PHOTOELECTRIC SENSORS

PARTICULAR USE SENSORS OPTIONS SIMPLE WIRE-SAVING UNITS WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC ELECTRICITY PREVENTION DEVICES LASER MARKERS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

> Selection Guide

Amplifier Built-in

Amplifierseparated

GXL

GL

GX

GX-M

GX-U/GX-FU/ GX-N

PLC

LASER SENSORS

MICRO PHOTOELECTRIC SENSORS AREA SENSORS LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

# Rectangular-shaped Inductive Proximity Sensor Amplifier Built-in **GX-F/H SERIES**



# Industry No. 1\* in stable sensing



# 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.



# 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-08 0.4 mm 0.016 in or less 0.008 in ± 8 % (2.3 to 2.7 mm 0.091 to 0.106 in) 1.0 mm 0.039 in or less 0.090 in or less 0.000 in or less 0.090 in or less 0.000 in or les

	Maximum	Stable sen	ising 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

\* With standard sensing object

# 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.



\* Typical

\* Not including temperature characteristics.



# ENVIRONMENTAL RESISTANCE

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

The new integrated construction method used provides shock resistance of 10,000 m/s<sup>2</sup> (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 (p.812~)".



# Vibration resistance: 500 Hz

# **FUNCTIONS**

Sensing presence of metallic

objects on a part feeder

# 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. GX-H









Conductor thickness doubled to make wiring much easier! (GX-06/08 only)

The conductor's thickness was doubled for the GX-06/08. 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.



PARTICULAR USE SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS WIRE-SAVING

SYSTEMS MEASUREMENT SENSORS

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HUMAN MACHINE INTERFACES ENERGY CONSUMPTION

VISUALIZATION FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide Amplifie Built-in Amplifierseparated

GXL GL GX-M GX-U/GX-FU/ GX-N GX

# MOUNTING

# Tightening strength increased with no damage! (excluding GX-D6)

A metal sleeve has been inserted. It prevents the sensor from being damaged by tightening too much.



**ORDER GUIDE** 

LASER SENSORS	GX	-6 t	уре				
PHOTO- ELECTRIC SENSORS MICRO	Туре		Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
PHOTO- ELECTRIC SENSORS		p	$\sim$ $^{/2}$		GX-F6A		Nemellu en en
AREA SENSORS		Front sensing			GX-F6AI		Normally open
LIGHT CURTAINS/	Ŧ	ont s	6 0.236 24.5 0.965		GX-F6B		Normally closed
SAFETY COMPONENTS	outpı	ц	6 0.236	_	GX-F6BI	NPN open-collector	Normally closed
PRESSURE / FLOW SENSORS	NPN output	g	$\sim 1$		GX-H6A	transistor	Normally open
	2	sensing		Maximum	GX-H6AI		
INDUCTIVE PROXIMITY SENSORS		Top s	6 0.236	operation distance	GX-H6B		Normally closed
PARTICULAR USE SENSORS		-	6 0.236	1.6 mm 0.063 in	GX-H6BI		
		bu	$\sim$	(0 to 1.3 mm 0 to 0.051 in)	GX-F6A-P	_	Normally open
SENSOR OPTIONS		sensing	6 0.236		GX-F6AI-P	_	
SIMPLE WIRE-SAVING UNITS	t	Front :	24.5	Stable sensing range	GX-F6B-P	_	Normally closed
	outpi	Ē	6 0.236 🔨 🔨 0.965	_	GX-F6BI-P	PNP open-collector	
WIRE-SAVING SYSTEMS	PNP output	p	$\sim 1$		GX-H6A-P	transistor	Normally open
MEASURE- MENT SENSORS		sensing	6 0.236		GX-H6AI-P		
STATIC ELECTRICITY PREVENTION		Top s	25		GX-H6B-P		Normally closed
PREVENTION			6 0.236		GX-H6BI-P		

