

Guard Lock Safety-door Switch D4NL

CSM_D4NL_DS_E_9_9

Best-selling Guard Lock Safety-door Switch Available in Several Compact, Multi-contact Models



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Be sure to read the "Safety Precautions" on page 14.

Model Number Structure

Model Number Legend

Switch (Standard type)

D4NL-□□□□-□□□□
1 2 3 4 5 6 7

1. Conduit Outlet

1: Pg13.5

2: G1/2

4: M20 *

* D4NL-4□□□□-□□□□-NPT: 1/2-14NPT, includes M20-to-1/2-14NPT conversion adapter

2. Built-in Switch (with Door Open/Closed Detection Switch and Lock Monitor Switch Contacts)

A: 1NC/1NO (slow-action contacts) + 1NC/1NO (slow-action contacts)

B: 1NC/1NO (slow-action contacts) + 2NC (slow-action contacts)

C: 2NC (slow-action contacts) + 1NC/1NO (slow-action contacts)

D: 2NC (slow-action contacts) + 2NC (slow-action contacts)

E: 2NC/1NO (slow-action contacts) + 1NC/1NO (slow-action contacts)

F: 2NC/1NO (slow-action contacts) + 2NC (slow-action contacts)

G: 3NC (slow-action contacts) + 1NC/1NO (slow-action contacts)

H: 3NC (slow-action contacts) + 2NC (slow-action contacts)

3. Head Mounting Direction and Material

F: Four mounting directions possible (Front-side mounting at shipping)/plastic

D: Four mounting directions possible (Front-side mounting at shipping)/metal

4. Door Lock and Release

A: Mechanical lock/24 VDC solenoid release

B: Mechanical lock/110 VAC solenoid release

G: 24 VDC solenoid lock/mechanical release

H: 110 VAC solenoid lock/mechanical release

5. Indicator

B: 10 to 115 VAC/VDC (orange LED indicator)

6. Release Key Type

Blank: Standard (resin)

4: Special release key (resin)

(Note: Release tool is included.)

7. Release Key Position

Blank: Bottom

S: Front

Switch (Metallic release key type)

D4NL-□□□□-□□□□-SJ

1 2 3 4 5 6 7

1. Conduit Outlet

2: G1/2 (1-conduit type)

4: M20 (1-conduit type)

2. Built-in Switch

E: 2NC/1NO + 1NC/1NO

F: 2NC/1NO + 2NC

G: 3NC + 1NC/1NO

H: 3NC + 2NC

3. Head Mounting Direction and Material

F: Four mounting directions possible (Front-side mounting at shipping)/resin

4. Door Lock and Release

A: Mechanical lock/ 24 VDC solenoid release

G: 24 VDC solenoid lock/ mechanical release

5. Indicator

B: 10 to 115 VAC/VDC (orange LED indicator)

6. Release Key Type

Blank: Standard (metal)

7. Release Key Position

Blank: Bottom

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: The recommended models for equipment and machinery being exported to Europe are those with an M20 conduit outlet, and for North America, the recommended models are those with a 1/2-14NPT conduit outlet.

Ordering Information

List of Models

Switches (Operation Keys are sold separately.)

