# **Safety Precautions**

safety outputs.

table.

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



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



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.

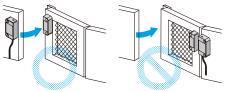
Control device	Requirements
Emergency Stop Switch	Use approved device with direct opening mechanism complying with IEC/EN 60947-5-1.
Safety Door Switch, Safety Limit Switch	Use approved device with direct opening mechanism complying with IEC/EN 60947-5-1 and capable of switching micro loads of 24 VDC, 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**

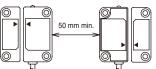
- 1. Disconnect the G9SX-NS from the power supply when wiring the D40Z.Devices connected to the product may operate unexpectedly.
- 2. Do not operate the product in atmospheres containing flammable or explosive gas.
- **3.** Wire conductors correctly and verify the operation of the product before using the system in which the product is incorporated. Incorrect wiring may lead to loss of safety functions.
- 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.
- 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**

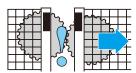
- 1. The D40Z must be used with a designated actuator and controller to comply with EN ISO 13849-1.
- 2. Handle with care
- Do not drop the product or expose it to excessive vibration or mechanical shock. The product may be damaged and may not function properly.
- **3.** Storage and operating conditions
  - 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.
- Do not use to connect other switches or sensors to the wire conductors of D40Z.
- 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.
- 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.
- 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.



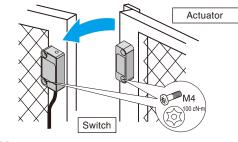
13.Be sure that the machine is stopped whenever the guard door is open.



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.

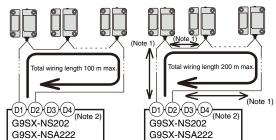


16.Wiring

- 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

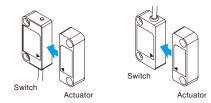


- Note 1.The wiring length between the products must be 100 m max.
- Note 2.For details on connection terminal and wiring of G9SP, refer to the G9SP Manual (Cat.No.Z922).
- 18.D40Z is a class A product. In residential areas D40Z may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- **19.**D40Z may not function properly in surrounding environment with strong electromagnetic equipment such as RFID system,

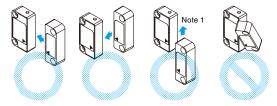
proximity sensor, motor, inverter, and switching power supply. If you use D40Z near such equipment, be sure to verify effects of such equipment on D40Z before using.

- 20.Handle cables with care:
  - 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 μs) 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

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