

Compact, Plastic-body Safety-door Hinge Switch Designed for Saving Space in Machines and Other Equipment

- Lineup includes three contact models with 2NC/1NO and 3NC contact forms in addition to the previous contact forms 1NC/1NO, and 2NC. Models with MBB contacts are also available.
- M12-connector models are available, saving on labor and simplifying replacement.
- Standardized gold-clad contacts provide high contact reliability. Can be used with both standard loads and microloads.

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



 Be sure to read the "Safety Precautions" on page 9 and the "Precautions for All Safety Door Switches".

Model Number Structure

Model Number Legend

D4NH-
1 2 3

1. Conduit size

- 1: Pg13.5 (1-conduit)
- 2: G1/2 (1-conduit)
- 3: 1/2-14NPT (1-conduit)
- 4: M20 (1-conduit)
- 5: Pg13.5 (2-conduit)
- 6: G1/2 (2-conduit)
- 7: 1/2-14NPT (2-conduit)
- 8: M20 (2-conduit)
- 9: M12 connector (1-conduit)

2. Built-in Switch

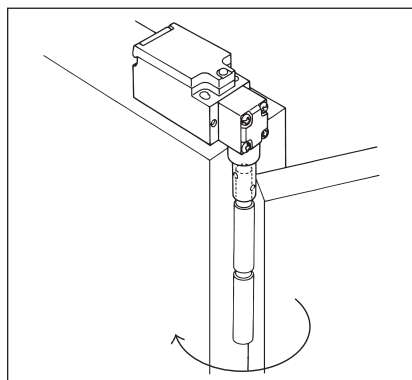
- A: 1NC/1NO (slow-action)
- B: 2NC (slow-action)
- C: 2NC/1NO (slow-action)
- D: 3NC (slow-action)
- E: 1NC/1NO (MBB contact) (slow-action)
- F: 2NC/1NO (MBB contact) (slow-action)

3. Actuator

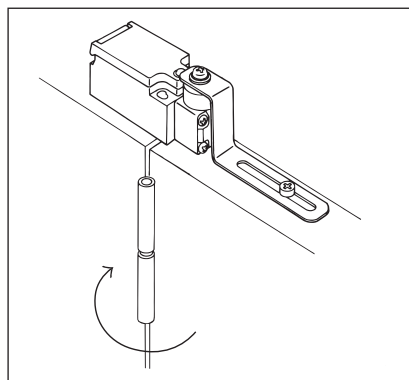
- AS: Shaft
- BC: Arm lever

Application Examples (Protective Door Safety Measures)

Shaft Actuator



Arm Lever Actuator



Ordering Information

List of Models

Switches

■ : Models with certified direct opening contacts.

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

Actuator	Conduit size		Built-in switch mechanism		
			1NC/1NO (Slow-action)	2NC (Slow-action)	2NC/1NO (Slow-action)
Shaft	1-conduit	Pg13.5	D4NH-1AAS	D4NH-1BAS	D4NH-1CAS
		G1/2	D4NH-2AAS	D4NH-2BAS	D4NH-2CAS
		1/2-14NPT	D4NH-3AAS	D4NH-3BAS	D4NH-3CAS
		M20	D4NH-4AAS	D4NH-4BAS	D4NH-4CAS
		M12 connector	D4NH-9AAS	D4NH-9BAS	---
	2-conduit	Pg13.5	D4NH-5AAS	D4NH-5BAS	D4NH-5CAS
		G1/2	D4NH-6AAS	D4NH-6BAS	D4NH-6CAS
		1/2-14NPT *	D4NH-7AAS	D4NH-7BAS	D4NH-7CAS
		M20	D4NH-8AAS	D4NH-8BAS	D4NH-8CAS
Arm lever	1-conduit	Pg13.5	D4NH-1ABC	D4NH-1BBC	D4NH-1CBC
		G1/2	D4NH-2ABC	D4NH-2BBC	D4NH-2CBC
		1/2-14NPT	D4NH-3ABC	D4NH-3BBC	D4NH-3CBC
		M20	D4NH-4ABC	D4NH-4BBC	D4NH-4CBC
		M12 connector	D4NH-9ABC	D4NH-9BBC	---
	2-conduit	Pg13.5	D4NH-5ABC	D4NH-5BBC	D4NH-5CBC
		G1/2	D4NH-6ABC	D4NH-6BBC	D4NH-6CBC
		1/2-14NPT *	D4NH-7ABC	D4NH-7BBC	D4NH-7CBC
		M20	D4NH-8ABC	D4NH-8BBC	D4NH-8CBC

