D4NL

SpeedSPEC www.sti.com
D4NL

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.

Guard Lock Safety-Door Switch

- Best-selling guard lock safety-door switch available in several compact, multi-contact models
- Selectable Operation Key insertion direction and adjustable mounting ensure installation flexibility
- Built-in switches with multiple-contact construction are available
- Key holding force of 1,300 N minimum
- Can be used for either standard loads or microloads
- Lineup includes models with a conduit size of M20
- IP67 degree of protection
- Variety of metallic heads available
- A Rapid Delivery Product: Select models are available for shipment today or within 3 to 5 days

G

Specifications

Standards and EC Directives

Conforms to the following EC Directives:
- Machinery Directive
- Low Voltage Directive
- EN 1088
- EN 60204-1
- GS-ET-19

Certified Standards

Certification body	Standard	File No.
TÜV SÜD	EN 60947-5-1 (certified direct opening)	Consult your representative for details.
UL *1	UL 508, CSA C22.2 No.14	E76675
CQC (CCC)	GB14048.5	2003010305064267
KOSHA *2	EN60947-5-1	2005-196

*1. Certification for CSA C22.2 No. 14 is certified by the UL mark.
*2. Only certain models have been certified.

Certified Standard Ratings

TÜV (EN 60947-5-1), CCC (GB14048.5)

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	110 VAC	230 VAC
Rated operating voltage (100% ED)	24 VDC $^{+10\%}_{-15\%}$	110 VAC ±10%	230 VAC ±10%
Current consumption	Approx. 200 mA	Approx. 50 mA	Approx. 30 mA
Insulation Class	Class F (130°C max.)		

Indicator Characteristics

Item Type	LED
Rated voltage	10 to 115 VAC/VDC
Current consumption	Approx. 1 mA
Color (LED)	Orange

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Connections

Contact Form

Indicates conditions where the Key is inserted and the lock is applied. Terminals 12 and 41 are connected internally (as per GS-ET-19).
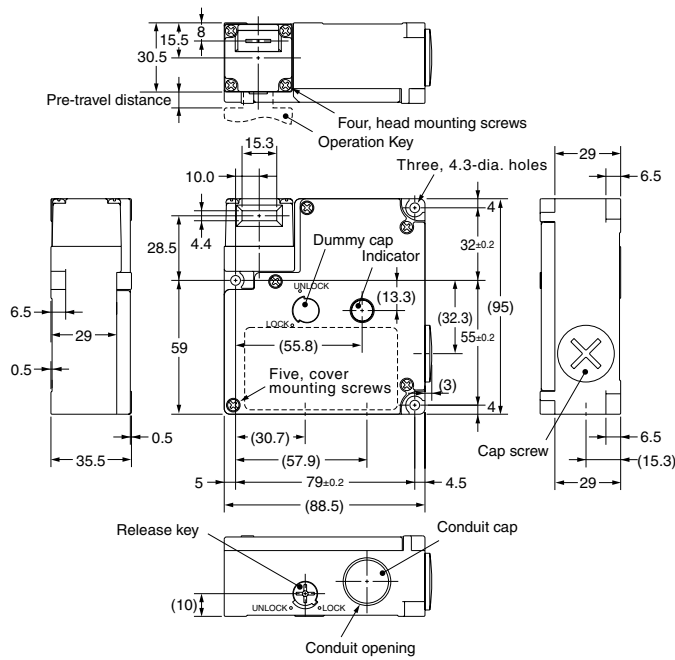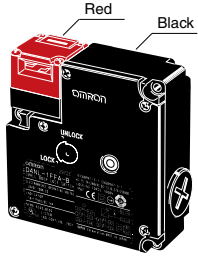
Model	Contact (door open/closed detection and lock monitor)	Contact form — Door open/closed detection	Lock monitor	Operating pattern	Remarks
D4NL-□AF□-□	1NC/1NO + 1NC/1NO	Door open/closed detection: 11–12 (Zb), 33–34	Lock monitor: 41–42 (Zb), 53–54	Lock position. 11-42, 33-34, 53-54. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-42, 33-34, and 53-54 can be used as unlike poles.
D4NL-□BF□-□	1NC/1NO + 2NC	Door open/closed detection: 11–12 (Zb), 33–34	Lock monitor: 41–42 (Zb), 51–52	Lock position. 11-42, 33-34, 51-52. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-42, 33-34, and 51-52 can be used as unlike poles.
D4NL-□CF□-□	2NC + 1NC/1NO	Door open/closed detection: 11–12 (Zb), 31–32	Lock monitor: 41–42 (Zb), 53–54	Lock position. 11-42, 31-32, 53-54. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 31-32, and 53-54 can be used as unlike poles.
D4NL-□DF□-□	2NC + 2NC	Door open/closed detection: 11–12 (Zb), 31–32	Lock monitor: 41–42 (Zb), 51–52	Lock position. **11-42**, 31-32, **51-52**. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12 and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 31-32, and 51-52 can be used as unlike poles.
D4NL-□EF□-□	2NC/1NO + 1NC/1NO	Door open/closed detection: 11–12 (Zb), 21–22, 33–34	Lock monitor: 41–42 (Zb), 53–54	Lock position. **11-42**, **21-22**, **33-34**, **53-54**. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 33-34, and 53-54 can be used as unlike poles.
D4NL-□FF□-□	2NC/1NO + 2NC	Door open/closed detection: 11–12 (Zb), 21–22, 33–34	Lock monitor: 41–42 (Zb), 51–52	Lock position. 11-42, 21-22, 33-34, 51-52. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 33-34, and 51-52 can be used as unlike poles.
D4NL-□GF□-□	3NC + 1NC/1NO	Door open/closed detection: 11–12 (Zb), 21–22, 31–32	Lock monitor: 41–42 (Zb), 53–54	Lock position. 11-42, 21-22, 31-32, 53-54. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 31-32, and 53-54 can be used as unlike poles.
D4NL-□HF□-□	3NC + 2NC	Door open/closed detection: 11–12 (Zb), 21–22, 31–32	Lock monitor: 41–42 (Zb), 51–52	Lock position. 11-42, 21-22, 31-32, 51-52. ON. Stroke. Operation/Key insertion completion position → Extraction completion position	Only NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→) The terminals 11-42, 21-22, 31-32, and 51-52 can be used as unlike poles.

