

INSTRUCTION MANUAL

Inductive Proximity Sensor Small GX Series



- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

1 SPECIFICATIONS

Type	Shielded type						Non-shielded type
	Non-threaded type			Threaded type			Threaded type
Model No. (Note 1)	Normally closed	GX-3S	GX-4S	GX-5S	GX-5M	GX-8M	GX-8ML
Item	Normally open	GX-3SB	GX-4SB	GX-5SB	GX-5MB	GX-8MB	GX-8MLB
Max. operation distance (Note 2)		0.8mm±15%		1mm±15%	0.8mm±15%	1mm±15%	2mm±15%
Stable sensing range (Note 2)		0 to 0.6mm		0 to 0.6mm	0 to 0.6mm	0 to 0.8mm	0 to 1.6mm
Standard sensing object		Iron sheet 5×5×1mm		Iron sheet 6×6×1mm	Iron sheet 5×5×1mm	Iron sheet 8×8×1mm	Iron sheet 12×12×1mm
Supply voltage		12 to 24V DC±10% Ripple P-P 10% or less		10 to 30V DC Ripple P-P 10% or less	12 to 24V DC±10% Ripple P-P 10% or less	10 to 30V DC Ripple P-P 10% or less	
Current consumption		15mA or less					
Output		<GX-3S□, GX-4S□, GX-5M□> NPN open-collector transistor • Maximum sink current: 50mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 0.4V or less (at 50mA sink current)			<GX-5S□, GX-8M□, GX-8ML□> NPN open-collector transistor • Maximum sink current: 200mA (Note 3) • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1.5V or less (at 200mA sink current) 0.4V or less (at 50mA sink current)		
Short-circuit protection		—	Incorporated	—	Incorporated	—	Incorporated
Max. response frequency		1kHz		1.5kHz		1kHz	500Hz
Operation indicator		Red LED (lights up when the output is ON)					
Protection		IP67 (IEC)					
Ambient temperature		-25 to +70°C, Storage: -25 to +80°C					
Ambient humidity		35 to 95% RH, Storage: 35 to 95% RH		35 to 85% RH Storage: 35 to 95% RH		35 to 95% RH, Storage: 35 to 95% RH	
Material		Enclosure: Stainless steel (SUS304) Resin part: TPX		Enclosure: Brass (Nickel plated) Resin part: ABS		Enclosure: Brass (Nickel plated) Resin part: ABS	
Cable		0.08mm ² 3-core oil, heat and cold resistant cabtyre cable, 3m long		0.14mm ² 3-core oil, heat and cold resistant cabtyre cable, 3m long		0.08mm ² 3-core oil, heat and cold resistant cabtyre cable, 3m long	
Weight (Note 4)		30g approx.		55g approx.		30g approx.	
Accessories		MS-SS3 (Sensor mounting bracket): 1 pc. MS-SS3-2 (C bracket): 1 pc.		MS-SS5 (Sensor mounting bracket): 1 pc.		Nut: 2 pcs., Toothed lock washer: 1 pc.	

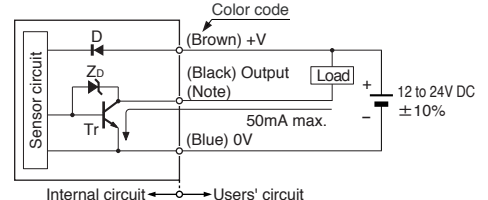
- Notes: 1) The model No. with '-R' stands for the flexible cable type.
(e.g.) As for the flexible cable type of GX-3SB 'GX-3SB-R'
The model No. with suffix '-C5' stands for the 5m cable length type.
(e.g.) As for the 5m cable length type of GX-3SB 'GX-3SB-C5'
- 2) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.
- 3) The maximum sink current varies depending on the ambient temperature. Refer to '3 I/O CIRCUIT DIAGRAMS'.
- 4) The weight of the threaded type includes the weight of two nuts and one toothed lock washer.

