Two-circuit Limit Switch/Long-life Two-circuit Limit Switch

WL/WLM

Wide Range of Two-circuit Switches; Select One for the Operating Environment/Application

- A wide selection of models are available, including the overtravel models with greater OT, indicator-equipped models for checking operation, low-temperature models, heat-resistant models, and corrosion-proof models.
- Microload models are added to the product lineup.
- Meets EN/IEC standards (only Switches with ground terminals and pre-wired connectors with DC specifications).
- Approved by UL, CSA, and CCC (Chinese standard). (Ask your OMRON representative for information on approved models.)

Be sure to read *Safety Precautions* on page 39 to 42 and *Safety Precautions for All Limit Switches*.

Features

Standard Models

Many Variations in Standard Limit Switches

A Wide Range of Models

The WL Series provides a complete range of Limit Switches with a long history of meeting user needs. Select environment-resistant specifications, actuators for essentially any workpiece, operating sensitivity matched to the workpiece, operation indicators to aid operation and maintenance, and various wiring specifications.

Environment-resistant Models

Select from Six Types of Environment Resistance

The series includes Airtight Switches, Hermetic Switches, Heat-resistant Switches, Low-temperature Switches, Corrosion-proof switches, and Weather-proof Switches. Select the one required by the onsite environment.

Spatter-prevention Models

Excellent Performance on Arc Welding Lines or Sites with Spattering Cutting Powder

Ideal for Welding Sites

Stainless steel and resins that resist adhesion of spatters are used to prevent troubles caused by zinc powder generated during welding.

Long-life Models

Mechanical Endurance of 30 Million Operations

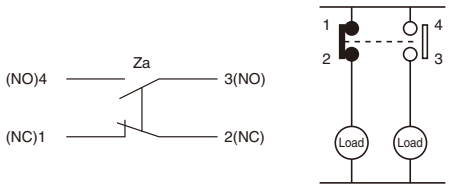
Long-life Models for High-frequency Applications

Long life has been achieved by increasing the resistance to friction and creating better sliding properties in the head mechanism. Greater visibility is provided when setting with a fluorescent display for setting the stroke.

Features Common to All Models

DPDB Operation

The double-pole, double-break structure ensures circuit braking.



Degree of Protection; IP67

O-rings, cover seals, and other measures provide a water-proof, drip-proof structure (IP67).

Approved Standards to Aid Export Machines

Various WL/WLM switches are approved by UL, CSA, TÜV, EN/IEC, and CCC making them ideal for export machines.

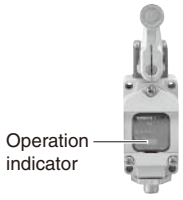
High-precision Models Available in All Switch Types; Ideal for Position Control

High-precision models achieve a very small movement to operation (approx. 5°) and a repeat accuracy that is twice that of basic models.

Operation Indicators for Easier Daily Inspections*

Confirm operation with a neon lamp or LED for easier startup confirmations and maintenance.

* Specify the type of operation indicator for general-purpose models. Provided on standard models for spatter-prevention and long-life models.

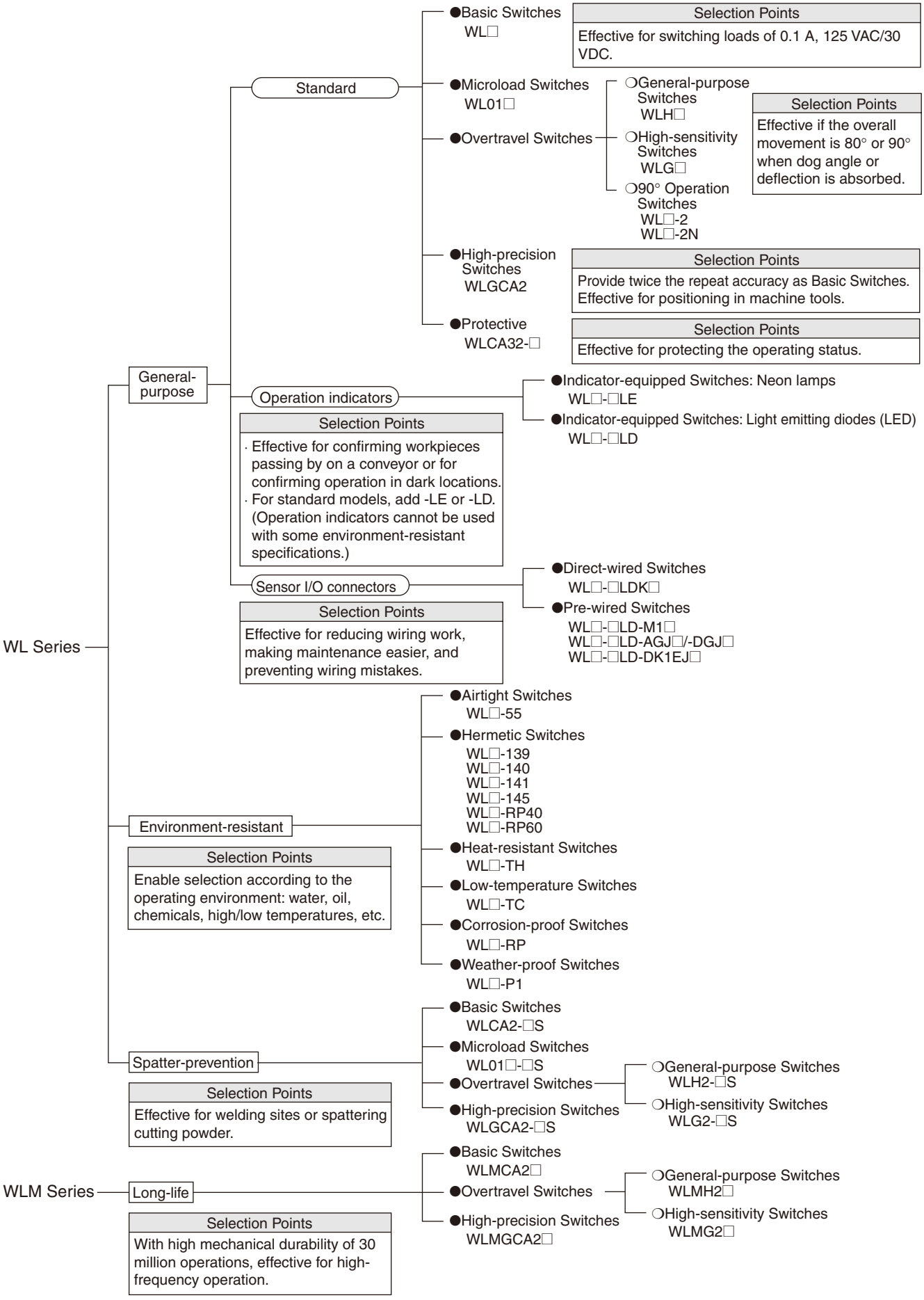


Models with Connectors Provided with All Switch Types

Reduced wiring with one-touch connection. Connectors that also make Switch replacement easier are provided with direct-wired and prewired models).

Product Configuration

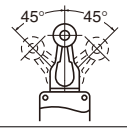
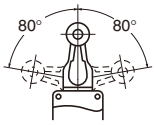
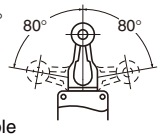
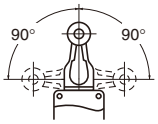
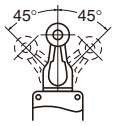
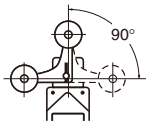
Selection by Purpose



Tables of Models

General-purpose Switches | **Spatter-prevention Switches** | **Long-life Switches**

Actuators/Heads

Type	General purpose	Actuators			Features	Head specifications		Spatter prevention	Long-life
	Model	Roller lever	Plunger	Flexible rod	Total travel (TT)	One-side operation	Head mounting	Model	Model
Basic	**WL□**	Possible	Possible	Possible	• With a Roller Lever 	Possible *1 (Except for long-life models.)	Any of 4 directions	**WLCA2-□S**	**WLMCA2□**
General-purpose Overtravel	**WLH□**	Possible	—	—	• Overtravel is large, making setting the dog easier. • Mounting is compatible with WLH2. 	Not possible *2	Any of 4 directions	**WLH2-□S**	**WLH2□**
High-sensitivity Overtravel	**WLG□**	Possible	—	—	• Operation is highly sensitive with only 10° pretravel. • Overtravel is large, making setting the dog easier. • Mounting is compatible with WLG2. 	Not possible *2	Any of 4 directions	**WLG2-□S**	**WLMG2□**
Overtravel, 90° operation	**WL□-2**	Possible	—	—	• Overtravel is large, making setting the dog easier. • Mounting is compatible with WLCA2-2. 	Not possible *2	Any of 4 directions	—	—
	WL□-2N	Possible	—	—		Possible *1	Either of 2 directions		
High-precision	**WLGCA2**	Possible	—	—	• Repeat accuracy is twice that basic models. • Operation is highly sensitive with only 5° pretravel. • Ideal for positioning, e.g., with machine tools. 	Not possible *2	Any of 4 directions	**WLGCA2-□S**	**WLMGCA2□**
Maintained	**WLCA32-□**	Possible	—	—	• When the dog throws the lever, the output is reversed and the reversed output is held even after the dog passed. The original status is returned to only after the dog passed. 	—	Any of 4 directions	—	—

*1. 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.
*2. Those models for which one-side operation is impossible can only operate on both sides.

Connectors and Conduits

Wiring type	General-purpose	Connector/conduit specifications	Spatter-prevention	Long-life
	Model		Model	Model
Direct-wired connector	**WL□-□LDK□**	• SC-2F/-4F Connector built-in	—	**WLM□-LDK□**
Pre-wired connector	**WL□-□LD-M1□** **WL□-□LD-□GJ□** **WL□-□LD-DK1EJ□**	• XS2H-series Pre-wired Connector built-in	**WL□-□S-M1□J-1** **WL□-□S-DGJS03**	**WLM□-LD-M1J** **WLM□-LD-□GJ□**
Conduit (screw terminal)	**WL□-□** **WL□-□G1□** **WL□-□G□** **WL□-□Y□** **WL□-□TS□**	• G1/2 with no ground terminal • G1/2 with ground terminal • Pg13.5 with ground terminal • M20 with ground terminal • 1/2 14NPT with ground terminal	—	**WLM□-LD** — — — —

Environment-resistant Switches

Item		Environment-resistant		
Type	Model	Application	Environment-resistant construction	Applicable models
Airtight seal	WL□-55	For uses in locations subject to cutting oil or water	Uses the W-10FB3-55 Airtight Built-in Switch. Note: Use the SC Connector for the conduit opening.	All models except the low-temperature and heat-resistant models Note: Models can be produced using standard actuators.
Hermetic seal (Molded terminals/ Anti-coolant)	WL□-139 WL□-140 WL□-141 WL□-145 WL□-RP40 WL□-RP60		Refer to page 25 for information on the environment-resistant construction of Switches with Hermetic Seals.	All models except the low-temperature and heat-resistant models Note: Models can be produced using standard actuators. Only the WLCA2, WLGCA2, or WLH2 can be produced for the WL□-141 and WL□-145.
Low-temperature *	WL□-TC	Can be used at a temperature of –40°C (operating temperature range: –40 to 40°C), but cannot withstand icing.	• Uses a general-purpose built-in switch. • Silicone rubber is used for rubber parts such as the O-ring, gasket, etc.	All models except airtight seal, hermetic seal, heat-resistant, corrosion-proof, and indicator-equipped models
Heat-resistant *	WL□-TH	Can be used in temperatures of 120°C (operating temperature range: 5 to 120°C).	• Uses a special built-in switch made from heat-resistant resin. • Silicone rubber is used for rubber parts such as the O-ring, gasket etc.	All models except airtight seal, hermetic seal, heat-resistant, corrosion-proof, and indicator-equipped, nylon roller (WLCA2-26N), seal roller models, and resin rod (WLNJ-2) models
Corrosion-proof	WL□-RP	For use in locations subject to corrosive gases and chemicals.	• Diecast parts, such as the switch box, are made of corrosion-proof aluminum. • Rubber sealing parts are made of fluorine rubber which aids in resisting oil, chemicals and adverse weather conditions. • Exposed nuts and screws (except the actuator section) are made of stainless steel. • Moving and rotary parts such as rollers are made of sintered stainless steel or stainless steel.	All models except overtravel (90° operation), fork lever lock (WLCA32-41 to -43), low-temperature, heat-resistant, and indicator-equipped models
Weather-proof *	WL□-P1	For use in parking lots and other outdoor locations.	• Rubber parts are made from silicone rubber, which has a high-tolerance to deterioration over time and changes in temperature. • Rollers are made of stainless steel to improve corrosion resistance. • Exposed nuts and screws are made of stainless steel.	Only general-purpose overtravel (WLH2/12) and high-sensitivity overtravel (WLG2/12) models (excluding heat-resistant models).

* Weather Resistance, Cold Resistance, and Heat Resistance
Silicon rubber is used to increase resistance to weather, cold, and heat. Silicon rubber, however, can generate silicon gas. (This can occur at room temperature, but the amount of silicon gas generated increases at higher temperatures.) Silicon gas will react as a result of arc energy and form silicon oxide (SiO_2). If silicon oxide accumulates on the contacts, contact interference can occur and can interfere with the device. Before using a Switch, test it under actual application conditions (including the environment and operating frequency) to confirm that no problems will occur in actual.

Selection Guide

With the WL Series, OMRON will combine the switch, Actuator, and wiring method required to build the ideal switch for your application.

The WL Series consists of four basic types: General-purpose, Environment-resistant, Spatter-prevention, and Long-life Switches. WLCA2 Switches can be used for the most common applications.

According to Operating Environment

	Environment	Key specifications	Models	
Ambient operating temperature	Normal	−10°C +80°C Water-resistant to IP67.	WL□ WLM□	General-purpose Switches Long-life Switches
	High-temperature	+5°C +120°C To increase heat resistance, the rubber material (silicon rubber) and the material of the built-in switch have been changed.	WL□-TH	Heat-resistant Switches *
	Low-temperature	−40°C +40°C To increase resistance to cold, silicon rubber and other measures are used.	WL□-TC	Low-temperature Switches *
Operating environment	Outdoors	Rubber parts are made from silicone rubber, which has a high-tolerance to deterioration over time and changes in temperature. Rollers are made of stainless steel to improve corrosion resistance. Exposed nuts and screws are made of stainless steel.	WL□-P1	Weather-proof Switches *
	Chemicals and oil	Corrosion-proof aluminum diecast has been used for the housing, fluorine rubber has been used for rubber parts, and stainless steel has been used for screws and nuts (except for actuator) to increase resistance to oils, chemicals, and weather.	WL□-RP	Corrosion-proof Switches *
	Water drops and mist	Uses an airtight built-in switch.	WL□-55	Airtight Switches *
	Constant water drops and mist	Cables attached. Uses a general-purpose built-in switch. The case cover and conduit opening are molded from epoxy resin to increase the seal. The cover cannot be removed.	WL□-139 Hermetic, Molded-terminal Switches *	
		Cables attached. Uses an airtight built-in switch. The case cover and box interior are molded from epoxy resin to increase the seal. The cover cannot be removed. The SC connector can be removed, so it is possible to use flexible conduits for the cable.	WL□-RP40 Hermetic, Molded-terminal Switches *	
		Cables attached. Uses an airtight built-in switch. The cover screws, case cover, box interior, and conduit opening are molded from epoxy resin to increase the seal. (The cover cannot be removed.)	WL□-140 Hermetic, Molded-terminal Switches *	
	Constant water drops or splattering cutting powder	Cables attached. Uses an airtight built-in switch. The cover screws, case cover, box interior, conduit opening, box head, and head screws are molded from epoxy resin to increase the seal. (The cover cannot be removed.) The Head opening is protected from cutting powder. -141: The Head section is molded from epoxy resin; Head direction cannot be changed. -145: The Head section is molded from epoxy resin; Head can be in any of 4 directions.	WL□-141, -145 Hermetic, Molded-terminal Switches * (Only the WLCA2, WLG2, WLGCA2, and WLH2 can be produced.)	
	Coolant	Cables attached. Uses an airtight built-in switch. The case cover, box interior, conduit opening, and head screws are molded from epoxy resin to increase the seal. (The cover cannot be removed.) Rubber parts are made from fluorine rubber to increase resistance to coolant.	WL□-RP60 Hermetic, Molded-terminal Switches *	
	Spattering from welding	To prevent spatter during welding, a heat-resistant resin is used for the indicator cover and screws and rollers are all made from stainless steel.	WL□-S	Spatter-prevention Switches

* Not all functions can be combined with environment-resistant switches. Refer to the applicable models on the previous page.

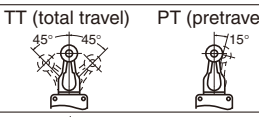
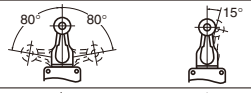
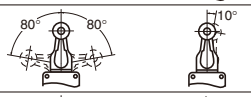
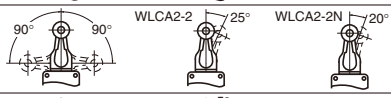
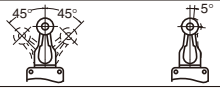
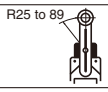
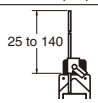
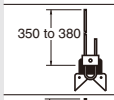
According to Application Conditions

	Conditions	Key specifications	Models
Load	Switching standard loads	10 A at 125,250, or 500 VAC 0.8 A at 125 VDC 0.4 A at 250 VDC	WL□ General-purpose Switches WL□-S Spatter-prevention Switches WLM□ Long-life Switches
Load	Switching microloads	0.1 A at 125 VAC, resistive load 0.1 A at 30 VDC, resistive load	WL01□ General-purpose Microload Switches WL01□-S Spatter-prevention Microload Switches
Durability	Normal durability	Mechanical: 15 million operation min. (10 million operation min. for overtravel general-purpose or high-sensitivity models or flexible rod models)	WL□ General-purpose Switches WL□-S Spatter-prevention Switches
Durability	Long-life	Mechanical: 30 million operation min.	WLM□ Long-life Switches

According to Ease of Installation and Maintenance

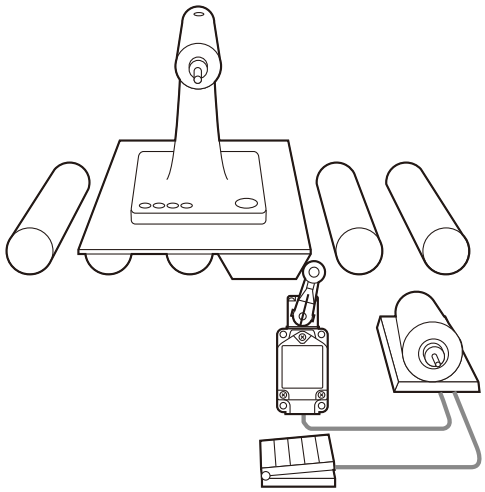
	Conditions	Key specifications	Models
Operation indicator	Daily inspections and maintenance checks	Switching light-ON between operating/not operating. (Switching not possible for models with molded terminals.) Neon lamp 125 to 250 VAC	WL□-LE General-purpose, Indicator-equipped (Neon Lamp) Switches WL□-LES Spatter-prevention, Indicator-equipped (Neon Lamp) Switches
Operation indicator	Daily inspections and maintenance checks	Switching light-ON between operating/not operating. (Switching not possible for models with molded terminals.) LED 10 to 115 VAC/DC	WL□-LD General-purpose, Indicator-equipped (LED) Switches WL□-LDS Spatter-prevention, Indicator-equipped (LED) Switches
Wiring specification	Screw tightening and installation	Screw terminals. No ground terminal. Conduit size: G1/2	WL□ General-purpose Switches WLM□ Long-life Switches
Wiring specification	Screw tightening and installation	Screw terminals. Ground terminal. Conduit size: 4 sizes	WL□ General-purpose Switches
Wiring specification	One-touch connector attachment	Direct-wired connector, 2-conductor. Greatly reduces wiring work. Water-proof to IP67.	WL□-□LDK13 General-purpose, Direct-wired Connector Switches WLM□-LDK13 Long-life, Direct-wired Connector Switches
Wiring specification	One-touch connector attachment	Direct-wired connector, 4-conductor. Greatly reduces wiring work. Water-proof to IP67.	WL□-□LDK43 General-purpose, Direct-wired Connector Switches WLM□-LDK43 Long-life, Direct-wired Connector Switches
Wiring specification	Connector attachment in control and relay boxes	Pre-wired connector, 2-conductor. Greatly reduces wiring work. Water-proof to IP67.	WL□-□LD-M1J General-purpose, Pre-wired Connector Switches WL□-□S-M1J-1 Spatter-prevention, Pre-wired Connector Switches WLM□-LD-M1J Long-life, Pre-wired Connector Switches
Wiring specification	Connector attachment in control and relay boxes	Pre-wired connector, 4-conductor. Greatly reduces wiring work. Water-proof to IP67.	WL□-□LD-□GJO3 General-purpose, Pre-wired Connector Switches WL□-□S-□GJSO3 Spatter-prevention, Pre-wired Connector Switches WLM□-LD-□GJO3 Long-life, Pre-wired Connector Switches

According to Form of Operation

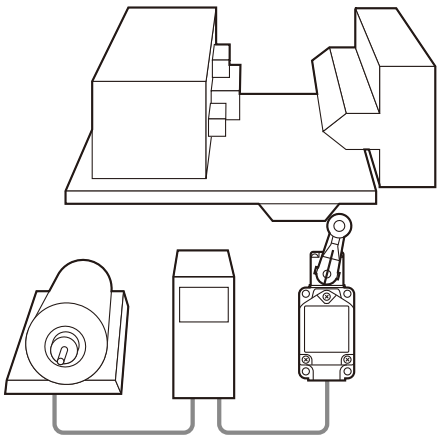
	Detection object	Key specifications	Models	
Operation angles	General		WLCA2 WLCA2-□S WLMCA2	General-purpose Switches Spatter-prevention Switches Long-life Switches
	Passing dogs		WLH2 WLH2-□S WLMH2	General-purpose Switches Spatter-prevention Switches Long-life Switches
	Passing dogs, high sensitivity		WLG2 WLG2-□S WLMG2	General-purpose Switches Spatter-prevention Switches Long-life Switches
	Passing dogs		WLCA2-2 WLCA2-2N	General-purpose Switches General-purpose Switches
	High precision		WLGCA2 WLGCA2-□S WLMGCA2	General-purpose Switches Spatter-prevention Switches Long-life Switches
Actuators	Dogs and workpieces (Mounts in any of 4 directions)	 ● Short lever ● One-Horizontal operation possible. (WLCA□ only) ● Head mounts in any of 4 directions.	WL□2 WL□2-□S WLM□2	Roller Lever Actuators Roller Lever Actuators Roller Lever Actuators
		 ● Medium lever ● One-Horizontal operation possible. (WLCA□ only) ● Head mounts in any of 4 directions.	WL□2-7	Roller Lever Actuators
		 ● Long lever ● One-Horizontal operation possible. (WLCA□ only) ● Head mounts in any of 4 directions.	WL□2-8	Roller Lever Actuators
	Adjustable between dog and lever	 ● One-Horizontal operation possible. (WLCA□ only) ● Head mounts in any of 4 directions.	WL□12	Adjustable Roller Lever Actuators
	Dogs or workpieces with large deflection	 ● One-Horizontal operation possible. (WLCL only) ● Head mounts in any of 4 directions.	WL□L	Adjustable Rod Lever Actuators
		 ● One-Horizontal operation not possible. ● Head mounts in any of 4 directions.	WLHAL4	Adjustable Rod Lever Actuator
		 ● One-Horizontal operation not possible. ● Head mounts in any of 4 directions.	WLHAL5	Rod Spring Lever Actuator
	Round-trip operation of passing dogs	 ● Head mounts in any of 4 directions.	WLCA32-41	Fork Lever Lock Actuator
		 ● Head mounts in any of 4 directions.	WLCA32-42	Fork Lever Lock Actuator
		 ● Head mounts in any of 4 directions.	WLCA32-43	Fork Lever Lock Actuator
		 ● Head mounts in any of 4 directions.	WLCA32-44	Fork Lever Lock Actuator
	Cams or workpieces with vertical movement		WLD	Top Plunger Actuator
		 ● Head mounts in any of 4 directions.	WLSD	Horizontal Plunger Actuator
			WLD3	Top-ball Plunger Actuator
		 ● Head mounts in any of 4 directions.	WLSD3	Horizontal-ball Plunger Actuator
		 ● Available in sealed models. (WLD28□)	WLD2 WLD28	Top-roller Plunger Actuator Sealed Top-roller Plunger Actuator
			WLSD2	Horizontal-roller Plunger Actuator

Application Examples

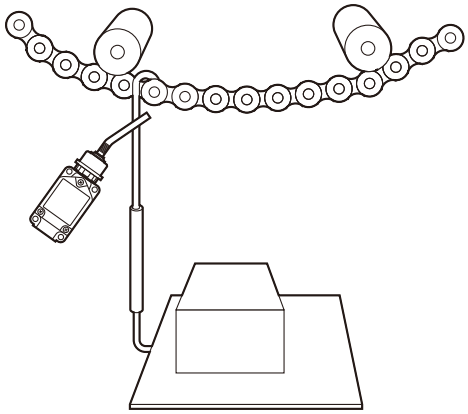
Positioning on Production Lines



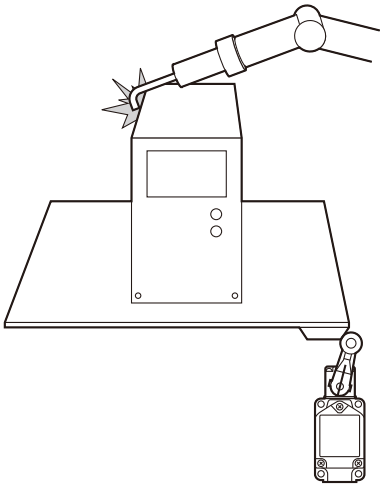
High-precision Positioning of Machine Tools



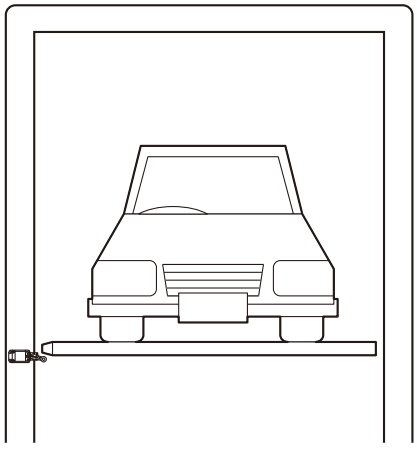
Positioning on Suspended Conveyors



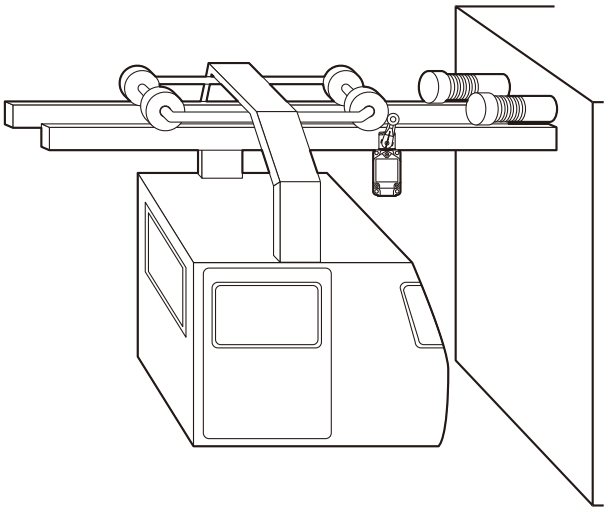
Pallet Detection in Arc Welding Lines



Multilevel Car Parking Towers



Limit Detection is Transport Systems



Model Number Structure

Model Number Legend

General-purpose and Environment-resistant Switches

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

(1) Electrical Rating

Blank	Standard
01	Microload

Note: Dimensions are the same as the standard models.

