

NEW

# OMRON

## Guard Lock Safety-door Switch D4SL

**sti** SAFETY,  
TECHNOLOGY  
& INNOVATION

### World Smallest Class



Strong

Easy



realizing

**Strong**

**Easy**



# World Smallest Class 6-contact Guard Lock Safety-door Switch

Achieved world smallest class  
with easily selectable wiring  
method and metal-head  
robustness



## Conveniently Selectable Wiring Method

Two types of wiring methods are available to shorten wiring work time and prevent miswiring. Use of the "connector type" with the corresponding connector cable provides speedy maintenance and prevents miswiring. The "terminal block type" comprises a detachable terminal block, significantly increasing wiring efficiency.

Connector Type




Terminal Block Type




\* Connector cables are not included with the connector type and are to be purchased separately.

Easy replacement in case of cable break (Connector type)


**1** Cable break




**2** Remove the cable.



**3** Replace with a new cable, and resume production without delay.



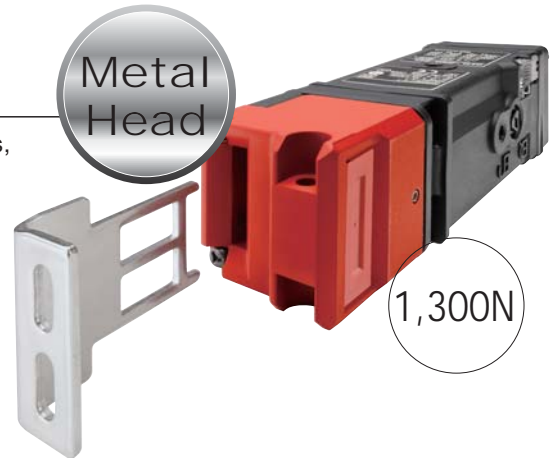




## Adopting Metal Head

The head is designed with strong and durable materials, able to withstand prolonged use in the workplace.

To prepare for any unforeseeable circumstances, a key holding force of 1,300 N (min.) has been achieved. This has increased the range of possible applications.



## Wide Key Slot

Even when the door is unstable, the wide key slot provides easier insertion than prior models.

**D4SL**  
Actual size



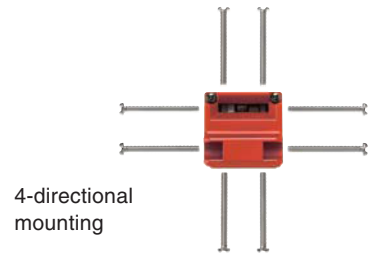
**D4GL**  
(Precedent model)  
Actual size





## Wide Variety of Mounting Methods

The switch can be mounted in four directions by rotating the dedicated spacer. Mounting screws can be inserted 4-directionally, enabling mounting on a wider range of surfaces. Thus saving time and effort over the prior mounting method.



Front mounting



Pull out



Rotate 90°

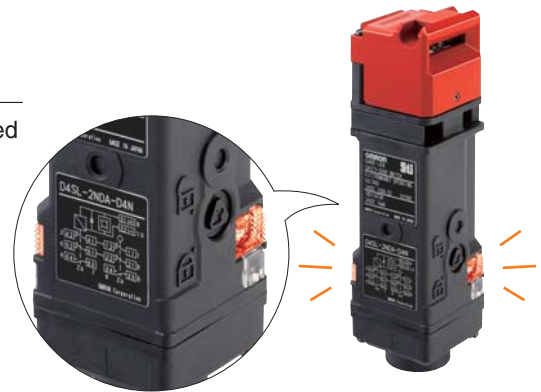


Side mounting\*

\* Three screws are needed for side mounting.

## Easy View LED Indicators

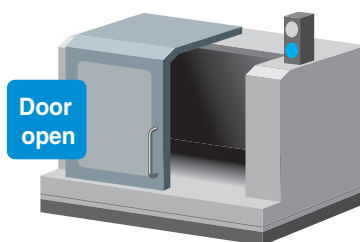
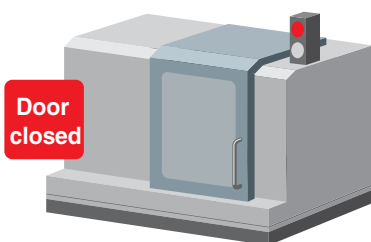
With the two LED indicators, switch status can be checked from any direction.



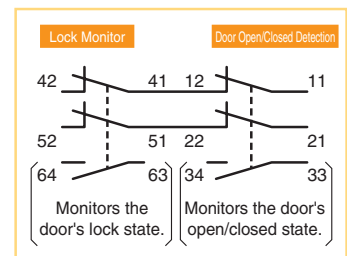
## Merits of 6-contact Models

The safety circuit comprises of four contacts and of two contacts used for monitoring. Door open/closed status and lock status can be monitored.

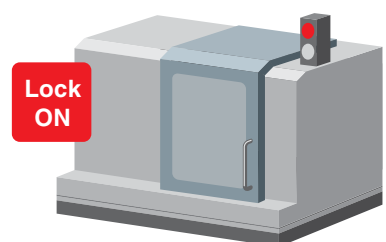
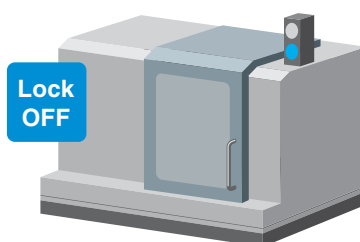
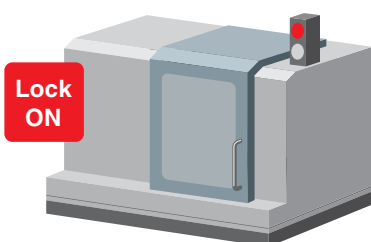
### Pattern 1



Monitors if the door is open.



### Pattern 2



Monitors if the door lock is released.



## Wide Variety of Operation Keys

Within the selection are keys with shock and vibration resistant properties and a single adjustable type.



Horizontal mounting  
**D4SL-K1**



Horizontal mounting (Short)  
**D4SL-K1S**



Horizontal mounting (with Cushion Rubber)  
**D4SL-K1G**



Vertically mounting  
**D4SL-K2**



Vertical mounting (with Cushion Rubber)  
**D4SL-K2G**



Adjustable (Horizontal)  
**D4SL-K3**



## Accessories for Room Access Control

Door mounting accessories for D4SL are provided to prevent an operator becoming trapped inside the hazardous area by using a lockout key. In combination with A22TK, a safe environment can be kept during maintenance inside the hazardous area.



# Guard Lock Safety-door Switch D4SL


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

- Two types are available: a connector type that reduces wiring time and a detachable terminal block type.
- Robust and durable metal head.
- Key holding force of 1,300 N.
- The wider key slot is less susceptible to movement from doors, and can handle doors with a small radius.
- By rotating the mounting part, it is possible, both to change the key insertion point and to enable mounting on various devices.
- Easy view LED indicators can be checked from any direction.
- By utilizing the 6-contact type, both the door open/closed status and the solenoid ON/OFF status can be monitored independently.
- A cost-effective 5-contact model is also available.



Connector Type

Terminal Block Type

 Be sure to read the "Safety Precautions" on page 24.

## Model Number Structure

### Model Number Legend

Switch

D4SL-

□	□	□	□	□	□	□
---	---	---	---	---	---	---

  
1 2 3 4 5 6 7

#### 1. Conduit Size

- 2 : G1/2 (1 conduit)
- 3 : 1/2-14NPT (1 conduit) \*1
- 4 : M20 (1 conduit)

#### 2. Built-in Switch \*2

##### 5-contact Model

- J : 1NC/1NO + 2NC/1NO
- K : 1NC/1NO + 3NC
- L : 2NC + 2NC/1NO
- M : 2NC + 3NC

##### 6-contact Model

- N : 2NC/1NO + 2NC/1NO
- P : 2NC/1NO + 3NC
- Q : 3NC + 2NC/1NO
- R : 3NC + 3NC

\*1. M20, includes M20-to-1/2-14NPT conversion adapter (To be released.)

\*2. If a current is detected in the solenoid lock model (built-in switches; N,P,Q,R), before the door is closed, the door will remain unlocked.  
Be sure to close the door before turning ON the solenoid.

\*3. Connector cables are not included with the connector type and are to be purchased separately.

#### 3. Head Material

- D : Metal

#### 4. Door Lock and Release

- A : Mechanical lock/  
24 VDC solenoid release
- G : 24 VDC solenoid lock/  
mechanical release

#### 5. Indicator

- D : 24 VDC (orange LED indicator)

#### 6. Release Key Type

- Blank : Standard release key
- 4 : Special release key  
(Note: Release keys are provided.)

#### 7. Connection Method

- Blank : Terminal block
- N : Connector \*3

### Operation Key

D4SL-K

□	□
---	---

  
1 2

#### 1. Operation Key Type

- 1 : Horizontal mounting
- 2 : Vertical mounting
- 3 : Adjustable mounting (horizontal)

#### 2. Key Type

- Blank : No cushion rubber
- G : Cushion rubber
- S : No cushion rubber, short type



## Ordering Information

### Mechanical lock/24 VDC solenoid release (G1/2, M20 conduit type)

List of Models (Operation Keys are sold separately.)

