# Rectangular-shaped Inductive Proximity Sensor Amplifier Built-in

# GX-F/H SERIES

FIBER SENSORS Related Information

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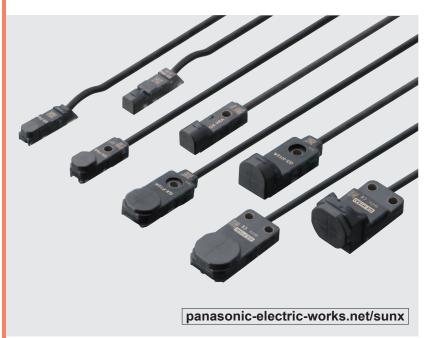
FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide Amplifier Built-in Amplifierseparated

GX-F/H
GXL
GL
GX-U/GX-FU/
GX-N



Conforming to EMC Directive





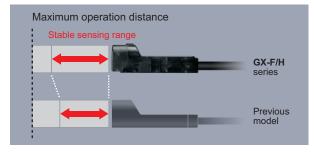


# Industry No. 1\* in stable sensing

\* Based on research conducted by Panasonic Electric Works SUNX as of August 2010 among equivalent rectangular inductive sensors.

## Can be installed with ample space

This sensor has the longest stable sensing range among the same level of rectangular inductive proximity sensors in the industry. It is easy to install the sensor.



	Maximum	Stable sen	sing range
Туре	operation distance	GX-F/H series	Previous model
GX-□6	1.6 mm 0.063 in	0 to 1.3 mm 0.051 in	0 to 1.2 mm 0.047 in
GX-□8	2.5 mm 0.098 in	0 to 2.1 mm 0.083 in	0 to 1.8 mm 0.709 in
GX-□12	4.0 mm 0.157 in	0 to 3.3 mm 0.130 in	0 to 3.0 mm 0.118 in
GX-□15	5.0 mm 0.197 in	0 to 4.2 mm 0.165 in	0 to 4.0 mm 0.157 in
Long sensing range	8.0 mm 0.315 in	0 to 6.7 mm 0.264 in	0 to 6.4 mm 0.252 in

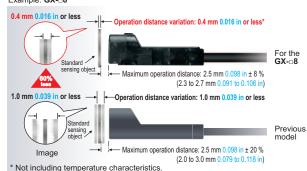
<sup>\*</sup> With standard sensing object

## Variation at the maximum operation distance is within ±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 is much easier.

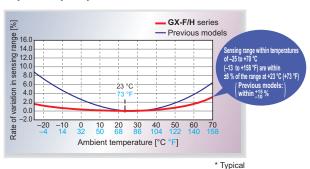
Example: GX
8



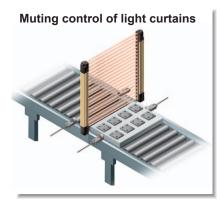
#### Temperature characteristics vary within ±8 %

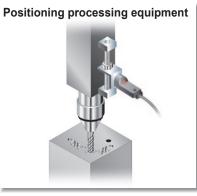
Components such as the sensor coil and core and product design have been totally revised to provide excellent temperature characteristics.

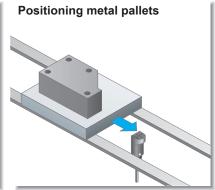
Stable sensing can be obtained regardless of the time of day or the yearly season.



## **APPLICATIONS**



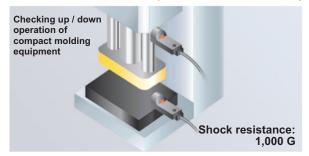




## **ENVIRONMENTAL RESISTANCE**

## 10 times the durability! (Compared to previous models)

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 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.



# 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 getting inside.

\* For details, refer to the "SPECIFICATIONS".



# Sensing presence of metallic objects on a part feeder Vibration resistance: 500 Hz

## **FUNCTIONS**

## 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.



## MOUNTING

Tightening strength increased with no damage! (excluding GX-□6)

A metal sleeve has been inserted.

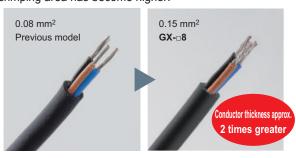
It prevents the sensor from being damaged by tightening too much.





Conductor thickness doubled to make wiring much easier! (GX-□6/□8 only)

The conductor's thickness was doubled for the **GX-**□**6**/□**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.



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## **ORDER GUIDE**

## **GX-6** type

Ту	/pe	Appearance (mm in)	Sensing range (Note 1)	ng range (Note 1) Model No. (Note 2)		Output operation
	ng	~\^		GX-F6A		Normally open
	sensing			GX-F6AI		Normally open
=	Front s	6 0.236		GX-F6B		Normally closed
outpu	ᇤ	6 0.236		GX-F6BI	NPN open-collector	Normally closed
NPN output	g		Maximum	GX-H6A	transistor	Normally open
	Top sensing	1		GX-H6AI		
		6 0.236	operation distance	GX-H6B		Normally closed
		6 0.236 0.984	1.6 mm 0.063 in	GX-H6BI		
	БL	1	(0 to 1.3 mm 0 to 0.051 in)	GX-F6A-P		Normally open
	Front sensing			GX-F6AI-P	PNP open-collector transistor	
+	ont s	6 0.236	Stable sensing range	GX-F6B-P		No
PNP output	Fre	6 0.236 0.965		GX-F6BI-P		Normally closed
N <sub>O</sub>	g	. />		GX-H6A-P		N
₫.	sensing			GX-H6AI-P		Normally open
	ob se	6 0.236		GX-H6B-P		
	Тор	6 0.236 0.984		GX-H6BI-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-8** type

