勝特力科技 886-3-5753170
百年電子 86-755-83289224
Http://www.100y.com.tw

Safety-Door Switch

Compact Safety Switch Saves Space and is Ideal for a Variety of Doors



- Conforms to EN (TÜV) standards. (positive opening mechanism ⊖ is indicated on the switch)
- Wide standard operating temperature range: –30 to 70°C
- Double-insulation structure (with □ mark) requires no grounding terminals
- Five-direction Operation Key
- Approved by UL, CSA, BIA and SUVA standards
- Standards and EC Directives:
  - Conforms to the following EC Directives:
    Machinery Directive
    Low Voltage Directive
    EN50047
    EN1088
- Approved Standards

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1	R9551708 ⊖ (Positive opening: approved)
UL (see note)	UL508 CSA C22.2 No.14	E76675
BIA	GS-ET-15	1-conduit: 9509915 2-conduit: 9509913
SUVA	SUVA	1-conduit: 6010Z 2-conduit: 6011Z

Note: CSA C22.2 No. 14 compliance was verified and approved by UL (Marked with ⓤL).

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Ordering Information

■ MODEL NUMBER LEGEND

Switch

D4DS-□□□S
1 2 3

1. **Conduit size/type**
   1: Pg13.5 (1-conduit, European type)
   2: G1/2 (1-conduit, Japanese type)
   3: 1/2-14NPT (1-conduit, North American type)
   5: Pg13.5 (2-conduit) (1-conduit, European type)
   6: G1/2 (2-conduit Japanese type)
2. **Built-in Switch**
   5: 1NC/1NO (Slow-action)
   A: 2NC (Slow-action)
3. **Head Mounting Direction**
   F: Four mounting directions possible (Front-side mounting at shipping)

Operation Key

D4DS-K□
1

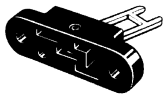
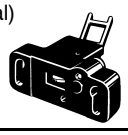
1. **Operation Key Type**
   1: Horizontal mounting
   2: Vertical mounting
   3: Adjustable mounting (Horizontal)
   5: Adjustable mounting (Horizontal/Vertical)

Note: An order for the head part or the switch part alone cannot be accepted. The Operation Key is sold separately.

■ SWITCHES

Description			Part number	
Appearance	Conduit size/type		1NC/1NO (Slow-action)	2NC (Slow-action)
	1-conduit	Pg13.5 (European)	**D4DS-15FS**	**D4DS-1AFS**
		G1/2 (Japanese)	**D4DS-25FS**	**D4DS-2AFS**
		1/2-14NPT (North American)	**D4DS-35FS**	**D4DS-3AFS**
	2-conduit	Pg13.5 (European)	**D4DS-55FS**	**D4DS-5AFS**
		G1/2 (Japanese)	**D4DS-65FS**	**D4DS-6AFS**

■ OPERATION KEYS (ORDER SEPARATELY)

Type	Part number
Horizontal mounting 	**D4DS-K1**
Vertical mounting 	**D4DS-K2**
Adjustable mounting (Horizontal) 	**D4DS-K3**
Adjustable mounting (Horizontal/Vertical) 	**D4DS-K5**

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Specifications

■ APPROVED STANDARD RATINGS

TÜV (EN60947-5-1)

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

Note: Use a 10-A fuse type gl or gG as a short-circuit protection device that conforms to IEC269.

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

A600

Rated voltage	Carry current	Current		Volt-amperes	
		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

