## Guard Lock Safety-door Switch/D4SL-N-mounting Slide Key

## D4SL-N / D4SL-NSK10-LK

## World's smallest Class 6-contact Guard Lock Safety-door Switch









#### <Guard Lock Safety-door Switch D4SL-N>

- Wiring time is reduced with two types of wiring methods capable of one-touch attachment and removal.
- A wide variety of built-in switches can be used for various devices.
  - (4-, 5-, and 6-contact models are available)
- Key holding force of 1,300 N.
- It is possible to change the operation key insertion point without detaching the head.
- Drive solenoids directly from the Controller.

#### <Slide Key D4SL-NSK10-LK□>

- Lockout key to prevent workers from becoming trapped inside the hazardous area.
- The vertical D4SL-N Guard Lock Safety-door Switch can be easily mounted on  $40 \times 40$  mm aluminum frames.
- The plastic material makes the Slide Key suitable for lightweight doors.



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 22.

Scan the 2D codes using the smartphone to see the D4SL-N promotional videos.

Reduction in time and effort



Safe access application



#### **Model Number Structure**

#### **Model Number Legend**

Switch (Standard type)



#### (1) Conduit Outlet

Contact Model	Conduit Outlet
4-contact Model   5-contact Model   Common	2: G1/2 3: 1/2-14NPT *1
6-contact Model	4: M20

#### (2) Built-in Switch

Contact Model	Built-in Switch		
4 contact Model	Door monitor and Lock monitor are connected in series internally. A: 1NC/1NO + 1NC/1NO B: 1NC/1NO + 2NC C: 2NC + 1NC/1NO D: 2NC + 2NC		
4-contact Model	Door monitor and Lock monitor are NOT connected in series internally. S: 1NC/1NO + 1NC/1NO T: 1NC/1NO + 2NC U: 2NC + 1NC/1NO V: 2NC + 2NC		
5-contact Model	E: 2NC/1NO + 1NC/1NO F: 2NC/1NO + 2NC G: 3NC + 1NC/1NO H: 3NC + 2NC		
6-contact Model	N: 2NC/1NO + 2NC/1NO P: 2NC/1NO + 3NC Q: 3NC + 2NC/1NO R: 3NC + 3NC		

#### (4) Door Lock and Release

Contact Model	Door Lock and Release
4-contact Model 5-contact Model 6-contact Model	A: Mechanical lock/24VDC solenoid release G: 24VDC solenoid lock/mechanical release

#### (5) Indicator

Contact Model	Indicator	
4-contact Model	-: None	
5-contact Model 6-contact Model Common	D: 24VDC (orange LED indicator)	

#### (6) Release Key Type

Contact Model	Release Key Type	
4-contact Model	-: Standard release key (metal)	
5-contact Model 6-contact Model Common	-: Standard release key (metal) 4: Special release key (resin) (Note:Release keys are provided.)	

#### (7) Connection Method

Contact Model	Connection Method
4-contact Model 5-contact Model 6-contact Model	-: Terminal block N: Connector *2

#### (3) Head Material

Contact Model	Head Material	
4-contact Model	F: Resin	
5-contact Model 6-contact Model Common	F: Resin D: Metal	

- \*1. 1/2-14NPT models (conduit outlet: M20) will come with an M20-to-1/2-14NPT conversion adapter.
- \*2. Connector cables are not included with the connector type and are to be purchased separately.

#### **Operation Key**

## **D4SL-NK** (1) (2)

#### (1) Operation Key Type

- 1: Horizontal mounting
- 2: Vertical mounting
- 3: Adjustable mounting (horizontal) 5: Adjustable mounting (horizontal/vertical)
- (2) Key Type
- -: No cushion rubber
- G: Cushion rubber S: No cushion rubber, short type

#### Slide Key

## **D4SL-NSK10-LK** 111-22

#### (1) Inner Lever

Blank: No inner lever H: With inner lever

#### (2) Lockout key Type

Lockout key can be created up to 30 types. Specify keys in order starting from 01. Blank: 01

02 to 30: 02 to 30

## **Ordering Information**

#### **List of Models**

Release key type	Wiring method	Solenoid voltage/ Indicator	Lock and release type	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit outlet (See Note.)	Model
				6-contact Model Insert the built-in switch (N, P, Q or R)	G1/2	D4SL-N2□FA-DN
					1/2-14NPT	D4SL-N3□FA-DN
		24VDC		into the blank $\square$ .	M20	D4SL-N4□FA-DN
		(Orange)		5-contact Model	G1/2	D4SL-N2□FA-DN
	Connector			Insert the built-in switch (E, F, G or H)	1/2-14NPT	D4SL-N3□FA-DN
				into the blank $\square$ .	M20	D4SL-N4□FA-DN
		0.0/100		4-contact Model	G1/2	D4SL-N2□FA-N
		24VDC (without indicator)		Insert the built-in switch (A, B, C, D, S,	1/2-14NPT	D4SL-N3□FA-N
		(Without maloutor)	Mechanical lock	T, U or V) into the blank □.	M20	D4SL-N4□FA-N
			Solenoid release	6-contact Model	G1/2	D4SL-N2□FA-D
				Insert the built-in switch (N, P, Q or R)	1/2-14NPT	D4SL-N3□FA-D
		24VDC		into the blank $\square$ .	M20	D4SL-N4□FA-D
	T	(Orange)		5-contact Model	G1/2	D4SL-N2□FA-D
	Terminal block			Insert the built-in switch (E, F, G or H)	1/2-14NPT	D4SL-N3□FA-D
	Dioon			into the blank $\square$ .	M20	D4SL-N4□FA-D
Standard		0.0/100		4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.	G1/2	D4SL-N2□FA
(metal)		24VDC (without indicator)			1/2-14NPT	D4SL-N3□FA
					M20	D4SL-N4□FA
69				6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FG-DN
E PRODUNE					1/2-14NPT	D4SL-N3□FG-DN
		24VDC			M20	D4SL-N4□FG-DN
		(Orange)		5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.	G1/2	D4SL-N2□FG-DN
	Connector				1/2-14NPT	D4SL-N3□FG-DN
					M20	D4SL-N4□FG-DN
				4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.	G1/2	D4SL-N2□FG-N
					1/2-14NPT	D4SL-N3□FG-N
			Solenoid lock Mechanical		M20	D4SL-N4□FG-N
			release	6-contact Model	G1/2	D4SL-N2□FG-D
				Insert the built-in switch (N, P, Q or R)	1/2-14NPT	D4SL-N3□FG-D
		24VDC		into the blank $\square$ .	M20	D4SL-N4□FG-D
	T	(Orange)		5-contact Model	G1/2	D4SL-N2□FG-D
	Terminal block			Insert the built-in switch (E, F, G or H)	1/2-14NPT	D4SL-N3□FG-D
	DISOR			into the blank $\square$ .	M20	D4SL-N4□FG-D
		24VDC (without indicator)		4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.	G1/2	D4SL-N2□FG
					1/2-14NPT	D4SL-N3□FG
					M20	D4SL-N4□FG

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.