Ту	/ре	Appearance (mm in)	Sensing range (Note 1)	ng range (Note 1) Model No. (Note 2)		Output operation
	ng	$\sim$ 3		GX-F8A		Normally open
	sensing	7.4 0.291		GX-F8AI		Normally open
=	Front s	8 0.315 0.906		GX-F8B		Normally closed
outpu	필	0.313		GX-F8BI	NPN open-collector	Normally closed
NPN output	g			GX-H8A	transistor	Normally open
Z	Top sensing	8.2 0.323 8 0.315 25 0.984	Maximum	GX-H8AI		
			operation distance 2.5 mm 0.098 in	GX-H8B		Normally closed
	Ĕ			GX-H8BI		
	βL	1	7.4 0.291	GX-F8A-P	PNP open-collector transistor	Normally open
	sensing	1 ~ 6 3		GX-F8AI-P		
+	Front s			GX-F8B-P		No
PNP output	Fre	0.500		GX-F8BI-P		Normally closed
N <sub>O</sub>	g	<u></u>		GX-H8A-P		N
<u>-</u>	sensing			GX-H8AI-P		Normally open
	es do	8.2 0.323		GX-H8B-P		Normally closed
	Тор	8 0.315 0.984		GX-H8BI-P	1	

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.

## **ORDER GUIDE**

## GX-12 type

Ту	/ре	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
	ng			GX-F12A		Normally open
	ensi	7.1 0.280		GX-F12AI		Normany open
=	Front sensing	27.8		GX-F12B		Normally closed
outpi	F.	0.472 1.094		GX-F12BI	NPN open-collector	Normally closed
NPN output	Top sensing	12 0.472		GX-H12A	transistor	Normally open
Z			Maximum operation distance 2 0.472  27.4 2 0.472  4.0 mm 0.157 in (0 to 3.3 mm 0 to 0.130 in)	GX-H12AI		
		27.4		GX-H12B		Normally closed
		12 0.472		GX-H12BI		
	б	7.1 0.280		GX-F12A-P		Normally open
	sensing			GX-F12AI-P	PNP open-collector transistor	
+	Front s	27.8	Stable sensing range	GX-F12B-P		Namenthialanad
PNP output	Fre	0.472 1.094		GX-F12BI-P		Normally closed
NP o	g			GX-H12A-P		Name II
Δ_	sensing	12 0.472		GX-H12AI-P		Normally open
		27.4		GX-H12B-P		No II I I
	Тор	12 0.472		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.

## GX-15 type

Ty	/pe	Appearance (mm in) Sensing range (Note 1)		Model No. (Note 2)	Output	Output operation				
	βι			GX-F15A		Normally open				
	sensing	8 0.315		GX-F15AI						
=	Front s	31.5 15 0.591		GX-F15B		Name III. da a d				
outpr	ᇍ			GX-F15BI	NPN open-collector transistor	Normally closed				
NPN output	б	16.5 0.650		GX-H15A		Normally open				
	sensing		Maximum	GX-H15AI						
	Top se	29.5	operation distance	GX-H15B		Normally along				
	Ĕ	15 0.591 1.161	5.Ó mm 0.197 in	GX-H15BI		Normally closed				
	б	8 0.315								
	sensing			\	GX-F15AI-P		Normally open			
+	Front s	31.5	Stable sensing range	GX-F15B-P						
utbn	Fre	15 0.591 1.240		GX-F15BI-P	PNP open-collector	Normally closed				
PNP output	sensing	- 1		GX-H15A-P	transistor					
		16.5 0.650		GX-H15AI-P		Normally open				
	ob se	29.5		GX-H15B-P						
	Тор	15 0.591 1.161		GX-H15BI-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.

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## **ORDER GUIDE**

## GX-15 (Long sensing range) type

Ту	/pe	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
	ng	8 0.315		GX-FL15A		Normally open
	sensing			GX-FL15AI		Tromiany open
=	Front 8	31.5 15 0 591 1.240	31.5	GX-FL15B		Normally closed
NPN output	L.	15 0.591		GX-FL15BI	NPN open-collector	140many closed
M	Top sensing	16.5 0.650		GX-HL15A	transistor	Normally open
2			Maximum	GX-HL15AI		
		29.5	operation distance	GX-HL15B		Normally closed
	-	15 0.591 1.161	8.0 mm 0.315 in	GX-HL15BI		Normally closed
	gu	8 0.315 Stable sensing range  GX-FL15A-P  GX-FL15A-P  GX-FL15A-P  GX-FL15B-P  GX-FL15B-P  GX-FL15B-P		Normally open		
	sensing			GX-FL15AI-P	PNP open-collector transistor	Normally open
=	Front s		Stable sensing range	GX-FL15B-P		Normally along
outpu	뇬		GX-FL	GX-FL15BI-P		Normally closed
PNP output	g			GX-HL15A-P		Normally open
₾.	sensing	16.5 0.650	16.5 0.650	GX-HL15AI-P		Normally open
		29.5		GX-HL15B-P		Normally aloned
	Тор	15 0.591 1.161		GX-HL15BI-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.

#### 5 m 16.404 ft cable length type, flexible cable type

5 m 16.404 ft cable length type (standard: 1 m 3.281 ft) and flexible cable (excluding 5 m 16.404 ft cable length type) are available. However, long sensing range type is not available. When ordering 5 m 16.404 ft cable length type, suffix "-C5" to the model No. When ordering flexible cable type, suffix "-R" to the model No.