Degree of protection (see note 1)	IP65 (EN60947-5-1)
Life expectancy (see note 2)	Mechanical: 1,000,000 operations min. Electrical: 150,000 operations min.
Operating speed	0.1 m/s to 0.5 m/s
Contact gap	2 x 2.0 mm min.
Operating frequency	30 operations/minute min.
Positive opening force (see note 3)	58.84 N min.
Positive opening travel (see note 3)	10 mm min.
Insulation resistance	100 MΩ min. (at 500 VDC) between terminals of same polarity, between terminals of different polarity, between each terminal and ground, and between each terminal and non-current-carrying metal part
Contact resistance	25 mΩ max. (initial value)
Dielectric strength	U_{imp} 4 kV between terminals of same polarity, between terminals of different polarity, and between each terminal and non-current-carrying metal part (EN60947-5-1)
Rated insulation voltage (U_i)	400 V (EN60947-5-1)
Conditional short-circuit current	100 A (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A, fuse type gl or gG (IEC269)
Switching overvoltage	1,500 V max. (EN60947-5-1)
Pollution degree (operating environment)	3 (EN60947-5-1)
Conventional enclosed thermal current (I_{the})	10 A (EN60947-5-1)
Protection against electric shock	Class II (double insulation)
Vibration resistance	Malfunction: 10 to 500 Hz, 0.65-mm single amplitude with an imposed acceleration of 100 m/s^2 max.
Shock resistance	Destruction: 1,000 m/s^2 min. Malfunction: 300 m/s^2 min.
Ambient temperature	Operating: −30°C to 70°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 76 g (for D4DS-15FS)

Note: 1. Although the Switch casing resists dust, oil, and water, make sure that the keyhole on the head is free from dust, oil, water, and chemical, or the D4DS may wear out, break, or malfunction.

2. Life expectancy values are calculated at an operating temperature of 5°C to 35°C, and an operating humidity of 40% to 70%. Contact your OMRON sales representative for more detailed information on other operating environments.

3. These figures are minimum requirements for safe operation.

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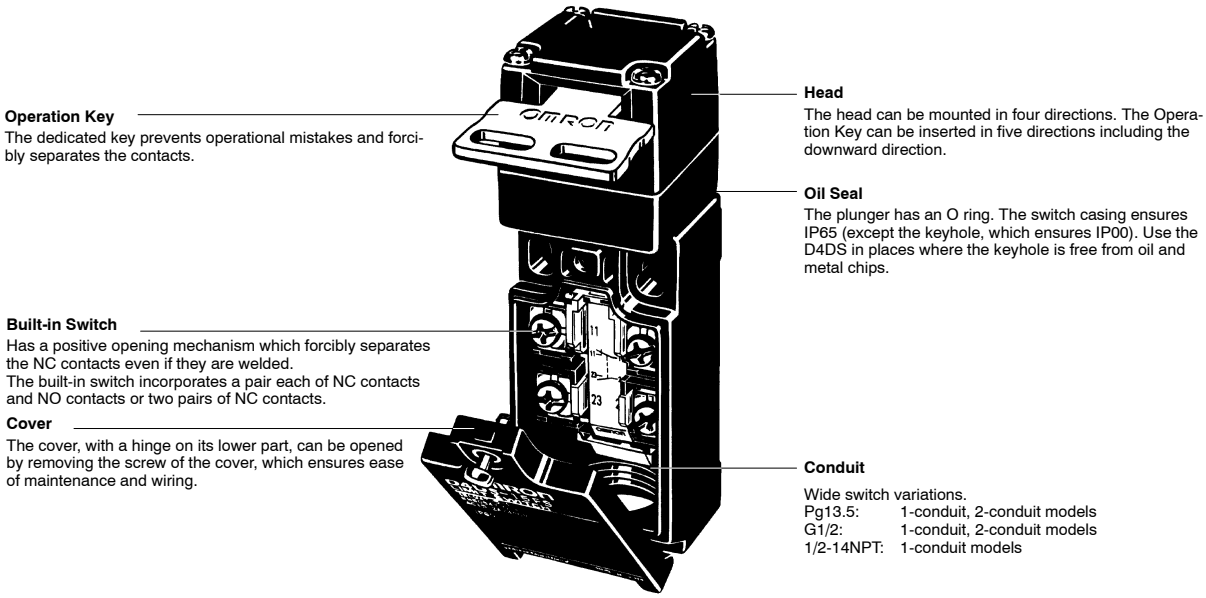
■ OPERATING CHARACTERISTICS

1-Conduit/2-Conduit Models

Model	D4DS-□□□S
Operating force (extraction)	14.71 N
Release force (insertion)	29.42 N
Pretravel	6±3 mm
Total travel (reference value)	28 mm
Min. positive opening force (see note)	58.84 N
Min. positive opening stroke (see note)	10 mm

Note: Make sure that the positive opening stroke is at least 16 mm in order to use the D4DS safely.

