Guard Lock Safety-door Switch

D4NL

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
- 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.



Be sure to read the "Safety Precautions" on page 16 and the "Precautions for All Safety Door Switches".















Model Number Structure

Model Number Legend Switch (Standard type)

D4NL-1 2 3 4 5 6 7

1. Conduit Size

- 1: Pg13.5
- 2: G1/2
- 4: M20

2. 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)

3. 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

4. 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

5. Indicator

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

6. Release Key Type

Blank: Standard (resin)

Special release key (resin) (Note: Release keys are provided.)

7. Release Key Position

Blank: Bottom

Front

Switch (Metallic release key type)

D4NL-1 2 3 4 5 6 7

1. Conduit Size

2: G1/2 (1-conduit)

4: M20 (1-conduit)

2. Built-in Switch

E: 2NC/1NO + 1NC/1NO

F: 2NC/1NO + 2NC

G: 3NC + 1NC/1NO

H: 3NC + 2NC

3. Head Material

F: resin

4. Door Lock and Release

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

5. Indicator

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

6. Release Key Type

Blank: Standard (metal)

7. Release Key Position

Blank: Bottom

Operation Key

D4DS-K□

1. Operation Key Type

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

Ordering Information

List of Models

Switches (Operation Keys are sold separately.)

: Models with certified direct opening contacts.

Consult with your OMRON representative when ordering any models that are not listed in this table.

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
						Pg13.5	D4NL-1AFA-B
					1NC/1NO+1NC/1NO	G1/2	D4NL-2AFA-B
						M20	D4NL-4AFA-B
						Pg13.5	D4NL-1BFA-B
					1NC/1NO+2NC	G1/2	D4NL-2BFA-B
						M20	D4NL-4BFA-B
						Pg13.5	D4NL-1CFA-B
					2NC+1NC/1NO	G1/2	D4NL-2CFA-B
						M20	D4NL-4CFA-B
						Pg13.5	D4NL-1DFA-B
					2NC+2NC	G1/2	D4NL-2DFA-B
				Mechanical lock		M20	D4NL-4DFA-B
				Solenoid release		Pg13.5	D4NL-1EFA-B
					2NC/1NO+1NC/1NO	G1/2 D4NL-2EFA-B	
						M20	Pg13.5 D4NL-1FFA-B
						Pg13.5	
					2NC/1NO+2NC	G1/2 D4NL-2FFA-B	
						M20	D4NL-4FFA-B
						Pg13.5	D4NL-1GFA-B
					3NC+1NC/1NO	G1/2	D4NL-2GFA-B
						M20	D4NL-4GFA-B
						Pg13.5	D4NL-1HFA-B
					3NC+2NC	3NC+2NC G1/2 D4NL-2HFA	D4NL-2HFA-B
Plastic *	Bottom	Standard	Solenoid: 24 VDC Orange LED: 10 to 115			M20	D4NL-4HFA-B
riasiic 4	DOLLOTT	(resin)	VAC/VDC		1NC/1NO+1NC/1NO	Pg13.5	D4NL-1AFG-B
						G1/2	D4NL-2AFG-B
						M20	D4NL-4AFG-B
						Pg13.5	D4NL-1BFG-B
		1NC/1NO+	1NC/1NO+2NC	G1/2	D4NL-2BFG-B		
			M20	M20	D4NL-4BFG-B		
						Pg13.5 D4NL-1CFG-B	D4NL-1CFG-B
					2NC+1NC/1NO	G1/2	D4NL-2CFG-B
						M20	D4NL-4CFG-B
						Pg13.5	D4NL-1DFG-B
					2NC+2NC	G1/2	D4NL-2DFG-B
				Solenoid lock		M20	D4NL-4DFG-B
				Mechanical release		Pg13.5	D4NL-1EFG-B
					2NC/1NO+1NC/1NO	G1/2	D4NL-2EFG-B
						M20	D4NL-4EFG-B
						Pg13.5	D4NL-1FFG-B
					2NC/1NO+2NC	G1/2	D4NL-2FFG-B
						M20	D4NL-4FFG-B
						Pg13.5	D4NL-1GFG-B
					3NC+1NC/1NO	G1/2	D4NL-2GFG-B
						M20	D4NL-4GFG-B
						Pg13.5	D4NL-1HFG-B
					3NC+2NC	G1/2	D4NL-2HFG-B
						M20	D4NL-4HFG-B

^{*} Switches with metal heads can also be manufactured upon request. Ask your OMRON representative for details.

