# Magnetic Non-contact Safety Switches

# F3S-TGR-N

### F3S-TGR-N replacement sensors for D40B - family

- OFF → ON (Sao) = 10mm (Reed version), 12mm (Coded version)
- ON → OFF (Sar) = 22mm (Reed version), 17mm (Coded version)
- Mechanically compatible to D40B family

## Ordering Information

| Model | Contact configuration | Housing material | Connection | Order code |
|---|---|---|---|---|
| Small sensor Reed contacts | 2NC+1NO | Plastic | 5m flying lead | **F3S-TGR-NSPR-21-05** |
| Small sensor Reed contacts | 2NC+1NO | Plastic | 10m flying lead | **F3S-TGR-NSPR-21-10** |
| Small sensor Reed contacts | 2NC+1NO | Plastic | M12 - 8pin | **F3S-TGR-NSPR-21-M1J8** |
| Small sensor Coded contacts | 2NC+1NO | Plastic | 5m flying lead | **F3S-TGR-NSPC-21-05** |
| Small sensor Coded contacts | 2NC+1NO | Plastic | 10m flying lead | **F3S-TGR-NSPC-21-10** |
| Small sensor Coded contacts | 2NC+1NO | Plastic | M12 - 8pin | **F3S-TGR-NSPC-21-M1J8** |
| Compact sensor Reed contacts | 2NC+1NO | Plastic | 5m flying lead | **F3S-TGR-NCPR-21-05** |
| Compact sensor Reed contacts | 2NC+1NO | Plastic | 10m flying lead | **F3S-TGR-NCPR-21-10** |
| Wide body sensor Reed contacts | 2NC+1NO | Plastic | 5m flying lead | **F3S-TGR-NWPR-21-05** |
| Wide body sensor Reed contacts | 2NC+1NO | Plastic | 10m flying lead | **F3S-TGR-NWPR-21-10** |

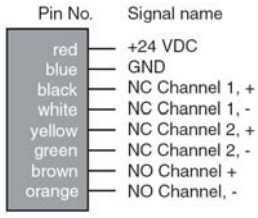
## Specifications

| | | NSPC | NSPR | NCPR | NWPR |
|---|---|---|---|---|---|
| Operating distance | OFF → ON (Sao) | 10mm | 10mm | 10mm | 12mm |
| | On → OFF (Sar) | 20mm | 22mm | 22mm | 22mm |
| Actuator approach speed | Min. | 4mm/s | | | |
| | Max. | 1000mm/s | | | |
| Switching frequency | | 1Hz | | | |
| Operating temperature | | -25°C …+80°C | | | |
| Enclosure protection | | IP 67 | | | |
| Housing material | | Black Polyester | | Red Polyester | Black Polyester |
| Mounting bolts | | 2 x M4 recommended | | | |
| Tightening torque | | 0,8 Nm | 1,0 Nm | | |
| Mounting position | | Any | | | |
| Mechanical life expectancy | | 10.000.000 cycles | | | |
| Electrical life expectancy | | 1.000.000 cycles | | | |
| | Derating Safety Factor 2 | 2.000.000 cycles @ 24VDC/100mA | | | |
| Power supply | | 24VDC±15%, 50mA | n.a. | | |
| Contact release time | | Max. 2ms | | | |
| Initial contact resistance | | Max. 500 mΩ | | | |
| Switching current | | Min. 1mA@10VDC | Min. 10mA@10VDC | | |
| Max. Rated load | NC contact | 0,2A @ 24VDC | 1,0A @ 250VAC | | 2,0A @ 250VAC |
| | NO contact | 0,2A @ 24VDC | 0,2A @ 24VDC | | 0,2A @ 24VDC |
| Insulation resistance | | 100MΩ | | | |
| Rated insulation voltage | | 250VAC | | | |
| Cable diameter | | 6mm | | | |
| Approved Standards | | Up to cat. 4; PL=e depending on system architecture (using OMRON G9S_ or NE_A controllers); Nop = 192/day; Proof Test Interval = 47 years; MTTFd = 470years | | | |
| | | Up to cat. 3 with D4B-J_ controller | | | |
| | | | | | |
| | | EN ISO 13849-1, EN 60204-1, EN/IEC 60947-5-3, UL 508, CSA 22.2, BS 5304, EN 1088-1 conformance | | | |

