D4B-N

勝 特 力 材 料 886-3-5753170
胜特力电子(上海) 86-21-34970699
胜特力电子(深圳) 86-755-83298787
Http://www.100y.com.tw

OMRON

Safety Limit Switch

Positive Action Limit Switches with Direct Drive Contacts for Critical Switching Applications

- Snap-action contact for accurate switching with safe operation via direct drive positive opening mechanism
- Two sets of contacts: one (NC) for safety circuit and the other (NO) for control circuit
- Safety of lever settings ensured as a mechanism engages a gear between the operating position indicator plate and the lever
- Conforms to EN (TÜV) standards corresponding to the CE marking
- 3-conduit switches are available for easy wiring
- Conforms to these standards and EC Directives:

  Machinery Directive
  Low Voltage Directive
  EN1088
  EN50041
- Approved Standards

Snap-Action Models

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1	R9851083 (Positive opening: approved) R9151372 (Positive opening: approval pending) (See note 1.)
UL	UL508	E76675
CSA	C22.2 No. 14	LR45746
BIA (See note 2.)	GS-ET-15	1-conduit: 9202158 3-conduit: 9309655

Note: 1. Adjustable roller lever, adjustable rod lever, coil spring, and plastic rod models only.
2. Not including adjustable roller lever, adjustable rod lever, coil spring, and plastic rod models.

Slow-Action Models

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1	R9151643 (Positive opening: approved) (See note)
UL	UL508	E76675
CSA	C22.2 No. 14	LR45746
BIA (See note.)	GS-ET-15	1-conduit: 9202158 3-conduit: 9309655
SUVA (See note.)	SUVA	1-conduit: E6188.d 3-conduit: E6189.d

Note: Not including adjustable roller lever, adjustable rod lever, coil spring, and plastic rod models.

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Http://www.100y.com.tw

Ordering Information

■ MODEL NUMBER LEGEND

D4B-□□□□N
1 2 3

1. Conduit
- 1: PG13.5 (1-conduit) European type
- 2: G1/2 (PF1/2) (1-conduit) Japanese type
- 3: 1/2-14NPT (1-conduit) North American type
- 5: PG13.5 (3-conduit) European type
- 6: G1/2 (PF1/2) (3-conduit) Japanese type
- 7: 1/2-14NPT (3-conduit) North American type

2. Built-in Switch
- 1: 1NC/1NO (Snap-action)
- A: 2NC (Slow-action)
- 5: 1NC/1NO (Slow-action) (See Note)

Note: Excluding D4B-□□81N and D4B-□□87N models.

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

■ SWITCHES (EN50041)

Description		Part number								
Actuator		Conduit size/type								
		PG13.5 (European)			G1/2 (Japanese)			1/2-14NPT (North American)		
		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, rubber, 50.0 mm (1.97 in) dia.1/2-14NPT	**D4B-3113N**	**D4B-3513N**	**D4B-3A13N**	———			———		
	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 2)	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 slow-action models with adjustable roller levers or adjustable rod levers 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.
The snap-action models with adjustable roller levers or adjustable rod levers are not approved under the Forced Opening Certificate (TÜV) of the EN standard.

2. The wobble lever models are ordinary limit switches and are not approved under EN, GS, and SUVA's Forced Opening Certificate.

3-Conduit Switch

Description		Part number								
Actuator		Conduit size								
		PG13.5 (European) See Note 2			G1/2 (Japanese)			1/2-14NPT North American		
		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, rubber, 50.0 mm (1.97 in) dia.	**D4B-7113N**	**D4B-7513N**	**D4B-7A13N**	———					
	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 2)	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 slow-action models with adjustable roller levers or adjustable rod levers 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.
The snap-action models with adjustable roller levers or adjustable rod levers are not approved under the Forced Opening Certificate (TÜV) of the EN standard.
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.

■ LEVERS (FOR SIDE ROTARY SWITCHES)

Description			Part number
Actuator	Length	Diameter of roller	
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**

Note: Other lever types are also available.

Specifications

■ APPROVED STANDARD RATINGS

TÜV Rheinland: EN60947-5-1

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 IEC269.

■ UL/CSA: (UL508, CSA C22.2 NO. 14)

A600

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

Q150

Rating Codes for DC Control-Circuit Contacts

Thermal continuous test current, amperes	Maximum make or break current, amperes			Maximum make or break volt-amperes at 300 volts or less
	125 Volt	250 Volt	301 to 600 Volt	
2.5	0.55	—	—	69

■ CHARACTERISTICS

Item		Snap-action	Slow-action
Life expectancy (see note 2)	Mechanical	30,000,000 operations min.	10,000,000 operations min.
	Electrical	500,000 operations min. (at a 250 VAC, 10-A resistive load)	
Operating speed		1 mm/s to 0.5 m/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)	
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)	
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, 0.75 mm single amplitude	
Shock resistance		Destruction: 1,000 m/s^2 min. Malfunction: 300 m/s^2 min.	
Ambient temperature		Operating: -40°C to 80°C, with no icing (-25°C to 80°C for the flexible-rod type)	
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.