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
						Pg13.5	D4NL-1AFA-B4
					1NC/1NO+1NC/1NO	G1/2	D4NL-2AFA-B4
						M20	D4NL-4AFA-B4
						Pg13.5	D4NL-1BFA-B4
					1NC/1NO+2NC	G1/2	D4NL-2BFA-B4
						M20	D4NL-4BFA-B4
						Pg13.5	D4NL-1CFA-B4
					2NC+1NC/1NO	G1/2	D4NL-2CFA-B4
						M20	D4NL-4CFA-B4
					2NC+2NC	Pg13.5	D4NL-1DFA-B4
						G1/2	D4NL-2DFA-B4
				Mechanical lock		M20	D4NL-4DFA-B4
				Solenoid release		Pg13.5	D4NL-1EFA-B4
					2NC/1NO+1NC/1NO	G1/2	D4NL-2EFA-B4 *2
						M20 D4NL-4EFA-B4	
						Pg13.5	Pg13.5 D4NL-1FFA-B4
					2NC/1NO+2NC	G1/2 D4NL-2FFA-B4 *2	
						M20	D4NL-4FFA-B4
						Pg13.5	D4NL-1GFA-B4
					3NC+1NC/1NO	G1/2	D4NL-2GFA-B4 *2
						M20	D4NL-4GFA-B4
						Pg13.5	D4NL-1HFA-B4
		0			3NC+2NC	M20 D4NL-4HFA-	D4NL-2HFA-B4 *2
	D	Special release	Solenoid: 24 VDC				D4NL-4HFA-B4
lastic *1	Bottom	key	Orange LED: 10 to 115 VAC/VDC				D4NL-1AFG-B4
		(resin)			1NC/1NO+1NC/1NO G1/2 M20	G1/2	D4NL-2AFG-B4
						M20	D4NL-4AFG-B4
						Pg13.5	D4NL-1BFG-B4
					1NC/1NO+2NC	G1/2	D4NL-2BFG-B4
						M20	D4NL-4BFG-B4
						Pg13.5	D4NL-1CFG-B4
					2NC+1NC/1NO	G1/2	D4NL-2CFG-B4
						M20 D4NL-4CF	D4NL-4CFG-B4
						Pg13.5	D4NL-1DFG-B4
					2NC+2NC	G1/2	D4NL-2DFG-B4
				Solenoid lock		M20	D4NL-4DFG-B4
				Mechanical release		Pg13.5	D4NL-1EFG-B4
					2NC/1NO+1NC/1NO	G1/2	D4NL-2EFG-B4
						M20	D4NL-4EFG-B4
						Pg13.5	D4NL-1FFG-B4
					2NC/1NO+2NC	G1/2	D4NL-2FFG-B4
						M20	D4NL-4FFG-B4
						Pg13.5	D4NL-1GFG-B4
					3NC+1NC/1NO	G1/2	D4NL-2GFG-B4
						M20	D4NL-4GFG-B4
						Pg13.5	D4NL-1HFG-B4
					3NC+2NC	G1/2	D4NL-2HFG-B4
						M20	D4NL-4HFG-B4

^{*1.} Switches with metal heads can also be manufactured upon request. Ask your OMRON representative for details. *2. Models with Korean S-mark certification.

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						
					2NC/1NO+1NC/1NO	G1/2	D4NL-2EFA-B-SJ *						
					ZING/TINO+TING/TINO	M20	D4NL-4EFA-B-SJ *						
					2NC/1NO+2NC	G1/2	D4NL-2FFA-B-SJ *						
				Mechanical lock Solenoid release	ZINO/TINO+ZINO	M20	D4NL-2EFA-B-SJ * D4NL-4EFA-B-SJ *						
					3NC+1NC/1NO	G1/2							
					SINC+TINC/TINC	M20							
										and and	3NC+2NC	G1/2	D4NL-2HFA-B-SJ *
Plastic	Bottom	Standard	Solenoid: 24 VDC			SINC+ZINC	M20						
Plastic	Bollom	(metal)	Orange LED: 10 to 115 VAC/VDC		2NC/1NO+1NC/1NO	G1/2	D4NL-2EFG-B-SJ *						
					ZING/TING+TING/TING	M20	D4NL-4EFG-B-SJ *						
					ONC/1NO - ONC	G1/2	D4NL-2FFG-B-SJ *						
				Solenoid lock	Solenoid lock	Solenoid lock	2NC/1NO+2NC	M20	D4NL-4FFG-B-SJ *				
				Mechanical release	2NC - 1NC/1NO	G1/2	D4NL-2GFG-B-SJ *						
					3NC+1NC/1NO	M20	D4NL-4GFG-B-SJ *						
					ONG ONG	G1/2	D4NL-2HFG-B-SJ *						
					3NC+2NC	M20	D4NL-4HFG-B-SJ *						

^{*} These models will receive Korean S-mark certification.

