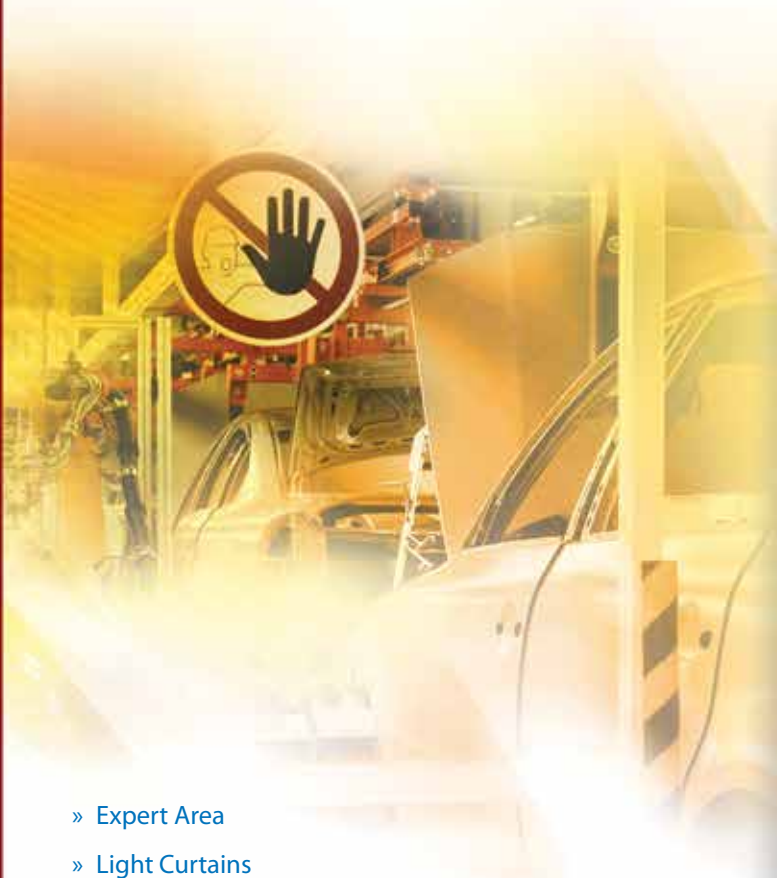


Machine & Process Safeguarding

Solution Selection Guide

2015-2016



- » Expert Area
- » Light Curtains
- » Laser Scanners
- » Programmable Safety Systems
- » Mats and Edges
- » Door Switches
- » Emergency Stop Devices
- » Switches and Operator Controls
- » Monitoring Relays
- » Safeguard Integration Services



Safety Door Switches

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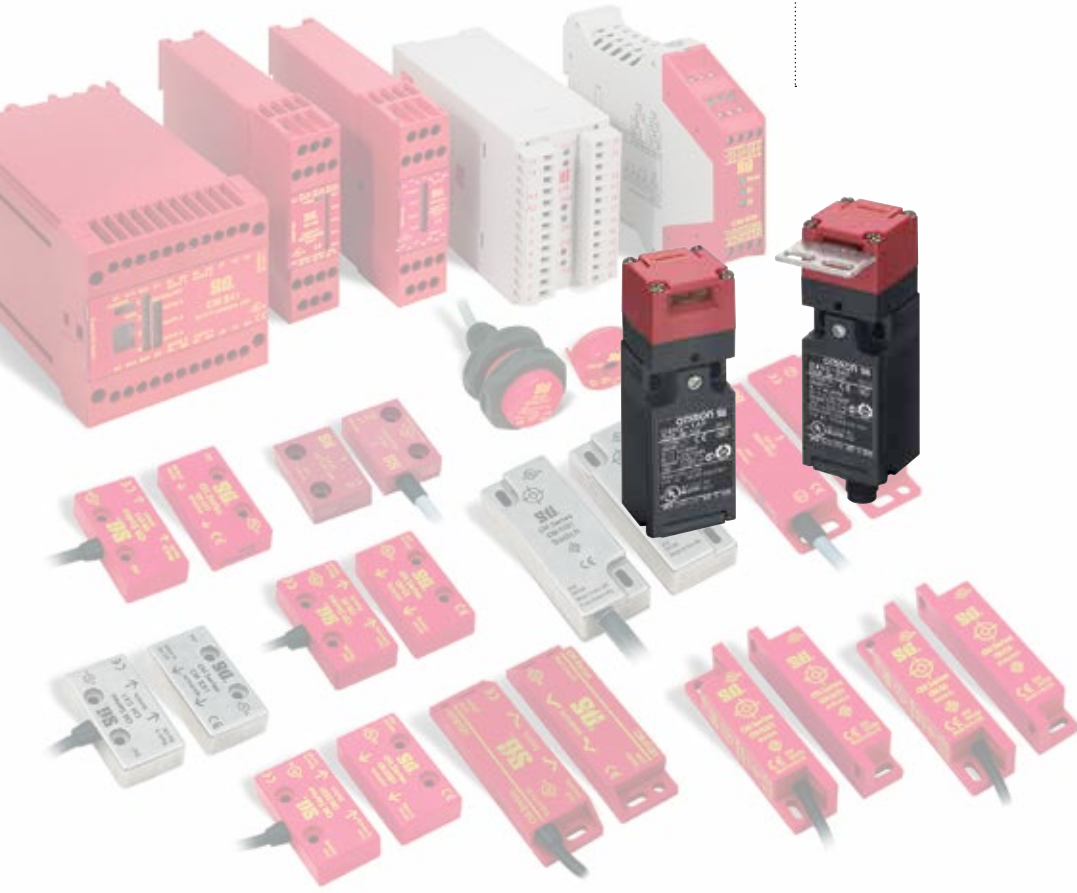
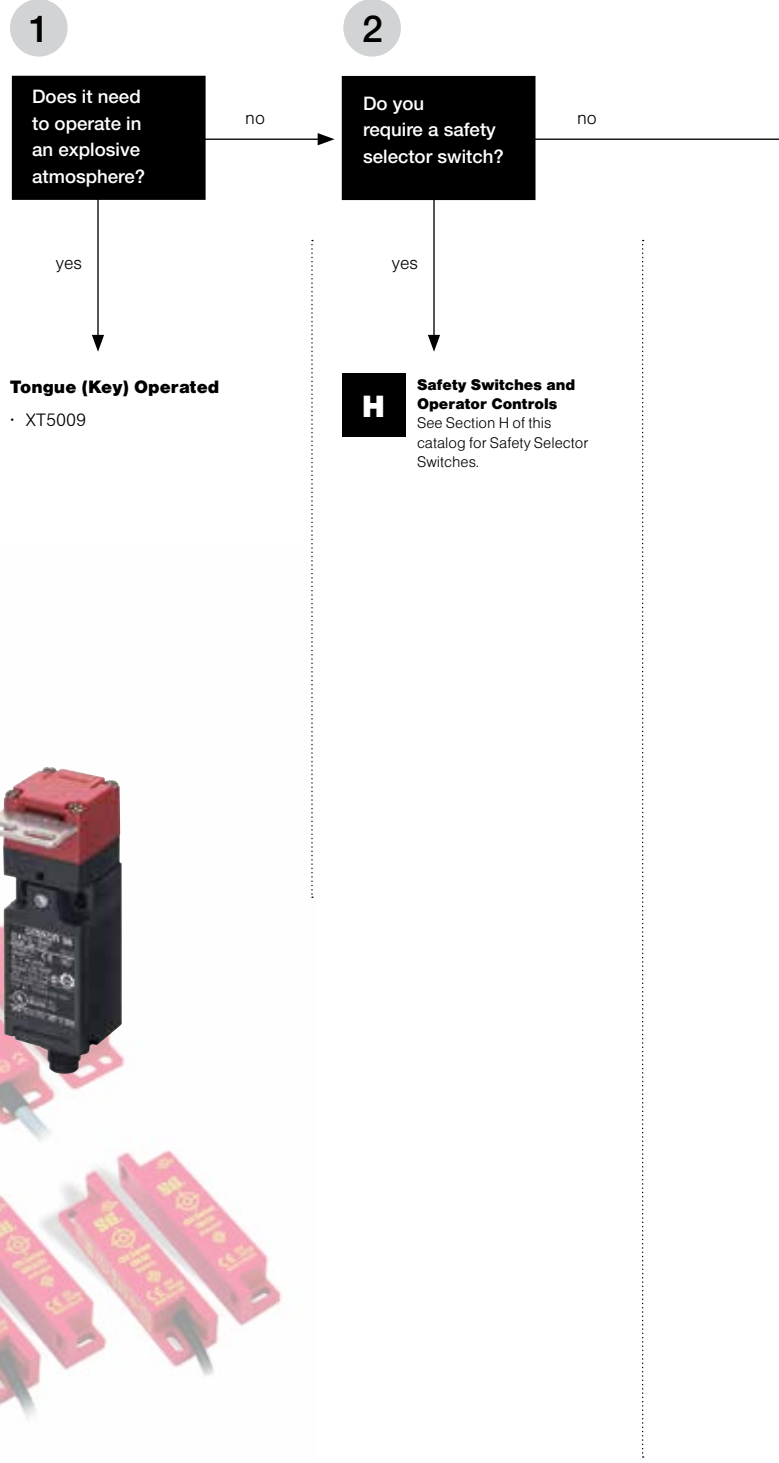
Selection Guide

Selecting the Proper Safety Door Switch for Your Application

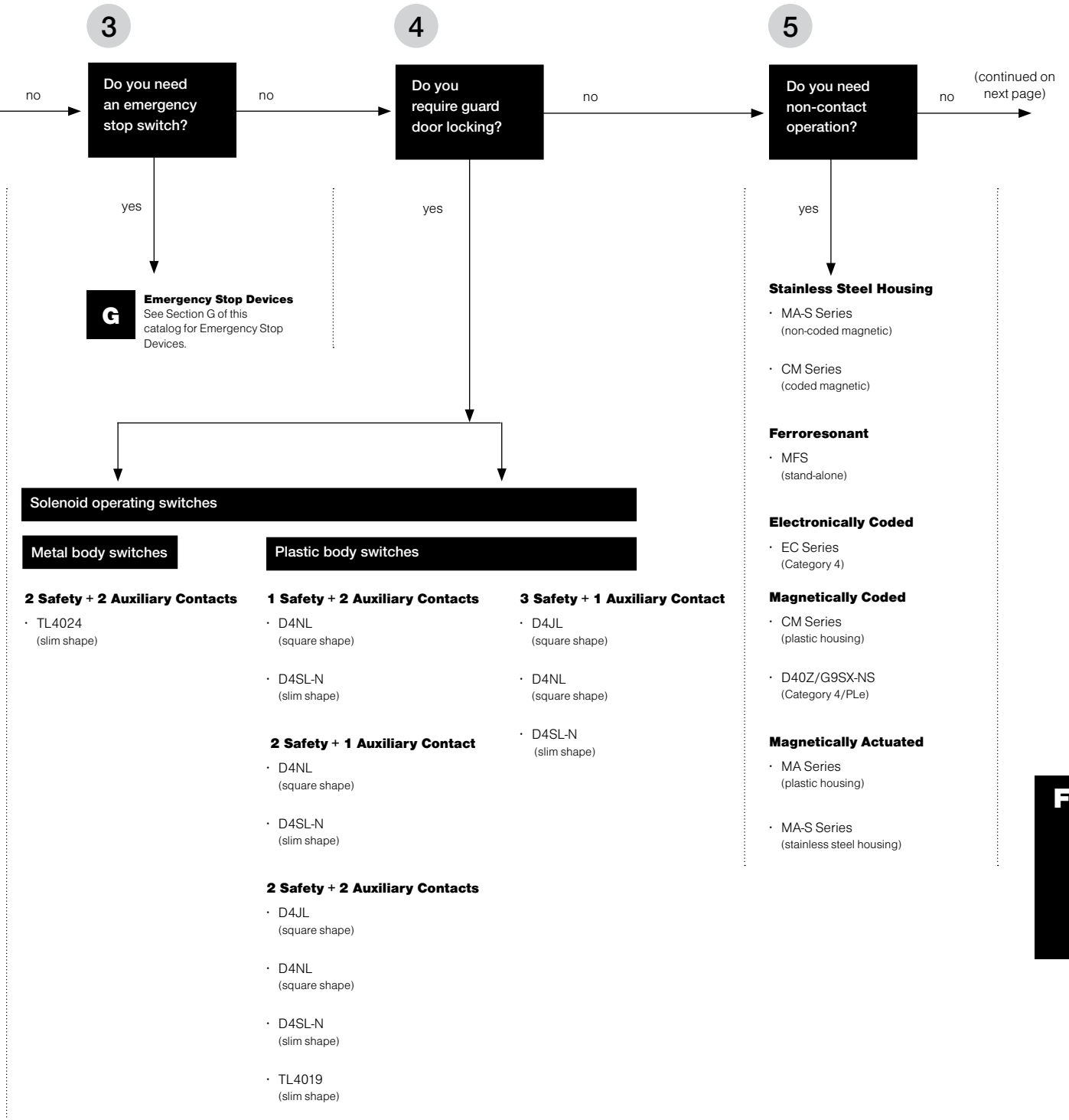
Selecting the Correct Safety Door Switch is Easy

Our selection guide will help you with the selection process. First, determine if your application will include the use of mechanical guards. If not, please review the Safety Light Curtain, Safety Mat, or Two-Hand Control products in this catalog.

The following questions will guide you to the appropriate models. Contact OMRON Automation and Safety for assistance.

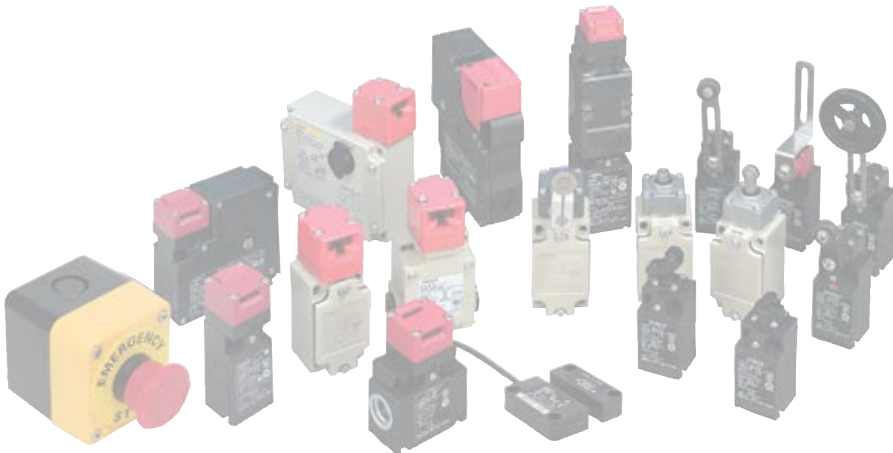
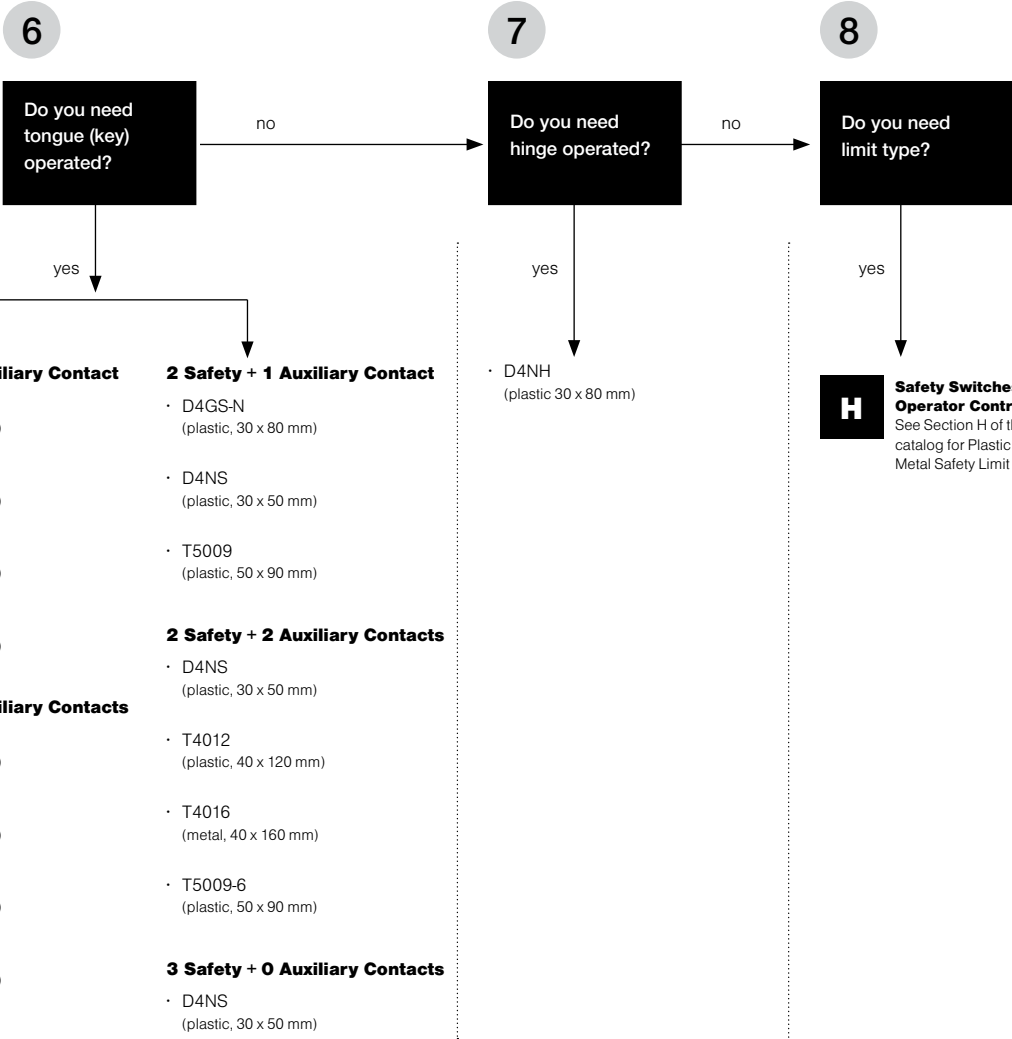


Selection Guide (continued)



Selection Guide (continued)

(continued from previous page)



Optional Safety Door Switch Products

Several of our safety interlocks switches can be customized to suit specific application requirements.

Status Indication

The following switches are available with LED status indicators. The indicator lights provide a visual indication of whether the switch is open or closed. LED Conduit Beacons may also be installed as an alternative means of providing status indication to most all switches with conduit openings.

Guard-Locking Switches

- D4JL
(solenoid operating, plastic, square shape)
- D4NL
(solenoid operating, plastic, square shape)
- D4SL-N
(solenoid operating, plastic, slim shape)
- TL4019
(solenoid operating, plastic, slim shape)
- TL4024
(solenoid operating, metal, slim shape)

Tongue Switches

- T4016
(metal, 40 x 160 mm)

Non-Contact Switches

- D40Z/D40A/G9SX-NS
(magnetically coded, plastic housing)
- MFS
(stand-alone)



T4016 with LED Indication

Slide Bolt Assemblies

The following switches may be installed with a slide bolt assembly. The use of a slide bolt assembly simplifies the installation of the switch on many machine guarding applications and provides an integral handle for operation of the guard door.



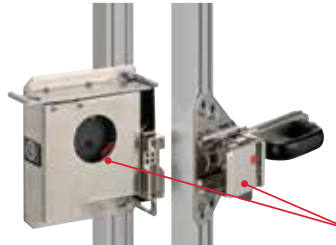
TL4019 with Metal Slide Bolt

Guard-Locking Switches

- D4JL
(solenoid operating, plastic, square shape)
- D4SL-N
(solenoid operating, plastic, slim shape)
- TL4019
(solenoid operating, plastic, slim shape)
- TL4024
(solenoid operating, metal, slim shape)

Tongue Switches

- D4NS
(plastic, 30 x 50 mm)
- T2008
(plastic, 20 x 80 mm)
- T4012
(plastic, 40 x 120 mm)
- T4016
(metal, 40 x 160 mm)



D4JL Slide Bolt Assembly with special slide key

Additional Accessories

From spare actuators to our switch locking devices, OMRON Automation and Safety has you covered when it comes to outfitting your safety interlocking needs.

- Slide Mounting Key for D4SL-N
- Slide Mounting Key for D4NS or D4JL
- Replacement Contact Blocks
- Micro Style Cables
- Cabling Components
- Conduit LED Beacons
- Conduit Lights and Remote Indicator
- Security Bits/Drives
- Universal Mounting Brackets
- Switch Locking Devices



Switch Locking Devices



Conduit LED Beacons



Universal Mounting Brackets

Safety-Door Switch

- Multi-contact, labor-saving, environment-friendly, next-generation safety-door switch
- Lineup includes three contact models with 2NC/1NO and 3NC contact forms and MBB models in addition to the previous contact forms 1NC/1NO, and 2NC
- M12-connector models are available, saving on labor and simplifying replacement.
- Standardized gold-clad contacts provide high contact reliability. Applicable to both standard loads and microloads.
- Variety of metallic heads available



Specifications

Standards and EC Directives

Conforms to the following EC Directives:

- Machinery Directive
- Low Voltage Directive
- EN50047
- EN 1088
- EN 60204-1
- GS-ET-15

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	2003010305077330
KOSHA *2	EN60947-5-1	2005-197

*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 (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		

Specifications (continued)

Characteristics

Degree of protection *1		IP67 (EN60947-5-1)
Durability *2	Mechanical	1,000,000 operations min.
	Electrical	500,000 operations min. (3 A resistive load at 250 VAC) *3 300,000 operations min. (10 A resistive load at 250 VAC)
Operating speed		0.05 to 0.5 m/s
Operating frequency		30 operations/minute max.
Direct opening force *4		60 N min.
Direct opening travel *4		10 mm min.
Contact resistance		25 mΩ max.
Minimum applicable load *5		1 mA resistive load at 5 VDC (N-level reference value)
Rated insulation voltage (Ui)		300 V
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 each terminals and non-current carrying metallic parts.	6 kV
Insulation resistance		100 MΩ min.
Contact gap		2 x 2 mm min.
Vibration resistance		10 to 55 Hz, 0.75 mm single amplitude
Shock resistance	Destruction	1,000 m/s ² min.
	Malfunction	300 m/s ² min.
Conditional short-circuit current		100 A (EN60947-5-1)
Conventional free air thermal current (Ith)		10 A (EN60947-5-1)
Ambient operating temperature		-30 to +70 °C (with no icing)
Ambient operating humidity		95% max.
Weight		Approx. 96 g (D4NS-1CF)

Notes: The above values are initial values.

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 D4NS 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 value will vary with the switching frequency, environment, and reliability level. Confirm that correct operation is possible with the actual load beforehand.

Connections

Contact Form

Diagrams show state with key inserted.

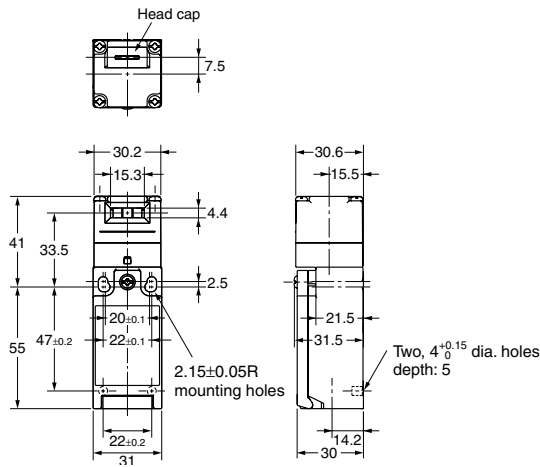
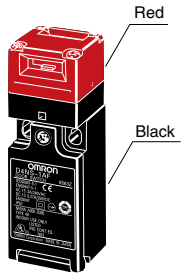
Model	Contact	Contact form	Operating pattern	Remarks
D4NS-□A□	1NC/1NO			Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-12 and 33-34 can be used as unlike poles.
D4NS-□B□	2NC			NC contacts 11-12 and 31-32 have a certified direct opening mechanism. (→) The terminals 11-12 and 31-32 can be used as unlike poles.
D4NS-□C□	2NC/1NO			NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-12, 21-22, and 33-34 can be used as unlike poles.
D4NS-□D□	3NC			NC contacts 11-12, 21-22, and 31-32 have a certified direct opening mechanism. (→) The terminals 11-12, 21-22, and 31-32 can be used as unlike poles.
D4NS-□E□	1NC/1NO MBB*			Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-12 and 33-34 can be used as unlike poles.
D4NS-□F□	2NC/1NO MBB*			NC contacts 11-12 and 21-22 have a certified direct opening mechanism. (→) The terminals 11-12, 21-22 and 33-34 can be used as unlike poles.

*MBB (Make Before Break) contacts have an overlapping structure, so that before the normally closed contact (NC) opens, the normally open contact (NO) closes.

Dimensions and Operating Characteristics

1-Conduit Models

- D4NS-1□F
- D4NS-2□F
- D4NS-4□F

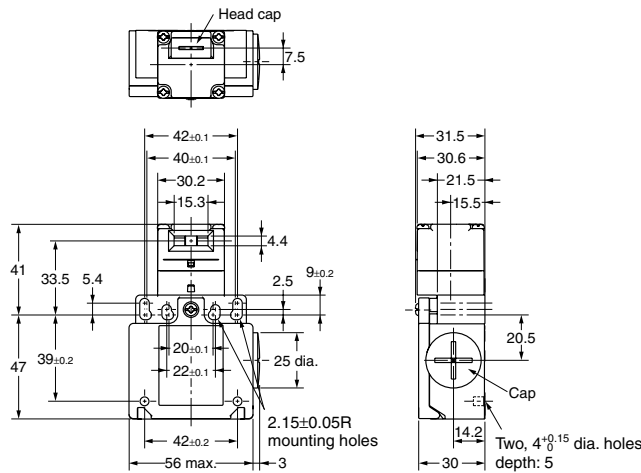
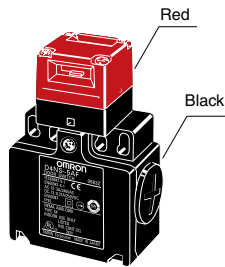


Operating characteristics	Model	D4NS-1@F D4NS-2@F D4NS-3@F D4NS-4@F
Key insertion force		15 N max.
Key extraction force		30 N max.
Pretravel (PT)		6±3 mm
Total travel (TT)		(28 mm)
Direct opening force *		60 N min.
Direct opening stroke *		10 mm min.

* Always maintain the above operating characteristics for safe use.

2-Conduit Models

- D4NS-6□F
- D4NS-8□F

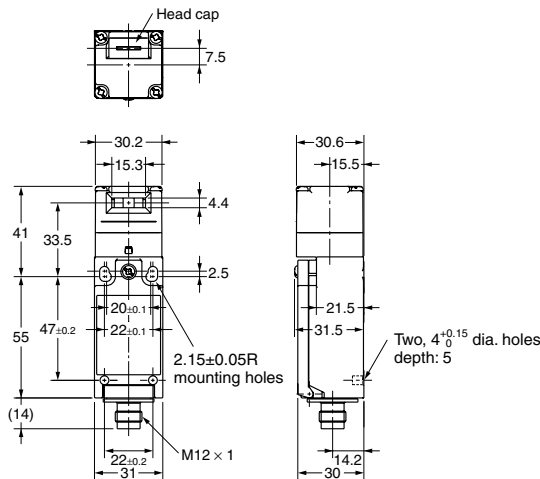
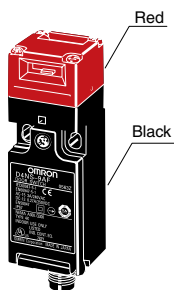


Operating characteristics	Model	D4NS-5@F D4NS-6@F D4NS-7@F D4NS-8@F
Key insertion force		15 N max.
Key extraction force		30 N max.
Pretravel (PT)		6±3 mm
Total travel (TT)		(28 mm)
Direct opening force *		60 N min.
Direct opening stroke *		10 mm min.

* Always maintain the above operating characteristics for safe use.

1-Conduit Connector Models

- D4NS-9□F



Operating characteristics	Model	D4NS-9□F
Key insertion force		15 N max.
Key extraction force		30 N max.
Pretravel (PT)		6±3 mm
Total travel (TT)		(28 mm)
Direct opening force *		60 N min.
Direct opening stroke *		10 mm min.

* Always maintain the above operating characteristics for safe use.

Notes:

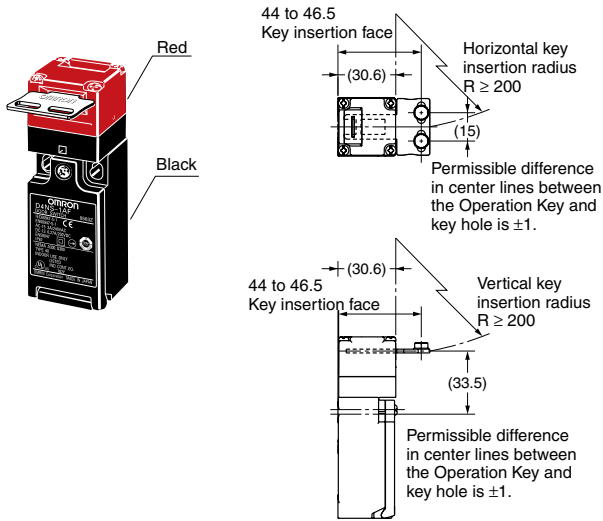
1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
2. There are fluctuations in the contact ON/OFF timing for Switches with multiple poles (2NC, 2NC/1NO, or 3NC). Confirm performance before application.

Dimensions and Operating Characteristics (continued)

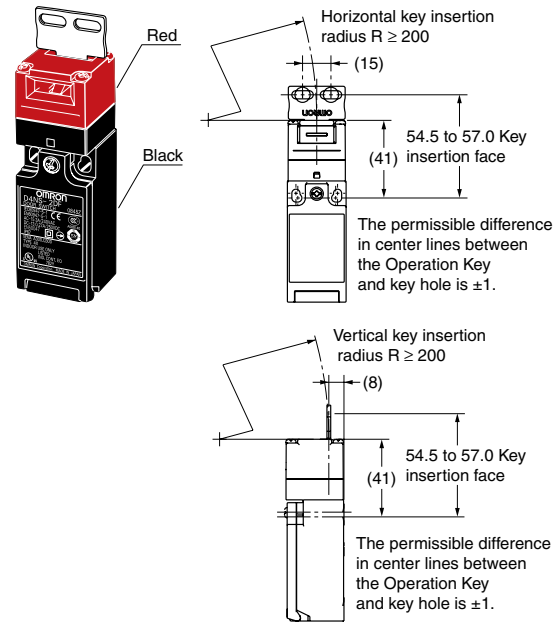
(mm)

With Operation Key Inserted (Relationship between Insertion Radius and Key Hole)

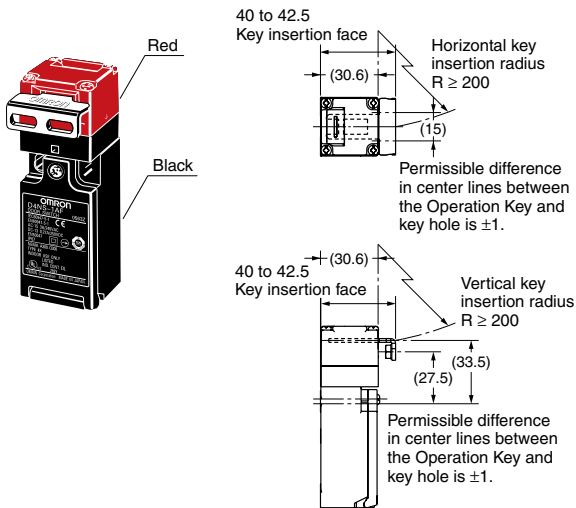
**D4NS-1□F + D4DS-K1
(with Front-inserted Operation Key)**



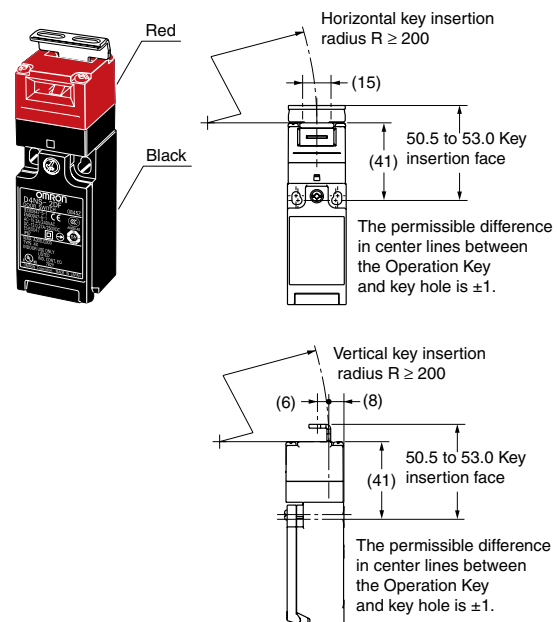
**D4NS-1□F + D4DS-K1
(with Top-inserted Operation Key)**



**D4NS-1□F + D4DS-K2
(with Front-inserted Operation Key)**



**D4NS-1□F + D4DS-K2
(with Top-inserted Operation Key)**

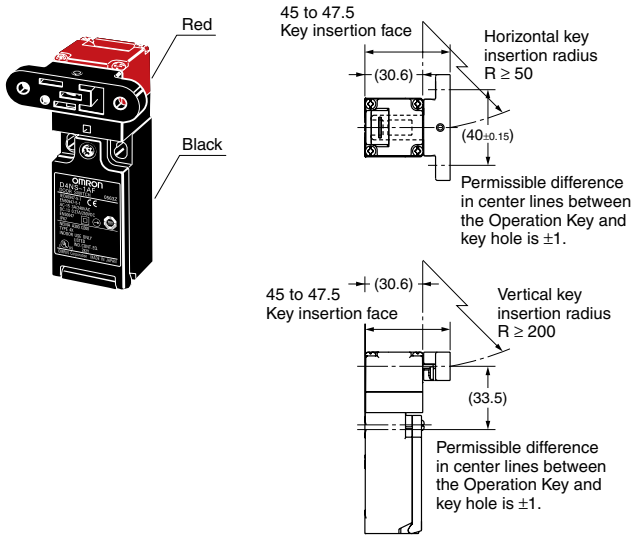


Note: Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

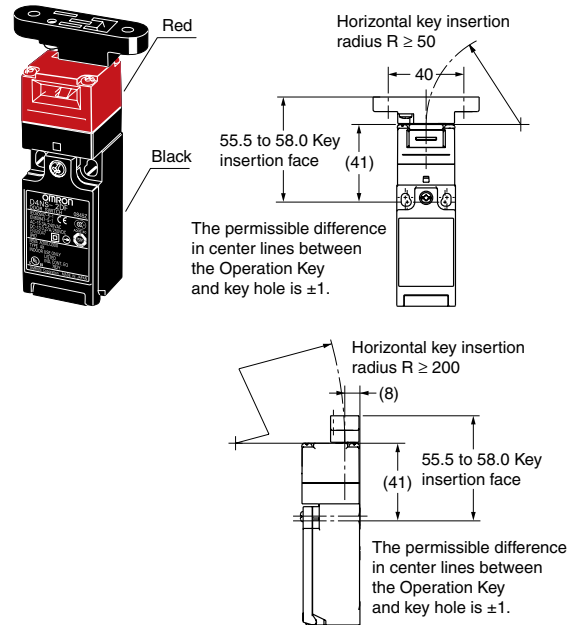
Dimensions and Operating Characteristics (continued)

(mm)

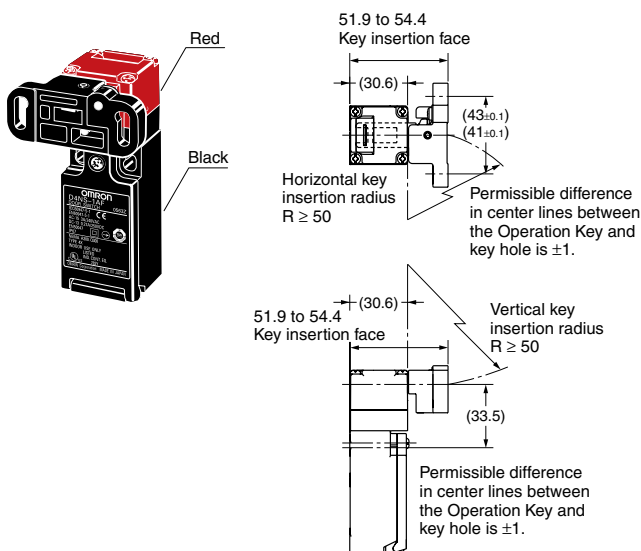
D4NS-1□F + D4DS-K3
(with Front-inserted Operation Key)



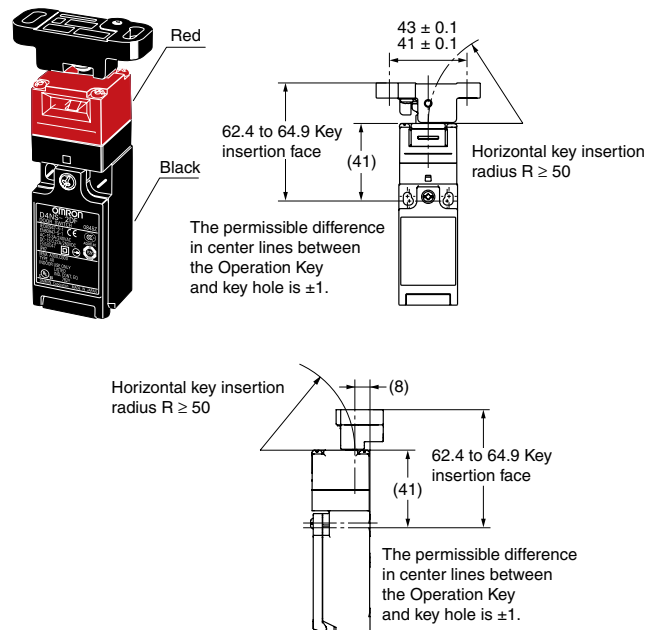
D4NS-1□F + D4DS-K3
(with Top-inserted Operation Key)



D4NS-1□F + D4DS-K5
(with Front-inserted Operation Key)



D4NS-1□F + D4DS-K5
(with Top-inserted Operation Key)



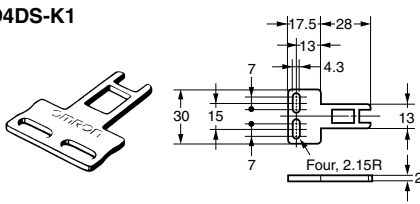
F

Dimensions and Operating Characteristics (continued)

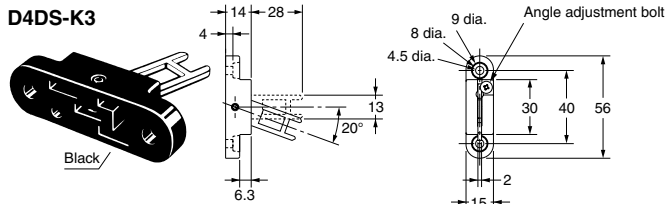
(mm)

Operation Keys

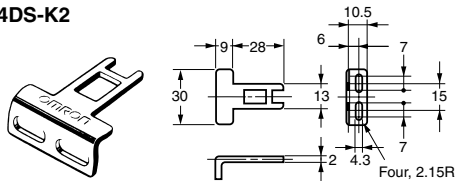
D4DS-K1



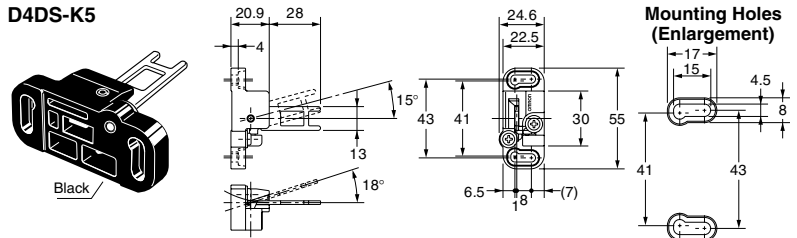
D4DS-K3



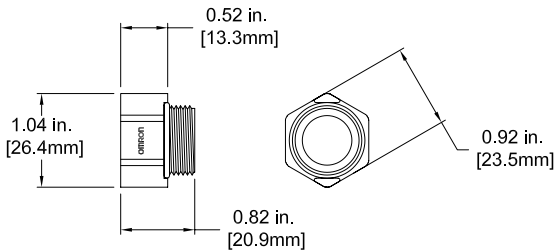
D4DS-K2



D4DS-K5



M20-NPT Adapter



Ordering

Model Number Structure

Switch

D4NS - □ □ □ - □
 ① ② ③ ④

- ① Conduit Size
 - 1: Pg 13.5 (1-conduit)
 - 2: G1/2 (1-conduit)
 - 4: M20 (1-conduit)
 - 6: G1/2 (2-conduit)
 - 8: M20 (2-conduit)
 - 9: M12 connector (1-conduit) (only 4-pin is available)
- ② Built-in Switch (with Door Open/Closed Detection Switch and Lock Monitor Switch Contacts)
 - A: 1NC/1NO (slow-action)
 - B: 2NC (slow-action)
 - C: 2NC/1NO (slow-action)
 - D: 3NC (slow-action)
 - E: 1NC/1NO (MBB contact)
 - F: 2NC/1NO (MBB contact)

- ③ Head Mounting Direction
 - F: Four mounting directions possible (Front-side mounting at shipping)/plastic
 - D: Four mounting directions possible (Front-side mounting at shipping)/metal
- ④ M20-to-NPT Adapter
 - Blank: Adapter is not included
 - NPT: Adapter is included*



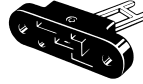

Note: An order for the head part or the switch part alone cannot be accepted. (The operation key is sold separately.)

*Not available with 2-conduit models.

