Magnetic non-contact safety switches

F3S-TGR-N□R

Reed non-contact switches monitor the status of guarding doors. Stainless steel housing for high hygiene demands in the food industry are available.

- Based on reed technology
- Connect up to 6 switches in series
- Operates with all Omron safety controllers
- Operates behind stainless steel fittings
- Non-contact – no abrasion – no particles
- Compensation of mechanical tolerances
- Suitable for high pressure cleaning, CIP/SIP processes due IP69K (pre-wired types)
- Conforms to safety categories up PLe acc. EN ISO13849-1

Model Number Structure

F3S-TGR-N□□R-□□-□□
1 2 3 4

1. Type
   - L: Elongated Sensor
   - S: Small Sensor
   - M: Miniature Sensor
   - C: Compact Sensor
   - W: Wide Sensor
   - B: Barell Sensor

2. Housing Material
   - P: Plastic Housing
   - M: Stainless Steel Housing
   - H: Hygienic designed Stainless Steel Housing
   - F: Special Food Type Stainless Steel Housing

3. Contact configuration
   - 11*: 1 Normally Closed Contact (NC) + 1 Normally Open Contact (NO)
   - 20*: 2 Normally Closed Contacts (NC)
   - 21: 2 Normally Closed Contacts (NC) + 1 Normally Open Contact (NO)

   * only existing for some NMPR-types

4. Cable Length/connection
   - 05: 5 m Cable
   - 05-R*: 5 m Cable exit to the right
   - 10: 10 m Cable
   - 10-R*: 10 m Cable, exit to the right
   - M1J8: M12 male connector, 8 pin, fitted with 250 mm cable
   - M1J8-R*: M12 male connector, 8 pin, fitted with 250 mm cable exit to the right
   - 08-L10**: M8 male connector, 4 pin
   - 08-R10**: M8 male connector, 4 pin, exit to the right

   * only for F3S-TGR-NMPR and F3S-TGR-NMHR
   ** only for F3S-TGR-NMPR

Ordering Information

Polyester Housing

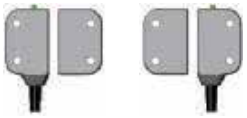
Type	Cable connection	Contact configuration	Order code
Elongated Sensors 	5 m pre-wired	2NC/1NO	**F3S-TGR-NLPR-21-05**
	10 m pre-wired		**F3S-TGR-NLPR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NLPR-21-M1J8**
Small Sensors 	5 m pre-wired		**F3S-TGR-NSPR-21-05**
	10 m pre-wired		**F3S-TGR-NSPR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NSPR-21-M1J8**
Miniature Sensors  F3S-TGR-NMPR-□□-□□-R	5 m pre-wired, cable exit left		**F3S-TGR-NMPR-21-05**
	10 m pre-wired, cable exit left		**F3S-TGR-NMPR-21-10**
	M12, 8 pin, fitted with 250 mm cable exit left		**F3S-TGR-NMPR-21-M1J8**
	5 m pre-wired, cable exit right		**F3S-TGR-NMPR-21-05-R**
	10 m pre-wired, cable exit right		**F3S-TGR-NMPR-21-10-R**
	M12, 8 pin, fitted with 250 mm cable exit right		**F3S-TGR-NMPR-21-M1J8-R**
 F3S-TGR-NMPR-□□-08-L10	M8, 4 pin, direct connector left side	2NC	**F3S-TGR-NMPR-20-08-L10**
	M8, 4 pin, direct connector right side		**F3S-TGR-NMPR-20-08-R10**
	M8, 4 pin, direct connector left side	1NC/1NO	**F3S-TGR-NMPR-11-08-L10**
	M8, 4 pin, direct connector right side		**F3S-TGR-NMPR-11-08-R10**
Compact Sensors 	5 m pre-wired	2NC/1NO	**F3S-TGR-NCPR-21-05**
	10 m pre-wired		**F3S-TGR-NCPR-21-10**
Wide Sensors 	5 m pre-wired		**F3S-TGR-NWPR-21-05**
	10 m pre-wired		**F3S-TGR-NWPR-21-10**
Barrel Sensors 	5 m pre-wired		**F3S-TGR-NBPR-21-05**
	10 m pre-wired		**F3S-TGR-NBPR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NBPR-21-M1J8**

Stainless steel housing

Type	Cable connection	Contact configuration	Order code
Elongated Sensors 	5 m pre-wired	2NC/1NO	**F3S-TGR-NLMR-21-05**
	10 m pre-wired		**F3S-TGR-NLMR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NLMR-21-M1J8**
Small Sensors 	5 m pre-wired		**F3S-TGR-NSMR-21-05**
	10 m pre-wired		**F3S-TGR-NSMR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NSMR-21-M1J8**
Barrel Sensors 	5 m pre-wired		**F3S-TGR-NBMR-21-05**
	10 m pre-wired		**F3S-TGR-NBMR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NBMR-21-M1J8**