Operation Keys

Туре	Model
Horizontal mounting	D4DS-K1
Vertical mounting	D4DS-K2
Adjustable mounting (Horizontal)	D4DS-K3
Adjustable mounting (Horizontal/Vertical)	D4DS-K5

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	EN60947-5-1 (certified direct opening)	Consult your OMRON representative for details.
UL * 1	UL508, 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 authorized by the UL mark. ***2.** Only certain models have been certified.

Certified Standard Ratings TÜV (EN60947-5-1), CCC (GB14048.5)

Item	Utilization category	AC-15	DC-13
Rated opera	ating current (l _e)	3 A	0.27 A
Rated opera	ating voltage (U _e)	240 V	250 V

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

UL/CSA (UL508, CSA C22.2 No. 14) A300

Rated	Corry ourrent	Curre	nt (A)	Volt-amperes (VA)	
voltage	Carry current	Make	Break	Make	Break
120 VAC	10 A	60	6	7.200	720
240 VAC	IUA	30	3	7,200	720

Q300

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

Solenoid Coil Characteristics

Item Type	24 VDC	110 VAC	
Rated operating voltage (100% ED)	24 VDC +10% -15%	110 VAC ±10%	
Current consumption	Approx. 200 mA Approx. 50 mA		
Insulation	Class B (130°C max.)		

Indicator Characteristics

Item T	уре	LED
Rated voltage		10 to 115 VAC/VDC
Current leakage		Approx. 1 mA
Color (LED)		Orange

Characteristics

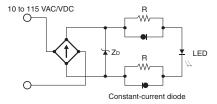
Degree of protection	n * 1	IP67 (EN60947-5-1)		
Durahilih, #0	Mechanical	1,000,000 operations min.		
Durability *2	Electrical	500,000 operations min. (3 A resistive load at 250 VAC) *3		
Operating speed		0.05 to 0.5 m/s		
Operating frequency		30 operations/minute max.		
Direct opening force	* 4	60 N min. (EN60947-5-1)		
Direct opening trave	H * 4	10 mm min. (EN60947-5-1)		
Holding force ★ 5		1,300 N min.		
Contact resistance		25 m $Ω$ max. (per contact)		
Minimum applicable	load *6	1 mA resistive load at 5 VDC (N-level reference value)		
Rated insulation vol	tage (Ui)	300 V (EN60947-5-1)		
Rated frequency		50/60 Hz		
Protection against e	lectric shock	Class II (double insulation)		
Pollution degree (op	erating environment)	3 (EN60947-5-1)		
	Between terminals of same polarity	2.5 kV		
Impulse withstand voltage	Between terminals of different polarity	4 kV		
(EN60947-5-1)	Between each terminal and non-current carrying metallic parts	6 kV		
Insulation resistance	e	100 M Ω min. (at 500 VDC)		
Contact gap		2 × 2 mm min.		
Vibration resistance	Malfunction	10 to 55 Hz, 0.75 mm single amplitude		
Shock resistance	Destruction	1,000 m/s ² min.		
Snock resistance	Malfunction	100 m/s² min.		
Conditional short-circuit current		100 A (EN60947-5-1)		
Conventional free air thermal current (Ith)		10 A (EN60947-5-1)		
Ambient operating temperature		−10 to 55°C (with no icing)		
Ambient operating h	numidity	95% max.		
Weight		Approx. 370 g (D4NL-1AFA-B)		
N		·		

- Note: 1. The above values are initial values.
 - 2. The Switch contacts can be used with either standard loads or microloads. Once the contacts have been used to switch a load, however, they cannot be used to switch smaller loads. The contact surfaces will become rough once they have been used and contact reliability for smaller loads may be reduced.
- ***1.** The degree of protection is tested using the method specified by the standard (EN60947-5-1). Confirm that sealing properties are sufficient for the operating conditions and environment beforehand. Although the switch box is protected from dust or water penetration, do not use the D4NL 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 more details, consult your OMRON representative.
- ***3.** Do not pass the 3 A, 250 VAC load through more than 2 circuits.
- *4. These figures are minimum requirements for safe operation.
- ***5.** This figure is based on the GS-ET-19 evaluation method.
- *6. This value will vary with the switching frequency, environment, and reliability level. Confirm that correct operation is possible with the actual load beforehand.

