

General-purpose Limit Switch

D4B-□N

- Snap-action or slow-action contact for accurate switching with safe operation via direct drive positive contact opening even with metal deposition between mating contacts.
- Two sets of contact: one (NC) for safety circuit and the other (NO) for control circuit.
- Enclosure rating: IP67 (IEC529), UL/CSA type 3, 4, 4X, 6P and 13.
- Wide standard operating temperature range: -40°C to 80°C (standard type).
- Conforms to EN50041 (42.5 x 60 mm) with the Forms A, B, C and D.
- Actuators are interchangeable and can be mounted in any of four directions.
- 3-conduit switches are available.
- Safety Standards:
 - Conformity:
 - Machinery Directive
 - Low Voltage Directive
 - EN1088
 - EN50041
 - Approval:



Agency	Standard	File No.	
		Snap-action	Slow-action
TÜV Rheinland	EN60947-5-1 ⊕	With ⊕ R9850211 Without ⊕ R9151372	R9151643
BIA	EN60947-5-1 GS-ET-15 ⊕	Pending	9202158
UL	UL508	E76675	
CSA	CSA C22.1 No.14	LR45746	
SUVA	SUVA ⊕	Pending	4887

Ordering Information

Model Number Legend:

D4B - □ □ □ □ N - □
1 2 3 4

1. Conduit

- 1: PG13.5 (standard)
- 2: G1/2 (PF1/2) (standard)
- 3: 1/2-14NPT (standard)
- 5: PG13.5 (3-conduit)
- 6: G1/2 (PF1/2) (3-conduit)
- 7: 1/2-14NPT (3-conduit)

2. Built-in Switch

- 1: 1NC/1NO (Snap-action)
- A: 2NC (Slow-action)
- 5: 1NC/1NO (Slow-action)

3. Actuator

- 11: Roller lever (standard)
- 16: Adjustable roller lever
- 17: Adjustable rod lever
- 70: Top plunger
- 71: Top roller lever
- 81: Coil spring
- 87: Plastic rod
- 00: Switch box (without head)
- 1R: Roller lever (conventional D4B-compatible)

4. Indicator

- LD: LED (10 to 115 VDC/VAC)
- LE: Neon lamp (125/250 VAC)

■ Standard Switch (EN50041)

Actuator		Conduit size								
		PG13.5 (see note 2)			G1/2			1/2-14NPT		
		1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)
Side rotary	Roller lever (form A)	D4B-1111N	D4B-1511N	D4B-1A11N	D4B-2111N	D4B-2511N	D4B-2A11N	D4B-3111N	D4B-3511N	D4B-3A11N
	Adjustable roller lever (see note 1)	D4B-1116N	D4B-1516N	D4B-1A16N	D4B-2116N	D4B-2516N	D4B-2A16N	D4B-3116N	D4B-3516N	D4B-3A16N
	Adjustable rod lever (form D) (see note 1)	D4B-1117N	D4B-1517N	D4B-1A17N	D4B-2117N	D4B-2517N	D4B-2A17N	D4B-3117N	D4B-3517N	D4B-3A17N
Top plunger	Plain (form B)	D4B-1170N	D4B-1570N	D4B-1A70N	D4B-2170N	D4B-2570N	D4B-2A70N	D4B-3170N	D4B-3570N	D4B-3A70N
	Roller (form C)	D4B-1171N	D4B-1571N	D4B-1A71N	D4B-2171N	D4B-2571N	D4B-2A71N	D4B-3171N	D4B-3571N	D4B-3A71N
Wobble lever (see note 3)	Coil spring	D4B-1181N	---	D4B-1A81N	D4B-2181N	---	D4B-2A81N	D4B-3181N	---	D4B-3A81N
	Plastic rod	D4B-1187N	---	D4B-1A87N	D4B-2187N	---	D4B-2A87N	D4B-3187N	---	D4B-3A87N
Standards		EN60947-5-1 			EN60947-5-1 			EN60947-5-1 		

- Note:**
1. The adjustable roller lever and adjustable rod lever models are approved under the Forced Opening Certificate (TÜV) of the EN standard, but they do not conform to the GS-ET-15 Standard (BIA) and SUVA.
 2. The D4B-□N is a Limit Switch conforming to European standards, and PG13.5 is commonly used in Europe.
 3. The wobble lever models are ordinary limit switches and are not approved under EN, GS, and SUVA's Forced Opening Certificate.

