# Guard Lock Safety-door Switch D4JL/D4JL-SK40

#### CSM\_D4JL\_D4JL-SK40\_DS\_E\_5\_

## World's Top\* Holding Force of 3,000 N

\*For plastic models, as of May 2008

- Two safety circuits and two monitor contacts provide an array of monitoring patterns.
- Standard gold-clad contacts enable use with ordinary loads and microloads.
- Models with trapped keys prevent workers from being locked in hazardous work areas.
- Models with rear release buttons allow people to unlock the Switch and escape if they are locked into hazardous areas.
- IP67 degree of protection

Be sure to read the *"Safety Precautions"* on page 22.



## Features

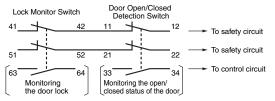
### Plastic Guard Lock Safety-door Switches Rank Among the Strongest in the World

A holding force of 3,000 N makes these Switches suitable for large, heavy doors.



## Two Safety Circuits and Two Monitor Contacts

The D4JL has two safety circuits. It also has two contacts to separately monitor the open/closed status of the door and the status of the lock.

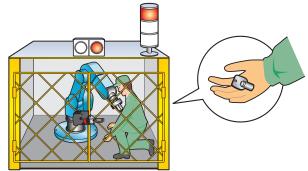


## Wide variations to protect workers who enter hazardous areas.

• Models with Trapped Keys (mechanical lock models only) As long as a person has the trapped key when he enters a hazardous area, he does not have to worry about somebody locking the door and trapping him inside.

The door can be opened only by supplying power to the solenoid and then turning the trapped key to unlock the D4JL.

There are thirty different types of trapped keys available for use in applications with adjacent hazardous areas.



Models with Rear Release Buttons

A rear release button allows the door to be unlocked from inside a hazardous area in an emergency.

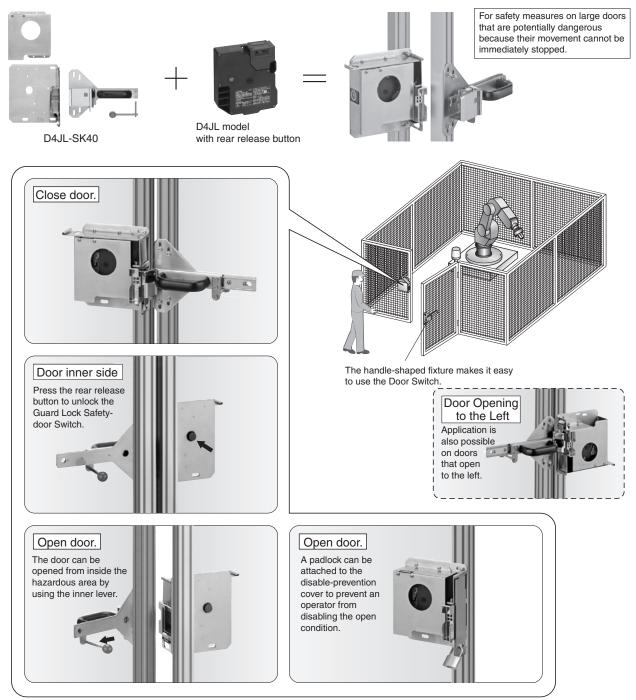


Special Slide Key

A special Slide Key shortens the lead time for mounting design. The padlock that can be attached to the disable-prevention cover prevents other workers from restarting machines. (See page 2 for details.)

## D4JL/D4JL-SK40

#### **Slide Keys** D4JL-SK40 Configuration



ANSI/RIA R15.06-1999 11.2.2 Interlocking portion b) The interlocking portion of the interlocked barrier shall be installed, applied, and maintained so that:

8) be capable of being easily unlocked from the inside of the safeguarded space with or without power available, when the possibility of full body access exists;

## **Model Number Structure**

#### Model Number Legend Switches

#### D4JL-000-00-00 1 2 3 4 5 6 7 1. Conduit Size 2: G1/2 4: M20 2. Built-in Switch N: 2NC/1NO + 2NC/1NO (slow-action contacts) P: 2NC/1NO + 3NC (slow-action contacts) Q: 3NC + 2NC/1NO (slow-action contacts) R: 3NC + 3NC (slow-action contacts) 3. Head Material F: Plastic 4. Door Lock and Release A: Mechanical lock/24 VDC solenoid release G: 24 VDC Solenoid lock/Mechanical release 5. Indicator C: 24 VDC (green LED indicator)

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

#### 5: Special release key \*1

- 6: Special release key + rear release button \*1
- 7: Trapped key
- 7. Trapped Key Type

#### 01 to 30: 30 types \*2

Note: A 24 VDC solenoid lock cannot be combined with a trapped key.

A 24 VDC solenoid lock cannot be combined with a special release key and rear release button. **\*1.** Release keys are provided.

\*2. Thirty types of trapped keys can be manufactured. Specify the trapped key type in numerical order starting from 01 when ordering.

#### Switches (Connector type)

#### D4JL-2RFA-D5N-X

1234 567 8

- 1. Conduit Size 2: G1/2
- 2. Built-in Switch
- R: 3NC + 3NC (slow-action contacts) 3. Head Material
- F: Plastic
- 4. Door Lock and Release A: Mechanical lock/24 VDC solenoid release

- 5. Indicator
- C: 24 VDC (green LED indicator) D: 24 VDC (orange LED indicator)
- 6. Release Key Type
- 5: Standard release key 7. Connection Method
- N: Connector type
- 8. Cover Mounting Screws T: Standard screws X: Special screws

Note: For more information about connector types, contact your OMRON sales representative.

### **Operation Keys**

## D4JL-K

- 1. Operation Key Type
  - 1: Horizontal mounting
  - 2: Vertical mounting
  - 3: Adjustable mounting (horizontal)

## D4JL/D4JL-SK40

: Models with certified direct opening contacts.

## **Ordering Information**

## Switches (Operation Keys are sold separately.) Consult with your OMRON representative when ordering any models that are not listed in this table.

#### **Standard Models**

Release key type	Indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit opening	Model
			2NC/1NO+2NC/1NO	G1/2	D4JL-2NFA-C5
			2NC/TNO+2NC/TNO	M20	D4JL-4NFA-C5
		2NC/1NO+3NC	G1/2	D4JL-2PFA-C5	
		Mechanical lock Solenoid release	2NC/ INO+3NC	M20	D4JL-4PFA-C5
		Solehold release	3NC+2NC/1NO	G1/2	D4JL-2QFA-C5
			SNC+2NC/TNO	M20	D4JL-4QFA-C5
			2010-2010	G1/2	D4JL-2RFA-C5
	Crean		3NC+3NC	M20	D4JL-4RFA-C5
	Green		G1/2	D4JL-2NFG-C5	
	1		2NC/1NO+2NC/1NO	M20	D4JL-4NFG-C5
	1			G1/2	D4JL-2PFG-C5
		Solenoid lock	2NC/1NO+3NC	M20	D4JL-4PFG-C5
		Mechanical release	3NC+2NC/1NO	G1/2	D4JL-2QFG-C5
				M20	D4JL-4QFG-C5
			3NC+3NC	G1/2	D4JL-2RFG-C5
				M20	D4JL-4RFG-C5
cial release key			2NC/1NO+2NC/1NO	G1/2	D4JL-2NFA-D5
				M20	D4JL-4NFA-D5
			2NC/1NO+3NC	G1/2	D4JL-2PFA-D5
		Mechanical lock		M20	D4JL-4PFA-D5
		Solenoid release	3NC+2NC/1NO	G1/2	D4JL-2QFA-D5
				M20	D4JL-4QFA-D5
				G1/2	D4JL-2RFA-D5
	0.000		3NC+3NC	M20	D4JL-4RFA-D5
	Orange		2010/1010 2010/1010	G1/2	D4JL-2NFG-D5
			2NC/1NO+2NC/1NO	M20	D4JL-4NFG-D5
				G1/2	D4JL-2PFG-D5
		Solenoid lock	2NC/1NO+3NC	M20	D4JL-4PFG-D5
		Mechanical release	010.010/010	G1/2	D4JL-2QFG-D5
			3NC+2NC/1NO	M20	D4JL-4QFG-D5
			010.010	G1/2	D4JL-2RFG-D5
			3NC+3NC	M20	D4JL-4RFG-D5

#### **Models with Rear Release Buttons**

: Models with certified direct opening contacts.

