

G9SX Series 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-2/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 90.

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	
					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

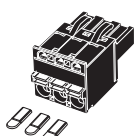
Safety outputs		Auxiliary outputs	OFF-delay time	Rated voltage	Terminal block type	Model
Instantaneous	OFF-delayed					
4PST-NO	---	1 (Semiconductor) *1	---	24 VDC	Screw terminals	G9SX-EX401-RT
---	4PST-NO		*2		Spring-cage terminals	G9SX-EX401-RC
					Screw terminals	G9SX-EX041-T-RT
					Spring-cage 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.

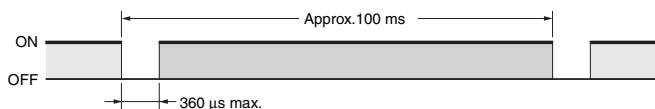
*2. Provide a current equal to or higher than that of the minimum applicable load of the connected input control device.

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-2/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-2/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-2/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-2/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	---			2,200 VAC for 1 min
	Between relay outputs connected together and other terminals connected together				
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-2/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.

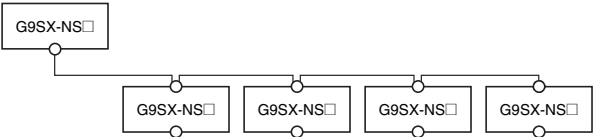
Logical AND Connection

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.		---

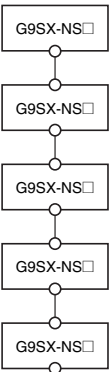
Note: See Logical AND Connection Combinations below for details.
*1. The number of G9SX-EX401-□ Expansion Units or G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) not included.
*2. G9SX-EX401-□ Expansion Units and G9SX-EX041-T-□ Expansion Units (OFF-delayed Model) can be mixed.

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.

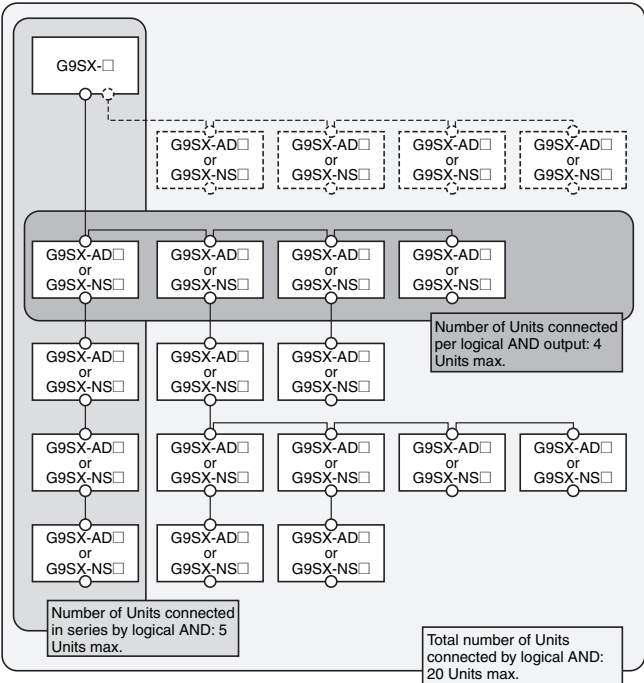


2. Any G9SX-NS□ Controller that receives a logical AND connection input can be logically connected to other Controllers on up to five layers.



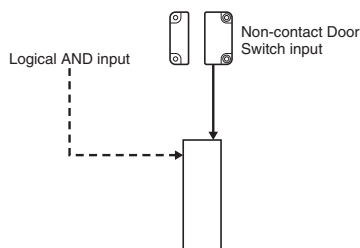
Note: The G9SX-NS□ in the above diagram can be replaced by the G9SX-AD□ Advanced Unit.
For details on G9SX-AD□ advanced unit, refer to G9SX Flexible Safety Unit on your OMRON website.

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-2/D40A connected: 20 ms max. *3 D40Z connected: 45 ms max. *3	D40A-2/D40A connected: 100 ms max. *4 D40Z connected: 200 ms max. *4
Logical AND input	15 ms	100 ms

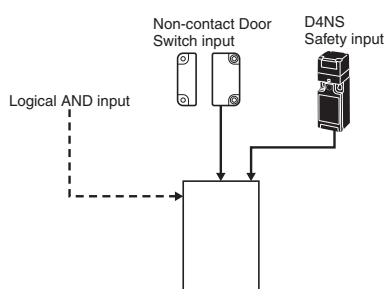
*1. The maximum response time is the time it takes the output to switch from ON to OFF after the input switches from ON to OFF.

*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-2/D40A connected: 20 ms max. *3 D40Z connected: 45 ms max. *3	D40A-2/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.

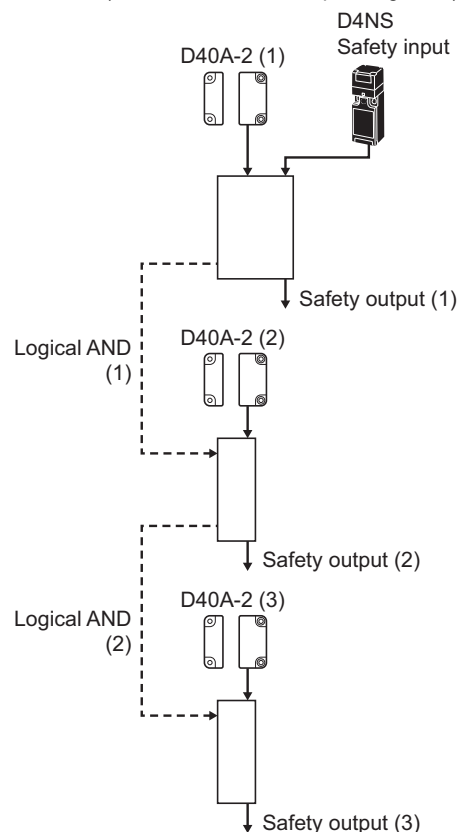
*2. The maximum operating time is the time it takes the output to switch from OFF to ON after the input switches from OFF to ON.

*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-2 (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-2 (1)) (Logical AND connection (1))

Note: 1. 20 ms + 15 ms = 35 ms when D40A is connected.
2. 45 ms + 15 ms = 60 ms when D40Z is connected.

Case (b)

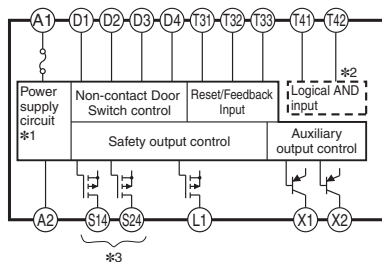
Response Time from When D4NS Turns from ON to OFF until Safety Output (3) Turns from ON to OFF

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

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

Internal Connection

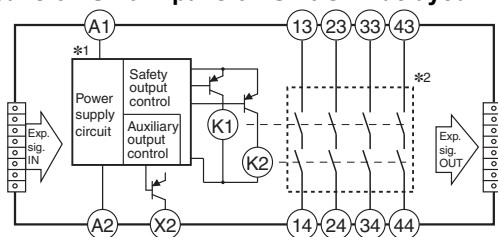
G9SX-NS202-□ (Non-contact Door Switch Controller)



- *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-□

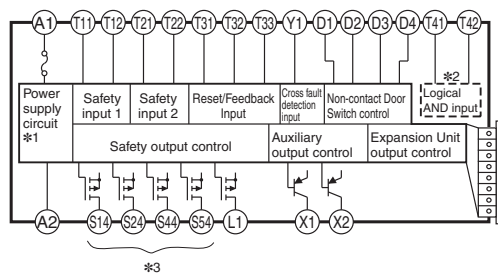
(Expansion Unit/Expansion Unit OFF-delayed Model)