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Dimensions and Operating Characteristics

(mm)

Switches

D4NL-□□□□-B

Operating characteristics	D4NL-□□□□-BS
Key insertion force Key extraction force	15 N max. 30 N max.
Pre-travel distance	9 mm max.
Movement before being locked	3 mm min.
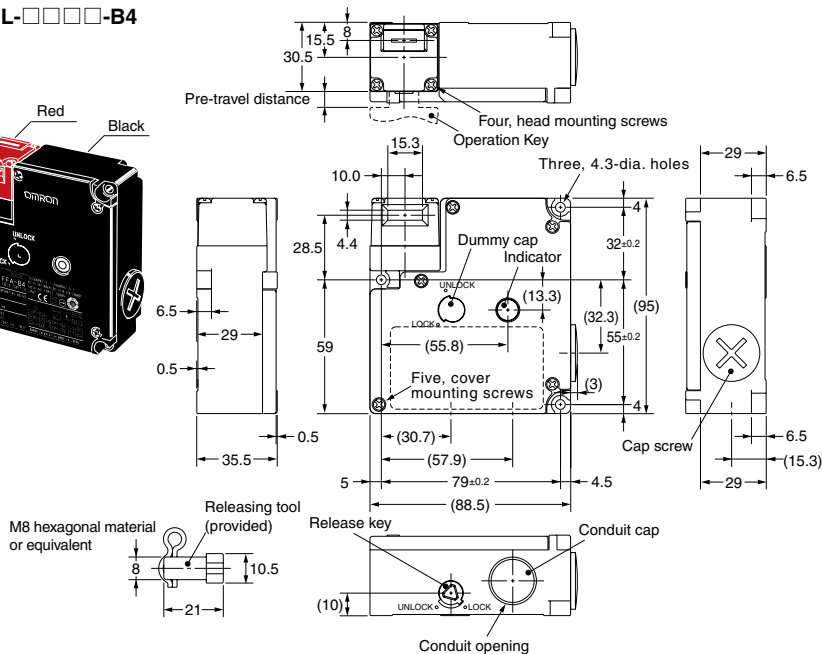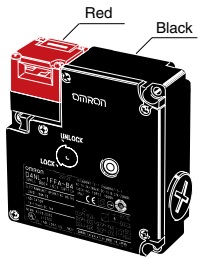
D4NL-□□□□-B4

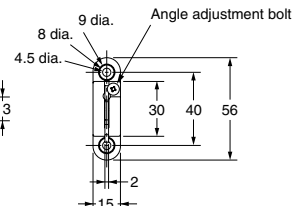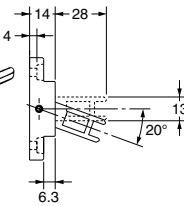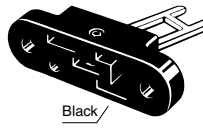| Operating characteristics	D4NL-□□□□-B4
Key insertion force Key extraction force	15 N max. 30 N max.
Pre-travel distance	9 mm max.
Movement before being locked	3 mm min.

Notes:
1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
2. There are fluctuations in the contact ON/OFF timing for Switches with multiple poles (2NC, 2NC/1NO, or 3NC). Confirm performance before application.

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Dimensions and Operating Characteristics (continued)

(mm)

D4NL-☐☐☐☐-BS

Red   Black

Pre-travel distance
Four, head mounting screws
Operation Key
Three, 4.3-dia. holes
Release key
Indicator
UNLOCK
LOCK
Five, cover mounting screws
Cap screw
Dummy cap
Conduit cap
Conduit opening

15.5 8
30.5
15.3
10.0
28.5 4.4
6.5
29
0.5
59
35.5
0.5
5
(30.7)
(57.9)
79±0.2
4.5
(88.5)
(31.5)
(55.8)
(13.3)
32±0.2
(32.3)
55±0.2
(95)
(3)
4
4
29
6.5
6.5
(15.3)
29

Operating characteristics	D4NL-☐☐☐☐-BS
Key insertion force Key extraction force	15 N max. 30 N max.
Pre-travel distance	9 mm max.
Movement before being locked	3 mm min.

