



Amplifier Built-in

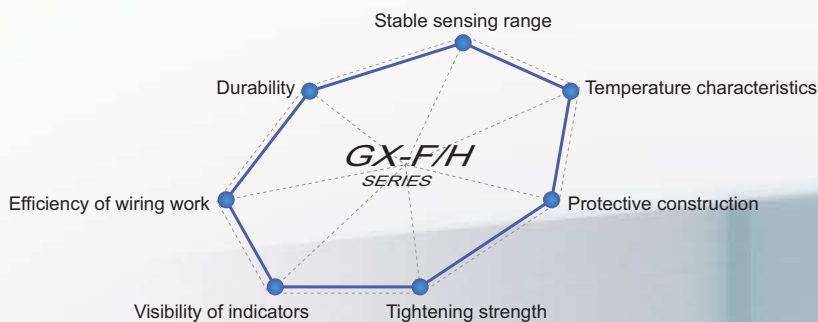
NEW

RECTANGULAR INDUCTIVE PROXIMITY SENSOR

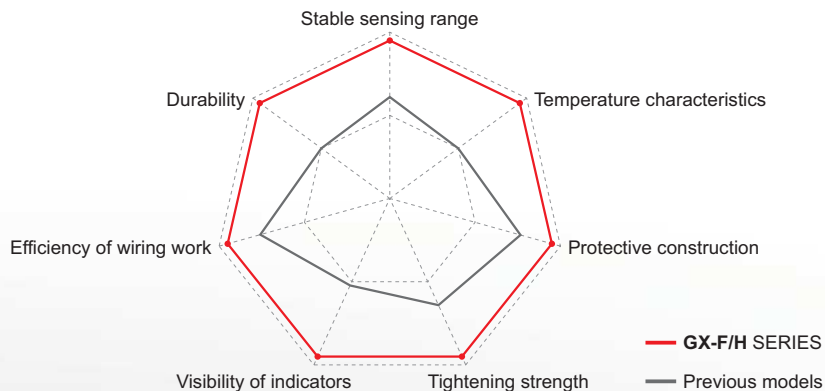
GX-F/H_{SERIES}



In response to the requirements of our customers
Industry No. 1* in stable sensing



* Based on research conducted by SUNX as of August 2007 among equivalent rectangular inductive proximity sensors.



Use with confidence at any time and anywhere

Have you ever thought that sensing was simple, but then when you tried to use an rectangular inductive proximity sensor, the sensing was not stable? It is because SUNX is the leading manufacturer of inductive proximity sensors that we have been able to accumulate our sensor technology to develop high-precision inductive proximity sensors that can be used at any time and anywhere.

The requirements of our customers have been accommodated by basic performance which is not to be found with other manufacturers.

GX-H8□

GX-F8□

GX-H12□

GX-F12□

The industry No. 1* in accommodating to customer requirements in basic performance

* Based on research conducted by SUNX as of August 2007 among equivalent rectangular inductive proximity sensors.

Customer requirements		Answer of GX-F/H series	
<p>We're frustrated because sensing results weren't stable.</p> <p>① And the screw mounting method makes it difficult to adjust the sensor position.</p>		<p>>> Industry No. 1 in stable sensing</p>	<p>P.3</p>  <p>Maximum operation distance variation: 0.4 mm 0.016 in or less</p> <p>Maximum operation distance: 2.5 mm 0.098 in ± 8 % (2.3 to 2.7 mm 0.091 to 0.106 in)</p>
<p>When the sensing position changes because of temperature variations during the morning, afternoon and nighttime, fine adjustments become very difficult to make.</p> <p>②</p>		<p>>> Industry No. 1 in temperature characteristics</p>	<p>P.4</p>  <p>23 °C 73 °F</p> <p>Ambient temperature [°C °F]</p>
<p>③ We want sensors that are good at withstanding vibration and shocks!</p>		<p>>> Industry No. 1 in durability</p>	<p>P.5</p> 
<p>④ Are the sensors really safe to be used in places where water or oil will get on them?</p>		<p>>> Industry No. 1 in protective construction</p>	<p>P.5</p> 
<p>⑤ We'd really like to have sensors that let you see the operating status at a glance.</p>		<p>>> Bright and easy-to-see indicators</p>	<p>P.5</p> 
<p>⑥ If you tighten the screws too tightly, it will damage the sensors.</p>		<p>>> Improved tightening strength</p>	<p>P.6</p> 
<p>⑦ There are too many thin wires which are very difficult to work with!</p>		<p>>> Greater efficiency in wiring work</p>	<p>P.6</p> 

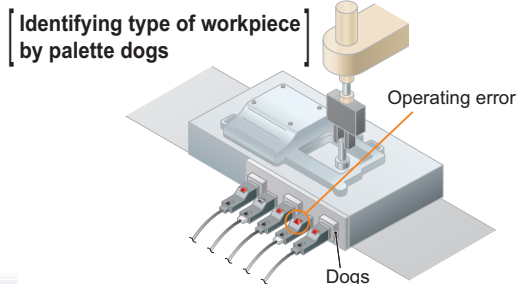
1 Customer requirements



We're frustrated because sensing results weren't stable. And the screw mounting method makes it difficult to adjust the sensor position.

