

# Safety Interlock Switches

# D4SL-N



Rev. 11.12b

## 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 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 Guard Lock Safety-door Switch can be easily mounted on 40 x 40 mm aluminum frames.
- The plastic material makes the Slide Key suitable for lightweight doors.



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## Specifications

### Standards and EC Directives

#### Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EMC Directive
- EN 1088
- EN 60204-1
- GS-ET-19

#### Certified Standards

| Certification body | Standard                                   | File No.                                 |
|--------------------|--------------------------------------------|------------------------------------------|
| TÜV SÜD            | EN 60947-5-1<br>(certified direct opening) | Consult your representative for details. |
| UL *1              | UL 508, CSA C22.2 No.14                    | E76675                                   |
| CQC (CCC)          | GB14048.5                                  | pending                                  |
| KOSHA *2           | EN60947-5-1                                |                                          |

\*1.Certification has been obtained for UL CSA C22.2 No. 14.

### Certified Standard Ratings

#### TÜV (EN 60947-5-1)

| Utilization category         | AC-15              | DC-13  |
|------------------------------|--------------------|--------|
| Rated operating current (Ie) | 1.5 A *1<br>1 A *2 | 0.22 A |
| Rated operating voltage (Ue) | 120 V              | 125 V  |

Note: Use a 4 A fuse that conforms to IEC 60127 as a short-circuit protection device. This fuse is not included with the switch.

\*1. 11-42, 21-42, 21-22

\*2. Other terminals

### UL/CSA (UL 508, CSA C22.2 No. 14) C150

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

### R150

| Rated voltage | Carry current | Current (A) |       | Volt-amperes (VA) |       |
|---------------|---------------|-------------|-------|-------------------|-------|
|               |               | 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 <sup>+10%</sup> <sub>-15%</sub>                                                                                                                      |
| Current consumption*              | Power ON:<br>6-contact type Approx. 6.4 W at 0.26 A<br>4-contact/5-contact type Approx. 4.8 W at 0.2 A<br>Constant: Approx. 2.6 W (average) at 0.2 A (max.) |
| Insulation Class                  | Class E (120°C max.)                                                                                                                                        |

\*A starting current is applied to the solenoid for for approx. 10 seconds. After this, the internal circuit switches to constant current.

### Indicator

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

## Specifications (continued)

### Characteristics

|                                             |                                                                  |                                                               |
|---------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------|
| Degree of protection *1                     |                                                                  | IP67 (EN60947-5-1)                                            |
| Durability *2                               | Mechanical                                                       | 1,000,000 operations min.                                     |
|                                             | Electrical                                                       | 150,000 operations min.<br>(1 A resistive load at 125 VAC) *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<br>(N-level reference value)     |
| Rated insulation voltage (Ui)               |                                                                  | 150 V (EN60947-5-1)                                           |
| Rated frequency                             |                                                                  | 50/60 Hz                                                      |
| Protection against electric shock           |                                                                  | Class II (double insulation)                                  |
| Pollution degree<br>(operating environment) |                                                                  | 3 (EN60947-5-1)                                               |
| Impulse withstand voltage<br>(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 MΩ min. (at 500 VDC)                                      |
| Vibration resistance                        | Malfun                                                           | 10 to 55 Hz,<br>0.35 mm single amplitude                      |
|                                             | Malfunction                                                      | 80 m/s <sup>2</sup> min.                                      |
| Shock resistance                            | Malfunction                                                      | 1,000 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 (11-42, 21-52, 21-22)<br>1A (Others)                    |
| Ambient operating temperature               |                                                                  | -10 to +55°C (with no icing)                                  |
| Ambient operating 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)                             |                                                               |

Notes: 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.

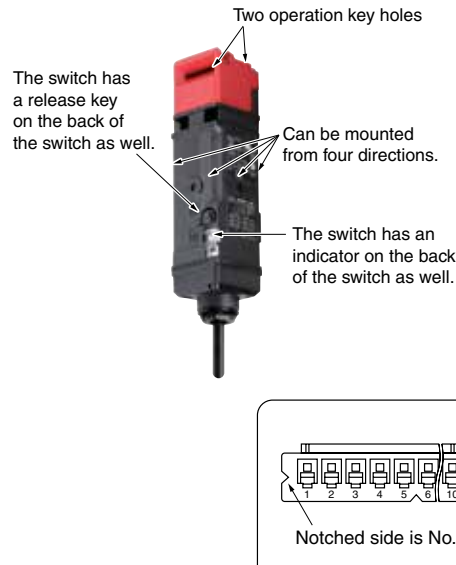
\*5 This figure is based on the GS-ET-19 evaluation method.

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

## Structure

### Structure

#### D4SL-N□□□□D-□N Connector Type



#### D4SL-N□□□□D-□ Terminal Block Type



## Terminal Arrangement

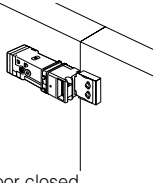
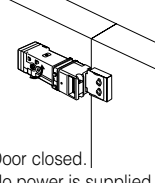
#### D4SL-N□N□□□D□



## Structure (continued)

### Operating Cycle Examples for Standard Models

#### D4SL-N□□□A-□ (Mechanical Lock Models)

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

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

|                                      |                                                                      |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      |                                                                      | Even when the door<br>is closed, it does<br>not lock until power<br>is supplied to the<br>solenoid. | Door closed.<br>The door is locked. | Door closed.<br>The door can be<br>opened. | <p>The shaded areas indicate the contact is closed and power is supplied to the solenoid.</p> <p>Door open/closed detection and lock monitor contacts:<br/>Can be used in safety circuits because of the direct opening mechanisms.</p> <p>Door open/closed detection contact:<br/>Can be used to confirm whether the key is inserted and to monitor the open/closed status of a door.</p> <p>Lock monitor contact:<br/>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.</p> |
| Terminal No. and<br>Contact No.      | Function                                                             |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [9]E1-[10]E2                         | Solenoid ON                                                          |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [2]42-[1]11 (NC)<br>[4]52-[3]21 (NC) | Door open/<br>closed<br>detection<br>and lock<br>monitor<br>contacts |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [3]21-[4]22 (NC)<br>[5]31-[6]32 (NC) | Door open/<br>closed<br>detection<br>contact                         |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [5]33-[6]34 (NO)                     | Door open/<br>closed<br>detection<br>contact                         |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [1]41-[2]42 (NC)<br>[7]61-[8]62 (NC) | Lock monitor<br>contact                                              |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [7]63-[8]64 (NO)                     | Lock monitor<br>contact                                              |                                                                                                     |                                     |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Notes: 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.

