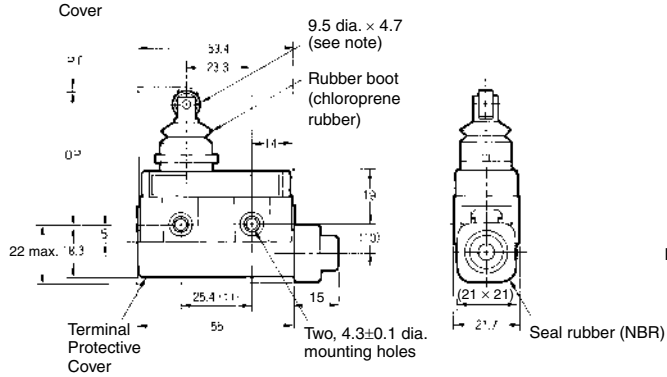

**Note:** **1.** Stainless sintered alloy roller
**2.** The length of the imperfect threads is 1.5 mm maximum.
**3.** Do not use the M14 mounting screw and the case mounting hole at the same time.

**Panel Mount Crossroller Plunger**
**ZC-Q2155**



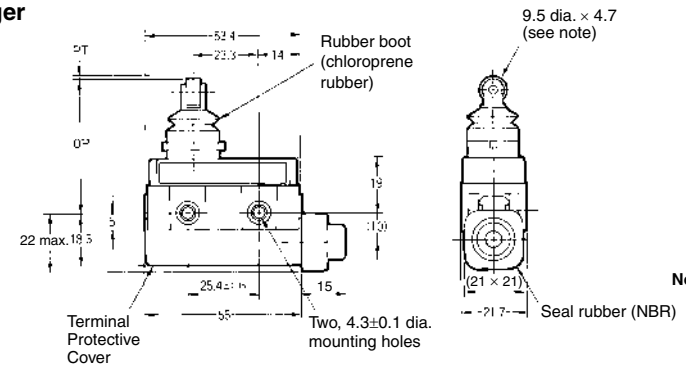

**Note:** **1.** Stainless sintered alloy roller
**2.** The length of the imperfect threads is 1.5 mm maximum.
**3.** Do not use the M14 mounting screw and the case mounting hole at the same time.

**Sealed Roller Plunger**
**ZC-N2255**



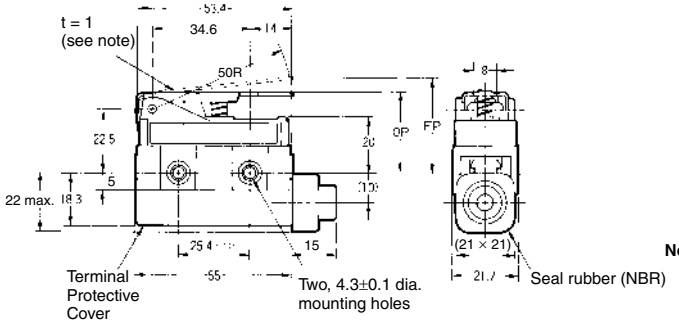

**Note:** Stainless sintered alloy roller

**Sealed Crossroller Plunger**
**ZC-N2155**



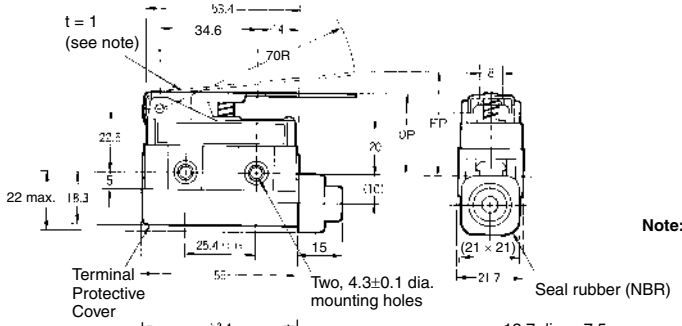

**Note:** Stainless sintered alloy roller

**Short Hinge Roller Lever**
**ZC-W55**



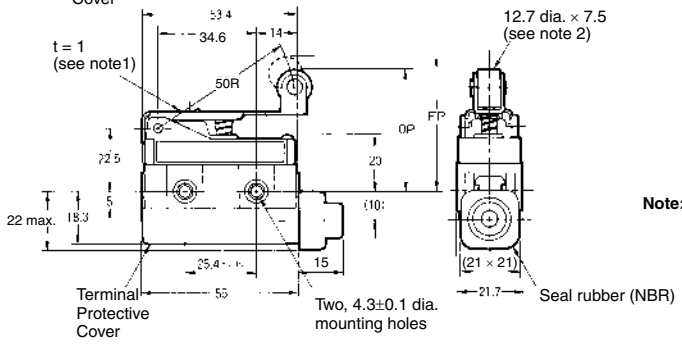

**Note:** Stainless steel lever

**Hinge Lever**
**ZC-W155**



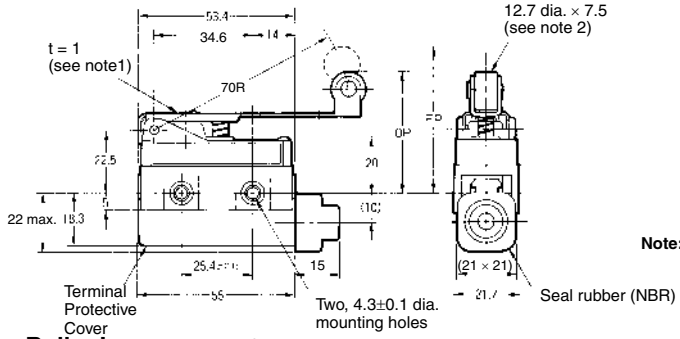

**Note:** Stainless steel lever

**Short Hinge Roller Lever**
**ZC-W255**



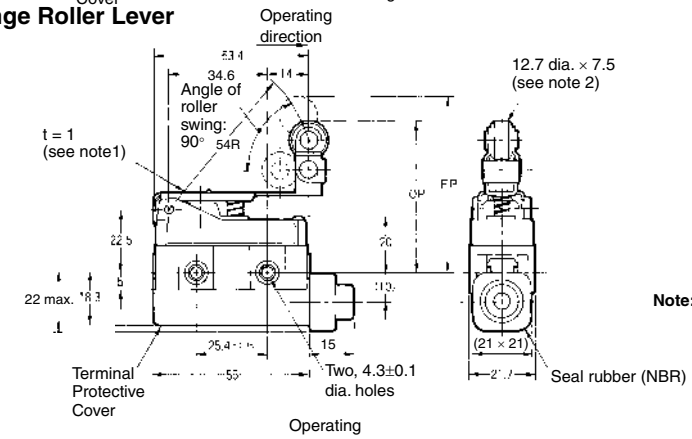

**Note:** 1. Stainless steel lever
2. Stainless steel roller

**Hinge Roller Lever**
**ZC-W2155**



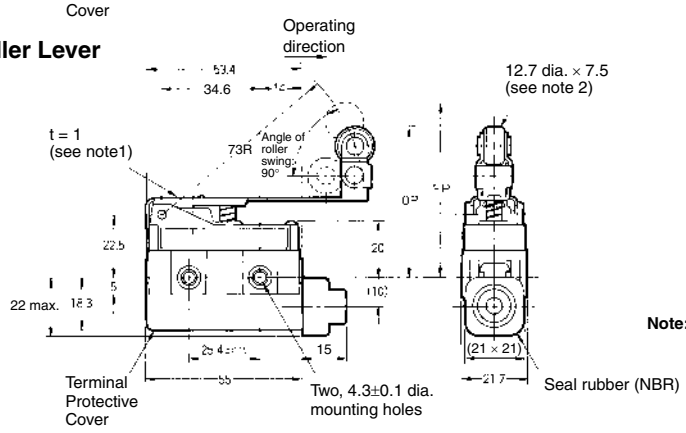

**Note:** 1. Stainless steel lever
2. Stainless steel roller

**One-way Action Short Hinge Roller Lever**
**ZC-W355**




**Note:** 1. Stainless steel lever
2. Stainless steel roller

**One-way Action Hinge Roller Lever**
**ZC-W3155**




**Note:** 1. Stainless steel lever
2. Stainless steel roller

# ■ Operation Indicator-equipped Models

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

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

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

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

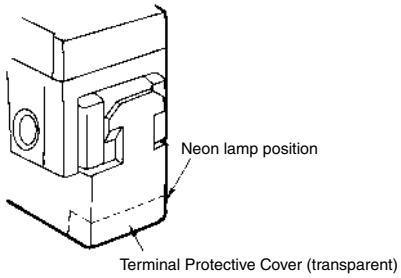
## AC Operation

The operating voltage range is from 90 to 250 VAC.

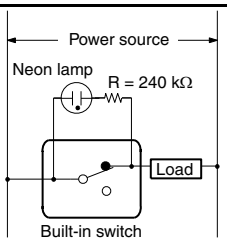
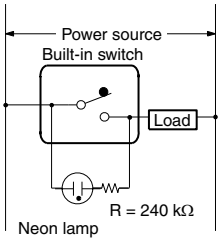
The dimensions are the same as the standard type. The top of the Terminal Protective Cover is transparent to allow checking the operation easily.

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

**Example:**
Standard type: ZC-Q2255
Indicator equipped type: ZC-Q2255-L




### Contact Circuit

| | |
|---|---|
| **NC terminal** |   |
| **NO terminal** |   |

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

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

## DC Operation

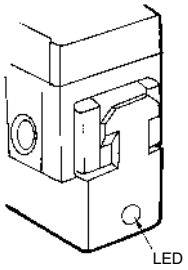
The DC-operated is provided with an LED indicator.

Since a rectifier stack is incorporated into the unit to permit reversing the polarity, this type can also operate on AC power source.

The LED projects from the housing for easy visibility.

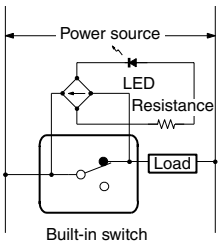
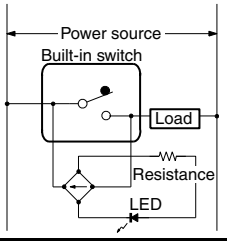
When placing your order, add suffix "L2" to "L5" to the model number of the standard type.

**Example:**
Standard type: ZC-Q2255
Indicator equipped type: ZC-Q2255-L2




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

### Contact Circuit

| | |
|---|---|
| **NC terminal** |   |
| **NO terminal** |   |

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

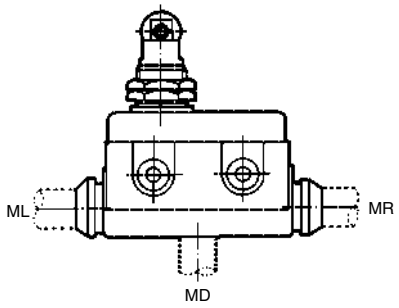
| Contact | LED | Load | Actuator |
|---|---|---|---|
| **NC** | ON | Does not operate | Operates |
| | OFF | Operates | Does not operate |
| **NO** | ON | Does not operate | Does not operate |
| | OFF | Operates | Operates |

# Molded Terminal Models

## ■ Molded Terminal Model

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

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




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

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

### Suffix by Location of Lead Outlet

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

### Lead Supplies

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

# Precautions

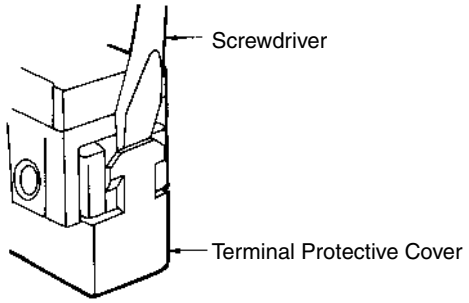
## ■ Correct Use

### Dog Angle

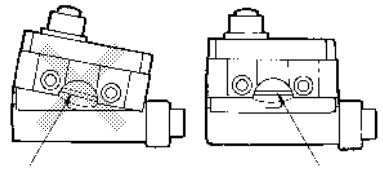
When operating the roller type, be sure to set the dog angle to less than 30° (even when operating at a low speed). Operating the model at a dog angle exceeding 30° will soon cause abrasion or damage. Do not apply a twisting force to the plunger. Set the OT to 70% to 100% of the specified value so that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

### Handling

When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.




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

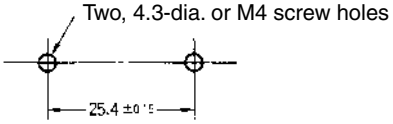



- A 8.5- to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 $mm^2$.)
- Use weather-proof rubber (chloroprene rubber) as seal rubber for the ZC-N22(21)55.

### Mounting

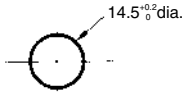
- When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

#### Mounting Holes




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

#### Mounting Hole Dimensions



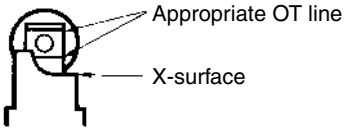

### Tightening Torque

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

| No. | Type | Torque |
|---|---|---|
| 1 | Terminal screw | 0.78 to 1.18 N·m |
| 2 | Panel mounting screw | 4.90 to 7.84 N·m |
| 3 | Side mounting screw | 1.18 to 1.47 N·m |

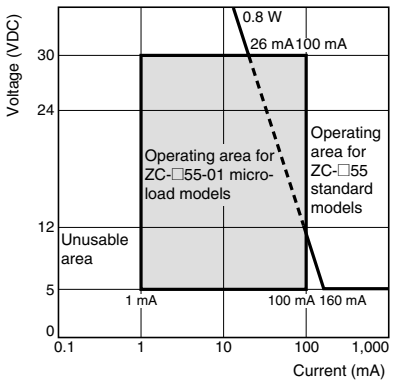
### Operation

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




### Micro-load Applicable Ranges

Using a standard load switch for opening and closing a micro-load circuit may cause wear on the contacts. Use the switch within the operating range. (Refer to the diagram below.) Even when using micro-load models within the operating range shown below, if inrush current occurs when the contact is opened or closed, it may cause the contact surface to become rough, and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary. The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% ($\lambda_{60}$). 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%.




| Model | ZC-□55-01 | ZC-□55 |
|---|---|---|
| Minimum applicable load | 1 mA at 5 VDC | 160 mA at 5 VDC |

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C025-E1-09

# Enclosed Switches
# ZE/ZV/XE/XV

## Long Service Life and Large Breaking Power

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



# Model Number Structure

## ■ Model Number Legend

□□-□-2□
1 2 3 4

**1. Built-in Switch**
- Z: SPDT (AC)
- X: SPDT (DC)

**2. Mounting Direction**
- E: Side mounting
- V: Base mounting
- V2: Diagonal side mounting

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

**4. Conduit/Ground Terminal**
- None: G $^1/_2$/without ground terminal
- G1: G $^1/_2$/with ground terminal
- G: Pg13.5/with ground terminal
- SG1: $^1/_2$-14NPSM/with ground terminal
- YG1: M20/with ground terminal
- S: $^1/_2$-14NPSM/without ground terminal
- Y: M20/without ground terminal

# Ordering Information

## ■ List of Models

### Standard Switches

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

**Note: 1.** The diagonal side mounting model feature improved sealing property, improved mounting strength through use of M5 screws, increased stability in seating with large mounting width (31 x 75 mm) and permit coupling of a number of Switch units.

**2.** ZE, ZV, and ZV2 series are approved by UL and CSA.

# Specifications

## ■ Approved Standards

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

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

## ■ Approved Standard Ratings

### UL/CSA

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

## ■ Ratings

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

**Note: 1.** The above figures are for standard currents.
**2.** Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp load has an inrush current of 10 times the steady-state current.
**4.** Motor load has an inrush current of 6 times the steady-state current.

| | | |
|---|---|---|
| **Inrush current** | NC | 30 A max. |
| | NO | 15 A max. |

## ■ Characteristics

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

**Note: 1.** The above figures are initial values.
**2.** IP65 for □E-N models and IP60 for □E-Q models.
**3.** The values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.
**4.** At the operation limit positions.
**5.** Only for plunger, sealed plunger, roller arm lever, and sealed roller arm lever.
**6.** Only for crossroller plunger, sealed crossroller plunger, roller plunger, and sealed roller plunger.

# ■ Operating Characteristics

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

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

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

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

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

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

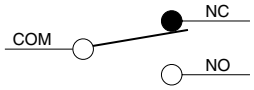
| Model | XV(2)-QA277-2 | ZV(2)-N-2 | XV(2)-N-2 | ZV(2)-N22-2 | ZV(2)-N21-2 | ZV(2)-NA2-2 |
|---|---|---|---|---|---|---|
| **OF** | 6.47 N | 7.85 N | 10.20 N | 4.90 N | | 6.28 N |
| **RF min.** | 1.67 N | 2.35 N | 2.35 N | 0.98 N | | 2.26 N |
| **PT max.** | 6 mm | 2 mm | 3 mm | 1 mm | | 5 mm |
| **OT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

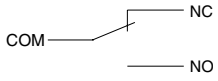
**Note: 1.** The OP of ZV2-N-2/XV2-N-2 is 31.9±0.8 mm.
**2.** The OP of ZV2-N22-2/ZV2-N21-2 is 35.7±0.8 mm.

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

## ■ Contact Form

**ZE-□, ZV-□, ZV2-□**
**XE-□, XV-□, XV2-□**



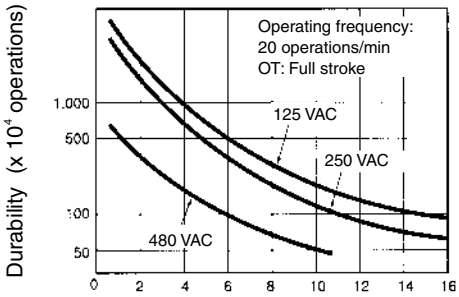

EN60947-5-1

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

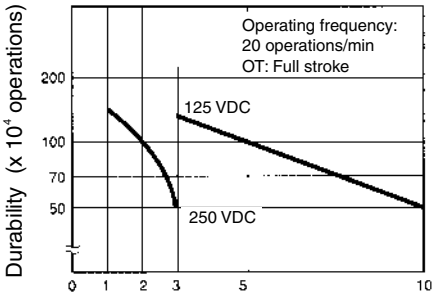
# Engineering Data

## ■ Electrical Durability

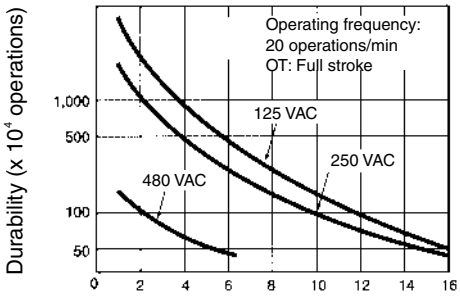
**ZE (cosϕ = 1)**



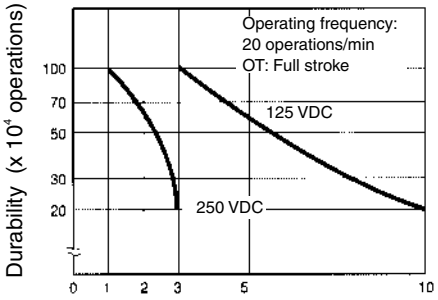

**XE (L/R = 0)**



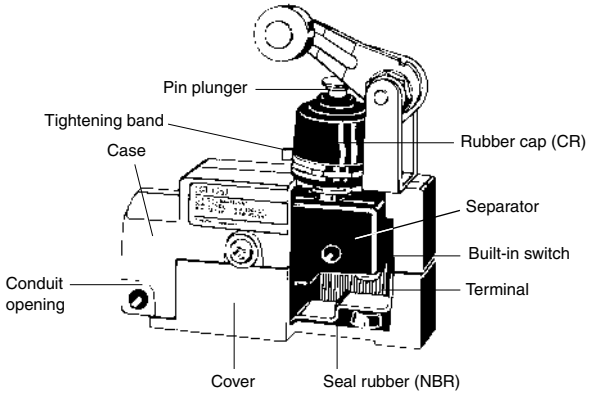

**ZE (cosϕ = 0.4)**




**XE (L/R = 7 ms)**



# Nomenclature




# Dimensions

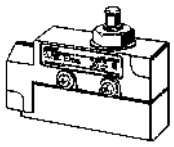
**Note: 1.** All units are in millimeters unless otherwise indicated.

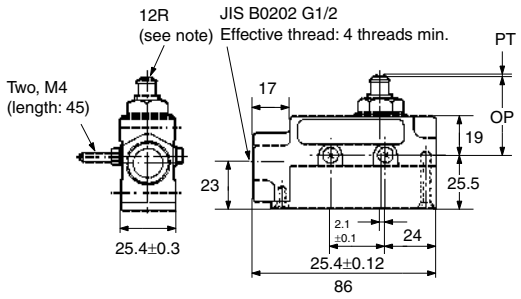
**2.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

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

## Side Mounting

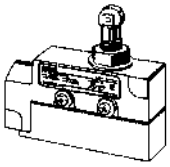
**Plunger**
**ZE-Q-2, XE-Q-2**

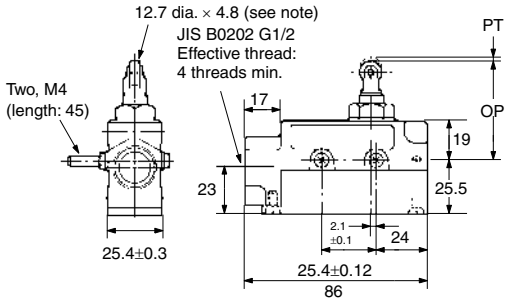





**Note:** Stainless steel plunger

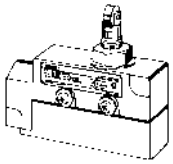
**Roller Plunger**
**ZE-Q22-2, XE-Q22-2**

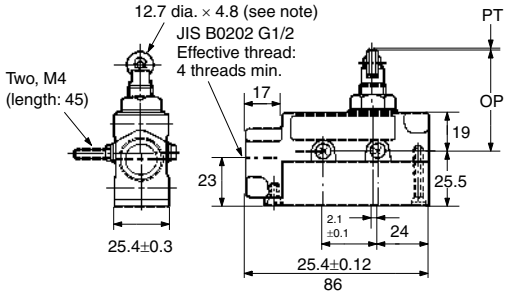





**Note:** Stainless steel roller

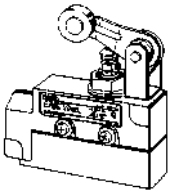
**Crossroller Plunger**
**ZE-Q21-2, XE-Q21-2**

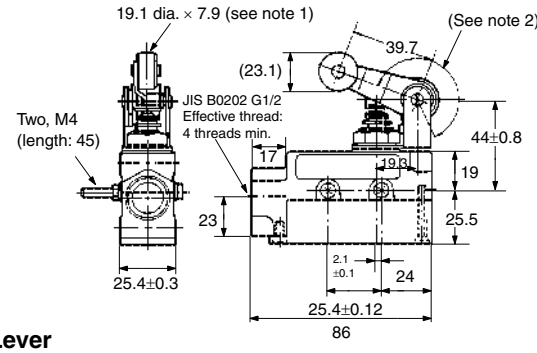





**Note:** Stainless steel roller

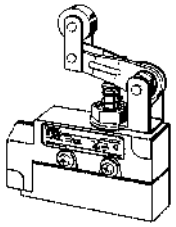
## Roller Arm Lever
## ZE-QA2-2, XE-QA2-2

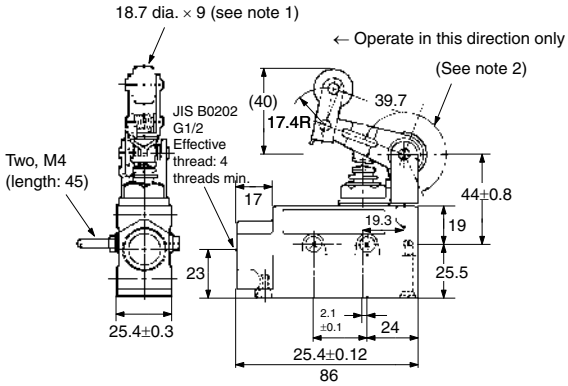





**Note:** **1.** Stainless sintered roller
**2.** Adjustable between 0° and 225°

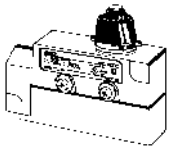
## One-way Action Roller Arm Lever
## ZE-QA277-2, XE-QA277-2

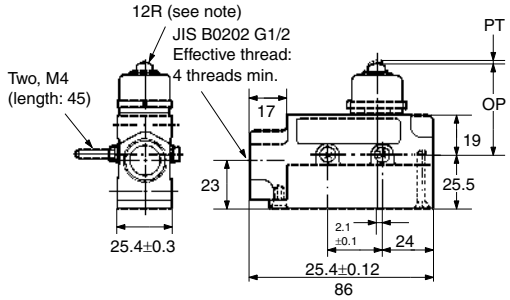





**Note:** **1.** Stainless sintered alloy roller
**2.** Adjustable between 0° and 225°

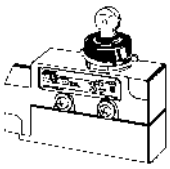
## Sealed Plunger
## ZE-N-2, XE-N-2

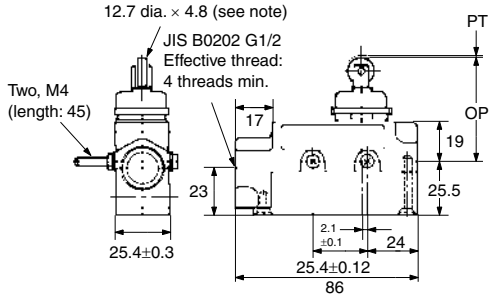





**Note:** Stainless steel plunger

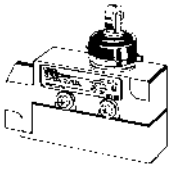
## Sealed Roller Plunger
## ZE-N22-2

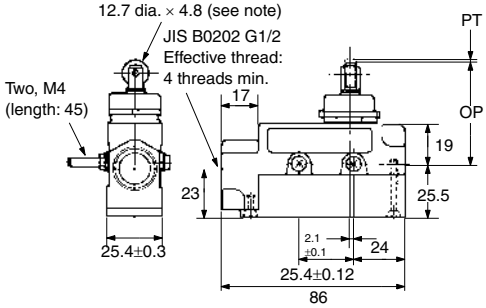





**Note:** Stainless steel roller

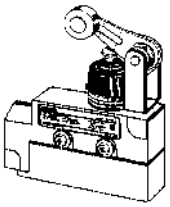
## Sealed Crossroller Plunger
## ZE-N21-2