Hygienic and food types

Type	Cable connection	Contact configuration	Order code
Small Sensors 	5 m pre-wired	2NC/1NO	**F3S-TGR-NSHR-21-05**
	10 m pre-wired		**F3S-TGR-NSHR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NSHR-21-M1J8**
Small Sensors (Special food types) 	5 m pre-wired		**F3S-TGR-NSFR-21-05**
	10 m pre-wired		**F3S-TGR-NSFR-21-10**
	M12, 8 pin, fitted with 250 mm cable		**F3S-TGR-NSFR-21-M1J8**
Miniature Sensors  F3S-TGR-NMHR-21-05-R	5 m pre-wired, cable exit left		**F3S-TGR-NMHR-21-05**
	10 m pre-wired, cable exit left		**F3S-TGR-NMHR-21-10**
	M12, 8 pin, fitted with 250 mm cable exit left		**F3S-TGR-NMHR-21-M1J8**
	5 m pre-wired, cable exit right		**F3S-TGR-NMHR-21-05-R**
	10 m pre-wired, cable exit right		**F3S-TGR-NMHR-21-10-R**
	M12, 8 pin, fitted with 250 mm cable exit right		**F3S-TGR-NMHR-21-M1J8-R**



cable exit left cable exit right

Accessories

		Order code
Cables 8-pin	2 m	**Y92E-M12PURSH8S2M-L**
	5 m	**Y92E-M12PURSH8S5M-L**
	10 m	**Y92E-M12PURSH8S10M-L**
	25 m	**Y92E-M12PURSH8S25M-L**
Cables 4-pin	2 m	**XS3F-M8PVC4S2M-EU**
	5 m	**XS3F-M8PVC4S5M-EU**
	10 m	**XS3F-M8PVC4S10M-EU**
	25 m	**XS3F-M8PVC4S20M-EU**
Actuators	for F3S-TGR-NLPR	**F39-TGR-NLPR-A**
	for F3S-TGR-NSPR	**F39-TGR-NSPR-A**
	for F3S-TGR-NMPR	**F39-TGR-NMPR-A**
	for F3S-TGR-NCPR	**F39-TGR-NCPR-A**
	for F3S-TGR-NWPR	**F39-TGR-NWPR-A**
	for F3S-TGR-NBPR	**F39-TGR-NBPR-A**
	for F3S-TGR-NLMR	**F39-TGR-NLMR-A**
	for F3S-TGR-NSMR	**F39-TGR-NSMR-A**
	for F3S-TGR-NBMR	**F39-TGR-NBMR-A**
	for F3S-TGR-NSHR	**F39-TGR-NSHR-A**
	for F3S-TGR-NSFR	**F39-TGR-NSFR-A**
	for F3S-TGR-NMHR	**F39-TGR-NMHR-A**
Mounting screws	Set of Torx safety screws (M4, 4 × 30 mm, 4 × 20 mm, 4 × 10 mm; incl. washers and Torx bit)	**F39-TGR-N-SCREWS**
Spacer (8 mm, Set of 2pcs.)[*1]	for Elongated Sensors	**F39-TGR-NLR-SPACER**
	for Small Sensors	**F39-TGR-NSR-SPACER**
	for Miniature Sensors	**F39-TGR-NMR-SPACER**
	for Compact Sensors	**F39-TGR-NCR-SPACER**
	for Wide Sensors	**F39-TGR-NWR-SPACER**

[*1] Spacers are needed to prefent influences if switch is mounted on ferromagnetic background (e. g. reduced switching distance, EMC influences)

Control units

		Order code
Safety relay units	G9SE 	**G9SE-201** **G9SE-401** **G9SE-221-T05** **G9SE-221-T30**
	G9SA 	**G9SA-301** **G9SA-501** **G9SA-321-T075** **G9SA-321-T15** **G9SA-321-T30**
	G9SR 	**G9SR-BC201-RC** **G9SR-AD201-RC** **G9SR-EX031-T90-RC**
Programmable standalone controllers	G9SP-N 	**G9SP-N10S** **G9SP-N10D** **G9SP-N20S**
Integrated safety/ Programmable standalone controller	NX-S 	**NX-SL3300** **NX-SL3500** **NX-SIH400** **NX-SID800** **NX-SOH200** **NX-SOD400**