Nomenclature

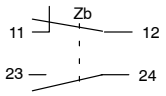
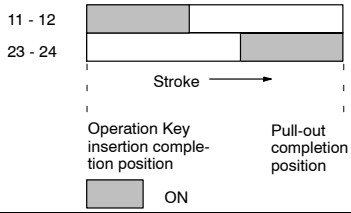
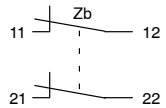
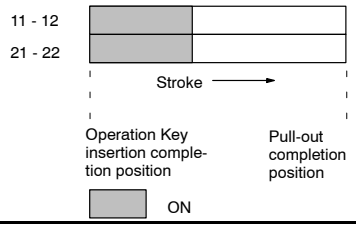


Note: The housing and head of the D4DS are made of synthetic resin. If high mechanical durability is required, use the D4BS Safety Door Switch.

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Operation

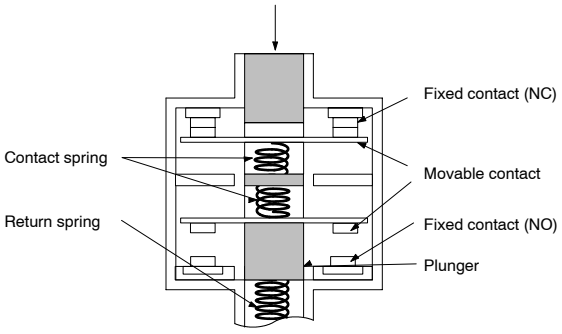
■ CONTACT FORM (DIAGRAMS SHOW STATE WITH KEY INSERTED)

Model	Contact		Diagrams	Remarks
D4DS-□5□S	1NC/1NO			Only NC contact 11-12 has an approved positive opening ⊖ mechanism. The terminals 11-12 and 23-24 can be used as unlike poles.
D4DS-□A□S	2NC			NC contacts 11-12 and 21-22 have an approved positive opening ⊖ mechanism. The terminals 11-12 and 23-24 can be used as unlike poles.

Note: Terminals are numbered according to EN50013 and contacts are marked according to EN60947-5-1.

■ POSITIVE OPENING MECHANISM

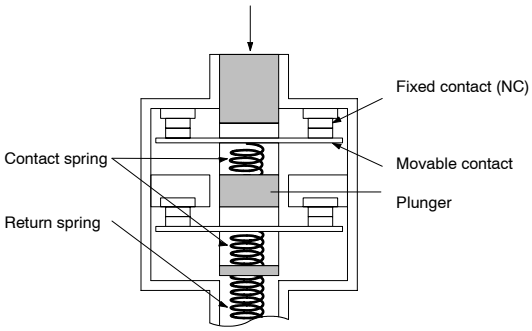
1NC/1NO Contact (Slow-Action)



Only the NC contacts have a positive opening function.
When metal deposition occurs, the contacts are separated from each other by pushing in the plunger.

Conforms to EN60947-5-1 Positive Opening ⊖

2NC Contact (Slow-Action)



Both NC contacts incorporate a positive opening function.
When metal deposition occurs, the contacts are separated from each other by pushing in the plunger.

Conforms to EN60947-5-1 Positive Opening ⊖

Note: The switches are marked with ⊖ indicating approval for the positive opening mechanism.