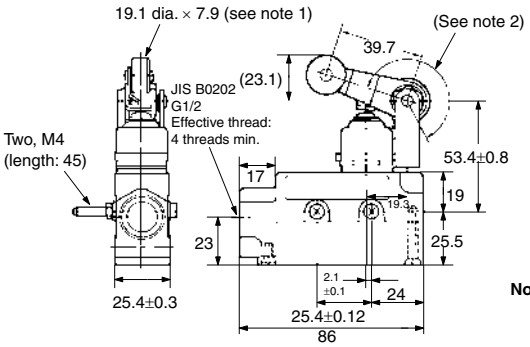





**Note:** Stainless steel roller

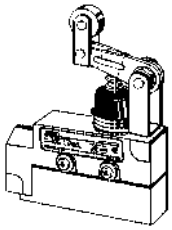
**Sealed Roller Arm Lever**
**ZE-NA2-2, XE-NA2-2**

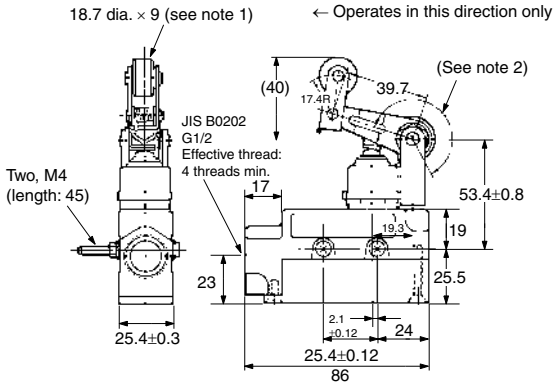





**Note:** **1.** Stainless steel roller
**2.** Adjustable between 0° and 225°

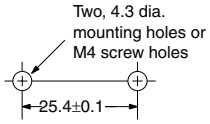
**One-way Action Sealed Roller Arm Lever**
**ZE-NA277-2, XE-NA277-2**





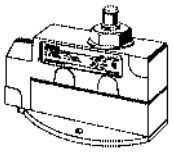

**Note:** **1.** Stainless steel roller
**2.** Adjustable between 0° and 225°

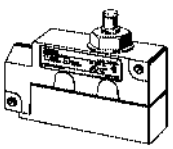
**Mounting Hole**

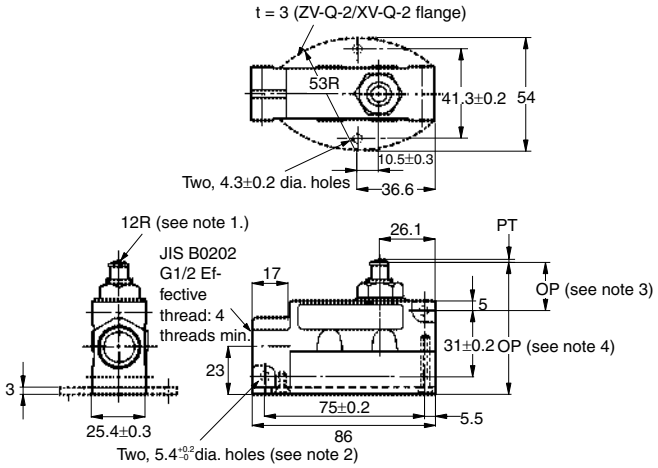



## Base Mounting/Diagonal Side Mounting

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

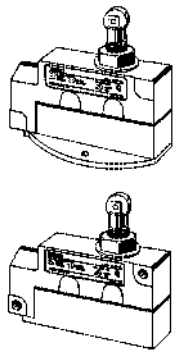


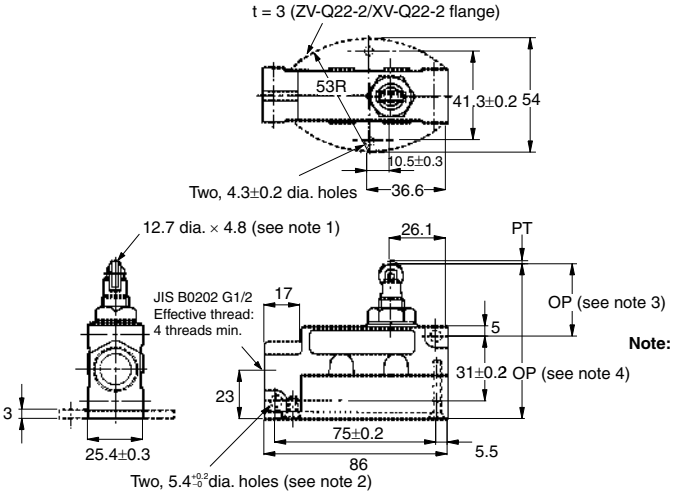





**Note:** **1.** Stainless steel plunger
**2.** Only the ZV2-Q-2 and XV2-Q-2 incorporate mounting holes.
**3.** OP for ZV2-Q-2 and XV2-Q-2 is 24.2 ±0.8 mm.

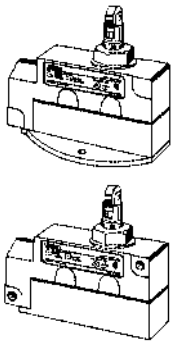
## Roller Plunger
## ZV(2)-Q22-2, XV(2)-Q22-2

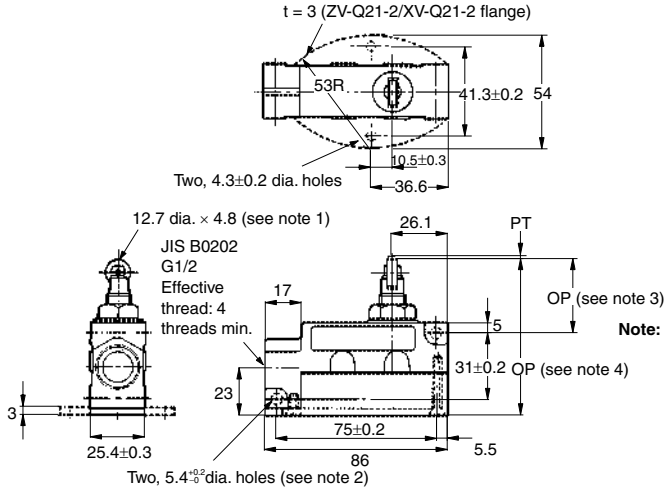





**Note:**
1. Stainless steel roller
2. Only the ZV2-Q22-2 and XV2-Q22-2 incorporate mounting holes.
3. OP for ZV2-Q22-2 and XV2-Q22-2 is 35.7 ±1 mm.

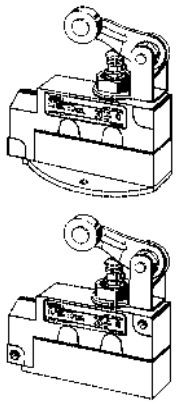
## Crossroller Plunger
## ZV(2)-Q21-2, XV(2)-Q21-2

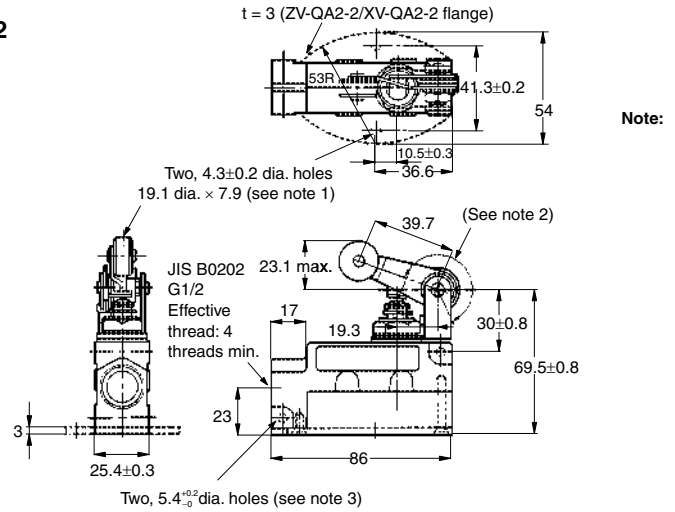





**Note:**
1. Stainless steel roller
2. Only the ZV2-Q21-2 and XV2-Q21-2 incorporate mounting holes.
3. OP for ZV2-Q21-2 and XV2-Q21-2 is 35.7 ±0.8 mm.

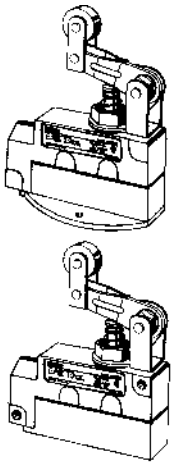
## Roller Arm Lever
## ZV(2)-QA2-2, XV(2)-QA2-2

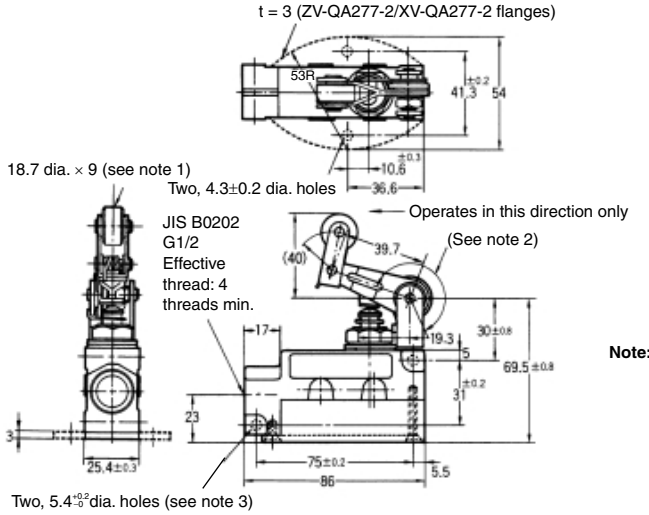





**Note:**
1. Stainless sintered alloy roller
2. Adjustment between 0° to 225°.
3. Only the ZV2-QA2-2 and XV2-QA2-2 incorporate mounting holes.

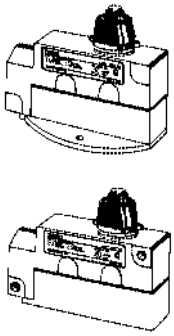
### One-way Action Roller Arm Lever
### ZV(2)-QA277-2, XV(2)-QA277-2

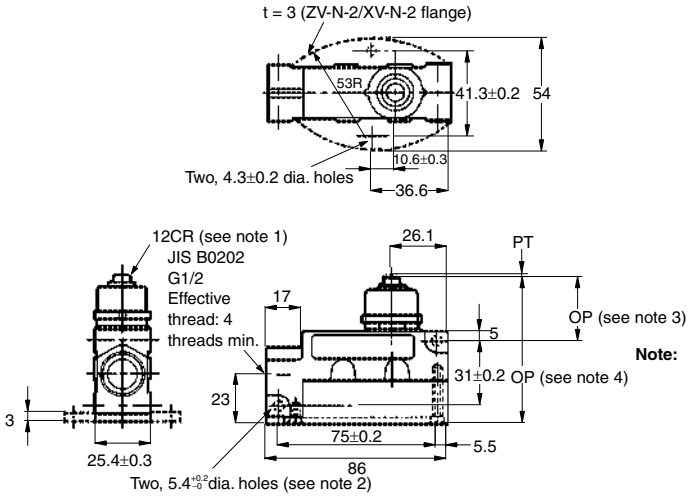





**Note:** **1.** Stainless steel roller
**2.** Adjustment between 0° to 225°.
**3.** Only the ZV2-QA277-2 and XV2-QA277-2 incorporate mounting holes.

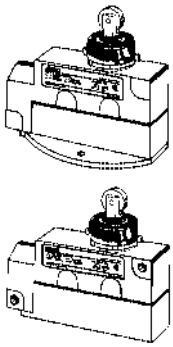
### Sealed Plunger
### ZV(2)-N-2, XV(2)-N-2

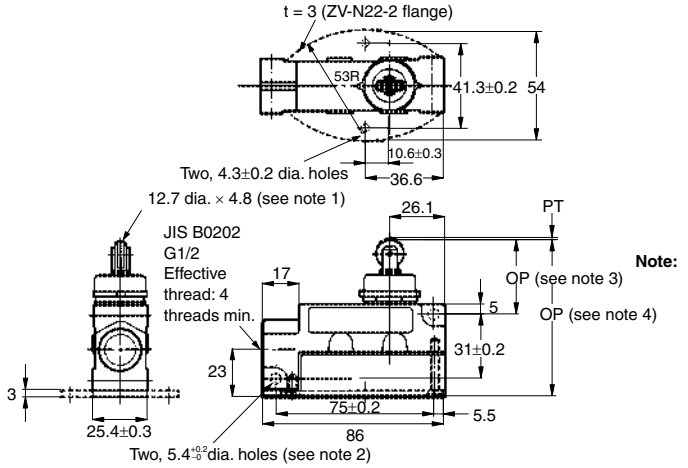





**Note:** **1.** Stainless steel plunger
**2.** Only the ZV2-N-2 and XV2-N-2 incorporate mounting holes.
**3.** OP for ZV2-N-2 and XV2-N-2 is 31.9 ±0.8 mm.

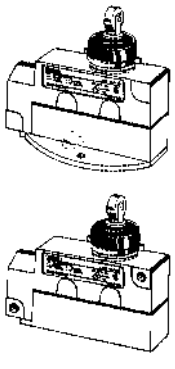
### Sealed Roller Plunger
### ZV(2)-N22-2

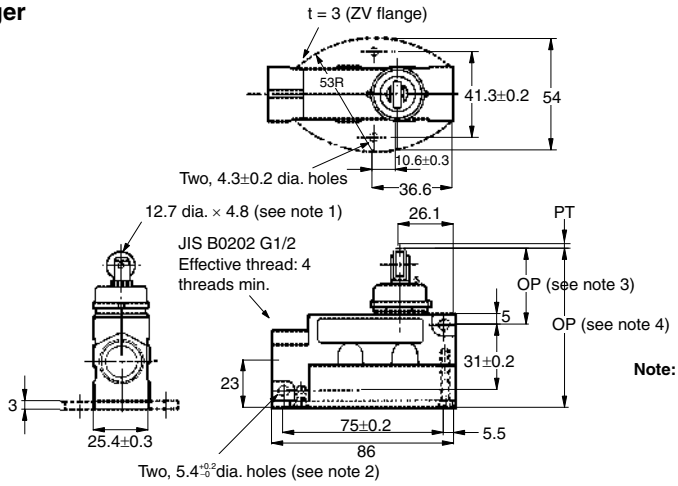





**Note:** **1.** Stainless steel roller
**2.** Only the ZV2-N22-2 incorpo incorporate mounting holes.
**3.** OP for ZV2-N22-2 is 35.7 ±0.8 mm.

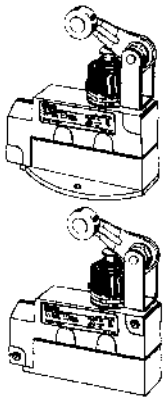
## Sealed Crossroller Plunger
## ZV(2)-N21-2

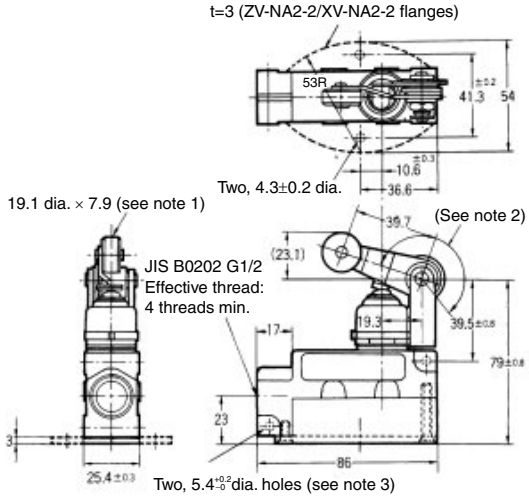





**Note:** **1.** Stainless steel roller
**2.** Only the ZV2-N21-2 incorporate mounting holes.
**3.** OP for ZV2-N21-2 is 35.7 ±0.8 mm.

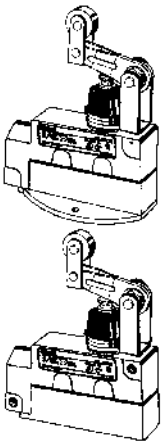
## Sealed Roller Arm Lever
## ZV(2)-NA2-2, XV(2)-NA2-2

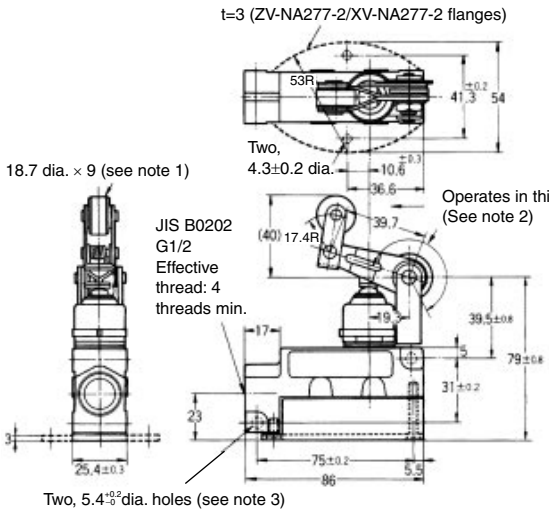





**Note:** **1.** Stainless steel roller
**2.** Adjustment between 0° to 225°.
**3.** Only the ZV2-NA2-2 and XV2-NA2-2 incorporate mounting holes.

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






**Note:** **1.** Stainless steel roller
**2.** Adjustment between 0° to 225°.
**3.** Only the ZV2-NA277-2 and XV2-NA277-2 incorporate mounting holes.

# Precautions

## ■ Correct Use

### Mounting

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

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

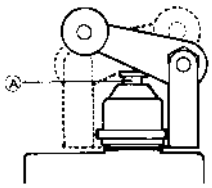
To provide the Switch with improved sealing property, use of the SC Connector is recommended.

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

### Environmental Precautions

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

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



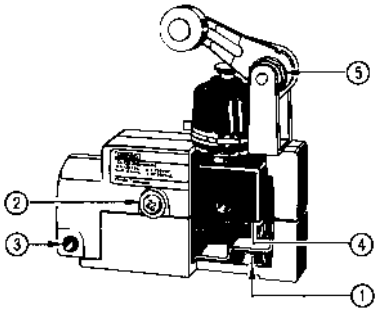

### Tightening Torque

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

| No. | Type | Torque |
|---|---|---|
| 1 | Cover mounting screw | 1.18 to 1.37 N·m |
| 2 | Switch mounting screw (see note 1) | 1.18 to 1.37 N·m |
| 3 | Switch mounting screw (see note 2) | 4.90 to 5.88 N·m |
| 4 | Switch terminal screw (M4 screws for head) | 0.78 to 1.18 N·m |
| 5 | Roller arm mounting nut | 4.90 to 5.88 N·m |

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

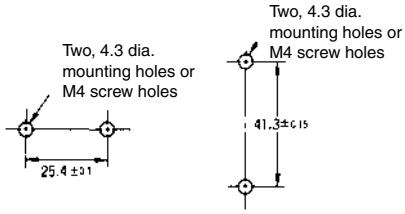
**2.** This torque range applies to side diagonal mounting. (M5 Allen-head bolt)



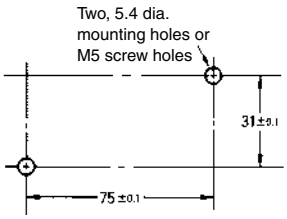

### Mounting

#### Mounting Holes

**Side Mounting** **Bottom Mounting**




**Side Diagonal Mounting**



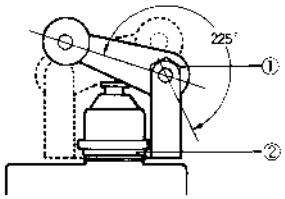

### Operation

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

### Dedicated Wrench

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

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




A dedicated wrench is provided separately.

Model: SUPANA FOR ZE

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. C020-E1-09

# General-purpose Basic Switch
# A

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

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



## Model Number Structure

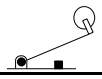
### ■ Model Number Legend

**A-20G□-□**
**1 2 3 4**

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

# Ordering Information

## ■ List of Models

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

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

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL508 (File No. E41515)
### CSA C22.2 No.55 (File No. LR21642)

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

## ■ Ratings

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

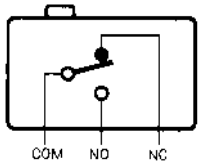
**Note: 1.** The above values are for steady-state current.
**2.** Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**3.** Lamp load has an inrush current of 10 times the steady-state current.
**4.** Motor load has an inrush current of 6 times the steady-state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

## ■ Characteristics

| | |
|---|---|
| **Operating speed** | 0.01 mm to 1 m/s (see note 1) |
| **Operating frequency** | Mechanical: 240 operations/min<br>Electrical: 20 operations/min (under rated load) |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance** | 15 mΩ max. (initial value) |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity<br>2,000 VAC, 50/60 Hz for 1 min between the current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 2) |
| **Shock resistance** | Destruction: 1,000 m/s$^2$ {approx. 100G} max.<br>Malfunction: 300 m/s$^2$ {approx. 30G} max. (see note 1, 2) |
| **Durability** | Mechanical: 1,000,000 operations min.<br>Electrical: 500,000 operations min. |
| **Degree of protection** | IP00 |
| **Degree of protection against electric shock** | Class I |
| **Proof tracking index (PTI)** | 175 |
| **Switch category** | D (IEC335-1) |
| **Ambient temperature** | Operating: –25°C to 80°C (with no icing) |
| **Ambient humidity** | Operating: 35% to 85% |
| **Weight** | Approx. 23 to 58 g |

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

## ■ Contact Form (SPDT)



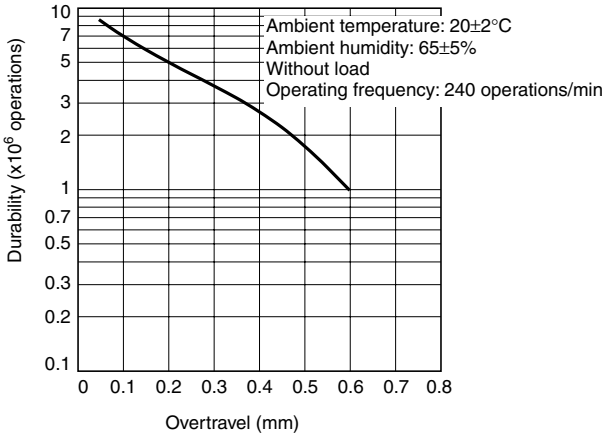
## ■ Contact Specification

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

# Engineering Data

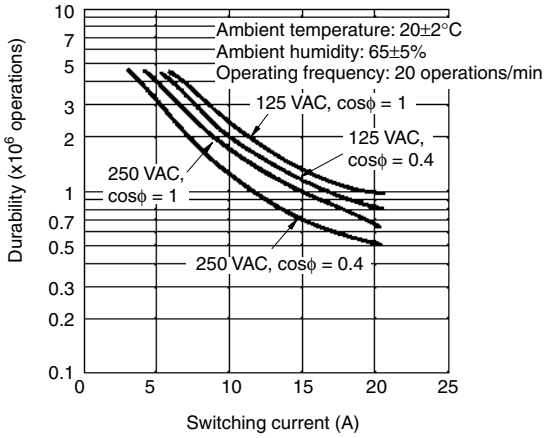
## ■ Mechanical Durability

**A-20G**




## ■ Electrical Durability

**A-20G**




# Dimensions

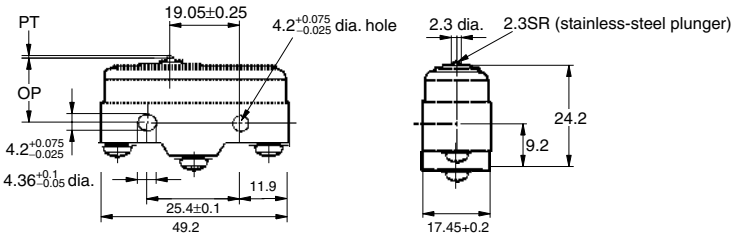
**Note: 1.** All units are in millimeters unless otherwise indicated.

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

## ■ Dimensions and Operating Characteristics

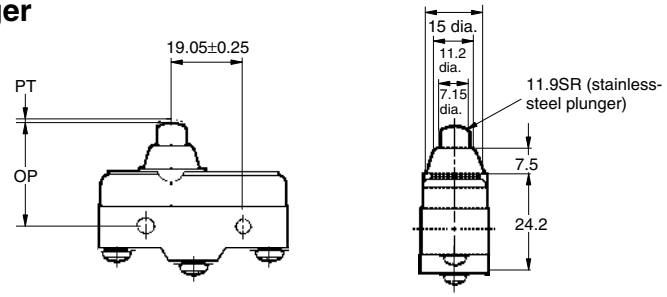
The models, illustrations, and graphics are for screw-terminal models. (The dimensions for models that are omitted here are the same as for pin-plunger models.)

### Pin Plunger
**A-20G-B**




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

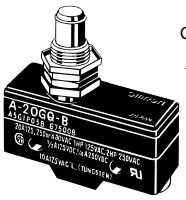
### Short Spring Plunger
**A-20GD-B**

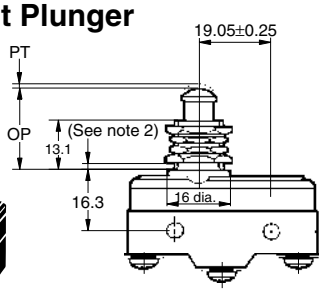


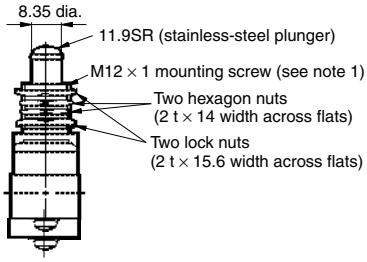

| | |
|---|---|
| **OF** | 3.92 to 6.13 N {400 to 625 gf} |
| **RF min.** | 2.79 N {285 gf} |
| **PT max.** | 1.3 mm |
| **OT min.** | 3 mm |
| **MD max.** | 0.2 mm |
| **OP** | 26.2±0.5 mm |

## Panel Mount Plunger

**A-20GQ-B**





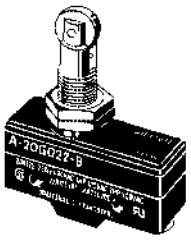



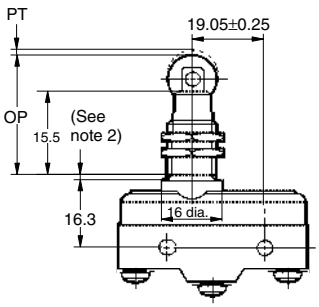

| | |
|---|---|
| **OF** | 3.92 to 6.13 N {400 to 625 gf} |
| **RF min.** | 2.79 N (285 gf) |
| **PT max.** | 1.3 mm |
| **OT min.** | 5.6 mm |
| **MD max.** | 0.2 mm |
| **OP** | 21.8±0.8 mm |

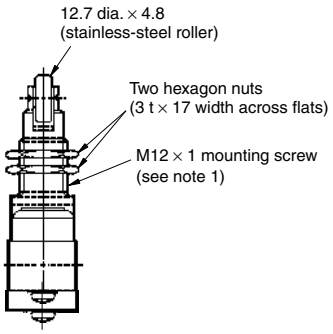
**Note: 1.** Do not use both M12 mounting screw and mounting holes at the same time.
**2.** Imperfect screw part with a maximum length of 1.5 mm.

