

Compact Non-contact Door Switch

D40Z

Wide range of applications
at the highest safety level



» Visible safety

» Ultimate safety level

» Versatile applications

realizing

Compliant with Safety Category 4/PLe (ISO 13849-1)

The compact non-contact feature allows easier installation for a wide range of environments.

The D40Z can be used in work environments under any risk level.
Its combination with safety controllers allows for a wide range of applications.



〈D40Z〉

Safety Categories

Different types of machines will have different levels of associated risk. As an index for determining the function to secure safety (safety function) based on the risk evaluation, the ISO 13849-1 which stipulates safety-related parts of control systems, categorizes the capability to maintain safety functions in the event of control system failures as category B to 4.

Performance Level (PL)

An index of the safety control system performance level shared by a person who implements risk assessment and a person who designs a machine is called Performance Level (hereinafter abbreviated as "PL") and has 5 levels of evaluation from "a" to "e".

For details on safety category and PL, refer to page 5.

The highest safety level

ISO 13849-1 (Safety Category 4/PLe) achieved with the non-contact door switch

The D40Z conforms to the international standard ISO 13849-1 (Safety Category 4/PLe) enabling use in hazardous work environments.

• Redundant internal circuit

The thorough pursuit of safety through mutual checking by double CPUs.

• Self-diagnosis function

Made possible by adopting OMRON's original safety-purpose electromagnetic induction method.

The combination with safety controllers allows for a wide range of applications.

The D40Z can be connected to Safety Controller G9SP or G9SX-NS□.

The controller can be selected according to application type.

Up to 30 units can be connected to one controller.

Up to 30 units can be connected to one controller while maintaining Safety Category 4 (ISO 13849-1).

Note: The G9SP supports 2 channels of 15 units each. For more information, refer to "Applicable level and the number of connections according to controller combination" on page 5.

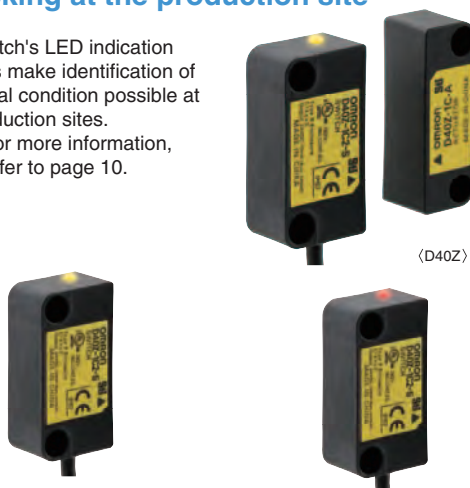


Visible safety

Checking at the production site

The switch's LED indication patterns make identification of abnormal condition possible at the production sites.

Note: For more information, refer to page 10.



Yellow LED ON : Door closed (normal)

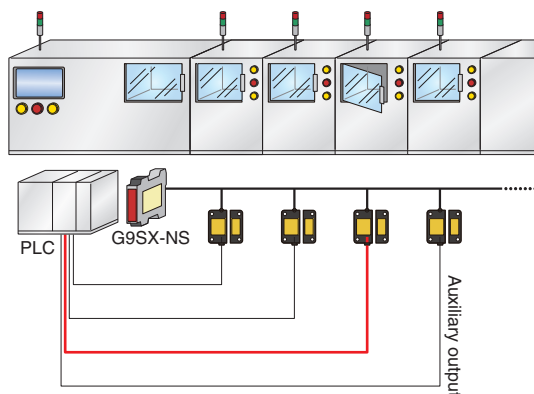
Yellow LED Blinking : When connected in series; Other D40Zs are turned OFF etc.

Red LED ON : Door Open

Red LED Blinking : Error occurred

Centralized monitoring

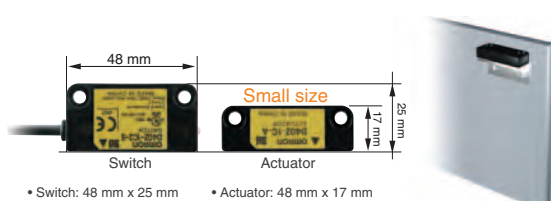
Bipolar NPN/PNP allows for easy connection with any PLC. The error location can be easily identified. Using a branch relay for a different pole is not required.



Compact body and non-contact feature allows easier mounting

Compact actuator

The D40Z requires less space even inside the door.

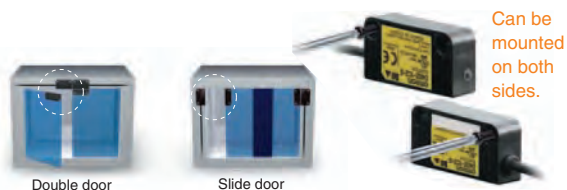


• Switch: 48 mm x 25 mm

• Actuator: 48 mm x 17 mm

Mountable on both sides

The D40Z can be mounted to any door as the above feature allows the user to select the direction to run the cable.



For an easier and safer work environment in all industries.
The application of the D40Z will continue to increase in all environments.



Automotive manufacturing (multi-axis robot)

Position detection of a robot (hazard)

Problem

Detecting the position of a multi-axis robot is difficult using a limit switch. Additionally, it is easy to disable the function.