D4NL-☐☐☐☐-B4S

G

Red   Black

Pre-travel distance
Four, head mounting screws
Operation Key
Three, 4.3-dia. holes
Release key
Indicator
UNLOCK
LOCK
Five, cover mounting screws
Cap screw
Conduit cap
Dummy cap
UNLOCK LOCK
Conduit opening

15.5 8
30.5
15.3
10.0
28.5 4.4
6.5
29
0.5
59
35.5
0.5
5
(30.7)
(57.9)
79±0.2
4.5
(88.5)
(31.5)
(55.8)
(13.3)
32±0.2
(32.3)
55±0.2
(95)
(3)
4
4
29
6.5
6.5
(15.3)
29

M8 hexagonal material or equivalent
Releasing tool (provided)
8
10.5
21

Operating characteristics	D4NL-☐☐☐☐-B4S
Key insertion force Key extraction force	15 N max. 30 N max.
Pre-travel distance	9 mm max.
Movement before being locked	3 mm min.

Notes:
1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
2. There are fluctuations in the contact ON/OFF timing for Switches with multiple poles (2NC, 2NC/1NO, or 3NC). Confirm performance before application.
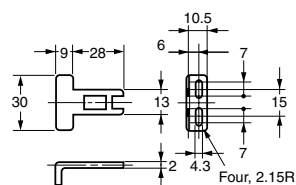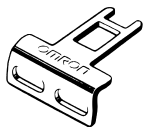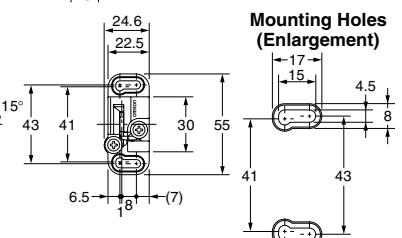
Operation Keys

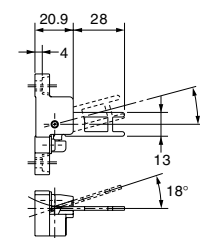### D4DS-K1

17.5 28
13
7 4.3
30 15 13
7
Four, 2.15R
2

D4DS-K3

14 28
4
Black
13
20°
6.3
9 dia.
8 dia.
4.5 dia.
Angle adjustment bolt
30 40 56
2
15

D4DS-K2

9 28
10.5
6 7
30 13 15
7
2 4.3
Four, 2.15R

D4DS-K5

20.9 28
4
Black
13
18°
24.6
22.5
15°
43 41
30 55
6.5 8 (7)
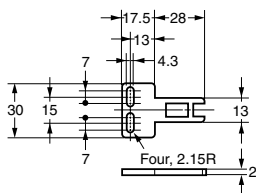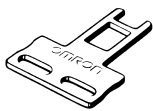
Mounting Holes (Enlargement)

17
15
4.5
8
41 43

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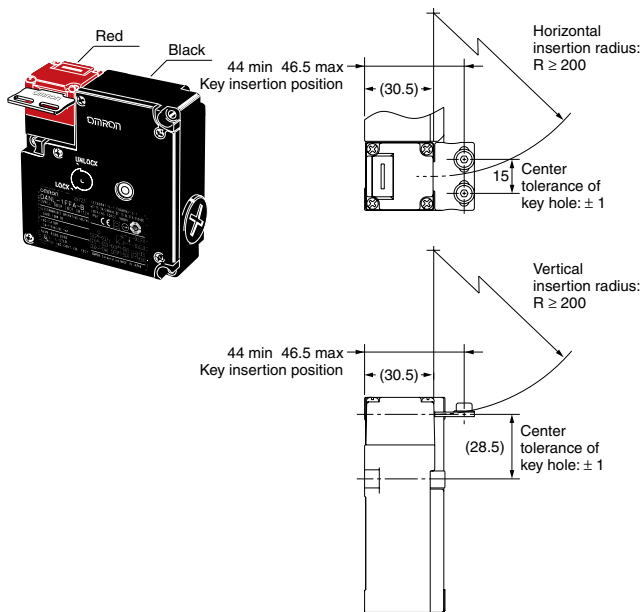STI SAFETY, TECHNOLOGY & INNOVATION

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Dimensions and Operating Characteristics (continued)

(mm)

