

Safety-door Switch

D4DS

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

- Positive opening mechanism  and double insulation  approved by TÜV and BIA.
- Five-direction Operation Key.
- Approved by UL and CSA standards.
- Switzerland's SUVA approval pending.
- Degree of protection: IP65 (EN60529), Type 4 (UL/CSA) (indoor use only).
- Safety Standards:
 - Conformity:
 - Machinery directive
 - Low voltage directive
 - EN50047
 - EN1088

■ Approved Standards

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1 	R9551708
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 ).



Ordering Information

■ Model Number Legend

Limit Switch

D4DS-S
1 2 3

1. Conduit
- 1: Pg13.5 (1-conduit)
2: G1/2 (1-conduit)
3: 1/2-14NPT (1-conduit)
5: Pg13.5 (2-conduit)
6: G1/2 (2-conduit)
2. Built-in Switch
- 5: 1NC/1NO (Slow-action)
A: 2NC (Slow-action)

Operation Key

D4DS-K
1

3. Head Mounting Direction
- F: Four mounting directions possible (Front-side mounting at shipping)
1. Operation Key Type
- 1: Horizontal mounting
2: Vertical mounting
3: Horizontal-adjustable vertical mounting
5: Vertical/Horizontal-adjustable vertical mounting

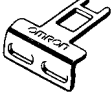
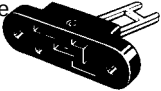
Note: An order for the head part or the switch part alone cannot be accepted. The Operation Key is sold separately.

■ List of Models

Type		Conduit size	1NC/1NO (Slow-action)	2NC (Slow-action)
			Model	Model
1-conduit		Pg13.5	D4DS-15FS	D4DS-1AFS
		G1/2	D4DS-25FS	D4DS-2AFS
		1/2-14NPT	D4DS-35FS	D4DS-3AFS
2-conduit		Pg13.5	D4DS-55FS	D4DS-5AFS
		G1/2	D4DS-65FS	D4DS-6AFS

■ Accessories (Order Separately)

Operation Keys

Type	Model
Horizontal mounting 	D4DS-K1
Vertical mounting 	D4DS-K2
Horizontal-adjustable vertical mounting 	D4DS-K3
Vertical/Horizontal adjustable vertical mounting 	D4DS-K5

Specifications

■ Approved Standard Ratings

TÜV and BIA (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 gI 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 M Ω 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 m Ω 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 gI 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:**
- 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, otherwise the D4DS may wear out, break, or malfunction.
 - 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.
 - These figures are minimum requirements for safe operation.

