

Non-Contact Door Switch Controller G9SX-NS

Dedicated controller for Non-Contact Door Switch with programless and safety circuit configuration

- Up to 30 units of D40A/D40Z Compact Non-Contact Door Switch can be connected to a single Controller.
- Logical AND connection function provides easy system configuration for partial stop and complete stop.
- Programless.
- G9SX-NSA provides simultaneous inputs of a Non-Contact Door Switch and a conventional key-insertion type Safety Door Switch.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

 Be sure to read the "Safety Precautions" on page 32.

Model Number Structure

Model Number Legend

Non-Contact Door Switch Controller

G9SX - □□□□□□ - □□□ - □□
 1 2 3 4 5 6

1. Functions

NS/NSA: 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

Controller
 T03: 3 s (Variable)
 Expansion Unit
 Blank: No OFF delay
 T: OFF delay

6. Terminal Block Type

RT: Screw terminals
 RC: Spring-cage terminals

Ordering Information

List of Models

Non-Contact Door Switch Controllers

Safety outputs *1		Auxiliary outputs *3	Logical AND connection input	Logical AND connection output	Max. OFF delay time *4	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed *2							
2 (Semi-conductors)	0	2 (Semi-conductors)	1	1	---	24 VDC	Screw terminals	G9SX-NS202-RT
	2 (Semiconductors)				Spring-cage terminals		G9SX-NS202-RC	
					3.0 s		Screw terminals	G9SX-NSA222-T03-RT
	Spring-cage terminals						G9SX-NSA222-T03-RC	

*1. P channel MOS FET transistor output

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

*3. PNP transistor output

*4. 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

Expansion Units

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

*1. PNP transistor output

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

Accessories

Terminal Block

Appearance *	Specifications	Applicable units	Model	Remarks
	Terminal Block with screw terminals (3-pin)	G9SX-NSA	Y9S-03T1B-02A	Two Terminal Blocks (black) with screw terminals, and a set of six code marks to prevent erroneous insertion.
	Terminal Block with screw terminals (4-pin)	G9SX-NS G9SX-EX-□	Y9S-04T1B-02A	Two Terminal Blocks (black) with screw terminals, and a set of six code marks to prevent erroneous insertion.
	Terminal Block with spring-cage terminals (3-pin)	G9SX-NSA	Y9S-03C1B-02A	Two Terminal Blocks (black) with spring-cage terminals, and a set of six code marks to prevent erroneous insertion.
	Terminal Block with spring-cage terminals (4-pin)	G9SX-NS G9SX-EX-□	Y9S-04C1B-02A	Two Terminal Blocks (black) with spring-cage terminals, and a set of six code marks to prevent erroneous insertion.

Note: The G9SX main unit comes with a terminal block as standard equipment. The accessories shown here can be ordered as a replacement.

* The illustrations show 3-pin types

G9SX-NS

Specifications

Non-contact Door Switch Controllers

Ratings

Power input

Item	Model	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	Model	G9SX-NS202-□/G9SX-NSA222-T03-□
Safety input *1		Operating voltage: 20.4 VDC to 26.4 VDC, internal impedance: approx. 2.8 kΩ *2
Feedback/reset input		

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

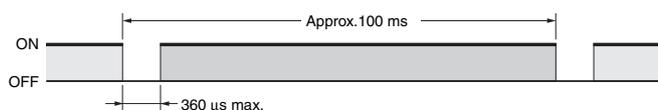
*2. Provide a current equal to or higher than that of the minimum applicable load of the connected input control device.

Outputs

Item	Model	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	Model	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

Characteristics

Item	Model	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		Logical AND connection input: 100 ms max. D40A connected: 100 ms max. D40Z connected: 200 ms max.	Safety input: 50 ms max. *2 Logical AND connection input: 100 ms max. *3 D40A connected: 100 ms max. *3 D40Z connected: 200 ms max. *3	30 ms max. *4
Response time (ON to OFF state) *1		15 ms max. (Logical AND connection input: OFF) Logical AND connection input: 15 ms max. D40A connected: 20 ms max. *6 D40Z connected: 45 ms max.	15 ms max. (Logical AND connection input: OFF) Safety input: 15 ms max. Logical AND connection input: 15 ms max. D40A connected: 20 ms max. *6 D40Z connected: 45 ms max.	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 N·m (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.

The operating time/response time of the Non-contact Door Switch are included of the time with the D40A/D40Z.

*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.

Logical AND Connection

Item	Model	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.		---

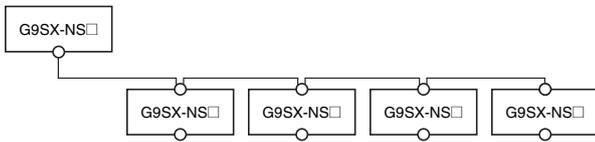
Note: See Logical AND Connection Combinations below for details.

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

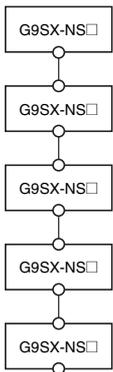
*2. G9SX-EX401-□ Expansion Units and G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) can be mixed.

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.

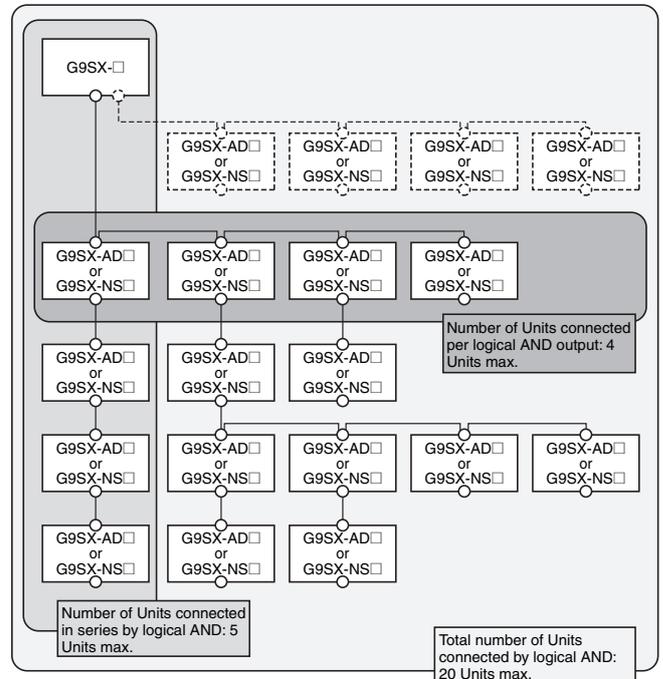


2. Any G9SX-NS□ Controller that receives a logical AND connection input can be logically connected to other Controllers on up to five layers.



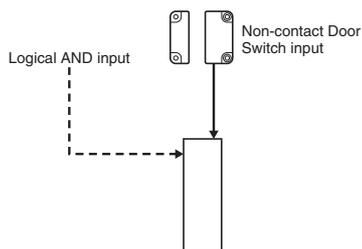
Note: The G9SX-NS□ in the above diagram can be replaced by the G9SX-AD□ Advanced Unit. For details on G9SX-AD□ advanced unit, refer to G9SX Flexible Safety Unit on your OMRON website.

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.