With Operating Key Inserted

**D4NL + D4DS-K1
(with Front-inserted Operation Key)**
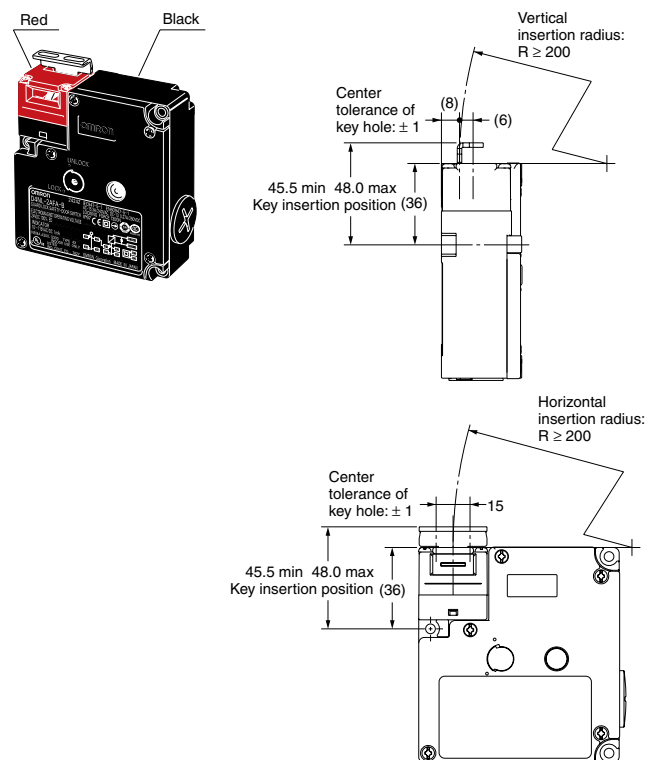
Red Black

44 min 46.5 max
Key insertion position

Horizontal insertion radius: R ≥ 200

(30.5)

15 Center tolerance of key hole: ± 1

Vertical insertion radius: R ≥ 200

44 min 46.5 max
Key insertion position

(30.5)

(28.5)

Center tolerance of key hole: ± 1

**D4NL + D4DS-K1
(with Top-inserted Operation Key)**

Red Black

Vertical insertion radius: R ≥ 200

Center tolerance of key hole: ± 1

(8)

49.5 min 52.0 max
Key insertion position (36)

Horizontal insertion radius: R ≥ 200

Center tolerance of key hole: ± 1

15

49.5 min 52.0 max
Key insertion position (36)

G
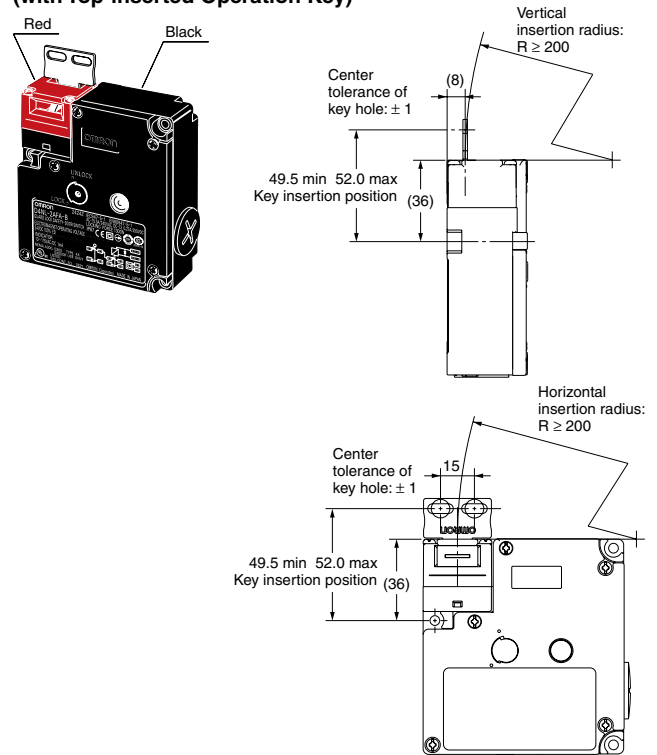
**D4NL + D4DS-K2
(with Front-inserted Operation Key)**

Red Black

40 min 42.5 max
Key insertion position

Horizontal insertion radius: R ≥ 200

(30.5)

15 Center tolerance of key hole: ± 1

Vertical insertion radius: R ≥ 200

40 min 42.5 max
Key insertion position

(30.5) (6)

(22.5)

Center tolerance of key hole: ± 1

(28.5)
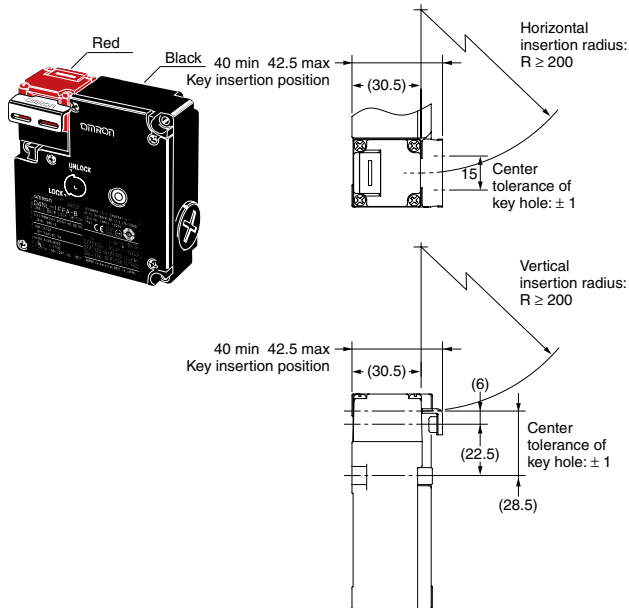
**D4NL + D4DS-K2
(with Top-inserted Operation Key)**

Red Black

Vertical insertion radius: R ≥ 200

Center tolerance of key hole: ± 1

(8) (6)

45.5 min 48.0 max
Key insertion position (36)