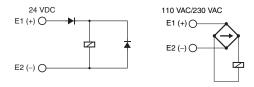
Connections

Internal Circuit Diagram

Indicator



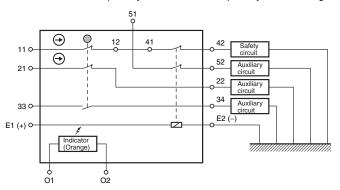
Solenoid



Circuit Connection Example

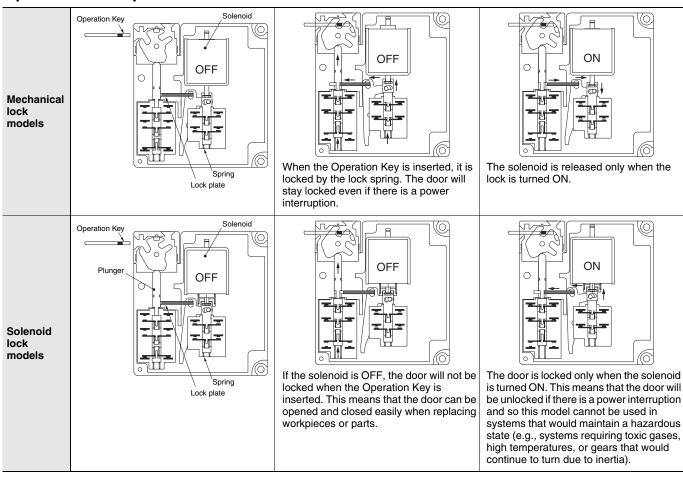
Connection Example for D4NL-□F□□-B

- Terminals 12 and 41 are connected internally. When connecting inputs to safety circuits, use terminals 11 and 42. (GS-ET-19).
- Connect terminals 21 and 22 and terminals 51 and 52 in series
 when using as safety-circuit inputs (redundancy circuit for
 terminals 11 and 12 and terminals 41 and 42 below). Connect the
 terminals individually when using as auxiliary-circuit inputs (e.g.,
 terminals 21 and 22 for safety-door open/closed monitoring and
 terminals 51 and 52 for monitoring the lock status).
- In the following connection example, terminals 21 and 22 and terminals 51 and 52 are used as auxiliary-circuit inputs.
- Direct opening contacts used as safety-circuit inputs are indicated with the
 mark. Terminals 11 and 42, and terminals 21 and 22 have direct opening contacts.
- Connect the indicators in parallel to the auxiliary circuits or terminals E1 and E2 (D4NL-□□□A-B, -□□□G-B, -□□□B-B, and -□□□H-B only).
 - Connecting to contacts with direct opening mechanisms may result in short-circuit current flowing if the indicator is destroyed, possibly resulting in incorrect equipment operation.
- Do not switch circuits for two or more standard loads at the same time. Doing so may adversely affect insulation performance.
- DC solenoids have polarity. Confirm terminal polarity before wiring.



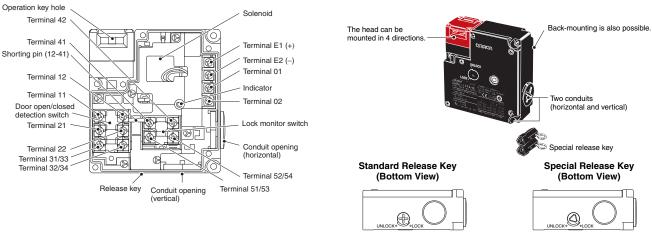
Operation Method

Operation Principles



Structure and Nomenclature

Structure



Note: Terminal numbers vary with the model.

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).

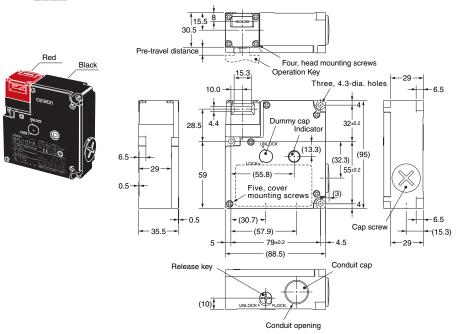
	Contact	Contac	• • • • • • • • • • • • • • • • • • • •	rminals 12 and 41 are connected internall		
Model	(door open/closed detection and lock monitor)	Door open/ closed detection	Lock monitor	Operating pattern	Remarks	
D4NL-□AF□-□	1NC/1NO + 1NC/1NO		Lock monitor Zb 41 42 53 54	Lock position 11-42 33-34 53-54 Stroke Operation Key insertion Completion position Stroke Operation Oper	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 Zb 11 12 33 34	Lock monitor Zb 41 42 51 52	11-42 33-34 51-52 Operation Key insertion completion position Stroke Operation position Stroke Operation position Stroke Operation 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 Zb 11 12 31 32	Lock monitor Zb 41 42 53 54	Lock position 11-42 31-32 53-54 Stroke Operation Key insertion completion 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 Zb 11 12 31 32	Lock monitor Zb 41 42 51 52	Lock position 11-42 31-32 51-52 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 Zb 11 12 21 22 33 34	Lock monitor Zb 41 42 53 54	Lock position 11-42 21-22 33-34 53-54 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 Zb 11 12 12 22 33 34		Lock position 11-42 21-22 33-34 51-52 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 Zb 11 12 21 22 31 32	Lock monitor Zb 41 42 53 54	Lock position 11-42 21-22 31-32 53-54 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 Zb 11 12 22 31 32	Lock monitor Zb 41 42 51 52	Lock position 11-42 21-22 31-32 51-52 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.	