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

CONSUMPTION								
CONSUMPTION VISUALIZATION COMPONENTS FA COMPONENTS	Туре		Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation	
MACHINE		БĽ	- 4		GX-F8A		Namally and	
MACHINE VISION SYSTEMS		sensing	7.4 0.291		GX-F8AI		Normally open	
UV CURING SYSTEMS	ŧ	Front s	8 0.315 23 8 0.315 0.906 8.2 0.323		GX-F8B	NPN open-collector transistor	No	
	outpu	Free		Maximum operation distance 2.5 mm 0.098 in (0 to 2.1 mm 0 to 0.083 in)	GX-F8BI		Normally closed	
	NPN output	b			GX-H8A		Namally and	
	z	sensing			GX-H8AI		Normally open	
		Top se			GX-H8B		Normally closed	
Selection Guide		Ĕ	8 0.315		GX-H8BI			
Amplifier Built-in		b	- 4		GX-F8A-P		Namally and	
Amplifier- separated		sensing	7.4 0.291		GX-F8AI-P		Normally open	
	Ŧ	Front s	8 0.315 0.906	Stable sensing range	GX-F8B-P			
GX-F/H	output	Fro	0.515		GX-F8BI-P	PNP open-collector	Normally closed	
GXL	PNP 0	5	~		GX-H8A-P	transistor		
GX-M	sensi	p sensing			GX-H8AI-P		Normally open	
GX-U/GX-FU/			8.2 0.323		GX-H8B-P			
GX-N GX		Top	8 0.315		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.

# ORDER GUIDE

GX-12 type

		(ypc					
Ту	/pe	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation	PHOTO- ELECTRIC SENSORS
	6	~~~~>		GX-F12A			MICRO PHOTO- ELECTRIC SENSORS
	sensing	7.1 0.280		GX-F12AI	_	Normally open	AREA SENSORS
ц.	NPN output Top sensing Front se	27.8		GX-F12B	-	Normally closed	
outpu		0.472		GX-F12BI	NPN open-collector transistor		LIGHT CURTAINS / SAFETY COMPONENTS
PN o		12 0.472 12 0.472 12 0.472 1.079	Maximum	GX-H12A		Normally open	PRESSURE / FLOW SENSORS
z				GX-H12AI			
			operation distance	GX-H12B		Normally closed	INDUCTIVE PROXIMITY SENSORS
	F		4.0 mm 0.157 in	GX-H12BI			PARTICULAR
	bu		(0 to 3.3 mm 0 to 0.130 in)	to 0.130 in) GX-F12A-P	_	Normally open	SENSORS
	sensing	7.1 0.280		GX-F12AI-P	-		SENSOR OPTIONS
Ħ	Front s	12 27.8	Stable sensing range	GX-F12B-P		Normally closed	SIMPLE WIRE-SAVING UNITS
PNP output	Ē	0.472	_	GX-F12BI-P	PNP open-collector		WIRE-SAVING
NP	Б			GX-H12A-P	transistor	Normally open	SYSTEMS
u.	PN	12 0.472		GX-H12AI-P			MEASURE- MENT SENSORS
	Top s	27.4		GX-H12B-P	_	Normally closed	
			at a da fa a tha ann ànn an thatan an fa	GX-H12BI-P			STATIC ELECTRICITY PREVENTION DEVICES

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

Ту	/pe	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation	FA COMPONENTS
	p			GX-F15A			MACHINE
	sensing	8 0.315		GX-F15AI	-	Normally open	VISION SYSTEMS
÷	NPN output Top sensing Front se	31.5	Maximum operation distance 5.0 mm 0.197 in	GX-F15B	-		UV CURING SYSTEMS
outpu		15 0.591		GX-F15BI	NPN open-collector	Normally closed	
PN		16.5 0.650 15 0.591 1.161		GX-H15A	transistor	Normally on an	-
z				GX-H15AI		Normally open	
				GX-H15B		Normally closed	-
				GX-H15BI			Selection Guide
	Ъ			GX-F15A-P		Normally open	Amplifier Built-in Amplifier-
	sensing	8 0.315		GX-F15AI-P			separated
ŧ	Front s	31.5	Stable sensing range	GX-F15B-P		Normally closed	
outpu	Ē	15 0.591		GX-F15BI-P	PNP open-collector	Normally closed	GX-F/H GXL
PNP output	g			GX-H15A-P	transistor	Normally open	GL
с.	PNI	16.5 0.650		GX-H15AI-P	-	Normally open	GX-M
	Top se	29.5		GX-H15B-P		Normally closed	GX-U/GX-FU/ GX-N
	1 T	15 0.591 1.161		GX-H15BI-P			GX