Horizontal insertion radius: R ≥ 200

Center tolerance of key hole: ± 1

15

45.5 min 48.0 max
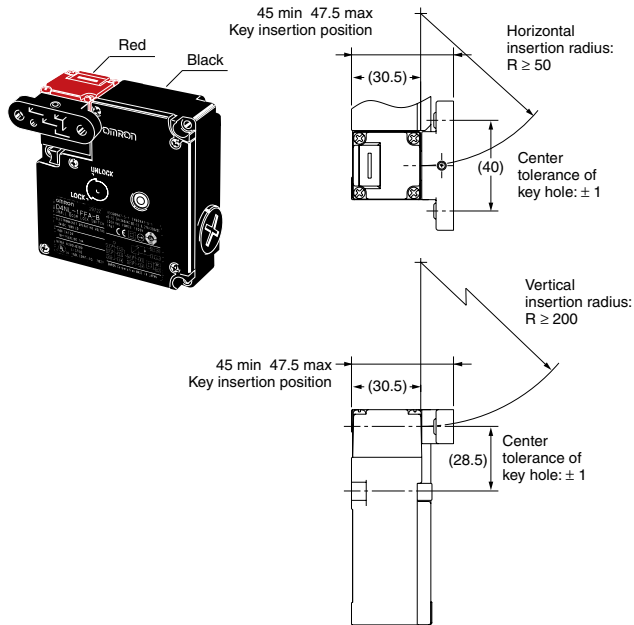Key insertion position (36)

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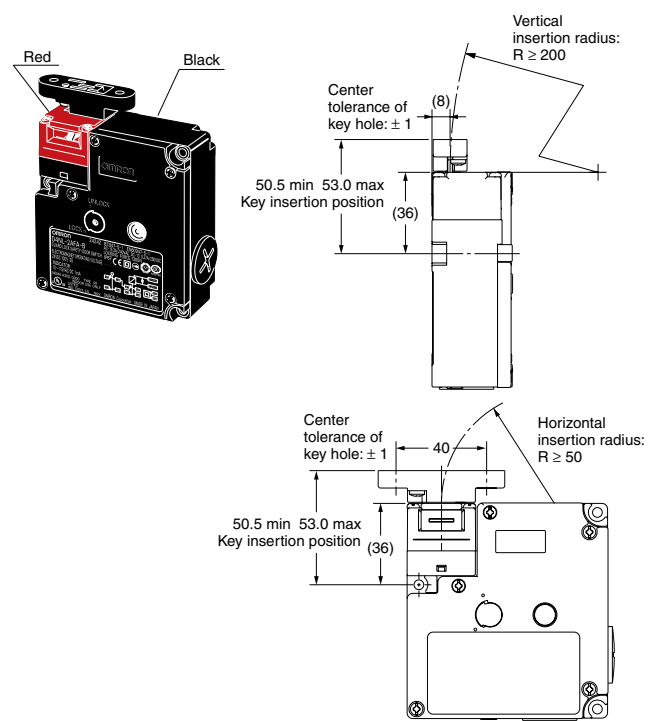
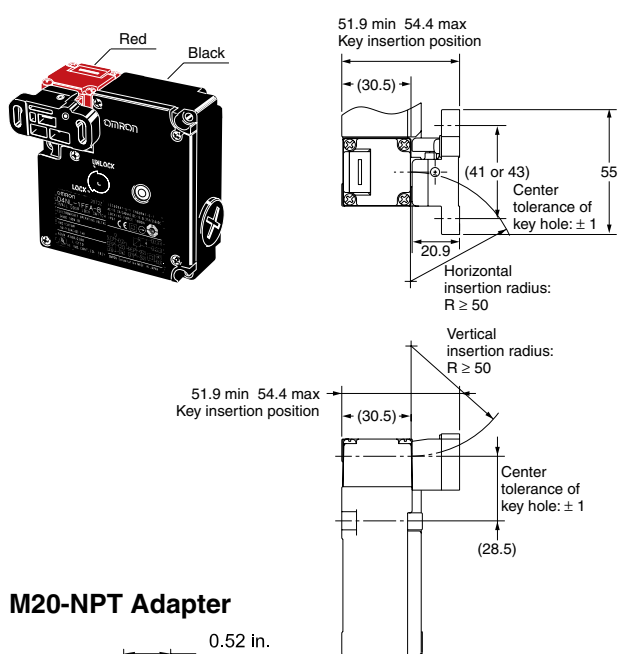# Dimensions and Operating Characteristics (continued) (mm)
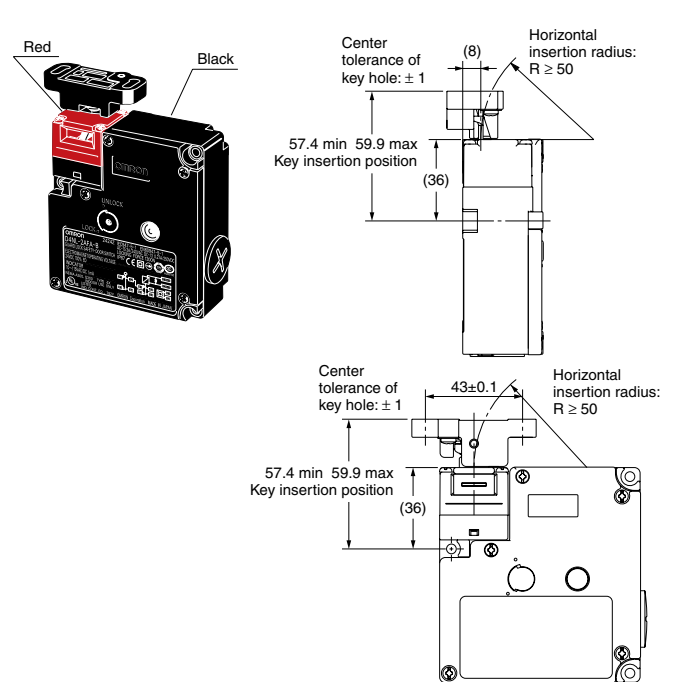
D4NL + D4DS-K3
(with Front-inserted Operation Key)