(e.g.) 5 m 16.404 ft cable length type of GX-F15AI-P is "GX-F15AI-P-C5". Flexible cable type of GX-F15AI-P is "GX-F15AI-P-R".

## **OPTIONS**

Designation	Model No.	Description			
	MS-GX6-1	Mounting bracket for <b>GX-6</b> type Sensors can be mounted close			
Sensor	MS-GL6-1	Mounting brackets for <b>GX-6</b> type Sensor mounting brackets for <b>GL-6</b> can be used. Interchange is			
mounting bracket	MS-GL6-2	possible.			
	MS-GXL8-4	Mounting bracket for <b>GX-8</b> type			
	MS-GXL15	Mounting bracket for <b>GX-15</b> type			
Aluminum	MS-A15F	For <b>GX-FL15</b> □(- <b>P</b> )	Mounting example when mounted onto a steel or		
sheet	MS-A15H	For <b>GX-HL15</b> □(- <b>P</b> )	stainless steel plate		

## Sensor mounting bracket



· MS-GL6-1



· MS-GL6-2



#### · MS-GXL8-4 · MS-GXL15





## **Aluminum sheet**

- · MS-A15F
- · MS-A15H



## SPECIFICATIONS

#### **GX-6** type

Туре		Туре	NPN (	output	PNP output				
		S Front sensing	GX-F6A(I)	GX-F6B(I)	GX-F6A(I)-P	GX-F6B(I)-P	MICRO PHOTO-		
Iten	n \	Top sensing	GX-H6A(I)	GX-H6B(I)	GX-H6A(I)-P	GX-H6B(I)-P	PHOTO- ELECTRIC SENSORS		
Max	. opera	ation distance (Note 3)		1.6 mm 0.063 in ± 8 %					
Stat	ble sen	sing range (Note 3)		0 to 1.3 mm	0 to 0.051 in		LIGHT CURTAIN:		
Star	Standard sensing object Iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in								
Hys	teresis	•		20 % or less of operation distant	ce (with standard sensing object	)	- PRESSURE FLOW SENSORS		
Rep	eatabi	lity	Along	sensing axis, perpendicular to s	ensing axis: 0.04 mm 0.0016 in	or less	INDUCTIVI PROXIMIT		
Sup	ply vol	tage		12 to 24 V DC <sup>+10</sup> <sub>-15</sub> %	Ripple P-P 10 % or less		- PARTICULA		
Curi	rent co	nsumption		15 mA	or less		PARTICULA USE SENSORS		
Out	Output		NPN open-collector transistor • Maximum sink current: 100		PNP open-collector transistor • Maximum source current:	100 mA	SENSOR OPTIONS		
Out			Applied voltage: 30 V DC o     Residual voltage: 2 V or le:	or less (between output and 0 V) as (at 100 mA sink current)	11	or less (between output and +V) ess (at 100 mA source current)	SIMPLE WIRE-SAVING UNITS		
	Utiliz	ation category		DC-12 c	or DC-13		WIRE-SAVING SYSTEMS		
	Outp	ut operation	Normally closed	Normally closed	Normally closed	Normally closed	MEASURE - MENT SENSORS		
Max	c. respo	onse frequency		400	) Hz		SENSORS STATIC		
Оре	eration	indicator	Orange LED (lights up when the output is ON)						
	Pollu	tion degree	3 (Industrial environment)						
e	Prote	ection		IP68 (IEC), IP68g (JEM) (Note 4, 5)					
resistance	Amb	ient temperature	-25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F						
resi	Amb	ient humidity		35 to 85 % RH, Storage: 35 to 95 % RH					
ental	EMC	:		EN 609	947-5-2		PLC / TERMINAL: HUMAN		
Environmental	Volta	ige withstandability	1,000 V AC	for one min. between all supply	terminals connected together ar	nd enclosure	MACHINE INTERFACE		
invir	Insul	ation resistance	50 MΩ, or more, with	th 500 V DC megger between al	I supply terminals connected tog	ether and enclosure	ENERGY CONSUMPTIO		
ш	Vibra	ation resistance	10 to 500 Hz frequer	ncy, 3 mm 0.118 in amplitude (M	lax. 20 G) in X, Y and Z direction	ns for two hours each	VISUALIZATIO COMPONENT:		
	Shoo	ck resistance	10,000 m/s <sup>2</sup>	<sup>2</sup> acceleration (1,000 G approx.)	in X, Y and Z directions for three	e times each	FA COMPONENT		
Sen	sing	Temperature characteristics	Over ambient temperate	ure range –25 to +70 °C –13 to +	+158 °F: Within ± 8 % of sensing	range at +23 °C +73 °F	MACHINE VISION SYSTEMS		
	ation	Voltage characteristics		Within $\pm 2$ % for $^{+10}_{-15}$ % fluctuation of the supply voltage					
Mat	erial			Enclosure: PBT, Ind	icator part: Polyester		UV CURING SYSTEMS		
Cab	ole		0.15 ו	mm <sup>2</sup> 3-core oil, heat and cold res	sistant cabtyre cable, 1 m 3.281	ft long			
Cab	le exte	ension	Extensi	ion up to total 100 m 328.084 ft i	s possible with 0.3 mm <sup>2</sup> , or more	e, cable.	_		
Net weight				15 g a	ipprox.		Selection		

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) Panasonic Electric Works 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.
  - (a) After tests (1) to (3), insulation resistance, voltage withstandability, current consumption, and sensing range must meet the standard values.
- 5) If using the sensor in an environment where cutting oil droplets splatter, the sensor may be deteriorated due to added substances in the oil.