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 size	Model
Standard	Connector	24 VDC Orange	Mechanical lock Solenoid release	2NC/1NO + 2NC/1NO	G1/2	D4SL-2NDA-DN
					M20	D4SL-4NDA-DN
				2NC/1NO + 3NC	G1/2	D4SL-2PDA-DN
					M20	D4SL-4PDA-DN
				3NC + 2NC/1NO	G1/2	D4SL-2QDA-DN
					M20	D4SL-4QDA-DN
				3NC + 3NC	G1/2	D4SL-2RDA-DN
					M20	D4SL-4RDA-DN
	Terminal block			2NC/1NO + 2NC/1NO	G1/2	D4SL-2NDA-D
					M20	D4SL-4NDA-D
				2NC/1NO + 3NC	G1/2	D4SL-2PDA-D
					M20	D4SL-4PDA-D
				3NC + 2NC/1NO	G1/2	D4SL-2QDA-D
					M20	D4SL-4QDA-D
3NC + 3NC	G1/2	D4SL-2RDA-D				
	M20	D4SL-4RDA-D				
Special release key	Connector	24 VDC Orange	Mechanical lock Solenoid release	2NC/1NO + 2NC/1NO	G1/2	D4SL-2NDA-D4N *
					M20	D4SL-4NDA-D4N *
				2NC/1NO + 3NC	G1/2	D4SL-2PDA-D4N *
					M20	D4SL-4PDA-D4N *
				3NC + 2NC/1NO	G1/2	D4SL-2QDA-D4N *
					M20	D4SL-4QDA-D4N *
				3NC + 3NC	G1/2	D4SL-2RDA-D4N *
					M20	D4SL-4RDA-D4N *
	Terminal block			2NC/1NO + 2NC/1NO	G1/2	D4SL-2NDA-D4 *
					M20	D4SL-4NDA-D4 *
				2NC/1NO + 3NC	G1/2	D4SL-2PDA-D4 *
					M20	D4SL-4PDA-D4 *
				3NC + 2NC/1NO	G1/2	D4SL-2QDA-D4 *
					M20	D4SL-4QDA-D4 *
3NC + 3NC	G1/2	D4SL-2RDA-D4 *				
	M20	D4SL-4RDA-D4 *				

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

\* These models received Korean S-mark certification.

# D4SL

## 24 VDC solenoid lock/Mechanical release (G1/2, M20 conduit type)

List of Models (Operation Keys are sold separately.)

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 size	Model
Standard	Connector	24 VDC Orange	Solenoid lock/ Mechanical release	1NC/1NO + 2NC/1NO	G1/2	D4SL-2JDG-DN
					M20	D4SL-4JDG-DN
				1NC/1NO + 3NC	G1/2	D4SL-2KDG-DN
					M20	D4SL-4KDG-DN
				2NC + 2NC/1NO	G1/2	D4SL-2LDG-DN
					M20	D4SL-4LDG-DN
				2NC + 3NC	G1/2	D4SL-2MDG-DN
					M20	D4SL-4MDG-DN
				2NC/1NO + 2NC/1NO	G1/2	D4SL-2NDG-DN
					M20	D4SL-4NDG-DN
				2NC/1NO + 3NC	G1/2	D4SL-2PDG-DN
					M20	D4SL-4PDG-DN
	3NC + 2NC/1NO			G1/2	D4SL-2QDG-DN	
				M20	D4SL-4QDG-DN	
	3NC + 3NC			G1/2	D4SL-2RDG-DN	
				M20	D4SL-4RDG-DN	
	Terminal block			1NC/1NO + 2NC/1NO	G1/2	D4SL-2JDG-D
					M20	D4SL-4JDG-D
				1NC/1NO + 3NC	G1/2	D4SL-2KDG-D
					M20	D4SL-4KDG-D
				2NC + 2NC/1NO	G1/2	D4SL-2LDG-D
					M20	D4SL-4LDG-D
				2NC + 3NC	G1/2	D4SL-2MDG-D
					M20	D4SL-4MDG-D
2NC/1NO + 2NC/1NO		G1/2	D4SL-2NDG-D			
		M20	D4SL-4NDG-D			
2NC/1NO + 3NC		G1/2	D4SL-2PDG-D			
		M20	D4SL-4PDG-D			
3NC + 2NC/1NO	G1/2	D4SL-2QDG-D				
	M20	D4SL-4QDG-D				
3NC + 3NC	G1/2	D4SL-2RDG-D				
	M20	D4SL-4RDG-D				

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



## 24 VDC solenoid lock/Mechanical release (G1/2, M20 conduit type)

List of Models (Operation Keys are sold separately.)

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 size	Model
Special release key	Connector	24 VDC Orange	Solenoid lock/ Mechanical release	1NC/1NO + 2NC/1NO	G1/2	D4SL-2JDG-D4N
					M20	D4SL-4JDG-D4N
				1NC/1NO + 3NC	G1/2	D4SL-2KDG-D4N
					M20	D4SL-4KDG-D4N
				2NC + 2NC/1NO	G1/2	D4SL-2LDG-D4N
					M20	D4SL-4LDG-D4N
				2NC + 3NC	G1/2	D4SL-2MDG-D4N
					M20	D4SL-4MDG-D4N
				2NC/1NO + 2NC/1NO	G1/2	D4SL-2NDG-D4N *
					M20	D4SL-4NDG-D4N *
				2NC/1NO + 3NC	G1/2	D4SL-2PDG-D4N *
					M20	D4SL-4PDG-D4N *
	3NC + 2NC/1NO			G1/2	D4SL-2QDG-D4N *	
				M20	D4SL-4QDG-D4N *	
	3NC + 3NC			G1/2	D4SL-2RDG-D4N *	
				M20	D4SL-4RDG-D4N *	
	Terminal block			1NC/1NO + 2NC/1NO	G1/2	D4SL-2JDG-D4
					M20	D4SL-4JDG-D4
				1NC/1NO + 3NC	G1/2	D4SL-2KDG-D4
					M20	D4SL-4KDG-D4
				2NC + 2NC/1NO	G1/2	D4SL-2LDG-D4
					M20	D4SL-4LDG-D4
				2NC + 3NC	G1/2	D4SL-2MDG-D4
					M20	D4SL-4MDG-D4
2NC/1NO + 2NC/1NO		G1/2	D4SL-2NDG-D4 *			
		M20	D4SL-4NDG-D4 *			
2NC/1NO + 3NC		G1/2	D4SL-2PDG-D4 *			
		M20	D4SL-4PDG-D4 *			
3NC + 2NC/1NO	G1/2	D4SL-2QDG-D4 *				
	M20	D4SL-4QDG-D4 *				
3NC + 3NC	G1/2	D4SL-2RDG-D4 *				
	M20	D4SL-4RDG-D4 *				

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

\* These models received Korean S-mark certification.

**Mechanical lock/24 VDC solenoid release (1/2-14NPT conduit type)**

List of Models (Operation Keys are sold separately.)

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 size	Model (Available soon)
Standard	Connector	24 VDC Orange	Mechanical lock Solenoid release	2NC/1NO + 2NC/1NO	1/2-14NPT	D4SL-3NDA-DN
				2NC/1NO + 3NC		D4SL-3PDA-DN
				3NC + 2NC/1NO		D4SL-3QDA-DN
				3NC + 3NC		D4SL-3RDA-DN
	Terminal block			2NC/1NO + 2NC/1NO		D4SL-3NDA-D
				2NC/1NO + 3NC		D4SL-3PDA-D
				3NC + 2NC/1NO		D4SL-3QDA-D
				3NC + 3NC		D4SL-3RDA-D
Special release key	Connector	24 VDC Orange	Mechanical lock Solenoid release	2NC/1NO + 2NC/1NO	1/2-14NPT	D4SL-3NDA-D4N *
				2NC/1NO + 3NC		D4SL-3PDA-D4N *
				3NC + 2NC/1NO		D4SL-3QDA-D4N *
				3NC + 3NC		D4SL-3RDA-D4N *
	Terminal block			2NC/1NO + 2NC/1NO		D4SL-3NDA-D4 *
				2NC/1NO + 3NC		D4SL-3PDA-D4 *
				3NC + 2NC/1NO		D4SL-3QDA-D4 *
				3NC + 3NC		D4SL-3RDA-D4 *

Note: The recommended models for equipment and machinery being exported to North America are those with a 1/2-14NPT conduit sizes.  
\* These models will receive Korean S-mark certification.







**24 VDC solenoid lock/Mechanical release (1/2-14NPT conduit type)**

List of Models (Operation Keys are sold separately.)

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 size	Model (Available soon)
Standard	Connector	24 VDC Orange	Solenoid lock/ Mechanical release	1NC/1NO + 2NC/1NO	1/2-14NPT	D4SL-3JDG-DN
				1NC/1NO + 3NC		D4SL-3KDG-DN
				2NC + 2NC/1NO		D4SL-3LDG-DN
				2NC + 3NC		D4SL-3MDG-DN
				2NC/1NO + 2NC/1NO		D4SL-3NDG-DN
				2NC/1NO + 3NC		D4SL-3PDG-DN
				3NC + 2NC/1NO		D4SL-3QDG-DN
				3NC + 3NC		D4SL-3RDG-DN
	Terminal block			1NC/1NO + 2NC/1NO		D4SL-3JDG-D
				1NC/1NO + 3NC		D4SL-3KDG-D
				2NC + 2NC/1NO		D4SL-3LDG-D
				2NC + 3NC		D4SL-3MDG-D
				2NC/1NO + 2NC/1NO		D4SL-3NDG-D
				2NC/1NO + 3NC		D4SL-3PDG-D
				3NC + 2NC/1NO		D4SL-3QDG-D
				3NC + 3NC		D4SL-3RDG-D
Special release key	Connector	24 VDC Orange	Solenoid lock/ Mechanical release	1NC/1NO + 2NC/1NO	1/2-14NPT	D4SL-3JDG-D4N
				1NC/1NO + 3NC		D4SL-3KDG-D4N
				2NC + 2NC/1NO		D4SL-3LDG-D4N
				2NC + 3NC		D4SL-3MDG-D4N
				2NC/1NO + 2NC/1NO		D4SL-3NDG-D4N *
				2NC/1NO + 3NC		D4SL-3PDG-D4N *
				3NC + 2NC/1NO		D4SL-3QDG-D4N *
				3NC + 3NC		D4SL-3RDG-D4N *
	Terminal block			1NC/1NO + 2NC/1NO		D4SL-3JDG-D4
				1NC/1NO + 3NC		D4SL-3KDG-D4
				2NC + 2NC/1NO		D4SL-3LDG-D4
				2NC + 3NC		D4SL-3MDG-D4
				2NC/1NO + 2NC/1NO		D4SL-3NDG-D4 *
				2NC/1NO + 3NC		D4SL-3PDG-D4 *
				3NC + 2NC/1NO		D4SL-3QDG-D4 *
				3NC + 3NC		D4SL-3RDG-D4 *

\* The recommended models for equipment and machinery being exported to North America are those with a 1/2-14NPT conduit sizes.  
\* These models will receive Korean S-mark certification.