Dimensions (Unit: mm)

Dimensions and Operating Characteristics

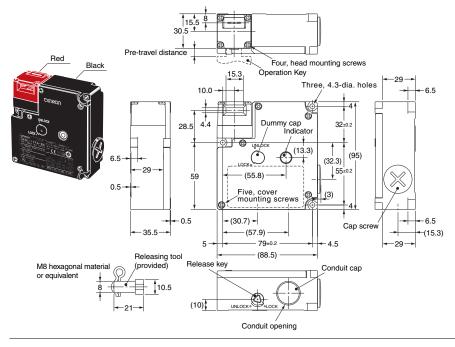
Switches

D4NL-□□□□-B



Operating Model characteristics	D4NL-□□□-B	
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

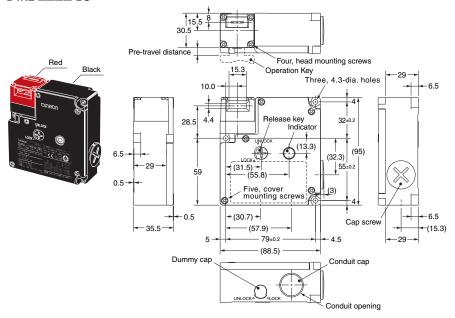


Operating Model characteristics	D4NL	
Key insertion force Key extraction force	15 N max. 30 N max.	
Pre-travel distance	9 mm max.	
Movement before being locked	3 mm min.	

Note: 1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.

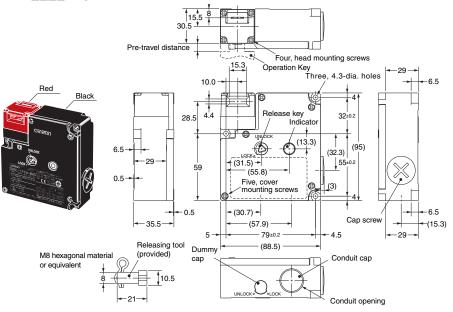
2. There are fluctuations in the contact ON/OFF timing for Switches with multiple poles (2NC, 2NC/1NO, or 3NC). Confirm performance before application.





Operating Model 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-UUUU-B4S

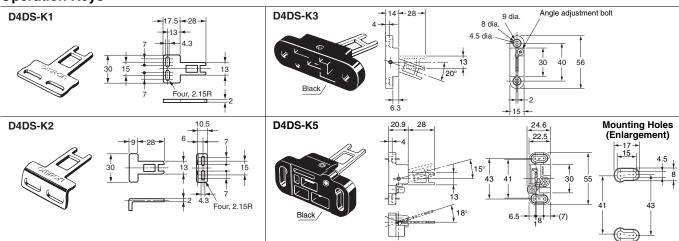


Operating Model characteristics	D4NL-□□□-B4S
Key insertion force Key extraction force	15 N max. 30 N max.
Pre-travel distance	9 mm max.
Movement before being locked	3 mm min.

Note: 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.

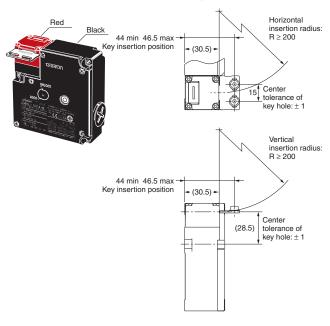
Operation Keys



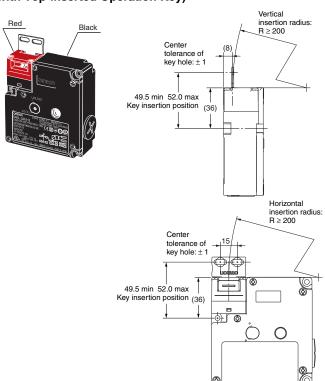
Note: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

With Operation Key Inserted

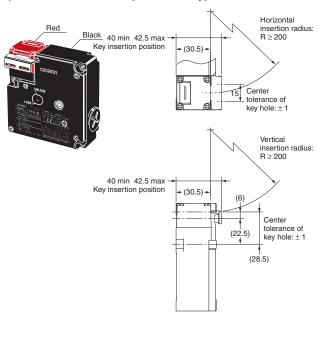
D4NL + D4DS-K1 (with Front-inserted Operation Key)