Response Time and Operating Time

1. G9SX-NS□



	Max. response time (excluding Expansion Units) *1	Max. operating time (excluding Expansion Units) *2
Non-contact Door Switch input	D40A connected: 20 ms max. *3 D40Z connected: 45 ms max. *3	D40A connected: 100 ms max. *4 D40Z connected: 200 ms max. *4
Logical AND input	15 ms	100 ms

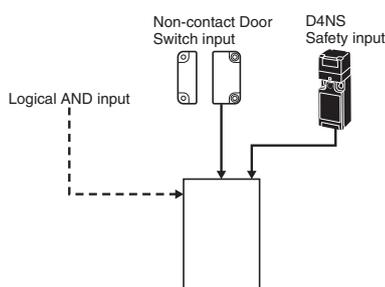
*1. The maximum response time is the time it takes the output to switch from ON to OFF after the input switches from ON to OFF.

*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. Represents the response time of Non-contact Door Switch (1 to 30 units connected) and the response time of G9SX-NS added.

*4. Represents the operating time of Non-contact Door Switch (1 to 30 units connected) and the operating time of G9SX-NS added.

2. G9SX-NSA□



	Max. response time (excluding Expansion Units) *1	Max. operating time (excluding Expansion Units) *2
Non-contact Door Switch input	D40A connected: 20 ms max. *3 D40Z connected: 45 ms max. *3	D40A connected: 100 ms max. *4 D40Z connected: 200 ms max. *4
Safety input	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.

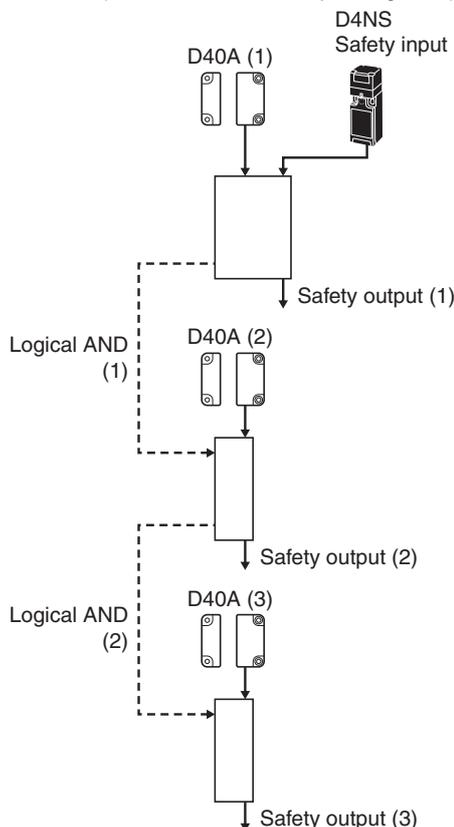
*2. The maximum operating time is the time it takes the output to switch from OFF to ON after the input switches from OFF to ON.

*3. Represents the response time of Non-contact Door Switch (1 to 30 units connected) and the response time of G9SX-NS added.

*4. Represents the operating time of Non-contact Door Switch (1 to 30 units connected) and the operating time of G9SX-NS added.

3. Multiple G9SX-NS□/NSA□ Non-contact Door Switch Controllers

When multiple Controllers are logically connected with AND connections, the response time is the sum of the response times given in 1 and 2 above. (It is the same for the operating time.)



Case (a)

Response Time from When D40A (1) Turns from ON to OFF until Safety Output (2) Turns from ON to OFF

$$20 \text{ ms} \quad + \quad 15 \text{ ms} \quad = \quad 35 \text{ ms}$$

(D40A (1)) (Logical AND connection (1))

Note: 45 ms + 15 ms = 60 ms when D40Z is connected.

Case (b)

Response Time from When D4NS Turns from ON to OFF until Safety Output (3) Turns from ON to OFF

$$15 \text{ ms} \quad + \quad 15 \text{ ms} \quad + \quad 15 \text{ ms} \quad = \quad 45 \text{ ms}$$

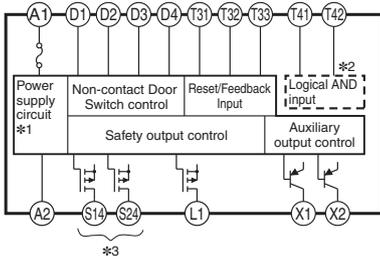
(D4NS) (Logical AND connection (1)) (Logical AND connection (2))

G9SX-NS

Connections

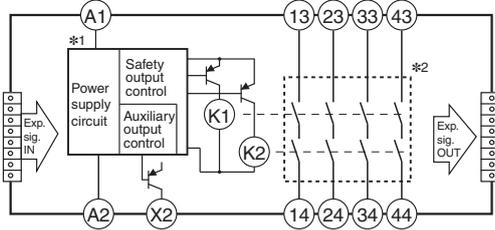
Internal Connection

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



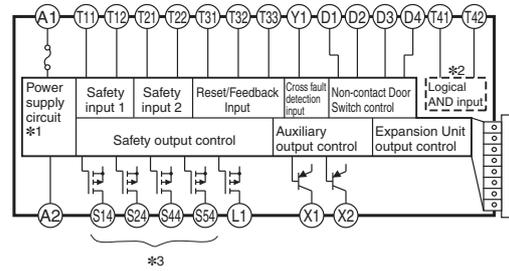
- *1. Internal power supply circuit is not isolated.
- *2. Logical AND input is isolated.
- *3. Outputs S14 to S24 are internally redundant.

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



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

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

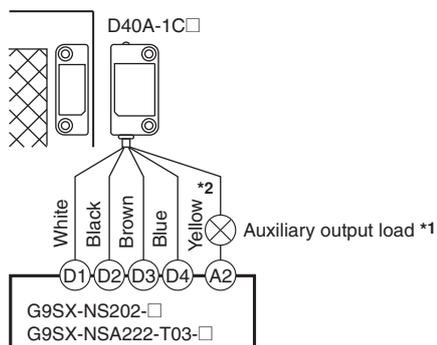


- *1. Internal power supply circuit is not isolated.
- *2. Logical AND input is isolated.
- *3. Outputs S14 to S54 are internally redundant.

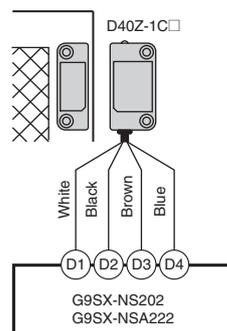
D40A, D40Z and G9SX-NS□ Wiring

Example: Wiring a Single Switch

D40A



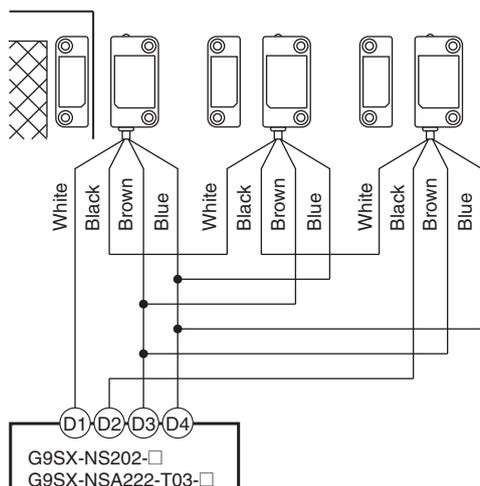
D40Z



- *1. The auxiliary output load current must be 10 mA max.
- *2. When connecting a XS2F series connector with cable to a connector type, the color of the auxiliary output cable is gray.

Example: Wiring Multiple Switches

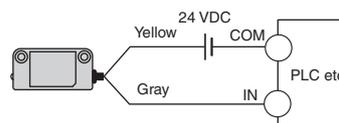
Connect Up to 30 Non-contact Door Switches



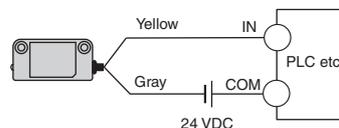
Example of auxiliary outputs of the D40Z

The auxiliary output of the D40Z supports the input polarities of both PNP and NPN.