<Have you ever had this experience?>

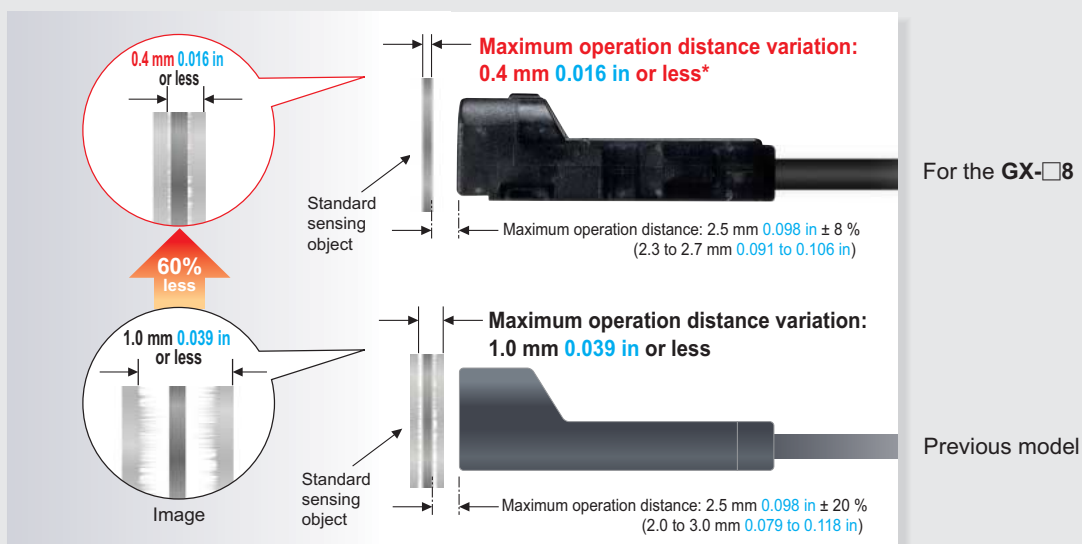
- The positions of rectangular inductive proximity sensors which are installed using screws cannot be adjusted, and so they have been designed with as short sensing ranges as possible to minimize variations caused by the sensing range.
- The sensor used as a replacement for maintenance has a longer sensing range, so that not only the dog but also the base was detected, meaning that position adjustment is necessary.



Answer of GX-F/H series

Industry No.1

Stable sensing! Variation at the maximum operation distance is within $\pm 8\%$

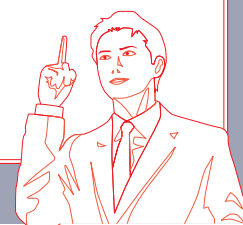


Thorough adjustment and control of sensing sensitivity greatly reduces individual sensor differences and variations. The work of adjusting sensor positions when using multiple sensors and when sensors have been replaced has become much easier.

* Not including temperature characteristics. GX-□12 has a variation of 0.64 mm 0.025 in or less for a maximum operation distance of 4 mm 0.157 in

Answer of GX-F/H series

The longest stable sensing range in the industry gives you much greater flexibility.



2 Customer requirements

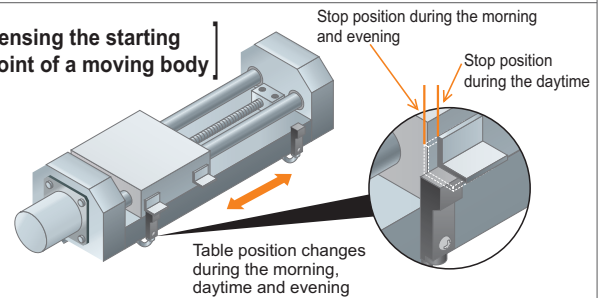


When the sensing position changes because of temperature variations during the morning, afternoon and nighttime, fine adjustments become very difficult to make.

<Have you ever had this experience?>

- Temperature differences between morning and nighttime or as a result of seasonal changes cause slight shifts in the sensing position.
- Every time when the equipment is moved to a place with different weather conditions, readjustments are necessary.