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

Head material	Release key position	Release key type	Solenoid voltage/ indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts) (slow-action) Certified direct opening NC contact	Conduit outlet	Model
Plastic *1	Bottom	Standard (resin)	Solenoid: 24 VDC Orange LED: 10 to 115 VAC/VDC	Mechanical lock Solenoid release	1NC/1NO+1NC/1NO	Pg13.5	D4NL-1AFA-B
						G1/2	D4NL-2AFA-B
						M20	D4NL-4AFA-B
					1NC/1NO+2NC	Pg13.5	D4NL-1BFA-B
						G1/2	D4NL-2BFA-B
						M20	D4NL-4BFA-B
					2NC+1NC/1NO	Pg13.5	D4NL-1CFA-B
						G1/2	D4NL-2CFA-B
						M20	D4NL-4CFA-B
					2NC+2NC	Pg13.5	D4NL-1DFA-B
						G1/2	D4NL-2DFA-B
						M20	D4NL-4DFA-B
					2NC/1NO+1NC/1NO	Pg13.5	D4NL-1EFA-B
						G1/2	D4NL-2EFA-B *2
						M20	D4NL-4EFA-B *2
					2NC/1NO+2NC	Pg13.5	D4NL-1FFA-B
						G1/2	D4NL-2FFA-B *2
						M20	D4NL-4FFA-B *2
						1/2-14NPT	D4NL-4FFA-B-NPT
					3NC+1NC/1NO	Pg13.5	D4NL-1GFA-B
						G1/2	D4NL-2GFA-B *2
						M20	D4NL-4GFA-B *2
					3NC+2NC	Pg13.5	D4NL-1HFA-B
						G1/2	D4NL-2HFA-B *2
						M20	D4NL-4HFA-B *2
				Solenoid lock Mechanical release	1NC/1NO+1NC/1NO	Pg13.5	D4NL-1AFG-B
						G1/2	D4NL-2AFG-B
						M20	D4NL-4AFG-B
					1NC/1NO+2NC	Pg13.5	D4NL-1BFG-B
						G1/2	D4NL-2BFG-B
						M20	D4NL-4BFG-B
					2NC+1NC/1NO	Pg13.5	D4NL-1CFG-B
						G1/2	D4NL-2CFG-B
						M20	D4NL-4CFG-B
					2NC+2NC	Pg13.5	D4NL-1DFG-B
						G1/2	D4NL-2DFG-B
						M20	D4NL-4DFG-B
					2NC/1NO+1NC/1NO	Pg13.5	D4NL-1EFG-B
						G1/2	D4NL-2EFG-B *2
						M20	D4NL-4EFG-B *2
					2NC/1NO+2NC	Pg13.5	D4NL-1FFG-B
						G1/2	D4NL-2FFG-B *2
						M20	D4NL-4FFG-B *2
					3NC+1NC/1NO	Pg13.5	D4NL-1GFG-B
						G1/2	D4NL-2GFG-B *2
						M20	D4NL-4GFG-B *2
					3NC+2NC	Pg13.5	D4NL-1HFG-B
						G1/2	D4NL-2HFG-B *2
						M20	D4NL-4HFG-B *2

*1. Switches with metal heads can also be manufactured upon request. Ask your OMRON representative for details.

*2. Models with Korean S-mark certification.

Head material	Release key position	Release key type	Solenoid voltage/ indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts) (slow-action) Certified direct opening NC contact	Conduit outlet	Model
Plastic *1	Bottom	Special release key (resin)	Solenoid: 24 VDC Orange LED: 10 to 115 VAC/VDC	Mechanical lock Solenoid release	1NC/1NO+1NC/1NO	Pg13.5	D4NL-1AFA-B4
						G1/2	D4NL-2AFA-B4
						M20	D4NL-4AFA-B4
					1NC/1NO+2NC	Pg13.5	D4NL-1BFA-B4
						G1/2	D4NL-2BFA-B4
						M20	D4NL-4BFA-B4
					2NC+1NC/1NO	Pg13.5	D4NL-1CFA-B4
						G1/2	D4NL-2CFA-B4
						M20	D4NL-4CFA-B4
					2NC+2NC	Pg13.5	D4NL-1DFA-B4
						G1/2	D4NL-2DFA-B4
						M20	D4NL-4DFA-B4
					2NC/1NO+1NC/1NO	Pg13.5	D4NL-1EFA-B4
						G1/2	D4NL-2EFA-B4 *2
						M20	D4NL-4EFA-B4 *2
					2NC/1NO+2NC	Pg13.5	D4NL-1FFA-B4
						G1/2	D4NL-2FFA-B4 *2
						M20	D4NL-4FFA-B4 *2
					3NC+1NC/1NO	Pg13.5	D4NL-1GFA-B4
						G1/2	D4NL-2GFA-B4 *2
						M20	D4NL-4GFA-B4 *2
					3NC+2NC	Pg13.5	D4NL-1HFA-B4
						G1/2	D4NL-2HFA-B4 *2
						M20	D4NL-4HFA-B4 *2
				Solenoid lock Mechanical release	1NC/1NO+1NC/1NO	Pg13.5	D4NL-1AFG-B4
						G1/2	D4NL-2AFG-B4
						M20	D4NL-4AFG-B4
					1NC/1NO+2NC	Pg13.5	D4NL-1BFG-B4
						G1/2	D4NL-2BFG-B4
						M20	D4NL-4BFG-B4
					2NC+1NC/1NO	Pg13.5	D4NL-1CFG-B4
						G1/2	D4NL-2CFG-B4
						M20	D4NL-4CFG-B4
					2NC+2NC	Pg13.5	D4NL-1DFG-B4
						G1/2	D4NL-2DFG-B4
						M20	D4NL-4DFG-B4
					2NC/1NO+1NC/1NO	Pg13.5	D4NL-1EFG-B4
						G1/2	D4NL-2EFG-B4 *2
						M20	D4NL-4EFG-B4 *2
					2NC/1NO+2NC	Pg13.5	D4NL-1FFG-B4
						G1/2	D4NL-2FFG-B4 *2
						M20	D4NL-4FFG-B4 *2
					3NC+1NC/1NO	Pg13.5	D4NL-1GFG-B4
						G1/2	D4NL-2GFG-B4 *2
						M20	D4NL-4GFG-B4 *2
					3NC+2NC	Pg13.5	D4NL-1HFG-B4
						G1/2	D4NL-2HFG-B4 *2
						M20	D4NL-4HFG-B4 *2



