Safety Limit Switch

D4B-□N

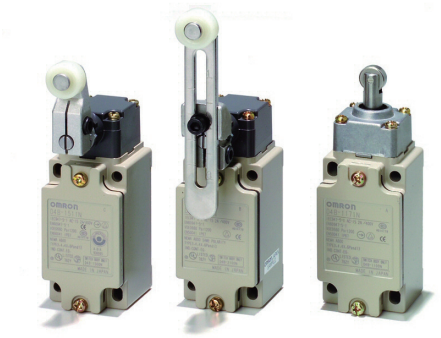
CSM_D4B-_N_DS_E_10_1

Robust safety limit switch with metal housing Slow-action and snap-action contact with certified direct opening operation certification

- Direct opening mechanism (NC contacts only) added to enable opening contacts when faults occur, such as fused contacts.
- Safety of lever settings ensured using a mechanism that engages a gear between the operating position indicator plate and the lever.
- Equipped with a mechanism that indicates the applicable operating zone, as well as push-button switching to control left and right motion.
- Head seal structure strengthened to improve seal properties (TÜV: IEC IP67, UL: NEMA 3, 4, 4X, 6P, and 13).
- Wide standard operating temperature range: –40 to 80°C (standard type).
- Certified standards: UL, CSA, EN (TÜV), and CCC.

⚠ Be sure to read the *"Safety Precautions"* on page 9.

Note: Contact your sales representative for details on models with safety standard certification.



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

D4B-□□□□N

1 2 3

1. Conduit size
- 2: G1/2 (PF1/2) (1-conduit)
- 4: M20 (1 conduit)

2. Built-in Switch
- 1: 1NC/1NO (snap-action)
- 5: 1NC/1NO (slow-action)
- A: 2NC (slow-action)

3. Actuator
- 11: Roller lever (resin roller)
- 15: Roller lever (stainless steel roller)
- 16: Adjustable roller lever
- 17: Adjustable rod lever
- 70: Top plunger
- 71: Top roller plunger

Ordering Information

Set Model Numbers

Consult with your OMRON representative when ordering any models that are not listed in this table.

Safety Limit Switches (with Direct Opening Mechanism)

Actuator	Conduit openings	1NC/1NO (Snap-action)		1NC/1NO (Slow-action)		2NC (Slow-action)	
		Model	Direct opening	Model	Direct opening	Model	Direct opening
Roller lever (resin roller)	G1/2 (PF1/2)	D4B-2111N	⊖	D4B-2511N	⊖	D4B-2A11N	⊖
	M20	D4B-4111N		D4B-4511N		D4B-4A11N	
Roller lever (stainless steel roller)	G1/2 (PF1/2)	D4B-2115N	⊖	D4B-2515N	⊖	D4B-2A15N	⊖
	M20	D4B-4115N		D4B-4515N		D4B-4A15N	
Top plunger	G1/2 (PF1/2)	D4B-2170N	⊖	D4B-2570N	⊖	D4B-2A70N	⊖
	M20	D4B-4170N		D4B-4570N		D4B-4A70N	
Top roller plunger	G1/2 (PF1/2)	D4B-2171N	⊖	D4B-2571N	⊖	D4B-2A71N	⊖
	M20	D4B-4171N		D4B-4571N		D4B-4A71N	

General-purpose Limit Switches

Actuator	Conduit openings	1NC/1NO (Snap-action)		1NC/1NO (Slow-action)		2NC (Slow-action)	
		Model	Direct opening	Model	Direct opening	Model	Direct opening
Adjustable roller lever	G1/2 (PF1/2)	D4B-2116N	---	D4B-2516N	---	D4B-2A16N	---
	M20	D4B-4116N		D4B-4516N		D4B-4A16N	
Adjustable rod lever	G1/2 (PF1/2)	D4B-2117N	---	D4B-2517N	---	D4B-2A17N	---
	M20	D4B-4117N		D4B-4517N		D4B-4A17N	

Note: Consult your OMRON representative for products.