Actuator	Conduit size		Built-in switch mechanism		
			3NC (Slow-action)	1NC/1NO MBB (Slow-action)	2NC/1NO MBB (Slow-action)
Shaft	1-conduit	Pg13.5	D4NH-1DAS	D4NH-1EAS	D4NH-1FAS
		G1/2	D4NH-2DAS	D4NH-2EAS	D4NH-2FAS
		1/2-14NPT	D4NH-3DAS	D4NH-3EAS	D4NH-3FAS
		M20	D4NH-4DAS	D4NH-4EAS	D4NH-4FAS
		M12 connector	---	D4NH-9EAS	---
	2-conduit	Pg13.5	D4NH-5DAS	D4NH-5EAS	D4NH-5FAS
		G1/2	D4NH-6DAS	D4NH-6EAS	D4NH-6FAS
		1/2-14NPT *	D4NH-7DAS	D4NH-7EAS	D4NH-7FAS
		M20	D4NH-8DAS	D4NH-8EAS	D4NH-8FAS
Arm lever	1-conduit	Pg13.5	D4NH-1DBC	D4NH-1EBC	D4NH-1FBC
		G1/2	D4NH-2DBC	D4NH-2EBC	D4NH-2FBC
		1/2-14NPT	D4NH-3DBC	D4NH-3EBC	D4NH-3FBC
		M20	D4NH-4DBC	D4NH-4EBC	D4NH-4FBC
		M12 connector	---	D4NH-9EBC	---
	2-conduit	Pg13.5	D4NH-5DBC	D4NH-5EBC	D4NH-5FBC
		G1/2	D4NH-6DBC	D4NH-6EBC	D4NH-6FBC
		1/2-14NPT *	D4NH-7DBC	D4NH-7EBC	D4NH-7FBC
		M20	D4NH-8DBC	D4NH-8EBC	D4NH-8FBC

Note: 1. It is recommended that M20 be used for Switches to be exported to Europe and 1/2-14NPT be used for Switches to be exported to North American countries.

2. All models have slow-action contacts with certified direct opening mechanisms on NC contacts only.

* The 1/2-14NPT 2-conduit models include an M20-to-1/2-14NPT changing adaptor.

Specifications

Standards and EC Directives

Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EN50047
- EN60204-1
- EN1088
- GS-ET-15

Certified Standards

Certification body	Standard	File No.
TÜV SÜD	EN60947-5-1 (certified direct opening)	Ask your OMRON representative for information on certified models.
UL *	UL508, CSA C22.2 No.14	E76675
CCC (CQC)	GB14048.5	2004010305105973

* Certification for CSA C22.2 No. 14 is authorized by the UL mark.

Certified Standard Ratings

TÜV (EN60947-5-1)

Item	Utilization category	AC-15	DC-13
Rated operating current (I_e)		3 A	0.27 A
Rated operating voltage (U_e)		240 V	250 V

Note: Use a 10 A fuse type gI or gG that conforms to IEC60269 as a short-circuit protection device. This fuse is not built into the Switch.

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

A300

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		

Q300

Rated voltage	Carry current	Current (A)		Volt-amperes (VA)	
		Make	Break	Make	Break
125 VDC	2.5 A	0.55	0.55	69	69
250 VDC		0.27	0.27		

Characteristics

Degree of protection *1		IP67 (EN60947-5-1)
Durability *2	Mechanical	1,000,000 operations min.
	Electrical	500,000 operations min. (3 A resistive load at 250 VAC) *3 300,000 operations min. (10 A resistive load at 250 VAC)
Operating speed		2 to 360°/s
Operating frequency		30 operations/minute max.
Contact resistance		25 mΩ max.
Minimum applicable load *4		1 mA resistive load at 5 VDC (N-level reference value)
Rated insulation voltage (U_i)		300 V
Rated frequency		50/60 Hz
Protection against electric shock		Class II (double insulation)
Pollution degree (operating environment)		3 (EN60947-5-1)
Impulse withstand voltage (EN60947-5-1)	Between terminals of same polarity	2.5 kV
	Between terminals of different polarity	4 kV
	Between each terminal and non-current carrying metallic parts	6 kV
Insulation resistance		100 MΩ min.
Contact gap		2 × 2 mm min.
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 free air thermal current (I_{th})		10 A (EN60947-5-1)
Ambient operating temperature		−30 to 70°C (with no icing)
Ambient operating humidity		95% max.
Weight		Approx. 87 g (D4NH-1AAS) Approx. 97 g (D4NH-1ABC)

Note: 1. The above values are initial values.