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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FIBER SENSORS

LASER SENSORS

MICRO PHOTO-ELECTRIC SENSORS AREA SENSORS

LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

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# ORDER GUIDE

### GX-15 (Long sensing range) type

RO RO RO RO RO RO RO RO RO RO RO RO	Ту	ре	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation						
RS 0-		БĽ			GX-FL15A		N						
EA RS		ensii	8 0.315		GX-FL15AI		Normally open						
		Front sensing	31.5 31.5 15 0.591		GX-FL15B		Normally algood						
GHT NS/ ETY NTS	outpu	ц			GX-FL15BI	NPN open-collector	Normally closed						
RE / DW RS	NPN output	Top sensing	16.5 0.650	Maximum	GX-HL15A	transistor	Nemente						
VE	z				GX-HL15AI		Normally open						
TY RS			29.5	operation distance ✓	GX-HL15B		Normally closed						
AR JSE JRS		Ĕ	15 0.591	8.0 mm 0.315 in (0 to 6.7 mm 0 to 0.264 in)	GX-HL15BI		Normally closed						
		БĽ			GX-FL15A-P		Normally anon						
OR NS		Front sensing	8 0.315	ĺ`.∖	GX-FL15AI-P	_	Normally open						
PLE ING ITS	t	onts	31.5	Stable sensing range	GX-FL15B-P		Nemelle						
	output	Ц	15 0.591		GX-FL15BI-P	PNP open-collector	Normally closed						
ING EMS	PNP 0	b			GX-HL15A-P	transistor	Nemente						
RE- NT RS	д.	Top sensing	16.5 0.650		GX-HL15AI-P		Normally open						
RS					GX-HL15B-P		N.L						
TIC ITY ION DES			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.	De	Description				
		MS-GX6-1	Mounting bracket for <b>GX-6</b> Sensors can be mounted cl	type (recommended). losely together for space-saving.				
	Sensor	MS-GL6-1	Mounting brackets for GX-6					
	mounting bracket	MS-GL6-2	Sensor mounting brackets for <b>GL-6</b> can be used. Interchange is possible.					
ier- ted		MS-GXL8-4	Mounting bracket for GX-8 type					
		MS-GXL15	Mounting bracket for GX-15 type					
	Aluminum	MS-A15F	For GX-FL15 (-P)	Mounting example when				
	sheet	MS-A15H	For GX-HL15□(-P)	mounted onto a steel or stainless steel plate				
	Mounting sleeve	MS-GX8-1×10 10 pcs. per set	Mounting sleeve for <b>GX-8</b> type Screw, nut, bracket of <b>GXL-8</b> series can be used by inserting the bracket into the mounting hole of <b>GX-8</b> type when replacing 3-wire type <b>GXL-8</b> series (discontinued model) with <b>GX-8</b> type.					

# Sensor mounting bracket • MS-GX6-1 • MS-GL6-1 • Screw is not attached. Screw is not

MS-GL6-2

MS-GXL8-4



Aluminum sheet

· MS-A15F

· MS-A15H

Screw is not attached.

attached.

Screw is not attached.