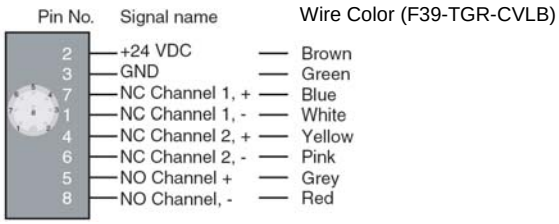
## Connection diagram

### Coded version

Cable version

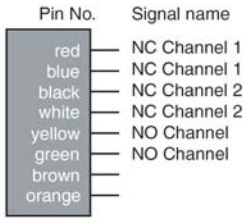



M12 connector version

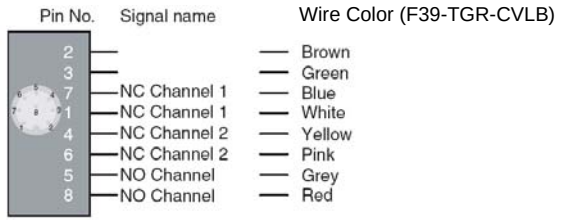



### Reed version

Cable version

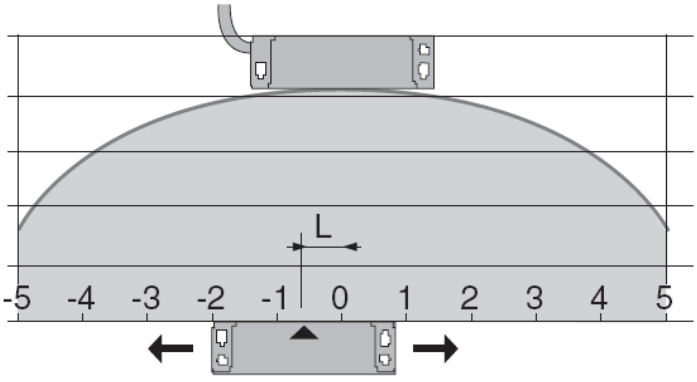



M12 connector version



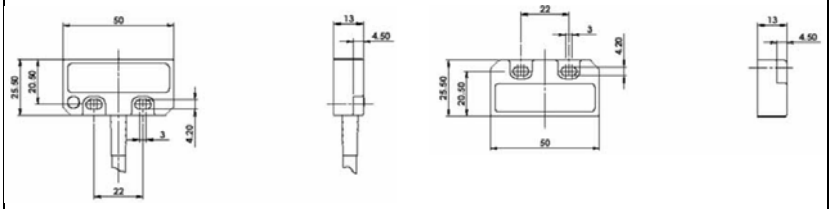
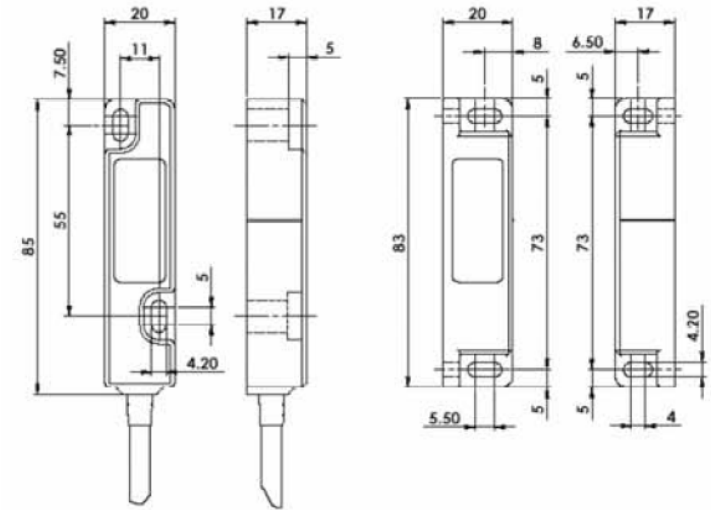
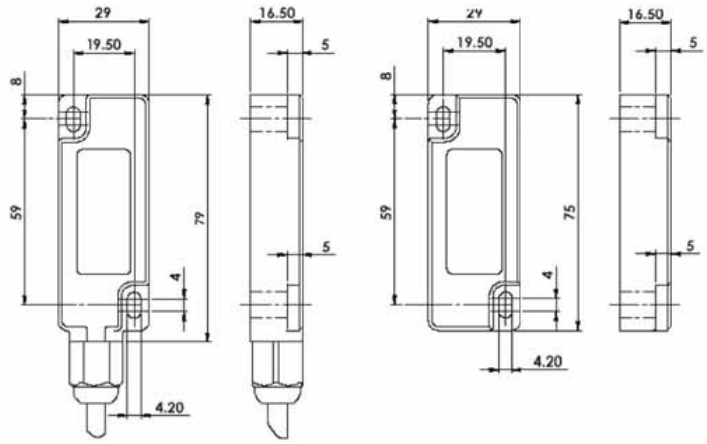

Note: If the auxiliary circuit is not fitted or not used then cut and discard the Yellow and Green Conductors.

