D4JL

SpeedSPEC www.sti.com D4JL

For full product information, visit www.sti.com. Use the SpeedSpec Code or scan the QR Code for quick access to the specific web page.

Rev. 7.13

Guard Lock Safety-Door Switch

- Holding force of 3,000 N
- 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

G

Features

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

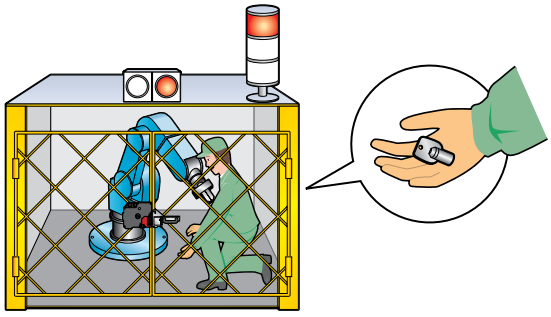
A holding force of 3,000 N makes these Switches suitable for large, heavy doors.

Models with Trapped Keys

OMRON Automation and Safety also offers Trapped Key Switches (on mechanical lock models only).

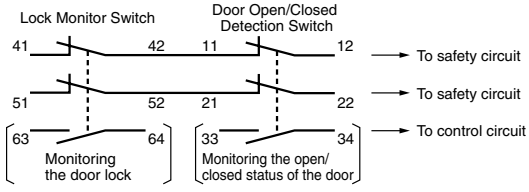
As long as a person has the trapped key when he enters a hazardous area, he does not have to worry about somebody locking the door and trapping him inside. The door can be opened only by supplying power to the solenoid and then turning the trapped key to unlock the D4JL.

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



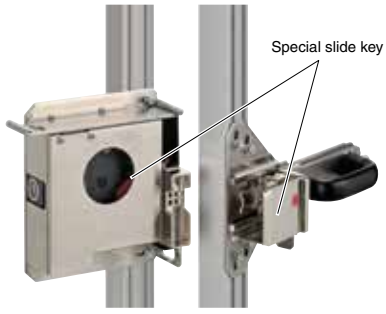
Two Safety Circuits and Two Monitor Contacts

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.



Models with Rear Release Buttons

A Switch with a rear release button allows the door to be unlocked from inside a hazardous area in an emergency. STI also offers Switches with Special Slide Keys. Refer to the D4NS-SK/D4JL-SK for details.



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 Product Service	EN 60947-5-1 (certified direct opening)	Consult your representative for details.
UL *1	UL 508, CSA C22.2 No.14	
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 (Ie)	3 A	0.27 A
Rated operating voltage (Ue)	240 V	250 V

Note: Use a 10 A fuse type gI or gG that conforms to IEC 60269 as a short-circuit protection device. This fuse is not built into the Switch.

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

A300

Rated voltage	Carry current	Current (A)		Volt-amperes (VA)	
		Make	Break	Make	Break
120 VAC	10 A	60	6	7,200	720
240 VAC		30	3		

Q300

Rated voltage	Carry current	Current (A)		Volt-amperes (VA)	
		Make	Break	Make	Break
125 VDC	2.5 A	0.55	0.55	69	69
250 VDC		0.27	0.27		

Solenoid Coil Characteristics

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

Indicator Characteristics

Item	Type	LED	
Rated voltage		24 VDC	24 VDC
Current consumption		Approx. 1 mA	Approx. 8 mA
Color (LED)		Orange	Green

Characteristics

Degree of protection *1		IP67 (EN60947-5-1)
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 frequency		30 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		3,000 N min.
Contact resistance		25 mΩ max. (per contact)
Minimum applicable load *6		1 mA resistive load at 5 VDC (N-level reference value)
Rated insulation voltage (Ui)		300 V (EN60947-5-1)
Rated frequency		50/60 Hz
Protection against electric shock		Class II (double insulation)
Pollution degree (operating environment)		3 (EN60947-5-1)
Impulse withstand voltage (EN60947-5-1)	Between terminals of same polarity	2.5 kV
	Between terminals of different polarity	4 kV
	Between other terminals and non-current carrying metallic parts.	6 kV
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact gap		2 x 2 mm min.
Vibration resistance	Malfunction	10 to 55 Hz, 0.75 mm single amplitude
Shock resistance	Destruction	1,000 m/s^2 min.
	Malfunction	80 m/s^2 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)
Ambient operating temperature		-10 to +55°C (with no icing)
Ambient operating humidity		95% max.
Weight		Approx. 650 g (D4JL-4NFA-C7-01)