Operation Key

D4DS-K □
 ①

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

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

Ordering (continued)

List of Models

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

Type	Contact configuration	Conduit opening/Connector	Model	
1-Conduit	Slow-action	1NC/1NO	Pg13.5	D4NS-1AF *
			G1/2	D4NS-2AF *
			NPT	D4NS-4AF-NPT
			M20	D4NS-4AF
		2NC	Pg13.5	D4NS-1BF *
			G1/2	D4NS-2BF *
			NPT	D4NS-4BF-NPT
			M20	D4NS-4BF
		2NC/1NO	Pg13.5	D4NS-1CF *
			G1/2	D4NS-2CF *
			NPT	D4NS-4CF-NPT
			M20	D4NS-4CF
	3NC	Pg13.5	D4NS-1DF *	
		G1/2	D4NS-2DF *	
		NPT	D4NS-4DF-NPT	
		M20	D4NS-4DF	
	Slow-action MBB contact	1NC/1NO	Pg13.5	D4NS-1EF
			G1/2	D4NS-2EF
			NPT	D4NS-4EF-NPT
			M20	D4NS-4EF
2NC/1NO		Pg13.5	D4NS-1FF	
		G1/2	D4NS-2FF	
		NPT	D4NS-4FF-NPT	
		M20	D4NS-4FF	
2-Conduit	Slow-action	1NC/1NO	G1/2	D4NS-6AF
			M20	D4NS-8AF
		2NC	G1/2	D4NS-6BF
			M20	D4NS-8BF
		2NC/1NO	G1/2	D4NS-6CF
			M20	D4NS-8CF
	3NC	G1/2	D4NS-6DF	
		M20	D4NS-8DF	
	Slow-action MBB contact	1NC/1NO	G1/2	D4NS-6EF
			M20	D4NS-8EF
		2NC/1NO	G1/2	D4NS-6FF
			M20	D4NS-8FF
1-Conduit, with connector	Slow-action	M12 connector	1NC/1NO	D4NS-9AF
			2NC	D4NS-9BF
	Slow-action MBB contact		1NC/1NO	D4NS-9EF

- The recommended models for equipment and machinery being exported to Europe are those with an M20 or Pg13.5 conduit sizes, and for North America, the recommended models are those with a NPT conduit sizes.
 - Resin is used as the material for the D4NS housing and head. Use the metal D4BS Safety-door Switch for applications requiring greater mechanical strength.
- *Models with Korean S-mark certification.

T5009 & T5009-6

Quick Link

S249

omron247.com

Universal Tongue-Operated Safety Interlock Switch

- Strong and versatile—the compact size of the strong, glass-filled polyester housing and metal reinforced cam allows this popular switch to be used in most applications
- NEMA 6 enclosure enables these switches to withstand water washdown cleaning.
- Rotatable head gives four possible actuator entry points for versatile installation. A blanking plug is supplied for the unused entry.
- Small swing radius allows use on doors with a swing radius as small as 2.5 in. when using the optional flexible actuators
- Hi-Hold models reduce nuisance rips and allow the switch to also serve as the gate catch without the need to mount any additional hardware.
- The 4 contact poles provide 2 poles for dual channel safety monitoring and 2 additional poles for status monitoring
- Optional connector makes installation easy
- An optional stainless steel head is available



Conforms to EN1088, EN292, EN60947-5-1, EN60204-1
UL and C-UL listed

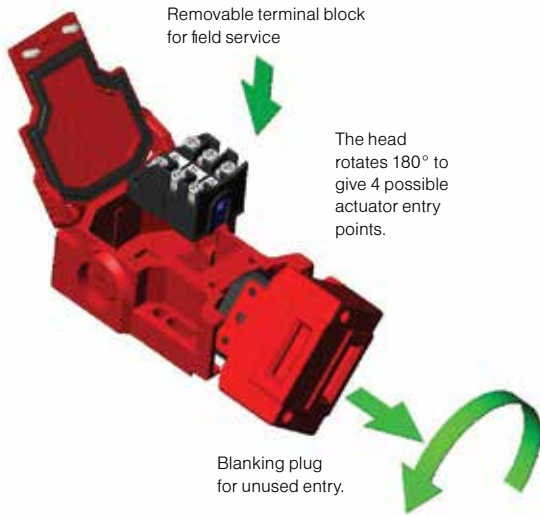
Specifications

Electrical	All Models	T5009	T5009-6
Contact Configurations:		2 N/C + 1 N/O	2 N/C + 2 N/O, 3 N/C + 1 N/O, 4 N/C
Safety Contacts:	2 N/C positive break		
Switching Ability	AC: 500 V–1 A, 240 V–3 A, 120 V–6 A DC: 250 V–0.5 A, 24 V–2.5 A		
Safety Contact Gap:	> 2 mm (0.079 in.)		
Auxiliary Contacts:		1 N/O	1 N/C + 1 N/O, 2 N/C, 2 N/O
Max Switching Current/Volt/Amp:	500 V/500 VA		
Minimum Current:	5 V 5 mA DC		
Electrical Life:	1 x 10 ⁸ minimum		
Mechanical			
Mounting:	Any position		
Mounting Hardware:	2 x M5 screws		
Actuator Travel for Positive Opening:	7 mm (0.275 in.)		
Min Operating Radius:	60 mm (2.5 in.) with Flex 1 actuator; 175 mm (6.89 in.) with standard actuator		
Break Contact Min Force:	12 N (2.7 lb.); Hi-Hold models are 50 N (11.2 lbs.)		
Max Actuation Speed:	160 mm/sec (6.30 in./sec)		
Max Actuation Frequency:	2 cycles/sec		
Case Material:	UL listed, glass-filled polyester, optional stainless steel head		
Actuator Material:	Stainless steel		
Wiring Entry:	M20 with 1/2 in. NPT adapter included, 1/2 in. NPT, 6-pin micro AC connector 1/2 in.–20		
Weight:	160 g (5.6 oz.)		
Color:	Red		
Mechanical Life:	1 x 10 ⁸ minimum		
Environmental			
Protection:	IP67 (NEMA 6)		
Operating Temperature:	-25 to 80°C (-13 to 176°F)		
Cleaning:	Water washdown		
Compliance			
Standards:	EN1088, EN292, EN60947-5-1, EN60204-1, UL508		
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL		

Specifications are subject to change without notice.

Note: The safety contacts of the STI switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

Operation



Flex 1
15° flexibility in any direction.



Flex 2
15° flexibility in two directions.



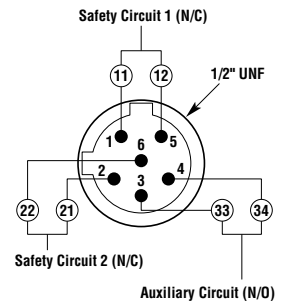
Optional SLD Series

Optional switch locking devices are available. See accessories section for details.

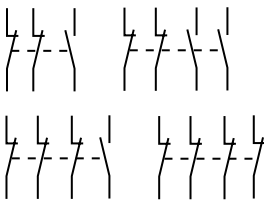


Optional Connector for 3-Pole Switches

6-Pin Male, Micro AC, 1/2-20 UN2A

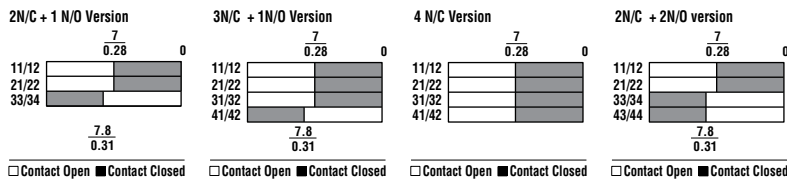


Contact Arrangements



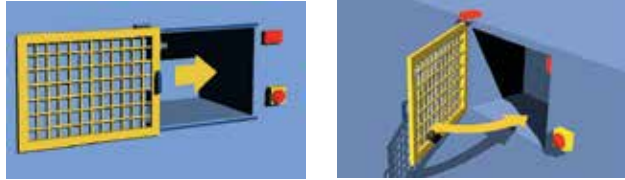
Minimum Allowable Radius for Actuator Entry				
44501-0755	175 mm	175 mm	175 mm	175 mm
44501-0785	175 mm	175 mm	175 mm	175 mm
44501-0790	175 mm	175 mm	175 mm	175 mm
44501-0765	175 mm	50 mm	60 mm	175 mm
44501-0760	60 mm	60 mm	60 mm	60 mm

Contact Block Operation at Withdrawal of Actuator

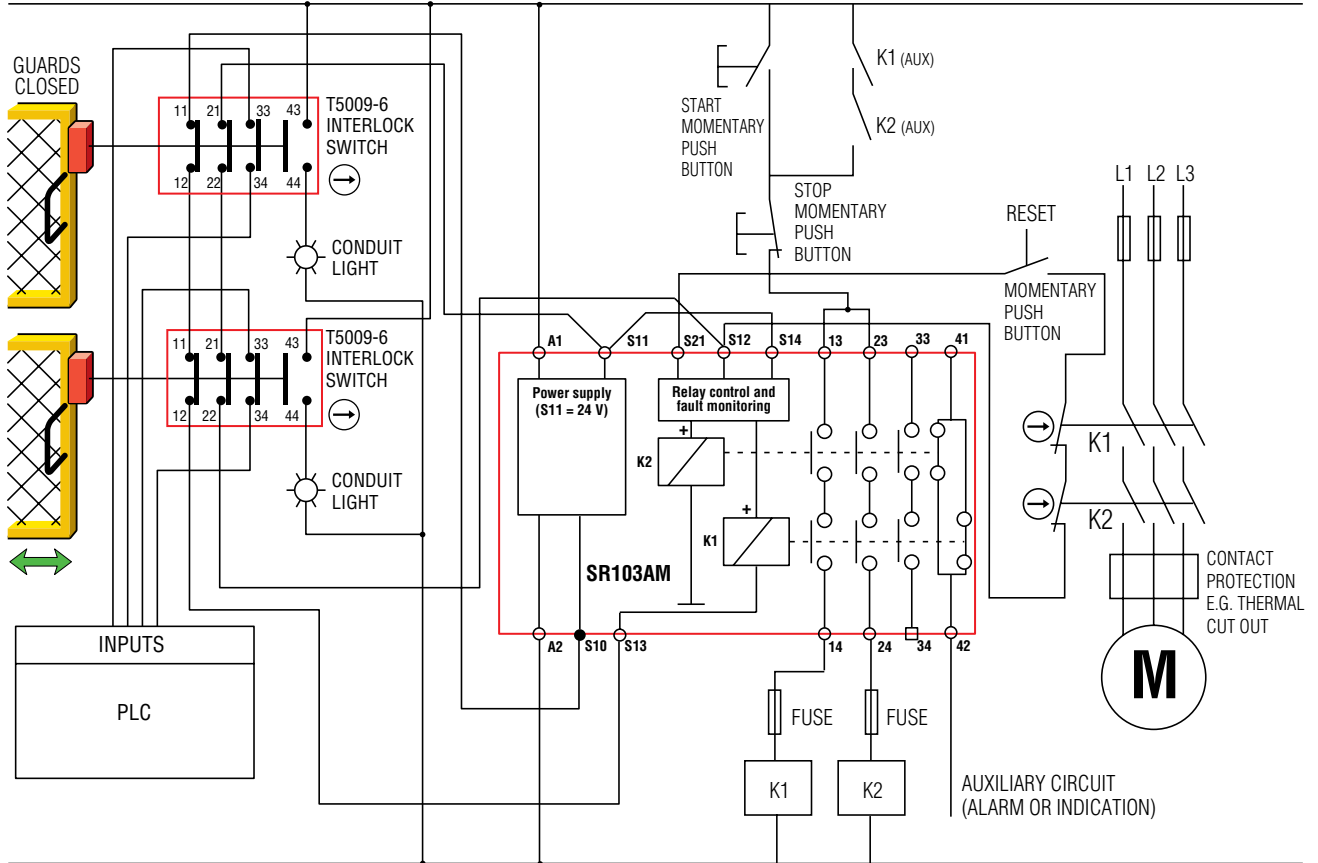



Applications

Typical applications are on sliding guard doors or swinging guard doors with a 2.5 in. minimum swing radius when using the flexible actuators.



24VAC/DC, 110VAC, 230VAC

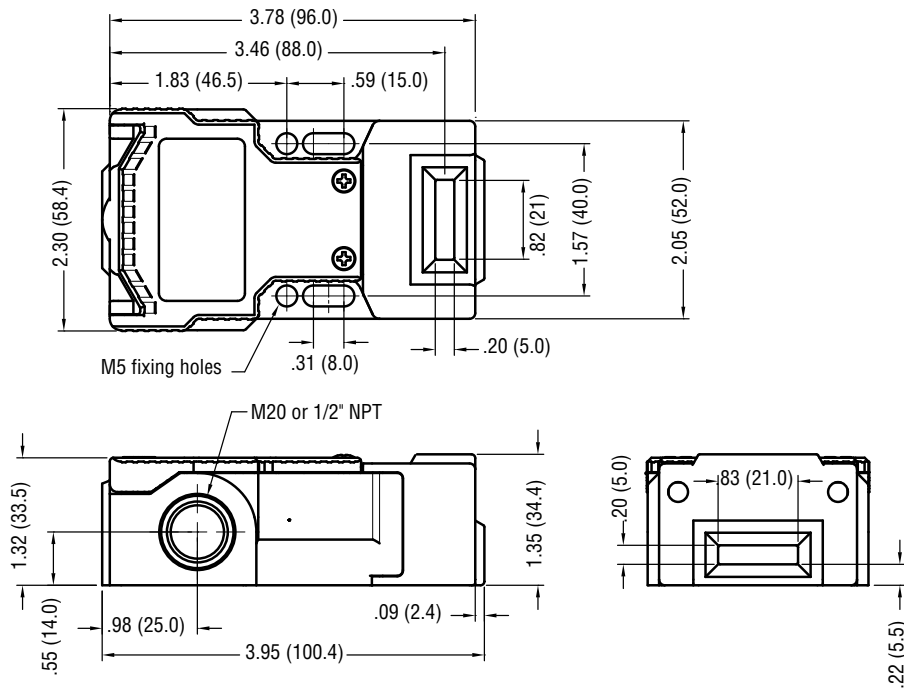


 For a full explanation of the circuit operating principle and fault detection, see "Common Circuit Examples" in the Expert Area Section of this catalog on page A-27

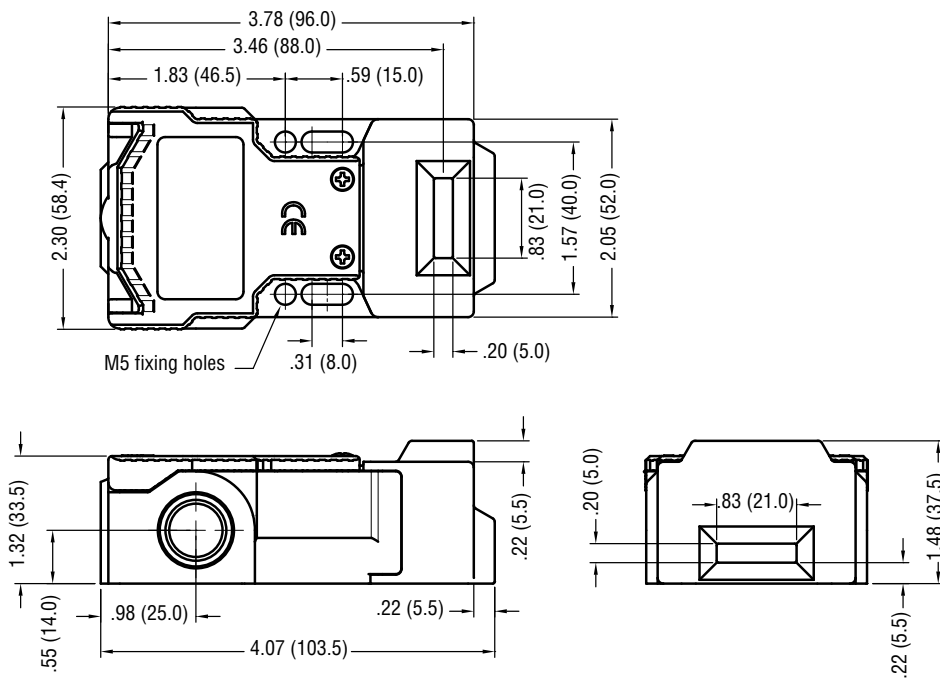
Dimensions

(mm/in.)

T5009, T5009-6 Switch with Plastic Head



T5009, T5009-6 Switch with Stainless Steel Head



F

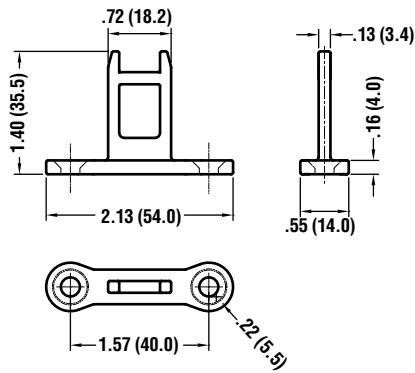
Dimensions (continued)

(mm/in.)

Standard & Flat Actuator Selections

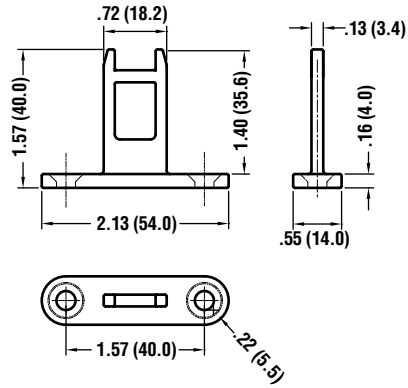
SA01-STD

44501-0755 (for use with plastic headed switches)



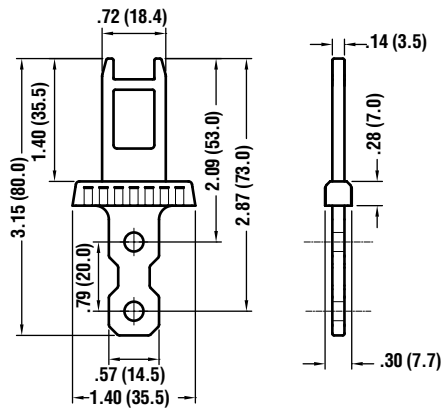
SA01-SSTD

44501-0785 (for use with stainless steel headed switches)



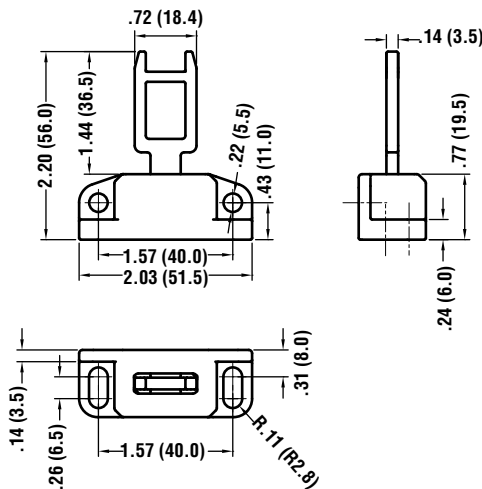
SA01-FSTD

44501-0790 (for use with plastic or stainless steel headed switches)



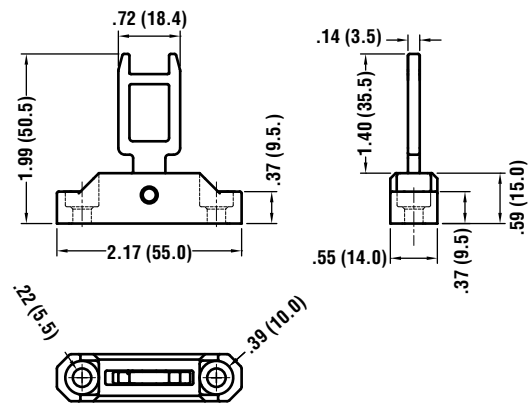
SA01-FLX1

44501-0760 (for use with plastic or stainless steel headed switches)



SA01-FLX2

44501-0765 (for use with plastic or stainless steel headed switches)



Ordering

Model	Contacts	Wiring Entry	Part No.
T5009 Switch Only			
T5009-021M	2NC+1NO BBM	3 x M20/NPT	44501-0010
T5009-021MHH (High-Hold Model)	2NC+1NO BBM	3 x M20/NPT	44501-5010
T5009-021N	2NC+1NO BBM	3 X 1/2 NPT	44501-0020
T5009-021NHH (High-Hold Model)	2NC+1NO BBM	3 x 1/2 NPT	44501-5020
T5009-021QD	2NC+1NO BBM	6-pin Micro AC Conn.	44501-0030
T5009-021QDHH (High-Hold Model)	2NC+1NO BBM	6-pin Micro AC Conn.	44501-5030
T5009-021SSM (Stainless Steel Head)	2NC+1NO BBM	3 x M20/NPT	44501-0040
T5009-021SSMHH (Stainless Steel Head, High-Hold Model)	2NC+1NO BBM	3 x M20/NPT	44501-5040
T5009-021SSN (Stainless Steel Head)	2NC+1NO BBM	3 X 1/2 NPT	44501-0050
T5009-021SSNHH (Stainless Steel Head, High-Hold Model)	2NC+1NO BBM	3 x 1/2 NPT	44501-5050
T5009-021SSCC (Stainless Steel Head)	2NC+1NO BBM	6-pin Micro AC Conn.	44501-0060
T5009-021SSCCHH (Stainless Steel Head, High-Hold Model)	2NC+1NO BBM	6-pin Micro AC Conn.	44501-5060
T5009 Standard Actuator			
T5009-021SM	2NC+1NO BBM	3 x M20/NPT	44501-0110
T5009-021SMHH (High-Hold Model)	2NC+1NO BBM	3 x M20/NPT	44501-5110
T5009-021SN	2NC+1NO BBM	3 X 1/2 NPT	44501-0450
T5009-021SCC	2NC+1NO BBM	6-pin Micro AC Conn.	44501-0410
T5009-021FSSM (Stainless Steel Head)	2NC+1NO BBM	3 x M20/NPT	44501-0500
T5009-021FSSN (Stainless Steel Head)	2NC+1NO BBM	3 X 1/2 NPT	44501-0520
T5009 Flex 1 Actuator			
T5009-021F1M	2NC+1NO BBM	3 x M20/NPT	44501-0120
T5009-021F1MHH (High-Hold Model)	2NC+1NO	3 x M20/NPT	44501-5120
T5009-021F1N	2NC+1NO BBM	3 X 1/2 NPT	44501-0170
T5009 Flex 2 Actuator			
T5009-021F2M	2NC+1NO BBM	3 x M20/NPT	44501-0440
T5009-021F2N	2NC+1NO BBM	3 X 1/2 NPT	44501-0470
T5009-6 Switch Only			
T5009-6022M	2NC+2NO BBM	3 x M20/NPT	44501-1020
T5009-6022N	2NC+2NO BBM	3 X 1/2 NPT	44501-1025
T5009-6031M	3NC+1NO BBM	3 x M20/NPT	44501-1030
T5009-6031N	3NC+1NO BBM	3 X 1/2 NPT	44501-1035
T5009-6040M	4NC BBM	3 x M20/NPT	44501-1040
T5009-6040N	4NC BBM	3 X 1/2 NPT	44501-1045
T5009-6022SSM (Stainless Steel Head)	2NC+2NO BBM	3 x M20/NPT	44501-2020
T5009-6022SSN (Stainless Steel Head)	2NC+2NO BBM	3 X 1/2 NPT	44501-2025
T5009-6031SSM (Stainless Steel Head)	3NC+1NO BBM	3 x M20/NPT	44501-2030
T5009-6031SSN (Stainless Steel Head)	3NC+1NO BBM	3 X 1/2 NPT	44501-2035
T5009-6040SSM (Stainless Steel Head)	4NC BBM	3 x M20/NPT	44501-2040
T5009-6040SSN (Stainless Steel Head)	4NC BBM	3 X 1/2 NPT	44501-2045
T5009-6 Standard Actuator			
T5009-6022SM	2NC+2NO BBM	3 x M20/NPT	44501-3020
T5009-6022SN	2NC+2NO BBM	3 X 1/2 NPT	44501-3025
T5009-6031SM	3NC+1NO BBM	3 x M20/NPT	44501-3030
T5009-6031SN	3NC+1NO BBM	3 X 1/2 NPT	44501-3035
T5009-6040SM	4NC BBM	3 x M20/NPT	44501-3040
T5009-6040SN	4NC BBM	3 X 1/2 NPT	44501-3045
Actuators For Plastic Headed T5009, T5009-6 Switches			
SA01-STD, Standard Actuator T5009, T5009-6, Plastic Head Switches			44501-0755
Actuators For Stainless Steel Headed T5009, T5009-6 Switches			
SA01-SSTD, Standard Actuator for T5009, T5009-6 Stainless Steel Head Switches			44501-0785
Actuators Compatible with both Plastic and Stainless Steel Headed T5009, T5009-6 Switches			
SA01-FLX1, Flex 1 Actuator T5009, T5009-6, Plastic or SS Headed Switches			44501-0760
SA01-FSTD, Flat Actuator T5009, T5009-6, Plastic or SS Headed Switches			44501-0790
SA01-FLX2, Flex 2 Actuator T5009, T5009-6, Plastic Head Switches			44501-0765
Accessories			
Spare M20 to 1/2" NPT Adapter			44512-0110
M20 Cord Grip			44512-0090

BBM = Break Before Make Contacts

T4012

Quick Link

S252

omron247.com

Universal Tongue-Operated Safety Interlock Switch

- Strong and versatile—the compact size of the strong, glass-filled thermoplastic housing allows this switch to be used in most applications
- NEMA 6 enclosure enables these switches to withstand water washdown cleaning
- Rotatable head gives eight possible actuator entry points for versatile installation. A blanking plug is supplied for the unused entry.
- Long life—these switches, with their stainless steel actuators, are designed for a minimum of two million actuations
- Available in 2 or 4 contact pole versions. The 4 contact pole version provides 2 poles for dual channel safety monitoring and 2 additional poles for status monitoring.
- An optional stainless steel guide is available for demanding applications



T4016

Quick Link

S253

omron247.com

Heavy-Duty Metal-Body Safety Interlock Switch

- Rugged enclosure—the all metal housing and stainless steel actuator of the T4016 makes it suitable for harsh environments
- NEMA 6/IP67 enclosure enables these switches to withstand water washdown cleaning.
- Rotatable head gives eight possible actuator entry points for versatile installation. A blanking plug is supplied for the unused entry.
- Long life—these switches, with their stainless steel actuators, are designed for a minimum of two million actuations
- A variety of 4 contact pole versions provides 2 poles for dual channel safety monitoring and 2 additional poles for status monitoring



Small Tongue-Operated Safety Interlock Switch

- Small size—these switches are ideal for guarding applications with space restrictions. Fits on 1 inch square tubing.
- NEMA 6 (IP67) enclosure enables these switches to withstand water washdown cleaning
- Rotatable head gives eight possible actuator entry points for versatile installation. A blanking plug is supplied for the unused entry.
- Long life—these switches, with their stainless steel actuators, are designed for a minimum of one million actuations
- Available with two contact poles. Contact configurations of 1 N/O and 1 N/C or 2 N/C are available to meet requirements of dual channel safety monitoring
- An optional stainless steel guide is available for demanding applications



Conforms to EN60947-5-1, EN1088, EN ISO 13849-1
UL and C-UL listed
DGUV approved

Specifications

Electrical	All Models
Contact Configurations:	1 N/O + 1 N/C, 2 N/C
Safety Contacts:	1 N/C positive break, 2 N/C positive break
Switching Ability:	AC: 230 V, 4 A DC: 24 V, 4 A
Contact Material:	Silver alloy, gold flashed
Auxiliary Contacts:	1 N/O (T2008-11 models only)
Minimum Switching Voltage:	12 V at 10 mA
Minimum Switching Current:	1 mA at 24 V
Mechanical	
Mounting:	Any position
Mounting Hardware:	2 x M4 screws (not supplied)
Min Operating Radius:	150 to 200 mm based upon orientation of actuator to switch
Break Contact Min Force:	6 N (0.23 lb.)
Max Actuation Speed:	20 m/min.
Max Actuation Frequency:	7000 cycles/hour
Case Material:	Glass-fibre reinforced thermoplastic
Actuator Material:	Stainless steel
Wiring Entry:	1 x M16
Weight:	55 g (1.8 oz.)
Color:	Black with red lid
Mechanical Life:	1 x 10 ⁶ minimum
Environmental	
Protection:	IP67 (NEMA 6)
Operating Temperature:	-20 to 80°C (-4 to 176°F)
Cleaning:	Water washdown
Compliance	
Standards:	EN60947-5-1, EN1088, EN ISO 13849-1
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL, DGUV

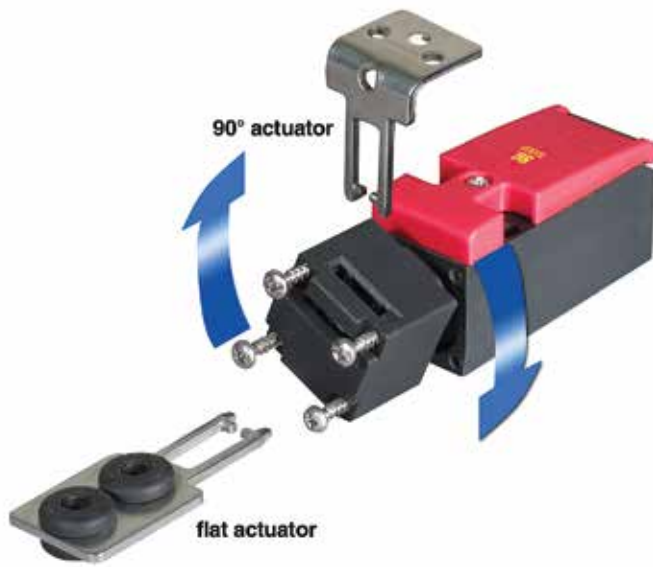
Specifications are subject to change without notice.

Note: The safety contacts of the STI switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

Actual Size

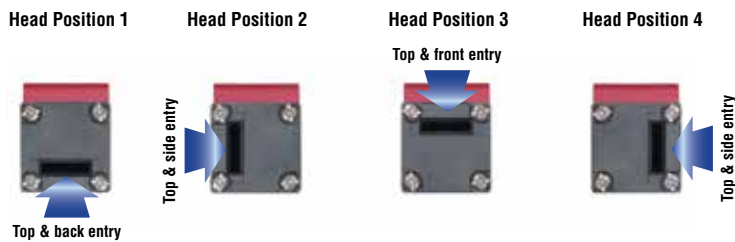


Operation

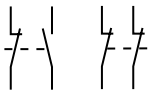


Optional Slide Bolts

- Allows easy installation of switch on machine guards
- Actuator included (order switch separately)
- Integral handle included
- Metal construction is suitable for demanding applications
- Yellow color for easy recognition



Contact Arrangements



Optional Alignment Guide

Optional stainless steel alignment guide aids actuator entry and is easily installed.



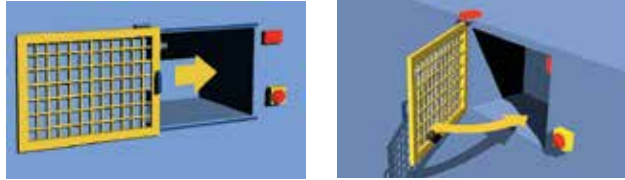
Optional SLD Series

Optional switch locking devices are available. See accessories section for details.

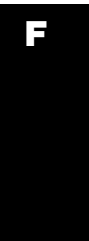
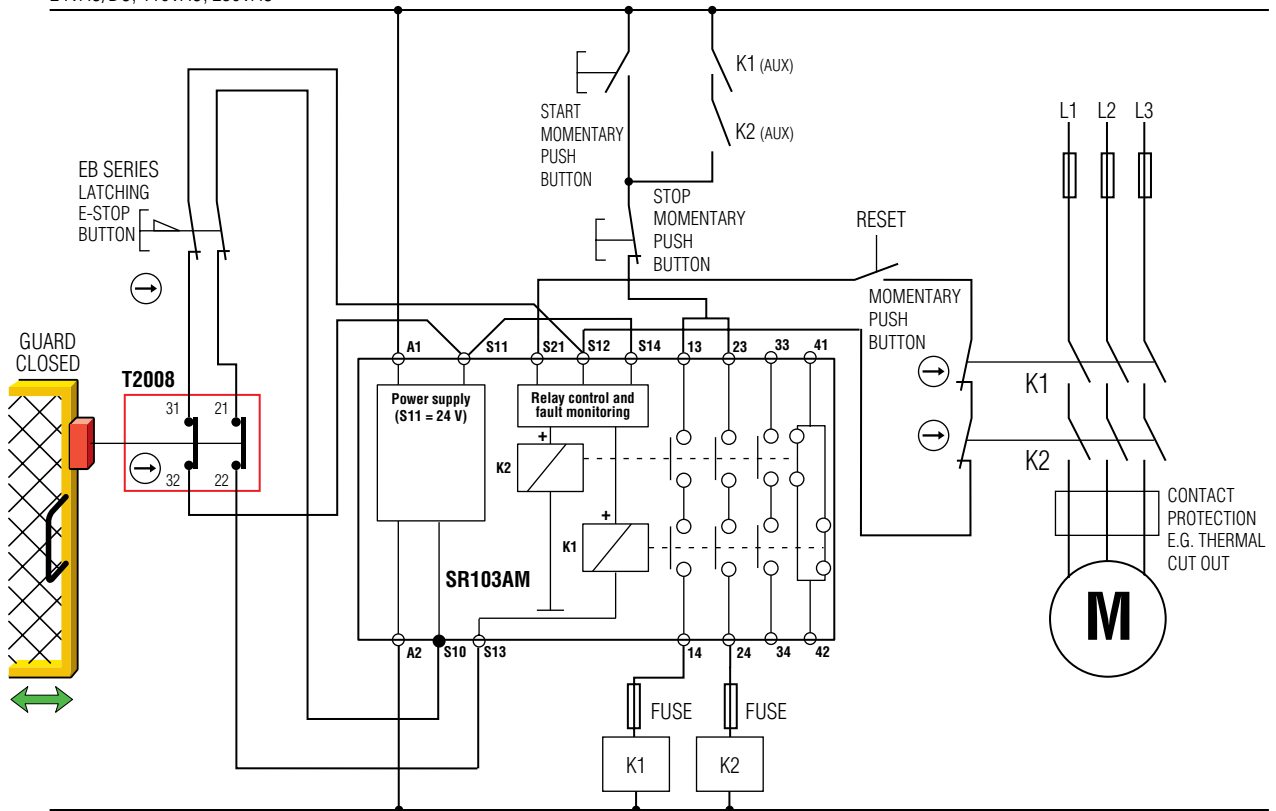


Applications

Typical applications are on sliding guard doors or swinging guard doors.

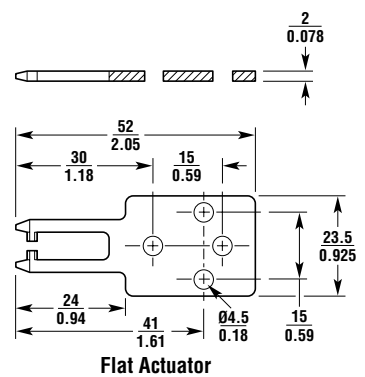
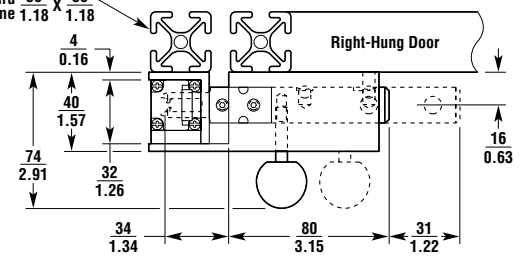
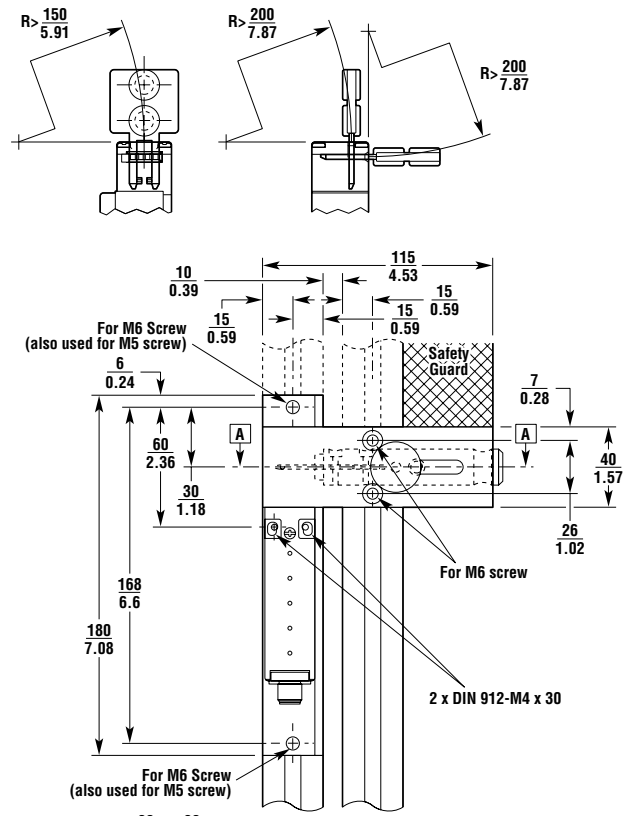
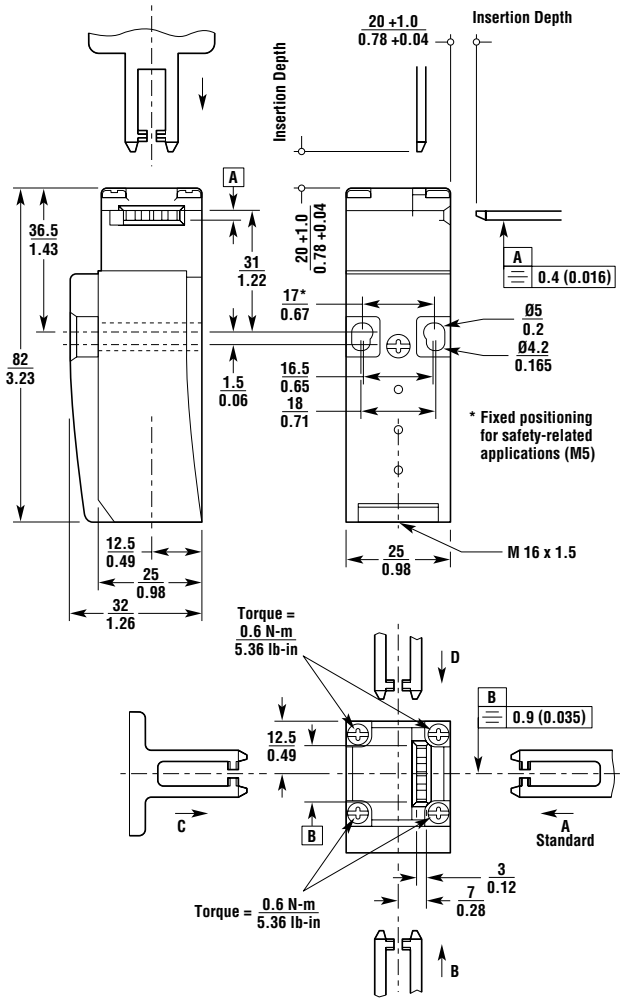


24VAC/DC, 110VAC, 230VAC

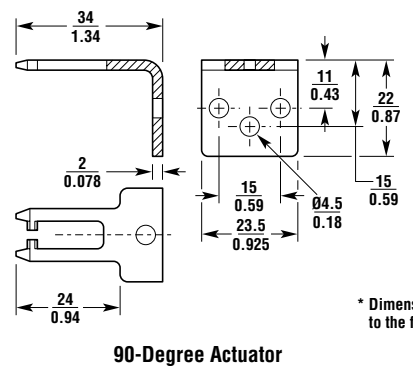


Dimensions

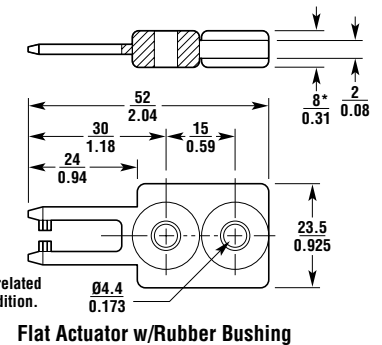
(mm/in.)



Flat Actuator



90-Degree Actuator



Flat Actuator w/Rubber Bushing

Ordering

Model	Contacts	Wiring Entry	Part No.
T2008 90-Degree Actuator			
T2008-11SM	1 N/C + 1 N/O	1 x M16 + NPT adapter	44540-0010
T2008-02SM	2 N/C	1 x M16 + NPT adapter	44540-0020
T2008 Flat Actuator			
T2008-11TM	1 N/C + 1 N/O	1 x M16 + NPT adapter	44540-0110
T2008-02TM	2 N/C	1 x M16 + NPT adapter	44540-0120
T2008 Flat Actuator with Rubber Bushing			
T2008-11TRM	1 N/C + 1 N/O	1 x M16 + NPT adapter	44540-0210
T2008-02TRM	2 N/C	1 x M16 + NPT adapter	44540-0220
T2008 Switch Only (no actuators and no adapters included)			
T2008-11	1 N/C + 1 N/O	1 x M16	44540-2010
T2008-02	2 N/C	1 x M16	44540-2020
Accessories			
Spare Actuators			
SA40-S00 90-degree actuator			44540-0700
SA40-T10 flat actuator			44540-0710
SA40-TR20 flat actuator with rubber bushings			44540-0720
Stainless Steel Guide			
SM40-SG50 stainless steel guide			44540-0750
Slide Bolt			
SB40-M00 slide bolt left or right hand door with bracket			44540-8000
Mounting Bracket			
SB40-M10 right angle bracket only for mounting T2008/T2011 switches			44540-8010
Adapter			
SC12-M16A00 M16 to 1/2 in. NPT adapter			44512-0300

Slim Safety Door Switches with IP67 Rating

- Slim design with a width of only 17 mm (three-contact models).
- Reversible design allowing either front or rear mounting.
- Built-in Switches with two- or three-terminal contact construction are available.
- Operation Key with rubber mounting hole to absorb vibration and shock.
- IP67 degree of protection.



Super Small Class 6-Contact Guard Lock Safety-Door Switch

D4SL-N Guard Lock Safety-door Switch

- Wiring time is reduced with two types of wiring methods capable of one-touch attachment and removal.
- A wide variety of built-in switches can be used for various devices. (4-, 5-, and 6-contact models are available)
- Key holding force of 1,300 N.
- It is possible to change the key insertion point without detaching the head.
- Drive solenoids directly from the Controller.