## Operating Characteristics




5 mm misalignment tolerance after setting

## Dimensions (Unit: mm)

| | | |
|---|---|---|
| NSPC<br>NSPR |  |  |
| NCPR |  |  |
| NWPR |  |  |

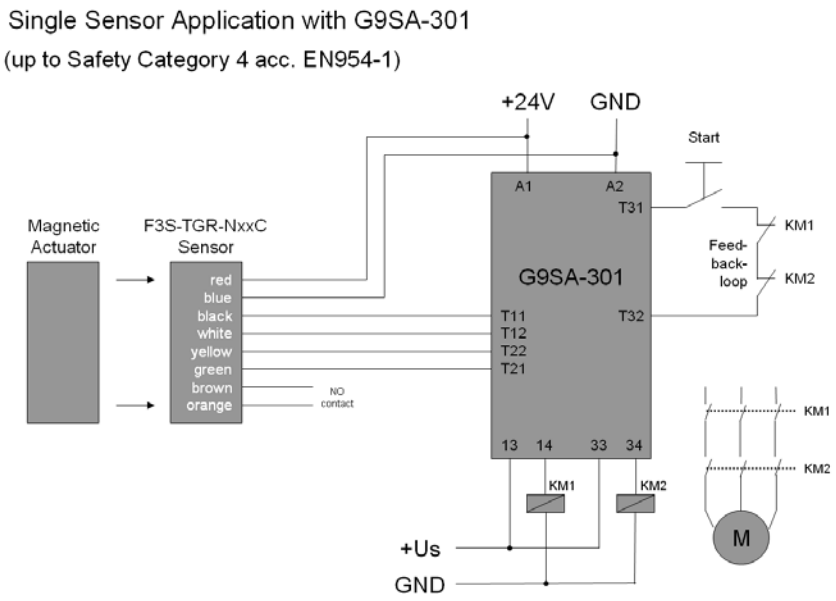
## Wiring examples

All F3S-TGR-N – non contact switches can be used with all OMRON controllers like:

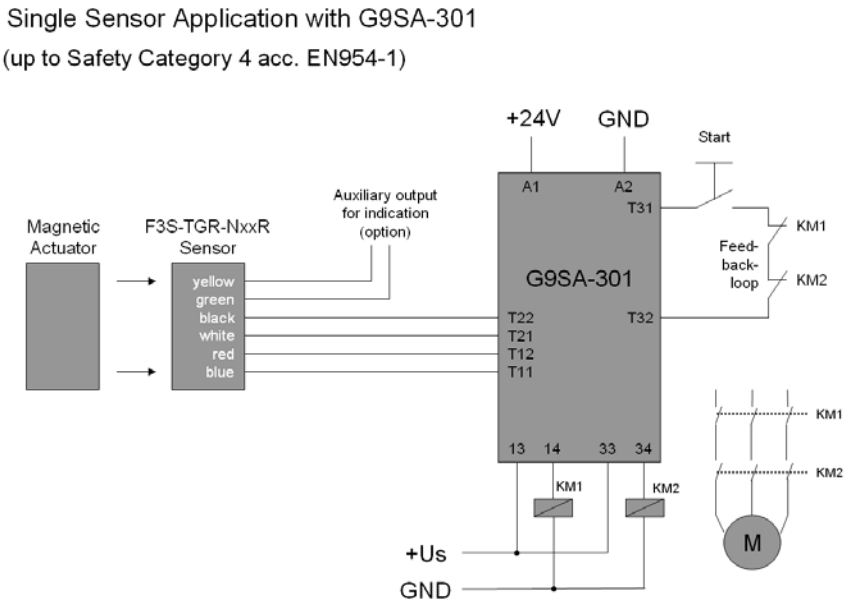
- G9S_
- NE0A
- NE1A – family

Series connection: F3S-TGR-N__C – version up to 6 sensors (3 sensors with G9SB)
F3S-TGR-N__R – version up to 6 sensors