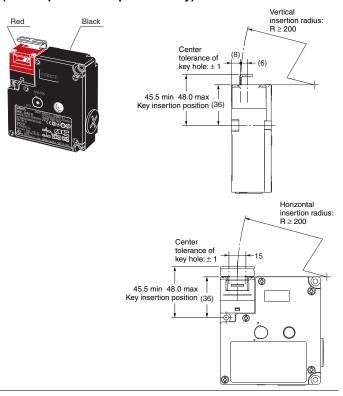
D4NL + D4DS-K1 (with Top-inserted Operation Key)



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



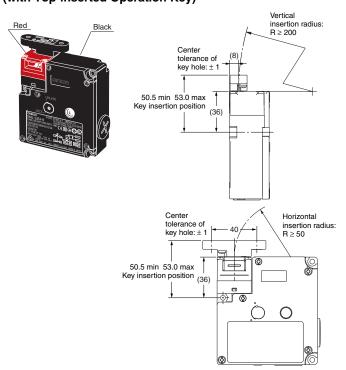
D4NL + D4DS-K2 (with Top-inserted Operation Key)



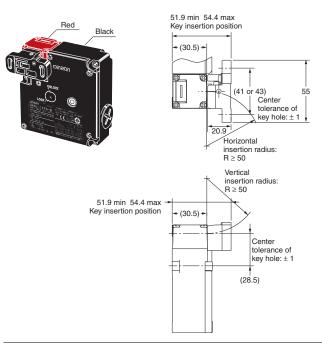
D4NL + D4DS-K3 (with Front-inserted Operation Key)

45 min 47.5 max Key insertion position Horizontal Red insertion radius: R ≥ 50 Black **→** (30.5) Center (40) tolerance of key hole: ± 1 Vertical insertion radius: R ≥ 200 45 min 47.5 max Key insertion position **→** (30.5) Center (28.5) tolerance of key hole: \pm 1

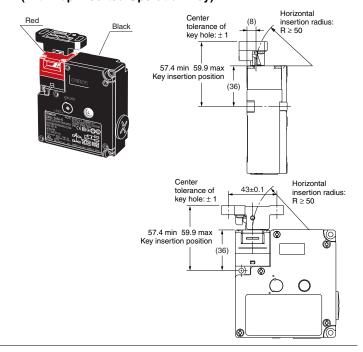
D4NL + D4DS-K3 (with Top-inserted Operation Key)



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

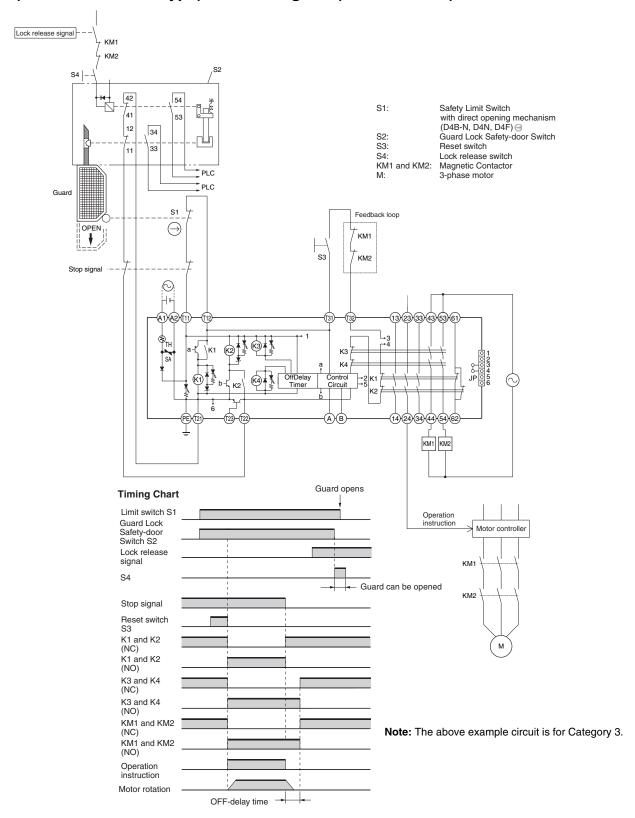


D4NL + D4DS-K5 (with Top-inserted Operation Key)