PNP



NPN

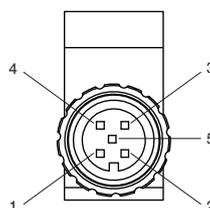


Note: The auxiliary output load current must be 10 mA max. Wrong connection may lead to a failure of the auxiliary output circuit.

Wiring of Inputs and Outputs

Signal name	Cable color of D40A/D40Z	Pin No. of D40A connector type	Description of operation
Non-contact Door Switch power supply input	+	Brown	Supplies power to the D40A or D40Z. Connect to the D3 and D4 terminal of the G9SX-NS□.
	-	Blue	
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	---	Turns ON when actuator is detected. When a fault is detected, turns into OFF state regardless of actuator status. *3
	Gray	5	

- Note: 1.** When connecting a XS2F series connector with cable to a D40A connector type, the cable color of the auxiliary output is gray.
- 2.** For details, refer to the data sheet of each Non-contact Door Switch.
- *3.** Only D40Z turns into OFF state when a fault is detected by the actuator.



Pin arrangement of D40A connector type

Wiring of Inputs and Outputs

G9SX-NS202-□

Signal name	Terminal name	Description of operation	Wiring
Power supply input	A1, A2	Connect the power source to the A1 and A2 terminals.	Connect the power supply plus (24 VDC) to the A1 terminal. Connect the power supply minus (GND) to the A2 terminal.
Non-contact Door Switch input	D1, D2, D3, D4	All Non-contact Door Switch inputs connected to the G9SX-NS□ must be ON as a required condition for the safety outputs to be ON. Otherwise the safety outputs cannot be in the ON state.	
Feedback/reset input	T31, T32, T33	To set the safety outputs in the ON state, the ON state signal must be input to T33. Otherwise the safety outputs cannot be in the ON state.	Auto reset
		To set the safety outputs in the ON state, the signal input to T32 must change from the OFF state to the ON state, and then to the OFF state. Otherwise the safety outputs cannot be in the ON state.	Manual reset
Logical AND connection input	T41, T42	A logical AND connection means that one unit (Unit A) outputs a safety signal “a” to a subsequent unit (Unit B) and Unit B calculates the logical AND (i.e., outputs the AND) of the signal “a” and safety signal “b”, which is input to Unit B. Thereby the logic of the safety output of Unit B is (AND). (An AND of inputs “a” and “b” is output.) To set the safety outputs of the subsequent Unit in the ON state, its logical AND connection preset switch must be set to AND (enable) and the high signal must be input to T41 of the subsequent unit.	
Instantaneous safety output	S14, S24	Turns ON/OFF according to the state of the safety inputs, Non-contact Door Switch inputs, feedback/reset inputs, and logical AND connection inputs.	Keep these outputs open when not used.
Logical AND connection output	L1	Outputs a signal of the same logic and at the same time as the instantaneous safety outputs.	Keep these outputs open when not used.
Auxiliary monitor output	X1	Outputs a signal of the same logic and at the same time as the instantaneous safety outputs.	Keep these outputs open when not used.
Auxiliary error output	X2	Outputs when the error indicator is lit or flashing.	Keep these outputs open when not used.

G9SX-NSA222-T03-□

Signal name	Terminal name	Description of operation	Wiring
Power supply input	A1, A2	Connect the power source to the A1 and A2 terminals.	Connect the power supply plus (24 VDC) to the A1 terminal. Connect the power supply minus (GND) to the A2 terminal.
Safety input 1	T11, T12	To set the safety outputs in the ON state, the high state signals must be input to both safety input 1 and safety input 2. Otherwise the safety outputs cannot be in the ON state.	Using safety input 1 system
Safety input 2	T21, T22		Using safety input 2 system (without short-circuit monitoring between systems)
			Using safety input 2 system (with short-circuit monitoring between systems)
Non-contact Door Switch input	D1, D2, D3, D4	All Non-contact Door Switch inputs connected to the G9SX-NS must be ON as a required condition for the safety outputs to be ON. Otherwise the safety outputs cannot be in the ON state.	
Feedback/reset input	T31, T32, T33	To set the safety outputs in the ON state, the ON state signal must be input to T33. Otherwise the safety outputs cannot be in the ON state.	Auto reset
		To set the safety outputs in the ON state, the signal input to T32 must change from the OFF state to the ON state, and then to the OFF state. Otherwise the safety outputs cannot be in the ON state.	Manual reset
Logical AND connection input	T41, T42	A logical AND connection means that one unit (Unit A) outputs a safety signal "a" to a subsequent unit (Unit B) and Unit B calculates the logical AND (i.e., outputs the AND) of the signal "a" and safety signal "b", which is input to Unit B. Thereby the logic of the safety output "b" is output.) To set the safety outputs of the subsequent Unit in the ON state, its logical AND connection preset switch must be set to AND (enable) and the high signal must be input to T41 of the subsequent unit.	
Cross fault detection input	Y1	Selects the mode for the failure detecting (cross fault detecting) function for the safety inputs of G9SX corresponding to the connection of the cross fault detection input.	Whether Y1 is connected depends on whether the T11 and T21 terminals are used. Refer to wiring information for safety inputs 1 and 2.
Instantaneous safety output	S14, S24	Turns ON/OFF according to the state of the safety inputs, feedback/reset inputs, and logical AND connection inputs. During OFF-delay state, the Instantaneous safety outputs are not able to turn ON.	Keep these outputs open when not used.
OFF-delayed safety output	S44, S54	OFF-delayed safety outputs. The OFF-delay time is set by the OFF-delay preset switch. When the delay time is set to zero, these outputs can be used as non-delay outputs.	Keep these outputs open when not used.
Logical AND connection output	L1	Outputs a signal of the same logic and at the same time as the instantaneous safety outputs.	Keep these outputs open when not used.
Auxiliary monitor output	X1	Outputs a signal of the same logic and at the same time as the instantaneous safety outputs.	Keep these outputs open when not used.
Auxiliary error output	X2	Outputs when the error indicator is lit or flashing.	Keep these outputs open when not used.

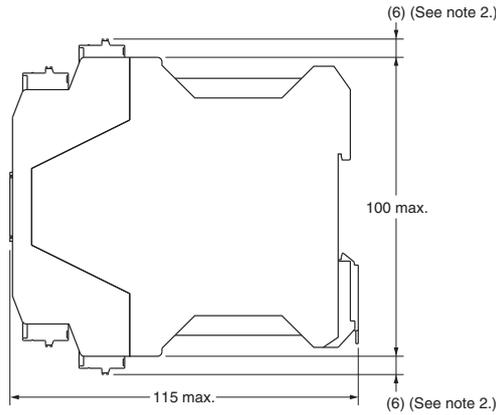
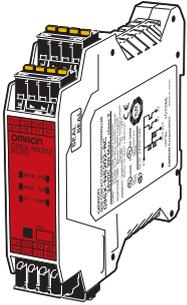
G9SX-NS

Dimensions and Terminal Arrangement

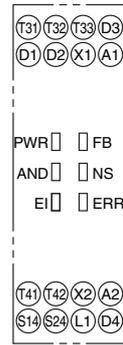
(Unit: mm)

Non-contact Door Switch Controller

G9SX-NS202-□



Terminal arrangement

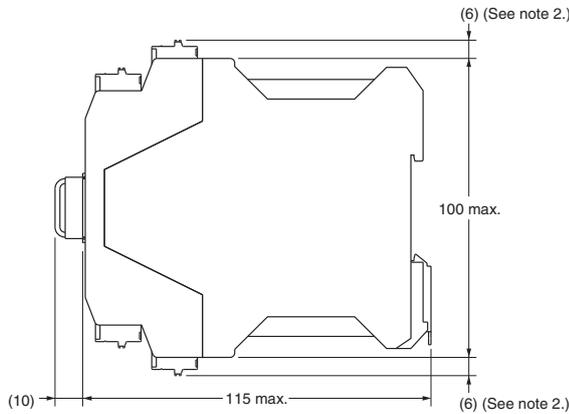
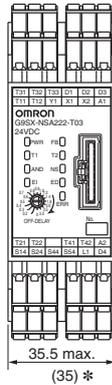
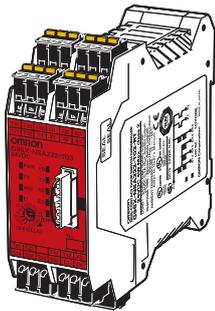


Note: 1. Above outline drawing is for models with spring-cage terminals (-RC).
2. For models with spring-cage terminals (-RC) only.