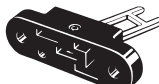
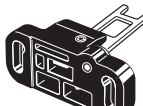
*1. Switches with metal heads can also be manufactured upon request. Ask your OMRON representative for details.

*2. Models with Korean S-mark certification.

Head material	Release key position	Release key type	Solenoid voltage/ indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts) (slow-action) Certified direct opening NC contact	Conduit outlet	Model
Plastic	Bottom	Standard (metal)	Solenoid: 24 VDC Orange LED: 10 to 115 VAC/VDC	Mechanical lock Solenoid release	2NC/1NO+1NC/1NO	G1/2	D4NL-2EFA-B-SJ *2
						M20	D4NL-4EFA-B-SJ *2
					2NC/1NO+2NC	G1/2	D4NL-2FFA-B-SJ *2
						M20	D4NL-4FFA-B-SJ *2
					3NC+1NC/1NO	G1/2	D4NL-2GFA-B-SJ *2
						M20	D4NL-4GFA-B-SJ *2
					3NC+2NC	G1/2	D4NL-2HFA-B-SJ *2
						M20	D4NL-4HFA-B-SJ *2
				Solenoid lock Mechanical release	2NC/1NO+1NC/1NO	G1/2	D4NL-2EFG-B-SJ *2
						M20	D4NL-4EFG-B-SJ *2
					2NC/1NO+2NC	G1/2	D4NL-2FFG-B-SJ *2
						M20	D4NL-4FFG-B-SJ *2
					3NC+1NC/1NO	G1/2	D4NL-2GFG-B-SJ *2
						M20	D4NL-4GFG-B-SJ *2
					3NC+2NC	G1/2	D4NL-2HFG-B-SJ *2
						M20	D4NL-4HFG-B-SJ *2

*2. Models with Korean S-mark certification.

Operation Keys

Type	Model
Horizontal mounting 	D4DS-K1
Vertical mounting 	D4DS-K2
Adjustable mounting (Horizontal) 	D4DS-K3
Adjustable mounting (Horizontal/Vertical) 	D4DS-K5

Specifications

Standards and EC Directives

Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EN ISO 14119
- EN60947-5-1

Certified Standards

Standard type

Certification body	Standard	File No.
TÜV SÜD	EN60947-5-1 (certified direct opening)	Consult your OMRON representative for details.
UL *1	UL508, CSA C22.2 No.14	E76675
CQC (CCC)	GB/T 14048.5	Consult your OMRON representative for details.
KOSHA *2	EN60947-5-1	Consult your OMRON representative for details.

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

*2. Only certain models have been certified.

Metallic release key type

Certification body	Standard	File No.
TÜV SÜD	EN60947-5-1 (certified direct opening)	Consult your OMRON representative for details.
KOSHA	EN60947-5-1	Consult your OMRON representative for details.

Certified Standard Ratings

TÜV (EN60947-5-1), CCC (GB/T 14048.5)

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		

Solenoid Coil Characteristics

Item	Type	24 VDC	110 VAC
Rated operating voltage (100% ED)		24 VDC ^{+10%} _{-15%}	110 VAC $\pm 10\%$
Current consumption		Approx. 200 mA	Approx. 50 mA
Insulation		Class B (130°C max.)	

Indicator Characteristics

Item	Type	LED
Rated voltage		10 to 115 VAC/VDC
Current leakage		Approx. 1 mA
Color (LED)		Orange

Characteristics

Interlock type		Type 2 (EN ISO 14119)
Coding level		Low level coded (EN ISO 14119)
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
Operating speed		0.05 to 0.5 m/s
Operating frequency		30 operations/minute max.
Direct opening force *4		60 N min. (EN60947-5-1)
Direct opening travel *4		10 mm min. (EN60947-5-1)
Holding force (Fzh) *5		1,300 N min.
Contact resistance		25 mΩ max. (per contact)
Minimum applicable load *6		1 mA resistive load at 5 VDC (N-level reference value)
Rated insulation voltage (U _i)		300 V (EN60947-5-1)
Rated frequency		50/60 Hz
Protection against electric shock		Class II (double insulation) □
Pollution degree (operating environment)		3 (EN60947-5-1)
Impulse withstand voltage (U _{imp}) (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. (at 500 VDC)
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	100 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		–10 to 55°C (with no icing)
Ambient operating humidity		95% max.
Weight		Approx. 370 g (D4NL-1AFA-B)

Note: 1. The above values are initial values.