Release key type	Indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit opening	Model
			2NC/1NO+2NC/1NO	G1/2	D4JL-2NFA-C6
			2NC/TNO+2NC/TNO	M20	D4JL-4NFA-C6
				G1/2	D4JL-2PFA-C6
	0		2NC/1NO+3NC	M20	D4JL-4PFA-C6
	Green			G1/2	D4JL-2QFA-C6
			3NC+2NC/1NO	M20	D4JL-4QFA-C6
		Mechanical lock Solenoid release		G1/2	D4JL-2RFA-C6
o			3NC+3NC	M20	D4JL-4RFA-C6
Special release key				G1/2	D4JL-2NFA-D6
			2NC/1NO+2NC/1NO	D4JL-4NFA-D6	
				G1/2	D4JL-2PFA-D6
	Orange		2NC/1NO+3NC	M20	D4JL-4PFA-D6
				G1/2	D4JL-2QFA-D6
			3NC+2NC/1NO	M20	D4JL-4QFA-D6
				G1/2	D4JL-2RFA-D6
			3NC+3NC	M20	D4JL-4RFA-D6

## D4JL/D4JL-SK40

#### **Models with Trapped Keys**

Models with T	rapped Keys	5	: Model	s with certified dired	ct opening contacts.
Release key type	Indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit opening	Model
			2NC/1NO+2NC/1NO	G1/2	D4JL-2NFA-C7-01
				M20	D4JL-4NFA-C7-01
			2NC/1NO+3NC	G1/2	D4JL-2PFA-C7-01
	Crean		ZNC/TNO+3NC	M20	D4JL-4PFA-C7-01
	Green		3NC+2NC/1NO	G1/2	D4JL-2QFA-C7-01
			SNC+2NC/TNO	M20	D4JL-4QFA-C7-01
				G1/2	D4JL-2RFA-C7-01
Tropped key dat		Mechanical lock		M20	D4JL-4RFA-C7-01
Trapped key *1		Solenoid release		G1/2	D4JL-2NFA-D7-01 *2
				M20	D4JL-4NFA-D7-01
				G1/2	D4JL-2PFA-D7-01 *2
	Orange		2NC/1NO+3NC	M20	D4JL-4PFA-D7-01
				G1/2	D4JL-2QFA-D7-01 *2
			3NC+2NC/1NO	M20	D4JL-4QFA-D7-01
				G1/2	D4JL-2RFA-D7-01 *2
			3NC+3NC	M20	D4JL-4RFA-D7-01

\*1. Thirty types of trapped keys can be manufactured. Specify the trapped key type in numerical order starting from 01 when ordering. **\*2.** Models with Korean S-mark certification.

Release key position	Front	Front and rear re	Front	
Release key type	y type Special release key Special release key		ase key	Trapped key
Switch appearance		Front	Rear	

## **Operation Keys**

Туре	Model	Туре	Model
Horizontal mounting	D4JL-K1	Adjustable mounting (horizontal)	D4JL-K3
Vertical mounting	D4JL-K2		

## Slide Keys

Appearance	Specifications	Contents	Model	Applicable Door Switch
	Weight: 3,400 g Mechanical durability: 20,000 operations min.	Slide Key: 1 D4JL mounting tool: 1 Inner lever: 1 Inner lever mounting screws: 2 Door Switch mounting one-way screws: 3 Switch protective cover: 1 Switch protective cover screws: 4 Disable-prevention cover (already mounted on Slide Key): 1	D4JL-SK40	D4JL- rear release button type

Note: 1. The Door Switch is not included. Select the Door Switch depending on the necessary number of contacts and the conduit size. 2. Perform risk assessment for the equipment in question, configure relay units and other safety circuits, and use properly.

3. Ask your OMRON representative for information on the D4JL-SK30.

## **Specifications**

## **Standards and EC Directives**

## Conforms to the following EC Directives:

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

#### **Certified Standards**

Certification body	Standard	File No.
TÜV SÜD	EN 60947-5-1 (certified direct opening)	Consult your OMRON
UL *1	UL 508, CSA C22.2 No.14	representative for details.
CQC (CCC)	GB14048.5	2005010305167533
KOSHA *2	EN60947-5-1	2005-196

\*1. CSA C22.2 No. 14 was certified by UL. \*2. Only certain models have been certified.

#### **Certified Standard Ratings** TÜV (EN 60947-5-1)

Item	Utilization category	AC-15	DC-13
Rated operating current (le)		3 A	0.27 A
Rated operating voltage (Ue)		240 V	250 V

Note: Use a 10 A fuse type  ${\rm gI}$  or  ${\rm gG}$  that conforms to IEC60269 as a short-circuit protection device. This fuse is not built into the Switch.

(VA)

720

7,200

#### UL/CSA (UL 508, CSA C22.2 No. 14) A300 (between terminals 12 and 41)

	•••••••••••••••••••••••••••••••••••••••				
Rated	Carry	Curre	nt (A)	Volt-amp	eres (VA)
voltage	current	Make	Break	Make	Break
120 VAC	10.4	60	6	7 000	700

30

## A300 (between all other terminals)

10 A

Rated	Carry	Curre	nt (A)	Volt-amp	eres (VA)
voltage	current	Make	Break	Make	Break
240 VAC	3 A	30	3	7,200	720

3

#### Q300

240 VAC

Rated	Carry	Curre	nt (A)	Volt-amp	eres (VA)
voltage	current	Make	Break	Make	Break
125 VDC	2.5 A	0.55	0.55	69	60
250 VDC		0.27	0.27	69	69

#### **Solenoid Coil Characteristics**

Item Type	24 VDC	
Rated operating voltage (100% ED)	24 VDC +10% -15%	
Current consumption	Approx. 200 mA	
Insulation Class	Class B (130°C max.)	