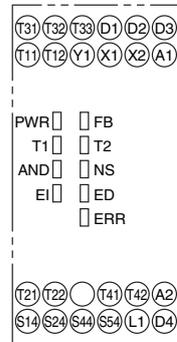
* Typical dimension

Non-contact Door Switch Controller

G9SX-NSA222-T03-□



Terminal arrangement



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

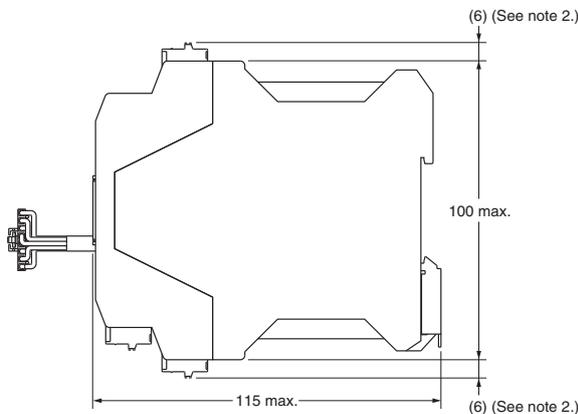
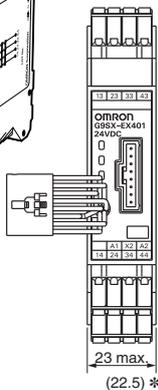
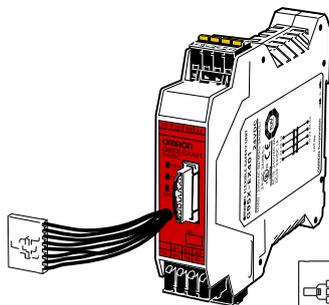
* Typical dimension

Expansion Unit

G9SX-EX401-□

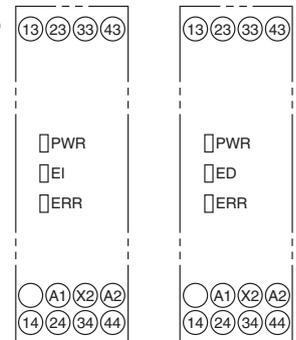
Expansion Unit (OFF-delayed Model)

G9SX-EX041-T-□



Terminal arrangement

G9SX-EX401-□ (Expansion Unit) G9SX-EX041-T-□ (Expansion Unit with OFF Delay)



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

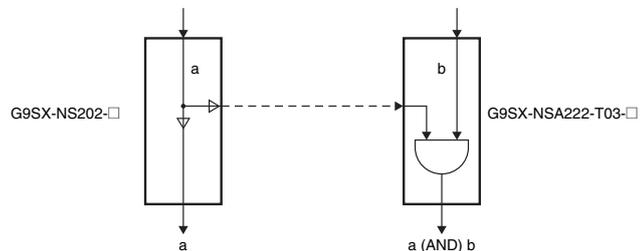
* Typical dimension

Operation

Functions

Logical AND Connection

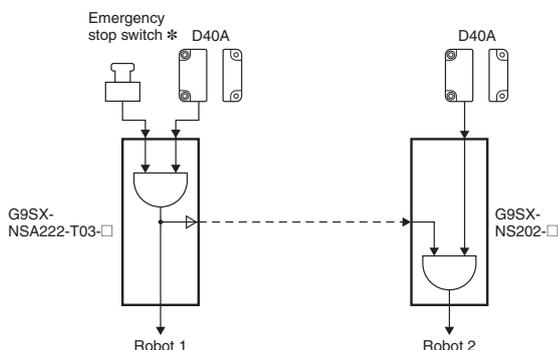
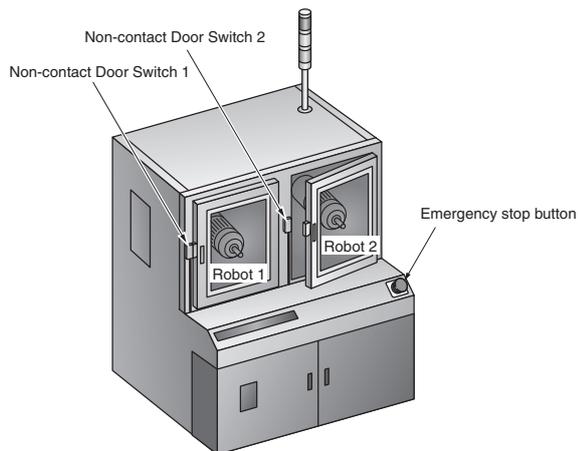
A logical AND connection means that the G9SX outputs a safety signal "a" to another G9SX, and that G9SX creates the logical AND of safety signal "a" and safety signal "b." The safety output of the G9SX-NSA222-T03-□ with the logical AND connection shown in the following diagram is "a" AND "b."



This is illustrated using the application in the following diagram as an example. The equipment here has two hazards identified as Robot 1 and Robot 2, and it is equipped with Non-contact Door Switches and an emergency stop button as safety measures. If the door to Robot 2 is opened, only Robot 2 is stopped (i.e., a partial stop). If the door to Robot 1 is opened or the emergency stop button is pressed, both Robot 1 and Robot 2 stop (i.e., a complete stop).

The actual situation using a G9SX for this application is shown in this example.

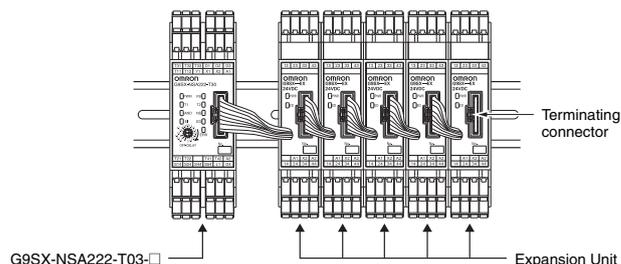
Note: The logical AND setting on the G9SX-NS202-□ must be set to AND (enabled).



* A manual reset is required when an emergency stop is used.

Connecting Expansion Units

- The G9SX-EX and G9SX-EX-T Expansion Units can be connected to a G9SX-NSA222-T3-□ Non-contact Door Switch Controller to increase the number of safety outputs. (They cannot be connected to a G9SX-NS202-□.)
- A maximum of five Expansion Units can be connected to one G9SX-NSA222-T03-□. This may be a combination of G9SX-EX instantaneous models and G9SX-EX-T OFF-delayed models.
- Remove the terminating connector from the receptacle on G9SX-NSA222-T03-□ and insert the Expansion Unit cable connector into the receptacle. Insert the terminating connector into the receptacle on the Expansion Unit at the very end (rightmost).
- When Expansion Units are connected to a Controller, make sure that power is supplied to every Expansion Unit. (Refer to the following diagram for actual Expansion Unit connection.)