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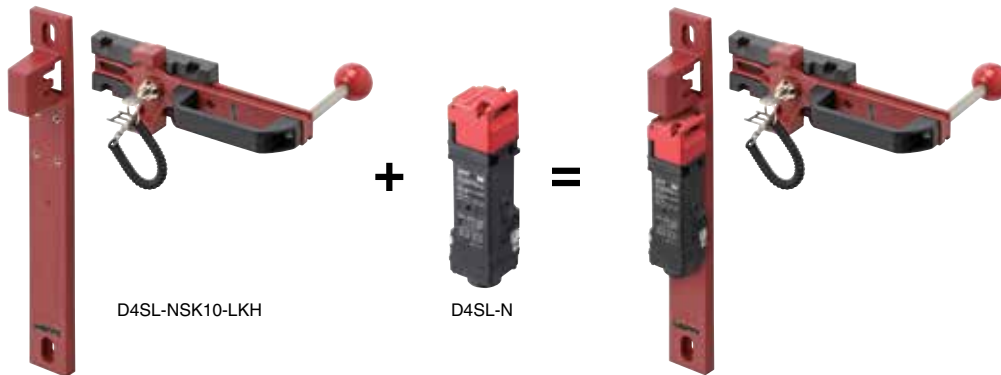
## Applicable Door Switches

### D4SL-NSK10-LK



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### D4SL-NSK10-LKH



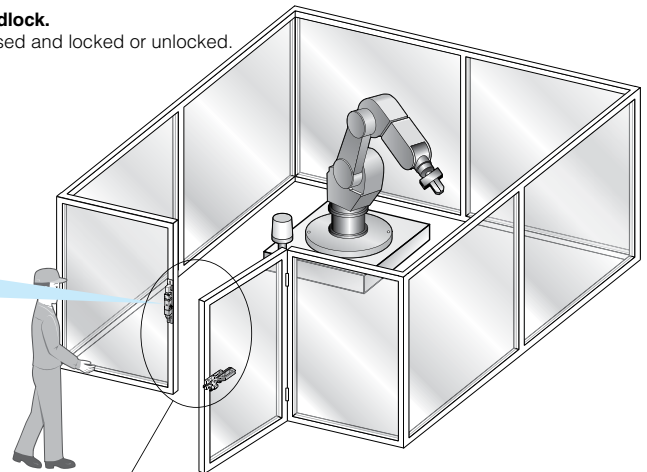
## Door Switch Features

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

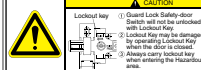
Note: Using LEDs of D4SL-N enables confirming whether the door is open or closed and locked or unlocked.

### Close door

Locked (power not supplied to solenoid) The slide handle is closed.



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



Attach the supplied caution labels for display.

### Close door

Unlocked (power supplied to solenoid) The slide handle is closed.



The slide handle can be pulled.

### Lockout Key



Do not turn the key as in the figure above if the slide handle is closed.

### Left door

Door Opening to the Left.



### Open door

The slide handle is open.



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

### Open door

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.

### Open door

The slide handle is open.

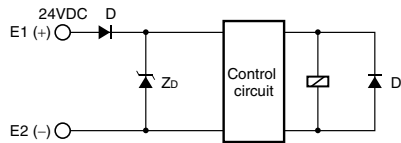


If the lockout key is not mounted, the slide handle will not move and the door will not close.

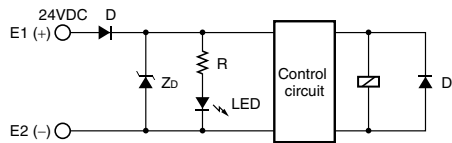
## Connections

### Internal Circuit Diagram

#### Without Indicator



#### With Indicator

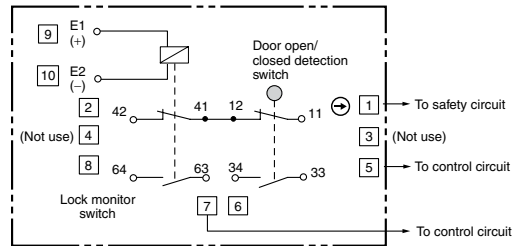


### Circuit Connection Example

- Direct opening contacts used as safety-circuit input are indicated with the 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.
- 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.

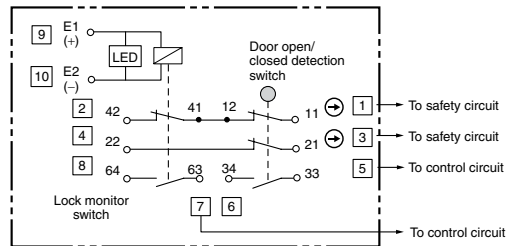
#### Connection Example for D4SL-N□AF□-□

Contacts 12 and 41 are internally connected.



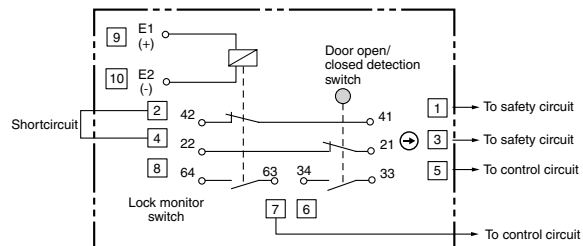
#### Connection Example for D4SL-N□EF□-D□

Contacts 12 and 41 are internally connected.