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

G9SX-NSA222-T03-□

(Non-contact Door Switch Controller)



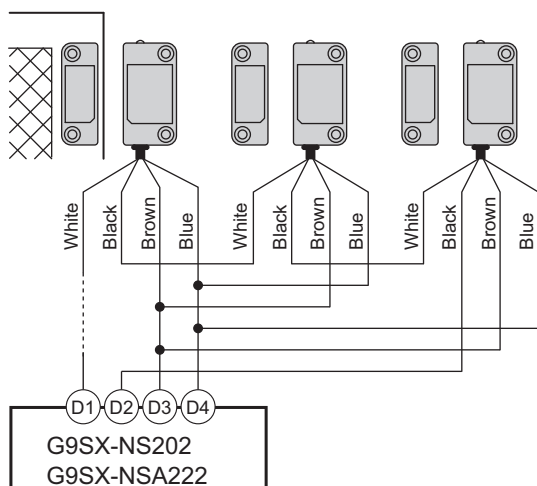
- *1. Internal power supply circuit is not isolated.
- *2. Logical AND input is isolated.
- *3. Outputs S14 to S54 are internally redundant.

D40A-2 and G9SX-NS□ Wiring

Connecting the D40A-2 to the G9SX-NS allows for PLe and Category 4 compliance.

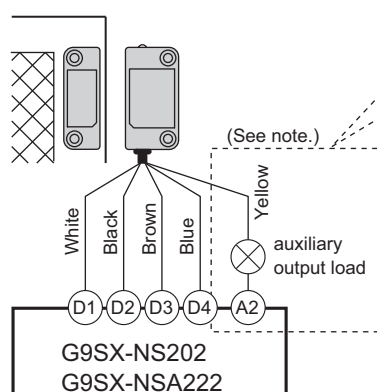
Multiple switch connection

Maximum 30 switches can be connected in series.



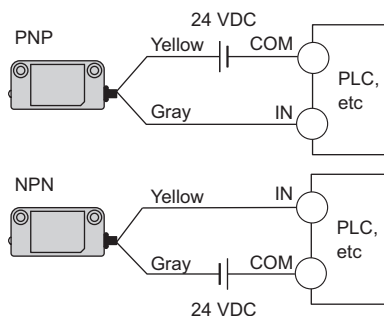
Single switch connection

D40A-□2C□



Note. D40A-□2D□

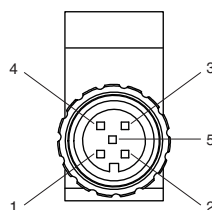
The auxiliary output of D40A-□2D□ supports the input polarity of both PNP and NPN.



Wiring

Signal Name		Wiring color	Pin number	Description of operation
Safety door switch power input	+	Brown	1	Power supply for D40A-2□. Connect to D3 terminal and D4 terminal on G9SX-NS□.
	-	Blue	3	
Safety door switch signal input		White	2	Input designated signal from G9SX-NS□. To set safety door switch output in ON state, safety door switch input must be in ON state.
Safety door switch output		Black	4	Output status depends on actuator status and safety door switch input state.
Auxiliary output		Yellow	5	Output when sensor detect actuator.
		Gray	---	

Note: 1. When connecting a XS2F series connector with cable to a connector type, the color of the auxiliary output cable is gray.
2. For details, refer to the data sheet of each Non-contact Door Switch.

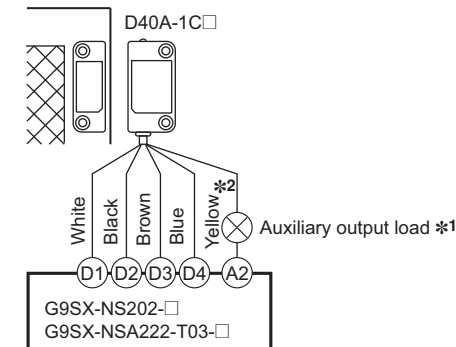


Pin arrangement of D40A-2 connector type

D40A, D40Z and G9SX-NS□ Wiring

Example: Wiring a Single Switch

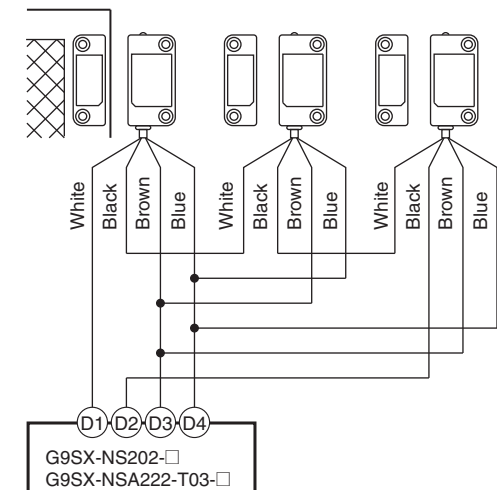
D40A



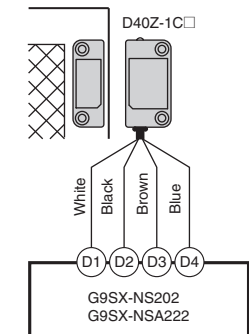
- *1. The auxiliary output load current must be 10 mA max.
- *2. When connecting a XS2F series connector with cable to a connector type, the color of the auxiliary output cable is gray.

Example: Wiring Multiple Switches

Connect Up to 30 Non-contact Door Switches



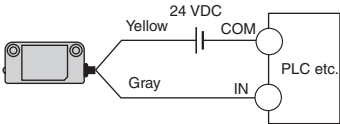
D40Z



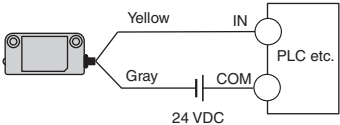
Example of auxiliary outputs of the D40Z

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

PNP



NPN

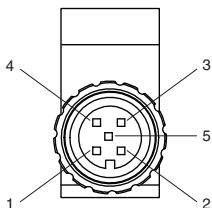


Note: The auxiliary output load current must be 10 mA max. Wrong connection may lead to a failure of the auxiliary output circuit.

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	1	Supplies power to the D40A or D40Z. Connect to the D3 and D4 terminal of the G9SX-NS□.
	-	Blue	3	
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.
		Gray	5	When a fault is detected, turns into OFF state regardless of actuator status. *3

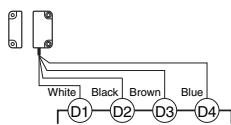
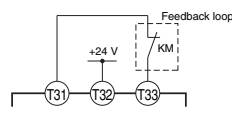
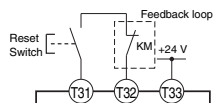
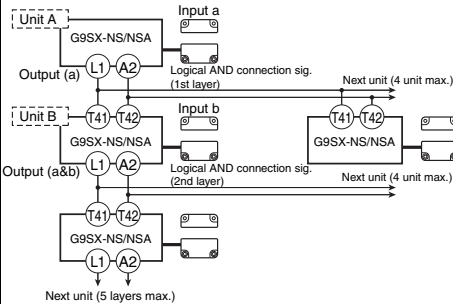
- Note:** 1. When connecting a XS2F series connector with cable to a D40A connector type, the cable color of the auxiliary output is gray.
2. For details, refer to the data sheet of each Non-contact Door Switch.
*3. Only D40Z turns into OFF state when a fault is detected by the actuator.