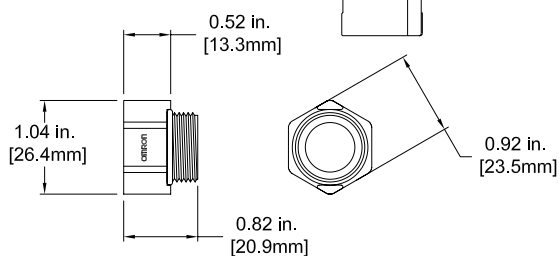### D4NL + D4DS-K3
(with Top-inserted Operation Key)

D4NL + D4DS-K5
(with Front-inserted Operation Key)

D4NL + D4DS-K5
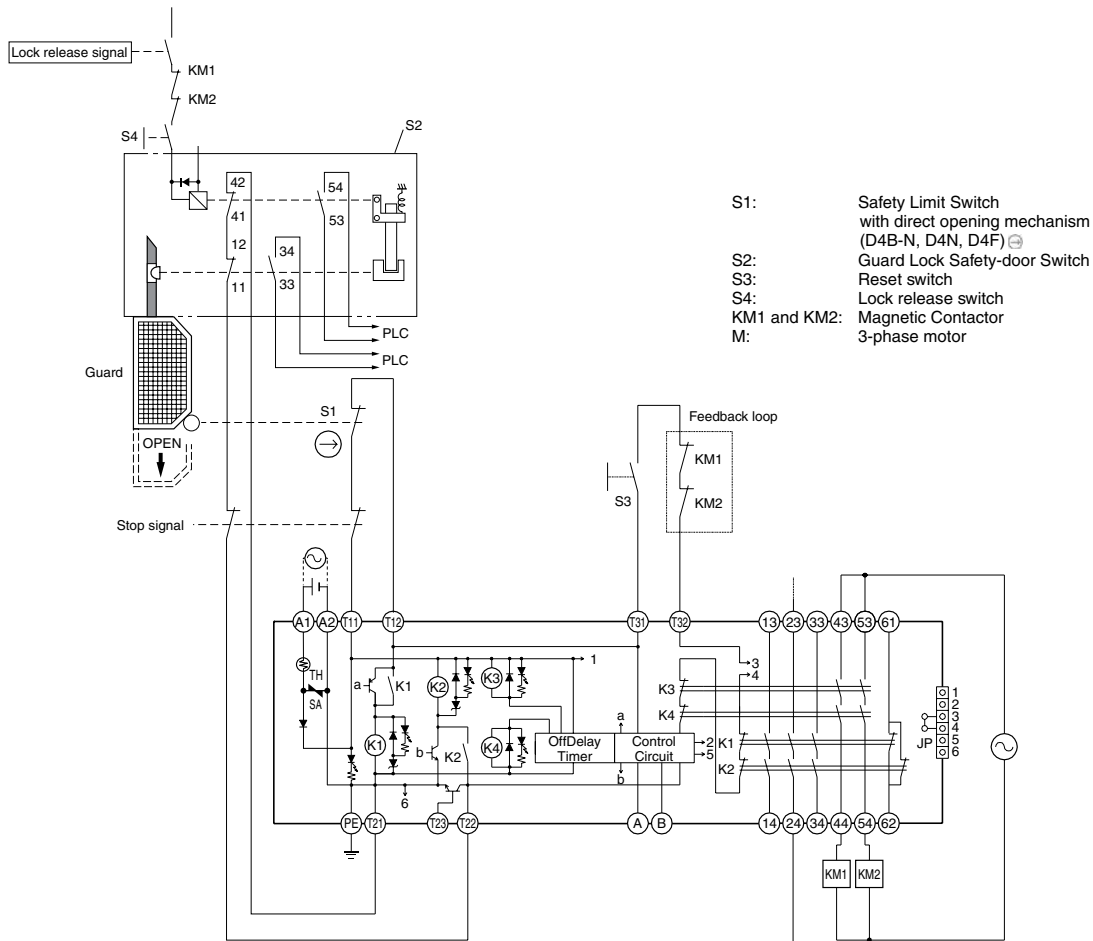### (with Top-inserted Operation Key)