Setting Procedure

1. Cross Fault Detection (G9SX-NSA222-T03-□)

Set the cross fault detection mode for safety inputs by shorting Y1 to 24 V or leaving it open.

When cross fault detection is set to ON, short-circuit failures are detected between safety inputs T11-T12 and T21-T22. When a cross fault is detected, the following will occur.

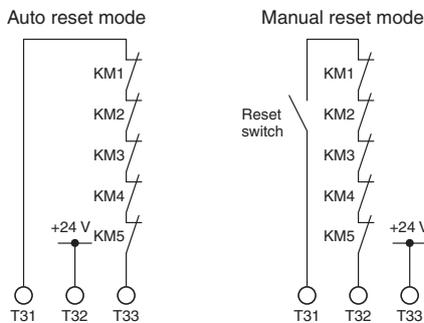
- (1) The safety outputs and logical AND outputs lock out.
- (2) The LED error indicator is lit.
- (3) The error output (auxiliary output) turns ON.

Cross fault detection	Wiring	
OFF	Using safety input 1 system	
	Using safety input 2 system	
ON		

2. Reset Mode (G9SX-NS202-□/NSA222-T03-□)

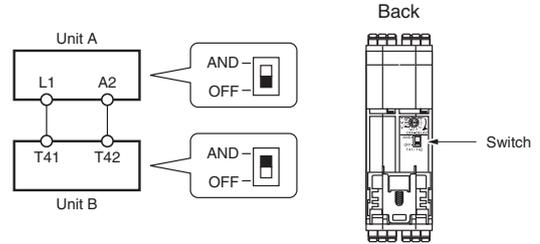
Set the reset mode using feedback/reset input terminals T31, T32, and T33.

Auto reset mode is selected when terminal T32 is shorted to 24 V and manual reset mode is selected when terminal T33 is shorted to 24 V.



3. Setting Logical AND Connection (G9SX-NS202-□/NSA222-T03-□)

When connecting two or more Non-contact Door Switch Controllers by logical AND connection, set the logical AND connection preset switch on the Controller that is on the input side (Unit B in the following diagram) to AND. The default setting of the logical AND connection preset switch is set to OFF.

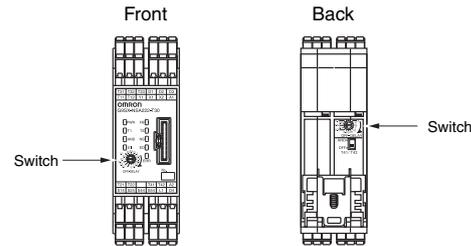


Note: A setting error will occur and Unit B will lock out if the logical AND setting switch on the Unit B is set to OFF.

4. Setting the OFF-delay Time (G9SX-NSA222-T03-□)

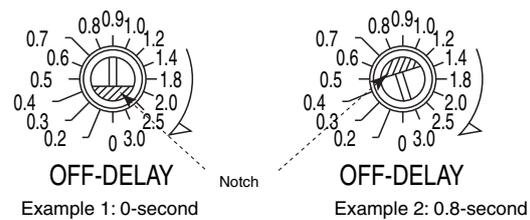
The OFF-delay preset time on G9SX-NSA222-T03-□ is set from the OFF-delay time preset switch (1 each on the front and back of the Unit).

Normal operation will only occur if both switches are identically set. An error will occur if the switches are not identically set. The default setting of the OFF-delay time preset switch is set to 0 s.



Refer to the following illustration for details on setting switch positions.

G9SX-NSA222-T03-□



LED Indicators

Marking	Color	Name	G9SX-NS202	G9SX-NSA222	G9SX-EX	G9SX-EX-T	Function	Reference
PWR	Green	Power supply indicator	○	○	○	○	Lights while power is supplied.	---
T1	Orange	Safety input #1 indicator	---	○	---	---	Lights while a high signal is input to T12. Flashes when an error relating to safety input #1 occurs.	
T2	Orange	Safety input #2 indicator	---	○	---	---	Lights while a high signal is input to T22. Flashes when an error relating to safety input #2 occurs.	
NS	Orange	Non-contact Door Switch input indicator	○	○	---	---	Lights when the Non-contact Door Switch input turns ON. Flashes when an error relating to the Non-contact Door Switch input occurs.	
FB	Orange	Feedback/reset input indicator	○	○	---	---	Lights in the following cases: With automatic reset while a high signal is input to T33. With manual reset while a high signal is input to T32. Flashes when an error relating to feedback/reset input occurs.	*
AND	Orange	Logical AND input indicator	○	○	---	---	Lights while a high signal is input to T41. Flashes when an error relating to logical AND connection input occurs.	
EI	Orange	Instantaneous safety output indicator	○	○	○	---	Lights while the Instantaneous safety outputs (S14, S24, S34) are in the ON state. Flashes when an error relating to the instantaneous safety output occurs.	
ED	Orange	OFF-delayed safety output indicator	---	○	---	○	Lights while OFF-delayed safety outputs (S44, S54) are in the ON-state. Flashes when an error relating to OFF-delayed safety output occurs.	
ERR	Red	Error indicator	○	○	○	○	Lights or flashes when an error occurs.	

* Refer to "Fault Detection" on the next page for details.

Settings Indication (at Power ON)

Settings for the G9SX can be checked by the orange indicators for approx. 3 seconds after the power is turned ON. During this settings indication period, the ERR indicator will light, however the auxiliary error output will remain OFF.

Indicator	Item	Setting position	Indicator status	Setting mode	Setting status
T1	Cross fault detection mode	Y1 terminal	Lit	Detection mode	Y1 = open
			Not lit	Non-detection mode	Y1 = 24 VDC
FB	Reset mode	T32 or T33 terminal	Lit	Manual reset mode	T33 = 24 VDC
			Not lit	Auto reset mode	T32 = 24 VDC
AND	Logical AND connection input mode	Logical AND connection preset switch	Lit	Enable logical AND input	AND
			Not lit	Disable logical AND input	OFF

Fault Detection

When the Non-contact Door Switch Controller detects a fault, the ERR indicator and/or other indicators light up or flash to inform the user about the fault.

Check and take necessary measures referring to the following table, and then re-supply power to the Non-contact Door Switch Controller.