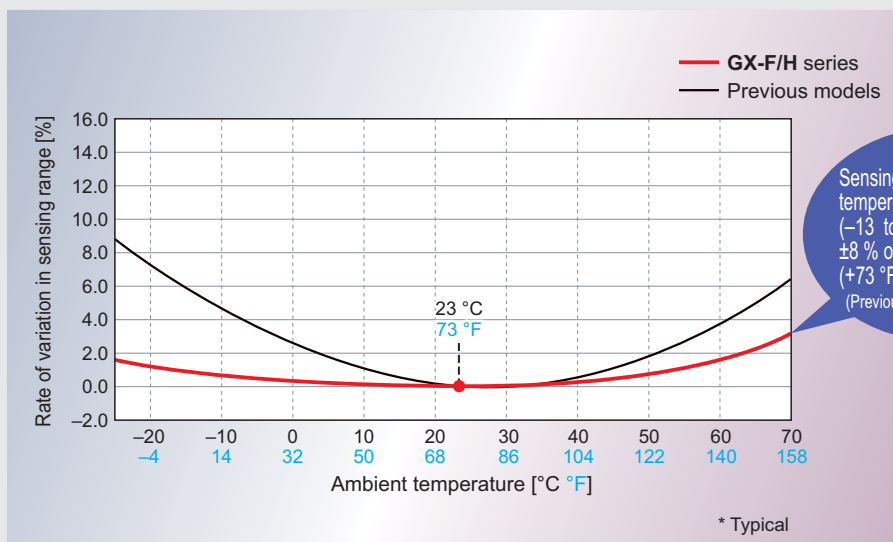
Sensing the starting point of a moving body



Answer of GX-F/H series

Industry No.1

Stable sensing! Temperature characteristics vary within $\pm 8\%$



Components such as the sensor coil and core and product design have been totally revised to provide excellent temperature characteristics. Stable sensing can be obtained regardless of the time of the day or the yearly seasons.



GX-□8: 2.1 mm 0.083 in
(Maximum operation distance: 2.5 mm 0.098 in)

Stable sensing range

2.5 mm 0.098 in | 2.1 to 0 mm 0.083 to 0 in



GX-□8

2.5 mm 0.098 in | 1.8 to 0 mm 0.071 to 0 in



Previous model

GX-□12: 3.3 mm 0.130 in
(Maximum operation distance: 4.0 mm 0.157 in)

Stable sensing range

4.0 mm 0.157 in | 3.3 to 0 mm 0.130 to 0 in



GX-□12

4.0 mm 0.157 in | 3.0 to 0 mm 0.118 to 0 in



Previous model

3 Customer requirements



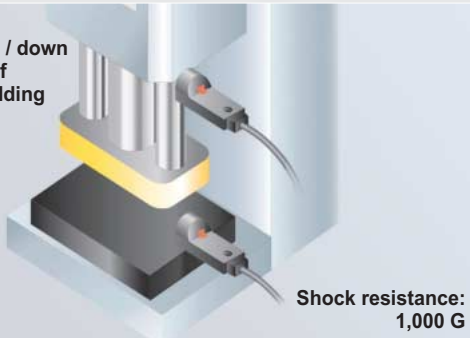
We want sensors that are good at withstanding vibration and shocks!

Answer of GX-F/H series

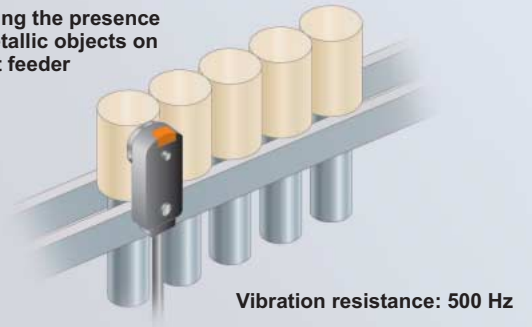
Industry No.1

10 times the durability! (Compared to previous models)

Checking up / down operations of compact molding equipment



Sensing the presence of metallic objects on a part feeder



The new integrated construction method used provides shock resistance of 10,000 m/s² (approx. 1,000 G in X, Y and Z directions for three times each), and vibration resistance which clears durability tests of between 10 and 500 Hz (3 mm 0.118 in amplitude in X, Y and Z directions for 2 hours each). In addition, resistance to impulse noise is approx. three times greater than for previous models.



4 Customer requirements



Are the sensors really safe to be used in places where water or oil will get on them?

Answer of GX-F/H series

Industry No.1

Highly resistant to water or oil! IP68g* protective construction



The new integrated construction method used improves environmental resistance performance. The IP68g prevents damage to the sensor by stopping water and oil from getting inside.