Specifications

Standards and EC Directives

Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EN50041
- EN60204-1
- EN ISO 14119

Certified Standards

Snap-action Models

Certification body	Standard	File No.
TÜV Rheinland	EN60947-5-1 (certified direct opening mechanism) GS-ET-15	Consult your OMRON representative for details.
	EN60947-5-1 (uncertified direct opening mechanism)	J50005477 ✻
UL	UL508	E76675
CSA	C22.2 No. 14	LR45746
CQC (CCC)	GB14048.5	2003010305077612

✻ Adjustable roller lever, adjustable rod lever only.

Slow-action Models

Certification body	Standard	File No.
TÜV Rheinland	EN60947-5-1 (certified direct opening mechanism) GS-ET-15	Consult your OMRON representative for details.
	EN60947-5-1 (uncertified direct opening mechanism)	J50005477 ✻
UL	UL508	E76675
CSA	C22.2 No. 14	LR45746
CQC (CCC)	GB14048.5	2003010305077612

✻ Adjustable roller lever, adjustable rod lever only.

Certified Standard Ratings

TÜV (EN60947-5-1), CCC (GB14048.5)

Item	Utilization category	AC-15
Rated operating current (I_e)		2 A
Rated operating voltage (U_e)		400 V

Note: As protection against short-circuiting, use either a gI-type or gG-type 10 A fuse that conforms to IEC60269.

UL/CSA: (UL508, CSA C22.2 No. 14)

A600

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

Ratings

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
125 VAC	10		3	1.5	10		5	2.5
250	10		2	1	10		3	1.5
400	10		1.5	0.8	3		1.5	0.8
8 VDC	10		6	3	10		6	
14	10		6	3	10		6	
30	6		4	3	6		4	
125	0.8		0.2	0.2	0.8		0.2	
250	0.4		0.1	0.1	0.4		0.1	

Note: 1. The above values are continuous currents.
2. Inductive loads have a power factor of 0.4 or higher (AC) or a time constant of 7 ms or lower (DC).
3. Lamp loads have a inrush current of 10 times the normal current.
4. Motor loads have a inrush current of 6 times the normal current.

Inrush current	30 A max.

Characteristics

Degree of protection ✻1		IP67 (EN60947-5-1)
Durability ✻2	**Mechanical**	30,000,000 operations min. (snap-action) 10,000,000 operations min. (slow-action)
	Electrical	500,000 operations min. (10 A resistive load at 250 VAC)
Operating speed		1 mm/s to 0.5 m/s
Operating frequency	**Mechanical**	120 operations/minute
	Electrical	30 operations/minute
Contact resistance		25 mΩ max.
Minimum applicable load ✻3		180 mA resistive load at 5 VAC (N-level reference value)
Rated insulation voltage (U_i)		600 V (EN60947-5-1)
Rated frequency		50/60 Hz
Protection against electric shock		Class I (with ground terminal)
Pollution degree (operating environment)		3 (EN60947-5-1)
Impulse withstand voltage (EN60947-5-1)	**Between terminals of same polarity**	2.5 kV (snap-action)/4 kV (slow-action)
	Between terminals of different polarity	4 kV (slow-action)
	Between each terminal and ground	4 kV
Insulation resistance		100 MΩ min. (at 500 VDC) between terminals of the same polarity and between each terminal and non-current-carrying part
Contact gap		2 × 2 mm min. (slow-action) 2 × 0.5 mm min. (snap-action)
Vibration resistance	**Malfunction**	10 to 55 Hz, 0.75 mm single amplitude
Shock resistance	**Destruction**	1,000 m/s^2 min.
	Malfunction	300 m/s^2 min.
Conditional short-circuit current		100 A (EN60947-5-1)
Conventional enclosed thermal current (I_{the})		20 A (EN60947-5-1)
Ambient operating temperature		–40 to 80°C (with no icing)
Ambient operating humidity		95% max.
Weight		Approx. 250 g

Note: 1. The above values are initial values.
2. The above values may vary depending on the model. Consult your OMRON sales representative for details.