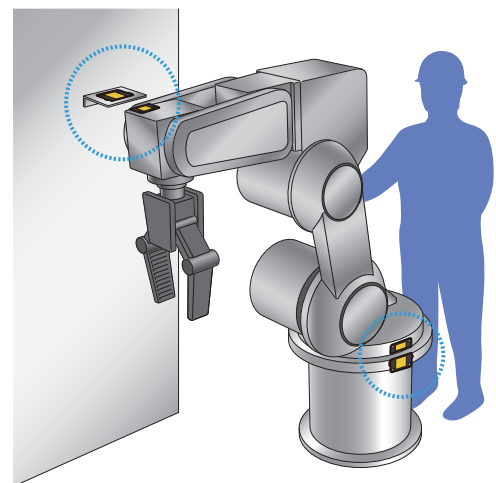
Solution

The non-contact door switch enables ease in detecting the robot position which prevents the operator from easily disabling the function. The maintenance work is safer than ever as the switch conforms to ISO 13849-1 (safety category 4/PLe).

Key factor

Wide detection area

ISO 13849-1 (Safety Category 4/PLe)



D40Z



FPD

Manufacturing process

Problem

There are too many doors, and it takes too long to identify the location of a failure when it occurs.

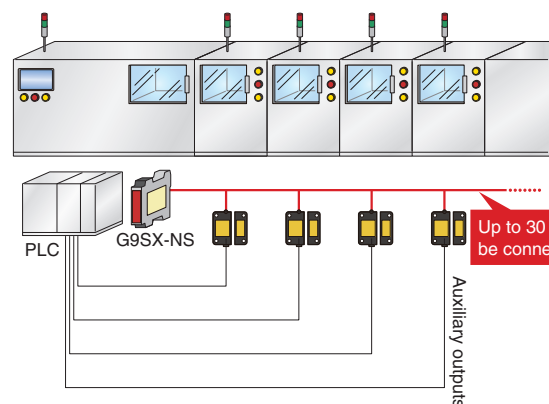
Solution

Auxiliary output is provided for each switch. As each switch can be monitored, it is possible to pinpoint the location of the failure.

Key factor

PNP/NPN

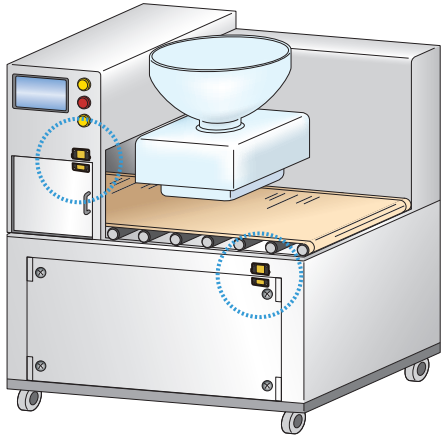
Up to 30 units connectable



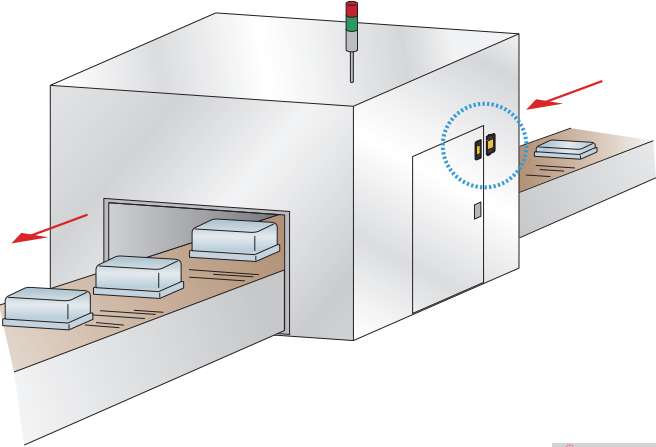
D40Z

The D40Z solves problems at the production sites of various industries that require safety (FPD, automotive parts, food, packaging, multi-axis robot, etc).

The D40Z supports a wide range of risk levels, contributing to a safer environment at production sites for various industries' applications.

Food		Material processing
Problem	The machine's small size limits the space available to install a switch.	
Solution	The D40Z's compact size fits into a narrow space (Switch: 48x25 mm, Actuator: 48x17 mm). The D40Z can be used at an ambient operating temperature of up to 65°C.	
Key factor	Compact size Improvement on ambient operating temperature	

 **D40Z**

Automotive parts		Manufacturing process for secondary batteries
Problem	Although safety is ensured with a contact door switch, particles are generated which affect product quality.	
Solution	With the non-contact door switch D40Z, no particles will be generated through friction.	
Key factor	No particles generation	

 **D40Z**

A wide range of choices for the versatile applications

A combination of non-contact door switches and safety controllers can be selected according to the application or the required risk level.

Mounting compatibility with the D40A allows for standardization of machine design.

Non-contact Door Switch

■ Applicable level and the number of connections according to controller combination

Safety
Category
/PL

4/PLe



D40Z

Combination	Category	PL (maximum value)	Number of connectable D40Z Series
G9SP + D40Z	4	PLe	15 x 2 channels*
G9SX-NS + D40Z	4	PLe	30
G9SX-NSA + D40Z	4	PLe	30

3/PLd



D40A

Combination	Category	PL (maximum value)	Number of connectable D40Z Series
G9SP + D40A	3	PLd	15 x 2 channels*
G9SX-NS + D40A	3	PLd	30
G9SX-NSA + D40A	3	PLd	30

* G9SP-N10S supports 15 x 1 channel.