#### **Indicator Characteristics**

ltem Typ	be	LED
Rated voltage	24 VDC	24 VDC
Current consumption	Approx. 1 mA	Approx. 8 mA
Color (LED)	Orange	Green

### Characteristics

Decree of protecti	ion sta	IP67 (EN60947-5-1)				
Degree of protecti	1011 * 1					
Durability *2	Mechanical	1,000,000 operations min. (trapped key: 10,000 operations min., rear release button: 3,000 operations min.)				
Electrical		500,000 operations min. (3 A resistive load at 250 VAC) *3				
Operating speed		0.05 to 0.5 m/s				
Operating frequer	псу	30 operations/minute max.				
Direct opening for	rce *4	60 N min. (EN60947-5-1)				
Direct opening tra	ivel *4	15 mm min. (EN60947-5-1)				
Holding force *5		3,000 N min.				
Contact resistance	e	25 mΩ max. (per contact)				
Minimum applicat	ole load *6	1 mA resistive load at 5 VDC (N-level reference value)				
Rated insulation v	voltage (Ui)	300 V (EN60947-5-1)				
Rated frequency		50/60 Hz				
Protection agains	t electric shock	Class II (double insulation)				
Pollution degree (	operating environment)	3 (EN60947-5-1)				
	Between terminals of same polarity	2.5 kV				
Impulse withstand	Between terminals of different polarity	4 kV				
voltage (EN60947-5-1)	Between other terminals and non-current carrying metallic parts	6 KV				
Insulation resistar	nce	100 MΩ min. (at 500 VDC)				
Contact gap		2 × 2 mm min.				
Vibration resistance	Malfunction	10 to 55 Hz, 0.75 mm single amplitude				
Chaok registeres	Destruction	1,000 m/s <sup>2</sup> min.				
Shock resistance	Malfunction	80 m/s <sup>2</sup> min.				
Conditional short-	-circuit current	100 A (EN60947-5-1) *7				
Conventional free	air thermal current (Ith)	10 A (between terminals 12 and 41), 3 A (between all other terminals) (EN60947-5-1)				
· · · ·		-10 to +55°C (with no icing)				
Ambient operating temperature		95% max.				
Ambient operating		95% max.				

Note: The above values are initial values.

\*1. The degree of protection is tested using the method specified by the standard (EN60947-5-1). Confirm that sealing properties are sufficient for the operating conditions and environment beforehand. Although the switch box is protected from dust or water penetration, do not use the D4JL in places where foreign material may enter through the key hole on the head, otherwise Switch damage or malfunctioning may occur.

**\*2.** The durability is for an ambient temperature of 5 to 35°C and an ambient humidity of 40% to 70%. For further conditions, consult your OMRON sales representative.

**\*3.** Do not pass a 3 A, 250 VAC load through more than two circuits.

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

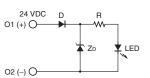
**\*5.** This figure is based on the GS-ET-19 evaluation method.

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

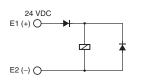
**\*7.** Use a 10 A fuse type gI or gG that conforms to IEC 60269 as a short-circuit protection device.

## Connections

#### Internal Circuit Diagram Indicator



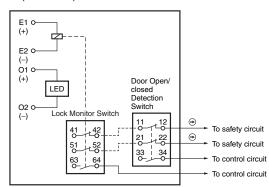
#### Solenoid



#### **Circuit Connection Example**

#### (Examples for the D4JL-ONFO-O)

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

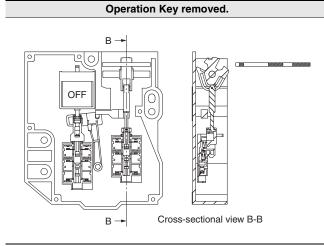


- Direct opening contacts used as safety-circuit input are indicated with the  $\boxdot$  mark.
- Terminals 11-12 and terminals 21-22 are direct opening contacts.
- Do not connect the indicator directly to direct opening contacts. If indicator is connected in parallel with direct opening contacts, a short-circuit current may flow in the event that the indicator is damaged, causing equipment to malfunction.
- Do not switch standard loads for more than 2 circuits. Otherwise, the level of insulation may decrease.
- The solenoid terminals have polarity (E1: + and E2: -). Confirm the polarity before wiring.

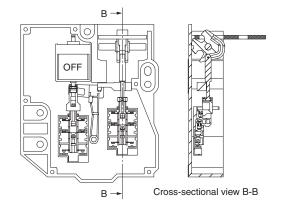
## **Operation Method**

#### **Operation Principles** Mechanical Lock Models

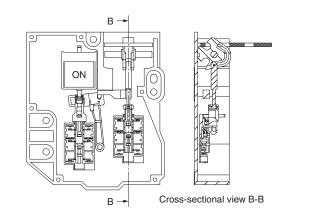




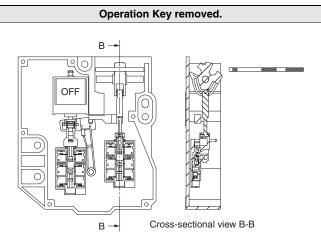
#### Operation Key inserted: Door locked.



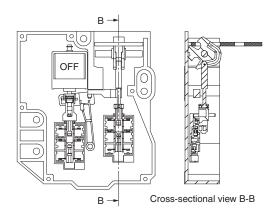
#### Solenoid ON: Door unlocked.



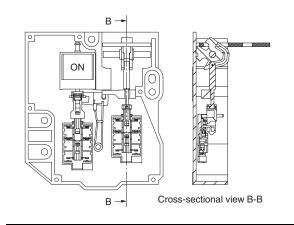
#### **Solenoid Lock Models**



#### Operation Key inserted: Door unlocked.

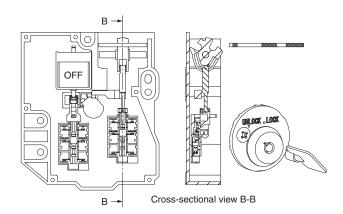


#### Solenoid ON: Door locked.

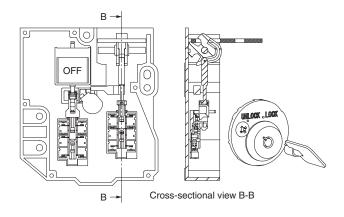


#### **Trapped Key Models**

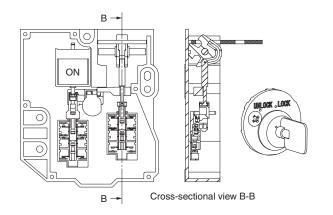
(1) Operation Key removed, solenoid OFF, and trapped key removed.



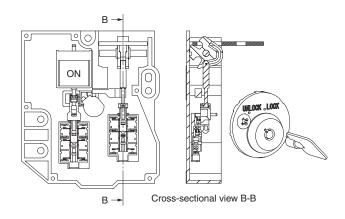
## (2) Operation Key inserted, solenoid OFF, and trapped key removed. Status: Door unlocked.



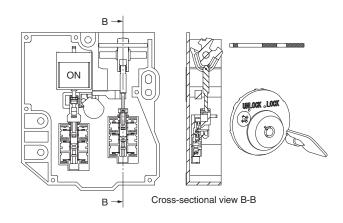
(4) Operation Key inserted, solenoid ON, and trapped key inserted. Status: Door locked and trapped key can be removed.



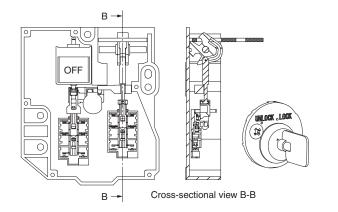
(5) Operation Key inserted, solenoid ON, and trapped key removed. Status: Door unlocked.



(6) Operation Key removed, solenoid ON, and trapped key removed.

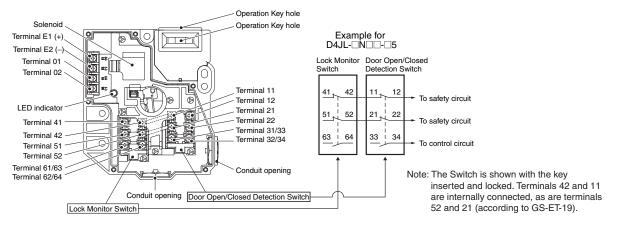


(3) Operation Key inserted, solenoid OFF, and trapped key inserted. Status: Door locked and trapped key cannot be removed.