✻1. 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.

✻2. The durability is for an ambient temperature of 5 to 35°C and ambient humidity of 40% to 70%. For further conditions, consult your OMRON sales representative.

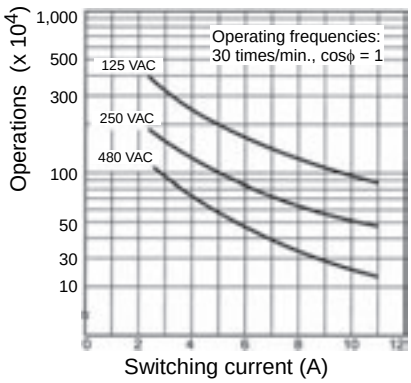
✻3. The above values may vary depending on switching frequency, environmental condition, and relativity level, consult your OMRON sales representative.

Engineering Data

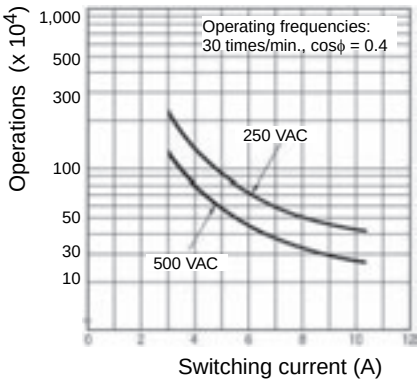
Electrical Durability (Snap-action)

(Ambient temperature: 5 to 30°C, ambient humidity: 40 to 70%)

(cosϕ = 1)



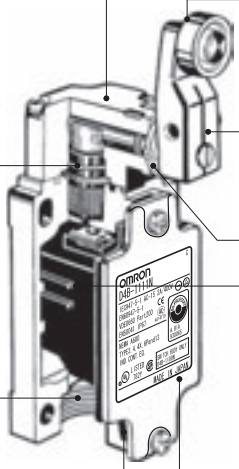
(cosϕ = 0.4)



Structure and Nomenclature

Structure

The roller lever switch employs a system which allows selection of operation on only one side (left or right) or both sides without the use of any tools.



Head
Can be connected in any of four directions (except for Roller Plunger Models, which can be connected at either of 2 directions that differ by 90°)

Roller
Nylon rollers used for superior resistance to wear.

Lever (Form Lock Structure)
The lever has an operating position indication plate and grooves that mate every 90° to prevent slipping between the rotary axis and lever.

The operating position indicator plate

Built-in Switch
Direct opening mechanism used for NC contact to separate contact for faults, such as contact welding. The heights of the NC and NO terminals are different to enable easier wiring.

Seal Ring
Sealing properties improved by using a X ring and bearing-free structure.

Conduit Opening
G1/2 or M20

Cover

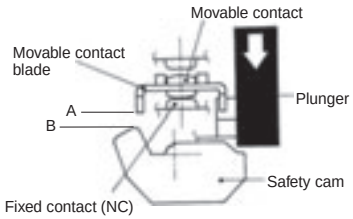
Ground Screw
Ground screws are provided on all models for increased safety.

Direct Opening Mechanism

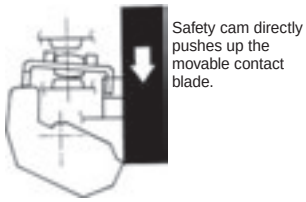
1NO/1NC Contact (Snap-action)

Conforms to EN60947-5-1 Direct Opening ⊖ (Only NC contact has a direct opening mechanism.)

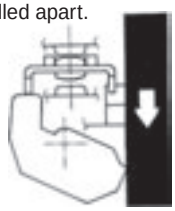
1. When contact welding occurs.