2. The Switch contacts can be used with either standard loads or microloads. 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 D4NL in places where foreign material may enter through the key hole on the head, otherwise 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. These figures are minimum requirements for safe operation.

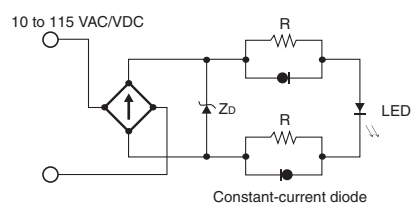
*5. This figure is based on the EN ISO 14119 evaluation method.

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

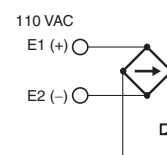
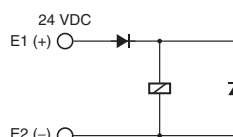
Connections

Internal Circuit Diagram

Indicator

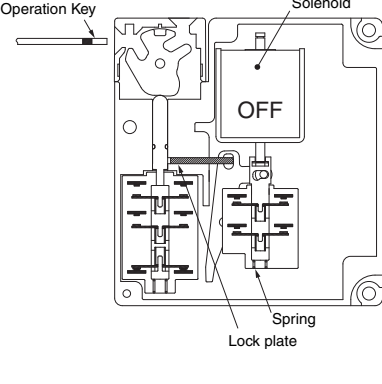
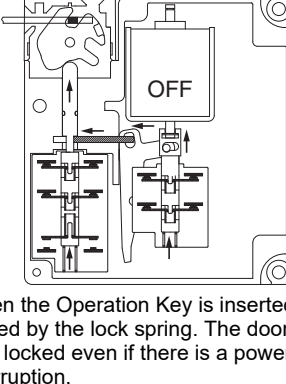
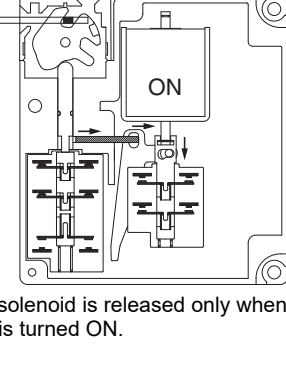
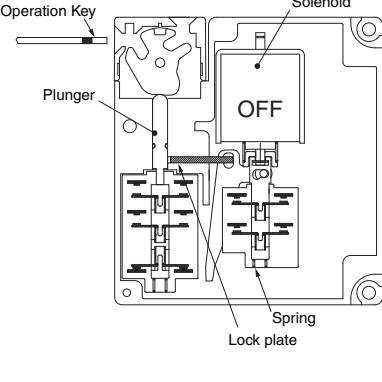
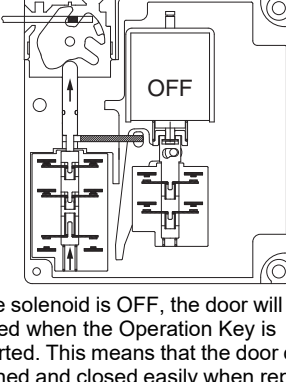
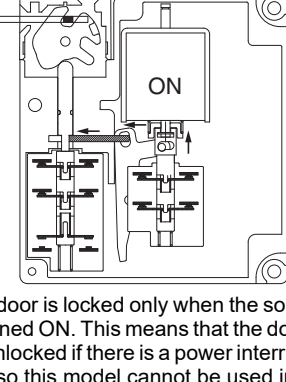