■ OPERATING CHARACTERISTICS

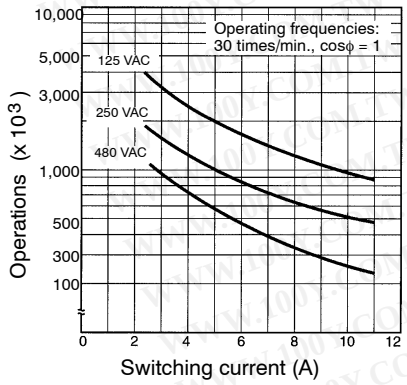
Model	D4B-□□11N	D4B-□□16N (see note 1)	D4B-□□17N (see note 2)	D4B-□□70N	D4B-□□71N	D4B-□□81N	D4B-□□87N
OF max.	9.41 N		2.12 N	18.63 N		1.47 N	
RF min.	1.47 N		0.29 N	1.96 N		---	
PT	21±3°			2.0 mm max.		15° max.	
PT (2nd) (see note 3)	45°			3.0 mm		---	
OT min.	50°			5.0 mm		---	
MD max. (see note 4)	12°			1.0 mm		---	
POT min.	35° (Slow-action models)			3.2 mm		---	
	55° (Snap-action models)						
POF min.	19.61 N			49.03 N		---	
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.

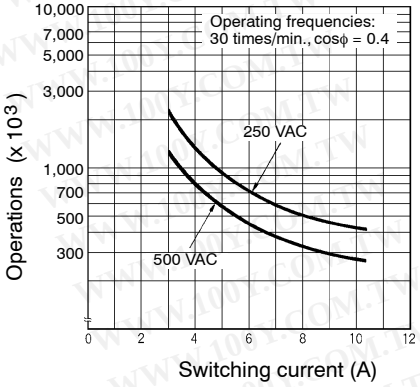
Engineering Data

■ ELECTRICAL LIFE EXPECTANCY SNAP-ACTION MODELS

(cosφ = 1)



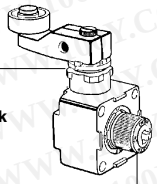
(cosφ = 0.4)



Nomenclature

Head
With roller lever models, 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)

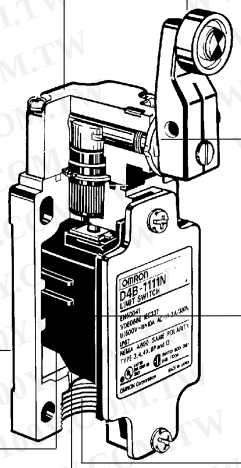


Push and rotate

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 operating position indicator plate to prevent the lever from slipping against the rotary shaft.

Equipped with Operating Position Indicator Plate
An optimum overtravel (OT) value may be secured by setting a desired OT value with a projection.

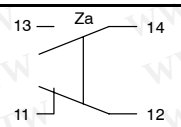
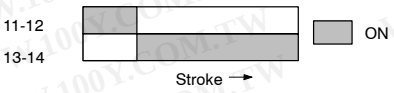
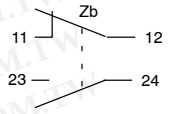
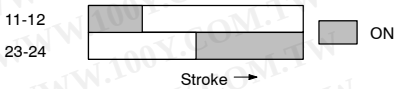
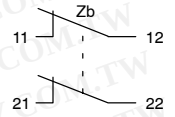
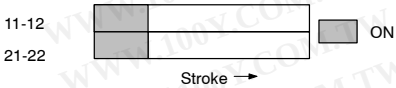
Shearing Force Contact Separating Mechanism (NC Contact Section Only)
Should any abnormality occur in the contact area, the contacts are positively pulled apart from each other by shearing force.

Ground Terminal Screw
A ground terminal is provided to improve safety.

Contact Material
Ag alloy

Operation

■ CONTACT FORM (EN50013)

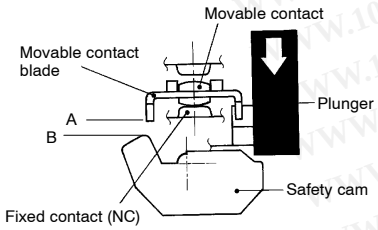
Model	Contact		Diagrams	Explanation
D4B-□1□N	1NC/1NO (Snap-action)			Only NC contact 11-12 has an approved positive opening mechanism. ⊖ Terminal numbers 11-12 and 13-14 cannot be used as unlike poles.
D4B-□5□N	1NC/1NO (Slow-action)			Only NC contact 11-12 has an approved positive opening mechanism. ⊖ 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 an approved positive opening mechanism. ⊖ Terminal numbers 11-12 and 21-22 can be used as unlike poles.

■ POSITIVE CONTACT OPENING MECHANISM

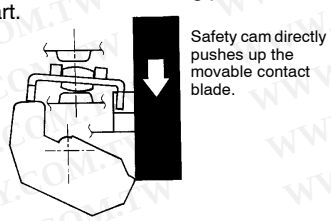
1NO/1NC Contact (Snap-action)

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.

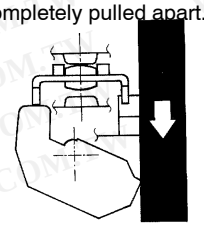
1. When metal deposition occurs.



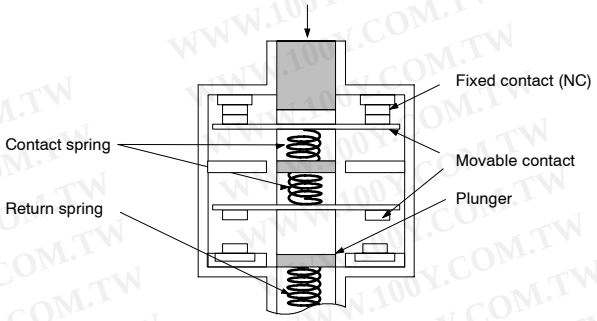
2. When contacts are being pulled apart.