## Panel Mount Roller Plunger

**A-20GQ22-B**





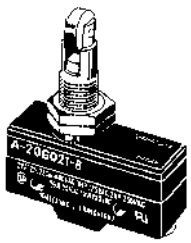



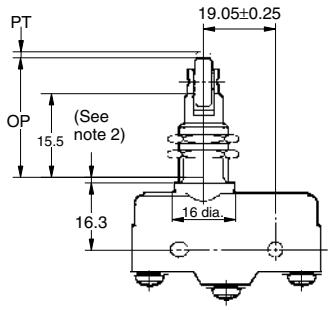

| | |
|---|---|
| **OF** | 6.18 N {630 gf} max. |
| **RF min.** | 2.75 N {280 gf} |
| **PT max.** | 1.3 mm |
| **OT min.** | 3.58 mm |
| **MD max.** | 0.35 mm |
| **OP** | 33.4±1.2 mm |

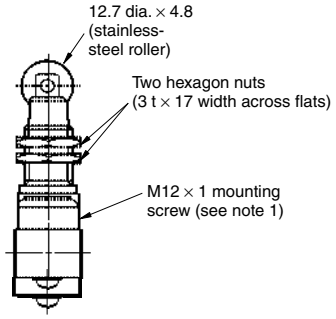
**Note: 1.** Do not use both M12 mounting screw and mounting holes at the same time.
**2.** Imperfect screw part with a maximum length of 1.5 mm.

## Panel Mount Cross Roller Plunger

**A-20GQ21-B**





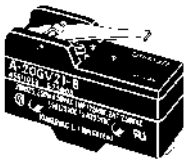



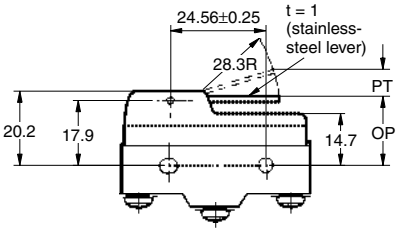

| | |
|---|---|
| **OF** | 6.18 N {630 gf} max. |
| **RF min.** | 2.75 N {280 gf} |
| **PT max.** | 1.3 mm |
| **OT min.** | 3.58 mm |
| **MD max.** | 0.35 mm |
| **OP** | 33.4±1.2 mm |

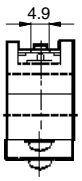
**Note: 1.** Do not use both M12 mounting screw and mounting holes at the same time.
**2.** Imperfect screw part with a maximum length of 1.5 mm.

## Short Hinge Lever

**A-20GV21-B**



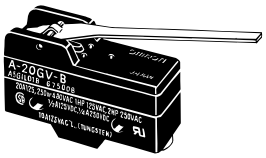


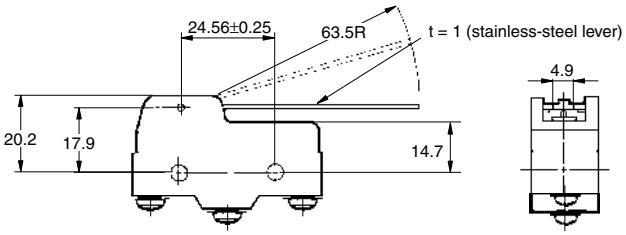




| | |
|---|---|
| **OF** | 1.57 N {160 gf} max. |
| **RF min.** | 0.41 N {42 gf} |
| **PT max.** | 6.5 mm |
| **OT min.** | 1.2 mm |
| **MD max.** | 1.2 mm |
| **OP** | 19±0.8 mm |

## Hinge Lever

**A-20GV-B**



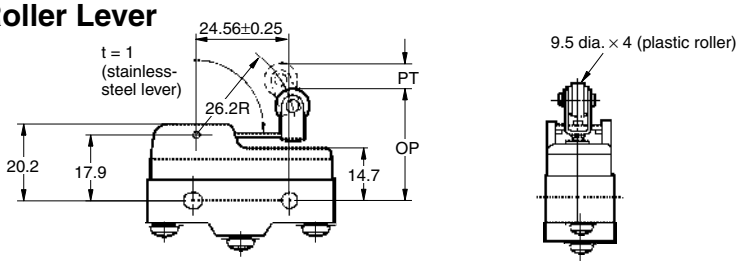



| | |
|---|---|
| **OF** | 0.69 N {70 gf} max. |
| **RF min.** | 0.14 N {14 gf} |
| **PT max.** | 15.9 mm |
| **OT min.** | 4 mm |
| **MD max.** | 2.4 mm |
| **OP** | 19±0.8 mm |

.

## Short Hinge Roller Lever

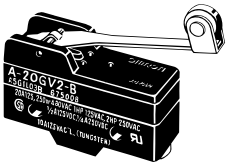
**A-20GV22-B**

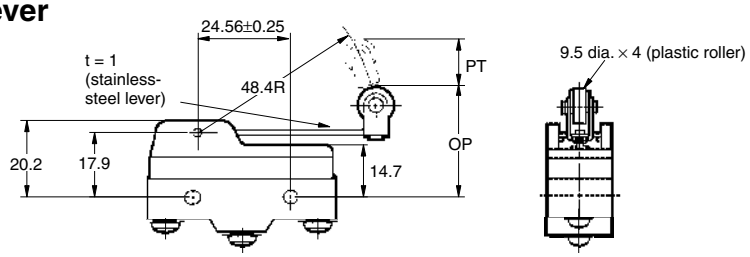



| | |
|---|---|
| **OF** | 1.57 N {160 gf} |
| **RF min.** | 0.41 N {42 gf} |
| **PT max.** | 6.3 mm |
| **OT min.** | 1.2 mm |
| **MD max.** | 1.22 mm |
| **OP** | 29.8±0.8 mm |

## Hinge Roller Lever

**A-20GV2-B**

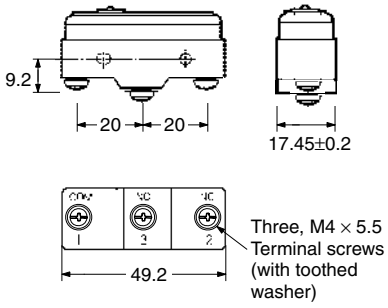





| | |
|---|---|
| **OF** | 0.88 N {90 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **PT max.** | 12 mm |
| **OT min.** | 2.4 mm |
| **MD max.** | 2.2 mm |
| **OP** | 30.2±0.8 mm |

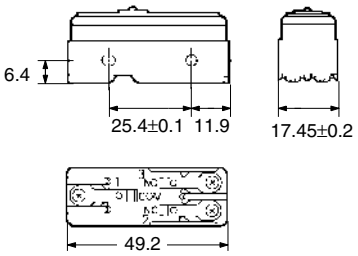
# ■ Terminals

### Screw Terminals (-B)




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

### Solder Terminal



# Precautions

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

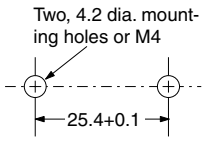
## ■ Correct Use

### Mounting

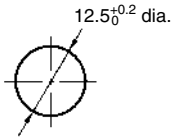
Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}.

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

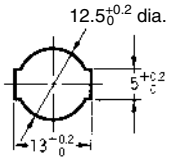
### Mounting Holes




**Panel Mount Plunger**




**Panel Mount Roller Plunger**




### Panel-mounting (A-20GQ□)

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

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

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

## ■ Accessories (Order Separately)

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B002-E1-07

# Special-purpose Basic Switch
# DZ

### DPDT Basic Switch for Two Independent Circuit Control

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



## Model Number Structure

### ■ Model Number Legend

**DZ-10G□-1□**
**1 2 3 4 5**

1. **Ratings**
   10: 10 A (250 VAC)
2. **Contact Gap**
   G: 0.5 mm
3. **Actuator**
   None: Pin plunger
   V: Hinge lever
   V22: Short hinge roller lever
   V2: Hinge roller lever
   W: Hinge lever
   W22: Short hinge roller lever
   W2: Hinge roller lever
4. **Contact Form**
   1: DPDT
5. **Terminals**
   A: Solder terminal
   B: Screw terminal

## Ordering Information

### ■ List of Models

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

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL508 (File No. E41515)/ CSA C22.2 No. 55 (File No. LR21642)

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

## ■ Ratings

| Rated voltage | Non-inductive load | | | | Inductive load | | | | Inrush current | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Resistive load | | Lamp load | | Inductive load | | Motor load | | | |
| | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO |
| **125 VAC** | 10 A | | 2 A | 1 A | 6 A | | 3 A | 1.5 A | 30 A max. | 15 A max. |
| **250 VAC** | 10 A | | 1.5 A | 0.7 A | 4 A | | 2 A | 1 A | | |
| **8 VDC** | 10 A | | 3 A | 1.5 A | 6 A | | 5 A | 2.5 A | | |
| **14 VDC** | 10 A | | 3 A | 1.5 A | 6 A | | 5 A | 2.5 A | | |
| **30 VDC** | 10 A | | 3 A | 1.5 A | 4 A | | 3 A | 1.5 A | | |
| **125 VAC** | 0.5 A | | 0.5 A | | 0.05 A | | 0.05 A | | | |
| **250 VDC** | 0.25 A | | 0.25 A | | 0.03 A | | 0.03 A | | | |

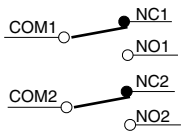
**Note: 1.** Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
**2.** Lamp load has an inrush current of 10 times the steady-state current.
**3.** Motor load has an inrush current of 6 times the steady-state current.

## ■ Characteristics

| | |
|---|---|
| **Operating speed** | 0.1 mm to 1 m/s (at pin plunger) |
| **Operating frequency** | Mechanical: 240 operations/min<br>Electrical: 20 operations/min |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance** | 15 mΩ max. (initial value) |
| **Dielectric strength** | 1,000 VAC, 50/60 Hz for 1 min between non-continuous terminals<br>1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and non-current-carrying metal part, and between current-carrying metal part and ground and between switches |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude |
| **Shock resistance** | Destruction: 1,000 m/s$^2$ {approx. 100G} max.<br>Malfunction: 300 m/s$^2$ {approx. 30G} max. (See notes 1 and 2.) |
| **Durability** | Mechanical: 1,000,000 operations min.<br>Electrical: 500,000 operations min. |
| **Ambient temperature** | Operating: –25°C to 80°C (with no icing) |
| **Ambient humidity** | Operating: 35% to 85% max. |
| **Weight** | Approx. 30 to 50 g |

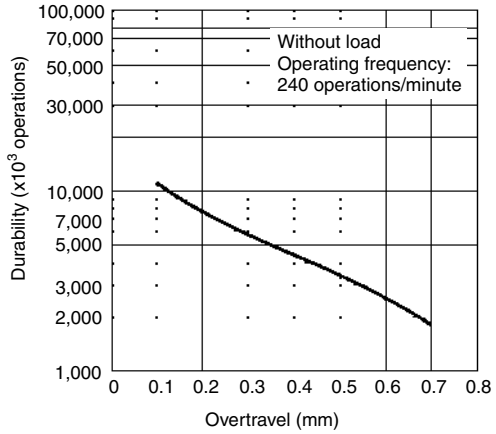
**Note: 1.** The values are for pin plunger models. (Contact your OMRON representative for other models.)
**2.** Malfunction: 1 ms max.

## ■ Contact Form (DPDT)

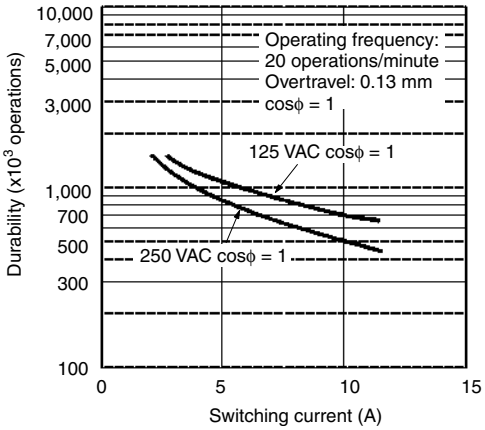


# Engineering Data

## ■ Mechanical Durability (Pin Plunger)




## ■ Electrical Durability (Pin Plunger)




# Dimensions

## ■ Dimensions and Operating Characteristics

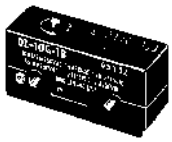
**Note: 1.** All units are in millimeters unless otherwise indicated.

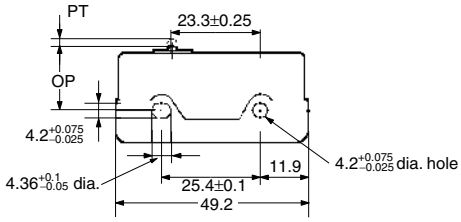
**2.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

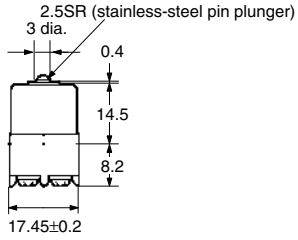
**3.** The solder terminal model has a suffix "-1A" in its model number and its omitted dimensions are the same as the corresponding dimensions of the pin plunger model.

### Pin Plunger

**DZ-10G-1B**



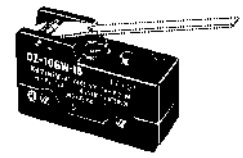


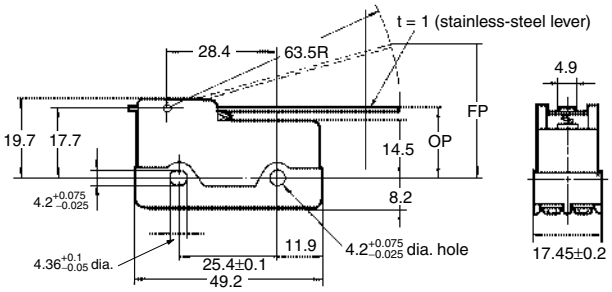




| | |
|---|---|
| **OF max.** | 5.59 N {570 gf} |
| **RF min.** | 0.55 N {57 gf} |
| **PT max.** | 1.7 mm |
| **OT min.** | 0.13 mm |
| **MD max.** | 0.4 mm |
| **OP** | 15.6±0.4 mm |

### Hinge Lever

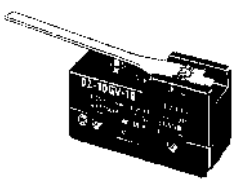
**DZ-10GW-1B**

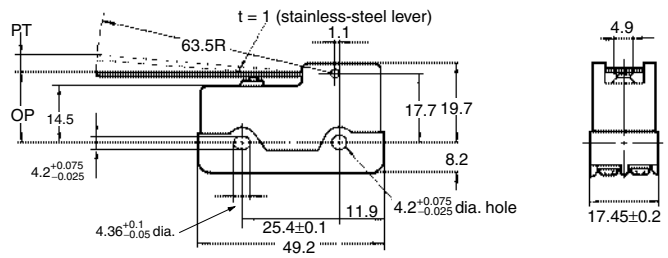





| | |
|---|---|
| **OF max.** | 1.67 N {170 gf} |
| **RF min.** | 0.27 N {28 gf} |
| **OT min.** | 1.6 mm |
| **MD max.** | 4 mm |
| **FP max.** | 46.3 mm |
| **OP** | 21.8±1 mm |

**DZ-10GV-1B**

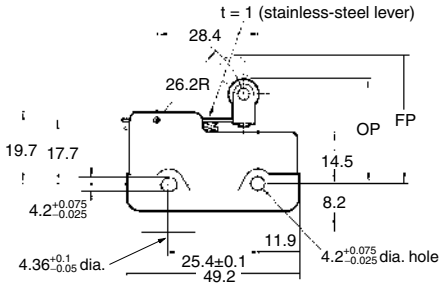


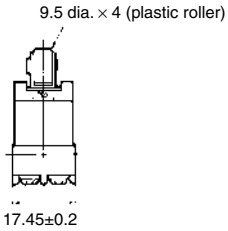



| | |
|---|---|
| **OF max.** | 1.96 N {200 gf} |
| **RF min.** | 0.13 N {14 gf} |
| **PT max.** | 6 mm |
| **OT min.** | 0.4 mm |
| **MD max.** | 1.7 mm |
| **OP** | 18.3±1 mm |

## Short Hinge Roller Lever

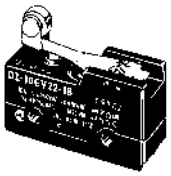
### DZ-10GW22-1B

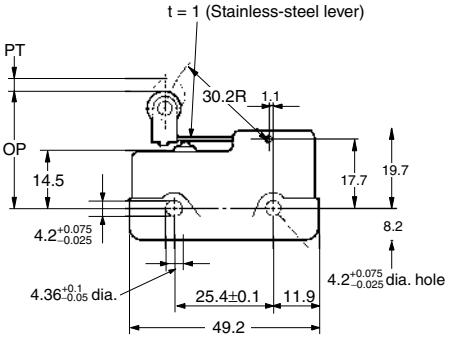


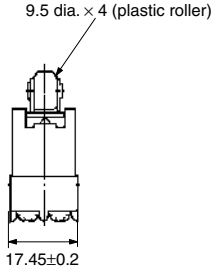




| | |
|---|---|
| **OF max.** | 3.92 N {400 gf} |
| **RF min.** | 0.83 N {85 gf} |
| **OT min.** | 0.9 mm |
| **MD max.** | 2.4 mm |
| **FP max.** | 39.7 mm |
| **OP** | 30.2±0.8 mm |

### DZ-10GV22-1B



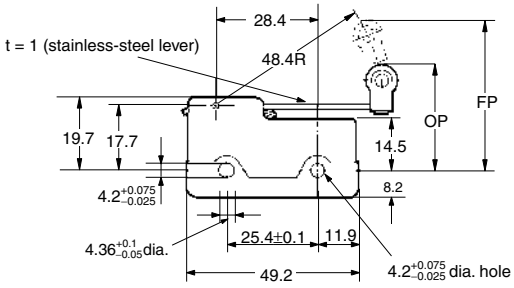


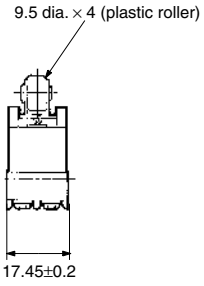




| | |
|---|---|
| **OF max.** | 4.22 N {430 gf} |
| **RF min.** | 0.41 N {42 gf} |
| **PT max.** | 3 mm |
| **OT min.** | 0.13 mm |
| **MD max.** | 0.6 mm |
| **OP** | 29.4±0.8 mm |

## Hinge Roller Lever

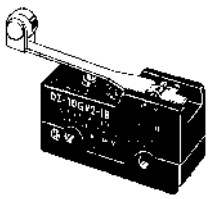
### DZ-10GW2-1B

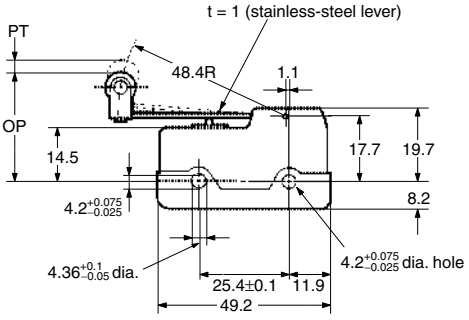


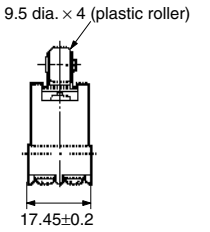




| | |
|---|---|
| **OF max.** | 2.09 N {213 gf} |
| **RF min.** | 0.41 N {42 gf} |
| **OT min.** | 1.2 mm |
| **MD max.** | 3.3 mm |
| **FP max.** | 47.6 mm |
| **OP** | 31.8±0.8 mm |

### DZ-10GV2-1B



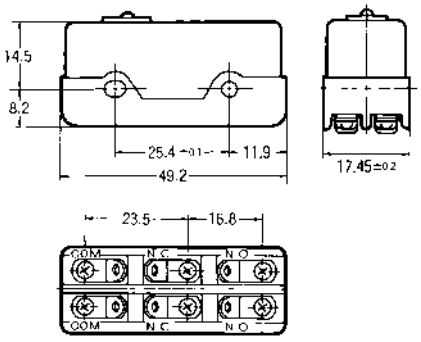


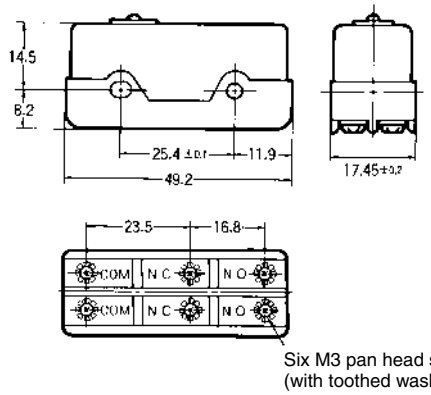

| | |
|---|---|
| **OF max.** | 2.65 N {270 gf} |
| **RF min.** | 0.33 N {34 gf} |
| **PT max.** | 4 mm |
| **OT min.** | 0.26 mm |
| **MD max.** | 1.1 mm |
| **OP** | 29.4±0.8 mm |

## ■ Terminals

**Solder Terminals (-1A)**




**Screw Terminals (-1B)**




# Precautions

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

## ■ Cautions

### Terminal Connection

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

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

### Operation

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

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

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

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

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

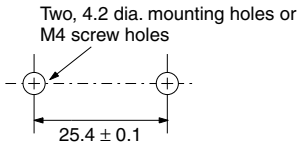
Make sure that the actuator travel does not exceed the permissible OT position. The operating stroke must be set to 70% to 100% of the rated OT.

## ■ Correct Use

### Mounting

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

### Mounting Holes




## ■ Accessories (Order separately)

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B060-E1-07

# High-temperature Basic Switch
# TZ

### Stable Operation at an Ambient Temperature of 400°C

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




## Model Number Structure

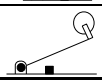
### ■ Model Number Legend

**TZ-1G□**
**1 2 3**

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

## Ordering Information

### ■ List of Model

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

# Specifications

## ■ Ratings

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

**Note: 1.** The above current ratings are the values of the steady-state current.

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

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

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

**5.** The above ratings are tested under the following conditions.

1. Ambient temperature: 20±2 °C
2. Ambient humidity: 65±5%
3. Switching frequency: 20 times/min

## ■ Characteristics

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

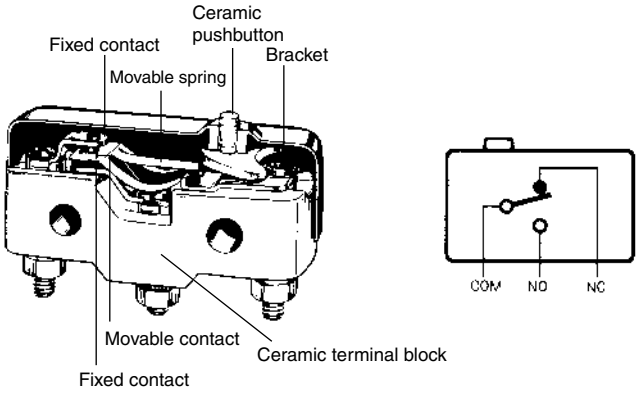
**Note: 1.** This operating speed applies to switches with pin-type pushbuttons.

**2.** This refers to a malfunction period of 1 ms max.

## ■ Contact Specifications

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

# Nomenclature



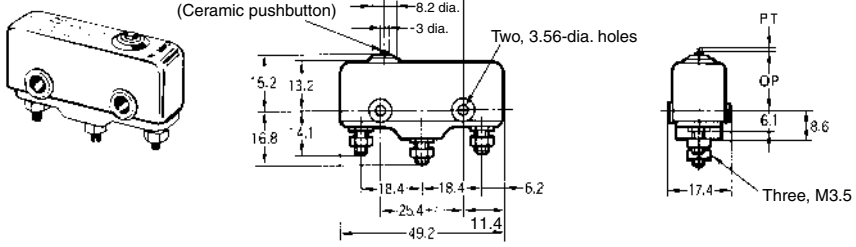

# Dimensions

## ■ Dimensions and Operating Characteristics

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

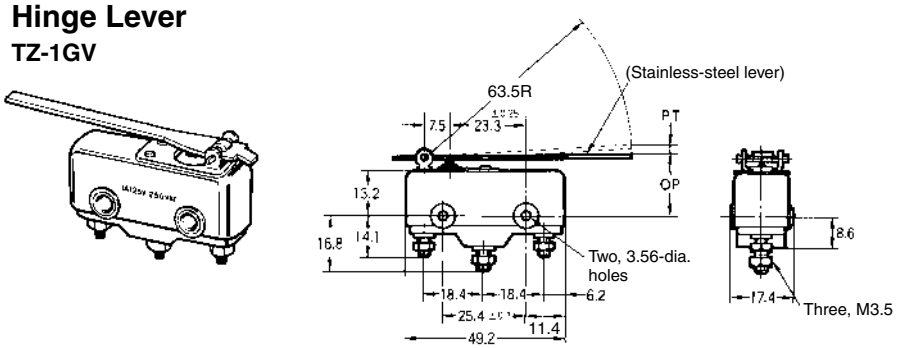


### Pin Plunger
**TZ-1G**



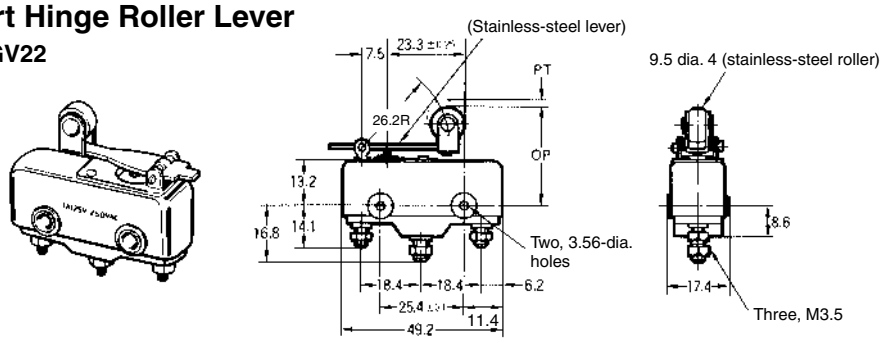

| | |
|---|---|
| **OF max.** | 4.9 N {500 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 0.4 mm |
| **OT min.** | 0.13 mm |
| **MD max.** | 0.15 mm |
| **OP** | 15.6±0.6 mm |

### Hinge Lever
**TZ-1GV**




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

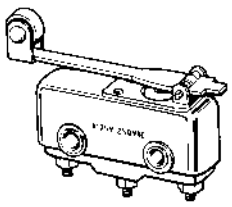
### Short Hinge Roller Lever
**TZ-1GV22**

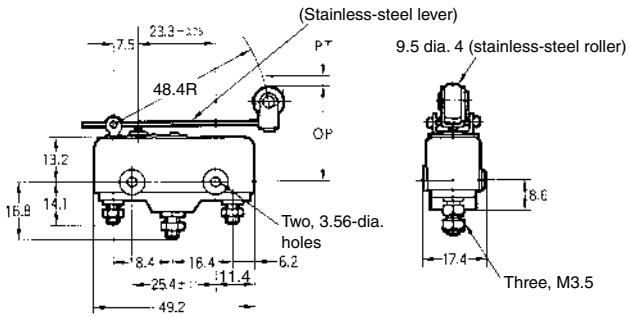



| | |
|---|---|
| **OF max.** | 2.35 N {240 gf} |
| **RF min.** | 0.33 N {34 gf} |
| **PT max.** | 1.5 mm |
| **OT min.** | 1.9 mm |
| **MD max.** | 0.6 mm |
| **OP** | 28.6±1.2 mm |

## Hinge Roller Lever

**TZ-1GV2**






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

# Precautions

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

## ■ Correct Use

### Handling

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

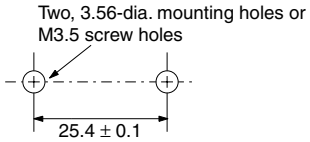
### Mounting

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

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

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

#### Mounting Holes




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

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

### Operation

Do not modify the Actuator and change the operating position.