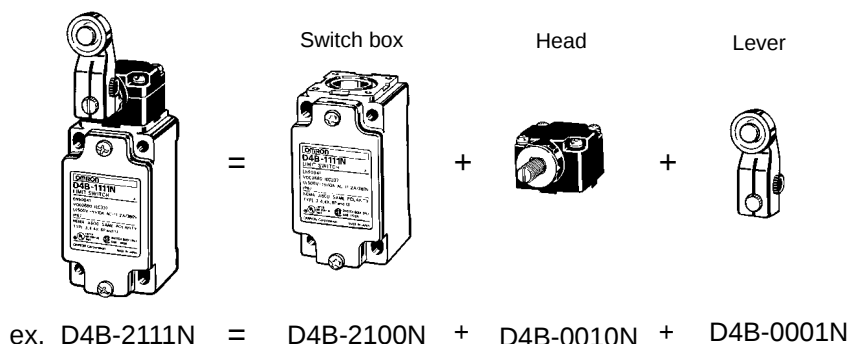
■ 3-conduit Switch

Actuator		Conduit size								
		PG13.5 (see note 2)			G1/2			1/2-14NPT		
		1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)	1NC/1NO (Snap-action)	1NC/1NO (Slow-action)	2NC (Slow-action)
Side rotary	Roller lever (form A)	D4B-5111N	D4B-5511N	D4B-5A11N	D4B-6111N	D4B-6511N	D4B-6A11N	D4B-7111N	D4B-7511N	D4B-7A11N
	Adjustable roller lever (see note 1)	D4B-5116N	D4B-5516N	D4B-5A16N	D4B-6116N	D4B-6516N	D4B-6A16N	D4B-7116N	D4B-7516N	D4B-7A16N
	Adjustable rod lever (form D) (see note 1)	D4B-5117N	D4B-5517N	D4B-5A17N	D4B-6117N	D4B-6517N	D4B-6A17N	D4B-7117N	D4B-7517N	D4B-7A17N
Top plunger	Plain (form B)	D4B-5170N	D4B-5570N	D4B-5A70N	D4B-6170N	D4B-6570N	D4B-6A70N	D4B-7170N	D4B-7570N	D4B-7A70N
	Roller (form C)	D4B-5171N	D4B-5571N	D4B-5A71N	D4B-6171N	D4B-6571N	D4B-6A71N	D4B-7171N	D4B-7571N	D4B-7A71N
Wobble lever (see note 3)	Coil spring	D4B-5181N	---	D4B-5A81N	D4B-6181N	---	D4B-6A81N	D4B-7181N	---	D4B-7A81N
	Plastic rod	D4B-5187N	---	D4B-5A87N	D4B-6187N	---	D4B-6A87N	D4B-7187N	---	D4B-7A87N
Standards		EN60947-5-1 			EN60947-5-1 			EN60947-5-1 		

- Note:**
1. The adjustable roller lever and adjustable rod lever models are approved under the Forced Opening Certificate (TÜV) of the EN standard, but they do not conform to the GS-ET-15 Standard (BIA) and SUVA.
 2. The D4B-□N is a Limit Switch conforming to European standards, and PG13.5 is commonly used in Europe.
 3. The wobble lever models are ordinary limit switches and are not approved under EN, GS, and SUVA's Forced Opening Certificate.

■ Replacement Part

Because the D4B-□N employs a block mounting construction, the switch box, operating head, and lever (side rotary type only) may be ordered as a complete assembly or individually as replacement parts. (Replacement parts are not available as a switch box and head assembly or as a head and lever assembly.)



Switch Box

		EN50041			3-conduit type		
		PG13.5	G1/2	1/2-14NPT	PG13.5	G1/2	1/2-14NPT
1NC/1NO (Snap-action)		D4B-1100N	D4B-2100N	D4B-3100N	D4B-5100N	D4B-6100N	D4B-7100N
1NC/1NO (Slow-action)		D4B-1500N	D4B-2500N	D4B-3500N	D4B-5500N	D4B-6500N	D4B-7500N
2NC (Slow-action)		D4B-1A00N	D4B-2A00N	D4B-3A00N	D4B-5A00N	D4B-6A00N	D4B-7A00N

Operating Heads

Actuator	Type	Model
Side rotary	Standard	D4B-0010N
Top plunger	Plain	D4B-0070N
	Roller	D4B-0071N
Wobble lever	Coil spring	D4B-0081N
	Plastic rod	D4B-0087N

Levers (for Side Rotary Switches)

Actuator	Length	Diameter of roller	Model
Standard	31.5	17.5 dia.	D4B-0001N
Adjustable roller lever	25 to 89	19 dia.	D4B-0006N
Adjustable rod lever	145 max.	---	D4B-0007N
Interchangeable with D4B-0001	33.7	19 dia.	D4B-000RN

Specifications

■ Ratings

1. TÜV Rheinland-approved: AC-15, 2 A/400 V

2. UL/CSA-approved: A600

Rated voltage	Current			Switching power	
	Continuous	Make	Break	Make	Break
120 VAC	10 A	60 A	6 A	7,200 VA	720 VA
240 VAC		30 A	3 A		
480 VAC		15 A	1.5 A		
600 VAC		12 A	1.2 A		

■ Characteristics

Item	Snap-action	Slow-action
Operating speed	1 mm/s to 50 cm/s	
Operating frequency	Mechanical: 120 operations/min Electrical: 30 operations/min	
Rated frequency	50/60 Hz	
Insulation resistance	100 MΩ min. (at 500 VDC) between terminals of the same polarity and between each terminal and non-current-carrying part	
Contact resistance	25 mΩ max. (initial value)	25 mΩ max. (initial value)
Dielectric strength		
Between terminals of same polarity	U_{imp} 2.5 kV	U_{imp} 4 kV
Between terminals of different polarity	---	U_{imp} 4 kV
Between current-carrying metal parts and ground	U_{imp} 4 kV	U_{imp} 4 kV
Between each terminal and non-current-carrying parts	U_{imp} 4 kV	U_{imp} 4 kV
Rated insulation voltage (U_i)	600 VAC (EN60947-5-1)	
Counter electromotive voltage at switching	1,500 VAC max. (EN60947-5-1)	
Operating environmental pollution level	3 (EN60947-5-1)	
Short-circuit protective device	10-A fuse (type gI or gG) (IEC269)	
Conditional short-circuit current	100 A (EN60947-5-1)	
Conventional enclosed thermal current (I_{the})	20 A (EN60947-5-1)	
Electric shock protection class	Class I (with grounding terminal)	
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance	Destruction: 1,000 m/s ² min. {approx. 100G min.} Malfunction: 300 m/s ² min. {approx. 30G min.}	
Life expectancy (see note 2)	Mechanical: 30,000,000 operations min. Electrical: 500,000 operations min.	Mechanical: 10,000,000 operations min. Electrical: 500,000 operations min.
Contact gap	2 x 0.5 mm min.	2 x 2 mm min.
Bounce time	3 ms min.	Same as the operating speed
Ambient temperature	Operating: -40°C to 80°C (with no icing) (see note 4)	
Ambient humidity	Operating: 95% max.	
Degree of protection	IP67 (EN60947-5-1)	
Weight	Approx. 250 g	

Note: 1. The above values are for initial operation.

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

3. The values in this table are for an ambient temperature of 5°C to 35°C and ambient humidity of 40% to 70%. For further conditions, consult your OMRON sales representative.

4. -25°C to 80°C for the flexible-rod type.