Release key type	Wiring method	Solenoid voltage/ Indicator	Lock and release type	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit outlet (See Note.)	Model
				6-contact Model Insert the built-in switch (N, P, Q or R)	G1/2	D4SL-N2□FA-D4N
					1/2-14NPT	D4SL-N3□FA-D4N
	Connector			into the blank $\square$ .	M20	D4SL-N4□FA-D4N
	Connector			5-contact Model	G1/2	D4SL-N2□FA-D4N
				Insert the built-in switch (E, F, G or H)	1/2-14NPT	D4SL-N3□FA-D4N
			Mechanical lock	into the blank $\square$ .	M20	D4SL-N4□FA-D4N
			Solenoid release	6-contact Model	G1/2	D4SL-N2□FA-D4
				Insert the built-in switch (N, P, Q or R) into the blank □.	1/2-14NPT	D4SL-N3□FA-D4
	Terminal				M20	D4SL-N4□FA-D4
Special	block	24VDC		5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.	G1/2	D4SL-N2□FA-D4
(resin)					1/2-14NPT	D4SL-N3□FA-D4
					M20	D4SL-N4□FA-D4
		(Orange)		6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FG-D4N
					1/2-14NPT	D4SL-N3□FG-D4N
	Connector				M20	D4SL-N4□FG-D4N
	Connector			5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.	G1/2	D4SL-N2□FG-D4N
					1/2-14NPT	D4SL-N3□FG-D4N
			Solenoid lock Mechanical		M20	D4SL-N4□FG-D4N
			release	6-contact Model	G1/2	D4SL-N2□FG-D4
				Insert the built-in switch (N, P, Q or R)	1/2-14NPT	D4SL-N3□FG-D4
	Terminal			into the blank $\square$ .	M20	D4SL-N4□FG-D4
	block			5-contact Model	G1/2	D4SL-N2□FG-D4
				Insert the built-in switch (E, F, G or H) into the blank □.	1/2-14NPT	D4SL-N3□FG-D4
					M20	D4SL-N4□FG-D4

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.

#### **Operation Keys**

Тур	Model	
Horizontal mounting		D4SL-NK1
Horizontal mounting (Short)		D4SL-NK1S
Horizontal mounting (Cushion rubber)		D4SL-NK1G
Vertical mounting		D4SL-NK2
Vertical mounting (Cushion rubber)		D4SL-NK2G
Adjustable (Horizontal)		D4SL-NK3
Adjustable (Horizontal/Vertical)		D4SL-NK5

#### **Connector Cables**

Cable length	Model	
1 m	D4SL-CN1	
3 m	D4SL-CN3	
5 m	D4SL-CN5	
10 m	D4SL-CN10	

#### Slide Key

Туре	Specifications	Contents	Model
	Weight: Approx. 0.6 kg	Slide Key: 1 (not yet mounted) Inner Lever: None D4SL-N mounting plate: 1 Door Switch special mounting screws: 3 D4SL-NK1 (operation key): 1	D4SL-NSK10-LK *1
	Mechanical durability: 20,000 operations min.	D4SL-NK1 special mounting screws: 2 Lockout keys: 2 Lockout key strap: 1 Caution labels (stickers): 2 sheets (English and Japanese)	D4SL-NSK10-LK-□ *2
	Weight: Approx. 0.1 kg	Inner Lever: 1	D4SL-SK10H *3
	Weight: Approx. 0.7 kg Mechanical durability:	Slide Key: 1 (not yet mounted) Inner Lever: 1 D4SL-N mounting plate: 1 Door Switch special mounting screws: 3 D4SL-NK1 (operation key): 1	D4SL-NSK10-LKH *1
	20,000 operations min.	D4SL-NK1 special mounting screws: 2 Lockout keys: 2 Lockout key strap: 1 Caution labels (stickers): 2 sheets (English and Japanese)	D4SL-NSK10-LKH-□ *2

- Note: 1. The Door Switch is not included. Select the Door Switch depending on the necessary number of contacts and the conduit outlet. The contents are provided as a total set, individual contents cannot be ordered separately.
  - 2. Perform risk assessment for the equipment in question, configure relay units and other safety circuits, and use properly.
- \*1. The number for the lockout key is 01.
- \*2. Replace the box with 02 to 30 (lockout key number). Ask your OMRON representative for delivery times. \*3. The inner lever for D4SL-NSK10 that can not be used for other products and applications.

## **Applicable Door Switches**

#### D4SL-NSK10-LK



#### **Features**

#### The lockout key prevents workers from becoming trapped without using a padlock.

Note: Using LEDs of D4SL-N enables confirming whether the door is open or closed and locked or unlocked.



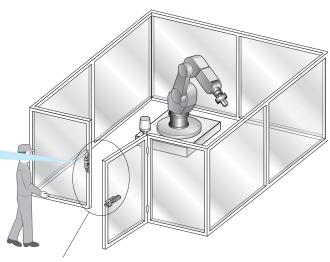








When the slide handle is open, the lockout key can be pulled regardless of whether power is being supplied to the solenoid or not.



The handle-shaped fixture makes it easy to use the Door Switch.









The slide handle is open.



The slide handle is secured at the position shown in the figure.

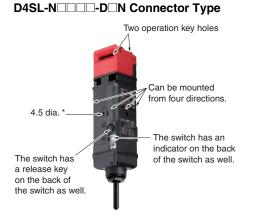
A worker holding the lockout key will not be trapped locked inside the hazardous area by another person.



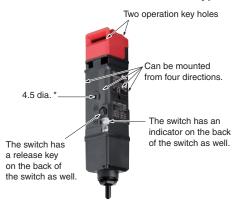
If the lockout key is not mounted, the slide handle will not move and the door will not close.

#### **Structure and Nomenclature**

#### **Structure**

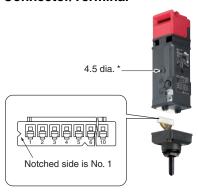


#### **D4SL-** Terminal Block Type



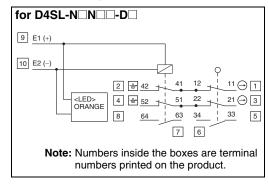
You can insert and secure a stud or other projection in the 4.5-dia. hole to make the installation even stronger. For details, refer to "Switch and Operation Key Mounting" on page 24.