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Dimensions

Unit: mm (inch)

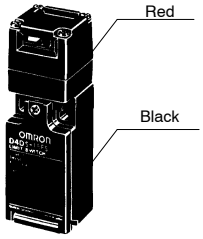
Note: 1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
2. The conduit thread varies with the model as follows:

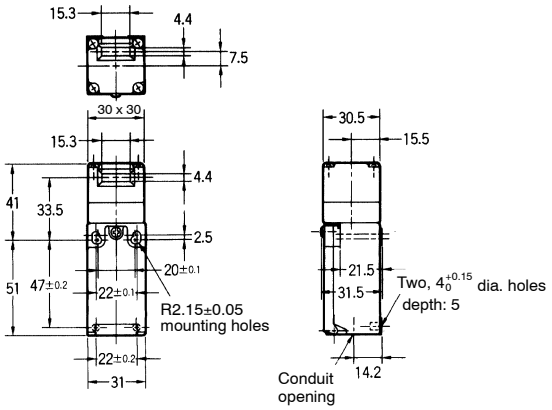
Conduit thread	Model
Pg13.5	D4DS-1□□S/-5□□S
G1/2	D4DS-2□□S/-6□□S
1/2-14NPT	D4DS-3□□S

■ SWITCHES

1-Conduit Models

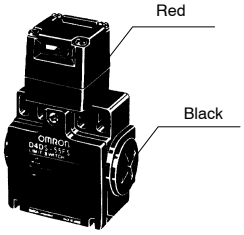
D4DS-1□□S
D4DS-2□□S
D4DS-3□□S

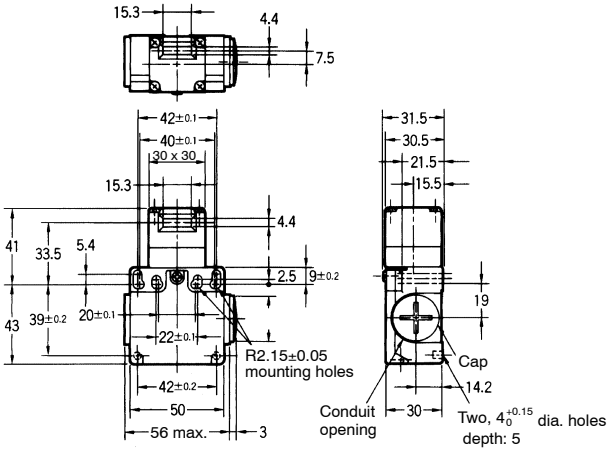




2-Conduit Models

D4DS-5□□S
D4DS-6□□S

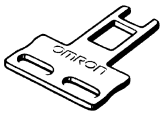


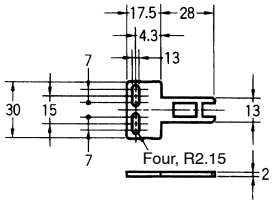


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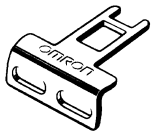
■ OPERATION KEYS

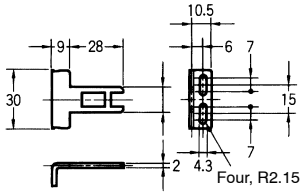
Horizontal Mounting
D4DS-K1



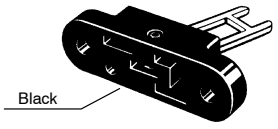


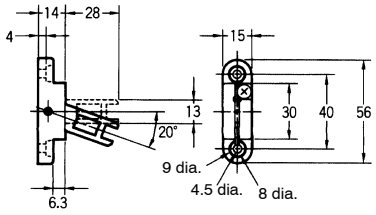
Vertical Mounting
D4DS-K2



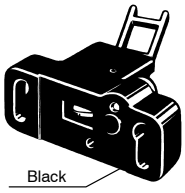


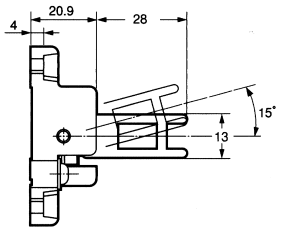
Adjustable Mounting (Horizontal)
D4DS-K3

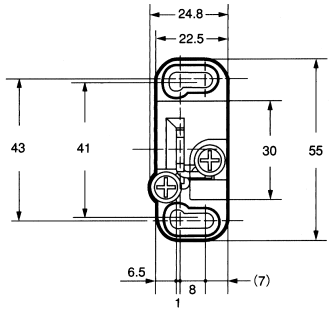




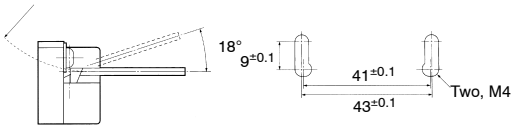
Adjustable Mounting (Horizontal/Vertical)
D4DS-K5