(3) Environment-resistant Model Specifications

Blank	Standard
RP	Corrosion-proof *1
P1	Weather-proof *1

Note: Dimensions are the same as the standard models.
*1. Refer to page 4 for applicable models.

(4) Built-in Switch Type

Blank	Standard
55	Hermetically sealed *1

Note: Dimensions are the same as the standard models.
*1. Refer to page 4 for applicable models.

(5) Temperature Specifications

Blank	Standard: –10°C to +80°C
TH	Heat-resistant: +5°C to +120°C *1
TC	Low-temperature: –40°C to +40°C *1

Note: Dimensions are the same as the standard models.
*1. Refer to page 4 for applicable models.

(7) Conduit Size, Ground Terminal Specifications *2

Blank	G1/2 without ground terminal
G1	G1/2 with ground terminal
G	Pg13.5 with ground terminal
Y	M20 with ground terminal
TS	1/2-14NPT with ground terminal

Note: Dimensions are the same as the standard models.
*2. Models with ground terminals are approved by EN/IEC (CE marking).

(6) 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). *
140	Airtight built-in switch with cables attached and molded conduit opening, cover, and box interior cover screws (cover cannot be removed). *
141	Airtight built-in switch with cables attached and molded conduit opening, cover, head, box interior, cover screws, and head screws (cover cannot be removed, Head direction cannot be changed). The Head opening is created to protect it from cutting powder. *
145	Airtight built-in switch with cables attached and molded conduit opening, cover, box interior, and cover screws (cover cannot be removed, Head can be mounted in any of 4 directions). The Head opening is created to protect it from cutting powder. *
RP40	Airtight built-in switch with cables attached and molded cover and box interior (cover cannot be removed, Head direction can be changed). SC Connector can be removed, so it is possible to use flexible conduits for the cable. *
RP60	Airtight built-in switch with cables attached, fluorine rubber used, and molded conduit opening, cover, and box interior (cover cannot be removed, Head direction cannot be changed). *

* Refer to page 4 for applicable models.

(2) Actuator and Head Specifications

Symbol	Actuator type	Switch without lever
CA2	Roller lever: Standard model R38	WLRCA2
CA2-7	Roller lever: Standard model R50	WLRCA2
CA2-8	Roller lever: Standard model R63	WLRCA2
H2	Roller lever: General-purpose overtravel model, 80°	WLRH2
G2	Roller lever: High-sensitivity overtravel, 80°	WLRG2
CA2-2	Roller lever: Overtravel, 90°	WLRCA2-2
CA2-2N	Roller lever: Overtravel, 90°	WLRCA2-2N
GCA2	Roller lever: High-precision R38	WLRGCA2
CA12	Adjustable roller lever: Standard	WLRCA2
H12	Adjustable roller lever: General-purpose overtravel model, 80°	WLRH2
G12	Adjustable roller lever: High-sensitivity overtravel, 80°	WLRG2
CA12-2	Adjustable roller lever: Overtravel, 90°	WLRCA2-2
CA12-2N	Adjustable roller lever: Overtravel, 90°	WLRCA2-2N
CL	Adjustable rod lever: Standard, 25 to 140 mm	WLRCL
HL	Adjustable rod lever: General-purpose overtravel model, 80°, 25 to 140 mm	WLRH2
HAL4	Adjustable rod lever: General-purpose overtravel model, 80°, 350 to 380 mm	WLRH2
GL	Adjustable rod lever: High-sensitivity overtravel, 80°, 25 to 140 mm	WLRG2
CL-2	Adjustable rod lever: Overtravel, 90°, 25 to 140 mm	WLRCA2-2
CL-2N	Adjustable rod lever: Overtravel, 90°, 25 to 140 mm	WLRCA2-2N
HAL5	Rod spring lever: General-purpose overtravel model, 80°	WLRH2
CA32-41	Fork lever lock: Miantained, WL-5A100	WLRCA32
CA32-42	Fork lever lock: Miantained, WL-5A102	WLRCA32
CA32-43	Fork lever lock: Miantained, 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	—
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	—

(8) Indicator Type

Symbol	Element	Voltage	Leakage current
Blank	No indicator		
LE	Neon lamp	125 to 250 VAC	Approx. 0.6 to 1.9 mA
LD	LED	115 VAC/VDC	Approx. 0.5 mA
		10 to 24 VAC/VDC	Approx. 0.4 mA

Note: Dimensions are the same for both LE and LD models.

(9) Indicator Wiring

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

Note: Include the indicator wiring specification only when a (6) hermetic seal and (8) operation indicator have been selected.

(10) Lever Type

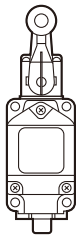
Blank	Standard lever
A	Double nut lever

General-purpose Switches

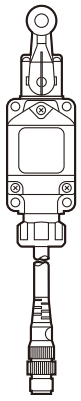
Sensor I/O Connector Switches

WL □□-□ LD □
(1)(2)(3) (4) (5)

Direct-wired Connector



Pre-wired Connector



(1) Electrical Rating

Blank	Standard
01	Microload

Note: Dimensions are the same as the standard models.

(2) Actuator Type

CA2	Roller lever: Standard model
GCA2	Roller lever: High-precision model
H2	Roller lever: General-purpose overtravel model
G2	Roller-lever: High-sensitivity over-travel model
D2	Top-roller plunger
D28	Sealed top-roller plunger

(3) Built-in Switch Type

Blank	Standard
55	Hermetically sealed

Note: Dimensions are the same as the standard models.

(4) Indicator Type

LD	LED, 10 to 115 VAC/DC

(5) Wiring Specifications

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

*1. Models with pre-wired connectors and DC specifications have EN/IEC approval (CE marking).
*2. With 0.3-m cable attached.

Spatter-prevention Switches

WL □□-□□S □
(1)(2) (3)(4) (5)

(1) Electrical Rating

Blank	Standard
01	Microload

Note: Dimensions are the same as the standard models.

(2) Actuator Type

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

(3) Built-in Switch Type

Blank	Standard
55	Hermetically sealed

Note: Dimensions are the same as the standard models.

(4) Indicator Type

LD	LED, AC/DC
LE	Neon lamp

Note: Dimensions are the same for both LE and LD models.

(5) Wiring Specifications

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

*1. Models with pre-wired connectors and DC specifications are approved by EN/IEC (CE marking) except for LE Models (Neon Lamp Models).
*2. With 0.3-m cable attached.

Long-life Switches

WLM□ -LD □
(1) (2) (3)

(1) Actuator

CA2	Roller lever: Standard model
GCA2	Roller lever: High-precision model
H2	Roller lever: General-purpose overtravel model
G2	Roller lever: High-sensitivity overtravel model

(2) Indicator Type

LD	LED, 10 to 115 VAC/DC

(3) Wiring Specifications

Blank	Screw terminal: G1/2 conduit
K13A	Direct-wired Connector: 2-conductor, AC
K13	Direct-wired Connector: 2-conductor, DC
K43A	Direct-wired Connector: 4-conductor, AC
K43	Direct-wired Connector: 4-conductor, DC
-M1J	Pre-wired Connector: 2-conductor, DC *
-AGJ03	Pre-wired Connector: 4-conductor, AC *
-DGJ03	Pre-wired Connector: 4-conductor, DC *

* With 0.3-m cable attached.

Ordering Information

General-purpose Switches

Standard Switches

Note: Models are also available with ground terminals.

Item		Actuator	Roller lever R38	Roller lever R50	Roller lever R63
			Model	Model	Model
Basic		Standard load	WLCA2	WLCA2-7	WLCA2-8
		Microload	WL01CA2	WL01CA2-7	WL01CA2-8
Overtravel	General-purpose	Standard load	WLH2	—	—
		Microload	WL01H2	—	—
	High-sensitivity	Standard load	WLG2	—	—
		Microload	WL01G2	—	—
	90° operation	Standard load	WLCA2-2	—	—
		Microload	WL01CA2-2	—	—
		Standard load	WLCA2-2N	—	—
		Microload	WL01CA2-2N	—	—
High-precision		Standard load	WLGCA2	—	—
		Microload	WL01GCA2	—	—

Item		Actuator	Adjustable roller lever	Adjustable rod lever 25 to 140mm	Adjustable rod lever 350 to 380mm	Rod spring lever
			Model	Model	Model	Model
Basic		Standard load	WLCA12	WLCL	—	—
		Microload	WL01CA12	WL01CL	—	—
Overtravel	General-purpose	Standard load	WLH12	WLHL	WLHAL4	WLHAL5
		Microload	WL01H12	WL01HL	—	—
	High-sensitivity	Standard load	WLG12	WLGL	—	—
		Microload	WL01G12	WL01GL	—	—
	90° operation	Standard load	WLCA12-2	WLCL-2	—	—
		Microload	WL01CA12-2	—	—	—
		Standard load	WLCA12-2N	WLCL-2N	—	—
		Microload	WL01CA12-2N	WL01CL-2N	—	—

Item		Actuator	Fork lever lock (with WL-5A100 Plastic Roller Lever)	Fork lever lock (with WL-5A102 Plastic Roller Lever)	Fork lever lock (with WL-5A104 Plastic Roller Lever)	Fork lever lock (with WL-5A104 Plastic Roller Lever)
			Model	Model	Model	Model
Maintained		Standard load	WLCA32-41	WLCA32-42	WLCA32-43	WLCA32-44
		Microload	WL01CA32-41	WL01CA32-42	WL01CA32-43	WL01CA32-44

Item		Actuator	Top plunger	Top-roller plunger	Top-ball plunger	Sealed top-roller plunger
			Model	Model	Model	Model
Basic		Standard load	WLD	WLD2	WLD3	WLD28
		Microload	WL01D	WL01D2	WL01D3	WL01D28

Item		Actuator	Horizontal plunger	Horizontal-roller plunger	Horizontal-ball plunger
			Model	Model	Model
Basic		Standard load	WLSD	WLSD2	WLSD3
		Microload	WL01SD	WL01SD2	WL01SD3

Item		Actuator	Coil spring (spring diameter: 6.5)	Coil spring (spring diameter: 4.8)	Coil spring (spring diameter: 8)	Steel wire (wire diameter: 1)
			Model	Model	Model	Model
Basic		Standard load	WLNJ	WLNJ-30	WLNJ-2	WLNJ-S2
		Microload	WL01NJ	WL01NJ-30	WL01NJ-2	WL01NJ-S2

General-purpose Switches

Indicator-equipped Switches

Item		Actuator	Roller lever R38	Roller lever R50	Roller lever R63	Adjustable roller lever
			Model	Model	Model	Model
Basic		Neon lamp	WLCA2-LE	WLCA2-7LE	WLCA2-8LE	WLCA12-LE
		LED	WLCA2-LD	WLCA2-7LD	WLCA2-8LD	WLCA12-LD
Overtravel	General-purpose	Neon lamp	WLH2-LE	—	—	WLH12-LE
		LED	WLH2-LD	—	—	WLH12-LD
	High-sensitivity	Neon lamp	WLG2-LE	—	—	WLG12-LE
		LED	WLG2-LD	—	—	WLG12-LD
	90° operation	Neon lamp	WLCA2-2LE	—	—	WLCA12-2LE
		LED	WLCA2-2LD	—	—	WLCA12-2LD
		Neon lamp	WLCA2-2NLE	—	—	WLCA12-2NLE
		LED	WLCA2-2NLD	—	—	WLCA12-2NLD
High-precision		Neon lamp	WLGCA2-LE	—	—	—
		LED	WLGCA2-LD	—	—	—

Item		Actuator	Adjustable rod lever 25 to 140 mm	Adjustable rod lever 350 to 380 mm	Rod spring lever
			Model	Model	Model
Basic		Neon lamp	WLCL-LE	—	—
		LED	WLCL-LD	—	—
Overtravel	General-purpose	Neon lamp	WLHL-LE	WLHAL4-LE	WLHAL5-LE
		LED	WLHL-LD	WLHAL4-LD	WLHAL5-LD
	High-sensitivity	Neon lamp	WLGL-LE	—	—
		LED	WLGL-LD	—	—
	90° operation	Neon lamp	WLCL-2LE	—	—
		LED	WLCL-2LD	—	—
		Neon lamp	WLCL-2NLE	—	—
		LED	WLCL-2NLD	—	—

Item		Actuator	Fork lever lock (with WL-5A100 Plastic Roller Lever)	Fork lever lock (with WL-5A102 Plastic Roller Lever)	Fork lever lock (with WL-5A104 Plastic Roller Lever)
			Model	Model	Model
Maintained		Neon lamp	WLCA32-41LE	WLCA32-42LE	WLCA32-43LE
		LED	WLCA32-41LD	WLCA32-42LD	WLCA32-43LD

Item		Actuator	Top plunger	Top-roller plunger	Top-ball plunger	Sealed top-roller plunger
			Model	Model	Model	Model
Basic		Neon lamp	WLD-LE	WLD2-LE	WLD3-LE	WLD28-LE
		LED	WLD-LD	WLD2-LD	WLD3-LD	WLD28-LD

Item		Actuator	Horizontal plunger	Horizontal-roller plunger	Horizontal-ball plunger
			Model	Model	Model
Basic		Neon lamp	WLSD-LE	WLSD2-LE	WLSD3-LE
		LED	WLSD-LD	WLSD2-LD	WLSD3-LD

Item		Actuator	Coil spring (spring diameter: 6.5)	Coil spring (spring diameter: 4.8)	Coil spring (spring diameter: 8)	Steel wire (wire diameter: 1)
			Model	Model	Model	Model
Basic		Neon lamp	WLNJ-LE	WLNJ-30LE	WLNJ-2LE	WLNJ-S2LE
		LED	WLNJ-LD	WLNJ-30LD	WLNJ-2LD	WLNJ-S2LD

General-purpose Switches

Sensor I/O Connector Switches

Direct-wired Connectors

Actuator	Wiring		Item: Built-in switch specification	Basic: Model	Overtravel: General-purpose: Model	Overtravel: High-sensitivity: Model	High-precision: Model
Roller lever 	2-conductor	DC	Standard	WLCA2-LDK13	WLH2-LDK13	WLG2-LDK13	WLGCA2-LDK13
			Airtight seal	WLCA2-55LDK13	WLH2-55LDK13	WLG2-55LDK13	WLGCA2-55LDK13
	4-conductor	DC	Standard	WLCA2-LDK43	WLH2-LDK43	WLG2-LDK43	WLGCA2-LDK43
			Airtight seal	WLCA2-55LDK43	WLH2-55LDK43	WLG2-55LDK43	WLGCA2-55LDK43
Top-roller plunger 	2-conductor	DC	Standard	WLD2-LDK13	—	—	—
			Airtight seal	WLD2-55LDK13	—	—	—
	4-conductor	DC	Standard	WLD2-LDK43	—	—	—
			Airtight seal	WLD2-55LDK43	—	—	—

Pre-wired Connectors

Actuator	Wiring				Item: Built-in switch specification	Basic: Model	Overtravel: General-purpose: Model	Overtravel: High-sensitivity: Model	High-precision: Model
Roller lever 	2-conductor	DC	NO	No. 3, 4	Standard	WLCA2-LD-M1J	WLH2-LD-M1J	WLG2-LD-M1J	WLGCA2-LD-M1J
					Airtight seal	WLCA2-55LD-M1J	—	—	WLGCA2-55LD-M1J
				No. 1, 4	Standard	WLCA2-LD-M1GJ	WLH2-LD-M1GJ	WLG2-LD-M1GJ	WLGCA2-LD-M1GJ
					Airtight seal	WLCA2-55LD-M1GJ	—	WLG2-55LD-M1GJ	—
			NC	No. 3, 2	Standard	—	—	WLG2-LD-M1JB	—
					Airtight seal	WLCA2-55LD-M1JB	—	WLG2-55LD-M1JB	WLGCA2-55LD-M1JB
	4-conductor	DC			Standard	WLCA2-LD-DGJ03	WLH2-LD-DGJ03	WLG2-LD-DGJ03	—
					Airtight seal	WLCA2-55LD-DGJ03	—	WLG2-55LD-DGJ03	WLGCA2-55LD-DGJ03
	3-conductor	DC		No. 2, 3, 4	Standard	WLCA2-LD-DK1EJ03	—	WLG2-LD-DK1EJ03	—
					Airtight seal	WLCA2-55LD-DK1EJ03	—	WLG2-55LD-DK1EJ03	—
Top-roller plunger 	2-conductor	DC	NO	No. 3, 4	Standard	WLD2-LD-M1J	—	—	—
					Airtight seal	WLD2-55LD-M1J	—	—	—
				No. 1, 4	Standard	WLD2-LD-M1GJ	—	—	—
					Airtight seal	WLD2-55LD-M1GJ	—	—	—
			NC	No. 3, 2	Standard	—	—	—	—
					Airtight seal	WLD2-55LD-M1JB	—	—	—
	4-conductor	DC			Standard	WLD2-LD-DGJ03	—	—	—
					Airtight seal	—	—	—	—
	3-conductor	DC		No. 2, 3, 4	Standard	WLD2-LD-DK1EJ03	—	—	—
					Airtight seal	WLD2-55LD-DK1EJ03	—	—	—

Environment-resistant Switches

Note: Models are also available with ground terminals.

Item					Actuator: Roller lever R38		
					Basic	Overtravel	
						General-purpose	High-sensitivity
					Model	Model	Model
Airtight seal			No indicator		WLCA2-55	WLH2-55	WLG2-55
			Indicator	LED	WLCA2-55LD	WLH2-55LD	WLG2-55LD
				Neon	WLCA2-55LE	WLH2-55LE	WLG2-55LE
Hermetic seal	Molded terminals	-139	No indicator		WLCA2-139	WLH2-139	WLG2-139
			Indicator	NC wiring	WLCA2-139LD2	—	—
				NO wiring	WLCA2-139LD3	—	WLG2-139LD3
		-140	No indicator		WLCA2-140	WLH2-140	WLG2-140
			Indicator	NC wiring	WLCA2-140LD2	—	WLG2-140LD2
				NO wiring	WLCA2-140LD3	—	WLG2-140LD3
		-141	No indicator		WLCA2-141	WLH2-141	WLG2-141
			Indicator	NC wiring	WLCA2-141LD2	—	WLG2-141LD2
				NO wiring	WLCA2-141LD3	WLH2-141LD3	WLG2-141LD3
	Anti-coolant		No indicator		WLCA2-RP60	WLH2-RP60	WLG2-RP60
			Indicator	NC wiring	WLCA2-RP60LD2	—	WLG2-RP60LD2
				NO wiring	WLCA2-RP60LD3	WLH2-RP60LD3	WLG2-RP60LD3
Heat-resistant			No indicator		WLCA2-TH	WLH2-TH	WLG2-TH
Low-temperature					WLCA2-TC	WLH2-TC	WLG2-TC
Corrosion-proof					WLCA2-RP	WLH2-RP	WLG2-RP
Weather-proof					—	WLH2-P1	WLG2-P1

Item					Actuator: Roller lever R38		
					Overtravel		High-sensitivity
					90° (-2 model)	90° (-2N model)	
					Model	Model	Model
Airtight seal			No indicator		WLCA2-255	WLCA2-2N55	WLGCA2-55
			Indicator	LED	WLCA2-255LD	WLCA2-2N55LD	WLGCA2-55LD
				Neon	WLCA2-255LE	WLCA2-2N55LE	WLGCA2-55LE
Hermetic seal	Molded terminals	-139	No indicator		WLCA2-2139	WLCA2-2N139	WLGCA2-139
			Indicator	NC wiring	WLCA2-2139LD2	—	WLGCA2-139LD2
				NO wiring	WLCA2-2139LD3	—	WLGCA2-139LD3
		-140	No indicator		WLCA2-2140	WLCA2-2N140	WLGCA2-140
			Indicator	NC wiring	—	—	WLGCA2-140LD2
				NO wiring	—	—	WLGCA2-140LD3
		-141	No indicator		—	—	WLGCA2-141
			Indicator	NC wiring	—	—	—
				NO wiring	—	—	WLGCA2-141LD3
	Anti-coolant		No indicator		WLCA2-2RP60	—	WLGCA2-RP60
			Indicator	NC wiring	WLCA2-2RP60LD2	—	WLGCA2-RP60LD2
				NO wiring	WLCA2-2RP60LD3	—	WLGCA2-RP60LD3
Heat-resistant			No indicator		WLCA2-2TH	WLCA2-2NTH	WLGCA2-TH
Low-temperature					WLCA2-2TC	WLCA2-2NTC	WLGCA2-TC
Corrosion-proof					—	—	WLGCA2-RP

Item	Actuator			Adjustable roller lever		
				Basic	Overtravel	
					General-purpose	High-sensitivity
				Model	Model	Model
Airtight seal	No indicator			WLCA12-55	—	—
	Indicator	LED		WLCA12-55LD	—	—
		Neon		WLCA12-55LE	—	—
Hermetic seal	Molded terminals	-139	No indicator	WLCA12-139	—	—
		-140		WLCA12-140	—	—
		-141		WLCA12-141	—	—
	Anti-coolant			WLCA12-RP60	—	—
Heat-resistant	No indicator			WLCA12-TH	WLH12-TH	WLG12-TH
Low-temperature				WLCA12-TC	WLH12-TC	WLG12-TC
Corrosion-proof				WLCA12-RP	WLH12-RP	WLG12-RP
Weather-proof				—	WLH12-P1	WLG12-P1

Item	Actuator	Adjustable roller lever	
		Overtravel	
		90° (-2 model)	90° (-2N model)
		Model	Model
Heat-resistant	No indicator	WLCA12-2TH	WLCA12-2NTH
Low-temperature		WLCA12-2TC	WLCA12-2NTC

Item	Actuator			Adjustable rod lever 25 to 140 mm		
				Basic	Overtravel	
					General-purpose	High-sensitivity
				Model	Model	Model
Airtight seal	No indicator			WLCL-55	—	—
	Indicator	LED		WLCL-55LD	—	—
		Neon		—	—	—
Hermetic seal	Molded terminals	-139	No indicator	WLCL-139	—	—
		-140		WLCL-140	—	—
		-141		—	—	—
	Anti-coolant			WLCL-RP60	—	—
Heat-resistant	No indicator			WLCL-TH	WLHL-TH	WLGL-TH
Low-temperature				WLCL-TC	WLHL-TC	WLGL-TC
Corrosion-proof				WLCL-RP	WLHL-RP	WLGL-RP

Item	Actuator	Adjustable rod lever 25 to 140 mm	
		Overtravel	
		90° (-2 model)	90° (-2N model)
		Model	Model
Heat-resistant	No indicator	WLCL-2TH	WLCL-2NTH
Low-temperature		WLCL-2TC	WLCL-2NTC
Corrosion-proof		WLCL-2RP	—

Item			Actuator		Top-roller plunger 	Sealed top-roller plunger 	Horizontal plunger 
					Model	Model	Model
Airtight seal			No indicator		WLD2-55	WLD28-55	WLSD-55
			Indicator	LED	WLD2-55LD	WLD28-55LD	WLSD-55LD
				Neon	WLD2-55LE	WLD28-55LE	—
Hermetic seal	Molded terminals	-139	No indicator		WLD2-139	WLD28-139	WLSD-139
		-140			—	WLD28-140	—
	Anti-coolant				WLD2-RP60	WLD28-RP60	WLSD-RP60
Heat-resistant			No indicator		WLD2-TH	WLD28-TH	WLSD-TH
Low-temperature					WLD2-TC	—	WLSD-TC
Corrosion-proof					WLD2-RP	WLD28-RP	WLSD-RP

Note: The standard cable length for models with airtight seals is 5 m.