**Operation Keys**

Type		Model
Horizontal mounting		D4SL-K1
Horizontal mounting (Short)		D4SL-K1S
Horizontal mounting (Cushion rubber)		D4SL-K1G
Vertical mounting		D4SL-K2
Horizontal mounting (Cushion rubber)		D4SL-K2G
Adjustable (Horizontal)		D4SL-K3

**Connector Cables**

Type	Model
1m	D4SL-CN1
3m	D4SL-CN3
5m	D4SL-CN5

**Slide Key**

Type	Model
	D4SL-SK10-LK

# D4SL

## Specifications

### Standards and EC Directives

Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EMC Directive
- EN1088
- EN60204-1
- 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 *	UL508, CSA C22.2 No.14	E76675
CQC(CCC)	GB14048.5	pending
KOSHA	EN60947-5-1	Consult your OMRON representative for details.

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

### Certified Standard Ratings

TÜV(EN60947-5-1)

Item	Utilization category	AC-15	DC-13
Rated operating current (Ie)		1.5A	0.22A
Rated operating current (Iu)		120V	125V

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

Rated voltage	Carry current	Current (A)		Volt-amperes (VA)	
		Make	Break	Make	Break
120 VAC	2.5A	15	1.5	1,800	180

R150

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

### Solenoid Coil Characteristics

Item	Type	24 VDC
Rated operating voltage (100% ED)		24 VDC <sup>+10%</sup> / <sub>-15%</sub>
Current consumption *		Power ON: Approx. 34 W at 1.4 A Constant: Approx. 2.6 W (average) at 0.4 A (max.)
Insulation		Class E (120°C max.)

\* A starting current is applied to the solenoid for a maximum of one second.

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

### Indicator

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

### Characteristics

Degree of protection *1	IP67 (EN60947-5-1)	
Durability *2	Mechanical	1,000,000 operations min.
	Electrical	150,000 operations min. (1A resistance at 125VAC) *3
Operating speed	0.05 to 1 m/s	
Operating frequency	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 *5	1,300 N min.	
Contact resistance	200 mΩ max.	
Minimum applicable load *6	1 mA resistive load at 5 VDC (N-level reference value)	
Rated insulation voltage (Ui)	150V (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 (EN60947-5-1)	Between terminals of same polarity	1.5 kV
	Between terminals of different polarity	1.5 kV
	Between other terminals and non-current carrying metallic parts	2.5 kV
Insulation resistance	100 Ω min. (at 500 VDC)	
Vibration resistance	Malfuction	10 to 55 Hz, 0.75 mm single amplitude
Shock resistance	Malfuction	100 m/s <sup>2</sup> min.
	Destruction	1,000 m/s <sup>2</sup> min.
Conditional short-circuit current	100 A (EN60947-5-1)	
Conventional free air thermal current (Ith)	2.5 A (EN60947-5-1)	
Ambient operating temperature	-10 to 55°C (with no icing)	
Ambient operations humidity	95% max.	
Weight	Approx. 360 g (Connector model)	
	Approx. 390 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.

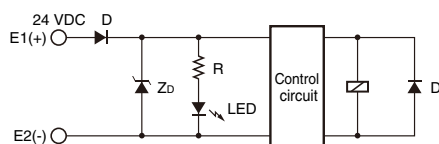
\*4. These figures are minimum requirements for safe operation.

\*5. This figure is based on the GS-ET-19 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

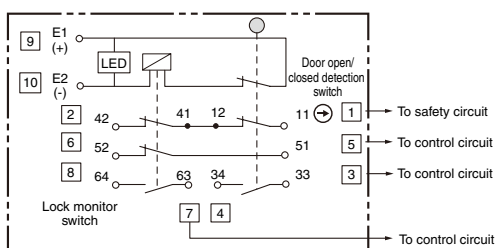


### Circuit Connection Example

- Direct opening contacts used as safety-circuit input are indicated with the  $\ominus$  mark.
- Do not switch circuits for three or more standard loads at the same time. Doing so may adversely affect insulation performance.
- DC solenoids have polarity. (E1: Positive, E2: Negative) Confirm terminal polarity before wiring.

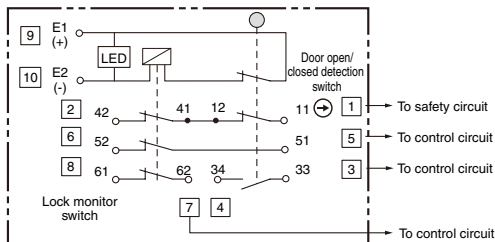
#### Connection Example for D4SL-□JDG

- Terminals 12-41 are connected internally and so connect terminals 11-42 for safety-circuit input. (BIA GS-ET-19)



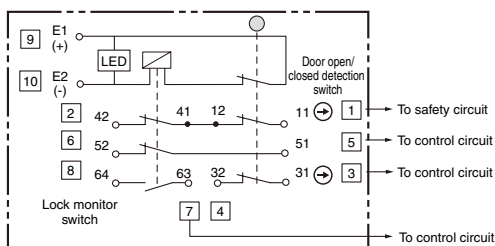
#### Connection Example for D4SL-□KDG

- Terminals 12-41 are connected internally and so connect terminals 11-42 for safety-circuit input. (BIA GS-ET-19)



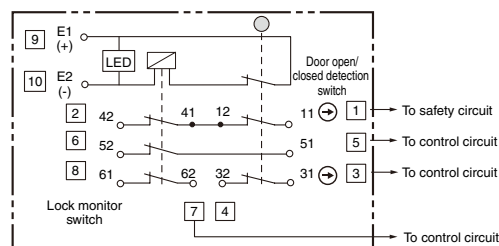
#### Connection Example for D4SL-□LDG

- Terminals 12-41 are connected internally and so connect terminals 11-42 for safety-circuit input. (BIA GS-ET-19)



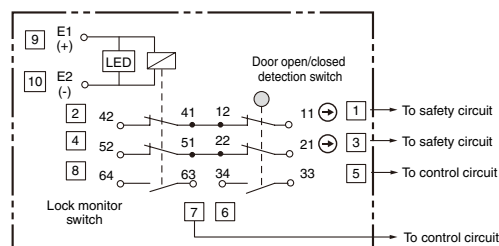
#### Connection Example for D4SL-□MDG

- Terminals 12-41 are connected internally and so connect terminals 11-42 for safety-circuit input. (BIA GS-ET-19)



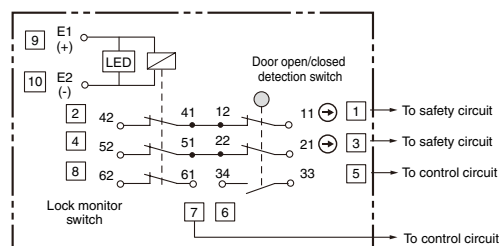
#### Connection Example for D4SL-□NDA and D4SL-□NDG

- Terminals 12- 41, and 22- 51 are connected internally and so connect terminals 11-42, and 21-52 for safety-circuit input. (BIA GS-ET-19)



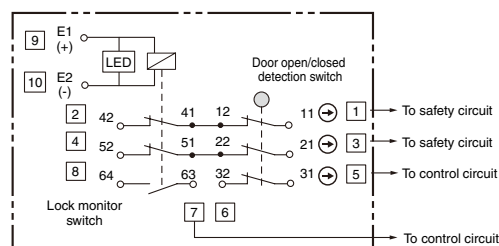
#### Connection Example for D4SL-□PDA and D4SL-□PDG

- Terminals 12-41, and 22-51 are connected internally and so connect terminals 11-42, and 21-52 for safety-circuit input. (BIA GS-ET-19)



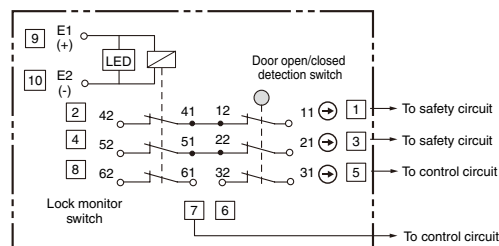
#### Connection Example for D4SL-□QDA and D4SL-□QDG

- Terminals 12-41, and 22-51 are connected internally and so connect terminals 11-42, and 21-52 for safety-circuit input. (BIA GS-ET-19)



#### Connection Example for D4SL-□RDA and D4SL-□RDG

- Terminals 12-41, and 22-51 are connected internally and so connect terminals 11-42, and 21-52 for safety-circuit input. (BIA GS-ET-19)