(G9SX-NS202-□/NSA222-T03-□)

ERR indicator	Other indicator	Fault	Expected causes of the fault	Check points and measures to take
 Flashes	---	Fault due to electromagnetic disturbance or of internal circuits.	<ol style="list-style-type: none"> Excessive electromagnetic disturbance Failure of the internal circuit 	<ol style="list-style-type: none"> Check the disturbance level around the G9SX and the related system. Replace with a new product.
 Lights	 T1 flashes	Fault involved with safety input 1	<ol style="list-style-type: none"> Error in the wiring of safety input 1 Incorrect setting of cross fault detection input Failure of the circuit of safety input 1 	<ol style="list-style-type: none"> Check the wiring to T11 and T12. Check the wiring to Y1. Replace with a new product.
	 T2 flashes	Fault involved with safety input 2	<ol style="list-style-type: none"> Error in the wiring of safety input 2 Incorrect setting of cross fault detection input Failure of the circuit of safety input 2 	<ol style="list-style-type: none"> Check the wiring to T21 and T22. Check the wiring to Y1. Replace with a new product.
	 NS flashes	Fault involved with Non-contact Door Switch input	<ol style="list-style-type: none"> Error in the wiring of Non-contact Door Switch input Error in the wiring of Non-contact Door Switch inputs in series connections. Failure of the internal circuits of Non-contact Door Switch inputs Failure of the Non-contact Door Switch 	<ol style="list-style-type: none"> Check the wiring to D1 and D2. Check the wiring to the D40A. Replace with a new product. Replace with a new D40A.
	 FB flashes	Fault involved with feedback/reset inputs	<ol style="list-style-type: none"> Error in the wiring of feedback/reset input. Failure of the circuit of feedback/reset input 	<ol style="list-style-type: none"> Check the wiring to T31, T32 and T33. Replace with a new product.
		Fault in Expansion Unit	<ol style="list-style-type: none"> Improper feedback signals from Expansion Unit Abnormal supply voltage to Expansion Unit Failure of the circuit of safety relay contact outputs 	<ol style="list-style-type: none"> Check the connecting cable of Expansion Unit and the connection of the termination socket. Check the supply voltage to Expansion Unit. Replace with a new product. <p>Note: Make sure that all Expansion Units' PWR indicators are lit.</p>
	 EI flashes	Fault involved with instantaneous safety outputs, logical AND connection outputs, or auxiliary monitor output	<ol style="list-style-type: none"> Error in the wiring of instantaneous safety outputs Failure of the circuit of instantaneous safety outputs Error in the wiring of the logical AND connection output Failure of the circuit of the logical AND connection output Error in the wiring of the auxiliary monitor output Impermissible high ambient temperature 	<ol style="list-style-type: none"> Check the wiring to S14 and S24. Replace with a new product. Check the wiring to L1. Replace with a new product. Check the wiring to X1. Check the ambient temperature and spacing around the G9SX.
 ED flashes	Fault involved with OFF-delayed safety outputs	<ol style="list-style-type: none"> Error in the wiring of OFF-delayed safety relay contact outputs Incorrect set values for OFF-delay time Failure of the circuit of OFF-delayed safety relay contact outputs Impermissible high ambient temperature 	<ol style="list-style-type: none"> Check the wiring to S44 and S54. Check the settings of the OFF-delay time setting switch. Replace with a new product. Check the ambient temperature and spacing around the G9SX. 	

ERR indicator	Other indicator	Fault	Expected causes of the fault	Check points and measures to take
● Lights	☀ AND flashes	Fault involved with logical AND connection input	<ol style="list-style-type: none"> 1. Error in the wiring of the logical AND connection input 2. Incorrect setting for the logical AND connection input 3. Failure of the circuit of the logical AND connection input 	<ol style="list-style-type: none"> 1. Check the wiring to T41 and T42. Note: 1. Make sure that the wiring length for the T41, T42 terminal is 100 meters or less. 2. Make sure that the logical AND connection signal is branched for 4 units or fewer. 2. Confirm the set value of the logical AND connection preset switch. 3. Replace with a new product.
	☀ All indicators except PWR flash	Supply voltage outside the rated value	<ol style="list-style-type: none"> 1. Supply voltage outside the rated value 	<ol style="list-style-type: none"> 1. Check the supply voltage to the Units.

When indicators other than the ERR indicator flash, check and take necessary actions referring to the following table.

ERR indicator	Other indicators	Fault	Expected cause of the fault	Check points and measures to take			
○ Off	<table border="1"> <tr> <td>T1</td> <td rowspan="2">☀ flash</td> </tr> <tr> <td>T2</td> </tr> </table>	T1	☀ flash	T2	Mismatch between input 1 and input 2.	The input status between input 1 and input 2 is different, due to contact failure or a short circuit of safety input device(s) or a wiring fault.	Check the wiring from safety input devices to the G9SX. Or check the input sequence of safety input devices. After removing the fault, turn both safety inputs 1 and 2 to the OFF state.
T1	☀ flash						
T2							

(Expansion Unit)

ERR indicator	Other indicators	Fault	Expected cause of the fault	Check points and measures to take
● Lights	---	Fault involved with safety relay outputs of Expansion Units	<ol style="list-style-type: none"> 1. Welding of relay contacts 2. Failure of the internal circuit 	Replace with a new product.

Application Examples

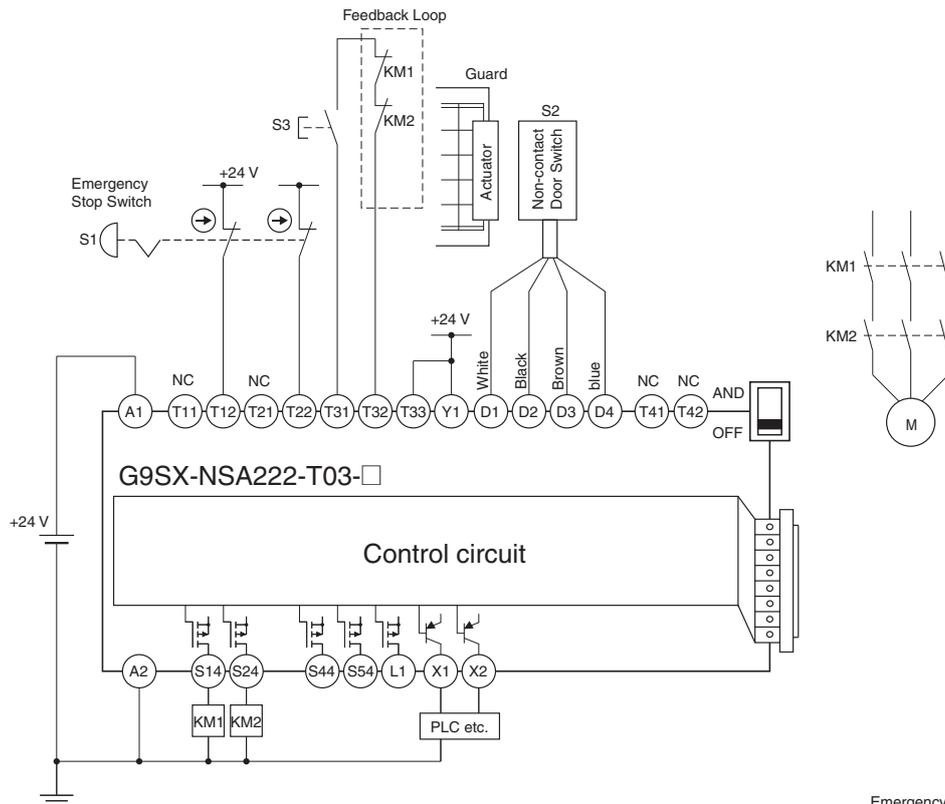
Example 1: Connection with D40A

Highest achievable PL/safety category	Model	Stop category	Reset
PLd/3 equivalent	Emergency Stop Switch A165E/A22E Non-contact Door Switch D40A Non-contact Door Switch Controller G9SX-NSA222-T03-□	0	Manual

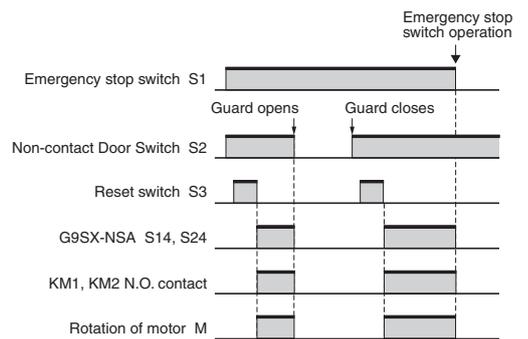
Note: The PL evaluation result on this connection example applies to safety functions related to the D40A Non-Contact Door Switch. The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

● Application Overview

- The power supply to the motor M is turned OFF immediately when the emergency stop switch S1 is pressed.
- The power supply to the motor M is turned OFF immediately when the S2 detects that the guard is opened.
- The power supply to the motor M is kept OFF until the reset switch S3 is pressed while the guard is closed and the emergency stop switch S1 is released.