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

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

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

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

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

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

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B102-E1-02

# General-purpose Basic Switch
# X

### Direct Current Switch with Built-in Magnetic Blowout

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



## Model Number Structure

### ■ Model Number Legend

**X-10G□-□**
**1 2 3 4**

**1. Ratings**
10: 10 A (125 VDC)

**2. Contact Gap**
G: 0.9 mm

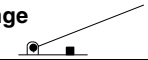
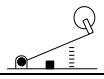
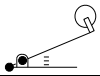
**3. Actuator**
None: Pin plunger
D: Short spring plunger
S: Slim spring plunger
Q: Panel mount plunger
Q21: Panel mount cross roller plunger
Q22: Panel mount roller plunger
L: Leaf spring
W: Hinge lever
W2: Hinge roller lever
W21: Short hinge lever
W22: Short hinge roller lever
W4: Low-force hinge lever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

**4. Terminals**
None: Solder terminal
B: Screw terminal (with toothed washer)

# Ordering Information

## ■ List of Models

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

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

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

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL508 (File No. E41515)
### CSA C22.2 No.55 (File No. LR21642)

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

## ■ Ratings

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

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

## ■ Characteristics

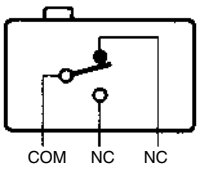
| | |
|---|---|
| **Operating speed** | 0.1 mm to 1 m/s (see note 1) |
| **Operating frequency** | Mechanical: 240 operations/min<br>Electrical: 20 operations/min |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) |
| **Contact resistance** | 15 mΩ max. (initial value) |
| **Dielectric strength** | 1,500 VAC, 50/60 Hz for 1 min between terminals of the same polarity, between current-carrying metal parts and the ground, and between each terminal and non-current-carrying metal parts |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 2) |
| **Shock resistance** | Destruction: 1,000 m/s$^2$ {approx. 100G} max.<br>Malfunction: 300 m/s$^2$ {approx. 30G} max. (see note 1, 2) |
| **Durability** | Mechanical: 1,000,000 operations min.<br>Electrical: 100,000 operations min. |
| **Degree of protection** | IP00 |
| **Degree of protection against electric shock** | Class I |
| **Proof tracking index (PTI)** | 175 |
| **Switch category** | D (IEC335-1) |
| **Ambient temperature** | Operating: –25°C to 80°C (with no icing) |
| **Ambient humidity** | Operating: 35% to 85% max. |
| **Weight** | Approx. 27 to 63 g |

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

## ■ Contact Specification

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

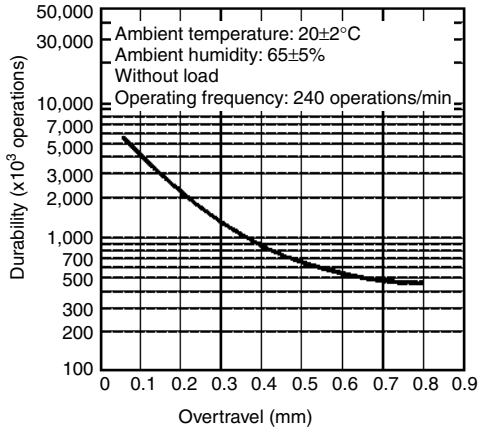
## ■ Contact Form (SPDT)



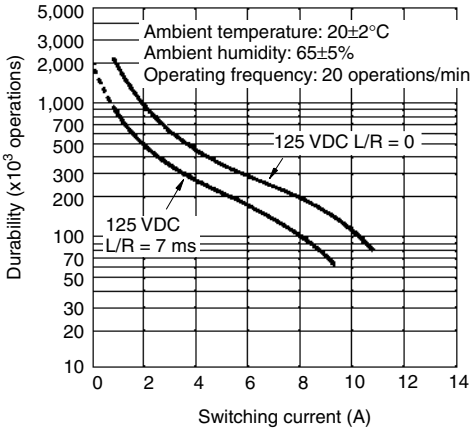

**Note:** With the reverse-type models (X-10GM□), the NC and NO terminal arrangements are reversed.

# Engineering Data

## ■ Mechanical Durability (Pin Plunger)




## ■ Electrical Durability (Pin Plunger)



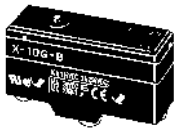

# Dimensions

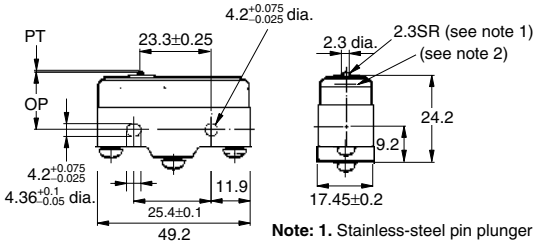
**Note: 1.** All units are in millimeters unless otherwise indicated.
**2.** Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

## ■ Dimensions and Operating Characteristics

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

### Pin Plunger
**X-10G-B**

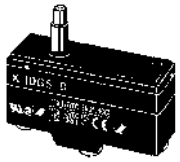


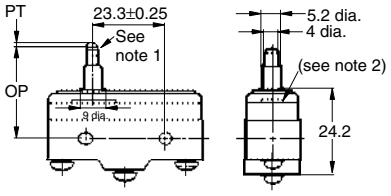



**Note: 1.** Stainless-steel pin plunger
**2.** Three vent holes

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

### Slim Spring Plunger
**X-10GS-B**

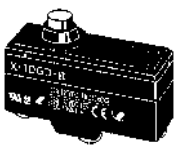


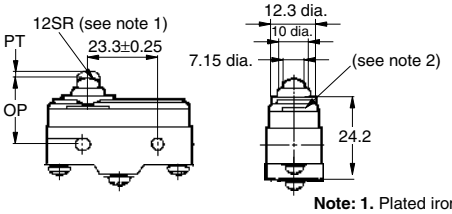



**Note: 1.** Stainless-steel pin plunger (flat, 1R chamfering)
**2.** Vent holes (3 places)

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

### Short Spring Plunger
**X-10GD-B**



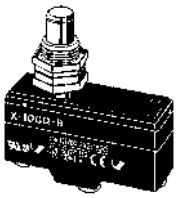


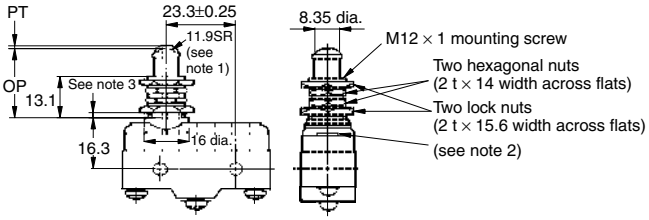

**Note: 1.** Plated iron plunger
**2.** Three vent holes

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

## Panel Mount Plunger

**X-10GQ-B**



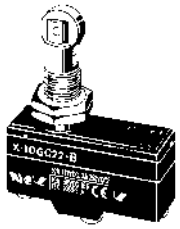


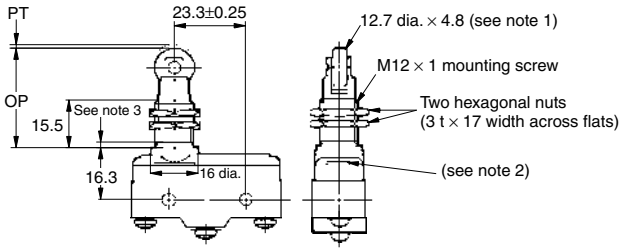

| | |
|---|---|
| **OF max.** | 5.00 N {510 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 0.9 mm |
| **OT min.** | 5.5 mm |
| **MD max.** | 0.18 mm |
| **OP** | 21.8±0.8 mm |

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

## Panel Mount Roller Plunger

**X-10GQ22-B**



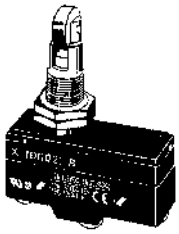


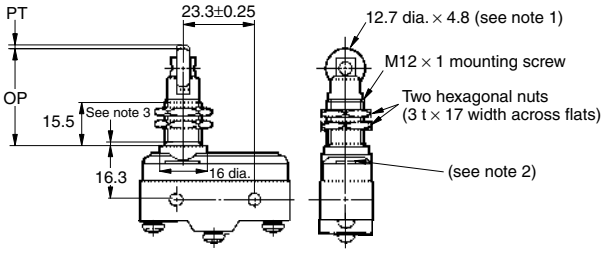

| | |
|---|---|
| **OF max.** | 5.00 N {510 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 0.9 mm |
| **OT min.** | 3.6 mm |
| **MD max.** | 0.18 mm |
| **OP** | 33.4±1.2 mm |

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

## Panel Mount Cross Roller Plunger

**X-10GQ21-B**



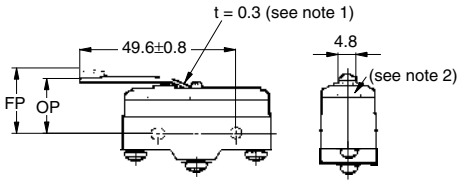



| | |
|---|---|
| **OF max.** | 5.00 N {510 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 0.9 mm |
| **OT min.** | 3.6 mm |
| **MD max.** | 0.18 mm |
| **OP** | 33.4±1.2 mm |

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

## Leaf Spring

**X-10GL-B**



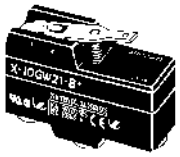

**Note: 1.** Stainless-steel spring lever
**2.** Three vent holes

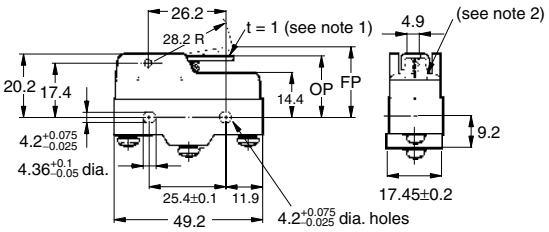
| | |
|---|---|
| **OF max.** | 1.96 N {200 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 1.6 mm (see note) |
| **MD max.** | 2.3 mm |
| **FP max.** | 22.1 mm |
| **OP** | 17.4±0.8 mm |

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

## Short Hinge Lever

**X-10GW21-B**



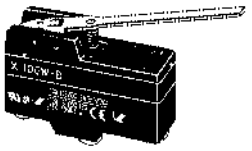


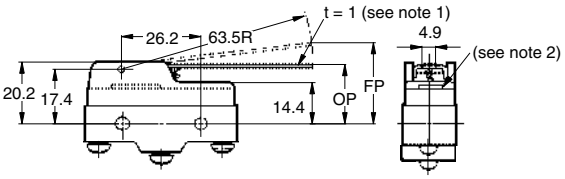

**Note: 1.** Stainless-steel lever
**2.** Three vent holes

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

## Hinge Lever

**X-10GW-B**



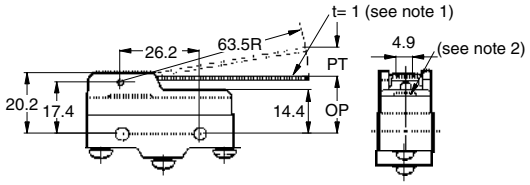



**Note: 1.** Stainless-steel lever
**2.** Three vent holes

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

## Low-force Hinge Lever

**X-10GW4-B**

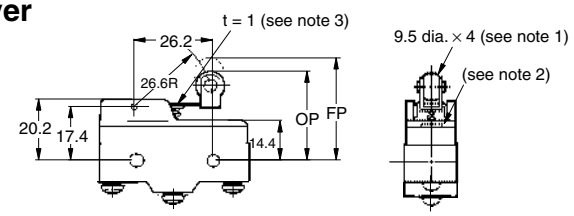



**Note: 1.** Stainless-steel lever
**2.** Three vent holes

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

## Short Hinge Roller Lever

**X-10GW22-B**

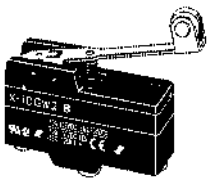


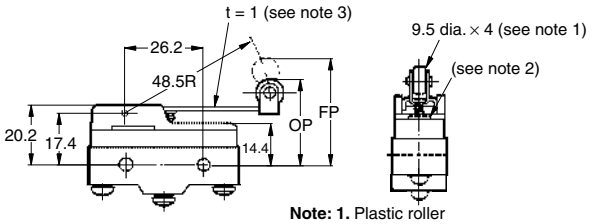

**Note: 1.** Plastic roller
**2.** Three vent holes
**3.** Stainless-steel spring lever

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

## Hinge Roller Lever

**X-10GW2-B**



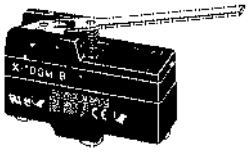


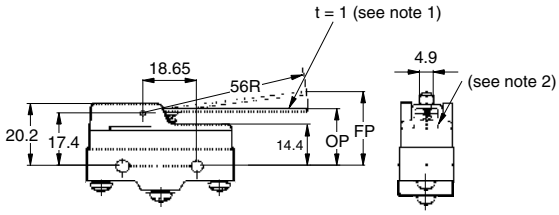

**Note: 1.** Plastic roller
**2.** Three vent holes
**3.** Stainless-steel spring lever

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

## Reverse Hinge Lever

**X-10GM-B**



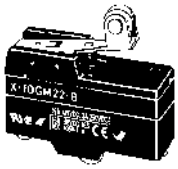


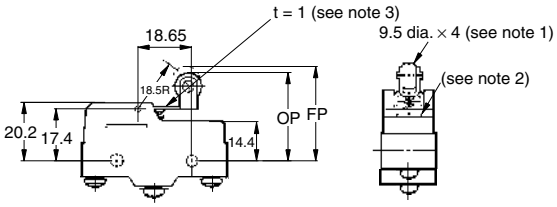

**Note: 1.** Stainless-steel lever
**2.** Three vent holes

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

## Reverse Short Hinge Lever

**X-10GM22-B**



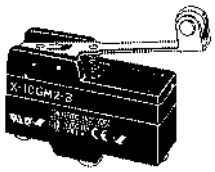


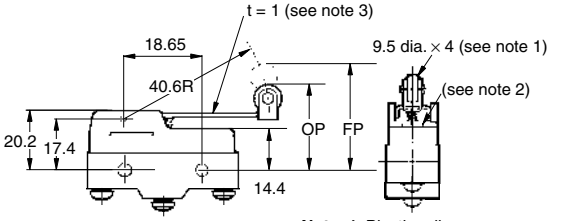

**Note: 1.** Plastic roller
**2.** Three vent holes
**3.** Stainless-steel spring lever

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

## Reverse Hinge Roller Lever

**X-10GM2-B**



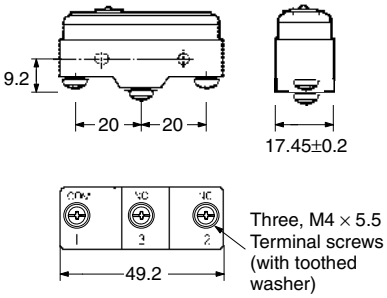



**Note: 1.** Plastic roller
**2.** Three vent holes
**3.** Stainless-steel spring lever

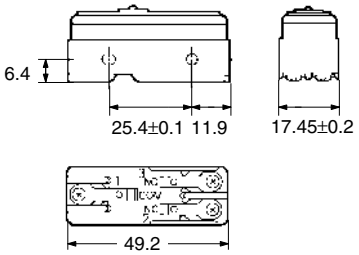
| | |
|---|---|
| **OF max.** | 3.14 N {320 gf} |
| **RF min.** | 0.49 N {50 gf} |
| **OT min.** | 4 mm |
| **MD max.** | 1.5 mm |
| **FP max.** | 37.4 mm |
| **OP** | 32.2±0.8 mm |

# ■ Terminals

### Screw Terminals (-B)




### Solder Terminal




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

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

# Precautions

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

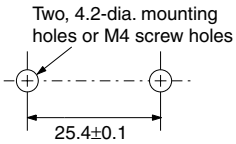
## ■ Correct Use

### Mounting

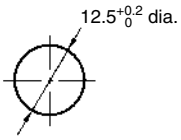
Use M4 mounting screws with plane washers or spring washers to securely mount the Switch. Tighten the screws to a torque of 1.18 to 1.47 N·m {12 to 15 kgf·cm}

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

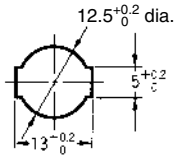
#### Mounting Holes




**Panel Mount Plunger**




**Panel Mount Roller Plunger**




### Handling

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

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

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

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

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

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

### Panel-mounted Model (X-10GQ□)

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

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

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

## ■ Accessories (Order separately)

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B003-E1-08

# General-purpose Basic Switch
# Z

### Best-selling Basic Switch Boasting High Precision and Wide Variety

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



## Model Number Structure

### ■ Configuration

| | | | |
|---|---|---|---|
| Basic models | General-purpose | | Refer to page 3. |
| | Drip-proof | Without terminal protective cover | Refer to individual datasheets. (Contact your OMRON representative). |
| | | With terminal protective cover | Refer to individual datasheets. (Contact your OMRON representative). |
| | | Molded terminal | Refer to page 5. |
| Split-contact models | General-purpose | | Refer to page 4. |
| Maintained-contact models | General-purpose | | Refer to page 5. |

## Basic Models

### General-purpose

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

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

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

## Split-contact Models

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

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

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

## Maintained-contact Models

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

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

# ■ Model Number Legend

## Basic Models

**Z-□□□□-□**
**1 2 3 4 5**

**1. Ratings**
- 01: 0.1 A (for micro load)
- 15: 15 A

**2. Contact Gap**
- H: 0.25 mm (high-sensitivity, micro load)
- G: 0.5 mm (standard)
- E: 1.8 mm (high-capacity)

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

**4. Degree of Protection**
- None: General-purpose
- 55: Drip-proof
- A55: Drip-proof (including the terminals)

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

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

## Split-contact Models

**Z-10F□Y-B**
**1 2 3 4 5**

**1. Ratings**
- 10: 10 A

**2. Contact Gap**
- F: 1 mm (high-capacity)

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

**4. Construction**
- Y: Split-contact models

**5. Terminals**
- None: Solder terminal
- B: Screw terminal (with toothed washer)

## Maintained-contact Models

**Z-15-E□R**
**1 2 3 4**

**1. Ratings**
- 15: 15 A

**2. Contact Gap**
- E: 1.8 mm (High capacity)

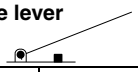
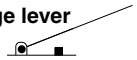
**3. Actuator**
- None: Pin plunger
- S: Slim spring plunger
- W: Hinge lever

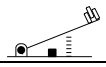
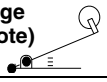
**4. Structure**
- R: Maintained-contact models

# Ordering Information

## ■ List of Models

### Basic Models (General-purpose)

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

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

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

## Minimum Order Lot

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

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

# Split-contact Models

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

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

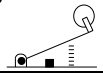
**Note:** The pin plungers of reverse-type models are continuously pressed by the actuator levers with compression coil springs and the pin plungers are freed by operating the levers. Reverse-type models are highly vibration- and shock-resistive because the pin plungers are normally pressed.

## Maintained-contact Models

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

## Basic Models (Drip-proof Models)

| Actuator | | | Basic model (drip-proof) | | |
|---|---|---|---|---|---|
| | | | Standard | | Micro load |
| | | | G (0.5 mm) | | H (0.25 mm) |
| | | | Without drip-proof terminal protective cover | With drip-proof terminal protective cover | Without drip-proof terminal protective cover |
| Pin plunger | | Solder terminal | Z-15G55 | --- | Z-01H55 |
| | | Screw terminal | Z-15G55-B | Z-15GA55-B5V | Z-01H55-B |
| Short spring plunger | | Solder terminal | Z-15GD55 | --- | Z-01HD55 |
| | | Screw terminal | Z-15GD55-B | | Z-01HD55-B |
| Spring plunger | Medium OP | Solder terminal | Z-15GK55 | --- | --- |
| | | Screw terminal | Z-15GK55-B | | |
| | HIgh OP | Solder terminal | Z-15GK355 | --- | --- |
| | | Screw terminal | Z-15GK355-B | Z-15GK3A55-B5V | |
| Panel mount plunger | Medium OP | Solder terminal | Z-15GQ55 | --- | --- |
| | | Screw terminal | Z-15GQ55-B | Z-15GQA55-B5V | |
| Panel mount roller plunger | | Solder terminal | Z-15GQ2255 | --- | --- |
| | | Screw terminal | Z-15GQ2255-B | Z-15GQ22A55-B5V | |
| Panel mount cross roller plunger | | Solder terminal | --- | --- | --- |
| | | Screw terminal | Z-15GQ2155-B | Z-15GQ21A55-B5V | |
| Leaf spring | | Solder terminal | Z-15GL55 | --- | --- |
| | | Screw terminal | Z-15GL55-B | | |
| Roller leaf spring | | Solder terminal | Z-15GL255 | --- | --- |
| | | Screw terminal | Z-15GL255-B | | |
| Short hinge lever | | Solder terminal | Z-15GW2155 | --- | --- |
| | | Screw terminal | Z-15GW2155-B | | |
| Long hinge lever | | Solder terminal | Z-15GW4455 | --- | --- |
| | | Screw terminal | Z-15GW4455-B | Z-15GW44A55-B5V | |
| Hinge lever | | Solder terminal | Z-15GW55 | --- | --- |
| | | Screw terminal | Z-15GW55-B | Z-15GWA55-B5V | |
| Short hinge roller lever | | Solder terminal | Z-15GW2255 | --- | Z-01HW2255 |
| | | Screw terminal | Z-15GW2255-B | Z-15GW22A55-B5V | Z-01HW2255-B |

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

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

**2.** The tip is made of resin.

## Minimum Order Lot

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

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

# Basic Models (Drip-proof High-sensitivity Models)

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

# Specifications

## ■ Approved Standards

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

## ■ Approved Standard Ratings

### UL508 (File No. E41515)
### CSA C22.2 No.55 (File No. LR21642)

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

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

### EN (EN61058-1)

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

## ■ Ratings

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

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

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

### Z-15 (Flexible Rod Models)

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

## Z-01H

| Rated voltage | Resistive load | |
|---|---|---|
| | NC | NO |
| 125 VAC | 0.1 A | |
| 8 VDC<br>14 VDC<br>30 VDC | 0.1 A<br>0.1 A<br>0.1 A | |

## Z-10F

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

**Note: 1.** The above current ratings are the values of the steady-state current.

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

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

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

**5.** The normally closed and normally open ratings of reverse hinge lever models are opposite to each other.

**6.** The AC ratings of molded terminals are 125 and 250 V only.

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

# ■ Characteristics

| Item | Basic (except micro load and flexible rod)/ maintained contact Z-15 | Basic (micro load) Z-01H | Basic (flexible rod) Z-15 | Split-contact Z-10F |
|---|---|---|---|---|
| **Operating speed (see note)** | 0.01 mm to 1 m/s (see note 1) | | 1 mm to 1 m/s | 0.1 mm to 1 m/s (see note 1) |
| **Operating frequency** | Mechanical: 240 operations/min<br>Electrical: 20 operations/min | | Mechanical: 120 operations/min<br>Electrical: 20 operations/min | Mechanical: 240 operations/min<br>Electrical: 20 operations/min |
| **Insulation resistance** | 100 MΩ min. (at 500 VDC) | | | |
| **Contact resistance** | 15 mΩ max. (initial value) | 50 mΩ max. (initial value) | 15 mΩ max. (initial value) | 25 mΩ max. (initial value) |
| **Dielectric strength** | Between contacts of same polarity<br>Contact gap G: 1,000 VAC, 50/60 Hz for 1 min<br>Contact gap H: 600 VAC, 50/60 Hz for 1 min<br>Contact gap E: 1,500 VAC, 50/60 Hz for 1 min<br>Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts<br>2,000 VAC, 50/60 Hz for 1 min | | Between contacts of same polarity<br>Contact gap G: 1,000 VAC, 50/ 60 Hz for 1 min<br>Contact gap H: 600 VAC, 50/ 60 Hz for 1 min<br>Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts<br>2,000 VAC, 50/60 Hz for 1 min | Between contacts of same polarity<br>Contact gap F: 1,500 VAC, 50/ 60 Hz for 1 min<br>Between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal parts<br>2,000 VAC, 50/60 Hz for 1 min |
| **Vibration resistance** | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 5) | | Malfunction: 10 to 20 Hz, 1.5-mm double amplitude (see note 5) | Malfunction: 10 to 55 Hz, 1.5-mm double amplitude (see note 5) |
| **Shock resistance** | Destruction: 1,000 m/s² {approx. 100G} max.<br>Malfunction: 300 m/s² {approx. 30G} max. (see note 2, 5) | | Destruction: 1,000 m/s² {approx. 100G} max.<br>Malfunction: 50 m/s² {approx. 5G} max. (see note 5) | Destruction: 1,000 m/s² {approx. 100G} max.<br>Malfunction: 300 m/s². {approx. 30G} max. (see note 3, 5) |
| **Durability** | Mechanical:<br>Contact gap G, H: 20,000,000 operations min. (see note 4)<br>Contact gap E: 300,000 operations<br>Electrical:<br>Contact gap G, H: 500,000 operations min.<br>Contact gap E: 100,000 operations min. | | Mechanical: 1,000,000 operations min.<br>Electrical: 100,000 operations min. | Mechanical: 500,000 operations min. (see note 1)<br>Electrical: 100,000 operations min. |
| **Degree of protection** | General-purpose: IP00<br>Drip-proof: IP62 | | | |
| **Degree of protection against electric shock** | Class I | | | |
| **Proof tracking index (PTI)** | 175 | | | |
| **Switch category** | D (IEC335-1) | | | |
| **Ambient temperature** | Operating:<br>General-purpose: −25°C to 80°C (with no icing)<br>Drip-proof: −15°C to 80°C (with no icing) | | | |
| **Ambient humidity** | Operating:<br>General-purpose: 35% to 85%<br>Drip-proof: 35% to 95% | | | |
| **Weight** | Approx. 22 to 58 g | | Approx. 42 to 48 g | Approx. 34 to 61 g |