■ Operating Characteristics

Model	D4B-□□11N	D4B-□□16N (see note 1)	D4B-□□17N (see note 2)	D4B-□□70N	D4B-□□71N	D4B-□□81N	D4B-□□87N
OF max.	9.41 N {960 gf}		2.12 N {216 gf}	18.63 N {1,900 gf}		1.47 N {150 gf}	
RF min.	1.47 N {150 gf}		0.29 N {30 gf}	1.96 N {200 gf}		---	
PT	21±3°			2.0 mm max.		15° max.	
PT (2nd) (see note 3)	(45°)			(3.0 mm)		---	
OT min.	50°			5.0 mm		---	
MD max. (see note 4)	12°			1.0 mm		---	
POT min.	35° (Slow-action models) 55° (Snap-action models)			3.2 mm		---	
POF min.	19.61 N {2,000 gf}			49.03 N {5,000 gf}		---	
TT	(75°)			7.0 mm		---	
FP max.	---			38 mm	51 mm	---	
OP	---			35±1 mm	48±1 mm	---	

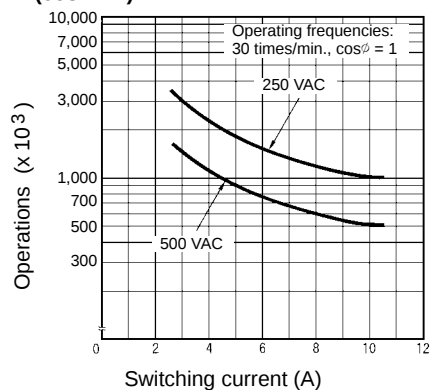
Note:

1. The operating characteristics of these Switches were measured with the roller lever set at 31.5 mm.
2. The operating characteristics of these Switches were measured with the rod lever set at 140 mm.
3. Only for slow-action models.
4. Only for snap-action models.

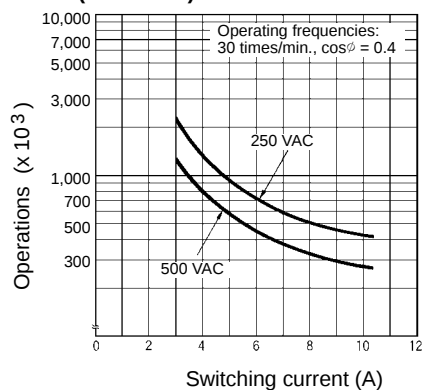
Engineering Data

Electrical Life Expectancy (Snap-action)

($\cos\phi = 1$)



($\cos\phi = 0.4$)



Nomenclature

Head

With Roller Lever Switches, the direction of the switch head can be varied to any of the four directions by loosening the roller lever switch screws at the four corners of the head.

Operating Position Mark
(arrow)

Push and rotate

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.

Switch Box Material
Aluminum die-cast

Conduit Opening

Available in three different types of conduit threads:
Pg 13.5, G1/2 or 1/2-14NPT

Safety-oriented Lever Setting

Grooves which engage the lever every 90° are cut in the operation indicator disk to prevent the lever from slipping against the rotary shaft.

Equipped with Operation Display Plate

An optimum overtravel (OT) value may be secured by setting a desired OT value with a projection

Shearing Force Contact Separating Mechanism (NC Contact Section Only)

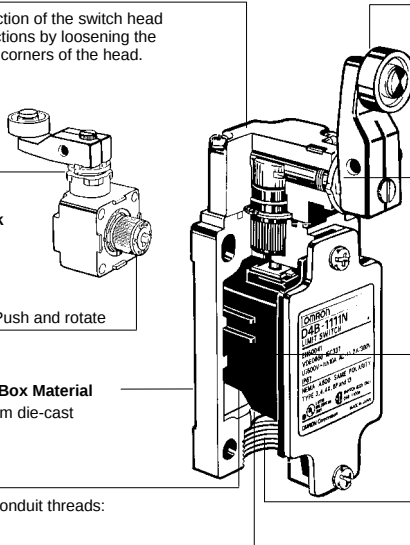
Should any abnormality occur in the contact area, the contacts are positively pulled apart from each other by shearing force.

Ground Terminal Screw

A ground terminal is provided to improve safety.

Contact Material

Ag alloy



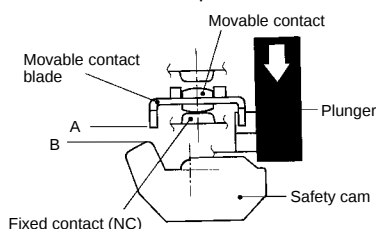
Operation

■ Positive Contact Opening Mechanism

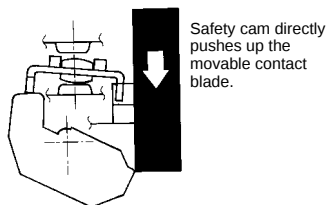
1NO/1NC Contact (Snap-action)

If metal deposition between mating contacts occurs on the NC contact side, they can be pulled apart by the shearing force and tensile force generated when part B of the safety cam or plunger engages part A of the movable contact blade. When the safety cam or plunger is moved in the direction of the arrow, the Limit Switch releases.

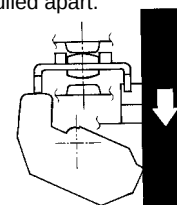
1. When metal deposition occurs.



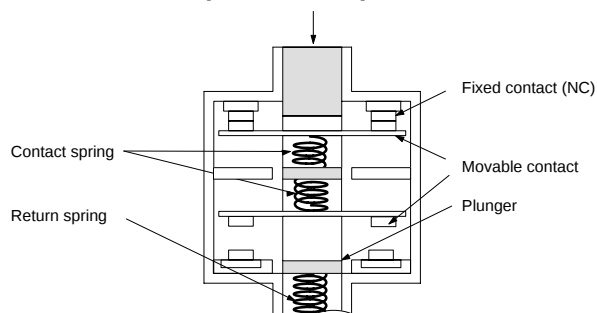
2. When contacts are being pulled apart.