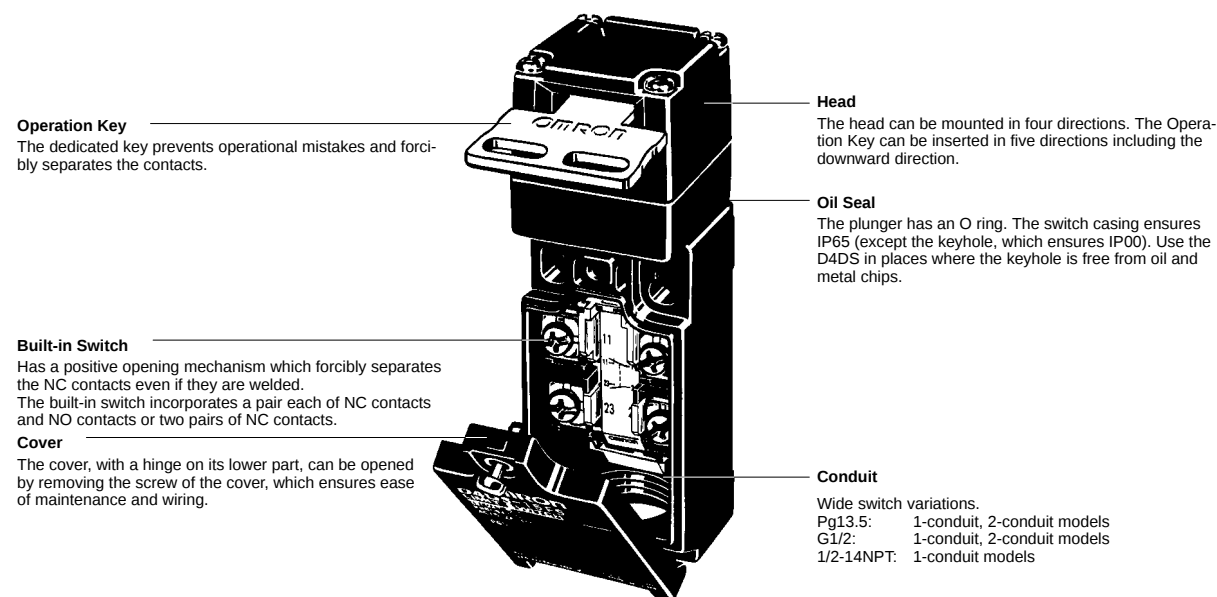
■ Operating Characteristics

1-conduit/2-conduit Models

Model	D4DS-1□□S/D4DS-2□□S/D4DS-3□□S	D4DS-5□□S/D4DS-6□□S/D4DS-7□□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.

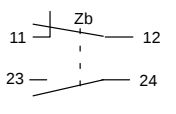
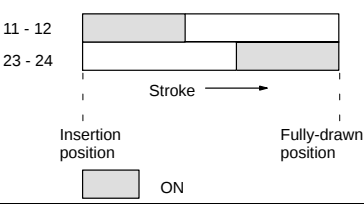
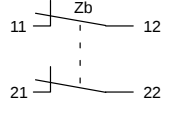
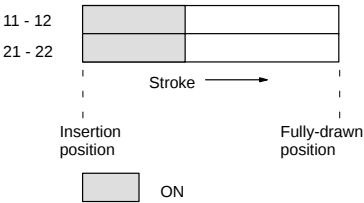
Nomenclature



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.

Operation

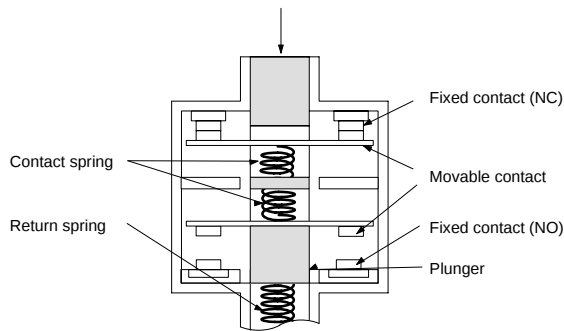
■ Contact Form

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 opposing 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 opposing poles.

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

■ Positive Opening Mechanism

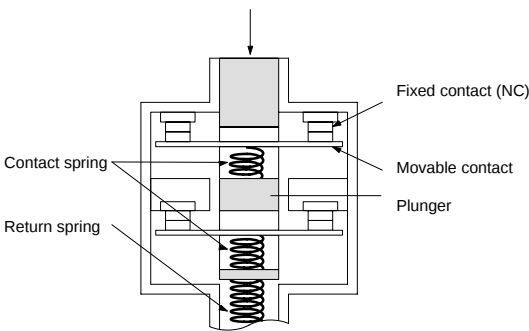
1NC/1NO Contact (Slow-action)



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.

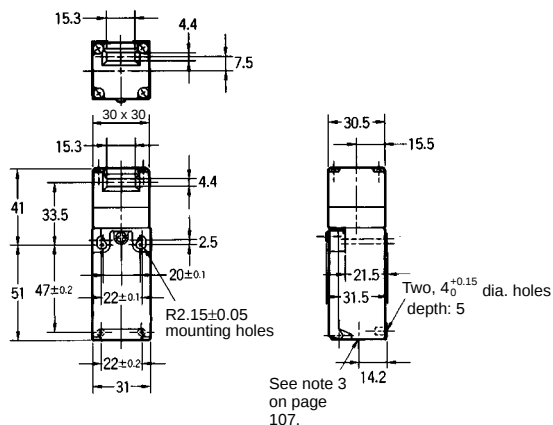
Dimensions

- Note:**
1. All units are in millimeters unless otherwise indicated.
 2. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
 3. 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

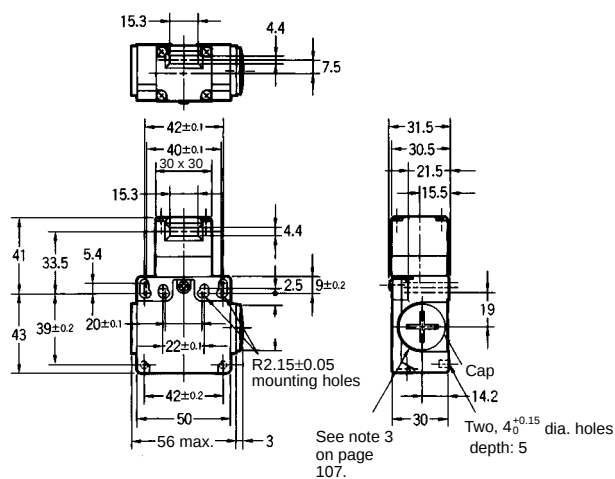
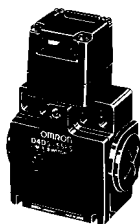
1-conduit Models