## **Structure and Nomenclature**

#### Structure (D4JL-00A-05 and D4JL-00G-05)



## **Contact Forms**

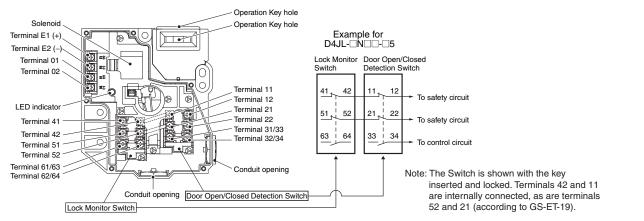
Indicates conditions where the Key is inserted and the lock is applied. Terminals 42-11 and terminals 52-21 are connected internally (as per BIA GS-ET-19).

	Contact	Conta	ct form		
Model	(door open/closed detection and lock monitor)	Lock monitor	Door open/ closed detection	Operating pattern	Remarks
D4JL-□NF□-□	2NC/1NO+2NC/1NO		Door open/ closed detection 11 1 12 21 22 33 34	Lock position 41-12 51-22 33-34 63-64 Stroke Operation Key insertion completion position	NC contacts 11-12 and 21-22 have a certified direct opening mechanism (☉). The terminals 41-12, 51-22, 33-34, and 63-64 can be used as unlike poles.
D4JL-□PF□-□	2NC/1NO+3NC		Door open/ closed detection 11 1 12 21 22 33 34	Lock position 41-12 51-22 33-34 61-62 Stroke Operation Key insertion completion position	NC contacts 11-12 and 21-22 have a certified direct opening mechanism (☉). The terminals 41-12, 51-22, 33-34, and 61-62 can be used as unlike poles.
D4JL-□QF□-□	3NC+2NC/1NO	Lock monitor 41 - 42 $51 - 52$ $63 - 64$		Lock position 41-12 51-22 31-32 63-64 Stroke Operation Key insertion completion position	NC contacts 11-12, 21-22 and 31-32 have a certified direct opening mechanism (☉). The terminals 41-12, 51-22, 31-32, and 63-64 can be used as unlike poles.
D4JL-□RF□-□	3NC+3NC		Door open/ closed detection 11 $12$ $1221$ $2231$ $32$	Lock position 41-12 51-22 31-32 61-62 Stroke Operation Key insertion completion position	NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism (☉). The terminals 41-12, 51-22, 31-32, and 61-62 can be used as unlike poles.

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## **Operating Cycle**

#### Structure (D4JL-DDA-D5 and D4JL-DDG-D5)



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

D4JL-

	Door condition	Condition 1		Condition 2		Condition 3		Turning the special release key
			$\langle \rangle$		$\langle \rangle$		Return to condition 1	
		Door open. The door will lock when		Door closed. The door is locked.		Door closed. The door can be		Door closed. No power is supplied to
-		the door closes.				opened.		the solenoid. The door is unlocked manually.
Terminal No	o. and function							uniconcer manaany.
E1-E2	Solenoid ON							
41-12 (NC) 51-22 (NC)	Door open/closed detection and lock monitor contacts							
31-32 (NC)	Door open/closed detection contact							
33-34 (NO)	Door open/closed detection contact							
61-62 (NC)	Lock monitor contact							
63-64 (NO)	Lock monitor contact							

D4JL-DDG-D5 (Solenoid Lock Models with Special Release Keys)

Terminal No. and function		Even when the door is closed, it does not lock until power is supplied	Door closed. The door is locked.	Door closed. The door can be opened.	
		to the solenoid.		opened.	
E1-E2	Solenoid ON				
41-12 (NC) 51-22 (NC)	Door open/closed detection and lock monitor contacts				
31-32 (NC)	Door open/closed detection contact				
33-34 (NO)	Door open/closed detection contact				
61-62 (NC)	Lock monitor contact				
63-64 (NO)	Lock monitor contact				

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

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

Door open/closed detection contact:

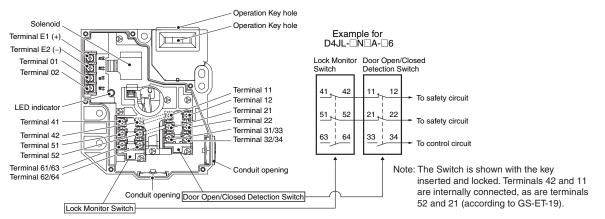
Can be used to confirm whether the key is inserted and to monitor the open/closed status of a door.

Lock monitor contact:

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

Note: The door open/closed detection and lock monitor contact configuration depends on the model.

#### Structure (D4JL-00A-06)



## **Operating Cycle Examples (for Models with Rear Release Buttons)**

D4JL-DD4JL-DD6 (Mechanical Lock Models with Special Release Keys and Rear Release Buttons)

	Door condition	Condition 1		Condition 2		Condition 3		Turning the special release key	Pressing the rear release button
Terminal No	o. and function	Door open. The door will lock when the door closes.	$\downarrow$	Door closed. The door is locked.	$\langle \rangle$	Door closed. The door can be opened.	Return to condition 1	Door closed. No power is supplied to the solenoid. The door is unlocked manually.	Door closed. No power is supplied to the solenoid. The door is unlocked manually.
E1-E2	Solenoid ON								
41-12 (NC) 51-22 (NC)	Door open/ closed detection and lock monitor contacts								
31-32 (NC)	Door open/ closed detection contact								
33-34 (NO)	Door open/ closed detection contact								
61-62 (NC)	Lock monitor contact								
63-64 (NO)	Lock monitor contact								

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

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

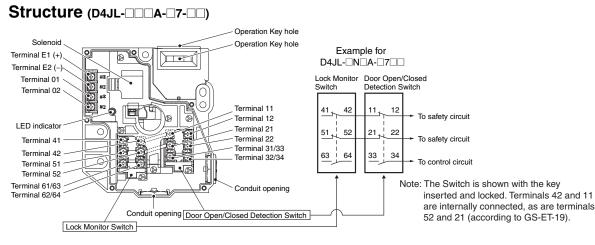
Door open/closed detection contact:

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

Lock monitor contact:

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

Note: The door open/closed detection and lock monitor contact configuration depends on the model.



## **Operating Cycle Examples (for Models with Trapped Keys)**

D4JL-DA-D7DD (Models with Trapped Keys)

Do	or condition	Condition 1		Condition 2		Condition 3		Condition 4		Condition 5		Condition 6	
		Door open. The Key is not inserted. The door will not	$\diamondsuit$	Door closed. The Key is not inserted. The door is not	$\diamondsuit$	Door closed. The Key is inserted. The door is	$\Diamond$	Door closed. The Key is inserted. The door	¢	Door closed. The Key is not inserted. The door can be	$\downarrow$	Door open. The Key is not inserted. The door will not	Return to condition 1
Terminal No function	o. and	lock when the door closes.		locked.		locked.		remains locked.		opened.		lock when the door closes.	
E1-E2	Solenoid ON												
41-12 (NC) 51-22 (NC)	Door open/ closed detection and lock monitor contacts												
31-32 (NC)	Door open/ closed detection contact												
33-34 (NO)	Door open/ closed detection contact								_				
61-62 (NC)	Lock monitor contact												
63-64 (NO)	Lock monitor contact												

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

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

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

Lock monitor contact:

Can be used to confirm whether power is supplied to the solenoid and to monitor whether or not a key can be removed.