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GL
GX-I/GX-FU/
GX-N
GX

## SPECIFICATIONS

#### **GX-8** type

	_	Туре	NPN	output	PNP	output			
		Sign Front sensing	GX-F8A(I)	GX-F8B(I)	GX-F8A(I)-P	GX-F8B(I)-P			
Item		Top sensing	GX-H8A(I)	GX-H8B(I)	GX-H8A(I)-P	GX-H8B(I)-P			
Max.	opera	tion distance (Note 3)		2.5 mm 0.098 in ± 8 %					
Stabl	le sen	sing range (Note 3)		0 to 2.1 mm	0 to 0.083 in				
Stand	dard s	ensing object		Iron sheet 15 × 15 × t 1 mn	n 0.591 × 0.591 × t 0.039 in				
Hyste	eresis			20 % or less of operation distance	ce (with standard sensing object)	)			
Repe	eatabil	ity	Along	sensing axis, perpendicular to se	ensing axis: 0.04 mm 0.0016 in	or less			
Supp	ly vol	age		12 to 24 V DC <sup>+10</sup> <sub>-15</sub> % F	Ripple P-P 10 % or less				
Curre	ent co	nsumption		15 mA	or less				
Output			NPN open-collector transistor  • Maximum sink current: 100 mA  • Applied voltage: 30 V DC or less (between output and 0 V)  • Residual voltage: 2 V or less (at 100 mA sink current)		PNP open-collector transistor  • Maximum source current: 100 mA  • Applied voltage: 30 V DC or less (between output ar  • Residual voltage: 2 V or less (at 100 mA source curr				
	Utiliza	ation category		DC-12 c	2 or DC-13				
	Outp	ut operation	Normally open	Normally closed	Normally open	Normally closed			
Max. response frequency				500	Hz				
Oper	ation	indicator	Orange LED (lights up when the output is ON)						
	Pollu	tion degree	3 (Industrial environment)						
e l	Prote	ction	IP68 (IEC), IP68g (JEM) (Note 4, 5)						
Environmental resistance	Ambi	ent temperature	-25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F						
resi	Ambi	ent humidity	35 to 85 % RH, Storage: 35 to 95 % RH						
ental	EMC			EN 60947-5-2					
oum	Volta	ge withstandability	1,000 V AC	for one min. between all supply	terminals connected together ar	nd enclosure			
invir	Insula	ation resistance	50 MΩ, or more, wi	th 500 V DC megger between all	supply terminals connected tog	ether and enclosure			
	Vibra	tion resistance	10 to 500 Hz freque	ncy, 3 mm 0.118 in amplitude (M	fax. 20 G) in X, Y and Z directions for two hours each				
	Shoc	k resistance	10,000 m/s	<sup>2</sup> acceleration (1,000 G approx.)	in X, Y and Z directions for three	e times each			
Sens		Temperature characteristics	Over ambient temperat	ure range –25 to +70 °C –13 to +		range at +23 °C +73 °F			
varia		Voltage characteristics	Within ±2 % for $^{+10}_{-15}$ % fluctuation of the supply voltage						
Mate	rial		Enclosure: PBT, Indicator part: Polyester						
Cable	е		0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long						
Cable	e exte	nsion	Extens	Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.					
Net v	veight			Front sensing type: 15 g approx.	, Top sensing type: 20 g approx.				
				d precisely, the conditions used					

- 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) Panasonic Electric Works 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

	Type NPN output PNP output		output					
	So Front sensing	GX-F12A(I)	GX-F12B(I)	GX-F12A(I)-P	GX-F12B(I)-P			
Item	Top sensing	GX-H12A(I)	GX-H12B(I)	GX-H12A(I)-P	GX-H12B(I)-P			
Max. opera	ation distance (Note 3)		4.0 mm 0.157 in ± 8 %					
Stable sen	nsing range (Note 3)	range (Note 3) 0 to 3.3 mm 0 to 0.130 in						
Standard s	sensing object		Iron sheet 20 × 20 × t 1 mr	m 0.787 × 0.787 × t 0.039 in				
Hysteresis	s		20 % or less of operation distant	ce (with standard sensing object)	)			
Repeatabi	ility	Along	sensing axis, perpendicular to s	sensing axis: 0.04 mm 0.0016 in o	or less			
Supply vol	ltage		12 to 24 V DC <sup>+10</sup> <sub>-15</sub> %	Ripple P-P 10 % or less				
Current co	onsumption		15 mA	or less				
Output  NPN open-collector transistor  • Maximum sink current: 100 mA  • Applied voltage: 30 V DC or less (between output and 0 V)  • Residual voltage: 2 V or less (at 100 mA sink current)  PNP open-collector transistor  • Maximum source current: 100 mA  • Applied voltage: 30 V DC or less (between output explicitly residual voltage: 2 V or less (at 100 mA source current)		100 mA						
		,						
Utiliz	zation category		DC-12 (	or DC-13				
Outp	out operation	Normally open	Normally closed	Normally open	Normally closed			
Max. respo	onse frequency		500	) Hz				
Operation	indicator		Orange LED (lights up	when the output is ON)				
Pollu	ution degree	3 (Industrial environment)						
Prote	ection		IP68 (IEC), IP68g	g (JEM) (Note 4, 5)				
Amb	pient temperature	–25 to +70 °C –13 to +158 °F, Storage: –40 to +85 °C –40 to +185 °F						
Amb	pient humidity	35 to 85 % RH, Storage: 35 to 95 % RH						
EMC			EN 609	947-5-2				
Volta	age withstandability	1,000 V AC	for one min. between all supply	terminals connected together an	d enclosure			
Ambi EMC Volta	lation resistance	50 MΩ, or more, wi	50 M $\Omega$ , or more, with 500 V DC megger between all supply terminals connected together and enclosure					
	ation resistance	10 to 500 Hz freque	ncy, 3 mm 0.118 in amplitude (M	flax. 20 G) in X, Y and Z direction	s for two hours each			
Shoo	ck resistance	10,000 m/s	<sup>2</sup> acceleration (1,000 G approx.)	in X, Y and Z directions for three	times each			
Sensing range	Temperature characteristics	Over ambient tempera	ture range –25 to +70 °C –13 to	+158 °F: Within ±8 % of sensing	range at +23 °C +73 °F			
variation	Voltage characteristics		Within ±2 % for +10 % fluct	ruation of the supply voltage				
Material			Enclosure: PBT, Ind	licator part: Polyester				
Cable		0.15	mm <sup>2</sup> 3-core oil, heat and cold res	sistant cabtyre cable, 1 m 3.281 f	tlong			
Cable exte	ension	Extens	ion up to total 100 m 328.084 ft i	is possible with 0.3 mm <sup>2</sup> , or more	, cable.			
Net weight	nt		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) Panasonic Electric Works 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.