3. When contacts are completely pulled apart.



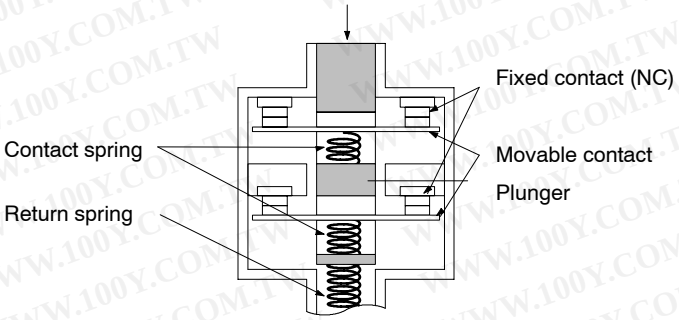
1NC/1NO Contact (Slow-Action)



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.

Dimensions

Unit: mm (inch)

Note: 1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions shown in this section.

2. When placing your order, specify the conduit type by adding a code (see below) to the first blank box in the model number of the selected switch. (For more ordering information, refer to the Model Number Legend, found in the *Ordering Information* of this data sheet.)

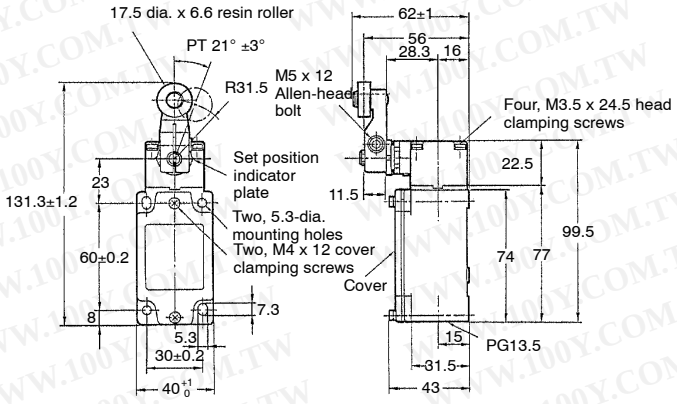
Key for Part No. Code:

Conduit type for standard switches
1: PG 13.5 (European)
2: G 1/2 (Japanese)
3: 1/2-14NPT (North American)

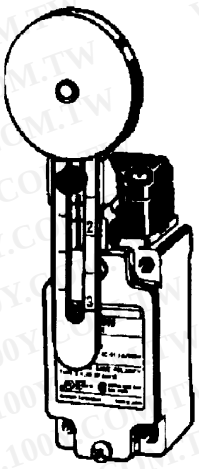
Conduit type for 3-conduit switches
5: PG 13.5 (European)
6: G 1/2 (Japanese)
7: 1/2-14NPT (North American)

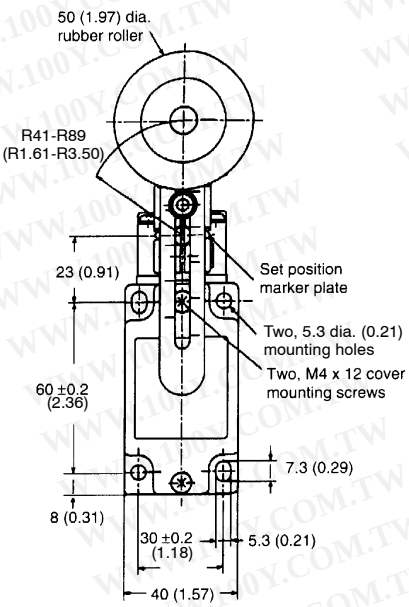
■ SWITCHES

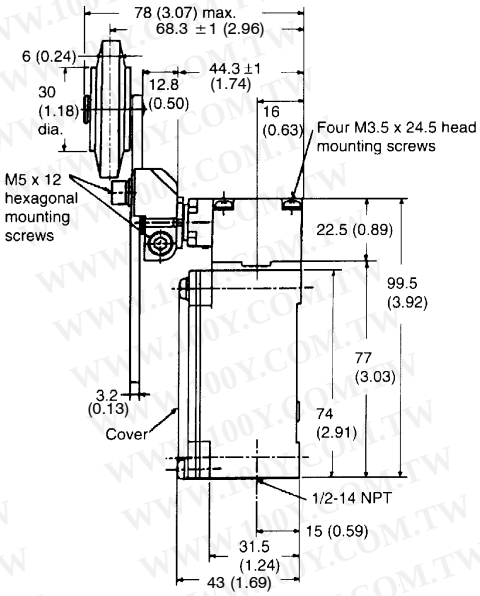
Roller Lever
D4B-□□11N



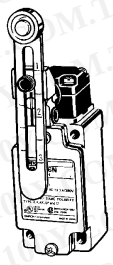
Adjustable Roller Lever Switch, Rubber Roller
D4B-3113N, D4B-3513N, D4B-3A13N