D4SL-NSK10-LK □ Slide Key

- Lockout Key to prevent workers from becoming trapped inside the hazardous area.
- The vertical D4SL Guard Lock Safety-door Switch can be easily mounted on 40 x 40 mm aluminum frames.
- The plastic material makes the Key suitable for lightweight doors.



Specifications

Standards and EC Directives

Conforms to the following EC Directives:

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

Certified Standards

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

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

Certified Standard Ratings

TÜV (EN 60947-5-1)

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

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

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

*2. Other terminals

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

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

R150

Rated voltage	Carry current	Current (A)		Volt-amperes (VA)	
		Make	Break	Make	Break
125 VDC	1.0 A	0.22	0.22	28	28

Solenoid Coil Characteristics

Item	24 VDC
Rated operating voltage (100% ED)	24 VDC ^{+10%} _{-15%}
Current consumption*	Power ON: 6-contact type Approx. 6.4 W at 0.26 A 4-contact/5-contact type Approx. 4.8 W at 0.2 A Constant: Approx. 2.6 W (average) at 0.2 A (max.)
Insulation Class	Class E (120°C max.)

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

Indicator

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

Specifications (continued)

Characteristics

Degree of protection *1		IP67 (EN60947-5-1)
Durability *2	Mechanical	1,000,000 operations min.
	Electrical	150,000 operations min. (1 A resistive load at 125 VAC) *3
Operating speed		0.05 to 1 m/s
Operating frequency		5 operations/minute max.
Direct opening force *4		60 N min. (EN60947-5-1)
Direct opening travel *4		15 mm min. (EN60947-5-1)
Holding force *5		1,300 N min.
Contact resistance		200 mΩ max.
Minimum applicable load *6		1 mA resistive load at 5 VDC (N-level reference value)
Rated insulation voltage (Ui)		150 V (EN60947-5-1)
Rated frequency		50/60 Hz
Protection against electric shock		Class II (double insulation)
Pollution degree (operating environment)		3 (EN60947-5-1)
Impulse withstand voltage (EN60947-5-1)	Between terminals of same polarity	1.5 kV
	Between terminals of different polarity	1.5 kV
	Between other terminals and non-current carrying metallic parts.	2.5 kV
Insulation resistance		100 MΩ min. (at 500 VDC)
Vibration resistance	Malfunction	10 to 55 Hz, 0.35 mm single amplitude
	Destruction	1,000 m/s ² min.
Shock resistance	Malfunction	80 m/s ² min.
	Destruction	1,000 m/s ² min.
Conditional short-circuit current		100 A (EN60947-5-1)
Conventional free air thermal current (Ith)		2.5 A (11-42, 21-52, 21-22) 1A (Others)
Ambient operating temperature		-10 to +55°C (with no icing)
Ambient operating humidity		95% max.
Weight	Head: Resin	
	Approx. 290 g (Connector model)	
	Approx. 330 g (Terminal block model)	
	Head: Metal	
Approx. 370 g (Connector model)		
Approx. 410 g (Terminal block model)		

Notes: 1. The above values are initial values.
 2. The Switch contacts can be used with either standard loads or microloads. Once the contacts have been used to switch a load, however, they cannot be used to switch smaller loads. The contact surfaces will become rough once they have been used and contact reliability for smaller loads may be reduced.

*1 The degree of protection is tested using the method specified by the standard (EN60947-5-1). Confirm that sealing properties are sufficient for the operating conditions and environment beforehand. Although the switch box is protected from dust, oil or water penetration, do not use the D4SL in places where cutting chips, oil, water or chemicals may enter through the key hole on the head, otherwise Switch damage or malfunctioning may occur.

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

*3 Do not pass the 1 A, 125 VAC load through more than 3 circuits.

*4 These figures are minimum requirements for safe operation.

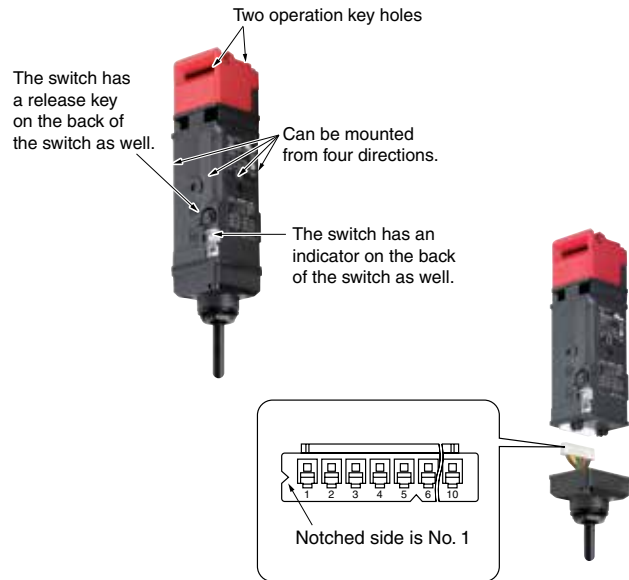
*5 This figure is based on the GS-ET-19 evaluation method.

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

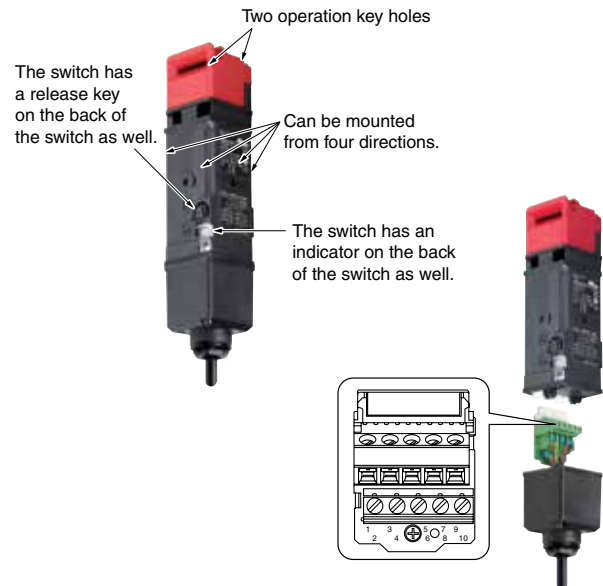
Structure

Structure

D4SL-N□□□□D-□N Connector Type

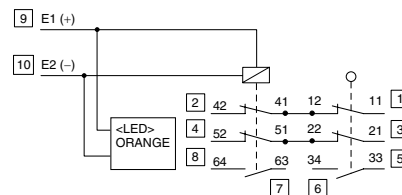


D4SL-N□□□□D-□ Terminal Block Type



Terminal Arrangement

D4SL-N□N□□-D□

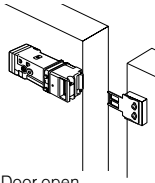
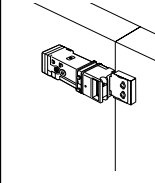
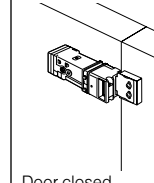
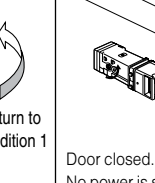


Note: Numbers inside the boxes are terminal numbers printed on the product.

Structure (continued)

Operating Cycle Examples for Standard Models

D4SL-N□□□A-□ (Mechanical Lock Models)

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

D4SL-N□□□G-□ (Solenoid Lock Models)

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

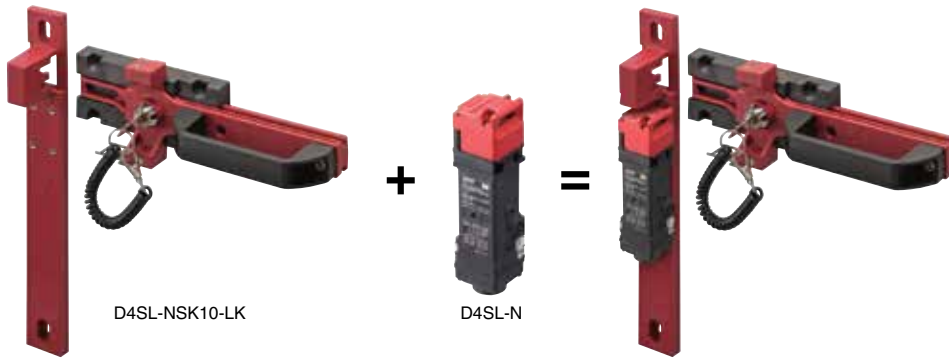
Note: The door open/closed detection and lock monitor contact configuration depends on the model.

Caution: For solenoid-to-lock 6-contact models (contact configuration: N,P,Q,R), if a current is detected in the solenoid before the door is closed, the door might remain unlocked. Apply power to the solenoid AFTER the door is closed to ensure proper locking function.

F

Applicable Door Switches

D4SL-NSK10-LK



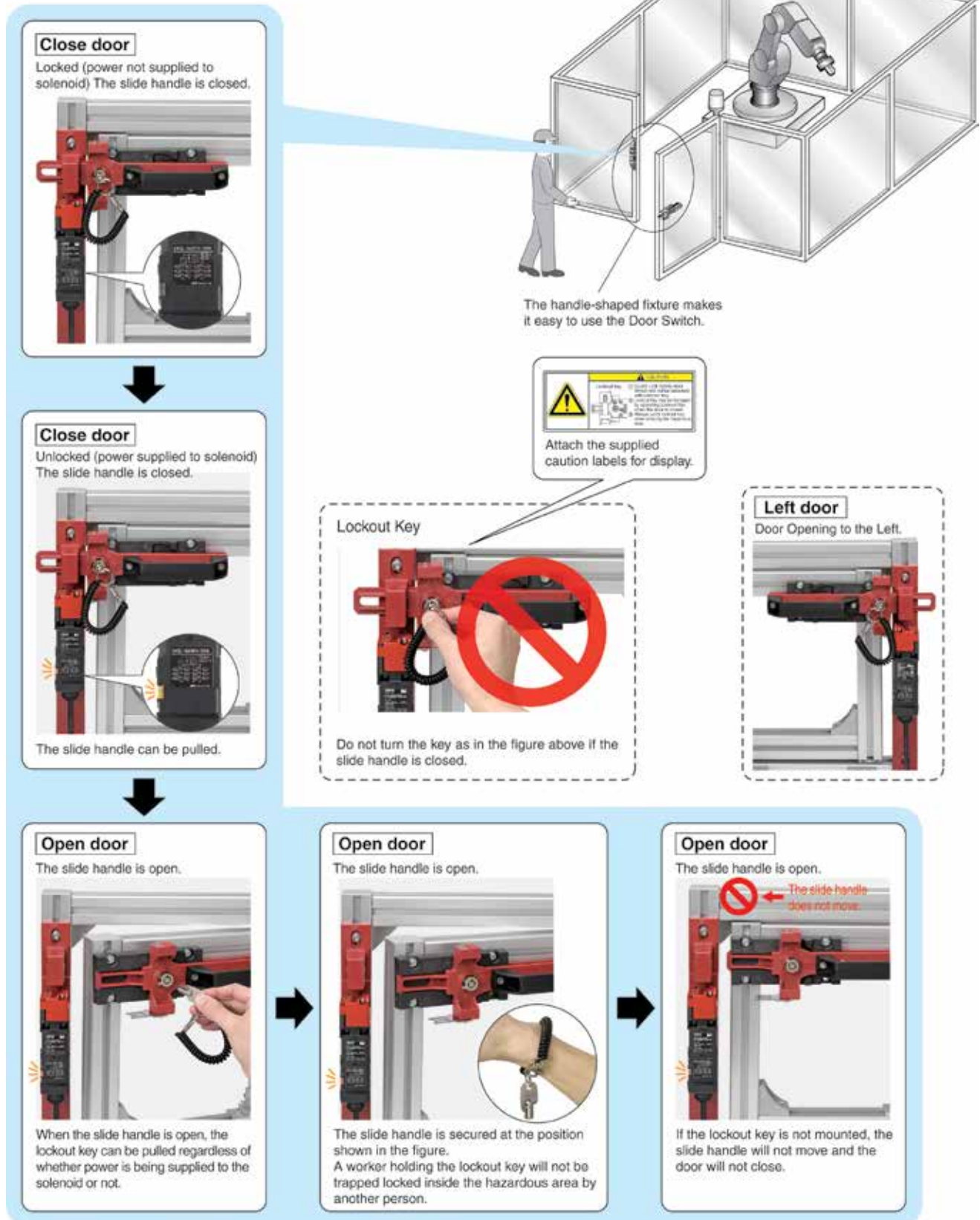
D4SL-NSK10-LKH



Door Switch Features

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

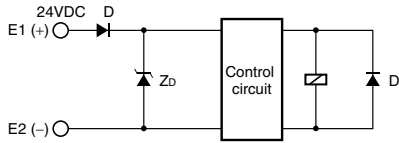
Note: Using LEDs of D4SL-N enables confirming whether the door is open or closed and locked or unlocked.



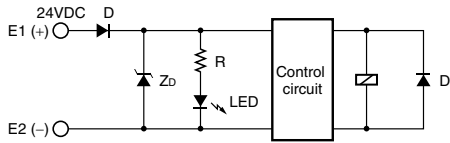
Connections

Internal Circuit Diagram

Without Indicator



With Indicator

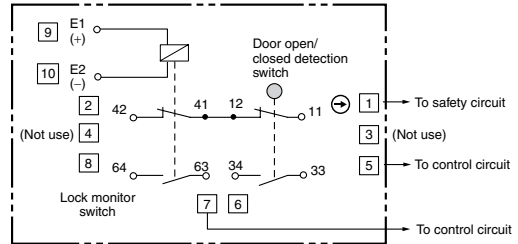


Circuit Connection Example

- Direct opening contacts used as safety-circuit input are indicated with the mark.
- Do not switch circuits for three or more standard loads at the same time. Doing so may adversely affect insulation performance.
- DC solenoids have polarity. (E1: Positive, E2: Negative)
- Confirm terminal polarity before wiring.
- If a lock is required for safety, design the system so that the closing of the NC contacts on both the door open/closed detection switch and the lock monitor switch is detected.

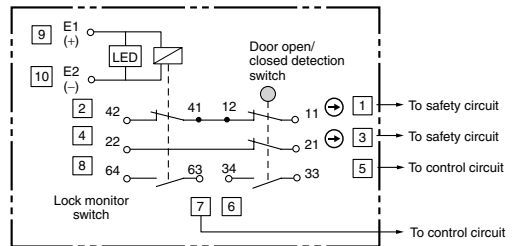
Connection Example for D4SL-N AF -

Contacts 12 and 41 are internally connected.



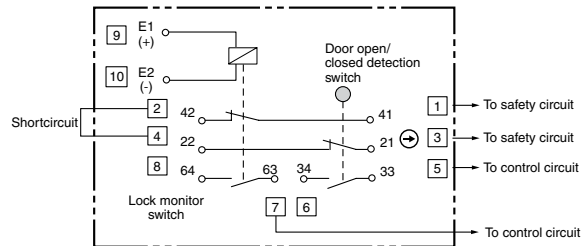
Connection Example for D4SL-N EF -D

Contacts 12 and 41 are internally connected.



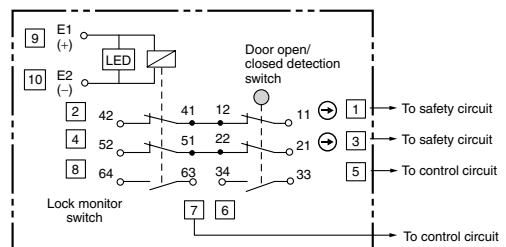
Connection Example for D4SL-N SF -

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



Connection Example for D4SL-N NF -D

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

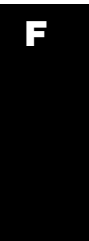


Connections (continued)

Contact Form

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

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



Connections (continued)

Contact Form (continued)

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

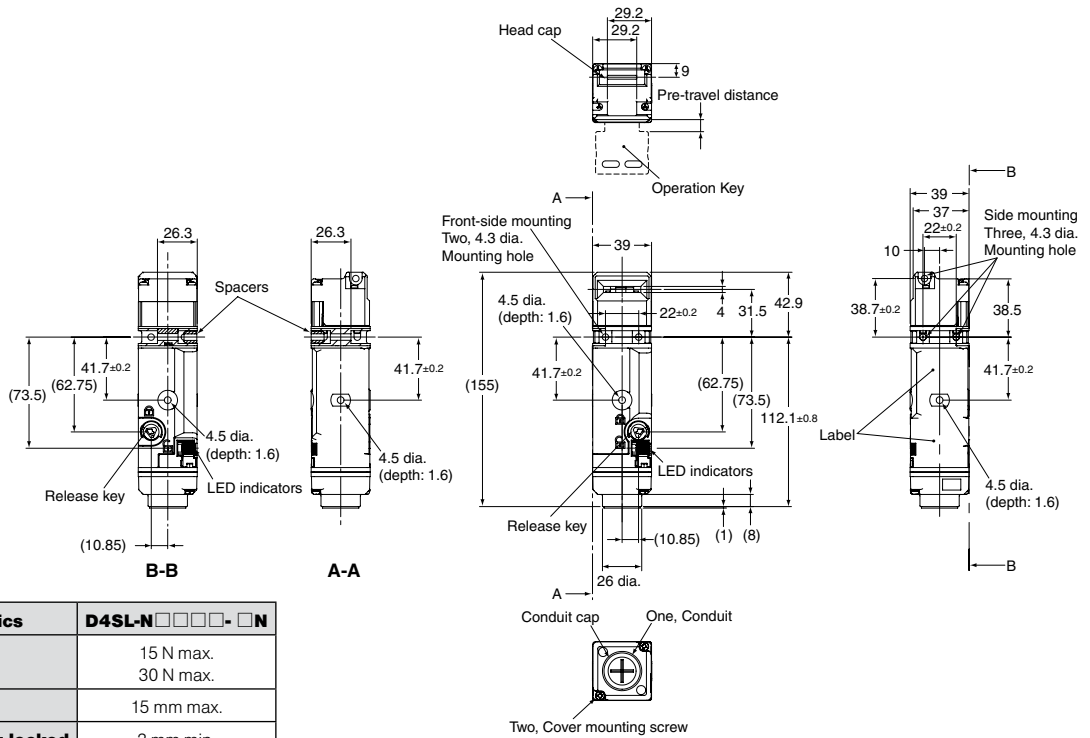
Model	Contact (door open/closed detection and lock monitor)	Contact form		Operating pattern	Remarks
		Lock monitor	Door open/closed detection		
D4SL-N□E□□□□	2NC/1NO+1NC/1NO				Only NC contact 11-12 and 21-22 has a certified direct opening mechanism. (⊖) The terminals 42-11, 22-21, 34-33, and 64-63 can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

Dimensions and Operating Characteristics

(mm)

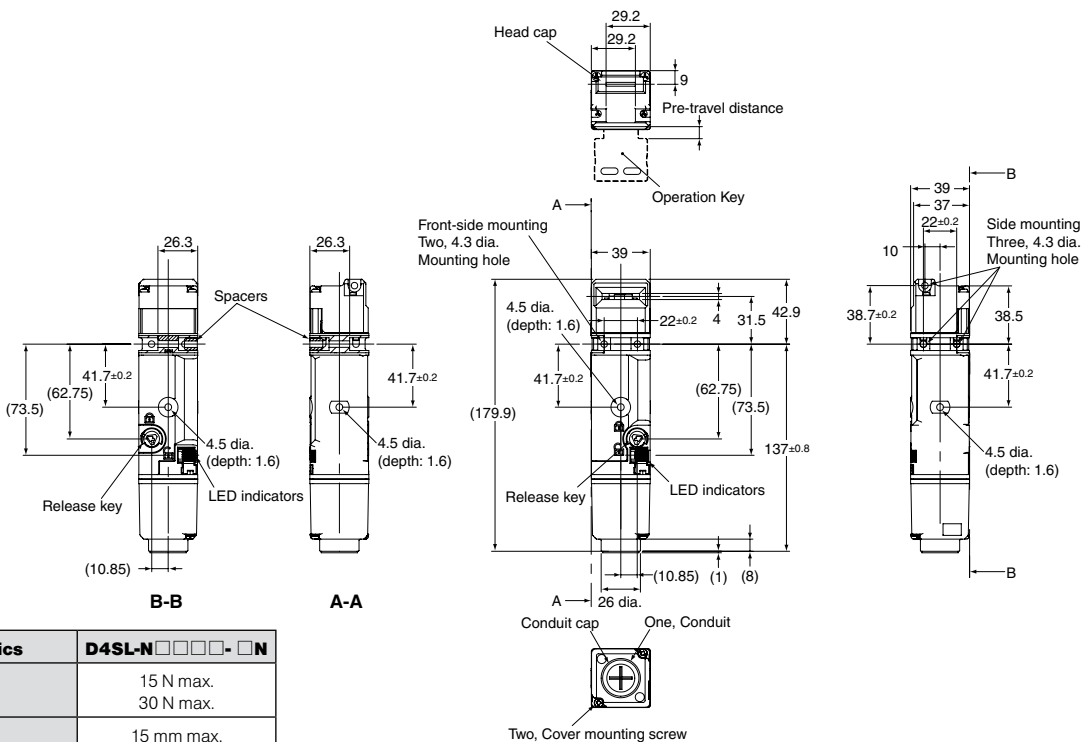
Switches

D4SL-N□□□□-□N (Connector Type)



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

D4SL-N□□□□-□ (Terminal Block Type)



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

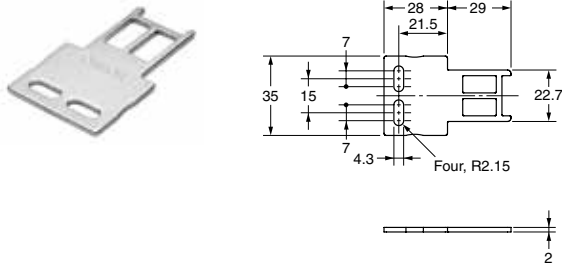
Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

Dimensions and Operating Characteristics (continued)

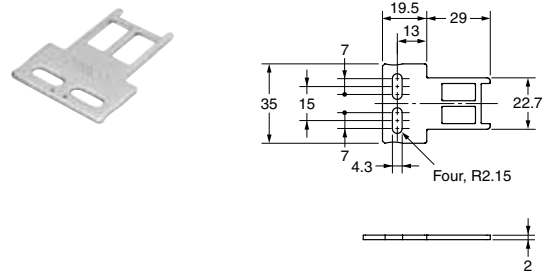
(mm)

Operation Keys

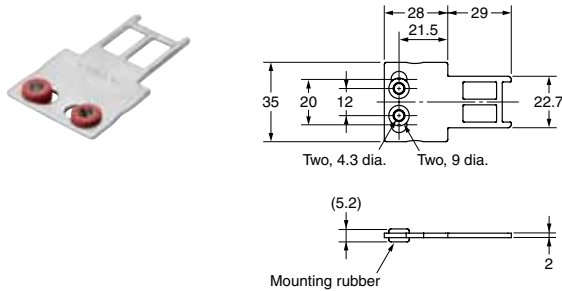
D4SL-NK1



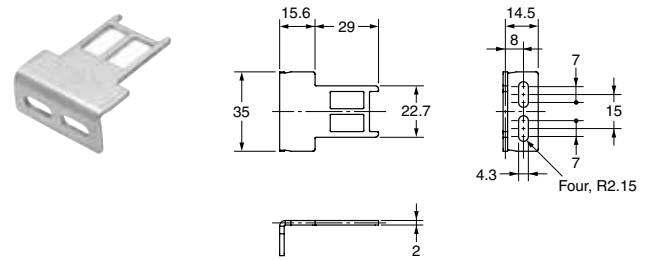
D4SL-NK1S



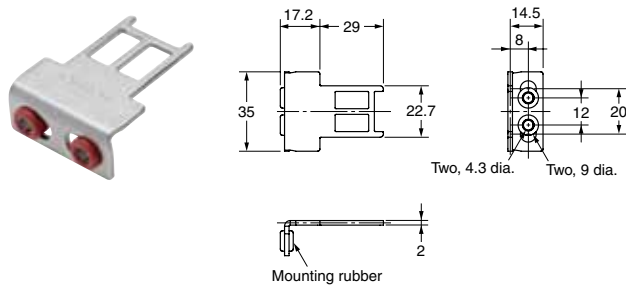
D4SL-NK1G



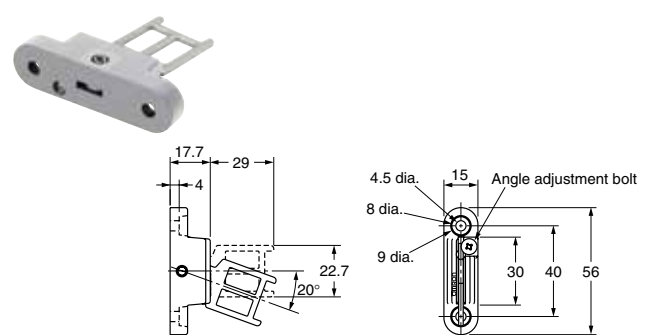
D4SL-NK2



D4SL-NK2G

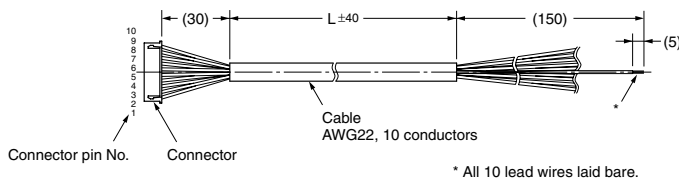


D4SL-NK3



Connector Cable

D4SL-CN□



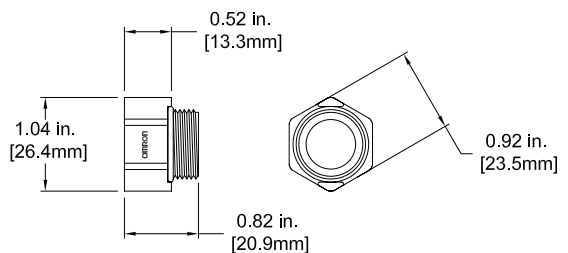
Model	L size
D4SL-CN1	1 m
D4SL-CN3	3 m
D4SL-CN5	5 m

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

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

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

M20-NPT Adapter

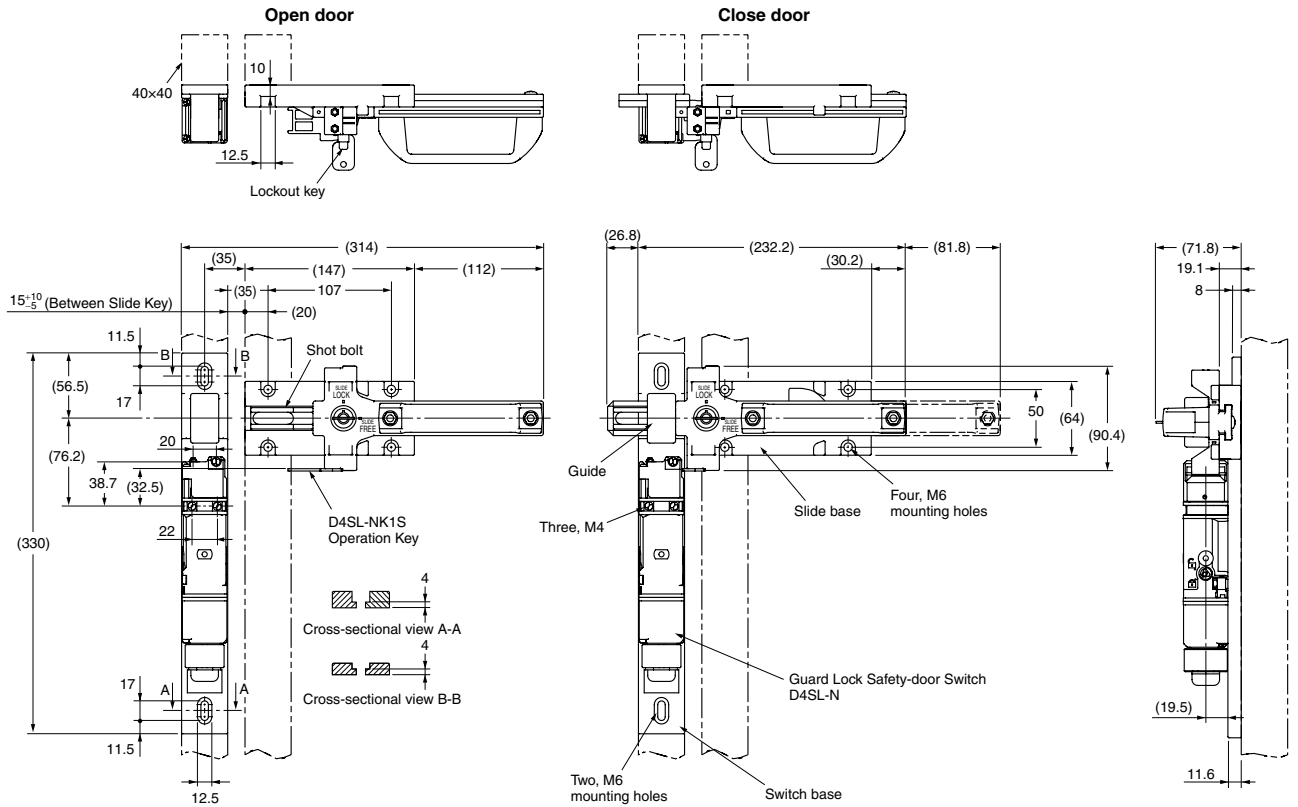


Dimensions and Operating Characteristics

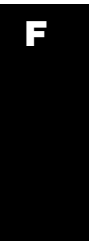
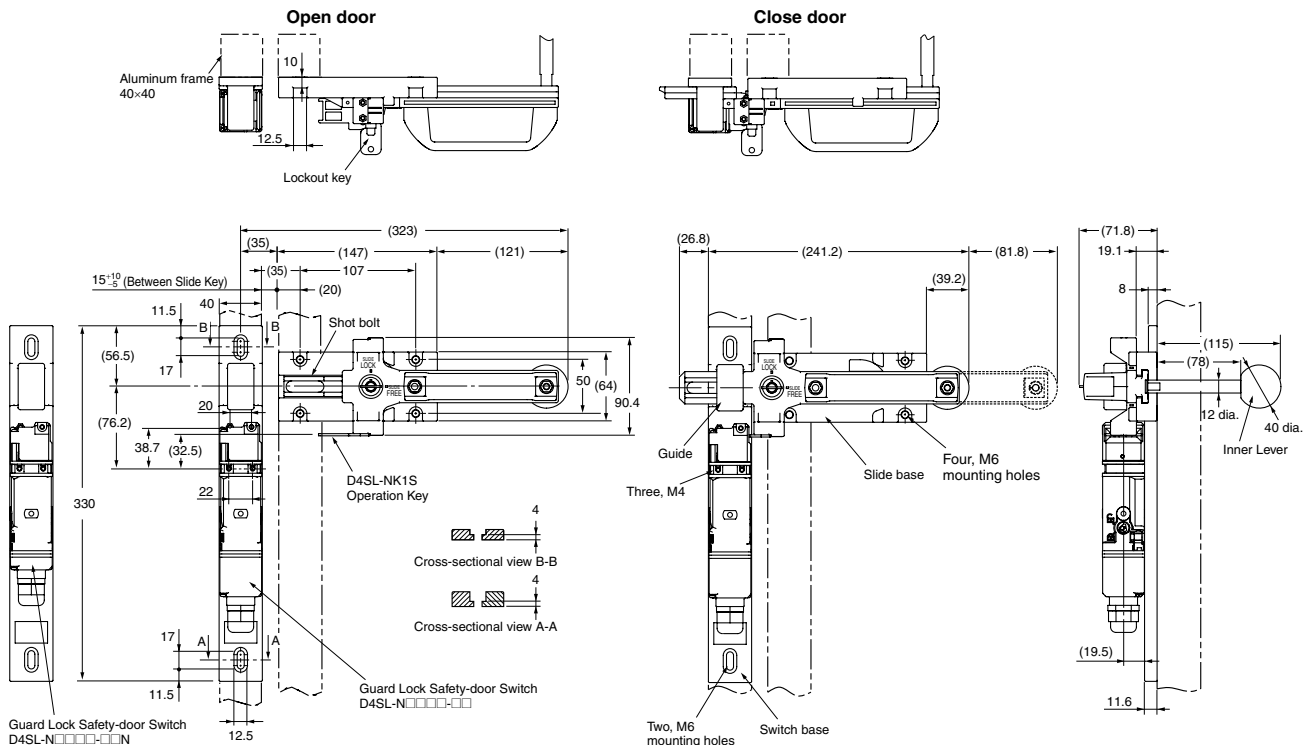
(mm)

Slide Key

D4SL-NSK10-LK



D4SL-NSK10-LKH



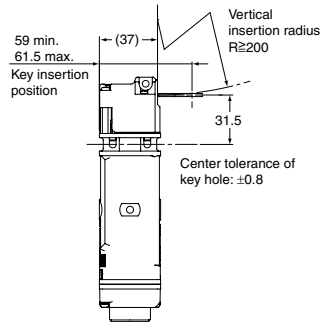
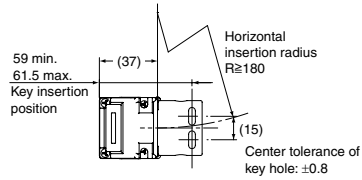
Dimensions and Operating Characteristics (continued)

(mm)

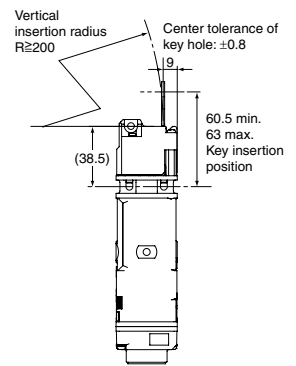
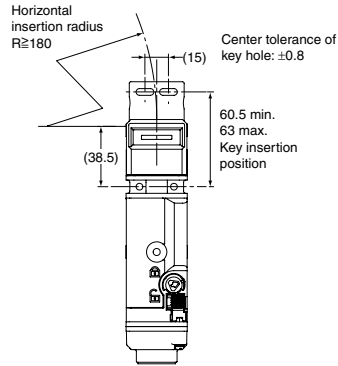
Operating Key Mounting

D4SL-N+D4SL-NK1

With Front-inserted Operation Key

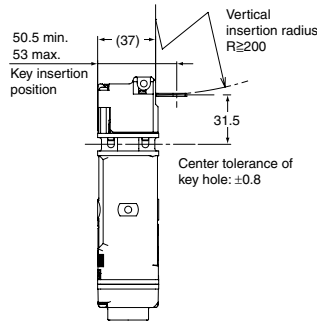
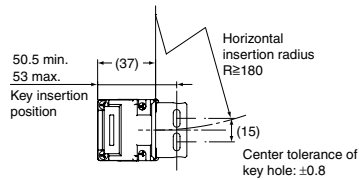


With Top-inserted Operation Key

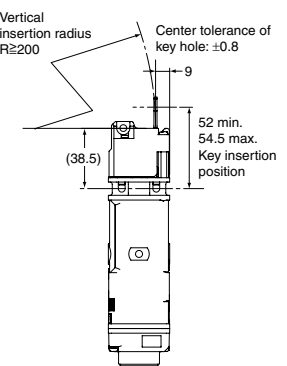
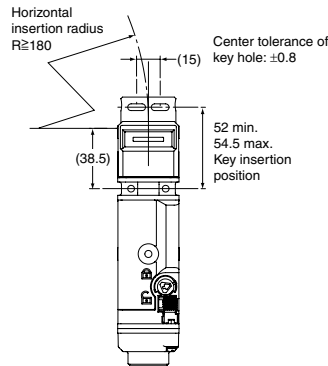


D4SL-N+D4SL-NK1S

With Front-inserted Operation Key

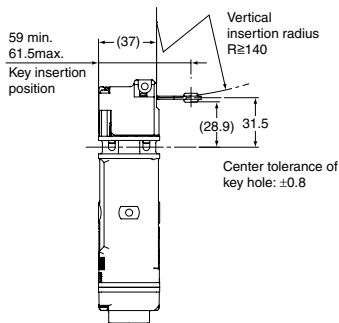
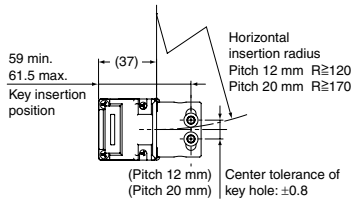


With Top-inserted Operation Key

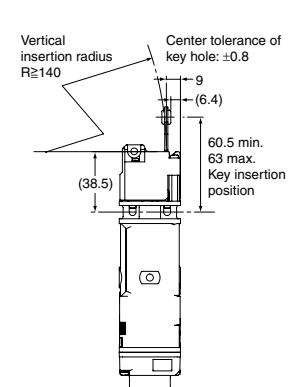
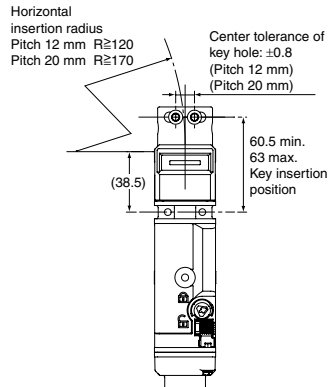


D4SL-N+D4SL-NK1G

With Front-inserted Operation Key



With Top-inserted Operation Key



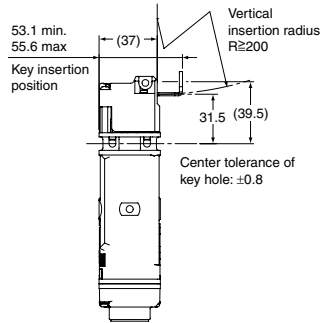
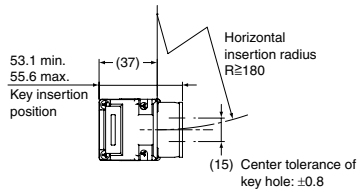
Dimensions and Operating Characteristics (continued)

(mm)

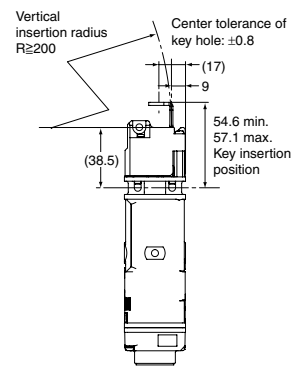
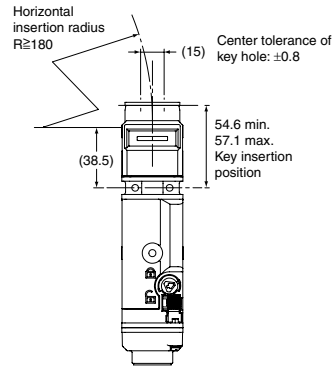
Operating Key Mounting (continued)

D4SL-N+D4SL-NK2

With Front-inserted Operation Key

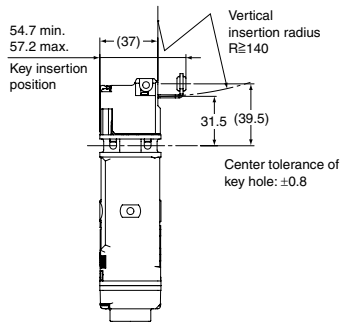
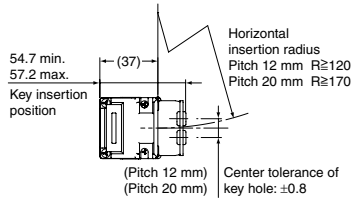


With Top-inserted Operation Key

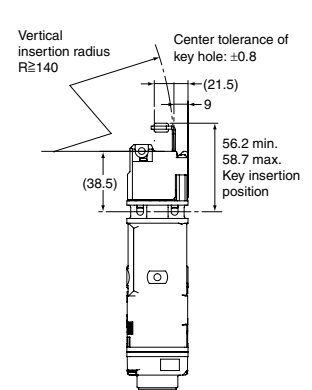
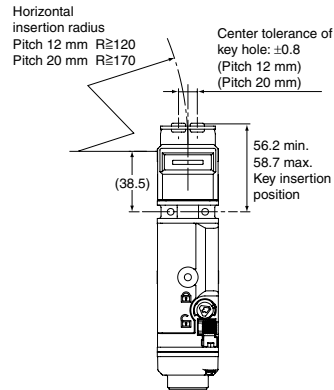


D4SL-N+D4SL-NK2G

With Front-inserted Operation Key

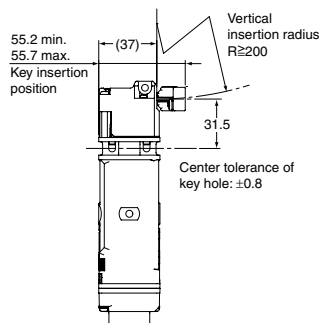
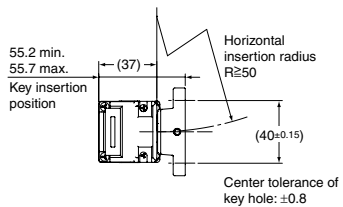


With Top-inserted Operation Key

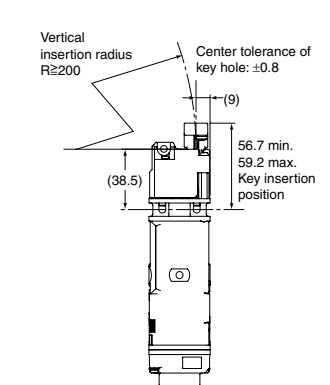
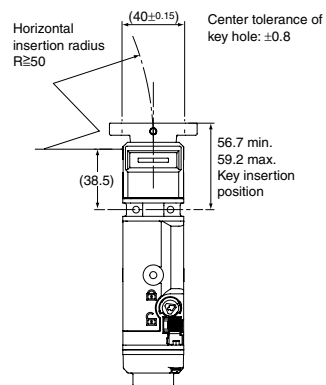


D4SL-N+D4SL-NK3

With Front-inserted Operation Key



With Top-inserted Operation Key



Application Examples

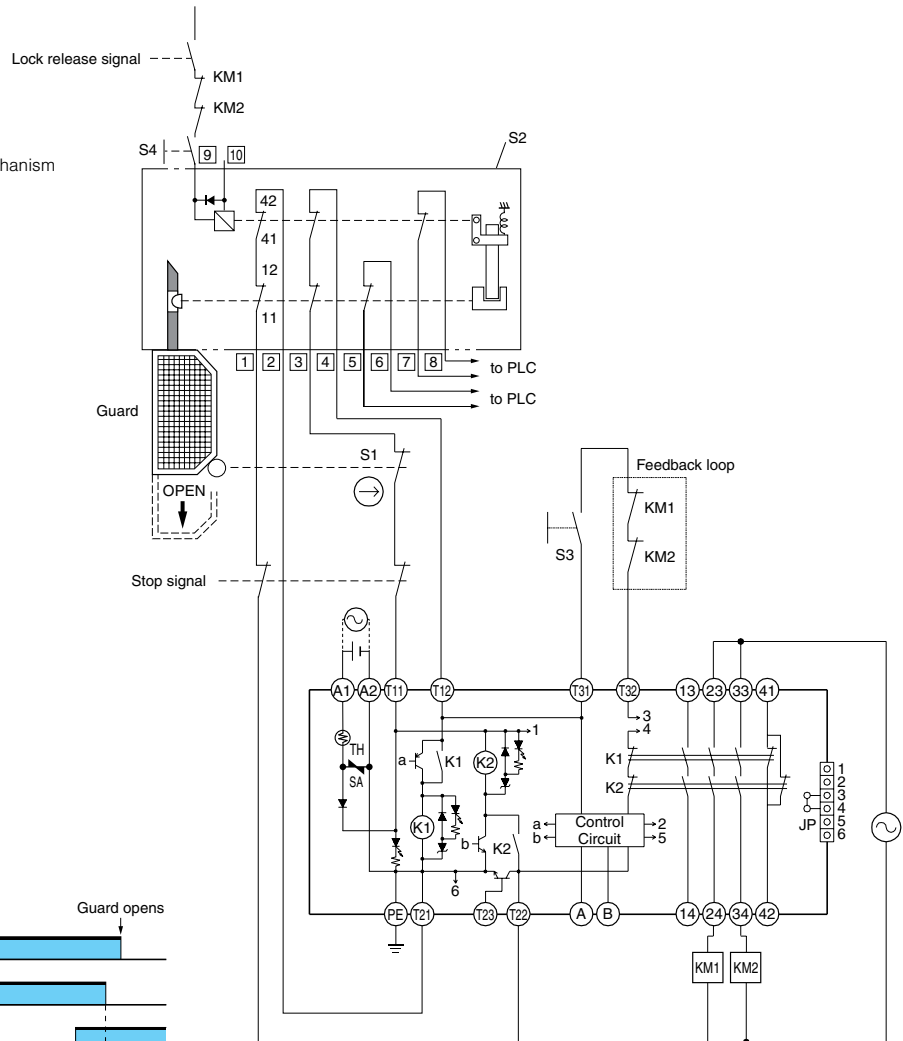
D4SL-N Application Example

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

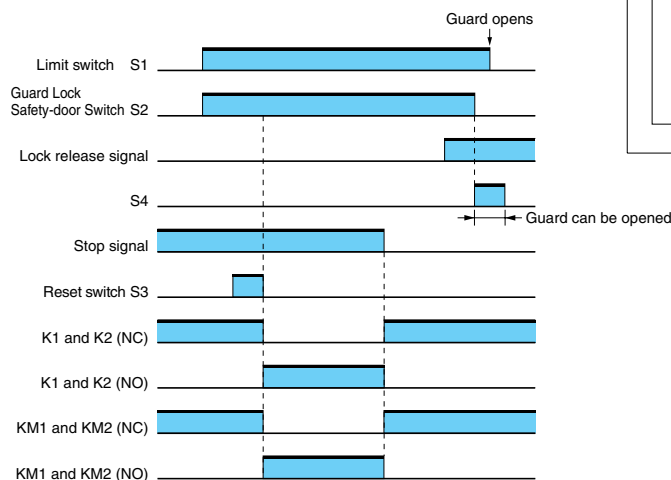
Application Overview

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

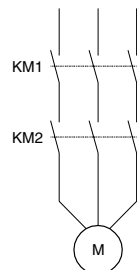
- S1: Safety Limit Switch with direct opening mechanism (D4B-N, D4N, D4F) (→)
 S2: D4SL-N
 S3: Reset switch
 S4: Lock release switch
 KM1 and KM2: Magnetic Contactor
 M: 3-phase motor



Timing Chart



- Notes: 1. The above circuit diagram is for Category 3.
 2. Numbers inside the boxes are terminal numbers printed on the product.