D4DS-1□□S
D4DS-2□□S
D4DS-3□□S

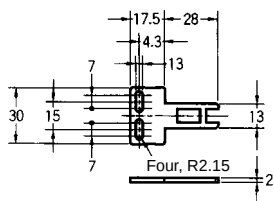
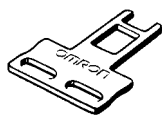
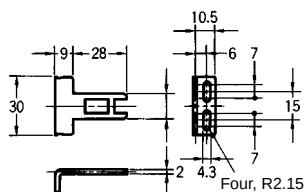
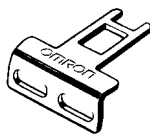
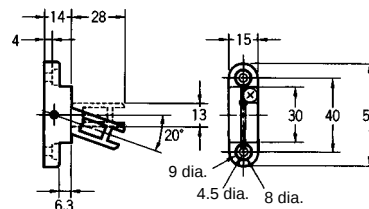
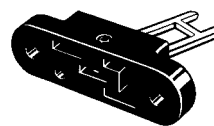


2-conduit Models

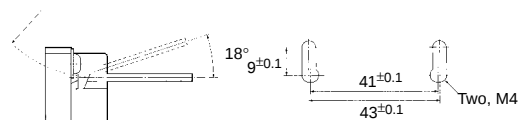
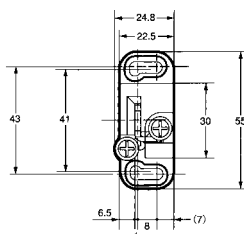
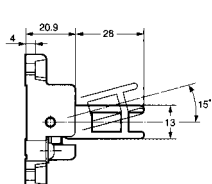
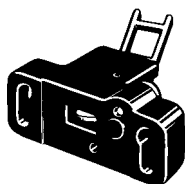
D4DS-5□□S
D4DS-6□□S



Operation Keys

D4DS-K1
Horizontal MountingD4DS-K2
Vertical MountingD4DS-K3
Horizontal-adjustable Vertical Mounting

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

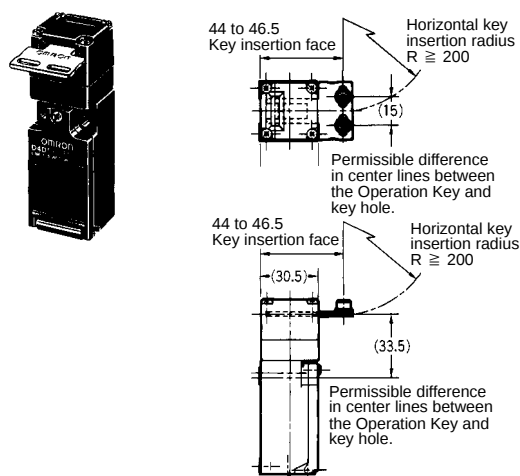
D4DS-K5
Horizontal/Vertical-adjustable Vertical Mounting