Safety Controller G9SP

- Flexible programming
- Extensive system configurations
- Decreased work hours by convenient configurator



G9SP Series Catalog
Catalog No.: J181

Non-contact Door Switch Controller G9SX-NS

- Easy expansion of output points with an expansion unit
- Improved maintainability with LED display
- No special programming required



D40A/G9SX-NS Catalog
Catalog No.: C140

Compact non-contact Door Switch D40Z

Supports ISO 13849-1 (Safety Category 4/PLe).
Can be used on higher risk level applications by connecting to Safety Controllers.

- Supports a wide range of applications in combination with Safety Controller G9SP or G9SX-NS□.
- Up to 30 units can be connected.
Ideal for middle to large scale device applications.
- Contributes to shortening the time it takes to find the cause of failure by the switch's LED display patterns.
- Photocoupler monitor output allows connection to a general-purpose PLC (NPN type).
- Compatibility with the D40A allows standardization of machine design.
- Compact Non-contact Door Switch can be mounted from both sides.



Refer to "Safety Precautions" on page 14

Model Number Structure

Model Number Legend

Non-contact Door Switch (Switch/Actuator)

D40Z-□□□
1 2 3

1 Type

1: Standard model (Switch/Actuator)

2 Auxiliary Output

C: 1 NO (Photocoupler Output)

3 Cable length

2: 2 m

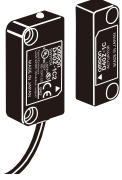
5: 5 m

Note: Must be used in combination with a G9SP Safety Controller or G9SX-NS□ Non-contact Door Switch Controller.
For details, refer to G9SP Series Catalog (Cat.No.J181) or D40A/G9SX-NS Catalog (Cat.No.C140).

D40Z

Ordering Information

Non-contact Door Switch (Switch/Actuator)

Classification	Appearance	Auxiliary monitoring output	Cable length	Model
Standard models		Photocoupler outputs *1	2 m	D40Z-1C2
			5 m	D40Z-1C5

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

*1. Photocoupler output. Load current: 10 mA

G9SP Series

Name	No. of I/O points				Unit version	Model
	Safety inputs	Test outputs	Safety outputs	Standard outputs		
Safety Controller	10	4	Semiconductor outputs: 4	4	Ver.1.0	G9SP-N10S
	10	6	Semiconductor outputs: 16	--		G9SP-N10D
	20	6	Semiconductor outputs: 8	--		G9SP-N20S

Non-contact Door Switch Controller

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

Specifications

Ratings and Characteristics (Non-contact Door Switch)

Item	Model	D40Z-1C□
Operating characteristics	Operating distance (OFF → ON)	5 mm min. *1
	Operating distance (ON → OFF)	15 mm max. *1
	Differential travel	Refer to "Detection Ranges (Typical Characteristics Data)" on page 9.
	Influence of temperature	Refer to "Detection Ranges (Typical Characteristics Data)" on page 9.
	Repeat accuracy	±10% of operating distance at 23 °C
	Response time (ON → OFF) *2	25 ms max.
	Operating time (OFF → ON) *2	100 ms max. (Distance between the switch and actuator is 5 mm)
Ambient operating temperature		-10 to 65 °C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Insulation resistance (between charged parts and case)		50 MΩ max. (at 500 VDC)
Dielectric strength (between charged parts and case)		1,000 VAC for 1 min
Degree of contamination		3
Electromagnetic compatibility		IEC/EN 60497-5-3 compliant
Vibration resistance		10 to 55 to 10 Hz (single amplitude: 0.75 mm, double amplitude: 1.5 mm)
Shock resistance		300 m/s ² min.
Degree of protection		IP67
Material		PBT resin
Mounting method		M4 screws
Terminal screw tightening torque		1 N·m
Power supply voltage		24 V DC +10%/-15%
Power consumption *3		0.5 W max.
Auxiliary monitoring output		Photocoupler output: 24 V DC, load current: 10 mA
LED indicators		Actuator not detected (lights in red); error occurred (blinks in red), actuator detected (lights in yellow), actuator detected and Non-contact Door Switch input OFF (blinks in yellow)
Connecting cables		2 m, 5 m
Number of connectable switches *4		30 max. (wiring length: 100 m max.)
Weight		Switch: approx. 175 g, actuator: approx. 20 g (D40Z-1C5)

*1. This is the distance where the switch operates from OFF to ON when approaching and the distance where the switch operates from ON to OFF when separating when the switch and actuator target marks are on the same axis, and the sensing surface coincide. For details, refer to "Detection Ranges (Typical Characteristics Data)" on page 9.

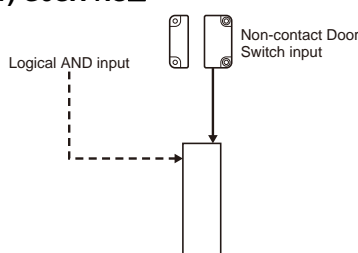
*2. Indicates the value of the non-contact door switch output.

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

*4. For details, refer to item 17 on page 16.

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	45 ms *3	200 ms *4
Logical AND input	15 ms	100 ms

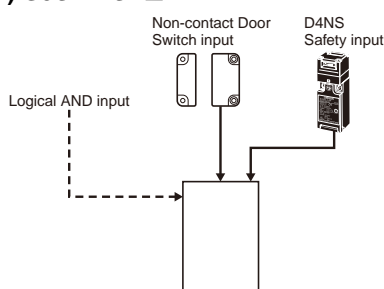
*1. The maximum response time is the time it takes the output to switch from ON to OFF after the input switches from ON to OFF.