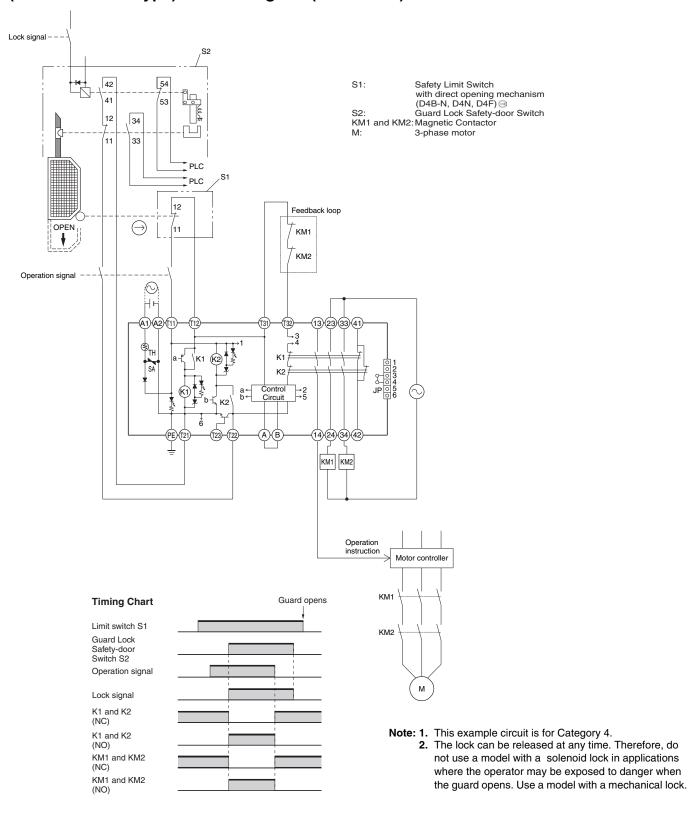


Application Examples

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



G9SA-301 (24 VAC/VDC) + D4NL-□A□G-□, -□A□H-□, -□A□J-□ (Solenoid Lock Type) Circuit Diagram (Auto-reset)



Safety Precautions

Refer to the "Precautions for All Switches" and "Precautions for All Safety Door Switches".

/ DANGER

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



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. Always ensure that the release key is set to "UNLOCK" or that the Operation Key is inserted before changing the direction of the head. Not doing so may damage the Switch, causing some machines to continue operating in situations where they should be stopped. Refer to "Release Key" on page 16.



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.



/!\ CAUTION

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



Precautions for Safe Use

Installation Environment

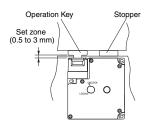
 Do not use the Switch submersed in oil or water or in locations continuously subject to splashes of oil or water. Doing so may result in oil or water entering the Switch. (The IP67 degree of protection of the Switch specifies the amount of water penetration after the Switch is submerged in water for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

Wiring

- Do not switch circuits for two or more standard loads (250 VAC,
 3 A). Doing so may adversely affect insulation performance.
- 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 to ensure that the base of the Operation Key does not strike the Head, and adjust the stopper to be within the setting zone (0.5 to 3 mm) of the base of the Operation Key.
- Do not subject the Switch to a shock that exceeds the Switch's shock resistance of 1,000 m/s².

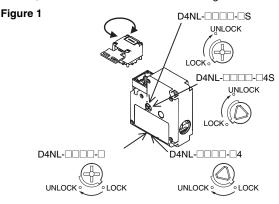


Precautions for Correct Use

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.
- If the release key setting is changed from LOCK to UNLOCK, the lock will be released and the safety door can be opened (mechanical lock models only).
- The release key is set in the unlock position at the factory for the D4NL-\(\subseteq\) \(\subseteq\) A/B/C and to the lock position for the D4NL-\(\subseteq\) \(\subseteq\) G/H/.
- Do not use the release key to start or stop machines.
- The auxiliary lock must only be released 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.



Hinged Door

If an attempt is made to open the door beyond the lock position when the Switch is used for a hinged door at a location near to the hinged side, where the Operation Key's insertion radius is comparatively small, the force imposed will be much larger than for locations far from the hinged side, 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. Therefore, the door will be unlocked if the power supply to the solenoid stops. Therefore, do not use solenoid lock models for machines that may be operating and dangerous even after the machine stops operating.

Mounting

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	0.59 to 0.78 N⋅m	
Cover mounting screw	0.49 to 0.69 N⋅m	
Head mounting screw	0.49 to 0.59 N⋅m	
Operation Key mounting screw	2.35 to 2.75 N⋅m	
Switch mounting screw	0.49 to 0.69 N⋅m	
Connector	1.77 to 2.16 N⋅m	
Cap screw	1.27 to 1.67 N⋅m	

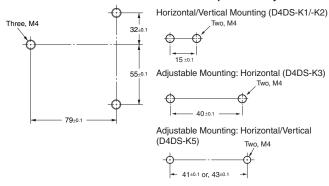
 When loosening a screw with an electrical screwdriver or similar tool while pressing down on the screw head, do not continue turning the screw past the point where the threads disengage.
 Doing so may strip the end of the threads.