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GXL GL

GX-U/GX-FU/ GX-N GX

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PARTICULAR USE SENSORS SENSOR OPTIONS

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Selection Guide Amplifier Built-in Amplifier-

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GL
GX-U/GX-FU/
GX-N
GX

## **SPECIFICATIONS**

## GX-15 type

		T		NPN	output			PNP	output	
		Туре			Long sens	sing range			Long sens	sing range
	\	Front sensing	GX-F15A(I)	GX-F15B(I)	GX-FL15A(I)	GX-FL15B(I)	GX-F15A(I)-P	GX-F15B(I)-P	GX-FL15A(I)-P	GX-FL15B(I)-P
Item		Top sensing	GX-H15A(I)	GX-H15B(I)	GX-HL15A(I)	GX-HL15B(I)	GX-H15A(I)-P	GX-H15B(I)-P	GX-HL15A(I)-P	GX-HL15B(I)-P
Max.	operati	ion distance (Note 3)	5.0 mm 0.1	97 in ± 8 %	8.0 mm 0.315 ir	1 ± 8 % (Note 4)	5.0 mm 0.1	97 in ± 8 %	8.0 mm 0.315 ir	± 8 % (Note 4)
Stable sensing range (Note 3)			0 to 4.2 mm	0 to 0.165 in	0 to 6.7 mm 0 to	0.264 in (Note 4)	0 to 4.2 mm	0 to 0.165 in	0 to 6.7 mm 0 to	0.264 in (Note 4)
Standard sensing object				Iron sheet 20 × 20 × t 1 mm         Iron sheet 30 × 30 × t 1 mm         Iron sheet 20 × 20 × t 1 mm         Iron sheet 30 × 30 × t 1 mm         Iron sheet 20 × 20 × t 1 mm         Iron sheet 30 × 30 × t 1 mm <t< td=""><td></td></t<>						
Hyst	eresis				20 % or less of o	operation distance	ce (with standard	sensing object	)	
Repe	eatabilit	ty		Along	sensing axis, pe	erpendicular to s	ensing axis: 0.04	4 mm 0.0016 in	or less	
Supp	oly volta	age			12 to 24	4 V DC <sup>+10</sup> <sub>-15</sub> %	Ripple P-P 10 %	or less		
Curr	ent con	sumption				15 mA	or less			
Output			NPN open-collector transistor  • Maximum sink current: 100 mA  • Applied voltage: 30 V DC or less (between output and 0 V)  • Residual voltage: 2 V or less (at 100 mA sink current)  PNP open-collector transistor  • Maximum source current: 100 mA  • Applied voltage: 30 V DC or less (between output and 0 V)  • Residual voltage: 2 V or less (at 100 mA source)				'			
Utilization category						DC-12 c	or DC-13			
	Outpu	t operation	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed
Max	respor	nse frequency	250	Hz	150 Hz	(Note 5)	250	Hz	150 Hz	(Note 5)
Ope	ation ir	ndicator	Orange LED (lights up when the output is ON)							
	Polluti	on degree	3 (Industrial environment)							
Φ	Protec	ction			IF	P68 (IEC), IP68g	(JEM) (Note 6,	7)		
Environmental resistance	Ambie	ent temperature		-2	5 to +70 °C –13	to +158 °F, Stor	age: -40 to +85	°C -40 to +185	i °F	
resis	Ambie	ent humidity			35 t	o 85 % RH, Stor	rage: 35 to 95 %	RH		
ental	EMC					EN 609	947-5-2			
onme	Voltag	e withstandability		1,000 V AC	for one min. bet	ween all supply	terminals conne	cted together ar	nd enclosure	
invir	Insula	tion resistance	50 1	MΩ, or more, wi	th 500 V DC meg	gger between all	supply terminal	s connected tog	ether and enclos	ure
ш	Vibrati	ion resistance	10 to	500 Hz frequer	ncy, 3 mm 0.118	in amplitude (M	1ax. 20 G) in X, `	Y and Z direction	ns for two hours	each
	Shock	resistance		10,000 m/s	<sup>2</sup> acceleration (1,	,000 G approx.)	in X, Y and Z dir	ections for three	e times each	
Sens		Temperature characteristics	Over ar	nbient temperat	ure range –25 to	+70 °C -13 to +	+158 °F: Within ±	8 % of sensing	range at +23 °C	+73 °F
varia		Voltage characteristics			Within ±2 %	% for <sup>+10</sup> % flucti	uation of the sup	ply voltage		
Mate	erial				Encl	osure: PBT, Ind	icator part: Polye	ester		
Cabl	е			0.15	mm² 3-core oil, h	neat and cold res	sistant cabtyre ca	able, 1 m 3.281	ft long	
Cabl	e exter	nsion		Extens	ion up to total 10	0 m 328.084 ft i	s possible with 0	.3 mm², or more	e, cable.	
Net	weight					20 g a	pprox.			