Ordering

Model Number Structure

Switch

D4SL-N □ □ □ □ - □ □ □
 ① ② ③ ④ ⑤ ⑥ ⑦

- ① Conduit Size
 - 2: G1/2 (conduit)
 - 3: 1/2-14 NPT (M20, includes M20-to-1/2-14NPT conversion adapter)
 - 4: M20
- ② Built-in Switch
 - 4-contact Model: Door monitor and lock monitors are connected in series internally**
 - A: 1NC/1NO + 1NC/1NO
 - B: 1NC/1NO + 2NC
 - C: 2NC + 1NC/1NO
 - D: 2NC + 2NC
 - 4-contact Model: Door monitor and lock monitors are NOT connected in series internally**
 - S: 1NC/1NO + 1NC/1NO
 - T: 1NC/1NO + 2NC
 - U: 2NC + 1NC/1NO
 - V: 2NC + 2NC
 - 5-contact Model**
 - E: 2NC/1NO + 1NC/1NO
 - F: 2NC/1NO + 2NC
 - G: 3NC + 1NC/1NO
 - H: 3NC + 2NC
 - 6-contact Model**
 - N: 2NC/1NO + 2NC/1NO
 - P: 2NC/1NO + 3NC
 - Q: 3NC + 2NC/1NO
 - R: 3NC + 3NC
- ③ Head Material
 - 4-contact Model**
 - F: Resin
 - 5- or 6-contact Model (common)**
 - F: Resin
 - D: Metal
- ④ Door Lock and Release
 - A: Mechanical lock/24 VDC solenoid release
 - G: 24 VDC solenoid lock/mechanical release
- ⑤ Indicator
 - 4-contact Model**
 - Blank: None
 - 5- or 6-contact Model (common)**
 - D: 24 VDC (orange LED indicator)
- ⑥ Release Key Type
 - 4-contact Model**
 - Blank: Standard release key (metal)
 - 5- or 6-contact Model (common)**
 - Blank: Special release key (metal)
 - 4: Special release key (resin) (Note: Release keys are provided)
- ⑦ Connection Method
 - Blank: Terminal block
 - N: Connector *1

Operation Key

D4SL-NK □ □
 ① ②

- ① Operation Key Type
 - 1: Horizontal mounting
 - 2: Vertical mounting
 - 3: Adjustable mounting (horizontal)
- ① Key Type
 - Blank: No cushion rubber
 - G: Cushion rubber
 - S: No cushion rubber, short type

Note:

*1. Connector cables are not included with the connector type and are to be purchased separately.

Caution! For solenoid-to-lock 6-contact models (contact configuration: N,P,Q,R), if a current is detected in the solenoid before the door is closed, the door might remain unlocked. Apply power to the solenoid AFTER the door is closed to ensure proper locking function.

Ordering (continued)


List of Models

Release Key Type	Wiring method	Solenoid voltage/ Indicator	Lock and release type	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit size (See Note.)	Model	
Standard (metal)	Connector	24 VDC (Orange)	Mechanical lock Solenoid release	6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FA-DN	
					1/2-14NPT	D4SL-N3□FA-DN	
					1/2-14NPT	D4SL-N3NFA-DN	
		M20		D4SL-N4□FA-DN			
		5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.		G1/2	D4SL-N2□FA-DN		
				1/2-14NPT	D4SL-N3□FA-DN		
	M20			D4SL-N4□FA-DN			
	24 VDC (without indicator)	4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.		G1/2	D4SL-N2□FA-N		
				1/2-14NPT	D4SL-N3□FA-N		
				M20	D4SL-N4□FA-N		
	Terminal block	24 VDC (Orange)		Solenoid lock Mechanical release	6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FA-D
						1/2-14NPT	D4SL-N3□FA-D
			1/2-14NPT			D4SL-N3NFA-D	
			1/2-14NPT		D4SL-N3QFA-D		
			M20		D4SL-N4□FA-D		
			5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.		G1/2	D4SL-N2□FA-D	
	1/2-14NPT	D4SL-N3□FA-D					
	M20	D4SL-N4□FA-D					
	24 VDC (without indicator)	4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.	G1/2	D4SL-N2□FA			
			1/2-14NPT	D4SL-N3□FA			
			M20	D4SL-N4□FA			
	Connector	24 VDC (Orange)	Solenoid lock Mechanical release	6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FG-DN	
					1/2-14NPT	D4SL-N3□FG-DN	
					1/2-14NPT	D4SL-N3NFG-DN	
M20				D4SL-N4□FG-DN			
5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.				G1/2	D4SL-N2□FG-DN		
				1/2-14NPT	D4SL-N3□FG-DN		
		1/2-14NPT		D4SL-N3HFG-DN			
M20		D4SL-N4□FG-DN					
24 VDC (without indicator)		4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.		G1/2	D4SL-N2□FG-N		
				1/2-14NPT	D4SL-N3□FG-N		
				M20	D4SL-N4□FG-N		
Terminal block		24 VDC (Orange)		Solenoid lock Mechanical release	6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FG-D
	1/2-14NPT		D4SL-N3□FG-D				
	1/2-14NPT		D4SL-N3NFG-D				
	M20		D4SL-N4□FG-D				
	5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.		G1/2		D4SL-N2□FG-D		
			1/2-14NPT		D4SL-N3□FG-D		
M20		D4SL-N4□FG-D					
24 VDC (without indicator)	4-contact Model Insert the built-in switch (A, B, C, D, S, T, U or V) into the blank □.	G1/2	D4SL-N2□FG				
		1/2-14NPT	D4SL-N3□FG				
		M20	D4SL-N4□FG				

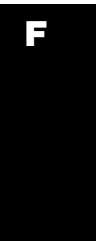
Note: The recommended models for equipment and machinery being exported to Europe are those with an M20 conduit sizes, and for North America, the recommended models are those with a 1/2-14NPT conduit sizes.

Ordering (continued)

List of Models (continued)





Release Key Type	Wiring method	Solenoid voltage/ Indicator	Lock and release type	Contact configuration (door open/closed detection switch and lock monitor switch contacts)	Conduit size (See Note.)	Model							
Special (resin) 	Connector	24 VDC (Orange)	Mechanical lock Solenoid release	6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FA-D4N							
					1/2-14NPT	D4SL-N3□FA-D4N							
					M20	D4SL-N4□FA-D4N							
				5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.	G1/2	D4SL-N2□FA-D4N							
					1/2-14NPT	D4SL-N3□FA-D4N							
					M20	D4SL-N4□FA-D4N							
	Terminal block			6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.			G1/2	D4SL-N2□FA-D4					
							1/2-14NPT	D4SL-N3□FA-D4					
							1/2-14NPT	D4SL-N3NFA-D4					
				5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.				G1/2	D4SL-N2□FA-D4				
								1/2-14NPT	D4SL-N3□FA-D4				
								M20	D4SL-N4□FA-D4				
	Connector			Solenoid lock Mechanical release	6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FG-D4N						
						G1/2	D4SL-N2NFG-D4N						
						1/2-14NPT	D4SL-N3□FG-D4N						
					5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.				G1/2	D4SL-N2□FG-D4N			
									1/2-14NPT	D4SL-N3□FG-D4N			
									M20	D4SL-N4□FG-D4N			
				Terminal block				6-contact Model Insert the built-in switch (N, P, Q or R) into the blank □.	G1/2	D4SL-N2□FG-D4			
									1/2-14NPT	D4SL-N3□FG-D4			
									1/2-14NPT	D4SL-N3NFG-D4			
								5-contact Model Insert the built-in switch (E, F, G or H) into the blank □.				G1/2	D4SL-N2□FG-D4
												1/2-14NPT	D4SL-N3□FG-D4
												M20	D4SL-N4□FG-D4

Note: The recommended models for equipment and machinery being exported to Europe are those with an M20 conduit sizes, and for North America, the recommended models are those with a 1/2-14NPT conduit sizes.



Ordering (continued)

Operation Keys

Type		Model
Horizontal mounting		D4SL-NK1
Horizontal mounting (Short)		D4SL-NK1S
Horizontal mounting (Cushion rubber)		D4SL-NK1G
Vertical mounting		D4SL-NK2

Vertical mounting (Cushion rubber)		D4SL-NK2G
Adjustable (Horizontal)		D4SL-NK3




Notes:

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

Connector Cables

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

Slide Key

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

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



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

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).

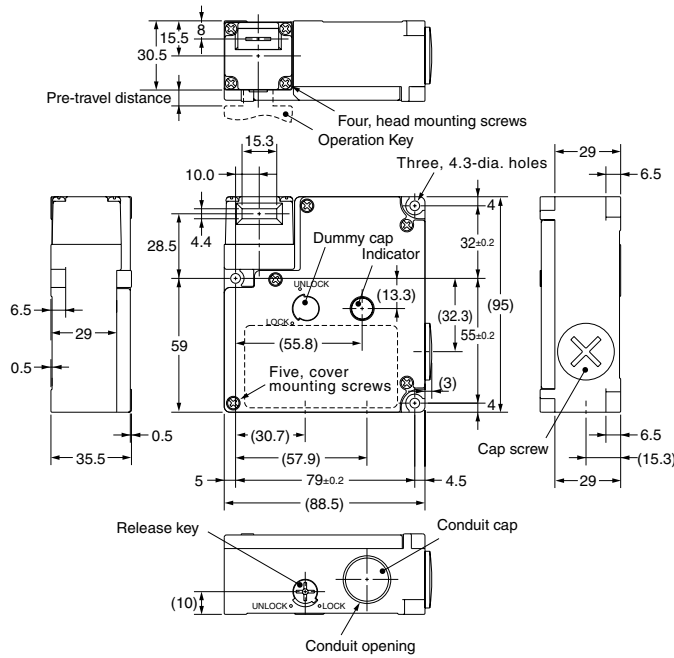
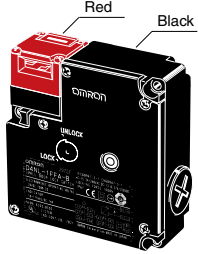
Model	Contact (door open/closed detection and lock monitor)	Contact form		Operating pattern	Remarks
		Door open/ closed detection	Lock monitor		
D4NL-□AF□-□	1NC/1NO + 1NC/1NO				Only NC contacts 11-12 have a certified direct opening mechanism. (→) The terminals 11-42, 33-34, and 53-54 can be used as unlike poles.
D4NL-□BF□-□	1NC/1NO + 2NC				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				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				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				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				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				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				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 and Operating Characteristics

(mm)

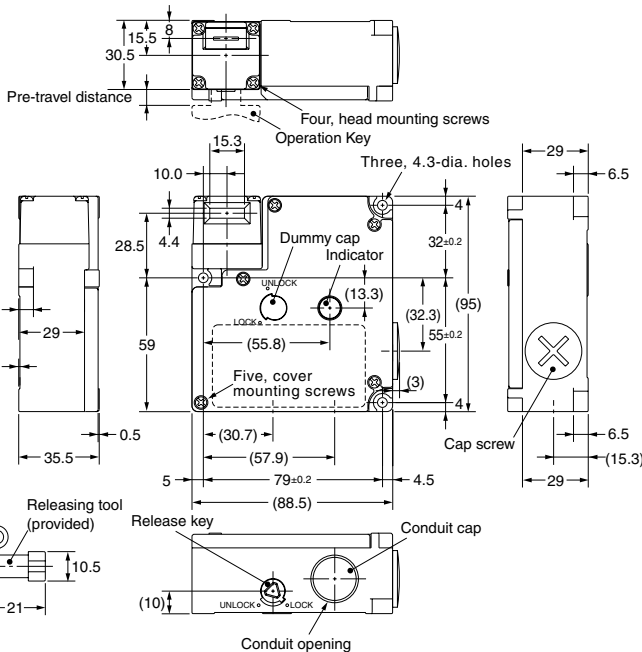
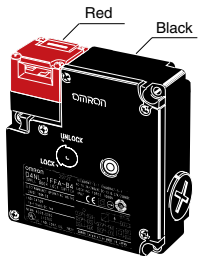
Switches

D4NL-□□□□-B



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

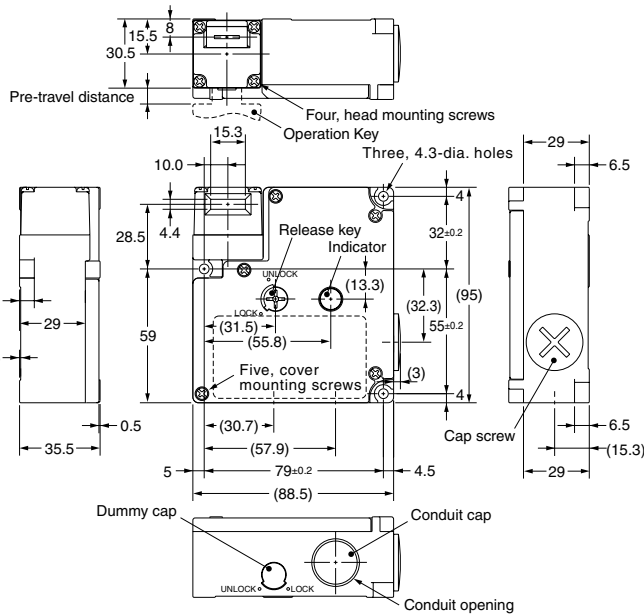
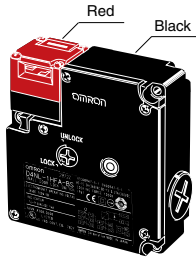
Notes:

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.

Dimensions and Operating Characteristics (continued)

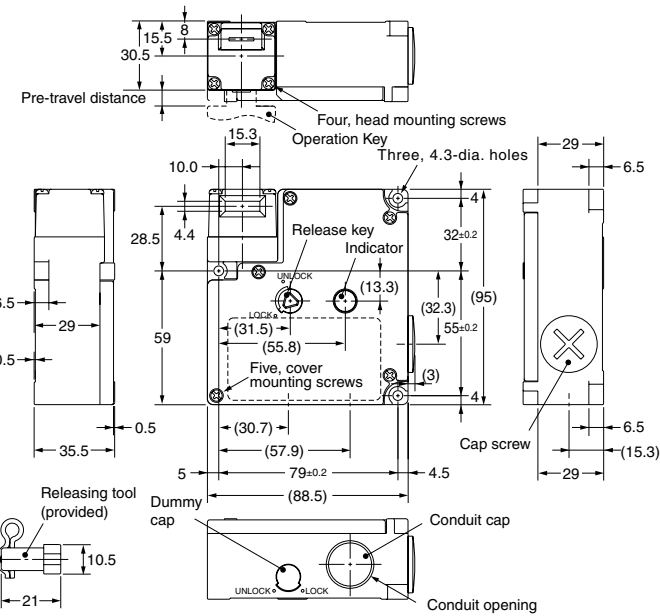
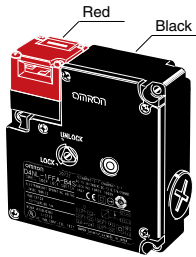
(mm)

D4NL-□□□□-BS



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

D4NL-□□□□-B4S



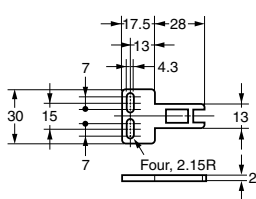
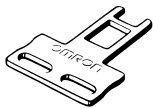
Operating characteristics	D4NL-□□□□-B4S
Key insertion force	15 N max.
Key extraction force	30 N max.
Pre-travel distance	9 mm max.
Movement before being locked	3 mm min.

Notes:

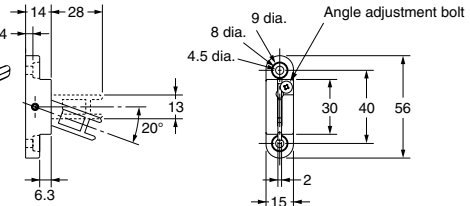
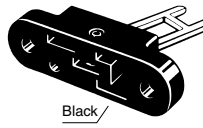
1. Unless otherwise specified, a tolerance of ± 0.4 mm applies to all dimensions.
2. There are fluctuations in the contact ON/OFF timing for Switches with multiple poles (2NC, 2NC/1NO, or 3NC). Confirm performance before application.

Operation Keys

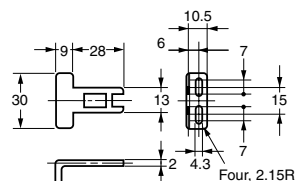
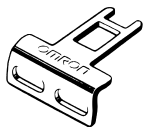
D4DS-K1



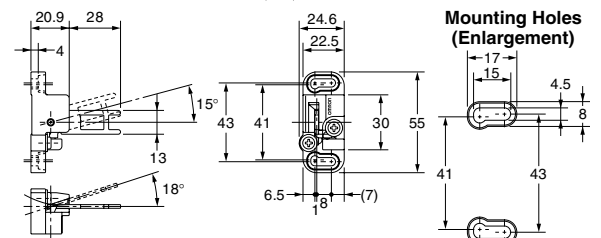
D4DS-K3



D4DS-K2



D4DS-K5

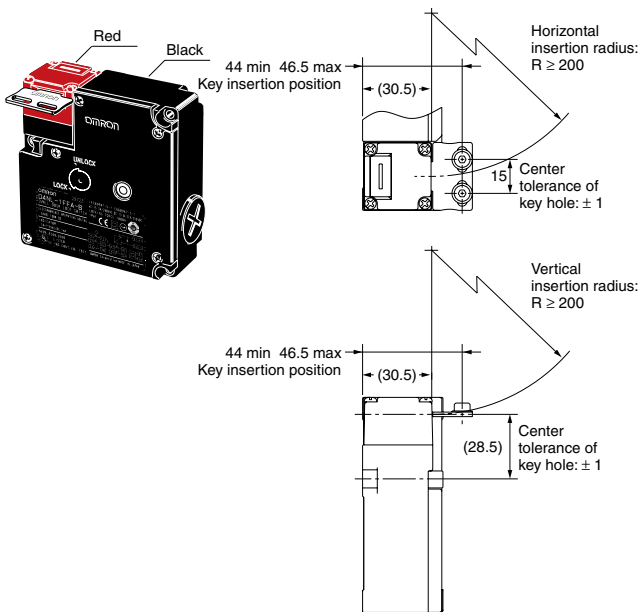


Dimensions and Operating Characteristics (continued)

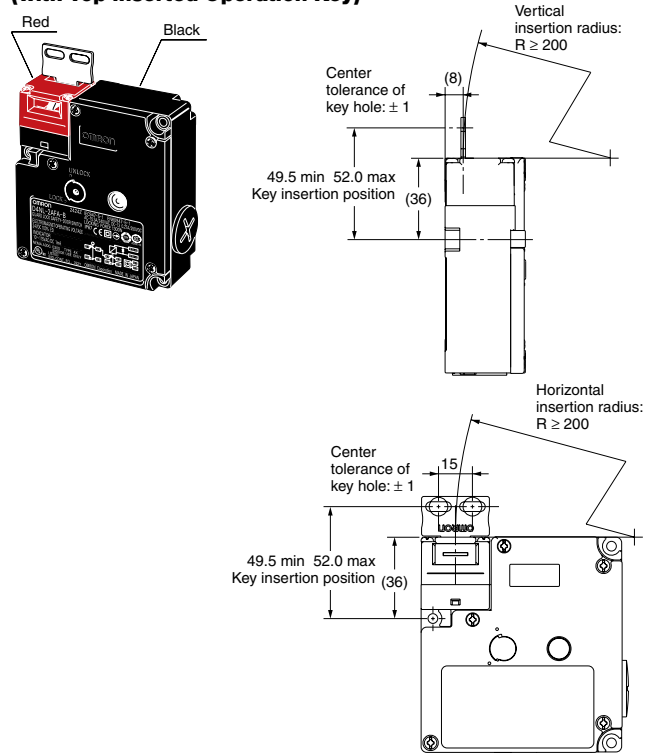
(mm)

With Operating Key Inserted

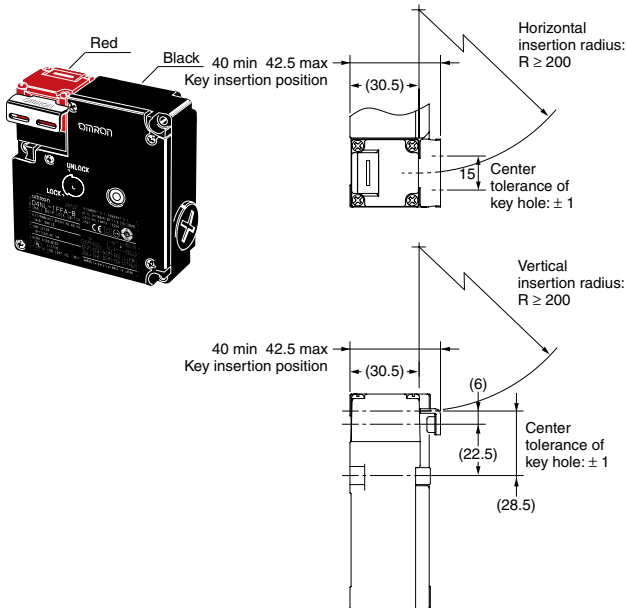
D4NL + D4DS-K1
(with Front-inserted Operation Key)



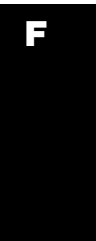
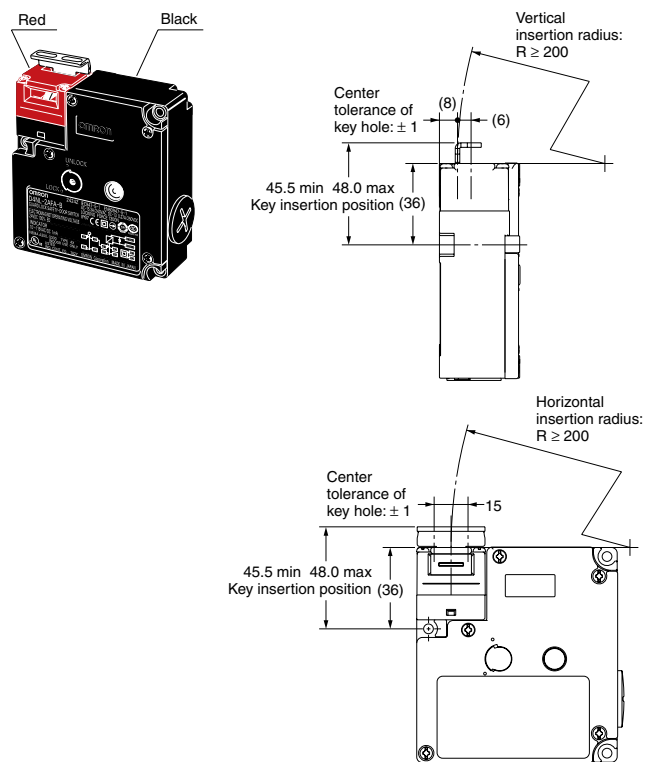
D4NL + D4DS-K1
(with Top-inserted Operation Key)



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



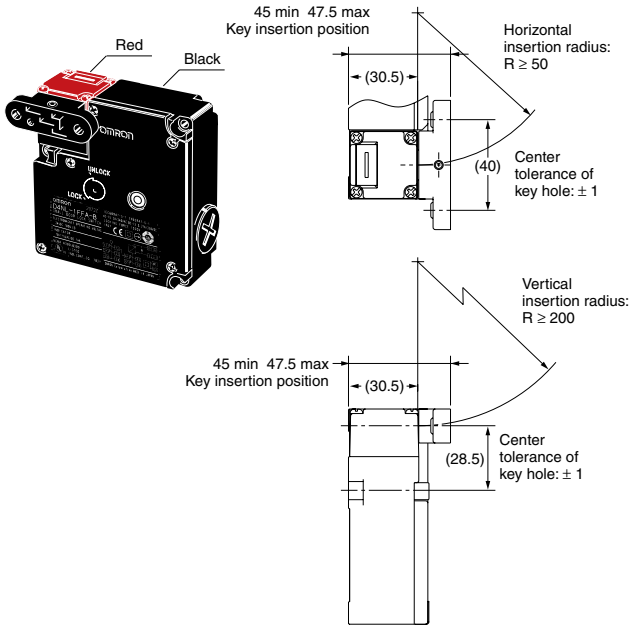
D4NL + D4DS-K2
(with Top-inserted Operation Key)



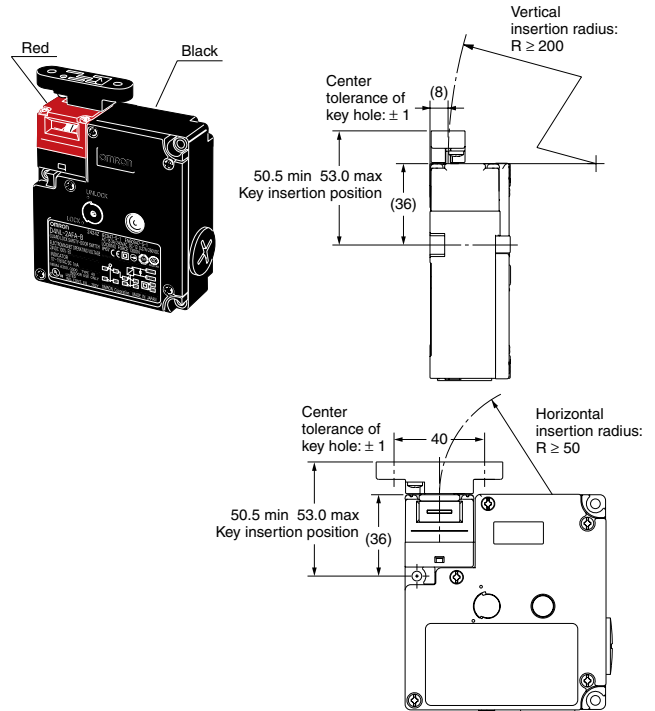
Dimensions and Operating Characteristics (continued)

(mm)

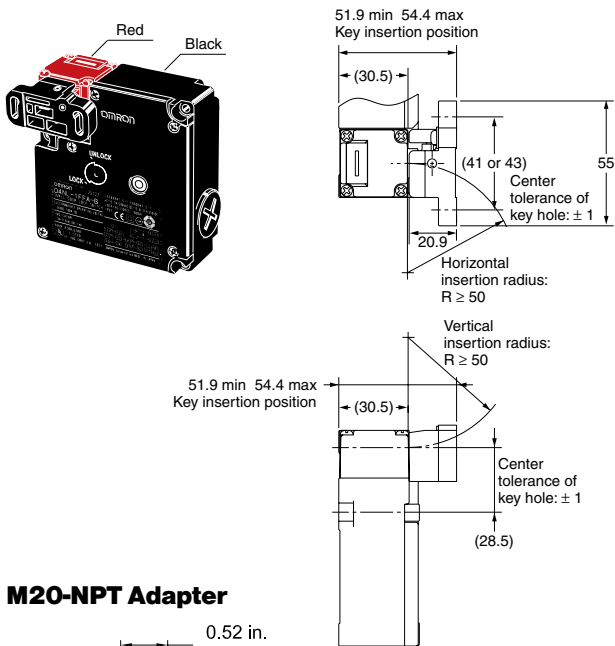
D4NL + D4DS-K3
(with Front-inserted Operation Key)



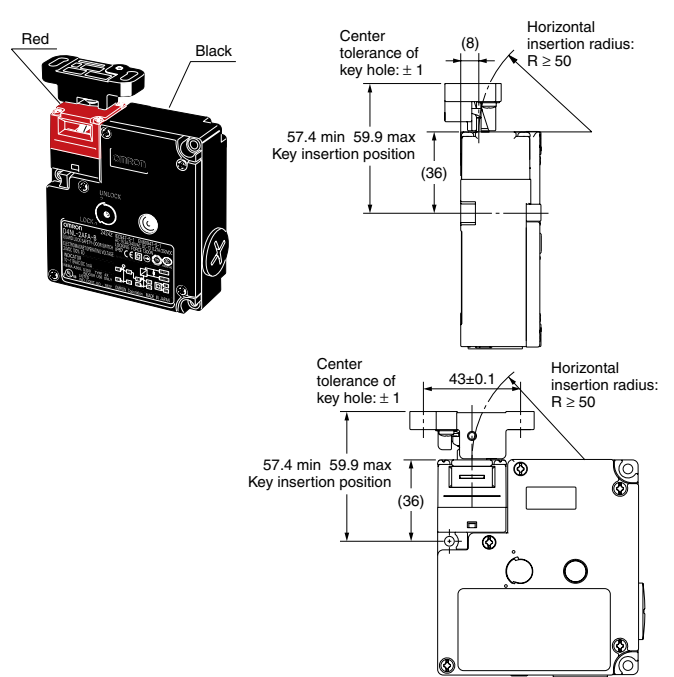
D4NL + D4DS-K3
(with Top-inserted Operation Key)



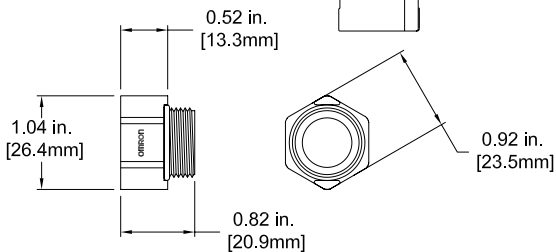
D4NL + D4DS-K5
(with Front-inserted Operation Key)



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

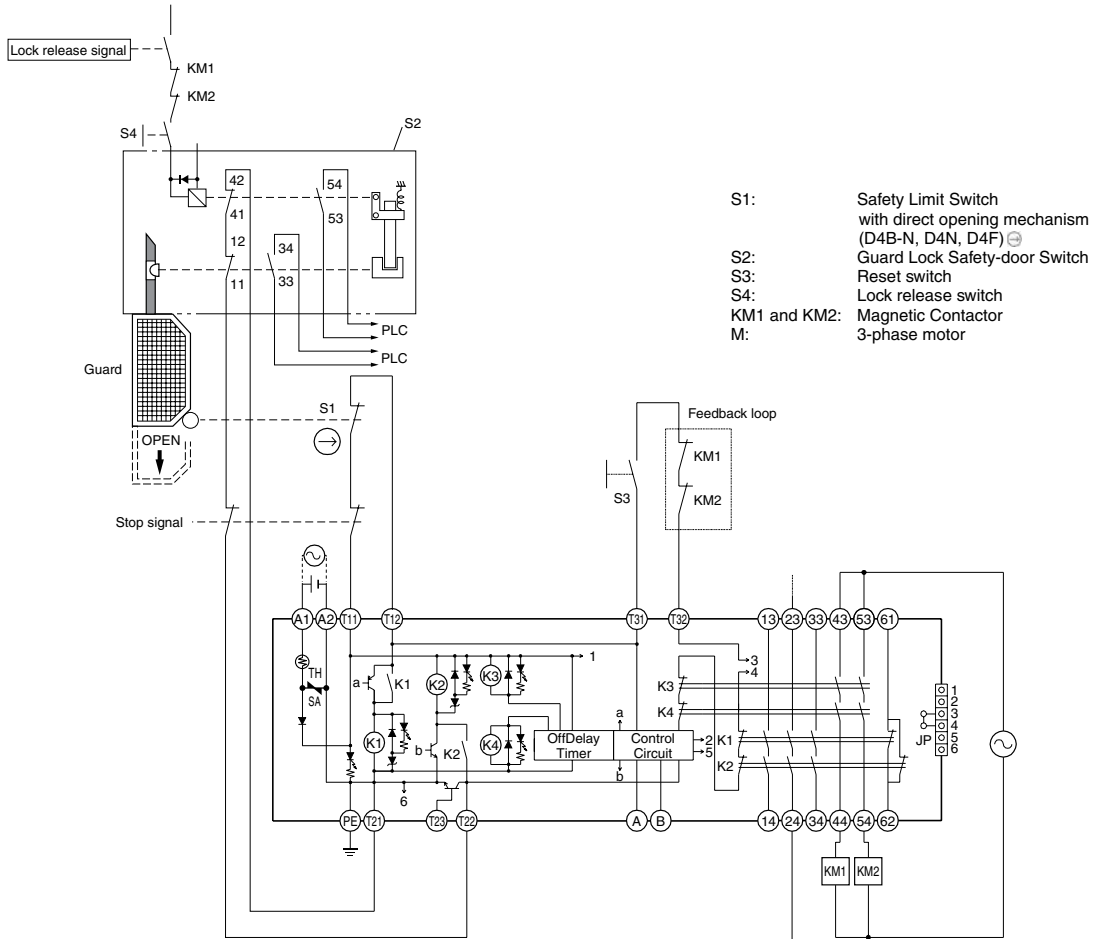


M20-NPT Adapter



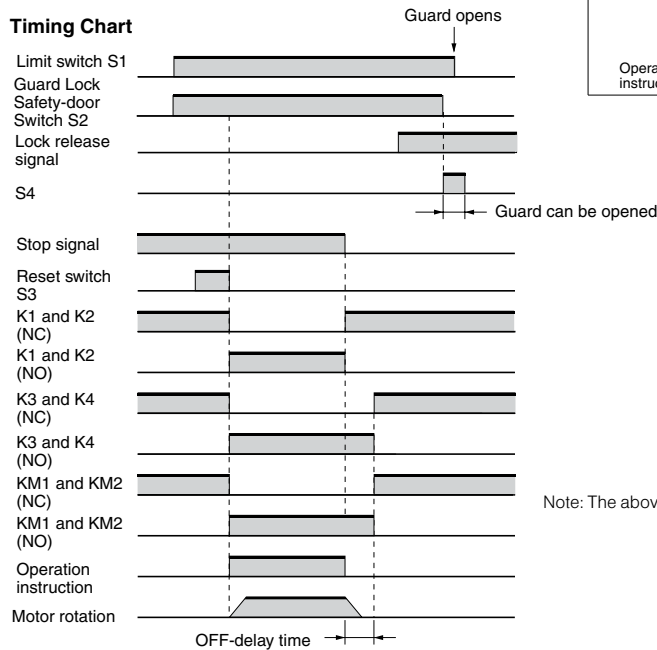
Application Examples

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

Timing Chart



Note: The above example circuit is for Category 3.



Ordering

Model Number Structure

Switch

D4NL-□□□□-□□□□-□
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- 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
 - 4: Special release key
- ⑦ Release Key Position
 - Blank: Bottom
 - S: Front
- ⑧ M20-to-NPT Adapter
 - Blank: Adapter is not included
 - NPT: Adapter is included



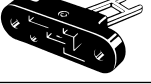

* 110 VAC version is not available for -4□-NPT models.

Operation Key


D4DS-K □

①

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

Type		Model
Horizontal mounting		D4DS-K1
Vertical mounting		D4DS-K2
Adjustable 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

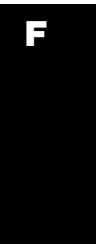
Ordering (continued)

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					

(Continued on next page)



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-NPT					
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	D4NL-4GDG-B4-NPT			

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

Safety Interlock Switch with Guard Door Locking

- High locking force of 1,200 N (270 lb.) locks guard door shut until machine is safe to enter
- IP67 (NEMA 6) enclosure enables the TL4019 to withstand water washdown
- Door and lock monitoring—the TL4019 has a total of 4 contacts: 2 N/C safety + 1 contact for door position monitoring + 1 contact for lock monitoring
- Rear manual release—allows unlocking of switch from inside of guarded area per ANSI/RIA R15.06
- Narrow profile enables mounting to 2 in. square tubing or in applications with space restrictions
- Rotatable head—the rotatable head of the TL4019 provides 8 actuator entry positions to satisfy most installation requirements
- Optional key release—this option on power-to-unlock models allows manual unlocking of the guard door
- Optional slide bolt with integral door handle aids installation on sliding and swinging guard doors



Conforms to EN60947-5-1, EN1088, EN ISO 13849-1
UL and C-UL listed
DGUV approved

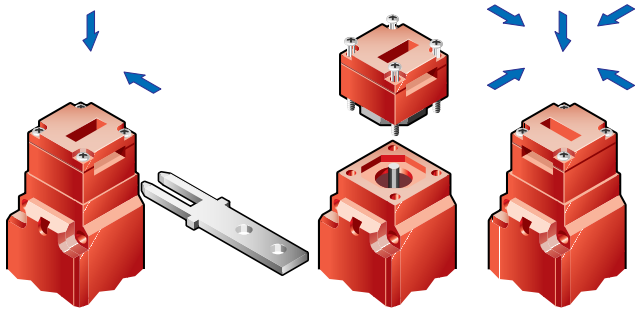
Specifications

Electrical	All Models	TL4019-1 & -2	TL4019-3 & -4	TL4019-5
Safety Contacts:		2 N/C	2 N/C	1 N/C
Auxiliary Contacts:		2 N/O	1 N/O + 1 N/O 1 N/O + 1 N/C 1 N/C + 1 N/O	1 N/C + 1 N/O
Switching Ability	AC: 230 V – 4 A DC: 24 V – 4 A			
Safety Contact Material:	Silver alloy with gold flash			
Minimum Current:	24 V 1 mA			
Solenoid Supply Voltage:	24 VAC/DC or 110 VAC (all -15% / +10%)			
Solenoid Power:	8 W			
Solenoid Rating:	100% duty			
Mechanical				
Mounting:	Any position			
Mounting Hardware:	4 x M5 screws (not supplied)			
Min Operating Radius:	Approximately 100 mm (3.9 in.) with flex actuators Approximately 1000 mm (39 in.) with flat and 90-degree actuators			
Max Holding Force:	1200 N (270 lb.)			
Max Actuation Speed:	20 m/min.			
Case Material:	Reinforced thermoplastic			
Actuator Material:	Stainless steel			
Wiring Entry:	3 x M20 conduit with 0.5 in. NPT adapter			
Weight:	500 g (17 oz.)			
Color:	Red			
Mechanical Life:	1 x 10 ⁸ minimum			
Environmental				
Protection:	IP67 (NEMA 6)			
Operating Temperature:	-20 to 55 °C (-4 to 131 °F)			
Cleaning:	Water washdown			
Compliance				
Standards:	EN60947-5-1, EN1088, EN ISO 13849-1			
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL, DGUV			

Specifications are subject to change without notice.

Note: The safety contacts of the STI switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

Operation



Optional Slide Bolts

- Allows easy installation of switch on machine guards
- Actuator included (order switch separately)
- Integral handle included
- Metal is ideal for heavy doors; plastic is suitable for smaller and lighter doors
- Slotted hole in bolt permits attaching multiple padlocks
- Yellow color for easy recognition



Metal Slide Bolt



Plastic Slide Bolt

Alignment Guide

Optional stainless steel alignment guide aids actuator entry and is easily installed.