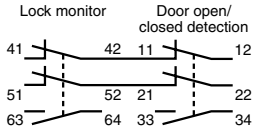
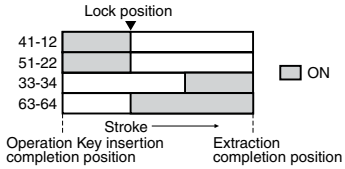
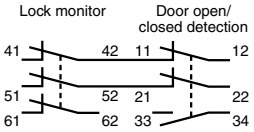
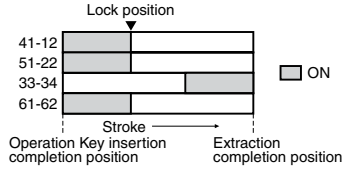
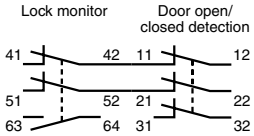
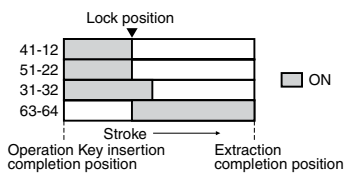
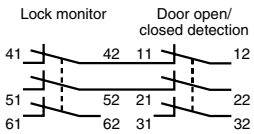
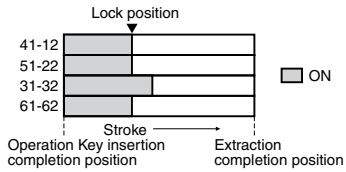
Notes: The above values are initial values.
*1. The degree of protection is tested using the method specified by the standard (EN60947-5-1). Confirm that sealing properties are sufficient for the operating conditions and environment beforehand. Although the switch box is protected from dust or water 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 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.

G

Connections

Contact Forms

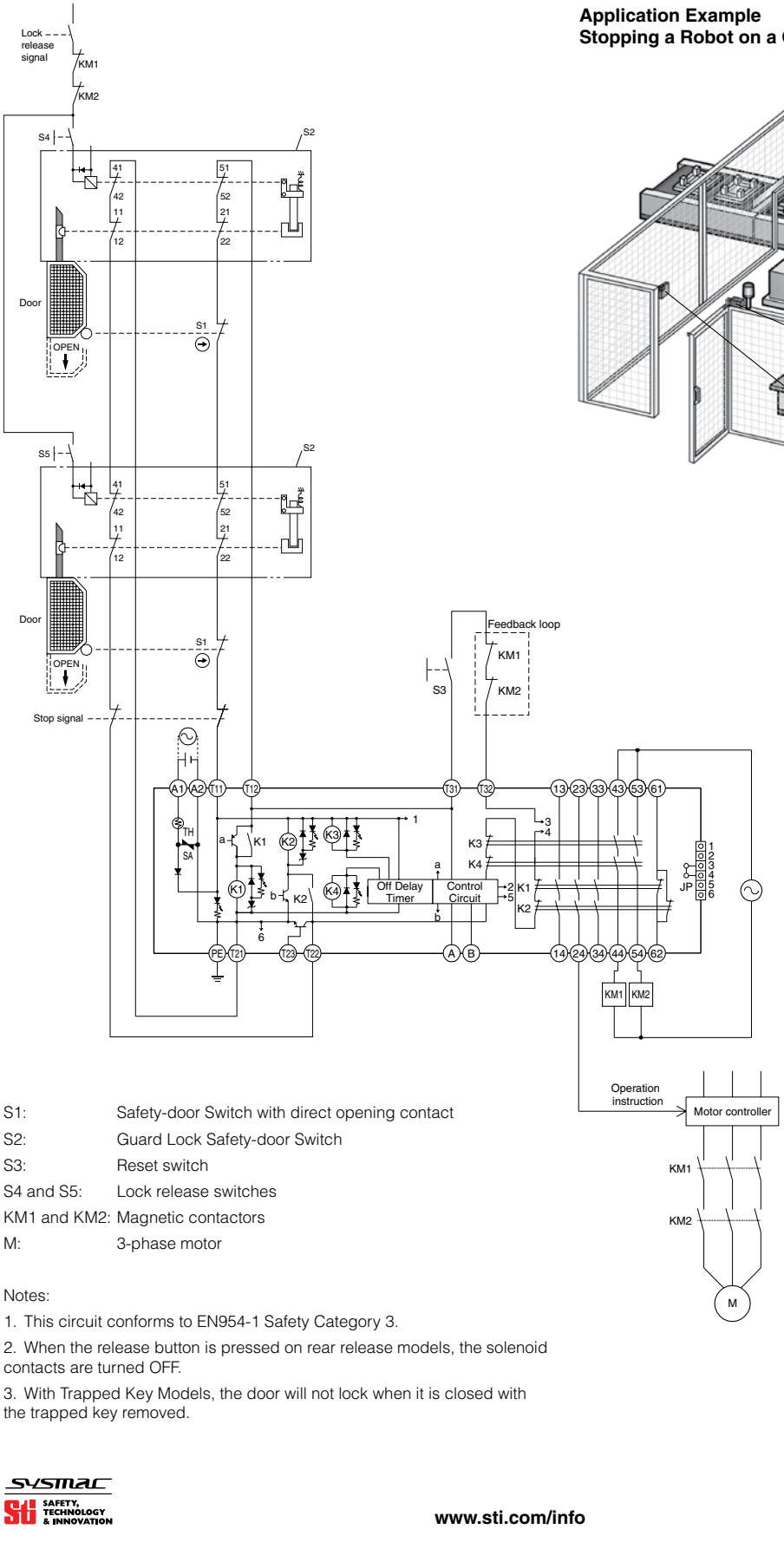
Indicates conditions where the Key is inserted and the lock is applied. Terminals 42-11 and terminals 52-21 are connected internally (as per BIA GS-ET-19).