* For details, refer to the "SPECIFICATIONS" (p.8~)



5 Customer requirements



We'd really like to have sensors that let you see the operating status at a glance.

Answer of GX-F/H series

Indicators are easy to see over a wide field of view



A prism with a wide field of view has been developed. This has greatly improved the visibility of the operation indicators.



6 Customer requirements

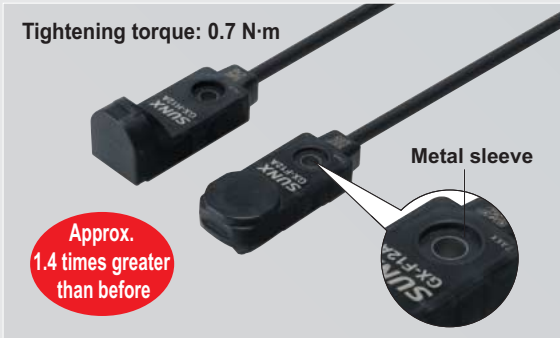


If you tighten the screws too tightly, it will damage the sensors.

Answer of GX-F/H series

Tightening strength increased with no damage!

Tightening torque: 0.7 N·m



A metal sleeve has been inserted! It is possible to tighten up to 0.7 N·m*.

* Maximum tightening torque for M3 screw.



7 Customer requirements



There are too many thin wires which are very difficult to work with!

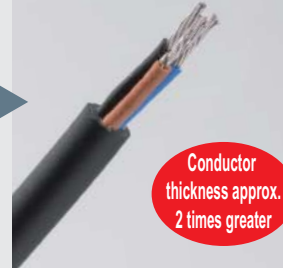
Answer of GX-F/H series

Conductor thickness doubled to make wiring much easier! (GX-□8 only)

0.08 mm²
Previous model



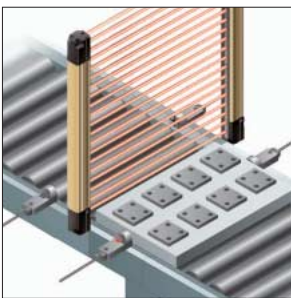
0.15 mm²
GX-□8



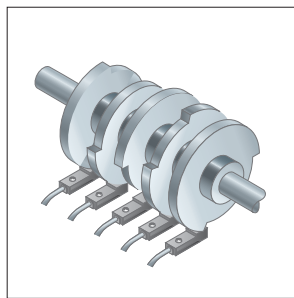
The conductor's thickness was doubled for the GX-□8. This makes it easier to handle and perform crimping work on the cables. In addition, the tensile strength of the crimping area has become higher.



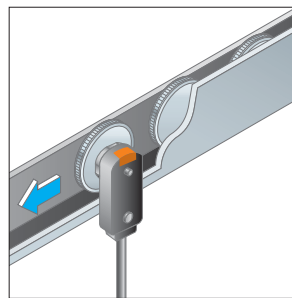
Applications



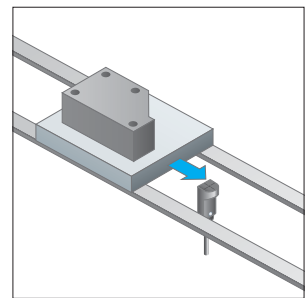
Muting control of light curtains



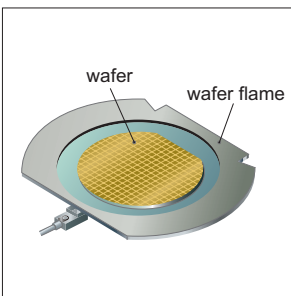
Detecting cam position



Detecting rolling coins



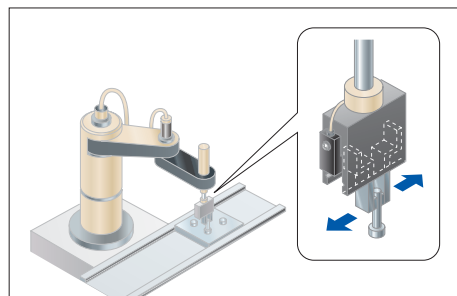
Positioning metal pallets



Detecting wafer flame



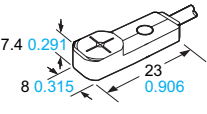
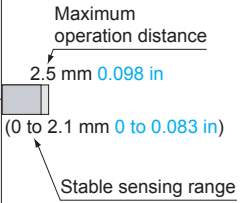
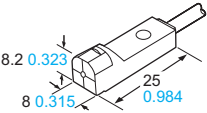
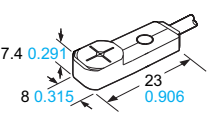
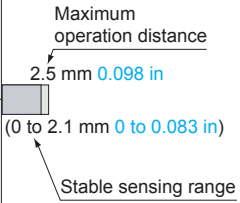
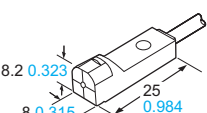
Positioning processing equipment