2 CAUTIONS

- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Extension up to total 100m is possible with a 0.3mm², or more (GX-8ML□: 0.14mm², or more), cable.
- Do not use during the initial transient time (10ms) after the power supply is switched on.
- GX-3S□, GX-4S□ and GX-5M□ do not incorporate a short-circuit protection at the output.
- Do not connect them directly to a power supply or a capacitive load.
- Take care that the sensor does not come in direct contact with water, oil, grease, organic solvents, such as thinner etc., or strong acid, and alkaline.
- Make sure that the sensing end is not covered with metal dust, scrap or spatter. It will result in malfunction.
- Make sure that stress by forcible bend or pulling is not applied directly to the sensor cable joint.
- Since the cable end is not waterproof, do not use the sensor in the application where water may seep in from the cable end.

3 I/O CIRCUIT DIAGRAMS

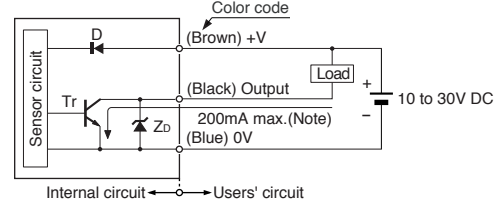
● GX-3S□, GX-4S□, GX-5M□



Symbols...D : Reverse supply polarity protection diode
Zd : Surge absorption zener diode
Tr : NPN output transistor

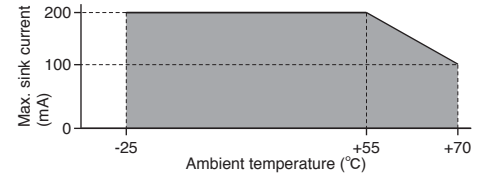
Note: GX-3S□, GX-4S□ and GX-5M□ do not incorporate a short-circuit protection at the output. Do not connect them directly to a power supply or a capacitive load.

● GX-5S□, GX-8M□, GX-8ML□

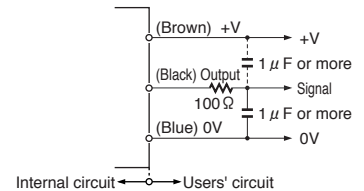


Symbols...D : Reverse supply polarity protection diode
Zd : Surge absorption zener diode
Tr : NPN output transistor

Note: The maximum sink current varies depending on the ambient temperature.



- If a capacitor of 1 μF or more is connected between 0V and output or between +V and output, connect a 100 Ω resistor in series as shown below. Without the resistor, the short-circuit protection is activated by the change or discharge current of the capacitor, so that it results in delaying the response whenever the sensor switches. The connected resistor solves this problem.



4 MOUNTING

When mounting the sensor, if tightening torque exceeding the specified is applied, the sensor may be damaged.

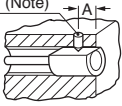
- The tightening torque should be under the value given below.

Mounting with a set screw

<Shielded threaded type>

- Tighten the set screw on the flat surface of the sensor without applying excessive force. Make sure to use a set screw with a cup-point end.

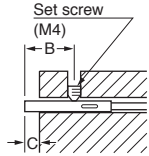
Set screw (M4 or less) (Note)



Note: To fasten **GX-5M□**, use a M3 or less set screw.

Model No.	Set screw tightening position A (mm)	Tightening torque
GX-5M□	5 to 10	0.29N·m
GX-8M□	8 to 22	0.29N·m

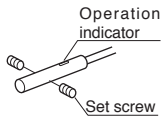
<Non-threaded type and non-shielded threaded type>



Model No.	B (mm)	C (mm)	Tightening torque
GX-3S□	5 to 10	3	0.29N·m
When using the C bracket			0.58N·m
GX-4S□	5 to 10	3	0.58N·m
GX-5S□	8 to 20	5	0.29N·m
GX-8ML□	13 to 22	10	0.29N·m

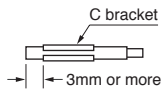
Note: Mount such that the nuts do not protrude from the threaded position.