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

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

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

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

**5.** Malfunction: 1 ms max.

## ■ Contacts Specification

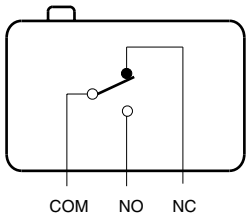
| Item | | Z-15 | Z-01H | Z-10F |
|---|---|---|---|---|
| Contacts | Shape | Rivet | Single crossbar | Rivet |
| | Material | Silver alloy | Gold alloy | Silver alloy |
| Inrush current | NC | 30 A max. | 0.1 A max. | 40 A max. |
| | NO | 15 A max. | 0.1 A max. | 20 A max. |

## ■ Contact Form

### Basic Models

#### General-purpose

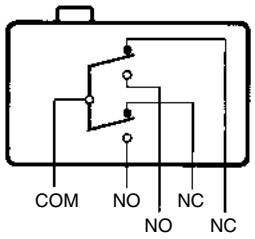
**Contact Form (SPDT)**




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

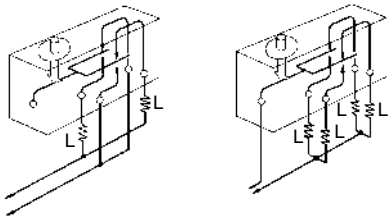
### Split-contact Models

**Contact Form (Split-contact)**



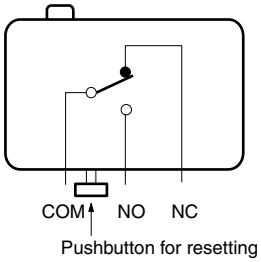

**Connection Example**

**Series Connection** **Parallel Connection**




### Maintained-contact Models

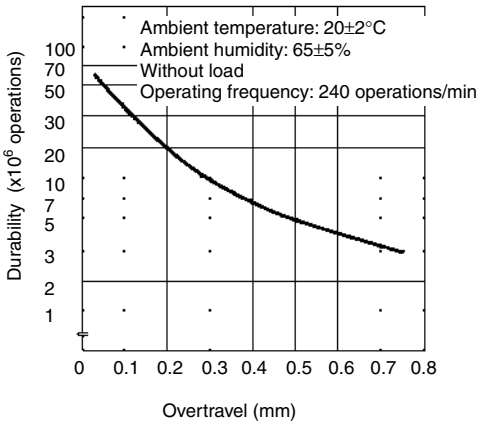
**Contact Form (Maintained-contact)**



# Engineering Data

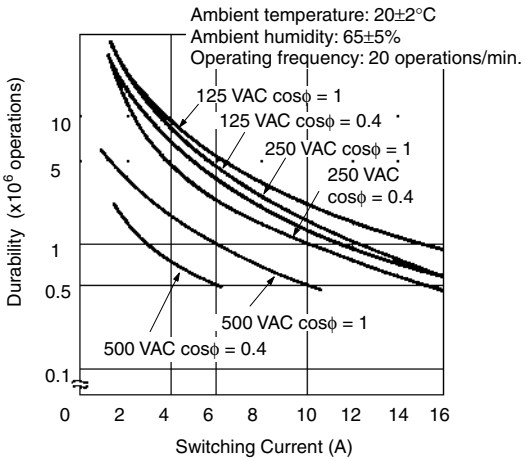
## ■ Mechanical Durability

**Z-15G**




## ■ Electrical Durability

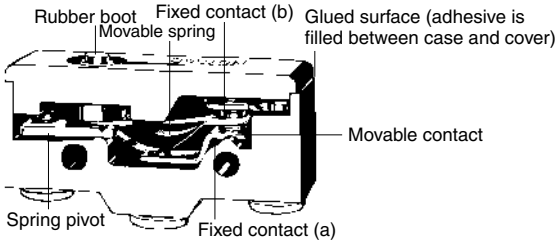
**Z-15G**



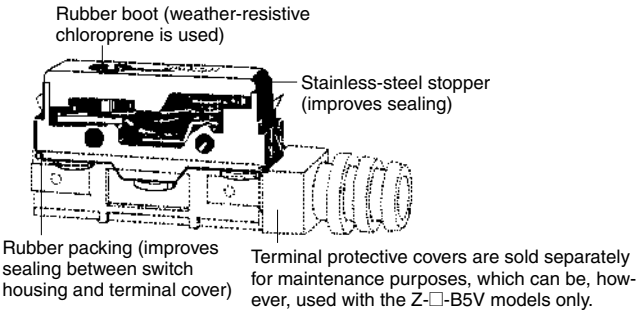

# Nomenclature

## ■ Drip-proof Construction

### Without Terminal Protective Cover




### With Terminal Protective Cover



# Dimensions

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

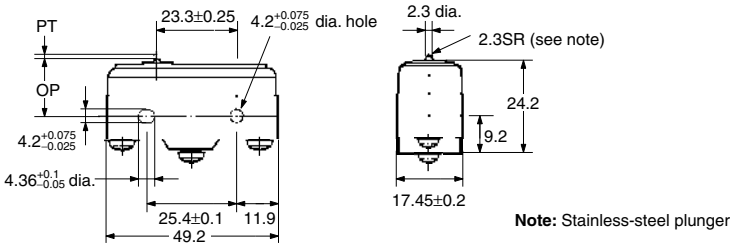
## ■ Dimensions and Operating Characteristics

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

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

#### Pin Plunger

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

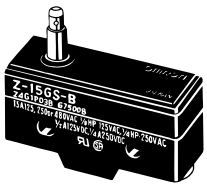


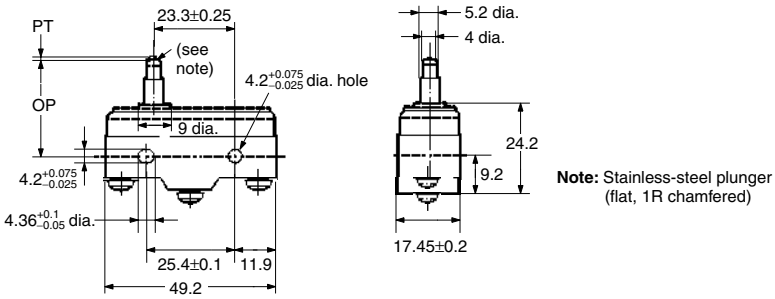

**Note:** Stainless-steel plunger

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

#### Slim Spring Plunger

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



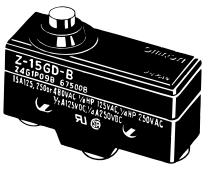


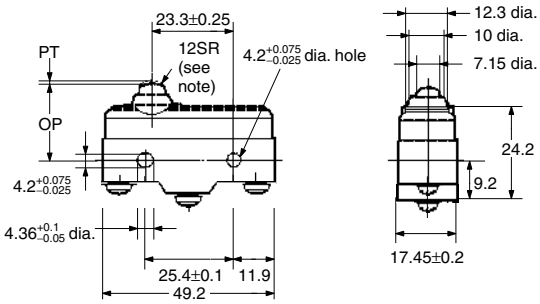

**Note:** Stainless-steel plunger (flat, 1R chamfered)

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

## Short Spring Plunger

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



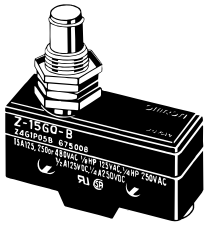


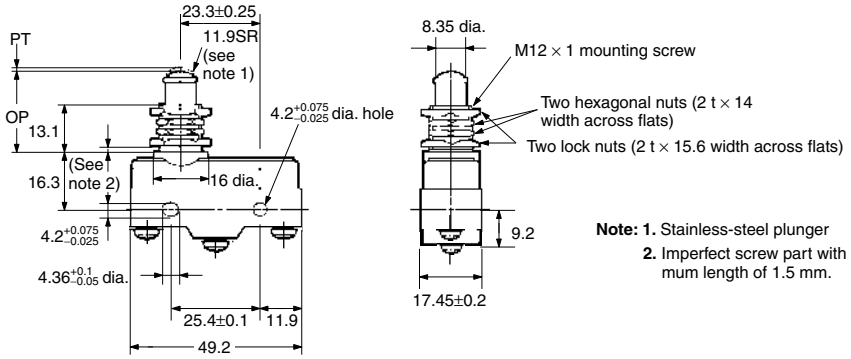

**Note:** Plated iron plunger

| | Z-15GD-B | Z-15HD-B | Z-15ED-B | Z-01HD-B | Z-10FDY-B |
|---|---|---|---|---|---|
| **OF** | 2.45 to 3.43 N {250 to 350 gf} | 1.96 to 2.79 N {200 to 285 gf} | 6.13 to 7.85 N {625 to 800 gf} | 2.45 N {250 gf} max. | 4.46 to 7.26 N {455 to 740 gf} |
| **RF min.** | 1.12 N {114 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} | 0.78 N {80 gf} | 1.12 N {114 gf} |
| **PT max.** | 0.4 mm | 0.3 mm | 0.8 mm | 0.5 mm | 0.8 mm |
| **OT min.** | 1.6 mm | 1.6 mm | 1.6 mm | 1.6 mm | 1.6 mm |
| **MD max.** | 0.05 mm | 0.025 mm | 0.13 mm | 0.05 mm | 0.1 mm |
| **OP** | 21.5±0.5 mm | | | | |

## Panel Mount Plunger

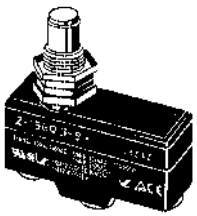
**Z-15GQ-B, Z-01HQ-B**
**Z-15HQ-B, Z-10FQY-B**
**Z-15EQ-B**

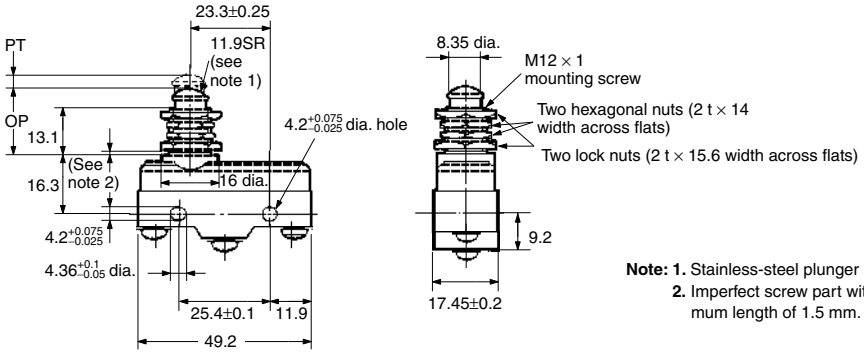





**Note: 1.** Stainless-steel plunger
**2.** Imperfect screw part with a maximum length of 1.5 mm.

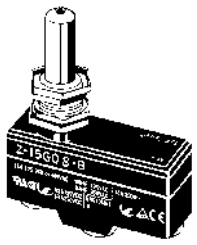
**Z-15GQ3-B**

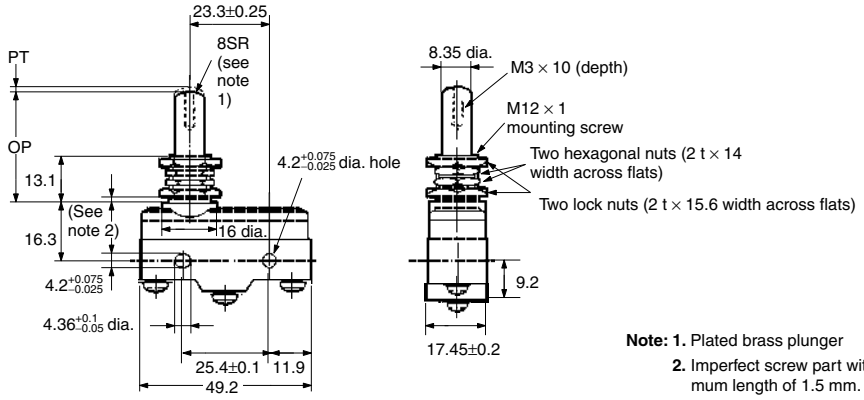





**Note: 1.** Stainless-steel plunger
**2.** Imperfect screw part with a maximum length of 1.5 mm.

**Z-15GQ8-B**






**Note: 1.** Plated brass plunger
**2.** Imperfect screw part with a maximum length of 1.5 mm.

| | Z-15GQ-B | Z-15HQ-B | Z-15EQ-B | Z-01HQ-B | Z-10FQY-B | Z-15GQ3-B | Z-15GQ8-B |
|---|---|---|---|---|---|---|---|
| **OF** | 2.45 to 3.43 N {250 to 350 gf} | 1.96 to 2.79 N {200 to 285 gf} | 6.13 to 7.85 N {625 to 800 gf} | 2.45 N {250 gf} max. | 4.46 to 7.26 N {455 to 740 gf} | 2.45 to 3.43 N {250 to 350 gf} | 2.45 to 3.43 N {250 to 350 gf} |
| **RF min.** | 1.12 N {114 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} | 0.78 N {80 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} |
| **PT max.** | 0.4 mm | 0.3 mm | 0.8 mm | 0.5 mm | 0.8 mm | 4.2 mm | 0.5 mm |
| **OT min.** | 5.5 mm | 5.5 mm | 5.5 mm | 5.5 mm | 5.5 mm | 2.5 mm | 5.5 mm |
| **MD max.** | 0.05 mm | 0.025 mm | 0.13 mm | 0.05 mm | 0.1 mm | 2.2 mm | 0.05 mm |
| **OP** | 21.8±0.8 mm | | | | | 18.8±0.8 mm | 32.5±1 mm |

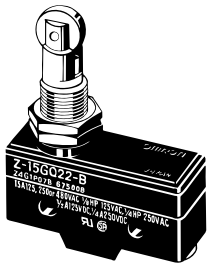
**Note: 1.** Do not use the M12 mounting screw and the case mounting hole at the same time, or excessive pulling force will be imposed on the Switch and the case and cover may be damaged.

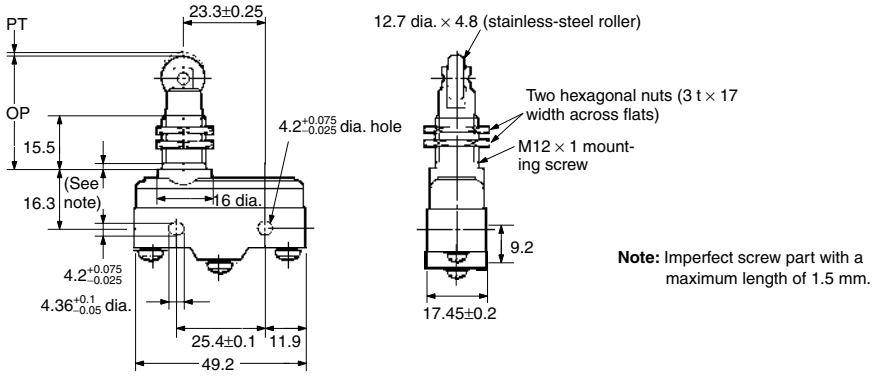
**2.** On the model Z-15GQ3-B, PT can be set to a value larger than that for the Z-15GQ.

**3.** On the model Z-15GQ8-B, operating position can be adjusted by providing a screw in the plunger section. The M3 hole with a depth of 10 mm is a through hole. Take precautions so that no water or screw lock agent penetrates into the hole.

## Panel Mount Roller Plunger

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



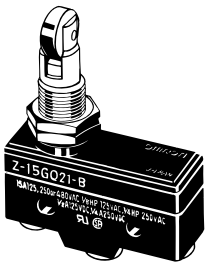


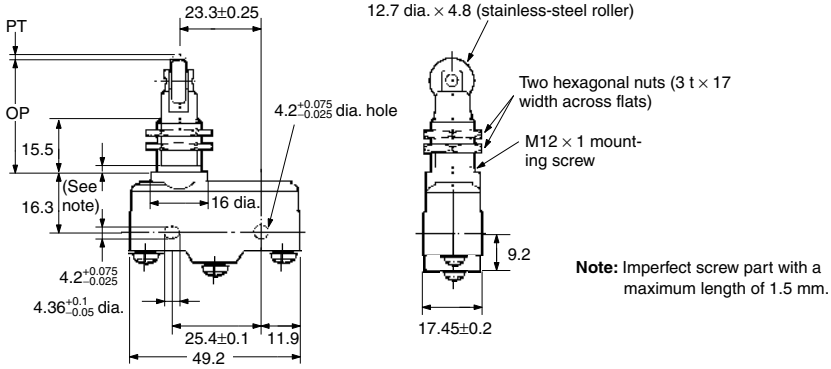

| | Z-15GQ22-B | Z-15HQ22-B | Z-15EQ22-B | Z-10FQ22Y-B |
|---|---|---|---|---|
| **OF** | 2.45 to 3.43 N {250 to 350 gf} | 1.96 to 2.79 N {200 to 285 gf} | 6.13 to 7.85 N {625 to 800 gf} | 4.46 to 7.26 N {455 to 740 gf} |
| **RF min.** | 1.12 N {114 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} |
| **PT max.** | 0.4 mm | 0.3 mm | 0.8 mm | 1 mm |
| **OT min.** | 3.58 mm | 3.58 mm | 3.58 mm | 3.55 mm |
| **MD max.** | 0.05 mm | 0.025 mm | 0.13 mm | 0.1 mm |
| **OP** | 33.4±1.2 mm | | | |

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

## Panel Mount Cross Roller Plunger

**Z-15GQ21-B, Z-15HQ21-B,**
**Z-15EQ21-B**



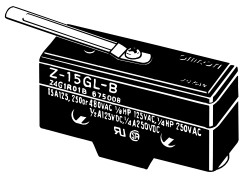


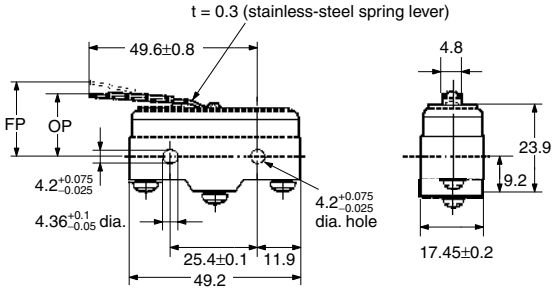
| | Z-15GQ21-B | Z-15HQ21-B | Z-15EQ21-B |
|---|---|---|---|
| **OF** | 2.45 to 3.43 N {250 to 350 gf} | 1.96 to 2.79 N {200 to 285 gf} | 6.13 to 7.85 N {625 to 800 gf} |
| **RF min.** | 1.12 N {114 gf} | 1.12 N {114 gf} | 1.12 N {114 gf} |
| **PT max.** | 0.4 mm | 0.3 mm | 0.8 mm |
| **OT min.** | 3.58 mm | 3.58 mm | 3.58 mm |
| **MD max.** | 0.05 mm | 0.025 mm | 0.13 mm |
| **OP** | 33.4±1.2 mm | | |

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

## Leaf Spring

**Z-15GL-B**



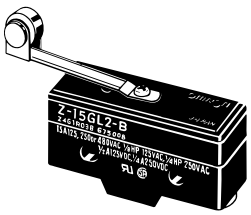


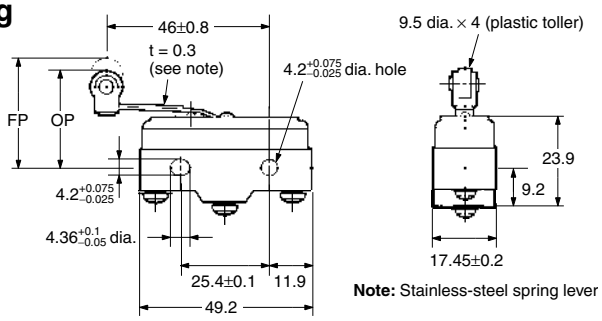

| | |
|---|---|
| **OF max.** | 1.38 N {141 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 1.6 mm (see note) |
| **MD max.** | 1.3 mm |
| **FP max.** | 20.6 mm |
| **OP** | 17.4±0.8 mm |

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

## Roller Leaf Spring

**Z-15GL2-B**





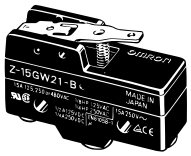

**Note:** Stainless-steel spring lever

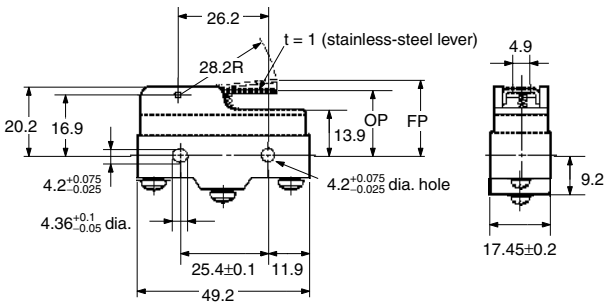
| | |
|---|---|
| **OF max.** | 1.38 N {141 gf} |
| **RF min.** | 0.14 M {14 gf} |
| **OT min.** | 1.6 mm (see note) |
| **MD max.** | 1.3 mm |
| **FP max.** | 31.8 mm |
| **OP** | 28.6±0.8 mm |

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

## Short Hinge Lever

**Z-15GW21-B**

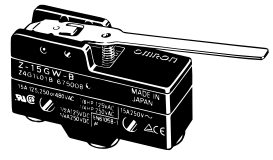


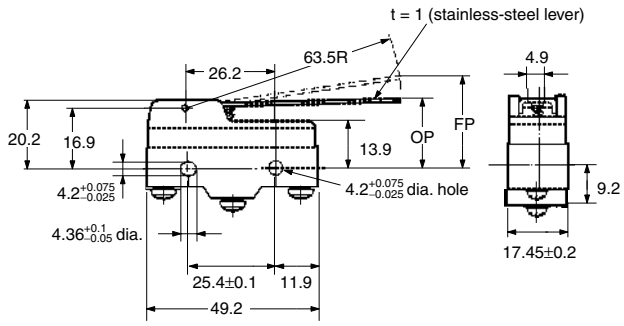



| | |
|---|---|
| **OF max.** | 1.57 N {160 gf} |
| **RF min.** | 0.27 N {28 gf} |
| **OT min.** | 2 mm |
| **MD max.** | 1 mm |
| **FP max.** | 24.8 mm |
| **OP** | 19±0.8 mm |

## Hinge Lever

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



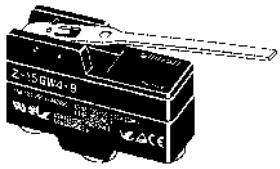


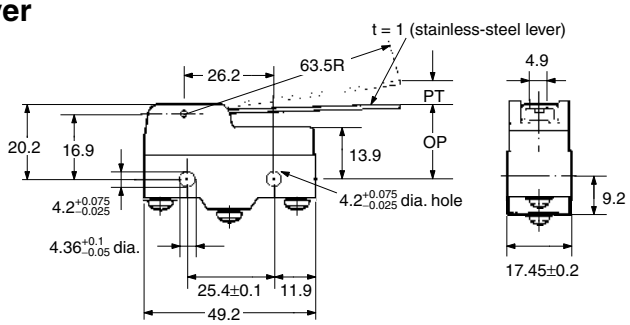

**Note:** The external dimensions of the actuator vary.

| | Z-15GW-B | Z-15HW-B | Z-15GW32-B | Z-10FWY-B | Z-15GW3-B |
|---|---|---|---|---|---|
| **OF max.** | 0.69 N {70 gf} | 0.66 N {67 gf} | 1.47 to 1.96 N {150 to 200 gf} | 0.88 N {90 gf} | 0.78 N {80 gf} |
| **RF min.** | 0.14 N {14 gf} | 0.14 N {14 gf} | 0.92 N {94 gf} | 0.14 N {14 gf} | 0.15 N {15.5 gf} |
| **OT min.** | 5.6 mm | 5.6 mm | 5.6 mm | 5.6 mm | 4.8 mm |
| **MD max.** | 1.27 mm | 0.63 mm | 1.27 mm | 2.4 mm | 1.12 mm |
| **FP max.** | 28.2 mm | 27.4 mm | 28.2 mm | 29.8 mm | 27.2 mm |
| **OP** | 19±0.8 mm | | | | |

## Low-force Hinge Lever

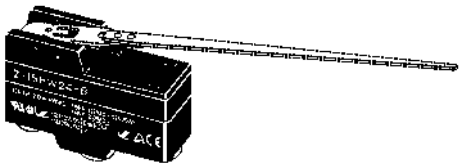
### Z-15GW4-B

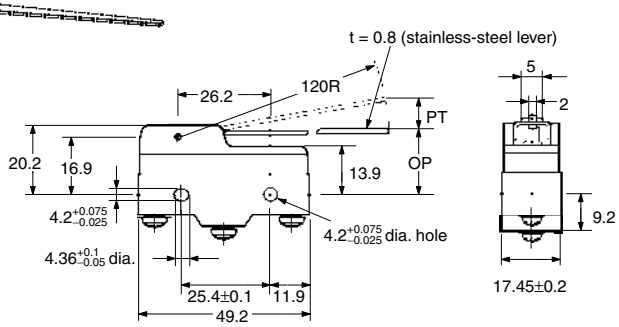





| | |
|---|---|
| **OF max.** | 274 mN {28 gf} |
| **RF min.** | 34.3 mN {3.5 gf} |
| **PT max.** | 10 mm |
| **OT min.** | 5.6 mm |
| **MD max.** | 1.27 mm |
| **OP** | 19±0.8 mm |