3. When contacts are completely pulled apart.



1NC/1NO Contact (Slow-action)

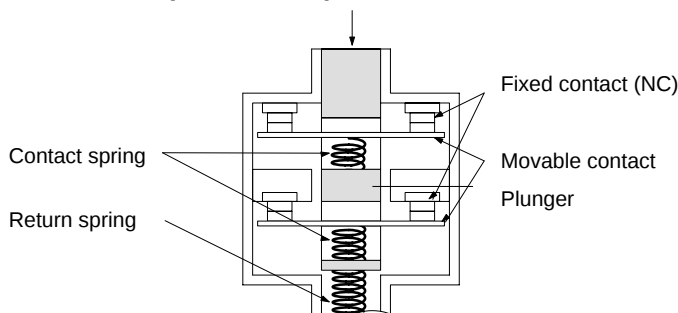


Conforms to IEC 947-5-1 Positive Opening



When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

2NC Contact (Slow-action)



Conforms to EN60947-5-1



When metal deposition occurs, the contacts are separated from each other by the plunger being pushed in.

⊞ is marked on the product to indicate approval of positive opening.

Contact Form (EN50013)

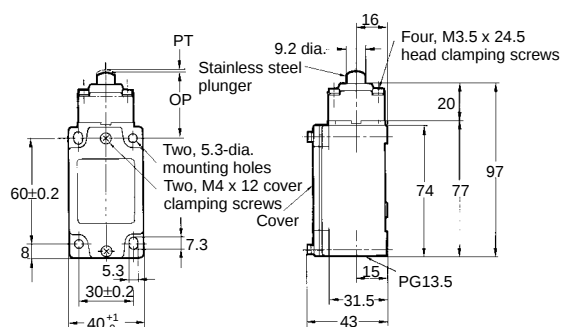
Model	Contact	Diagrams (see note)
1NC/1NO Contacts (Snap-action)	Only 11 to 12 contacts are positive opening. EN60947-5-1 ⊞ conformity	
1NC/1NO Contacts (Slow-action)	Only 11 to 12 contacts are positive opening. EN60947-5-1 ⊞ conformity	
2NC Contacts (Slow-action)	Both 11 to 12 and 21 to 22 contacts are positive opening. EN60947-5-1 ⊞ conformity	

Note: 1. Contact operation

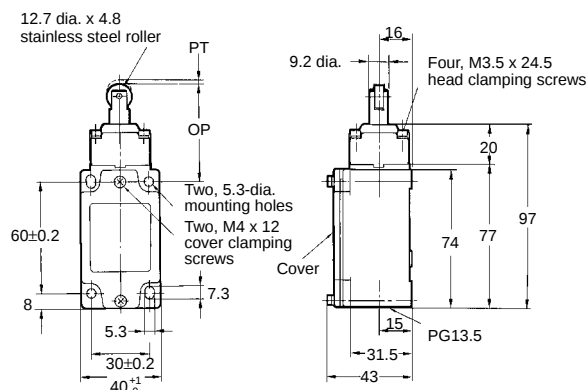
Closed Open

2. The stroke value in parentheses refers to the D4B-□□70N.

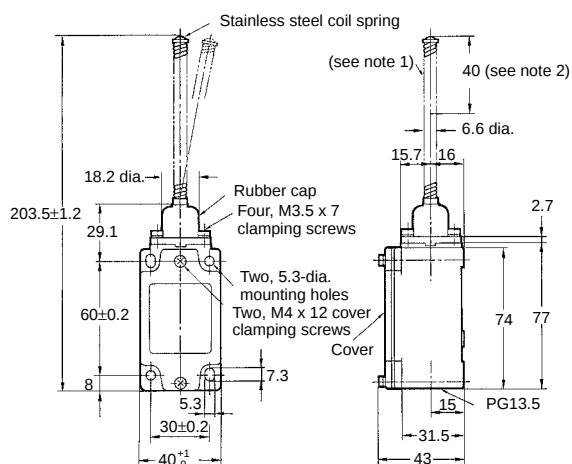
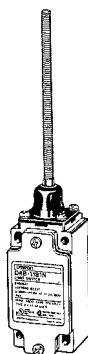
D4B-□170N
D4B-□A70N
D4B-□570N



D4B-□171N
D4B-□A71N
D4B-□571N



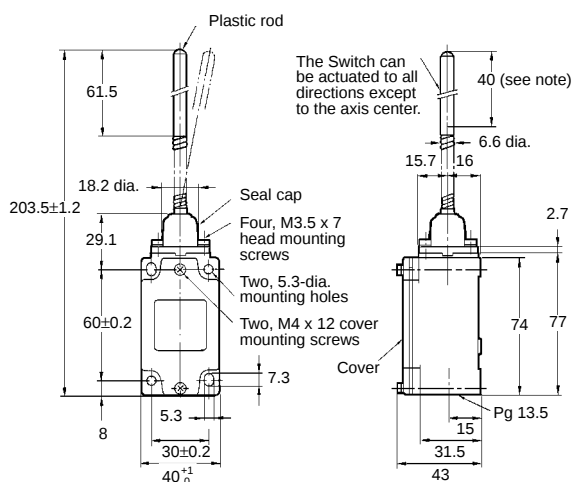
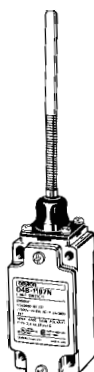
D4B-□181N
D4B-□A81N



Note:

1. The coil spring may be operated from any directions except axial directions (↓).
2. Be sure to adjust the dog to within 40 mm from the top end of the coil spring.

