

Safety-door Switch

D4BS

Safety-door Switch's Special Operation Key Positively Pulls Apart the Contacts from Each Other and Contributes to the Safety of the Production Site

- Special Operation Key prevents mis-operation.
- Wide operating temperature range: -40°C to 80°C.
- Mounting pitch and shape of the switch box conforms to CENELEC EN50041.
- Degree of protection of the switch box: IP67 (IEC529).
- Impulse voltage U_{imp} : 4,000 V (IEC 947-5-1).
- Pollution degree: 3 (IEC 947-5-1).
- Electric shock protection: Class I (IEC 536).

■ Safety Standards:

- Conformity:
 - Machinery directive
 - Low voltage directive
 - EN50041
 - EN1088

■ Approved Standards

Agency	Standard	File No.
TÜV Rheinland	EN60947-5-1 	R9351022
UL	UL508	E76675
CSA	CSA C22.2 No. 14	LR45746
BIA	GS-ET-15	9303323
SUVA	SUVA	E6187.d



Ordering Information

■ Model Number Legend

Limit Switch

D4BS - ☐ ☐ ☐ S
 1 2 3

1. Conduit

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

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

D4BS - K ☐
 1

1. Operation Key Type

- 1: Horizontal mounting
- 2: Vertical mounting
- 3: Horizontal-adjustable vertical mounting

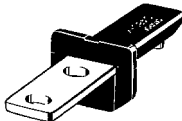
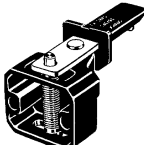
■ List of Models

Standard Switches

Type	Mounting direction		Conduit size	1NC/1NO (Slow-action)	2NC (Slow-action)
1-conduit	Front-side mounting		Pg13.5	D4BS-15FS	D4BS-1AFS
			G1/2	D4BS-25FS	D4BS-2AFS
			1/2–14NPT	D4BS-35FS	D4BS-3AFS
3-conduit			Pg13.5	D4BS-55FS	D4BS-5AFS
			G1/2	D4BS-65FS	D4BS-6AFS
			1/2–14NPT	D4BS-75FS	D4BS-7AFS

■ Accessories (Order Separately)

Operation Keys

Type	Model
Horizontal mounting 	D4BS-K1
Vertical mounting 	D4BS-K2
Horizontal-adjustable vertical mounting 	D4BS-K3

Specifications

■ Approved Standard Ratings

TÜV (EN60947-5-1)

Utilization category	AC-15
Rated operating current (Ie)	2 A
Rated operating voltage (Ue)	400 V

Note: Use IEC269-compliant 10-A fuse type gI or gG as a short-circuit protective device.

UL/CSA (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 2)	IP67 (EN60947-5-1)
Life expectancy (see note 3)	Mechanical: 1,000,000 operations min. Electrical: 500,000 operations min. (10 A at 250 VAC, resistive load)
Operating speed	0.1 m/s to 0.5 m/s
Operating frequency	30 operations/min max.
Rated frequency	50/60 Hz
Contact gap	2 x 2 mm min.
Positive opening force (see note 4)	19.61 N min. (EN60947-5-1)
Positive opening travel (see note 4)	20 mm min. (EN60947-5-1)
Full stroke	23 mm min.
Insulation resistance	100 MΩ min. (at 500 VDC) between terminals of same or different polarity, between each terminal and ground, and between each terminal and non-current-carrying metal part
Contact resistance	25 mΩ max. (initial value)
Rated insulation voltage (U _i)	600 VAC (EN60947-5-1)
Conventional enclosed thermal current (I _{the})	20 A (EN60947-5-1)
Dielectric strength (U _{imp})	Impulse dielectric strength (U _{imp}) 4 kV (EN60947-5-1) for 1 min between terminals of same or different polarity, between current-carrying metal parts and ground, and between each terminal and non-current-carrying metal part
Switching overvoltage	1,500 V max. (EN60947-5-1)
Conditional short-circuit current	100 A (EN60947-5-1)
Short-circuit protective device (SCPD)	10 A fuse type gI or gG (IEC 269)
Pollution degree (operating environment)	3 (EN60947-5-1)
Insulation class	Class I (with ground terminal)
Vibration resistance	Malfunction: 10 to 500 Hz, 0.65-mm single amplitude
Shock resistance	Destruction: 1,000 m/s ² min. (IEC68-2-27) Malfunction: 300 m/s ² min. (IEC68-2-27)
Ambient temperature	Operating: -40°C to 80°C (with no icing)
Ambient humidity	Operating: 95% max.
Weight	Approx. 285 g (in the case of D4BS-15FS)