### Z-15HW24-B

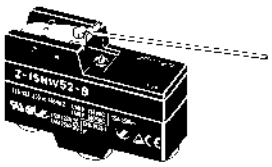


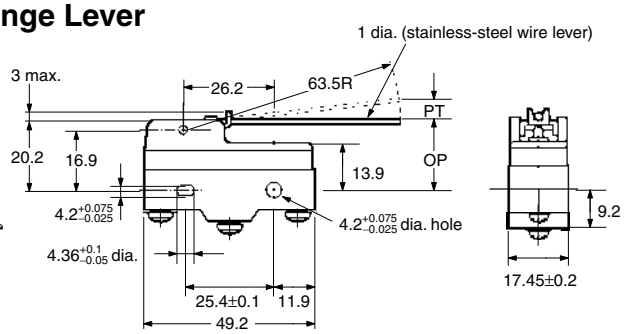



| | |
|---|---|
| **OF max.** | 58.8 mN {6 gf} |
| **RF min.** | 4.90 mN {0.5 gf} |
| **PT max.** | 19.8 mm |
| **OT min.** | 10 mm |
| **MD max.** | 2 mm |
| **OP** | 19.8±1.6 mm |

## Low-force Wire Hinge Lever

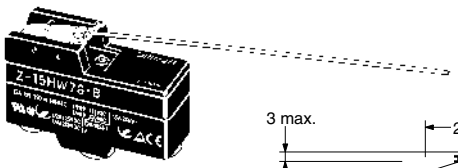
### Z-15HW52-B

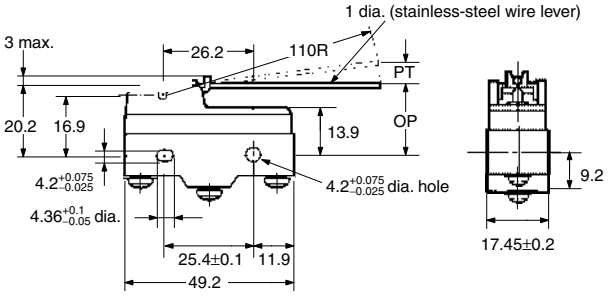





| | |
|---|---|
| **OF max.** | 58.8 mN {6 gf} |
| **RF min.** | 4.90 mN {0.5 gf} |
| **PT max.** | 8.3 mm |
| **OT min.** | 5.6 mm |
| **MD max.** | 0.65 mm |
| **OP** | 19±1 mm |

### Z-15HW78-B

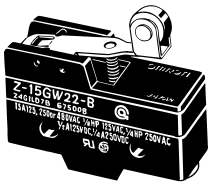


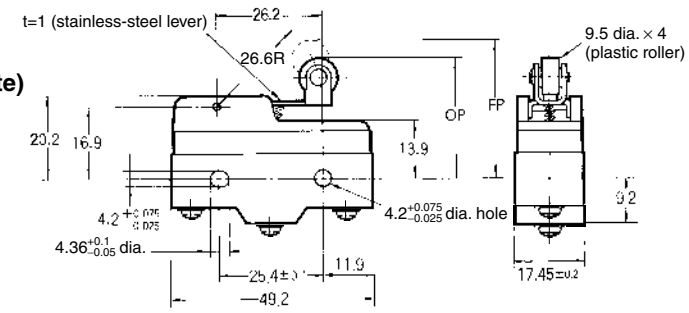



| | |
|---|---|
| **OF max.** | 39.2 mN {4 gf} |
| **RF min.** | 2.94 mN {0.3 gf} |
| **PT max.** | 10 mm |
| **OT min.** | 6 mm |
| **MD max.** | 3 mm |
| **OP** | 20±1 mm |

## Short Hinge Roller Lever

**Z-15GW22-B, Z-01HW22-B**
**Z-15HW22-B, Z-10FW22Y-B (see note)**
**Z-15EW22-B, Z-15GW2-B**
**Z-15HW2-B (see note), Z-10FW2Y-B (see note)**
**(Lever Length: 48.5R) (see note)**



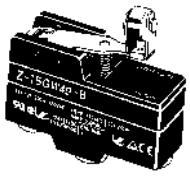


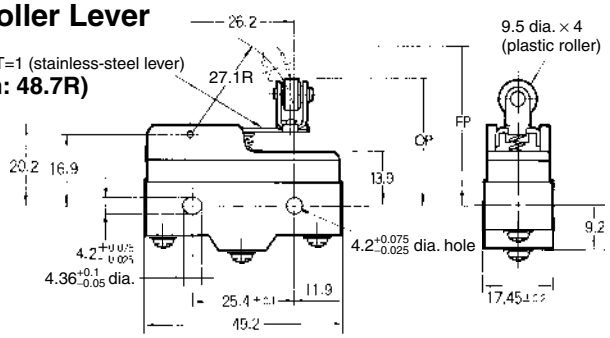

**Note:** The external dimensions of the actuator vary.

| | Z-15GW22-B | Z-15HW22-B | Z-15EW22-B | Z-01HW22-B | Z-10FW22Y-B | Z-15GW2-B | Z-15HW2-B | Z-10FW2Y-B |
|---|---|---|---|---|---|---|---|---|
| **OF max.** | 1.57 N {160 gf} | 1.47 N {150 gf} | 1.94 N {198 gf} | 1.57 N {160 gf} | 2.45 N {250 gf} | 0.98 N {100 gf} | 0.84 N {86 gf} | 1.27 N {130 gf} |
| **RF min.** | 0.41 N {42 gf} | 0.41 N {42 gf} | 0.41 N {42 gf} | 0.27 N {28 gf} | 0.34 N {35 gf} | 0.22 N {22 gf} | 0.22 N {22 gf} | 0.22 N {22 gf} |
| **OT min.** | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm | 2.4 mm | 4 mm | 4 mm | 4 mm |
| **MD max.** | 0.5 mm | 0.45 mm | 1.3 mm | 0.5 mm | 1 mm | 1.02 mm | 0.6 mm | 2 mm |
| **FP max.** | 32.5 mm | | 35.1 mm | 32.5 mm | 34.8 mm | 36.5 mm | | 37.4 mm |
| **OP** | 30.2±0.4 mm | | 30.2±0.4 mm | 30.2±0.4 mm | 30.2±0.4 mm | 30.2±0.8 mm | | 30.2±0.8 mm |

## Short Hinge Cross Roller Lever

**Z-15GW49-B**
**Z-15GW54-B (Lever Length: 48.7R)**
**(see note)**

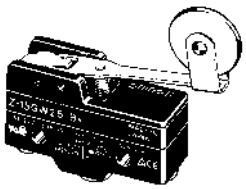


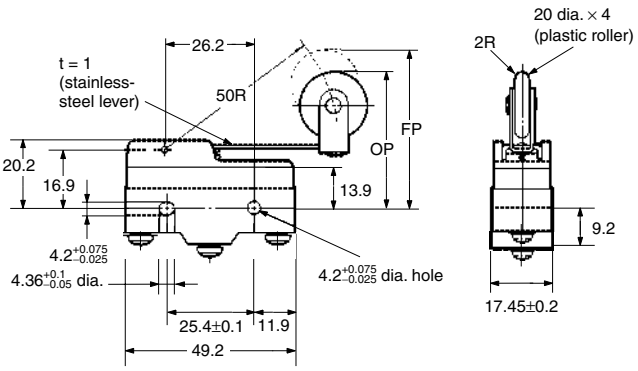



| Model | Z-15GW49-B | Z-15GW54-B |
|---|---|---|
| **OF max.** | 1.67 N {170 gf} | 0.98 N {100 gf} |
| **RF min.** | 0.41 N {42 gf} | 0.22 N {22 gf} |
| **OT min.** | 2.4 mm | 4 mm |
| **MD max.** | 0.51 mm | 1 mm |
| **FP max.** | 33.3 mm | 37.3 mm |
| **OP** | 31±0.4 mm | 31±0.8 mm |

**Note:** The external dimensions of the actuator vary.

**Z-15GW25-B**

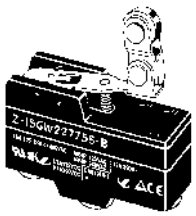


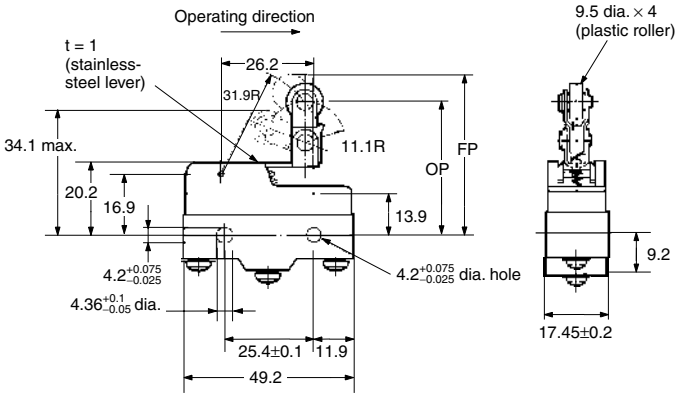



| | |
|---|---|
| **OF max.** | 0.98 N {100 gf} |
| **RF min.** | 0.21 N {21 gf} |
| **OT min.** | 4 mm |
| **MD max.** | 1.6 mm |
| **FP max.** | 47.5 mm |
| **OP** | 41.2±0.8 mm |

## Unidirectional Short Hinge Roller Lever

**Z-15GW2277-B**



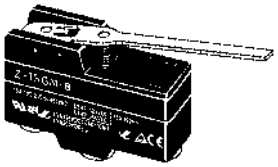


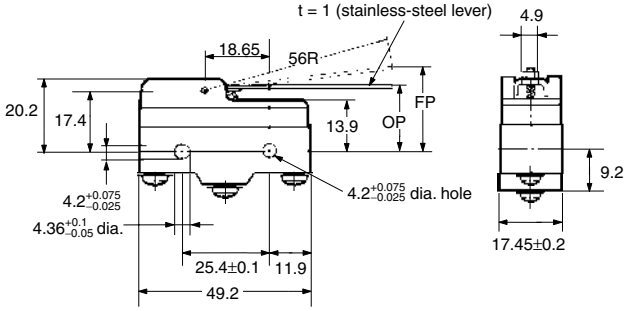

| | |
|---|---|
| **OF max.** | 1.67 N {170 gf} |
| **RF min.** | 0.41 N {42 gf} |
| **OT min.** | 2.4 mm |
| **MD max.** | 0.51 mm |
| **FP max.** | 43.6 mm |
| **OP** | 41.3±0.8 mm |

## Reverse Hinge Lever

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

**Z-15GM-B**



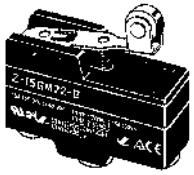


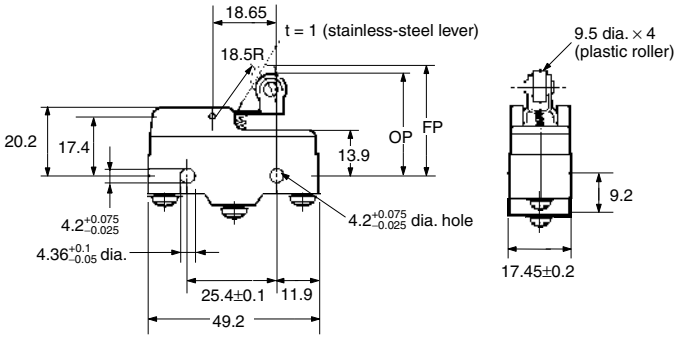

| | |
|---|---|
| **OF max.** | 1.67 N {170 gf} |
| **RF min.** | 0.27 N {28 gf} |
| **OT min.** | 5.6 mm |
| **MD max.** | 0.89 mm |
| **FP max.** | 23.8 mm |
| **OP** | 19±0.8 mm |

## Reverse Short Hinge Roller Lever

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

**Z-15GM22-B,**
**Z-10FM22Y-B**



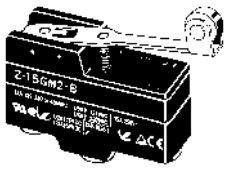


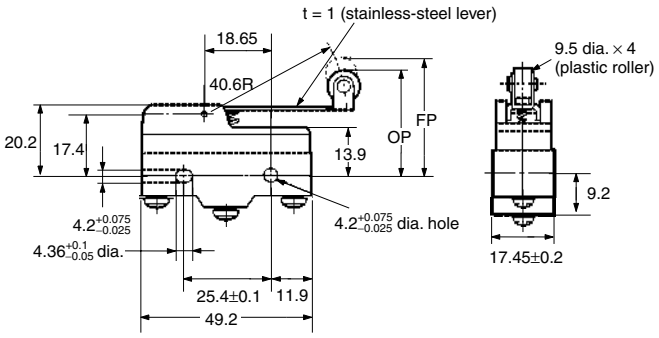

| Model | Z-15GM22-B | Z-10FM22Y-B |
|---|---|---|
| **OF max.** | 5.28 N {538 gf} | 6.37 N {650 gf} |
| **RF min.** | 1.67 N {170 gf} | 1.67 N {170 gf} |
| **OT min.** | 2 mm | 2 mm |
| **MD max.** | 0.28 mm | 0.56 mm |
| **FP max.** | 31.8 mm | 33 mm |
| **OP** | 29.4±0.4 mm | 29.4±0.4 mm |

## Reverse Hinge Roller Lever

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

**Z-15GM2-B**



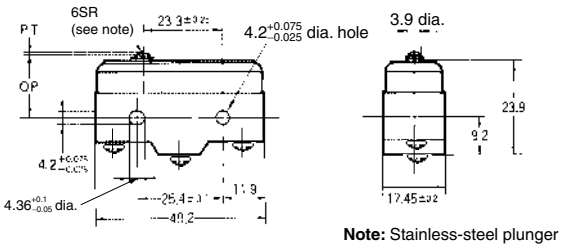



| | |
|---|---|
| **OF max.** | 2.35 N {240 gf} |
| **RF min.** | 0.55 N {56 gf} |
| **OT min.** | 4 mm |
| **MD max.** | 0.64 mm |
| **FP max.** | 35 mm |
| **OP** | 30.2±0.8 mm |

# Basic Models (Drip-proof) without Terminal Protective Cover

## Pin Plunger

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

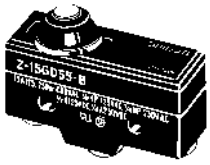


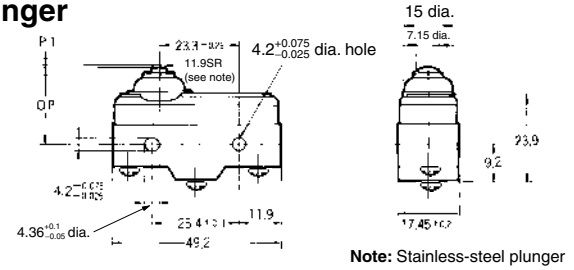

**Note:** Stainless-steel plunger

| Model | Z-15G55-B | Z-01H55-B |
|---|---|---|
| OF | 2.45 to 4.22 N {250 to 431 gf} | 3.43 N {350 gf} max. |
| RF min. | 1.12 N {114 gf} | 0.78 N {80 gf} |
| PT max. | 2.2 mm | 2.2 mm |
| OT min. | 0.13 mm | 0.13 mm |
| MD max. | 0.06 mm | 0.06 mm |
| OP | 15.9±0.4 mm | |

## Short Spring Plunger

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



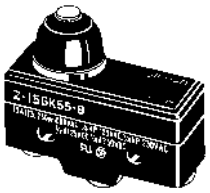


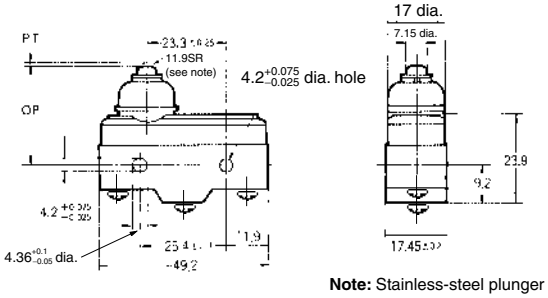

**Note:** Stainless-steel plunger

| Model | Z-15GD55-B | Z-01HD55-B |
|---|---|---|
| OF max. | 5.30 N {541 gf} | 3.63 N {370 gf} |
| RF min. | 1.12 N {114 gf} | 0.78 N {80 gf} |
| PT max. | 1.8 mm | 1.9 mm |
| OT min. | 1.6 mm | 1.6 mm |
| MD max. | 0.06 mm | 0.06 mm |
| OP | 21.5±0.5 mm | |

## Spring Plunger

**Z-15GK55-B**

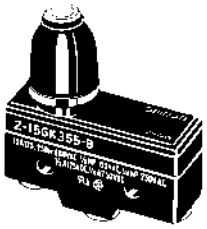


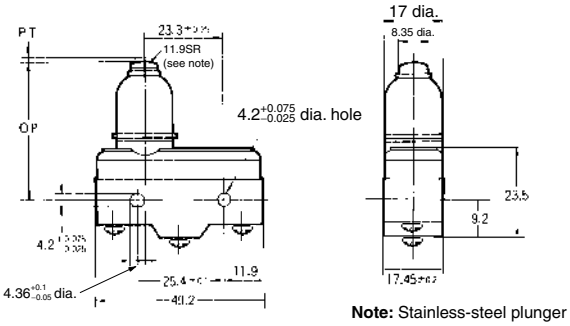



**Note:** Stainless-steel plunger

| | |
|---|---|
| OF max. | 5.30 N {541 gf} |
| RF min. | 1.12 N {114 gf} |
| PT max. | 2.3 mm |
| OT min. | 1.6 mm |
| MD max. | 0.06 mm |
| OP | 28.2±0.5 mm |

**Z-15GK355-B**



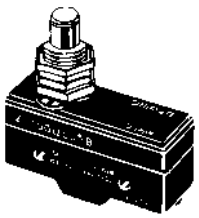


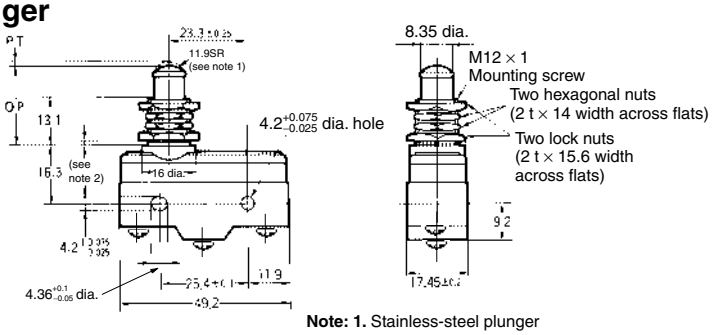

**Note:** Stainless-steel plunger

| | |
|---|---|
| OF max. | 5.30 N {541 gf} |
| RF min. | 1.12 N {114 gf} |
| PT max. | 2.4 mm |
| OT min. | 3.5 mm |
| MD max. | 0.06 mm |
| OP | 37.8±1.2 mm |

## Panel Mount Plunger

**Z-15GQ55-B**





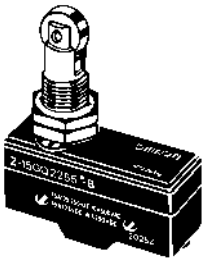

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 1.8 mm |
| **OT min.** | 5.5 mm |
| **MD max.** | 0.06 mm |
| **OP** | 21.8±0.8 mm |

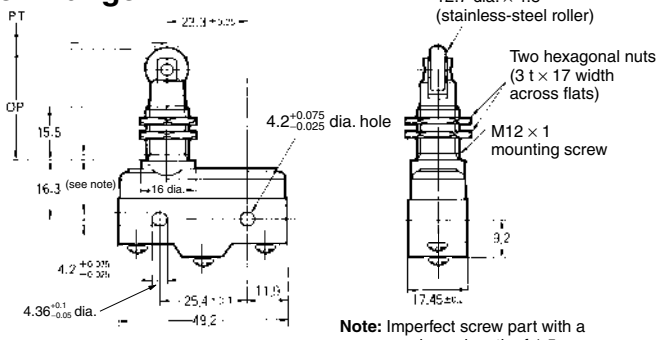
**Note: 1.** Stainless-steel plunger
**2.** Imperfect screw part with a maximum length of 1.5 mm.

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

## Panel Mount Roller Plunger

**Z-15GQ2255-B**





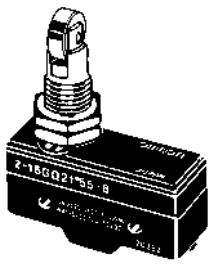

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 1.8 mm |
| **OT min.** | 3.58 mm |
| **MD max.** | 0.06 mm |
| **OP** | 33.4±1.2 mm |

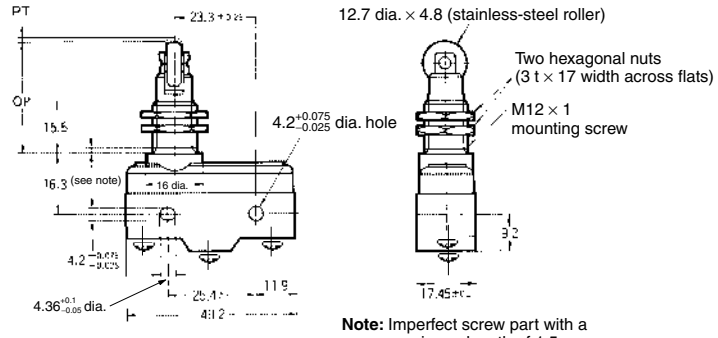
**Note:** Imperfect screw part with a maximum length of 1.5 mm.

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

## Panel Mount Cross Roller Plunger

**Z-15GQ2155-B**





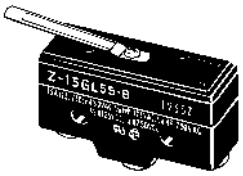

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 1.8 mm |
| **OT min.** | 3.58 mm |
| **MD max.** | 0.06 mm |
| **OP** | 33.4±1.2 mm |

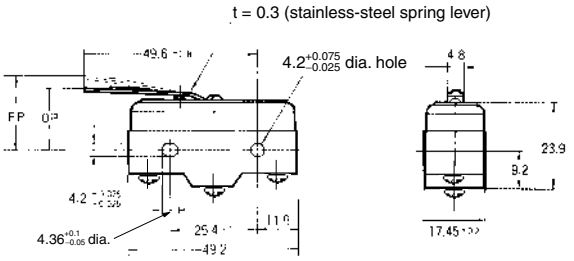
**Note:** Imperfect screw part with a maximum length of 1.5 mm.

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

## Leaf Spring

**Z-15GL55-B**



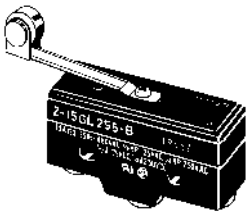


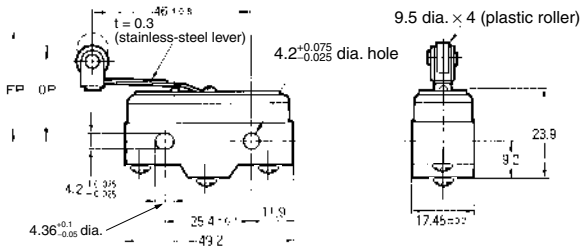

| | |
|---|---|
| **OF max.** | 1.96 N {200 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 1.6 mm |
| **MD max.** | 1.3 mm |
| **FP max.** | 20.6 mm |
| **OP** | 17.5±0.8 mm |

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

## Roller Leaf Spring

**Z-15GL255-B**



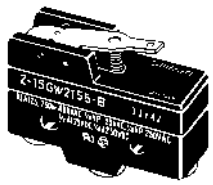


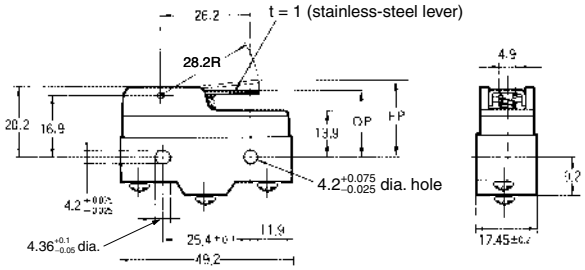

| | |
|---|---|
| **OF max.** | 1.96 N {200 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 1.6 mm |
| **MD max.** | 1.3 mm |
| **FP max.** | 31.8 mm |
| **OP** | 28.6±0.8 mm |

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

## Short Hinge Lever

**Z-15GW2155-B**

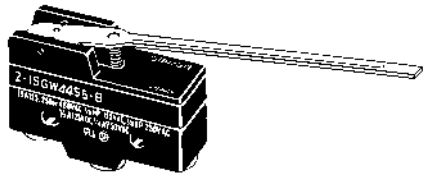


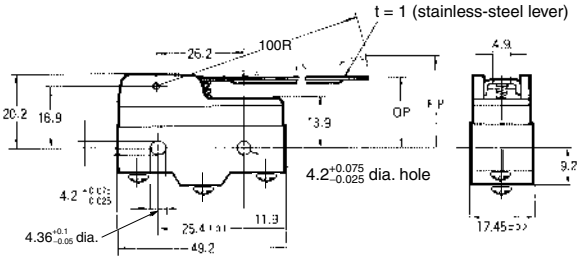



| | |
|---|---|
| **OF max.** | 1.86 N {190 gf} |
| **RF min.** | 0.27 N {28 gf} |
| **OT min.** | 2 mm |
| **MD max.** | 1 mm |
| **FP max.** | 25 mm |
| **OP** | 19±0.8 mm |

## Long Hinge Lever

**Z-15GW4455-B**

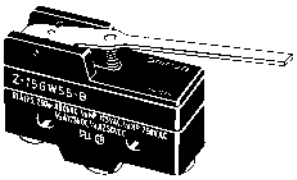


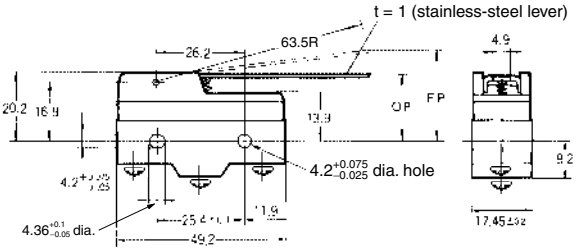



| | |
|---|---|
| **OF max.** | 0.88 N {90 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 5.6 mm |
| **MD max.** | 3.5 mm |
| **FP max.** | 33 mm |
| **OP** | 19±1.2 mm |

## Hinge Lever

**Z-15GW55-B**

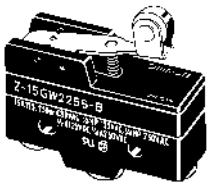


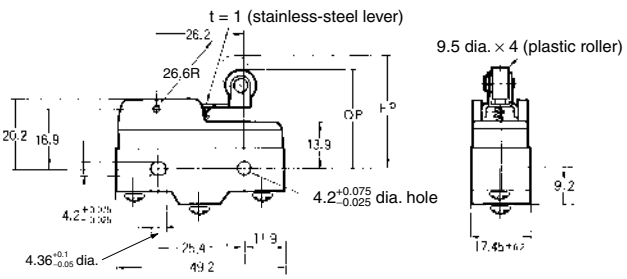



| | |
|---|---|
| **OF max.** | 0.98 N {100 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 5.6 mm |
| **MD max.** | 2 mm |
| **FP max.** | 28.2 mm |
| **OP** | 19±0.8 mm |