# SPECIFICATIONS

#### GX-6 type

	Туре	NPN	output	PNP o	utput				
	2 R Eront consing	GX-F6A(I)	GX-F6B(I)	GX-F6A(I)-P	GX-F6B(I)-P				
Item	Top sensing	GX-H6A(I)	GX-H6B(I)	GX-H6A(I)-P	GX-H6B(I)-P				
Max. opera	ation distance (Note 3)		1.6 mm 0.063 in ± 8 %						
Stable sen	nsing range (Note 3)		0 to 1.3 mm	0 to 0.051 in					
Standard s	sensing object		Iron sheet 12 × 12 × t 1 mr	n 0.472 × 0.472 × t 0.039 in					
Hysteresis 20 % or less of operation distance (with standard sensing object)									
Repeatabi	lity	Along		ensing axis: 0.04 mm 0.0016 in o	r less				
Supply vol	Itage		12 to 24 V DC <sup>+10</sup> 15 %	Ripple P-P 10 % or less					
Current consumption 15 mA or less									
Output			or less (between output and 0 V)		r less (between output and +V)				
Utiliz	ation category		ual voltage: 2 V or less (at 100 mA sink current)  • Residual voltage: 2 V or less (at 100 mA source current)  DC-12 or DC-13						
	out operation	Normally closed	Normally closed	Normally closed	Normally closed				
vlax. respo	onse frequency		400	) Hz					
Operation	indicator		Orange LED (lights up	when the output is ON)					
Pollu	ition degree	3 (Industrial environment)							
Prote	ection	IP68 (IEC), IP68G (Note 4, 5)							
Ambi	ient temperature	–25 to +70 °C –13 to +158 °F, Storage: –40 to +85 °C –40 to +185 °F							
Ambi	ient humidity		35 to 85 % RH, Storage: 35 to 95 % RH						
Ambi Ambi EMC Volta Insul	;		EN 609	947-5-2					
Č Volta	age withstandability	1,000 V AC	c for one min. between all supply	terminals connected together and	l enclosure				
Insul	ation resistance	50 MΩ, or more, w	ith 500 V DC megger between al	I supply terminals connected toge	ther and enclosure				
	ation resistance	10 to 500 Hz freque	ency, 3 mm 0.118 in amplitude (N	lax. 20 G) in X, Y and Z directions	for two hours each				
Shoc	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 ange	Temperature characteristics	Over ambient temperat	6	+158 °F: Within ± 8 % of sensing r	ange at +23 °C +73 °F				
ariation	Voltage characteristics	Within $\pm 2$ % for $^{+10}_{-15}$ % fluctuation of the supply voltage							
Material			Enclosure: PBT, Indicator part: Polyester						
Cable		0.15	0.15 mm <sup>2</sup> 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long						
Cable exte	ension	Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable.							
Net weight	t		15 g a	approx.					

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

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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 Industrial Devices 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. 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. 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.

Please check the resistivity of the sensor against the cutting oil you are using beforehand.

Selection Guide Amplifie separate

FIBER SENSORS

LASER SENSORS

LASER SENSORS

# SPECIFICATIONS

#### GX-8 type

PHOTO- ELECTRIC	$\frown$	_	Туре	NPN o	output	PNP	output			
ELECTRIC SENSORS MICRO		No.	Front sensing	GX-F8A(I)	GX-F8B(I)	GX-F8A(I)-P	GX-F8B(I)-P			
PHOTO- ELECTRIC SENSORS	Item	Model 1	Top sensing	GX-H8A(I)	GX-H8B(I)	GX-H8A(I)-P	GX-H8B(I)-P			
AREA SENSORS	Max. o		distance (Note 3)		2.5 mm 0.0	98 in ± 8 %				
	Stable	sensing	range (Note 3)		0 to 2.1 mm	0 to 0.083 in				
LIGHT CURTAINS/ SAFETY COMPONENTS	Standa	rd sens	ing object		Iron sheet 15 × 15 × t 1 mm	n 0.591 × 0.591 × t 0.039 in				
PRESSURE / FLOW SENSORS	Hyster	esis			20 % or less of operation distant	ce (with standard sensing object)	)			
	Repea	tability		Along	Along sensing axis, perpendicular to sensing axis: 0.04 mm 0.0016 in or less					
INDUCTIVE PROXIMITY SENSORS	Supply	voltage	)		12 to 24 V DC <sup>+10</sup> <sub>-15</sub> % I	Ripple P-P 10 % or less				
PARTICULAR USE SENSORS	Current consumption				15 mA or less					
SENSOR OPTIONS SIMPLE WIRE-SAVING	Output			Applied voltage: 30 V DC o	NPN open-collector transistor       PNP open-collector transistor         • Maximum sink current: 100 mA       • Maximum source current: 100 mA         • Applied voltage: 30 V DC or less (between output and 0 V)       • Applied voltage: 30 V DC or less (between output and 0 V)					
WIRE-SAVING UNITS				Residual voltage: 2 V or les	ss (at 100 mA sink current)	Residual voltage: 2 V or le	ess (at 100 mA source current)			
WIRE-SAVING SYSTEMS	Utilization category		n category		DC-12 c	or DC-13	1			
	C	output o	peration	Normally open	Normally closed	Normally open	Normally closed			
MEASURE- MENT SENSORS	Max. re	esponse	frequency		500	) Hz				
STATIC ELECTRICITY PREVENTION DEVICES	Operat	ion indi	cator	Orange LED (lights up when the output is ON)						
LASER	P	ollution	degree	3 (Industrial environment)						
MARKERS	8 F	rotectio	n	IP68 (IEC), IP68G (Note 4, 5)						
PLC	Environmental resistance	mbient	temperature	-2!	5 to +70 °C –13 to +158 °F, Stor	age: -40 to +85 °C -40 to +185	°F			
HUMAN	A		humidity			rage: 35 to 95 % RH				
INTERFACES	ienta	MC			EN 609	947-5-2				
ENERGY CONSUMPTION VISUALIZATION COMPONENTS	v v		vithstandability		,	terminals connected together an				
FA			n resistance			supply terminals connected tog				
COMPONENTS			resistance	· · ·		ax. 20 G) in X, Y and Z direction	· · · · · · · · · · · · · · · · · · ·			
MACHINE VISION SYSTEMS			sistance			in X, Y and Z directions for three				
UV CURING	Sensin range	- <u>-</u>	nperature characteristics	Over ambient temperatu		-158 °F: Within ± 8 % of sensing	range at +23 °C +73 °F			
CURING SYSTEMS	variatio		tage characteristics		Within ±2 % for <sup>+10</sup> / <sub>-15</sub> % fluct					
	Materia	al				icator part: Polyester				
	Cable				0.15 mm <sup>2</sup> 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long					
			Dri	Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable.						
Selection Guide	Net we	<u> </u>	n manauramant a	1	-ront sensing type: 15 g approx. d precisely, the conditions used	, 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.