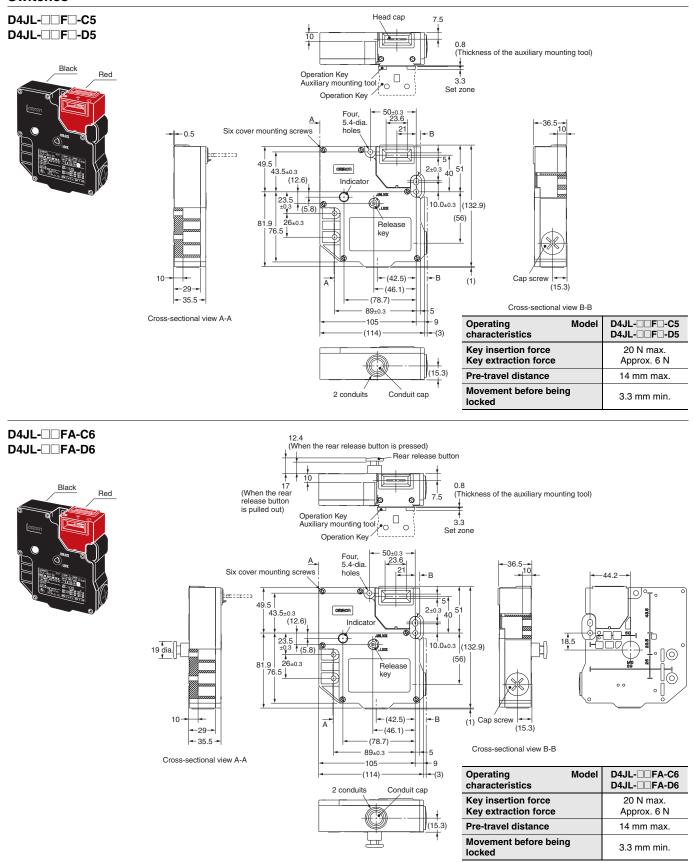
Note: 1. Door open/closed detection and lock monitor contact configuration depends on the model.

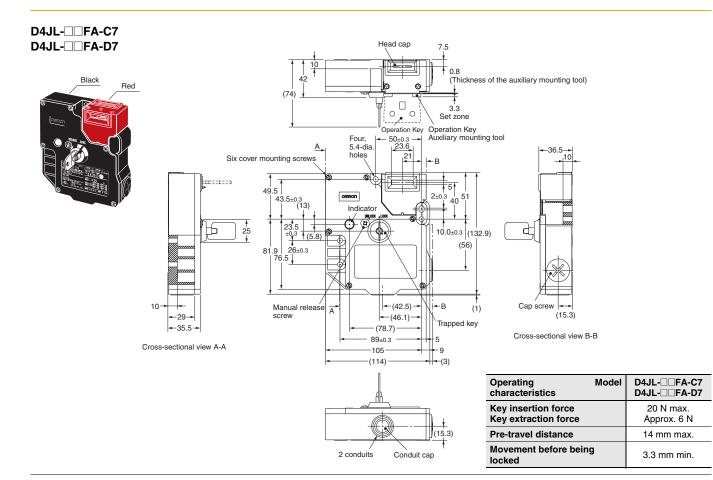
2. If power is supplied to the solenoid, the door cannot be unlocked until the Key is turned to the left and removed. The Key cannot be removed unless it is in the UNLOCK position.

(Unit: mm)

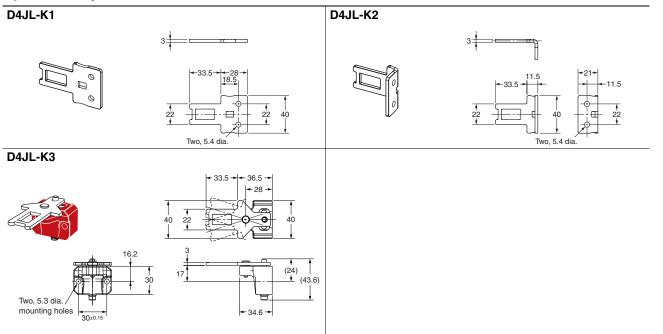
## **Dimensions**

Dimensions and Operating Characteristics Switches





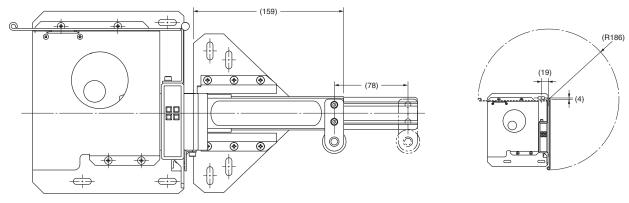
#### **Operation Keys**

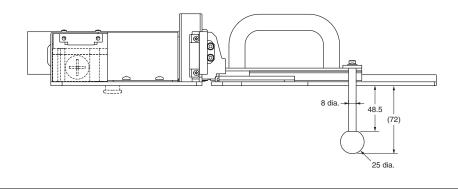


Note: Unless otherwise specified, a tolerance of ±0.8 mm applies to all Switch dimensions and a tolerance of ±0.4 mm applies to Operation Key dimensions.

#### Slide Keys D4JL-SK40 **Open Door** (160) Disable-prevention cover (24) - (15.3) Four, 6.5 × 19 long holes (237) ● ● P Trademark (Û Rear release button Ð (108) hole 23 dia -() <sup>96</sup> (87) (21.5) (21.5) ۲ ۲ ۲ Two, M4 56.5 66 \*:\\ \*\*/) 23.2 (193) (168) 56.5 Sliding 72 (60) 66 (35.3) (85) -. Б ti ↔⇒ 17.5 20 Guard Lock Safety Switch D4JL (sold separately) Three, 6.5 × 19 long holes Shot bolt 17.5 -90 (32) (70) Brand Name / Model / Lot No. / Country of Origin Guide Lever unit Guard Lock Safety Switch D4JL (sold separately) (117) (70) 8 dia ٩ P (76) (15 (15.3) (75.5) 4 <u> 4:--</u>5 — (114.5) -Switch part 25 dia. Handle part

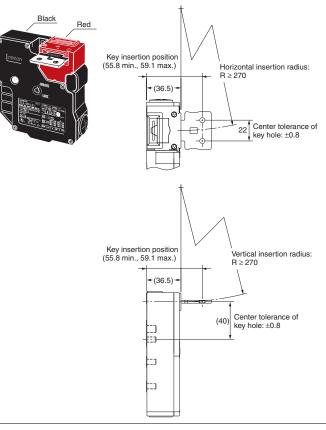
#### **Closed Door**



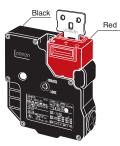


#### With Operation Key Inserted

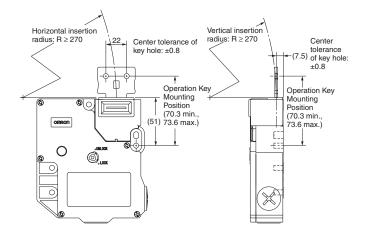
#### D4JL+D4JL-K1 (with Front-inserted Operation Key)