Note: 1. The above figures are initial values.

2. 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 D4BS may wear out, break, or malfunction.

3. 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.

4. These figures are minimum requirements for safe operation.

■ Operating Characteristics

Model	D4BS-1□□S/D4BS-2□□S/D4BS-3□□S	D4BS-5□□S/D4BS-6□□S/D4BS-7□□S
Operating force (extraction)	19.61 N max.	
Release force (insertion)	19.61 N max.	
Pretravel (PT)	10±5 mm	
Positive opening force	19.61 N min.	
Positive opening stroke	20 mm min.	

Nomenclature

Operation Key

D4BS's exclusive-use Operation Key is provided to assure accurate switching operation.

Set Zone Mark

A triangular Set Zone Mark makes it easy to adjust the operating position when inserting the Operation Key.

Built-in Switch

A shearing force contact separating mechanism (NC contact) is employed, which positively pulls apart the contacts from each other by using shearing force if any abnormality such as contact welding should occur in the contact area.

There is a difference in level between the NC and NO terminal, which assures easy wiring.

Head

The switch head is coated with easy-to-see red paint. The mounting direction of the switch head can be varied to any of the four directions.

Seal Ring (NBR)

Oil Seal (NBR)

The operation plunger employs an oil seal, with which the switch box meets the requirements of IP67 (the sealing capability of the Operation Key's insertion mouth is IP00).

Seal Packing (NBR)

Conduit Opening

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

Ground Terminal Screw

A ground terminal is provided to improve safety.

Operation

■ Contact Form

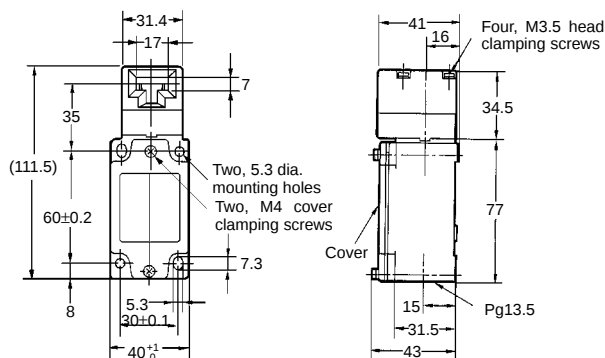
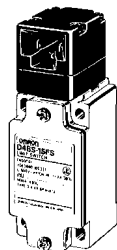
Model	Contact	Contact form	Diagrams	Remarks
D4BS-□5□S	1NC/1NO			Only NC contact 11-12 has forced release function. Terminals 11-12 and 21-22 can be used as different poles.
D4BS-□A□S	2NC			Both NC contacts 11-12 and 21-22 have forced release function. Terminals 11-12 and 21-22 can be used as different poles.

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:.

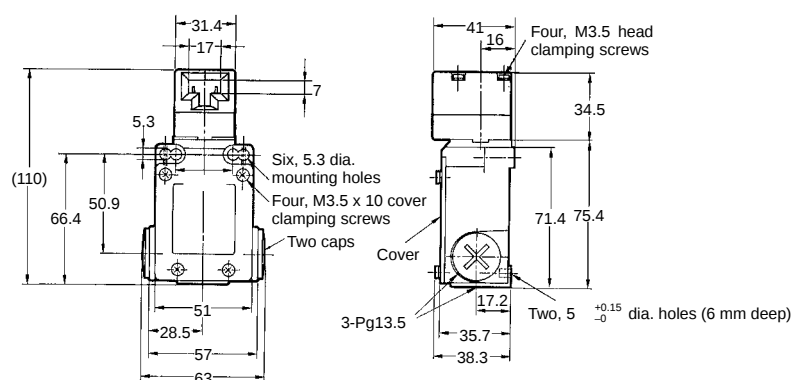
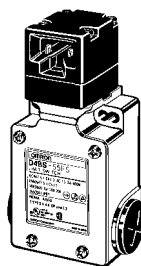
Standard