Solenoid



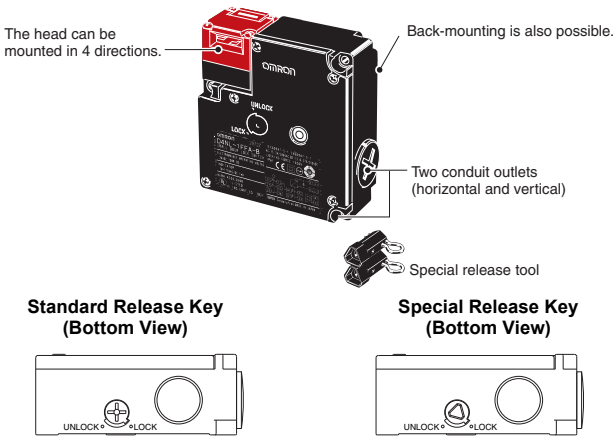
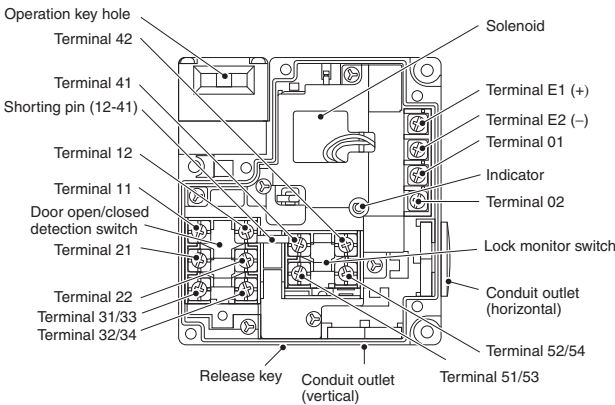
Operation Method

Operation Principles

Mechanical lock models		 <p>When the Operation Key is inserted, it is locked by the lock spring. The door will stay locked even if there is a power interruption.</p>	 <p>The solenoid is released only when the lock is turned ON.</p>
Solenoid lock models		 <p>If the solenoid is OFF, the door will not be locked when the Operation Key is inserted. This means that the door can be opened and closed easily when replacing workpieces or parts.</p>	 <p>The door is locked only when the solenoid is turned ON. This means that the door will be unlocked if there is a power interruption and so this model cannot be used in systems that would maintain a hazardous state (e.g., systems requiring toxic gases, high temperatures, or gears that would continue to turn due to inertia).</p>

Structure and Nomenclature

Structure



Note: Terminal numbers vary with the model.

Model and Contact Configuration

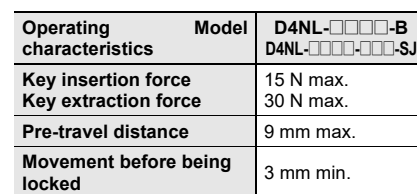
Indicates conditions where the Key is inserted and the lock is applied. Terminals 12 and 41 are connected internally.

Model	Contact (door open/closed detection and lock monitor)	Contact form		Operating pattern	Remarks
		Door open/ closed detection	Lock monitor		
D4NL-□AF□-□	1NC/1NO + 1NC/1NO				Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-42, 33-34, and 53-54 can be used as unlike poles.
D4NL-□BF□-□	1NC/1NO + 2NC				Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-42, 33-34, and 51-52 can be used as unlike poles.
D4NL-□CF□-□	2NC + 1NC/1NO				Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 31-32, and 53-54 can be used as unlike poles.
D4NL-□DF□-□	2NC + 2NC				Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 31-32, and 51-52 can be used as unlike poles.
D4NL-□EF□-□	2NC/1NO + 1NC/1NO				Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 33-34, and 53-54 can be used as unlike poles.
D4NL-□FF□-□	2NC/1NO + 2NC				Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 33-34, and 51-52 can be used as unlike poles.
D4NL-□GF□-□	3NC + 1NC/1NO				Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 31-32, and 53-54 can be used as unlike poles.
D4NL-□HF□-□	3NC + 2NC				Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 31-32, and 51-52 can be used as unlike poles.

Dimensions and Operating Characteristics

Switches

D4NL-□□□□-□□□-SJ



Technical drawings of the C117A-BA fire alarm control unit, showing dimensions and component labels.

Top View Dimensions:

- Overall width: 153 mm
- Overall height: 30.5 mm
- Pre-travel distance: 15.5 mm
- Operation Key: 8 mm
- Four, head mounting screws: 10.0 mm
- Three, 4.3-dia. holes: 29 mm
- Dummy cap Indicator: 13.3 mm
- Five, cover mounting screws: 59 mm
- Cap screw: 6.5 mm
- Conduit cap: 29 mm
- Conduit outlet: 15.3 mm
- Release key: 5 mm
- Releasing tool (provided): 10.5 mm
- M8 hexagonal material or equivalent: 8 mm

Front View Dimensions:

- Overall width: 79 ± 0.2 mm
- Overall height: 95 mm
- Operation Key: 4.4 mm
- Four, head mounting screws: 4 mm
- Three, 4.3-dia. holes: 32 ± 0.2 mm
- Dummy cap Indicator: 32.3 mm
- Five, cover mounting screws: 55 ± 0.2 mm
- Cap screw: 4.5 mm
- Conduit cap: 4.5 mm
- Conduit outlet: 4.5 mm
- Release key: 4.5 mm
- Releasing tool (provided): 4.5 mm
- M8 hexagonal material or equivalent: 4.5 mm