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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.

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Please check the resistivity of the sensor against the cutting oil you are using beforehand.

GX

Amplifie Built-ir

Amplifier-separated

# SPECIFICATIONS

#### GX-12 type

	Туре	NDN	output	PNP o	utput			
	Si 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 0.1	57 in ± 8 %				
Stable ser	nsing range (Note 3)		0 to 3.3 mm	0 to 0.130 in				
Standard	sensing object		Iron sheet 20 × 20 × t 1 mr	n 0.787 × 0.787 × t 0.039 in				
Hysteresis	3		20 % or less of operation distant	ce (with standard sensing object)				
Repeatab	ility	Along	sensing axis, perpendicular to s	ensing axis: 0.04 mm 0.0016 in o	r less			
Supply vo	Itage		12 to 24 V DC <sup>+10</sup> <sub>-15</sub> %	Ripple P-P 10 % or less				
Current consumption 15 mA or less								
Output			or less (between output and 0 V)	PNP open-collector transistor • Maximum source current: 100 mA () • Applied voltage: 30 V DC or less (between output and				
1 14:1:-	ation optional	Residual voltage: 2 V or le	· · · ·	Residual voltage: 2 V or less (at 100 mA source curren				
	zation category	Normally anon		or DC-13	Normally algood			
	out operation	Normally open	Normally closed	Normally open	Normally closed			
Operation				when the output is ON)				
· ·	ution degree	3 (Industrial environment)						
Prote	ection	IP68 (IEC), IP68G (Note 4, 5)						
ance Amp	ient temperature	-25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F						
Amb	ient humidity	35 to 85 % RH, Storage: 35 to 95 % RH						
EMC	;		EN 609	947-5-2				
Amb Amb EMC Volta Insul	age withstandability	1,000 V AC	for one min. between all supply	terminals connected together and	l enclosure			
Insu	lation resistance	50 MΩ, or more, wi	th 500 V DC megger between al	I supply terminals connected toge	ther and enclosure			
	ation resistance	10 to 500 Hz freque	ncy, 3 mm 0.118 in amplitude (N	lax. 20 G) in X, Y and Z directions	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 temperat	sure range $-25$ to $+70$ °C $-13$ to	+158 °F: Within ±8 % of sensing r	ange at +23 °C +73 °F			
variation	Voltage characteristics		Within $\pm 2$ % for $^{+10}_{-15}$ % fluctuation of the supply voltage					
Material		Enclosure: PBT, Indicator part: Polyester						
Cable		0.15 mm <sup>2</sup> 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long						
Cable exte	ension		•	s possible with 0.3 mm <sup>2</sup> , or more,	cable.			
Net weigh	t		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 Industrial Devices 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. Regard the heat shock test in ① as one cycle and perform 20 cycles.
 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.