D4BS-1□□S
D4BS-2□□S
D4BS-3□□S



3-conduit

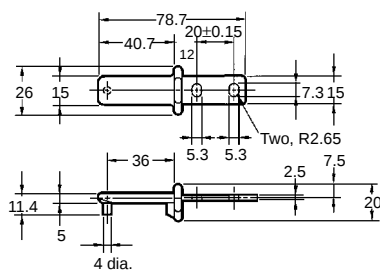
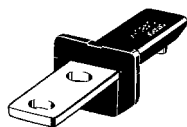
D4BS-5□□S
D4BS-6□□S
D4BS-7□□S



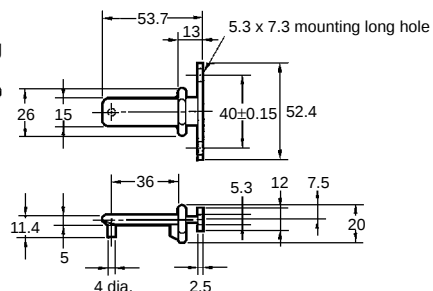
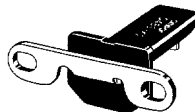
Conduit thread	Model
Pg 13.5	D4BS-1□□S, D4BS-5□□S
G1/2	D4BS-2□□S, D4BS-6□□S
1/2-14NPT	D4BS-3□□S, D4BS-7□□S

■ Operation Keys

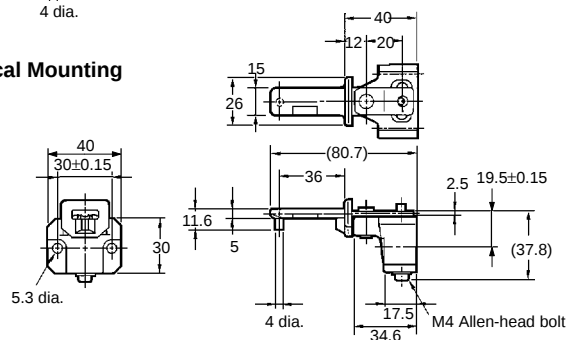
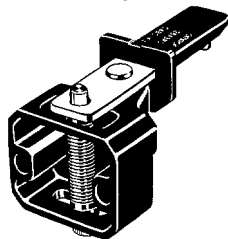
D4BS-K1 Horizontal Mounting



D4BS-K2 Vertical Mounting



D4BS-K3 Horizontal-adjustable Vertical Mounting



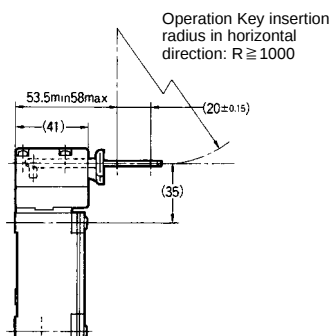
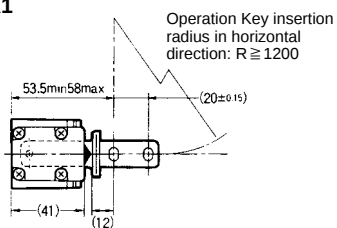
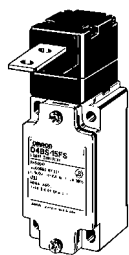
■ With Operation Key Inserted