Item			Actuator		Horizontal-roller plunger 	Coil spring (spring diameter: 6.5) 	Coil spring (spring diameter: 8) 
					Model	Model	Model
Airtight seal			No indicator		WLSD2-55	WLNJ-55	WLNJ-255
			Indicator	LED	WLSD2-55LD	WLNJ-55LD	WLNJ-255LD
				Neon	—	—	—
Hermetic seal	Molded terminals	-139	No indicator		WLSD2-139	WLNJ-139	—
		-140			WLSD2-140	WLNJ-140	WLNJ-2140
	Anti-coolant				WLSD2-RP60	WLNJ-RP60	WLNJ-2RP60
Heat-resistant			No indicator		WLSD2-TH	WLNJ-TH	—
Low-temperature					WLSD2-TC	WLNJ-TC	WLNJ-2TC
Corrosion-proof					WLSD2-RP	WLNJ-RP	WLNJ-2RP

Note: The standard cable length for models with airtight seals is 5 m.

Spatter-prevention Switches

Item			Actuator: Roller lever — Double nut lever	Actuator: Roller lever — Allen-head lever	Actuator: Sealed top-roller plunger
			Model	Model	Model
Neon lamp operation indicator	Basic		WLCA2-LEAS	WLCA2-LES	WLD28-LES
	Overtravel	General-purpose	WLH2-LEAS	WLH2-LES	—
		High-sensitivity	WLG2-LEAS	WLG2-LES	—
	High-precision		—	WLGCA2-LES	—
LED operation indicator	Basic		WLCA2-LDAS	WLCA2-LDS	WLD28-LDS
	Overtravel	General-purpose	WLH2-LDAS	WLH2-LDS	—
		High-sensitivity	WLG2-LDAS	WLG2-LDS	—
	High-precision		—	WLGCA2-LDS	—

Note: Ask your OMRON representative about WL01□-□S Microload Switches.

Long-life Switches

Actuator			Item: LED operation indicator *1 — Basic	Overtravel — General-purpose	Overtravel — High-sensitivity	High-precision
			Model	Model	Model	Model
Roller lever, screw terminal			WLMCA2-LD	WLMH2-LD	WLMG2-LD	WLMGCA2-LD
Roller lever, direct-wired connector	2-conductor	AC	WLMCA2-LDK13A	WLMH2-LDK13A	WLMG2-LDK13A	WLMGCA2-LDK13A
		DC	WLMCA2-LDK13	WLMH2-LDK13	WLMG2-LDK13	WLMGCA2-LDK13
	4-conductor	AC	WLMCA2-LDK43A	WLMH2-LDK43A	WLMG2-LDK43A	WLMGCA2-LDK43A
		DC	WLMCA2-LDK43	WLMH2-LDK43	WLMG2-LDK43	WLMGCA2-LDK43
Roller lever, pre-wired connector *2	2-conductor	DC	WLMCA2-LD-M1J	WLMH2-LD-M1J	WLMG2-LD-M1J	WLMGCA2-LD-M1J
	4-conductor	DC	WLMCA2-LD-DGJ03	WLMH2-LD-DGJ03	WLMG2-LD-DGJ03	WLMGCA2-LD-DGJ03

*1. The default setting is "light-ON when not operating."
Turn the lamp holder by 180° to change the setting to "light-ON when operating". (Ask your OMRON representative about 2-conductor models.)
*2. With 0.3-m cable attached.

Individual Parts

Heads

Actuator type	Set model	Head model (with Actuator)
Roller lever 	WLCA2	**WL-1H1100**
	WLG2	**WL-2H1100**
	WLH2	**WL-2H1100-1** *
	WLCA2-2	**WL-3H1100**
	WLCA2-2N	**WL-6H1100**
Adjustable roller lever 	WLCA12	**WL-1H2100**
	WLG12	**WL-2H2100**
	WLH12	**WL-2H2100-1** *
	WLCA12-2	**WL-3H2100**
	WLCA12-2N	**WL-6H2100**
Adjustable rod lever 	WLCL	**WL-4H4100**
	WLGL	**WL-2H4100**
	WLCL-2	**WL-3H4100**
	WLCL-2N	**WL-6H4100**

Actuator type	Set model	Head model (with Actuator)
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**
	WLCA32-42	**WL-5H5102**
	WLCA32-43	**WL-5H5104**
	WLCA32-44	**WL-5H5104**
Coil spring 	WLNJ	**WL-9H100**
	WLNJ-30	**WL-9H200**
	WLNJ-2	**WL-9H300**
	WLNJ-S2	**WL-9H400**

* The model number of Heads without levers are same as those of Heads with levers without the numbers at the end.
Example: WL-1H1100 becomes WL-1H without the lever.
However, the WLH2 and WLH12 become WL-2H-1 and the WLGCA2 becomes WL-1H-1 for the Heads without levers.
Other Heads are also available. Ask your OMRON representative.

Switches without levers

Actuator type		Switches without levers 
		Model
Switches for roller levers 	Basic R38	**WLRCA2**
	High-precision R38	**WLRGCA2**
	High-sensitivity overtravel, 80°	**WLRG2**
	General-purpose overtravel, 80°	**WLRH2**
	Overtravel, 90° operation	**WLRCA2-2**
	Overtravel, 90° operation	**WLRCA2-2N**
Switches for adjustable roller levers 	Basic	**WLRCA2**
	High-sensitivity overtravel, 80°	**WLRG2**
	General-purpose overtravel, 80°	**WLRH2**
	Overtravel, 90° operation	**WLRCA2-2**
	Overtravel, 90° operation	**WLRCA2-2N**
Switches for adjustable rod lever 	Basic, 25 to 140 mm	**WLRCL**
	High-sensitivity overtravel, 80°, 25 to 140 mm	**WLRG2**
	Overtravel, 90° operation, 25 to 140 mm	**WLRCA2-2**
	Overtravel, 90° operation, 25 to 140 mm	**WLRCA2-2N**
Switches for top plungers 	—	—
Switches for horizontal plungers 	—	—
Switches for fork lever locks 	Maintained, WL-5A100 Maintained, WL-5A102 Maintained, WL-5A104	**WLRCA32**
Switches for coil springs 	—	—

Covers with Operation Indicators

Cover	Cover only with indicator 
Item	Model
Neon lamp	**WL-LE**
LED	**WL-LD**

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

Spatter-prevention Products

Head (with actuator)

Complete Heads with allen-head levers	Double Nut Lever
Model	Model
WL-1H1100S (for WLCA2-□ or WLGCA2-□)	**WL-2H1100S** (for WLH2-□ or WLG2-□)

Lever

Allen-head Lever	Double Nut Lever
Model	Model
WL-1A103S Roller lever (forward and backward lever)	**WL-1A105S** Roller Lever (forward and backward lever)

Cover with indicator

Cover with Indicator
Model
Neon lamp **WL-LES**
LED (LED) **WL-LDS**

Switches without Levers

Switches without levers
Model
WLRCA2-LDS
WLRH2-LES **WLRH2-LDS**
WLRG2-LDS
WLRGCA2-LES

WL Head Replacement

Heads can be replaced within the same model group. They cannot be replaced between different model groups.

Group No.	Set model number	Head model number (with Actuator)
1	WLCA2	**WL-1H1100**
	WLCA2-7	**WL-1H1200**
	WLCA2-8	**WL-1H1300**
	WLCA12	**WL-1H2100**
2	WLCL	**WL-4H4100** *
3	WLH2	**WL-2H1100-1**
	WLH12	**WL-2H2100-1**
	WLHL	**WL-2H4100**
	WLHAL4	**WL-2H4106**
	WLHAL5	**WL-2H4107**
4	WLCA2-2N	**WL-6H1100**
	WLCA12-2N	**WL-6H2100**
	WLCL-2N	**WL-6H4100**
5	WLCA2-2	**WL-3H1100**
	WLCA12-2	**WL-3H2100**
	WLCL-2	**WL-3H4100**
6	WLG2	**WL-2H1100**
	WLG12	**WL-2H2100**
	WLGL	**WL-2H4100**
7	WLCA32-41	**WL-5H5100**
	WLCA32-42	**WL-5H5102**
	WLCA32-43	**WL-5H5104**
	WLCA32-44	**WL-5H5104**
8	WLD	**WL-7H100**
	WLD2	**WL-7H200**
	WLD3	**WL-7H300**
9	WLD28	**WL-7H400** *
10	WLSD	**WL-8H100**
	WLSD2	**WL-8H200**
	WLSD3	**WL-8H300**
11	WLNJ	**WL-9H100**
	WLNJ-30	**WL-9H200**
12	WLNJ-2	**WL-9H300** *
13	WLNJ-S2	**WL-9H400** *

* This Heads are special and must be used. Do not use any other Head.

Specifications

Approved Standards

Agency	Standard	File No.	Approved models
UL	UL508	E76675	All modes with direct-wired connectors or pre-wired connectors except for hermetically sealed models
CSA	CSA C22.2 No.14	LR45746	
TÜV Rheinland	EN60947-5-1	J50022353	Only models with ground terminals
		J9950023	Models with direct-wired connectors and no ground terminal
		J9950959	Only models with pre-wired connectors and DC specifications
CCC (CQC)	GB14048.5	2004010305128675	Contact your OMRON representative for information on approved models.

General-purpose Switches

Ratings

Standard-load Switches

Item / Model	Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Basic models, overtravel models (except for high-sensitivity models), and high-precision models	125 VAC	10		3	1.5	10		5	2.5
	250 VAC	10		2	1	10		3	1.5
	500 VAC	10		1.5	0.8	3		1.5	0.8
	8 VDC	10		6	3	10		6	
	14 VDC	10		6	3	10		6	
	30 VDC	6		4	3	6		4	
	125 VDC	0.8		0.2	0.2	0.8		0.2	
	250 VDC	0.4		0.1	0.1	0.4		0.1	
High-sensitivity overtravel models	125 VAC	5		—		—		—	
	250 VAC	5							
	125 VDC	0.4		—		—		—	
	250 VDC	0.2							

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

* For high-sensitivity overtravel models.

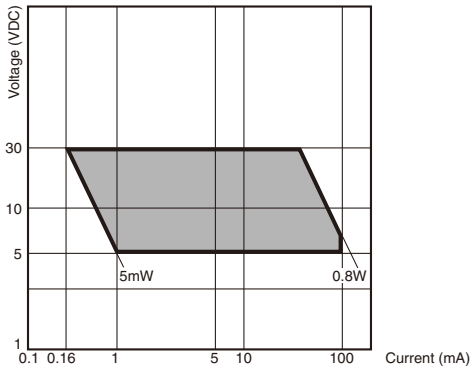
Note: 1. The above figures are for steady-state currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. A lamp load has an inrush current of 10 times the steady-state current.
4. A motor load has an inrush current of 6 times the steady-state current.
5. For PC loads, use the microload models.

Microload Switches (Refer to these ratings before using the product.)

Rated voltage (V)	Resistive load (A)
AC 125	0.1
DC 30	

Operation in the following ranges will produce optimum performance.

Recommended load range	5 to 30 VDC 0.5 to 100 mA



Approved Standard Ratings

UL/CSA

Standard-load Switches: A600, NEMA

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

Microload Switches

0.1 A 125 VAC, 0.1 A 30 VDC

TÜV (EN60947-5-1) (Only models with ground terminals are approved.)

Model	Application category and ratings	Thermal current (I_{the})	Indicator
WL□	AC-15: 2 A/250 V DC-12: 2 A/48 V	10 A	—
WL01□	AC-14: 0.1 A/125V DC-12: 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 DC-12: 2 A/48 V	10 A	LED
WL01□-LD	AC-14: 0.1 A/115 V DC-12: 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)	2A
Rated operating voltage (Ue)	250V

Indicator-equipped Switches

Model	Item	Max. rated voltage (V)	Leakage current (mA)
WL-LE	Neon lamp	125 AC	Approx. 0.6
		250 AC	Approx. 1.9
WL-LD	LED	115 AC/DC	Approx. 0.5
		10 to 24 AC/DC	Approx. 0.4

Characteristics

Degree of protection		IP67
Durability *1	Mechanical	15,000,000 operations min. *2
	Electrical	750,000 operations min. *3
Operating speed		1 mm/s to 1 m/s (in case of WLCA2)
Operating frequency	Mechanical	120 operations/minute min.
	Electrical	30 operations/minute min.
Rated frequency		50/60 Hz
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact resistance		25 mΩ max. (initial value)
Dielectric strength	Between terminals of the same polarity	1,000 VAC (600 VAC), 50/60 Hz for 1 min
	Between current-carrying metal part and ground	2,200 VAC (1,500 VAC), 50/60 Hz for 1 min/Uimp 2.5 kV
	Between each terminal and non-current-carrying metal part	2,200 VAC (1,500 VAC), 50/60 Hz for 1 min/Uimp 2.5 kV
Rated insulation voltage (Ui)		250 V (EN60947-5-1)
Pollution degree (operating environment)		3 (EN60947-5-1)
Short-circuit protective device (SCPD)		10 A, fuse type gG or gI (IEC60269)
Conditional short-circuit current		100 A (EN60947-5-1)
Conventional enclosed thermal current (Ithe)		10 A, 0.5 A (EN60947-5-1)
Protection against electric shock		Class I
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude *4
Shock resistance	Destruction	1,000 m/s² min.
	Malfunction	300 m/s² min. *4
Ambient operating temperature		–10°C to +80°C (with no icing) *5
Ambient operating humidity		35% to 95%RH
Weight		Approx. 275 g (in case of WLCA2)

Note: 1. The above figures are initial values.
2. The figures in parentheses for dielectric strength are those for the high-sensitivity overtravel models.

*1. The values are calculated at an operating temperature of +5°C to +35°C and an operating humidity of 40% to 70%RH. Contact your OMRON sales representative for more detailed information on other operating environments.
*2. Durability is 10,000,000 operations min. for general-purpose or high-sensitivity overtravel models, and for flexible rod models.
*3. Durability is 500,000 operations min. for high-sensitivity models. All microload models however, are 1,000,000 operations min.
*4. Except flexible rod models. The shock resistance (malfunction) for microload models is 200 m/s² min.
*5. For low-temperature models this is –40°C to +40°C (with no icing). For heat-resistant models the range is +5°C to +120°C.

Spatter-prevention Switches

Ratings

Item / Model	Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
WL□-LES	125 VAC 250 VAC	10 10		3 2	1.5 1	10 10		5 3	2.5 1.5
WL□-LDS	115 VAC	10		3	1.5	10		5	2.5
	12 VDC 24 VDC 48 VDC	10 6 3		6 4 2	3 3 1.5	10 6 3		6 4 2	

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. A lamp load has an inrush current of 10 times the steady-state current.
4. A 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%RH max.

Approved Standard Ratings

UL/CSA

LE Switches (Neon lamp): A300

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

LD Switches (LED)

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

CCC (GB14048.5)

Model	Application category and ratings
WL□	AC-15: 2 A/250 V DC-12: 2 A/48 V
WL01□	AC-14: 0.1 A/125V DC-12: 0.1 A/48 V
WL□-LE	AC-15: 2 A/250 V
WL01□-LE	AC-14: 0.1 A/125 V
WL□-LD	AC-15: 2 A/115 V DC-12: 2 A/48 V
WL01□-LD	AC-14: 0.1 A/115 V DC-12: 0.1 A/48 V

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

Characteristics

Degree of protection		IP67
Durability *1	Mechanical	15,000,000 operations min. *2
	Electrical	750,000 operations min. *3
Operating speed		1 mm/s to 1 m/s (in case of WLCA2)
Operating frequency	Mechanical	120 operations/minute min.
	Electrical	30 operations/minute min.
Rated frequency		50/60 Hz
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact resistance		25 mΩ max. (initial value)
Dielectric strength	Between terminals of the same polarity	1,000 VAC (600 VAC), 50/60 Hz for 1 min
	Between current-carrying metal part and ground	2,200 VAC (1,500 VAC), 50/60 Hz for 1 min/Uimp 2.5 kV
	Between each terminal and non-current-carrying metal part	2,200 VAC (1,500 VAC), 50/60 Hz for 1 min/Uimp 2.5 kV
Rated insulation voltage (Ui)		250 V (EN60947-5-1)
Pollution degree (operating environment)		3 (EN60947-5-1)
Short-circuit protective device (SCPD)		10 A, fuse type gG or gI (IEC60269)
Conditional short-circuit current		100 A (EN60947-5-1)
Conventional enclosed thermal current (Ithe)		10 A, 0.5 A (EN60947-5-1)
Protection against electric shock		Class I
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction	1,000 m/s² min.
	Malfunction	300 m/s² min.
Ambient operating temperature		–10°C to +80°C (with no icing)
Ambient operating humidity		35% to 95%RH
Weight		Approx. 275 g (in case of WLCA2)

Note: 1. The above figures are initial values.
2. The figures in parentheses for dielectric strength are those for the high-sensitivity overtravel models.

*1. The values are calculated at an operating temperature of +5°C to +35°C and an operating humidity of 40% to 70%RH. Contact your OMRON sales representative for more detailed information on other operating environments.
*2. Durability is 10,000,000 operations min. for general-purpose or high-sensitivity overtravel models.
*3. Durability is 500,000 operations min. for high-precision models. All microload models however, are 1,000,000 operations min.

Long-life Switches

Ratings

General Ratings (Refer to these ratings before using the product.)

Screw Terminal Switches

Item / Model	Rated voltage (V)	Non-inductive load (A)				Inductive load (A)			
		Resistive load		Lamp load		Inductive load		Motor load	
		NC	NO	NC	NO	NC	NO	NC	NO
Basic models, overtravel models, (except for high-sensitivity models), and high-precision models	115 AC	10		3	1.5	10		5	2.5
	12 DC	10		6	3	10		6	
	24 DC	6		4	3	6		4	
	48 DC	3		2	1.5	3		2	
	115 DC	0.8		0.2	0.2	0.8		0.2	
High-sensitivity overtravel models	115 AC	5		—		—		—	
	115 DC	0.4		—		—		—	

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

* For high-sensitivity overtravel models.

Direct-wired Connector and Pre-wired Connector Switches

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

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. A lamp load has an inrush current of 10 times the steady-state current.
4. A motor load has an inrush current of 6 times the steady-state current.

Characteristics

Degree of protection		IP67
Durability *	Mechanical	30,000,000 operations min.
	Electrical	30,000,000 operations min. (10 mA at 24 VDC, resistive load) 750,000 operations min. (10 A at 115 VAC, resistive load), but for high-precision models: 500,000 operations min. (10 A at 115 VAC, resistive load)
Operating speed		1 mm/s to 1 m/s (in case of WLCA2)
Operating frequency	Mechanical	120 operations/minute
	Electrical	30 operations/minute
Rated frequency		50/60 Hz
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact resistance		25 mΩ max. (initial value)
Dielectric strength (50/60 Hz for 1 min)	Between terminals of the same polarity	1,000 VAC (except connector models)
	Between current-carrying metal part and ground	2,200 VAC (1,500 V)
	Between each terminal and non-current-carrying metal part	2,200 VAC (1,500 V)
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Destruction	1,000 m/s² min.
	Malfunction	300 m/s² min.
Ambient operating temperature		–10°C to +80°C (with no icing)
Ambient operating humidity		35% to 95%RH
Weight		Approx. 275 g (in case of WLCA2)

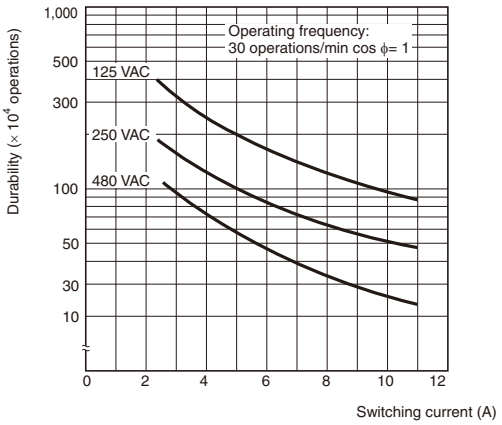
Note: The figures in parentheses for dielectric strength, are those for overtravel (high-sensitivity) or connector models.

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

Engineering Data

Electrical Durability: cosϕ= 1

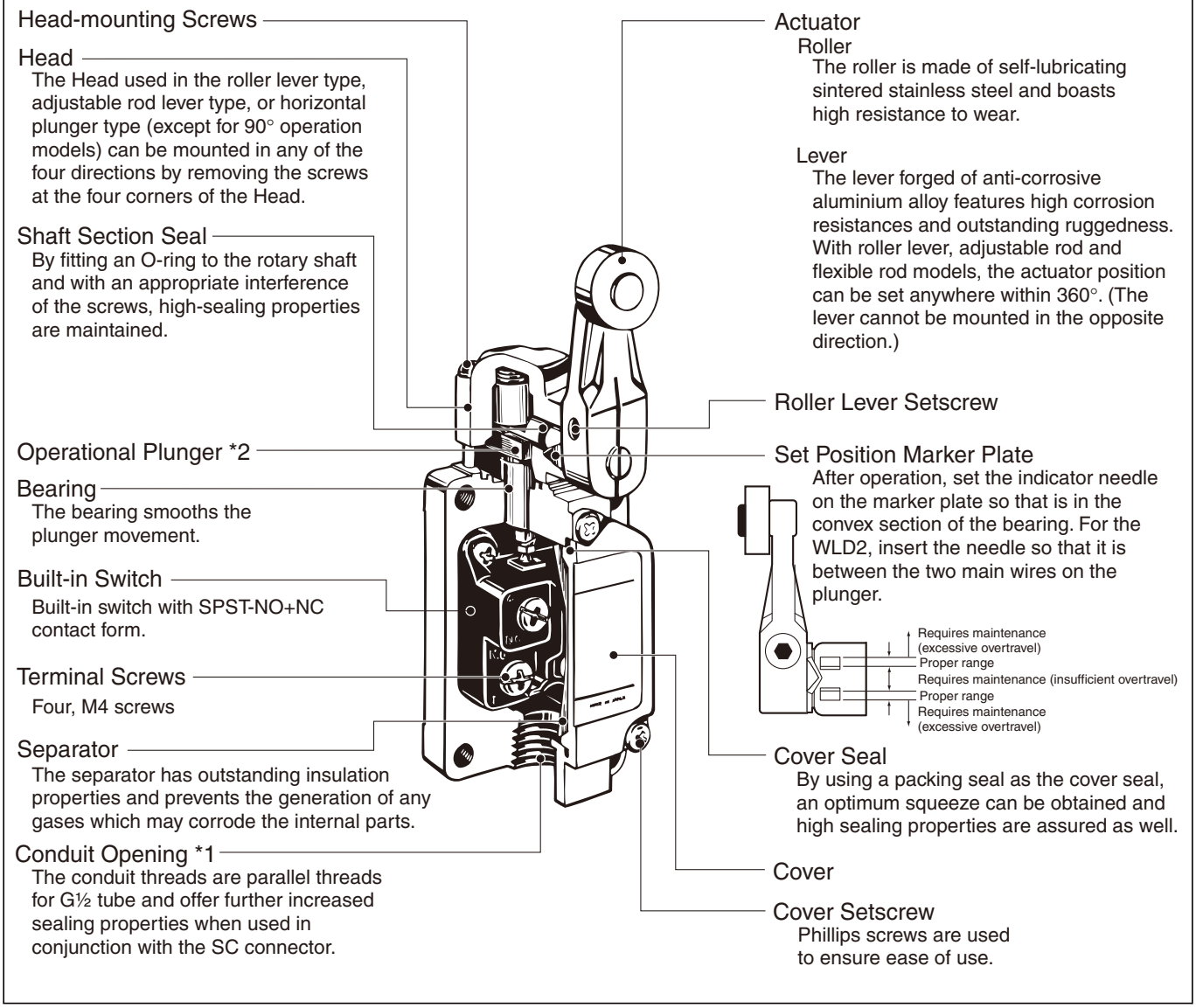
(Operating temperature: +5°C to +35°C, operating humidity: 40% to 70%RH)



Structure and Nomenclature

Structure

General-purpose Switches



*1. The display for conduit threads has changed from PF½ to G½, 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 ½-14NPT are also available.)