Mounting Holes

With Operation Key Inserted

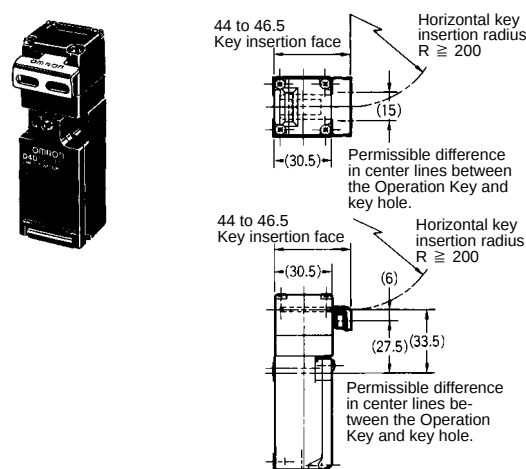
Horizontal Mounting

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



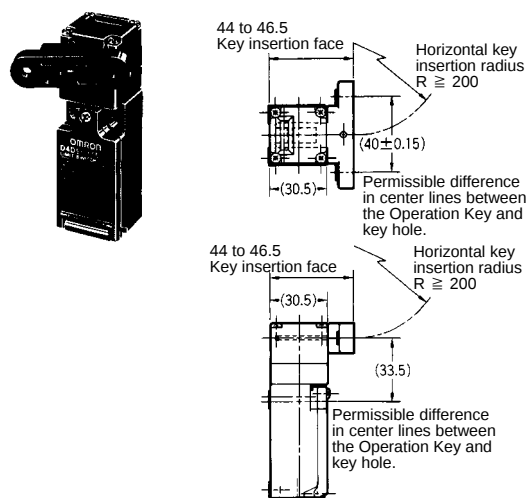
Vertical Mounting

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



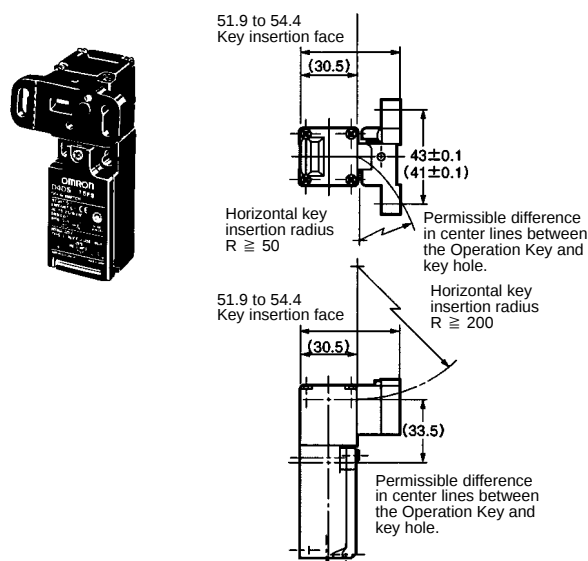
Horizontal-adjustable Vertical Mounting

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



Horizontal/Vertical-adjustable Vertical Mounting

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



Precautions

▲ CAUTION

Do not dismount the operation key from the door intentionally and insert it to the switch with the door open. 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.

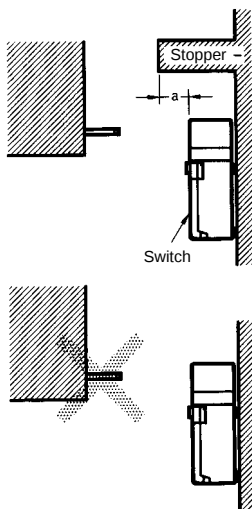
If the D4DS is to be used as a switch in an emergency stop circuit or in a safety circuit for preventing accidents resulting in injuries or deaths, use NC contacts with a forced release mechanism and set the D4DS so that it will operate in positive opening mode. For safety, install the Switch and the 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.

Mounting

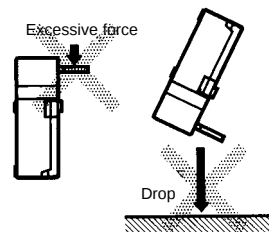
Be sure to mount the D4DS with a stopper as shown in the following illustration. Do not use the casing of the D4DS as a stopper. Be sure to install the stopper so that the space "a" will be a maximum of 3 mm.



Operation Key

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

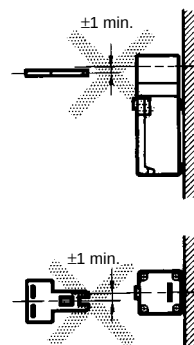
Do not impose excessive force on the Operation Key inserted into the D4DS or drop the D4DS with the Operation Key inserted, otherwise the Operation Key may deform or break.



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

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

Make sure that the Operation Key can be inserted properly with a tolerance of ± 0.5 mm in the upward, downward, left, or right direction, otherwise the D4DS may soon become damaged.



■ Correct Use

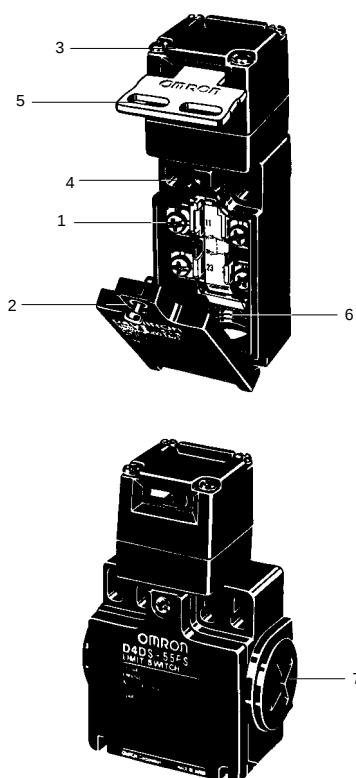
Operating Environment

Do not use the D4DS in the following environments, otherwise 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

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	1.8 to 2.2 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.

