

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

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.

- 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.

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	10 A	60	6	7,200	720
240 VAC		30	3		
480 VAC		15	1.5		
600 VAC		12	1.2		

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

Inrush current	30 A max.
----------------	-----------

Characteristics

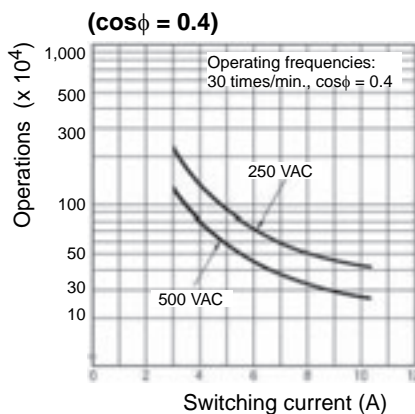
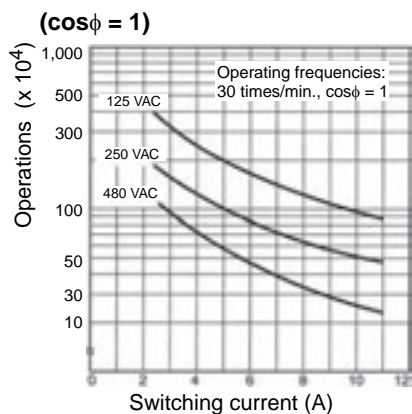
Degree of protection *1	IP67 (EN60947-5-1)	
Durability *2	Mechanical	30,000,000 operations min. (snap-action) 10,000,000 operations min. (slow-action)
	Electrical	500,000 operations min. (10 A resistive load at 250 VAC)
Operating speed	1 mm/s to 0.5 m/s	
Operating frequency	Mechanical	120 operations/minute
	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:**
- The above values are initial values.
 - 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%)



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.