M20-NPT Adapter
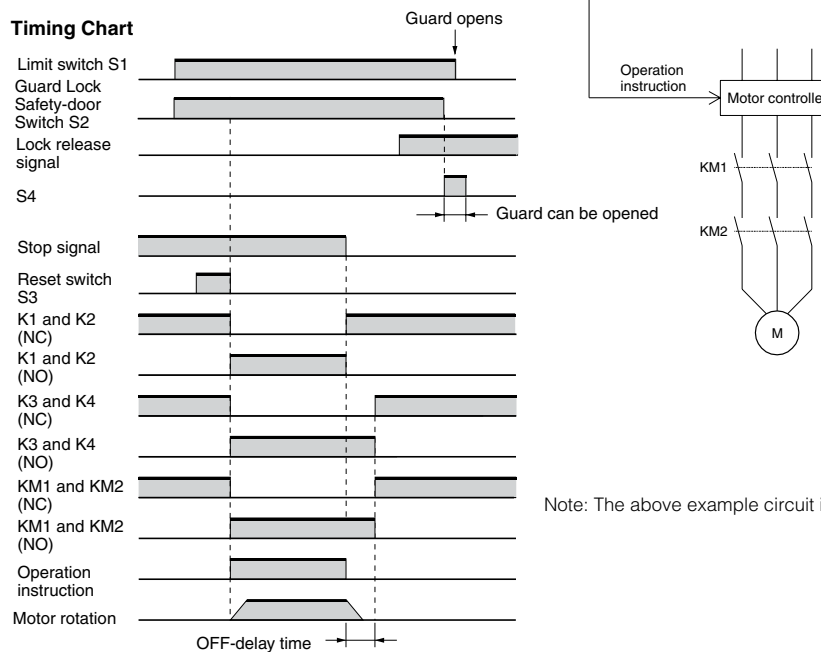
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Application Examples

G9SA-321-T□ (24 VAC/VDC) + D4NL-□A□A-□, -□A□B-□, -□A□C-□ (Mechanical Lock Type) Circuit Diagram (Manual Reset)

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

G

Feedback loop

Lock release signal
KM1
KM2
S4
S2
Guard
OPEN
Stop signal
S1
PLC
PLC
S3
KM1
KM2

Timing Chart

Guard opens

Limit switch S1	
Guard Lock Safety-door Switch S2	
Lock release signal	
S4	Guard can be opened
Stop signal	
Reset switch S3	
K1 and K2 (NC)	
K1 and K2 (NO)	
K3 and K4 (NC)	
K3 and K4 (NO)	
KM1 and KM2 (NC)	
KM1 and KM2 (NO)	
Operation instruction	
Motor rotation	

OFF-delay time

Operation instruction

Motor controller

KM1

KM2

M

Note: The above example circuit is for Category 3.

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Ordering

Model Number Structure

Switch

D4NL – ☐ ☐ ☐ ☐ – ☐ ☐ ☐ – ☐
　　　　❶ ❷ ❸ ❹　❺ ❻ ❼　❽

❶ Conduit Size
　1: Pg13.5
　2: G1/2
　4: M20

❷ Built-in Switch (with Door Open/Closed Detection Switch and Lock Monitor Switch Contacts)
　A: 1NC/1NO (slow-action contacts) + 1NC/1NO (slow-action contacts)
　B: 1NC/1NO (slow-action contacts) + 2NC (slow-action contacts)
　C: 2NC (slow-action contacts) + 1NC/1NO (slow-action contacts)
　D: 2NC (slow-action contacts) + 2NC (slow-action contacts)
　E: 2NC/1NO (slow-action contacts) + 1NC/1NO (slow-action contacts)
　F: 2NC/1NO (slow-action contacts) + 2NC (slow-action contacts)
　G: 3NC (slow-action contacts) + 1NC/1NO (slow-action contacts)
　H: 3NC (slow-action contacts) + 2NC (slow-action contacts)

❸ Head Mounting Direction and Material
　F: Four mounting directions possible (Front-side mounting at shipping)/plastic
　D: Four mounting directions possible (Front-side mounting at shipping)/metal

❹ Door Lock and Release
　A: Mechanical lock/24 VDC solenoid release
　B: Mechanical lock/110 VAC solenoid release*
　G: 24 VDC solenoid lock/mechanical release
　H: 110 VAC solenoid lock/mechanical release*

❺ Indicator
　B: 10 to 115 VAC/VDC (orange LED indicator)

❻ Release Key Type
　Blank: Standard
　4: Special release key

❼ Release Key Position
　Blank: Bottom
　S: Front

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

* 110 VAC version is not available for -4☐-NPT models.