Timing chart



- S1: Emergency Stop Switch
- S2: Non-contact Door Switch (D40A)
- S3: Reset Switch
- KM1, KM2: Magnetic contactor
- M: Motor

Note: For details on Non-contact Door Switch wiring, refer to page 19 or to the Instruction Sheet.

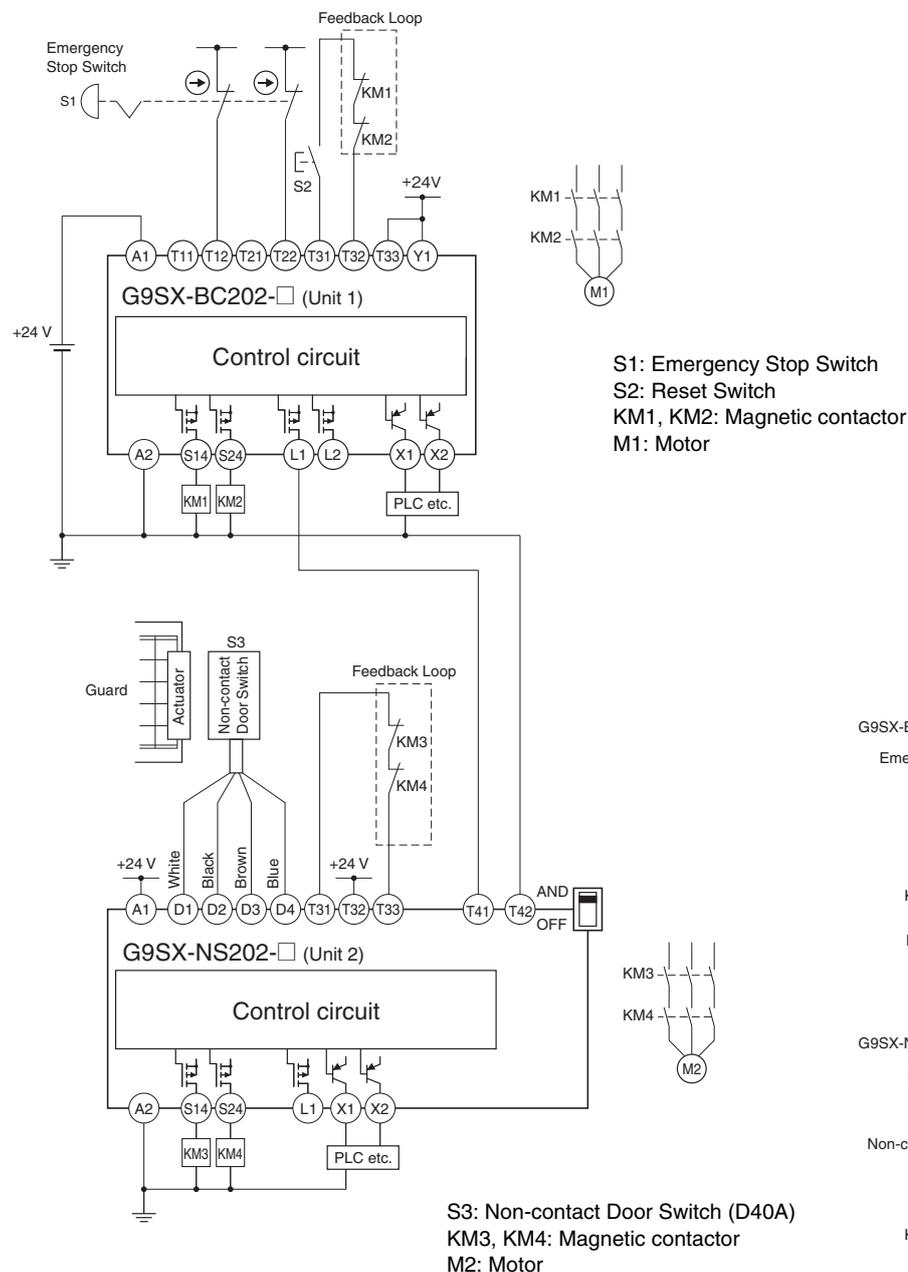
Example 2: Connection with D40A

Highest achievable PL/safety category	Model	Stop category	Reset
PLd/3 equivalent	Emergency Stop Switch A165E/A22E Non-contact Door Switch D40A Flexible Safety Unit G9SX-BC202-□ Non-contact Door Switch Controller G9SX-NS202-□	0	Emergency Stop Switch: Manual Non-contact Door Switch: Auto

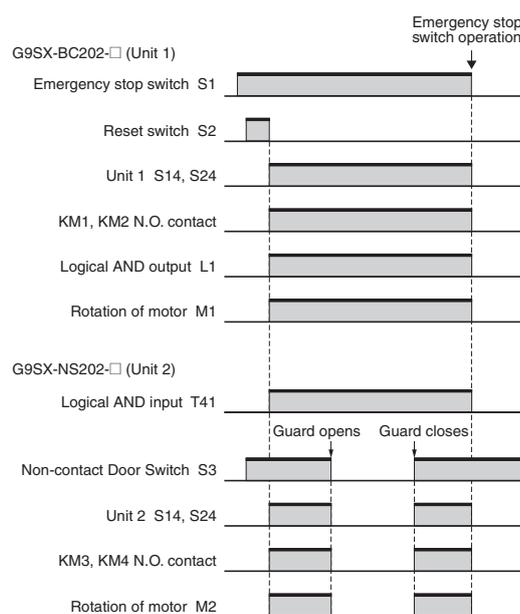
Note: The PL evaluation result on this connection example applies to safety functions related to the D40A Non-Contact Door Switch. The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

● Application Overview

- The power supply to the motor M1 and M2 is turned OFF immediately when the emergency stop switch S1 is pressed.
- The power supply to the Motor M1 is kept OFF until the reset switch S2 is pressed while the emergency stop switch S1 is released.
- The power supply to the motor M2 is turned OFF immediately when the S3 detects that the guard is opened.
- The power supply to the motor M2 is kept OFF until the reset switch S1 is pressed while the guard is closed and the emergency stop switch S1 is released.



Timing chart



Note: For details on Non-contact Door Switch wiring, refer to page 19 or to the Instruction Sheet.