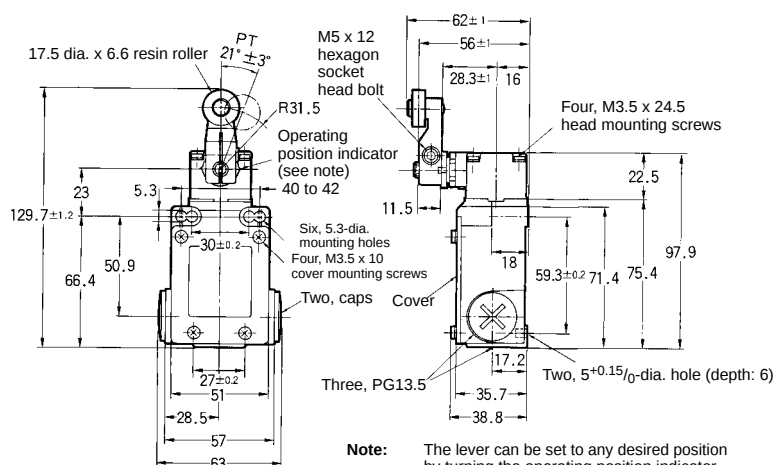
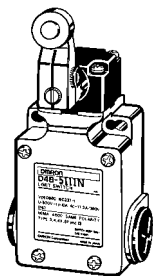
D4B-□187N
D4B-□A87N



Note: Be sure to adjust the dog to within 40 mm from the top end of the plastic rod.

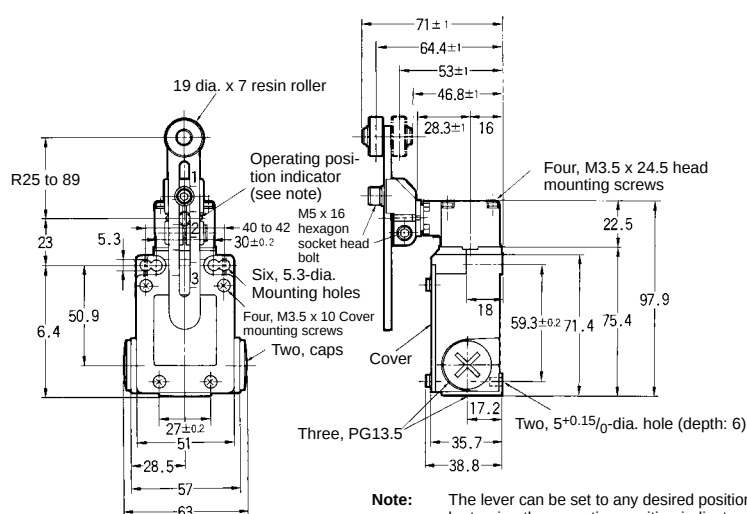
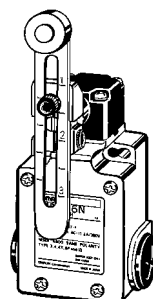
3-conduit Switches

D4B-□111N
D4B-□A11N
D4B-□511N



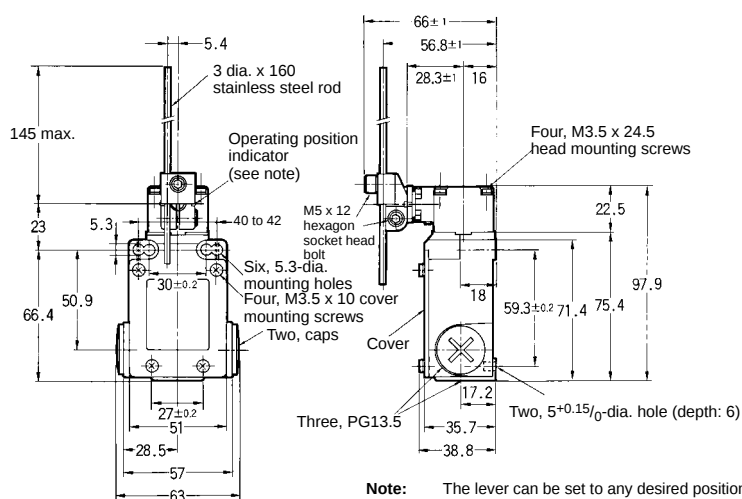
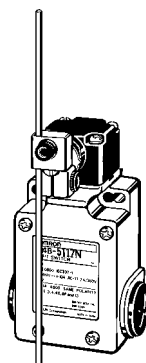
Note: The lever can be set to any desired position by turning the operating position indicator.

D4B-□116N
D4B-□A16N
D4B-□516N



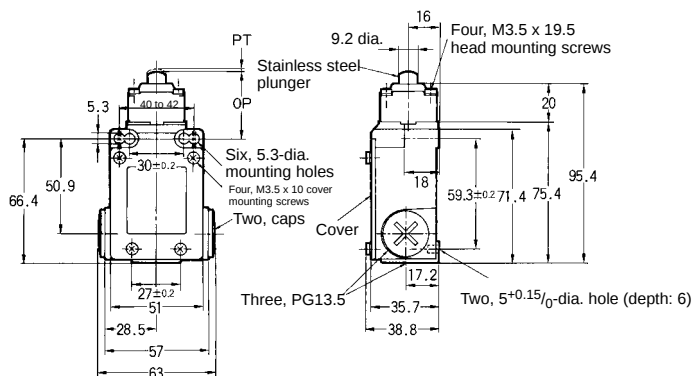
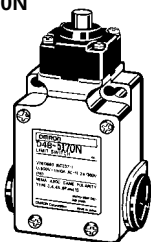
Note: The lever can be set to any desired position by turning the operating position indicator.