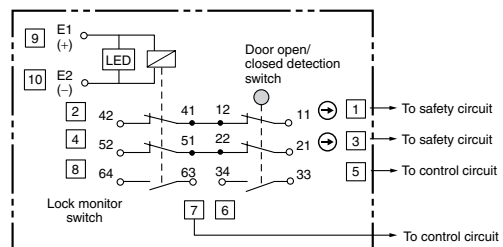
#### Connection Example for D4SL-N□SF□-□

There is no internal connection, so connect contacts 22 and 42 externally.



#### Connection Example for D4SL-N□NF□-D□

Contacts 12 and 41 and contacts 22 and 51 are internally connected.



## Connections (continued)

### Contact Form

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

| Model         | Contact<br>(door open/<br>closed detection<br>and lock monitor) | Contact form    |                                   | Operating pattern | Remarks                                                                                                                                                          |
|---------------|-----------------------------------------------------------------|-----------------|-----------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |                                                                 | Lock<br>monitor | Door open/<br>closed<br>detection |                   |                                                                                                                                                                  |
| D4SL-N□A□□□□□ | 1NC/1NO+<br>1NC/1NO                                             |                 |                                   |                   | Only NC contact 11-12 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 34-33, and 64-63 can be used as unlike poles.                    |
| D4SL-N□B□□□□□ | 1NC/1NO+2NC                                                     |                 |                                   |                   | Only NC contact 11-12 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 34-33, and 62-61 can be used as unlike poles.                    |
| D4SL-N□C□□□□□ | 2NC+1NC/1NO                                                     |                 |                                   |                   | Only NC contact 11-12 and 31-32 have a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 32-31, and 64-63 can be used as unlike poles.         |
| D4SL-N□D□□□□□ | 2NC+2NC                                                         |                 |                                   |                   | Only NC contact 11-12 and 31-32 have a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 32-31, and 62-61 can be used as unlike poles.         |
| D4SL-N□S□□□□□ | 1NC/1NO+<br>1NC/1NO                                             |                 |                                   |                   | Only NC contact 21-22 has a certified direct opening mechanism. (→)<br><br>The terminals 42-41, 22-21, 34-33, and 64-63 can be used as unlike poles.             |
| D4SL-N□T□□□□□ | 1NC/1NO+2NC                                                     |                 |                                   |                   | Only NC contact 21-22 has a certified direct opening mechanism. (→)<br><br>The terminals 42-41, 22-21, 34-33, and 62-61 can be used as unlike poles.             |
| D4SL-N□U□□□□□ | 2NC+1NC/1NO                                                     |                 |                                   |                   | Only NC contact 21-22, and 31-32 have a certified direct opening mechanism. (→)<br><br>The terminals 42-41, 22-21, 32-31, and 64-63 can be used as unlike poles. |
| D4SL-N□V□□□□□ | 2NC+2NC                                                         |                 |                                   |                   | Only NC contact 21-22, and 31-32 have a certified direct opening mechanism. (→)<br><br>The terminals 42-41, 22-21, 32-31, and 62-61 can be used as unlike poles. |

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## Connections (continued)

## Contact Form (continued)

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

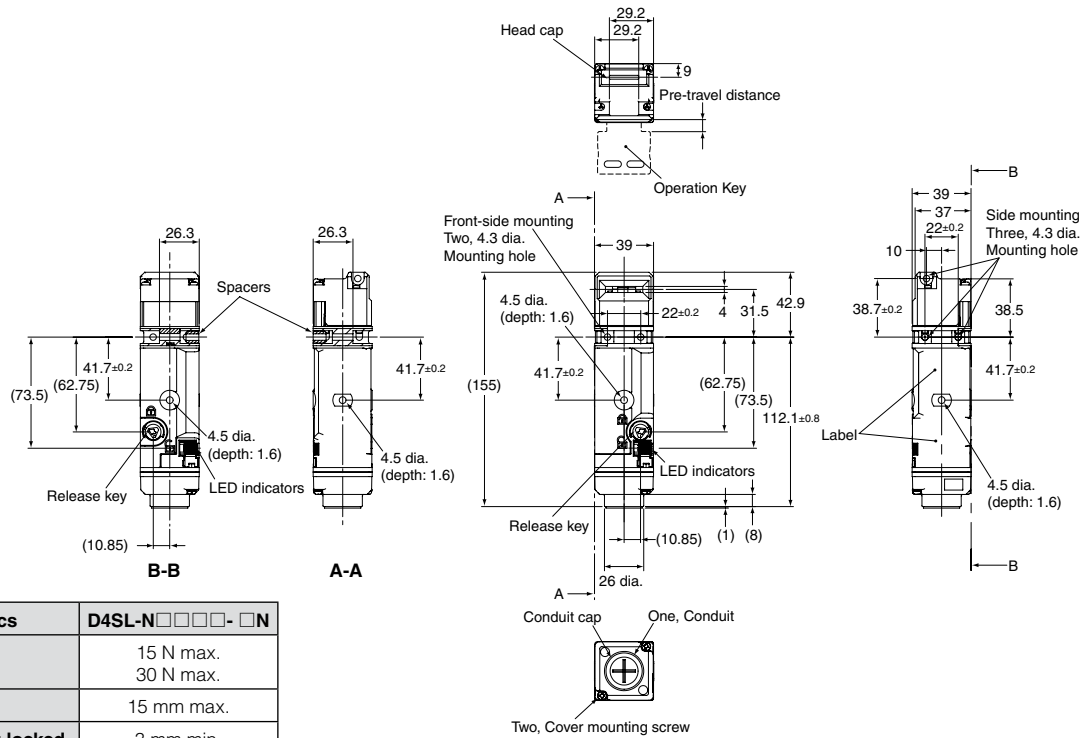
| Model        | Contact<br>(door open/<br>closed detection<br>and lock monitor) | Contact form    |                                   | Operating pattern | Remarks                                                                                                                                                                 |
|--------------|-----------------------------------------------------------------|-----------------|-----------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                                                                 | Lock<br>monitor | Door open/<br>closed<br>detection |                   |                                                                                                                                                                         |
| D4SL-N□E□□-□ | 2NC/1NO+<br>1NC/1NO                                             |                 |                                   |                   | Only NC contact 11-12 and 21-22 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 22-21, 34-33, and 64-63 can be used as unlike poles.          |
| D4SL-N□F□□-□ | 2NC/1NO+2NC                                                     |                 |                                   |                   | Only NC contact 11-12 and 21-22 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 22-21, 34-33, and 62-61 can be used as unlike poles.          |
| D4SL-N□G□□-□ | 3NC+1NC/1NO                                                     |                 |                                   |                   | Only NC contact 11-12, 21-22, and 31-32 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 22-21, 32-31, and 64-63 can be used as unlike poles.  |
| D4SL-N□H□□-□ | 3NC+2NC                                                         |                 |                                   |                   | Only NC contact 11-12, 21-22, and 31-32 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 22-21, 32-31, and 62-61 can be used as unlike poles.  |
| D4SL-N□N□□-□ | 2NC/1NO+<br>2NC/1NO                                             |                 |                                   |                   | Only NC contact 11-12 and 21-22 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 52-21, 34-33, and 62-61 can be used as unlike poles.          |
| D4SL-N□P□□-□ | 2NC/1NO+3NC                                                     |                 |                                   |                   | Only NC contact 11-12 and 21-22 has a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 52-21, 34-33, and 62-61 can be used as unlike poles.          |
| D4SL-N□Q□□-□ | 3NC+2NC/1NO                                                     |                 |                                   |                   | Only NC contact 11-21, 21-22, and 31-32 have a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 52-21, 32-31, and 64-63 can be used as unlike poles. |
| D4SL-N□R□□-□ | 3NC+3NC                                                         |                 |                                   |                   | Only NC contact 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→)<br><br>The terminals 42-11, 52-21, 32-31, and 62-61 can be used as unlike poles. |