Model	Contact (door open/closed detection and lock monitor)	Contact form		Operating pattern	Remarks
		Lock monitor	Door open/ closed detection		
D4JL-□NF□-□	2NC/1NO+2NC/ 1NO				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				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				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				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.

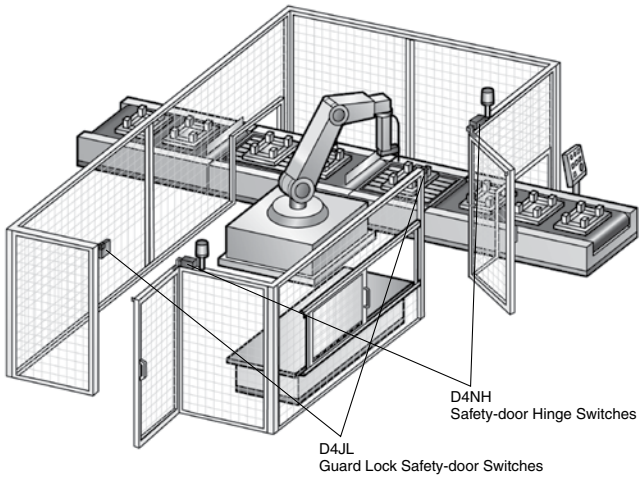
G

Application Examples

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



Application Example
Stopping a Robot on a Conveyor Line



S1:	Safety-door Switch with direct opening contact
S2:	Guard Lock Safety-door Switch
S3:	Reset switch
S4 and S5:	Lock release switches
KM1 and KM2:	Magnetic contactors
M:	3-phase motor

Notes:

1. This circuit conforms to EN954-1 Safety Category 3.
2. When the release button is pressed on rear release models, the solenoid contacts are turned OFF.
3. With Trapped Key Models, the door will not lock when it is closed with the trapped key removed.

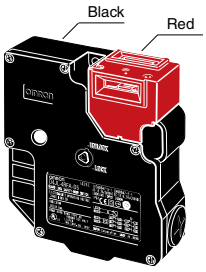
Dimensions and Operating Characteristics