Specifications

Mechanical data

		Plastic housing	Stainless steel housing
Indicator	**–**	None	
Operating distance	**OFF → ON (Sao)**	10 mm (NBPR, NBMR: 8 mm)	
	ON → OFF (Sar)	20 mm (NBPR, NBMR: 12 mm)	
Recommended setting gap	**–**	5 mm	
Actuator approach speed	**Min.**	4 mm/s	
	Max.	1,000 mm/s	
Switching frequency	**Max.**	1 Hz	
Operating temperature	**–**	–25 to 80°C	–25 to 105°C
Enclosure protection	**Flying lead**	IP69K	
	M12 connector	IP67	
	M8 connector	IP67	
Cable material	**Flying lead**	PVC, 8 core, Ø 6 mm o.d.	
	M12 connector	250 mm, PVC, Ø 6 mm o.d.	
Mounting bolts	**–**	2 × M4	
Tightening torque for mounting bolts	**Max.**	1 Nm	
Shock resistance (IEC 68-2-27)	**–**	11 ms, 30 g	
Vibration resistance (IEC 68-2-6)	**–**	10 to 55 Hz, 1 mm	
Material	**–**	Black polyester	Stainless steel 316

Electrical data

		Plastic housing	Stainless steel housing
Sensor technology	**–**	Reed	
Serial switching	**–**	up to 6 pcs. in series	
Rated loads	**NC contacts Max.**	1 A @ 250 VAC (NMPR and NMHR: 0.5 A @ 250 VAC, NBPR and NBMR: 0.5 A @ 24 VDC)	
	NO contacts Max.	0.2A @ 24VDC	
Contact release time	**Max.**	2 ms	
Initial contact resistance	**Max.**	500 mΩ	
Dielectric withstand	**–**	250 VAC	
Insulation resistance	**–**	100 MΩ	
Switching current	**Min.**	1 mA, 10 VDC	

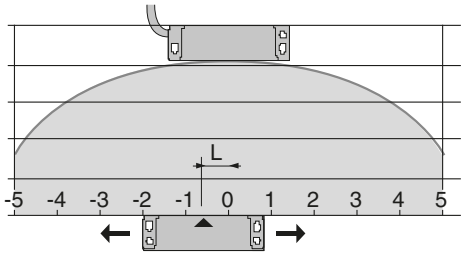
Reliability data

	Plastic housing	Stainless steel housing
EN ISO 13849-1	up to PLe depending upon system architecture	
EN 62061	up to SIL3 depending upon system architecture	
B10d	3.3×10^6 cycles at 100 mA load	

Approved standards

EN standards certified by TÜV Rheinland
EN ISO13849-1
EN 62061
EN 60204-1
EN ISO 14119
EN/IEC 60947-5-3
UL 508, CSA C22.2
BS 5304
EN 1088 conformance

Operating characteristics



5 mm misalignment tolerance after setting

Connection diagrams

Cable version

Pin No.	Signal name
red	NC Channel 1
blue	NC Channel 1
black	NC Channel 2
white	NC Channel 2
yellow	NO Channel Auxillary
green	NO Channel Auxillary
brown	
orange	

M1J8-Connector version (M12 male)

Pin No. (male side)	Signal	Wire (Y92E-M12PURSH8S_M-L)
2		brown
3		green
7	NC Channel 1	blue
1	NC Channel 1	white
4	NC Channel 2	yellow
6	NC Channel 2	pink
5	NO Channel Aux.	grey
8	NO Channel Aux.	red

Note: If the auxiliary circuit is not fitted or not used then cut and discard the yellow/green or grey/red conductors.

M8 connection diagram

F3S-TGR-NMPR-20-08-_10-Connector version (M8 male, 2NC)

Pin No. (male side)	Signal	Wire (XS3F-M8PVC4S_M-EU)
1	NC Channel 1	brown
2	NC Channel 1	white
3	NC Channel 2	blue
4	NC Channel 2	black

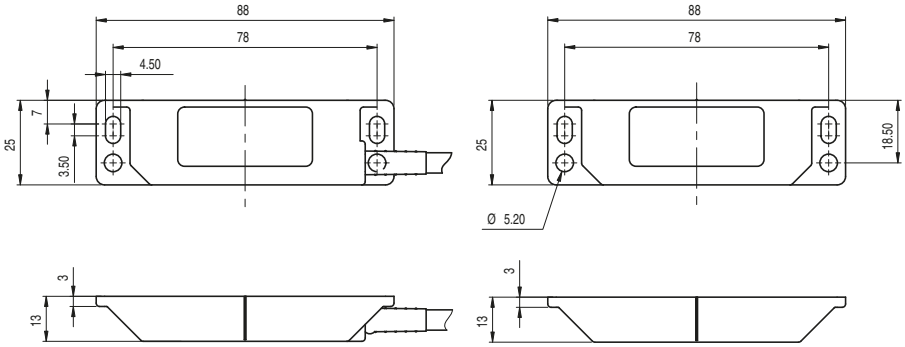
F3S-TGR-NMPR-11-08-_10-Connector version (M8 male, 1NC/1NO)