#### Connector/Terminal





#### **Terminal Arrengement**



#### **Operating Cycle Examples for Standard Models**

**D4SL-N**A
(Mechanical Lock Models)

	Door condition	Condition 1		Condition 2		Condition 3		Turning the special release key
Terminal No. and		Door open. The door will lock when the door closes.	•	Door closed. The door is locked.	<b>→</b>	Door closed. The door can be opened.	Return to condition 1	Door closed. No power is supplied to the solenoid. The door is unlocked
Contact No.	Function							manually.
9 E1-10 E2	Solenoid ON							
2 42- 1 11(NC) 4 52- 3 21(NC)	Door open/closed detection and lock monitor contacts							
3 21- 4 22 (NC) 5 31- 6 32 (NC)	Door open/closed detection contact							
5 33- 6 34 (NO)	Door open/closed detection contact							
1 41- 2 42 (NC) 7 61- 8 62 (NC)	Lock monitor contact							
7 63- 8 64 (NO)	Lock monitor contact							

#### D4SL-N□□□G-□ (Solenoid Lock Models)

	•	•			
Terminal No. and Contact No.	Door condition  Function	Even when the door is closed, it does not lock until power is supplied to the solenoid.	Door closed. The door is locked.	Door closed. The door can be opened.	
9 E1-10 E2	Solenoid ON				
2 42- 1 11(NC) 4 52- 3 21(NC)	Door open/closed detection and lock monitor contacts				
3 21- 4 22 (NC) 5 31- 6 32 (NC)	Door open/closed detection contact				
5 33- 6 34 (NO)	Door open/closed detection contact				The shaded areas indi
1 41- 2 42 (NC) 7 61- 8 62 (NC)	Lock monitor contact				the contact is closed a power is supplied to the
7 63- 8 64 (NO)	Lock monitor contact				solenoid.

Door open/closed detection and lock monitor contacts: Can be used in safety circuits because of the direct opening mechanisms.

Door open/closed detection contact: Can be used to confirm whether the key is inserted and to monitor the open/closed status of a door.

Lock monitor contact: Can be used to confirm whether power is supplied to the solenoid and to monitor whether or not a door can be opened or closed.

- Note: 1. The door open/closed detection and lock monitor contact configuration depends on the model.
  - 2. For solenoid lock models, be sure to supply power to the solenoid after the door is closed (after the operation key is inserted). If the door is closed after power is supplied to the solenoid, locking the operation key may not be possible. For details, refer to "Solenoid Lock Models" on page 23.

### **Specifications**

#### Standards and EC Directives

#### Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EMC Directive
- EN ISO 14119
- EN60947-5-1
- GS-ET-19

#### **Certified Standards**

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.

<sup>\*1.</sup> Certification has been obtained for UL CSA C22.2 No. 14.

#### **Certified Standard Ratings**

#### TÜV (EN60947-5-1) CCC (GB/T 14048.5)

Utilization category	AC-15	DC-13
Rated operating current (le)	1.5 A*1 1 A *2	0.22 A
Rated operating voltage (Ue)	120 V	125 V

Note: Use a 4 A fuse that conforms to IEC60127 as a short-circuit protection device. This fuse is not included with the switch.

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

#### C150

Poted voltage	Corry ourrent	Curre	nt (A)	Volt-amperes (VA)	
Rated voltage	Carry current	Make	Break	Make	Break
120 VAC	2.5 A	15	1.5	1,800	180

#### R150

Rated voltage	Carry current	Curre	ent (A)	Volt-amperes (VA)	
Hated voltage	Carry current	Make	Break	Make	Break
125 VDC	1.0 A	0.22	0.22	28	28

#### **Solenoid Coil Characteristics**

Item	24 VDC				
Rated operating voltage (100% ED)	24 VDC +10% -15%				
Current consumption *	Power ON: 6-contact type Approx. 6.4 W at 0.26 A 4-contact/5-contact type Approx. 4.8 W at 0.2 A Constant: Approx. 2.6 W (average) at 0.2 A (max.)				
Insulation	Class E (to 120°C)				

<sup>\*</sup> A starting current is applied to the solenoid for Approx. 10 seconds.

After this, the internal circuit switches to a constant current.

Note: For solenoid lock models, be sure to supply power to the solenoid after the door is closed (after the operation key is inserted). If the door is closed after power is supplied to the solenoid, locking the operation key may not be possible. For details, refer to "Solenoid Lock Models" on page 23.

#### Indicator

Item	LED type
Rated voltage	24 VDC
Current consumption	Approx.10 mA
Color (LED)	Orange

<sup>\*2.</sup> Only certain models have been certified.

<sup>\*1. 11-42, 21-52, 21-22</sup> 

<sup>\*2.</sup> Other terminals

#### **Characteristics**

Interlock type		Type 2 (EN ISO 14119)		
Coding level		Low level coded (EN ISO 14119)		
Dograp of protection		IP67 *1 TYPE 4X Indoor use only (UL, CSA)		
Durability *2	Mechanical	1,000,000 operations min.		
Durability 2	Electrical	150,000 operations min. (1 A resistance at 125 VAC) *3		
Operating speed		0.05 to 1 m/s		
Operating frequency		4- and 5-contact Model: 30 operations minute max. 6-contact Model: 5 operations minute max.		
Direct opening force	*4	60 N min. (EN60947-5-1)		
Direct opening travel	*4	15 mm min. (EN60947-5-1)		
Holding force (Fzh) *5	i	1,300 N min.		
Contact resistance		200 mΩ max.		
Minimum applicable l	oad *6	1 mA resistive load at 5 VDC (N-level reference value)		
Rated insulation volta	age (Ui)	150 V (EN60947-5-1)		
Rated frequency		50/60 Hz		
Protection against electric shock		Class II (double insulation)		
Pollution degree (ope	rating environment)	3 (EN60947-5-1)		
Impulse	Between terminals of same polarity	1.5 kV		
withstand voltage	Between terminals of different polarity	1.5 kV		
(Uimp) (EN60947-5-1)	Between other terminals and non-current carrying metallic parts	2.5 kV		
Insulation resistance		100 Ω min. (at 500 VDC)		
Vibration resistance	Malfunction	10 to 55 Hz, 0.35 mm single amplitude		
Shock resistance	Malfunction	80 m/s <sup>2</sup> min.		
SHOCK resistance	Destruction	1,000 m/s² min.		
Conditional short-circ	cuit current	100 A (EN60947-5-1)		
Conventional free air	thermal current (Ith)	2.5A (11-42, 21-52, 21-22) 1A (Others)		
Ambient operating temperature		-10 to 55°C (with no icing)		
Ambient operations humidity		95% max.		
Weight		Head: Resin Approx. 290 g (Connector model) Approx. 330 g (Terminal block model) Head: Metal Approx. 370 g (Connector model) Approx. 410 g (Terminal block model)		

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, oil or water penetration, do not use the D4SL in places where cutting chips, oil, water or chemicals 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 1 A, 125 VAC load through more than 3 circuits.
- \*4. These figures are minimum requirements for safe operation.
- \*5. This figure is based on the 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.