## Dimensions and Operating Characteristics

(mm)

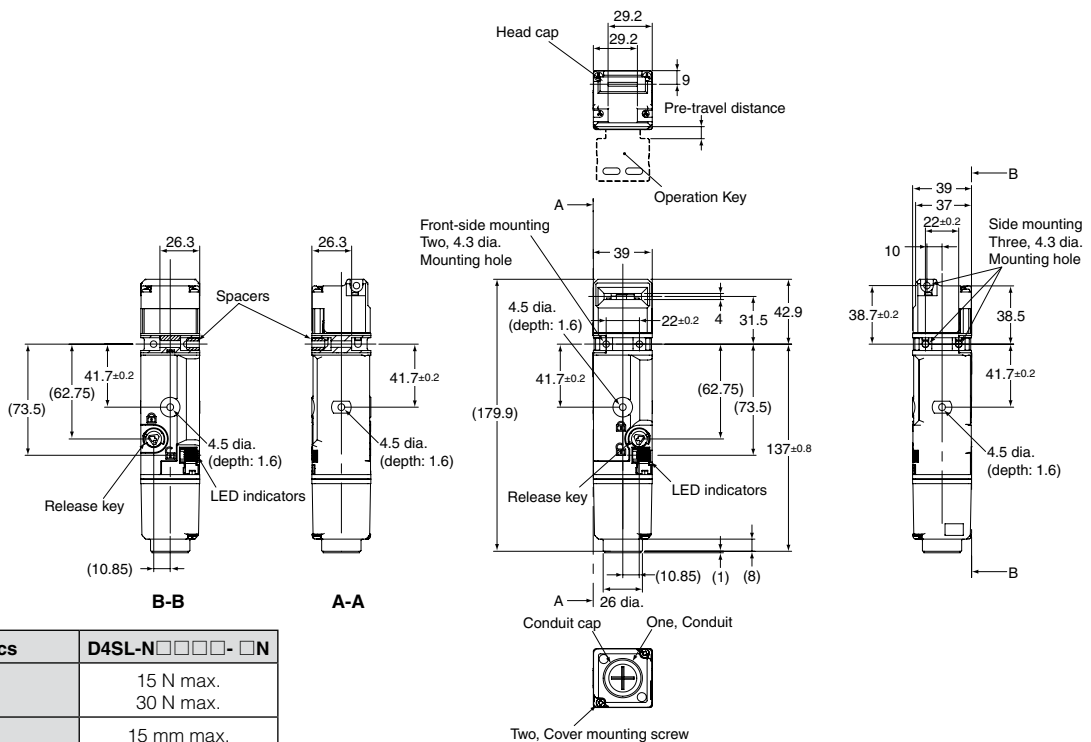
## Switches

## D4SL-N□□□□-□N (Connector Type)



| Operating characteristics    | D4SL-N□□□□-□N |
|------------------------------|---------------|
| Key insertion force          | 15 N max.     |
| Key extraction force         | 30 N max.     |
| Pre-travel distance          | 15 mm max.    |
| Movement before being locked | 3 mm min.     |

## D4SL-N□□□□-□ (Terminal Block Type)



| Operating characteristics    | D4SL-N□□□□-□N |
|------------------------------|---------------|
| Key insertion force          | 15 N max.     |
| Key extraction force         | 30 N max.     |
| Pre-travel distance          | 15 mm max.    |
| Movement before being locked | 3 mm min.     |

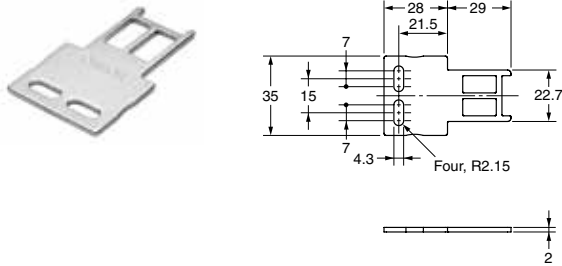
Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