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-□

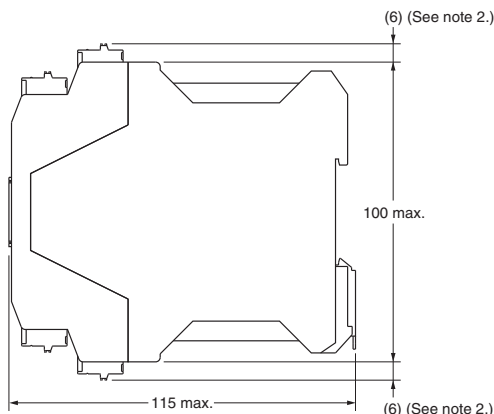
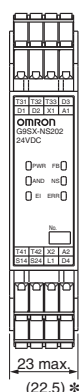
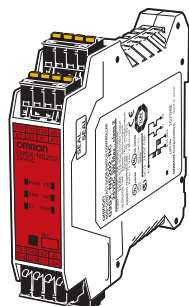
Signal name	Terminal name	Description of operation	Wiring	
Power supply input	A1, A2	Connect the power source to the A1 and A2 terminals.	Connect the power supply plus (24 VDC) to the A1 terminal. Connect the power supply minus (GND) to the A2 terminal.	
Safety input 1	T11, T12	To set the safety outputs 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	
			Using safety input 2 system (without short-circuit monitoring between systems)	
Safety input 2	T21, T22		Using safety input 2 system (with short-circuit monitoring between systems)	
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. 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.	Auto reset	
			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.	

Dimensions and Terminal Arrangement

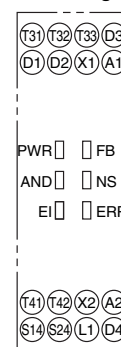
(Unit: mm)

Non-contact Door Switch Controller

G9SX-NS202-□



Terminal arrangement



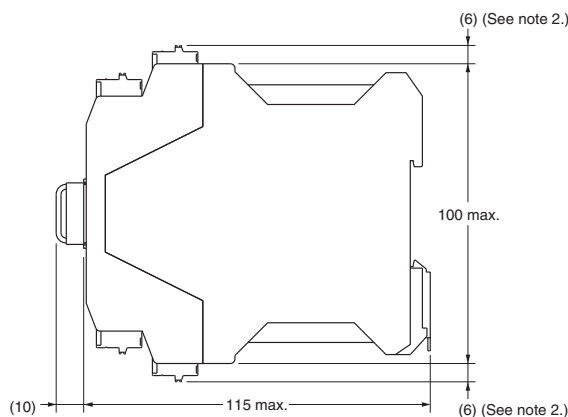
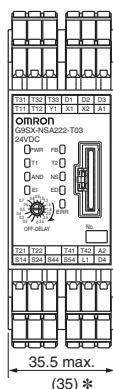
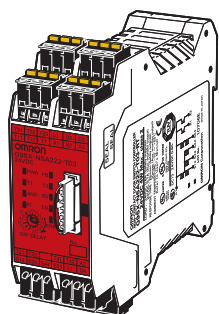
Note: 1. Above outline drawing is for models with spring-cage terminals (-RC).

2. For models with spring-cage terminals (-RC) only.

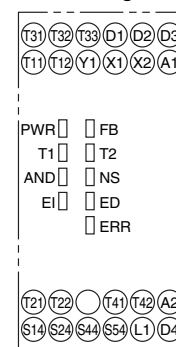
* Typical dimension

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.

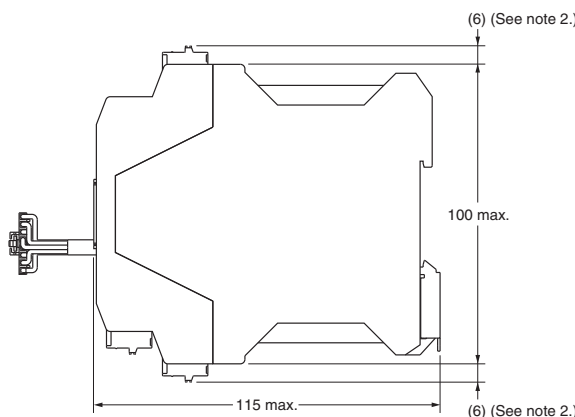
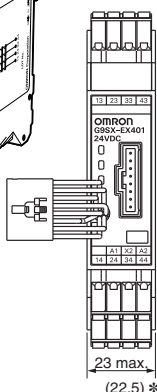
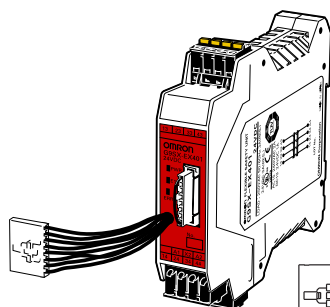
* Typical dimension

Expansion Unit

G9SX-EX401-□

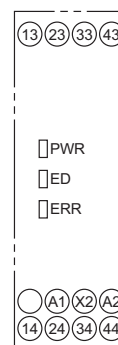
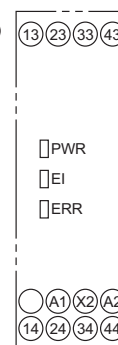
Expansion Unit (OFF-delayed Model)

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).

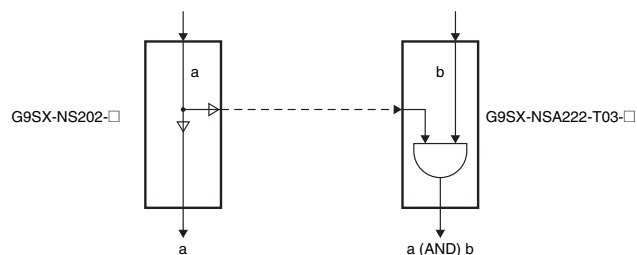
2. For models with spring-cage terminals (-RC) only.

* Typical dimension

Functions

Logical AND Connection

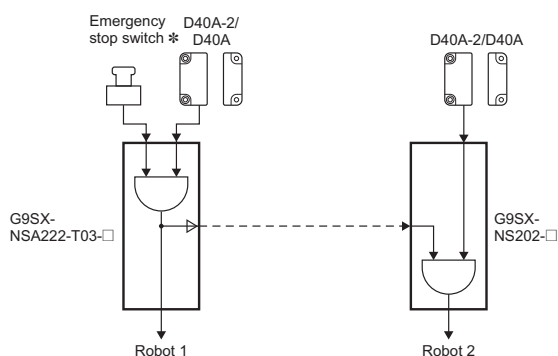
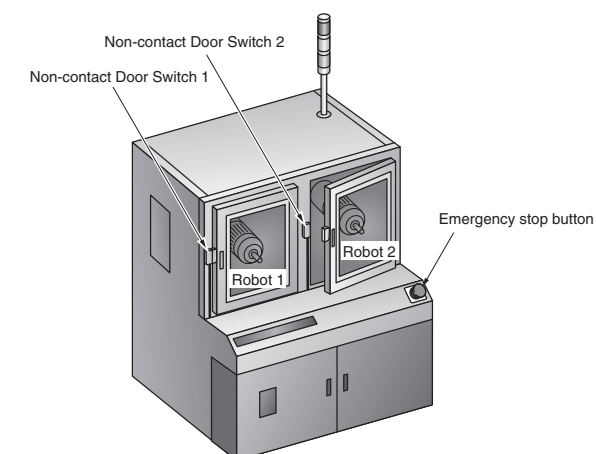
A logical AND connection means that the G9SX outputs a safety signal "a" to another G9SX, and that G9SX creates the logical AND of safety signal "a" and safety signal "b." The safety output of the G9SX-NSA222-T03-□ with the logical AND connection shown in the following diagram is "a" AND "b."