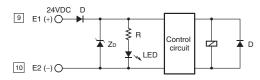
#### Connection

#### **Internal Circuit Diagram**

#### Without indicator

#### 

#### With indicator

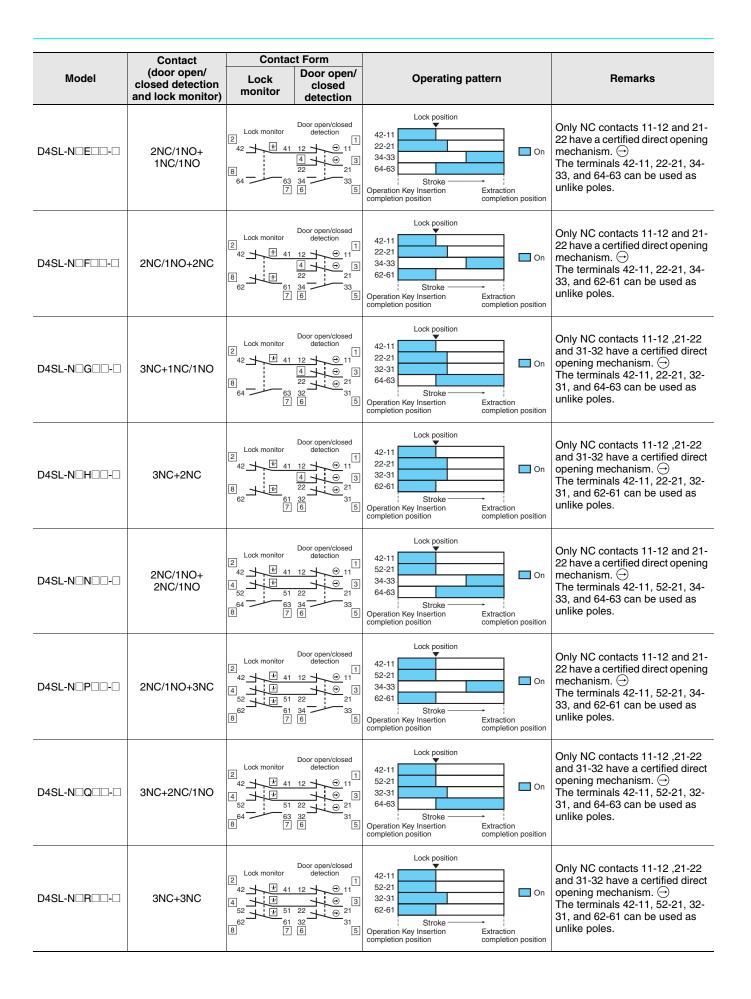


Note: The numbers in boxes are the terminal numbers given on the Switch.

#### **Model and Contact Configuration**

Indicates conditions where the Key is inserted and the lock is applied.

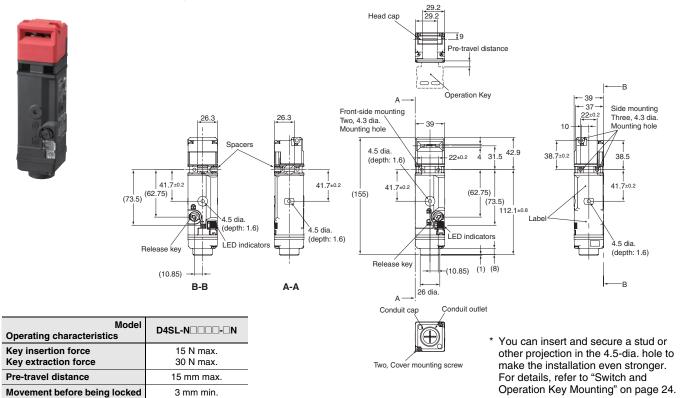
	Contact Contact Form					
Model	(door open/ closed detection and lock monitor)	Lock monitor	Door open/ closed detection	Operating pattern	Remarks	
D4SL-N□A□□-□	1NC/1NO+ 1NC/1NO	2 Lock monitor 42 1 41 8 64 63	34 33	Lock position  42-11 34-33 64-63 Stroke Operation Key Insertion Completion position  Extraction completion position	Only NC contacts 11-12 have a certified direct opening mechanism. $\bigcirc$ The terminals 42-11, 34-33, and 64-63 can be used as unlike poles.	
D4SL-N□B□□-□	1NC/1NO+2NC	2 Lock monitor 42 1 41 8 62 61	Door open/closed detection 1 1	Lock position  42-11 34-33 62-61 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 11-12 have a certified direct opening mechanism.  The terminals 42-11, 34-33, and 62-61 can be used as unlike poles.	
D4SL-N□C□□-□	2NC+1NC/1NO	Lock monitor 2 42 42 41 8 64 7		Lock position  42-11 32-31 64-63 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism.  The terminals 42-11, 32-31, and 64-63 can be used as unlike poles.	
D4SL-N□D□□-□	2NC+2NC	Lock monitor 2 42 42 41 8 62 61 7	Door open/closed detection 1  12	Lock position  42-11 32-31 62-61 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism.  The terminals 42-11, 32-31, and 62-61 can be used as unlike poles.	
D4SL-N□S□□-□	1NC/1NO+ 1NC/1NO	Lock monitor 2 42 41 8 64 63	4 ⊕ 3 22 21 34 33	Lock position  42-41 22-21 34-33 64-63 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 21-22 have a certified direct opening mechanism.  The terminals 42-41, 22-21, 34-33, and 64-63 can be used as unlike poles.	
D4SL-NOTOO-O	1NC/1NO+2NC	Lock monitor 2 42 42 41 8 62 61 7	Door open/closed detection 3 3 5	Lock position  42-41 22-21 34-33 62-61 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 21-22 have a certified direct opening mechanism.  The terminals 42-41, 22-21, 34-33, and 62-61 can be used as unlike poles.	
D4SL-N□U□□-□	2NC+1NC/1NO	Lock monitor 2 42 41 8 64 63	Door open/closed detection	Lock position  42-41 22-21 32-31 64-63 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 21-22 and 31-32 have a certified direct opening mechanism.  The terminals 42-41, 22-21, 32-31, and 64-63 can be used as unlike poles.	
D4SL-N□V□□-□	2NC+2NC	Lock monitor   1	Door open/closed detection  4 ⊕ 3 22 ⊕ 21 31 6 5	Lock position  42-41 22-21 32-31 62-61 Stroke Operation Key Insertion completion position  Extraction completion position	Only NC contacts 21-22 and 31-32 have a certified direct opening mechanism.  The terminals 42-41, 22-21, 32-31, and 62-61 can be used as unlike poles.	



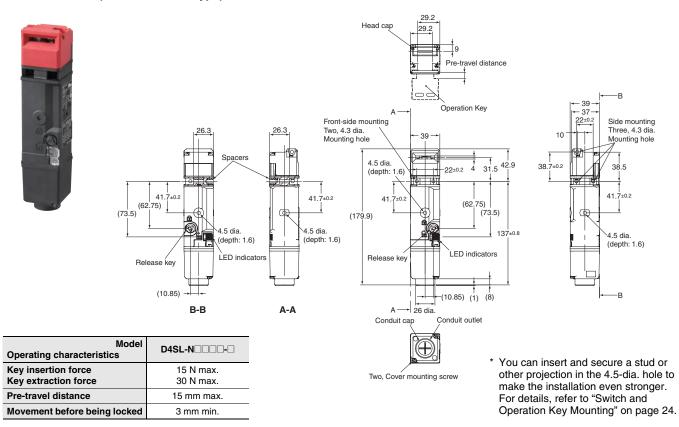
(Unit:mm)

#### **Switches**

#### D4SL-NOD-ON (Connector Type)



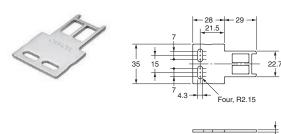
#### **D4SL-N** | Carminal Block Type)