## Dimensions and Operating Characteristics (continued)

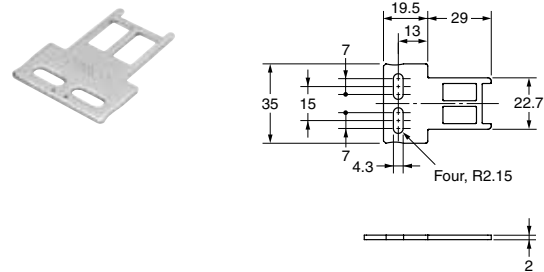
(mm)

## Operation Keys

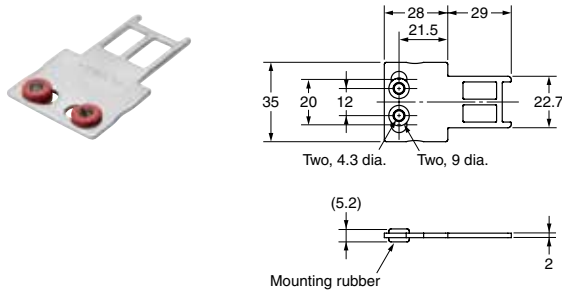
D4SL-NK1



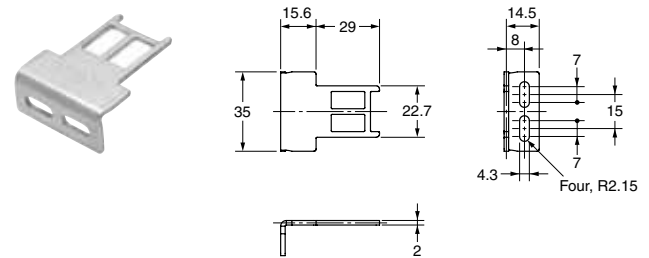
D4SL-NK1S



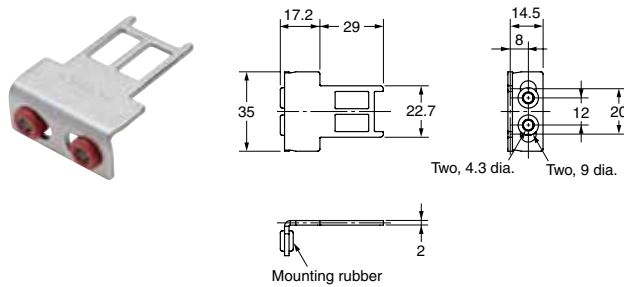
D4SL-NK1G



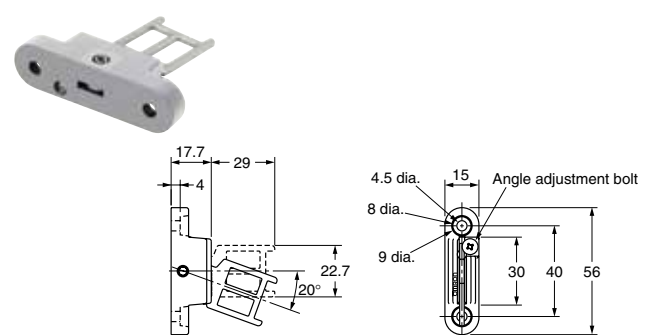
D4SL-NK2



D4SL-NK2G

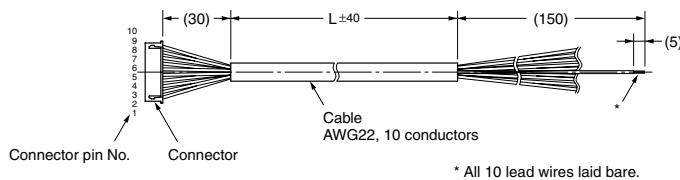


D4SL-NK3



## Connector Cable

D4SL-CN□



\* All 10 lead wires laid bare.

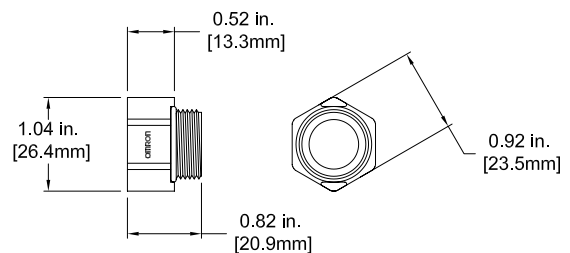
| Model    | L size |
|----------|--------|
| D4SL-CN1 | 1 m    |
| D4SL-CN3 | 3 m    |
| D4SL-CN5 | 5 m    |

| Connector No. | Lead wire color |
|---------------|-----------------|
| 1             | Black           |
| 2             | Black/White     |
| 3             | Red             |
| 4             | Red/White       |
| 6             | Green           |

| Connector No. | Lead wire color |
|---------------|-----------------|
| 6             | Green/White     |
| 7             | Yellow          |
| 8             | Yellow/White    |
| 9             | Brown           |
| 10            | Brown White     |

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

## M20-NPT Adapter



(mm)

# Dimensions and Operating Characteristics

## Slide Key

### D4SL-NSK10-LK



### D4SL-NSK10-LKH



## Dimensions and Operating Characteristics (continued)

(mm)

## Operating Key Mounting

## D4SL-N+D4SL-NK1

## With Front-inserted Operation Key

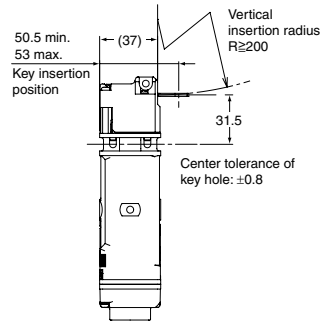
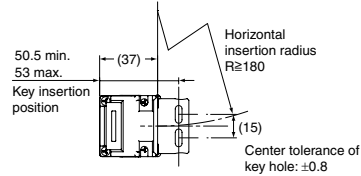