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

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

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

(2) G9SX-NSA□



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

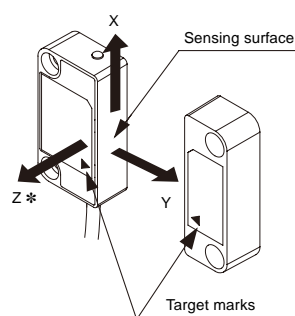
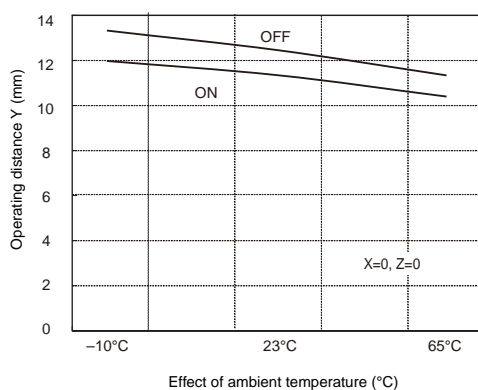
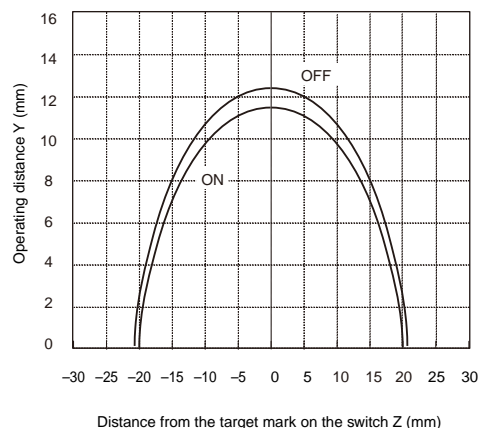
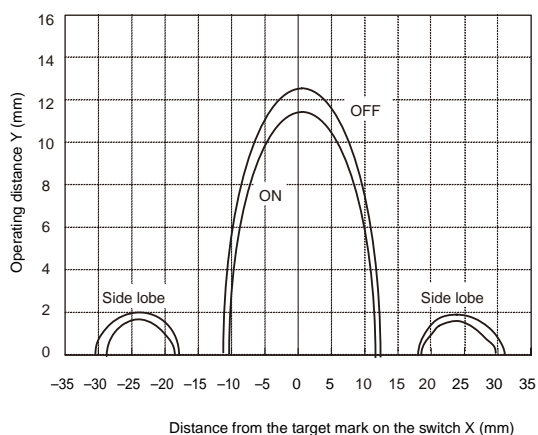
*1. The maximum response time is the time it takes the output to switch from ON to OFF after the input switches from ON to OFF.

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

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

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

Note: The response time and operating time of the G9SP varies depending on the cycle time. For details, refer to the G9SP Series User's Manual (Cat.No.Z922).



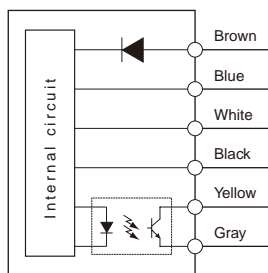
*The movement of the arrow direction indicates the positive direction on the graph.

- Note:**
1. The operating distance is the distance between the switch and actuator sensing surfaces.
 2. Data in the diagram is typical data at an ambient temperature of 23. Actual operating values may vary. The operating distance may be affected by ambient metal, magnet catches, and temperature.
 3. Detection may occur other than on the detection surfaces of the switch and actuator. Before you use the switch and actuator, refer to "Switch and Actuator Operation" on page 16 to set the detection surfaces of the switch and actuator face to face.









Connections

Internal Connection

D40Z-1C□



Troubleshooting

LED indicator	Causes and corrective actions *1	
 OFF	Fault in power supply input (brown/blue)	Power supply input may be improperly wired. Check and correct wiring of brown and blue lines. Refer to "Wiring of Inputs and Outputs" on page 11.
		Power supply voltage to D40Z may be insufficient. Check the power supply voltage (between brown and blue lines) of D40Z fills ratings. Refer to "Specifications" on page 8.
		The wiring length or size of the wire may not be to the specification. Check the wiring length and size of the wire. Refer to "Precautions for Correct Use".
 Red continuously blinking	Noise or D40Z failure	There may be excessive noise. Check and correct ambient noise environment. There may be a failure in internal circuit. Replace with a new D40Z.
	Fault in power supply input (brown/blue)	Power supply voltage to D40Z may be insufficient. Check the power supply voltage (between brown and blue cables) of D40Z fills ratings. Refer to "Specifications" on page 8.
		The wiring length or size of the wire may not be to the specification. Check the wiring length and size of the wire. Refer to "Precautions for Correct Use".
 Red blinks once for 2s	Fault in Non-contact door switch output (black)	Black line may be shorted to other line. Check and correct wiring of black line if the black line is shorted to other lines. Refer to "Wiring of Inputs and Outputs" on page 11.
 Red blinks twice for 2s	Sensing fault	Invalid actuator may be in a close range to switch. Use the dedicated actuator.
 Red blinks thrice for 2s	Fault in Non-contact door switch input (white)	Faulty signal may be input to white line. Check and correct wiring of white line. Refer to "Wiring of Inputs and Outputs" on page 11.
 Yellow blinking	OFF state of another D40Z	Another D40Z may be in OFF state. Check status of another D40Z connected to the white line and the wiring. Refer to "Switch and Actuator Operation" on page 16 or "Wiring of Inputs and Outputs" on page 11.
	Fault in Non-contact door switch input (white)	White line may be disconnected. Check and correct wiring of white line. Refer to "Wiring of Inputs and Outputs" on page 11.
 Red Solid-ON #2	Actuator fault	There may be a failure in actuator. Replace with a new D40Z.
 Yellow Solid-ON #3	Fault in Non-contact door switch input (white)	White line connected to D1 terminal (test output terminal of G9SP) of G9SX-NS□ may be shorted to other line. Check and correct wiring of white line connected to D1 terminal (test output terminal of G9SP) of G9SX-NS□ if the white line is shorted to other lines. Refer to "Wiring of Inputs and Outputs" on page 11.
	Fault in Non-contact door switch output (black)	Black line connected to D2 terminal (safety input terminal of G9SP) of G9SX-NS□ may be disconnected. Check and correct wiring of black line connected to D2 terminal (safety input terminal of G9SP) of G9SX-NS□. Refer to "Wiring of Inputs and Outputs" on page 11.