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.

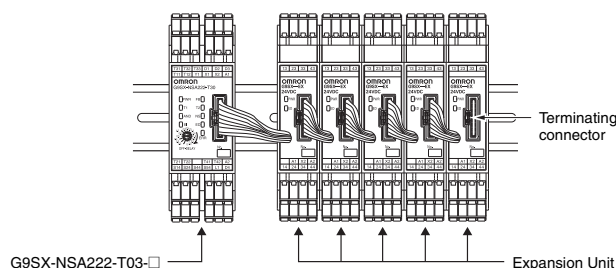
Note: The logical AND setting on the G9SX-NS202-□ must be set to AND (enabled).



* 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.

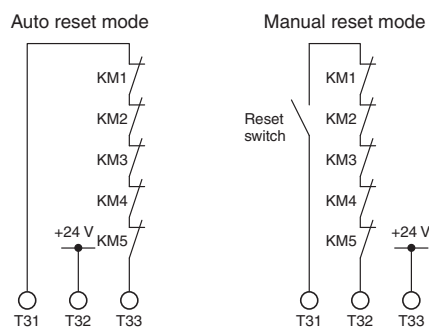
- (1) The safety outputs and logical AND outputs lock out.
- (2) The LED error indicator is lit.
- (3) The error output (auxiliary output) turns ON.

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

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

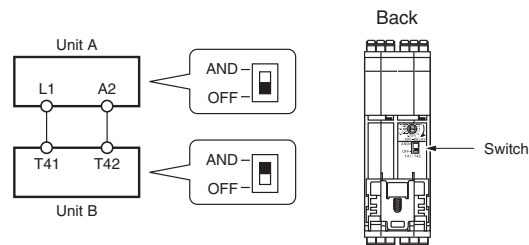
Set the reset mode using feedback/reset input terminals T31, T32, and T33.

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.

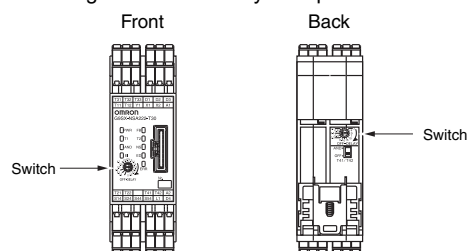


Note: A setting error will occur and Unit B will lock out if the logical AND setting switch on the Unit B is set to OFF.

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

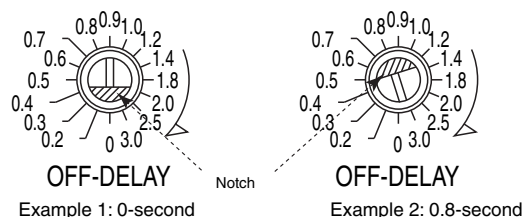
The OFF-delay preset time on G9SX-NSA222-T03-□ is set from the OFF-delay time preset switch (1 each on the front and back of the Unit).

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.	1. Excessive electromagnetic disturbance 2. Failure of the internal circuit	1. Check the disturbance level around the G9SX and the related system. 2. Replace with a new product.
 Lights	 T1 flashes	Fault involved with safety input 1	1. Error in the wiring of safety input 1 2. Incorrect setting of cross fault detection input 3. Failure of the circuit of safety input 1	1. Check the wiring to T11 and T12. 2. Check the wiring to Y1. 3. Replace with a new product.
	 T2 flashes	Fault involved with safety input 2	1. Error in the wiring of safety input 2 2. Incorrect setting of cross fault detection input 3. Failure of the circuit of safety input 2	1. Check the wiring to T21 and T22. 2. Check the wiring to Y1. 3. Replace with a new product.
	 NS flashes	Fault involved with Non-contact Door Switch input	1. Error in the wiring of Non-contact Door Switch input 2. Error in the wiring of Non-contact Door Switch inputs in series connections. 3. Failure of the internal circuits of Non-contact Door Switch inputs 4. Failure of the Non-contact Door Switch	1. Check the wiring to D1 and D2. 2. Check the wiring to the Non-Contact Door Switch. 3. Replace with a new product. 4. Replace with a new Non-Contact Door Switch.
	 FB flashes	Fault involved with feedback/reset inputs	1. Error in the wiring of feedback/reset input. 2. Failure of the circuit of feedback/reset input	1. Check the wiring to T31, T32 and T33. 2. Replace with a new product.
		Fault in Expansion Unit	1. Improper feedback signals from Expansion Unit 2. Abnormal supply voltage to Expansion Unit 3. Failure of the circuit of safety relay contact outputs	1. Check the connecting cable of Expansion Unit and the connection of the termination socket. 2. Check the supply voltage to Expansion Unit. Note: Make sure that all Expansion Units' PWR indicators are lit. 3. Replace with a new product.
	 EI flashes	Fault involved with instantaneous safety outputs, logical AND connection outputs, or auxiliary monitor output	1. Error in the wiring of instantaneous safety outputs 2. Failure of the circuit of instantaneous safety outputs 3. Error in the wiring of the logical AND connection output 4. Failure of the circuit of the logical AND connection output 5. Error in the wiring of the auxiliary monitor output 6. Impermissible high ambient temperature	1. Check the wiring to S14 and S24. 2. Replace with a new product. 3. Check the wiring to L1. 4. Replace with a new product. 5. Check the wiring to X1. 6. Check the ambient temperature and spacing around the G9SX.
	 ED flashes	Fault involved with OFF-delayed safety outputs	1. Error in the wiring of OFF-delayed safety relay contact outputs 2. Incorrect set values for OFF-delay time 3. Failure of the circuit of OFF-delayed safety relay contact outputs 4. Impermissible high ambient temperature	1. Check the wiring to S44 and S54. 2. Check the settings of the OFF-delay time setting switch. 3. Replace with a new product. 4. 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	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	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	1. Supply voltage outside the rated value	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	T1  T2 flash	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.

(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	1. Welding of relay contacts 2. Failure of the internal circuit	Replace with a new product.

Application Examples

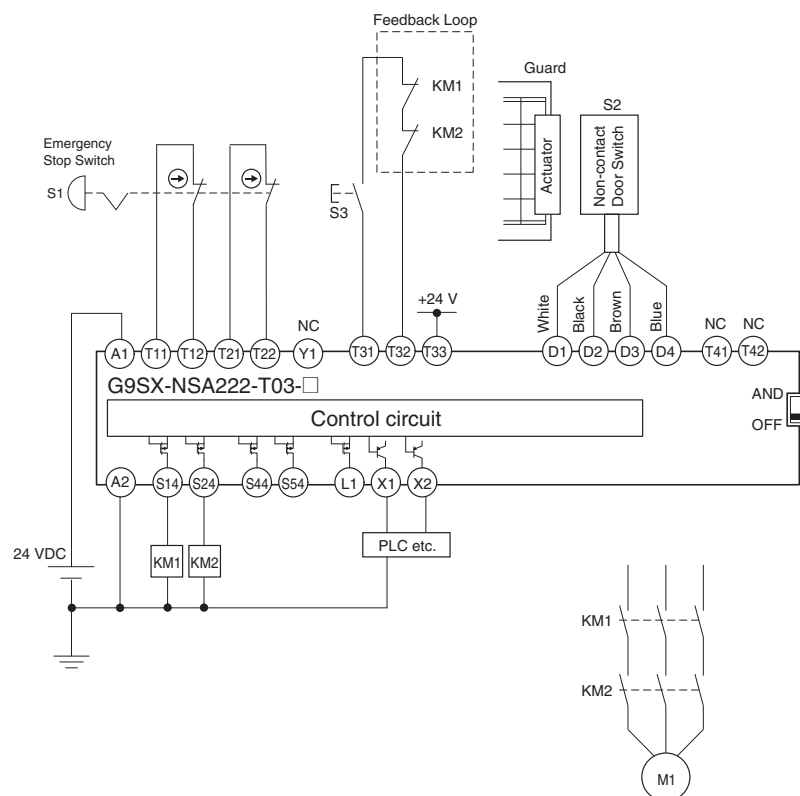
Connection example with D40A-2

Highest achievable PL/category	Model	Stop category	Reset
PL _e /4 equivalent	Non-contact Safety Door Switch D40A-2 Emergency stop pushbutton A165E/A22E 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.