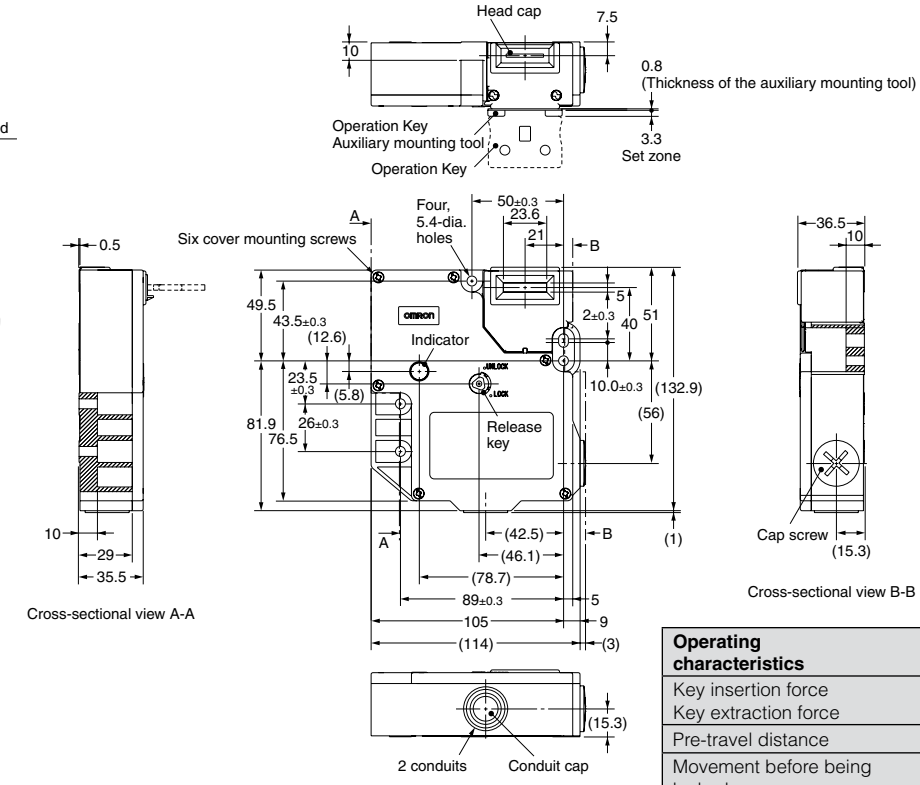
(mm)