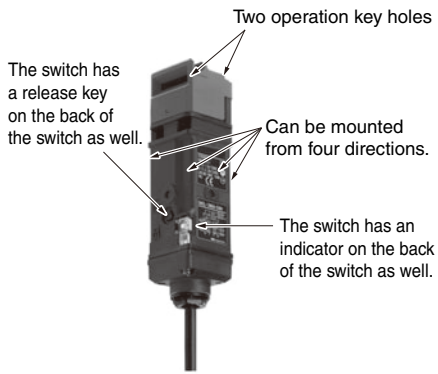


# D4SL

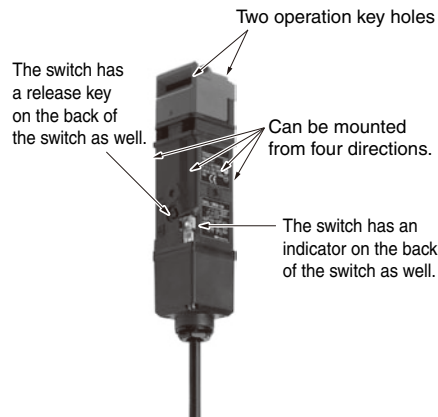
## Structure and Nomenclature

### Structure

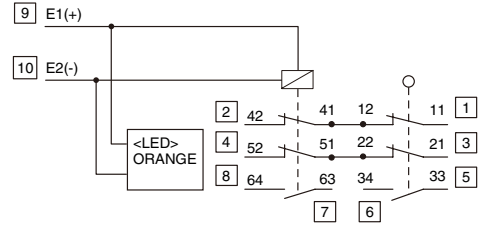
#### D4SL-□□D□-D4N Connector Model



#### D4SL-□□D□-D4 Terminal Block Model

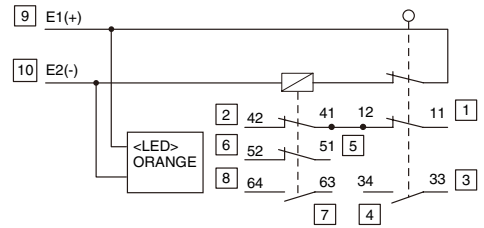


#### D4SL-□NDA and D4SL-□NDG



**Note:** Numbers inside the boxes are terminal numbers printed on the product.

#### D4SL-□JDG



**Note:** Numbers inside the boxes are terminal numbers printed on the product.



## Contact Form

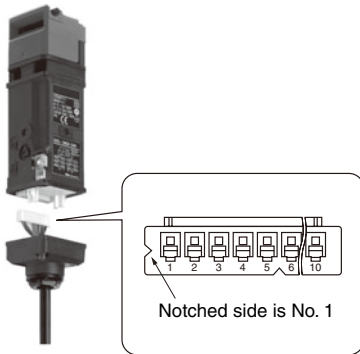
Indicates conditions where the Key is inserted and the lock is applied. Terminals 12 and 41, 51 and 22 are connected internally (as per BIA GS-ET-19).

Model	Contact (door open/closed detection and lock monitor)	Contact Form		Operating pattern	Remarks
		Lock monitor	Door open/closed detection		
D4SL- □JD□-D□□	1NC/1NO + 2NC/1NO				Only NC contact 11-12 has a certified direct opening mechanism. ⊖ The terminals 42-11, 33-34, 51-52, and 64-63 can be used as unlike poles.
D4SL- □KD□-D□□	1NC/1NO + 3NC				Only NC contact 11-12 has a certified direct opening mechanism. ⊖ The terminals 42-11, 33-34, 51-52, and 62-61 can be used as unlike poles.
D4SL- □LD□-D□□	2NC + 2NC/1NO				Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. ⊖ The terminals 42-11, 33-34, 51-52, and 64-63 can be used as unlike poles.
D4SL- □MD□-D□□	2NC + 3NC				Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. ⊖ The terminals 42-11, 33-34, 51-52, and 62-61 can be used as unlike poles.
D4SL- □ND□-D□□	2NC/1NO + 2NC/1NO				Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. ⊖ The terminals 42-11, 52-21, 34-33, and 64-63 can be used as unlike poles.
D4SL- □PD□-D□□	2NC/1NO + 3NC				Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. ⊖ The terminals 42-11, 52-21, 34-33, and 62-61 can be used as unlike poles.
D4SL- □QD□-D□□	3NC + 2NC/1NO				Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. ⊖ The terminals 42-11, 52-21, 32-31, and 64-63 can be used as unlike poles.
D4SL- □RD□-D□□	3NC + 3NC				Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. ⊖ The terminals 42-11, 52-21, 32-31, and 62-61 can be used as unlike poles.

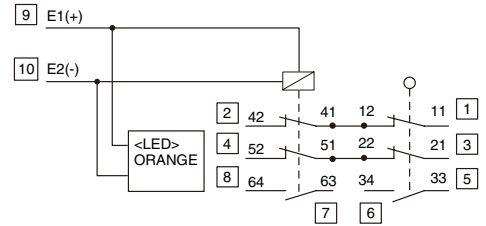
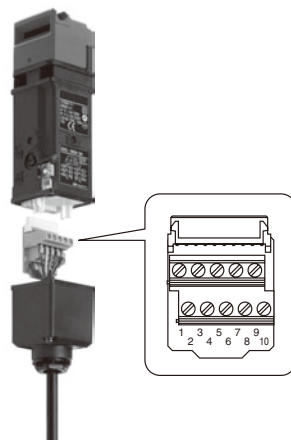
# D4SL

## Structure

D4SL-□□D□-D4N Connector Model

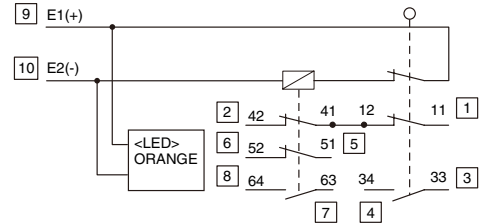


D4SL-□□D□-D4 Terminal Block Model D4SL-□NDA and D4SL-□NDG



**Note:** Numbers inside the boxes indicate terminal numbers printed on the product.

D4SL-□JDG



**Note:** Numbers inside the boxes indicate terminal numbers printed on the product.

## Operating Cycle Examples for Standard Models

D4SL-□□DA-D4□ (Mechanical Lock Models with Special Release Keys)

Door condition		Condition 1	Condition 2	Condition 3	Turning the special release key
		Door open. The door will lock when the door closes.	Door closed. The door is locked.	Door closed. The door can be opened.	Door closed. No power is supplied to the solenoid. The door is unlocked manually.
<b>Terminal No. and function</b>					
E1-E2	Solenoid ON				
42-11 (NC) 52-21 (NC)	Door open/closed detection and lock monitor contacts				
31-32 (NC)	Door open/closed detection contact				
33-34 (NO)	Door open/closed detection contact				
51-52 (NC) 61-62 (NC)	Lock monitor contact				
63-64 (NO)	Lock monitor contact				

Return to condition 1

D4SL-□□DG-D4□ (Solenoid Lock Models with Special Release Keys)

Door condition		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.
<b>Terminal No. and function</b>				
E1-E2	Solenoid ON			
42-11 (NC) 52-21 (NC)	Door open/closed detection and lock monitor contacts			
31-32 (NC)	Door open/closed detection contact			
33-34 (NO)	Door open/closed detection contact			
51-52 (NC) 61-62 (NC)	Lock monitor contact			
63-64 (NO)	Lock monitor contact			

The shaded areas indicate the contact is closed and power is supplied to the 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.

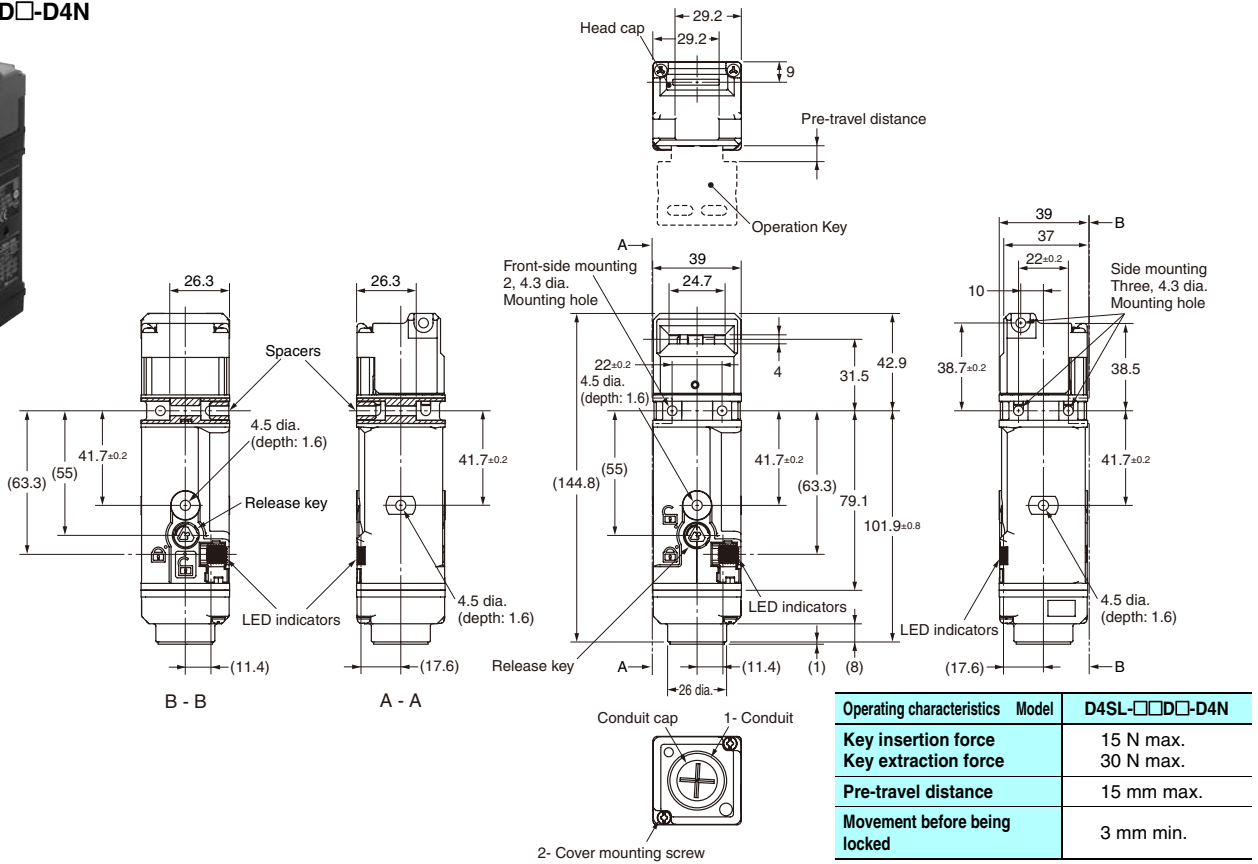
2. If a current is detected in the solenoid lock model (built-in switches; N,P,Q,R), before the door is closed, the door will remain unlocked. Be sure to supply power to the solenoid after the door is closed.