2. When contacts are being pulled apart.

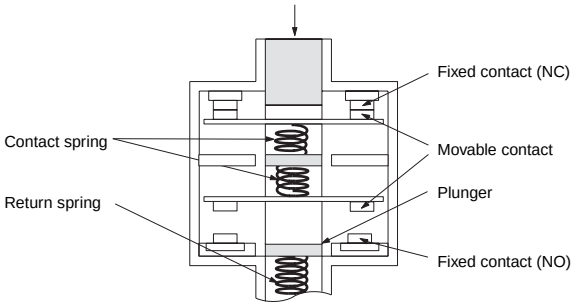


3. When contacts are completely pulled apart.



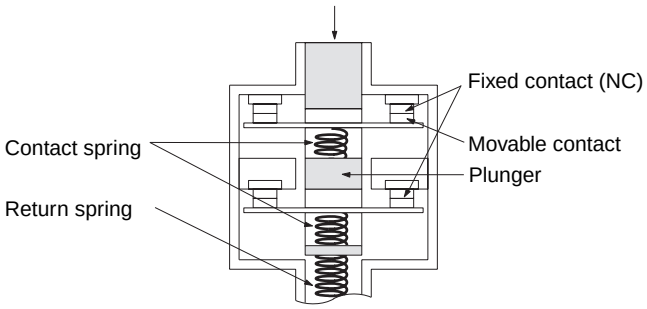
1NC/1NO Contact (Slow-action)

Conforms to EN60947-5-1 Direct Opening ⊖
(Only NC contact has a direct opening mechanism.)
When contact welding occurs, the contacts are separated from each other by the plunger being pushed in.

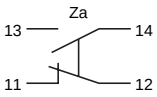
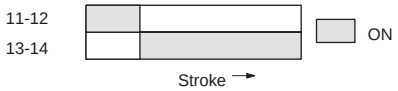
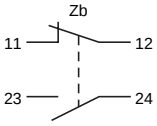
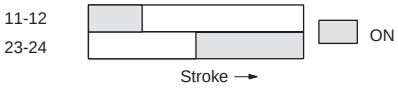
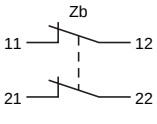
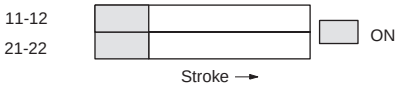


2NC Contact (Slow-action)

Conforms to EN60947-5-1 Direct Opening ⊖
(Both NC contacts have a direct opening mechanism.)
When contact welding occurs, the contacts are separated from each other by the plunger being pushed in.



Contact Form

Model	Contact	Contact form	Diagrams	Explanation
D4B-□1□N	1NC/1NO (Snap-action)			Only NC contact 11-12 has a certified direct opening mechanism. ⊖ Terminal numbers 11-12 and 13-14 cannot be used as unlike poles.
D4B-□5□N	1NC/1NO (Slow-action)			Only NC contact 11-12 has a certified direct opening mechanism. ⊖ Terminal numbers 11-12 or 23-24 can be used as unlike poles.
D4B-□A□N	2NC (Slow-action)			Both NC contacts 11-12 and 21-22 have a certified direct opening mechanism. ⊖ Terminal numbers 11-12 and 21-22 can be used as unlike poles.

Note: Terminal numbers are according to EN50013; contact symbols are according to IEC60947-5-1.