Side View Dimensions:

- Overall width: 35.5 mm
- Overall height: 6.5 mm
- Pre-travel distance: 0.5 mm
- Operation Key: 0.5 mm
- Four, head mounting screws: 0.5 mm
- Three, 4.3-dia. holes: 0.5 mm
- Dummy cap Indicator: 0.5 mm
- Five, cover mounting screws: 0.5 mm
- Cap screw: 0.5 mm
- Conduit cap: 0.5 mm
- Conduit outlet: 0.5 mm
- Release key: 0.5 mm
- Releasing tool (provided): 0.5 mm
- M8 hexagonal material or equivalent: 0.5 mm

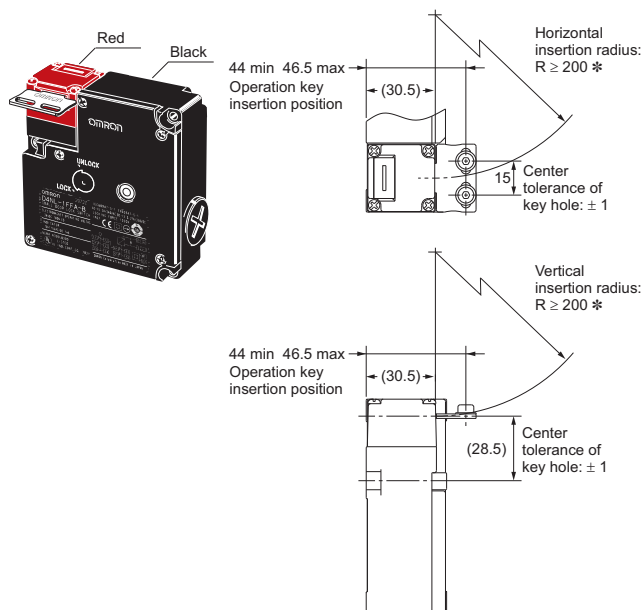
Operating characteristics	Model	D4NL-□□□□-B4
Key insertion force Key extraction force		15 N max. 30 N max.
Pre-travel distance		9 mm max.
Movement before being locked		3 mm min.

Note:

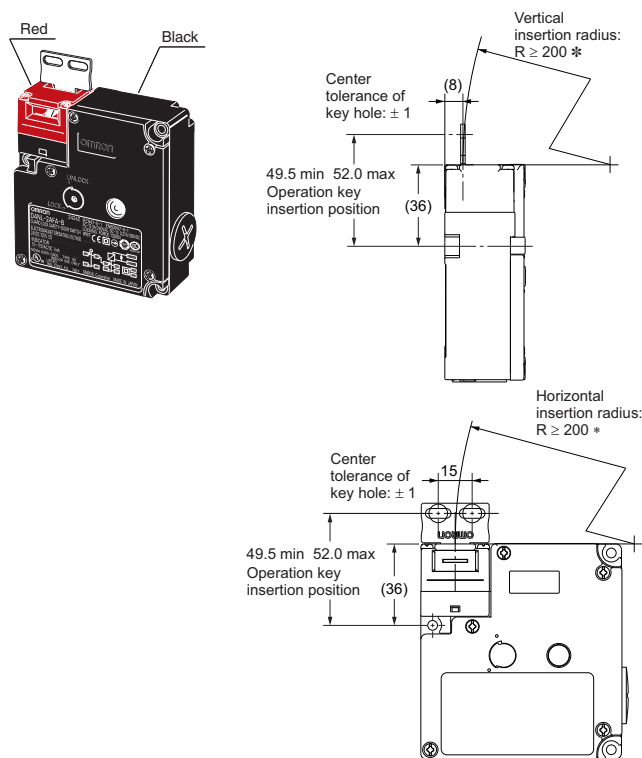
1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
2. There are fluctuations in the contact ON/OFF timing for Switches with multiple poles (2NC, 2NC/1NO, or 3NC). Confirm performance before application.