Checking robot finger chucks

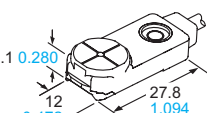
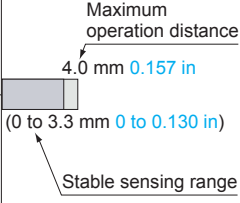
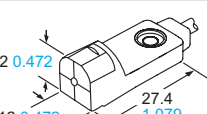
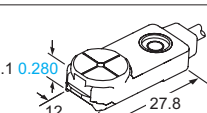
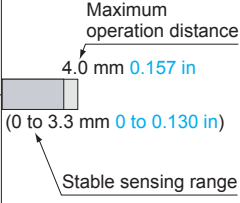
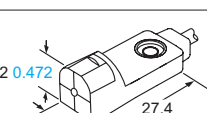
ORDER GUIDE

GX-8 type

Type	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
NPN output	Front sensing  7.4 0.291 8 0.315 23 0.906	 Maximum operation distance 2.5 mm 0.098 in Stable sensing range (0 to 2.1 mm 0 to 0.083 in)	GX-F8A	NPN open-collector transistor	Normally open
			GX-F8AI		Normally closed
			GX-F8B		Normally open
	GX-F8BI		Normally closed		
	Top sensing  8.2 0.323 8 0.315 25 0.984		GX-H8A		Normally open
			GX-H8AI		Normally closed
GX-H8B		Normally open			
PNP output	Front sensing  7.4 0.291 8 0.315 23 0.906	 Maximum operation distance 2.5 mm 0.098 in Stable sensing range (0 to 2.1 mm 0 to 0.083 in)	GX-F8A-P	PNP open-collector transistor	Normally open
			GX-F8AI-P		Normally closed
			GX-F8B-P		Normally open
	GX-F8BI-P		Normally closed		
	Top sensing  8.2 0.323 8 0.315 25 0.984		GX-H8A-P		Normally open
			GX-H8AI-P		Normally closed
GX-H8B-P		Normally open			
			GX-H8BI-P		Normally closed

- Notes: 1) 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.
- 2) "I" in the model No. indicates a different frequency type.

GX-12 type

Type	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
NPN output	Front sensing  7.1 0.280 12 0.472 27.8 1.094	 Maximum operation distance 4.0 mm 0.157 in Stable sensing range (0 to 3.3 mm 0 to 0.130 in)	GX-F12A	NPN open-collector transistor	Normally open
			GX-F12AI		Normally closed
			GX-F12B		Normally open
	GX-F12BI		Normally closed		
	Top sensing  12 0.472 12 0.472 27.4 1.079		GX-H12A		Normally open
			GX-H12AI		Normally closed
GX-H12B		Normally open			
PNP output	Front sensing  7.1 0.280 12 0.472 27.8 1.094	 Maximum operation distance 4.0 mm 0.157 in Stable sensing range (0 to 3.3 mm 0 to 0.130 in)	GX-F12A-P	PNP open-collector transistor	Normally open
			GX-F12AI-P		Normally closed
			GX-F12B-P		Normally open
	GX-F12BI-P		Normally closed		
	Top sensing  12 0.472 12 0.472 27.4 1.079		GX-H12A-P		Normally open
			GX-H12AI-P		Normally closed
GX-H12B-P		Normally open			
			GX-H12BI-P		Normally closed

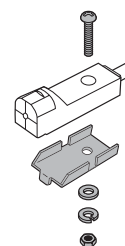
- Notes: 1) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.
- 2) "I" in the model No. indicates a different frequency type.

OPTIONS

Designation	Model No.	Description
Sensor mounting bracket	MS-GXL8-4	Mounting bracket for GX-8 type

Sensor mounting bracket

• MS-GXL8-4



1 pc. each of M3 (length: 12 mm **0.472 in**) truss head screw, nut, spring washer and plain washer is attached.