*2. By changing the orientation of the operational plunger, three operational directions can be selected electrically. (This is possible only with standard roller lever, adjustable roller lever, and adjustable rod lever models. For the overtravel models, only 90° operation models have this function.)

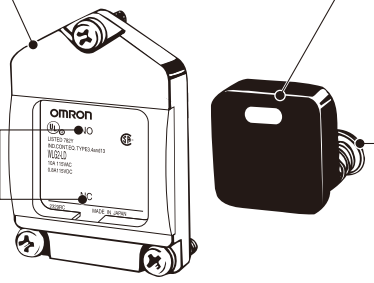
Indicators

Indicator Covers
The indicator covered if outsert molded from diecast aluminum and has outstanding sealing properties.

Indicator Windows
Operation (i.e., light-ON when operating or light-ON when not operating) depends on whether a neon lamp or LED is used.

Light-ON when Operating/Not Operating

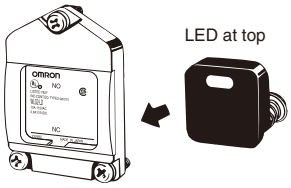
Indicators can be switched from light-ON when operating and light-ON when not operating, by simply rotating the indicator holder by 180°.
(Molded terminals cannot be switched in this way.)



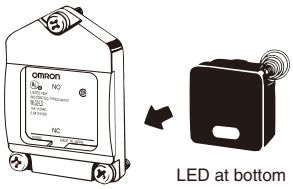
Indicator
The indicator is either a neon lamp or an LED. Models with LED indicators have a built-in rectifier stack, so it is not necessary to change the polarity.

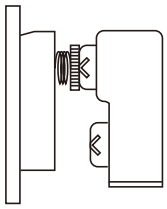
Contact Spring
The built-in switch's terminal screws are used to connect the indicator terminal. Since the connection spring (coil spring) is used for this connection, it will not be necessary to connect the indicator terminal. When a ground terminal is provided however, a lead wire must be used.

Light-ON when Operating

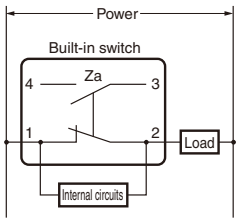
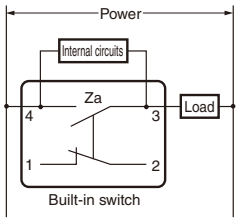


Light-ON when Not Operating

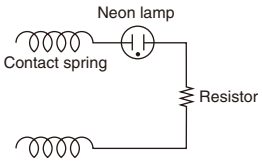
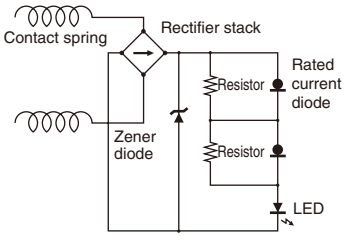




Operation

WL-LE WL-LD	Light-ON when operating *1	
	Light-ON when not operating *2	

Internal Circuits

WL-LE	
WL-LD	

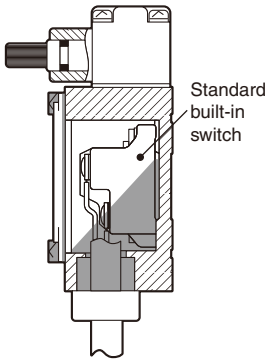
Note: The indicator cover cannot be replaced on the molded terminals. In all cases the indicator does not light when the load is ON.
*1. Light-ON when operating means that the lamp lights when the Limit Switch contacts (NC) release, or when the actuator rotates or is pushed down.
*2. Light-ON when not 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.

Environment-resistant Switches

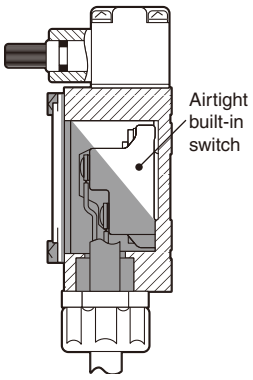
Mold Specifications for Hermetic Seal Switches

: Molded parts

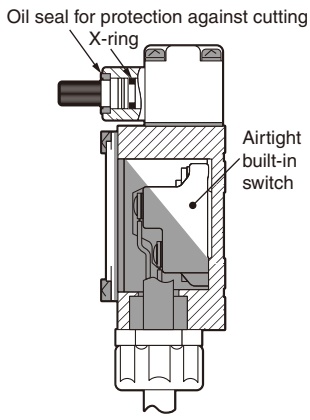
WL□-139



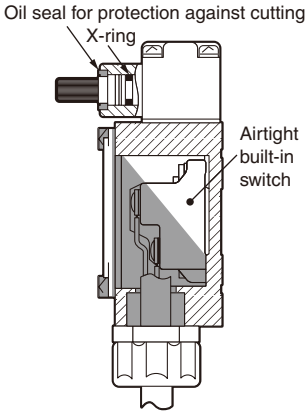
WL□-140



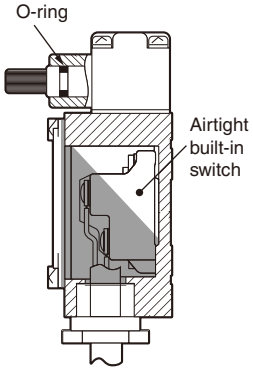
WL□-141



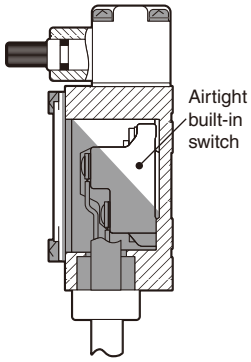
WL□-145



WL□-RP40



WL□-RP60



* Florine rubber is used for all rubber parts.

Model	Cable specifications
WL□-139	Standard 5-m VCT (vinyl cabtire cable) cable attached. Finished diameter: 11.5 mm, 4-conductor.
WL□-140 WL□-141 WL□-145 WL□RP40 WL□RP60	Standard 5-m VCT cable, with high flexibility and good anti-oil properties attached. Finished diameter: 11.5 mm, 4-conductor.

Spatter-prevention Switches

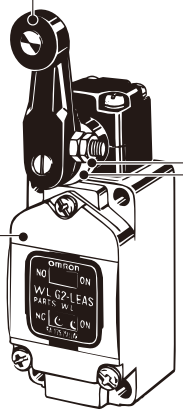
Actuator

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

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

Double Nut
SUS304 is used for double nut.

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.



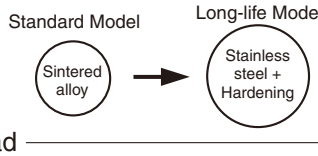
Screws
SUS304 is used, preventing spatter from adhering.

Head Cap
Using fluororesin prevents spatter from adhering.
*Spatter means the zinc 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.

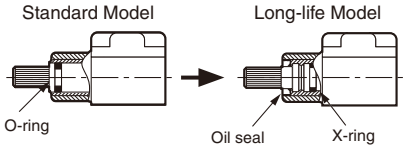
Long-life Switches

Release Plunger
Hardening method changed for greater abrasion resistance.

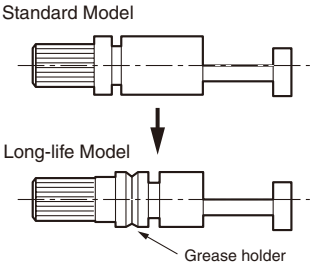


Head
The Head can be mounted in any of the four directions by removing the screws at the four corners of the Head.

Shaft Section Seal
By fitting a double seal consisting of an oil seal and an X-ring to the rotary shaft, even greater sealing properties are achieved.



Smoother Movement
A grease holder is provided on the shaft to prevent the grease from running out.

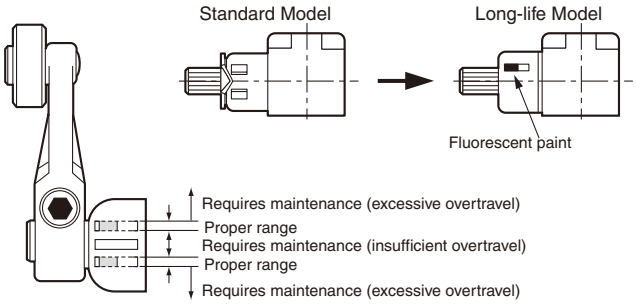


Smooth movement is achieved using olefin grease. (Standard models use molybdenum disulfide grease.)

Bearing
The bearing smooths the plunger movement.

Built-in Switch
Built-in switch with SPST-NO+NC contact form.

Set Position Marker Plate
The set position is easy to view.
The stroke is indicated in fluorescent color that is visible from the slit in the rubber cap.



Head Mounting Screws

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

Lever
The lever forged of anti-corrosive aluminium alloy features high corrosion resistance and outstanding ruggedness. With roller lever models, the actuator position can be set anywhere within 360°. (The lever cannot be mounted in the opposite direction.)

Operational Plunger *

Cover Seal
By using a packing seal as the cover seal, an optimum squeeze can be obtained and high sealing properties are assured as well.

Terminal Screws
Four, M4 screws

Cover

Separator
The separator has outstanding insulation properties and prevents the generation of any gases which may corrode the internal parts.

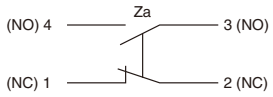
Cover Mounting Screw
Phillips screws are used to ensure ease of use.

Conduit Opening
In addition to level screws which use G½ tube, direct-wired and pre-wired connectors have been added to the Series.

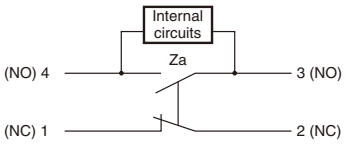
* By changing the direction of the operational plunger, any one of the three operational directions (both sides, left, or right) can be selected. (Applicable only to the WLMGCA2-□.)

Contact Forms

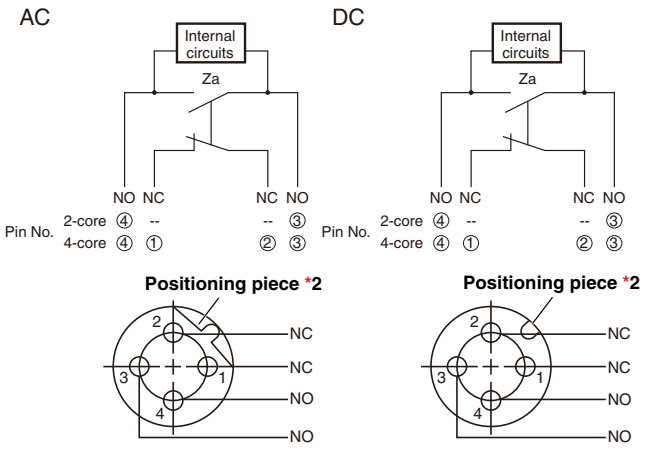
Screw Terminal Switches



Screw Terminal Switches Indicator-equipped (Light-ON when Not Operating) Switches *1



Direct-wired Connector, Pre-wired Connector, and Indicator-equipped (Light-ON when Not Operating) Switches *1



*1. Light-ON when not operating means the indicator is lit when the actuator is free and is not light when the Switch contacts (NO) close when the actuator rotates or is pushed down.
*2. The position of the positioning piece is not always the same. If using an L-shaped connector causes problems in application, use a straight connector.

Dimensions and Operating Characteristics

(Unit: mm)

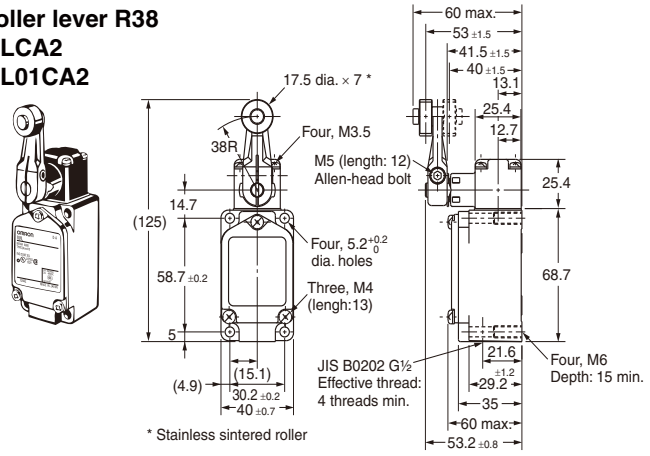
General-purpose Models

Standard Models

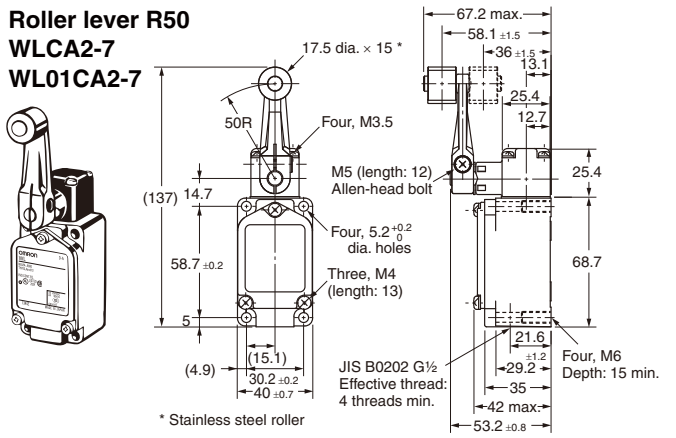
Basic

Rotating Lever ..... For all models WL□ indicates a standard-load model and WL01□ indicates a microload model.

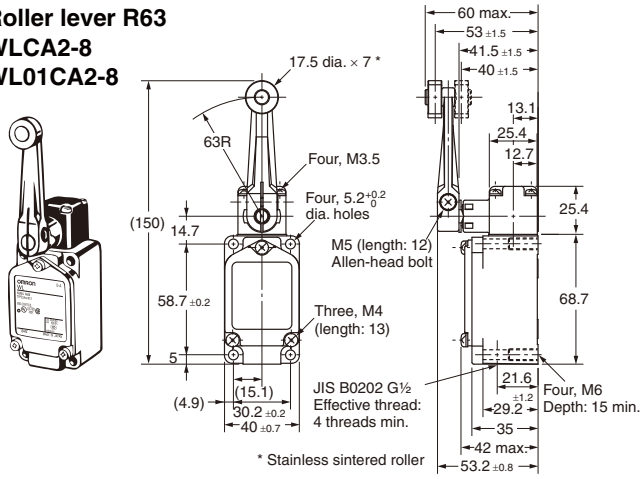
Roller lever R38
WLCA2
WL01CA2



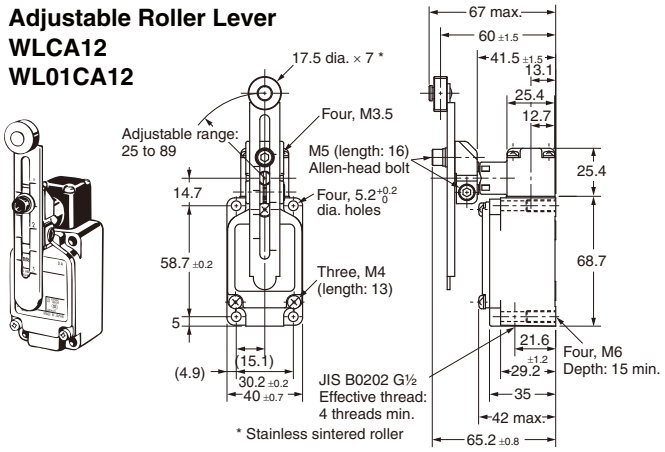
Roller lever R50
WLCA2-7
WL01CA2-7



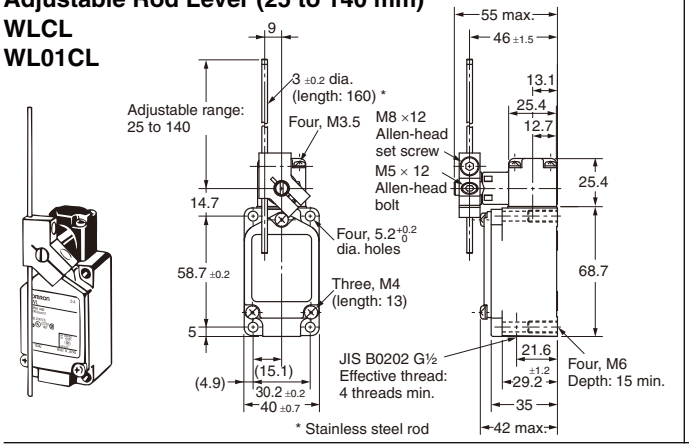
Roller lever R63
WLCA2-8
WL01CA2-8



Adjustable Roller Lever
WLCA12
WL01CA12

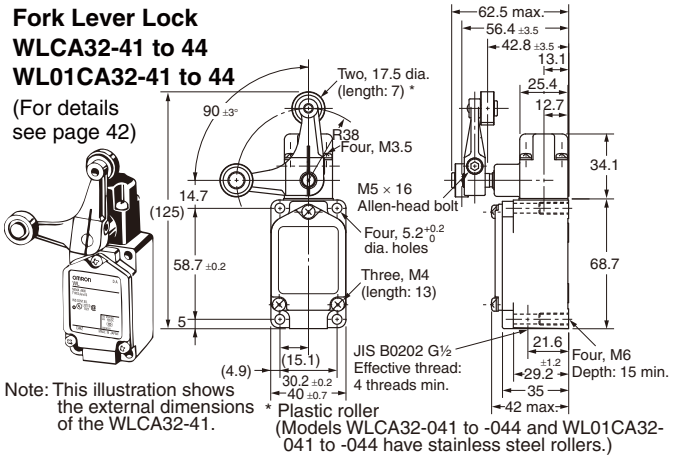


Adjustable Rod Lever (25 to 140 mm)
WLCL
WL01CL



Fork Lever Lock
WLCA32-41 to 44
WL01CA32-41 to 44

(For details see page 42)



Note: This illustration shows the external dimensions of the WLCA32-41.

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

Operating characteristics	Model	WLCA2 WL01CA2	WLCA2-7 WL01CA2-7	WLCA2-8 WL01CA2-8	WLCA12 *1 WL01CA12 *1	WLCL *2 WL01CL *2
Operating force	OF max.	13.34 N	10.2 N	8.04 N	13.34 N	1.39 N
Release force	RF min.	2.23 N	1.67 N	1.34 N	2.23 N	0.27 N
Pretravel	PT	15° ±5°	15° ±5°	15° ±5°	15° ±5°	15° ±5°
Overtravel	OT min.	30°	30°	30°	30°	30°
Movement Differential	MD max.	12°	12°	12°	12°	12°

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

Operating characteristics	Model	WLCA32-41 to 44 *1 WL01CA32-41 to 44 *1
Force necessary to reverse the direction of the lever: Max.		11.77 N
Movement until the lever reverses		50° ±5°
Movement until switch operation: Min.		55°
Movement after switch operation: Max.		35°

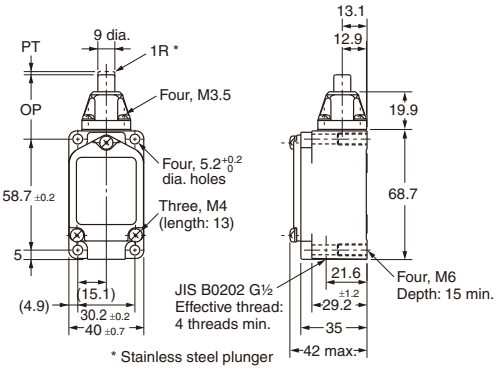
OF and RF for WLCA12, with a lever length of 89 mm.

	WLCA12, WL01CA12
OF	5.68 N
RF	0.95 N

Basic

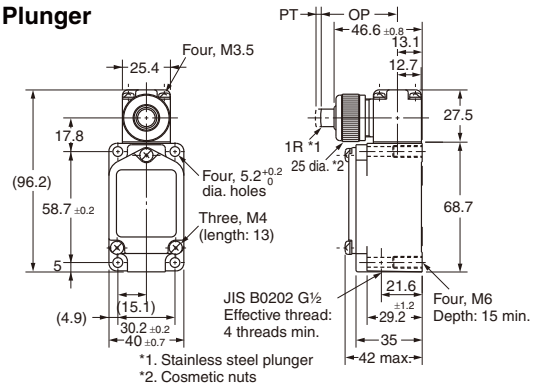
Plunger .....For all models WL□ indicates a standard-load model and WL01□ indicates a microload model.

Top Plunger
WLD
WL01D



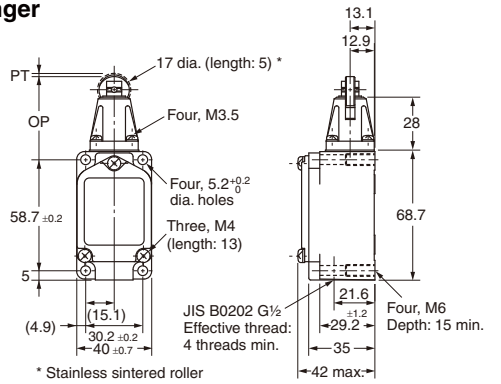
* Stainless steel plunger

Horizontal Plunger
WLSD
WL01SD



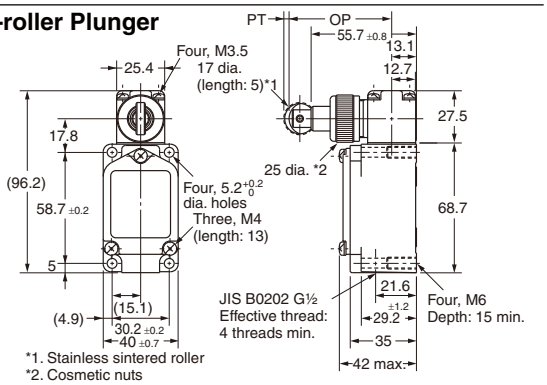
*1. Stainless steel plunger
*2. Cosmetic nuts

Top-roller Plunger
WLD2
WL01D2



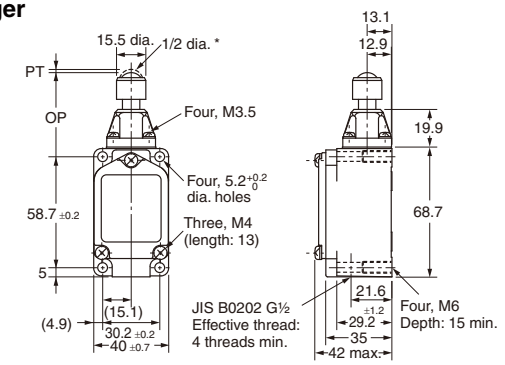
* Stainless sintered roller

Horizontal-roller Plunger
WLSD2
WL01SD2



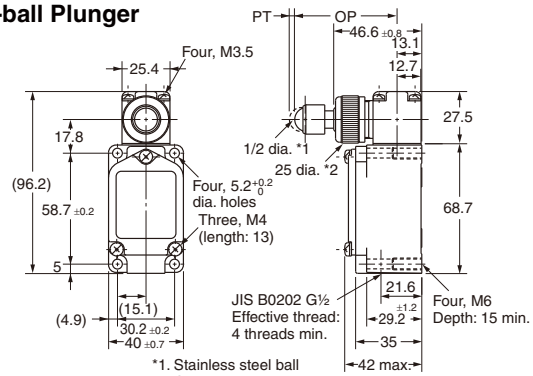
*1. Stainless sintered roller
*2. Cosmetic nuts
Note: The WLSD21 model, which has the roller rotated by 90° is also available.