D4B-□117N
D4B-□A17N
D4B-□517N

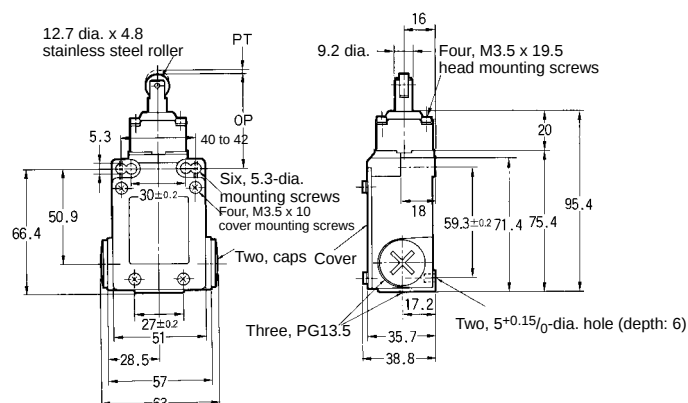
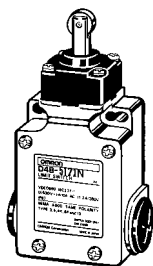


Note: The lever can be set to any desired position by turning the operating position indicator.

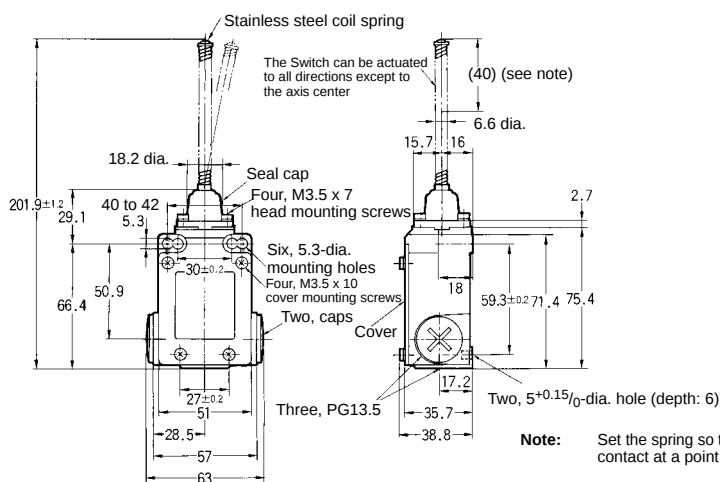
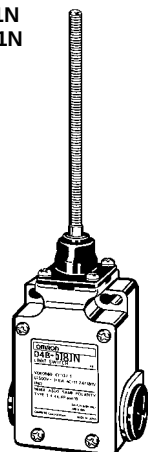
D4B-□170N
D4B-□A70N
D4B-□570N



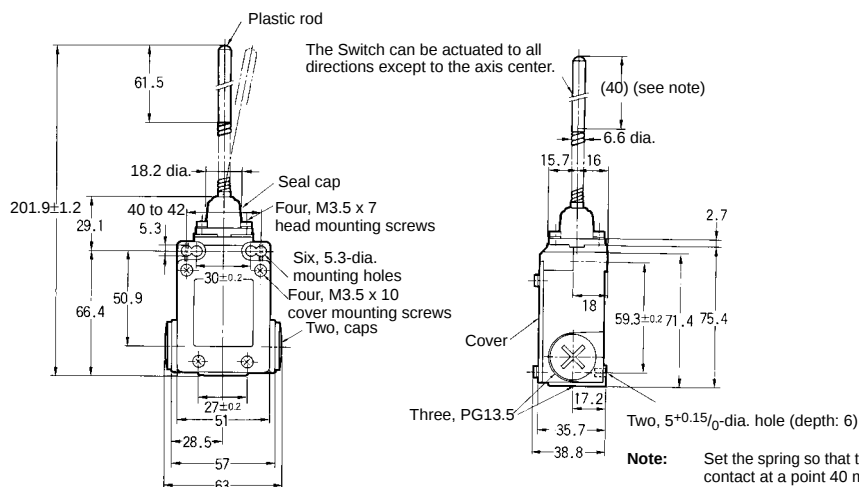
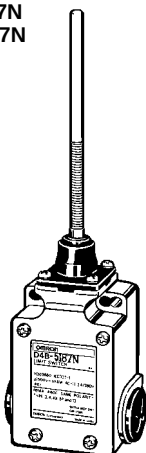
D4B-□171N
D4B-□A71N
D4B-□571N