- 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) This is the numerical value which the sensor mount onto an insulant plate. When mounted onto a steel or stainless steel plate, insert the optional aluminum sheet between the sensor and the plate.
  - 5) This is the numerical value which the sensor mount onto an insulant plate. When mounted onto a metallic plate, max. response frequency will decrease.
  - 6) Panasonic Electric Works 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 range must meet the standard values.
  - 7) If using the sensor in an environment where cutting oil droplets splatter, the sensor may be deteriorated due to added substances in the oil.

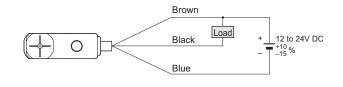
## I/O CIRCUIT DIAGRAMS

## **NPN** output type

## I/O circuit diagram

#### Color code D₁ (Brown) +V (Black) Output Load (Note) Sensor circuit 12 to 24V DC +10 -15 % 100 mA max. ZD (Blue) 0 V Internal circuit -- Users' circuit

## Wiring diagram



Symbols ... D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode

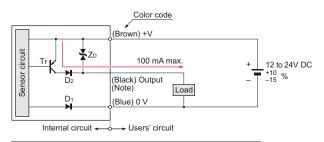
ZD: Surge absorption zener diode

Tr : NPN output transistor

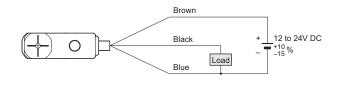
Note: The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

## **PNP** output type

#### I/O circuit diagram



## Wiring diagram



Symbols ... D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode ZD: Surge absorption zener diode Tr : PNP output transistor

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

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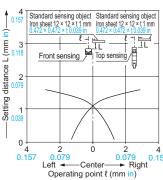
Selection Guide Amplifier Built-in Amplifierseparated

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GL
GX-U/GX-FU/
GX-N
GX-N

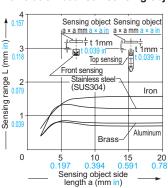
## SENSING CHARACTERISTICS (TYPICAL)

## GX-6 type

## Sensing field



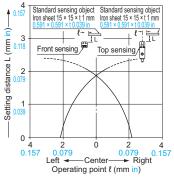
#### Correlation between sensing object size and sensing range



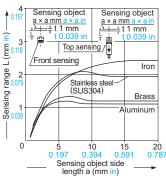
As the sensing object size becomes smaller than the standard size (iron sheet  $12 \times 12 \times t$  1 mm  $0.472 \times 0.472 \times t$  0.039 in), the sensing range shortens as shown in the left figure.

#### GX-8 type

#### Sensing field



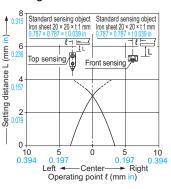
#### Correlation between sensing object size and sensing range



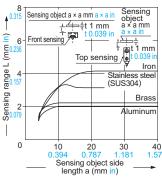
As the sensing object size becomes smaller than the standard size (iron sheet 15 × 15 × t 1 mm  $0.591\times0.591\times t~0.039$  in), the sensing range shortens as shown in the left figure.

#### GX-12 type

#### Sensing field



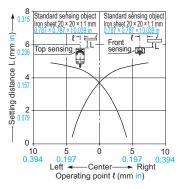
#### Correlation between sensing object size and sensing range



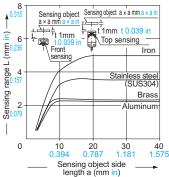
As the sensing object size becomes smaller than the standard size (iron sheet 20 × 20 × t 1 mm  $0.787\times0.787\times t~0.039$  in), the sensing range shortens as shown in the left figure.

#### GX-15 type

## Sensing field



## Correlation between sensing object size and sensing range



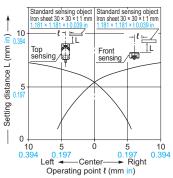
As the sensing object size becomes smaller than the standard size (iron sheet 20 × 20 × t 1 mm  $0.787\times0.787\times t~0.039$  in), the sensing range shortens as shown in the left figure.

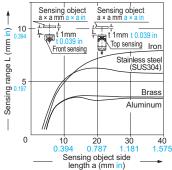
## SENSING CHARACTERISTICS (TYPICAL)

## GX-15 (Long sensing range) type

#### Sensing field

## Correlation between sensing object size and sensing range





As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1 mm  $1.181 \times 1.181 \times t \ 0.039$  in), the sensing range shortens as shown in the left figure.