Pin No. (male side)	Signal	Wire (XS3F-M8PVC4S_M-EU)
1	NO Channel 1	brown
2	NO Channel 1	white
3	NC Channel 2	blue
4	NC Channel 2	black

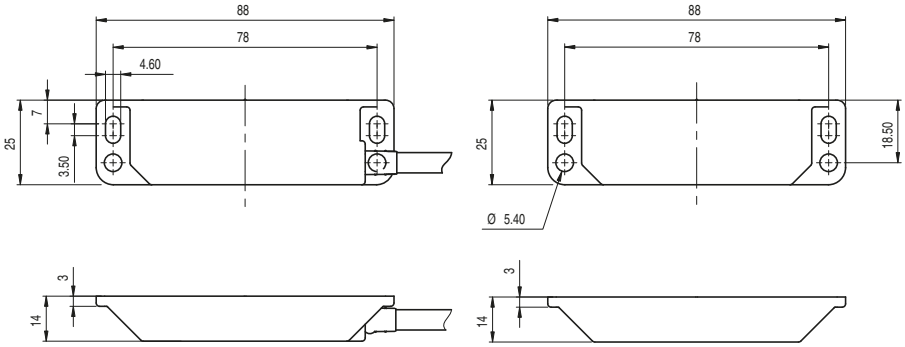
Dimensions

Elongated Sensor (Sensor/Actuator)

F3S-TGR-NLPR

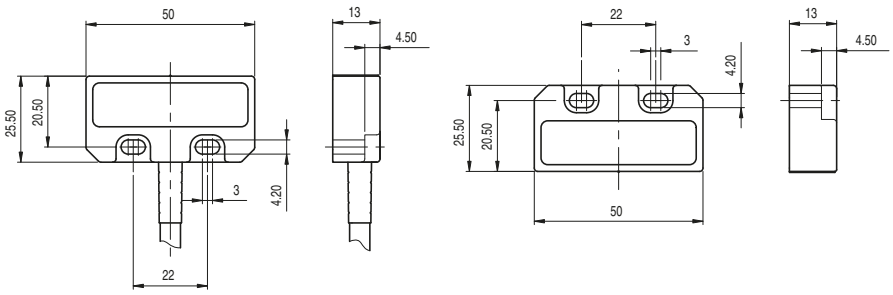


F3S-TGR-NLMR

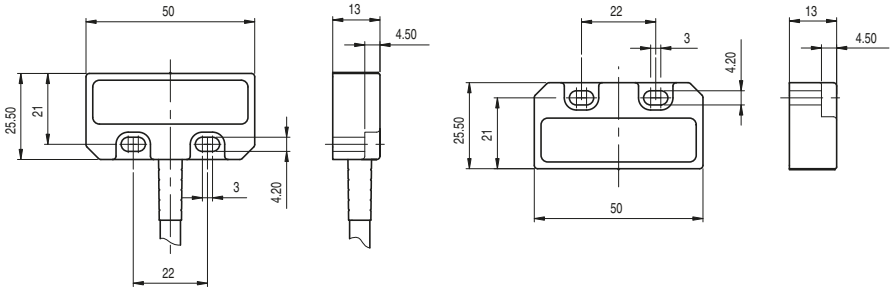


Small Sensor (Sensor/Actuator)