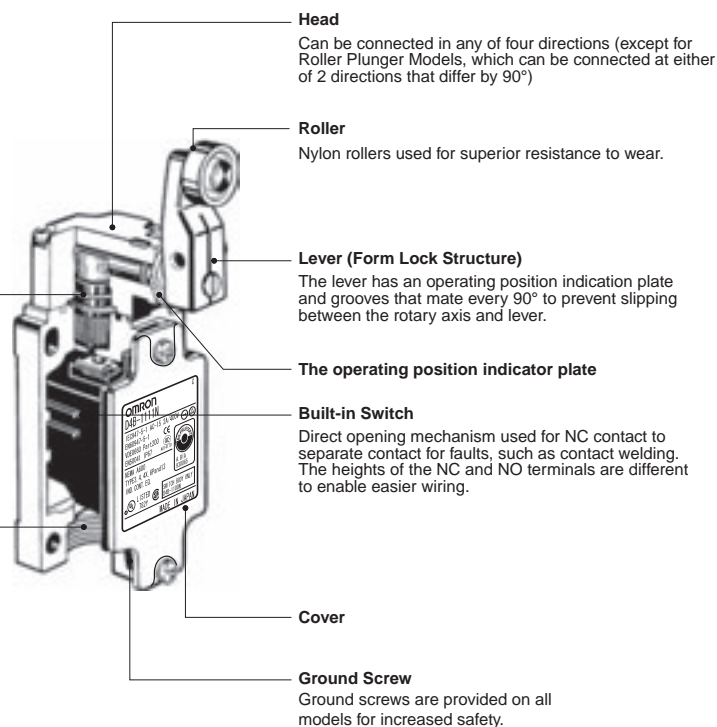


Seal Ring

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

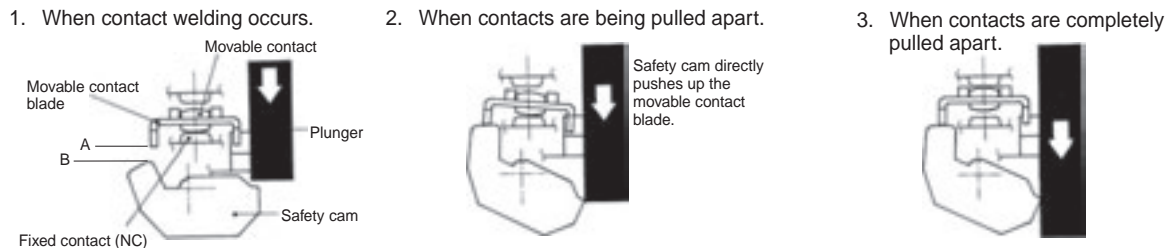
Conduit Opening

G1/2 or M20



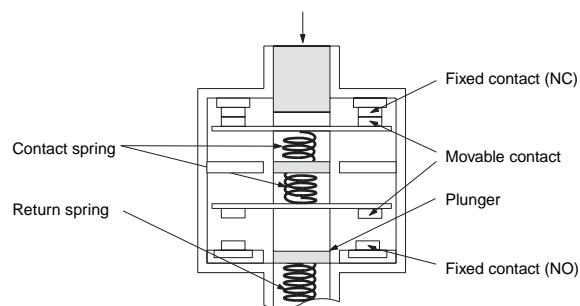
Direct Opening Mechanism 1NO/1NC Contact (Snap-action)

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



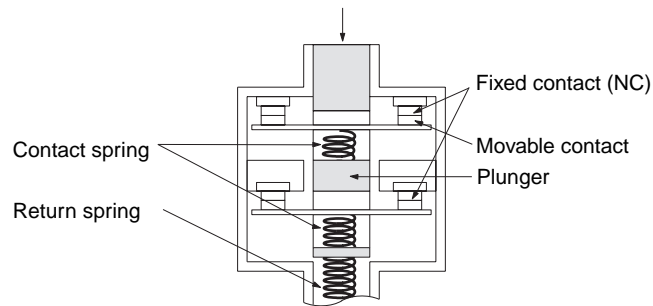
1NC/1NO Contact (Slow-action)

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

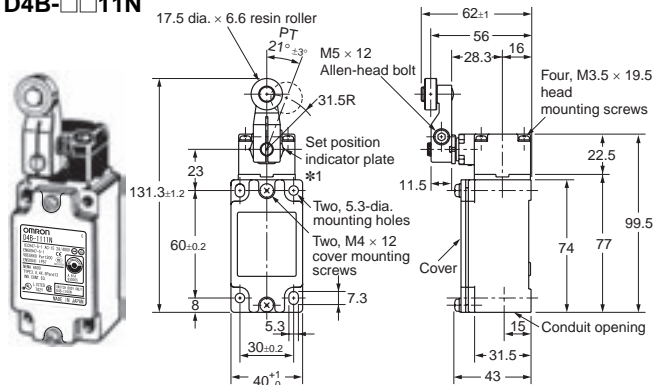
Note: Terminal numbers are according to EN50013; contact symbols are according to IEC60947-5-1.

Dimensions and Operating Characteristics

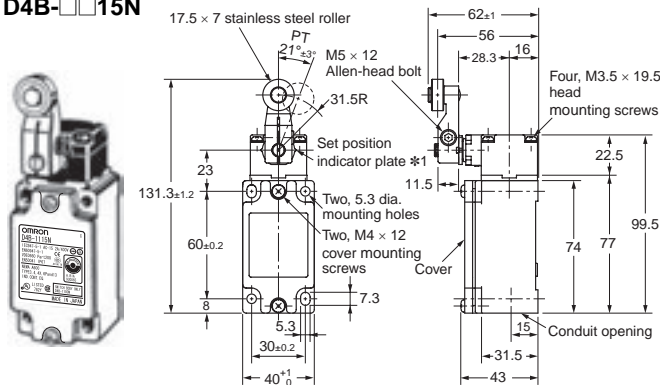
Note: Omitted dimensions are the same as those for the Roller Lever Type Models
 D4B-2□□□N have a G1/2 conduit opening.
 D4B-4□□□N have a M20 conduit opening.