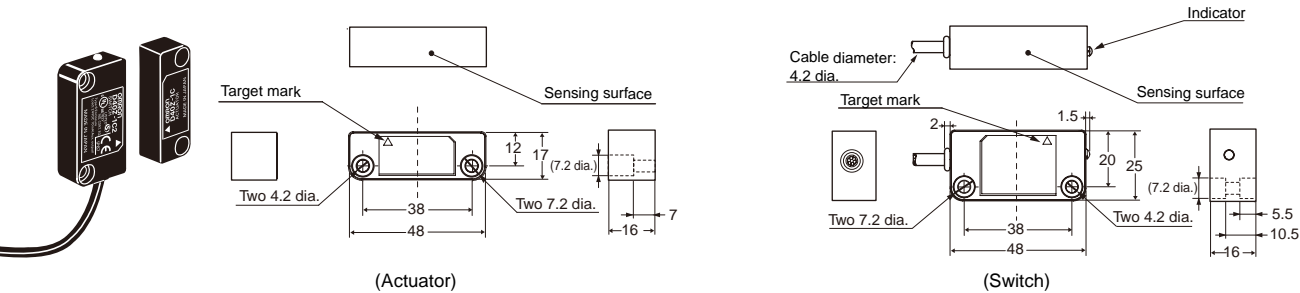
*1. Another possible cause is a failure in internal circuit. In this case, replace with a new D40Z.

Yet another possible cause is excessive noise. In this case, check and correct ambient noise environment.

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

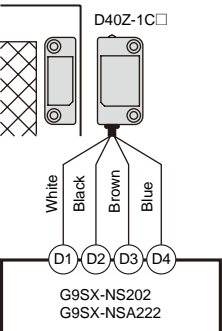
*3. The case where the system stops though the guard door is closed (Switch detects actuator) is indicated.

Non-contact Door Switch (Switch/Actuator)
D40Z-1C2
D40Z-1C5



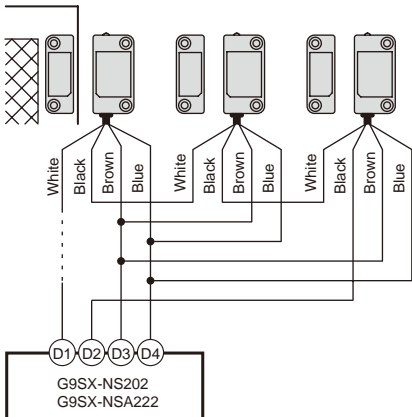
Non-contact Door Switch and Non-contact Door Switch Controller or Safety Controller Wiring

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

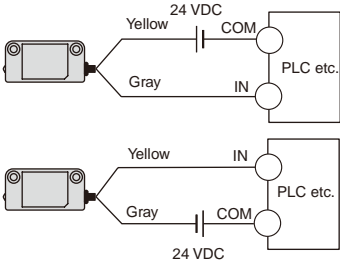


Example of connection to multiple switches

Connect up to 30 Non-contact Door Switches.



Example of auxiliary outputs



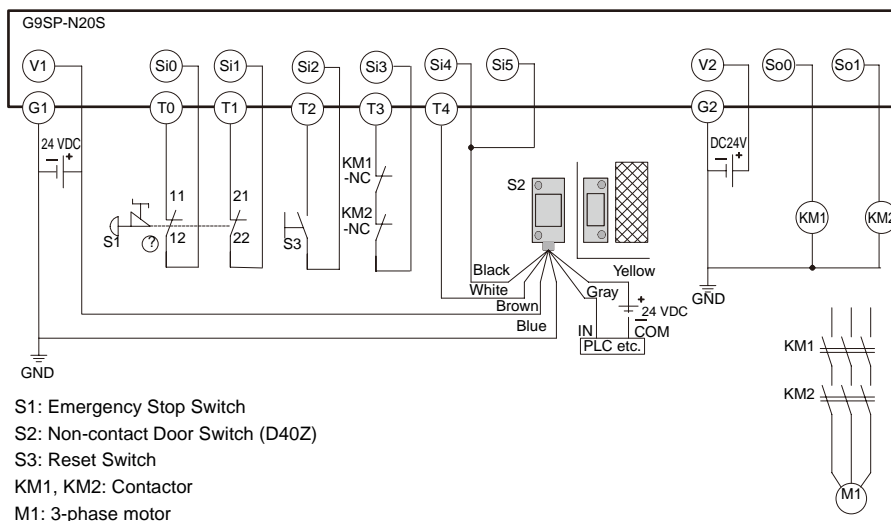
- Note:** 1. The auxiliary output load current must be 10 mA max. Wrong connection may lead to a failure of the auxiliary output circuit.
2. For details on other wiring, refer to Application Examples on page 12 or later.