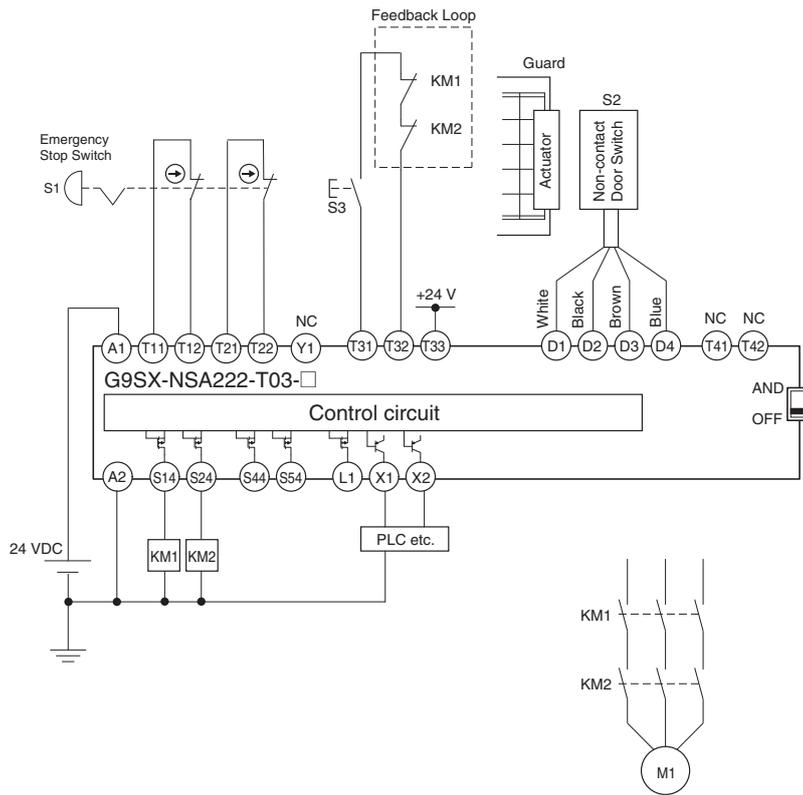
Example 1: Connection with D40Z

Highest achievable PL/safety category	Model	Stop category	Reset
PLe/4 equivalent	Emergency Stop Switch A165E/A22E Non-contact Door Switch D40Z Non-contact Door Switch Controller G9SX-NSA222-T03-□	0	Manual

Note: The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

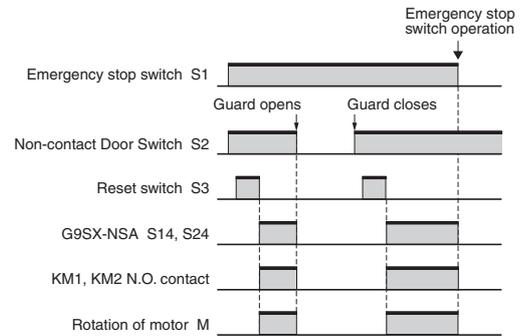
● Application Overview

- The power supply to the motor M1 is turned OFF immediately when the emergency stop switch S1 is pressed.
- The power supply to the motor M1 is turned OFF immediately when the S2 detects that the guard is opened.
- The power supply to the motor M1 is kept OFF until the reset switch S3 is pressed while the guard is closed and the emergency stop switch S1 is released.



- S1: Emergency Stop Switch
- S2: Non-contact Door Switch (D40Z)
- S3: Reset Switch
- KM1, KM2: Magnetic contactor
- M1: Motor

Timing chart



Note: For details on Non-contact Door Switch wiring, refer to page 19 or to the Instruction Sheet.

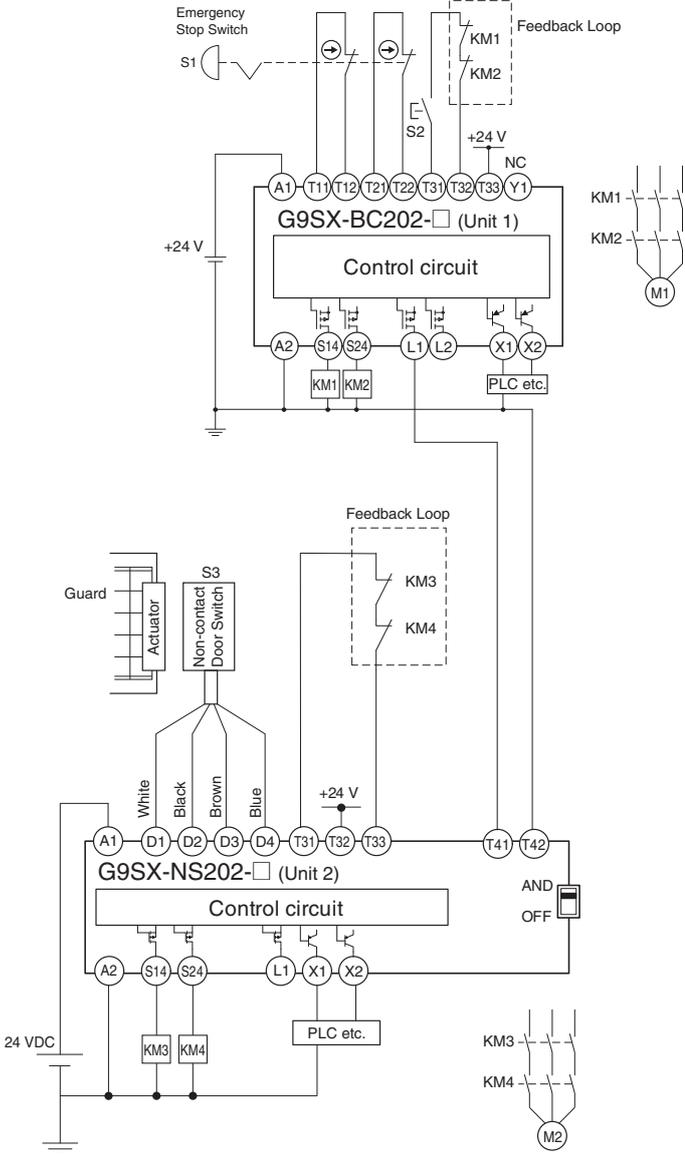
Example 2: Connection with D40Z

Highest achievable PL/safety category	Model	Stop category	Reset
PLe/4 equivalent	Emergency Stop Switch A165E/A22E Non-contact Door Switch D40Z Flexible Safety Unit G9SX-BC202-□ Non-contact Door Switch Controller G9SX-NS202-□	0	Emergency Stop Switch: Manual Non-contact Door Switch: Auto

Note: The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

● Application Overview

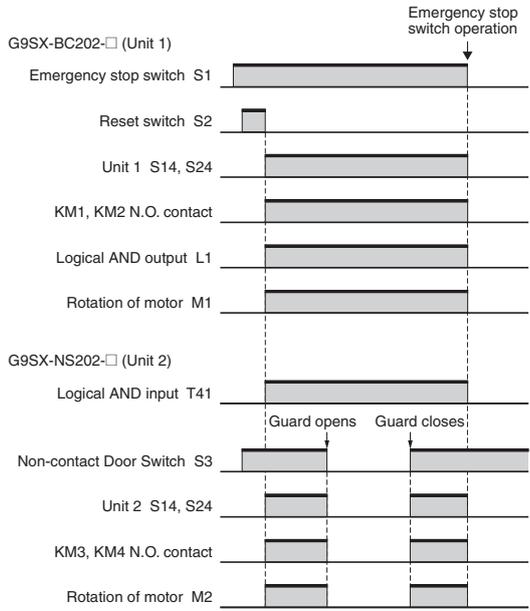
- The power supply to the motor M1 and M2 is turned OFF immediately when the emergency stop switch S1 is pressed.
- The power supply to the Motor M1 is kept OFF until the reset switch S2 is pressed while the emergency stop switch S1 is released.
- The power supply to the motor M2 is turned OFF immediately when the S3 detects that the guard is opened.
- The power supply to the motor M2 is kept OFF until the reset switch S1 is pressed while the guard is closed and the emergency stop switch S1 is released.



S1: Emergency Stop Switch
S2: Reset Switch
KM1, KM2: Magnetic contactor
M1: Motor

S3: Non-contact Door Switch (D40Z)
KM3, KM4: Magnetic contactor
M2: Motor

Timing chart



Note: For details on Non-contact Door Switch wiring, refer to page 19 or to the Instruction Sheet.