2. Once the contacts have been used to switch a load, however, they cannot be used to switch smaller loads. The contact surfaces will become rough once they have been used and contact reliability for smaller loads may be reduced.

*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. Although the switch box is protected from dust or water penetration, do not use the D4NH in places where foreign material such as dust, dirt, oil, water, or chemicals may enter through the head. Otherwise, accelerated wear, Switch damage, or malfunctioning may occur.

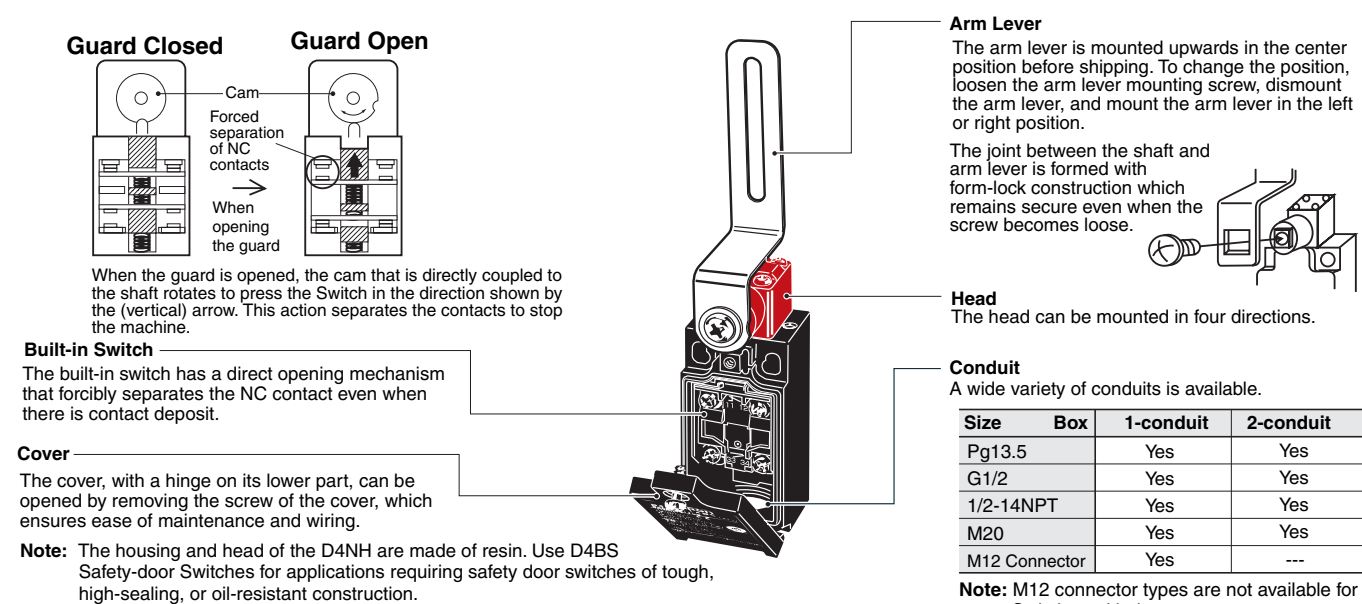
*2. The durability is for an ambient temperature of 5 to 35°C and an ambient humidity of 40% to 70%. For more details, consult your OMRON representative.

*3. Do not pass the 3 A, 250 VAC load through more than 2 circuits.

*4. This value will vary with the switching frequency, environment, and reliability level. Confirm that correct operation is possible with the actual load beforehand.

Structure and Nomenclature

Structure (D4NH-□□BC)



Contact Form

Model	Contact	Contact form	Operating pattern	Remarks
D4NH-□A□	1NC/1NO			Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-12 and 33-34 can be used as unlike poles.
D4NH-□B□	2NC			Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. (→) The terminals 11-12 and 31-32 can be used as unlike poles.
D4NH-□C□	2NC/1NO			Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-12, 21-22, and 33-34 can be used as unlike poles.
D4NH-□D□	3NC			Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→) The terminals 11-12, 21-22, and 31-32 can be used as unlike poles.
D4NH-□E□	1NC/1NO MBB *			Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-12 and 33-34 can be used as unlike poles.
D4NH-□F□	2NC/1NO MBB *			Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-12, 21-22 and 33-34 can be used as unlike poles.