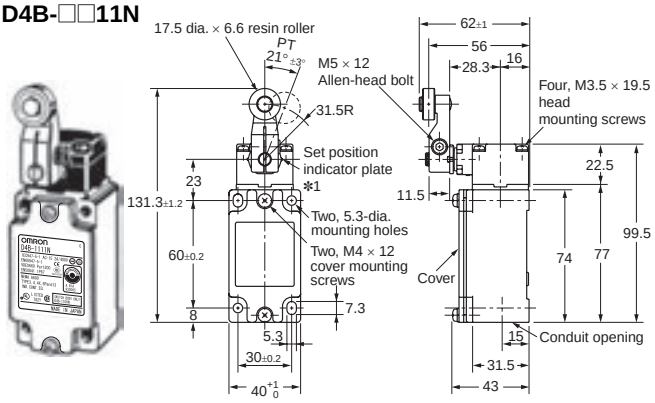
Dimensions and Operating Characteristics

(Unit: mm)

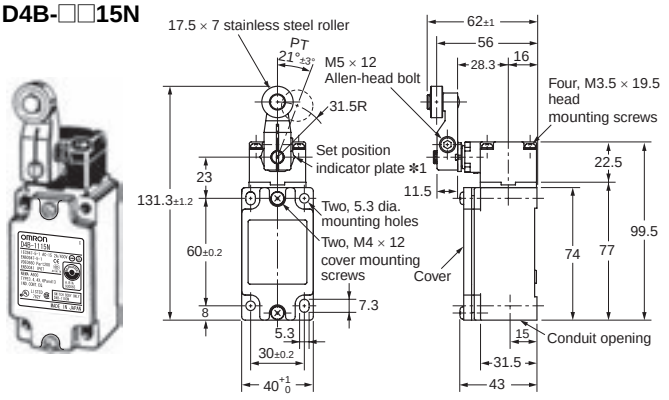
Note: Omitted dimensions are the same as those for the Roller Lever Type Models
D4B-2□□□N have a G1/2 conduit opening.
D4B-4□□□N have a M20 conduit opening.

Switches

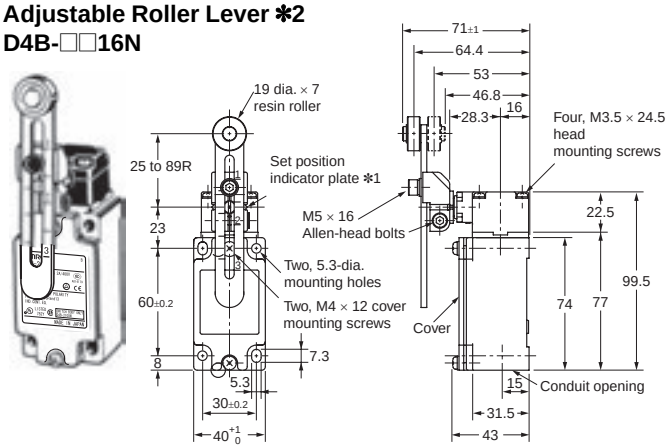
Roller Lever
D4B-□□11N



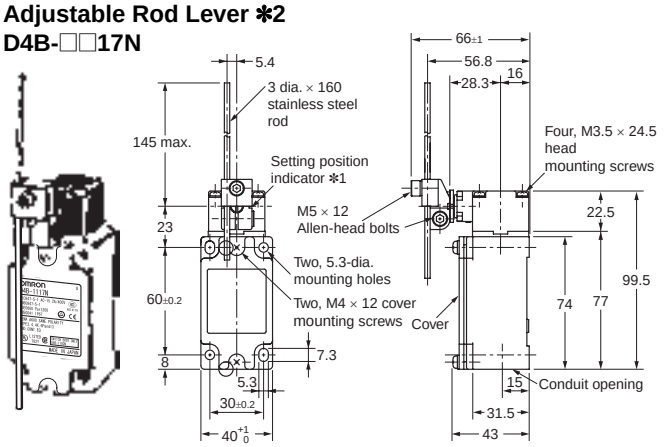
Roller Lever (Stainless Steel Roller)
D4B-□□15N