Dimensions and Operating Characteristics

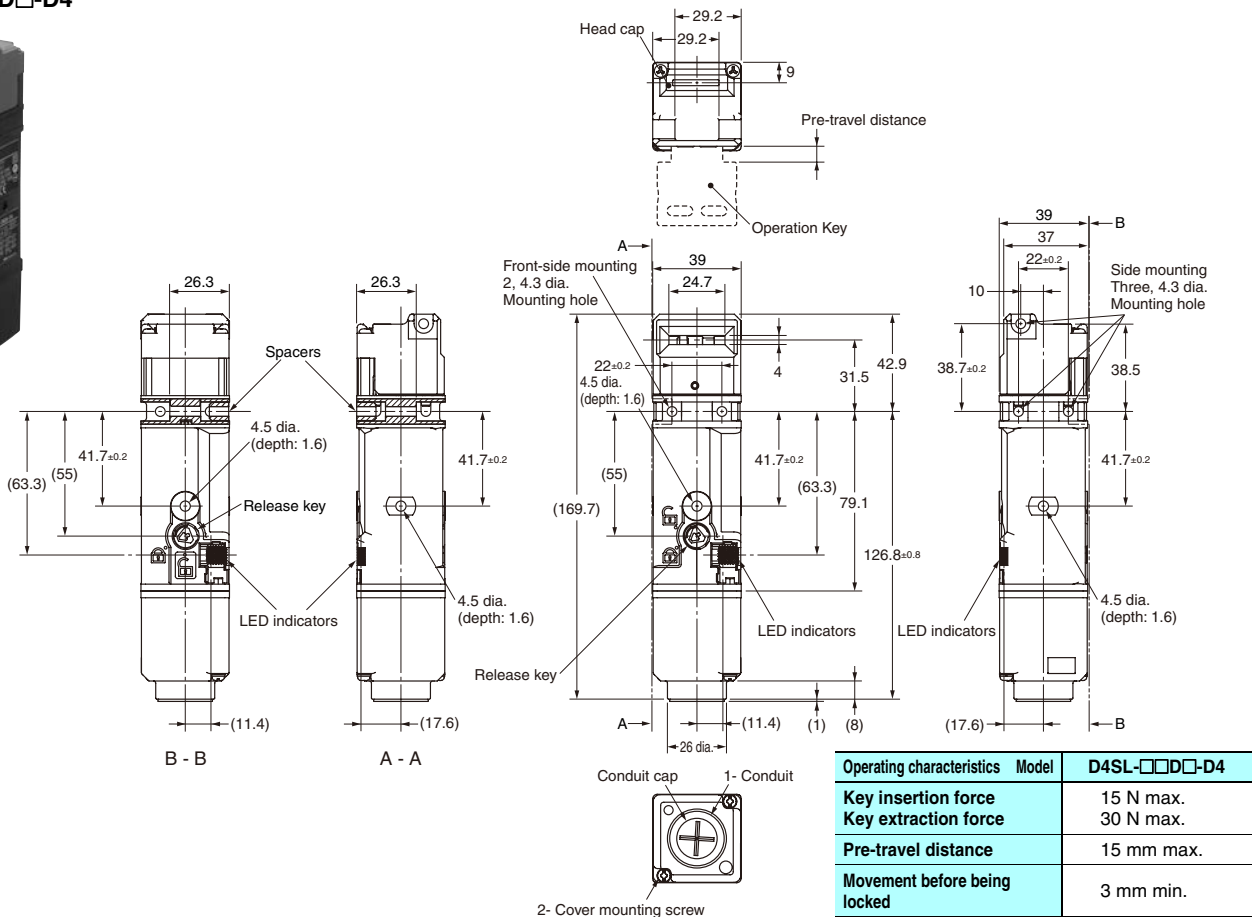
(unit: mm)

Switches

D4SL-□□D□-D4N



D4SL-□□D□-D4

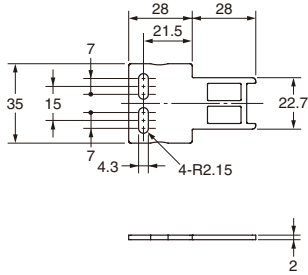


Note: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

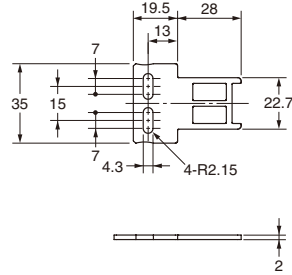
# D4SL

## Operation Key

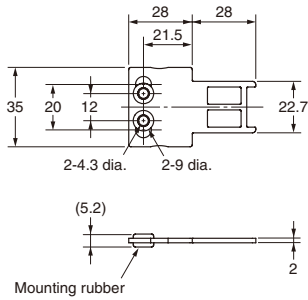
### D4SL-K1



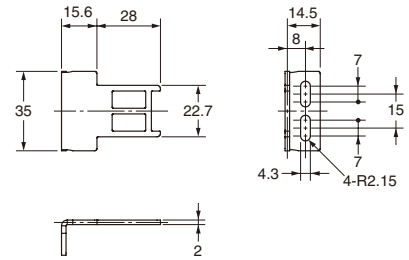
### D4SL-K1S



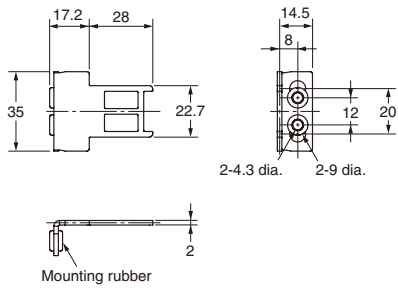
### D4SL-K1G



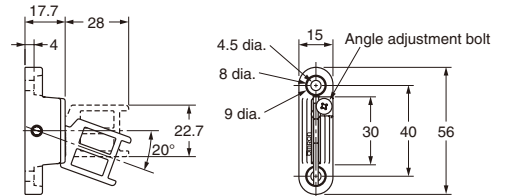
### D4SL-K2



### D4SL-K2G



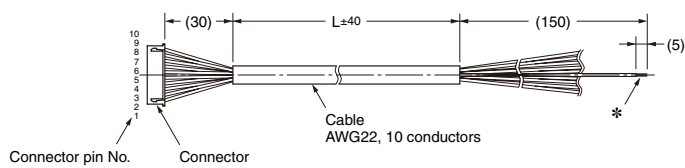
### D4SL-K3



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

Connector Cable

D4SL-CN□

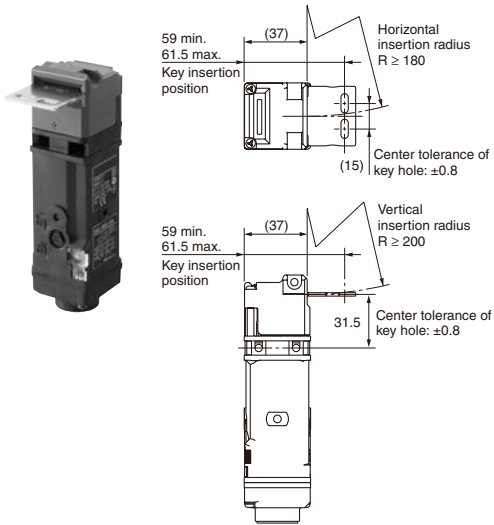


Model	L size
D4SL-CN1	1m
D4SL-CN3	3m
D4SL-CN5	5m

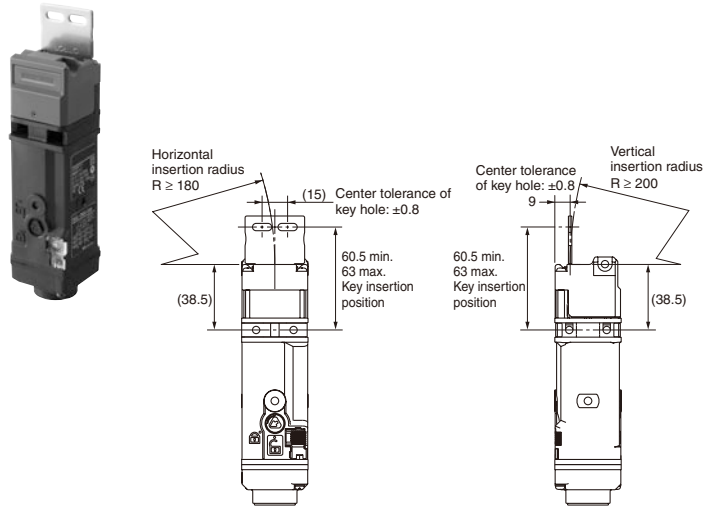
Connector No.	Lead wire color	Connector No.	Lead wire color
1	Black	6	Green/White
2	Black/White	7	Yellow
3	Red	8	Yellow/White
4	Red/White	9	Brown
5	Green	10	Brown/White

## Operation Key Mounting

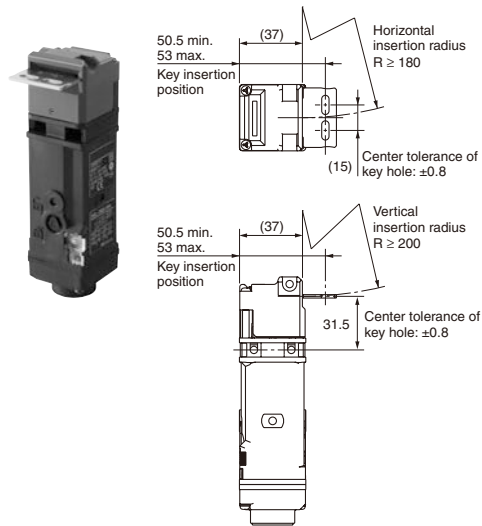
**D4SL + D4SL-K1**  
(with Front-inserted Operation Key)