- To fasten **GX-3S□** and **GX-4S□**, use a M3 or less set screw and tighten it from a direction perpendicular to the operation indicator.



Good	No good

- When using the C bracket, place it on the sensor at a distance of 3mm or more from the sensor end.

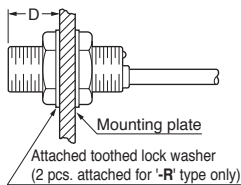


- To fasten the non-shielded threaded type, tighten the set screw on the flat surface on the sensor.

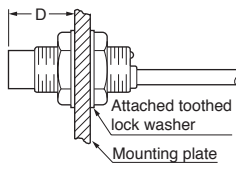
Mounting with nut

- Mount such that the nuts do not protrude from the threaded portion.

<Shielded threaded type>



<Non-shielded threaded type>



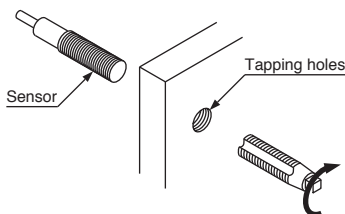
Model No.	Dimension D	Tightening torque
GX-5M□	2 to 3mm	0.49N·m
	3mm or more	1.47N·m
GX-8M□	3 to 11mm	1.47N·m
	11mm or more	3.43N·m
GX-8ML□	9 to 11mm	0.98N·m
	11mm or more	3.43N·m

Note: Mount such that the nuts do not protrude from the threaded portion.

- **Caution with GX-8M□ and GX-8ML□**

The root truncation of the threads is shallow owing to strengthening of the sensors against tightening.

When tapping holes on equipment to fix the sensors, the prepared holes must be $\phi 7.2$ mm or more with **GX-8M□** and **GX-8ML□**.

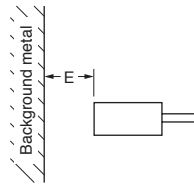


- **Distance from surrounding metal**

- As metal around the sensor may affect the sensing performance, pay attention to the following points.

Influence of surrounding metal

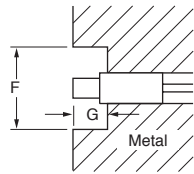
- The surrounding metal will affect the sensing performance. Keep the minimum distance specified in the table below.



Model No.	E (mm)
GX-3S□	3
GX-4S□	3
GX-5S□	4
GX-5M□	3
GX-8M□	4
GX-8ML□	8

Embedding of the sensor in metal

- Sensing range may decrease if the sensor is completely embedded in metal. Especially for the non-threaded type and the non-shielded type, keep the minimum distance specified in the table below.

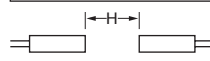


Model No.	F (mm)	G (mm)
GX-3S□	$\phi 12$	3
GX-4S□	$\phi 12$	3
GX-5S□	$\phi 15.4$	5
GX-8ML□	$\phi 30$	10

- **Mutual interference**

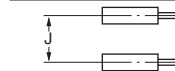
- When two or more sensors are installed in parallel or face to face, keep the minimum separation distance specified below to avoid mutual interference.

Face to face mounting



Model No.	H (mm)	J (mm)
GX-3S□	16	16
GX-4S□	16	16
GX-5S□	20	15
GX-5M□	10	10
GX-8M□	20	15
GX-8ML□	50	30

Parallel mounting



- **Sensing range**

- The sensing range is specified for the standard sensing object. With a non-ferrous metal, the sensing range is obtained by multiplying with the correction coefficient specified below.

Correction coefficient

Model No.	GX-3S□ GX-4S□	GX-5S□ GX-8M□ GX-8ML□	GX-5M□
Iron	1	1	1
Stainless steel (SUS304)	0.65 approx.	0.70 approx.	0.83 approx.
Brass	0.36 approx.	0.40 approx.	0.61 approx.
Aluminum	0.30 approx.	0.35 approx.	0.58 approx.

Note: The sensing range also changes if the sensing object is plated.

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