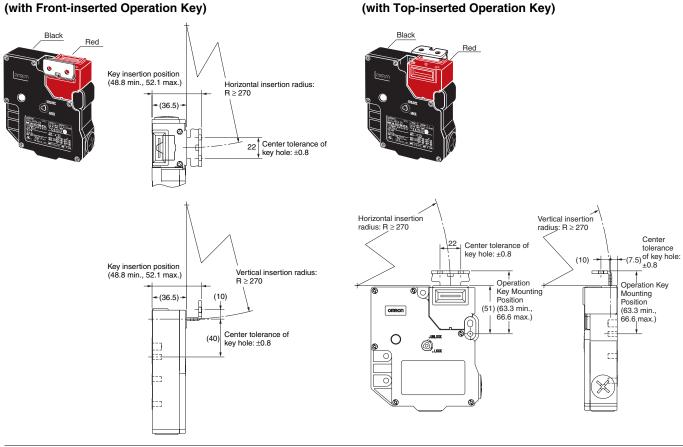
#### D4JL+D4JL-K1 (with Top-inserted Operation Key)



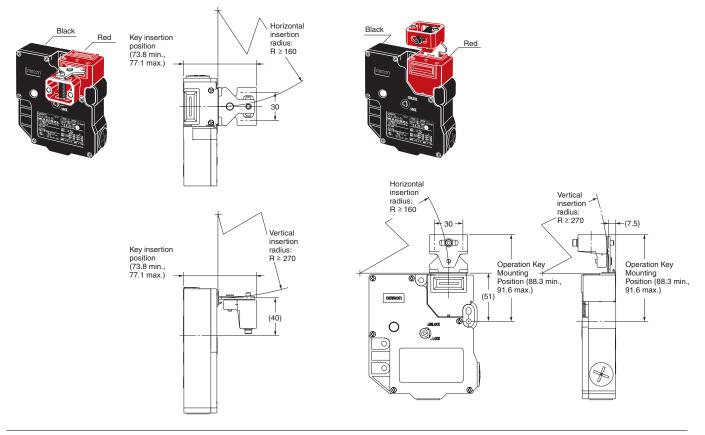
D4JL+D4JL-K2



D4JL+D4JL-K2 (with Front-inserted Operation Key)



#### D4JL + D4JL-K3 (with Front-inserted Operation key)



D4JL + D4JL-K3

(with Top-inserted Operation key)

## **Application Examples**

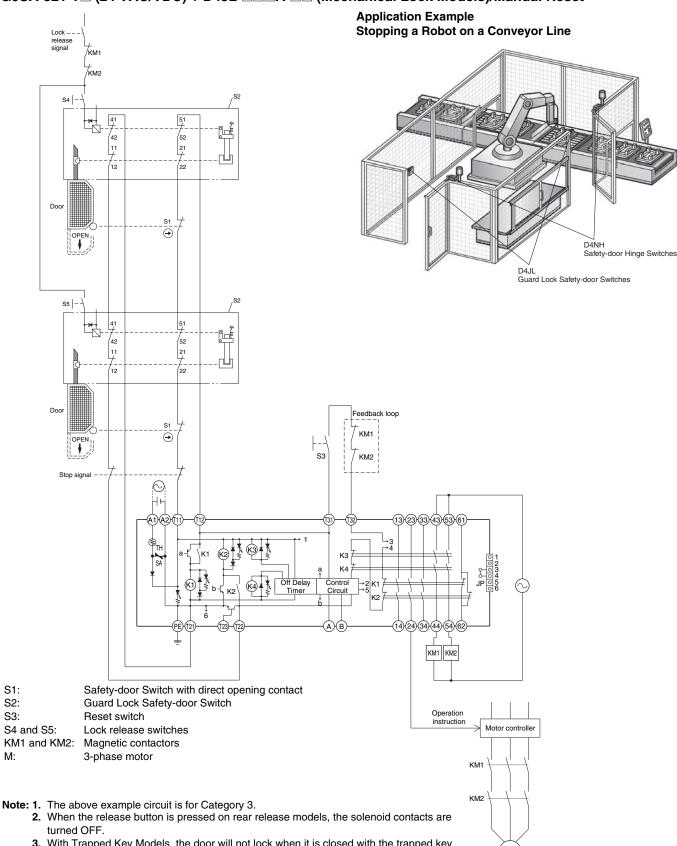
S1:

S2:

S3:

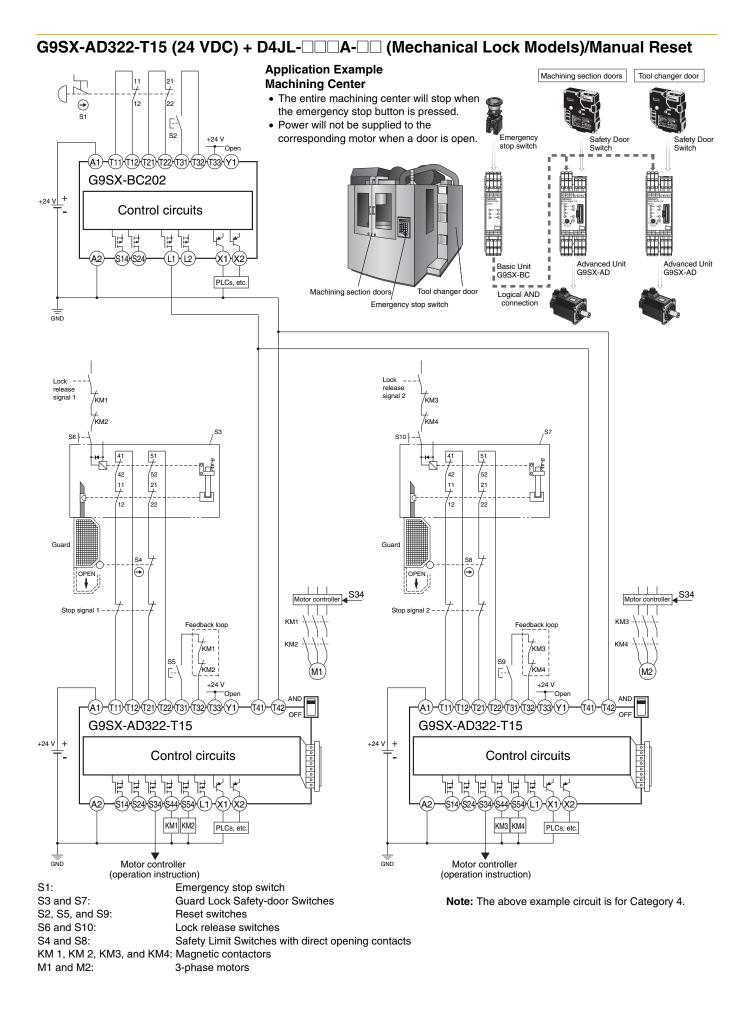
M:

#### G9SA-321-T (24 VAC/VDC) + D4JL- C A-C (Mechanical Lock Models)/Manual Reset



3. With Trapped Key Models, the door will not lock when it is closed with the trapped key removed.

М



## **Safety Precautions**

#### • Be sure to read the precautions for all D4JL/D4JL-SK40 models in the website at:http://www.ia.omron.com/.

#### <Guard Lock Safety-door Switch D4JL>

#### 

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



Injury may occasionally occur. If the machine is used with the release key in the UNLOCK position, the electromagnetic lock may not operate, causing some machines to continue operating in situations where they should be stopped. Be sure to put the release key in the LOCK position before using the machine. Also, check the condition of the lock and safety circuits.



Injury may occasionally occur. When the electromagnetic lock function or Switch function is damaged, some machines may continue operating in situations where they should be stopped. Do not use the electromagnetic lock function of the Switch in place of a door lock. Always provide a lock separate from the Switch, attach a warning seal to prevent people from using excessive force to open the door when it is locked, or provide an indicator lamp to show the locked/ unlocked status of the door.