Horizontal Mounting

D4BS-1□□S + D4BS-K1

D4BS-2□□S + D4BS-K1

D4BS-3□□S + D4BS-K1

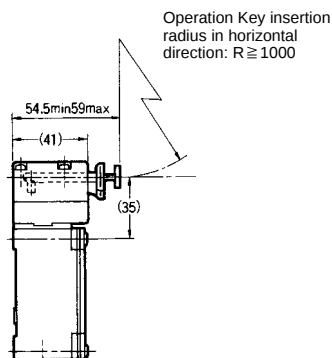
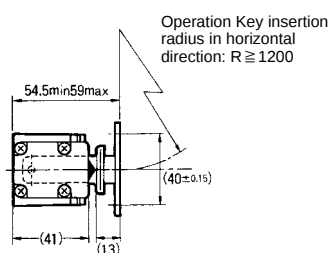
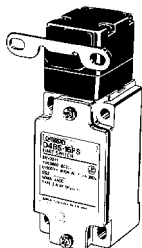


Vertical Mounting

D4BS-1□□S + D4BS-K2

D4BS-2□□S + D4BS-K2

D4BS-3□□S + D4BS-K2

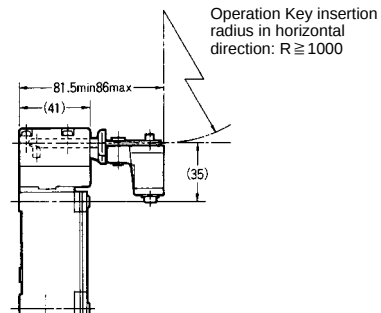
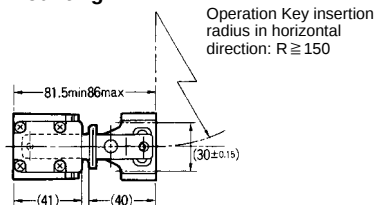
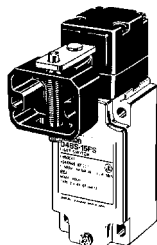


Horizontal-adjustable Vertical Mounting

D4BS-1□□S + D4BS-K3

D4BS-2□□S + D4BS-K3

D4BS-3□□S + D4BS-K3



Note: "R" is the Operation Key insertion radius.

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 of death may be caused.

Install the Operation Key so that it will not hit the operator when the door is open.

If the D4BS 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 D4BS so that it will operate in positive opening mode.

Protect the D4BS with an appropriate cover and post a warning sign near the D4BS, otherwise the D4BS or Operation Key may be removed carelessly, resulting in serious injury due to unexpected operation of the machine.

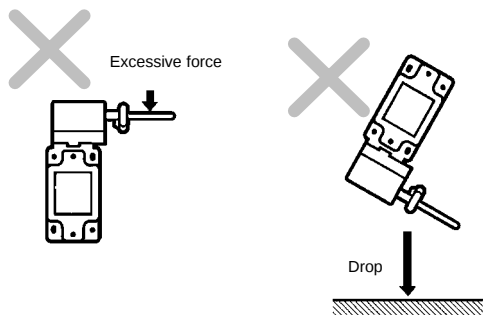
To prevent the D4BS from damage due to circuit short-circuiting, connect a fuse with a breaking current 1.5 to 2 times larger than the rated current of the D4BS in series to the D4BS.

If the D4BS is used under EN-approved conditions, use a gI or gG 10-A fuse approved by IEC269.

Operation Key

Be sure to use a special Operation Key only. Do not operate the D4BS with anything other than the special Operation Key, otherwise the D4BS may break or the safety of the system may not be maintained.

Do not impose excessive force on the Operation Key inserted into the D4BS or drop the D4BS with the Operation Key inserted, otherwise the Operation Key may deform or break.

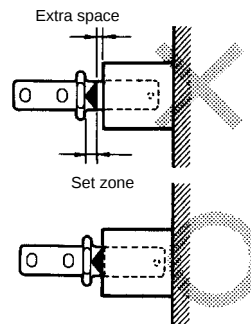


Secure the operation key with a one-way screw, or an equivalent, so that the operation key cannot be easily removed.