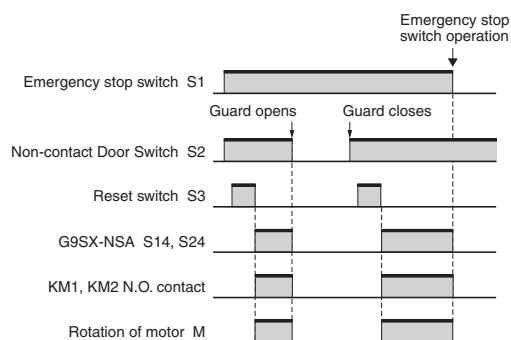
Application Overview

- 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 Safety Door Switch (D40A-2)
S3: Reset switch
KM1, KM2: Magnetic contactor
M1: Motor

Timing chart



Note: For details on Non-contact Door Switch wiring, refer to page 75 or to the Instruction Sheet.

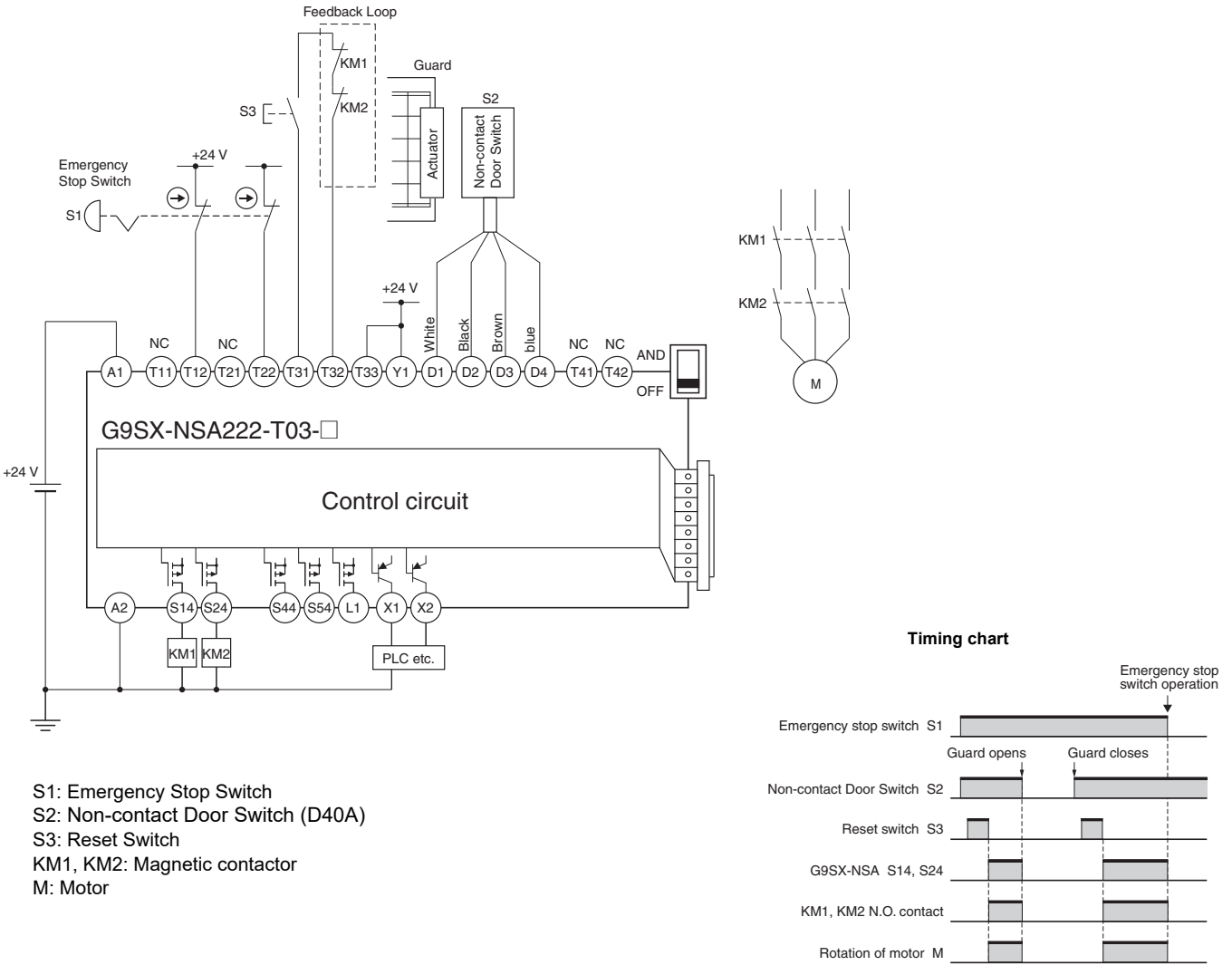
Example 1: Connection with D40A

Highest achievable PL/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.



Note: For details on Non-contact Door Switch wiring, refer to page 76 or to the Instruction Sheet.