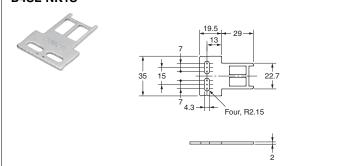
**Note:** Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

#### Operation key

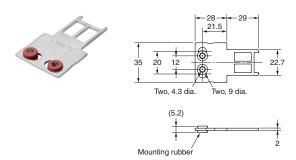
#### D4SL-NK1



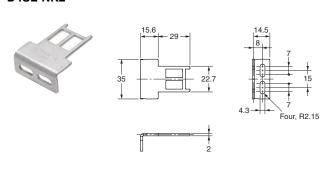
#### D4SL-NK1S



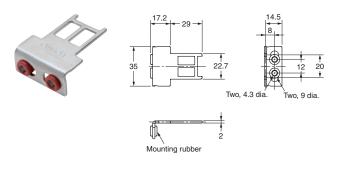
#### D4SL-NK1G



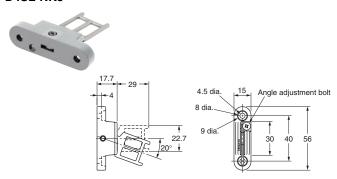
#### D4SL-NK2



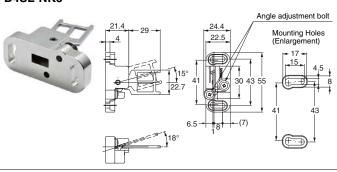
#### D4SL-NK2G



#### D4SL-NK3



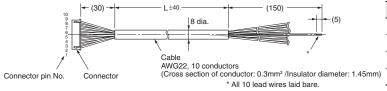
#### D4SL-NK5



Note: Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

#### **Connector Cables**

#### D4SL-CN□

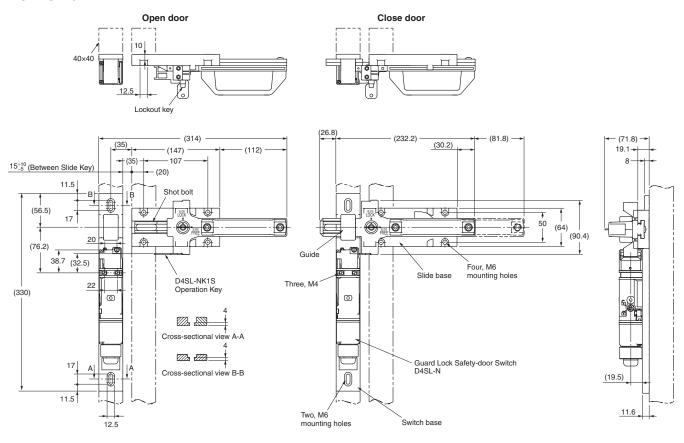


Model	L size
D4SL-CN1	1 m
D4SL-CN3	3 m
D4SL-CN5	5 m
D4SL-CN10	10 m

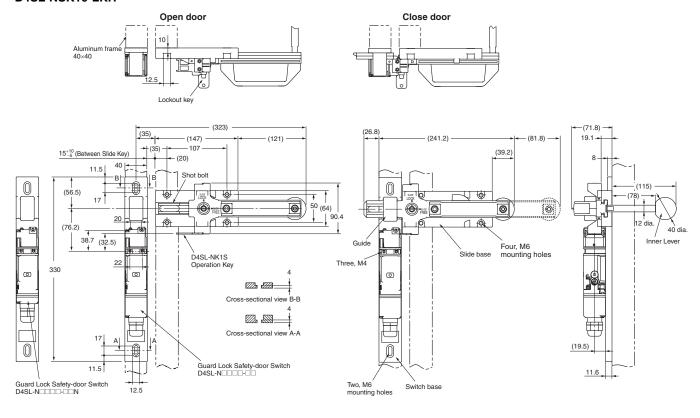
Connector No.	Lead wire color	Connector No.	Lead wire color
1	Black	6	Green/White
2	Black/White	7	Yellow
3	Red	8	Yellow/White
4	Red/White	9	Brown
5	Green	10	Brown/White

#### Slide Key

#### D4SL-NSK10-LK



#### D4SL-NSK10-LKH

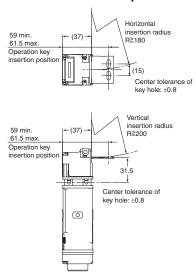


#### With Operation Key Inserted

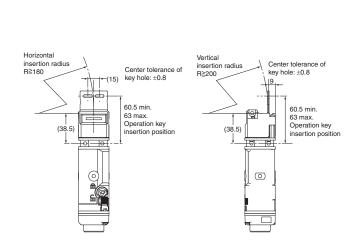
#### D4SL-N + D4SL-NK1



#### With Front-inserted Operation Key



#### With Top-inserted Operation Key

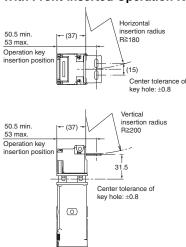


\* Insertion radii apply when the rotational center of the Operation Key is in line with a line extending from the front or top Head surface.

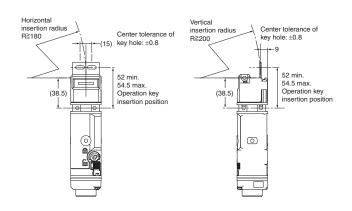
#### D4SL-N + D4SL-NK1S



#### With Front-inserted Operation Key



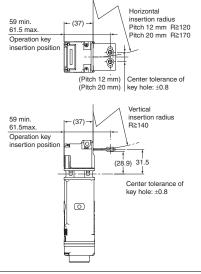
#### With Top-inserted Operation Key



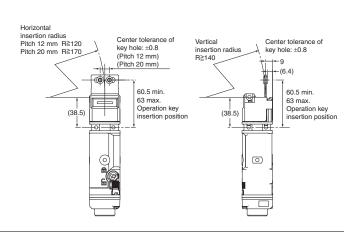
#### D4SL-N + D4SL-NK1G



#### With Front-inserted Operation Key



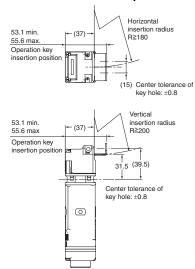
#### With Top-inserted Operation Key



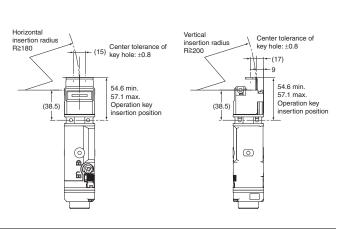
#### D4SL-N + D4SL-NK2



#### With Front-inserted Operation Key



#### With Top-inserted Operation Key

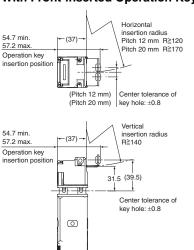


<sup>\*</sup> Insertion radii apply when the rotational center of the Operation Key is in line with a line extending from the front or top Head surface.