Dimensions and Operating Characteristics

Switches

D4JL-□□F□-C5
D4JL-□□F□-D5



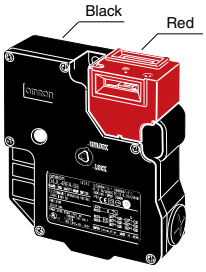


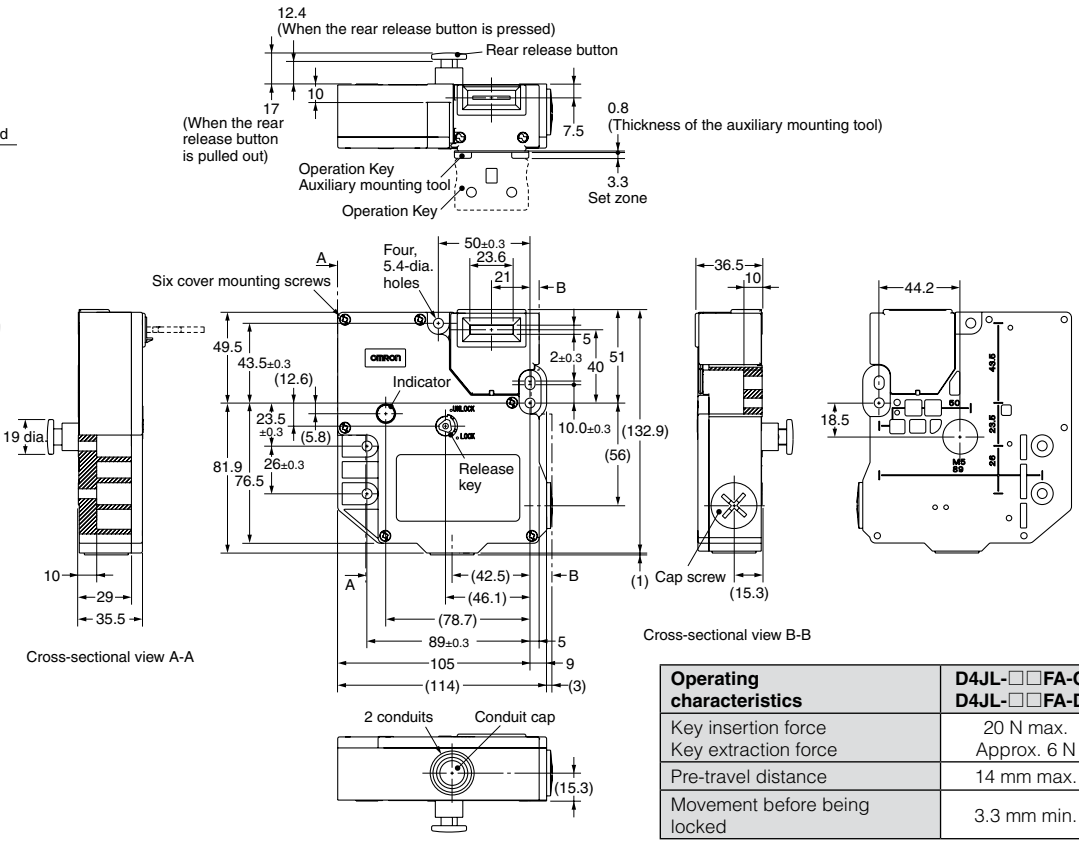
Cross-sectional view A-A

Cross-sectional view B-B

Operating characteristics	D4JL-□□F□-C5 D4JL-□□F□-D5
Key insertion force Key extraction force	20 N max. Approx. 6 N
Pre-travel distance	14 mm max.
Movement before being locked	3.3 mm min.

D4JL-□□FA-C6
D4JL-□□FA-D6





Cross-sectional view A-A

Cross-sectional view B-B

Operating characteristics	D4JL-□□FA-C6 D4JL-□□FA-D6
Key insertion force Key extraction force	20 N max. Approx. 6 N
Pre-travel distance	14 mm max.
Movement before being locked	3.3 mm min.

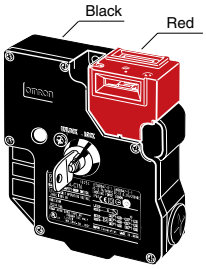
Dimensions and Operating Characteristics (continued)

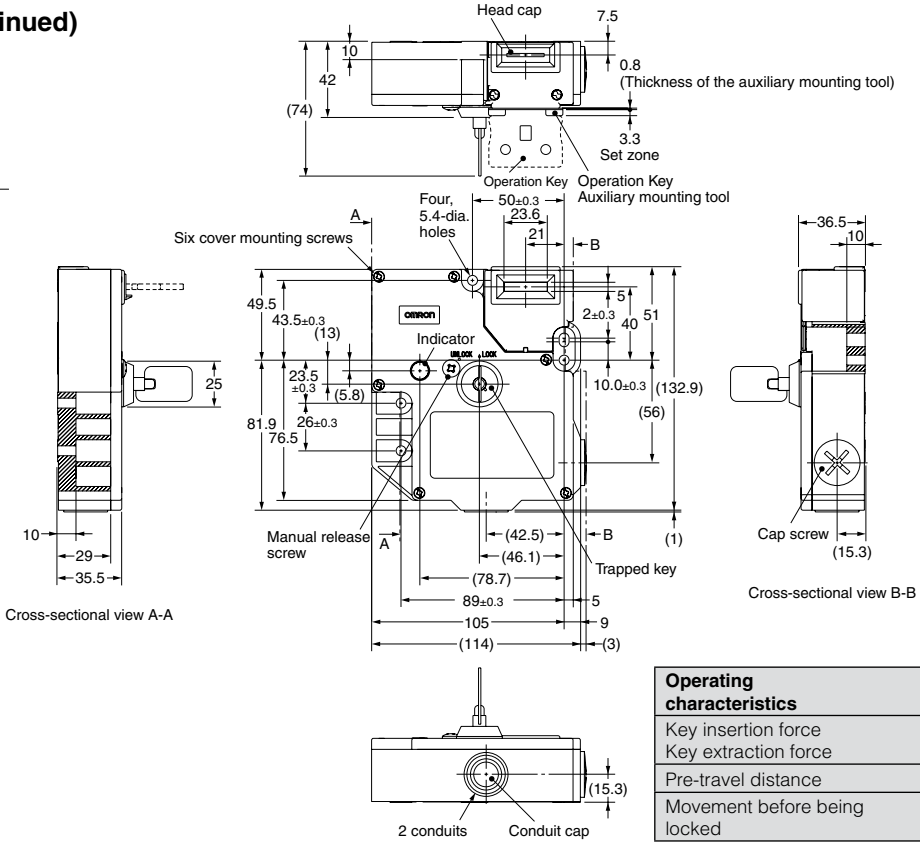
(mm)

Dimensions and Operating Characteristics

Switches (continued)

