General-purpose Limit Switch

HL-5000

CSM_HL-5000_DS_E_3_7

Economical, Miniature Limit Switch Boasting Rigid Construction

- The Head, Box, and Cover mate with ridged surfaces to maintain strength.
- A unique Head structure provides a large OT for smooth operation.
- Easy-to-wire conduit opening design.
- Ideal for application in printing machines, forming machines, and light machines.
  (High Switches with high sealing characteristics, such as WL or D4C Switches, in locations subject to oil, water, or precipitation.)
- Models with grounding terminals conform to the CE marking.
- Approved by CCC (Chinese standard).
  (Ask your OMRON representative for information on approved models.)

⚠ Be sure to read *Safety Precautions* on page 4 to 5 and *Safety Precautions for All Limit Switches*.

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Model Number Structure

Model Number Legend

(Not all combinations are possible. Ask your OMRON representative for details.)

HL-5□□
(1)(2)

(1) Actuators

000: Roller lever
030: Adjustable roller lever
050: Adjustable rod lever
100: Sealed plunger
200: Sealed roller plunger
300: Coil spring

(2) Ground Terminal Specifications

Blank : Without ground terminal
G : With ground terminal/M5 tapping on the rear side

Ordering Information

Actuator	Model
Roller lever	HL-5000 *
Adjustable roller lever	HL-5030 *
Adjustable rod lever	HL-5050 *
Sealed plunger	HL-5100 *
Sealed roller plunger	HL-5200
Coil spring	HL-5300

* HL-5000 Limit Switches are offered with a choice of ground terminal/M5 tapping on the rear side conforming to various standards. When placing an order, add the code to the model number to indicate if ground terminal/M5 tapping on the rear side is required.
-G: with ground terminal/M5 tapping on the rear side.

Specifications

Approved Standards

Agency	Standard	File No.
CCC (CQC)	GB/T14048.5	Contact your OMRON representative for details.

Note: Ask your OMRON representative for information on approved models.

Ratings

Rated voltage	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	5		1.5	0.7	3		2	1
250 VAC	5		1	0.5	3		1.5	0.8
12 VDC	5		3		4		3	
24 VDC	5		3		4		3	
125 VDC	0.4	0.2	–		–		–	
250 VDC	0.4	0.2	–		–		–	

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. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.

Inrush current	NC	24 A max.
	NO	12 A max.

Approved Standard Ratings

CCC (GB/T14048.5)

Applicable category and ratings
AC-15 3 A/250 VAC

Characteristics

Degree of protection *2		IP65 (EN60947-5-1)
Durability *1	**Mechanical**	10,000,000 operations min. (under rated conditions)
	Electrical	See the following *Electrical Durability*.
Operating speed		5 mm/s to 0.5 m/s
Operating frequency	**Mechanical**	120 operations/min
	Electrical	30 operations/min
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact resistance		25 mΩ max. (initial value)
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between terminals of the same polarity
		1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground
		1,500 VAC, 50/60 Hz for 1 min between each terminal and non-current-carrying metal part
Rated frequency		50/60 Hz
Vibration resistance	**Malfunction**	10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	**Destruction**	1,000 m/s² max.
	Malfunction	300 m/s² max.
Ambient operating temperature		–5°C to +65°C (with no icing)
Ambient operating humidity		35% to 95%RH
Weight		Approx. 130 to 190 g

Note: 1. The above figures are initial values.
2. The above characteristics may vary depending on the model. For further details, contact your OMRON sales representative.

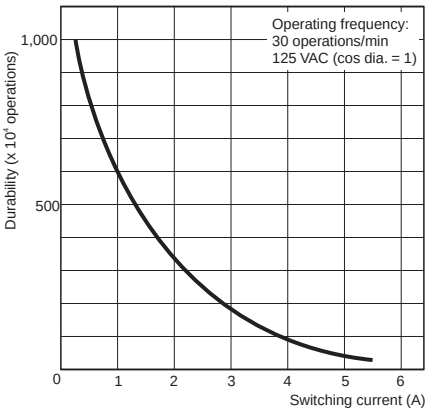
*1. The values are calculated at an operating temperature of +5°C to +35°C, and an operating humidity of 40% to 70%RH. Contact your OMRON sales representative for more detailed information on other operating environments.

*2. The degree of protection is tested using the method specified by the standard (EN60947-5-1). Confirm that sealing properties are sufficient for the operating conditions and environment beforehand.