With Operation Key Inserted

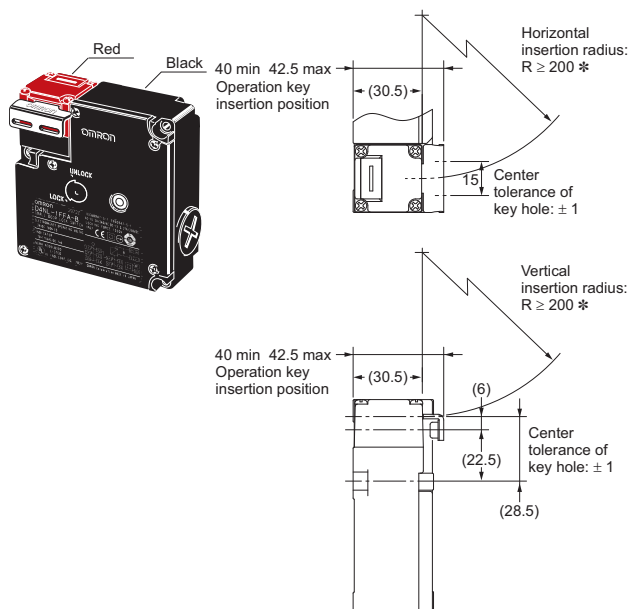
D4NL + D4DS-K1 (with Front-inserted Operation Key)



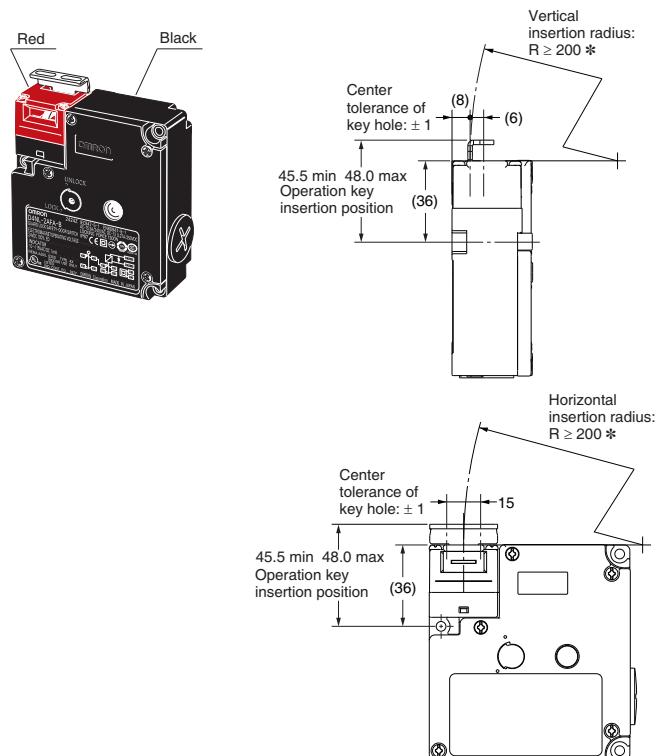
D4NL + D4DS-K1 (with Top-inserted Operation Key)



D4NL + D4DS-K2 (with Front-inserted Operation Key)

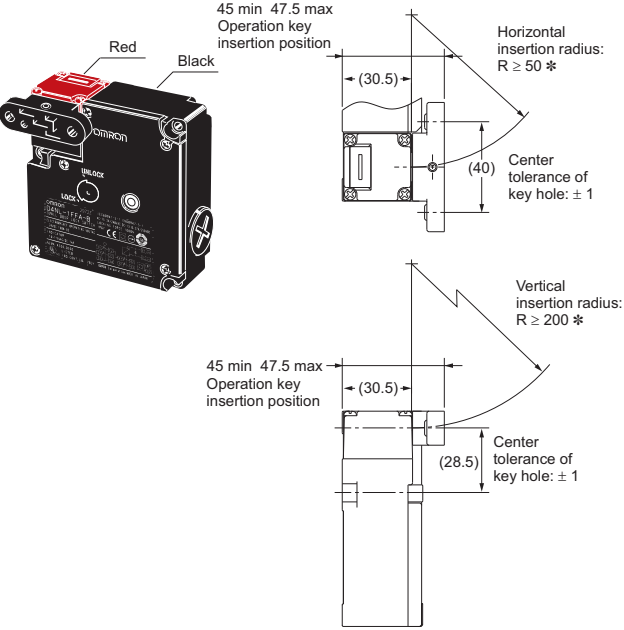


D4NL + D4DS-K2 (with Top-inserted Operation Key)