## With Top-Inserted Operation Key



## D4SL-N+D4SL-NK1S

## With Front-inserted Operation Key

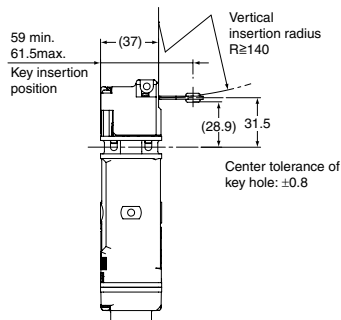


## With Top-Inserted Operation Key

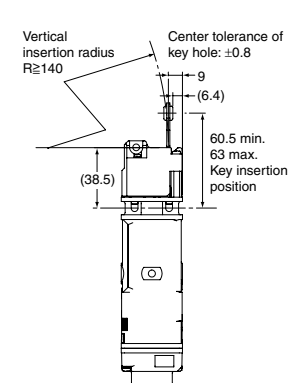


## D4SL-N+D4SL-NK1G

## With Front-inserted Operation Key



## With Top-Inserted Operation Key



## Dimensions and Operating Characteristics (continued)

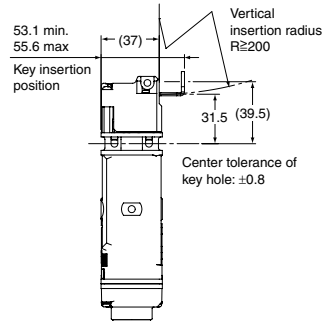
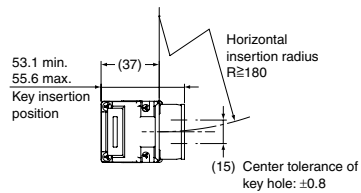
(mm)

## Operating Key Mounting (continued)

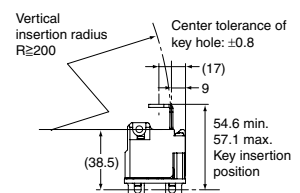
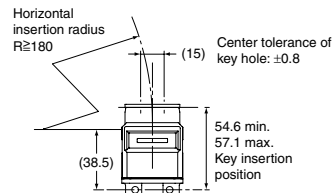
## D4SL-N+D4SL-NK2



## With Front-inserted Operation Key



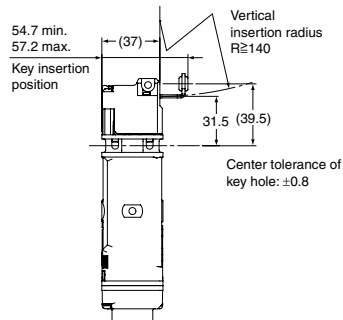
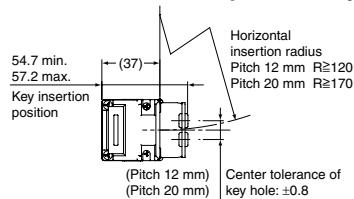
## With Top-Inserted Operation Key



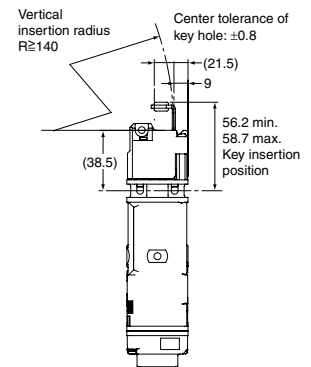
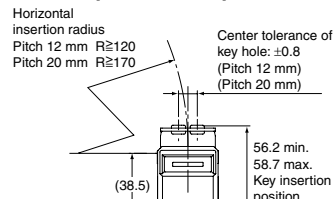
## D4SL-N+D4SL-NK2G



## With Front-inserted Operation Key



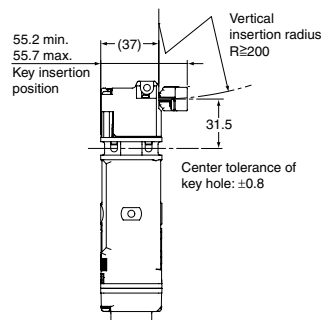
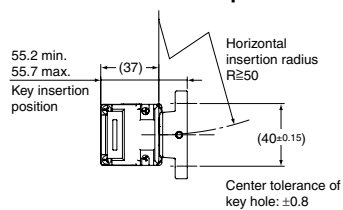
## With Top-Inserted Operation Key



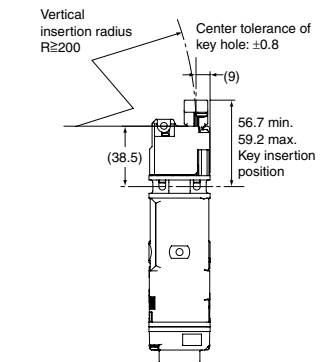
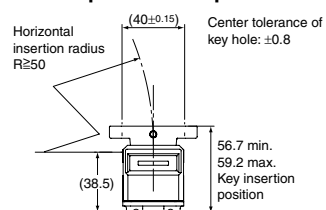
## D4SL-N+D4SL-NK3



## With Front-inserted Operation Key



## With Top-Inserted Operation Key



## Application Examples

### D4SL-N Application Example

| PL/Safety Category  | Applied models                                                                                                               | Stop category | Reset method |
|---------------------|------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|
| Equivalent to PLe/4 | D4SL-N□□□A-□ Compact<br>Safety Door Switch with Magnetic Lock (mechanical lock)<br>G9SA-301 (24 VAC/DC)<br>Safety Relay Unit | 0             | Manual       |

### Application Overview

- If the guard is opened, it is detected with S2 and the power supply to the motor (M) is shut OFF.
- When the guard is closed, the lock status can be detected and the power supply to the motor (M) remains shut OFF until limit switch S3 is pressed.