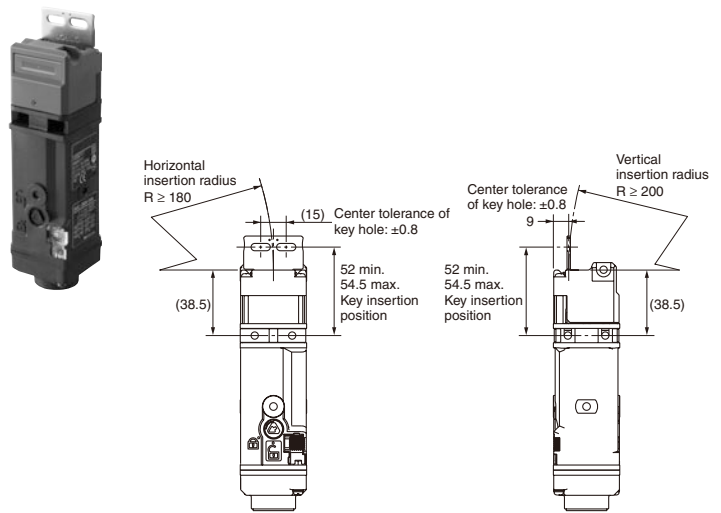
**D4SL + D4SL-K1**  
(with Top-inserted Operation Key)



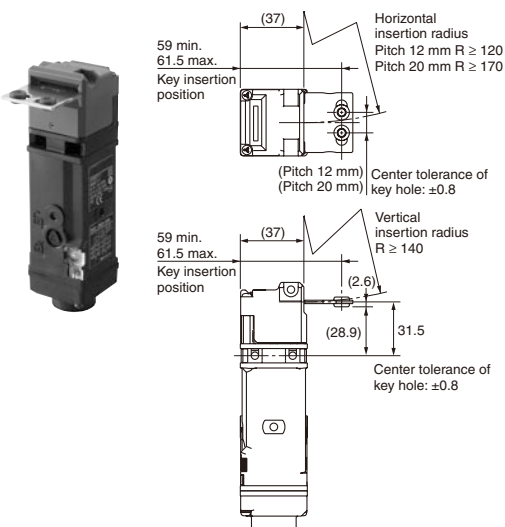
**D4SL + D4SL-K1S**  
(with Front-inserted Operation Key)



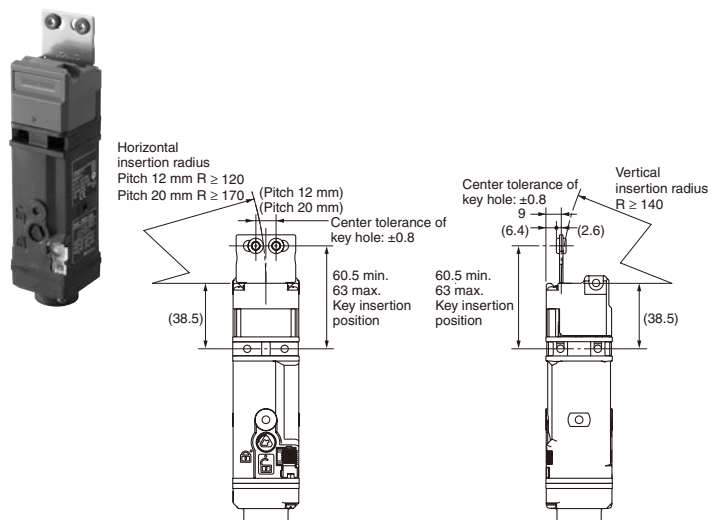
**D4SL + D4SL-K1S**  
(with Top-inserted Operation Key)



**D4SL + D4SL-K1G**  
(with Front-inserted Operation Key)

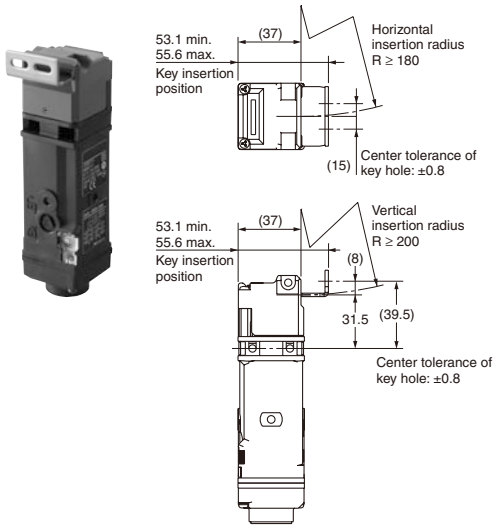


**D4SL + D4SL-K1G**  
(with Top-inserted Operation Key)

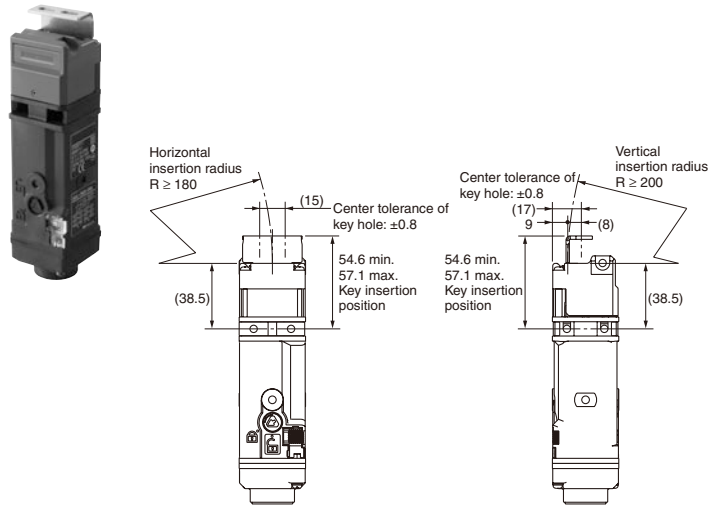




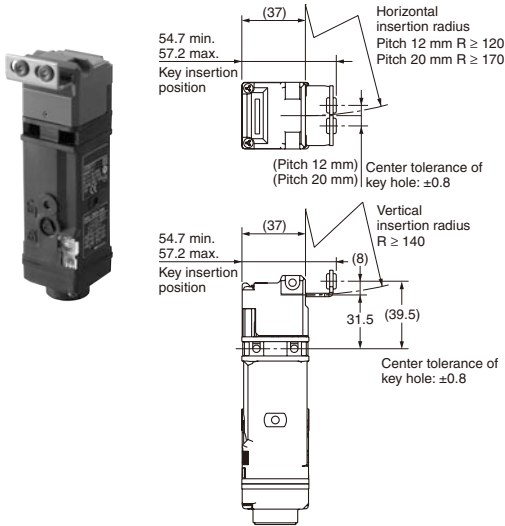
**D4SL + D4SL-K2  
(with Front-inserted Operation Key)**



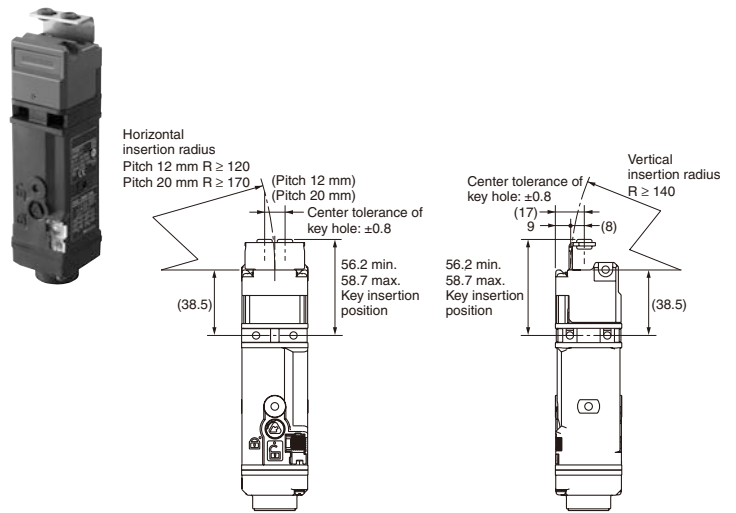
**D4SL + D4SL-K2  
(with Top-inserted Operation Key)**



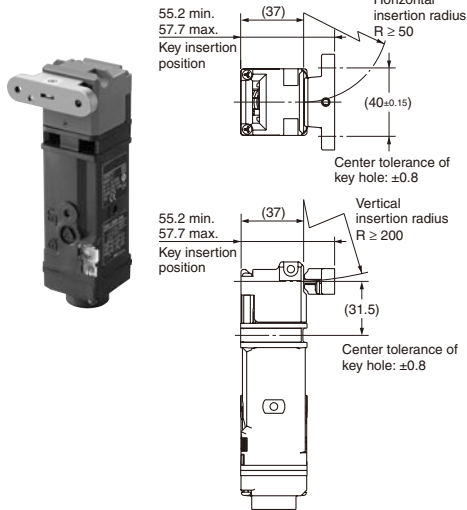
**D4SL + D4SL-K2G  
(with Front-inserted Operation Key)**