Top-ball Plunger
WLD3
WL01D3



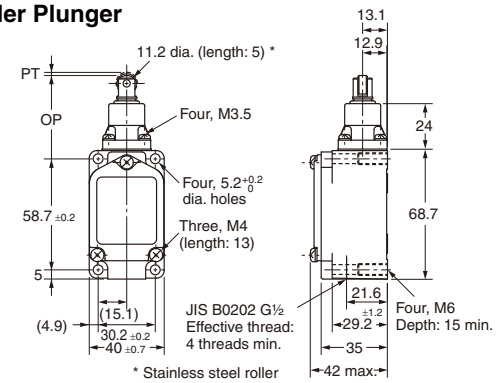
* Stainless steel ball

Horizontal-ball Plunger
WLSD3
WL01SD3



*1. Stainless steel ball
*2. Cosmetic nuts

Sealed Top-roller Plunger
WLD28
WL01D28



* Stainless steel roller

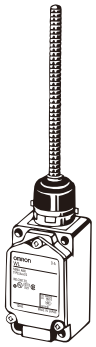
Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

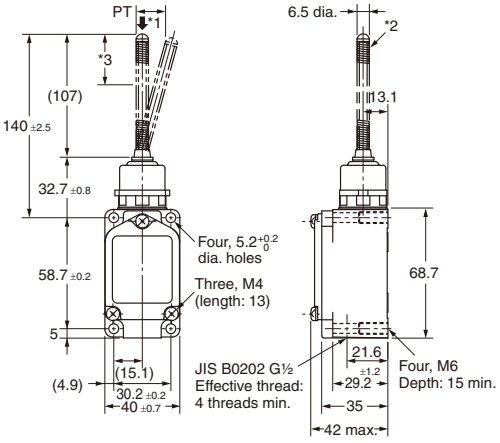
Operating characteristics / Model		WLD WL01D	WLD2 WL01D2	WLD3 WL01D3	WLD28 WL01D28	WLSD2 WL01SD2	WLSD3 WL01SD3	WLSD WL01SD
Operating force	OF max.	26.67 N	26.67 N	26.67 N	16.67 N	40.03 N	40.03 N	40.03 N
Release force	RF min.	8.92 N	8.92 N	8.92 N	4.41 N	8.89 N	8.89 N	8.89 N
Pretravel	PT max.	1.7 mm	1.7 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	5.6 mm	4 mm	6.4 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	54.2 ±0.8 mm	54.1 ±0.8 mm	40.6 ±0.8 mm
Total travel Position	TTP max.	29.5 mm	39.5 mm	41 mm	39.5 mm	—	—	—

Basic

Flexible Rod ..... For all models WL□ indicates a standard-load model and WL01□ indicates a microload model.

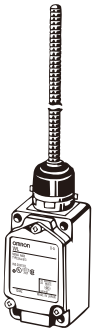
Coil Spring
WLNJ
WL01NJ

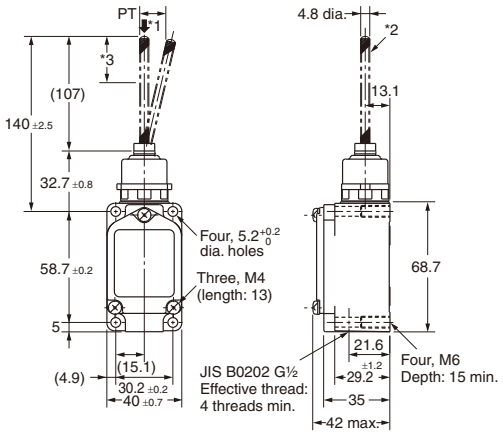




*1. The coil spring may be operated from any direction except the axial direction (↓).
*2. Stainless steel coil spring
*3. Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

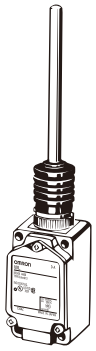
Coil Spring (Multi-wire)
WLNJ-30
WL01NJ-30

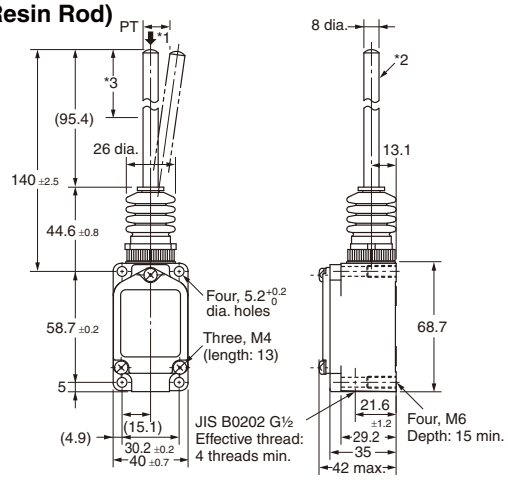




*1. The coil spring may be operated from any direction except the axial direction (↓).
*2. Piano wire coil
*3. Optimum operating range of the coil spring is within 1/3 of the entire length from the top end.

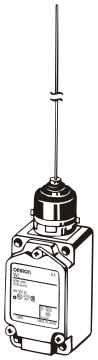
Coil Spring (Resin Rod)
WLNJ-2
WL01NJ-2

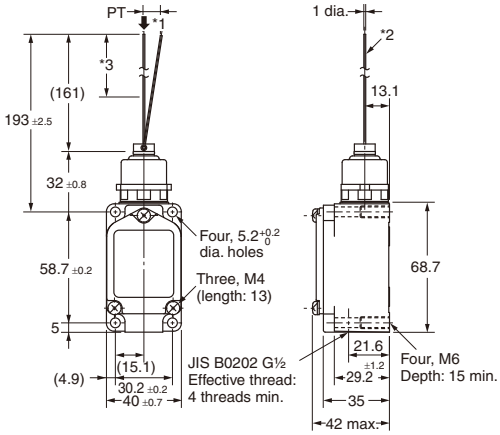




*1. The resin rod may be operated from any direction except the axial direction (↓).
*2. Polyamide resin rod
*3. Optimum operating range of the resin rod is within 1/3 of the entire length from the top end.

Steel Wire
WLNJ-S2
WL01NJ-S2





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

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

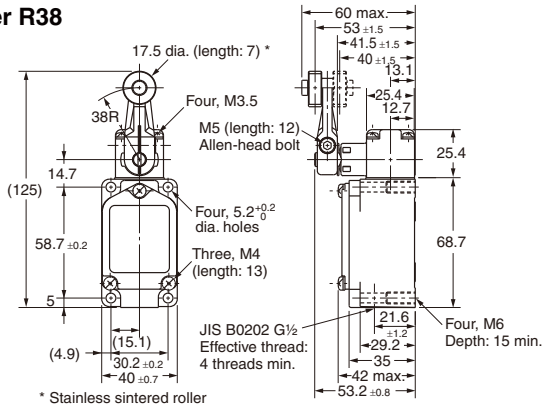
Operating characteristics / Model		WLNJ * WL01NJ *	WLNJ30 * WL01NJ30 *	WLNJ-2 * WL01NJ-2 *	WLNJ-S2 * WL01NJ-S2 *
Operating force	OF max.	1.47 N	1.47 N	1.47 N	0.28 N
Pretravel	PT	20 ±10mm	20 ±10mm	40 ±20mm	40 ±20mm

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

Overtravel

General-purpose/High-sensitivity Models ..... For all models WL□ indicates a standard-load model and WL01□ indicates a microload model.

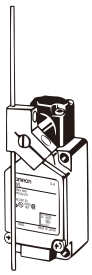
Roller Lever R38
WLH2
WL01H2
WLG2
WL01G2

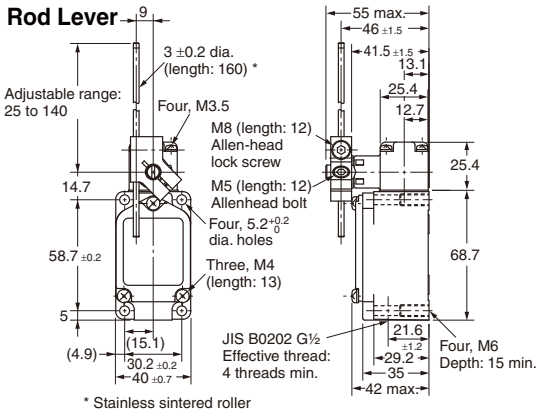


* Stainless sintered roller

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

Adjustable Rod Lever
WLHL
WL01HL
WLGL
WL01GL

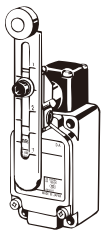


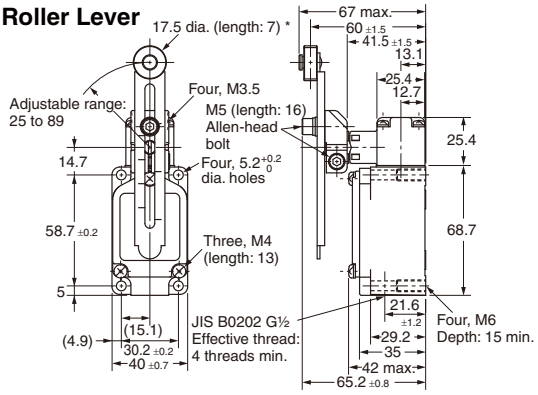


* Stainless sintered roller

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

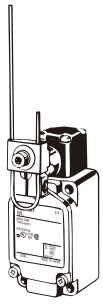


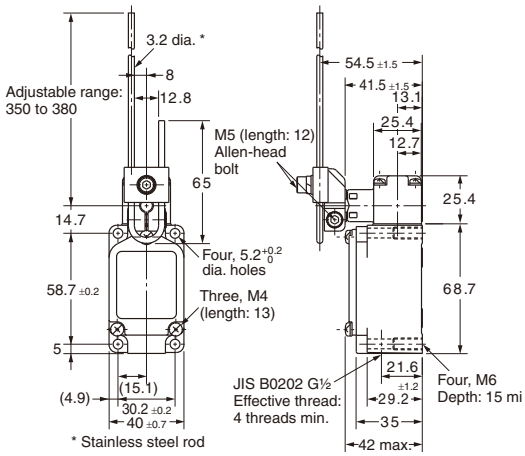


* Stainless sintered roller

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

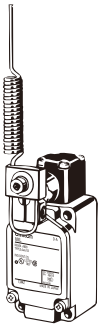
Adjustable Rod Lever
WLHAL4
WL01HAL4

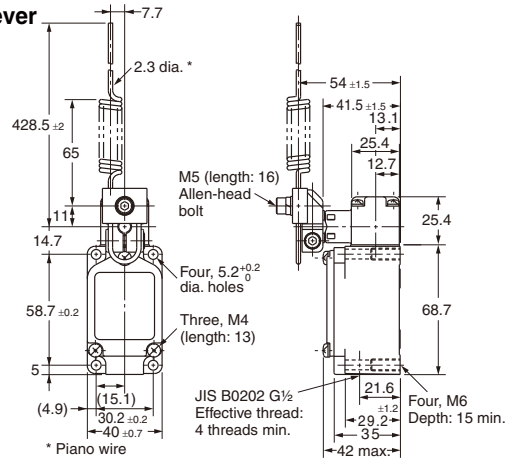




* Stainless steel rod

Rod Spring Lever
WLHAL5
WL01HAL5





* Piano wire

Note: 1. One-side operation is not possible with the general-purpose and high-sensitivity models.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

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

	WLH12, WLA01H12	WLG12, WL01G12
OF	4.18 N	4.18 N
RF	0.42 N	0.42 N

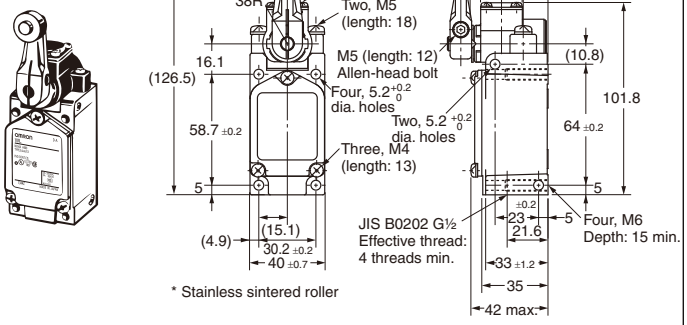
Operating characteristics / Model		WLH2 WL01H2	WLG2 WL01G2	WLH12 *1 WL01H12 *1	WLG12 *1 WL01G12 *1	WLHL *1 WL01HL *1	WLGL *2 WL01GL *2	WLHAL4 *3 WL01HAL4 *3	WLHAL5 WL01HAL5
Operating force	OF max.	9.81 N	9.81 N	9.81 N	9.81 N	2.84 N	2.84 N	0.98 N	0.90 N
Release force	RF min.	0.98 N	0.98 N	0.98 N	0.98 N	0.25 N	0.25 N	0.15 N	0.09 N
Pretravel	PT	15° ±5°	10° +2° −1°	15° ±5°	10° +2° −1°	15° ±5°	10° +2° −1°	15° ±5°	15° ±5°
Overtravel	OT min.	55°	65°	55°	65°	55°	65°	55°	55°
Movement Differential	MD max.	12°	7°	12°	7°	12°	7°	12°	12°

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

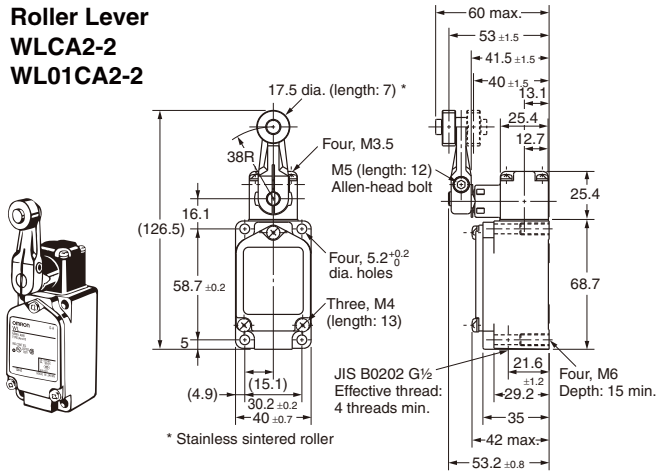
Overtravel

Side-installation Models ... For all models WL□ indicates a standard-load model and WL01□ indicates a microload model.

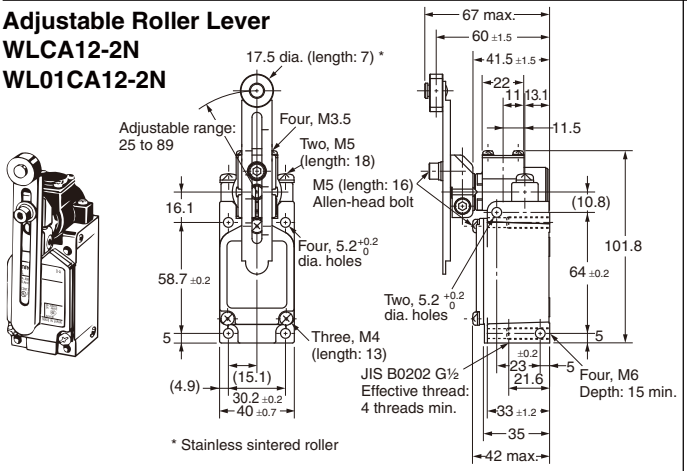
Roller Lever
WLCA2-2N
WL01CA2-2N



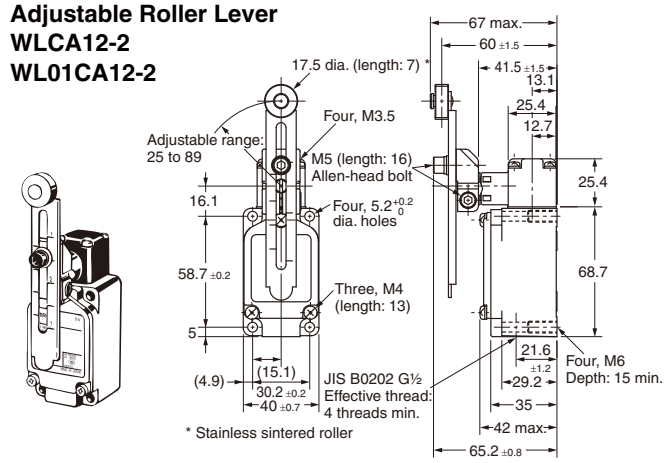
Roller Lever
WLCA2-2
WL01CA2-2



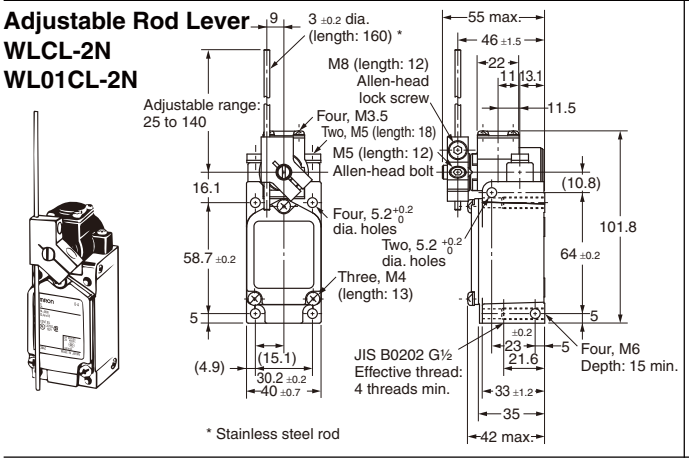
Adjustable Roller Lever
WLCA12-2N
WL01CA12-2N



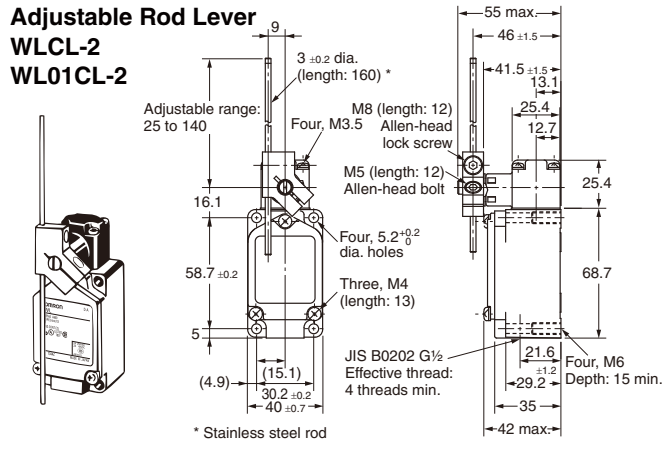
Adjustable Roller Lever
WLCA12-2
WL01CA12-2



Adjustable Rod Lever
WLCL-2N
WL01CL-2N



Adjustable Rod Lever
WLCL-2
WL01CL-2



Note: 1. With the side-installation models, 90° operation on one side is possible by simply changing the direction of the cam.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Operating characteristics	Model	WLCA2-2N WL01CA2-2N	WLCA12-2N *1 WL01CA12-2N *1	WLCL-2N *2 WL01CL-2N *2	WLCA2-2 WL01CA2-2	WLCA12-2 *1 WL01CA12-2 *1	WLCL-2 *2 WL01CL-2 *2
Operating force	OF max.	9.61 N	9.61 N	2.84 N	8.83 N	8.83 N	2.55 N
Release force	RF min.	1.18 N	1.18 N	0.25 N	0.49 N	0.49 N	0.1 N
Pretravel	PT	20° max.	20° max.	20° max.	25° ±5°	25° ±5°	25° ±5°
Overtravel	OT min.	70°	70°	70°	60°	60°	60°
Movement Differential	MD max.	10°	10°	10°	16°	16°	16°

*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.

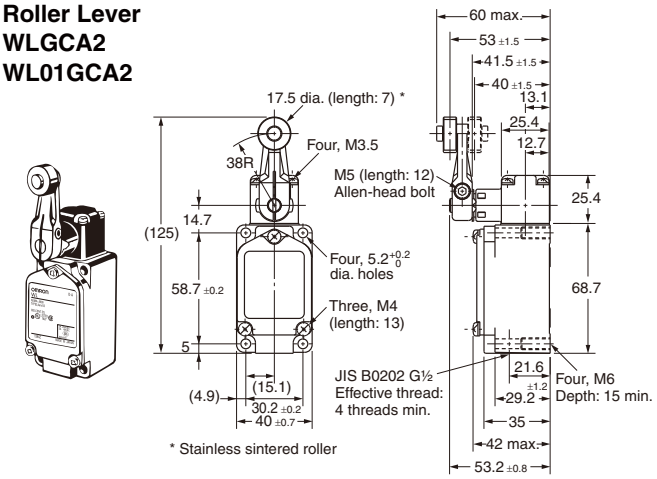
OF and RF for WLCA12-2N and WL01CA12-2N, with a lever length of 89 mm.

	WLCA12-2N, WLA01CA12-2N
OF	4.10 N
RF	0.50 N

High-precision Models

WL□ are Standard Models and WL01□ are Microload Models.

Roller Lever
WLGCA2
WL01GCA2



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

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

Sensor I/O Connector Switches

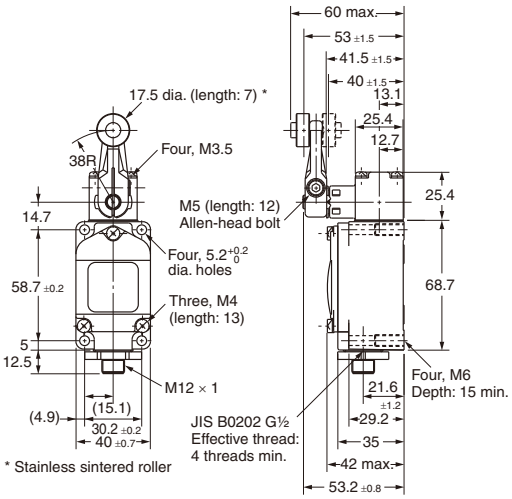
Direct-wired Connector/Pre-wired Connector Models

Refer to the D4CC for applicable Cables.

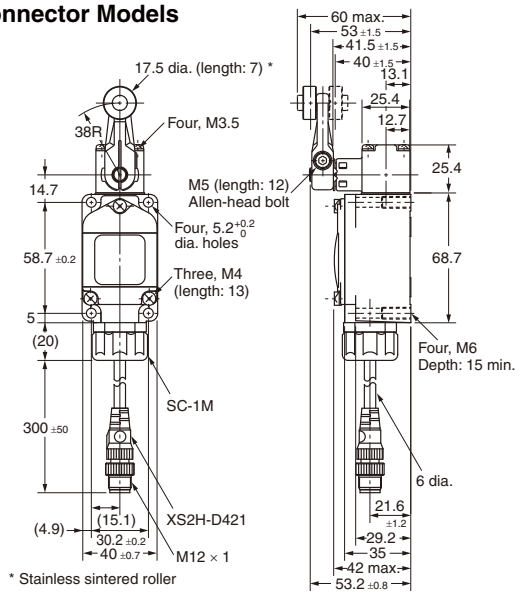
Roller Lever Plungers.....WL□ are Standard Models and WL01□ are Microload Models.

Standard Models (WLCA2), High-precision Models (WLGCA2),
Overtravel General-purpose Models (WLH2), Overtravel High-sensitivity Models (WLG2)

Connector Models



Pre-wired Connector Models

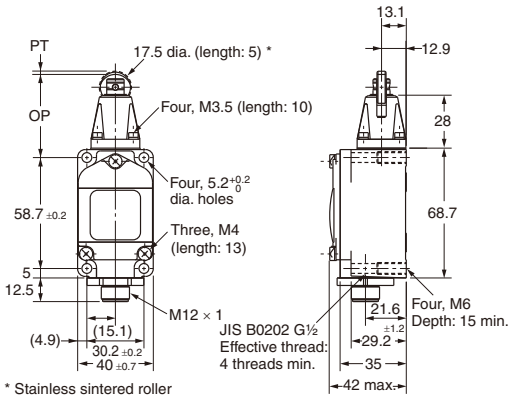


Note: 1. Only the dimension of the set position marker plate is different for WLG2 Models.
2. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
3. The models with operation indicators are shown in the above diagrams.