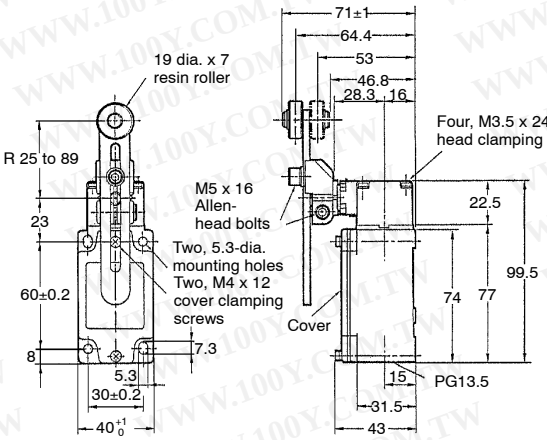




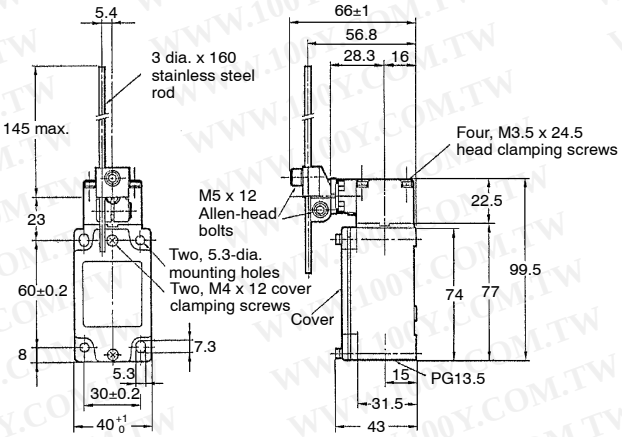


Adjustable Roller Lever
D4B-□□16N

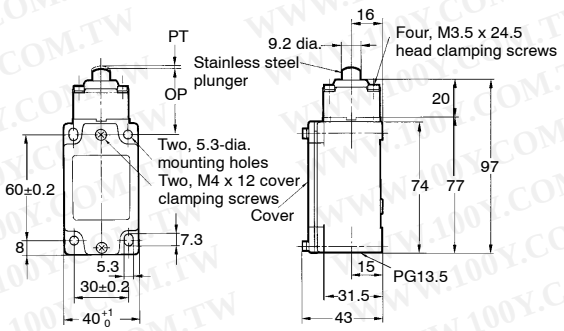




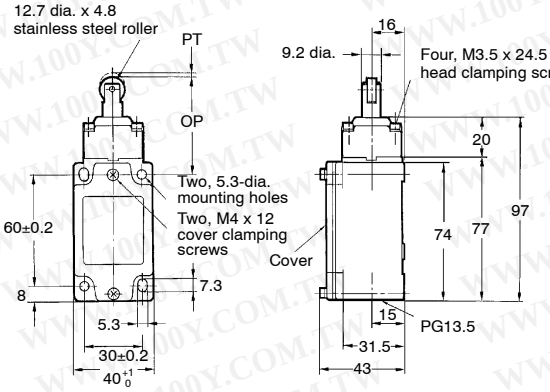
Adjustable Rod Lever
D4B-□□17N



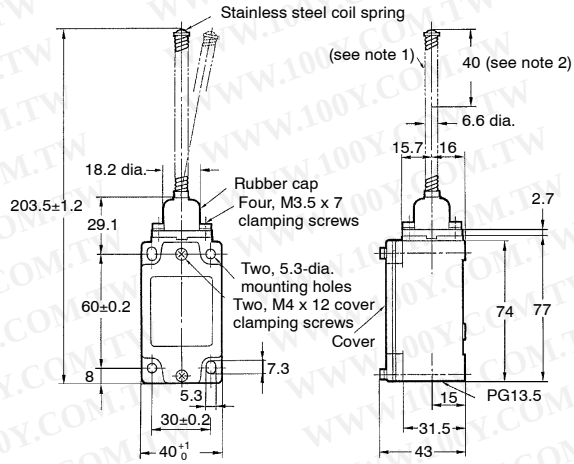
Top Plunger
D4B-□□70N



Top Roller Plunger
D4B-□□71N

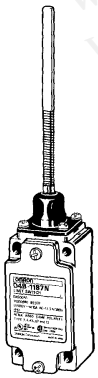


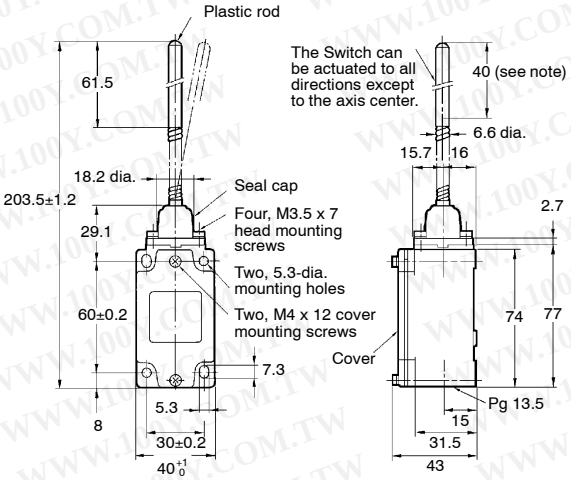
Coil Spring
D4B-□□81N



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.