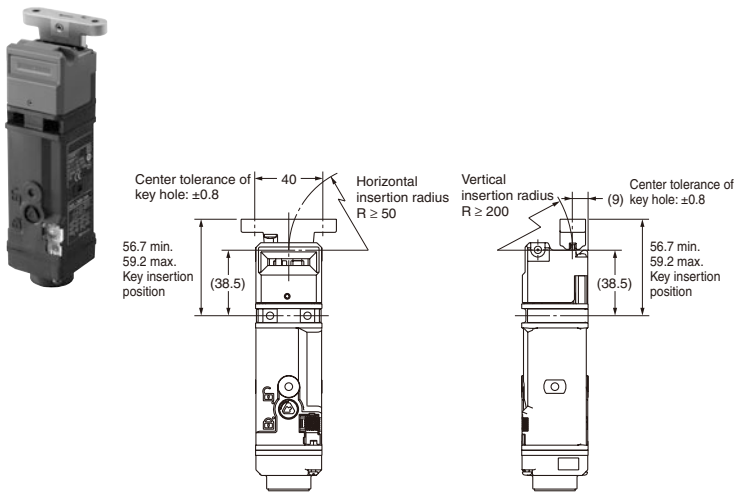
**D4SL + D4SL-K2G  
(with Top-inserted Operation Key)**



**D4SL + D4SL-K3  
(with Front-inserted Operation Key)**



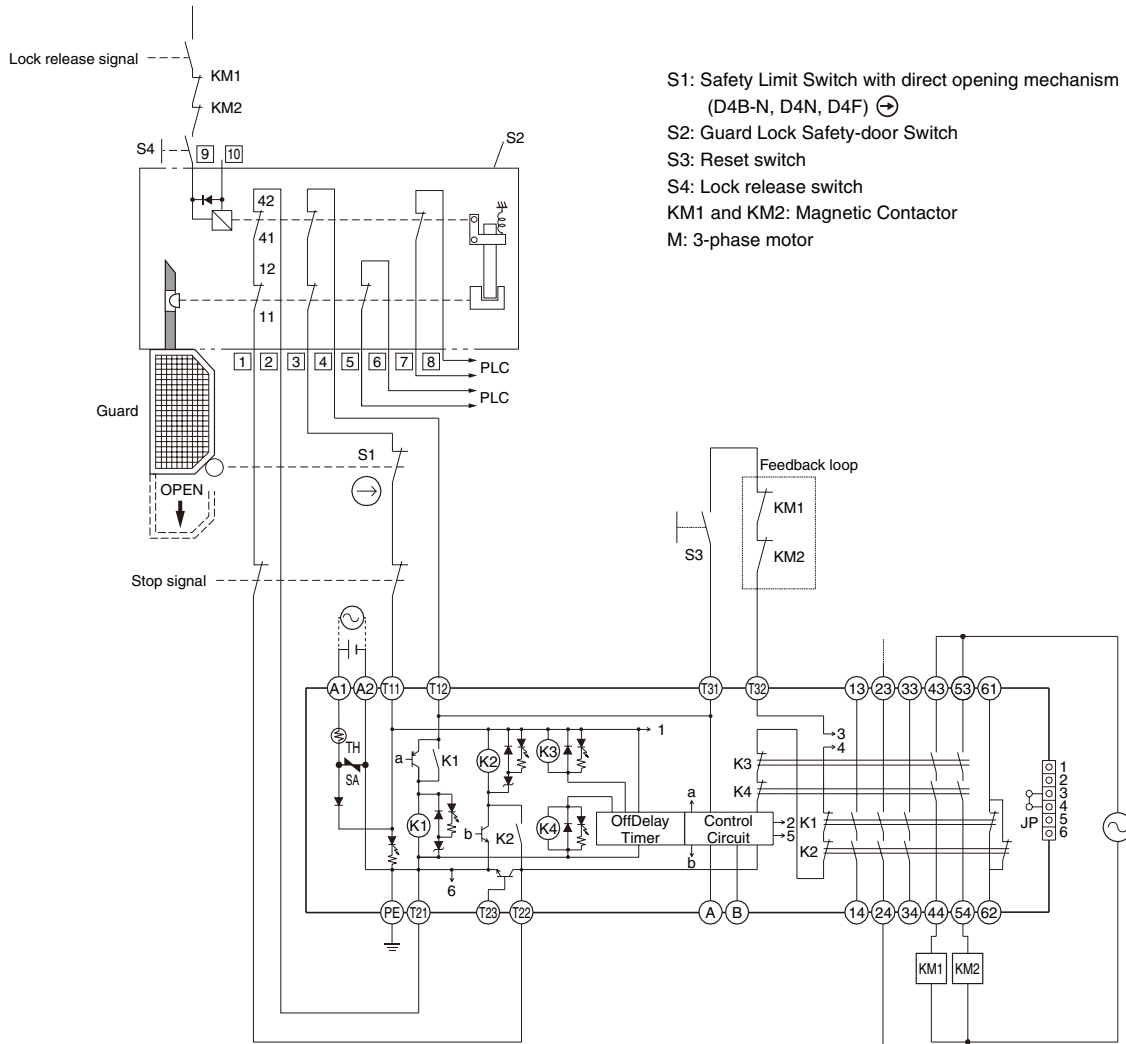
**D4SL + D4SL-K3  
(with Top-inserted Operation Key)**



# D4SL

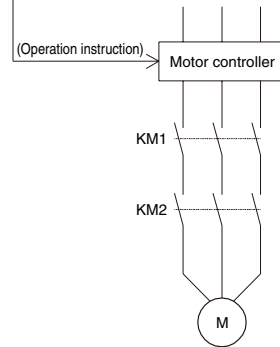
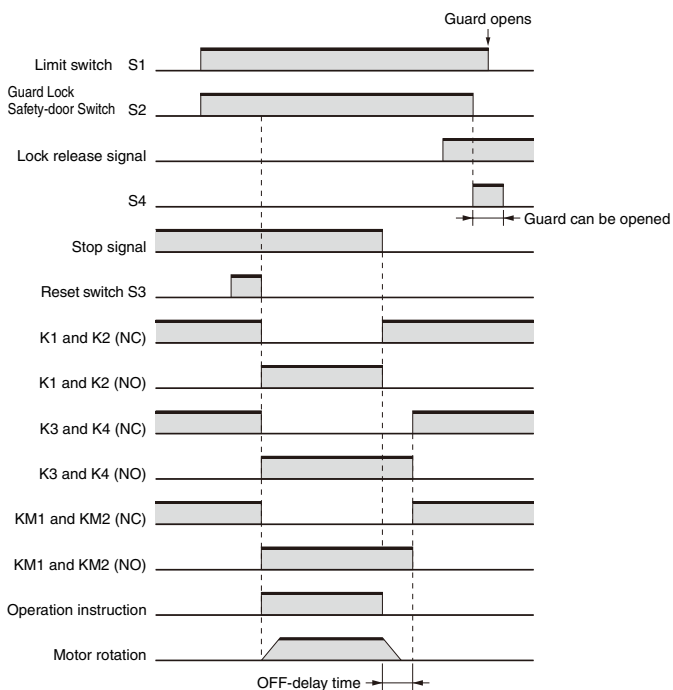
## Application Examples

### G9SA-321-T□ (24 VAC/VDC) + D4SL-□□DA-D4□ (Mechanical Lock Type) Circuit Diagram (Manual Reset)



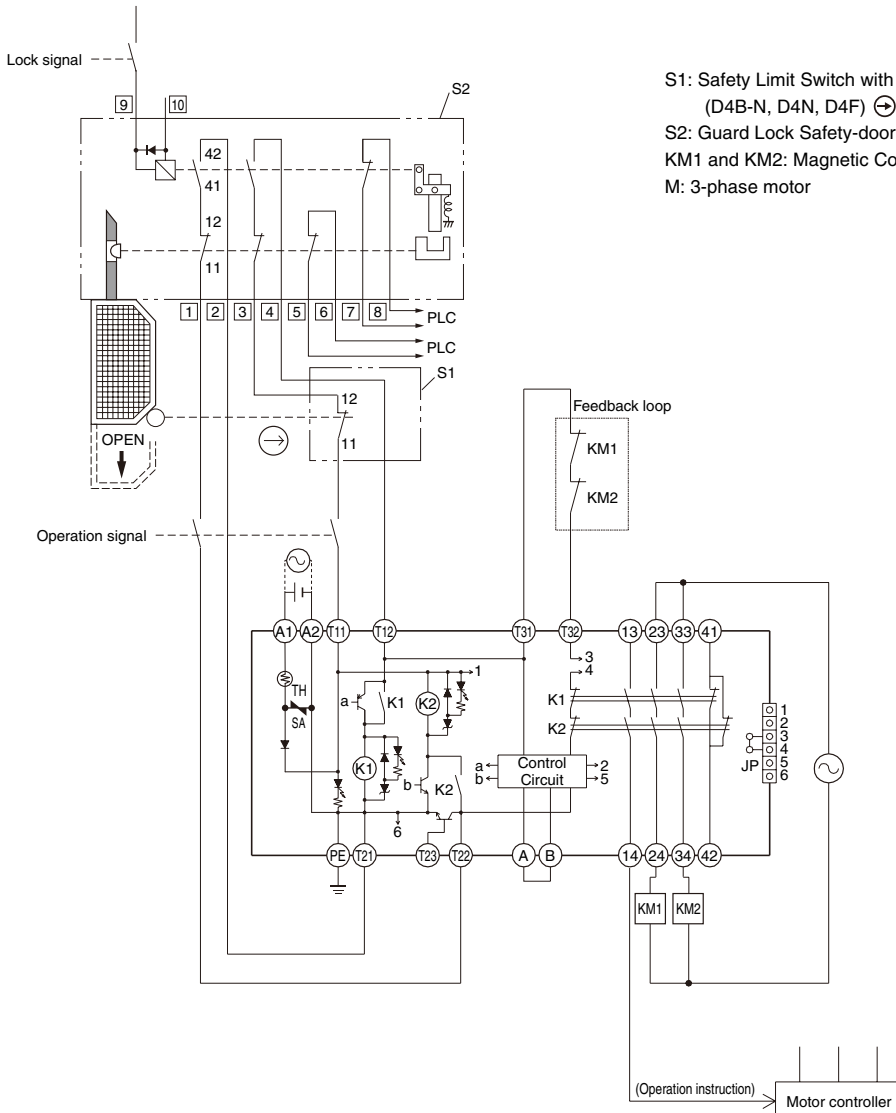
- S1: Safety Limit Switch with direct opening mechanism (D4B-N, D4N, D4F) ⊕
- S2: Guard Lock Safety-door Switch
- S3: Reset switch
- S4: Lock release switch
- KM1 and KM2: Magnetic Contactor
- M: 3-phase motor

### Timing Chart



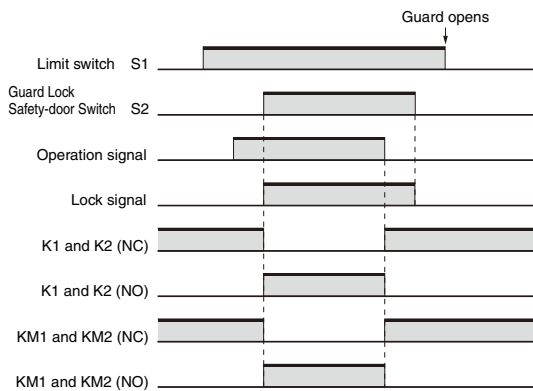
- Note: 1.** The above circuit diagram is for Category 3.
- Note: 2.** Numbers inside the boxes are terminal numbers printed on the product.