Engineering Data

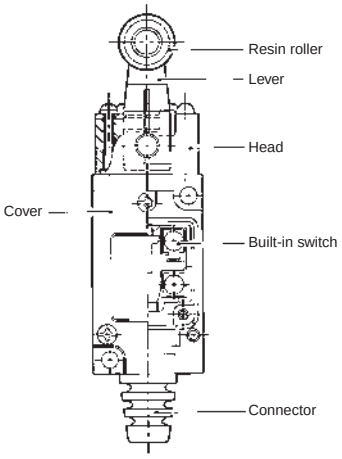
Electrical Durability (cos dia. =1)

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

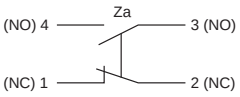


Structure and Nomenclature

Structure



Contact Form

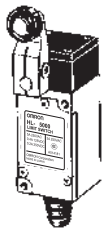


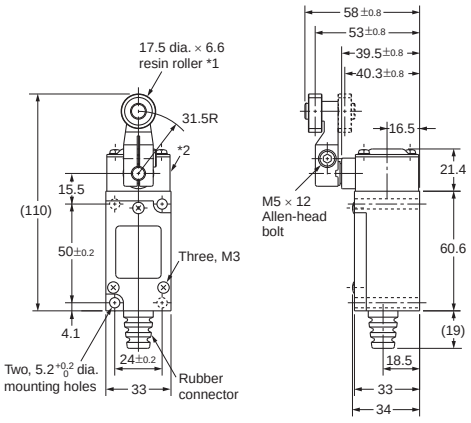
Dimensions and Operating Characteristics

(Unit: mm)

Switches (Dimensions not shown are the same as roller lever models.)

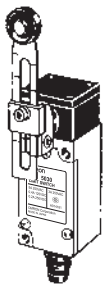
Roller Lever
HL-5000

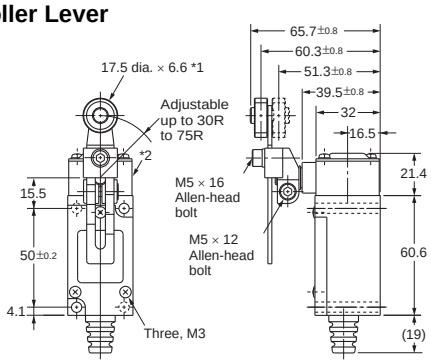




*1. The lever can be mounted anywhere in 360°.
*2. The head can be mounted in any of the four directions.

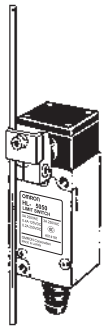
Adjustable Roller Lever
HL-5030

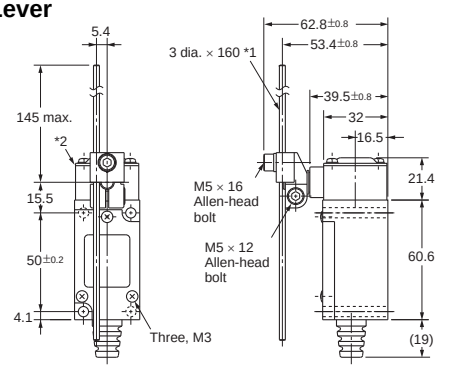




*1. Resin roller
*2. The head can be mounted in any of the four directions.

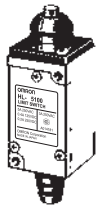
Adjustable Rod Lever
HL-5050

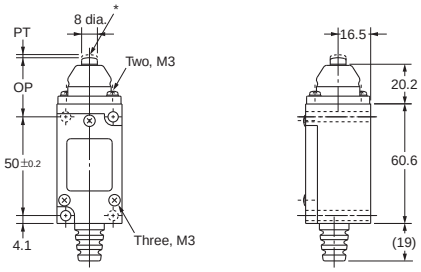




*1. Stainless steel rod
*2. The head can be mounted in any of the four directions.

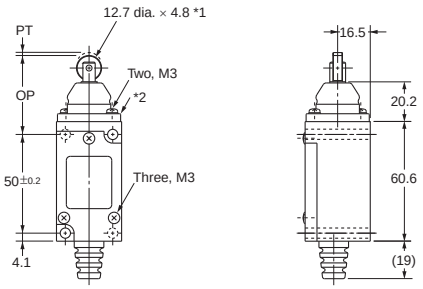
Sealed Plunger
HL-5100





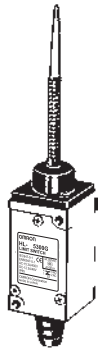
* Stainless steel plunger

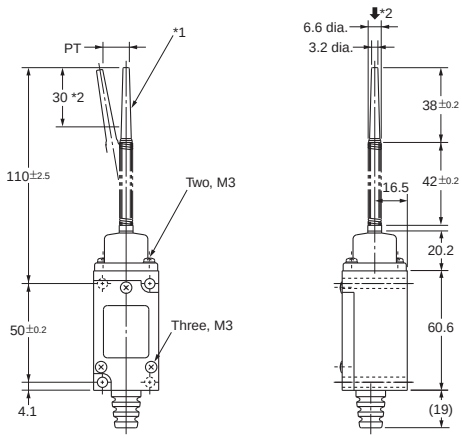
Sealed Roller Plunger
HL-5200



*1. Stainless sintered alloy roller
*2. The head can be mounted in either of the two directions.