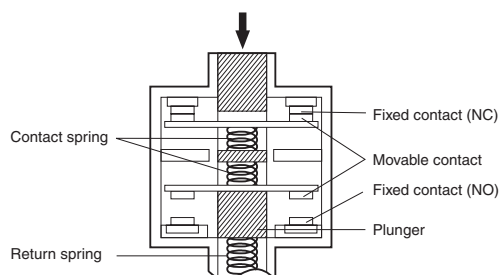
Note: 1. Terminals are numbered according to EN50013. Contact forms are according to EN60947-5-1.

2. MBB (Make Before Break) contacts have an overlapping structure, so that before the normally closed contact (NC) opens, the normally open contact (NO) closes.

* MBB (Make Before Break) contacts have an overlapping structure, so that before the normally closed contact (NC) opens, the normally open contact (NO) closes.

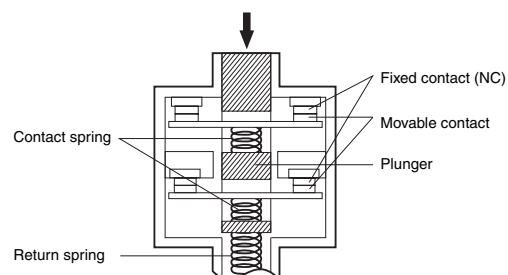
Direct Opening Mechanism

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.

Dimensions and Operating Characteristics

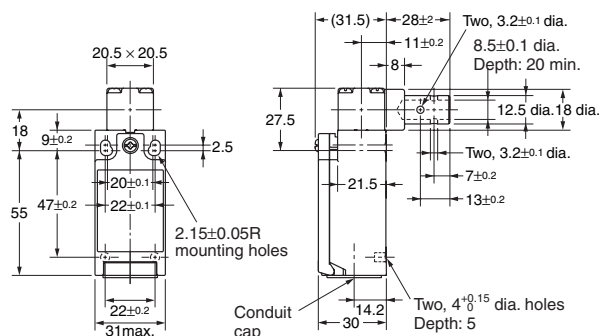
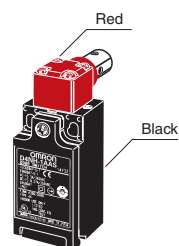
(Unit: mm)

Shaft Type with 1 Conduit

D4NH-1□AS D4NH-2□AS

D4NH-3□AS D4NH-4□AS

D4NH-9□AS *



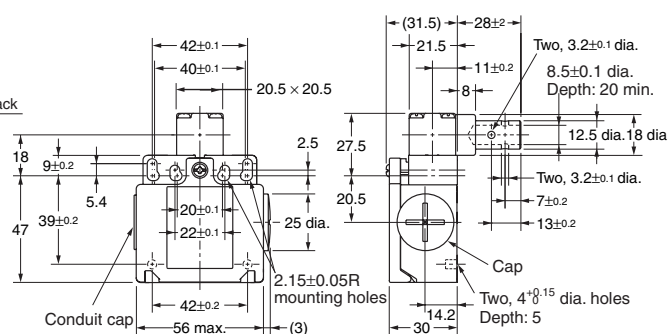
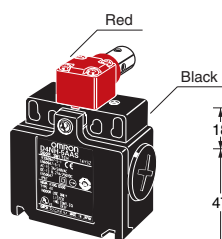
Operating force	OF max.	0.15 N·m
Pretravel PT 1 (NC)		(7°) (MBB: 10°)
Pretravel PT 2 (NO)		(19°) (MBB: 5°)
Direct opening travel	DOT min. *	18°
Direct opening force	DOF min.	1 N·m

* Be sure to provide this amount to ensure safety in operation.

Shaft Type with 2 Conduits

D4NH-5□AS D4NH-6□AS

D4NH-7□AS D4NH-8□AS



Operating force	OF max.	0.15 N·m
Pretravel PT 1 (NC)		(7°) (MBB: 10°)
Pretravel PT 2 (NO)		(19°) (MBB: 5°)
Direct opening travel	DOT min. *	18°
Direct opening force	DOF min.	1 N·m

* Be sure to provide this amount to ensure safety in operation.

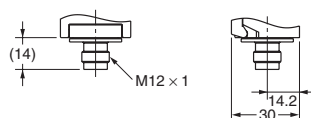
Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

2. Variation occurs in the simultaneity of contact opening/closing operations of 2NC, 2NC/1NO, and 3NC contacts. Check contact operation.

* Refer to the following diagram for details on M12 connectors.