**Wiring example with coded switch and G9SA controller:**
(wiring colors are shown for flying-lead – types)

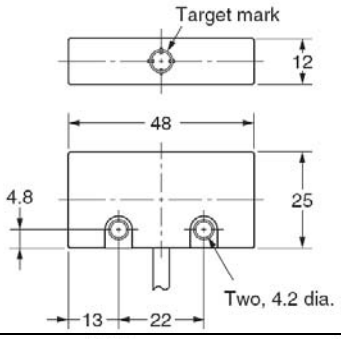
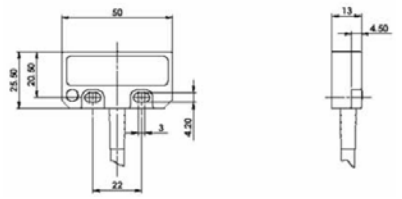
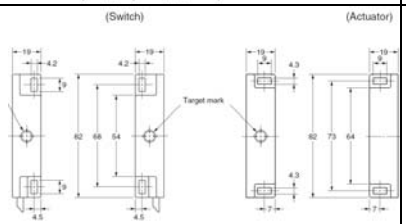
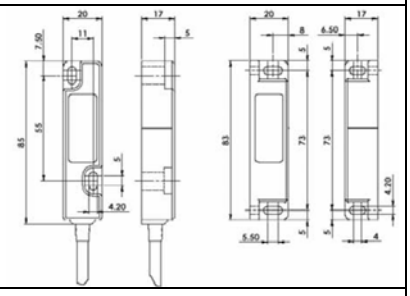
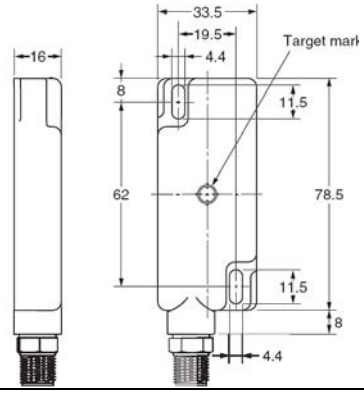
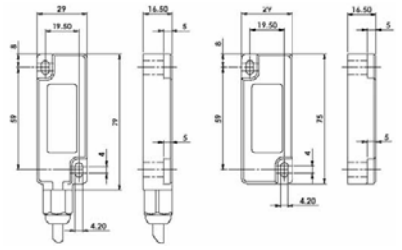



**Wiring example with reed switch and G9SA controller:**
(wiring colors are shown for flying-lead – types)



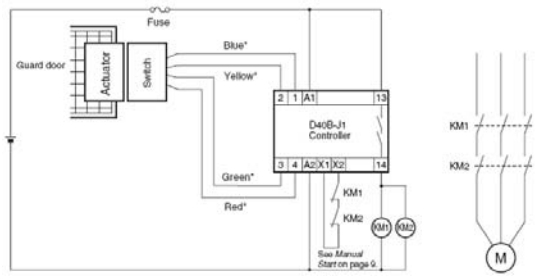
## Cross-reference D40B ←→ TGR-N

### Mechanical

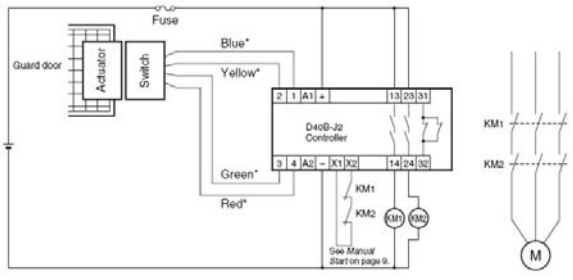
| D40B model | Mechanical drawing | F3S-TGR-N model | Mechanical drawing |
|---|---|---|---|
| D40B-1B3<br>D40B-1D3<br><br>D40B-1B10<br>D40B-1D10<br>  |  | F3S-TGR-NSPR-21-05<br><br>F3S-TGR-NSPR-21-10<br>  |  |
| D40B-2B3<br>D40B-2D3<br><br>D40B-2B10<br>D40B-2D10<br>  |  | F3S-TGR-NCPR-21-05<br><br>F3S-TGR-NCPR-21-10<br>  |  |
| D40B-3D5C<br>D40B-3E5C<br>  |  | F3S-TGR-NWPR-21-05<br><br>F3S-TGR-NWPR-21-10<br>  <br>**Note:**<br>**1) only plastic housing available**<br>**2) maximum operating temperature +80°C** |  <br>**Note: pre-wired models with 5m or 10m cable** |