Mounting Holes



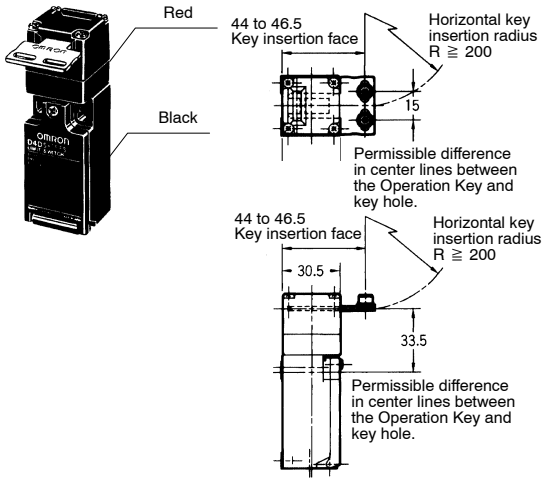
Note: Each dimension has a tolerance of ±0.4 mm unless otherwise specified.

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■ WITH OPERATION KEY INSERTED

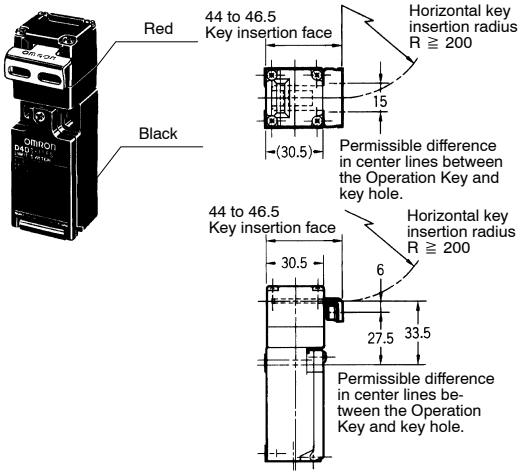
Horizontal Mounting

D4DS-1□□S + D4DS-K1
D4DS-2□□S + D4DS-K1
D4DS-3□□S + D4DS-K1
D4DS-5□□S + D4DS-K1
D4DS-6□□S + D4DS-K1



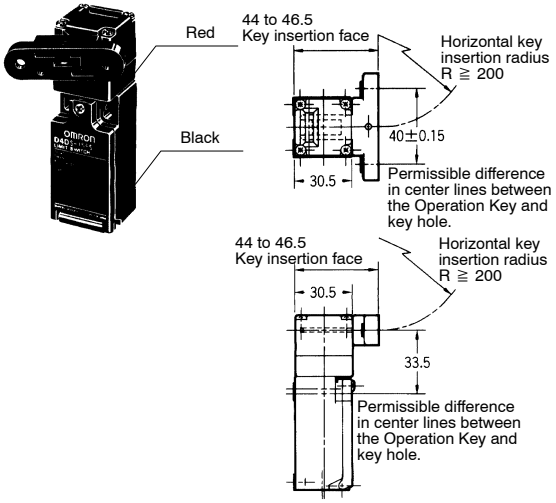
Vertical Mounting

D4DS-1□□S + D4DS-K2
D4DS-2□□S + D4DS-K2
D4DS-3□□S + D4DS-K2
D4DS-5□□S + D4DS-K2
D4DS-6□□S + D4DS-K2



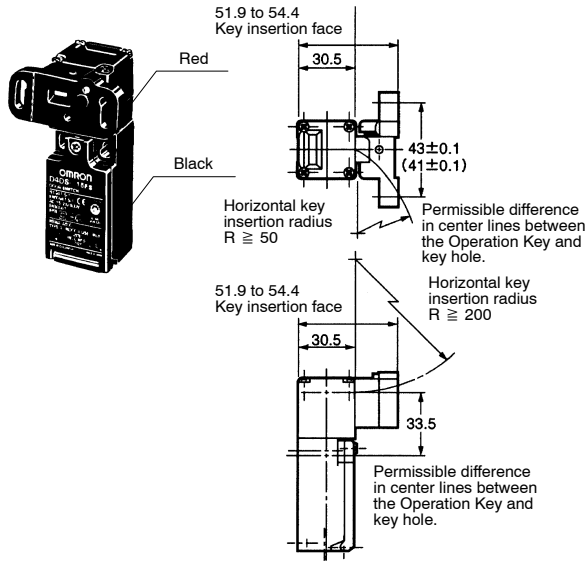
Adjustable Mounting (Horizontal)

D4DS-1□□S + D4DS-K3
D4DS-2□□S + D4DS-K3
D4DS-3□□S + D4DS-K3
D4DS-5□□S + D4DS-K3
D4DS-6□□S + D4DS-K3



Adjustable Mounting (Horizontal/Vertical)

D4DS-1□□S + D4DS-K5
D4DS-2□□S + D4DS-K5
D4DS-3□□S + D4DS-K5
D4DS-5□□S + D4DS-K5
D4DS-6□□S + D4DS-K5



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Precautions

⚠ CAUTION

Do not remove the operation key from the door intentionally and insert it into the switch with the door open. The machine may start operating, and injury or death may be caused.

Do not use metal connectors or conduits with this switch. Rigid connectors and conduits may damage the switch. The broken conduit hole may cause an electrical shock hazard.

Install the operation key so that it will not hit the operator when the door is open.

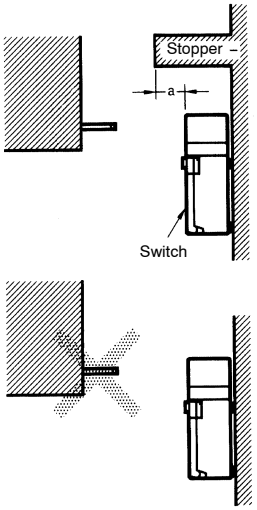