Wiring of Inputs and Outputs

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

Application Examples

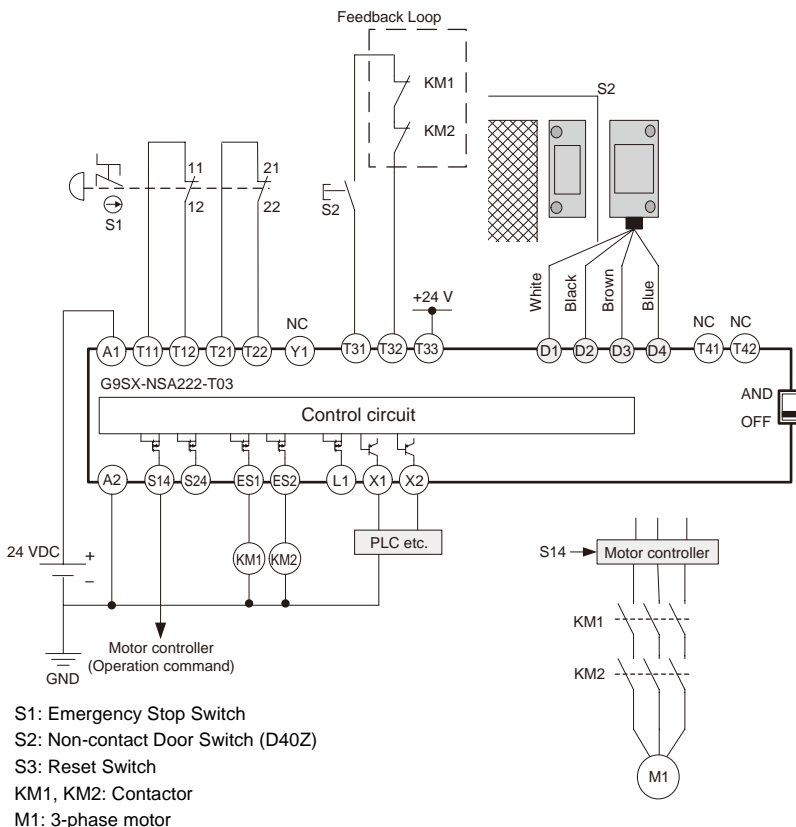
G9SP-N20S(24 VDC) (2-channel Emergency Stop Switch Inputs + Non-contact Door Switch/Manual Reset)



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

- Note: 1.** The PL and category that correspond to this circuit example vary depending on the program configured to the G9SP-N20S. For details, refer to "G9SP Series User's Manual (Cat.No.Z922)".
- 2.** For details on terminal arrangement, refer to "G9SP Series User's Manual (Cat.No.Z922)".
- 3.** Wire auxiliary outputs correctly. Incorrect wiring may lead to a failure of the auxiliary output circuit.

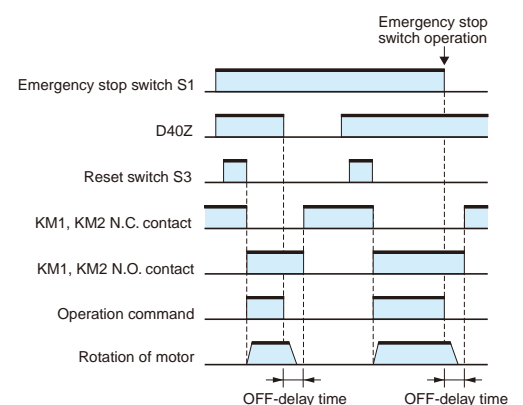
G9SX-NSA222-T03-□ (24 VDC) (2-channel Emergency Stop Switch Inputs + Non-contact Door Switch/Manual Reset)

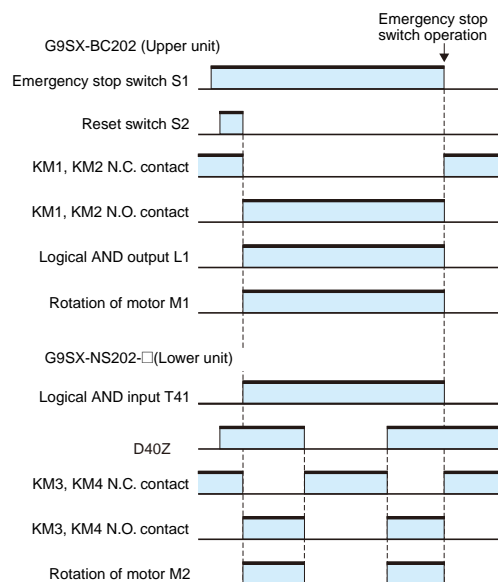
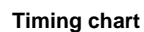


S1: Emergency Stop Switch
 S2: Non-contact Door Switch (D40Z)
 S3: Reset Switch
 KM1, KM2: Contactor
 M1: 3-phase motor

- Note: 1.** The example corresponds to category 4. For details, refer to "Safety Category (EN 954-1, ISO 13849-1)" on page 16.

Timing chart





Note: 1. The example corresponds to category 4.
For details, refer to “Safety Category (EN 954-1, ISO 13849-1)” on page 16.