Adjustable Roller Lever ✻2
D4B-□□16N



Adjustable Rod Lever ✻2
D4B-□□17N

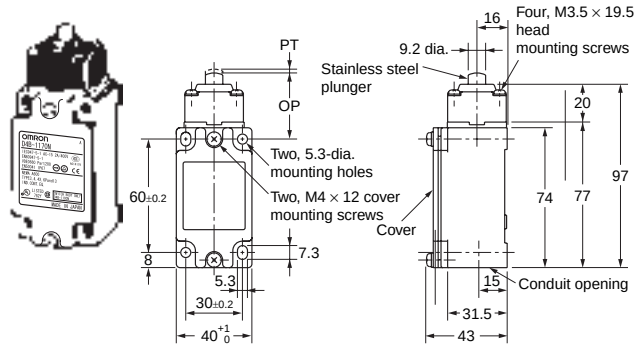


Note: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
✻1. The lever can be set to any desired position by turning the operating position indicator.
✻2. In terms of construction, the Switch is a General-purpose Limit Switch rather than a Safety Limit Switch.

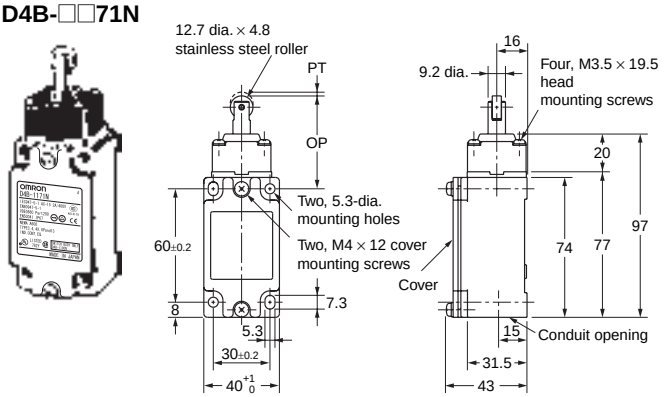
Operating characteristics	Model	D4B-□□11N	D4B-□□15N	D4B-□□16N ✻1	D4B-□□17N ✻2
Operating force	OF max.	9.41N	9.41N	9.41N	2.12N
Release force	RF min.	1.47N	1.47N	1.47N	0.29N
Pretravel	PT	21°±3°	21°±3°	21°±3°	21°±3°
	PT (2nd) ✻3 ✻5	(45°)	(45°)	(45°)	(45°)
Overtravel	OT min.	50°	50°	50°	50°
Movement differential	MD max. ✻4	12°	12°	12°	12°
Direct opening travel	DOT min. ✻3 ✻6	35°	35°	35°	35°
	✻4 ✻6	55°	55°	55°	55°
Direct opening force	DOF min. ✻6	19.61N	19.61N	19.61N	19.61N
Total travel	TT ✻5	(75°)	(75°)	(75°)	(75°)

Note: Variation occurs in the simultaneity of contact opening/closing operations of 2NC contacts. Check contact operation.
✻1. The operating characteristics of these Switches were measured with the roller level set at 31.5 mm.
✻2. The operating characteristics of these Switches were measured with the rod level set at 140 mm.
✻3. Only for slow-action models.
✻4. Only for snap-action models.
✻5. Reference values.
✻6. Must be provided to ensure safe operation.

Top Plunger
D4B-□□70N



Top Roller Plunger
D4B-□□71N



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

Operating characteristics	Model	D4B-□□70N	D4B-□□71N
Operating force	**OF max.**	18.63 N	18.63 N
Release force	**RF min.**	1.96 N	1.96 N
Pretravel	**PT max.**	2 mm	2 mm
	PT (2nd) ✻1 ✻3	(3 mm)	(3 mm)
Overtravel	**OT min.**	5 mm	5 mm
Movement differential	**MD max. ✻2**	1 mm	1 mm
Direct opening travel	**DOT min. ✻4**	3.2 mm	3.2 mm
Direct opening force	**DOF min. ✻4**	49.03 N	49.03N
Total travel	**TT ✻3**	(7 mm)	(7 mm)
Free position	**FP max.**	38 mm	51 mm
Operating position	**OP**	35±1 mm	48±1 mm

Note: Variation occurs in the simultaneity of contact opening/closing operations of 2NC contacts. Check contact operation.