If the D4DS is to be used as a switch in an emergency stop circuit or in a safety circuit for preventing accidents resulting in injuries or deaths, use NC contacts with a forced release mechanism and set the D4DS so that it will operate in positive opening mode. For safety, install the Switch and the Operation Key using one-way rotational screws or other similar means to prevent them from easily coming off. Protect the D4DS with an appropriate cover and post a warning sign near the D4DS in order to ensure the safety of the door.

To prevent the D4DS from damage due to circuit short-circuiting, connect a fuse with a breaking current 1.5 to 2 times larger than the rated current of the D4DS in series to the D4DS.

If the D4DS is used under EN-approved conditions, use a gI or gG 10-A fuse approved by IEC269.

Mount with a Stopper

Be sure to mount the D4DS with a stopper as shown in the following illustration. Do not use the casing of the D4DS as a stopper. Be sure to install the stopper so that the space “a” will be a maximum of 3 mm.



■ CORRECT USE

Operating Environment

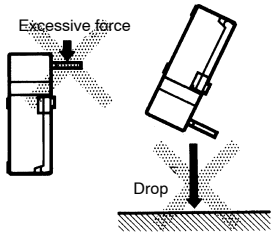
Do not use the D4DS in the following environments, or the D4DS may malfunction.

- Locations subject to significant temperature fluctuations
- Humid locations where there is a risk of condensation
- Locations subject to significant vibrations
- Locations subject to metal chips, oils, and chemicals inside a protective door

Operation Key

Be sure to use a special Operation Key only. Do not operate the D4DS with anything other than the special Operation Key, or the D4DS may break or the safety of the system may not be maintained.

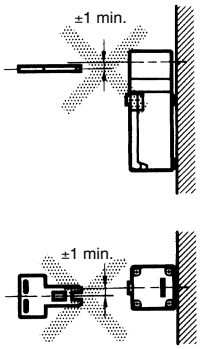
Do not impose excessive force on the Operation Key inserted into the D4DS or drop the D4DS with the Operation Key inserted, or the Operation Key may deform or break.