Please check the resistivity of the sensor against the cutting oil you are using beforehand.

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# SPECIFICATIONS

#### GX-15 type

HOTO- CTRIC SORS	$\wedge$		<b>T</b>		NPN	output			PNP	output	
		$\sim$	Туре			Long sens	sing range			Long sens	sing range
	```	S S S S S S S S S S S S S S S S S S S	ront 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	L Note	op 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.	operation dist	ance (Note 3)	5.0 mm 0.1	97 in ± 8 %	8.0 mm 0.315 ir	± 8 % (Note 4)	5.0 mm <mark>0.1</mark>	97 in ± 8 %	8.0 mm 0.315 ir	± 8 % (Note 4)
	Stabl	e sensing rar	nge (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		object	Iron sheet 20 = 0.7874 × 0.787		Iron sheet 30 1.181 × 1.18	× 30 × t 1 mm 1 × t 0.039 in	Iron sheet 20 × 20 × t 1 mm 0.7874 × 0.7874 × t 0.039 in		Iron sheet 30 1.181 × 1.18	
	Hyste	eresis				20 % or less of c	operation distanc	ce (with standard	sensing object	)	
	Repe	atability		Along sensing axis, perpendicular to sensing axis: 0.04 mm 0.0016 in or less							
	Supply voltage			12 to 24 V DC <sup>+10</sup> 15 % Ripple P-P 10 % or less							
	Curre	ent consumpt	ion		15 mA or less						
	Output			Maximum s     Applied vol	IPN open-collector transistor       PNP open-collector transistor         • Maximum sink current: 100 mA       • Maximum source current: 100 mA         • Applied voltage: 30 V DC or less (between output and 0 V)       • Applied voltage: 30 V DC or less (between output and 0 V)         • Residual voltage: 2 V or less (at 100 mA sink current)       • Residual voltage: 2 V or less (at 100 mA				or less (between		
	ſ	Utilization ca	itegory	DC-12 or DC-13							
		Output opera	ation	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed
	Max.	response fre	quency	250	Hz	150 Hz	(Note 5)	250	) Hz	150 Hz	(Note 5)
	Oper	ation indicato	r	Orange LED (lights up when the output is ON)							
		Pollution deg	gree	3 (Industrial environment)							
	е	Protection					IP68 (IEC), IP6	68G (Note 6, 7)			
	Environmental resistance	Ambient tem	perature		-2	5 to +70 °C –13	to +158 °F, Stora	age: -40 to +85	°C -40 to +185	°F	
	resis	Ambient hun	nidity	35 to 85 % RH, Storage: 35 to 95 % RH							
	ental	EMC		EN 60947-5-2							
	9mme	Voltage with	standability		1,000 V AC	for one min. bet	ween all supply	terminals conne	cted together an	d enclosure	
	Envire	Insulation rea	sistance	50 1	VΩ, or more, wit	th 500 V DC me	gger between all	supply terminals	s connected tog	ether and enclos	ure
	U Vibration resistance		istance	10 to	500 Hz frequer	ncy, 3 mm <mark>0.118</mark>	in amplitude (M	1ax. 20 G) in X, Y	Y and Z directior	ns for two hours e	each
	Shock resistance		ance		10,000 m/s <sup>2</sup>	<sup>2</sup> acceleration (1	,000 G approx.) i	in X, Y and Z dir	ections for three	times each	
	Sens range		ture characteristics	Over an	nbient temperati	ure range –25 to	+70 °C –13 to +	158 °F: Within ±	8 % of sensing	range at +23 °C	+73 °F
	varia		characteristics			Within ±2 %	% for <sup>+10</sup> % fluctu	uation of the sup	ply voltage		
	Material			Enclosure: PBT, Indicator part: Polyester							
	Cable	9		0.15 mm <sup>2</sup> 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long							
	Cable	Cable extension			Extensi	ion up to total 10	0 m <mark>328.084 ft</mark> is	s possible with 0	.3 mm <sup>2</sup> , or more	, cable.	

Net weight

GXL GL GX-M GX-U/GX-FU/ GX-N GX

rminals connected together and enclosure in X, Y and Z directions for two hours each d Z directions for three times each Vithin ± 8 % of sensing range at +23 °C +73 °F he supply voltage Polyester tyre cable, 1 m 3.281 ft long with 0.3 mm<sup>2</sup>, or more, cable 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) 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 Industrial Devices 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. Please check the resistivity of the sensor against the cutting oil you are using beforehand.