D4B-□181N
D4B-□A81N

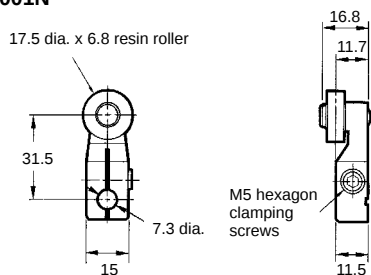


D4B-□187N
D4B-□A87N

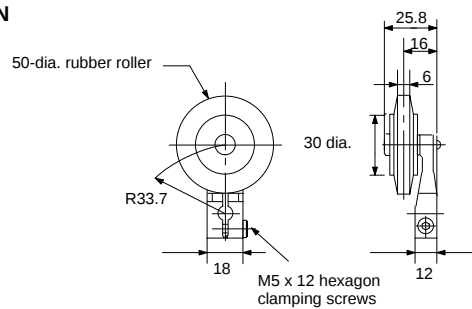


■ Roller Levers

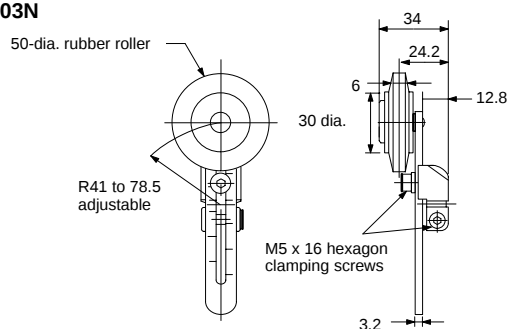
D4B-0001N



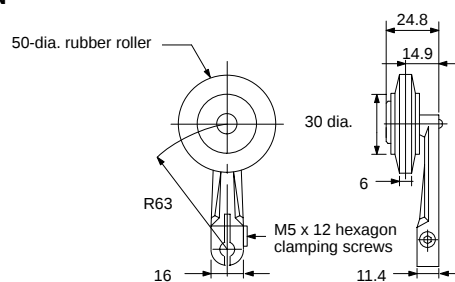
D4B-0002N



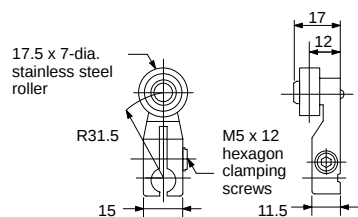
D4B-0003N



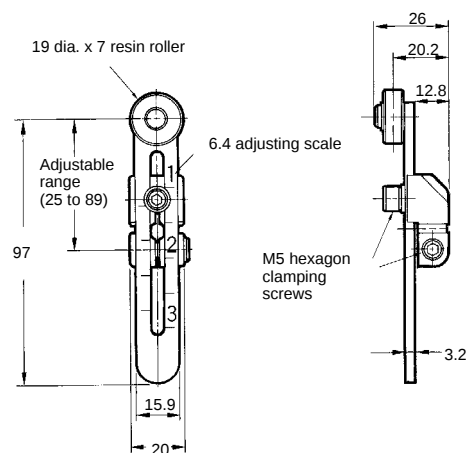
D4B-0004N



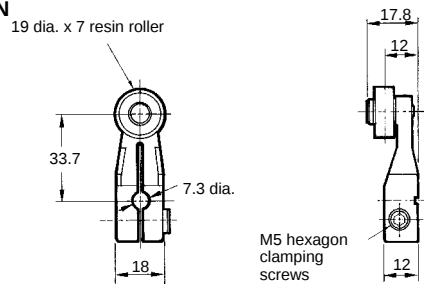
D4B-0005N



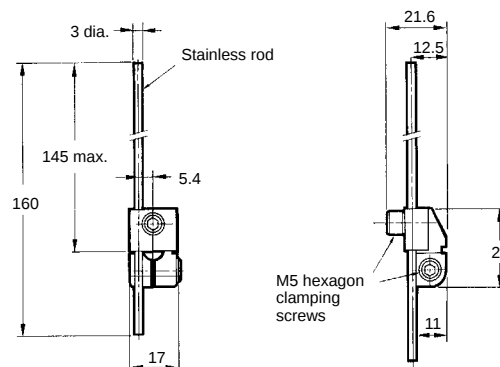
D4B-0006N



D4B-0007N

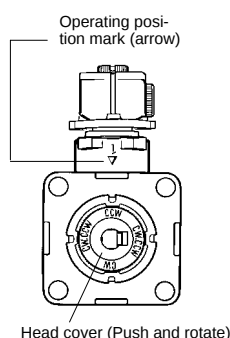


D4B-0007N



CW, CCW or Two-way Operation

The head of Side Rotary Switches can be converted in seconds to CW, CCW, or two-way operation. The conversion procedure follows.



Procedure

1. Dismount the head by loosening the four screws that secure it.
2. Turn over the head to set the desired operation (CW, CCW, or both). The desired operation can be selected by setting the mode selector knob shown in the figure. This knob is factory set to the "CW + CCW" (two-way operation) position.
3. Set the CW hole on the head at the operation position mark (arrow) for clockwise operation or set the CCW hole right at the arrow for counterclockwise operation. In either case, be sure to set the hole position exactly at the arrow point.

Precautions

If the D4B-□N is applied to an emergency stop circuit or safety circuit for prevention of injury, use the D4B-□N model that has an NC contact equipped with a force-separation mechanism, and make sure that the D4B-□N operates in the positive mode. Furthermore, secure the D4B-□N with screws or equivalent parts that are tightened in a single direction so that the D4B-□N cannot be easily removed. Then provide a protection cover for the D4B-□N and post a warning label near the D4B-□N.

In order to protect the D4B-□N from damage due to short-circuiting, connect a fuse breaking a current 1.5 to 2 times higher than the rated current in parallel with the D4B-□N.

If an application satisfying EN standards is to employ the D4BL, apply the 10-A gl or gG fuse approved by IEC269.

Do not apply the D4B-□N to the door without applying a stopper to the door.

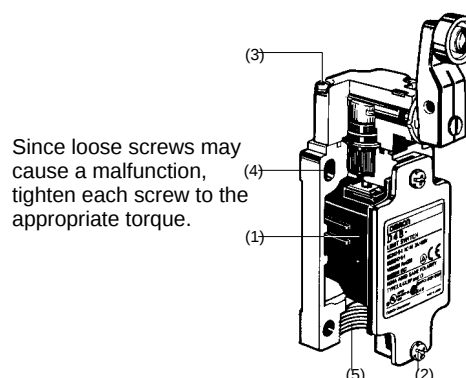
If the D4B-□N is used with the actuator normally pressed, the D4B-□N may malfunction or may soon have reset failures. Be sure to check and replace the D4B-□N regularly.

■ Correct Use

Operating Environment

- The D4B-□N is for indoor use. The D4B-□N may malfunction if the D4B-□N is used outdoors. Be sure to use a model with a lever-type actuator for outdoor use instead.
- Do not use the D4B-□N in the following places.
 - Places with radical temperature changes.
 - Places with excessive humidity that may cause condensation.
 - Places with excessive vibration.
 - Places where metal dust, oil, or chemical may be sprayed to the D4B-□N.

Tightening Torque



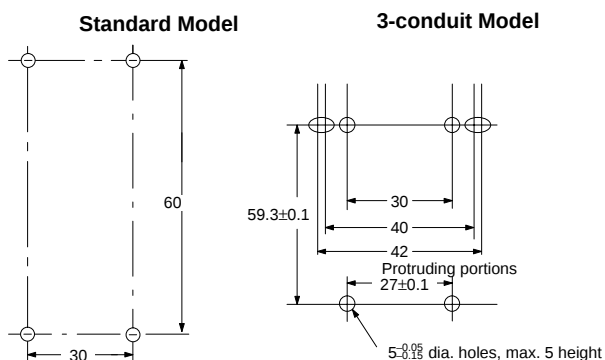
	Type	Proper tightening torque
1	Terminal screw	0.59 to 0.78 N • m {6 to 8 kgf • cm}
2	Cover-mounting screw	1.18 to 1.37 N • m {12 to 14 kgf • cm}
3	Head-mounting screw	0.78 to 0.98 N • m {8 to 10 kgf • cm}
4	Switch-mounting screw (M5)	4.90 to 5.88 N • m {50 to 60 kgf • cm}
5	Connector	1.77 to 2.16 N • m {18 to 22 kgf • cm}
6	Cap screw (for three-conduit models)	1.27 to 1.67 N • m {13 to 17 kgf • cm}

Note: Apply a tightening torque of 0.78 to 0.88 N • m {8 to 9 kgf • cm} to conduit models.