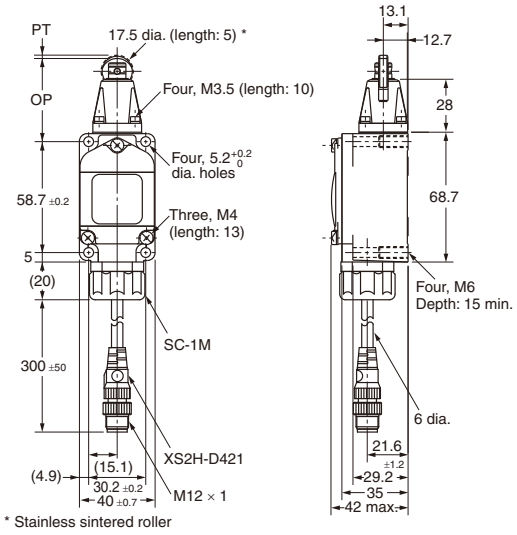
Operating characteristics	Actuator	Standard roller lever actuator	High-precision roller lever actuator	Overdrive general-purpose actuator	Overdrive high-sensitivity actuator
Operating force	OF max.	13.34 N	13.34 N	9.81 N	9.81 N
Release force	RF min.	2.23 N	1.47 N	0.98 N	0.98 N
Pretravel	PT	15° ±5°	5° +2° 0°	15° ±5°	10° +2° 0°
Overtravel	OT min.	30°	40°	55°	65°
Movement Differential	MD max.	12°	3°	12°	7°

Top-roller Plunger (WLD2)

Direct-wired Connector Models



Pre-wired Connector Models

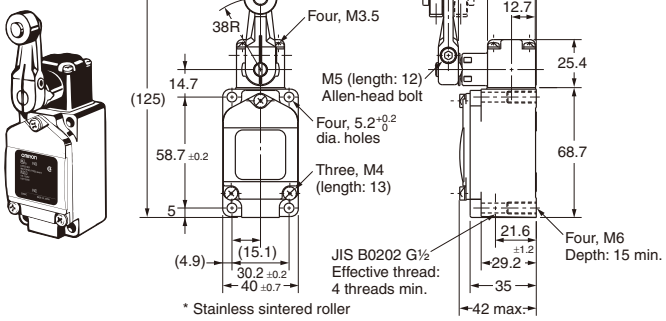


Note: 1. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
2. The following diagrams are for a indicator-equipped models.

Operating characteristics	Actuator	Top-roller plunger
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 ±0.8mm
Total travel Position	TTP max.	39.5 mm

Indicator-equipped Models

Roller Lever
WLCA2-LE/LD
WL01CA2-LE/LD

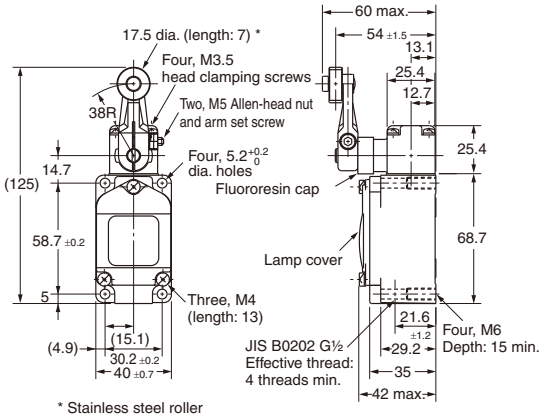


Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Operating characteristics	Actuator	WLCA2-LE/LD WL01CA2-LE/LD
Operating force	OF max.	13.34 N
Release force	RF min.	2.23 N
Pretravel	PT	15° ±5°
Overtravel	OT min.	30°
Movement Differential	MD max.	12°

Spatter-prevention Models

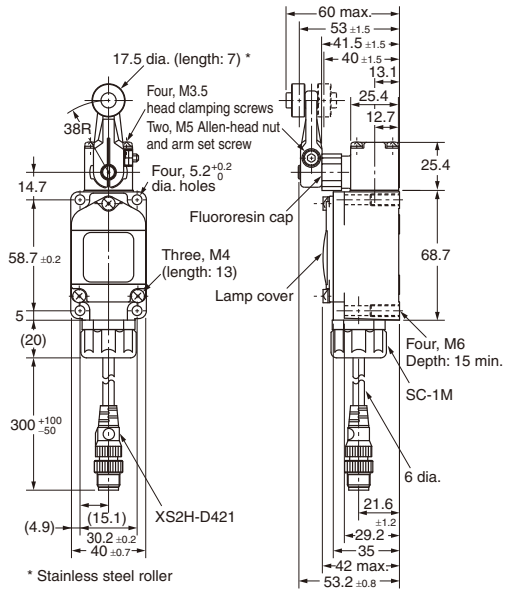
Roller Lever (Screw Terminals)
WLCA2-□S/WL01□-□S
WLH2-□S/WLG2-□S
WLGCA2-□S



* Stainless steel roller

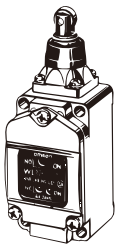
Roller Lever (Pre-wired connectors)
WLCA2-□S-M1J*/WL01□-□S-M1J*
WLH2-□S-M1J*/WLG2-□S-M1J*
WLGCA2-□S-M1J*

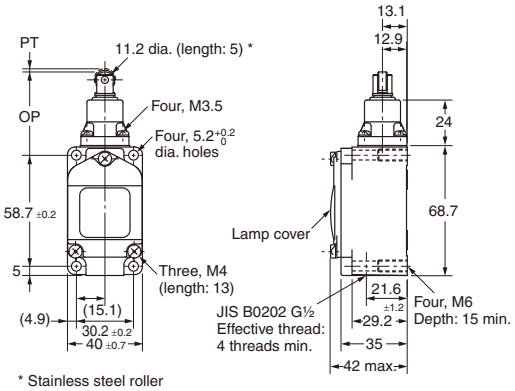
* External dimensions are the same even for different core wires.



* Stainless steel roller

Sealed Top-roller Plunger (Screw Terminals)
WLD28-□S

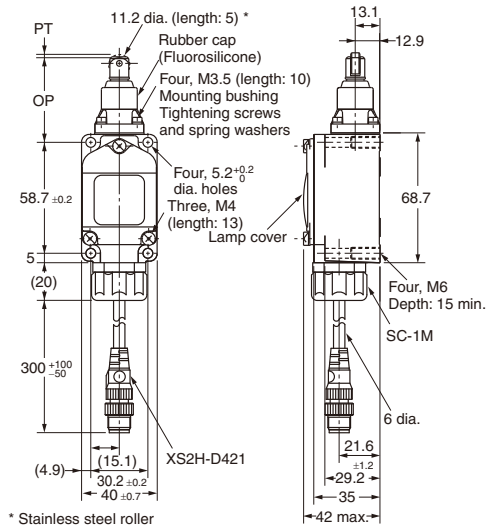




* Stainless steel roller

Sealed Top-roller Plunger (Pre-wired connectors)
WLD28-□S-M1J*

* External dimensions are the same even for different core wires.



* Stainless steel roller

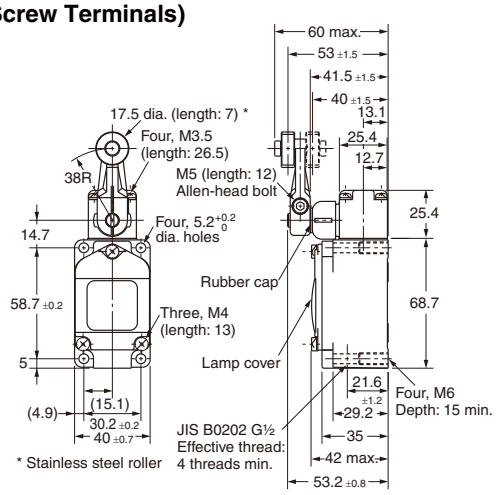
Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Operating characteristics	Actuator	Roller Lever				Sealed Top-roller Plunger
		Basic	Overtravel models		High-precision	
			General-purpose	High-sensitivity		
Operating force	OF max.	13.34 N	9.81 N	9.81 N	13.34 N	16.67 N
Release force	RF min.	2.23 N	0.98 N	0.98 N	1.47 N	4.41 N
Pretravel	PT	15° ±5°	15° ±5°	10° +2° −1°	5° +2° 0°	1.7 mm max.
Overtravel	OT min.	30°	55°	65°	40°	5.6 mm
Movement Differential	MD max.	12°	12°	7°	3°	1 mm
Operating Position	OP	—	—	—	—	44 ±0.8 mm
Total travel Position	TTP max.	—	—	—	—	39.5 mm

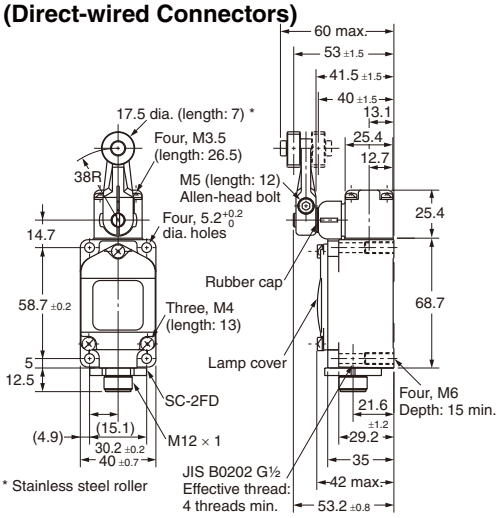
Long-life Models

Rotating Lever Models

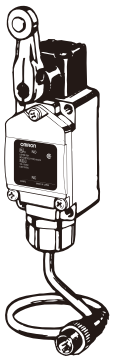
Roller Lever (Screw Terminals)
WLM□-LD

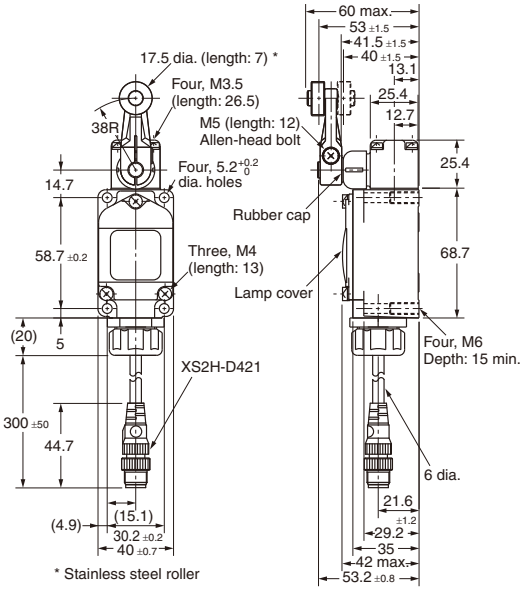


Roller Lever (Direct-wired Connectors)
WLM□-LD□



Roller Lever (Pre-wired Connectors)
WLM□-LD□





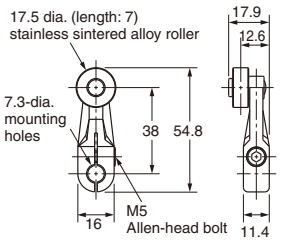
Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Operating characteristics	Model	WLMCA2-LD□ Basic models	WLMH2-LD□ General-purpose overtravel models	WLMG2-LD□ High-sensitivity overtravel models	WLMGCA2-LD□ High-precision models
Operating force	OF max.	9.81 N	9.81 N	9.81 N	13.34 N
Release force	RF min.	0.98 N	0.98 N	0.98 N	1.47 N
Pretravel	PT	15° ±5°	15° ±5°	$10^{\circ}{}^{+2^{\circ}}_{-1^{\circ}}$	$5^{\circ}{}^{+2^{\circ}}_{0^{\circ}}$
Overtravel	OT min.	30°	55°	65°	40°
Movement Differential	MD max.	12°	12°	7°	3°

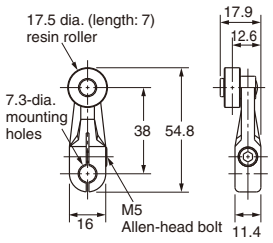
Actuators (Levers Only)

Lever: Only rotating lever models are illustrated.

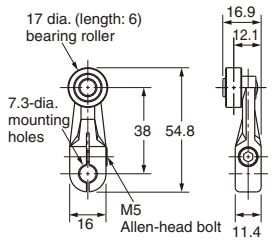
WL-1A100
Standard Lever



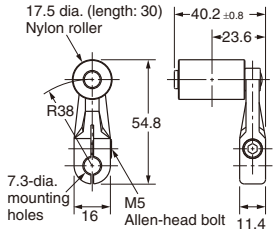
WL-1A115
Resin Roller



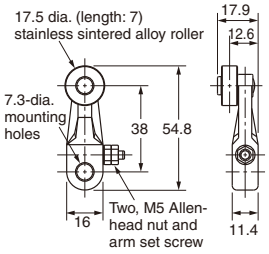
WL-1A400
Bearing Roller



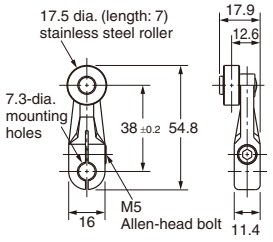
WL-1A118
Nylon Roller:
Roller Width: 30 mm



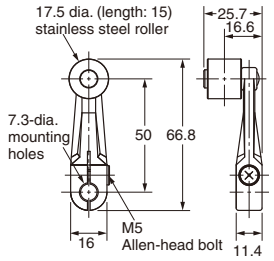
WL-1A105
Double Nuts



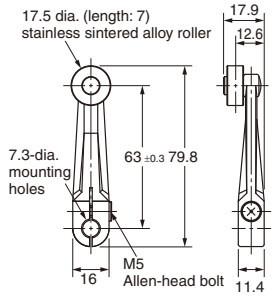
WL-1A103S
Spatter Prevention



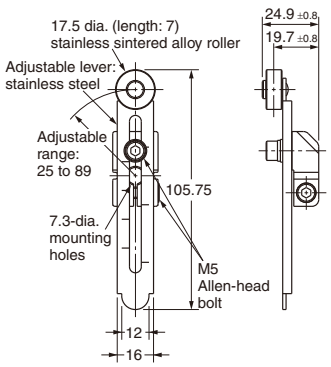
WL-1A200
Lever Length: 50
Roller Width: 15



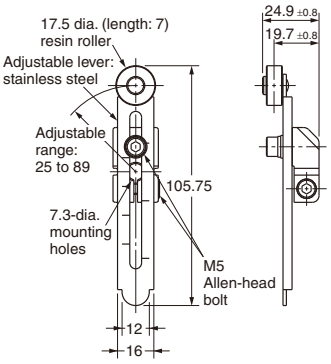
WL-1A300
Lever Length: 63



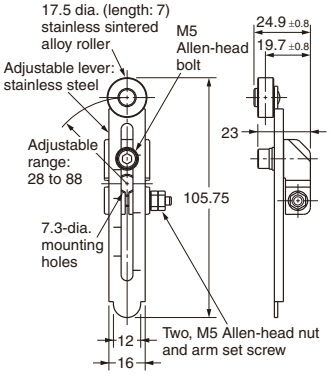
WL-2A100



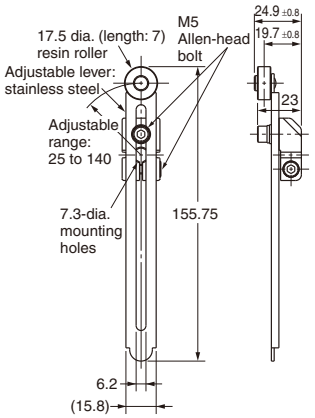
WL-2A111
Resin Roller



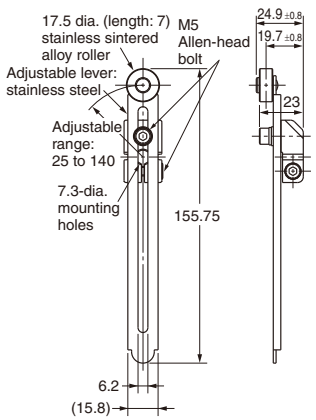
WL-2A107
Double Nuts



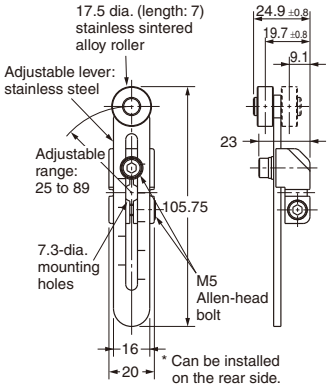
WL-2A108
Resin Roller



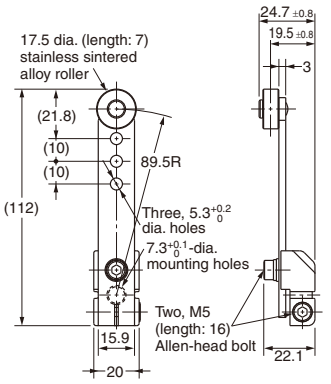
WL-2A122



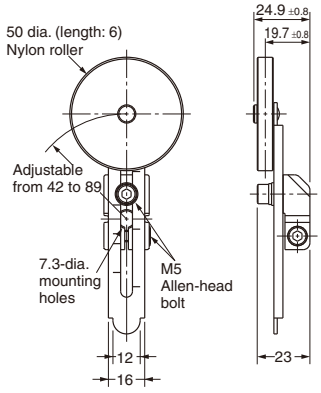
WL-2A106



WL-2A130



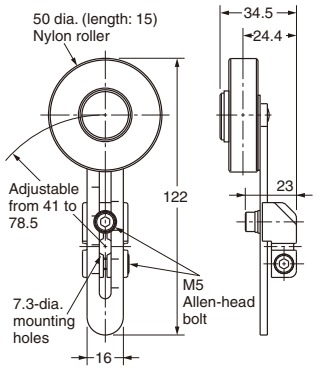
WL-2A104



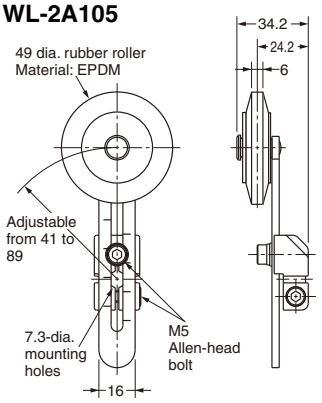
Note: Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.

Lever: Only rotating lever models are illustrated.

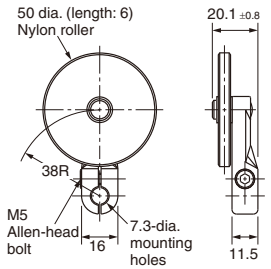
WL-2A110



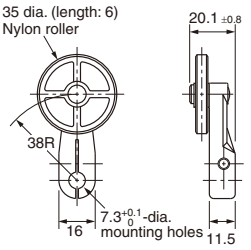
WL-2A105



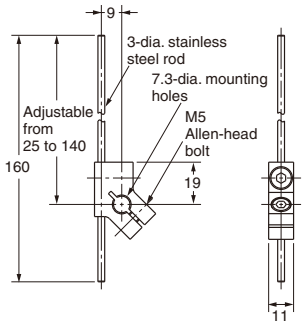
WL-1A106



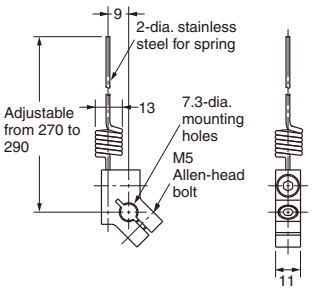
WL-1A110



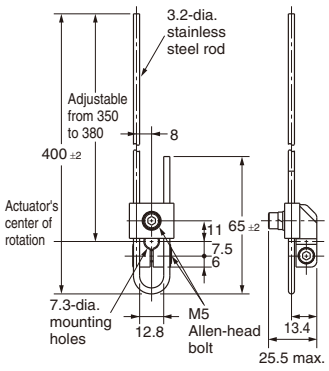
WL-4A100



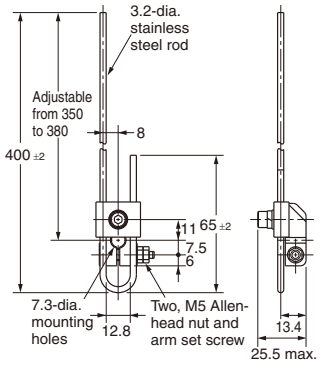
WL-4A201



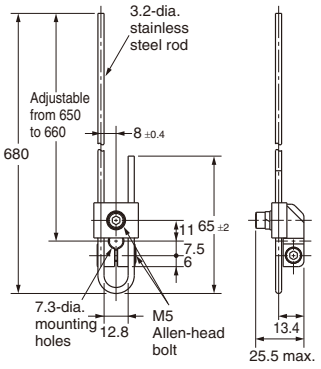
WL-3A100



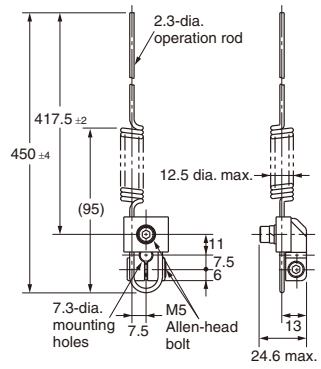
WL-3A106 Double Nut



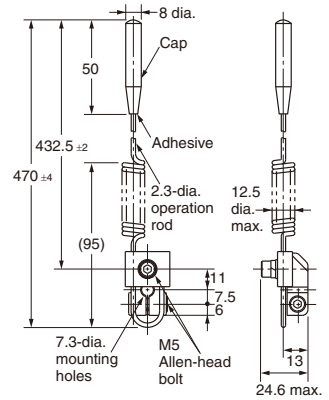
WL-3A108



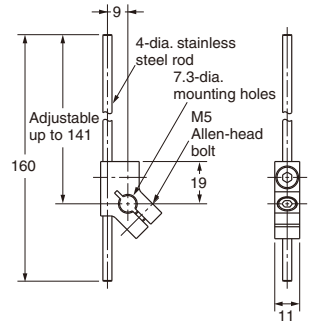
WL-3A200



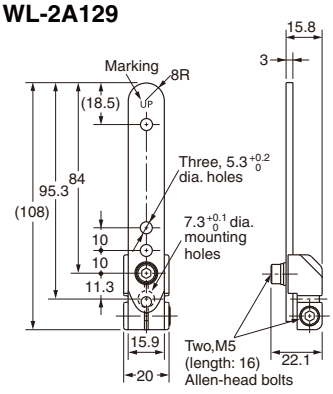
WL-3A203



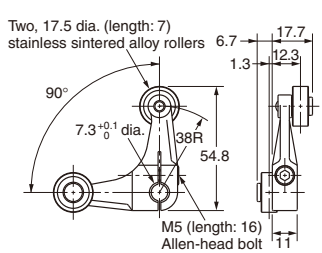
WL-4A112



WL-2A129

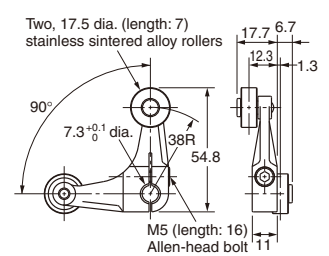


WL-5A101



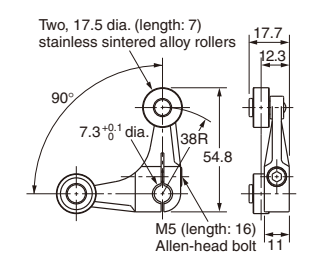
WL-5A100 has a plastic roller

WL-5A103



WL-5A102 has a plastic roller

WL-5A105



WL-5A104 has a plastic roller

Note: 1. Unless otherwise indicated, a tolerance of ±0.4 mm applies to all dimensions.
2. 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.

Safety Precautions

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

Precautions for Safe Use

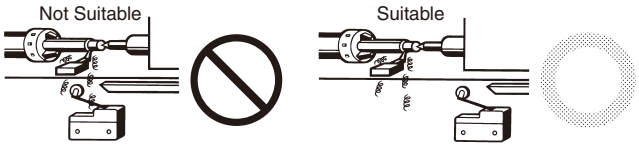
- When a rod or wired-type actuator is used, do not touch the top end of the actuator. Doing so may result in injury.
  (Applicable models)
  WLHAL5 and WL01HAL5 Rod Spring Levers and WLNJ-S2 and WL01NJ-S2 Steel-wire Actuators.
- A short-circuit may cause damage to the Switch, so insert a circuit breaker fuse, of 1.5 to 2 times the rated current, in series with the Switch.
- In order to meet EN approval ratings, use a 10-A fuse that corresponds to IEC60269, either a gI or gG for general-purpose types and spatter-prevention models only.

Precautions for Correct Use

- When wiring terminal screws, use M4 round crimp terminals and tighten screws to the recommended torque. Wiring with bare wires, or 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.

Operating Environment

- Seal material may deteriorate if a Switch is used outdoor or where subject to special cutting oils, solvents, or chemicals. Always appraise performance under actual application conditions and set suitable maintenance and replacement periods.
- Install Switches where they will not be directly subject to cutting chips, dust, or dirt. The Actuator and Switch must also be protected from the accumulation of cutting chips or sludge.