## PRECAUTIONS FOR PROPER USE

Refer to General precautions.



· 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-6 type

· Use the optional sensor mounting bracket when installing.

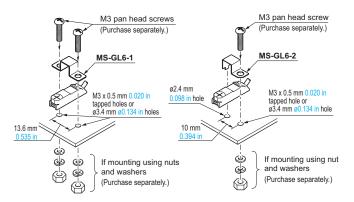
#### <When using MS-GX6-1 (recommended)>

- · To mount the sensor with a nut, the mounting hole diameter should be ø3.4 mm ø0.134 in.
- ① Insert the sensor into the bracket as shown on the right.
- 2 Push the sensor until the bracket hook is lodged in the groove on the upper portion of the sensor.
- 3 Fix the bracket in place with M3 pan head screw.



### <When using MS-GL6-1 / MS-GL6-2>

• To mount the sensor with a nut, the mounting hole diameter should be ø3.4 mm ø0.134 in.



#### 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.

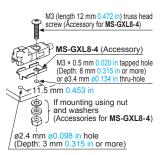
## GX-12 type

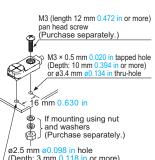
- The tightening torque should be 0.7 N m or less.
- To mount the sensor with a nut, the mounting hole diameter should be ø3.4 mm Ø0.134 in. Further, the hole in which the boss is inserted should be ø2.5 mm Ø0.098 in and 3 mm 0.118 in, or more, deep.

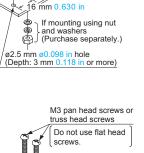
## GX-15 type

- The tightening torque should be 1 N·m or less.
- To mount the sensor with a nut, the mounting hole diameter should be ø3.4 mm ø0.134 in.

· When installing the long sensing range type on iron or stainless steel plate, put the optional aluminum sheet in between the sensor and the plate.







M3 x 0.5 mm 0.020 in

If mounting using nuts

(Purchase separately.) MS-GXL15

and washers

tapped holes or ø3.4 mm ø0.134 in holes

Selectio Guide

GXL

GL GX-U/GX-FU

(Sensor mounting bracket)

Aluminum sheet (Optional) • MS-A15F MS-A15H 

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CURING SYSTEMS

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> GX-U/GX-FU/ GX-N GX

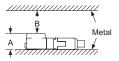
## PRECAUTIONS FOR PROPER USE

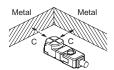
Refer to General precautions.

#### Influence of surrounding metal

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

#### Front sensing type



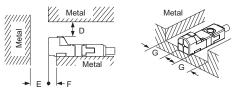


	GX-F6 type	GX-F8 type	GX-F12 type	GX-F15 type	GX-FL15 type
Α	6 mm 0.236 in (Note 1)	7.4 mm 0.291 in	7.1 mm 0.280 in	8 mm 0.315 in	8 mm 0.315 in (Note 2)
В	8 mm 0.315 in	8 mm 0.315 in	20 mm 0.787 in	20 mm 0.787 in	30 mm 1.181 in
С	3 mm 0.118 in	3 mm 0.118 in	7 mm 0.276 in	7 mm 0.276 in	10 mm 0.394 in

Notes: 1) When using MS-GX6-1 (recommended mounting bracket), the distance "A" including the thickness of mounting bracket will be 6.4 mm 0.2

2) The GXL-FL15 type should be mounted on an insulator. To mount it on an iron or stainless steel, use the enclosed aluminum sheet.

#### Top sensing type



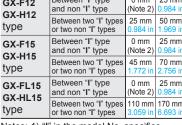
	GX-H6 type	GX-H8 type	GX-H12 type	GX-H15 type	GX-HL15 type
D	3 mm 0.118 in	4 mm 0.157 in	7 mm 0.276 in	6 mm 0.236 in	12 mm 0.472 in
Е	10 mm 0.394 in	10 mm 0.394 in	20 mm 0.787 in	20 mm 0.787 in	30 mm 1.181 in
F	2 mm 0.079 in	3 mm 0.118 in	3 mm 0.118 in	0 mm 0 in	10 mm 0.394 in (Note)
G	2 mm 0 079 in	3 mm 0 118 in	3 mm 0 118 in	3 mm 0 118 in	10 mm 0 394 in

Note: When GX-HL15 type is mounted on an insulator or seated on the enclosed aluminum sheet, the distance "F" can be zero.

## 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.

	Н	J	
GX-F6 GX-H6	Between "I" type and non "I" type	0 mm (Note 2)	15 mm 0.591 in
type	Between two "I" types or two non "I" types	13 mm 0.512 in	25 mm 0.984 in
GX-F8 GX-H8	Between "I" type and non "I" type	0 mm (Note 2)	15 mm 0.591 in
type	Between two "I" types or two non "I" types	20 mm 0.787 in	35 mm 1.378 in
GX-F12 GX-H12	Between "I" type and non "I" type	0 mm (Note 2)	25 mm 0.984 in
type	Between two "I" types or two non "I" types	25 mm 0.984 in	50 mm 1.969 in
GX-F15 GX-H15	Between "I" type and non "I" type	0 mm (Note 2)	25 mm 0.984 in
type	Between two "I" types or two non "I" types	45 mm 1.772 in	70 mm 2.756 in
GX-FL15 GX-HL15	Between "I" type and non "I" type	0 mm (Note 2)	25 mm 0.984 in
type	Between two "I" types or two non "I" types	110 mm 3.059 in	



Notes: 1) "I" in the model No. specifies the different frequency type.