Coil Spring
HL-5300





*1. Resin rod
*2. The coil spring may be operated from any directions except axial directions (⬇).
*3. The operating range of the dog or cam is the top third (i.e. from the tip of the rod) of the whole actuator.

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

Operating characteristics	Model	HL-5000	HL-5030 *	HL-5050 *	HL-5100	HL-5200	HL-5300
Operating force	OF max.	7.35 N	7.35 N	7.35 N	8.83 N	8.83 N	1.47 N
Release force	RF min.	0.98 N	0.98 N	0.98 N	1.47 N	1.47 N	–
Pretravel	PT max.	20°	20°	20°	1.5 mm	1.5 mm	30 mm
Overtravel	OT min.	50°	50°	50°	4 mm	4 mm	–
Movement Differential	MD max.	12°	12°	12°	1 mm	1 mm	–
Operating position	OP	–	–	–	30±0.8 mm	40±0.8 mm	–

* Measured with the types of the 31.5-mm arm or rod length.

OF and RF measured at the arm length of 75 mm for HL-5030, and 145 mm for HL-5050 (reference values).

	HL-5030	HL-5050
OF	3.09 N	1.60 N
RF	0.41 N	0.22 N

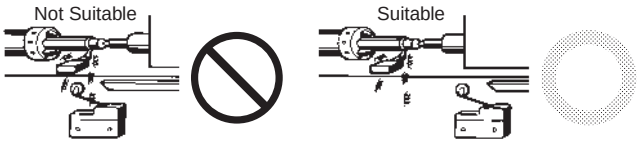
Safety Precautions

Refer to *Safety Precautions for All Limit Switches*.

Precautions for Correct Use

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.
- If there are materials that contain silicon components or phosphorus components in the vicinity of where the Switch is being used, these components may be converted into gas due to the type of the material or the operating temperature or humidity, resulting in inadequate conductivity. Examples of sources of silicon and phosphorous gas are shown below. Refer to these examples and implement countermeasures.

Examples of silicon gas sources

Sources

Silicon-based coating agents, silicon-based adhesives, silicon rubber, silicon oil/grease, silicon-based mold release agents, silicon filling agents, silicone power cables

Countermeasure details:

When a source of silicon gas exists, you are asked to suppress arcing with contact protective circuits, to remove this source from the vicinity of the Switch, or to change to a different material. Also, if you cannot avoid using the Switch in an environment where a source of silicon gas is present, check the Switch in the actual environment where it will be used and periodically inspect and replace the Switch.

Examples of phosphorus compound gas sources

Sources

Heat-shrinking tubes, lead wires, connectors, resin materials including red phosphorus, oil, industrial waste, decaying materials (garbage), seawater, insecticides, smoking materials, chemicals

Countermeasure details:

When a source of phosphorus compound gas exists, you are asked to remove this source from the vicinity of the Switch or to change to a different material. Also, if you cannot avoid using the Switch in an environment where a material including phosphorus (ammonium dihydrogen phosphate-based) components is present, check the Switch in the actual environment where it will be used and periodically inspect and replace the Switch.

Examples of material changes:

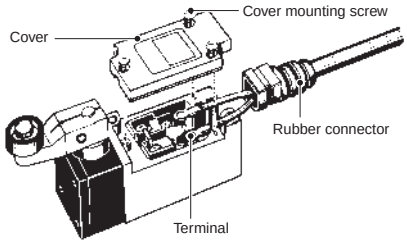
(1) Use M3.5-nylon insulation covered crimp terminals (round type) for wiring.

(2) When using heat-shrinking tubes, select those that do not use phosphorous or that use water-resistant red phosphorus. You can make it difficult for the phosphorus reaction to progress and thereby suppress the generation of gas by using heat-shrinking tubes that have undergone surface (waterproofing) treatment.

Wiring

Wiring Procedure

1. Loosen the cover mounting screws and remove the cover.
2. Disconnect the rubber connector from the box conduit and crimp a solderless terminal. The following solderless terminals are available.
3. After inserting the solderless terminal into the Switch, tighten the terminal screws securely.
4. After wiring the Limit Switch, insert the rubber connector into the groove of the box securely.
5. Tighten the three mounting screws evenly. The optimum tightening torque for each screw is 0.49 to 0.59 N·m.