Plastic Rod
D4B-□□87N

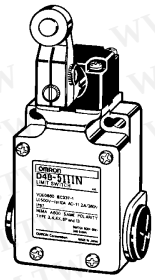


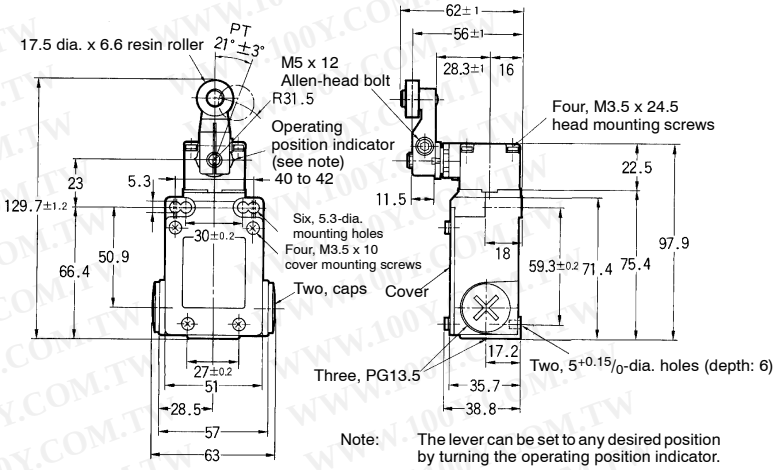


Note: Be sure to adjust the dog to within 40 mm from the top end of the plastic rod.

3-Conduit Switches

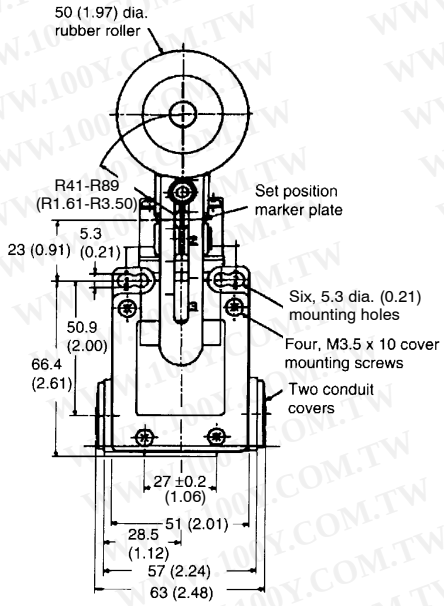
Roller Lever
D4B-□□11N

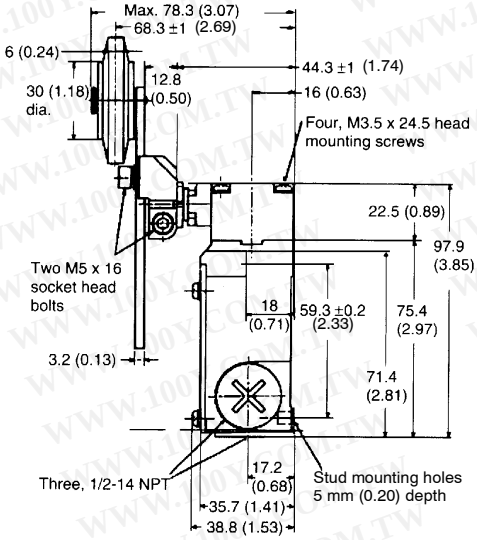




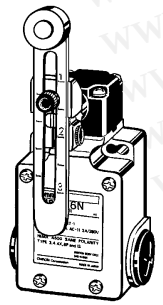
Note: The lever can be set to any desired position by turning the operating position indicator.

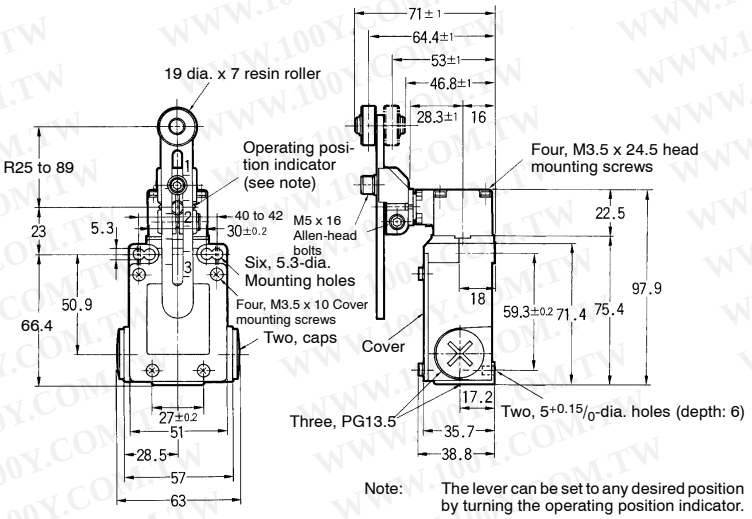
Adjustable Roller Lever Switch, Rubber Roller
D4B-7113N, D4B-7513N, D4B-7A13N