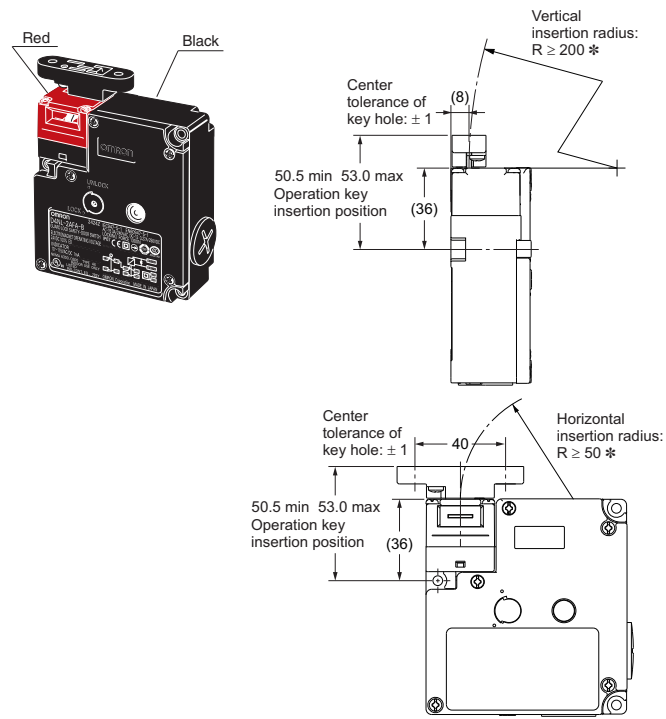


* Insertion radii apply when the rotational center of the Operation Key is in line with a line extending from the front or top Head surface.

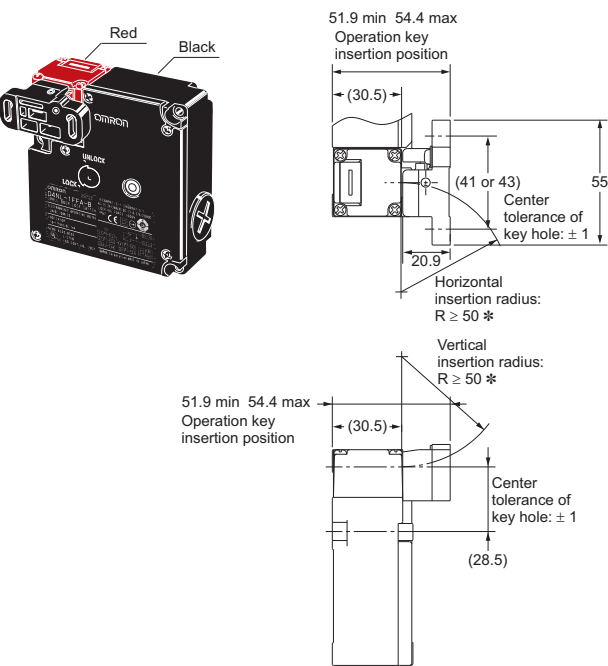
**D4NL + D4DS-K3
(with Front-inserted Operation Key)**



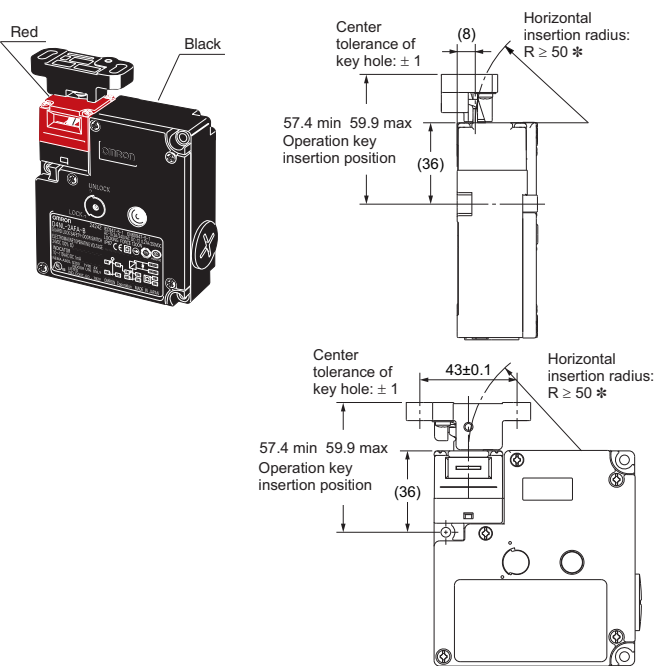
**D4NL + D4DS-K3
(with Top-inserted Operation Key)**



**D4NL + D4DS-K5
(with Front-inserted Operation Key)**



**D4NL + D4DS-K5
(with Top-inserted Operation Key)**



* Insertion radii apply when the rotational center of the Operation Key is in line with a line extending from the front or top Head surface.

Accessory

M20-to-1/2-14NPT conversion adapter for D4NL-4□□□-□□□-NPT