Switch and Operation Key Mounting

 Use M4 screws and washers to mount the Switch and Operation Key, and tighten the screws to a suitable torque.
 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 Switches

Mounting Holes for Operation Keys



- If the Switch is back-mounted, the release key can be operated only from the bottom and the indicator cannot be used.
- Ensure that the alignment offset between the Operation Key and the key hole does not exceed ±1 mm. If the Operation Key is offset or at an angle, accelerated wear or damage to the Switch may result.
- Observe the specified insertion radius for the Operation Key and insert it in a direction perpendicular to the key hole.
- 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.

Head Direction

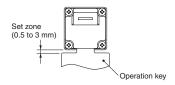
- Remove the four screws of the head to enable changing the mounting direction of the head. The head can be mounted in four directions. Ensure that no foreign material enters the interior of the Switch.
- Do not change the head direction with the cover removed.
- Do not insert or remove the Operation Key with the Switch head removed. Doing so may make it impossible to insert the Operation Key.

Attaching a Cover

- 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.

Securing the Door

When the door is closed (with the Operation Key inserted), the Operation Key may exceed the set zone because of, for example, the door's own weight, machine vibration, or the door cushion rubber. 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.



Solenoid

- The solenoid will heat when it carries current. Do not touch it.
- A DC solenoid has polarity. Confirm terminal polarity before wiring it.

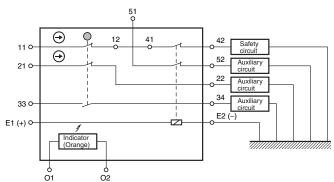
Wiring

Circuit Connection Example for the D4NL-□F□□-B

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

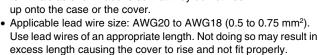
 mark. Terminals 11 and 42, and terminals 21 and 22 have direct opening contacts.
- Connect terminals 21 and 22 and terminals 51 and 52 in series
 when using as safety-circuit inputs (redundancy circuit for
 terminals 11 and 12 and terminals 41 and 42 below). Connect the
 terminals individually when using as auxiliary-circuit inputs (e.g.,
 terminals 21 and 22 for safety-door open/closed monitoring and
 terminals 51 and 52 for monitoring the lock status).
- In the following connection example, terminals 21 and 22 and terminals 51 and 52 are used as auxiliary-circuit inputs.
- Connect the indicators in parallel to the auxiliary circuits or terminals E1 and E2 (D4NL-\\ A-B, -\\ G-B, -\\ B-B, and -\\ H-B only).

Connecting to contacts with direct opening mechanisms may result in short-circuit current flowing if the indicator is destroyed, possibly resulting in incorrect equipment operation.



Wiring Precautions

- 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.
- When connecting to the terminals via insulating tube and M3.5 crimp terminals, cross the crimp terminals as shown above so that they do not rise up onto the case or the cover.



- Do not push crimp terminals into gaps in the case interior. Doing so may cause damage or deformation of the case.
- Use terminals having the thickness of 0.5 mm or less to avoid the contact between the terminal and the interior of the Switch case.

[Reference] The terminals listed below have thickness of 0.5 mm or less.

Manufacturer		Model	
J.S.T. Mfg Co.		FN0.5-3.7 (F Type) No. 5-3.7 (Straight Type)	_
dz dia.: 3. D dia.: 2. B: 6. L: 1! F: 7.	.6 mm	D dia.	В
	C	Forrect Inco	orrect
	4		

Processing the Conduit Opening

Crimp terminal

- 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 11 mm.
 Otherwise the screws will protrude into the case interior. The connectors given in the following table have connectors with screw sections not exceeding 11 mm.

Use the following connectors to ensure conformance to IP67.

	Size	Manufacturer	Model	Applicable cable diameter
_		LAPP	ST-PF1/2 5380-1002	6.0 to 12.0 mm
	G1/2	OHM ELECTRIC CO.	OA-W1609	7.0 to 9.0 mm
			OA-W1611	9.0 to 11.0 mm
-	Pg13.5	LAPP	ST-13.5 5301-5030	6.0 to 12.0 mm
_	M20	LAPP	ST-M20 × 1.5 5311-1020	7.0 to 13.0 mm

Use LAPP connectors together with Seal Packing (JPK-16, GP-13.5, or GPM20), and tighten to the applicable torque. Seal Packing is sold separately.

- LAPP is a German manufacturer.
- OHM Electric Co. is a Japanese manufacturer.

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

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.

2012.1

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





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов:
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001:
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина,

дом 2, корпус 4, литера А.