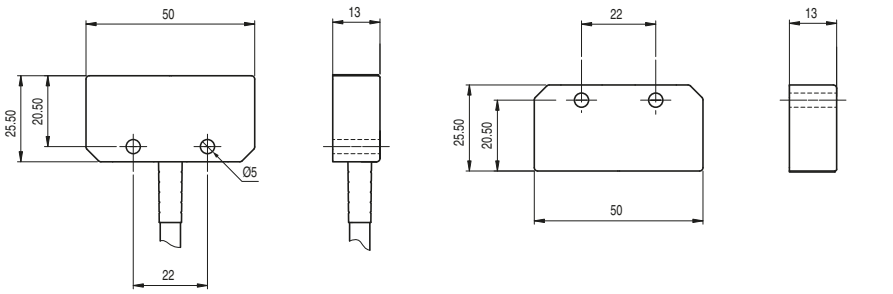
F3S-TGR-NSPR



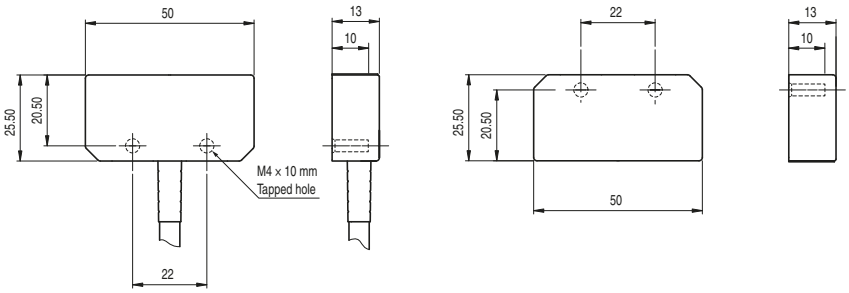
F3S-TGR-NSMR



F3S-TGR-NSHR



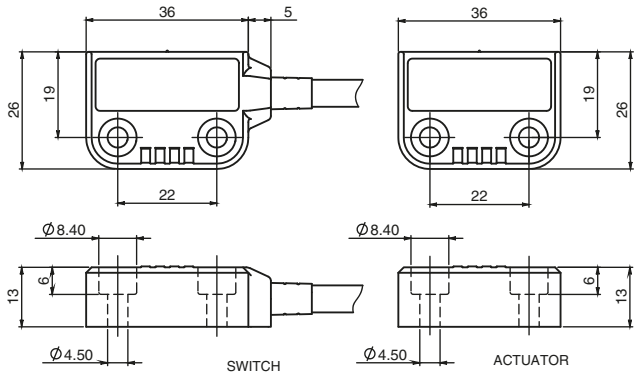
F3S-TGR-NSFR



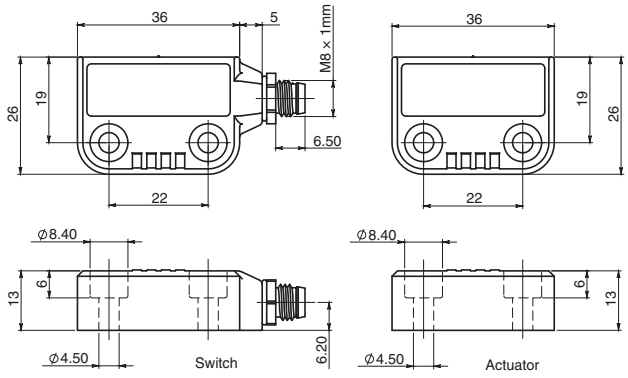
Miniature Sensor (Sensor/Actuator)

F3S-TGR-NMPR (Cable exit right)

TYPE : NMPR (Left)

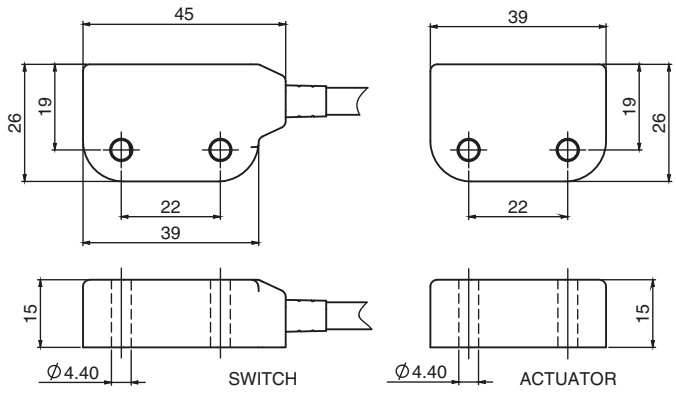


F3S-TGR-NMPR (M8, 4pin connector)



F3S-TGR-NMHR (Cable exit right)

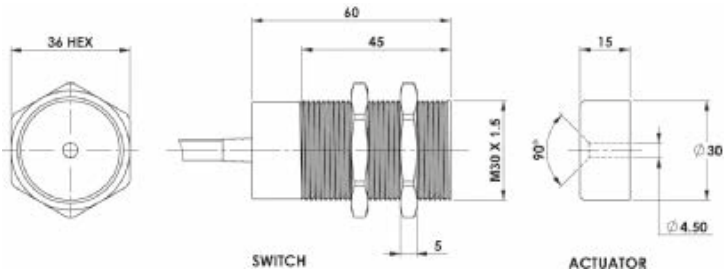
TYPE : NMHR (Left)



Barrel Sensor (Sensor/Actuator)