Mounting

Use four M5 screws with washers to mount the standard model. Be sure to apply the proper torque to tighten each screw. The D4B-□N can be mounted more securely by using the four screws plus two 5^{-0.05/-0.15}-mm protruding parts, each of which has a maximum height of 4.8 mm as shown below.

Mounting Dimensions (M5)



Changes in Actuator Mounting Position

To change the angle of the lever, loosen the hexagon-head bolts on the side of the lever.

The operation indicator plate has protruding parts which engage with the lever, thus allowing changes to the lever position by 90°.

The back of the operation indicator plate has no protruding parts. The lever can be set at any angle by attaching the operation indicator plate to the Switch so that this side will face the lever. In this case, however, the D4B-□N will not be approved by SUVA or BIA. Make sure that the lever engages with the operation indicator plate securely so that the lever will not slip.

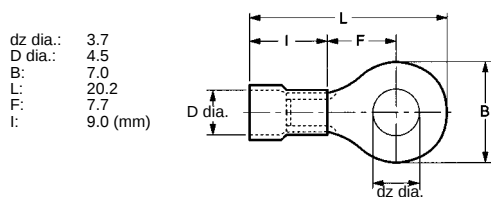
Changes in Head Mounting Position

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.

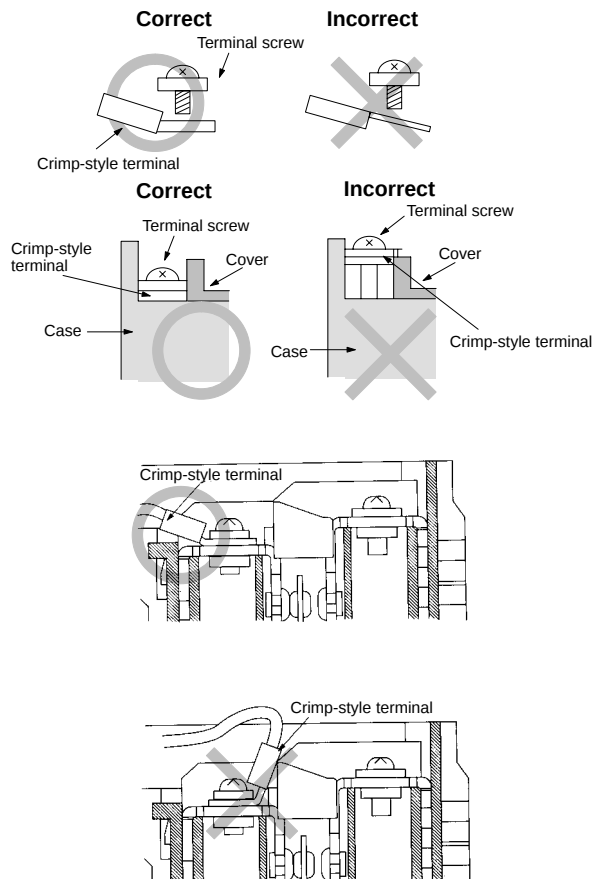
Wiring

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 solderless 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 solderless 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.



Connector

Make sure that each connector is tightened within the specified torque range. The casing may be damaged if the connector is tightened excessively.

If the 1/2-14NPT is used, cover the cable and conduit end with sealing tape in order to ensure IP67.

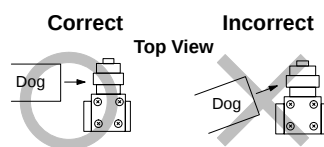
The Pg13.5 connector must be Nippon Flex's ABS-08Pg13.5 or ABS-12 Pg13.5.

Use OMRON's SC-series connector which is suited to the cable in diameter.

Properly attach the provided conduit cap to the unused conduit opening and securely tighten the cap screw within the specified torque when wiring the D4B-□N.

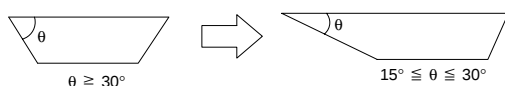
Others

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 like 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. For details, see page 13, *CW, CCW or Two-way Operation*.
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.

Correct Selection and Usage of Switches

Snap-action switch

A snap-action switch takes only a short time to switch electric current, which reduces contact arcing and prevents contacts from wear and tear. Therefore, a snap-action switch is more ideal than a slow-action switch for applications that require high repeat accuracy, high operation frequency, and slow operating speed.

Slow-action Switch

The electric current switching time of a slow-action switch differs in proportion to the operating speed of the switch. A slow-action switch operates safely via direct drive positive contact opening even after metal deposition between mating contacts and provides insulation capability after contact separation. Opposite polarity ensures high contact reliability, even when voltages and currents are small and allows switching of voltages of different potential by contacts blocks with several contacts. For example, it is possible to perform a control function with 220 VAC and signalling function with 60 VDC using only one device.

Safety Switch

The NC contact section of the D4B-□N's built-in switch incorporates a shearing force contact separating mechanism. Therefore, based on the above mentioned switching features, the snap-action switch can be mainly applied to positioning control purposes and the slow-action switch can be mainly applied to safety and protection purposes. Both slow- and snap-action switches conform to BS5304, IEC 204-1, and VDE 0113 safety standard.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. C005-E1-8 In the interest of product improvement, specifications are subject to change without notice.

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