S1: Safety Limit Switch with direct opening mechanism

(D4B-N, D4N, D4F) (→)

S2: D4SL-N

S3: Reset switch

S4: Lock release switch

KM1 and KM2: Magnetic Contactor

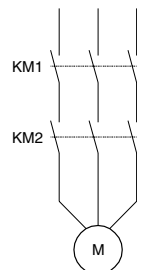
M: 3-phase motor



### Timing Chart



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



## Ordering

### Model Number Structure

#### Switch

D4SL - N ☐ ☐ ☐ ☐ - ☐ ☐ ☐ ☐

**1 2 3 4 5 6 7**

- 1** Conduit Size
  - 2: G1/2 (conduit)
  - 3: 1/2-14 NPT (M20, includes M20-to-1/2-14NPT conversion adapter)
  - 4: M20
- 2** Built-in Switch
 

*4-contact Model: Door monitor and lock monitors 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 monitors 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
- 3** Head Material
 

*4-contact Model*

F: Resin

*5- or 6-contact Model (common)*

F: Resin  
 D: Metal
- 4** Door Lock and Release
 

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

*4-contact Model*

Blank: None

*5- or 6-contact Model (common)*

D: 24 VDC (orange LED indicator)
- 6** Release Key Type
 

*4-contact Model*

Blank: Standard release key (metal)

*5- or 6-contact Model (common)*

Blank: Special release key (metal)

4: Special release key (resin) (Note: Release keys are provided)
- 7** Connection Method
 

Blank: Terminal block  
 N: Connector \*1

\*1. 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)
- 1** Key Type
 

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

G

## Ordering (continued)

## 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 size (See Note.)                                                                   | Model                                                                          |                                                                                |               |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------|
| <div>Standard (metal)</div> <div></div> | Connector                                                                      | 24VDC (Orange)                                                                             | Mechanical lock Solenoid release                                                           | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □.             | G1/2                                                                                       | D4SL-N2□FA-DN                                                                  |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            |                                                                                            | 1/2-14NPT                                                                                  | D4SL-N3□FA-DN                                                                  |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            |                                                                                            | 1/2-14NPT                                                                                  | D4SL-N3NFA-DN                                                                  |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            |                                                                                            | M20                                                                                        | D4SL-N4□FA-DN                                                                  |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □.             | G1/2                                                                                       | D4SL-N2□FA-DN                                                                  |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            |                                                                                            | 1/2-14NPT                                                                                  | D4SL-N3□FA-DN                                                                  |                                                                                |               |
|                                                                                                                            |                                                                                | M20                                                                                        |                                                                                            |                                                                                            | D4SL-N4□FA-DN                                                                              |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                | 4-contact Model<br>Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □. |                                                                                            |                                                                                            | G1/2                                                                                       | D4SL-N2□FA-N                                                                   |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | 1/2-14NPT                                                                                  | D4SL-N3□FA-N                                                                               |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | M20                                                                                        | D4SL-N4□FA-N                                                                               |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | Terminal block                                                                             | 24VDC (Orange)                                                                             | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □. | G1/2                                                                           | D4SL-N2□FA-D  |
|                                                                                                                            |                                                                                | 1/2-14NPT                                                                                  |                                                                                            |                                                                                            |                                                                                            |                                                                                | D4SL-N3□FA-D                                                                   |               |
|                                                                                                                            | 1/2-14NPT                                                                      | D4SL-N3NFA-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            | 1/2-14NPT                                                                      | D4SL-N3QFA-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            | M20                                                                            | D4SL-N4□FA-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            | 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □. | G1/2                                                                                       |                                                                                            |                                                                                            |                                                                                            | D4SL-N2□FA-D                                                                   |                                                                                |               |
|                                                                                                                            |                                                                                | 1/2-14NPT                                                                                  |                                                                                            |                                                                                            | D4SL-N3□FA-D                                                                               |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                | M20                                                                                        |                                                                                            |                                                                                            | D4SL-N4□FA-D                                                                               |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                | 24VDC (without indicator)                                                                  |                                                                                            |                                                                                            | 4-contact Model<br>Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □. | G1/2                                                                           | D4SL-N2□FA                                                                     |               |
|                                                                                                                            | 1/2-14NPT                                                                      |                                                                                            |                                                                                            |                                                                                            |                                                                                            | D4SL-N3□FA                                                                     |                                                                                |               |
|                                                                                                                            | M20                                                                            |                                                                                            |                                                                                            |                                                                                            |                                                                                            | D4SL-N4□FA                                                                     |                                                                                |               |
|                                                                                                                            | Connector                                                                      |                                                                                            |                                                                                            |                                                                                            | 24VDC (Orange)                                                                             | Solenoid lock Mechanical release                                               | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □. | G1/2          |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | 1/2-14NPT                                                                                  |                                                                                            |                                                                                |                                                                                | D4SL-N3□FG-DN |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | 1/2-14NPT                                                                                  |                                                                                            |                                                                                |                                                                                | D4SL-N3NFG-DN |
|                                                                                                                            |                                                                                | M20                                                                                        | D4SL-N4□FG-DN                                                                              |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                | 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □.             | G1/2                                                                                       | D4SL-N2□FG-DN                                                                              |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            | 1/2-14NPT                                                                                  | D4SL-N3□FG-DN                                                                              |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            | 1/2-14NPT                                                                                  | D4SL-N3HFG-DN                                                                              |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            | M20                                                                                        | D4SL-N4□FG-DN                                                                              |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                | 24VDC (without indicator)                                                                  | 4-contact Model<br>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                                                                               |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            |                                                                                            | M20                                                                                        | D4SL-N4□FG-N                                                                               |                                                                                |                                                                                |               |
|                                                                                                                            |                                                                                |                                                                                            | Terminal block                                                                             | 24VDC (Orange)                                                                             | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □.             |                                                                                | G1/2                                                                           | D4SL-N2□FG-D  |
|                                                                                                                            | 1/2-14NPT                                                                      |                                                                                            |                                                                                            |                                                                                            |                                                                                            |                                                                                | D4SL-N3□FG-D                                                                   |               |
|                                                                                                                            | 1/2-14NPT                                                                      |                                                                                            |                                                                                            |                                                                                            |                                                                                            |                                                                                | D4SL-N3NFG-D                                                                   |               |
|                                                                                                                            | M20                                                                            | D4SL-N4□FG-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
| 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □.                                             | G1/2                                                                           | D4SL-N2□FG-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            | 1/2-14NPT                                                                      | D4SL-N3□FG-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            | M20                                                                            | D4SL-N4□FG-D                                                                               |                                                                                            |                                                                                            |                                                                                            |                                                                                |                                                                                |               |
|                                                                                                                            | 24VDC (without indicator)                                                      | 4-contact Model<br>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 sizes, and for North America, the recommended models are those with a 1/2-14NPT conduit sizes.