1-conduit M12 Connector

D4NH-9□□□

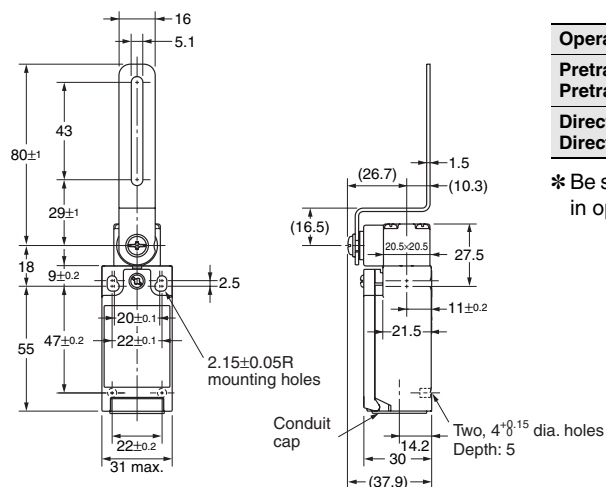
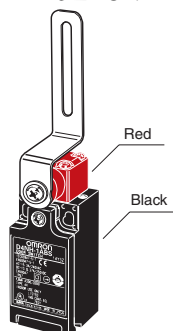


Arm Lever Type with 1 Conduit

D4NH-1□BC D4NH-2□BC

D4NH-3□BC D4NH-4□BC

D4NH-9□BC *



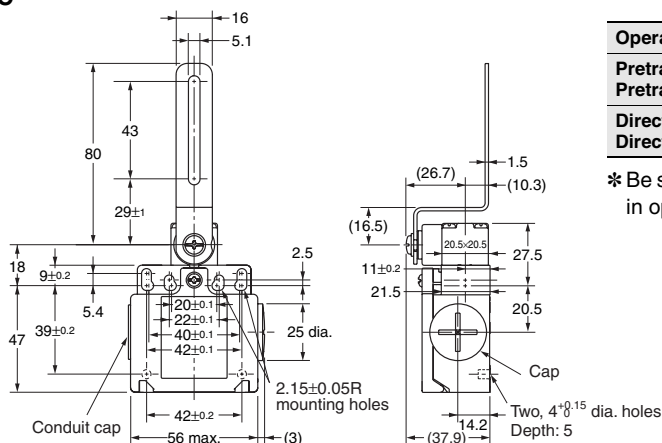
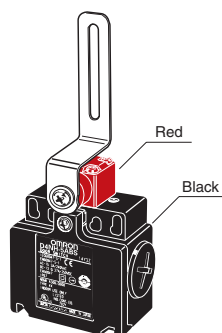
Operating force	OF max.	0.15 N·m
Pretravel PT 1 (NC) Pretravel PT 2 (NO)		(7°) (MBB: 10°) (19°) (MBB: 5°)
Direct opening travel	DOT min. *	18°
Direct opening force	DOF min.	1 N·m

* Be sure to provide this amount to ensure safety in operation.

Arm Lever Type with 2 Conduits

D4NH-5□BC D4NH-6□BC

D4NH-7□BC D4NH-8□BC



Operating force	OF max.	0.15 N·m
Pretravel PT 1 (NC) Pretravel PT 2 (NO)		(7°) (MBB: 10°) (19°) (MBB: 5°)
Direct opening travel	DOT min. *	18°
Direct opening force	DOF min.	1 N·m

* Be sure to provide this amount to ensure safety in operation.

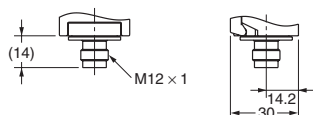
Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

2. Variation occurs in the simultaneity of contact opening/closing operations of 2NC, 2NC/1NO, and 3NC contacts. Check contact operation.

* Refer to the following diagram for details on M12 connectors.

1-conduit M12 Connector

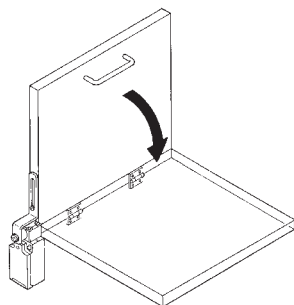
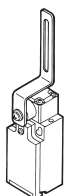
D4NH-9□□□



Application Examples of Arm Lever Use (Be sure to evaluate the Switch under actual working conditions after installation.)

When Installing at the Center

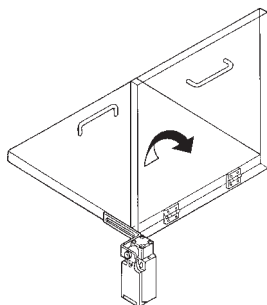
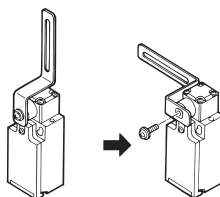
The arm lever is set for center installation at the time of shipment.