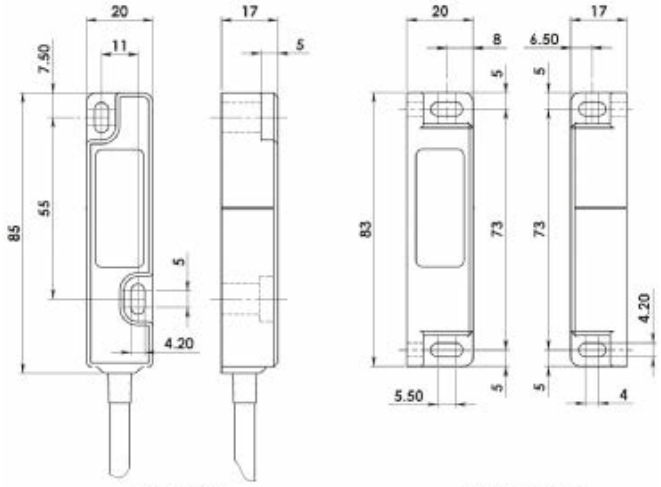
F3S-TGR-NBPR

F3S-TGR-NBMR



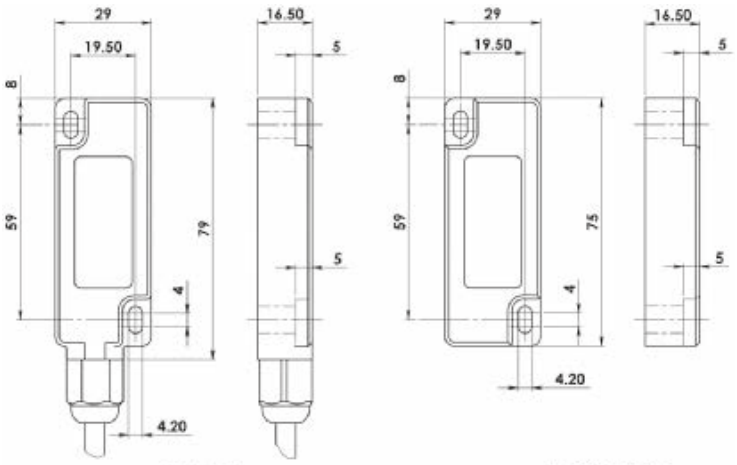
Compact Sensor (Sensor/Actuator)

F3S-TGR-NCPR



Wide Sensor (Sensor/Actuator)

F3S-TGR-NWPR

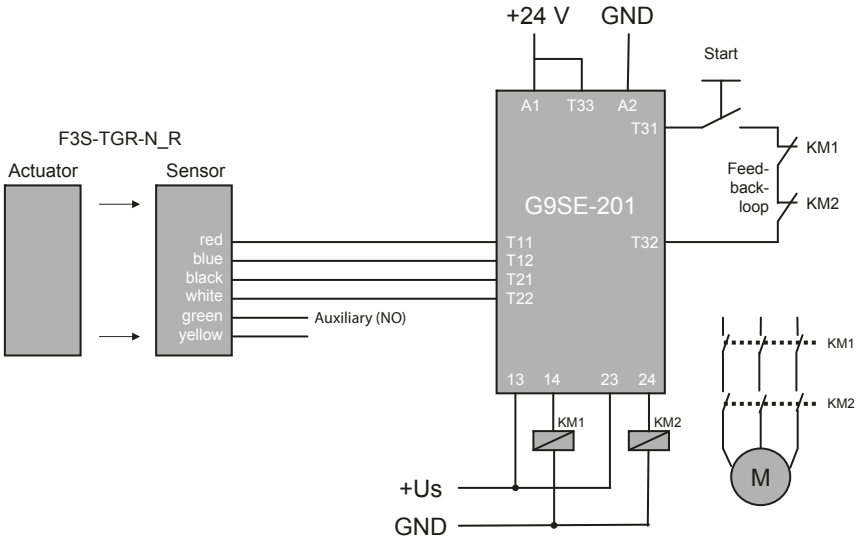


Wiring examples (Single head connection up to category 4 acc. EN954-1)