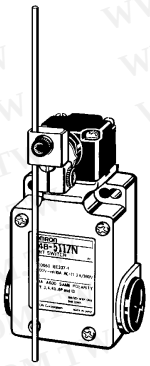
Adjustable Roller Lever
D4B-□□16N

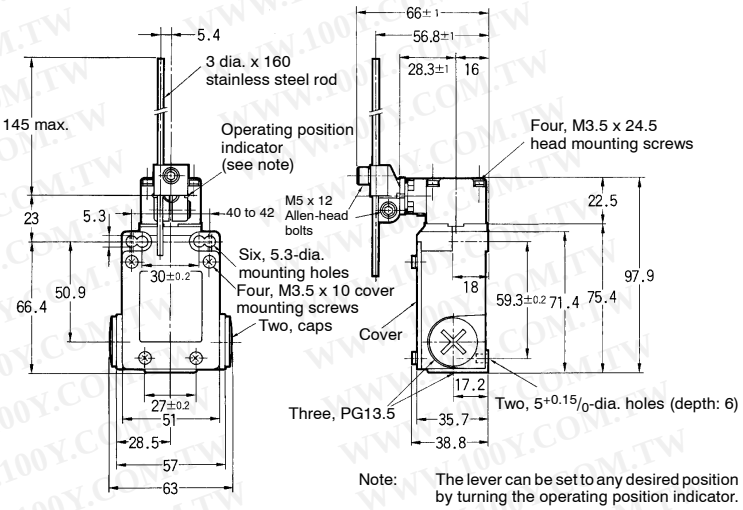




Note: The lever can be set to any desired position by turning the operating position indicator.

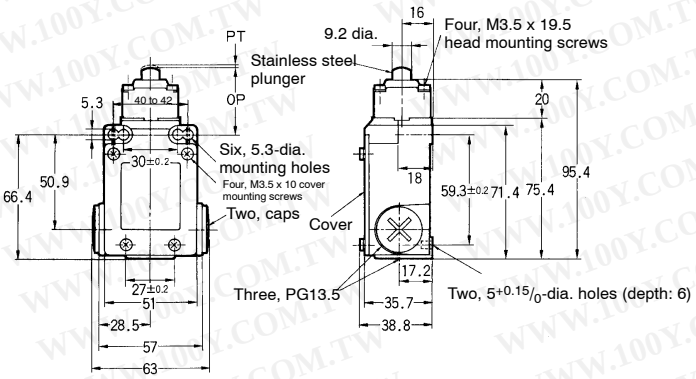
Adjustable Rod Lever
D4B-□□17N



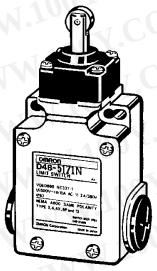


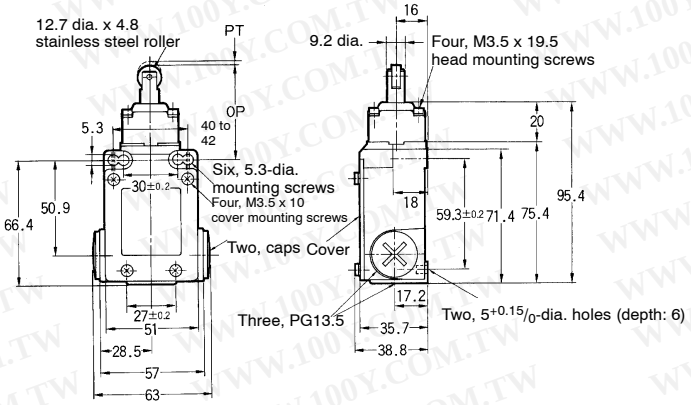
Note: The lever can be set to any desired position by turning the operating position indicator.