## Short Hinge Roller Lever

**Z-15GW2255-B**
**Z-01HW2255-B**

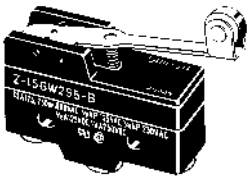


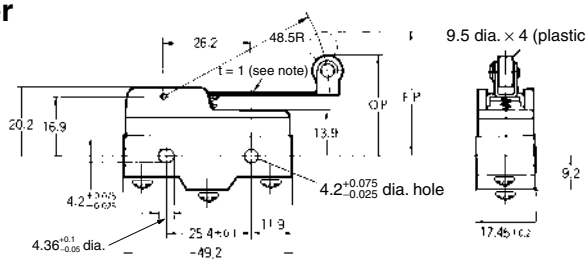



| Model | Z-15GW2255-B | Z-01HW2255-B |
|---|---|---|
| OF max. | 1.96 N {200 gf} | 1.96 N {200 gf} |
| RF min. | 0.41 N {42 gf} | 0.27 N {28 gf} |
| OT min. | 2.4 mm | 2.4 mm |
| MD max. | 0.8 mm | 0.8 mm |
| FP max. | 32.9 mm | |
| OP | 30.2±0.4 mm | |

## Hinge Roller Lever

**Z-15GW255-B**



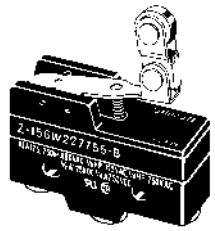


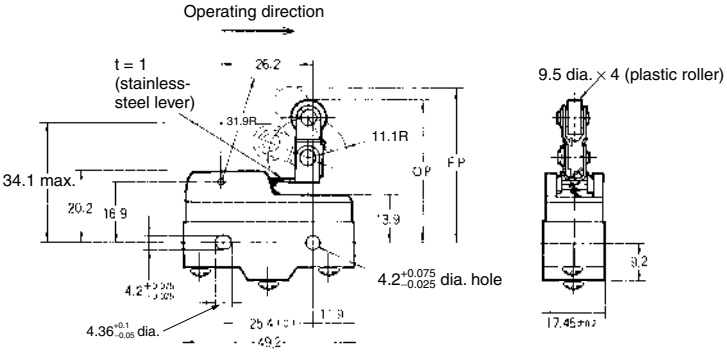

**Note:** Stainless-steel lever

| | |
|---|---|
| OF max. | 1.27 N {130 gf} |
| RF min. | 0.21 N {21 gf} |
| OT min. | 4 mm |
| MD max. | 1.6 mm |
| FP max. | 36.5 mm |
| OP | 30.2±0.8 mm |

## Unidirectional Short Hinge Roller Lever

**Z-15GW227755-B**



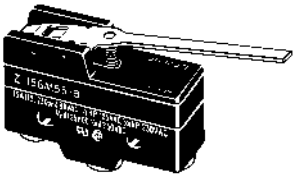


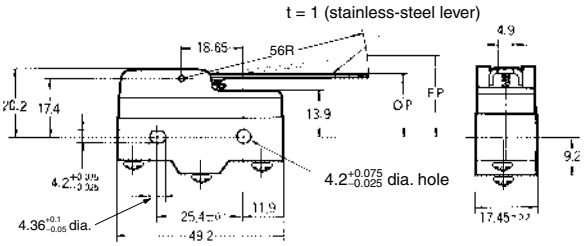

| | |
|---|---|
| OF max. | 1.77 N {181 gf} |
| RF min. | 0.49 N {50 gf} |
| OT min. | 2.4 mm |
| MD max. | 0.8 mm |
| FP max. | 43.6 mm |
| OP | 41.3±0.8 mm |

## Reverse Hinge Lever

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

**Z-15GM55-B**



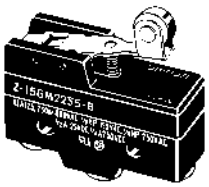


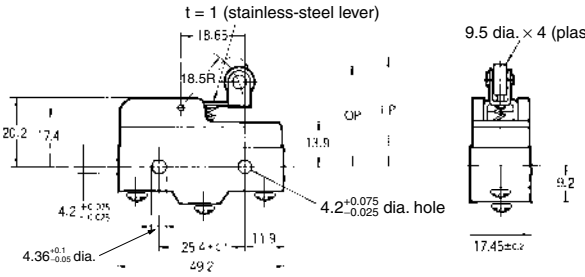

| | |
|---|---|
| OF max. | 1.96 N {200 gf} |
| RF min. | 0.27 N {28 gf} |
| OT min. | 5.6 mm |
| MD max. | 0.89 mm |
| FP max. | 23.8 mm |
| OP | 19±0.8 mm |

## Reverse Short Hinge Roller Lever

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

**Z-15GM2255-B**



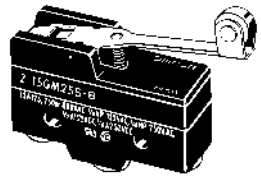


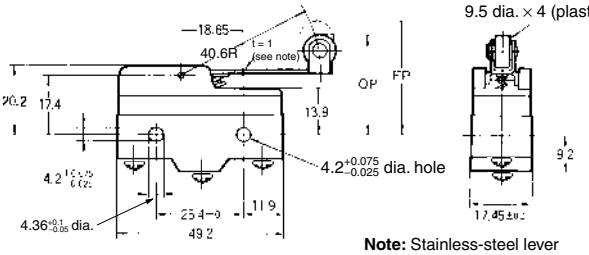

| | |
|---|---|
| **OF max.** | 5.69 N {581 gf} |
| **RF min.** | 1.67 N {170 gf} |
| **OT min.** | 2 mm |
| **MD max.** | 0.28 mm |
| **FP max.** | 31.8 mm |
| **OP** | 29.4±0.4 mm |

## Reverse Hinge Roller Lever

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

**Z-15GM255-B**





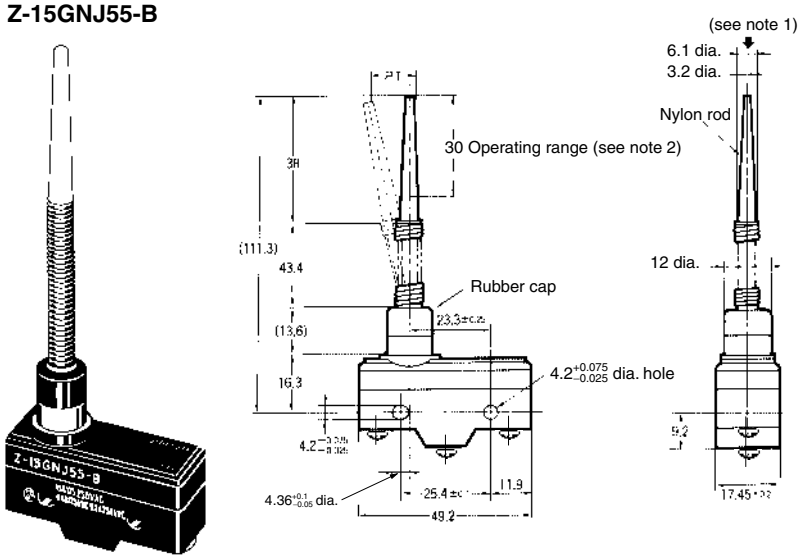

**Note:** Stainless-steel lever

| | |
|---|---|
| **OF max.** | 2.65 N {270 gf} |
| **RF min.** | 0.55 N {56 gf} |
| **OT min.** | 4 mm |
| **MD max.** | 0.64 mm |
| **FP max.** | 35 mm |
| **OP** | 30.2±0.8 mm |

## Flexible Rod (Coil Spring)

**Z-15GNJ55-B**

| | |
|---|---|
| **OF max.** | 0.49 N {50 gf} |
| **PT max.** | (20 mm) |
| **OT** | 42 to 60 mm |



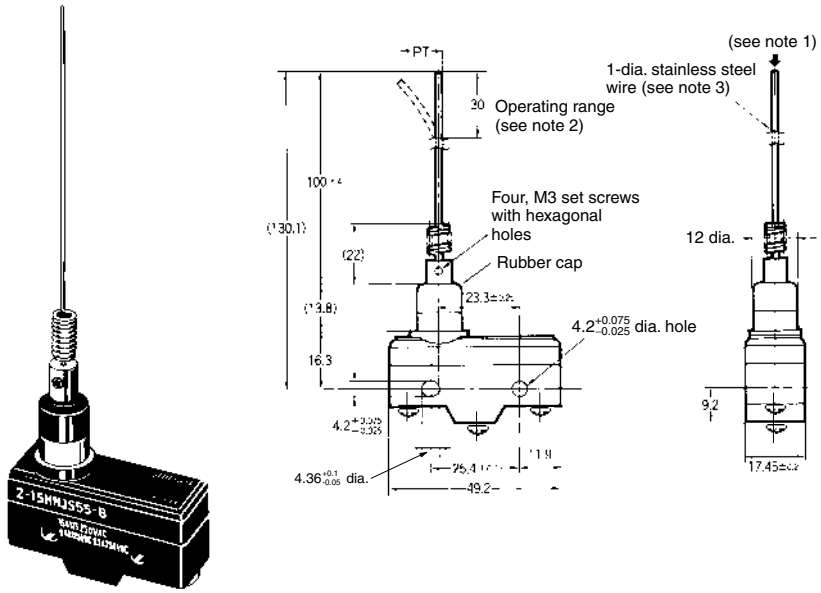

**Note: 1.** Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).

**2.** Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 80 mm from the mounting hole as the operating part. Using this area may cause damage to the nylon rod.)

## Flexible Rod (Steel Wire)

**Z-15HNJS55-B**

| | |
|---|---|
| **OF max.** | 0.15 N {15 gf} |
| **PT max.** | (25 mm) |




**Note: 1.** Operation is possible in any direction other than the axial direction (indicated by the arrow ↓).

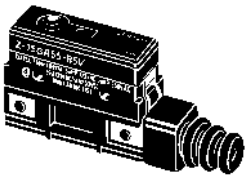
**2.** Use only the area within the top 30 mm of the rod as the operating part. (Do not use the area that falls within 100 mm from the mounting hole as the operating part. Using this area may cause damage to the steel wire.)

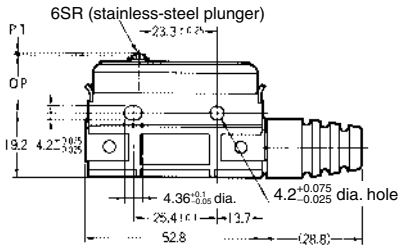
**3.** The steel wire can be replaced if damaged. (Model: Lever for HNJS55)

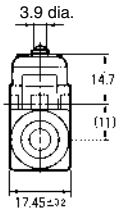
# Basic Models (Drip-proof) with Terminal Protective Cover

## Pin Plunger

**Z-15GA55-B5V**

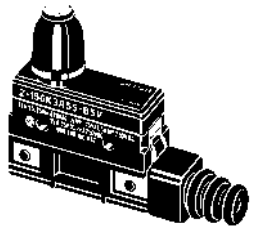


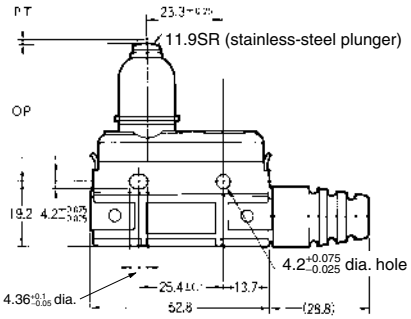


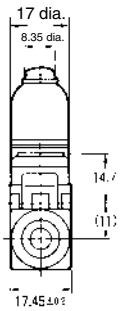




| | |
|---|---|
| **OF max.** | 2.45 to 4.22 N {250 to 431 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 2.2 mm |
| **OT min.** | 0.13 mm |
| **MD max.** | 0.06 mm |
| **OP** | 15.9±0.4 mm |

**Z-15GK3A55-B5V**



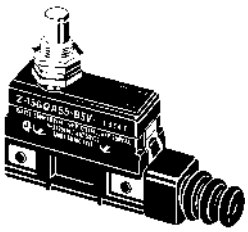


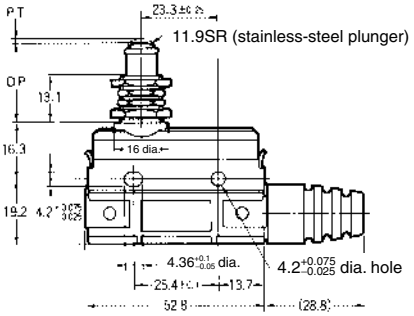



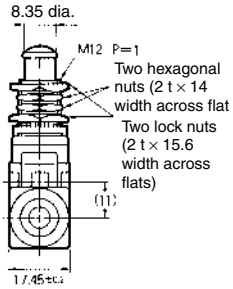

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 2.4 mm |
| **OT min.** | 3.5 mm |
| **MD max.** | 0.06 mm |
| **OP** | 37.8±1.2 mm |

## Panel Mount Plunger

**Z-15GQA55-B5V**





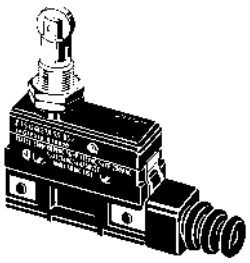



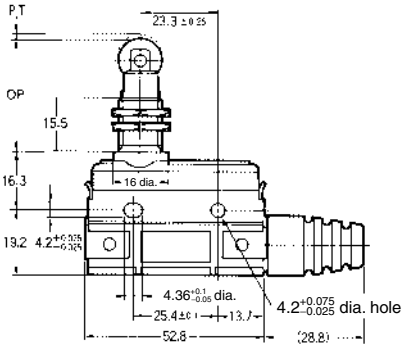

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 1.8 mm |
| **OT min.** | 5.5 mm |
| **MD max.** | 0.06 mm |
| **OP** | 21.8±0.8 mm |

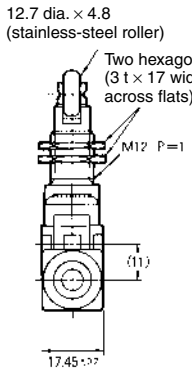
**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

## Panel Mount Roller Plunger

**Z-15GQ22A55-B5V**





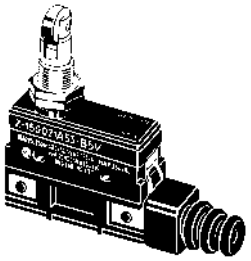



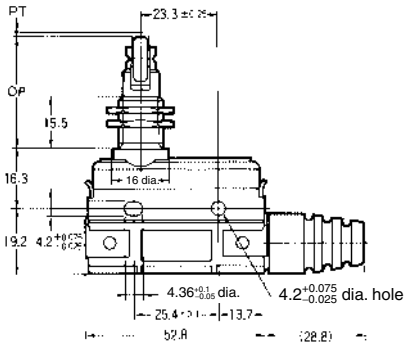

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 1.8 mm |
| **OT min.** | 3.58 mm |
| **MD max.** | 0.06 mm |
| **OP** | 33.4±1.2 mm |

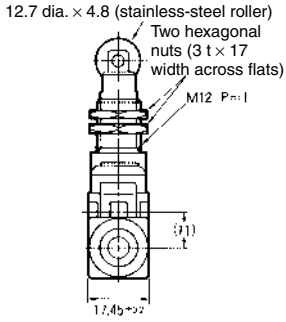
**Note:** Do not use the M12 mounting screw and the case mounting hole at the same time, or the case may be damaged.

## Panel Mount Cross-roller Plunger

**Z-15GQ21A55-B5V**





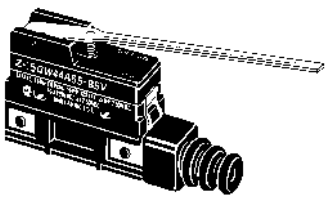



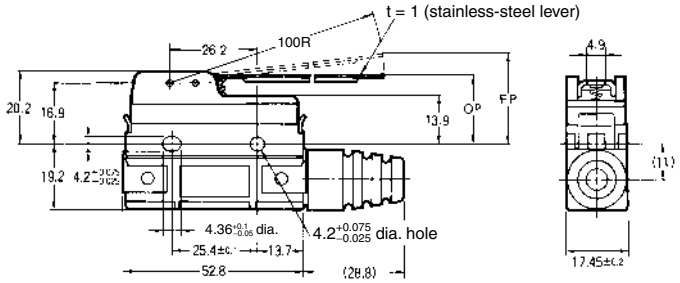

| | |
|---|---|
| **OF max.** | 5.30 N {541 gf} |
| **RF min.** | 1.12 N {114 gf} |
| **PT max.** | 1.8 mm |
| **OT min.** | 3.58 mm |
| **MD max.** | 0.06 mm |
| **OP** | 33.4±1.2 mm |

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

## Long Hinge Lever

**Z-15GW44A55-B5V**

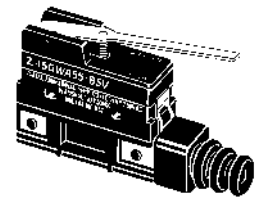


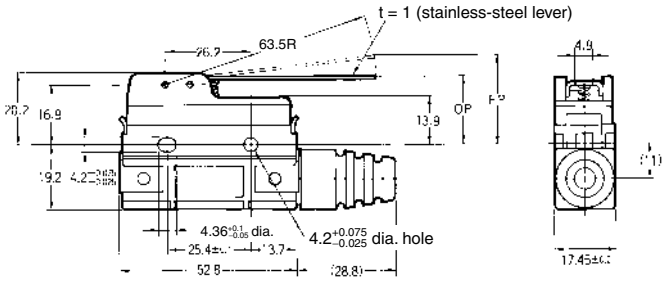



| | |
|---|---|
| **OF max.** | 0.88 N {90 gf} |
| **RF min.** | 1.14 N {116 gf} |
| **OT min.** | 5.6 mm |
| **MD max.** | 3.5 mm |
| **FP max.** | 33 mm |
| **OP** | 19±1.2 mm |

## Hinge Lever

**Z-15GWA55-B5V**

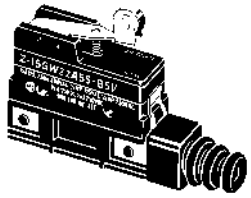


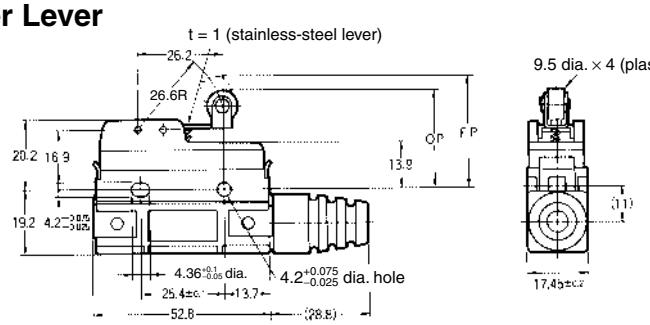



| | |
|---|---|
| **OF max.** | 0.98 N {100 gf} |
| **RF min.** | 0.14 N {14 gf} |
| **OT min.** | 5.6 mm |
| **MD max.** | 2 mm |
| **FP max.** | 28.2 mm |
| **OP** | 19±0.8 mm |

## Short Hinge Roller Lever

**Z-15GW22A55-B5V**

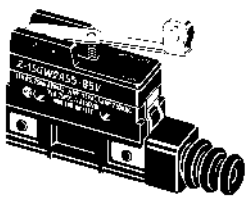


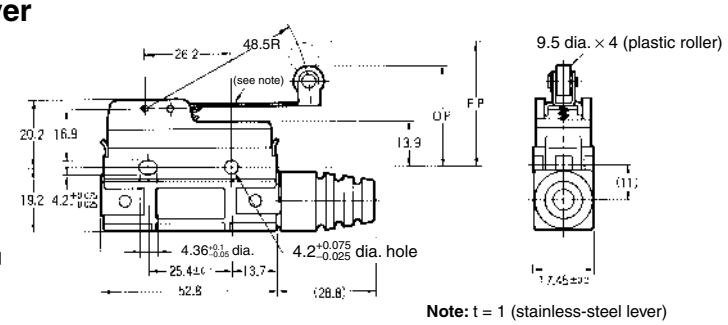



| | |
|---|---|
| **OF max.** | 1.96 N {200 gf} |
| **RF min.** | 0.41 N {42 gf} |
| **OT min.** | 2.4 mm |
| **MD max.** | 0.8 mm |
| **FP max.** | 32.9 mm |
| **OP** | 30.2±0.4 mm |

## Hinge Roller Lever

**Z-15GW2A55-B5V**



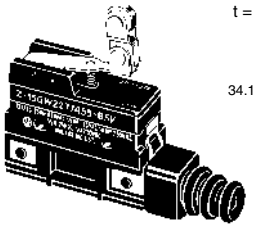


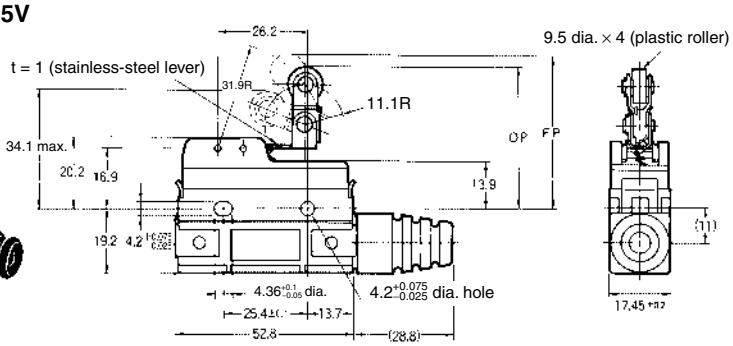

**Note:** t = 1 (stainless-steel lever)

| | |
|---|---|
| **OF max.** | 1.27 N {130 gf} |
| **RF min.** | 0.21 N {21 gf} |
| **OT min.** | 4 mm |
| **MD max.** | 1.6 mm |
| **FP max.** | 36.5 mm |
| **OP** | 30.2±0.8 mm |

## Unidirectional Short Hinge Roller Lever

**Z-15GW2277A55-B5V**



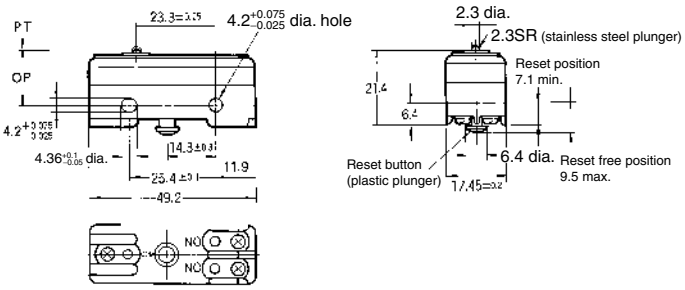



| | |
|---|---|
| **OF max.** | 1.77 N {181 gf} |
| **RF min.** | 0.49 N {50 gf} |
| **OT min.** | 2.4 mm |
| **MD max.** | 0.8 mm |
| **FP max.** | 43.6 mm |
| **OP** | 41.3±0.8 mm |

# Maintained-contact Models

## Pin Plunger

**Z-15ER**




**Plunger**

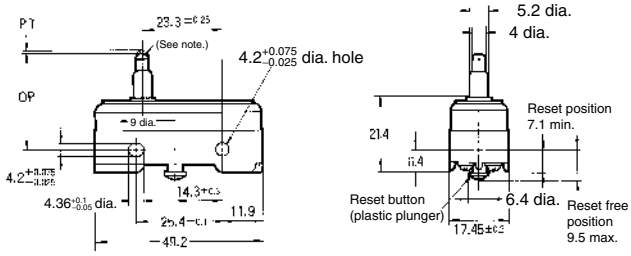
| | |
|---|---|
| **OF max.** | 1.96 to 2.50 N {200 to 255 gf} |
| **PT max.** | 0.4 mm |
| **OT min.** | 0.13 mm |
| **OP** | 15.9±0.4 mm |

**Reset Button**

| | |
|---|---|
| **OF max.** | 0.55 to 2.79 N {56 to 285 gf} |
| **OT min.** | 0.4 mm |

## Slim Spring Plunger

**Z-15ESR**




Note: Stainless steel plunger (tip only, flat, R1 bevel).