G9SE

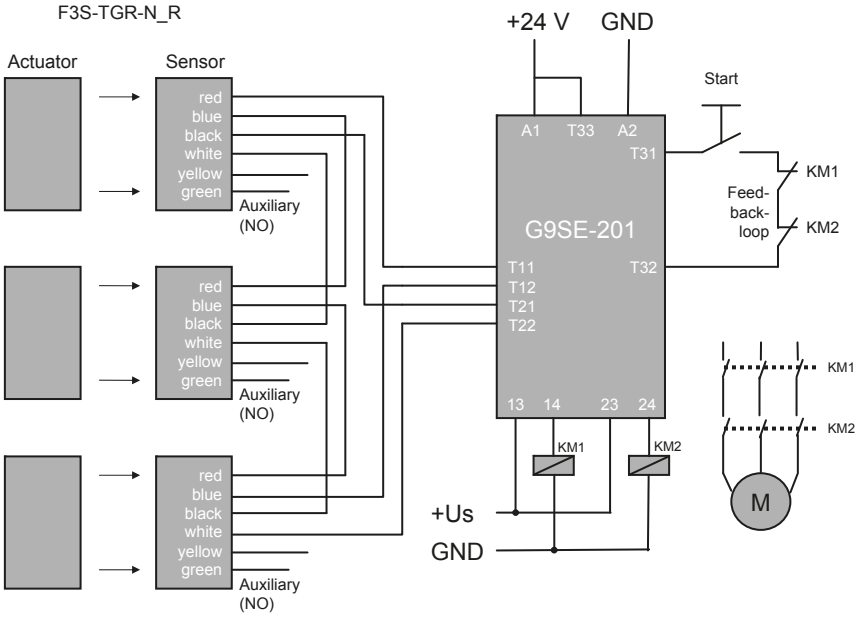
Single Sensor Application with G9SE-201

(up to Safety PLe acc. EN ISO 13849-1)



Series connection Application, up to 6 Sensors with G9SE-201

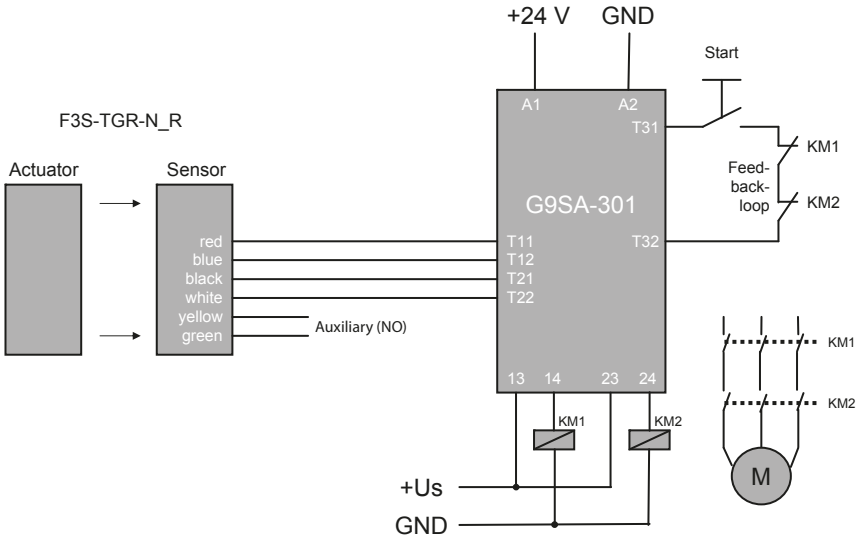
(up to Safety PLd acc. EN ISO 13849-1)



G9SA

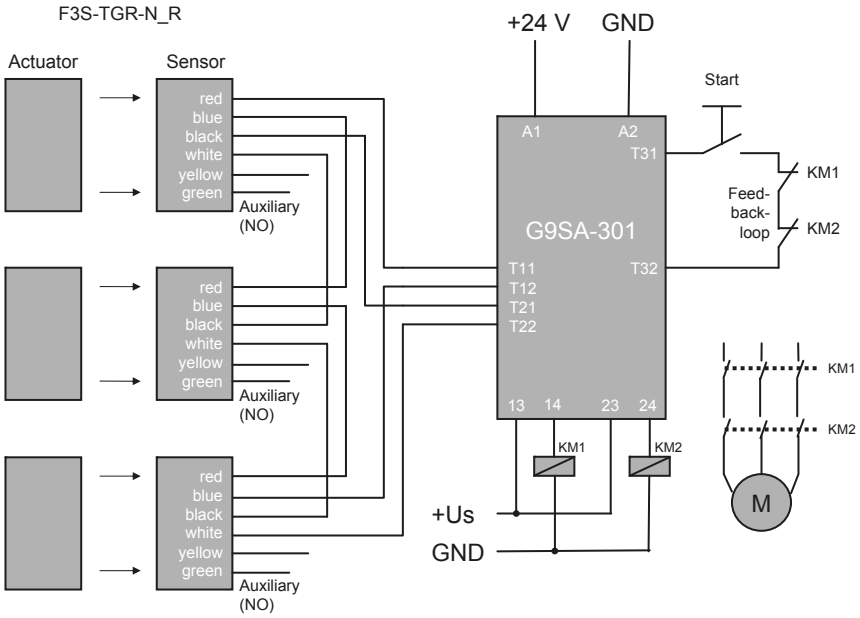
Single Sensor Application with G9SA-301

(up to Safety PLe acc. EN ISO 13849-1)