Note: Install the arm lever so that it will not rotate more than 90°.

When Installing to the Left

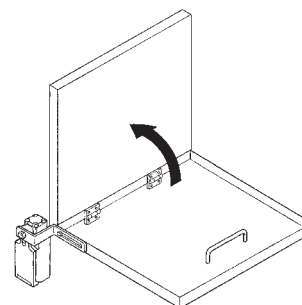
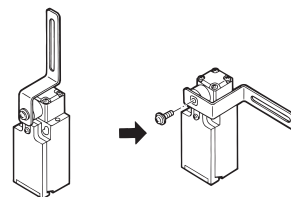
Remove the screw and arm lever, position the arm lever to the left, and then secure it with the screw.



Note: Install the arm lever so that it will not rotate more than 180°.

When Installing to the Right

Remove the screw and arm lever, position the arm lever to the right, and then secure it with the screw.



Note: Install the arm lever so that it will not rotate more than 180°.

Safety Precautions

Refer to the “*Precautions for All Switches*” and “*Precautions for All Safety Door Switches*”.

CAUTION

Electric shock may occasionally occur.
Do not use metal connectors or metal conduits.



Precautions for Safe Use

- Do not use the Switch submerged in oil or water, or in locations continuously subject to splashes of oil or water. Doing so may result in oil or water entering the Switch interior. (The IP67 degree of protection specification for the Switch refers to water penetration while the Switch is submersed in water for a specified period of time.)
- Always attach the cover after completing wiring and before using the Switch. Also, do not turn ON the Switch with the cover open. Doing so may result in electric shock.
- Do not switch circuits for two or more standard loads (250 VAC, 3 A) at the same time. Doing so may adversely affect insulation performance.

Precautions for Correct Use

Mounting Method

Appropriate Tightening Torque

- Loose screws may result in malfunction. Tighten the screws to the specified torques.

Terminal screw	0.6 to 0.8 N·m
Cover mounting screw	0.5 to 0.7 N·m
Head mounting screw	0.5 to 0.6 N·m
Arm lever mounting screw	1.6 to 1.8 N·m
Body mounting screw	0.5 to 0.7 N·m
Connector, M12 adaptor	1.8 to 2.2 N·m
	1.4 to 1.8 N·m (1/2-14NPT)
Cap screw	1.3 to 1.7 N·m

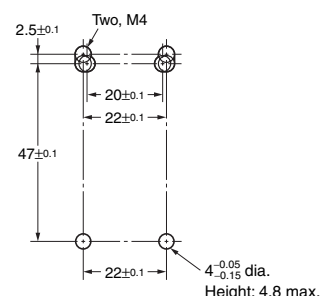
- When loosening a screw with an electrical screwdriver or similar tool while pressing down on the screw head, do not continue turning the screw past the point where the threads disengage. Doing so may strip the end of the threads.

Switch Mounting

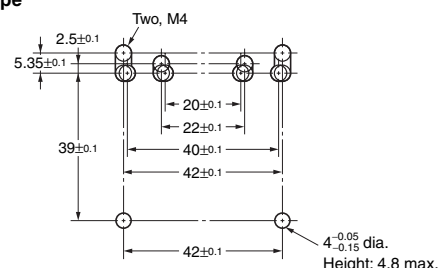
- Mount the Switch using M4 screws and spring washers and tighten the screws to the specified torque.
- To ensure safety, use screws that cannot be easily removed or another means to prevent the Switch and Operation Key from easily being removed.
- As shown below, two studs with a maximum height of 4.8 mm and a diameter of $4^{+0.05}_{-0.15}$ mm can be provided, the studs inserted into the holes on the bottom of the Switch, and the Switch secured at four locations to increase the mounting strength.

Switch Mounting Holes

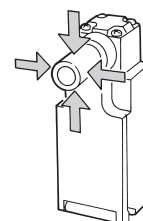
• One-conduit Type



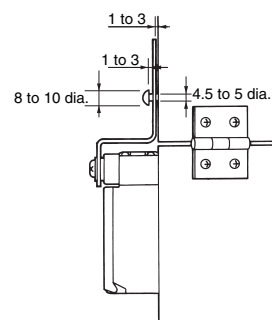
• Two-conduit Type



- Mount the shaft or arm lever securely with a one-way screw, or an equivalent so that the shaft or arm lever cannot be easily removed.
- Align the rotational center of the shaft with the door, so that the Switch shaft and head will not be subjected to mechanical stress when the door opens or closes.
Do not impose a force of 50 N or more on the shaft.