**Plunger**

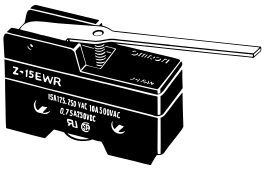
| | |
|---|---|
| **OF max.** | 2.65 N {270 gf} |
| **PT max.** | 0.4 mm |
| **OT min.** | 1.6 mm |
| **OP** | 28.2±0.5 mm |

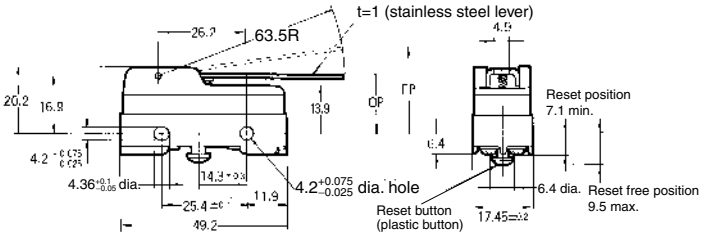
**Reset Button**

| | |
|---|---|
| **OF max.** | 2.79 N {285 gf} |
| **OT min.** | 0.4 mm |

## Hinge Lever

**Z-15EWR**






**Lever Tip**

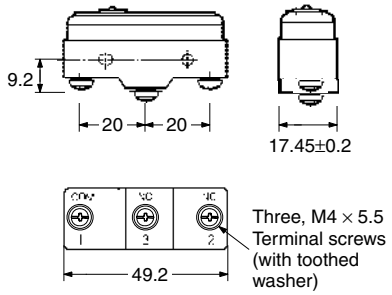
| | |
|---|---|
| **OF max.** | 0.54 N {55 gf} |
| **OT min.** | 5.6 mm |
| **FP max.** | 28.2 mm |
| **OP** | 19±0.8 mm |

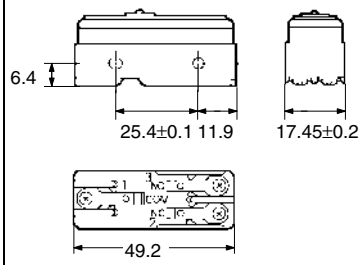
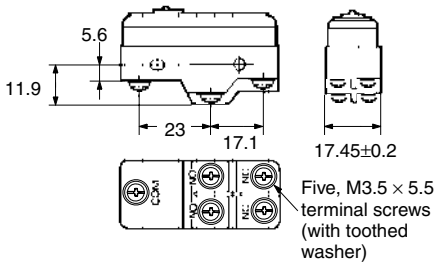
**Reset Button**

| | |
|---|---|
| **OF max.** | 2.94 N {0.3 gf} |
| **OT min.** | 0.4 mm |

# ■ Terminals

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

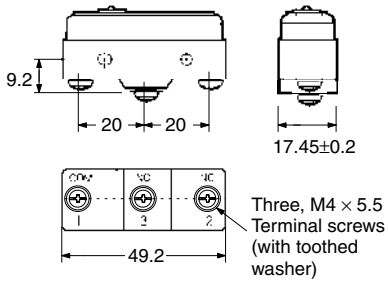
<table>
<tr><th colspan="2">Basic (General-purpose) Models</th><th>Split-contact Models</th></tr>
<tr>
<td>Screw Terminals (-B)<br> 

<br>Appropriate terminal screw tightening torque:<br>0.78 to 1.18 N·m {8 to 12 kgf·cm}.</td>
<td>Solder Terminal<br> 
</td>
<td>Screw Terminals (Y-B)<br> 

<br>Appropriate terminal screw tightening torque:<br>0.49 to 0.78 N·m {5 to 8 kgf·cm}.</td>
</tr>
<tr>
<td colspan="2">Note: With reverse action models (Z-15GM), the positions of NO and NC terminals are reversed.</td>
<td>Note: With reverse action models (Z-10FM), the positions of NO and NC terminals are reversed.</td>
</tr>
</table>

## Basic Models (Drip-proof) without Terminal Protective Cover

### Without Terminal Protective Cover




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

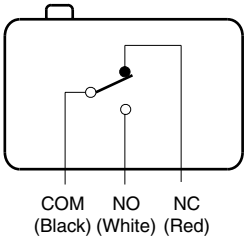
# Molded Terminals (Drip-proof Type/Molded Terminal)

## ■ Model Number Legend

**Z-□55-M□□ □M**
**1 2 3 4**

1. **Drip-proof Type**
2. **Lead Outlets**
   None: VSF
   19: VCT
3. **Directions of Lead Outlets**
   Refer to the following diagrams.
4. **Length of Lead Outlets**
   0.5: 0.5 m
   1: 1 m
   2: 2 m
   3: 3 m

## ■ Contact Form

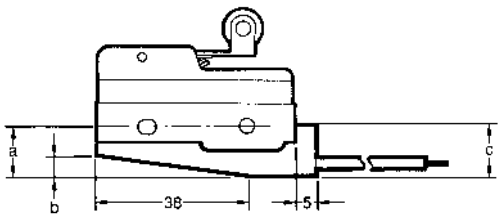



**Note:** With the reverse action model (Z-15GM), the positions of NO and NC terminals are reversed.

## ■ Dimensions

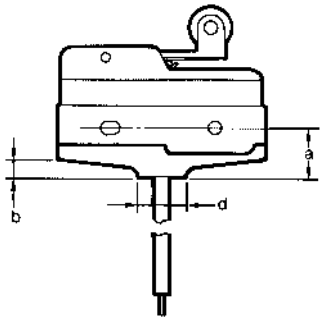
### L/R Type

(The following illustration is the R type.)




| Lead wire | a | b | d |
|---|---|---|---|
| VSF | 12 | 4 | 13 |
| VCT | 19 | 11 | 20 |

### D Type




| Lead wire | a | b | d |
|---|---|---|---|
| VSF | 12 | 4 | 12 |
| VCT | 19 | 11 | 16 |

### Lead Wire Specifications

| Lead wire | Nominal cross-sectional area ($mm^2$) | Finished outer diameter (mm) | Connection to terminal | Length (m) |
|---|---|---|---|---|
| VSF (single-core, vinyl cord) | 1.25 | Approx. 3.1 dia. | Black: COM<br>White: NO<br>Red: NC | 0.5, 1, 2, 3 |
| VCT (vinyl-insulated cable) | | Three-core: approx. 10.5 dia. | | |

**Note:** No models with molded terminals are approved by UL, CSA, or TÜV.

# Precautions

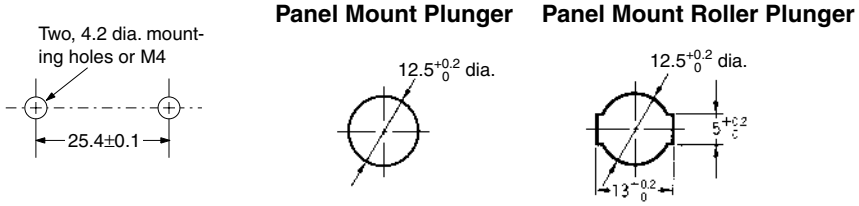
Refer to the *Technical Information for Basic Switches* (Cat. No. C122) for common precautions.

## ■ Correct Use

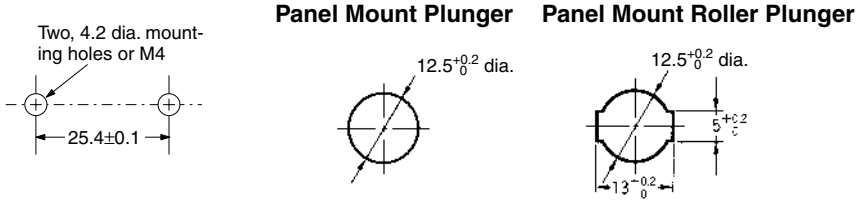
### Mounting

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

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




### Basic Models (Drip-proof) without Terminal Protective Cover




### Panel Mount Switch (Z-15□Q□, Z-01□Q□)

When mounting the panel mount plunger model with screws on a side surface, be careful of the dog angle and operation speed. Excessive dog angle or operation speed may damage the Switch.

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

When using the panel mount plunger model mounted with screws on a side surface, be careful not to apply a large shock. Applying a shock exceeding 100G may damage the Switch.

When using the panel mount plunger model mounted with screws on a side surface, remove the hexagonal nuts from the actuator.

### High-sensitivity Switch (Z-15H)

When using the Switch in a DC circuit, be sure to provide an arc suppressor as well because the small contact gap of the Switch may result in contact troubles.

In an application where a high repeat accuracy is required, limit the current that flows through the Switch to within 0.1 A. Also, use a relay to control a high-capacity load if the Switch is connected to such a load. (In this case, the exciting current of the relay coil is the load of the Switch.)

Do not apply a force of 19.6 N {2 kgf} or higher to the pin plunger.

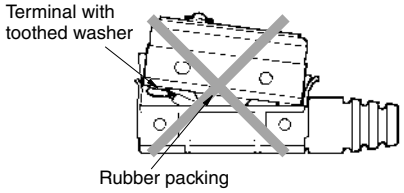
Exercise care that the environment conditions such as temperature and humidity do not change abruptly.

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

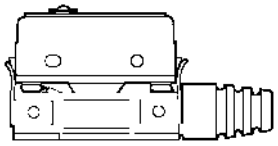
#### Wiring

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

**Incorrect**

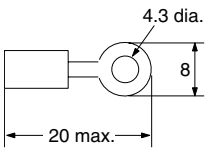



**Correct**



Use round solderless terminals having the following dimensions to connect leads to the terminals. Tighten the screws of terminals to a torque of 0.78 to 1.18 N·m {8 to 12 kgf·cm}.

Use the terminal shown below.



A cable 8.5 to 10.5 mm in diameter can be applicable to the sealing rubber of the lead outlet of the Switch. A two-core or three-core VCT cable having a cross-sectional area of 1.25 $mm^2$ is especially suitable for this.

Use M4 small screws with spring toothed washer are used as the terminal screws.

### Drip-proof Switch (Z□55)

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

The rubber boots are made from weather-resistive chloroprene rubber.

Do not use Basic Switches in places with radical changes in temperature.

### Split-contact Switch (Z-10F□Y)

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

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

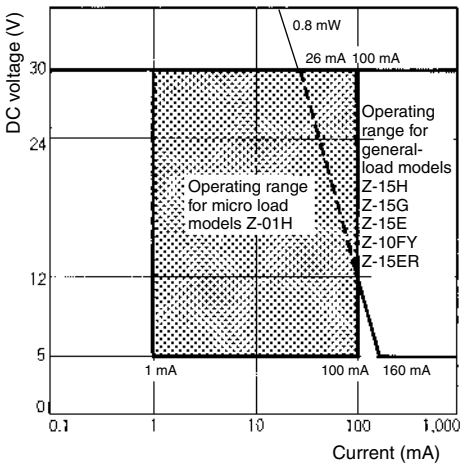
When the rod is fully swung, the Switch may operate when the lever returns, causing chattering. Use a circuit that compensates for chattering wherever possible.

Do not switch the rod to the fullest extent when the Switch is to break a power circuit because such a practice may cause metal deposition to occur between the mating contacts of the Switch.

## Micro Load Applicable Range

Using a model for ordinary loads to open or close the contact of a micro load circuit may result in faulty contact. Use models that operate in the following range. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease life expectancy. Therefore, insert a contact protection circuit where necessary.

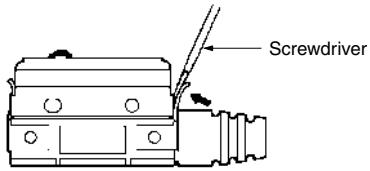
The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% ($\lambda$ 60). The equation, $\lambda$ 60 = $0.5\times10^{-6}$/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.




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

## Others

Do not apply an excessive force to the mounting bracket with a screwdriver or a similar object when attaching or detaching the protective cover; otherwise, the cover will be deformed.




This terminal protective cover cannot be used with models whose model number does not have the prefix "-B5V."

Terminal protective covers can be ordered separately for maintenance use.

# ■ Accessories (Order Separately)

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. B001-E1-12

# Z/A/X/DZ Common Accessories
# Z/A/X/DZ

## Ordering Information

### ■ List of Models

#### Terminal Covers (Sold Separately)

##### Common to Z, A, X, and DZ Models

The Terminal Cover is secured with mounting screws and protects the casing and terminal wires from dust, vibration, or fingers, thus preventing terminal short-circuiting, ground faults, wire disconnection or improper connection, and electric shock accidents.

Terminal Covers made of phenol resin have five or six thin wall sections. These sections can be torn open for providing holes for lead cables at desired points.

| Material | Application / Mounting direction | Soldering terminal use | Screw terminal use | Remarks |
|---|---|---|---|---|
| | | Model | | |
| Phenol resin | Side mounting | AP-A | AP-B | --- |
| Metal press mold | Side mounting | AP1-A | AP1-B | Used for AP-A and AP-B |
| Vinyl chloride | Side mounting | AP-Z | | --- |

**Note:** Use the screw-terminal use Terminal Cover for DZ-series soldering-terminal models.

#### Separator (Sold Separately)

##### Common to Z, A, X, and DZ Models

Model: Separator for Z

#### Actuators (Sold Separately)

##### Common to Z and X Models

A Switch can be actuated by a cam or an appropriate object, in which case, use one of the following Actuators according to the application.

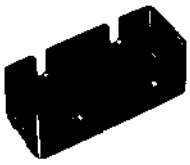
| Actuator | | Common to Z and X models |
|---|---|---|
| **Hinge lever**  | | XAA-1 |
| **Hinge roller lever**  | | ZAA-2 |
| **Panel mount plunger**  | Short | ZAQ-3 |
| | Medium | ZAQ-2 |
| | Long | ZAQ-1 |
| **Panel mount roller plunger**  | | ZAQ-22 |

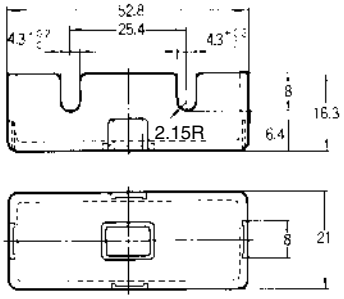
# Dimensions

## ■ Dimensions and Operating Characteristics

### Terminal Covers

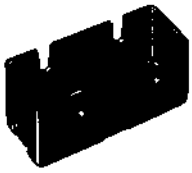
**AP-A**
**Soldering Terminal Use**
**(Phenol Resin)**

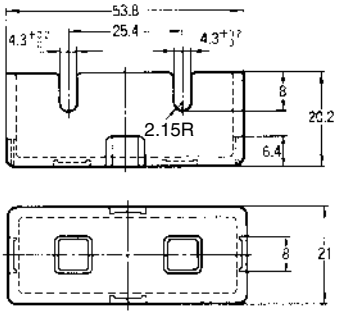





**Note:** The Cover has five thin, easy-to-separate portions for easy lead wire connections.

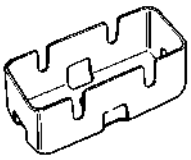
**AP-B**
**Screw Terminal Use**
**(Phenol Resin)**

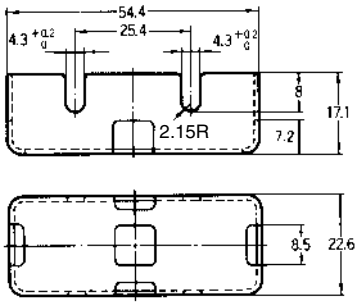





**Note:** The Cover has six thin, easy-to-separate portions for easy lead wire connections.

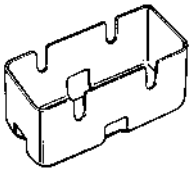
**AP1-A**
**Soldering Terminal Use**
**(Metal Press Mold)**

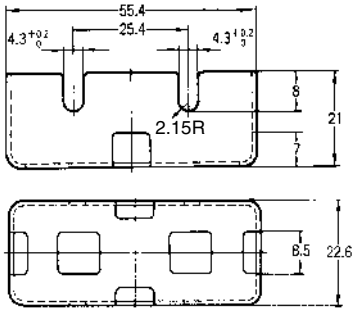





**Note: 1.** The Cover has five holes for easy lead wire connections.
**2.** AP1-A should be used with AP-A.

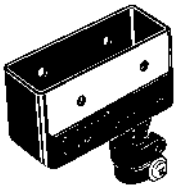
**AP1-B**
**Screw Terminal Use**
**(Metal Press Mold)**

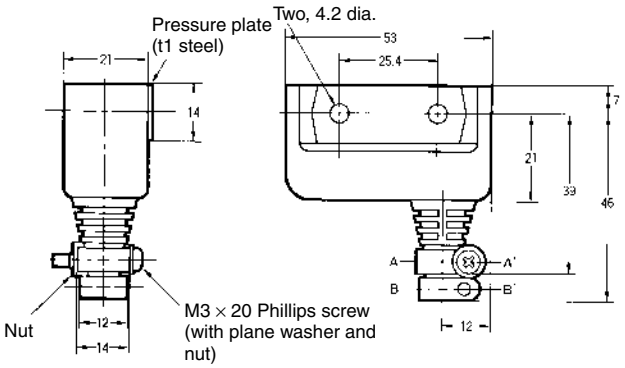




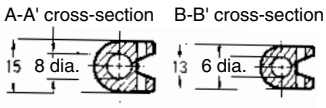

**Note: 1.** The Cover has six holes for easy lead wire connections.
**2.** AP1-B should be used with AP-B.

**AP-Z**
**Soldering or Screw Terminal Use**
**(Vinyl Chloride)**





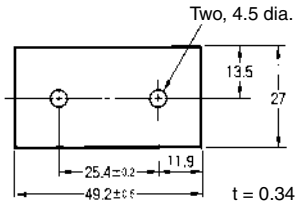

**Cable Pull-out Dimension**




**Note:** A 6-dia. or 8-dia. cable can be used by cutting the cable pull-out hole to the size of the cable to be used.

**Note:** Each dimension has a tolerance of ±0.4 mm unless otherwise specified. (±0.8 mm for the AP-Z)

## Separator




**Note: 1.** Each dimension has a tolerance of +0.4 mm unless otherwise specified.

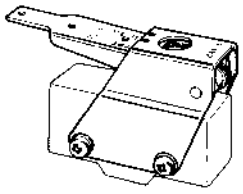
**2.** The material is EAVTC (Epoxide Alkyd Varnished Tetron Cloth) and its heat-resisting temperature is 130°C.

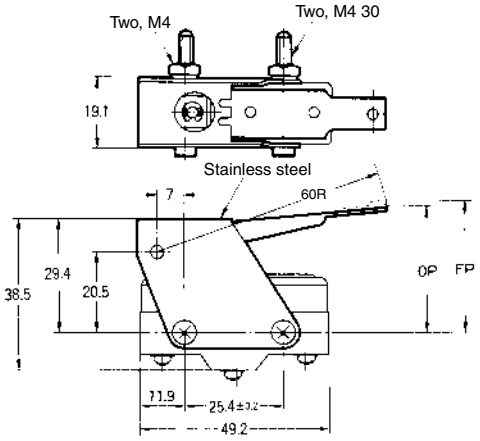
## Actuators

**Note:** These Actuators are not provided with Switches.

### Hinge Lever

**XAA-1**

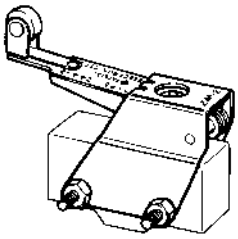


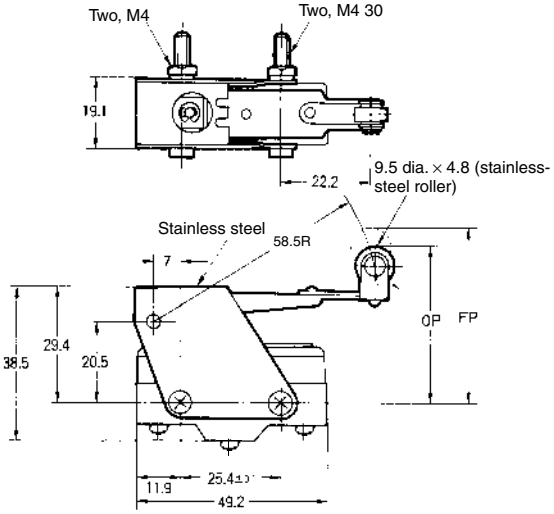



| Model | Z-15G-B | X-10G-B |
|---|---|---|
| OF max. | 4.90 n {500 gf} | 4.90 n {500 gf} |
| RF min. | 1.67 N {170 gf} | 1.67 N {170 gf} |
| PT max. | 6 mm | 6 mm |
| OT min. | 12.7 mm | 12.7 mm |
| MD max. | 2.2 mm | 3.3 mm |
| FP max. | 32.9±1.6 mm | |

### Hinge Roller Lever

**ZAA-2**



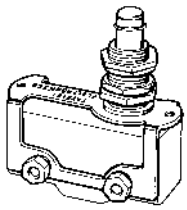


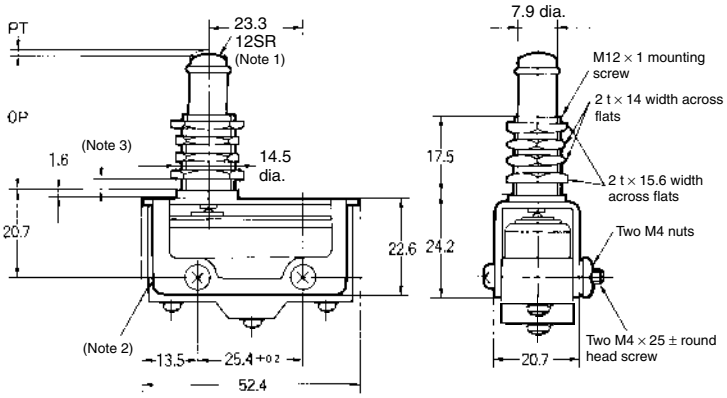

| Model | Z-15G-B | X-10G-B |
|---|---|---|
| OF max. | 4.90 n {500 gf} | 4.90 n {500 gf} |
| RF min. | 1.67 N {170 gf} | 1.67 N {170 gf} |
| PT max. | 6 mm | 6 mm |
| OT min. | 12.7 mm | 12.7 mm |
| MD max. | 2.2 mm | 3.3 mm |
| FP max. | 44.5±1.6 mm | |

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

## Short Panel Mount Plunger

**ZAQ-3**





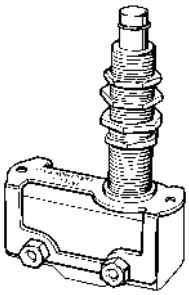

| Model | ZAQ-3 | |
|---|---|---|
| | Z-15E-B | X-10G-B |
| OF max. | 8.34 N {850 gf} | 5.39 N {550 gf} |
| RF min. | 1.12 N {114 gf} | 1.12 N {114 gf} |
| PT max. | 0.8 mm | 1 mm |
| OT min. | 4.8 mm | 4.5 mm |
| MD max. | 0.15 mm | 0.2 mm |
| OP | 27.8±1.5 mm | |

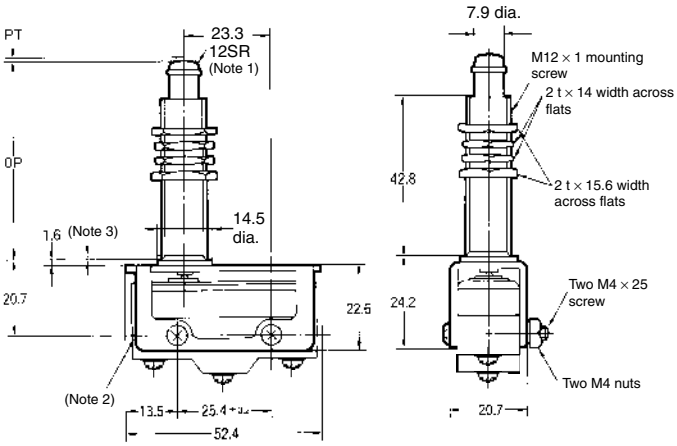
**Note: 1.** Stainless-steel pin plunger
**2.** Bronze frame
**3.** Incomplete screw section part with a maximum of 1.5 mm

**Note:** This Actuator (pin plunger) can be used with Standard Pin Plungers (Z-15G(-B), Z-15E(-B), X-10G(-B), DZ-10G-1A(-1B)) for the Z, X, and DZ models.

## Medium Panel Mount Plunger

**ZAQ-2**





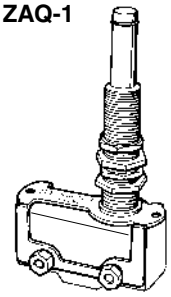

| Model | ZAQ-2 | |
|---|---|---|
| | Z-15E-B | X-10G-B |
| OF max. | 8.34 N {850 gf} | 5.39 N {550 gf} |
| RF min. | 1.12 N {114 gf} | 1.12 N {114 gf} |
| PT max. | 0.8 mm | 1 mm |
| OT min. | 4.8 mm | 4.5 mm |
| MD max. | 0.15 mm | 0.2 mm |
| OP | 53.2±1.5 mm | |

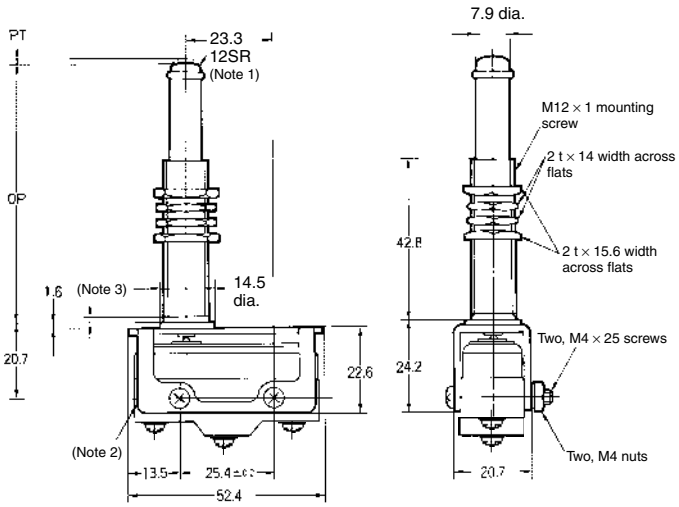
**Note: 1.** Stainless-steel pin plunger
**2.** Bronze frame
**3.** Incomplete screw section part with a maximum of 1.5 mm

**Note:** This Actuator (pin plunger) can be used with Standard Pin Plungers (Z-15G(-B), Z-15E(-B), X-10G(-B), DZ-10G-1A(-1B)) for the Z, X, and DZ models.

## Long Panel Mount Plunger

**ZAQ-1**





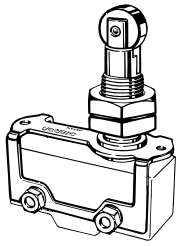

| Model | ZAQ-1 | |
|---|---|---|
| | Z-15E-B | X-10G-B |
| OF max. | 8.34 N {850 gf} | 5.39 N {550 gf} |
| RF min. | 1.12 N {114 gf} | 1.12 N {114 gf} |
| PT max. | 0.8 mm | 1 mm |
| OT min. | 20.6 mm | 20.4 mm |
| MD max. | 0.15 mm | 0.2 mm |
| OP | 69.1±1.5 mm | |

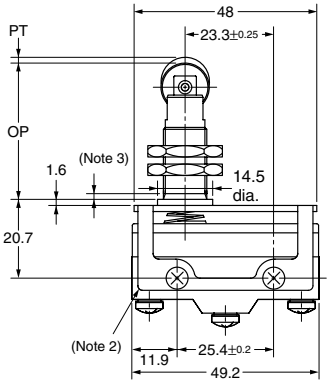
**Note: 1.** Stainless-steel pin plunger
**2.** Bronze frame
**3.** Incomplete screw section part with a maximum of 1.5 mm

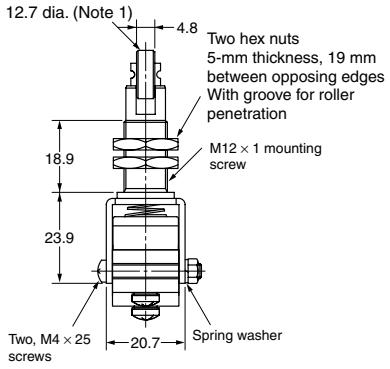
**Note:** This Actuator (pin plunger) can be used with Standard Pin Plungers (Z-15G(-B), Z-15E(-B), X-10G(-B), DZ-10G-1A(-1B)) for the Z, X, and DZ models.

## Panel Mount Roller Plunger

**ZAQ-22**






| Model | ZAQ-22 | |
|---|---|---|
| | Z-15E-B | X-10G-B |
| **OF max.** | 8.34 N {850 gf} | 5.39 N {550 gf} |
| **RF min.** | 1.12 N {114 gf} | 1.12 N {114 gf} |
| **PT max.** | 0.8 mm | 1 mm |
| **OT min.** | 20.6 mm | 20.4 mm |
| **MD max.** | 0.15 mm | 0.2 mm |
| **OP** | 37±0.8 mm | |

**Note: 1.** Stainless-steel pin plunger
**2.** Bronze frame
**3.** Incomplete screw section part with a maximum of 1.5 mm.