Secure the Operation Key with screws so that the Operation Key cannot be removed easily.

Refer to *Dimensions* for the mounting dimensions of the Operation Key and properly mount the Operation Key so that the position and angle will be correct.

Make sure that the Operation Key can be inserted correctly with a tolerance of ±0.5 mm in the upward, downward, left, or right direction, or damage to the D4DS may occur.

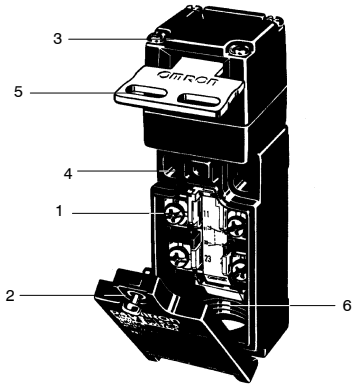


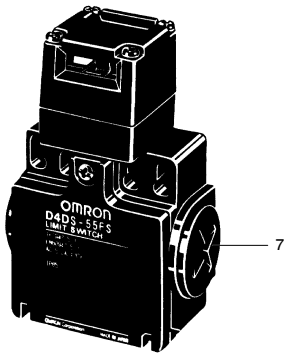
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■ MOUNTING

Tightening Torque

Be sure to tighten each screw to the appropriate tightening torque as shown below.





No.	Type	Torque
1	Terminal screw	0.59 to 0.78 N • m
2	Cover mounting screw	0.78 to 0.88 N • m
3	Head mounting screw	0.78 to 0.88 N • m
4	M4 switch mounting bolt (see note 1)	0.49 to 0.69 N • m
5	Operation Key mounting screw	2.35 to 2.75 N • m
6	Connector	1.77 to 2.16 N • m 1.37 to 1.77 N • m (see note 2)
7	Cap screw	1.27 to 1.67 N • m

Note: 1. Tighten each screw with a washer and use the appropriate tightening torque.
2. This force range applies to 1/2-14NPT.

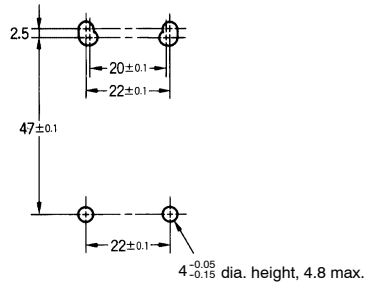
Mounting

Switch

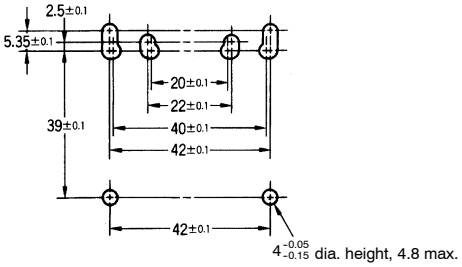
Two, M4 Allen-head bolts with washers must be used in order to mount the D4DS securely. To mount the D4DS more securely, prepare two, 4 $^{-0.05}/_{-0.15}$ dia. protruding portions with 4.8 mm maximum in height each as shown below and support the D4DS at a total of four points.

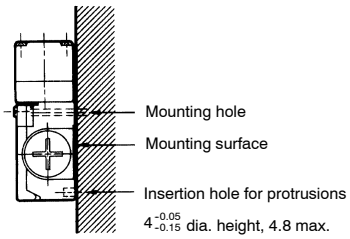
Mounting Dimensions with Protruding Portions

Standard Model



Two-Conduit Model

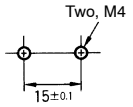




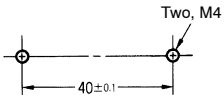
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Operation Key Mounting Dimensions

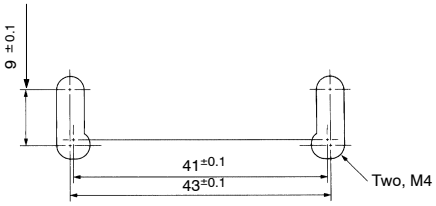
Horizontal/Vertical Mounting
D4DS-K1 or D4DS-K2