Door

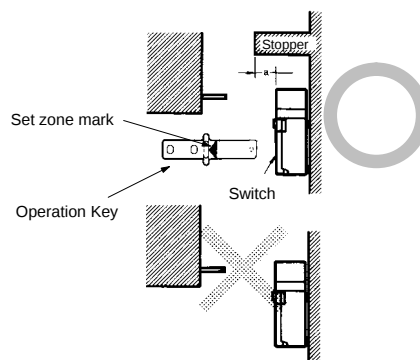
If the Operation Key on the closed door is continuously pulled in the opening direction by a force caused by vibration, the door by itself due to its weight, or cushion that may be attached to the door, the D4BS may soon become damaged.

Be sure to secure the door with a hook so that the Operation Key is inserted with the following set zone and without extra space.



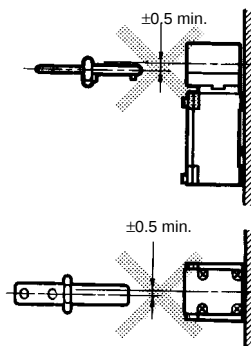
Mounting

Be sure to install a stopper as shown in the following illustration when mounting the Safety-door Limit Switch. The range of space "a" must be determined according to the available set zone of the Operation Key.



Refer to *Dimensions* for the mounting dimension of the Operation Key and mount the Operation Key correctly. The Operation Key will soon become damaged or worn away if it is not mounted correctly.

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 D4BS may soon become damaged.

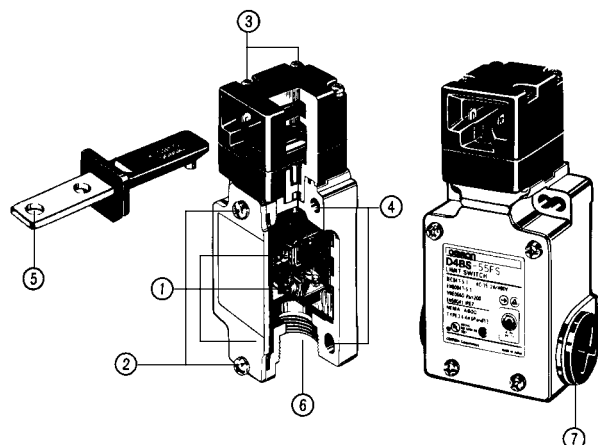


Other

Make sure that the D4BS is located outside the safety door and that no metal dust, oil, or chemical will be sprayed onto the D4BS. Otherwise, the D4BS may soon fail to operate due to the penetration of metal dust, oil, or chemical.

Tightening Torque

Be sure to tighten each screw of the D4BS properly, otherwise the D4BS may soon malfunction.

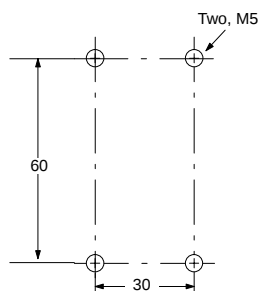


No.	Type	Torque
1	Terminal screw (including ground terminal screw)	0.59 to 0.78 N • m
2	Cover mounting screw (see note 1)	1.18 to 1.37 N • m
3	Head mounting screw	0.78 to 0.98 N • m
4	M5 switch mounting bolt (see note 2)	4.90 to 5.88 N • m
5	Operation Key mounting screw	2.35 to 2.75 N • m
6	Connector	1.77 to 2.16 N • m
7	Cap screw	1.27 to 1.67 N • m

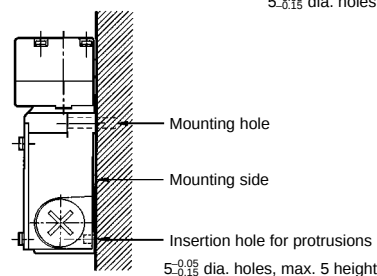
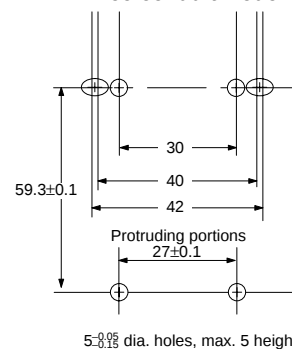
Note: 1. Apply a torque of 0.78 to 0.88 N • m if the D4BS is a three-conduit model.
2. Apply a torque of 4.90 to 5.88 N • m in the case of an Allen-head bolt. If it is a pan head screw, apply a torque of 2.35 to 2.75 N • m.