Flat Actuator

Available with and without rubber bushings.



90-Degree Actuator

Available with and without rubber bushings.



Optional Rear Release

- Allows manual rear release of a locked switch from inside a guarded area per ANSI/RIA R15.06
- May be installed on switch in conjunction with or without the use of a slide bolt
- Must use with Rear Release Switch Models only

Optional Key Release

A key release unit is easily attached to the TL4019 to provide emergency override of the switch locking mechanism by a qualified, responsible person.



Flexible 1 Actuator

15 degree flexibility may be adjusted with the set screw.



Flexible 2 Actuator

15 degree flexibility may be adjusted with the set screw.



Rear Release Actuator (Included with Rear Release Switches)



Rear Release T-Handle (Order separately)



Optional SLD Series

Optional switch locking devices are available. See accessories section for details.

Optional LED Lid Kit

Provides red and green LED indicators with user-configured operation.



Optional Interior Lever Kit

Use with metal rear release slide bolts.

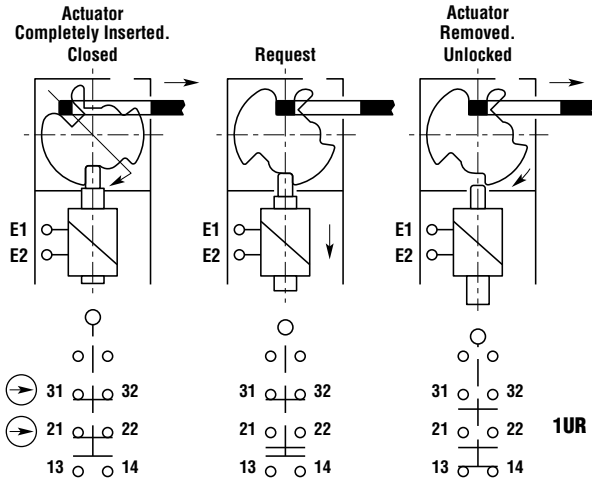


Operation (continued)

Contact Arrangements

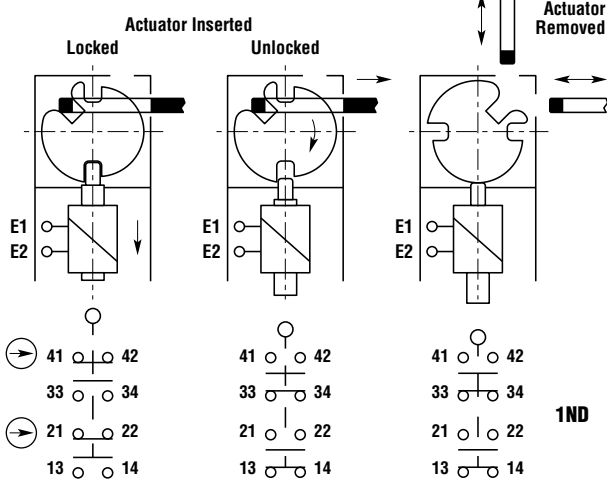
With Unlock Request Contact

1UR 1 positively driven N/C contact as door unlock request contact
1 positively driven N/C contact + 1 N/O (without door contact)



Without Door Contact

1ND 2 positively driven N/C contacts + 2 N/O

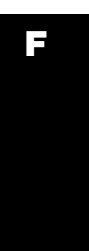
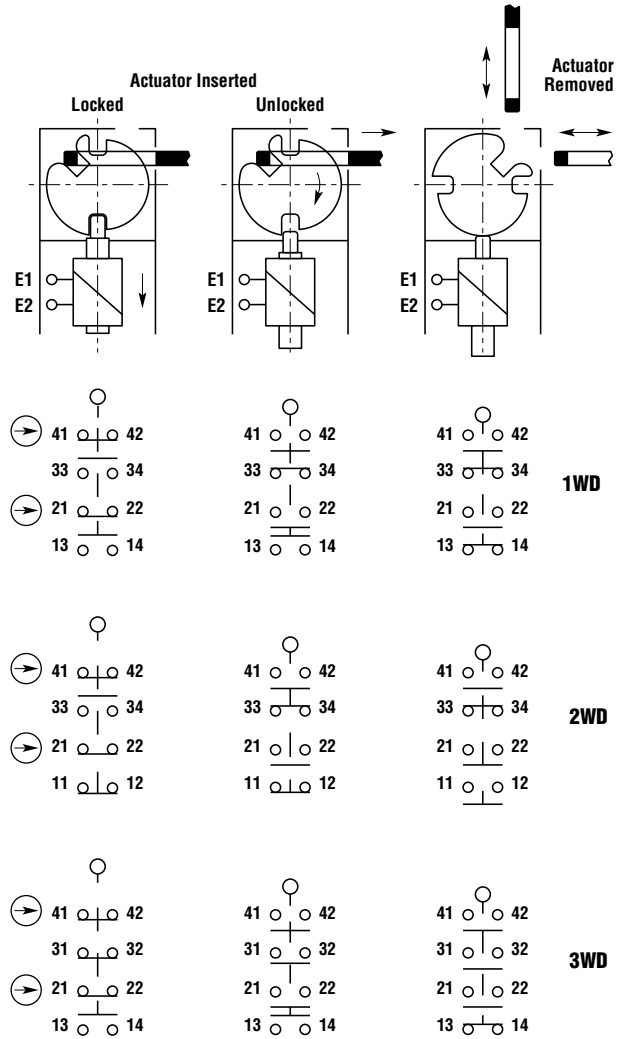


With Door Contact

1WD 2 positively driven N/C contacts + 1 N/O + 1 N/O as door contact

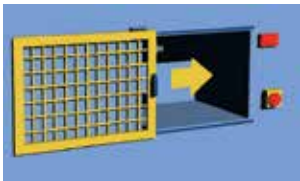
2WD 2 positively driven N/C contacts + 1 N/O + 1 N/C as door contact


3WD 2 positively driven N/C contacts + 1 N/C + 1 N/O as door contact



Applications

Typical applications are on sliding guard doors and swinging guard doors that must remain locked until a signal is applied to the internal solenoid that unlocks the guard door.



 For a wiring example of the TL4019 switch with a SR209AD delayed output safety monitoring relay see "Common Circuit Examples" in the Expert Area Section of this catalog.

Application Monitoring Units



SR223SMT Timer Unit

Used with the TL4019 for machines with constant overrun. Gives a timed delay to the lock/release signal. Failsafe and adjustable to a range of times from 1.0 seconds up to 31 seconds.



SR125SMS45 Stop Motion Sensing Unit

Used with the TL4019 for machines with inconstant or variable overrun. Senses back EMF of AC or DC motors. Failsafe and adjustable to a range of 0.01 V to 0.10 V.



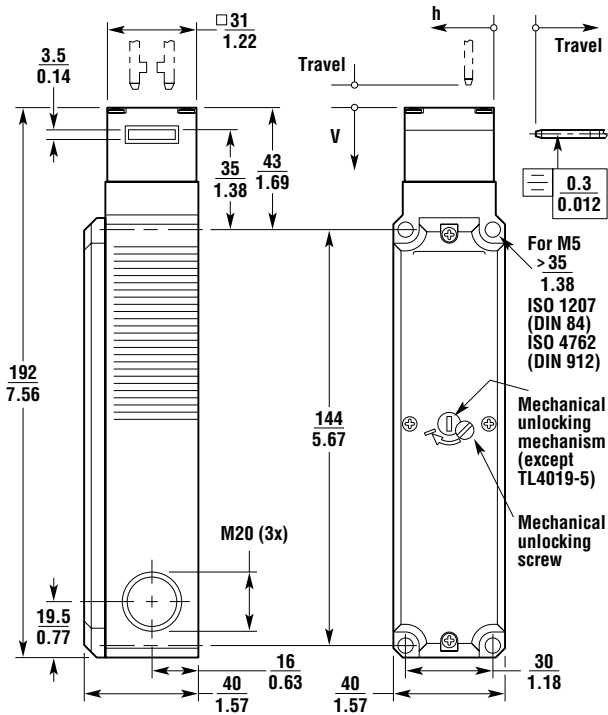
Safety Monitoring Relay Units

Safety monitoring relays ensure a maximum level of safety by monitoring all wiring in the safety circuit, including switches and contactors. Any fault and the power to the machine is switched off. A variety of safety monitoring relay units are available.

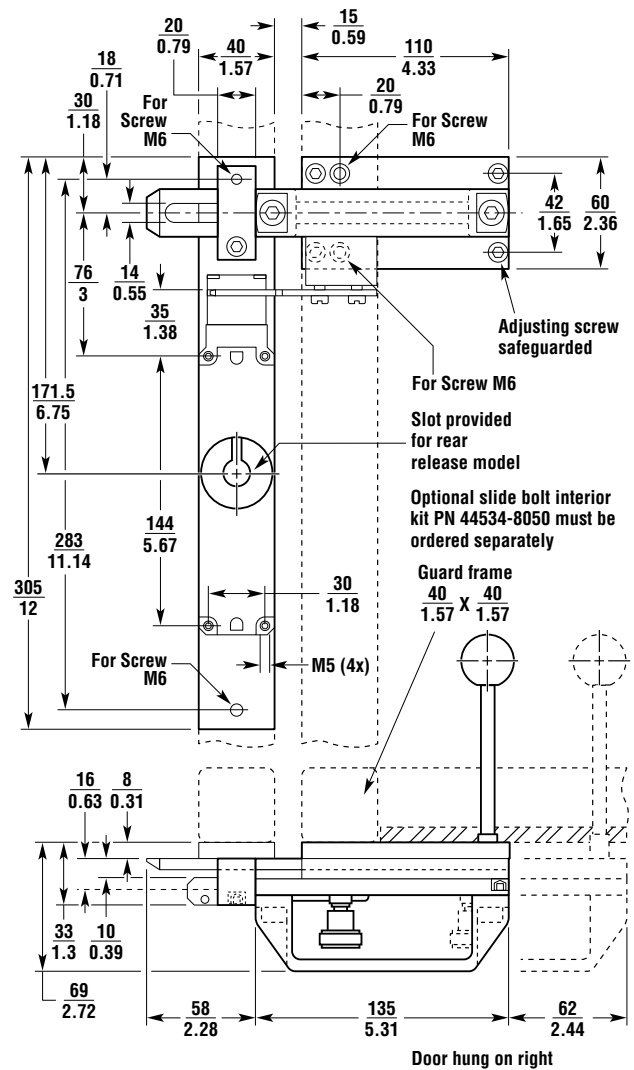
Dimensions

(mm/in.)

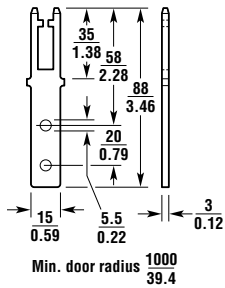
TL4019



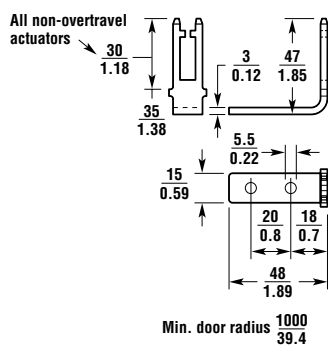
Optional Metal Slide Bolt for TL4019



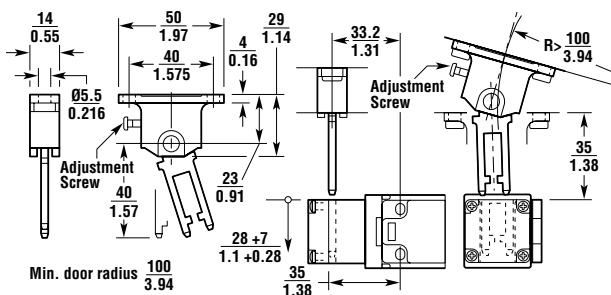
Overtravel Flat Actuator



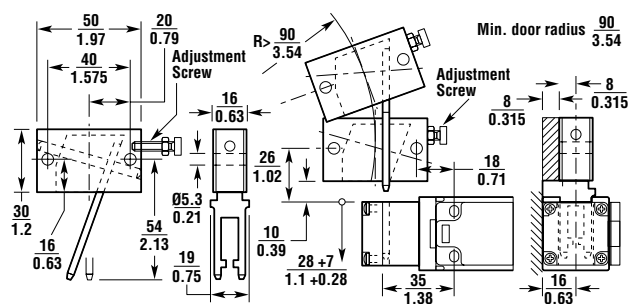
Overtravel 90-Degree Actuator



Flexible 1 Actuator



Flexible 2 Actuator



See website for the optional Plastic Slide Bolt Dimensions

Ordering

Model	Solenoid	Contacts	Wiring Entry	Part No.
Power to Lock (without door contact)				
TL4019-20241TM (flat actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0030
TL4019-20241SM (90-degree actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0130
TL4019-20241F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0230
TL4019-20241F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0330
TL4019-21101TM (flat actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0040
TL4019-21101SM (90-degree actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0140
TL4019-21101F2M (flex 2 actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0240
TL4019-21101F1M (flex 1 actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0340
Power to Lock (with door contact)				
TL4019-40241TM (flat actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0410
TL4019-40241SM (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0510
TL4019-40241F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0610
TL4019-40241F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-1710
TL4019-41101TM (flat actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0420
TL4019-41101SM (90-degree actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0520
TL4019-41101F2M (flex 2 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0620
TL4019-41101F1M (flex 1 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-1720
TL4019-40242TM (flat actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0430
TL4019-40242SM (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0530
TL4019-40242F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0630
TL4019-40242F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-1730
TL4019-41102TM (flat actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0440
TL4019-41102SM (90-degree actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0540
TL4019-41102F2M (flex 2 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0640
TL4019-41102F1M (flex 1 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-1740
TL4019-40243TM (flat actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0450
TL4019-40243SM (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0550
TL4019-40243F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0650
TL4019-40243F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-1750
TL4019-41103TM (flat actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0460
TL4019-41103SM (90-degree actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0560
TL4019-41103F2M (flex 2 actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0660
TL4019-41103F1M (flex 1 actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-1760
Power to Unlock (without door contact)				
TL4019-10241TM (flat actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0010
TL4019-10241SM (90-degree actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0110
TL4019-10241F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0210
TL4019-10241F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0310
TL4019-11101TM (flat actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0020
TL4019-11101SM (90-degree actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0120
TL4019-11101F2M (flex 2 actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0220
TL4019-11101F1M (flex 1 actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-0320
TL4019-10241SKM w/key (90-degree actuator)	24 VAC/DC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-1110
TL4019-11101SKM w/key (90-degree actuator)	110 VAC	2 N/C + 2 N/O	3 x M20 with NPT adapter	44534-1120
Power to Unlock (with door contact)				
TL4019-30241TM (flat actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0050
TL4019-30241SM (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0150
TL4019-30241F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0250
TL4019-30241F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0350
TL4019-31101TM (flat actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0060
TL4019-31101SM (90-degree actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0160
TL4019-31101F2M (flex 2 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0260
TL4019-31101F1M (flex 1 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-0360
TL4019-30242TM (flat actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0070
TL4019-30242SM (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0170
TL4019-30242F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0270
TL4019-30242F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0370

(Continued on next page)

Ordering (continued)

Model	Solenoid	Contacts	Wiring Entry	Part No.
TL4019-31102TM (flat actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0080
TL4019-31102SM (90-degree actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0180
TL4019-31102F2M (flex 2 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0280
TL4019-31102F1M (flex 1 actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-0380
TL4019-30243TM (flat actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0090
TL4019-30243SM (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0190
TL4019-30243F2M (flex 2 actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0290
TL4019-30243F1M (flex 1 actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0390
TL4019-31103TM (flat actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0400
TL4019-31103SM (90-degree actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0500
TL4019-31103F2M (flex 2 actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0600
TL4019-31103F1M (flex 1 actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-1700
TL4019-30241SKM w/key (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-1150
TL4019-31101SKM w/key (90-degree actuator)	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20 with NPT adapter	44534-1160
TL4019-30242SKM w/key (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-1170
TL4019-31102SKM w/key (90-degree actuator)	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20 with NPT adapter	44534-1180
TL4019-30243SKM w/key (90-degree actuator)	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-1190
TL4019-31103SKM w/key (90-degree actuator)	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-1500
Power to Unlock (with unlock request contact) (mechanical unlocking is not available on these switches)				
TL4019-50241TM (flat actuator)	24 VAC/DC	1 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0470
TL4019-50241SM (90-degree actuator)	24 VAC/DC	1 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0570
TL4019-50241F2M (flex 2 actuator)	24 VAC/DC	1 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-0670
TL4019-50241F1M (flex 1 actuator)	24 VAC/DC	1 N/C + 1 N/C + 1 N/O	3 x M20 with NPT adapter	44534-1770
Switch Only (no actuators or adapters included)				
Power to Unlock (without door contact)				
TL4019-10241	24 VAC/DC	2 N/C + 2 N/O	3 x M20	44534-2010
TL4019-11101	110 VAC	2 N/C + 2 N/O	3 x M20	44534-2020
Power to Unlock (with door contact)				
TL4019-30241	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20	44534-2050
TL4019-31101	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20	44534-2060
TL4019-30242	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20	44534-2070
TL4019-31102	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20	44534-2080
TL4019-30243	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20	44534-2090
TL4019-31103	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20	44534-2100
Power to Unlock (with unlock request contact)				
TL4019-50241	24 VAC/DC	1 N/C + 1 N/C + 1 N/O	3 x M20	44534-2170
Power to Lock (without door contact)				
TL4019-20241	24 VAC/DC	2 N/C + 2 N/O	3 x M20	44534-2030
TL4019-21101	110 VAC	2 N/C + 2 N/O	3 x M20	44534-2040
Power to Lock (with door contact)				
TL4019-40241	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20	44534-2110
TL4019-41101	110 VAC	2 N/C + 1 N/O + 1 N/O	3 x M20	44534-2120
TL4019-40242	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20	44534-2130
TL4019-41102	110 VAC	2 N/C + 1 N/O + 1 N/C	3 x M20	44534-2140
TL4019-40243	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20	44534-2150
TL4019-41103	110 VAC	2 N/C + 1 N/C + 1 N/O	3 x M20	44534-2160
Rear Release (no actuators or adapters included; rear release actuator included; order T-handle separately)				
Power to Unlock (without door contact)				
TL4019-10241RR	24 VAC/DC	2 N/C + 2 N/O	3 x M20	44534-3010
Power to Unlock (with door contact)				
TL4019-30241RR	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20	44534-3050
TL4019-30242RR	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20	44534-3070
TL4019-30243RR	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20	44534-3090
Power to Lock (without door contact)				
TL4019-20241RR	24 VAC/DC	2 N/C + 2 N/O	3 x M20	44534-3030
Power to Lock (with door contact)				
TL4019-40241RR	24 VAC/DC	2 N/C + 1 N/O + 1 N/O	3 x M20	44534-3110
TL4019-40242RR	24 VAC/DC	2 N/C + 1 N/O + 1 N/C	3 x M20	44534-3130
TL4019-40243RR	24 VAC/DC	2 N/C + 1 N/C + 1 N/O	3 x M20	44534-3150

(Continued on next page)

Ordering (continued)

Accessories				Part No.
Standard Actuators				
Replacement flat actuator for TL4019				44534-0700
Replacement 90-degree actuator for TL4019				44534-0710
Replacement flex 2 actuator for TL4019				44534-0720
Replacement flex 1 actuator for TL4019				44534-0730
Standard Actuators with Rubber Bushing				
Replacement flat actuator RB for TL4019				44534-0740
Replacement 90-degree actuator RB for TL4019				44534-0750
Overtravel Actuators				
Replacement flat actuator OT for TL4019				44534-0701
Replacement 90-degree actuator OT for TL4019				44534-0711
Replacement flex 2 actuator OT for TL4019				44534-0721
Replacement flex 1 actuator OT for TL4019				44534-0731
Overtravel Actuators with Rubber Bushing				
Replacement flat actuator OTRB for TL4019				44534-0741
Replacement 90-degree actuator OTRB for TL4019				44534-0751
Slide Bolts				
Bolt for right-hung door for TL4019 with/without rear release (yellow metal)				44534-8130
Bolt for left-hung door for TL4019 with/without rear release (yellow metal)				44534-8140
Plastic slide bolt for right or left-hung door for TL4019 (yellow) (okay for rear release switches)				44534-8070
Slide bolt interior lever kit (use with rear release slide bolts only)				44534-8050
Rear release T-handle (use with rear release switches only)				44534-8060
Bracket for TL4019 (galvanized)				44534-8020
Handle without snap-in (use with 44534-8020 bracket) (galvanized)				44534-8000
Handle with snap-in (use with 44534-8020 bracket) (galvanized)				44534-8010
Miscellaneous				
Stainless steel alignment guide for TL4019 (must use with Overtravel Actuator)				44534-0780
Latch spring for TL4019 (provides greater retention force for actuator)				44534-0760
Lockout bar for TL4019 (prevents insertion of actuator into switch)				44534-0770
Key lock release for TL4019 (2 keys included) (Do not use with TL4019-5)				44534-0802
Spare keys for key lock above (44534-0802) for TL4019				44534-0812
Spare keys for key lock (44534-0800, no longer available)				44534-0810
Unique key lock release for TL4019 (2 unique keys included) (Do not use with TL4019-5)				44534-0820
Replacement head for TL4019				44534-0790
LED lid kit (for 24 VAC/DC switches only)				44534-0761

Safety Interlock Switch with Guard Door Locking

- High locking force of 1,500 N (337 lb.) locks guard door shut until machine is safe to enter
- IP67 (NEMA 6) enclosure withstands water washdown
- Door and lock monitoring—the TL4024 has a total of 4 contacts: 2 N/C safety + 1 contact for door position monitoring + 1 contact for lock monitoring
- Unlocking is possible with a back load on the door to satisfy the demands of high cycle time applications
- Narrow profile enables mounting to 2 in. square tubing or in applications with space restrictions
- Rotatable head—the rotatable head provides 8 actuator entry positions to satisfy most installation requirements
- Optional key release—this option on power-to-unlock models allows manual unlocking of the guard door
- Optional slide bolt with integral door handle aids installation on sliding and swinging guard doors
- Two LED (red/green) status indicators on the lid may be wired to suit the application



Conforms to EN60947-5-1, EN1088, EN ISO 13849-1
UL and C-UL listed
DGUV approved

Specifications

Electrical	
Safety Contacts:	2 N/C
Auxiliary Contacts:	1 N/O + 1 N/C 1 N/O + 1 N/O
Switching Ability	AC: 230 V – 4 A DC: 24 V – 4 A
Safety Contact Material:	Silver alloy with gold flash
Minimum Current:	12 V 10 mA, 24 V 1 mA
Solenoid Supply Voltage:	24 VAC/DC or 110 VAC (all -15% / +10%)
Solenoid Power:	8 W
Solenoid Rating:	100% duty
Mechanical	
Mounting:	Any position
Mounting Hardware:	4 x M5 screws (not supplied)
Min Operating Radius:	Approximately 300 mm (12 in.) with 90-degree actuator
Max Holding Force:	1500 N (337 lb.)
Max Actuation Speed:	20 m/min.
Case Material:	Anodized die-cast alloy
Actuator Material:	Stainless steel
Wiring Entry:	3 x 0.5 in. NPT
Weight:	800 g (28 oz.)
Color:	Red
Mechanical Life:	1 x 10 ⁶ minimum
Environmental	
Protection:	IP67 (NEMA 6)
Operating Temperature:	-20 to 80 °C (-4 to 176 °F)
Cleaning:	Water washdown
Compliance	
Standards:	EN60947-5-1, EN1088, EN ISO 13849-1
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL, DGUV

Specifications are subject to change without notice.
Note: The safety contacts of the STI switches are described as normally closed (N/C)—i.e., with the guard closed, actuator in place, and the machine able to be started.

F

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



Features

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

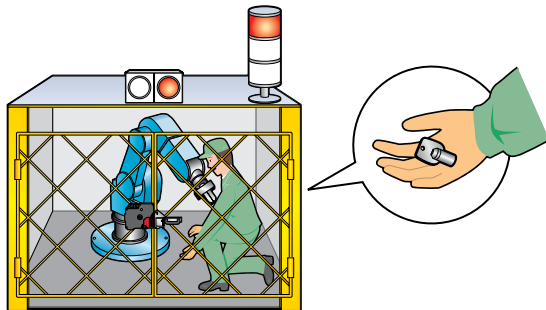
A holding force of 3,000 N makes these Switches suitable for large, heavy doors.

Models with Trapped Keys

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

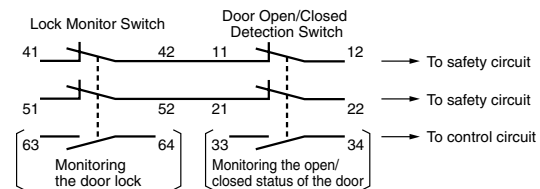
As long as a person has the trapped key when he enters a hazardous area, he does not have to worry about somebody locking the door and trapping him inside. The door can be opened only by supplying power to the solenoid and then turning the trapped key to unlock the D4JL.

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



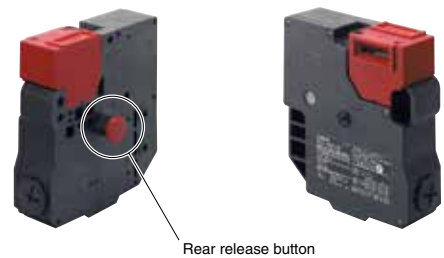
Two Safety Circuits and Two Monitor Contacts

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.

Connections

Contact Forms

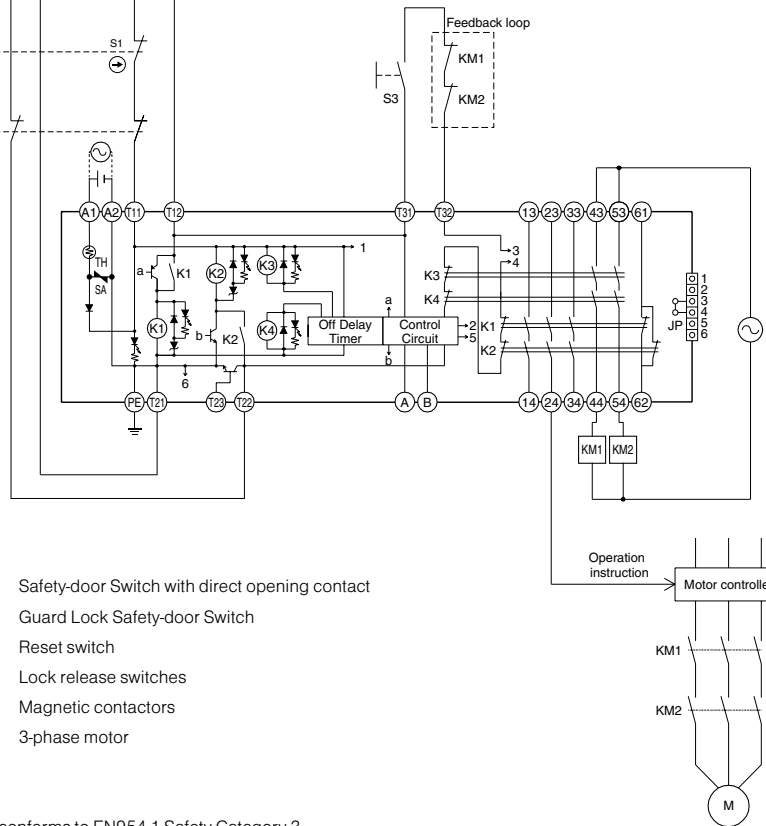
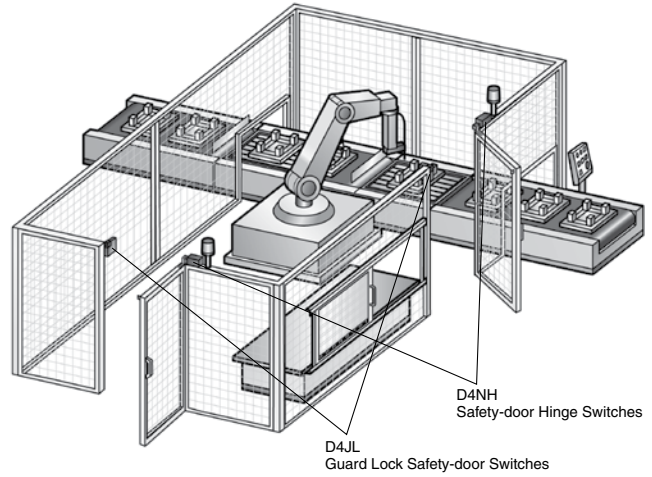
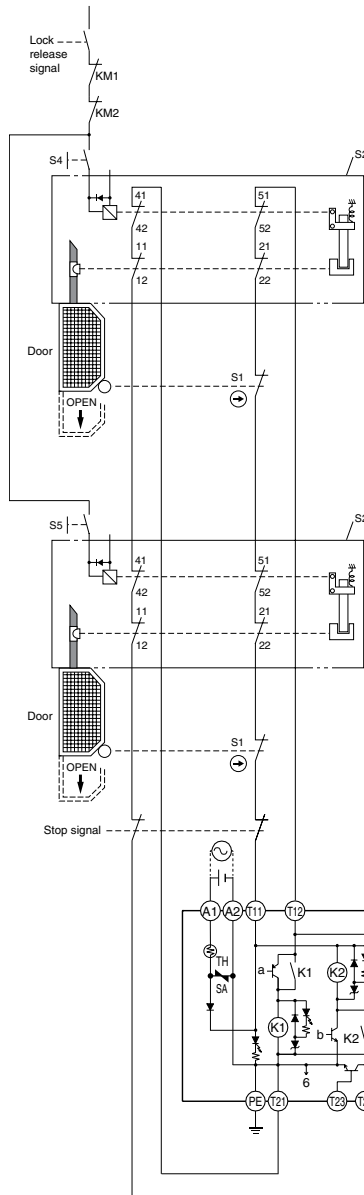
Indicates conditions where the Key is inserted and the lock is applied. Terminals 42-11 and terminals 52-21 are connected internally (as per BIA GS-ET-19).

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 (I). 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 (I). 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 (I). 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 (I). The terminals 41-12, 51-22, 31-32, and 61-62 can be used as unlike poles.	

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:

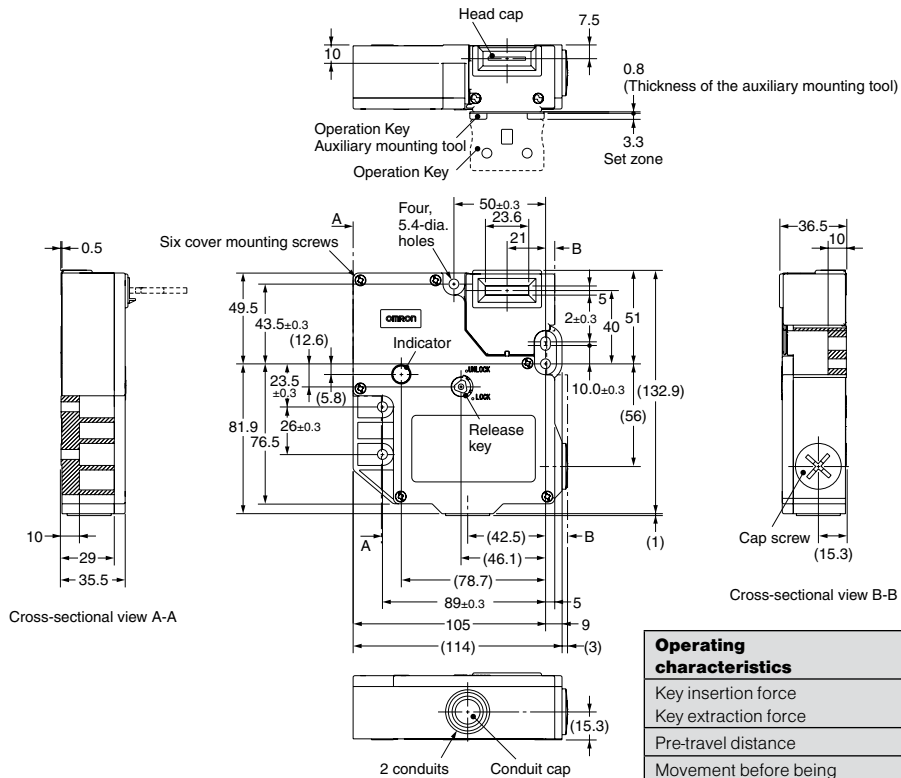
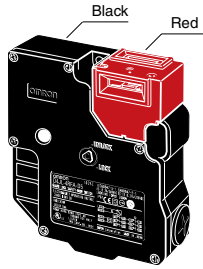
1. This circuit conforms to EN954-1 Safety Category 3.
2. When the release button is pressed on rear release models, the solenoid contacts are turned OFF.
3. With Trapped Key Models, the door will not lock when it is closed with the trapped key removed.

Dimensions and Operating Characteristics

Dimensions and Operating Characteristics

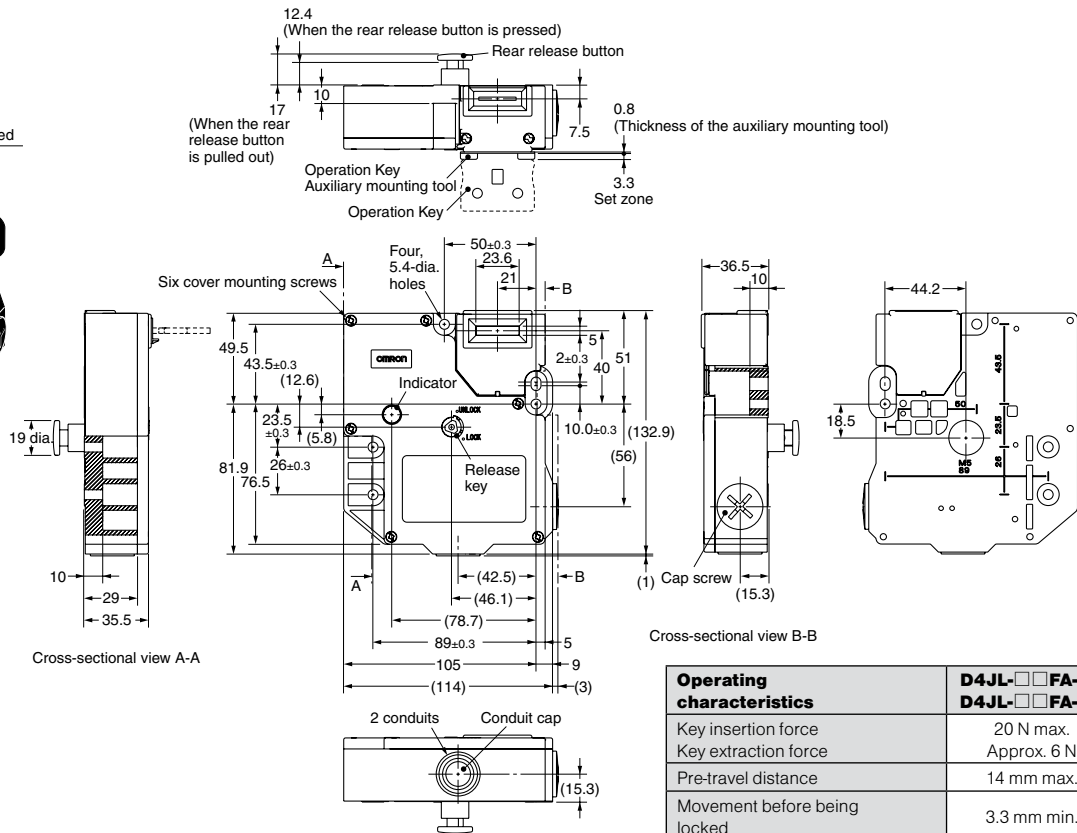
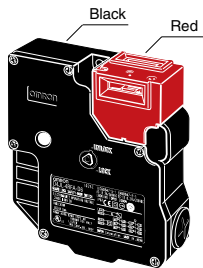
Switches

D4JL-□□F□-C5
D4JL-□□F□-D5



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

D4JL-□□FA-C6
D4JL-□□FA-D6



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

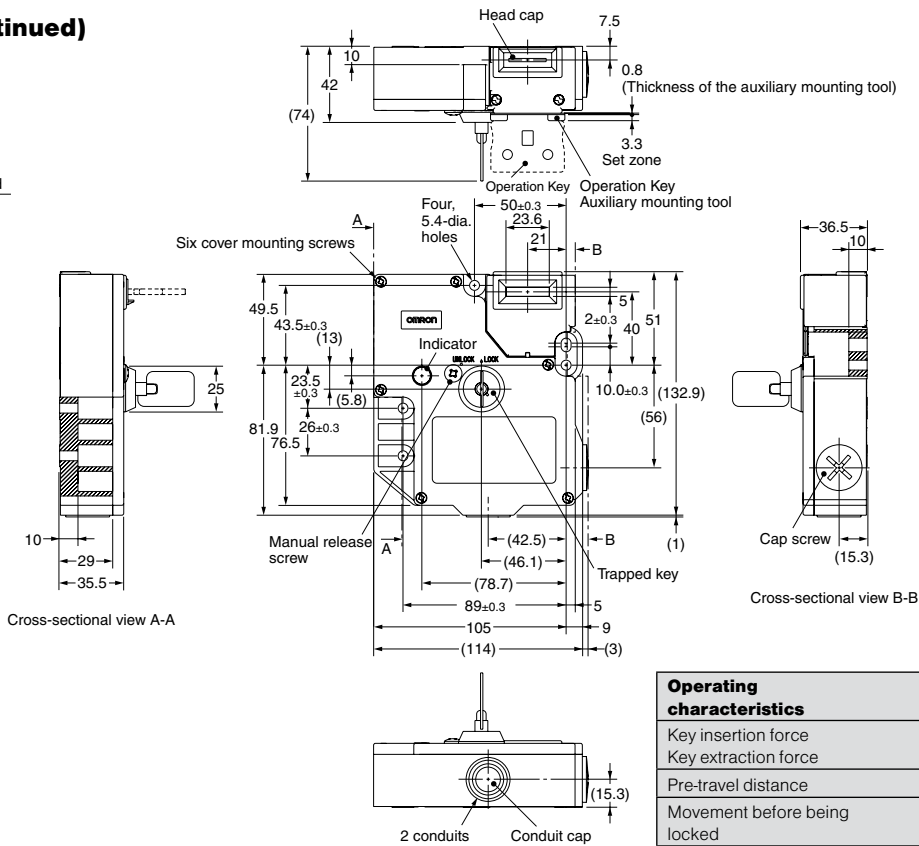
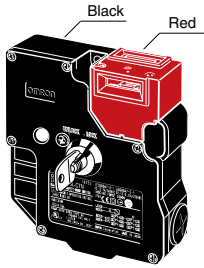
Dimensions and Operating Characteristics (continued)

(mm)

Dimensions and Operating Characteristics

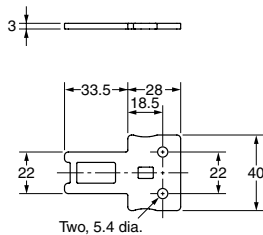
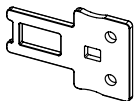
Switches (continued)

D4JL-□□FA-C7
D4JL-□□FA-D7

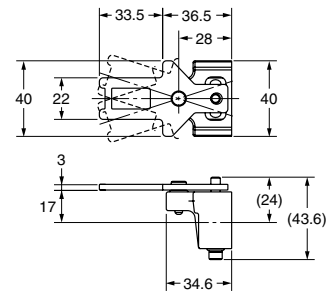
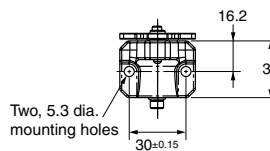


Operation Keys

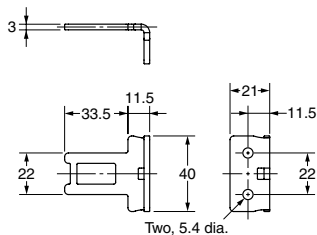
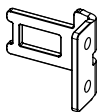
D4JL-K1



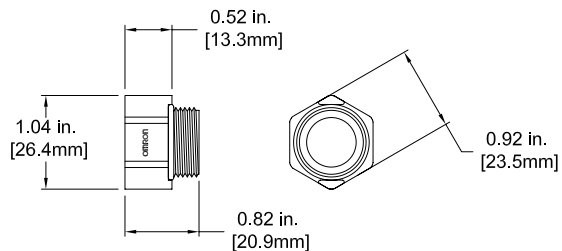
D4JL-K3



D4JL-K2



M20-NPT Adapter



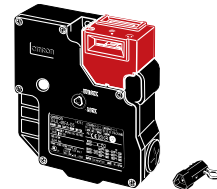
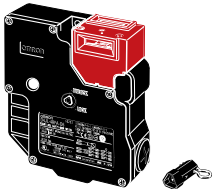
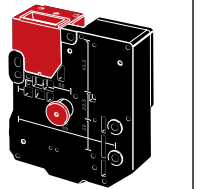
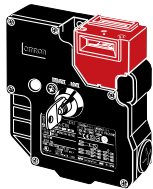
Note: Unless otherwise specified, a tolerance of ±0.8 mm applies to all Switch dimensions and a tolerance of ±0.4 mm applies to Operation Key dimensions.



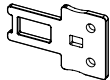


For complete specifications and additional models and accessories visit www.omron247.com




Ordering

Release key position	Front	Front and rear release button	Front
Release key type	Special release key	Special release key	Trapped key
Switch appearance		<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Front</p>  </div> <div style="text-align: center;"> <p>Rear</p>  </div> </div>	

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 - □ □ □ □ - □ □ - □ □ - □

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- 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
- ⑧ M20-to-NPT Adapter
 - Blank: Adapter is not included
 - NPT: Adapter is included

Operation Key

D4JL-K □

①

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

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)

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.

Most Diverse and Flexible Line of Coded Magnetic Safety Interlock Switches and Controllers

- Combine door switch monitoring and E-stop monitoring by using the CM-S41 controller
- Monitor is single switch to CAT4 with the CM-S30 controller
- Monitor multiple switches to CAT3 using CM-S4 or CM-S30 controllers
- Monitoring multiple switches on individual channels can be achieved by using the CM-S21 or CM-S41 controllers. Easily expand your system by using the CM-SE expansion module.
- All CM switches are rated IP67
- Stainless steel switches are available for harsh environments



Conforms to EN292, EN60204-1, EN954-1, EN1088, EN60947-5-3, EN947-5-3, EN50081, EN50082, EN61000-6-2, ISO 13849-1
UL and C-UL listed, TUV certified

Description

The CM series of controllers and coded magnetic switches offers the most flexibility and widest range of options available. The CM series is comprised of two basic technologies.