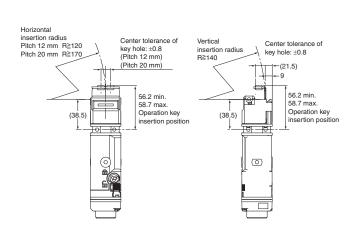
#### D4SL-N + D4SL-NK2G



#### With Front-inserted Operation Key



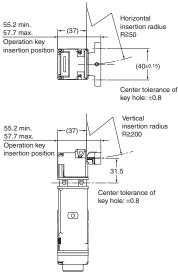
#### With Top-inserted Operation Key



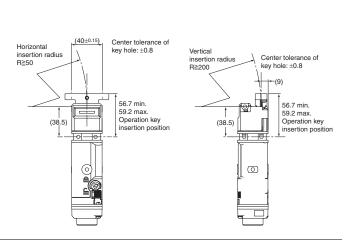
#### D4SL-N + D4SL-NK3



#### With Front-inserted Operation Key



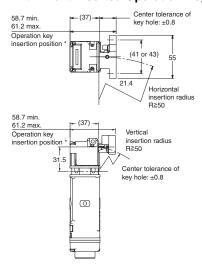
#### With Top-inserted Operation Key



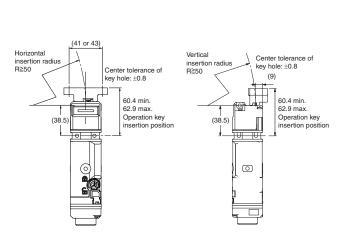
#### D4SL-N + D4SL-NK5



#### With Front-inserted Operation Key



#### With Top-inserted Operation Key



- \*1. 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.
- \*2. If you use the D4SL-NK5 turned over, the operation key insertion position is 60.3 min. and 61.2 max.

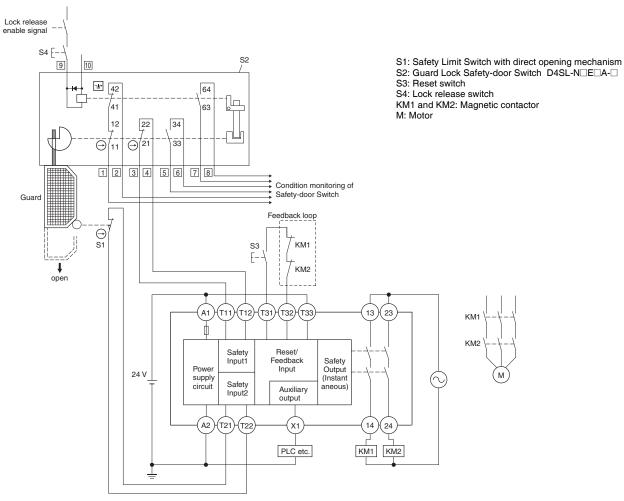
#### **Application Example**

Highest achievable PL/ safety category	Model	Stop category	Reset
	Guard Lock Safety-door Switch D4SL-N□E□A-□ (Mechanical Lock Type) Safety Limit Switch D4N/D4F/D4B-N Safety Relay Unit G9SE-201 (24 VAC/VDC)	0	Manual

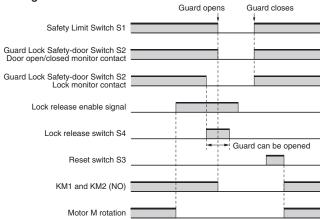
Note: The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

#### Application Overview

- After the opening of the guard is permitted by turning ON of the lock release enable signal, the guard is opened by operating the lock release switch S4.
- The guard status is monitored by the Safety Limit Switch S1 and Guard Lock Safety-door Switch S2, and a state in which the power supply to the motor M is turned OFF must be maintained while the guard is open.
- When the guard is closed, lock status is ensured, and the reset switch S3 is pressed, the power supply to the motor M is permitted.



#### **Timing Chart**



**Note:** The lock release enable signal must be configured so that it should turn ON after dangerous movement is stopped and safety is ensured for the door to open.

#### **Safety Precautions**

Be sure to read the precautions for All Safety Door Switches in the website at:http://www.ia.omron.com/.

<u></u> ∆ DANGER	Indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or may result in death. Additionally there may be severe property damage.
<b>^</b> CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.
Precautions for Safe Use	Supplementary comments on what to do or avoid doing, to use the product safely.
Precautions for Correct Use	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance.

#### **⚠ DANGER**

Injury may occasionally occur. Always check to make sure that the safety functions operate correctly before using the machine. The safety functions may not operate correctly because of wiring mistakes, setting mistakes, or Switch malfunction, causing some machines to continue operating in situations where they should be stopped.



#### ⚠ CAUTION

#### D4SL-N

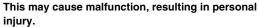
Injury may occasionally occur. When the Switch function is damaged, some machines may continue operating in situations where they should be stopped. Do not impose a force exceeding the key holding force.



Always provide a lock separate from the Switch, attach a warning seal to avoid excessive force applied to the Switch, or provide an indicator lamp to show the locked/unlocked status of the door.

#### D4SL-NSK10-LK

Do not use this product mounted so that it slides vertically.





Do not insert the operation key with the door open. Devices may start to operate, resulting in injury.



#### **Precautions for Safe Use**

#### D4SL-N

#### **Operating Environment**

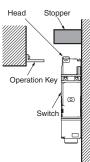
Do not use the Switch submersed in oil or water or in locations continuously subject to splashes of oil or water. Doing so may result in oil or water entering the Switch. (The IP67 degree of protection of the Switch specifies the amount of water penetration after the Switch is submerged in water for a certain period of time.)

#### Wiring

- Do not switch circuits for three or more standard loads (125 VAC, 1A). Doing so may adversely affect insulation performance.
- Do not allow the load current to exceed the rated value.
- For metal cable glands, use a cable gland with the screw length of 9 mm or less. Otherwise it may result in electric shock.
- Do not use metal conduits. Damage to the conduit outlet may result in an improper seal or electric shock.
- Do not a use metal cable gland for the conduit outlet of 1/2-14NPT.
   In the event of damage to the conversion adapter, this may cause seal failure and may result in electric shock.
- Always attach the cover after completing wiring and before using the Switch. Do not supply power when the cover is not attached.
   Electric shock may occur if the Switch is used without the cover attached.
- When using the terminal block type, make sure that foreign material does not adhere to the terminal block board. Otherwise a short circuit may occur between terminals and safety functions may fail to work properly.

#### Installation

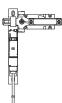
- Make sure the Switch is mounted securely to prevent it from falling off. Otherwise injury may result.
- Do not use a Switch as a stopper.
   Be sure to install a stopper as shown in the following illustration so that the Operation Key does not touch the head.
   Do not subject the Switch to a shock that exceeds the Switch's shock resistance of 1.000 m/s².