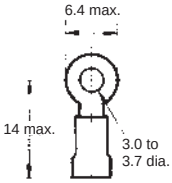
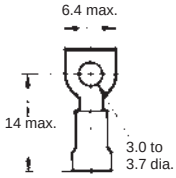
Applicable Lead Wires

Wire name	Applicable wire		
	Number of conductors	Conductor size	External size
Vinyl cabtire cord (VCTF)	2 3 4	0.75 mm²	Round, 6 to 9 dia. Flat, 9.4 max.
Vinyl cabtire cable (VCT)	2	0.75 mm²	
600-V vinyl-insulated sheath cable (VVF)	2	1 dia./1.2 dia./ 1.6 dia.	

Note: Do not use wires containing silicone, otherwise a contact failure may result.

Applicable Solderless Terminal

The following solderless terminals are available. Do not use fork or any other type of terminals, otherwise an accidental disconnection resulting in a ground fault may result.

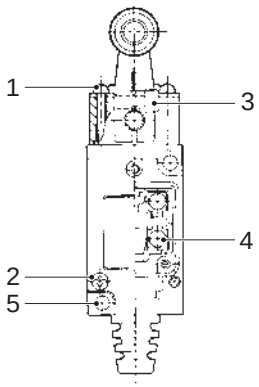
Terminal with insulated grip	
	

Appropriate Tightening Torque

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

No.	Type	Appropriate tightening torque
1	Head mounting screw	0.49 to 0.59 N·m
2	Cover mounting screw	0.49 to 0.59 N·m
3	Allen-head bolt	4.90 to 5.88 N·m
4	Terminal screw (M3 screw)	0.49 to 0.59 N·m
5	Switch mounting screw (M5 Allen-head bolt)	4.90 to 5.88 N·m

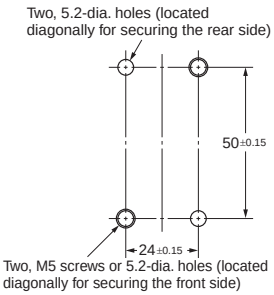
Note: If the head direction has been changed, check the torque of each screw and make sure that the screws are free of foreign substances, and that each screw is tightened to the proper torque.



Mounting

To mount the Limit Switch securely, be sure to use two M5 Allenhead bolts and washers.
The tightening torque applied to each bolt is 4.90 to 5.88 N·m. To mount the Limit Switch more securely, use two M5 screw holes on the rear panel and rear holes for positioning if the model is the HL-5□□□G-Series Limit Switches.

Mounting holes



Only the HL-5□□□G has M5 x 0.8 (10 depth min) screw holes on the rear side.

Others

- Do not use the Limit Switch outdoors, otherwise the Limit Switch will become damaged by rust or ozone.
- The Limit Switch is not suitable in places exposed to the spray of rainwater, seawater, or oily water. Consult your OMRON representative for models resisting rainwater, seawater, and oily water.
- If high-sealing performance is required along with shielded wiring or conduit wiring, use the D4C or WL.

Using the Switches

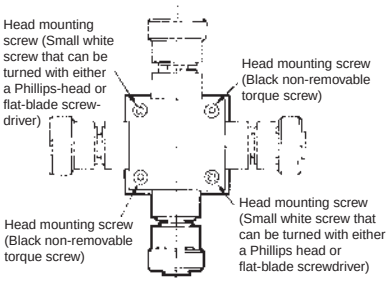
Actuator Position Change (HL-5000, HL-5030, HL-5050)

To change the angle of the actuator, loosen the Allen-head bolt on the side of the actuator lever. Then the actuator can be set at any angle.

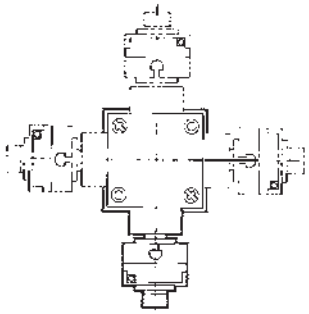
Head Direction Change (HL-5000, HL-5030, HL-5050, HL5200)

To change the head direction, loosen the two mounting screws. Then the head can be changed at 90° increments in one of four directions.

HL-5000
HL-5030

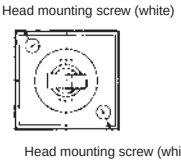


HL-5050



The head of the HL-5200 can be mounted in two directions only. (Refer to the following illustration.)

HL-5200



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