G9SA-301 (24 VAC/VDC) + D4SL-□□DG-D4□ (Solenoid Lock Type) Circuit Diagram (Auto-reset)



S1: Safety Limit Switch with direct opening mechanism (D4B-N, D4N, D4F) ⊕  
 S2: Guard Lock Safety-door Switch  
 KM1 and KM2: Magnetic Contactor  
 M: 3-phase motor

Timing Chart




- Note:**
1. This circuit diagram is for Category 4.
  2. The lock can be released at any time. Therefore, do not use a model with a solenoid lock in applications where the operator may be exposed to danger when the guard opens. Use a model with a mechanical lock.
  3. Numbers inside the boxes are terminal numbers printed on the product.

# D4SL


## Safety Precautions

Refer to the “Precautions for All Switches” and “Precautions for All Safety Door Switches”.

### 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

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. 

## Precautions for Safe Use

### Operating Environment

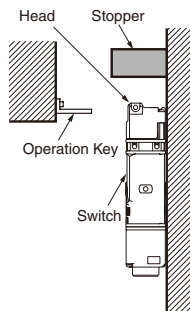
Do not use the Switch submerged in oil or water or in locations continuously subject to splashes of oil or water. Doing so may result in oil or water entering the Switch. (The IP67 degree of protection of the Switch specifies the amount of water penetration after the Switch is submerged in water for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

### Wiring

- Do not switch circuits for three or more standard loads (125 VAC, 1 A). Doing so may adversely affect insulation performance.
- Do not allow the load current to exceed the rated value.
- For metal connector, use a connector with the screw length of 9 mm or less. Otherwise it may result in electric shock.
- Do not use metallic conduits. In the event of damage to the conduit opening, this may cause seal failure and may result in electric shock.
- Do not use a metal connector for a 1/2-14NPT connector. 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/s<sup>2</sup>.



## Precautions for Correct Use

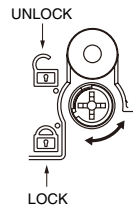
### Solenoid Lock Models

- If a current is detected in the solenoid lock model (built-in switches; N,P,Q,R), before the door is closed, the door will remain unlocked. Be sure to supply power to the solenoid after the door is closed (after the Operation Key is inserted).
- 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.

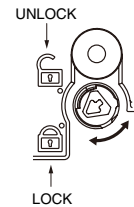
### Release Key

- 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).

D4SL-□□□□-□



D4SL-□□□□-□4



- 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-□□□□A and to the lock position for the D4SL-□□□□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

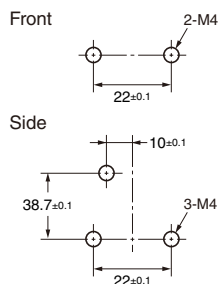
Loose screws may result in malfunction. Tighten the screws to the specified torques.

<b>Cover mounting screw</b>	0.4 to 0.5 N·m
<b>Operation Key mounting screw</b>	2.4 to 2.8 N·m (D4SL-K□, -K□S) 0.75 to 1.15 N·m (D4SL-K□G)
<b>Switch mounting screw</b>	0.75 to 1.15 N·m
<b>Connector</b>	1.8 to 2.2 N·m (except 1/2-14NPT) 1.4 to 1.8 N·m (for 1/2-14NPT)
<b>Terminal screw</b> * Terminal block type only.	0.5 to 0.6 N·m (D4SL-□□□□-□□)

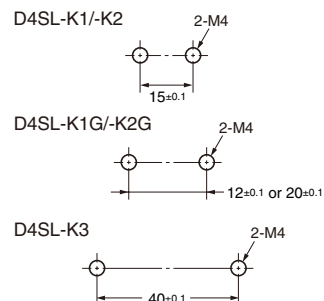
### Switch and Operation Key Mounting

- Mount the Switch and Operation Key securely to the applicable tightening torque with M4 screws. Always use washers.

#### Switch mounting



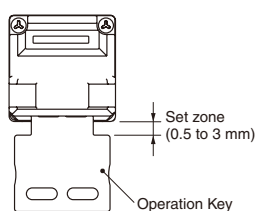
#### Operation Key mounting



- Ensure that the alignment offset between the Operation Key and the key hole does not exceed  $\pm 0.8$  mm. If the Operation Key is offset or at an angle, accelerated wear or damage to the Switch may result.
- Observe the specified insertion radius for the Operation Key and insert it in a direction perpendicular to the key hole.
- Mount a provided cap head to an unused Operation Key hole.
- Perform 3-point mounting including the head for side mounting.

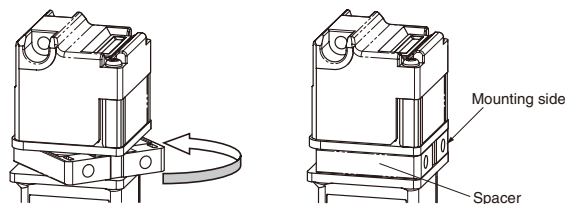
### Securing the Door

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.



### 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.

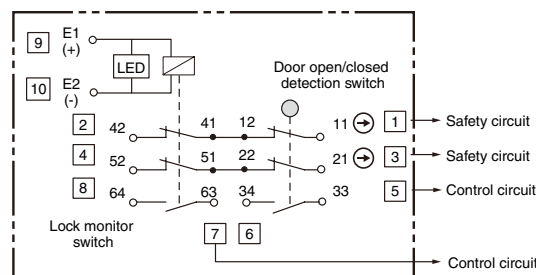


## Wiring

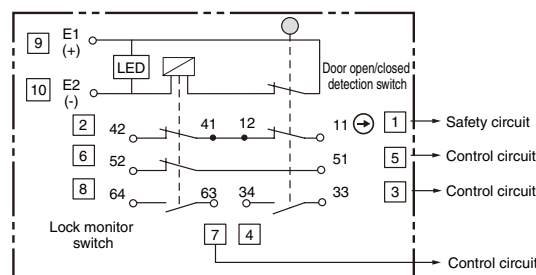
### Circuit Connection Example

- Direct opening contacts used as safety-circuit inputs are indicated with the  $\rightarrow$  mark. Terminals 11-42, and terminals 21-52 have direct opening contacts.
- 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.

(D4SL-□NDA, D4SL-□NDG)

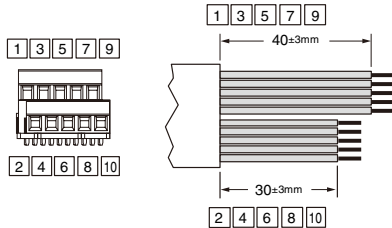


(D4SL-□JDG)



## Wiring Precautions for D4SL-□□□□-□□

- 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 mm<sup>2</sup>).
- 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

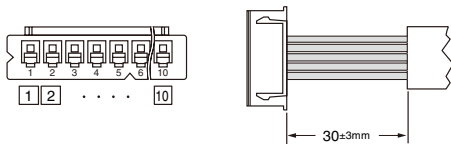
Manufacturer	Model	Applicable wire lead
PHOENIX CONTACT	AI0.34-8 TQ	AWG22
	AI0.5-8 WH	AWG20
	AI0.75-8 GY	AWG18

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



## 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.
- Applicable lead wire size: AWG24 to AWG22 (0.2 to 0.3 mm<sup>2</sup>). 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's conduit opening. Doing so may cause cable break.

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

## Applicable socket for cable side

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

## Processing the Conduit Opening

- Connect a recommended connector to the opening of the conduit and tighten the connector to the proper torque. The case may be damaged if excessive tightening torque is applied.
- Use the cable with the connector-specified outside diameter.
- For the 1/2-14NPT conduit, mount a provided conversion adapter to use the connector above.

## Recommended Connectors

- Use a connector with a screw section not exceeding 9 mm. Otherwise the screws will protrude into the case interior. The connectors given in the following table have connectors with screw sections not exceeding 9 mm.
- Use the following connectors to ensure conformance to IP67.

Size	Manufacturer	Model	Applicable cable diameter	Remarks
G1/2	LAPP	ST-PF1/2 5380-1002	6.0 to 12.0 mm	
	Ace Service Co.	LS-2G	6.0 to 11.0 mm	Short type
M20	LAPP	ST-M20X1.5 5311-1020	7.0 to 13.0 mm	
1/2-14NPT	LAPP	ST-NPT1/2 5301-6030	6.0 to 12.0 mm	

Use LAPP connectors together with Seal Packing (JPK-16 for G1/2, or GPM20 for M20), and tighten to the applicable torque. Seal Packing is sold separately.

- LAPP is a German manufacturer.
- Ace Service Co. is a Japanese manufacturer.



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