Electric shock may occasionally occur. Do not use metal connectors or metal conduits.



#### Precautions for Safe Use

#### Installation Environment

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

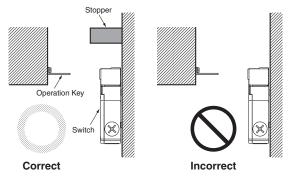
#### Wiring

- Do not switch circuits for two or more standard loads (250 VAC, 3 A) at the same time. Doing so may adversely affect insulation performance.
- Do not use screws longer than 9 mm when using metal connectors. Otherwise it may result in electric shock.
- Do not use metal conduits. Damage to the conduit opening may result in an improper seal or electric shock.
- Always attach the cover after completing wiring and before using the Switch. Do not supply power when the cover is not attached. Electric shock may occur if the Switch is used without the cover attached.

#### Installation

- Make sure the Switch is mounted securely to prevent it from falling off. Otherwise injury may result.
- Do not use the Switch as a stopper. Be sure to install a stopper as shown in the following illustration when mounting the Switch and adjust the stopper so that the Operation Key is within the setting zone.

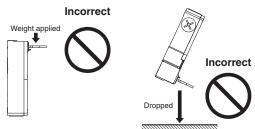
Do not subject the Switch to a shock that exceeds the Switch's shock resistance of  $1,000 \text{ m/s}^2$ .



#### Precautions for Correct Use

#### Operation Key

- Use only the designated Operation Key. The Head has been designed so that operation is not possible with a screwdriver or other tools. Using anything other than the designated Operation Key may damage the Switch or affect machine safety.
- Do not operate the Switch with anything other than the special OMRON Operation Key, otherwise the Switch may break or the safety of the system may not be maintained.
- Do not impose excessive force on the Operation Key while the Key is inserted into the Switch or drop the Switch with the Operation Key inserted. Doing either of these may deform the Key or break the Switch.

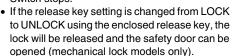


#### **Switch Contacts**

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.

#### **Release Key**

• The release key is used to unlock the Switch in case of emergency or if the power supply to the Switch stops.



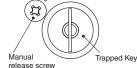
- After setting the release key to UNLOCK to, for example, change the head direction or perform maintenance, be sure to return it to the LOCK setting before resuming operation.
- The release key is set in the unlock position at the factory for the D4JL-D
- If the release key is set to UNLOCK when the Switch is used for the door of a machine room to ensure the safety of people performing adjustment work inside, the door will not be locked when the door is closed and no power will be supplied to the equipment.
- Do not use the release key to start or stop machines.
- The auxiliary lock must be released using the release key only by authorized personnel.
- Do not impose a force exceeding 1 N·m on the release key screws. The release key may be damaged and may not operate properly.
- To prevent the release key from being used by unauthorized personnel, set it to LOCK and seal it with sealing wax.

#### **Rear Release Button**

- The rear release button is used for emergency escapes when someone locks a worker in the work area (hazardous area).
- The door can be unlocked by pressing the rear release button.
- After the rear release button is used to unlock the door, pull the button out to restore it to its original state. If the button is left pressed in, the door will not lock when the door is closed and power will not be supplied to the equipment.
- Mount the Switch so that the rear release button can be operated by a worker inside the work area (hazardous area).

#### Trapped Key

- The trapped key is released when power is supplied to the solenoid.
   Turn the trapped key to the UNLOCK position and remove the
  - key to unlock the door.



UNLOCK .LOCK

As long as a worker has the trapped key with him when he enters the work area (hazardous area), he cannot be locked inside by another worker.

 Do not impose a force exceeding 1 N·m when operating the key. Otherwise, the Switch may be damaged and may not operate properly.

#### Attaching a Cover

- Make sure the release key is set to the LOCK position before covering the D4JL.
- When attaching a cover, be sure that the seal rubber is in place and that there is no foreign material present. If the cover is attached with the seal rubber out of place or if foreign material is stuck to the rubber, a proper seal will not be obtained.
- Do not use any screws to connect the cover other than the specified ones. The seal characteristics may be reduced.
- Use one of the following methods when covering a Trapped Key Switch.

When the Operation Key is removed (door open): Cover with the trapped key removed (UNLOCK).

When the Operation Key is inserted (door closed): Cover with the trapped key inserted (LOCK).

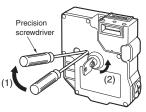
#### The door cannot be unlocked solely by supplying power to the solenoid. As long as a worker has the trapped the work area (hazardous area), he



oUNLOCK

#### **Manual Release**

- Manual release is used to unlock the Switch when power cannot be supplied to the solenoid, such as when power is interrupted or the equipment is being repaired.
  - 1. Use a Phillips screwdriver to remove the manual release screw. Use a precision screwdriver to press down the lever inside the Switch far enough to release the trapped key.
  - 2. The door is unlocked when the trapped key is turned to the UNLOCK position and removed.
- Do not use manual release to stop machines.
- After the Switch has been manually released, re-install the manual release screw in its proper position on the Switch using the specified torque.



#### **Hinged Doors**

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

#### **Solenoid Lock Models**

The solenoid lock locks the door only when power is supplied to the solenoid. The door will be unlocked if the power supply to the solenoid stops. Therefore, do not use the solenoid lock models for machines that may be operating and dangerous even after the machine stops operating.

#### **Mounting Methods**

#### **Appropriate Tightening Torque**

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

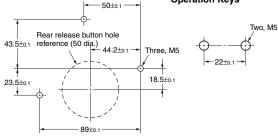
Туре	Appropriate tightening torque
Terminal screw	0.6 to 0.8 N·m
Cover mounting screw	0.7 to 0.9 N·m
Manual release screw	0.6 to 0.8 N·m
Operation Key mounting screw	2.4 to 2.8 N·m
Switch mounting screw	3.2 to 3.8 N·m
Connector	1.8 to 2.2 N·m
Cap screw	1.3 to 1.7 N·m

#### Switch and Operation Key Mounting

 Mount the Switch and Operation Key securely to the applicable tightening torque with M5 screws and flat or spring washers. To ensure safety, use screws that cannot be easily removed or another means to prevent the Switch and Operation Key from easily being removed.



Mounting Holes for Operation Keys

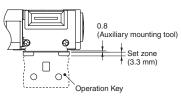


- Do not operate the Switch with anything other than the special OMRON Operation Key. Otherwise, the Switch may be damaged and the safety of the system may not be maintained.
- Ensure that the alignment offset between the Operation Key and the key hole does not exceed ±0.8 mm. If the Operation Key is offset or at an angle, accelerated wear or damage to the Switch may result.
- When inserting the Operation Key, install the provided mounting auxiliary tool in the key hole and use the tool to position the key in the key hole center and set zone.



mounting tool

- Remove the mounting auxiliary tool from the Switch after the Operation Key is properly inserted.
- Observe the specified insertion radius for the Operation Key and insert it in a direction perpendicular to the key hole.



- Do not impose excessive force on the Operation Key while the Key is inserted into the Switch or drop the Switch with the Operation Key inserted. Doing either of these may deform the Key or break the Switch.
- Attach the enclosed cap head to any Operation Key hole that is not used.