#### D4SL-NSK10-LK

- Do not drop the Product. Doing so may prevent the Product from functioning to full capacity.
- Mount the Product securely to prevent it from falling. Otherwise, injury may occur.
- Do not attempt to disassemble or modify the Switch. Doing so may cause the Switch to malfunction.
- Make sure that the gap between the shot bolt and the guide is  $\pm 0.5$
- Otherwise, excessive wear or damage may cause malfunction.
- To ensure safety, do not operate the Switch with anything other than the Slide Key Unit.
- Your hand may be injured by being pinched between the Operation Key and Switch when closing the door with your hand on the Product

- Be careful to avoid pinching your hand when operating the Slide Handle.
- Do not impose a force of exceeding 1 N•m when operating the Lockout Key.
  - Otherwise, the Product may be damaged and may not operate properly.
  - To prevent damage, attach the supplied labels for display near the Product.
- Do not force the slide handle to move when the lockout key is not inserted. Doing so may damage the product and make operation impossible.
- Do not force the slide handle to move when the door is locked.
   Doing so may damage the product and make operation impossible.
- Do not close the door with the shot bolt removed. Doing so may damage the product and make operation impossible.
- Turn the Lockout Key to the "SLIDE LOCK" position and remove it when opening the door to prevent a third party from operating the Slide Handle.
- The durability of the Switch varies considerably depending on the switching conditions. Always confirm the usage conditions by using the Switch in an actual application, and use the Switch only for the number of switching operations given in the performance specifications.
- The user must not maintain or repair equipment incorporating the Switch. Contact the manufacturer of the equipment for any maintenance or repairs required.
- Refer to the D4SL-N Guard Lock Safety-door Switch Instruction Sheet about storage conditions, ambient conditions, Switch details, and handling methods.
- Do not apply excessive force in the direction of the slide. This may damage the product and cause it to malfunction.
- Do not force the switch or cable. This may damage the product. The cable should be fixed at a point separate from the switch.



#### **Precautions for Correct Use**

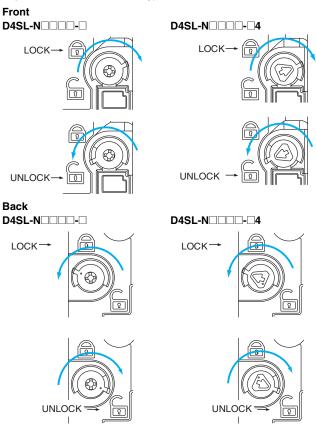
#### D4SL-N

#### **Solenoid Lock Models**

- For solenoid lock models, be sure to supply power to the solenoid
  after the door is closed (after the operation key is inserted). If the
  door is closed after power is supplied to the solenoid, locking the
  operation key may not be possible. (The solenoid carry current is
  applied for Approx. 10 seconds, after which the internal circuit
  switches to a constant current. The lock may not operate properly
  while the constant current is applied.)
- The solenoid lock locks the door only when power is supplied to the solenoid. Therefore, the door will be unlocked if the power supply to the solenoid stops. Therefore, do not use solenoid lock models for machines that may be operating and dangerous even after the machine stops operating.

#### Release Key

- The release key is used to unlock the Switch in case of emergency or if the power supply to the Switch stops.
- If the release key setting is changed from LOCK to UNLOCK, the lock will be released and the safety door can be opened (mechanical lock models only).



- When a Switch with a solenoid lock is in a locked state (i.e., when the solenoid is ON), do not change the release key from the LOCK to the UNLOCK position. Internal parts may be damaged.
- After setting the release key to UNLOCK to, for example, perform maintenance, be sure to return it to LOCK setting before resuming operation.
- The release key is set in the unlock position at the factory for the D4SL-N□□□A and to the lock position for the D4SL-N□□□G.
- In the unlock position, even when the door of large machines or stamping machines is closed during preliminary adjustment, the door will remain unlocked and the machines will not be activated.
- Do not use the release key to start or stop machines.
- The auxiliary lock must be released only by authorized personnel.
- Do not impose a force exceeding 0.2 N•m on the release key screws. The release key may be damaged and may not operate properly.
- To prevent the release key from being used by unauthorized personnel, set it to LOCK and seal it with sealing wax.

#### **Mounting Covers**

Confirm that the seal rubber has no defects before use. If the seal rubber is displaced or raised, or has foreign particles adhered to it, the sealing capability of the seal rubber will be adversely affected.

#### **Hinged Door**

 If the Switch is mounted too close to the hinge, the force imposed on the lock will be much larger than for locations far from the hinge and the lock may be damaged. Mount the Switch close to the handle

#### Mounting

#### **Appropriate Tightening Torque**

Loose screws may result in malfunction. Be sure to tighten each screw of the Switch properly.

Cover mounting screw	0.4 to 0.5 N·m
Operation Key	2.4 to 2.8 N⋅m (D4SL-NK□ and -NK□S)
mounting screw	0.75 to 1.15 N·m (D4SL-NK□G)
Switch mounting screw	0.75 to 1.15 N·m
Cable aland	1.8 to 2.2 N·m (except 1/2-14NPT)
Cable gland	1.4 to 1.8 N·m (1/2-14NPT)
Terminal screw * Terminal block type only	0.5 to 0.6 N·m (D4SL-N□□□-□□)

#### **Switch and Operation Key Mounting**

- Mount the Switch and Operation Key securely to the applicable tightening torque with M4 screws. Always use washers.
- The switch can be fastened more firmly by a stud (4 mm dia., 1.5 mm max height) inserted from back side at the hole of the switch.

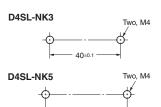
#### Switch mounting

## Front 22±0.1 Two, M4 41.7±0.15 Stud: 4±0.1 dia., height: 1.5 ma

# 38.7±0.1 22±0.1 Three, M4 41.7±0.15 Stud: 4±0.1 dia., height: 1.5 max

#### Operation Key mounting

D4SL-NK1/-NK2



- Do not impose excessive force on the key top while the operation key is inserted into the switch body or drop the switch with the operation key inserted to avoid the deformation of the key or the breakage of the switch body.
- Do not use the operation key other than dedicated OMRON's (D4SL-NK

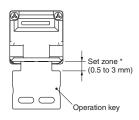
  ). Otherwise switch may be damaged.
- Do not use the operation key D4SL-K□. A lock will not be closed and a machine will not be activated.
- $\bullet$  Be sure that the operation key can be inserted properly to key hole with a tolerance of  $\pm 0.8$  mm.
- Insert the operation key into the key hole according to the specified "operation key insertion radius in horizontal direction".
- When mounting at the side of switch body, mount the switch with 3 points including the head.
- Attach cap heads to any operation key holes that are not being used.

#### **Securing the Door**

When the door is closed (with the Operation Key inserted), the Operation Key may exceed the set zone because of, for example, the door's own weight, machine vibration, or the door cushion rubber.

Secure the door with a stopper (hook) so that the Operation Key remains within the set zone.

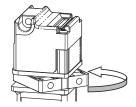
\* If you use the D4SL-NK5 with the front key hole oriented in the direction shown in the right diagram, the set zone will be 2.1 to 3.0 mm.

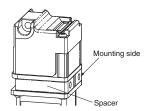




#### **Spacer**

Do not remove a spacer. Rotate the spacer in accordance with the Switch mounting direction. Use of the Switch without spacer will reduce the lock strength.