Be sure that the arm lever and door are mounted as shown in the following diagram so that the arm lever and head are not subjected to mechanical stress when the door opens or closes.



Changing the Head Direction

- By removing the four screws of the head, the mounting direction of the head can be changed. The head can be mounted in four directions.
Be sure that no foreign material will enter the head during a change in direction.
- Do not insert or remove the Operation Key with the Switch head removed. Doing so may make it impossible to insert the Operation Key.

Arm Lever Mounting Position

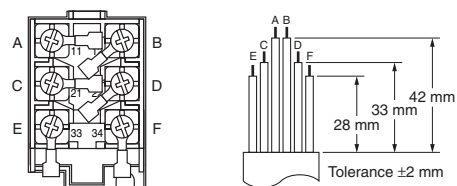
The arm lever is mounted upwards in the center position before shipping. To change the position, loosen the arm lever mounting screw, dismount the arm lever, and mount the arm lever in the left or right position.

Wiring

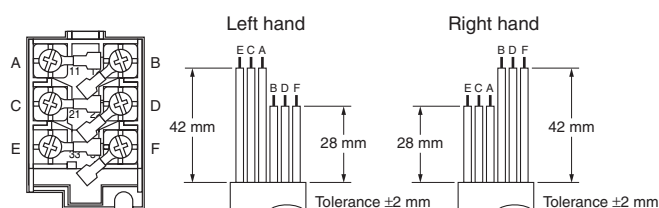
Wiring

- When connecting to the terminals via insulating tube and M3.5 crimp terminals, arrange the crimp terminals as shown below so that they do not rise up onto the case or the cover. Applicable lead wire size: AWG20 to AWG18 (0.5 to 0.75 mm²).
Use lead wires of an appropriate length, as shown below. Not doing so may result in excess length causing the cover to rise and not fit properly.

One-conduit Type (3 Poles)



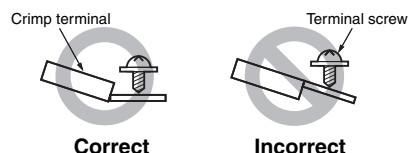
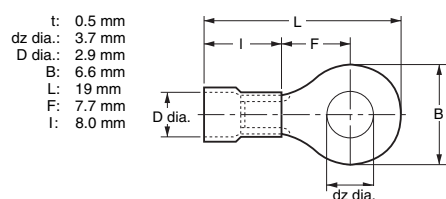
Two-conduit Type (3 Poles)



- Do not push crimp terminals into gaps in the case interior. Doing so may cause damage or deformation of the case.
- Use crimp terminals not more than 0.5 mm in thickness. Otherwise, they will interfere with other components inside the case.

[Reference] The crimp terminals shown below are not more than 0.5 mm thick.

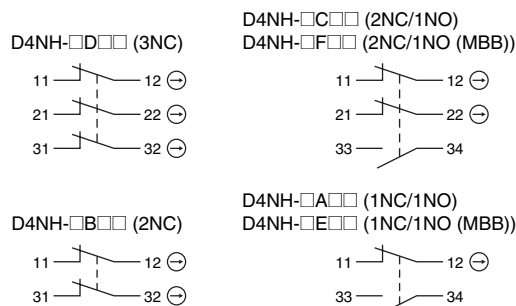
Manufacture	Type
J.S.T. Mfg Co.	FN0.5-3.7 (F Type) N0.5-3.7 (Straight Type)



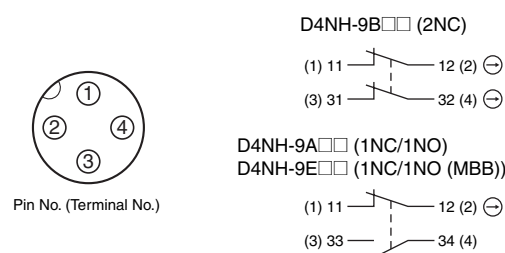
Contact Arrangement

- The following diagrams show the contact arrangements used for screw terminal types and connector types.

Screw Terminal Type



Connector Type



- Applicable socket: XS2F-D421 series (OMRON).
- Refer to the *Connector Catalog* for details on socket pin numbers and lead wire colors.