✻1. Only for slow-action models.

✻2. Only for snap-action models.

✻3. Reference values.

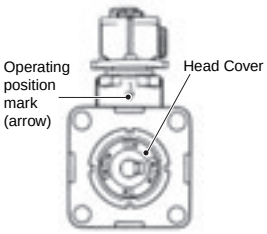
✻4. Must be provided to ensure safe operation.

Application Precaution

Changing the Operating Direction

Switches with Roller Levers

The operating direction of the lever can be easily changed without using any tools. It can be set to clockwise operation (CW) or counterclockwise (CCW) operation.
Use the procedure given at the right to change the operating direction.

Operating section (on back of Head)	Operating procedure
	**1.** Remove the four Head set screws and remove the Head from the Switch Box.
	2. Turn the bottom of the Head toward you, press in the Head Cover shown in the diagram at the left, and turn the Cover clockwise or counterclockwise. **Note:** The factory setting is for “CW.CCW.”
	3. The “CW” setting is for clockwise operation and the “CCW” setting is for counterclockwise operation. Set the Cover to the desired position.

Safety Precautions

Be sure to read the precautions **for All Safety Limit Switches** in the website at:http://www.ia.omron.com/.

Indication and Meaning for Safe Use

Precautions for Safe Use	**Supplementary comments on what to do or avoid doing, to use the product safely.**
Precautions for Correct Use	**Supplementary comments on what to do or avoid doing, to prevent failure to operate, or undesirable effect on product performance.**

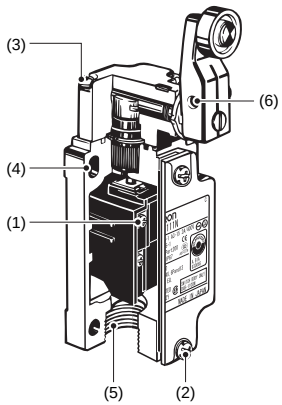
Precautions for Safe Use

- Do not use the Switch submerged in oil or water, or in locations continuously subject to splashes of oil or water. Doing so may result in oil or water entering the Switch interior. (The IP67 degree of protection specification for the Switch refers to water penetration while the Switch is submersed in water for a specified period of time.)
- Always attach the cover after completing wiring and before using the Switch. Also, do not turn ON the Switch with the cover open. Doing so may result in electric shock.

Precautions for Correct Use

Appropriate Tightening Torque

Be sure to tighten each screw of the D4B-□N properly, otherwise the D4B-□N may malfunction.



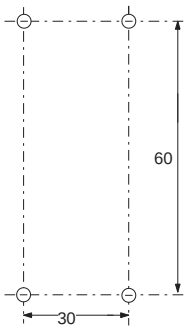
	Type	Appropriate tightening torque
1	M3.5 terminal screw	0.59 to 0.78 N·m
2	Cover mounting screw ✻	1.18 to 1.37 N·m
3	Head mounting screw	0.78 to 0.88 N·m
4	M5 body mounting screw	4.90 to 5.88 N·m
5	Connector	1.77 to 2.16 N·m
6	Lever Mounting Screws (Roller Levers)	4.90 to 5.88 N·m

Mounting

Use four M5 screws with washers to mount the standard model. Be sure to apply the proper torque to tighten each screw.

Mounting Dimensions (M5)

Standard Model



Changes in Actuator Mounting Position

- To change the angle of the lever, loosen the Allen-head bolts on the side of the lever.
- The operating position indicator plate ✻ has protruding parts which engage with the lever, thus allowing changes to the lever position by 90°.
- The back of the operating position indicator plate ✻ has no protruding parts. If this plate is turned over and attached, any angle within a 360° range can be set. Do not turn over the plate, however, when using the D4B-□N as a switch with a certified direct opening mechanism. For an SUVA- or BIA-certified application, make sure that the lever engages with the operating position indicator plate securely so that the lever will not slip.