#### Wiring

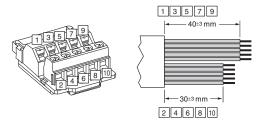
- DC solenoids have polarity. (E1: +, E2: -) Confirm terminal polarity before wiring.
- The current of the 24 VDC solenoid is different from when it is first turned ON as to when it is in operation. To take into account possible voltage drops, it is important to apply a rated operation voltage.
- To enable the 24 VDC solenoid, it is necessary to select the appropriate power supply capacity.
- The ON and OFF contact operation will not engage simultaneously.

Be sure to confirm operation under actual operating conditions.

If a lock is required for safety, design the system so that the closing
of the NC contacts on both the door open/closed detection switch
and the lock monitor switch is detected.

#### Wiring Precautions for D4SL-N

- Do not wire the Switch while power is being supplied. Doing so may result in electric shock.
- Do not let particles, such as small pieces of lead wire, enter the switch body when wiring.
- Do not directly wire the stranded wire to the terminal block.
- When connecting to the terminals via insulating tube and bar terminals, arrange the bar terminals so that they do not rise up onto the case or the cover.
- Applicable lead wire size: AWG22 to AWG18 (0.3 to 0.75 mm²).
- Use lead wires of an appropriate length. Not doing so may result in excess length causing the cover to rise and not fit properly.
- Remove the terminal block board out of the unit to perform wiring.
   Be sure to insert the connector properly.
- Do not pull on the lead wires with excessive force. Doing so may disconnect them.



#### **Recommended Crimp Terminals**

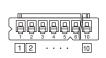
Manufacturer	Model	Applicable wire lead
DUOENIN	AI0.34-8 TQ	AWG22
PHOENIX CONTACT	AI0.5-8 WH	AWG20
001117101	AI0.75-8 GY	AWG18

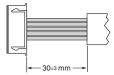
L1: 14 mm max. L2: 8 mm max.



#### Wiring Precautions for D4SL-NUUU-UN

- Do not wire the Switch while power is being supplied. Doing so may result in electric shock.
- Do not let particles, such as small pieces of lead wire, enter the switch body when wiring.
- Applicable lead wire size: AWG24 to AWG22 (0.2 to 0.3 mm²).
   Do not apply a current of 2 A or more when using AWG24.
- Use lead wires of an appropriate length. Not doing so may result in excess length causing the cover to rise and not fit properly.





 Do not pull on the lead wires with excessive force. Doing so may disconnect them.  Do not forcibly insert the wired socket at the cable side into the connector or D4SL-N's conduit outlet. Doing so may cause cable break.

Be sure to insert the cable into the connector or D4SL's conduit outlet before performing wiring to the socket, or insert the cable into the connector or conduit outlet from the opposite side of the socket.

#### Applicable socket for cable side

Manufacturer	Name	Model	
	Housing	XHP-10	
J.S.T. Mfg Co.	Contact (applicable wire lead: AWG24 to AWG22)	SXH-001T-P0.6	

#### **Processing the Conduit Outlet**

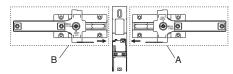
- Use a recommended cable gland and tighten it with the appropriate tightening torque. The case may be damaged if an excessive tightening torque is applied.
- Use a cable conforming to the diameter of the cable gland to be used.
- For the 1/2-14NPT conduit, mount a provided conversion adapter and wrap the seal tape around it to use the cable gland.

#### **Cable Gland**

- Use a commercially available cable gland.
- Use a cable gland with a screw section not exceeding 9 mm to ensure wiring properties.

#### D4SL-NSK10-LK

- Use this product for a lightweight door (20 kg max). Otherwise the product may be damaged.
- This product is for D4SL-N Guard Lock Safety-door Switch only.
   This product cannot be used with any other manufacturer's door switches.
- Use the Slide Handle in the direction A or B in the following figure.



Loose screws may result in malfunction. Use washers and tighten
the screws to the specified torques. Mount the Slide Base at four
points with screws. Adding adhesive is recommended for
preventing the screws from loosening.

Also, when mounting the Product to a door for disable-prevention purposes, purchase and use tamper-resistant screws.

#### **Approriate Tightening Torque**

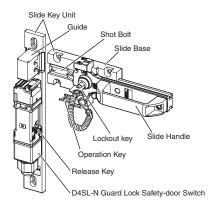
Slide Key mounting screw (M6)	6.0 to 7.0 N·m
Operation key special mounting screw (screws supplied)	2.4 to 2.8 N·m
Switch special mounting screw (screws supplied)	0.75 to 1.15 N⋅m
Inner Lever	9 to 10 N⋅m

#### **Technical Specifications**

Ambient operating temperature	-10 to 55°C (with no icing)
Ambient operating humidity	95% max.
Mechanical durability	20,000 operations min.

- Do not store the Switch where corrosive gases (e.g., H<sub>2</sub>S, SO<sub>2</sub>, NH<sub>3</sub>, HNO<sub>3</sub> or Cl<sub>2</sub>) or dust is present, or in locations subject to high temperature or humidity.
- Perform maintenance inspections periodically.
- When the lockout key is attached to your wrist, be careful that the strap does not get stuck in equipment.

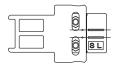
#### Nomenclature



## Differences between Lockout Key and Trapped Key (Reference)

	Lockout key	Trapped key (Refer to information on the D4JL-□□□A-□7-□□)
Closing the door	The door cannot be closed unless the lockout key is inserted in the slide and turned.	The door cannot be closed unless the trapped key is inserted in the Door Switch and turned.
Opening the door	The door can be opened by supplying power to the Door Switch solenoid without operating the lockout switch.	The door can never be opened without both supplying power to the Door Switch solenoid and operating the trapped key.

 When mounting the operation key, line up the inside edges of the long operation key holes with the outer edges of the slide handle as in the following figure to ensure easy position adjustment.



- Use the supplied special screws to mount the operation key and D4SL-N Guard Lock Safety-door Switch.
- To tighten the screws, use the tip of a flat-head screwdriver on the screw heads as shown in the following figure.



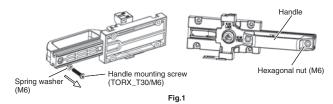
Note: The special screws are designed so that they cannot be turned counter-clockwise using a flat-head screwdriver.

• The special screws cannot be removed once they are tightened.

#### Mounting of innner lever Mounting method

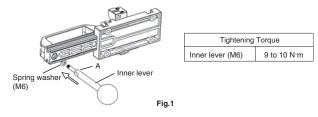
#### 1) Detaching of mounting screw

Remove the handle mounting screw with TORX screwdriver (T30).



#### 2) Mounting of inner lever

Tighten A portion of the inner lever to a suitable torque with wrench (width across flat: 10mm).



- This product is for Omron, the D4SL-NSK10 only. This product cannot be used with any other products.
- Do not operate the handle with the handle mounting screw removed. Doing so may result in malfunction.
- Be careful not to lose the spring washer and hexagonal nut when remove the handle mounting screw. (Fig.1)
- Loose inner lever may result in malfunction. Use washers and tighten the inner lever to the specified torque. (Fig.2)

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