Top sensing

Front sensing

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-F6 / H6 type: 3.5mm 0.138 GX-F8 / H8 type: 6mm 0.236 in GX-F12 / H12 type: 6.5mm 0.256 in GX-F15 / H15 type: 15mm 0.591 in GX-FL15 / HL15 type: 47.5mm 1.870 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. Metal	GX-F6 GX-H6 type	GX-F8 GX-H8 type	GX-F12 GX-H12 type	GX-F15 GX-H15 type	GX-FL15 type	GX-HL15 type
Iron	1	1	1	1	1	1
Stainless steel (SUS304)	0.76 approx.	0.76 approx.	0.79 approx.	0.68 approx.	0.70 approx.	0.76 approx.
Brass	0.50 approx.	0.50 approx.	0.56 approx.	0.47 approx.	0.45 approx.	0.50 approx.
Aluminum	0.48 approx.	0.48 approx.	0.53 approx.	0.45 approx.	0.43 approx.	0.48 approx.

#### Wiring

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

#### **Others**

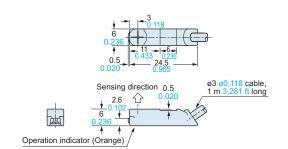
• Do not use during the initial transient time (50 ms) after the power supply is switched on.

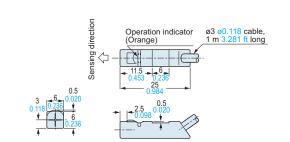
## DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

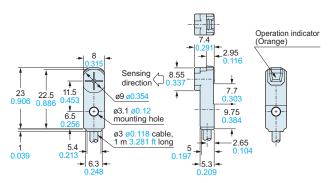
GX-F6□ Sensor GX-H6□ Sensor

GX-H8□

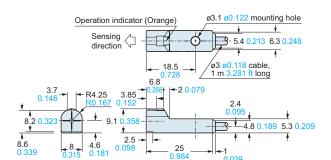




GX-F8□ Sensor



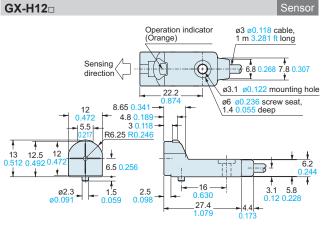
GX-F12



Operation indicator (Orange) - 3.3 0.130 <del>-</del>1.5 0.059 Sensing direction 11.05 27.8 16 16 ø3.1 ø0.12 mounting hole 12 4 ø6 ø0.236 screw seat, 0.8 0.032 deep 1 6.8 0.26<sup>2</sup> ø3 ø0.118 cable, 1 m 3.281 ft long 2.8 0.110 5.6

Operation indicator (Orange)

2.8



GX-F(L)15□ Sensor **GX-H(L)15**□ Sensor Operation indicator (Orange) 2-ø3.1 ø0.122 holes 31.5 ø3 ø0.118 cable, 1 m 3.281 ft long ø3 ø0.118 cable, 1 m 3.281 ft long 20.5 ₫ Ф Sensing direction < 9 0.354 15 26 1.024 21.5 0.846 1-11.95 2-ø3.1 ø0.122 holes Sensing direction ø15.5 ø0.610 ø15.5 3 0.118 →

> 16.5 15.65 0.650 0.616

> > 15 0.591

Sensor

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC

AREA SENSORS

LIGHT CURTAINS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS HUMAN

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

Selection Guide Amplifier Built-in

GX-F/H

GXL GL

GX-U/GX-FU/ GX-N

2.8 0.110

29.5 1.161

LASER SENSORS PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS AREA SENSORS

LIGHT CURTAINS PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS MEASURE-MENT SENSORS STATIC

STATIC CONTROL DEVICES ENDOSCOPE

LASER MARKERS PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

COMPONENTS

MACHINE VISION SYSTEMS

Selection Guide Amplifier Built-ir

> GX-F/H GXL

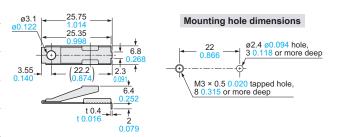
> > GL GX-U/GX-FU/

GX-U/GX-FU/ GX-N

## DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

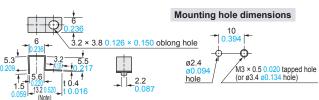
MS-GX6-1 Sensor mounting bracket for GX-6 type (Optional)



MS-GL6-1 Sensor mounting bracket for GX-6 type (Optional)

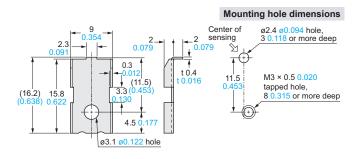


MS-GL6-2 Sensor mounting bracket for GX-6 type (Optional)



Note: 13.4 mm 0.528 in with the sensor fitted.

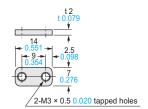
MS-GXL8-4 Sensor mounting bracket for GX-8 type (Optional)



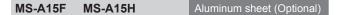
Material: Stainless steel (SUS304)

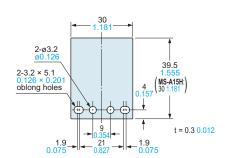
1 pc. each of M3 (length 12 mm 0.472 in) truss head screw, nut, spring washer and plain washer is attached.

MS-GXL15 Sensor mounting bracket for GX-15 type (Optional)



Material: SPCC





## MEMO