Socket Tightening (Connector Type)

- Turn the socket connector screws by hand and tighten until no space remains between the socket and the plug.
- Make sure that the socket connector is tightened securely. Otherwise, the rated degree of protection (IP67) may not be maintained and vibration may loosen the socket connector.

Conduit Opening

- Connect a recommended connector to the opening of the conduit and tighten the connector to the specified torque. The case may be damaged if an excessive tightening torque is applied.
- When using 1/2-14NPT conduits, apply sealing tape between the connector and conduit opening to maintain the degree of protection (IP67) of the Switch.
- Use a cable with a suitable diameter for the connector.
- Attach and tighten a conduit cap to the unused conduit opening when wiring. Tighten the conduit cap to the specified torque. The conduit cap is provided with the Switch (2-conduit types).

Recommended Connectors

Use connectors with screws not exceeding 9 mm, otherwise the screws will protrude into the case interior, interfering with other components in the case. The connectors listed in the following table have connectors with thread sections not exceeding 9 mm. Use the recommended connectors to ensure conformance to IP67.

Size	Manufacturer	Model	Applicable cable diameter
G1/2	LAPP	ST-PF1/2 5380-1002	6.0 to 12.0 mm
Pg13.5	LAPP	ST-13.5 5301-5030	6.0 to 12.0 mm
M20	LAPP	ST-M20 × 1.5 5311-1020	7.0 to 13.0 mm
1/2-14NPT	LAPP	ST-NPT1/2 5301-6030	6.0 to 12.0 mm

Use LAPP connectors together with Seal Packing (JPK-16, GP-13.5, or GPM20), and tighten to the specified tightening torque. Seal Packing is sold separately.

- LAPP is a German manufacturer.
- Before using a 2-conduit 1/2-14NPT type, attach the enclosed adaptor to the Switch and then connect the recommended connector.

Others

- When attaching a cover, be sure that the seal rubber is in place and that there is no foreign material present. If the cover is attached with the seal rubber out of place or if foreign material is stuck to the rubber, a proper seal will not be obtained.
- Do not use any screws to connect the cover other than the specified ones. The seal characteristics may be reduced.

Production Discontinuation

Following the release of the D4NH, production of the D4DH was discontinued.

Date of Production Discontinuation

Production of the D4DH Series was discontinued as of the end of March 2006.

Recommended Substitute Products

Use the D4NH-series Switches, which have been available since January 2004.

Product Substitution

1. Dimensions

The D4DH and D4NH use the same mounting method, and mounting hole. The multi-contact structure and the extra 4 mm in length, however, are different.

2. Terminal Numbers

Terminal Numbers
For the 2-contact model, the terminals 21, 22, 23, and 24 on the D4DH are 31, 32, 33, and 34 on the D4NH.

3. Recommended Terminals

If the recommended terminals are not used, the Switch may not be compatible. Make sure that the Switch is compatible with the terminals.

Comparison of the D4DH and Substitute Products

Model	D4NH
Switch color	Very similar
Dimensions	Very similar
Wiring/connection	Significantly different
Mounting method	Completely compatible
Ratings/performance	Very similar
Operating characteristics	Very similar
Operating method	Completely compatible

Discontinued Products and Recommended Substitute Products

Using M screws is recommended to comply with European standards. Therefore, the M20 conduit model is recommended for use in new designs.

Discontinued Products	Recommended substitute product	Discontinued Products	Recommended substitute product
D4DH-15AS	D4NH-1AAS	D4DH-1AAS	D4NH-1BAS
D4DH-25AS	D4NH-2AAS	D4DH-2AAS	D4NH-2BAS
D4DH-35AS	D4NH-3AAS	D4DH-3AAS	D4NH-3BAS
D4DH-55AS	D4NH-5AAS	D4DH-5AAS	D4NH-5BAS
D4DH-65AS	D4NH-6AAS	D4DH-6AAS	D4NH-6BAS
D4DH-15BC	D4NH-1ABC	D4DH-1ABC	D4NH-1BBC
D4DH-25BC	D4NH-2ABC	D4DH-2ABC	D4NH-2BBC
D4DH-35BC	D4NH-3ABC	D4DH-3ABC	D4NH-3BBC
D4DH-55BC	D4NH-5ABC	D4DH-5ABC	D4NH-5BBC
D4DH-65BC	D4NH-6ABC	D4DH-6ABC	D4NH-6BBC

Dimensions (Unit: mm)

Discontinued Models (1-conduit D4DH)	Replacement Substitute Products (1-conduit D4NH)
Discontinued Models (2-conduit D4DH)	Replacement Substitute Products (2-conduit D4NH)

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