Switches

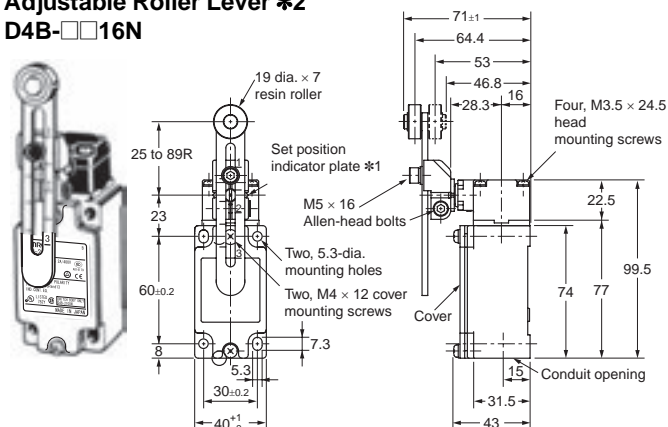
Roller Lever
D4B-□□11N



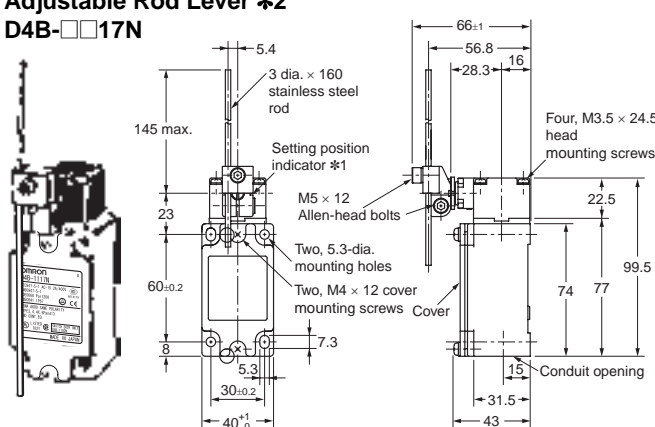
Roller Lever (Stainless Steel Roller)
D4B-□□15N



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°
Overtravel	PT (2nd) *3 *5 OT min.	(45°) 50°	(45°) 50°	(45°) 50°	(45°) 50°
Movement differential	MD max. *4	12°	12°	12°	12°
Direct opening travel	DOT min. *3 *6 *4 *6	35° 55°	35° 55°	35° 55°	35° 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.

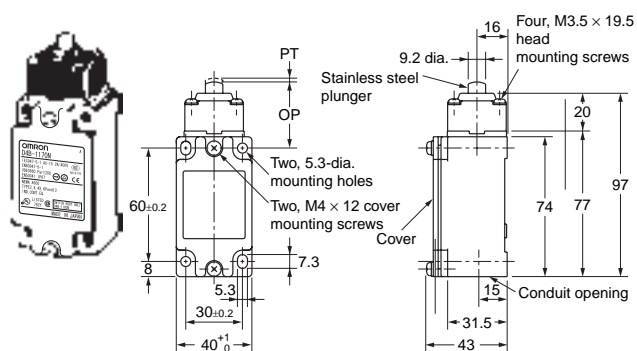
*3. Only for slow-action models.

*4. Only for snap-action models.

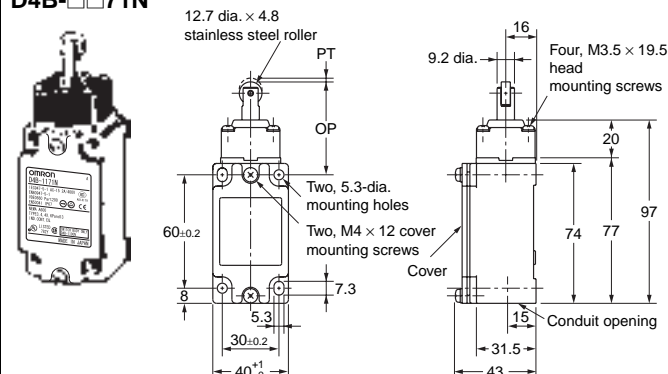
*5. Reference values.

*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.

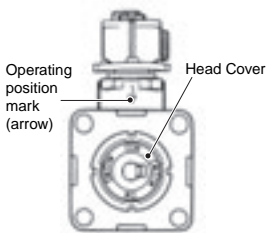
*4. Must be provided to ensure safe operation.