Series connection Application, up to 6 Sensors with G9SA-301

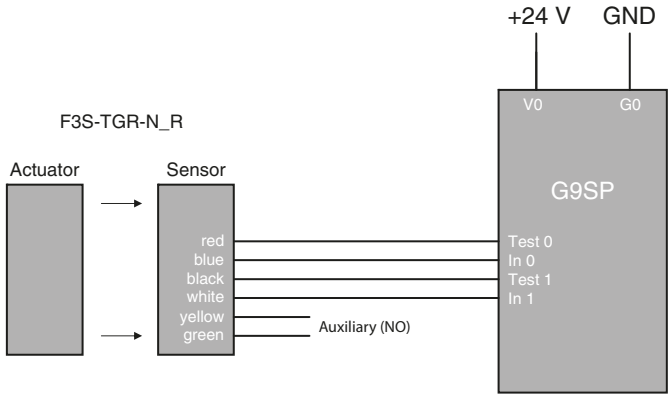
(up to Safety PLd acc. EN ISO 13849-1)



G9SP

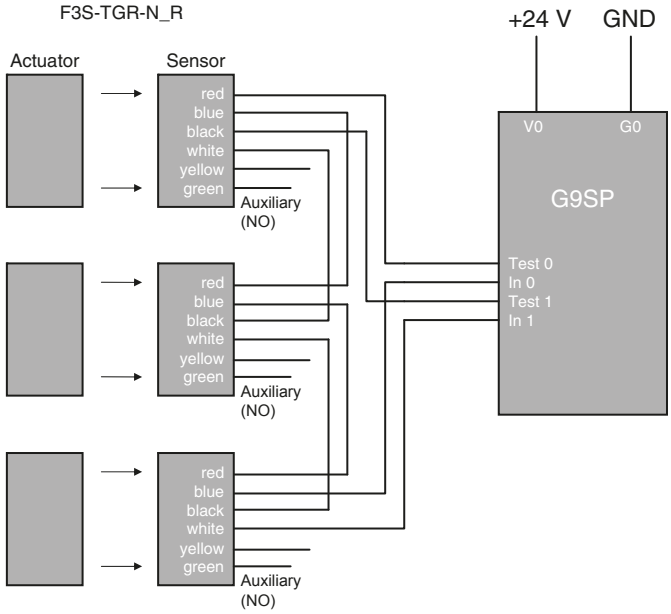
Single Sensor Application with G9SP

(up to Safety PLe acc. EN ISO 13849-1)



Series connection Application, up to 6 Sensors with G9SP

(up to Safety PLd acc. EN ISO 13849-1)



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.

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.

Installation Locations

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.

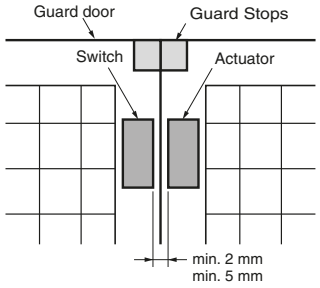
Solvents

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.

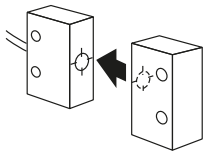
Guard Stops

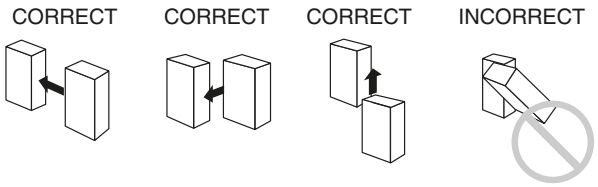
⚠ CAUTION

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.



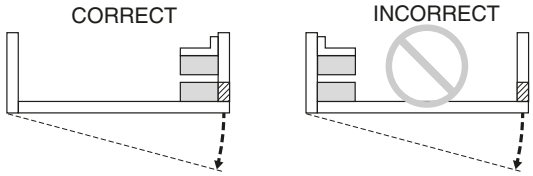
Mounting Direction





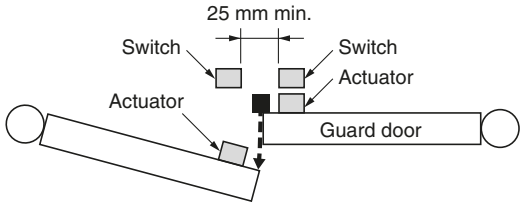
Using for Hinged Doors

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



Mutual Interference

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



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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