D4JL-□□FA-C7
D4JL-□□FA-D7

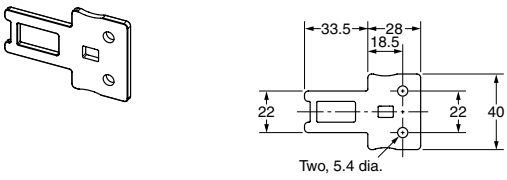




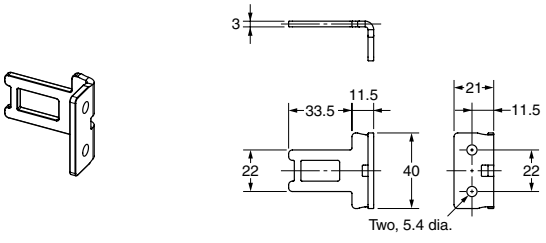
Operating characteristics	D4JL-□□FA-C7 D4JL-□□FA-D7
Key insertion force Key extraction force	20 N max. Approx. 6 N
Pre-travel distance	14 mm max.
Movement before being locked	3.3 mm min.

Operation Keys

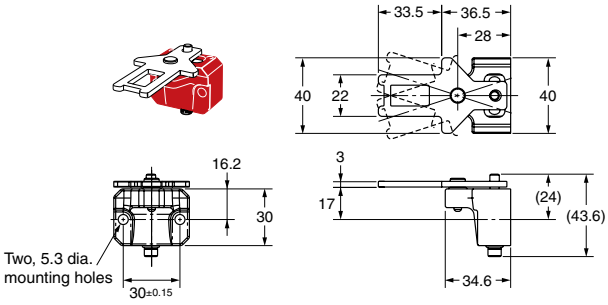
D4JL-K1



D4JL-K2

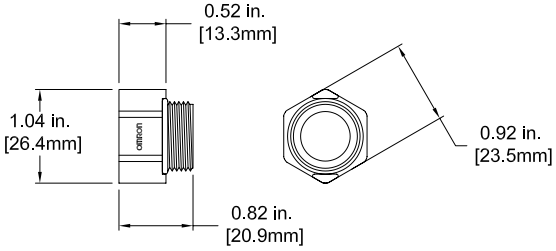


D4JL-K3



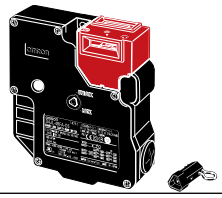
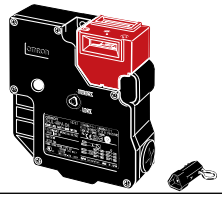
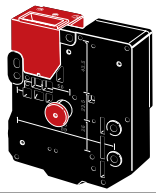
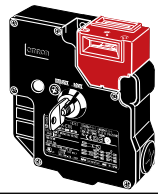
Note: Unless otherwise specified, a tolerance of ±0.8 mm applies to all Switch dimensions and a tolerance of ±0.4 mm applies to Operation Key dimensions.

M20-NPT Adapter

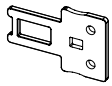


G

Ordering

Release key position	Front	Front and rear release button	Front
Release key type	Special release key	Special release key	Trapped key
Switch appearance		Front  Rear 	

Operation Keys

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

Special Release Key

Type	Model
Special Release Key for D4GL, D4JL, D4NL, and D4SL Switches 	D4NL-RK

Model Number Structure

Switch

D4JL – ☐ ☐ ☐ ☐ – ☐ ☐ – ☐☐ – ☐
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Conduit Size
2: G1/2
4: M20

❷ 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)

❸ Head Material
F: Plastic

❹ Door Lock and Release
A: Mechanical lock/24 VDC solenoid release
G: 24 VDC Solenoid lock/Mechanical release

❺ Indicator
C: 24 VDC (green LED indicator)
D: 24 VDC (orange LED indicator)

❻ Release Key Type
5: Special release key. *1
6: Special release key + rear release button. *1
7: Trapped key

❼ Trapped Key Type
01 to 30: 30 types *2

❽ M20-to-NPT Adapter
Blank: Adapter is not included
NPT: Adapter is included

Operation Key

D4JL-K ☐
❶

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

For information on the D4JL-SK Slide Key, see page G196.

Notes:
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.

Ordering (continued)

Switches (Operation keys are sold separately.)