SPECIFICATIONS

GX-8 type

Item	Model No. (Note 2)	Type	NPN output		PNP output	
		Front sensing	GX-F8A(I)	GX-F8B(I)	GX-F8A(I)-P	GX-F8B(I)-P
		Top sensing	GX-H8A(I)	GX-H8B(I)	GX-H8A(I)-P	GX-H8B(I)-P
Max. operation distance (Note 3)		2.5 mm 0.098 in ± 8 %				
Stable sensing range (Note 3)		0 to 2.1 mm 0 to 0.083 in				
Standard sensing object		Iron sheet 15 × 15 × t 1 mm 0.591 × 0.591 × t 0.039 in				
Hysteresis		20 % or less of operation distance (with standard sensing object)				
Repeatability		Along sensing axis, perpendicular to sensing axis: 0.04 mm 0.0016 in or less				
Supply voltage		12 to 24 V DC $^{+10}_{-15}$ % Ripple P-P 10 % or less				
Current consumption		15 mA or less				
Output		NPN open-collector transistor <ul style="list-style-type: none"> Maximum sink current: 100 mA Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current) 		PNP open-collector transistor <ul style="list-style-type: none"> Maximum source current: 100 mA Applied voltage: 30 V DC or less (between output and +V) Residual voltage: 1 V or less (at 100 mA source current) 0.4 V or less (at 16 mA source current) 		
Output operation		Normally open	Normally closed	Normally open	Normally closed	Normally closed
Max. response frequency		500 Hz				
Operation indicator		Orange LED (lights up when the output is ON)				
Environmental resistance	Protection	IP68 (IEC), IP68g (JEM) (Note 4, 5)				
	Ambient temperature	-25 to +70 °C -13 to +158 °F , Storage: -40 to +85 °C -40 to +185 °F				
	Ambient humidity	45 to 85 % RH, Storage: 35 to 95 % RH				
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure				
	Insulation resistance	50 MΩ, or more, with 500 V DC megger between all supply terminals connected together and enclosure				
	Vibration resistance	10 to 500 Hz frequency, 3 mm 0.118 in amplitude in X, Y and Z directions for two hours each				
	Shock resistance	10,000 m/s ² acceleration (1,000 G approx.) in X, Y and Z directions for three times each				
Sensing range variation	Temperature characteristics	Over ambient temperature range -25 to +70 °C -13 to +158 °F : Within ±8 % of sensing range at +23 °C +73 °F				
	Voltage characteristics	Within ±2 % for $^{+10}_{-15}$ % fluctuation of the supply voltage				
Material		Enclosure: PBT, Indicator part: Polyester				
Cable		0.15 mm ² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long				
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable.				
Net weight		Front sensing type: 15 g approx., Top sensing type: 20 g approx..				

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73 °F**.

2) "I" in the model No. indicates a different frequency type.

3) 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.

4) SUNX's IP68 test method

① Immerse at 0 m below 0 °C **+32 °F** water surface and leave for 30 min. Then, immerse at 0 m below +70 °C **+158 °F** water surface and leave for 30 min.

② Regard the heat shock test in ① as one cycle and perform 20 cycles.

③ Leave in water at a depth of 1 m **3.281 ft** in water for 500 hours.

④ After tests ① to ③, insulation resistance, voltage withstandability, current consumption, and sensing ranges must meet the standard values.

5) If using the sensor in an environment where cutting oil droplets splatter, the sensor may deteriorate due to added substances in the oil.

SPECIFICATIONS

GX-12 type

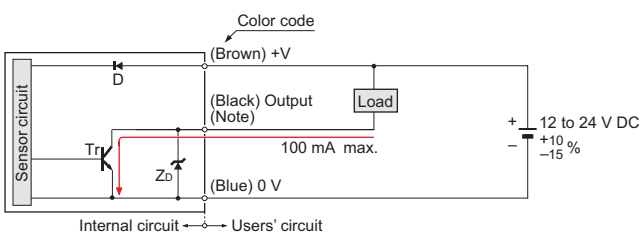
Item	Model No. (Note 2)	Type	NPN output		PNP output	
		Front sensing	GX-F12A(I)	GX-F12B(I)	GX-F12A(I)-P	GX-F12B(I)-P
		Top sensing	GX-H12A(I)	GX-H12B(I)	GX-H12A(I)-P	GX-H12B(I)-P
Max. operation distance (Note 3)		4.0 mm 0.157 in ± 8 %				
Stable sensing range (Note 3)		0 to 3.3 mm 0 to 0.130 in				
Standard sensing object		Iron sheet 0 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in				
Hysteresis		20 % or less of operation distance (with standard sensing object)				
Repeatability		Along sensing axis, perpendicular to sensing axis: 0.04 mm 0.0016 in or less				
Supply voltage		12 to 24 V DC $+10\%$ -15% Ripple P-P 10 % or less				
Current consumption		15 mA or less				
Output		NPN open-collector transistor		PNP open-collector transistor		
		<ul style="list-style-type: none"> Maximum sink current: 100 mA Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current) 		<ul style="list-style-type: none"> Maximum source current: 100 mA Applied voltage: 30 V DC or less (between output and +V) Residual voltage: 1 V or less (at 100 mA source current) 0.4 V or less (at 16 mA source current) 		
Output operation		Normally open	Normally closed	Normally open	Normally closed	Normally closed
Max. response frequency		500 Hz				
Operation indicator		Orange LED (lights up when the output is ON)				
Environmental resistance	Protection	IP68 (IEC), IP68g (JEM) (Note 4, 5)				
	Ambient temperature	-25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F				
	Ambient humidity	45 to 85 % RH, Storage: 35 to 95 % RH				
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure				
	Insulation resistance	50 MΩ, or more, with 500 V DC megger between all supply terminals connected together and enclosure				
	Vibration resistance	10 to 500 Hz frequency, 3 mm 0.118 in amplitude in X, Y and Z directions for two hours each				
	Shock resistance	10,000 m/s ² acceleration (1,000 G approx.) in X, Y and Z directions for three times each				
Sensing range variation	Temperature characteristics	Over ambient temperature range -25 to +70 °C -13 to +158 °F: Within ±8 % of sensing range at +23 °C +73 °F				
	Voltage characteristics	Within ±2 % for $+10\%$ -15% fluctuation of the supply voltage				
Material		Enclosure: PBT, Indicator part: Polyester				
Cable		0.15 mm ² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long				
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable.				
Net weight		Front sensing type: 20 g approx., Top sensing type: 20 g approx..				