Controller Technologies

2-Wire Single Channel Controllers

The CM-S41 and CM-S21 controllers monitor the 2-wire magnetically coded switches. The CM-S41 and CM-S21 controllers use a patented technology which allows them to monitor the 2-wire or single channel switches up to Category 3. The ability to monitor just a single channel enables the CM-S41 and CM-S21 to easily monitor multiple switches and provide individual status of each channel. Both of these controllers are compatible with the CM-SE expansion module.

Dual Channel Controllers

The CM-S4 and CM-S30 controllers are designed to monitor conventional read-style, magnetically-coded switches with 1 N/O + 1 N/C contacts. The CM-S4 controller can monitor up to four switches to category 3. The CM-S4 controller offers status indication for each individual switch. The CM-S30 controller can monitor one switch to category 4, or two switches to category 3. The CM-S30 control unit is capable of monitoring up to 30 conventional read style switches in series, but does not conform to category 3 when used with more than two switches.

Switch Categories

The CM series of switches are all magnetically coded. The CM series of switches fall into three main categories:

1. 2-wire Coded Magnetic
2. Conventional Read Style 1 N/C + 1 N/O contacts
3. Universal Read Style 2 N/C + 1 N/O contacts

The 2-wire Coded Magnetic Switches are only compatible with the CM-S21, CM-S41 and CM-SE control units and expansion module. The Conventional Read Style Switches are compatible with the CM-S4 and CM-S30 controllers. The Universal Read Style Switches are unique in design, all three contacts are rated for safety. This means that Universal Read Style switches can be used with the CM-S4 or CM-S30 Controllers, or conventional safety monitoring relays such as the G9SA, SR103 or G9SX-AD, -BC. This allows the Universal Read Style Switches to be run in series with E-stop switches or other mechanical door switches. Typically a category 2 rating would be applied to a system that incorporates multiple switches wired in series to a standard safety monitoring relay. A risk assessment should always be performed by properly trained and authorized personnel.

Switch Specifications

Electrical	CM-S1, CM-S2, CM-S3	CM-S5, CM-S6	CM-S221, CM-S521, CM-S621	CM-S11	CM-S31	CM-S321, CM-S421
Safety Contacts:	1 N/C + 1 N/O	1 N/C + 1 N/O	2 N/C + 1 N/O	Current Sensing Circuit	Current Sensing Circuit	2 N/C + 1 N/O
N/C Operating Distance:	CM-S1 – On = 3 mm; Off = 8 mm CM-S2 and CM-S3 – On = 6 mm; Off = 13 mm	On = 7 mm; Off = 10 mm	On = 7 mm; Off = 10 mm	On = 5-7 mm; Off = 8-12 m	On = 5-7 mm; Off = 8-12 mm	On = 7 mm; Off = 10 mm
Minimum Gap:	1 mm	1 mm	1 mm	1 mm	1 mm	1 mm
Max Switched Current/Voltage:	500 mA / 24 V	300 mA / 24 V	300 mA / 24 V			300 mA / 24 V
Mechanical						
Mounting:	2 x M4 screws supplied	2 x M4 screws supplied	2 x M4 screws supplied	2 x M4 screws supplied	2 x M4 screws supplied	3 x M4 screws supplied
Case Material:	Glass filled PPS	ABS	ABS	ABS	316 stainless steel	316 stainless steel
Max Wire Size:	Pre-wired cable to 5 m	Pre-wired cable to 10 m	Pre-wired cable to 10 m	Pre-wired cable to 10 m	Pre-wired cable to 10 m	Pre-wired cable to 5 m, 6-pin micro AC connector
Weight:	230 g (8.1 oz.)	207 g (8.1 oz.)	230 g (8.1 oz.)	207 g (7.3 oz.)	265 g (9.3 oz.)	545 g (19.2 oz.)
Color:	Red	Red	Red	Red	Stainless	Stainless
Mechanical Life:	10 ⁶	10 ⁶	10 ⁶	10 ⁶	10 ⁶	10 ⁶
Environmental						
Protection:	IP67 (NEMA 6)	IP67 (NEMA 6)	IP67 (NEMA 6)	IP67 (NEMA 6)	IP67 (NEMA 6)	IP67 (NEMA 6)
Operating Temperature:	-10 to 55°C (14 to 131°F)	-10 to 55°C (14 to 131°F)	-10 to 55°C (14 to 131°F)	-10 to 55°C (14 to 131°F)	-10 to 55°C (14 to 131°F)	Connector Models: -10 to 55°C (14 to 131°F) Integrated Cables: -10 to 95°C (14 to 203°F)
Humidity:	95% RH at 55°C (131°F)					
Compliance						
Standards:	EN292, EN60204-1, EN954-1, EN1088, EN60947-5-3, EN947-5-3, EN50081, EN50082, EN61000-6-2					
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL. TUV certified: CM-S1, CM-S2, CM-S3, CM-S11 and CM-S31.					

Specifications are subject to change without notice.

Note: The safety contacts of the STI switches are described as normally closed (N/C) i.e., with the guard closed, actuator in place, and the machine able to be started.

Control Unit Specifications

Electrical	CM-S4	CM-S30	CM-S41, CM-S21 & CM-SE
Power Supply:	24 VAC/DC ± 10%	24 VAC/DC ± 10%	CM-S41 – 24 VAC/DC, 110/230 VAC CM-S21 & CM-SE – 24 VAC/DC
Power Consumption:	2.4 VA typical, 0.25 A quick acting	120 mA	CM-S41 – 6 VA; CM-S21 & CM-SE – 3 VA
Input Fuse:	500 mA resettable	750 mA resettable	500 mA resettable
Safety Inputs:	1 N/O + 1 N/C	1 N/O + 1 N/C	CM-S41 – 4 CM-S11 or CM-S31 switches CM-S21 – 2 CM-S11 or CM-S31 switches CM-SE – 5 CM-S11 or CM-S31 switches
Max Cable Length:	–	–	100 m (328 ft.)
Max Input Resistance:	Contact factory	Contact factory	Contact factory
Relay Outputs:	1 N/O safety + 1 N/O aux.	2 N/O safety + 1 N/C aux.	CM-S41 & CM-S21 – 2 N/O; CM-SE – N/A
Max Switched Current/Voltage:	4 A / 24 VAC/DC	3 A / 24 VAC/DC	4 A / 230 VAC; 2 A / 24 VDC (resistive)
Min Switched Current/Voltage:	4 mA / 12 V	4 mA / 12 V	10 V / 10 mA
Impulse Withstand Voltage:	250 V	250 V	250 V
Max Drop-Out Time:	18 ms	18 ms	Deactivation by sensor 13 ms
Max Output Fuse:	4 A quick acting	4 A quick acting	AC = 5 A; DC = 2.5 A; quick acting
Reset Mode:	Automatic	Automatic/Manual, monitored	Monitored manual or automatic
External Device Monitoring:	N/C loop between Y1 and Y2	Between Y1, Y2, Y3	N/C loop between X1 and X2
Mechanical			
Mounting:	35 mm (1.38 in.) DIN rail	35 mm (1.38 in.) DIN rail	35 mm (1.38 in.) DIN rail
Case Material:	Polyamid PA6.6	Polyamid PA6.6	Polycarbonate
Max Wire Size:	2 x 2.5 mm ² (12 AWG)	1 x 2.5 mm ² (14 AWG)	1 x 2.5 mm ² stranded, 1 x 4 mm ² solid
Weight:	240 g (8.5 oz.)	230 g (8.1 oz.)	CM-S41 – 575 g (20.3 oz.) CM-S21 – 183 g (6.5 oz.) CM-SE – 135 g (4.8 oz.)
Color:	Grey	Red/Grey	Red
Indication:	U: Green = On Outputs Open: Red = On Outputs Closed: Green = On D11, D12, D21, D22: Green = Gate closed D31, D32, D41, D42: Red = Gate open	Green = Power On Green = K1 On Green = K2 On	Power = Red Outputs Closed: Green = On Outputs Open: No Light = Off Gate Closed: Yellow = On Gate Open: No Light = Off
Mechanical Life:	3 x 10 ⁷	1 x 10 ⁷	1 x 10 ⁶
Environmental			
Protection:	Housing IP40, Terminals IP20	Housing IP40, Terminals IP20	Housing IP40, Terminals IP20
Operating Temperature:	0 to 50°C (32 to 122°F)	0 to 55°C (32 to 131°F)	10 to 55°C (50 to 131°F)
Humidity:	95%	93%	85%
Compliance			
Standards:	EN292, EN60204-1, ISO 13849-1, EN1088, EN60947-5-3, EN947-5-3, EN50081, EN50082, EN61000-6-2		EN292, EN60204-1, EN954-1, EN1088, EN60947-5-3, EN947-5-3, EN50081, EN50082, EN61000-6-2
Approvals/Listings:	CE marked for all applicable directives, UL and C-UL, TUV (TUV pending for CM-S30)		
Safety Category:	Cat 3 per EN954-1 (internal operation)	Cat 4 per ISO 13894-1 (internal operation)	Cat 3 per EN954-1 (internal operation)

Specifications are subject to change without notice.

Note: The safety contacts of the STI switches are described as normally closed (N/C) i.e., with the guard closed, actuator in place, and the machine able to be started.

Applications

2-Wire Single Channel Controllers

CM-S41 Control Unit

The CM-S41 is a combined Safety Switch and E-Stop control unit. Along with the ability to monitor up to four, 2-wire CM Series safety switches, it can also monitor the normally closed contacts of emergency stop buttons or mechanical safety switches in dual channel control circuits.

The CM-S41 has 2 normally open safety contact outputs and 1 normally closed auxiliary output, an external reset/proving circuit and LED indication for "Power", "Run" and the status of each activated gate switch.

CM-S21 Control Unit

The CM-S21 control unit is a 24 VAC/DC system that can monitor up to 2 CM Series safety switches.

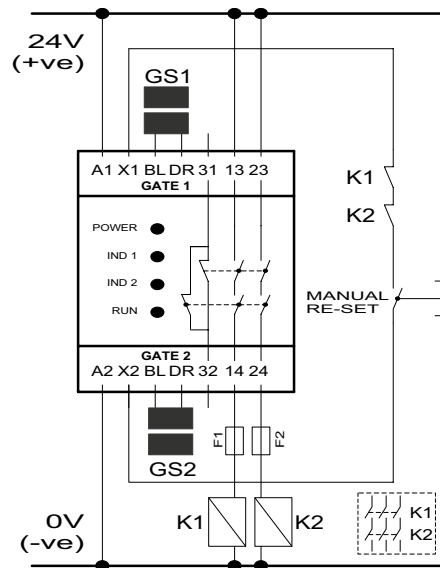
The CM-S21 has 2 normally open safety contact outputs and 1 normally closed auxiliary output, an external reset/proving circuit and LED indication for "Power", "Run" and the status of each activated gate switch.

CM-SE Extender Module

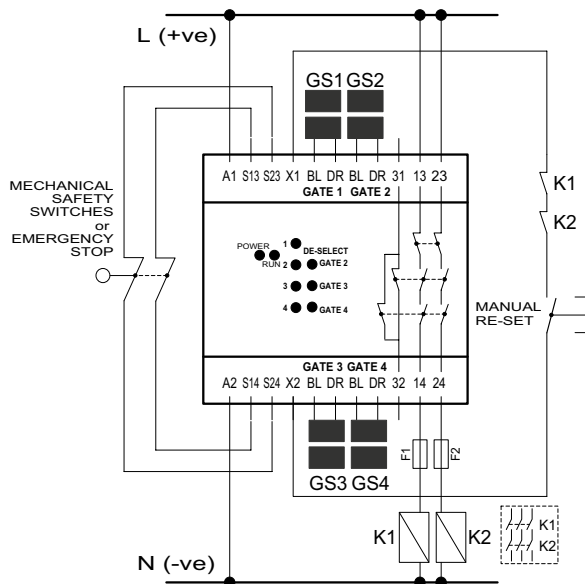
The CM-SE expansion module is a 24 VAC/DC unit that can be added to either the CM-S41 or CM-S21 to monitor an additional 5 CM Series safety switches. Connection to the main control unit is by a simple 2-wire bus connection. The status of each guard switch is shown by the YELLOW LED's. Additional CM-SE modules can be added to monitor larger systems.



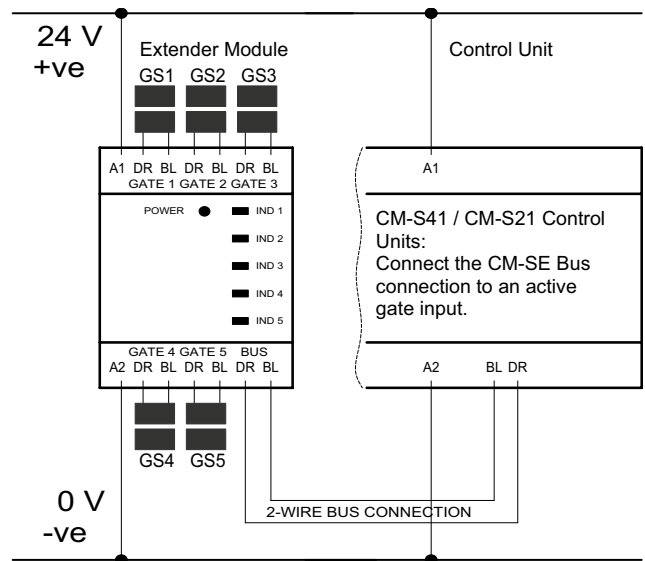
CM-S21 Application Diagram



CM-S41 Application Diagram



CM-SE Application Diagram



CM-S41 / CM-S21 Control Units:
Connect the CM-SE Bus connection to an active gate input.

Applications (continued)

Dual Channel Controllers

CM-S4 Control Unit

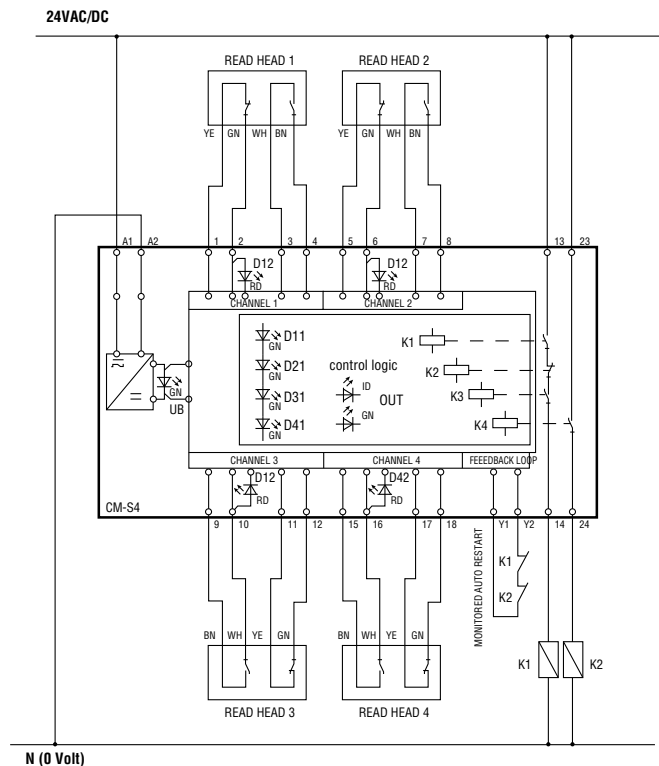
The CM-S4 controller is capable of monitoring up to four, magnetically coded switches with 1 N/O + 1 N/C contacts up to category 3 according to EN954-1. The CM-S4 has a dedicated dual channel input for each switch and has LED status indicators for each channel. The CM-S4 has 1 N/O safety contact and 1 N/O Aux contact. External Device Monitoring (EDM) is available using Y1,Y2 inputs.

CM-S30 Control Unit

The CM-S30 controller is capable of monitoring one magnetically coded switch with 1 N/O + 1 N/C contacts up to category 4, or two switches to category 3 according to ISO 13489-1. The CM-S30 control unit is capable of monitoring up to 30 conventional read style switches in series, but does not conform to category 4 when used with more than two switches. The CM-S30 controller has 2 N/O safety contacts and 1 N/C Auxiliary contact. External Device Monitoring (EDM) is available using Y1,Y2 inputs.

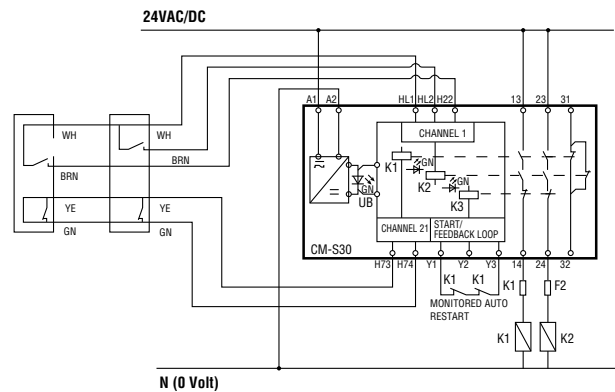


CM-S4 Application Diagram

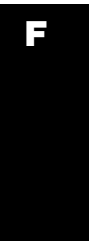
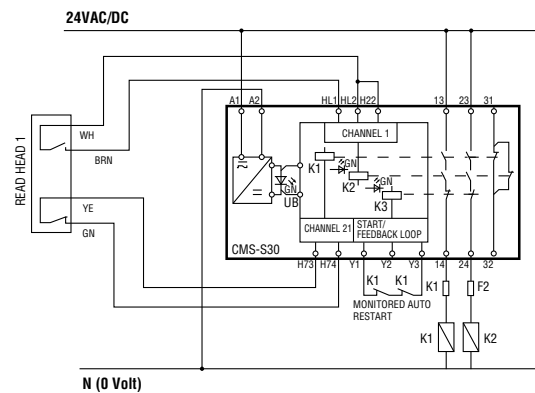


*23-24 should not be used as safety output.

CM-S30 Application Diagram (Cat 3)



CM-S30 Application Diagram (Cat 4)

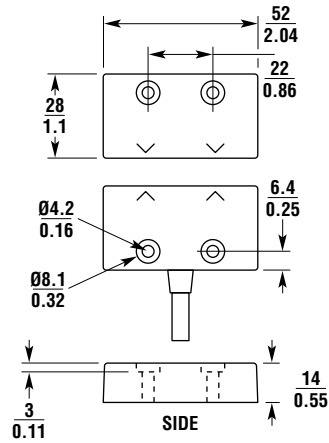


Dimensions

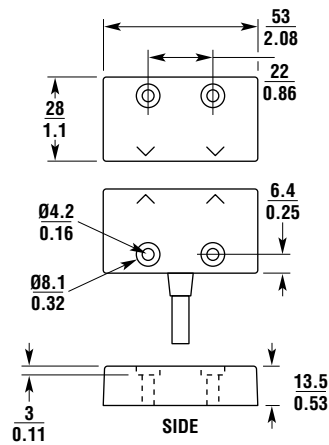
(mm/in.)

2-Wire Coded Magnetic Switches

CM-S11



CM-S31

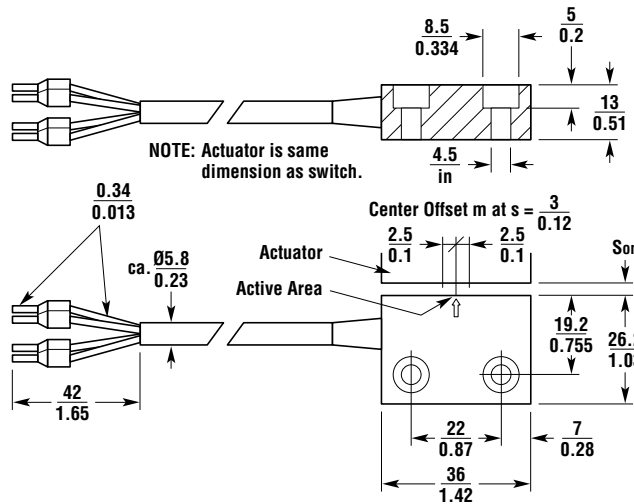


Dimensions (continued)

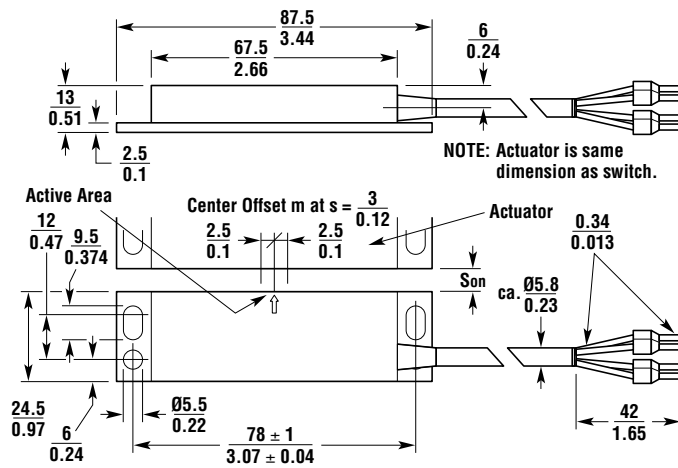
(mm/in.)

Conventional Read Style Switches

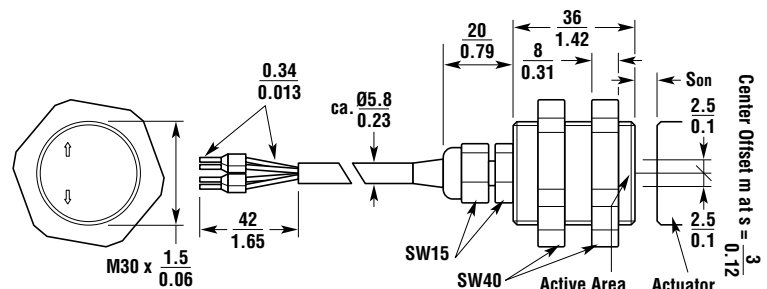
CM-S1



CM-S2



CM-S3



F

Dimensions (continued)

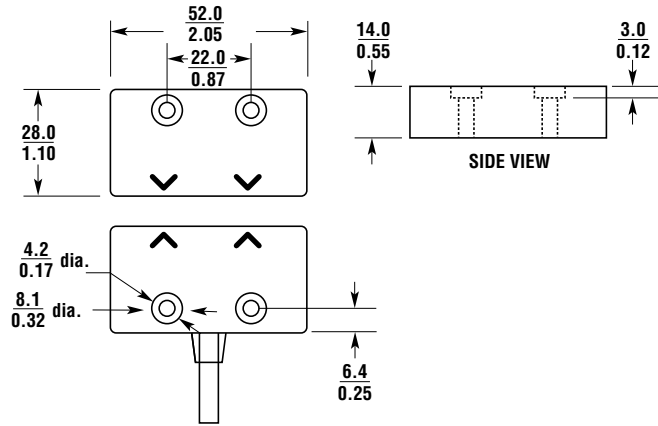
(mm/in.)

Conventional Read Style Switches (continued)

CM-S5



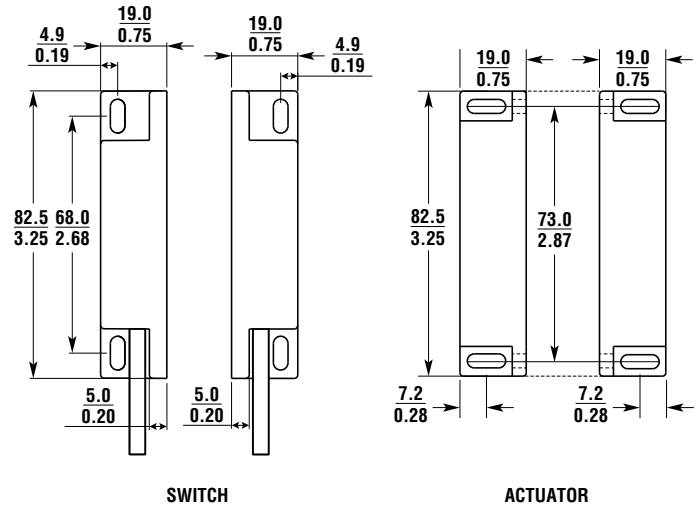
CM-S5 and CM-S521



CM-S6



CM-S6 and CM-S621

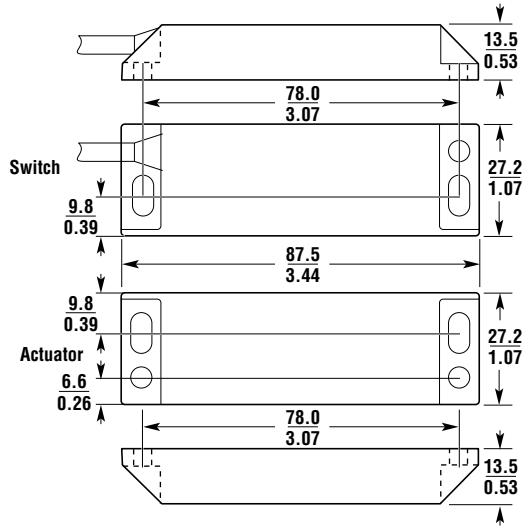


Dimensions (continued)

(mm/in.)

Universal Read Style Switches

CM-S221

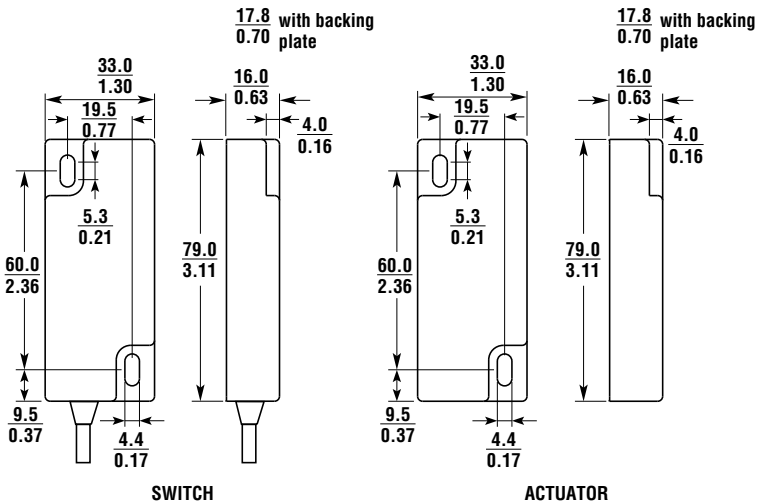


CM-S321/CM-S421



CM-S321 and CM-S421

Note: The CM-S321 includes a backing plate (not shown).



CM-S521



CM-S621



For CM-S521 dimensions, please refer to the CM-S5 dimensions on the previous page.

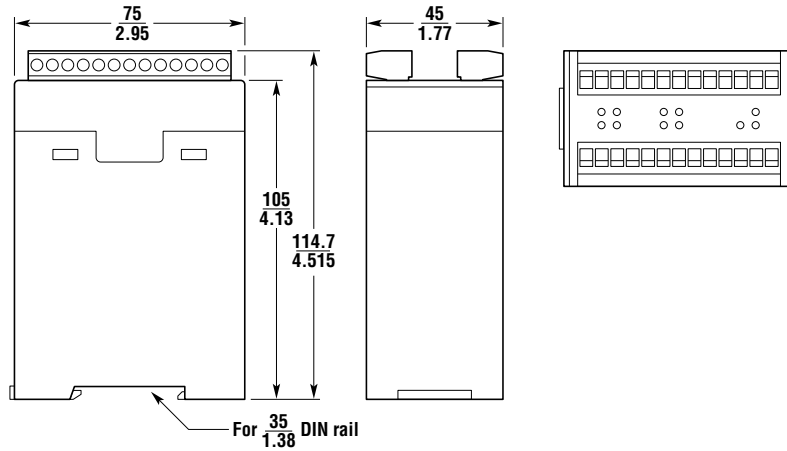
For CM-S621 dimensions, please refer to the CM-S6 dimensions on the previous page.

Dimensions (continued)

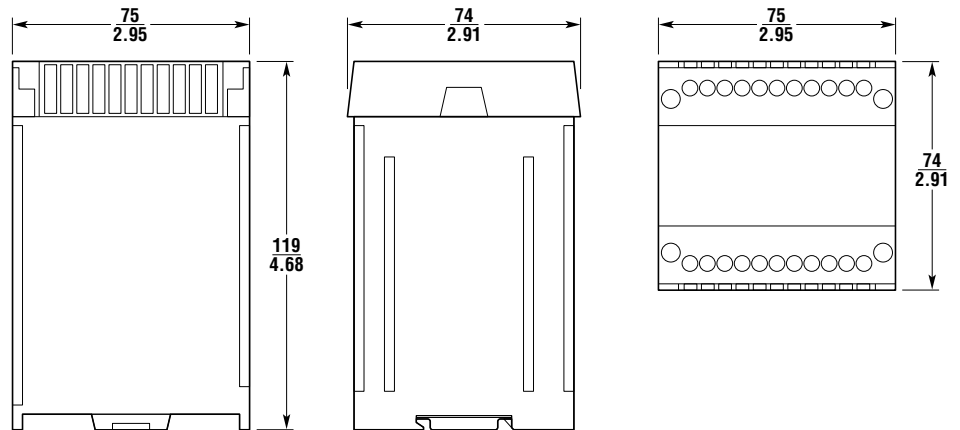
(mm/in.)

Control Units

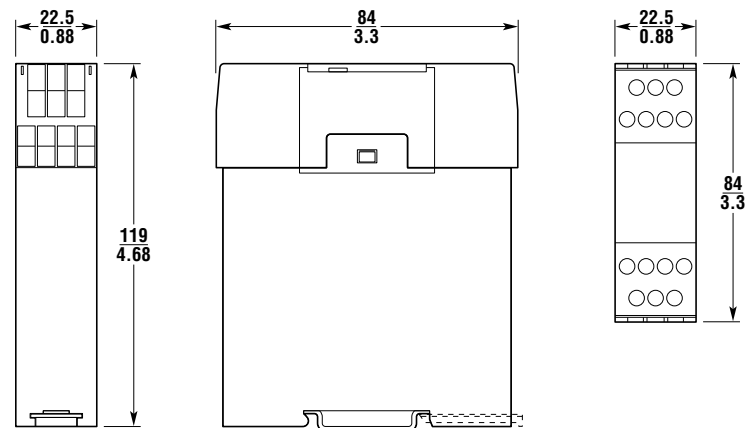
CM-S4



CM-S41



CM-S21 & CM-SE

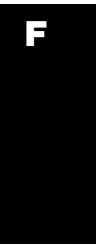
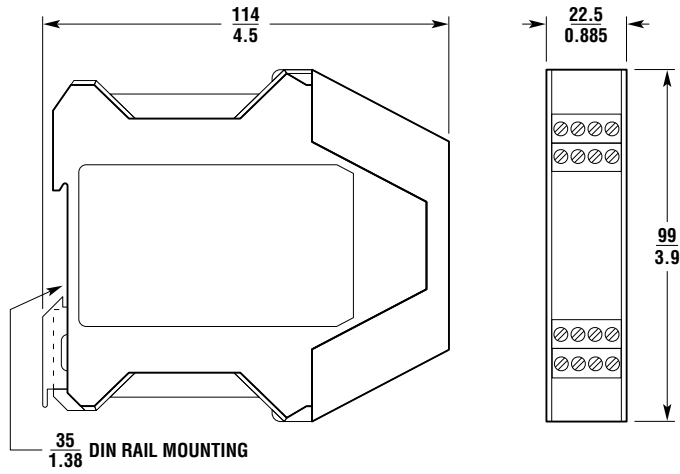


Dimensions (continued)

(mm/in.)

Control Units (continued)

CM-S30



Ordering

Model	Switch Construction	Contacts	Wiring Entry	Part No.
Control Units for 2-Wire Switches				
CM-S21-24 (24 VAC/DC)				44536-0120
CM-S41-24 (24 VAC/DC)				44536-0140
CM-S41-110 (110 VAC or 230 VAC)				44536-0141
CM-SF-24 (24 VAC/DC)				44536-0170
2-Wire Switches				
CM-S11-PC3	Plastic	2-wire system	3 m cable	44536-1100
CM-S11-PC5	Plastic	2-wire system	5 m cable	44536-1105
CM-S11-PC10	Plastic	2-wire system	10 m cable	44536-1110
CM-S11-PCC5	Plastic	2-wire system	connector + 5 m cable	44536-1159
CM-S31SC3	Stainless Steel	2-wire system	3 m cable	44536-3100
CM-S31SC5	Stainless Steel	2-wire system	5 m cable	44536-3105
CM-S31SCC5	Stainless Steel	2-wire system	connector + 5 m cable	44536-3159
Control Units for 1 N/C + 1 N/O Reed Style Switches				
CM-S30 (24 VAC/DC)				44536-0030
CM-S4 (24 VAC/DC)				44536-0040
1 N/C + 1 N/O Reed Style Switches				
CM-S1PC3	Plastic	1 N/C + 1 N/O	3 m cable	44536-0100
CM-S1PC5	Plastic	1 N/C + 1 N/O	5 m cable	44536-0105
CM-S2PC3	Plastic	1 N/C + 1 N/O	3 m cable	44536-0200
CM-S2PC5	Plastic	1 N/C + 1 N/O	5 m cable	44536-0205
CM-S3PC3	Plastic	1 N/C + 1 N/O	3 m cable	44536-0300
CM-S3PC5	Plastic	1 N/C + 1 N/O	5 m cable	44536-0305
CM-S5PC5	Plastic	1 N/C + 1 N/O	5 m cable	44536-0505
CM-S5PC10	Plastic	1 N/C + 1 N/O	10 m cable	44536-0510
CM-S6PC5	Plastic	1 N/C + 1 N/O	5 m cable	44536-0605
CM-S6PC10	Plastic	1 N/C + 1 N/O	10 m cable	44536-0610
Universal Reed Style Switches				
(can be used with safety monitoring relays that accept 1N/C + 1N/O or 2NC switch contacts except the SR203, SR208, SR209)				
<i>CAUTION! Universal reed switches may be operated with a coded or non-coded actuator when using 2 NC contacts with a safety monitoring relay.</i>				
CM-S221PC5	Plastic	2 N/C + 1 N/O	5 m cable	44536-0221
CM-S221PCC5	Plastic	2 N/C + 1 N/O	connector + 5 m cable	44536-0225
CM-S221PCC	Plastic	2 N/C + 1 N/O	no cable	44536-0226
CM-S521PC5	Plastic	2 N/C + 1 N/O	5 m cable	44536-0521
CM-S521PC10	Plastic	2 N/C + 1 N/O	10 m cable	44536-1521
CM-S621PC5	Plastic	2 N/C + 1 N/O	5 m cable	44536-0621
CM-S621PC10	Plastic	2 N/C + 1 N/O	10 m cable	44536-1621
CM-S321SC5	Stainless Steel	2 N/C + 1 N/O	5 m cable	44536-3221
CM-S321SCC5	Stainless Steel, backing plate	2 N/C + 1 N/O	M12 connector + 5 m cable	44536-3229
CM-S321SCC	Stainless Steel, backing plate	2 N/C + 1 N/O	M12 connector, no cable	44536-3220
CM-S421SC5	Stainless Steel, No backing plate	2 N/C + 1 N/O	5 m cable	44536-4221
CM-S421SCC5	Stainless Steel, No backing plate	2 N/C + 1 N/O	M12 connector + 5 m cable	44536-4229
Recommended Safety Monitoring Relays for Universal Reed Style Switches				
CM-S4, CM-S30, G9SA series, G9SX-AD, G9SX-BC, SR series				
Spare Actuators/Accessories				
Replacement Actuator for CM-S1, Red ABS Plastic				44536-0710
Replacement Actuator for CM-S2, Red ABS Plastic				44536-0720
Replacement Actuator for CM-S3, Red ABS Plastic				44536-0730
Replacement Actuator for CM-S5, CM-S521 Red ABS Plastic				44536-0750
Replacement Actuator for CM-S6, CM-S621 Red ABS Plastic				44536-0760
Replacement Actuator for CM-S11, Red ABS Plastic				44536-0711
Replacement Actuator for CM-S31, Red ABS Plastic				44536-0731
Replacement Actuator for CM-S221, Red ABS Plastic				44536-0721
Replacement Actuator for CM-S321, Stainless Steel, backing plate				44536-0741
Replacement Actuator for CM-S421, Stainless Steel, No backing Plate				44536-0751
Mounting Bracket for CM-S3				44536-0800

Magnetically Actuated Safety Interlock Switches

- Large selection—choose from a large selection of contact configurations housed in plastic to satisfy most application requirements
- NEMA 6 enclosure enables the MA Series switches to satisfy most application requirements (MA 3, 4, 5 are NEMA 4)
- Misalignment tolerant—the non-contact actuation of the switches makes them very tolerant to misalignment of up to 10 mm (0.39 in.)
- Variety of terminations—select various cable lengths or terminal strip termination for easy installation. Cable connector on selected models.
- Long life—the MA Series is designed for a minimum of one million actuations



Conforms to EN1088, EN292, EN60204-1
UL and C-UL listed

Specifications

Electrical	All Models Unless Indicated		
Safety Contacts:	AC models	MA-1 thru 5, 10, 12, 13, 16 – 1 N/C	MA-13, 16, 21 – 2 N/C
	DC models	MA-12, 13, 14, 16 – 1 N/C	MA-13, 15, 16, 20, 21 – 2 N/C
Safety Contact Operating Distance:	Make 7-12 mm (0.28-0.47in.); Break 12-25 mm (0.47-0.98 in.)		
Auxiliary Contacts:	MA-2, 4, 12, 13, 14, 15, 16, 21	1 N/O	
	MA-3	1 N/C	
Aux. Contact Operating Distance:	MA-2, 4, 16, 21	Make 8-13 mm (0.39-0.51 in.); Break 8-10 mm (0.31-0.39 in.)	
	MA-3	Make 21 mm (0.83 in.); Break 24 mm (0.94 in.)	
Safety Rated Voltage:	AC models: All except MA-10	230 VAC	
	AC models: MA-10	110 VAC	
	DC models	30 VDC	
Safety Rated Current:	AC models: All except MA-3	2 A, fuse externally 1.6 A quick acting	
	AC model: MA-3	3 A, fuse externally 2.5 A quick acting	
	DC models: All except MA-15	1 A, fuse externally 800 mA quick acting	
	DC model: MA-15	0.3 A max., fuse externally 0.2 A quick acting	
Internal Fuse:	AC models	2 A fast acting	
	DC models	1 A fast acting	
External Fuse (Customer Supplied):	AC models	1.6 A fast acting	
	DC models: All except MA-15	0.8 A fast acting	
Electrical Life:	1 x 10 ⁶		
Mechanical—Special Safety Reed		Safety	Aux.
Closing Time:		3.0 mS	0.5 mS
Drop-Out Time:		2.1 mS	0.3 mS
Bounce Time:		0.7 mS	0.7 mS
Shock:		10 G	10 G
Vibration:		10 G, 50 to 100 Hz	
Mechanical			
Mounting:		Any position	
Case & Actuator Material:		Molded ABS	
Wiring Connection:		Various lengths or male M12 micro connector	
Weight:		Approx. 384 g (14 oz.)	
Color:		Red	
Mechanical Life:		10 x 10 ⁶	
Environmental			
Protection:	All models except MA-3, 4, 5	IP67 (NEMA 6)	
	MA-3, 4, 5	IP65 (NEMA 4)	
Operating Temperature:	All models except MA-3, 4, 5	-10 to 55°C (14 to 131°F)	
	MA-3, 4, 5	-10 to 65°C (14 to 149°F)	
Compliance			
Standards:	EN1088, EN292, EN60204-1		
Approvals/Listings:	CE marked for all applicable directives		
	All models: except MA-3, 4, 5	UL and C-UL	
	MA-3, 4, 5	cCSAus	

Specifications are subject to change without notice. Note: The safety contacts of the STI switches are described as normally closed (N/C) i.e., with the guard closed, actuator in place, and the machine able to be started.

Basic Body Styles

MA-1, MA-2, MA-20 and MA-21



MA-10 and MA-16



MA-12 and MA-13



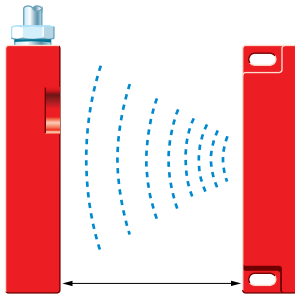
MA-14 and MA-15



MA-3, MA-4 and MA-5

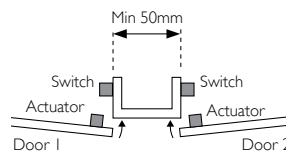
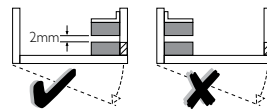
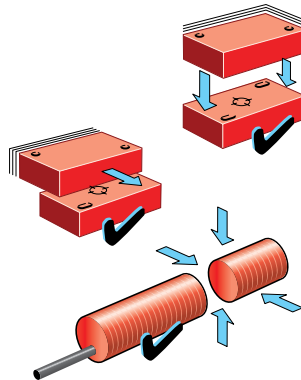
Operation

Operating Principle



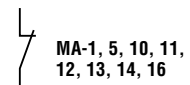
Encapsulated in the MA Series is a unique high-power industrial reed which is de-rated by a non-resettable overload protection circuit depending on switch type. On presenting the actuator to the switch, the high intensity magnetic field from the actuator causes the contacts to close. On removing the actuator (opening the door), the safety contacts open, isolating the machine.

Mounting Examples

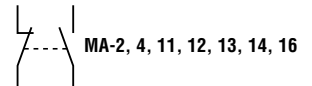


It is advisable, where possible, to mount the switch and actuator on non-ferrous materials otherwise it may affect the operating distances.