Operation Key

D4DS-K ☐
　　　　❶

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

Type	Model
Horizonal mounting	D4DS-K1
Vertical mounting	D4DS-K2
Adustable mounting (horizontal)	D4DS-K3
Adjustable mounting (horizontal/vertical)	D4DS-K5

Special Release Key

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

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Ordering (continued)

List of Models

Switches with direct opening mechanisms (Operation Keys are sold separately)

Head material	Release key position	Release key type	Solenoid voltage/ indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts) (slow-action) Certified direct opening NC contact	Conduit opening	Model
Plastic	Bottom	Standard	Solenoid: 24 VDC Orange LED: 10 to 115 VAC/VDC	Mechanical lock Solenoid release	1NC/1NO+1NC/1NO	M20	D4NL-4AFA-B
						M20 with 1/2" NPT adaptor	D4NL-4AFA-B-NPT
					1NC/1NO+2NC	M20	D4NL-4BFA-B
						M20 with 1/2" NPT adaptor	D4NL-4BFA-B-NPT
					2NC+1NC/1NO	M20	D4NL-4CFA-B
						M20 with 1/2" NPT adaptor	D4NL-4CFA-B-NPT
					2NC+2NC	M20	D4NL-4DFA-B
						M20 with 1/2" NPT adaptor	D4NL-4DFA-B-NPT
					2NC/1NO+1NC/1NO	M20	D4NL-4EFA-B
						M20 with 1/2" NPT adaptor	D4NL-4EFA-B-NPT
					2NC/1NO+2NC	M20	D4NL-4FFA-B
						M20 with 1/2" NPT adaptor	D4NL-4FFA-B-NPT
					3NC+1NC/1NO	M20	D4NL-4GFA-B
						M20 with 1/2" NPT adaptor	D4NL-4GFA-B-NPT
					3NC+2NC	M20	D4NL-4HFA-B
						M20 with 1/2" NPT adaptor	D4NL-4HFA-B-NPT
				Solenoid lock Mechanical release	1NC/1NO+1NC/1NO	M20	D4NL-4AFG-B
						M20 with 1/2" NPT adaptor	D4NL-4AFG-B-NPT
					1NC/1NO+2NC	M20	D4NL-4BFG-B
						M20 with 1/2" NPT adaptor	D4NL-4BFG-B-NPT
					2NC+1NC/1NO	M20	D4NL-4CFG-B
						M20 with 1/2" NPT adaptor	D4NL-4CFG-B-NPT
					2NC+2NC	M20	D4NL-4DFG-B
						M20 with 1/2" NPT adaptor	D4NL-4DFG-B-NPT
					2NC/1NO+1NC/1NO	M20	D4NL-4EFG-B
						M20 with 1/2" NPT adaptor	D4NL-4EFG-B-NPT
					2NC/1NO+2NC	M20	D4NL-4FFG-B
						M20 with 1/2" NPT adaptor	D4NL-4FFG-B-NPT
					3NC+1NC/1NO	M20	D4NL-4GFG-B
						M20 with 1/2" NPT adaptor	D4NL-4GFG-B-NPT
					3NC+2NC	M20	D4NL-4HFG-B
						M20 with 1/2" NPT adaptor	D4NL-4HFG-B-NPT

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Ordering (continued)

List of Models (continued)

Switches with direct opening mechanisms (Operation Keys are sold separately)

Head material	Release key position	Release key type	Solenoid voltage/ indicator	Lock and release types	Contact configuration (door open/closed detection switch and lock monitor switch contacts) (slow-action) Certified direct opening NC contact	Conduit opening	Model
Plastic	Bottom	Special release key	Solenoid: 24 VDC Orange LED: 10 to 115 VAC/VDC	Mechanical lock Solenoid release	1NC/1NO+1NC/1NO	M20	D4NL-4AFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4AFA-B4-NPT
					1NC/1NO+2NC	M20	D4NL-4BFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4BFA-B4-NPT
					2NC+1NC/1NO	M20	D4NL-4CFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4CFA-B4-NPT
					2NC+2NC	M20	D4NL-4DFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4DFA-B4-NPT
					2NC/1NO+1NC/1NO	M20	D4NL-4EFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4EFA-B4-NPT
					2NC/1NO+2NC	M20	D4NL-4FFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4FFA-B4-NPT
					3NC+1NC/1NO	M20	D4NL-4GFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4GFA-B4-NPT
					3NC+2NC	M20	D4NL-4HFA-B4
						M20 with 1/2" NPT adaptor	D4NL-4HFA-B4-NPT
				Solenoid lock Mechanical release	1NC/1NO+1NC/1NO	M20	D4NL-4AFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4AFG-B4-NPT
					1NC/1NO+2NC	M20	D4NL-4BFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4BFG-B4-NPT
					2NC+1NC/1NO	M20	D4NL-4CFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4CFG-B4-NPT
					2NC+2NC	M20	D4NL-4DFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4DFG-B4-NPT
					2NC/1NO+1NC/1NO	M20	D4NL-4EFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4EFG-B4-NPT
					2NC/1NO+2NC	M20	D4NL-4FFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4FFG-B4-NPT
					3NC+1NC/1NO	M20	D4NL-4GFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4GFG-B4-NPT
					3NC+2NC	M20	D4NL-4HFG-B4
						M20 with 1/2" NPT adaptor	D4NL-4HFG-B4-NPTt
Metal				Mechanical lock Solenoid release	2NC/1NO+1NC/1NO	M20 with 1/2" NPT adaptor	D4NL-4EDA-B4-NPT
					3NC+1NC/1NO		D4NL-4GDA-B4-NPT
				Solenoid lock Mechanical release	2NC/1NO+1NC/1NO	M20 with 1/2" NPT adaptor	D4NL-4EDG-B4-NPT
					3NC+1NC/1NO	M20 with 1/2" NPT adaptor	D4NL-4GDG-B4-NPT

Note: Consult factor for models with Korean S-mark certification.

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