Safety Precautions

For details, refer to the "*Precautions for All Switches*" and "*Precautions for All Safety Door Switches*" on "*Best Component Catalog (Cat.No.Y106)*".

For details on Safety Controllers, refer to G9SP Series Catalog (Cat.No.J181) or D40A/G9SX-NS Catalog (Cat.No.C140).

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 Edge Controller properly so that supply voltages or voltages for loads do NOT touch the safety outputs accidentally.



Serious injury may possibly occur due to breakdown of safety outputs.

Apply protection circuitry against back electromotive force in case connecting inductive loads to safety outputs.



Serious injury may possibly occur due to loss of required safety functions.

Use appropriate devices referring to the following table.



The machine may start operating and may result in serious injury or death. Do not put the actuator close to the switch when the door is open.



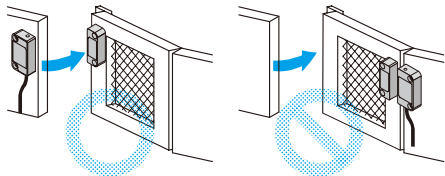
Control device	Requirements
Emergency Stop Switch	Use approved device with direct opening mechanism complying with IEC/EN 60947-5-1.
Safety Door Switch, Safety Limit Switch	Use approved device with direct opening mechanism complying with IEC/EN 60947-5-1 and capable of switching micro loads of 24 VDC, 5 mA.
Non-contact Door Switch	The G9SX-NS must be used with D40Z Non-contact Door Switches.
Relay with forcibly guided contacts	Use approved devices with forcibly guided contacts complying with EN 50205. For feedback, use devices with contacts capable of switching micro loads of 24 VDC, 5 mA.
Contactor	Use contactors with forcibly guided mechanism to input the signal to the Feedback/Reset input of the G9SX-NS through the NC contact of the contactor. For feedback, use devices with contacts capable of switching micro loads of 24 VDC, 5 mA. Failure to open contacts of a contactor cannot be detected by connecting NC contact of the contactor without a forcibly guided mechanism to the Feedback/Reset input.
Other devices	Evaluate whether devices used are appropriate to satisfy the requirements of the safety category level.

Precautions for Safe Use

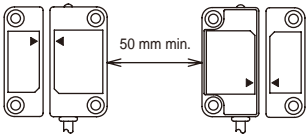
1. Disconnect the G9SX-NS from the power supply when wiring the D40Z. Devices connected to the product may operate unexpectedly.
2. Do not operate the product in atmospheres containing flammable or explosive gas.
3. Wire conductors correctly and verify the operation of the product before using the system in which the product is incorporated. Incorrect wiring may lead to loss of safety functions.
4. Auxiliary monitoring outputs are NOT safety outputs. Do not use auxiliary monitoring outputs as safety outputs. Such incorrect use will cause loss of safety function of D40Z and peripheral devices.
5. After installing the D40Z, 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 the system.
6. A qualified person in charge, who is familiar with the machine in which the D40Z is to be installed, must conduct and verify the installation.
7. Be sure to inspect the D40Z daily and every 6 months. Otherwise, serious injury may possibly occur due to system malfunctions.
8. Do not dismantle, repair, or modify the product. Doing so may lead to loss of safety functions.
9. Do not apply DC voltages exceeding the rated voltages, nor any AC voltages to D40Z.
10. 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.
11. Connect the D40Z to only appropriate components or devices complying with relevant safety standards corresponding to the required level of safety category. Conformity to requirements of the safety category must be determined for the entire system. It is recommended to consult an authorized certification body regarding assessment of conformity to the required safety level.

Precautions for Correct Use

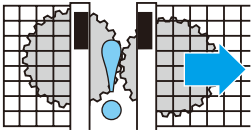
- 1. The D40Z must be used with a designated actuator and controller to comply with EN ISO 13849-1.
- 2. Handle with care
Do not drop the product or expose it to excessive vibration or mechanical shock. The product may be damaged and may not function properly.
- 3. Storage and operating conditions
Do not store or use the products under the following conditions.
 - 1. In direct sunlight
 - 2. At ambient temperatures not between -10 and 65°C
 - 3. At relative humidity not between 25% and 85%
 - 4. In corrosive or combustible gases
 - 5. Where subject to vibration or mechanical shock beyond the rated values
 - 6. Where subject to contact with oil or chemicals
 - 7. In an atmosphere containing excessive dust, saline, or metal powder
 - 8. Where iron filings or powder may fall on the product
- 4. Do not use D40Z at altitudes over 1,000 meters.
- 5. Do not use to connect other switches or sensors to the wire conductors of D40Z.
- 6. Disconnect D40Z and the controller connected to D40Z from power supply when replacing D40Z. Failure to do so may cause unexpected operation of devices connected to D40Z.
- 7. Keep D40Z from solvent such as alcohol, thinner, trichloroethane or gasoline. Such solvents make the marking on D40Z illegible and cause deterioration of parts.
- 8. Do not use D40Z in the magnetic field of 1.5 mT or more, otherwise D40Z may not function properly.
- 9. Do not use D40Z in the water or continuous water exposure environment, otherwise water may leak into D40Z. (An enclosure of IP67 rating, which D40Z is rated, protects against temporary immersion in water.)
- 10. Do not use D40Z switch or actuator as a stopper. Use a stopper to protect the switch and the actuator. Keep a distance of at least 1 mm between the switch and the actuator.
- 11. Be sure to install D40Z switch and actuator in such as appropriate distance that does not create a gap accessible to the hazard.