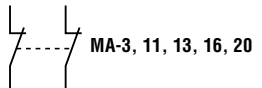
Contact Arrangement



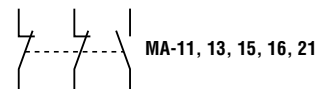
MA-1, 5, 10, 11, 12, 13, 14, 16



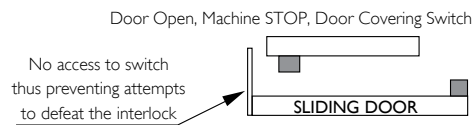
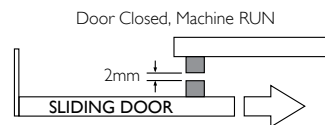
MA-2, 4, 11, 12, 13, 14, 16



MA-3, 11, 13, 16, 20



MA-11, 13, 15, 16, 21

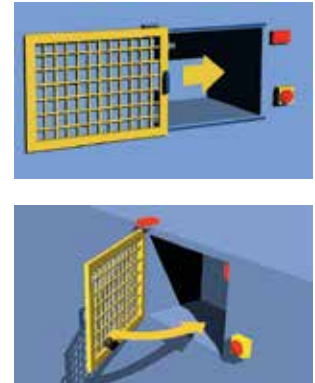
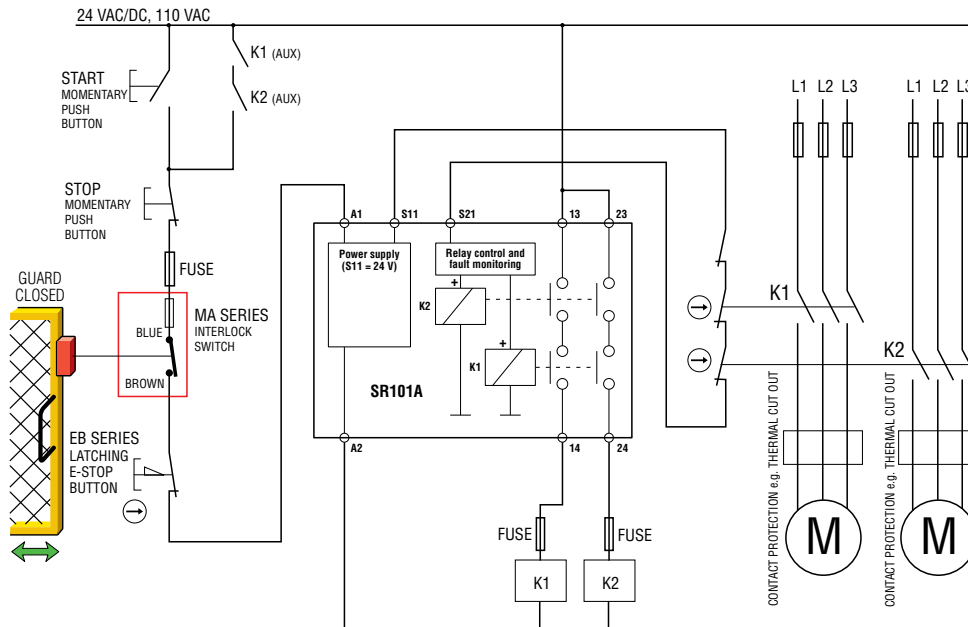


Wherever possible the units should be mounted so that no access can be obtained to the switch when the guard door is open, thus preventing attempts to defeat the safety system.

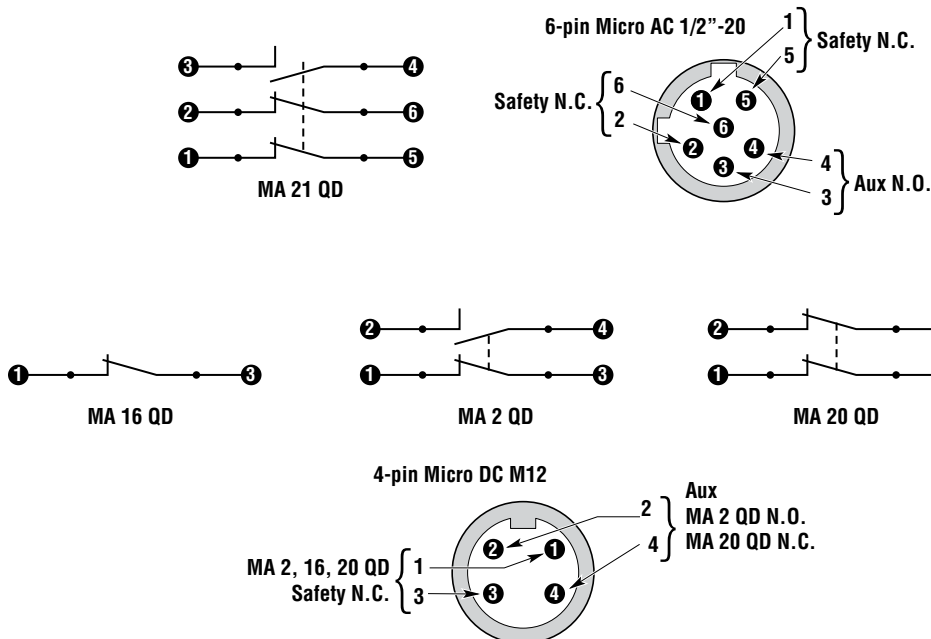
Applications

Typical Application of MA Series with a Safety Monitoring Relay

Typical applications are on sliding guard doors or swinging guard doors.



Pin Assignments with Connector Option

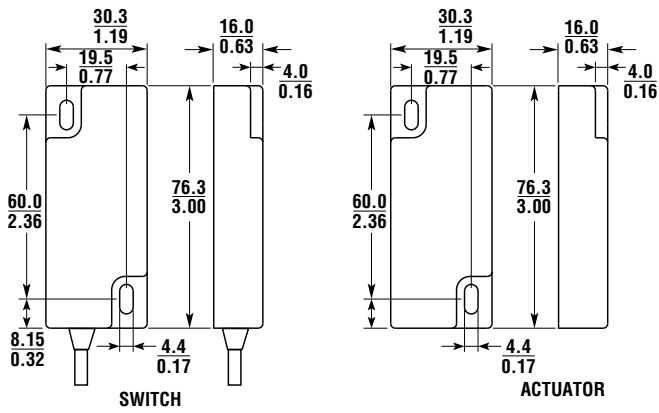


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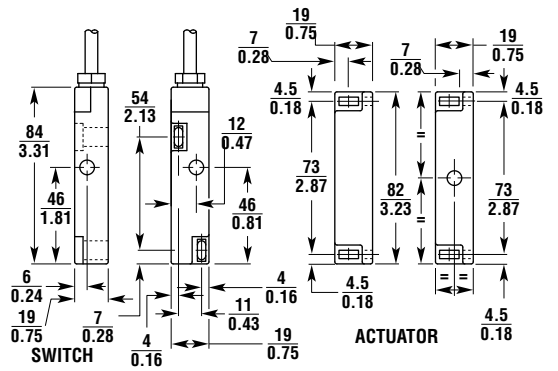
Dimensions

(mm/in.)

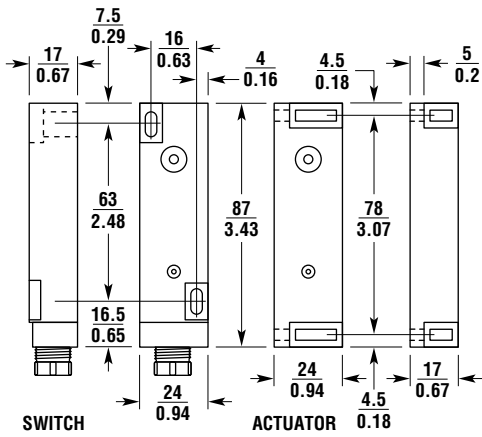
MA-1, 2, 20, 21



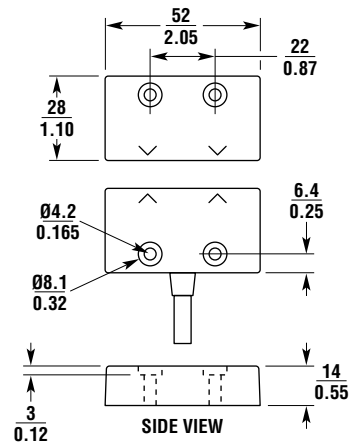
MA-10



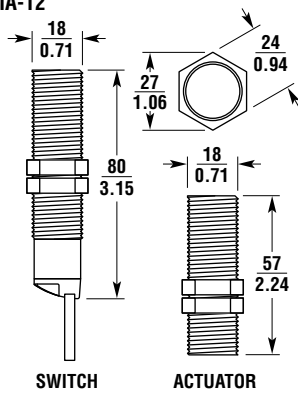
MA-11



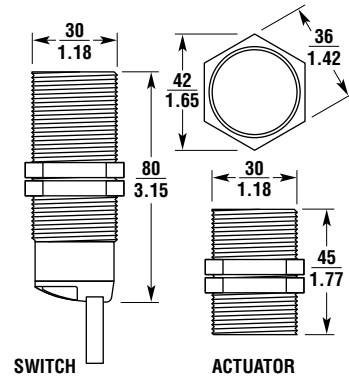
MA-14, 15



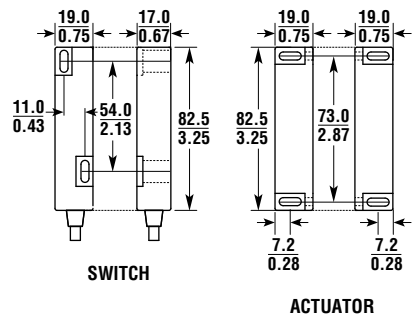
MA-12



MA-13



MA-16



Ordering

Model	Contacts	Wiring Entry	Part No.
AC Only			
MA-1APC2 (AC only)	1 N/C	2 m cable, pre-wired	44507-0010
MA-1APC4 (AC only)	1 N/C	4 m cable, pre-wired	44507-0020
MA-1APC8 (AC only)	1 N/C	8 m cable, pre-wired	44507-0180
MA-1APCC (AC only)	1 N/C	4 pin micro DC M12	44507-0619
MA-2APC2 (AC only)	1 N/C + 1 N/O	2 m cable, pre-wired	44507-0030
MA-2APC4 (AC only)	1 N/C + 1 N/O	4 m cable, pre-wired	44507-0040
MA-2APC6 (AC only)	1 N/C + 1 N/O	6 m cable, pre-wired	44507-0150
MA-2APC10 (AC only)	1 N/C + 1 N/O	10 m cable, pre-wired	44507-0750
MA-2APC15 (AC only)	1 N/C + 1 N/O	15 m cable, pre-wired	44507-0740
MA-2APCC (AC only)	1 N/C + 1 N/O	4-pin micro DC M12	44507-0600
MA-3APTC (AC only)	1 N/C + 1 N/C	Terminal connections	44507-0050
MA-4APTC (AC only)	1 N/C + 1 N/O	Terminal connections	44507-0060
MA-5APTC (AC only)	1 N/C	Terminal connections	44507-0070
MA-10APC2 (110 VAC, 3A max)	1 N/C	2 m cable, pre-wired	44507-0110
MA-10APC4 (110 VAC, 3A max)	1 N/C	4 m cable, pre-wired	44507-0330
MA-11AP10C3	1 N/C	3 m cable, pre-wired	44507-1150
MA-11AP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1160
MA-11AP11C10	1 N/C + 1 N/O	10 m cable, pre-wired	44507-1161
MA-11AP20C3	2 N/C	3 m cable, pre-wired	44507-1170
MA-11AP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1180
MA-12AP10C3	1 N/C	3 m cable, pre-wired	44507-1250
MA-12AP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1260
MA-13AP10C3	1 N/C	3 m cable, pre-wired	44507-1350
MA-13AP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1360
MA-13AP20C3	2 N/C	3 m cable, pre-wired	44507-1370
MA-13AP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1380
MA-16AP10C3 (AC only)	1 N/C	3 m cable, pre-wired	44507-1650
MA-16AP10C6 (AC only)	1 N/C	6 m cable, pre-wired	44507-1651
MA-16AP10C10 (AC only)	1 N/C	10 m cable, pre-wired	44507-1659
MA-16AP10CC	1 N/C	4-pin micro DC M12	44507-1652
MA-16AP11C3 (AC only)	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1660
MA-16AP11C6 (AC only)	1 N/C + 1 N/O	6 m cable, pre-wired	44507-1661
MA-16AP20C3 (AC only)	2 N/C	3 m cable, pre-wired	44507-1670
MA-16AP20C6 (AC only)	2 N/C	6 m cable, pre-wired	44507-1671
MA-16AP21C3 (AC only)	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1680
MA-16AP21C6 (AC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-1681
MA-20APC4 (AC only)	2 N/C	4 m cable, pre-wired	44507-0345
MA-20APCC (AC only)	2 N/C	4-pin micro DC M12	44507-0640
MA-21APC2 (AC only)	2 N/C + 1 N/O	2 m cable, pre-wired	44507-0160
MA-21APC4 (AC only)	2 N/C + 1 N/O	4 m cable, pre-wired	44507-0260
MA-21APC6 (AC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-0250
MA-21APC10 (AC only)	2 N/C + 1 N/O	10 m cable, pre-wired	44507-0170
MA-21APC15	2 N/C + 1 N/O	15 m cable, pre-wired	44507-0175
MA-21APCC	2 N/C + 1 N/O	6-pin micro DC M12	44507-0660

(Continued on next page)

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Ordering (continued)

Model	Contacts	Wiring Entry	Part No.
DC Only			
MA-1DPC2	1 N/C	2 m cable, pre-wired	44507-0022
MA-1DPC4	1 N/C	4 m cable, pre-wired	44507-0024
MA-1DPC8	1 N/C	8 m cable, pre-wired	44507-0028
MA-1DPCC	1 N/C	4p-pin micro DC M12	44507-0629
MA-2DPC2	1 N/C + 1 N/O	2 m cable, pre-wired	44507-0392
MA-2DPC4	1 N/C + 1 N/O	4 m cable, pre-wired	44507-0390
MA-2DPC6	1 N/C + 1 N/O	6 m cable, pre-wired	44507-0396
MA-2DPC10	1 N/C + 1 N/O	10 m cable, pre-wired	44507-0380
MA-2DPC15	1 N/C + 1 N/O	15 m cable, pre-wired	44507-0370
MA-2DPCC	1 N/C + 1 N/O	4-pin micro DC M12	44507-0650
MA-11DP10C3	1 N/C	3 m cable, pre-wired	44507-1110
MA-11DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1120
MA-11DP20C3	2 N/C	5 m cable, pre-wired	44507-1130
MA-11DP20C5	2 N/C	3 m cable, pre-wired	44507-1131
MA-11DP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1140
MA-12DP10C3	1 N/C	3 m cable, pre-wired	44507-1210
MA-12DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1220
MA-13DP10C3	1 N/C	3 m cable, pre-wired	44507-1310
MA-13DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1320
MA-13DP20C3	2 N/C	3 m cable, pre-wired	44507-1330
MA-13DP21C3	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1340
MA-13DP21C10	2 N/C + 1 N/O	10 m cable, pre-wired	44507-1341
MA-14DP10C3	1 N/C	3 m cable, pre-wired	44507-1410
MA-14DP11C3	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1420
MA-15DP21C3*	2 N/C + 1 N/O	3 m cable, pre-wired (300 mA max.)	44507-1540
MA-15DP21C5*	2 N/C + 1 N/O	5 m cable, pre-wired (300 mA max.)	44507-1541
MA-15DP21CC*	2 N/C + 1 N/O	6-pin micro DC M12	44507-1549
MA-16DP10C3 (DC only)	1 N/C	3 m cable, pre-wired	44507-1610
MA-16DP10C6 (DC only)	1 N/C	6 m cable, pre-wired	44507-1611
MA-16DP10C10 (DC only)	1 N/C	10 m cable, pre-wired	44507-1612
MA-16DP10CC (DC only)	1 N/C	4-pin micro DC M12	44507-1619
MA-16DP11C3 (DC only)	1 N/C + 1 N/O	3 m cable, pre-wired	44507-1620
MA-16DP11C6 (DC only)	1 N/C + 1 N/O	6 m cable, pre-wired	44507-1621
MA-16DP20C3 (DC only)	2 N/C	3 m cable, pre-wired	44507-1630
MA-16DP20C6 (DC only)	2 N/C	6 m cable, pre-wired	44507-1631
MA-16DP21C3 (DC only)	2 N/C + 1 N/O	3 m cable, pre-wired	44507-1640
MA-16DP21C6 (DC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-1641
MA-20DPC4 (24 VDC only)	2 N/C	4 m cable, pre-wired	44507-0340
MA-20DPCC (24 VDC only)	2 N/C	4-pin micro DC M12	44507-0630
MA-21DPC2 (24 VDC only)	2 N/C + 1 N/O	2 m cable, pre-wired	44507-0270
MA-21DPC4 (24 VDC only)	2 N/C + 1 N/O	4 m cable, pre-wired	44507-0280
MA-21DPC6 (24 VDC only)	2 N/C + 1 N/O	6 m cable, pre-wired	44507-0290
MA-21DPC10 (24 VDC only)	2 N/C + 1 N/O	10 m cable, pre-wired	44507-0350
MA-21DPC15 (24 VDC only)	2 N/C + 1 N/O	15 m cable, pre-wired	44507-0360
MA-21DPCC	2 N/C + 1 N/O	6-pin micro DC M12	44507-0670
Accessories			
Spare Actuator (1-5 & 20, 21), Red ABS Plastic			44507-0700
Replacement Actuator for MA-11, Red ABS Plastic			44507-0711
Replacement Actuator for MA-12, Red ABS Plastic			44507-0712
Replacement Actuator for MA-13, Red ABS Plastic			44507-0713
Replacement Actuator for MA-14, Red ABS Plastic			44507-0714
Replacement Actuator for MA-15, Red ABS Plastic			44507-0715
Replacement Actuator for MA-16, -10 Red ABS Plastic			44507-0716

*MA-15 switches are not compatible with the following STI safety relays: SR203M, SR203AM, SR208AD, SR209AD and all Legacy Relays.

Compact Non-contact Door Switch/ Flexible Safety Unit

D40Z

- Supports ISO 13849-1 (Safety Category 4/PLe). Can be used on higher risk level applications by connecting to Safety Controllers.
- Supports a wide range of applications in combination with Safety Controller G9SP or G9SX-NS□.
- Up to 30 units can be connected to a single G9SX (15 units with G9SP) Controller and maintain Cat 4/PLe. Ideal for middle to large scale device applications.
- Troubleshooting is made easy with the switch's two-color diagnostic LED display patterns.
- Photocoupler monitor output allows connection to a general-purpose PLC (NPN type).
- Similar size as the D40A allows standardization of machine design.
- Compact non-contact door switch can be mounted from both sides.

D40A

- Stable operation reduces controller errors caused by unstable doors
- Connect up to 30 non-contact door switches with LED indicators to one controller
- Reversible switch provides flexibility in installation
- Two-color LED indicator enables easier maintenance by identification of door status and cable disconnections
- Safety category 3 (EN 13849-1)
- Both non-contact door switches and conventional key-type safety-door switches can be input to one controller, saving space
- OFF-delay output provided for stop category 1
- Easily construct partial stop and complete stop systems with the logical AND connection function, using G9SX as the controller



Specifications

Ratings and Characteristics (Non-Contact Door Switches)

Item	Model	D40Z-1C□	D40A-1C□
Operating characteristics	Operating distance OFF → ON	5 mm min. *1	
	Operating distance ON → OFF	15 mm max. *1	
	Differential travel	Refer to "Detection Ranges"	
	Influence of temperature	Refer to "Detection Ranges"	±20% of operating distance at 23°C, within temperature range of -10 to 55°C
	Repeat accuracy	±10% of operating distance at 23°C	
	Response time ON → OFF *2	25 ms max.	
	Operating time OFF → ON *2	100 ms max. (Distance between the switch and actuator is 5 mm)	—
Ambient operating temperature		-10 to 65°C (with no icing or condensation)	-10 to 55°C (no icing or condensation)
Ambient operating humidity		25% to 85%	
Insulation resistance (between charged parts and case)		50 MΩ max. (at 500 VDC)	
Dielectric strength (between charged parts and case)		1,000 VAC for 1 min	
Degree of contamination		3	—
Dielectric strength (between charged parts and case)		—	1,000 VAC for 1 min
Electromagnetic compatibility		IEC/EN 60497-5-3 compliant	
Vibration resistance		10 to 55 to 10 Hz (single amplitude: 0.75 mm, double amplitude: 1.5 mm)	
Shock resistance		300 m/s ² min.	
Degree of protection		IP67	
Material		PBT resin	
Mounting method		M4 screws	
Terminal screw tightening torque		1 Nm	
Power supply voltage		24 VDC +10%/-15%	
Power consumption *3		0.5 W max.	0.6 W max.
Auxiliary monitoring output		Photocoupler output: 24 VDC, load current: 10 mA	24 VDC, 10 mA (PNP open-collector outputs) *4
LED indicators		Actuator not detected (lights in red); error occurred (blinks in red), actuator detected (lights in yellow), actuator detected and Non-contact Door Switch input OFF (blinks in yellow)	Actuator not detected (red); actuator detected (yellow)
Connecting cables		2 m, 5 m	
Number of connectable switches *5		30 max. (wiring length: 100 m max.)	
Weight		Switch: approx. 175 g, actuator: approx. 20 g (D40Z-1C5)	Switch: approx. 145 g, actuator: approx. 20 g (D40A-1C2)

*1. This is the distance where the switch operates from OFF to ON when approaching and the distance where the switch operates from ON to OFF when separating when the switch and actuator target marks are on the same axis, and the sensing surface coincide.

*2. Indicates the value of the non-contact door switch output.

*3. Power to be provided to the load is not included.

*4. Turns ON when the actuator is approaching. The G3R series of the SSR can be driven at an auxiliary output of 10 mA. Contact your Omron representative for details.

*5. For details, contact factory.

Specifications (continued)

Ratings (Non-contact Door Switch Controllers)

Power Inputs

Item	G9SX-NS202-□	G9SX-NSA222-T03-□	G9SX-EX-□
Rated supply voltage	24 V DC		
Operating voltage range	-15% to 10% of rated supply voltage		
Rated power consumption *	3 W max.	4 W max.	2 W max.

* Power consumption of loads not included.

Inputs

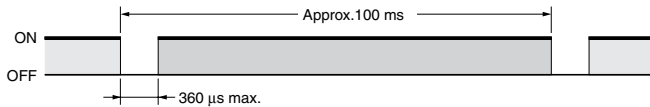
Item	G9SX-NS202-□/G9SX-NSA222-T03-□
Safety input *	Operating voltage: 20.4 VDC to 26.4 VDC, internal impedance: approx. 2.8 kW
Feedback/reset input	

* Only applies to the G9SX-NSA222-T03-□. Refers to input other than that from the Non-contact Door Switch.

Outputs

Item	G9SX-NS202-□/G9SX-NSA222-T03-□
Instantaneous safety output *1 OFF-delayed safety output *1	P channel MOS FET transistor output Load current: 0.8 A DC max. *2
Auxiliary output	PNP transistor output Load current: 100 mA max.

*1. While safety outputs are in the ON state, the following signal sequence is output continuously for diagnosis.
When using the safety outputs as input signals to control devices (i.e. Programmable Controllers), consider the OFF pulse shown below.



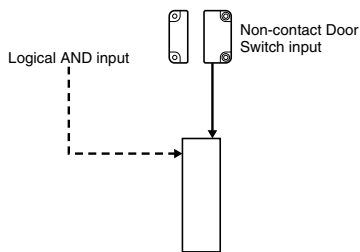
*2. The following derating is required when Units are mounted side-by-side. G9SX-NS202-□/G9SX-NSA222-T03-□: 0.4 A max. load current

Expansion Unit

Item	G9SX-EX-□
Rated load	250 VAC, 3 A/30 VDC, 3 A (resistive load)
Rated carry current	3 A
Maximum switching voltage	250 VAC, 125 VDC

Response Time and Operating Time

G9SX-NS□



	Max. response time (excluding Expansion Units) *1	Max. operating time (excluding Expansion Units) *2
Non-contact door switch input	45 ms *3	200 ms *4
Logical AND input	15 ms	100 ms

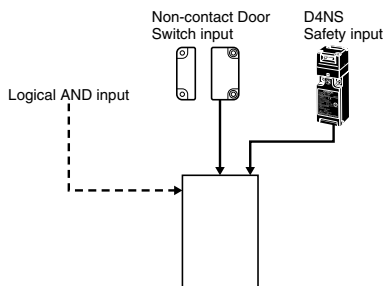
*1. The maximum response time is the time it takes the output to switch from ON to OFF after the input switches from ON to OFF.

*2. The maximum operating time is the time it takes the output to switch from OFF to ON after the input switches from OFF to ON.

*3. The value is the sum of D40Z's response time and G9SX-NS□'s response time.

*4. The value is the sum of D40Z's operating time and G9SX-NS□'s operating time.

G9SX-NSA□



	Max. response time (excluding Expansion Units) *1	Max. operating time (excluding Expansion Units) *2
Non-contact door switch input	45 ms *3	200 ms *4
Safety inputs	15 ms	50 ms
Logical AND input	15 ms	100 ms

*1. The maximum response time is the time it takes the output to switch from ON to OFF after the input switches from ON to OFF.

*2. The maximum operating time is the time it takes the output to switch from OFF to ON after the input switches from OFF to ON.

*3. The value is the sum of D40Z's response time and G9SX-NSA□'s response time.

*4. The value is the sum of D40Z's operating time and G9SX-NSA□'s operating time.

Note: The response time and operating time on the G9SP varies depending on the cycle time. For details, contact factory.

Specifications (continued)

Characteristics

Item		G9SX-NS202-□	G9SX-NSA222-T03-□	G9SX-EX-□
Over-voltage category (IEC/EN 60664-1)		II		II (Relay outputs 13 to 43 and 14 to 44: III)
Operating time (OFF to ON state) *1		100 ms max. (Logical AND connection input ON and Non-contact Door Switch input ON)	50 ms max. (Safety input: ON) *2 100 ms max. (Logical AND connection input ON and Non-contact Door Switch input ON) *3	30 ms max. *4
Response time (ON to OFF state) *1		15 ms max. (Logical AND connection input: OFF) 20 ms max. (Non-contact Door Switch input OFF) *6	15 ms max. (Safety input OFF and logical AND connection input OFF) 20 ms max. (Non-contact Door Switch input: OFF) *6	10 ms max. *4
ON-state residual voltage		3.0 V max. (safety output, auxiliary output)		
OFF-state leakage current		0.1 mA max. (safety output, auxiliary output)		
Maximum wiring length of safety input, logical AND connection input, and Non-contact Door Switch input		100 m max. (External connection impedance: 100 Ω max. and 10 nF max.)		
Reset input time (Reset button pressing time)		100 ms min.		
Accuracy of OFF-delay time *5		—	Within ±5% of the set value	Within ±5% of the set value
Insulation resistance	Between logical AND connection terminals, and power supply input terminals and other input and output terminals connected together	20 MΩ min. (at 100 VDC)		—
	Between all terminals connected together and DIN rail			100 MΩ min. (at 500 VDC)
Dielectric strength	Between logical AND connection terminals, and power supply input terminals and other input and output terminals connected together	500 VAC for 1 min.		—
	Between all terminals connected together and DIN rail			1,200 VAC for 1 min
	Between different poles of outputs	—		—
	Between relay outputs connected together and other terminals connected together			2,200 VAC for 1 min
Vibration resistance		10 to 55 to 10 Hz, 0.375 mm single amplitude (0.75 mm double amplitude)		
Shock resistance	Destruction	300 m/s ²		
	Malfunction	100 m/s ²		
Durability	Electrical	—		100,000 cycles min. rated load, switching frequency: 1,800 cycles/hour
	Mechanical	—		5,000,000 cycles min. (switching frequency: 7,200 cycles/hour)
Ambient operating temperature		-10 to 55°C (no icing or condensation)		
Ambient operating humidity		25% to 85%		
Terminal tightening torque		0.5 Nm (For the G9SX-NS□-RT (with screw terminals) only)		
Weight		Approx. 125 g	Approx. 200 g	Approx. 165 g

*1. When two or more Units are connected by logical AND, the operating time and response time are the sum total of the operating times and response times, respectively, of all the Units connected by logical AND.

*2. Represents the operating time when the safety input turns ON with all other conditions set.

*3. Represents the operating time when the logical AND input and the Non-contact Door Switch input turn ON with all other conditions set.

*4. This does not include the operating time or response time of G9SX-NS□ that are connected.

*5. This does not include the operating time or response time of internal relays in the G9SX-EX-□.

*6. The failure detection time for 24 V short-circuit failure on the input to Non-contact Door Switches is 35 ms max.

If using the Switch for an application other than as a Door Switch, calculate the safe distance using a failure detection time of 35 ms.

Specifications (continued)

Cable with Connector

Ratings and Characteristics

Rated current	3 A
Rated voltage	For DC 125 VDC, for AC 250 VAC
Contact resistance (Connector)	40 mΩ max. (20 mV max., 100 mA max.)
Insulation resistance	1,000 mΩ min (at 500 VDC)
Dielectric strength (Connector)	1,500 VAC for 1 min (leakage current 1 mA max.)
Degree of protection	IP67 (IEC529)
Insertion tolerance	200 times min.
Assembled fixture strength	Tensile: 98 N/15 s Torsion: 0.98 N m/15 s
Cable holding strength	Cable diameter: 6 mm 98 N/15 s
Ambient operating temp range	Operating: -25°C to 70°C
Ambient humidity range	20% to 80%

Materials and Finish

Item		XS2F/H/W
Contacts	Materials	Phosphor bronze
	Finish	Nickel base, 0.4-μm gold plating
Thread bracket	Materials	Brass
	Finish	Nickel plated
Pin block	Materials	PBT resin (UL94V-0)
	Finish	For DC: light gray; for AC: dark gray
O-ring/rubber bushing		Rubber
Cover		PBT resin (UL94V-0)

Logical AND Connection

Item	G9SX-NS202-□	G9SX-NSA222-T03-□	G9SX-EX-□
Number of Units connected per logical AND output	4 Units max.		—
Total number of Units connected by logical AND *1	20 Units max.		—
Number of Units connected in series by logical AND	5 Units max.		—
Max. number of Expansion Units connected *2	—		5 Units max.
Maximum cable length for logical AND input	100 m max.		—

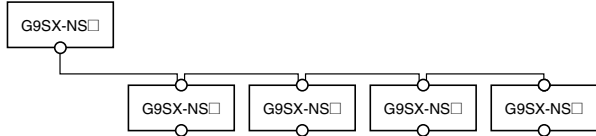
Note: See Logical AND Connection Combinations below for details.

*1. The number of G9SX-EX401-□ Expansion Units or G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) not included.

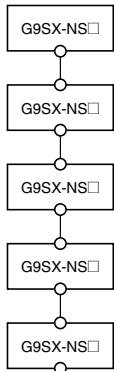
*2. G9SX-EX401-□ Expansion Units and G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) can be mixed.

Logical AND Connection Combinations

1. One logical AND connection output from a G9SX-NS□ Controller can be logical AND connected to up to four Controllers.

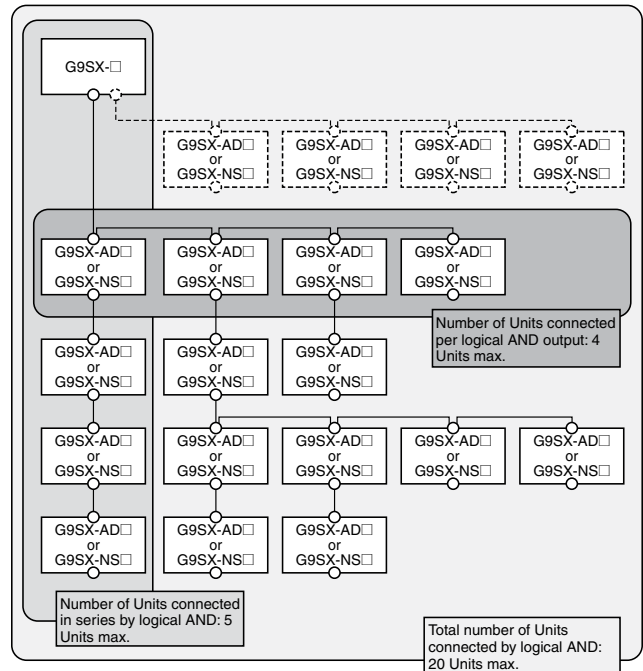


2. Any G9SX-NS□ Controller that receives a logical AND connection input can be logically connected to other Controllers on up to five layers.



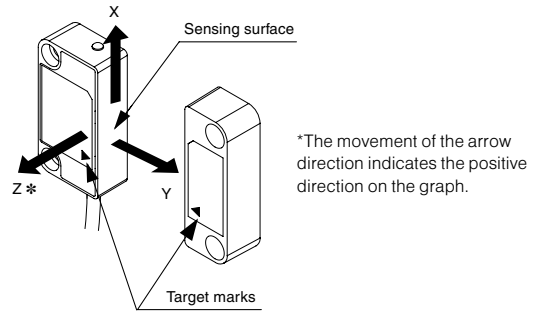
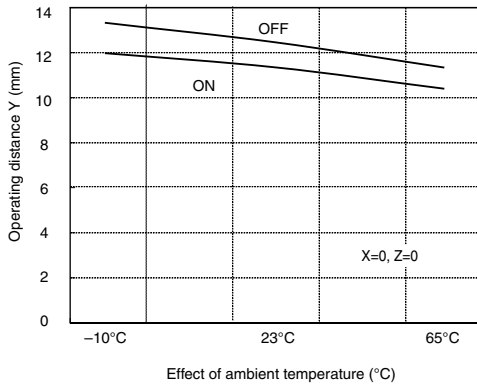
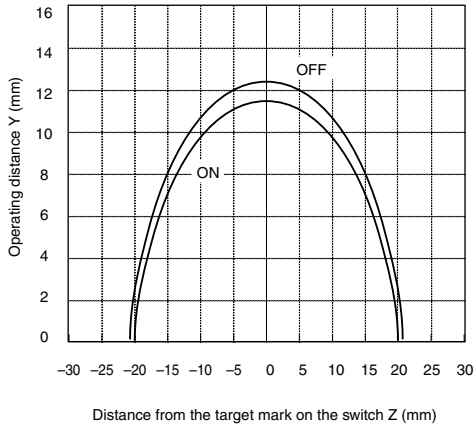
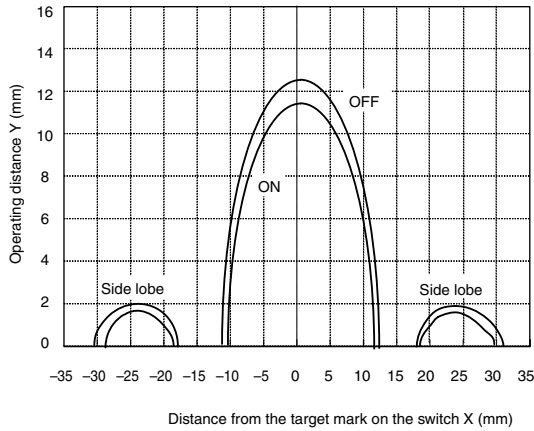
Note: The G9SX-NS□ in the above diagram can be replaced by the G9SX-AD□ Advanced Unit.

3. The largest possible system configuration contains a total of 20 G9SX-NS□ Controllers, G9SX-AD□ Advanced Units, and G9SX-BC Basic Units. In this configuration, each Controller or Advanced Unit can have up to five Expansion Units.



Engineering Data

D40Z Detection Ranges (Typical Characteristics Data)

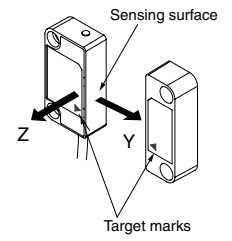
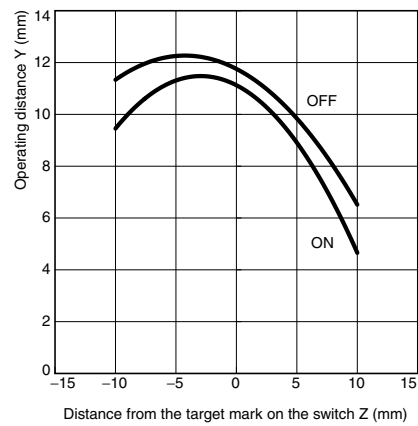
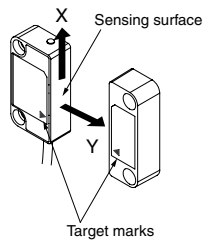
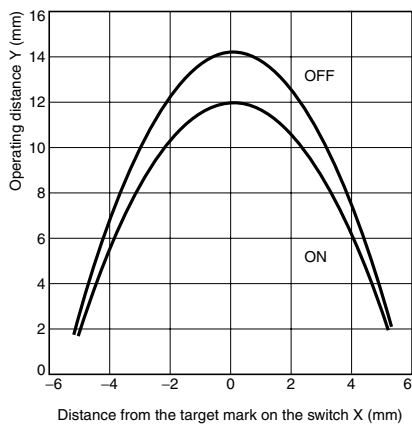


*The movement of the arrow direction indicates the positive direction on the graph.

Notes:

1. The operating distance is the distance between the switch and actuator sensing surfaces.
2. Data in the diagram is typical data at an ambient temperature of 23°C. Actual operating values may vary. The operating distance may be affected by ambient metal, magnet catches, and temperature.
3. Detection may occur other than on the detection surfaces of the switch and actuator. Before you use the switch and actuator, refer to manual to set the detection surfaces of the switch and actuator face to face.

D40A Detection Ranges (Typical Characteristics Data)

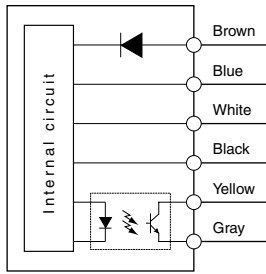


- Notes:
1. The operating distance is the distance between the switch and actuator sensing surfaces.
 2. Data in the diagram is typical data at an ambient temperature of 23°C. Actual operating values may vary. The operating distance may be affected by ambient metal, magnet catches, and temperature.

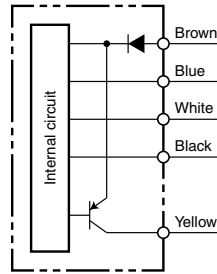
Connections

Internal Connections

D40Z-1C □

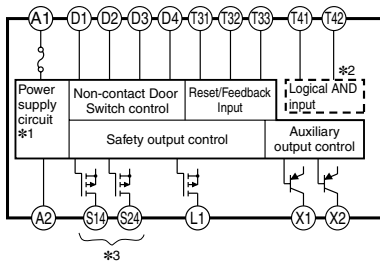


D40A-1C □



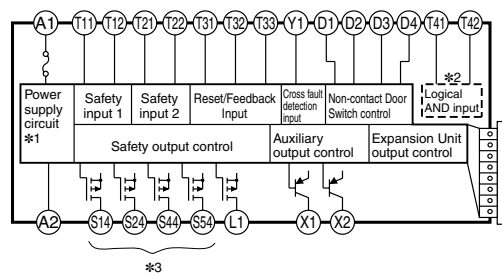
G9SX-NS202-□ (Non-contact Door Switch Controller)

- *1. Internal power supply circuit is not isolated.
- *2. Logical AND input is isolated.
- *3. Outputs S14 to S24 are internally redundant.



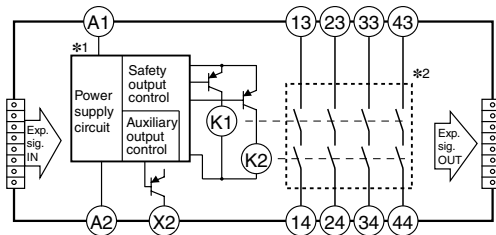
G9SX-NSA222-T03-□ (Non-contact Door Switch Controller)

- *1. Internal power supply circuit is not isolated.
- *2. Logical AND input is isolated.
- *3. Outputs S14 to S54 are internally redundant.











G9SX-EX401-□/ G9SX-EX041-T-□ (Expansion Unit/Expansion Unit OFF-delayed Model)

- *1. Internal power supply circuit is not isolated.
- *2. Relay outputs are isolated.



D40Z Troubleshooting

LED indicator	Causes and corrective actions *1	
 OFF	Fault in power supply input (brown/blue)	Power supply input may be improperly wired. Check and correct wiring of brown and blue lines.
		Power supply voltage to D40Z may be insufficient. Check the power supply voltage (between brown and blue lines) of D40Z fills ratings.
		The wiring length or size of the wire may not be to the specification. Check the wiring length and size of the wire..
 Red continuously blinking	Noise or D40Z failure	There may be excessive noise. Check and correct ambient noise environment. There may be a failure in internal circuit. Replace with a new D40Z.
	Fault in power supply input (brown/blue)	Power supply voltage to D40Z may be insufficient. Check the power supply voltage (between brown and blue cables) of D40Z fills ratings..
		The wiring length or size of the wire may not be to the specification. Check the wiring length and size of the wire.
 Red blinks once for 2s	Fault in Non-contact door switch output (black)	Black line may be shorted to other line. Check and correct wiring of black line if the black line is shorted to other lines..
 Red blinks twice for 2s	Sensing fault	Invalid actuator may be in a close range to switch. Use the dedicated actuator.
 Red blinks thrice for 2s	Fault in Non-contact door switch input (white)	Faulty signal may be input to white line. Check and correct wiring of white line.
 Yellow blinking	OFF state of another D40Z	Another D40Z may be in OFF state. Check status of another D40Z connected to the white line and the wiring.
	Fault in Non-contact door switch input (white)	White line may be disconnected. Check and correct wiring of white line..
 Red Solid-ON *2	Actuator fault	There may be a failure in actuator. Replace with a new D40Z.
 Yellow Solid-ON *3	Fault in Non-contact door switch input (white)	White line connected to D1 terminal (test output terminal of G9SP) of G9SX-NS□ may be shorted to other line. Check and correct wiring of white line connected to D1 terminal (test output terminal of G9SP) of G9SX-NS□ if the white line is shorted to other lines.
	Fault in Non-contact door switch output (black)	Black line connected to D2 terminal (safety input terminal of G9SP) of G9SX-NS□ may be disconnected. Check and correct wiring of black line connected to D2 terminal (safety input terminal of G9SP) of G9SX-NS□.

*1. Another possible cause is a failure in internal circuit. In this case, replace with a new D40Z. Yet another possible cause is excessive noise. In this case, check and correct ambient noise environment.

*2. The case where the guard door is closed (Switch detects actuator) is indicated.