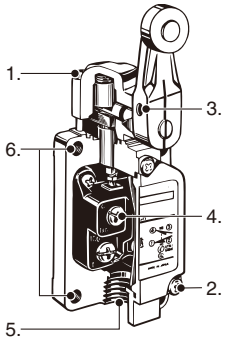
- Constantly subjecting a Switch to vibration or shock can result in wear, which can lead to contact interference with contacts, operation failure, reduced durability, and other problems. Excessive vibration or shock can lead to false contact operation or damage. Install Switches in locations not subject to shock and vibration and in orientations that will not produce resonance.
- The Switches have physical contacts. Using them in environments containing silicon gas will result in the formation of silicon oxide (SiO_2) due to arc energy. If silicon oxide accumulates on the contacts, contact interference can occur. If silicon oil, silicon filling agents, silicon cables, or other silicon products are present near the Switch, suppress arcing with contact protective circuits (surge killers) or remove the source of silicon gas.

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

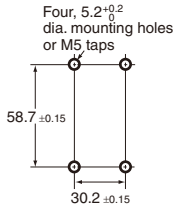
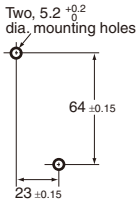
- If screws are too loose they can lead to an early malfunction of the Switch, so ensure that all screws are tightened using the correct torque.
- In particular, when changing the direction of the Head, make sure that all screws are tightened again to the correct torque. Do not allow foreign objects to fall into the Switch.



No.	Type	Appropriate tightening 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

Installing the Switch

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

General-purpose Models, Spatter-prevention Models, and Long-life Models	Side installation for 90° Operation Models
	

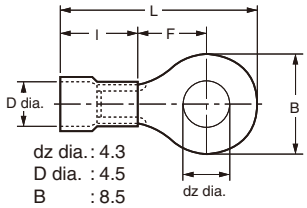
Connectors

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.

Wiring

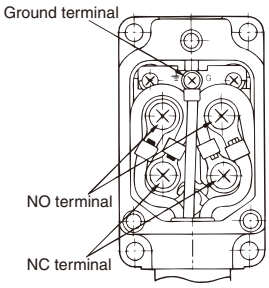
- Use 1.25-mm lead wires and M4-insulation covered crimp terminals for wiring.

Crimp Terminal External Dimensions



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

Wiring Method Switch Box Section



- The ground terminal is only installed on models with ground terminals.

Rotating Lever Set Position (General-purpose or Spatter-prevention Switches Only)

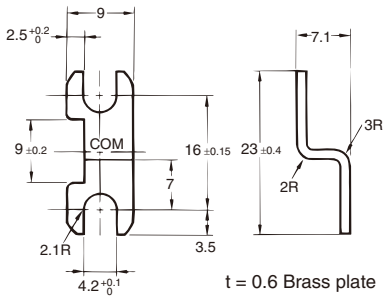
All rotating lever models, except the fork lever lock models, have a set position marker plate. (See page 23.) After operation, set the indicator needle on the marker plate so that is in the convex section of the bearing.

Operation Set Position (Long-life Switches Only)

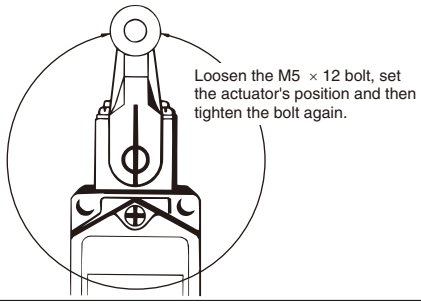
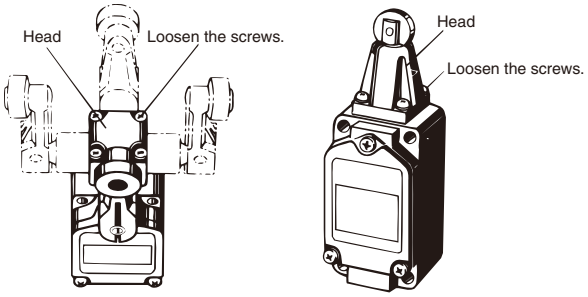
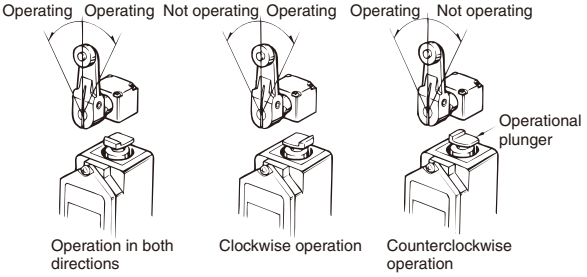
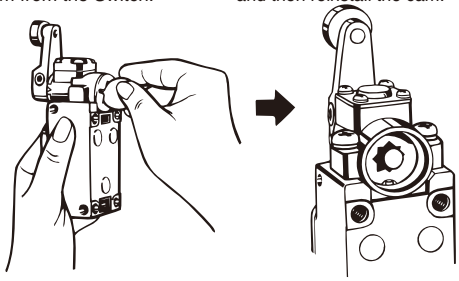
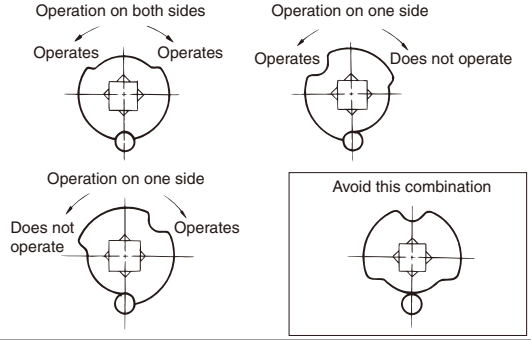
For all Long-life Switching, there is a set position marker slit on the rubber cap of the head. After operation, set the slit on the rubber cap so that the fluorescent color on the shaft section can be seen.

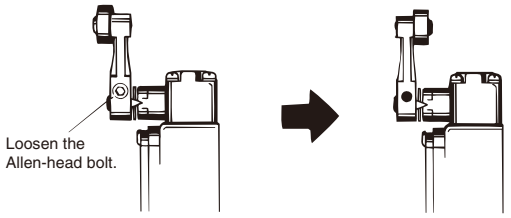
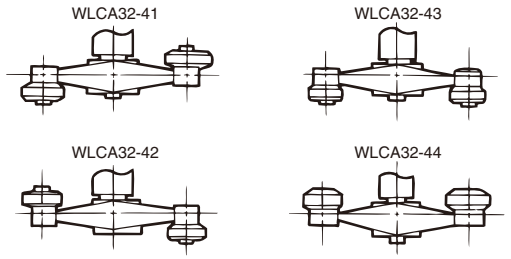
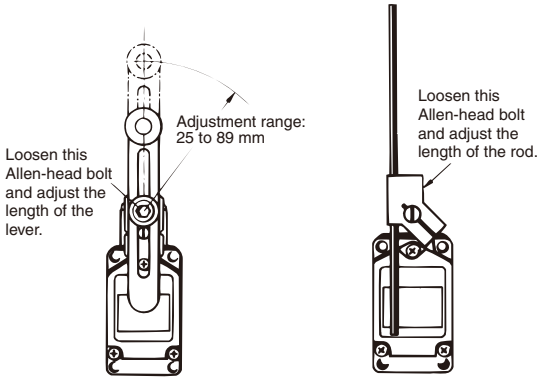
Terminal Plate

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



Using the Switches

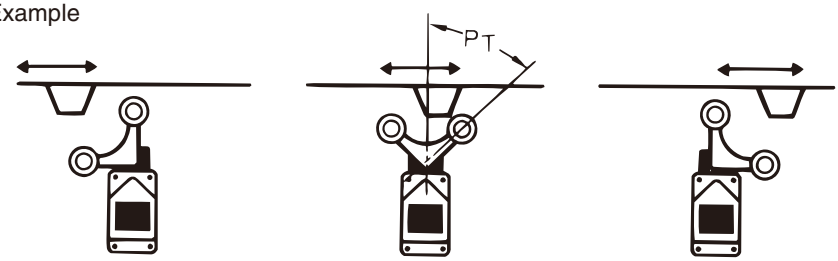
Item	Applicable models and Actuators	Details
Changing the Installation Position of the Actuator By loosening the Allen-head bolt on the actuator lever, the position of the actuator can be set anywhere within the 360°. With Indicator-equipped Switches, the actuator lever comes in contact with the top of the indicator 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 (except for long-life models).	Roller Levers: WLCA2, WL01CA2, WLCA2-2, WL01CA2-2, WLH2,WL01H2, WLG2, WL01G2, WLMCA2□, WLMH2□, WLMG2□, WLMGCA2□ Adjustable Roller Levers: WLCA12, WL01CA12, WLCA12-2, WL01CA12-2, WLH12, WL01H12, WLG12, WL01G12, Adjustable Rod Levers: WLCL, WL01CL, WLCL-2, WL01CL-2, WLHL, WL01HL, WLGL, WL01GL	
Changing the Orientation of the Head By removing the screws in the four corners of the Head, the Head can be set in any of the four directions. Be sure to change the plunger for internal operations at the same time. (The operational plunger does not need to be changed on general-purpose and high-sensitivity overtravel models.) The roller plunger can be set in either two positions at 90°. WLCA2-2N and WL01CA2-2N can be set only in either the forward or backward direction.	Roller Levers: WLCA□, WL01CA□, WLCA□-2, WL01CA□-2, WLGCA□, WLH□, WL01H□, WLG□, WL01G□, WLMCA2□, WLMH2□, WLMG2□, WLMGCA2□ Adjustable Rod Levers: WLCL, WL01CL, WLCL-2, WL01CL-2 Horizontal Plungers: WLSD□, WL01SD□ Top-roller Plungers: WLD2, WL01D2 Sealed Top-roller Plungers: WLD28, WL01D28 Does not include -RP60 Series or -141 Series.	
Changing the Operating Direction 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. For overtravel 90° operation models, one of three operating directions can be selected by loosening the rubber holder using either a coin or a flat-blade screwdriver and changing the direction of the internal rubber section. The tightening torque for the screws on the Head is 0.78 to 0.88 N•m.	Roller Levers: WLCA2, WL01CA2, WLGCA2, WLMGCA2□ Adjustable Roller Levers: WLCA12, WL01CA12 Adjustable Rod Levers: WLCL, WL01CL Overtravel Models: WLCA□-2N, WL01CA□-2N	One-side Operation for General-purpose and High-precision Switches The output of the Switch will be changed, regardless of which direction the lever is pushed. The output of the Switch will only be changed when the lever is pushed in one direction.  Cam Direction Changing Procedure for Overtravel, 90° Operation Switches Loosen the cam holder with a coin or screwdriver. Take out the cam from the Switch. Change the direction of the cam as required by your intended operation and then reinstall the cam.  Relationship of cam to operation as observed from the rear of Switch 

Item	Applicable models and Actuators	Details
Installing the Roller on the Inside By installing the roller lever in the opposite direction, the roller can be installed on the inside. (Set so that operation can be completed within a 180° level range.)	Roller Levers: WLCA□, WL01CA□, WLH□, WLCA□-2, WL01CA□-2, WLMCA2□, WLMH2□, WLMG2□, WLMGCA2□, WLG□, except for the adjustable roller levers. Fork Lever Locks: WLCA32-4□, WL01CA32-4□	
Selecting the Roller Position There are four types of fork lever lock for use depending on the roller position.	Fork Lever Locks: WLCA32-4□, WL01CA32-4□	 Note: An explanation of the operation of fork lever locks is provided after this table.
Adjusting the Length of the Rod or Lever The length of the rod or lever can be adjusted by loosening the Allen-head bolt.	Adjustable Roller Levers: WLCA12, WL01CA12 etc. Adjustable Rod Levers: WLCL, WL01CL, etc.	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

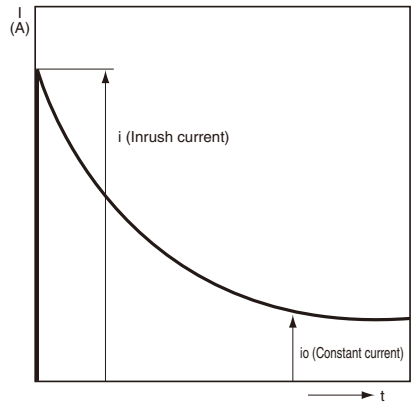
Precautions for All Limit Switches

(Not including Safety Switches)

Note: Refer to the *Precautions* section for each Switch for specific precautions applicable to each Switch.

Precautions for Safe Use

- If the Switch is to be used as a switch in an emergency stop circuit or in a safety circuit for preventing accidents resulting in injuries or deaths, use a Switch with a direct opening mechanism, use the NC contacts with a forced release mechanism, and set the Switch so that it will operate in direct opening mode.
  For safety, install the Switch using one-way rotational screws or other similar means to prevent it from easily being removed. Protect the Switch with an appropriate cover and post a warning sign near the Switch in order to ensure the safety.
- Do not supply electric power when wiring. Otherwise electric shock may result.
- Keep the electrical load below the rated value.
- Be sure to evaluate the Switch under actual working conditions after installation.
- Do not touch the charged switch terminals while the Switch has carry current, otherwise electric shock may result.
- If the Switch has a ground terminal, be sure to connect the ground terminal to a ground wire.
- Do not disassemble the Switch while electric power is being supply. Otherwise electric shock may result.
- The durability of the Switch greatly varies with switching conditions. Before using the Switch, be sure to test the Switch under actual conditions. Make sure that the number of switching operations is within the permissible range.
  If a deteriorated Switch is used continuously, insulation failures, contact weld, contact failures, switch damage, or switch burnout may result.
- Maintain an appropriate insulation distance between wires connected to the Switch.
- Some types of load have a great difference between normal current and inrush current. Make sure that the inrush current is within the permissible value. The greater the inrush current in the closed circuit is, the greater the contact abrasion or shift will be. Consequently, contact weld, contact separation failures, or insulation failures may result. Furthermore, the Switch may become broken or damaged.



Wiring

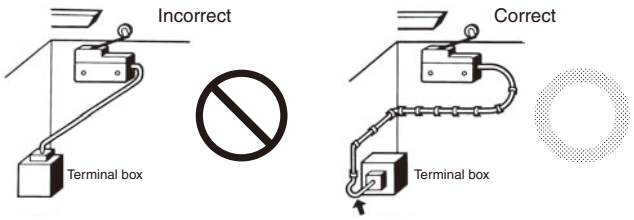
Pay the utmost attention so that each terminal is wired correctly. If the terminal is wired incorrectly, the Switch will not function. Furthermore, not only will the Switch have a bad influence on the external circuit, the Switch itself may become damaged or burnt.

Mounting

- Do not modify the actuator, otherwise the operating characteristics and performance of the actuator will change.
- Do not enlarge the mounting holes of the Switch or modify the Switch. Doing so may result in insulation failures, housing damage, or physical injuries.
- Be sure to evaluate the Switch under actual working conditions after installation.
- Do not apply oil, grease, or other lubricants to the moving parts of the actuator, otherwise the actuator may not operate correctly. Furthermore, intrusion of oil, grease, or other lubricants inside the Switch may reduce sliding characteristic or cause failures in the Switch.
- Mount the Switch and secure it with the specified screws tightened to the specified torque along with flat washers and springs. The actuator of a Pushbutton Limit Switch mounted to a panel with excessive tightening torque may not operate correctly.
- Be sure to wire the Switch so that the conduit opening is free of metal powder or any other impurities.
- If glue or bonding agent is applied, make sure that it does not adhere to the movable parts or intrude inside the Switch, otherwise the Switch may not work correctly or cause contact failure. Some types of glue or bonding agent may generate a gas that may have a bad influence on the Switch. Pay the utmost attention when selecting the glue or locking agent.
- Do not drop or disassemble the Switch, otherwise the Switch will not be capable of full performance. Furthermore, the Switch may become broken or burnt.
- Some models allow changes in head directions. When changing the head of such a model, make sure that the head is free of any foreign substance. Tighten each screw of the head to the rated torque.
- Be sure to take measures so that no foreign material, oil, or water will penetrate into the Switch through the conduit opening. Be sure to attach a connector suited to the cable thickness and tighten the connector securely to the rated torque.
- Do not impose shock or vibration on the actuator while it is fully pressed. Otherwise, the actuator will partially abrade and an actuation failure may result.

Wiring

- If the wiring method is incorrect, the wires may get caught on objects or the lead wires may be pulled excessively. Make sure that the lead wires are sufficiently long and secure them along the wiring path.



- Pay the utmost attention so that each terminal is wired correctly. If a terminal is wired incorrectly, the Limit Switch will not function properly. Furthermore, not only will the Limit Switch have an adverse influence on external circuits, the Limit Switch itself may become damaged or burnt.

Precautions for Correct Use

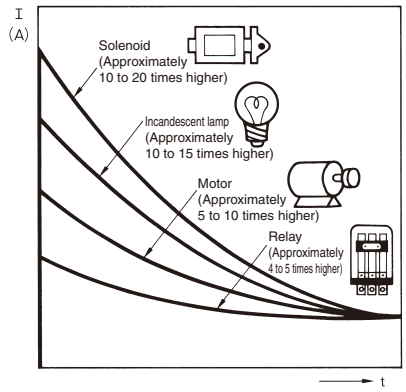
For details, refer to *Precautions for Correct Use* in the *Technical Guide for Limit Switches*.

Precautions for Correct Use

Switch Operation

- The Switch in actual operation may cause accidents that cannot be foreseen from the design stage. Therefore, the Switch must be practically tested before actual use.
- When testing the Switch, be sure to apply the actual load condition together with the actual operating environment.
- All the performance ratings in this catalog are provided under the following conditions unless otherwise specified.

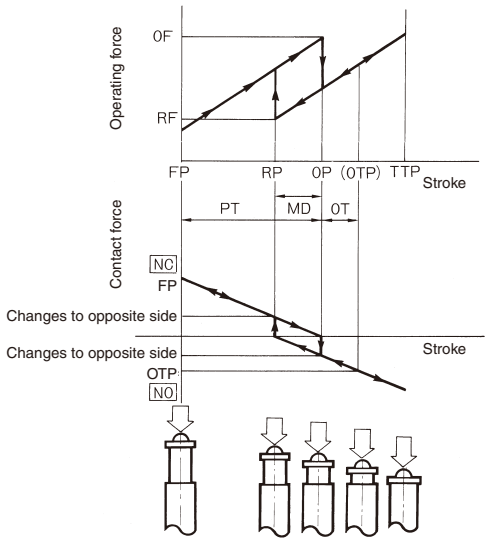
Inductive load:
A minimum power factor of 0.4 (AC) or a maximum time constant of 7 ms (DC)
Lamp load:
An inrush current 10 times higher than the normal current
Motor load:
An inrush current 6 times higher than the normal current
(1) Ambient temperature: +5°C to +35°C
(2) Ambient humidity: 40% to 70%RH
Note: An inductive load causes a problem especially in DC circuitry. Therefore, it is essential to know the time constants (L/R) of the load.



Mechanical Characteristics

Operating Force, Stroke, and Contact Characteristics

- The following graph indicates the relationship between operating force and stroke or stroke and contact force. In order to operate the Limit Switch with high reliability, it is necessary to use the Limit Switch within an appropriate contact force range. If the Limit Switch is used in a normally closed condition, the dog must be installed so that the actuator will return to the FP when the actuator is actuated by the dog. If the Limit Switch is used in a normally open condition, the actuator must be pressed to 70% to 100% of the OT (i.e., 60% to 80% of the TT) and any slight fluctuation must be absorbed by the actuator.
- If the full stroke is set close to the OP or RP, contact instability may result. If the full stroke is set to the TTP, the actuator or switch may become damaged due to the inertia of the dog. In that case, adjust the stroke with the mounting panel or the dog.
  Refer to page 11, Dog Design, page 12, Stroke Settings vs. Dog Movement Distance, and page 12, Dog Surface for details.
- The following graph shows an example of changes in contact force according to the stroke. The contact force near the OP or RP is unstable, and the Limit Switch cannot maintain high reliability. Furthermore, the Limit Switch cannot withstand strong vibration or shock.



- If the Limit Switch is used so that the actuator is constantly pressed, it will fail quickly and reset faults may occur. Inspect the Limit Switch periodically and replace it as required.

Mechanical Conditions for Switch Selection

- The actuator must be selected according to the operating method. (Refer to page 9.)
- Check the operating speed and switching frequency.

1. If the operating speed is extremely low, the switching of the movable contact will become unstable, thus resulting in incorrect contact or contact weld.
2. If the operating speed is extremely high, the Switch may break due to shock. If the switching frequency is high, the switching of the contacts cannot catch up with the switching frequency. Make sure that the switching frequency is within the rated switching frequency.

- Do not impose excessive force on the actuator, otherwise the actuator may become damaged or not operate correctly.
- Make sure that the stroke is set within the suitable range specified for the model, or otherwise the Switch may break.

Electrical Characteristics

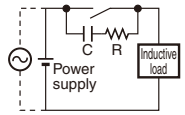
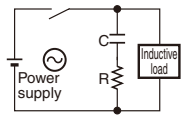
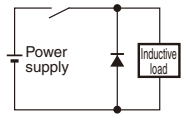
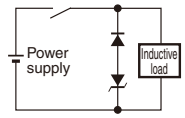
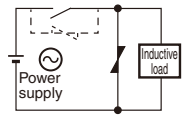
Electrical Characteristics for Switch Selection

- The switching load capacity of the Switch greatly varies between AC and DC. Always be sure to apply the rated load. The control capacity will drastically drop if it is a DC load. This is because a DC load has no current zero-cross point, unlike an AC load. Therefore, if an arc is generated, it may continue comparatively for a long time. Furthermore, the current direction is always the same, which results in a contact relocation phenomena whereby the contacts easily stick to each other and do not separate when the surfaces of the contacts are uneven.
- If the load is inductive, counter-electromotive voltage will be generated. The higher the voltage is, the higher the generated energy will be, which will increase the abrasion of the contacts and contact relocation phenomena. Be sure to use the Switch within the rated conditions.
- If the load is a minute voltage or current load, use a dedicated Switch for minute loads. The reliability of silver-plated contacts, which are used by standard Switches, will be insufficient if the load is a minute voltage or current load.

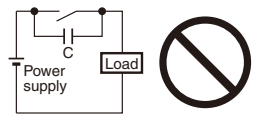
Contact Protective Circuit

Apply a contact protective circuit to increase the contact durability, prevent noise, and suppress the generation of carbide or nitric acid. Be sure to apply the contact protective circuit correctly, otherwise an adverse effect may occur.
The following provides typical examples of contact protective circuits. If the Switch is used in an excessively humid location for switching a load that easily generates arcs, such as an inductive load, the arcs may generate NOx, which will change into HNO_3 if it reacts with moisture.
Consequently, the internal metal parts may corrode and the Switch may fail. Be sure to select the ideal contact preventive circuit from the following.
Also, load operating times may be delayed somewhat if a contact protective circuit (a surge killer) is used.

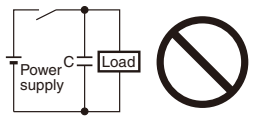
Typical Examples of Contact Protective Circuits

Circuit example		Applicable current		Feature and details	Element selection
		AC	DC		
CR circuit		Conditional *	O	* When AC is switched, the load impedance must be lower than the CR impedance.	C: 1 to 0.5 μF × switching current (A) R: 0.5 to 1 Ω × switching voltage (V) The values may change according to the characteristics of the load. The capacitor suppresses the spark discharge of current when the contacts are open. The resistor limits the inrush current when the contacts are closed again. Consider the roles of the capacitor and resistor and determine ideal capacitance and resistance values through testing. Generally, use a capacitor that has a dielectric strength of between 200 and 300 V. Use an AC capacitor for an AC circuit, i.e., a capacitor that has no polarity. If, however, the arc shutoff capacity between the contacts is a problem at high DC voltages, it may be more effective to connect a capacitor and resistor across the contacts rather than the load. Performing testing to determine the most suitable method.
		O	O	The operating time will be greater if the load is a relay or solenoid. Connecting the CR circuit in parallel to the load is effective when the power supply voltage is 24 or 48 V and in parallel to the contacts when the power supply voltage is 100 to 200 V.	
Diode method		×	O	Energy stored in the coil is changed into current by the diode connected in parallel to the load. Then the current flowing to the coil is consumed and Joule heat is generated by the resistance of the inductive load. The reset time delay with this method is longer than that in the CR method.	The diode must withstand a peak inverse voltage 10 times higher than the circuit voltage and a forward current as high or higher than the load current.
Diode and Zener diode method		×	O	This method will be effective if the reset time delay caused by the diode method is too long.	If a suitable Zener voltage is not used, the load may fail to operate depending on the environment. Use a Zener diode with a Zener voltage that is about 1.2 times the power supply voltage.
Varistor method		O	O	This method makes use of constant-voltage characteristic of the varistor so that no high voltage is imposed on the contacts. This method causes a reset time delay. Connecting a varistor in parallel to the load is effective when the supply voltage is 24 to 48 V and in parallel to the contacts when the supply voltage is 100 to 200 V.	Select a varistor with a cut voltage Vc that satisfies the following formula. For AC, the voltage must be multiplied by the square root of 2. Vc > Power supply voltage × 1.5 If Vc is set too high, effectiveness will be reduced because high voltages will not be cut.