Top Plunger
D4B-□□70N

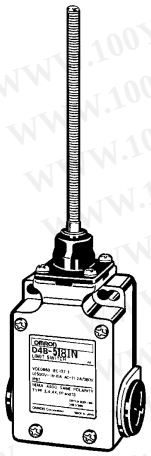


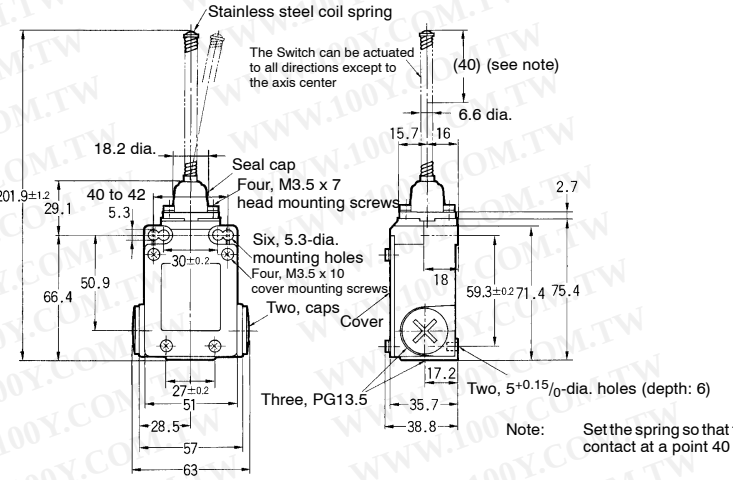
Top Roller Plunger
D4B-□□71N





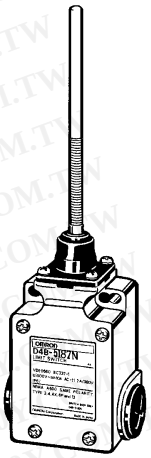
Coil Spring
D4B-□□81N

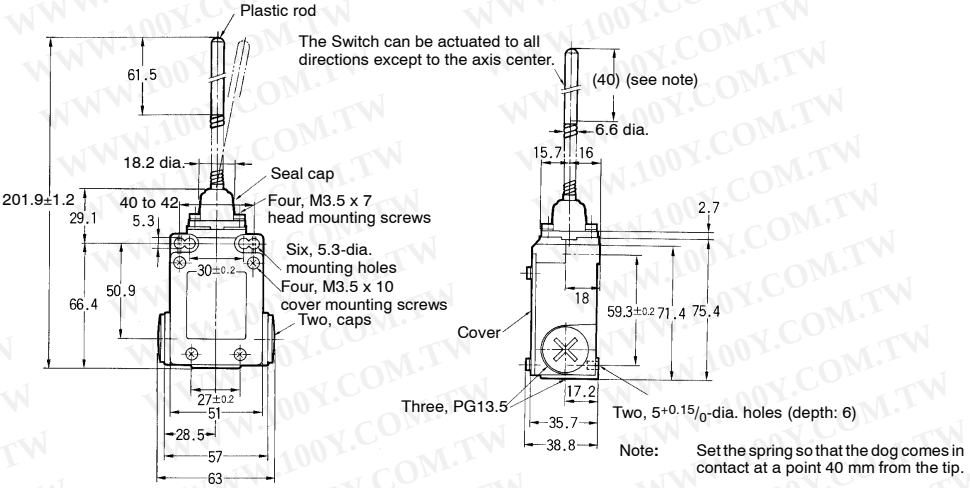




Note: Set the spring so that the dog comes in contact at a point 40 mm from the tip.

Plastic Rod
D4B-□□87N

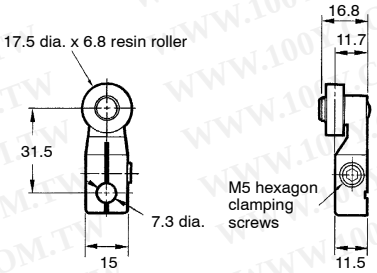




Note: Set the spring so that the dog comes in contact at a point 40 mm from the tip.

■ ROLLER LEVERS

D4B-0001N



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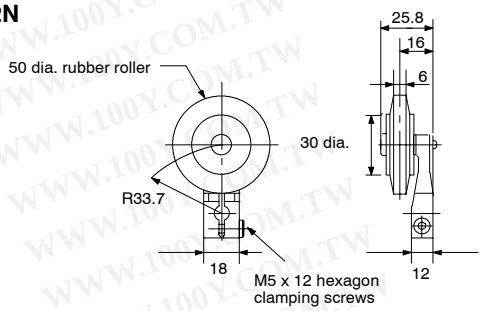

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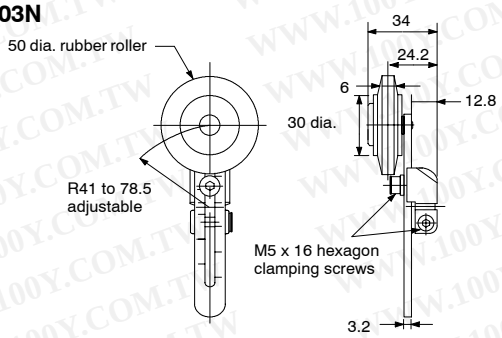

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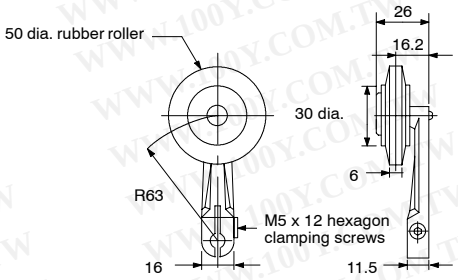

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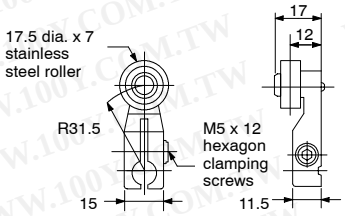

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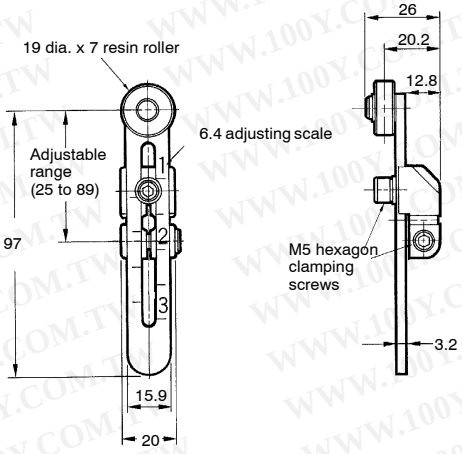

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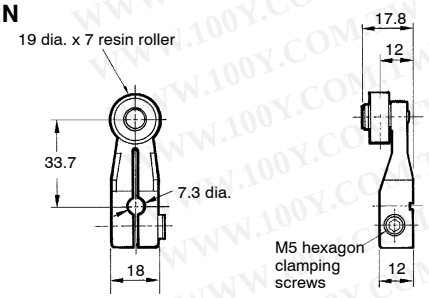

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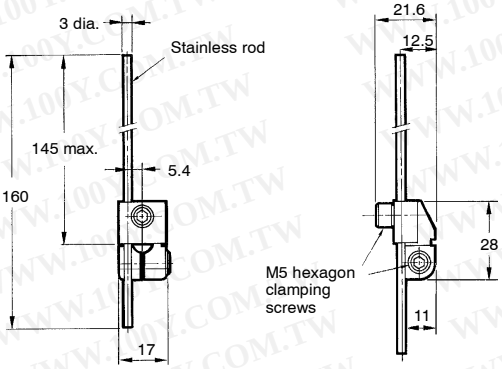
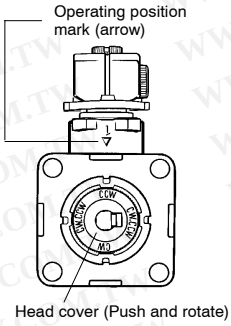


CW, CCW or Two-way Operation

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



Procedure

1. Remove 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. In addition, secure the D4B-□N with screws 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.