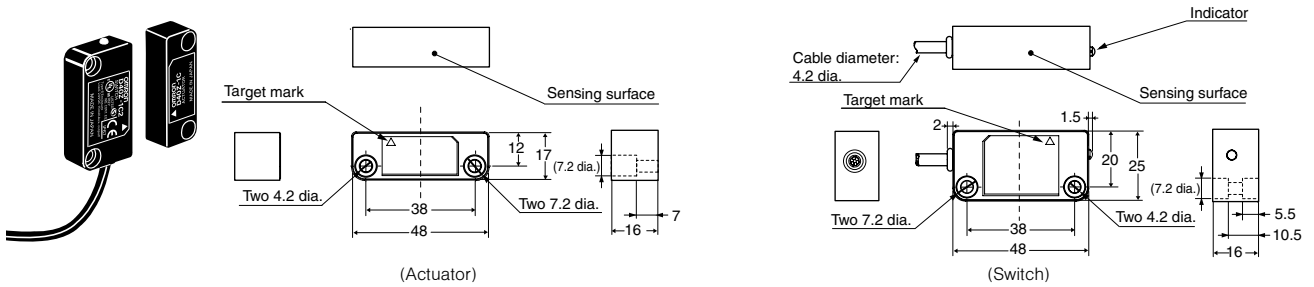
*3. The case where the system stops though the guard door is closed (Switch detects actuator) is indicated.

Dimensions and Wiring

(mm)

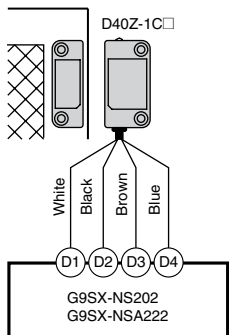
Non-contact Door Switch (Switch/Actuator)

D40Z-1C2
D40Z-1C5



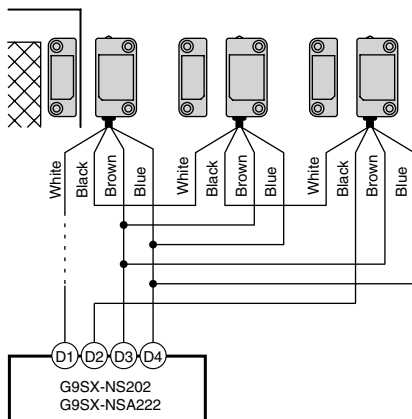
Non-contact Door Switch and Non-contact Door Switch Controller or Safety Controller Wiring

Example of connection to G9SX-NS@ (Single connection)

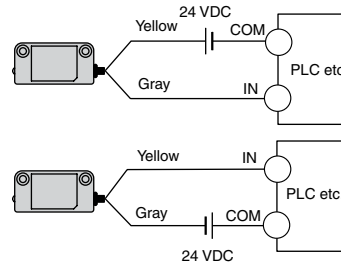


Example of connection to multiple switches

Connect up to 30 non-contact door switches.



Example of auxiliary outputs



Note:

1. The auxiliary output load current must be 10 mA max. Wrong connection may lead to a failure of the auxiliary output circuit.
2. For details on other wiring, refer to Application Examples.

Wiring of Inputs and Outputs

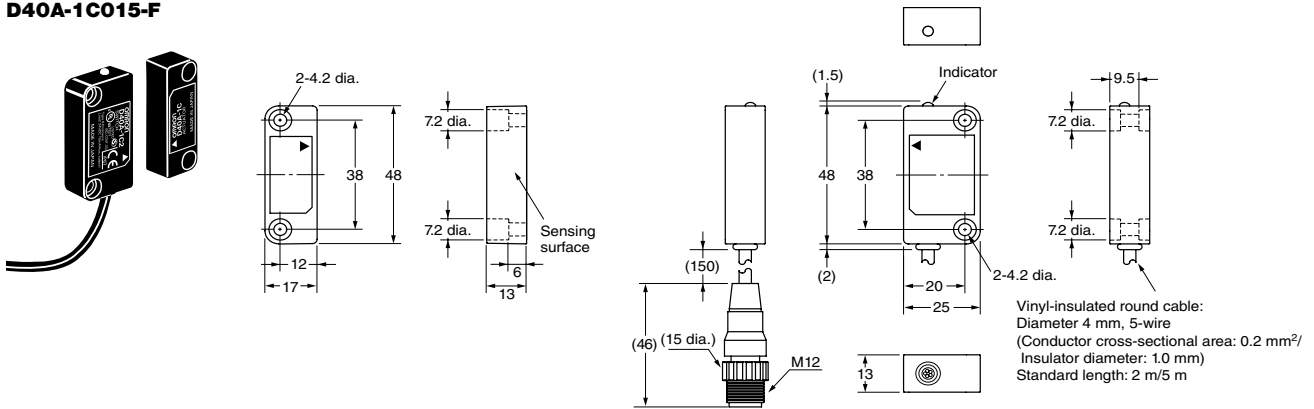
Signal name		Cable color	Description of operation
Non-contact Door Switch power supply input	+	Brown	Supplies power to the D40Z.
	-	Blue	
Non-contact door switch input		White	To set non-contact door switch output in ON state, non-contact door switch signal input must be in ON state.
Non-contact door switch output		Black	Output status depends on statuses of actuator and non-contact door switch signal input.
Auxiliary monitoring output		Yellow	Output status depends on status of actuator.
		Gray	When a fault is detected, turns into OFF state regardless of actuator status.

Dimensions and Wiring (continued)

(mm)

Non-contact Door Switch (Switch/Actuator)

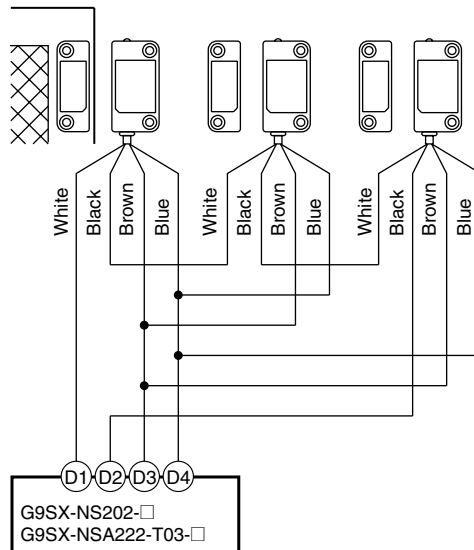
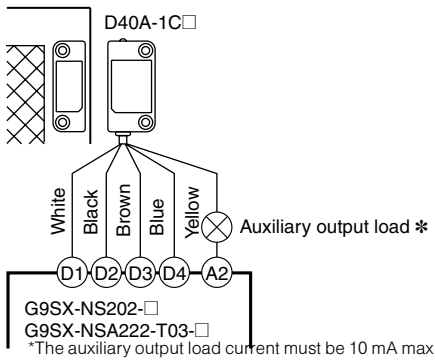
D40A-1C2
D40A-1C5
D40A-1C015-F



Non-contact Door Switch and Non-contact Door Switch Controller Wiring

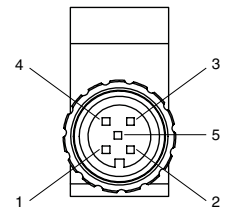
Example: Wiring a Single Switch

Example: Wiring Multiple Switches



Wiring of Inputs and Outputs

Signal name	Wire color	Pin No.	Description of operation
Non-contact Door Switch power supply input	Brown	1	Supplies power to the D40A.
	Blue	3	Connect to the D3 and D4 terminal of the G9SX-NS□.
Non-contact Door Switch input	White	2	Inputs signals from the G9SX-NS□. The Non-contact Door Switch input must be ON as a required condition for the Non-contact Door Switch output to be ON.
Non-contact Door Switch output	Black	4	Turns ON and OFF according to actuator detection and the status of the Non-contact Door Switch input.
Auxiliary output	Yellow	5	Turns ON when actuator is detected.

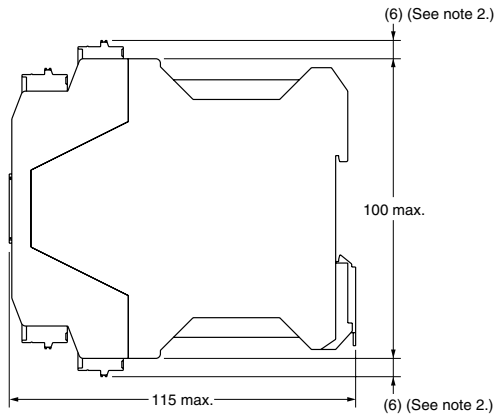
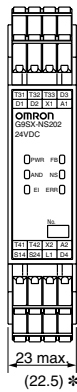
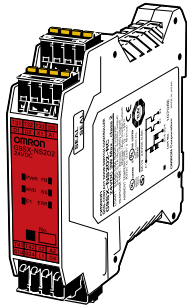


Dimensions and Wiring (continued)

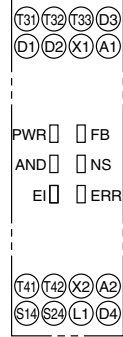
(mm)

Non-contact Door Switch Controller

G9SX-NS202-□



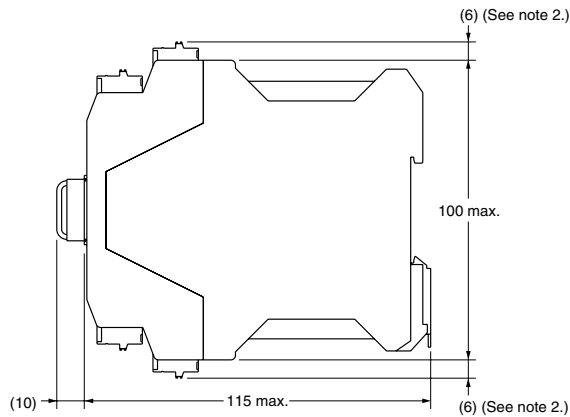
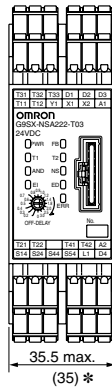
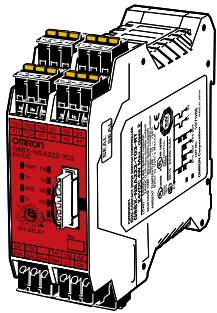
Terminal arrangement



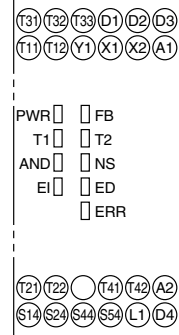
Notes: 1. Above outline drawing is for models with spring-cage terminals (-RC).
2. For models with spring-cage terminals (-RC) only.
*Typical dimension

Non-contact Door Switch Controller

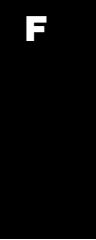
G9SX-NSA222-T03-□



Terminal arrangement



Notes: 1. Above outline drawing is for models with spring-cage terminals (-RC).
2. For models with spring-cage terminals (-RC) only.
*Typical dimension



Dimensions and Wiring (continued)

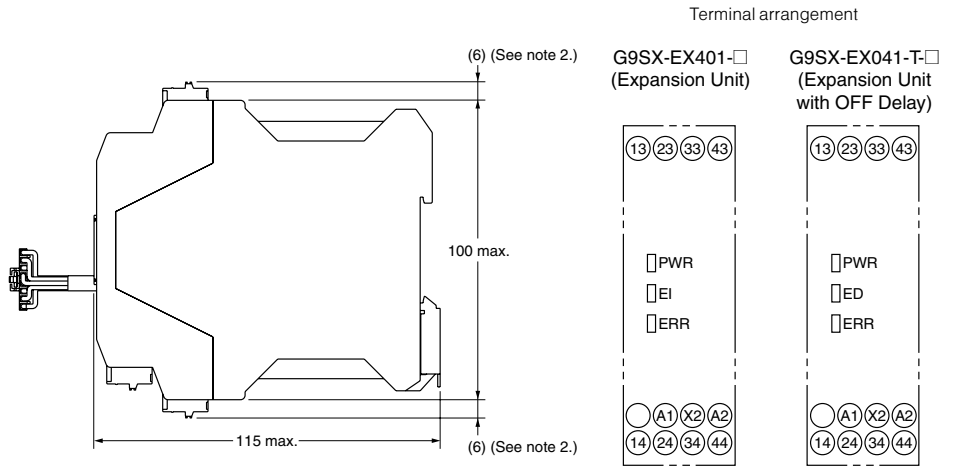
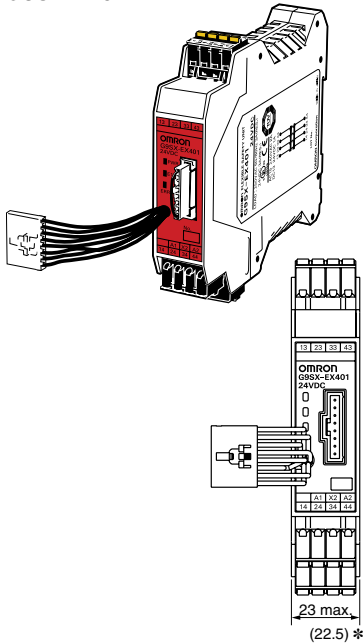
(mm)

Expansion Unit

G9SX-EX401-□

Expansion Unit (OFF-delayed Model)

G9SX-EX041-T-□

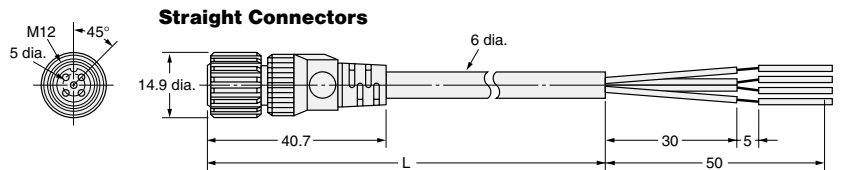


Notes: 1. Above outline drawing is for models with spring-cage terminals (-RC).
 2. For models with spring-cage terminals (-RC) only.
 *Typical dimension

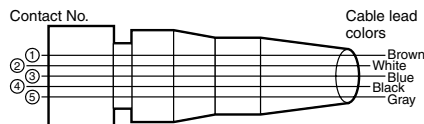
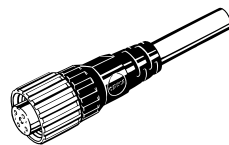
Accessories (sold separately)

Socket on One Cable End (5-Pole Connectors)

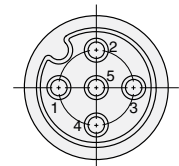
- XS2F-D521-DG0-A (L = 2 m)
- XS2F-D521-GG0-A (L = 5 m)
- XS2F-D521-JG0-A (L = 10 m)
- XS2F-D521-KG0-A (L = 15 m)
- XS2F-D521-LG0-A (L = 20 m)



Wiring Diagram

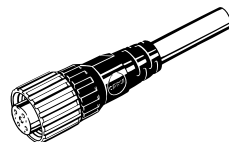


Pin Arrangements (Engagement Side)

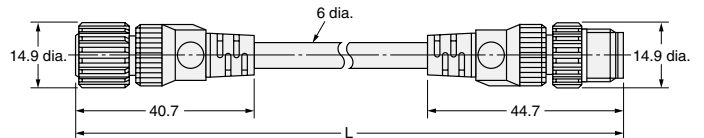


Socket and Plugs on Cable Ends (5-Pole Connectors)

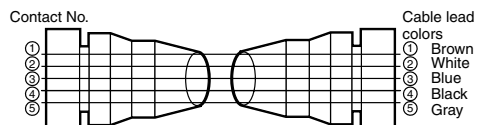
- XS2W-D521-DG1-A (L = 2 m)
- XS2W-D521-GG1-A (L = 5 m)
- XS2W-D521-JG1-A (L = 10 m)
- XS2W-D521-KG1-A (L = 15 m)
- XS2W-D521-LG1-A (L = 20 m)



Straight/Straight Connectors



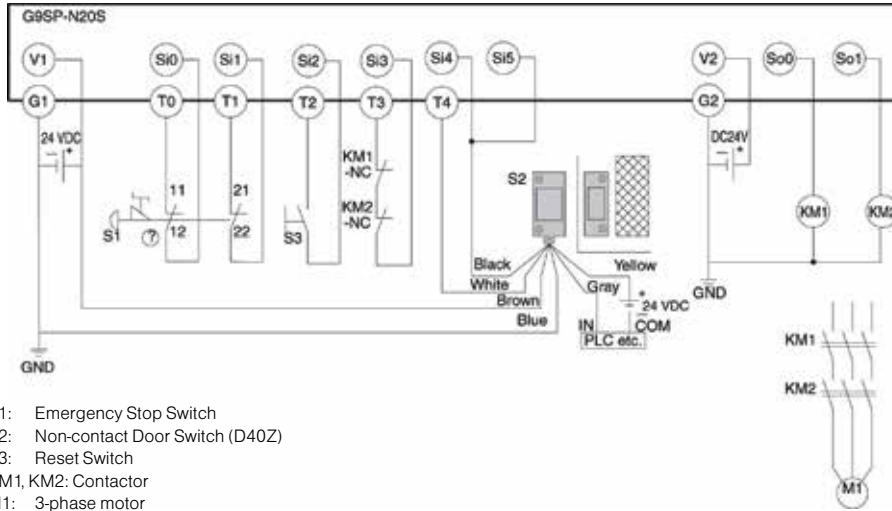
Wiring Diagram for 5 Cores



Application Examples

G9SP-N20S (24 VDC)

(2-channel Emergency Stop Switch Inputs + Non-contact Door Switch/Manual Reset)



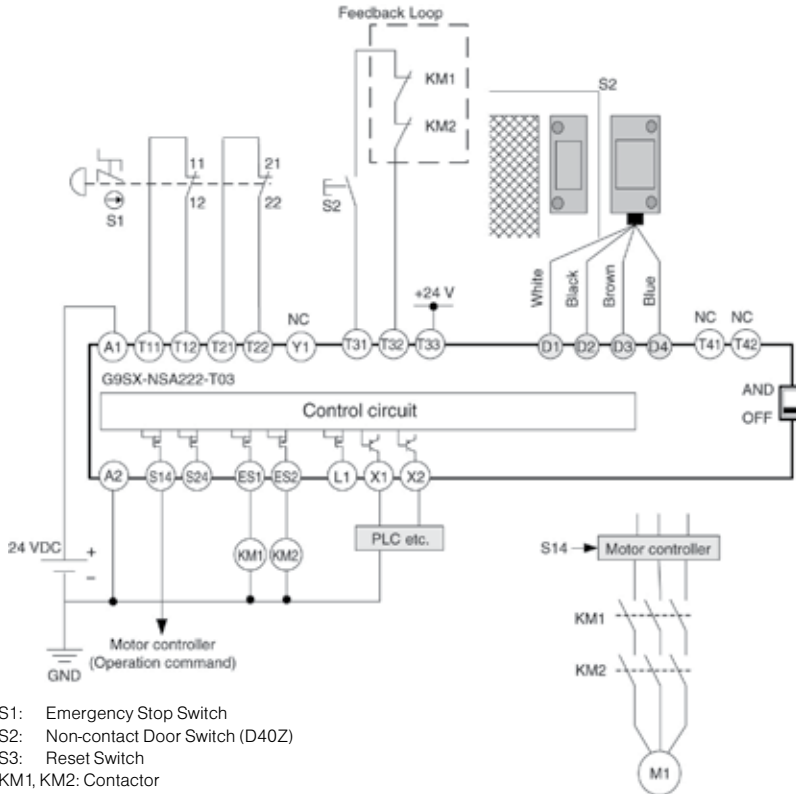
- S1: Emergency Stop Switch
- S2: Non-contact Door Switch (D40Z)
- S3: Reset Switch
- KM1, KM2: Contactor
- M1: 3-phase motor

Notes:

1. The PL and category that correspond to this circuit example vary depending on the program configured to the G9SP-N20S. For details, refer to the G9SP Series User's Manual.
2. For details on terminal arrangement, refer to G9SP Series User's Manual.
3. Wire auxiliary outputs correctly. Incorrect wiring may lead to a failure of the auxiliary output circuit.

G9SX-NSA222-T03-□ (24 VDC)

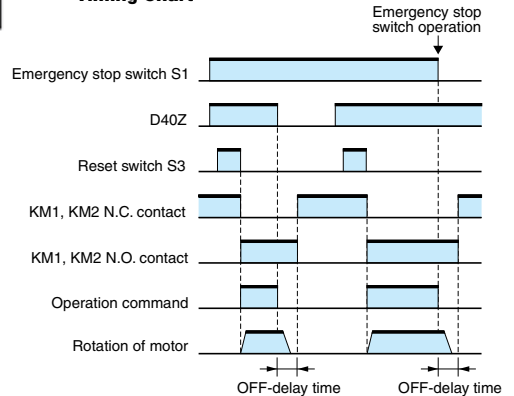
(2-channel Emergency Stop Switch Inputs + Non-contact Door Switch/Manual Reset)



- S1: Emergency Stop Switch
- S2: Non-contact Door Switch (D40Z)
- S3: Reset Switch
- KM1, KM2: Contactor
- M1: 3-phase motor

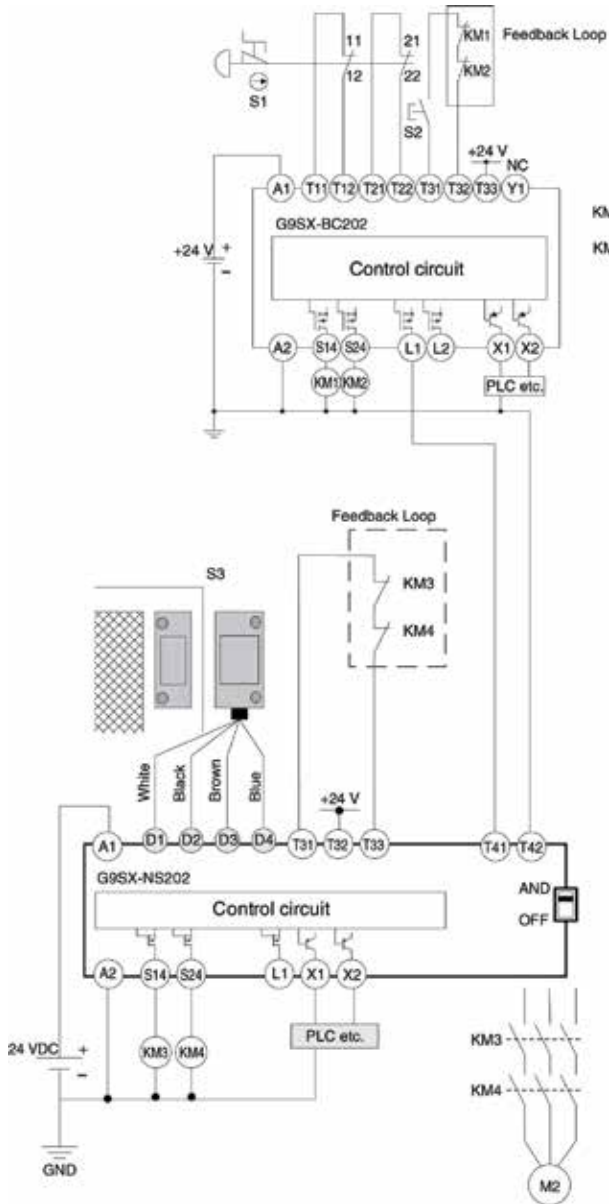
- Notes:
1. This example corresponds to category 4.
 2. For details, contact factory.

Timing Chart



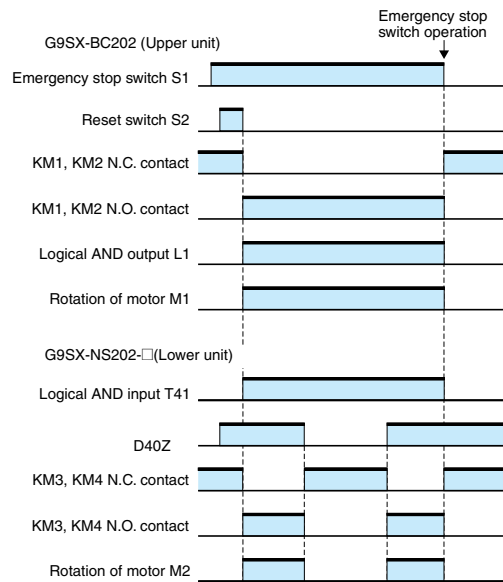
Application Examples (continued)

G9SX-BC202 (24 VDC) (2-channel Emergency Stop Switch Inputs/Manual Reset) + G9SX-NS202-□ (24 VDC) (Non-contact Door Switch/Auto Reset)



- S1: Emergency Stop Switch
- S2: Reset switch
- KM1, KM2: Contactor
- M1: 3-phase motor
- S3: Non-contact Door Switch (D40Z)
- KM3, KM4: Contactor
- M2: 3-phase motor

Timing Chart



- Notes:
1. This example corresponds to category 4.
 2. For details, contact factory.

Ordering

Model Number Structure

D40Z Non-Contact Door Switch (Switch/Actuator)

D40Z - □ □ □

① ② ③

- ① Type
1: Standard model (Switch/Actuator)
- ② Auxiliary Outputs
C: 1 NO (Photocoupler output)
- ③ Cable Length
2: 2 m
5: 5 m

Note: Must be used in combination with a G9SP Safety Controller or G9SX-NS □ Non-Contact Door Switch Controller.

D40A Non-Contact Door Switch (Switch/Actuator)

D40A - □ □ □

① ② ③

- ① Type
1: Standard model
- ② Auxiliary Outputs
C: 1NO (PNP transistor output)
- ③ Cable Length
2: 2 m
5: 5 m
015-F: connector (cable length 0.15 m)

G9SX Non-Contact Door Switch Controller

G9SX - □ □ □ □ - □ □




① ② ③ ④ ⑤ ⑥

- ① Functions
NS/NSA: D40A Controller
EX: Expansion Unit
- ② Output Configuration (Instantaneous Safety Outputs)
2: 2 outputs
4: 4 outputs
- ③ Output Configuration (OFF-delayed Safety Outputs)
0: None
2: 2 outputs
- ④ Output Configuration (Auxiliary Outputs)
1: 1 output
2: 2 outputs
- ⑤ Max. OFF-delay Time
D40A Controller
T03: 3 s (variable)
Expansion Unit
Blank: No OFF delay
T: OFF delay
- ⑥ Terminal Block Type
RT: Screw terminals
RC: Spring-cage terminal

Ordering (continued)



List of Models

D40Z Non-Contact Door Switches (Switch/Actuator)*1

Classification	Appearance	Auxiliary outputs	Cable length	Model
Standard models		Photocoupler outputs *2	2 m	D40Z-1C2
			5 m	D40Z-1C5
Switch only		—	2 m	D40Z-1C2-S
		—	5 m	D40Z-1C5-S
Actuator only		—	—	D40Z-1CA

Note: Must be used in combination with a G9SP Safety Controller or a G9SX-NS □ Non-contact Door Switch Contact Controller.

D40A Non-Contact Door Switches (Switch/Actuator)*3

Classification	Appearance	Auxiliary outputs	Cable length	Model
Standard models *4		Semiconductor outputs *5	2 m	D40A-1C2
			5 m	D40A-1C5
Connector model			0.15 m	D40A-1C015-F

Note: Must be used in combination with a G9SX-NS □ Non-contact Door Switch Controller or a G9SP safety controller.

Cable with Connector

Connector Type	Cable Length	Model	Packing Unit
Single End	2 m	XS2F-D521-DG0-A	5
	5 m	XS2F-D521-GG0-A	5
	10 m	XS2F-D521-JG0-A	1
	15 m	XS2F-D521-KG0-A	1
	20 m	XS2F-D521-LG0-A	1

Connector Type	Cable Length	Model	Packing Unit
Double End	2 m	XS2W-D521-DG1-A	5
	5 m	XS2W-D521-GG1-A	5
	10 m	XS2W-D521-JG1-A	1
	15 m	XS2W-D521-KG1-A	1
	20 m	XS2W-D521-LG1-A	1

Ordering (continued)

List of Models (continued)

G9SX-NS□ Series

Safety outputs *6		Auxiliary monitoring output *8	Logical AND connection input	Logical AND connection output	OFF-delayed Max. OFF-delay time *9	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed *7							
2 (Semi-conductors)	0	2 (Semi-conductors)	1	1	—	24 VDC	Screw terminals	G9SX-NS202-RT
	2 (Semi-conductors)				3.0 s		Spring-cage terminals	G9SX-NS202-RC
					—		—	Screw terminals
	—							—

G9SX-EX Expansion Units

Safety outputs		Auxiliary outputs	OFF-delay time	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed					
4PST-NO	—	1 (Semi-conductor) *8	—	24 VDC	Screw terminals	G9SX-EX401-RT
—	4PST-NO		*10		Spring-cage terminals	G9SX-EX401-RC
		—	—		Screw terminals	G9SX-EX041-T-RT
—	—	—	Spring-cage terminals		G9SX-EX041-T-RC	

G9SP Series

Name	No. of I/O Points				Unit Version	Model
	Safety Inputs	Test Outputs	Safety Outputs	Standard Outputs		
Safety Controller	10	4	Semiconductor outputs: 4	4	Ver. 1.0	G9SP-N10S
	10	6	Semiconductor outputs: 16	—		G9SP-N10D
	20	6	Semiconductor outputs: 8	—		G9SP-N20S

*1. Must be used in combination with a G9SP Safety Controller or a G9SX-NS□ Non-contact Door Switch Contact Controller.

*2. Photocoupler output. Load current: 10 mA

*3. Must be used in combination with a G9SX-NS□ Non-contact Door Switch Controller.

*4. Contact factory for the connector models.

*5. PNP open-collector semiconductor output.

*6. P channel MOS FET transistor output.

*7. The OFF-delayed output becomes an instantaneous output by setting the OFF-delay time to 0 s.

*8. PNP transistor output

*9. The OFF-delay time can be set in 16 steps as follows: 0/0.2/0.3/0.4/0.5/0.6/0.7/0.8/0.9/1.0/1.2/1.4/1.8/2.0/2.5/3.0 s

*10. The OFF-delay time is synchronized to the OFF-delay time setting in the connected Controller (G9SX-NSA222-T03-□).

EC Series

Quick Link

S284

omron247.com

Electrically Coded Interlock Switch & Control Unit

- The EC Series Control Units individually monitor one to four read heads to provide a Category 4 system for applications with up to four guard doors
- Uniquely coded actuators are a highly tamper resistance
- Misalignment of nearly 1/2 inch allows application on machine doors with a high level of vibration or alignment issues
- Manual or automatic start is switch selectable
- External Device Monitoring (EDM) allows the EC Series Control Unit to function as a safety monitoring relay
- The 6 A/24 VDC switching capability of the Control Unit allows connection directly to power contactors
- Individual guard door status may be monitored with the semiconductor outputs from the Control Unit; an additional output gives status of the Control Unit
- Guarding applications with more than four doors may be achieved by combining two or more Control Units in series while continuing to satisfy Category 4 according to EN954-1



MA-S Series

Quick Link

S285

omron247.com

Stainless Steel Magnetically Actuated Safety Interlock Switches and Actuators

- Stainless steel cases—both switch and actuator are housed in stainless steel for applications that require the use of this robust and corrosion resistant material
- Large selection—choose from a variety of contact configurations housed in stainless steel to satisfy the most demanding applications
- NEMA 6 enclosure enables the MA-S Series switches to satisfy most application requirements
- Misalignment tolerant—the non-contact actuation of the MA-S Series switches makes them very tolerant to misalignment of up to 10 mm (0.39 in.)
- High temperature—the MA-S switches and cables are designed to operate in temperatures up to 125°C (257°F)
- Long life—the MA-S Series safety interlock switches are designed for a minimum of one million actuations



MFS

Quick Link

S286

omron247.com

Magnetic Ferroresonant Stand-Alone Safety Interlock Switch

- Tamper resistant—the combination of magnetic and ferroresonant signals required to close the safety contacts makes the MFS very tamper resistant
- Stand-alone—use for lower risk applications as a stand-alone safety switch allowing direct switching of relays and contactors up to 2 A at 230 VAC
- MFS-11 provides a visible LED which illuminates green when the actuator is in range and contacts are closed
- MFS-12 provides a dual color LED indicator. The LED illuminates green when the actuator is in range and the contacts are closed. The LED illuminates Red when the actuator is out of range and contacts are open.
- Compact size—mounts easily on 1-in. square tubing
- Use with safety monitoring relays in applications requiring a higher level of safety reliability
- NEMA 4 enclosure enables water washdown cleaning



D4NH

Quick Link

S242

omron247.com

Safety-door Hinge Switch

- Compact, plastic-body safety-door hinge switch designed for saving space in machines
- Lineup includes three contact models with 2NC/1NO and 3NC contact forms in addition to the previous contact forms 1NC/1NO, and 2NC. Models with MBB contacts are also available
- M12-connector models are available, saving on labor and simplifying replacement
- Standardized gold-clad contacts provide high contact reliability. Can be used with both standard loads and microloads.



F

XT5009

Quick Link

S427

omron247.com

Universal Tongue-Operated Safety Interlock Switch

- Strong and versatile—the compact size of the strong, glass-filled polyester housing allows this popular switch to be used in most applications
- NEMA 6 enclosure enables the XT5009 to withstand water washdown cleaning
- Rotatable head gives four possible actuator entry points for versatile installation. A blanking plug is supplied for the unused entry.
- Small swing radius allows use on doors with a swing radius as small as 2.5 in. when using the optional flexible actuator with alignment guide
- Vibration resistant—preventing unwanted opening of guard doors on vibrating machines
- Long life—the XT5009, with its stainless steel actuator, is designed for a minimum of two million actuations



D4NS-SK/D4JL-SK

Quick Link

S246

omron247.com

D4NS/D4JL-mounting Slide Key

- Safety-door switch attachments fit doors on aluminum frames as small as 20 mm² and frames that are large enough to enclose robotics
- Shortens the lead time for safety-door switch mounting design
- Enables applications in compliance with ANSI/RIA U.S. robot standards (excluding the D4NS-SK01)



Note: Safety-door switches are sold separately.

Accessories

OMRON Automation and Safety has a complete line of accessory products for your safety interlock needs. For specific part numbers for replacement actuators or fuses, please refer to the specific product datasheet. Contact Omron for any concerns or questions.

Replacement Contact Blocks

	Part No.
BL6009, 2 N/C + 1 N/O, Rear Mounting	44512-0400
ER6019, 2 N/C + 1 N/O, Side Mounting	44512-0390
ER1022, ER1032, ER5018, ER6022, 2 N/C + 1 N/O terminals (11/12, 21/22, 33/34)	44512-2020
ER1022, ER1032, 2 N/C + 1 N/O terminals (41/42, 51/52, 63/64)	44512-2021
ER5018, ER6022, 3 N/C	44512-2030
ER6022, 2 N/C + 2 N/O	44512-2221
ER6022, 3 N/C + 1 N/O	44512-2311
ER6022, 4 N/C	44512-2400
HP6009, 2 N/C + 1 N/O, Side Mounting	44512-0390
T5009, 2 N/C + 1 N/O	44512-3210
T5009-6, 3 N/C + 1 N/O	44512-3310
T5009-6, 4 N/C	44512-3400



M20 to NPT Adapter	44512-0110
M20 to NPT Adapter (steel)	44512-0310
M20 Cord Grip (4-5 mm ID)	44512-0090
M20 Cord Grip (7-10 mm ID)	44512-0410
M20 Blanking Plug	44512-0100
M20 Plastic Nut 10-Pack	44512-0105
NPT to M20 Adapter	44512-1010

Conduit LED Beacons (High-Intensity)

	Part No.
Conduit LED, M20, Amber, 24 VDC	44512-0500
Conduit LED, M20, Amber, 110 VAC	44512-0510
Conduit LED, M20, Red, 24 VDC	44512-0520
Conduit LED, M20, Red, 110 VAC	44512-0530
Conduit LED, M20, Green, 24 VDC	44512-0540
Conduit LED, M20, Green, 110 VAC	44512-0550



Micro Style Cables

	Part No.
MA-2, 6, 9, 20, MC-S3, HP2007, T2007, Plastic SL Series, D4NS	
5 m Cable with 4-Pin Female Connector Micro DC	44512-0600
10 m Cable with 4-Pin Female Connector Micro DC	44512-0610
CM & MC Series	
5 m Cable with 8-Pin Female Connector	44512-0620
10 m Cable with 8-Pin Female Connector	44512-0630
HP3009, T3009, T5009, MA-21, Plastic SL Series, MA-15, MA-35, MFS	
5 m Cable with 6-Pin Female Connector (Dual Keyway)	44512-0640
10 m Cable with 6-Pin Female connector (Dual Keyway)	44512-0650



Conduit LED Beacons

	Part No.
Conduit LED, M20, Amber, 24 VDC	44512-1500
Conduit LED, M20, Red, 24 VDC	44512-1520
Conduit LED, M20, Green, 24 VDC	44512-1540

Conduit Lights and Remote Indicator

	Part No.
Conduit Light, M20, Amber, no bulb	44512-0130
Conduit Light, M20, Red, no bulb	44512-0290
Conduit Light, NPT, Amber, no bulb	44512-0260
Conduit Light, NPT, Red, no bulb	44512-0420
Bulb for Conduit Light, 24 VAC/DC	44512-0200
Bulb for Conduit Light, 110 VAC	44512-0140
Bulb for Conduit Light, 220 VAC	44512-0190



Cabling Components

	Part No.
M16 to NPT Adapter	44512-0300
M16 Cord Grip (4-7 mm ID)	44512-0080
M20 to PG11	44512-0120



Security Bits/Drives

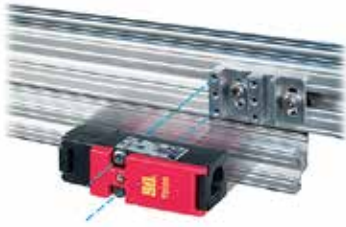
	Part No.
Spare Bit for Security Screw	44512-0050
Screwdriver for Security Bit	44512-0040
Lockoff Actuator for T4011, T5009, TL5012, TL8012-S	44512-0700



Lockoff Actuator

Universal Mounting Brackets

- Quickly and easily mounts non-contact switches and actuators to structural aluminum profiles
- Quickly and easily mounts tongue actuated safety interlock switches to structural aluminum profiles
- Quickly and easily mounts hinge operated safety interlock switches to structural aluminum profiles
- Use the universal mounting brackets to mount non-contact switches to Ferrous metals with minimal loss of range
- Designed to allow for easy alignment of switch to actuator
- Constructed from 6060-T5 aluminum, these brackets are resistant to harsh environments



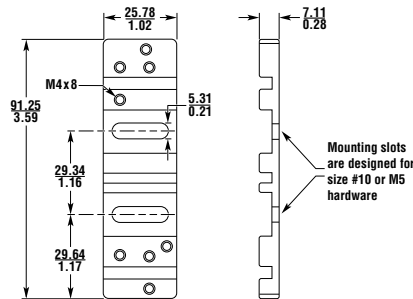
UMB-THP30 mounting bracket kit, being used to mount a T2008 interlock switch.



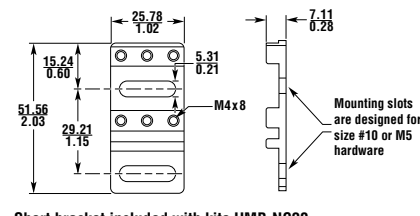
UMB-NC10 mounting bracket kit, being used to mount a CM-S2 switch and actuator.



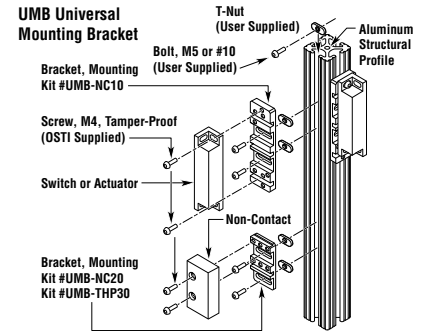
The brackets are designed to allow for movement along two axis.



Long bracket included with kit UMB-NC10



Short bracket included with kits UMB-NC20 and UMB-THP30



Model	Description	Compatible Switches & Actuators	Mounting Capability	Part No.
UMB-NC10	Universal Mounting Bracket Kit for non-contact switches and actuators (Includes long bracket)	CM-S2, CM-S221, CM-S6, CM-S621, MA-6, MA-9, MA-10, MA-11, MA-16, MA-S36, MC-S2, MF-1, MFS-12	Capable of 1 switch and 1 actuator	44512-3010
UMB-NC20	Universal Mounting Bracket Kit for non-contact switches and actuators (Includes short bracket)	CM-S1, CM-S11, CM-S31, CM-S5, CM-S521, MA-14, MA-15, MA-S34, MA-S35, MC-S1, MC-S31	Capable of 1 switch and 1 actuator	44512-3020
UMB-THP30	Universal Mounting Bracket Kit for hinge pins and tongue-actuated switches (Includes short bracket)	HP2011, T2008, T2011 (switches only)	Capable of 1 switch (no actuator)	44512-3030

Note: Tamper-proof hardware is included with each kit to mount the switch or actuator to the Universal Mounting Bracket. No hardware is supplied to mount the Universal Mounting Bracket to the aluminum profile.

SLD Series – Switch Locking Devices

- Allows personnel to quickly lock a safety interlock switch to a safe position allowing for certain types of maintenance
- Intended for use as an alternate control method while performing tasks that are routine, repetitive or integral to the production process (ANSI/ASSE Z244.1-2003 (R2008) section 5.4)
- Robust design and construction blocks all access points to the actuation mechanism of the safety interlock switch
- Designed to accept locks with standard shackle diameters of 5/16" or 7 mm; standard expansion devices may also be used in conjunction with the SLD
- The SLD series will work for designated switches with or without the optional stainless steel guide. If the optional stainless steel guide is used on a switch that is integrated with a slide bolt assembly, it will not be possible to attach a Switch Locking Device



See website for SLD dimensions

Warning: The SLD Series is intended for use as an alternative control method provided for by ANSI/ASSE Z244.1-2003 (R2008) section 5.4. This device does not protect against malicious tampering.



Model	Compatible Interlock Switches	Part No.
SLD26-01*	T4011, T5009, TL8012-S, D4SL-N	44526-0801
SLD34-01**	T2008, T2011, T4012, TL4019	44534-0801
SLD35-01***	T4016, TL4024	44535-0801

Notes:

*The SLD26-01 will not work with optional latch on T4011.

**The SLD34-01 is only compatible with slide bolt assemblies 44534-8130, -8140, -8070.

***The SLD35-01 is not compatible with slide bolt assemblies.