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73 °F.
 2) "I" in the model No. indicates a different frequency type.
 3) 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.
 4) SUNX's IP68 test method
 ① Immerse at 0 m below 0 °C +32 °F water surface and leave for 30 min. Then, immerse at 0 m below +70 °C +158 °F water surface and leave for 30 min.
 ② Regard the heat shock test in ① as one cycle and perform 20 cycles.
 ③ Leave in water at a depth of 1 m 3.281 ft in water for 500 hours.
 ④ After tests ① to ③, insulation resistance, voltage withstandability, current consumption, and sensing ranges must meet the standard values.
 5) If using the sensor in an environment where cutting oil droplets splatter, the sensor may deteriorate due to added substances in the oil.

I/O CIRCUIT DIAGRAMS

GX-□

NPN output type

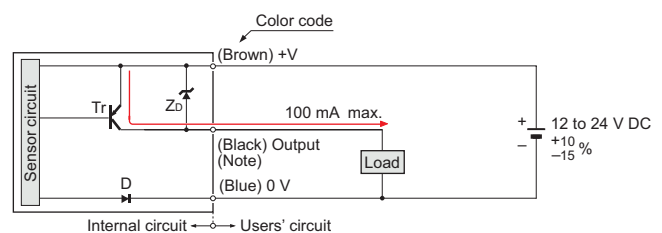


Note: The output does not incorporate a short-circuit protection circuit.
 Do not connect it directly to a power supply or a capacitive load.

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

GX-□-P

PNP output type



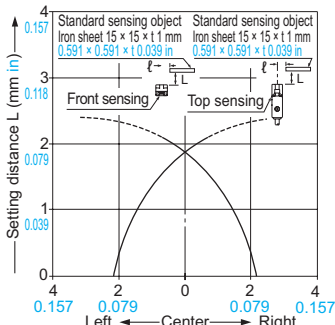
Note: The output does not incorporate a short-circuit protection circuit.
 Do not connect it directly to a power supply or a capacitive load.

Symbols ... D : Reverse supply polarity protection diode
 Z_D: Surge absorption zener diode
 Tr: PNP output transistor

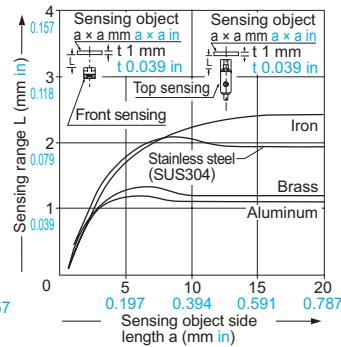
SENSING CHARACTERISTICS (TYPICAL)

GX-8 type

Sensing field



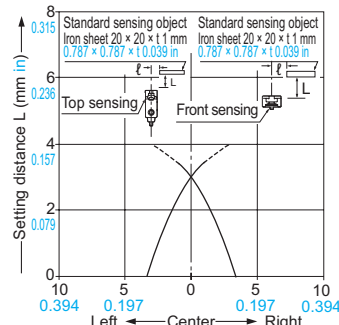
Correlation between sensing object size and sensing range



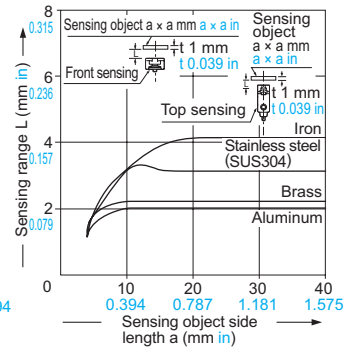
As the sensing object size becomes smaller than the standard size (iron sheet 15 × 15 × t 1 mm 0.591 × 0.591 × t 0.039 in), the sensing range shortens as shown in the left figures.