 = Highlighted **Rapid Delivery** products are available for shipment today or within **FIVE** days.

## Ordering (continued)

## List of Models (continued)

| 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 (See Note.)                                                       | Model          |
|-------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------|----------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------|
| <div>Special (resin)</div> <div></div> | Connector      | 24VDC (Orange)              | Mechanical lock Solenoid release | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □.             | G1/2                                                                           | D4SL-N2□FA-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | 1/2-14NPT                                                                      | D4SL-N3□FA-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | M20                                                                            | D4SL-N4□FA-D4N |
|                                                                                                                         |                |                             |                                  | 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □.             | G1/2                                                                           | D4SL-N2□FA-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | 1/2-14NPT                                                                      | D4SL-N3□FA-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | M20                                                                            | D4SL-N4□FA-D4N |
|                                                                                                                         | Terminal block |                             |                                  | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □.             | G1/2                                                                           | D4SL-N2□FA-D4  |
|                                                                                                                         |                |                             |                                  |                                                                                            | 1/2-14NPT                                                                      | D4SL-N3□FA-D4  |
|                                                                                                                         |                |                             |                                  |                                                                                            | 1/2-14NPT                                                                      | D4SL-N3NFA-D4  |
|                                                                                                                         |                |                             |                                  | M20                                                                                        | D4SL-N4□FA-D4                                                                  |                |
|                                                                                                                         |                |                             |                                  | 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □.             | G1/2                                                                           | D4SL-N2□FA-D4  |
|                                                                                                                         |                |                             |                                  |                                                                                            | 1/2-14NPT                                                                      | D4SL-N3□FA-D4  |
|                                                                                                                         | M20            |                             | D4SL-N4□FA-D4                    |                                                                                            |                                                                                |                |
|                                                                                                                         | Connector      |                             | Solenoid lock Mechanical release | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □.             | G1/2                                                                           | D4SL-N2□FG-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | G1/2                                                                           | D4SL-N2NFG-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | 1/2-14NPT                                                                      | D4SL-N3□FG-D4N |
|                                                                                                                         |                |                             |                                  |                                                                                            | M20                                                                            | D4SL-N4□FG-D4N |
|                                                                                                                         |                |                             |                                  | 5-contact Model<br>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                                                                 |                |
|                                                                                                                         |                | M20                         |                                  |                                                                                            | D4SL-N4□FG-D4N                                                                 |                |
|                                                                                                                         |                | Terminal block              |                                  |                                                                                            | 6-contact Model<br>Insert the built-in switch (N, P, Q or R) into the blank □. | G1/2           |
|                                                                                                                         |                |                             |                                  | 1/2-14NPT                                                                                  |                                                                                | D4SL-N3□FG-D4  |
|                                                                                                                         |                |                             |                                  | 1/2-14NPT                                                                                  |                                                                                | D4SL-N3NFG-D4  |
|                                                                                                                         |                |                             |                                  | M20                                                                                        | D4SL-N4□FG-D4                                                                  |                |
|                                                                                                                         |                |                             |                                  | 5-contact Model<br>Insert the built-in switch (E, F, G or H) into the blank □.             | G1/2                                                                           | D4SL-N2□FG-D4  |
|                                                                                                                         |                |                             | 1/2-14NPT                        |                                                                                            | D4SL-N3□FG-D4                                                                  |                |
|                                                                                                                         |                | M20                         | D4SL-N4□FG-D4                    |                                                                                            |                                                                                |                |

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G

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## Ordering (continued)

### Operation Keys

| Type                                 |                                                                                   | 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  |

#### Notes:

D4SL-NK□□ actuators are compatible with both D4SL & D4SL-N switches

D4SL-K□□ actuators are also compatible with both D4SL & D4SL-N switches

### Connector Cables

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

G

### Slide Key

| Type                                                                                | Specifications                                                          | Contents                                                                                                                                                                                                                                                                                              | Model          | Applicable Door Switch |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------|
|   | Weight: Approx. 0.6 kg<br>Mechanical durability: 20,000 operations min. | Slide Key: 1 (not yet mounted)<br>D4SL-N mounting plate: 1<br>Door Switch special mounting screws: 3<br>D4SL-NK1 (operation key): 1<br>D4SL-NK1 special mounting screws: 2<br>Lockout keys: 2<br>Lockout key strap: 1<br>Caution labels (stickers): 2 sheets (English and Japanese)                   | D4SL-NSK10-LK  | D4SL-N                 |
|  | Weight: Approx. 0.1 kg                                                  | Inner Lever: 1                                                                                                                                                                                                                                                                                        | D4SL-SK10H *   | —                      |
|  | Weight: Approx. 0.7 kg<br>Mechanical durability: 20,000 operations min. | Slide Key: 1 (not yet mounted)<br>Inner Lever: 1<br>D4SL-N mounting plate: 1<br>Door Switch special mounting screws: 3<br>D4SL-NK1 (operation key): 1<br>D4SL-NK1 special mounting screws: 2<br>Lockout keys: 2<br>Lockout key strap: 1<br>Caution labels (stickers): 2 sheets (English and Japanese) | D4SL-NSK10-LKH | D4SL-N                 |

 = Highlighted **Rapid Delivery** products are available for shipment today or within **FIVE** days.