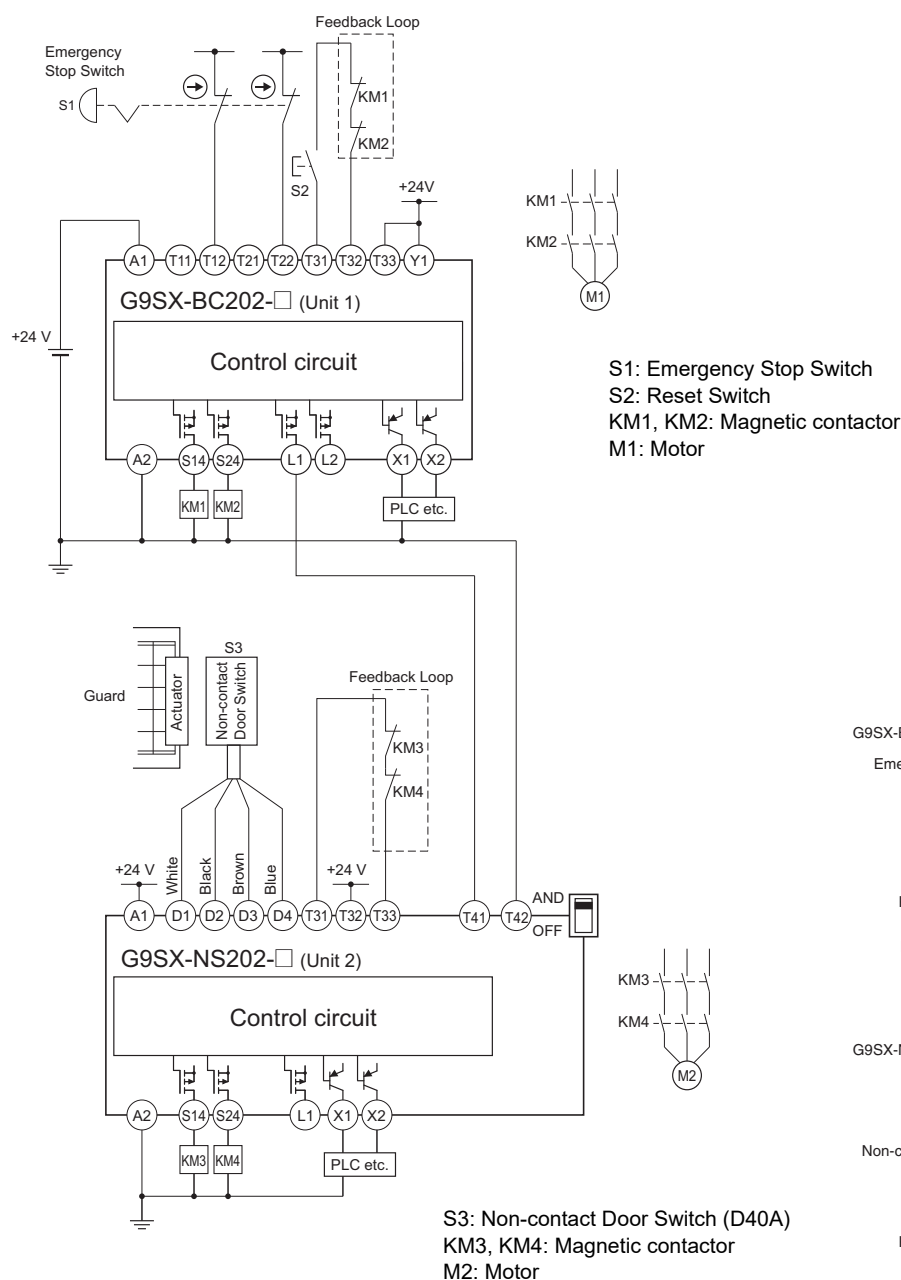
Example 2: Connection with D40A

Highest achievable PL/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

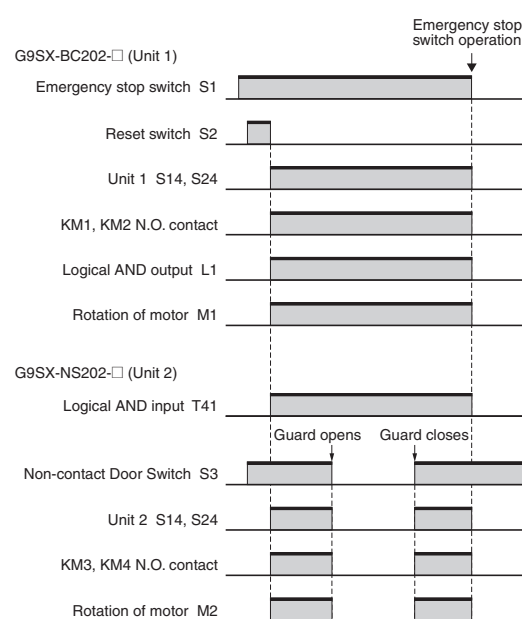
Note: The PL evaluation result on this connection example applies to safety functions related to the D40A Non-Contact Door Switch. The above PL is only the evaluation result of the example. The PL must be evaluated in an actual application by the customer after confirming the usage conditions.

● 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 76 or to the Instruction Sheet.

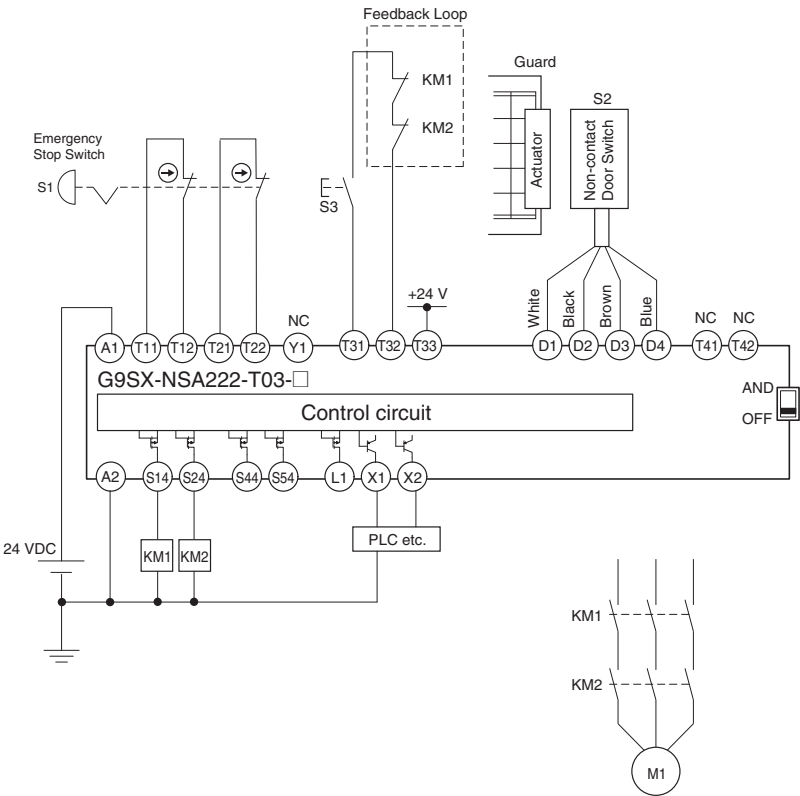
Example 1: Connection with D40Z

Highest achievable PL/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.

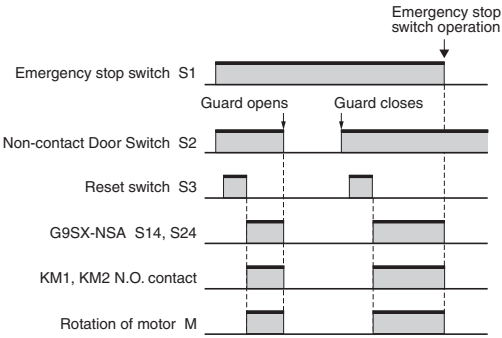
● Application Overview

- 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 76 or to the Instruction Sheet.