GX-12 type

Sensing field



Correlation between sensing object size and sensing range



As the sensing object size becomes smaller than the standard size (iron sheet 20 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in), the sensing range shortens as shown in the left figure.

PRECAUTIONS FOR PROPER USE

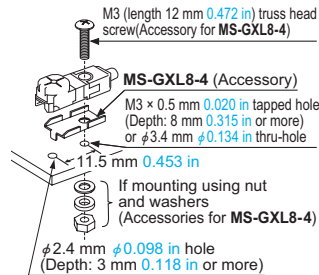


- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

Mounting

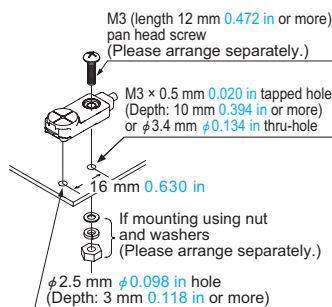
GX-8 type

- Make sure to use a M3 (length: 12 mm 0.472 in or more) truss head screw. The tightening torque should be 0.7 N·m or less. (Do not use a flat head screw or a pan head screw.)



GX-12 type

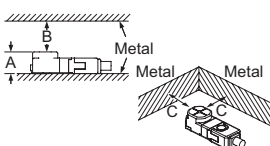
- The tightening torque should be 0.7 N·m or less.
- To mount the sensor with a nut, the mounting hole diameter should be φ 3.4 mm φ 0.134 in. Further, the hole in which the boss is inserted should be φ 2.5 mm φ 0.098 in and 3 mm 0.118 in, or more, deep.



Influence of surrounding metal

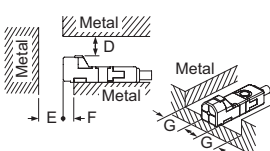
- When there is a metal near the sensor, keep the minimum separation distance specified below.

Front sensing type



	GX-F8 type	GX-F12 type
A	7.4 mm 0.291 in	7.1 mm 0.280 in
B	8 mm 0.315 in	20 mm 0.787 in
C	3 mm 0.118 in	7 mm 0.276 in

Top sensing type



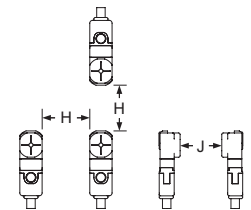
	GX-H8 type	GX-H12 type
D	4 mm 0.157 in	7 mm 0.276 in
E	10 mm 0.394 in	20 mm 0.787 in
F	3 mm 0.118 in	3 mm 0.118 in
G	3 mm 0.118 in	3 mm 0.118 in

Mutual interference prevention

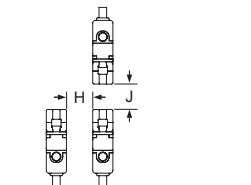
- When two or more sensors are installed in parallel or face to face, keep the minimum separation distance specified below to avoid mutual interference.

		H	J
GX-F8□	Between "I" type and non "I" type	0 mm (Note 2)	15 mm 0.591 in
GX-H8□	Between two "I" types or two non "I" types	20 mm	35 mm 1.378 in
GX-F12□	Between "I" type and non "I" type	0 mm (Note 2)	25 mm 0.984 in
GX-H12□	Between two "I" types or two non "I" types	25 mm	50 mm 1.969 in

Front sensing



Top sensing



- Notes: 1) "I" in the model No. specifies the different frequency type.
2) Close mounting is possible for up to two sensors.

When mounting three sensors or more at an equal spacing, align the model with "I" and the model without "I" alternately. The minimum value of dimension "H" should be as given below.
GX-8 type: 6 mm 0.236 in
GX-12 type: 6.5 mm 0.256 in

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. Further, the sensing range also changes if the sensing object is smaller than the standard sensing object or if the sensing object is plated.

Correction coefficient

Model No.	GX-8 type	GX-12 type
Metal		
Iron	1	1
Stainless steel (SUS304)	0.76 approx.	0.79 approx.
Brass	0.50 approx.	0.56 approx.
Aluminum	0.48 approx.	0.53 approx.

Others

- This product has been developed / produced for industrial use only.
- The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- Extension up to total 100 m 328.084 ft is possible with a 0.3 mm², or more, cable.