Mounting Dimensions (M5)

Standard Model



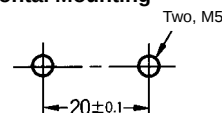
Three-conduit Model



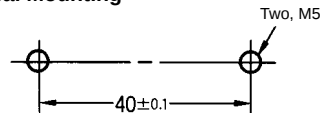
The D4BS can be mounted more securely by adding two protruding portions, each of which is 5 mm maximum in height and $5^{-0.05}/_{-0.15}$ mm in diameter as shown below.

Operating Key Mounting Dimensions

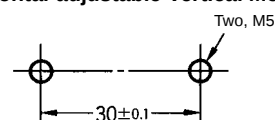
Horizontal Mounting



Vertical Mounting



Horizontal-adjustable Vertical Mounting



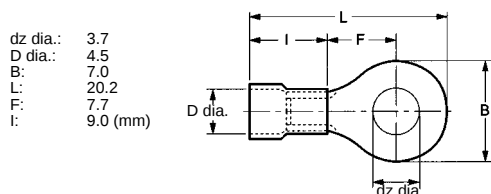
Changes in Head Mounting Direction

By removing the screws on the four corners of the head, the head can be reset in any of four directions. The head direction can be changed with or without the Operation Key inserted in the head. Make sure that no foreign materials penetrate through the head and that the head is tightened securely within the proper torque range.

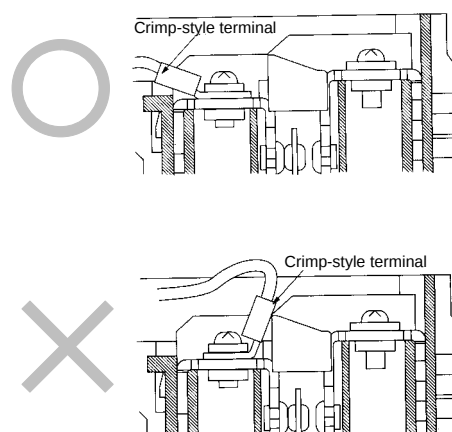
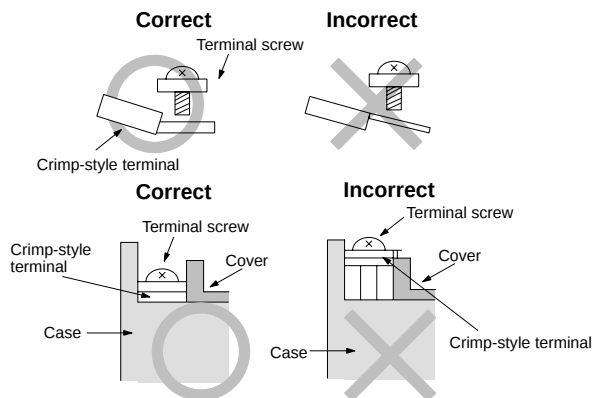
Wiring

Do not connect the lead wires directly to the terminals. Connect the lead wires through insulation tubes and M3.5 solderless terminals. Tighten each terminal screw within the proper torque range.

The proper lead wire is AWG20 to AWG14 (0.5 to 2.5 mm²) in size.



Make sure that all solderless terminals are correctly connected and located within the casing or cover as shown below.



Connector

Use an SC Connector that matches the cable diameter. Apply sealing tape between connector and conduit opening so that enclosure will confirm to IP67.

Tighten the connector to a torque of 1.77 to 2.16 N • m.

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 D4BS three-conduit model.

Maintenance and Repairs

The user must not maintain or repair equipment incorporating any D4BS 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.