# I/O CIRCUIT DIAGRAMS



#### I/O circuit diagram



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# SENSING CHARACTERISTICS (TYPICAL)

# GX-6 type Sensing field

817

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

Iron

Aluminur

20

0.78

Brass-

15 0.591

10 0.39/



As the sensing object size becomes smaller than the standard size (iron sheet 12 × 12 × 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



20 0.78

Sensing object side length a (mm in)

ġ

# GX-12 type

#### Sensing field

#### د 0.315 Standard sensing object Standard sensing object Iron sheet 20 × 20 × t 1 mm Iron sheet 20 × 20 × t 1 mm Sensing object a × a mm a × a in Setting distance L (mm in)-6 Front sensing 6 Top sensing range L (mm 4 157 4 57 Sensing Selection Guide 2 079 2 Amplifier Built-in 0↓ 10 35 5 197 ò 5 0 10 separated 10 0.197 0.394 → Right 0 -Center-Left Operating point { (mm in)

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

Sensing object a × a mm a × a in

Stainless stee (SUS304)

Iron

Brass

Aluminum

30

Top sensing

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

# GX-15 type

Amplifier

GXL

GL

GX-N

GX

GX-M GX-U/GX-FU/

# Sensing field

Standard sehsing object Iron sheet 20 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in Standard sensing object Iron sheet 20 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in ×<u>tu...</u> | ℓ =1 ≝== \_\_: ↓ L Setting distance L (mm in) Front sensing range L (mm in) Top sensing 6 6 4 157 4 157 Sensing I 2 2 0 Ó 0 10 5 0.197 ( → Right 10 5 0.197 10 0.394 0.39 0.3 -Center-Left -Operating point { (mm in)

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

40

1.575

Sensing object Sensing object a × a mm a × a im a × a mm a × a in to the tail object a × a mm a × a im a × a mm a × a in to tail to ta Top sension t 0.0. Front Iron Stainless stee (SUS304) Brass Áluminum 30 1.181 40 1.575 20 0.787 Sensing object side length a (mm in)

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

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.

# SENSING CHARACTERISTICS (TYPICAL)

#### GX-15 (Long sensing range) type

#### Sensing field

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



# 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-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.



M3 pan head screw (Purchase separately.) MS-GX6-1 Cable Hooł M3 x 0.5 mm 0.020 in tapped hole or ø3.4 mm ø0.134 in hole Groove ė. ø 22 mm (تى ø3.4 mm If mounting using nut ٩ 34 in hole and washers (a)

(Purchase separately.)

· 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.

Refer to p.1485~ for general precautions.

2~11.5 mm 0.453 ir

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M3 (length 12 mm 0.472 in) truss h screw (Accessory for MS-GXL8-4)

MS-GXL8-4 (Accessory)

(Depth: 8 mm 0.315 in or more) or ø3.4 mm ø0.134 in thru-hole

and washer

M3 × 0.5 mm 0.020 in tapped hole

n) truss head

#### 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.







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# **PRECAUTIONS FOR PROPER USE**

#### Influence of surrounding metal

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

#### Front sensing type



$\geq$	GX-F6 type	GX-F8 type	GX-F12 type	GX-F15 type	GX-FL15 type	
А	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) 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





$\overline{\ }$	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.

0 mm 15 mm

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GX

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

Between "I" type





0

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-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.

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Sensor

ø3 ø0.118 cable, 1 m 3.281 ft long













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