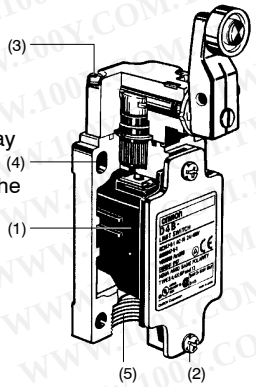
If an application satisfying EN standards is to employ the D4BL, apply the 10-A gI or gG fuse approved by IEC269.

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.

Tightening Torque

Since loose screws may cause a malfunction, tighten each screw to the appropriate torque.



	Type	Proper tightening torque
1	Terminal screw (M3.5)	0.59 to 0.78 N • m
2	Cover-mounting screw (see note)	1.18 to 1.37 N • m
3	Head-mounting screw	0.78 to 0.98 N • m
4	Switch-mounting screw (M5)	4.90 to 5.88 N • m
5	Connector	1.77 to 2.16 N • m
6	Cap screw (for three-conduit models)	1.27 to 1.67 N • m

Note: Apply a tightening torque of 0.78 to 0.88 N • m to conduit models.

■ 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.

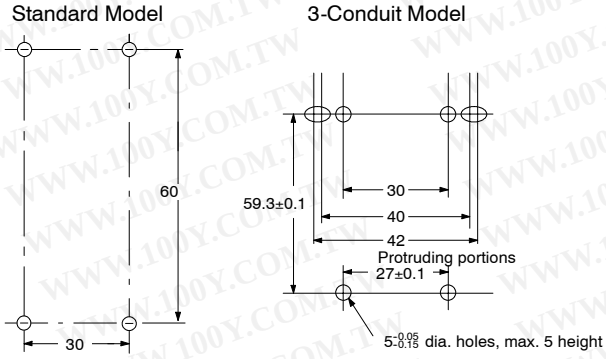
Do not use the D4B-□N in the following places:

- 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.

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 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. The lever can be set at any angle by attaching the operating position 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 operating position indicator plate securely so that the lever will not slip.

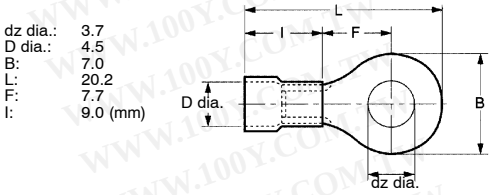
Changes in Head Mounting Position

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.

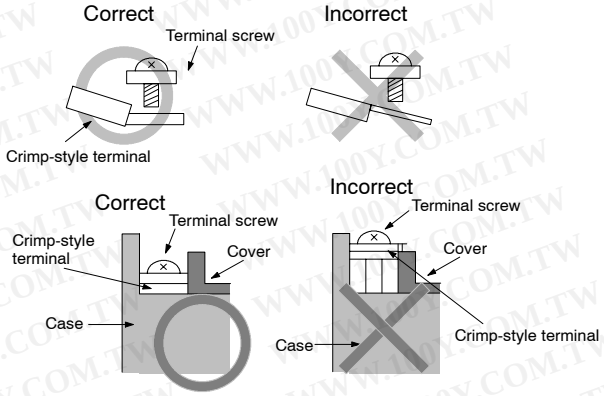
Wiring

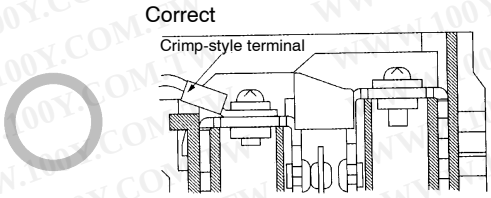
Do not connect the bare lead wires directly to the terminals but be sure to connect each of them by using an insulation tube and M3.5 round solderless terminals and tighten each terminal screw within the specified torque range.

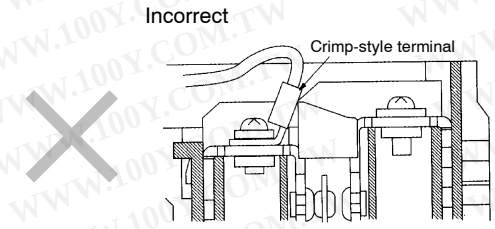
The proper lead wire is 20 to 14 AWG (0.5 to 2.5 mm^2) in size.



Make sure that all solderless terminals come into contact with the casing or cover as shown below, or 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.

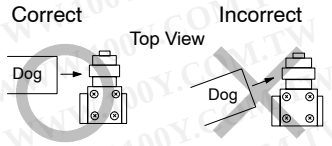
The Pg13.5 connector must be Nippon Flex's ABS-08Pg13.5 or ABS-12 Pg13.5.

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.

Actuator Load

The load for the actuator (roller) of the Switch must be imposed on the actuator in the horizontal direction, or 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 the data sheet section: *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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters into inches, divide by 25.4

OMRON

OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

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Global - http://www.omron.com
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