Adjustable Mounting (Horizontal) D4DS-K3

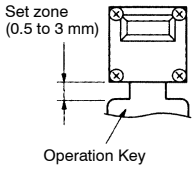


Adjustable Mounting (Horizontal/Vertical) D4DS-K5



Securing the Door

When the door is closed (with the Operation Key inserted), the door (or the Operation Key) may be pushed back across the set zone due to the door's weight, the door cushion rubber, etc. If load is applied to the Operation Key, the door may fail to unlock. Secure the door with hooks so that it will remain within in the set zone.



Changes in Head Mounting Direction

By removing the screws on the four corners of the head, the head can be reset in any of four directions.

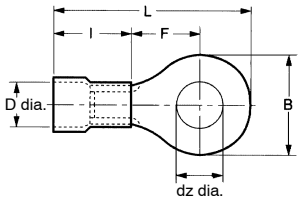
When changing the head mounting direction, make sure that the Operation Key is in the head.

Make sure that no foreign materials penetrate through the mounting holes of the head. Internal screws of the head must not be removed, or the internal parts of the head may be lost or deformed.

Wiring

Do not connect lead wires directly to the terminals. Be sure to connect the lead wires through insulation tubes and crimp terminals., and tighten each terminal screw within an optimum torque range. The lead wires must be an AWG20 to AWG14 type (i.e., 0.5 to 25 mm^2 thick).

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



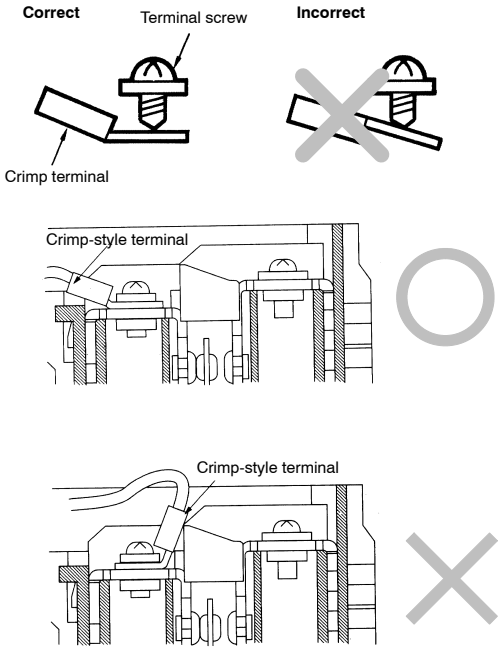
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Conduit Opening

Tighten the connector to a torque of 1.8 to 2.2 N • m (1.37 to 1.77 N • m if it is a 1/2-14NPT). Excessive tightening torque may damage the casing. In order to continue satisfying IP65, apply sealing tape to the connector conduit.

The diameter of the cable must be suited to the corresponding connector.

Wire the crimp terminal as shown in the following diagram so that it will not come in contact with the case or cover.



Properly attach the provided conduit cap to the unused conduit opening and securely tighten the cap screw within a torque range between 1.27 and 1.67 N • m when wiring the D4DS two-conduit model.

Recommended Connector

Size	Manufacturer	Model	Suitable cable dia.
G1/2	OMRON	SC-6	7.5 to 9.0 mm
	LAPP (see note 1)	ST-PF1/2 5360-1002	6.0 to 12.0 mm
	Ohm Electric	OA-W1609	7.0 to 9.0 mm
Pg13.5	LAPP (see note 1)	ST13.5 5301-5030	5.0 to 12.0 mm
1/2-14NPT	LAPP (see note 1)	ST-NPT1/2 5301-6030	6.0 to 12.0 mm

Note: 1. LAPP is a German manufacturer.
2. Ohm Denki is a Japanese manufacturer.

Maintenance and Repairs

The user must not maintain or repair equipment incorporating any D4DS model. Contact the manufacturer of the equipment for any maintenance or repairs required.