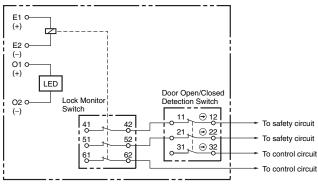
#### **Securing Doors**

When the door is closed (with the Operation Key inserted), the Operation Key may exceed the set zone because of, for example, the door's own weight, machine vibration, or the door cushion rubber. Then, when an attempt is made to open the door, it may result in damage or malfunction. Also, it may not be possible to unlock the Switch if there is weight placed on the Operation Key. Do not rely on the Switch to substitute for a door locking device. Secure the door with a stopper so that the Operation Key remains within the set zone.

#### Wiring

#### **Circuit Connection Example**

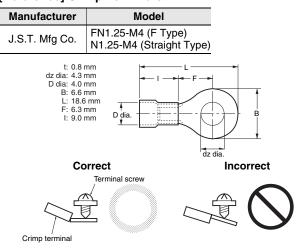
- Direct opening contacts used for safety circuit inputs are indicated with the 
   — mark. Terminals 12-41 and terminals 22-51 have direct opening contacts.
- Connect the indicators in parallel to the auxiliary circuits or terminals E1 and E2. Do not connect the indicators in parallel with the direct opening contact. If the indicators are broken, a short-circuit current may flow, causing equipment to malfunction.
- The 24 VDC solenoid terminals have polarity (E1: +, E2: –). Confirm the polarity before wiring.
- The contact ON/OFF timing for Switches is not synchronized. Confirm performance before application.



#### Wiring

- Do not wire the Switch while power is being supplied. Doing so may result in electric shock.
- Do not let particles, such as small pieces of lead wire, enter the switch body when wiring.
- Make sure that the wiring does not hide the LED indicator when wiring E1/E2 or O1/O2.
- When connecting to the terminals via insulating tube and M3.5 crimp terminals, arrange the crimp terminals so that they do not rise up onto the case or the cover.
- Applicable lead wire size: AWG22 to AWG18 (0.3 to 0.75 mm<sup>2</sup>). Use lead wires of an appropriate length. Not doing so may result in excess length causing the cover to rise and not fit properly.
- Do not pull on the lead wires with excessive force. Doing so may disconnect them.
- Do not push crimp terminals into gaps in the case interior. Doing so may cause damage or deformation of the case.

#### [Reference] Crimp Terminals



#### Processing the Conduit Opening

- Connect a recommended connector to the opening of the conduit and tighten the connector to the proper torque. The case may be damaged if excessive tightening torque is applied.
- Make sure that the outer diameter of the cable connected to the connector is correct.
- Attach a conduit cap to the unused conduit opening when wiring and tighten it to a suitable torque. The conduit cap is provided with the Switch.

#### **Recommended Connectors**

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

Size	Manufacturer	Мос	iel	Applicable cable diameter
G1/2	LAPP	ST-PF1/2	5380-1002	6.0 to 12.0 mm
M20	LAPP	$\text{ST-M20}\times 1.5$	5311-1020	7.0 to 13.0 mm

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

• LAPP is a German manufacturer.

#### Other Precautions

• The solenoid will heat when it carries current. Do not touch it.

#### <Slide Keys D4JL-SK40>

#### 

Incorrect operation may cause injury. Also, the product is designed to be mounted so that it slides horizontally. Do not mount the product in a vertically sliding configuration. (excluding the D4NS-SK01)



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

- Do not drop the Switch. Doing so may prevent the Switch from functioning to full capacity.
- Mount the Switch securely to prevent it from falling. Otherwise, injuries may occur.
- Do not attempt to disassemble or modify the Switch. Doing so may cause the Switch to malfunction.
- Make sure that the gap between the short bolt and guide is (±3 mm. Otherwise, excessive wear or damage may cause malfunction.
- To ensure safety, do not operate the Switch with anything other than a Slide Key.
- Be careful to avoid pinching your hand when operating the Switch.
- Be sure to mount the Switch protective cover. Otherwise, your hand may be injured by being pinched between the shot bolt and Switch when closing the door with your hand on the Switch.
- When opening the door, be sure to lower the disable-prevention cover into position, attach a padlock, or take other steps to prevent other people from operating the Switch.
- The durability of the Switch is greatly influenced by the switching conditions. Always test the Switch under actual working conditions before application and use it in a switching circuit for which there are no problems with performance.
- The user must not maintain or repair equipment incorporating the Switch. Contact the manufacturer of the equipment for any maintenance or repairs required.
- Do not shut the door while the shot bolt is extended. The Switch may be damaged, preventing proper operation.
- Do not apply excessive force in the direction of the slide. This may damage the product and cause it to malfunction.

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

• Insert the slide handle until the red operation indicator is completely displayed in the operation display window.





Normal Insufficient insertion

- Operation display window
- Loose screws may result in malfunction. Use washers and tighten the screws to the specified torques. Also, when mounting the Switch to a door for disable-prevention purposes, purchase and use tamper-resistant screws.

#### **Tightening Torque**

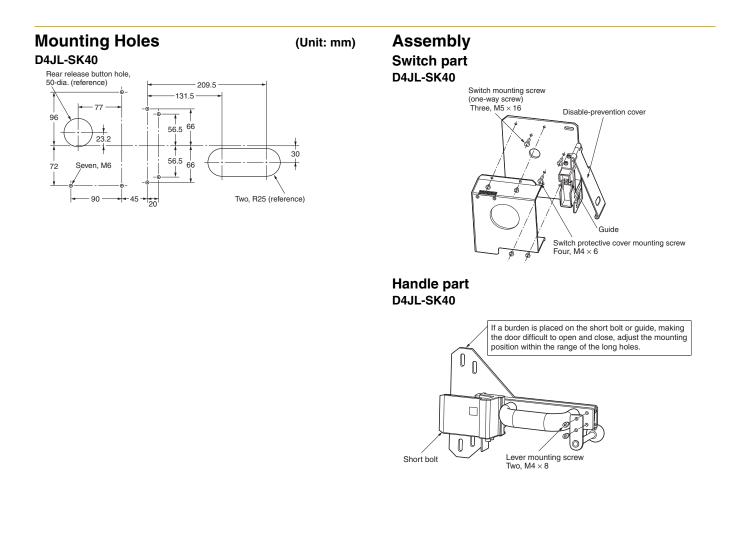
Slide Key mounting screw (M6)	6.0 to 7.0 N⋅m
Switch mounting screw (included with product)	3.2 to 3.8 N⋅m
Switch protective cover mounting screw (included with product)	1.2 to 1.4 N·m
Lever mounting screw (included with product)	1.2 to 1.4 N·m

#### **Technical Specifications**

	D4JL-SK40
Ambient operating temperature	-10 to 55°C (with no icing)
Ambient operating humidity	95% max.
Mechanical durability	20,000 operations min.
Weight	Approx. 3.4 kg (not including D4JL Guard Lock Safety-door Switch)

- Do not store the Switch where corrosive gases (e.g., H<sup>2</sup>S, SO<sup>2</sup>, NH<sup>3</sup>, HNO<sup>3</sup>, or CL<sup>2</sup>) or dust are present, or in locations subject to high temperature or humidity.
- Perform maintenance inspections periodically.
- This product is for use only with OMRON Safety-door Switches. Do not use it with door switches made by other manufacturers.

## D4JL/D4JL-SK40



#### **Read and Understand This Catalog**

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

#### Warranty and Limitations of Liability

#### WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

#### LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

#### **Application Considerations**

#### SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- · Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- · Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

#### **PROGRAMMABLE PRODUCTS**

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

#### Disclaimers

#### CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

#### DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

#### PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

#### ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

2012.4

## OMRON Corporation

In the interest of product improvement, specifications are subject to change without notice.

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