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
	<ol style="list-style-type: none"> 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. <p>Note: The factory setting is for "CW.CCW."</p> <ol style="list-style-type: none"> 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.

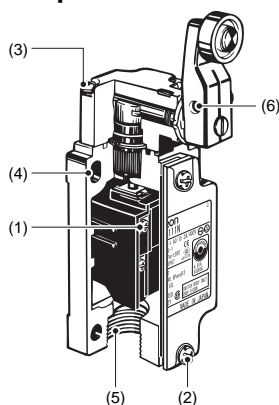
Precautions for Safe Use

- 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 submerged 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.

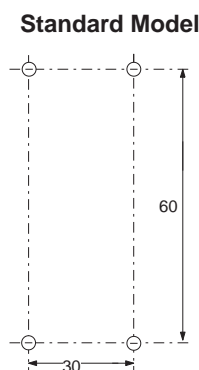


	Type	Appropriate tightening torque
1	M3.5 terminal screw	0.59 to 0.78 N·m
2	Cover mounting screw *	1.18 to 1.37 N·m
3	Head mounting screw	0.78 to 0.88 N·m
4	M5 body mounting screw	4.90 to 5.88 N·m
5	Connector	1.77 to 2.16 N·m
6	Lever Mounting Screws (Roller Levers)	4.90 to 5.88 N·m

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)



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.

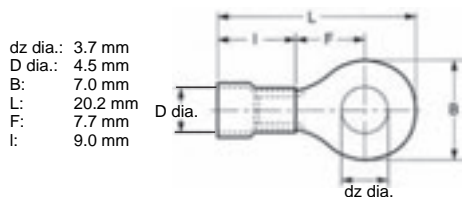
Changes in Head Mounting Position

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.

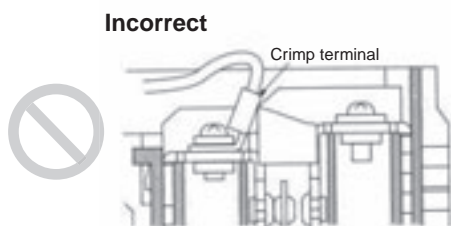
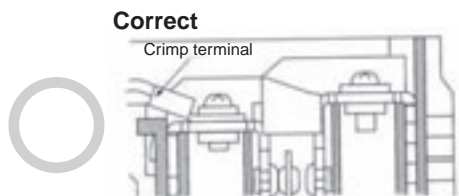
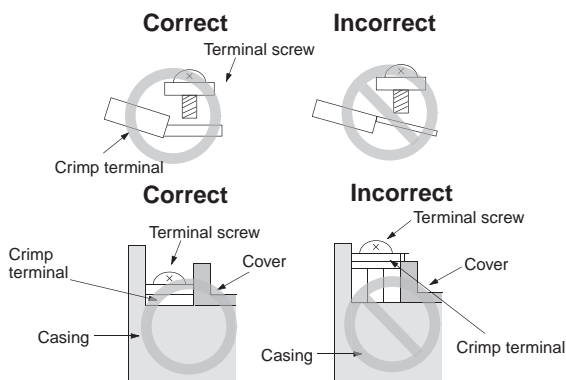
Wiring

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 mm²) in size.



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.

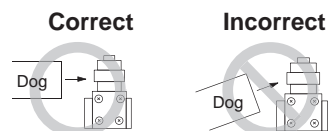


Conduit Opening

- 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.

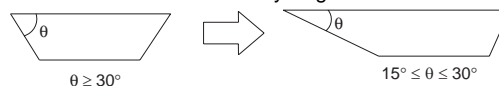
Others

- 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.

Terms and Conditions Agreement

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.

Warranties.

(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

(b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

Limitation on Liability; Etc.

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

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

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

2015.4

In the interest of product improvement, specifications are subject to change without notice.

OMRON Corporation
Industrial Automation Company

<http://www.ia.omron.com/>

(c)Copyright OMRON Corporation 2015 All Right Reserved.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».



JONHON

«**JONHON**» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«**FORSTAR**» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А