Standard Models with certified direct opening mechanisms

Release key type	Indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit opening	Model
Special release key	Green	Mechanical lock Solenoid release	2NC/1NO+2NC/1NO	NPT	D4JL-4NFA-C5-NPT
				M20	D4JL-4NFA-C5
			2NC/1NO+3NC	NPT	D4JL-4PFA-C5-NPT
				M20	D4JL-4PFA-C5
			3NC+2NC/1NO	NPT	D4JL-4QFA-C5-NPT
				M20	D4JL-4QFA-C5
			3NC+3NC	NPT	D4JL-4RFA-C5-NPT
				M20	D4JL-4RFA-C5
		Solenoid lock Mechanical release	2NC/1NO+2NC/1NO	NPT	D4JL-4NFG-C5-NPT
				M20	D4JL-4NFG-C5
			2NC/1NO+3NC	NPT	D4JL-4PFG-C5-NPT
				M20	D4JL-4PFG-C5
			3NC+2NC/1NO	NPT	D4JL-4QFG-C5-NPT
				M20	D4JL-4QFG-C5
			3NC+3NC	NPT	D4JL-4RFG-C5-NPT
				M20	D4JL-4RFG-C5
	Orange	Mechanical lock Solenoid release	2NC/1NO+2NC/1NO	NPT	D4JL-4NFA-D5-NPT
				M20	D4JL-4NFA-D5
			2NC/1NO+3NC	NPT	D4JL-4PFA-D5-NPT
				M20	D4JL-4PFA-D5
			3NC+2NC/1NO	NPT	D4JL-4QFA-D5-NPT
				M20	D4JL-4QFA-D5
			3NC+3NC	NPT	D4JL-4RFA-D5-NPT
				M20	D4JL-4RFA-D5
		Solenoid lock Mechanical release	2NC/1NO+2NC/1NO	NPT	D4JL-4NFG-D5-NPT
				M20	D4JL-4NFG-D5
			2NC/1NO+3NC	NPT	D4JL-4PFG-D5-NPT
				M20	D4JL-4PFG-D5
			3NC+2NC/1NO	NPT	D4JL-4QFG-D5-NPT
				M20	D4JL-4QFG-D5
			3NC+3NC	NPT	D4JL-4RFG-D5-NPT
				M20	D4JL-4RFG-D5
	Green	Mechanical lock Solenoid release	2NC/1NO+2NC/1NO	NPT	D4JL-4NFA-C6-NPT
				M20	D4JL-4NFA-C6
			2NC/1NO+3NC	NPT	D4JL-4PFA-C6-NPT
				M20	D4JL-4PFA-C6
			3NC+2NC/1NO	NPT	D4JL-4QFA-C6
				M20	D4JL-4QFA-C6
			3NC+3NC	NPT	D4JL-4RFA-C6-NPT
				M20	D4JL-4RFA-C6
	Orange		2NC/1NO+2NC/1NO	NPT	D4JL-4NFA-D6-NPT
				M20	D4JL-4NFA-D6
			2NC/1NO+3NC	NPT	D4JL-4PFA-D6-NPT
				M20	D4JL-4PFA-D6
			3NC+2NC/1NO	NPT	D4JL-4QFA-D6-NPT
				M20	D4JL-4QFA-D6
			3NC+3NC	NPT	D4JL-4RFA-D6-NPT
				M20	D4JL-4RFA-D6

(Continued on next page)

G

Ordering (continued)

Switches (continued) (Operation keys are sold separately.)

Models with Trapped Keys and certified direct opening mechanisms

Release key type	Indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit opening	Model
Trapped key *1	Green	Mechanical lock Solenoid release	2NC/1NO+2NC/1NO	NPT	D4JL-4NFA-C7-01-NPT
				M20	D4JL-4NFA-C7-01
			2NC/1NO+3NC	NPT	D4JL-4PFA-C7-01-NPT
				M20	D4JL-4PFA-C7-01
			3NC+2NC/1NO	NPT	D4JL-4QFA-C7-01-NPT
				M20	D4JL-4QFA-C7-01
			3NC+3NC	NPT	D4JL-4RFA-C7-01-NPT
				M20	D4JL-4RFA-C7-01
	Orange		2NC/1NO+2NC/1NO	NPT	D4JL-4NFA-D7-01-NPT
				M20	D4JL-4NFA-D7-01
			2NC/1NO+3NC	NPT	D4JL-4PFA-D7-01-NPT
				M20	D4JL-4PFA-D7-01
			3NC+2NC/1NO	NPT	D4JL-4QFA-D7-01-NPT
				M20	D4JL-4QFA-D7-01
			3NC+3NC	NPT	D4JL-4RFA-D7-01-NPT
				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.