12. When installing two or more adjacent switches, keep a distance of at least 50 mm from one another.



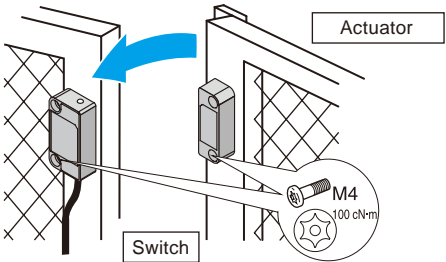
13. Be sure that the machine is stopped whenever the guard door is open.



14. Switch and actuator installed on a metallic material may affect the operating distance. When installing them on a metallic material, be sure to verify such an effect before using. Refer to the chart below for the estimated effect.

Distance from metallic materials	Operating distance
0 to 8 mm	Magnetic: Approximately 80% of the original value Aluminum: Approximately 90 to 110% of the original value
Larger than 8 mm	Not affected

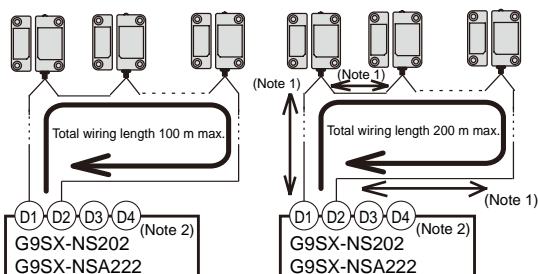
15. Use M4 screws and washers to install the switch and actuator. Tighten the screws with a specified torque. After installing and commissioning, coat the switch-actuator fixing screws with tamper-proof varnish or similar compound for locking. Using anaerobic locking compounds can have a detrimental effect on the plastic switch case if the compounds contact with the switch case.



16. Wiring
- 1. Stranded wire : 0.2 to 2.5 mm AWG24 to AWG12
Solid wire : 0.2 to 2.5 mm AWG24 to AWG12
 - 2. When not using auxiliary output, cut off the unused conductors and protect by insulating-taping to prevent contacting with other terminals.
 - 3. When you use an additional cable of 20 m or longer, use a multiconductor cable to group the white, black, brown, and blue lines together.

17. Use cables of a total length of 100 m max. to connect multiple D40Z switches. However, the total length of 200 m max. is possible depending on the number of D40Z switches connected. The supply voltage to D40Z may decrease by the voltage drop depending on the cable or the wiring configuration. Check the power-supply voltage is in the rated range.

30 or less D40Z connected 15 or less D40Z connected



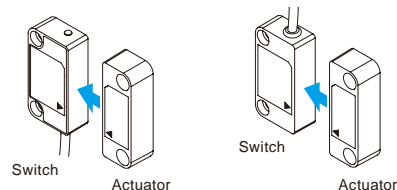
Note 1. The wiring length between the products must be 100 m max.

Note 2. For details on connection terminal and wiring of G9SP, refer to the G9SP Manual (Cat.No.Z922).

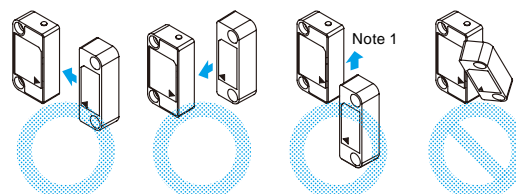
18. D40Z is a class A product. In residential areas D40Z may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
19. D40Z may not function properly in surrounding environment with strong electromagnetic equipment such as RFID system, proximity sensor, motor, inverter, and switching power supply. If you use D40Z near such equipment, be sure to verify effects of such equipment on D40Z before using.
20. Handle cables with care:
1. For bending cables, it is recommended to bend them with a radius of bend no less than six times the cable outer diameter.
 2. Do not apply a tensile strength of 50N or greater to the cables.
21. To determine safety distance to hazards, take into account the delay of non-contact door switch output caused the response time.
22. If there is any machine that has a large surge current (e.g., a motor) near D40Z, connected a surge absorber to D40Z between the blue and the other cables (white, black and brown) respectively, or between the yellow cable and gray cable.
- Suggested surge absorber's specification is as follows:
- Peak pulse power: 600 W (10/1000 μ s) or more (Per IEC 61000-4-5 (surge immunity))
 - Breakdown voltage: 27-33 V

Switch and Actuator Operation

Switch and Actuator Mounting Directions



Switch and actuator operating directions



Note 1. When using the operating direction along the sensing surface, be sure to install the switch and actuator so as not to be affected by the side lobe.

Safety Category (EN 954-1, ISO 13849-1)

When used in combination with the G9SP or G9SX-NS□, the D40Z can be used for the environments corresponding to performance level e and safety category 4 as required by EN ISO 13849-1. The settings are determined by circuit examples provided by OMRON, however, and may not be applicable depending on the operating conditions. Performance levels and safety categories are determined for the safety control system as a whole. You must confirm conformity for the entire system.

Approved Standards

D40Z-□/(used with G9SP or G9SP-NS□)

- EN 954-1 Cat. 4
- EN ISO 13849-1: 2008 Cat.4/PLe
- IEC/EN 61508 SIL 3
- EN 1088
- IEC/EN 60497-5-3 PDF-M
- IEC/EN 61000-6-4
- UL 508
- CAN/CSA C22.2 No.14

MEMO

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