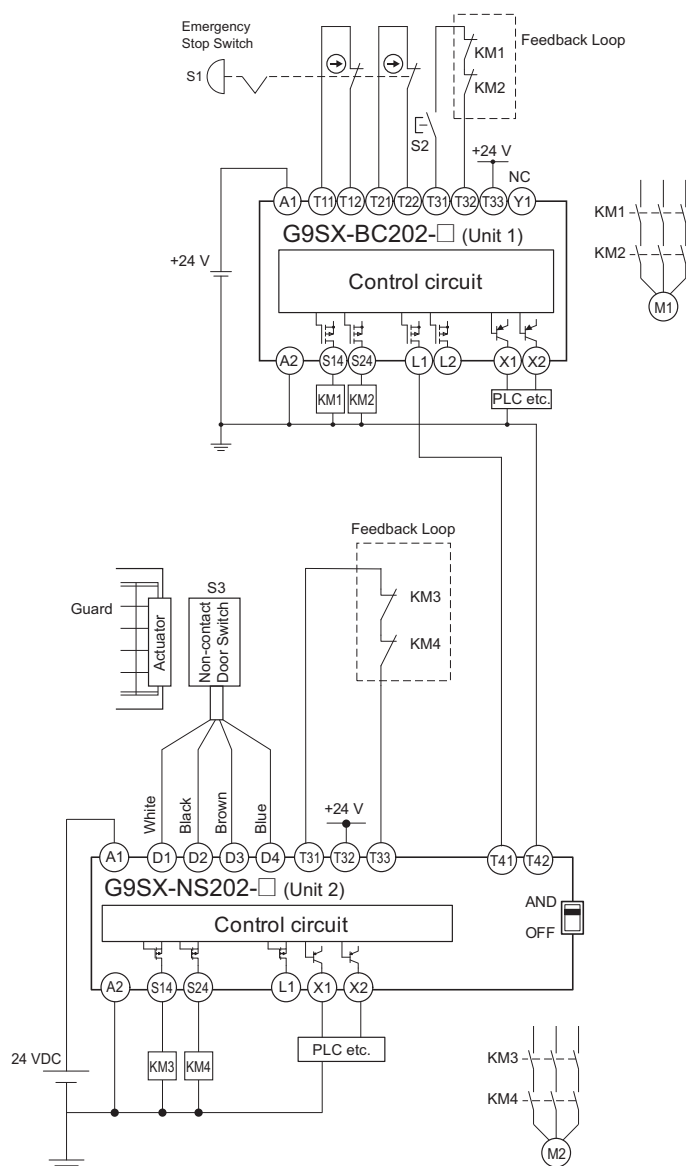
Example 2: Connection with D40Z

Highest achievable PL/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

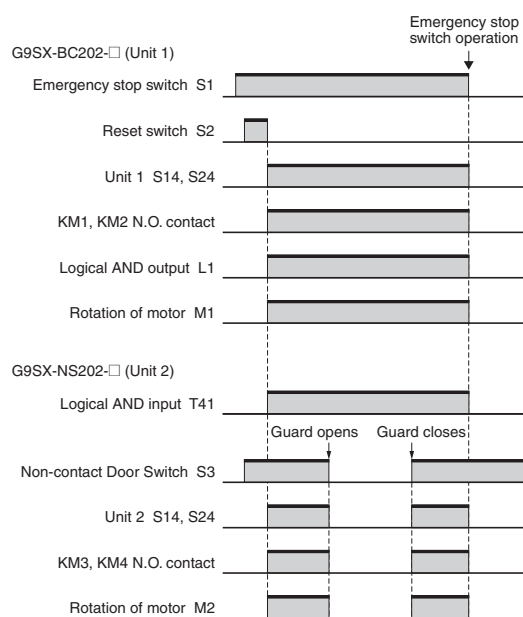
- The power supply to the motor M1 and M2 is turned OFF immediately when the emergency stop switch S1 is pressed.
- The power supply to the Motor M1 is kept OFF until the reset switch S2 is pressed while the emergency stop switch S1 is released.
- The power supply to the motor M2 is turned OFF immediately 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 76 or to the Instruction Sheet.

Safety Precautions

Be sure to read the *Common Precautions for Safety Warning* at the following URL: <http://www.ia.omron.com/>.

Indication and Meaning for Safe Use

 WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
Precautions for Safe Use	Supplementary comments on what to do or avoid doing, to use the product safely.
Precautions for Correct Use	Supplementary comments on what to do or avoid doing, to prevent failure to operate, or undesirable effect on product performance.

WARNING

Serious injury may possibly occur due to breakdown of safety outputs.
Do not connect loads beyond the rated value to the safety outputs.



Serious injury may possibly occur due to loss of required safety functions.
Wire the D40A and G9SX-NS properly so that supply voltages or voltages for loads do NOT touch the safety outputs accidentally.



Serious injury may possibly occur due to damage to safety outputs.
Provide protective circuits against counter-electromotive force if inductive loads are connected to safety outputs.



Serious injury may possibly occur due to loss of safety functions.
Use appropriate devices referring to the information provided below.



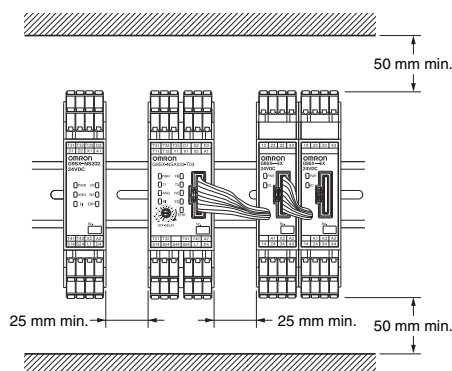
Control device	Requirements
Emergency stop switch	Use approved device with direct opening mechanism complying with IEC/EN 60947-5-1.
Safety door switch, Safety limit switch	Use approved device with direct opening mechanism complying with IEC/EN 60947-5-1 and capable of switching micro loads of 24 VDC, 5 mA.
Non-contact Door Switch	The G9SX-NS must be used with D40A-2/D40A Non-contact Door Switches.
Relay with forcibly guided contacts	Use approved devices with forcibly guided contacts complying with IEC 61810-3 (EN 50205). For feedback, use devices with contacts capable of switching micro loads of 24 VDC, 5 mA.
Contactor	Use approved devices complying with IEC/EN 60947-4-1 for auxiliary contact linked with power contact (mirror contact). For feedback, use devices with contacts capable of switching micro loads of 24 VDC, 5 mA.
Other devices	Evaluate whether devices used are appropriate to satisfy the requirements of the safety category level.

Precautions for Safe Use

- Disconnect G9SX-NS□ from power supply when wiring. Devices connected to G9SX-NS□ may operate unexpectedly.
 - Turn OFF the load power supply before wiring. Failure to do so may cause electric shock.
 - Devices connected to the product may operate unexpectedly.
- Do not operate the product in atmospheres containing flammable or explosive gas. Arcs or heating of relays during switching may cause fire or explosion.
- Wire conductors correctly and verify the operation of the product before using the system in which the product is incorporated. Incorrect wiring may lead to loss of safety functions.
- Do not dismantle, repair, or modify the product. Doing so may lead to loss of safety functions.
- Use the G9SX within an enclosure with a IP54 degree of protection or higher according to IEC/EN 60529.
- Do not apply DC voltages exceeding the rated voltages, nor any AC voltages to G9SX-NS□. Do not connect to DC distribution network.
- Use a DC supply satisfying the requirements given below to prevent electric shock.
 - A DC power supply with double or reinforced insulation, for example, according to IEC/EN 60950 or EN 50178, or a transformer according to IEC/EN 61558.
 - A DC supply satisfying the requirements for class 2 circuits or limited voltage/current circuits stated in UL 508.
- Properly apply the specified voltages to the inputs. Applying inappropriate voltages may cause the product to fail to perform its specified function, which could lead to the loss of safety functions or damages to the product.
- Auxiliary error outputs and auxiliary monitoring outputs are NOT safety outputs. Do not use these outputs as safety outputs. Such incorrect use will cause loss of safety functions of the G9SX and its relevant system. Also logical AND connection outputs can only be used for logical AND connections with the G9SX-□.
- After installing the G9SX-NS□, qualified personnel must confirm the installation, and must conduct test operations and maintenance. The qualified personnel must be qualified and authorized to secure safety at each phases of design, installation, running, maintenance, and disposal of system.
- A qualified person in charge, who is familiar with the machine in which G9SX-NS□ is to be installed, must conduct and verify the installation.
- Perform daily and 6-month inspections for the G9SX-NS□. Otherwise, the system may fail to work properly, resulting in serious injury.
- Connect to the G9SX-NS□ only appropriate components or devices complying with relevant safety standards corresponding to the required level of safety category. Conformity to requirements of safety category must be determined as an entire system. It is recommended to consult an authorized certification body regarding assessment of conformity to the required safety level.
- OMRON is not responsible for conformity with any safety standards covering the customer's entire system.
- Be careful not to have your fingers caught when mounting terminal blocks.
- The service life will depend on the switching conditions. Be sure to check the actual operating conditions using the actual devices, and make sure that the number of switching operations will not cause performance problems.