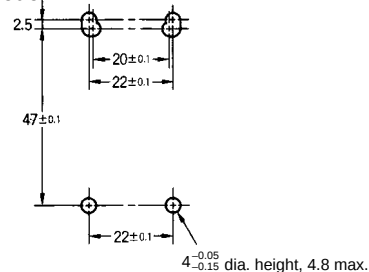
Mounting

Switch

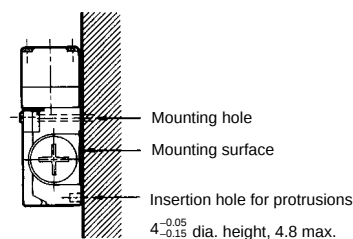
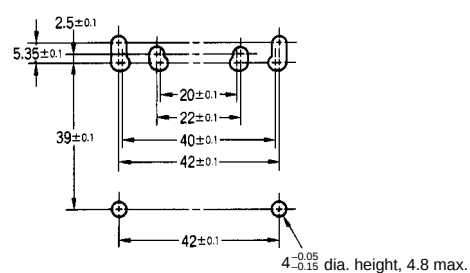
Two, M4 Allen-head bolts with washers must be used in order to mount the D4DS securely. To mount the D4DS more securely, prepare two, $4 \begin{smallmatrix} -0.05 \\ -0.15 \end{smallmatrix}$ dia. protruding portions with 4.8 mm maximum in height each as shown below and support the D4DS at a total of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

Mounting Dimensions with Protruding Portions

Standard Model



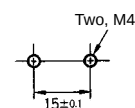
Two-conduit Model



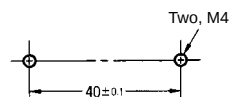
Operation Key

Mounting Dimensions

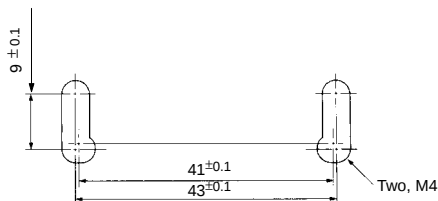
- Horizontal/Vertical Mounting
D4DS-K1 or D4DS-K2



- Horizontal-adjustable Vertical Mounting
D4DS-K3

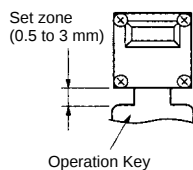


• Horizontal/Vertical-adjustable Vertical Mounting D4DS-K5



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

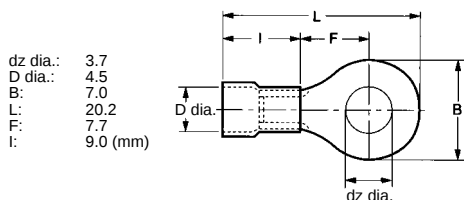
By removing the screws on the four corners of the head, the head can be reset in any of four directions.

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

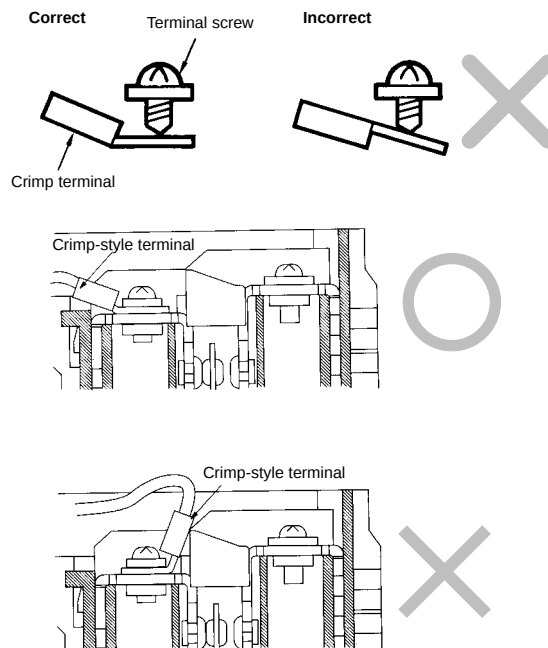
Make sure that no foreign materials penetrate through the mounting holes of the head. Internal screws of the head must not be removed, otherwise the internal parts of the head may be lost or deformed.

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 mm² thick).



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



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.

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.

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

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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