### Electrical

Wiring example with D40B-J1 (max. cat. 3)
(wiring colors are shown for F3S-TGR-N__R
Flying –lead – types)




Wiring example with D40B-J2 (max. cat. 3):
(wiring colors are shown for F3S-TGR-N__R
Flying –lead – types)



# Safety precautions

**⚠ WARNING**

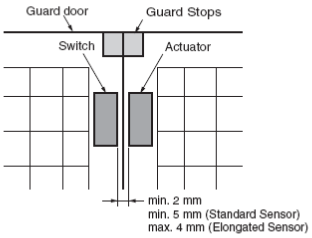
Be sure to turn OFF the power before performing wiring. Do not touch charge parts (e.g., terminals) while power is ON. Doing so may result in electric shock.

Do not allow the actuator to come close to the switch with the door open. Doing so may cause machinery to start operating and may result in injury.

Keep actuators (magnets) away from magnetically sensitive equipment like PC harddisks, floppy disks etc. The magnetic field of the magnet will damage existing data.

**⚠ CAUTION**

Use guard stops in the way shown below to ensure that the switch and actuator do not make contact when the guard door is closed.



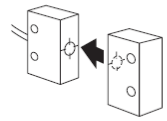

## Application Precautions

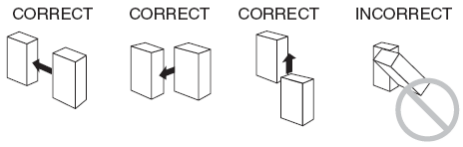
- Do not use the product in locations subject to explosive or flammable gases.
- Do not use load currents exceeding the rated value.
- Be sure to wire each conductor correctly.
- Be sure to confirm correct operation after completing mounting and adjustment.
- Do not drop or attempt to disassemble the product.
- Be sure to use the correct combination of switch and actuator.
- Use a power supply of the specified voltage. Do not use power supplies with large ripples or power supplies that intermittently generate incorrect voltages.
- Capacitors are consumable and require regular maintenance and inspection.

## Precautions for Safe Use

### Mounting Direction of Switch and Actuator

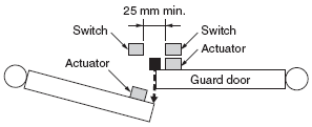
The Sensor will not operate properly if the switch and actuator come towards each other diagonally. The Sensor will, however, operate properly if the switch and actuator come towards each other head-on, horizontally or vertically (as long as the faces have the same orientation).





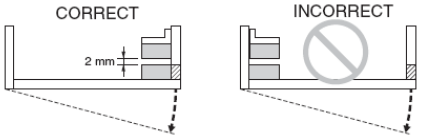

### Mutual Interference

If the switch and actuator are mounted in parallel, be sure to separate them by at least 25 mm, as shown below.




### Using for Hinged Doors

On hinged doors, install the Sensor at an opening edge as shown below.




### Solvents

Ensure that solvents, such as alcohol, thinner, trichloroethane, or gasoline do not adhere to the product. Solvents may cause markings to fade and components to deteriorate.

### Installation Location

Do not install the product in the following locations. Doing so may result in product failure or malfunction.

- Locations subject to direct sunlight
- Locations subject to humidity levels outside the range 35% to 85% or subject to condensation due to extreme temperature changes
- Locations subject to corrosive or flammable gases
- Locations subject to shocks or vibration in excess of the product ratings
- Locations subject to dust (including iron dust) or salts

Take appropiate and sufficient countermeasures when using the product in the following locations.

- Locations subject to static electricity or other forms of noise
- Locations subject to possible exposure to radioactivity
- Locations subject to power supply lines
- It is advisable to mount the switches on non ferrous materials. The presence of ferrous material can effect switching sensitivity.

### Wiring

Perform wiring using wire with the following dimensions.

Stranded wire: 2.5 $mm^2$

Solid wire: 4.0 $mm^2$

Tighten the terminal screws with the specified torque. Not doing so may result in malfunction or abnormal heat generation.

**Tightening torque:** **1Nm for NS__, NC__, NL__ and NW__**
**0,8Nm for NM__**

## <SUITABILITY FOR USE>

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the products. Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

## <CHANGE IN SPECIFICATIONS>

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

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