✻ The operating position indicator plate: Refer to page 5.

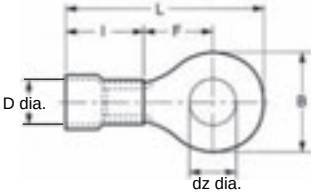
Changes in Head Mounting Position

By removing the screws on the four corners of the head, the head can be reset in any of four directions. Make sure that no foreign materials will penetrate through the head.

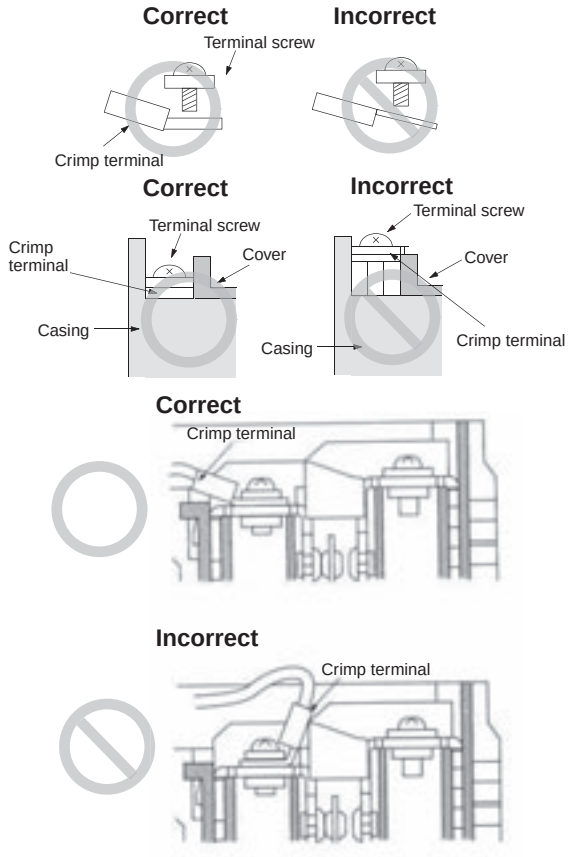
Wiring

Do not connect the bare lead wires directly to the terminals but be sure to connect each of them by using an insulation tube and M3.5 round crimp terminals and tighten each terminal screw within the specified torque range.
The proper lead wire is 20 to 14 AWG (0.5 to 2.5 mm^2) in size.

dz dia.: 3.7 mm
D dia.: 4.5 mm
B: 7.0 mm
L: 20.2 mm
F: 7.7 mm
I: 9.0 mm



Make sure that all crimp terminals come into contact with the casing or cover as shown below, otherwise the cover may not be mounted properly or the D4B-□N may malfunction.

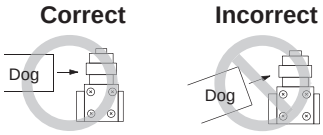


Conduit Opening

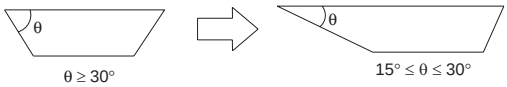
- Make sure that each connector is tightened within the specified torque range.
  The casing may be damaged if the connector is tightened excessively.
- Use an OMRON SC-series Connector (sold separately) that is suited to the cable in diameter.

Others

- The load for the actuator (roller) of the Switch must be imposed on the actuator in the horizontal direction, otherwise the actuator or the rotating axis may be deformed or damaged.



- When using a long lever model, the D4B-□□16N or D4B-□□17N, the Switch may telegraph. To avoid telegraphing, take the following precautions.
  1. Set the lever to operate in one direction.
  2. Modify the rear end of the dog to an angle of 15° to 30° as shown below or to a secondary-degree curve.



  3. Modify the circuit so as not to detect the wrong operating signals.

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