Precautions for Correct Use

- Handle with Care.
Do not drop the product or expose it to excessive vibration or mechanical shock. The product may be damaged and may not function properly.
- Storage and Operating Conditions
Do not store or use the products under the following conditions.
 - In direct sunlight
 - At ambient temperatures not between -10 and 55°C
 - At relative humidity not between 25% and 85% or under temperature changes that could causes condensation
 - In corrosive or combustible gases
 - Where subject to vibration or mechanical shock beyond the rated values
 - Where subject to contact with water, oil, or chemicals
 - In an atmosphere containing excessive dust, saline, or metal powder
 - Where iron filings or powder may fall on the product
- D40A is a class A product. In residential areas D40A may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- Mounting
Mount the G9SX-NS to a DIN rail using End Plates (PFP-M, not included with the product) so that the G9SX-NS does not fall off of the rails due to vibration or other causes, especially when the length of DIN railing is short compared to the width of the G9SX-NS.
- The following space must be provided around the G9SX-NS to enable applying the rated current to the outputs of the G9SX-NS, to ensure sufficient ventilation, and to enable wiring:
 - At least 25 mm between side surfaces of the G9SX-NS
 - At least 50 mm above the top surface of the G9SX-NS and below the bottom surface of the G9SX-NS.



6. Wiring

- G9SX-NS-RT (with Screw Terminals)
 - Use the following to wire the G9SX-NS-RT.

Solid wire (steel wire)	0.2 to 2.5 mm ² (AWG24 to AWG12)
Stranded wire (flexible wire)	0.2 to 2.5 mm ² (AWG24 to AWG12)

- Tighten each screw to the specified torque of 0.5 to 0.6 N·m, or the G9SX-NS may malfunction or generate heat.
 - Strip the wire for no longer than 7 mm.
- G9SX-NS-RC (with Spring-cage Terminals)
 - Use the following to wire the G9SX-NS-RC.

Solid wire (steel wire)	0.2 to 2.5 mm ² (AWG24 to AWG12)
Stranded wire (flexible wire)	0.2 to 2.5 mm ² (AWG24 to AWG12)

- Strip the wire for no longer than 7 mm.
- Logical AND Connections
 - Use VCTF cables or shielded cables for logical AND connections between Units.

7. Connecting G9SX-EX- Expansion Units

- Remove the terminating connector from the connector on the G9SX-NSA222-T03. Insert the connector on the connecting cable of Expansion Unit into the connector on the G9SX-NSA222-T03.
- Connect the terminating connector to the connector on the Expansion Unit at the end position.
When the G9SX-NSA222-T03 is used without Expansion Units, leave the terminating connector on the G9SX-NSA222-T03.
- Do not remove the terminating connector or connecting cables of Expansion Units while the system is operating.
- Before applying the supply voltage, confirm that the connectors are locked firmly.
- All of the Expansion Units must be supplied with its specified voltages within 10 s after the connected G9SX-NSA222-T03 is supplied with voltage.
Otherwise, the G9SX-NSA222-T03 will detect a power supply error for the Expansion Units.
- Use cables with a length of less than 100 m total to connect the safety inputs, feedback/reset inputs, and logical AND connection inputs and outputs.
- Set the time duration of OFF-delay to an appropriate value that does not cause the loss of safety functions of system.
- Logical AND connections between Units (Refer to *Functions* on page 80.)
 - To use logical AND connection inputs, enable the logical AND connection input for the G9SX-NS that will receive the inputs.
 - Connect the logical AND connection inputs appropriately to the logical AND connection outputs of the G9SX.
 - When configuring the safety system, be sure to consider that the delay of response time caused by logical AND connection does not degrade the safety functions of the system. (Refer to *Response Time and Operating Time* on page 73.)
- To determine safety distance to hazards, take into account the delay of safety outputs caused by the following time:
 - Response time of safety inputs
 - Response time of D40A-2/D40A Non-contact Door Switch inputs
 - Response time of logical AND connection input (Refer to *Response Time and Operating Time* on page 73.)
 - Preset OFF-delay time
 - Accuracy of OFF-delay time
- Start the rest of the system after 5 s or longer has passed since applying supply voltage to all G9SX- in the system.
- Be sure to ground the A2 terminal of the power supply to help prevent malfunctions caused by noise. Also, connect a surge absorber to each end of the coil on inductive loads to reduce noise generation. When sharing a power supply with a Light Curtain, use a DC power supply that will not fail for a momentary power interruption of 20 ms or less.
- Devices connected to the G9SX-NS may operate unexpectedly. When replacing the G9SX-NS, disconnect it from power supply.
- Adhesion of solvent
Do not allow organic solvents, such as alcohol, thinner, trichloroethane, or gasoline, to come into contact with the product. Such solvents make the markings on G9SX-NS illegible and cause deterioration of parts.
- Do not mix AC and DC circuits for contact outputs in a single G9SX-EX-. When using AC and DC circuits, connect at least two G9SX-EX- Units and use them respectively as dedicated DC-circuit and AC-circuit contact outputs.

17. Safety Application Controller's Relay durability depends greatly on the switching condition. Confirm the actual conditions of operation in which the Relay will be used in order to make sure the permissible number of switching operations.
When the accumulated number of operation exceeds its permissible range, it can cause failure of reset of safety control circuit. In such case, please replace the Relay or the Safety Application Controller immediately.
If the Relay or the Safety Application Controller is used continuously without replacing, then it can lead to loss of safety function.
18. Operate the reset input more than 0.4 seconds immediately after the safety outputs are OFF.
G9SX does not accept the reset input from when the outputs are turned ON and until 0.4 seconds passes after the outputs are turned OFF.

Safety Categories (EN ISO13849-1)

You can use the D40A-2 and D40Z with the G9SX-NS□ for applications in PLe and Safety Category 4 environments defined in the EN ISO13849-1 European standard and the ISO 13849-1 international standard.

You can use the D40A with the G9SX-NS□ for applications in PLd and Safety Category 3 environments defined in the EN ISO13849-1 European standard and the ISO 13849-1 international standard. Compliance was determined using circuit examples specified by OMRON and may not be applicable to all conditions. Safety categories are determined for the overall safety control system. Confirm compliance sufficiently with your application.

Requirements for Safety Category 3 or 4 (EN ISO 13849-1)

1. Connect external input D1-D2 and external output D3-D4 to D40A-2/D40Z (Category 4)/D40A (Category 3) Switches.
2. Input two channels for external inputs T11-T12 and T21-T22.
3. Input external inputs T11-T12 and T21-T22 from switches with direct opening mechanisms. For limit switches, make sure at least one of the switches has a direct opening mechanism.
4. Input the NC signal from the contactor to T31-T32 for a manual reset and to T31-T33 for an auto reset. (Refer to *Application Examples* on page 85)
5. Make sure to connect the A2 terminal to ground.

Standards Certification

Directives

- EMC Directive
- Machinery Directive

Standards/UL Certification

- EN ISO 13849-1 PLe/Safety Category 4 (Used with D40A-2 and D40Z)
- EN ISO 13849-1 PLd/Safety Category 3 (Used with D40A)
- IEC/EN 61508 SIL3
- IEC/EN 61000-6-2
- IEC/EN 61000-6-4
- UL508
- UL1998
- CAN/CSA C22.2 No.142