Do not apply contact protective circuits (surge killers) as shown below.



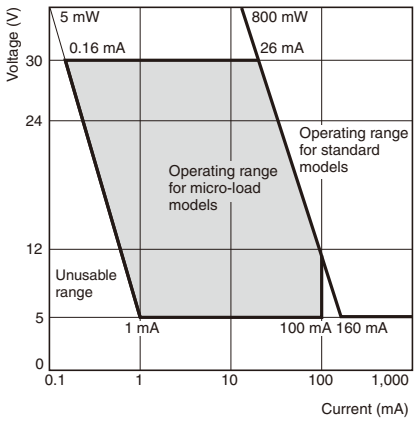
This circuit effectively suppresses arcs when the contacts are OFF. When the contacts are open, capacity is stored in the capacitor, and short-circuit current of the capacitor will flow when the contacts are turned ON, which may cause contacts to weld.



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

Using Switches for Micro Loads

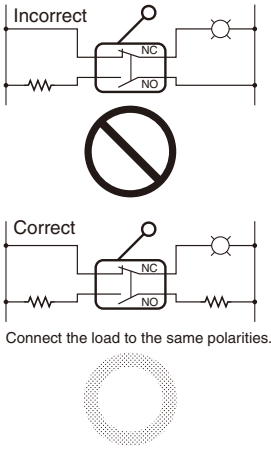
Contact faults may occur if a Switch for a general-load is used to switch a micro load circuit. Use switches in the ranges shown in the diagram on the right. However, even when using micro load models within the operating range shown here, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease durability. Therefore, insert a contact protection circuit where necessary. The minimum applicable load is the N-level reference value. This value indicates the malfunction reference level for the reliability level of 60% (λ_{60}).
The equation, $\lambda_{60} = 0.5 \times 10^{-6}$/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.



Connections

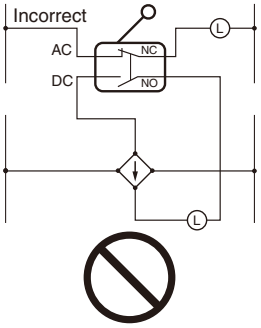
- Do not connect a Single Limit Switch to two power supplies that are different in polarity or type.

Power Connection Examples (Connection of Different Polarities)

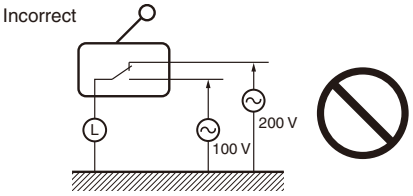


Connect the load to the same polarities.

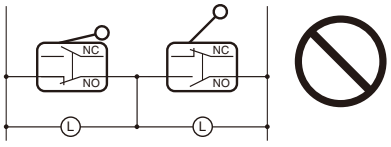
Incorrect Power Connection Example (Connection of Different Power Supplies) There is a risk of AC and DC mixing.



- Do not design a circuit where voltage is imposed between contacts, otherwise contact welding may result.



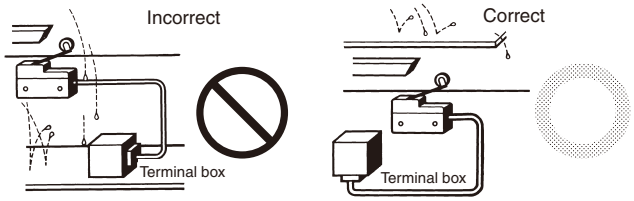
- Do not use a circuit that will short-circuit if an error occurs, otherwise the charged part may melt and break off.



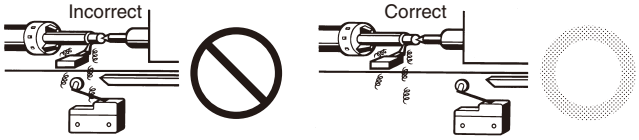
- Application of Switch to a Low-voltage, Low-current Electronic Circuit.
  1. If bouncing or chattering of the contacts results and causes problems, take the following countermeasures.
     (a)Insert an integral circuit.
     (b)Suppress the generation of pulse from the contact bouncing or chattering of the contacts so that it is less than the noise margin of the load.
  2. Conventional silver-plated contacts are not suited to this application. Use gold-plated contacts, which are ideal for handling minute voltage or current loads.
  3. The contacts of the Switch used for an emergency stop must be normally closed with a positive opening mechanism.
- In order to protect the Switch from damage due to short-circuits, be sure to connect a quick-response fuse with a breaking current 1.5 to 2 times larger than the rated current to the Switch in series. When complying with EN approved ratings, use a 10-A IEC 60269-compliant gI or gG fuse.

Operating Environment

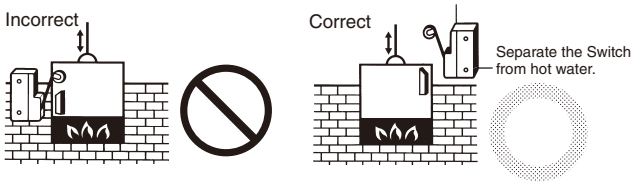
- Do not use the Switch by itself in atmospheres containing flammable or explosive gases. Arcs and heating resulting from switching may cause fire or explosion.
- Use protective covers to protect Switches that are not specified as waterproof or airtight whenever they are used in locations subject to splattering or spraying oil or water, or to accumulation of dust or dirt.



- The materials of Limit Switch may change in quality or deteriorate if the Limit Switch is used outdoors or any other location where the Limit Switch is exposed to special machining oil. Consult your OMRON representative before selecting the model.
- Be sure to install the Switch so that the Switch is free from dust or metal powder. The actuator and the switch casing must be protected from the accumulation of dust or metal powder.



- Do not use the Switch in locations where the Switch is exposed to hot water at a temperature greater than 60°C or steam.
- Do not use the Switch under temperatures or other environmental conditions not within the specified ranges.
  The rated permissible ambient temperature range varies with the model. Refer to the specifications in this catalog. If the Switch is exposed to radical temperature changes, the thermal shock may deform the Switch and the Switch may malfunction.



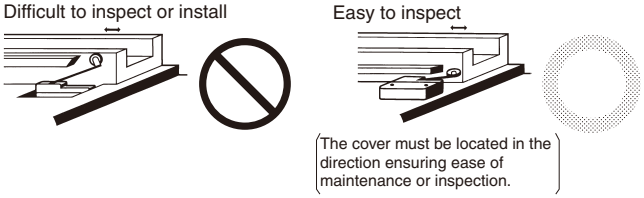
- Be sure to protect the Switch with a cover if the Switch is in a location where the Switch may be actuated by mistake or where the Switch is likely cause an accident.

- If vibration or shock is continuously imposed on the Switch, contact failure, malfunction, or decrease in service life may be caused by abrasive powder generated from the internal parts. If excessive vibration or shock is imposed on the Switch, the contacts may malfunction or become damaged. Make sure to install the Switch in locations free of constant vibration or shock.
- Do not use the Switch with silver-plated contacts for long periods if the switching frequency of the Switch is comparatively low or the load is minute. Otherwise, sulfuric film will be generated on the contacts and contact failures may result. Use the Switch with gold-plated contacts or use a dedicated Switch for minute loads instead.

- Do not use the Switch in locations with corrosive gas, such as sulfuric gas (H_2S or SO_2), ammonium gas (NH_3), nitric gas (HNO_3), or chlorine gas (Cl_2), or high temperature and humidity. Otherwise, contact failure or corrosion damage may result.
- If the Switch is used in locations with silicone gas, arc energy may create silicon dioxide (SiO_2) on the contacts and a contact failure may result. If there is silicone oil, silicone sealant, or wire covered with silicone close to the Switch, attach a contact protective circuit to suppress the arcing of the Switch or eliminate the source of silicone gas generation.

Regular Inspection and Replacement

- If the Switch is normally closed with low switching frequency (e.g., once or less than once a day), a reset failure may result due to the deterioration of the parts of the Switch. Regularly inspect the Switch and make sure that the Switch is in good working order.
- In addition to the mechanical durability or electrical durability of the Switch described previously, the durability of the Switch may decrease due to the deterioration of each part, especially rubber, resin, and metal. Regularly inspect the Switch and replace any part that has deteriorated in order to prevent accidents from occurring.
- If the Switch is not turned On or OFF for a long time, oxidation of the contacts may decrease contact reliability. Faulty continuity may result in accidents.
- Be sure to mount the Switch securely in a clean location to ensure ease of inspection and replacement. The Switch with operation indicator is available, which is ideal if the location is dark or does not allow easy inspection or replacement.



Storage of Switch

- When storing the Switch, make sure that the location is free of corrosive gas, such as H_2S, SO_2, NH_3, HNO_3, or Cl_2, or dust and does not have a high temperature or humidity.
- Be sure to inspect the Switch before use if it has been stored for three months or more.

Weather Resistance, Cold Resistance, and Heat Resistance

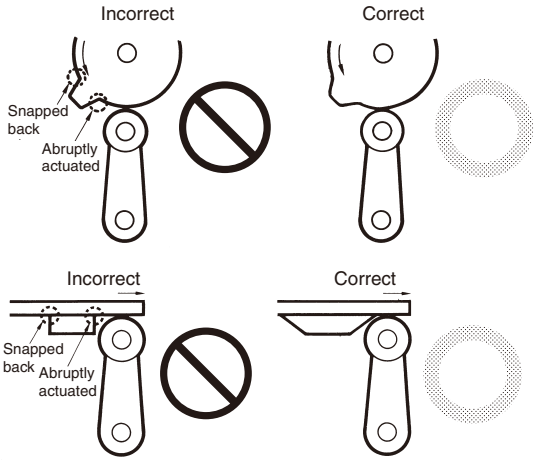
Silicon rubber is used to increase resistance to weather, cold, and heat. Silicon rubber, however, can generate silicon gas. (This can occur at room temperature, but the amount of silicon gas generated increases at higher temperatures.) Silicon gas will react as a result of arc energy and form silicon oxide (SiO_2). If silicon oxide accumulates on the contacts, contact interference can occur and can interfere with the device. Before using a Switch, test it under actual application conditions (including the environment and operating frequency) to confirm that no problems will occur in actual.

Outdoor Use

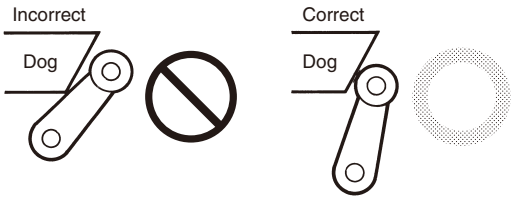
- If the Limit Switch is used in places with sludge or dust powder spray, make sure that the mechanical parts are sealed with a rubber cap.
- The rubber materials exposed to ozone may deteriorate. Check that the rubber parts are made of environment-resistive materials, such as chloroprene, silicone, or fluorine rubber.
- Due to capillary attraction, rainwater may enter the Limit Switch through the lead wires or sheath. Be sure to cover the wire connections in a terminal box so that they are not directly exposed to rainwater.
- If the Limit Switch is used outdoors, the steel parts of the Limit Switch (such as the screws and plunger parts) may corrode. Models with resistance against climatic conditions have been added to the series. Consider using outdoor models, such as the WL-□P1 or D4C-□P.
- "Limit Switch is used outdoors" refers to an environment where the Limit Switch is exposed directly to rainwater or sunlight (e.g., multistory parking facilities) excluding locations with corrosive gas or salty breezes. A Limit Switch used outdoors may not release due to icing and may not satisfy specified standards.

Operation

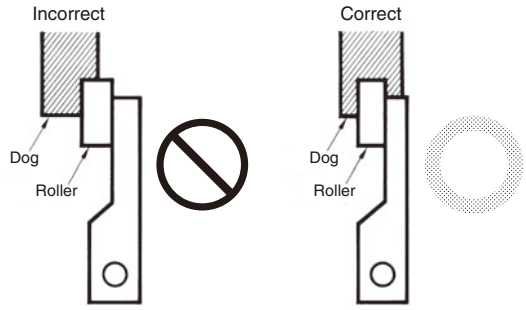
- Carefully determine the position and shape of the dog or cam so that the actuator will not abruptly snap back, thus causing shock. In order to operate the Limit Switch at a comparatively high speed, use a dog or cam that keeps the Limit Switch turned ON for a sufficient time so that the relay or valve will be sufficiently energized.
- The method of operation, the shape of the cam or dog, the operating frequency, and the travel after operation have a large influence on the durability and operating accuracy of the Limit Switch. The cam or dog must be smooth in shape.



- Appropriate force must be imposed on the actuator by the cam or dog in both rotary operation and linear operation.
  If the dog touches the lever as shown below, the operating position will not be stable.

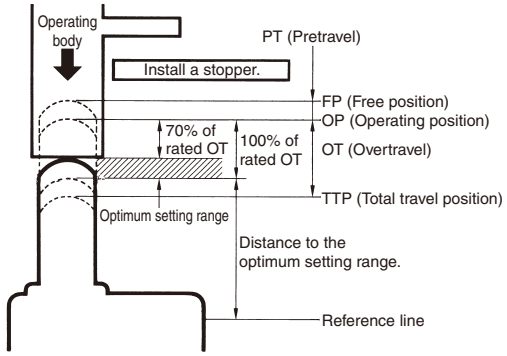


- Unbalanced force must not be imposed on the actuator. Otherwise, wear and tear on the actuator may result.

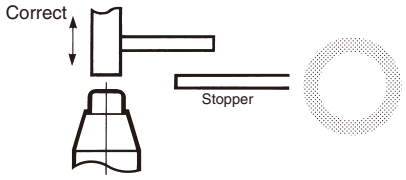


- With a roller actuator, the dog must touch the actuator at a right angle. The actuator or shaft may deform or break if the dog touches the actuator (roller) at an oblique angle.

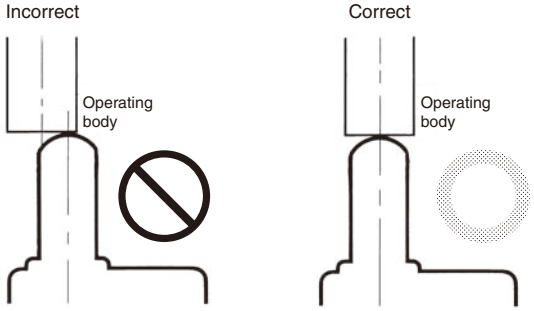
- Make sure that the actuator does not exceed the OT (overtravel) range, otherwise the Limit Switch may malfunction. When mounting the Limit Switch, be sure to adjust the Limit Switch carefully while considering the whole movement of the actuator.



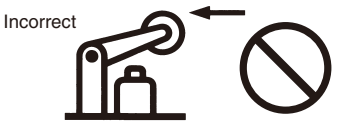
- The Limit Switch may soon malfunction if the OT is excessive. Therefore, adjustments and careful consideration of the position of the Limit Switch and the expected OT of the operating body are necessary when mounting the Limit Switch.



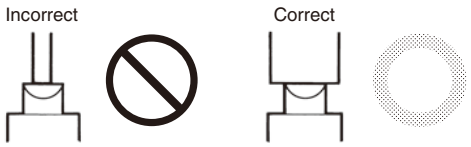
- When using a pin-plunger actuator, make sure that the stroke of the actuator and the movement of the dog are located along a single straight line.



- Be sure to use the Limit Switch according to the characteristics of the actuator.
  If a roller arm lever actuator is used, do not attempt to actuate the Limit Switch in the direction shown below.



- Do not modify the actuator to change the OP.
- With the long actuator of an Adjustable Roller Lever Switch, the following countermeasures against lever shaking are recommended.
  1. Make the rear edge of the dog smooth with an angle of 15° to 30° or make it in the shape of a quadratic curve.
  2. Design the circuit so that no error signal will be generated.
  3. Use a switch that is actuated in one direction only. (Alternatively, set the Switch so that it is operated only in one direction.)
- With a bevel plunger actuator, make sure that the width of the dog is wider than that of the plunger.



Dog Design

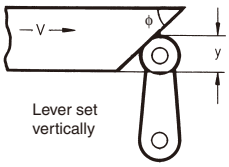
Speed and Angle of Dog and Relationship with Actuator

Before designing a dog, carefully consider the operating speed and angle of the dog (ϕ) and their relationship with the shape of the actuator. The optimum operating speed (V) of a standard dog at an angle of 30° to 45° is 0.5 m/s maximum.

Roller Lever Switches

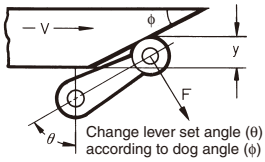
(1) Non-overtravel Dog

Dog speed: 0.5 m/s max. (standard speed)



ϕ	V max. (m/s)	y
30°	0.4	0.8 (TT) 80% of total travel
45°	0.25	
60°	0.1	
60° to 90°	0.05 (low speed)	

Dog speed: 0.5 m/s ≤ V ≤ 2 m/s (high speed)

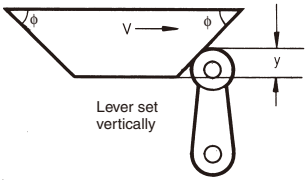


θ	ϕ	V max. (m/s)	y
45°	45°	0.5	0.5 to 0.8 (TT)
50°	40°	0.6	0.5 to 0.8 (TT)
60° to 55°	30° to 35°	1.3	0.5 to 0.7 (TT)
75° to 65°	15° to 25°	2	0.5 to 0.7 (TT)

Note: The above y values indicate the ratio ranges based on TT (total travel). Therefore, the optimum pressing distance of the dog is between 50% and 80% (or 50% and 70%).

(2) Overtravel Dog

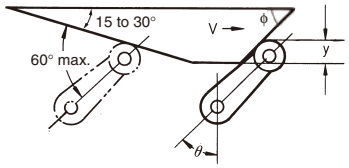
Dog speed: 0.5 m/s max.



ϕ	V max. (m/s)	y
30°	0.4	0.8 (TT) 80% of total travel
45°	0.25	
60°	0.1	
60° to 90°	0.05 (low speed)	

Dog speed: 0.5 m/s min.

If the speed of the overtravel dog is comparatively high, make the rear edge of the dog smooth at an angle of 15° to 30° or make it in the shape of a quadratic curve. Then lever shaking will be reduced.



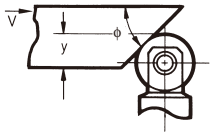
θ	ϕ	V max. (m/s)	y
45°	45°	0.5	0.5 to 0.8 (TT)
50°	40°	0.6	0.5 to 0.8 (TT)
60° to 55°	30° to 35°	1.3	0.5 to 0.7 (TT)
75° to 65°	15° to 25°	2	0.5 to 0.7 (TT)

Note: The above y values indicate the ratio ranges based on TT (total travel). Therefore, the optimum pressing distance of the dog is between 50% and 80% (or 50% and 70%).

Plunger Switches

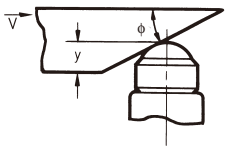
If the dog overrides the actuator, the front and rear of the dog may be the same in shape, provided that the dog is not designed to be separated from the actuator abruptly.

Roller Plunger



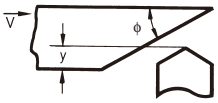
ϕ	V max. (m/s)	y
30°	0.25	0.6 to 0.8 (TT)
20°	0.5	0.5 to 0.7 (TT)

Ball Plunger



ϕ	V max. (m/s)	y
30°	0.25	0.6 to 0.8 (TT)
20°	0.5	0.5 to 0.7 (TT)

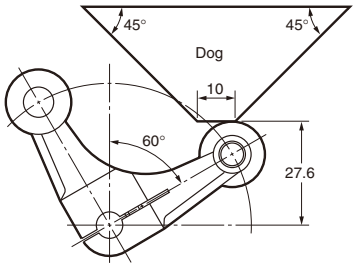
Bevel Plunger



ϕ	V max. (m/s)	y
30°	0.25	0.6 to 0.8 (TT)
20°	0.5	0.5 to 0.7 (TT)

Note: The above y values indicate the ratio ranges based on TT (total travel). Therefore, the optimum pressing distance of the dog is between 60% and 80% (or 50% and 70%).

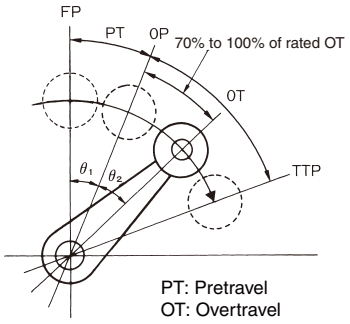
Fork Lever Lock Models



Note: Design the shape of the dog so that it does not come in contact with the other roller lever when the actuator is inverted.

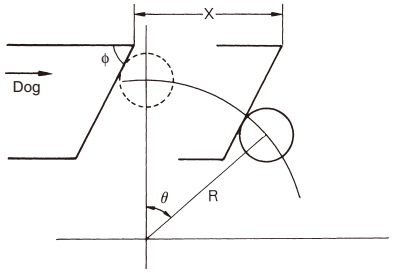
Stroke Settings vs. Dog Movement Distance

- The following information on stroke settings is based on the movement distance of the dog instead of the actuator angle.
  The following is the optimum stroke of the Limit Switch.
  Optimum stroke: PT + {Rated OT × (0.7 to 1.0)}
  In terms of angles, the optimum stroke is expressed as $\theta_1 + \theta_2$.



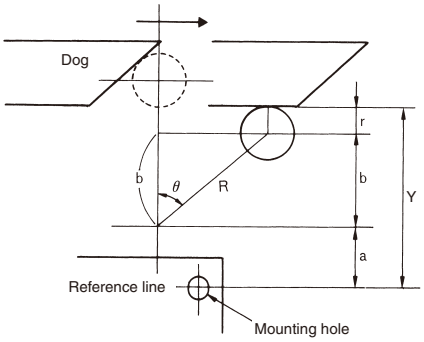
- The movement distance of the dog based on the optimum stroke is expressed by the following formula.
  Movement distance of dog

$$X = R\sin\theta + \frac{R\,(1-\cos\theta)}{\tan\phi}\ (mm)$$



ϕ: Dog angle
θ: Optimum stroke angle
R: Actuator length
X: Dog movement distance

- The distance between the reference line and the bottom of the dog based on the optimum stroke is expressed by the following formula.
  Y = a + b + r (mm)



a: Distance between reference line and actuator fulcrum
b: R cosθ
r: Roller radius
Y: Distance between reference line and bottom of dog

Dog Surface

The surface of dog touching the actuator should be 6.3 S in quality and a hardness of approximately HV450.
For smooth operation of the actuator, apply molybdenum disulfide grease to the actuator and the dog touching the actuator. This is ideal for Limit Switches of drip-proof construction and Multiple Limit Switches.

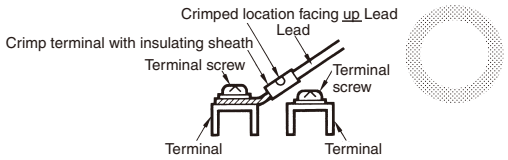
Maintenance and Repairs

The user of the system must not attempt to perform maintenance and repairs. Contact the manufacturer of the system concerning maintenance and repairs.

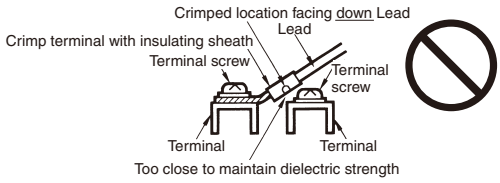
Other

- The standard material for the switch seal is nitrile rubber (NBR), which has superior resistance to oil. Depending on the type of oil or chemicals in the application environment, however, NBR may deteriorate, e.g., swell or shrink. Confirm performance in advance.
- The correct Switch must be selected for the load to ensure contact reliability. Refer to precautions for micro loads in individual product information for details.
- When using a Limit Switch with a long lever or long rod lever, make sure that the lever is in the downward direction.
- Wire the leads as shown in the following diagram.

Correct Wiring



Incorrect Wiring



- Reduced ambient temperature tends to result in hardening of the actuator's rubber seal. Therefore, reset may be delayed or reset may fail if the Switch is used with the actuator continually pressed in. Contact your OMRON representative if the Switch is to be used for this type of environment or application.

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

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