# Rectangular-shaped Inductive Proximity Sensor Amplifier Built-in

FIBER SENSORS

LASER **SENSORS** 

PHOTOELECTRIC

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

LIGHT CURTAINS

PRESSURE / FLOW SENSORS

PARTICUI AR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

**ENDOSCOPE** 

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide Amplifier Built-in Amplifier-separated

**GXL** 

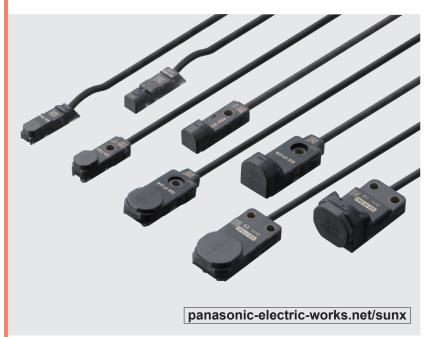
GX-U/GX-FU/ GX-N

■ General terms and conditions...... F-17 Related Information

■ Glossary of terms......P.1386~

■ Sensor selection guide ...... P.757~ ■ General precautions ...... P.1405









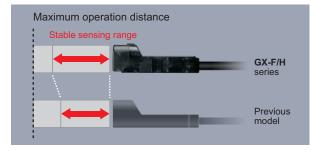


# Industry No. 1\* in stable sensing

\* 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<br>distance | GX-F/H<br>series     | Previous model       |  |
| C | GX-□6              | 1.6 mm 0.063 in       | 0 to 1.3 mm 0.051 in | 0 to 1.2 mm 0.047 in |  |
| C | GX-□8              | 2.5 mm 0.098 in       | 0 to 2.1 mm 0.083 in | 0 to 1.8 mm 0.709 in |  |
| C | GX-□12             | 4.0 mm 0.157 in       | 0 to 3.3 mm 0.130 in | 0 to 3.0 mm 0.118 in |  |
| C | 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 |  |

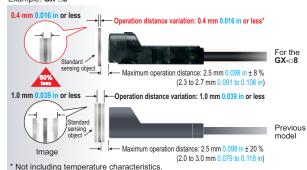
<sup>\*</sup> With standard sensing object

# 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.

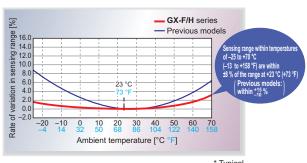
Example: GX
8



#### Temperature characteristics vary within ±8 %

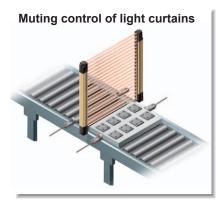
Components such as the sensor coil and core and product design have been totally revised to provide excellent temperature characteristics.

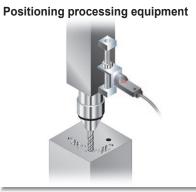
Stable sensing can be obtained regardless of the time of day or the yearly season.

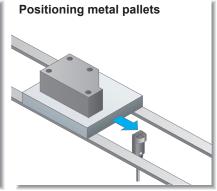


\* Typical

#### **APPLICATIONS**



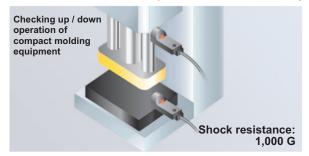




## **ENVIRONMENTAL RESISTANCE**

# 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.

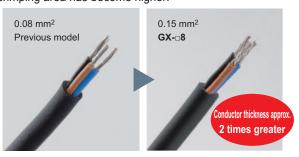
It prevents the sensor from being damaged by tightening too much.





Conductor thickness doubled to make wiring much easier! (GX-\(\text{G}\)/\(\text{O}\) 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.



FIBER SENSORS

LASER SENSORS

PHOTOELECTRIC SENSORS

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

LIGHT CURTAINS

PRESSURE A FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

**ENDOSCOPE** 

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

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

GX

LASER SENSORS

AREA SENSORS

LIGHT CURTAINS PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS SENSOR OPTIONS

MEASURE-MENT SENSORS STATIC CONTROL DEVICES

ENDOSCOPE LASER MARKERS

PLC / TERMINALS HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS COMPONENTS MACHINE VISION SYSTEMS

GXL GL GX-U/GX-FU/ GX-N GΧ

# **ORDER GUIDE**

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

| Ту      | /pe           | Appearance (mm in)                  | Sensing range (Note 1)      | Model No.<br>(Note 2) Output |                               | Output operation   |  |
|---------|---------------|-------------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------|--|
|         | Вu            | ~\^                                 |                             | GX-F6A                       |                               | Normally open      |  |
|         | ensi          |                                     |                             | GX-F6AI                      |                               | Normany open       |  |
| =       | Front sensing | 6 0.236<br>6 0.236<br>24.5<br>0.965 |                             | GX-F6B                       |                               | Normally closed    |  |
| NPN out | 뇬             |                                     |                             | GX-F6BI                      | NPN open-collector            |                    |  |
|         | g             |                                     | GX-H6A transistor           | transistor                   | Normally open                 |                    |  |
|         | ensir         | 1                                   | Maximum                     | GX-H6AI                      | _                             | Troiniany open     |  |
|         | Top se        | 6 0.236                             | operation distance          | GX-H6B                       |                               | Normally closed    |  |
|         | Ĺ             | 6 0.236 0.984                       | 1.6 mm 0.063 in             | GX-H6BI                      |                               | Troffficing closed |  |
|         | gu            | ~ />                                | (0 to 1.3 mm 0 to 0.051 in) | GX-F6A-P                     |                               | Normally open      |  |
|         | Front sensing |                                     | <b>\</b>                    | GX-F6AI-P                    | PNP open-collector transistor | Normany open       |  |
| =       | ont s         | 6 0.236                             | Stable sensing range        | GX-F6B-P                     |                               | Normally along     |  |
| output  | Ę.            | 6 0.236 0.965                       |                             | GX-F6BI-P                    |                               | Normally closed    |  |
| PNP o   | g             | . />                                |                             | GX-H6A-P                     |                               | Namalluana         |  |
| ₾.      | sensing       |                                     |                             | GX-H6AI-P                    |                               | Normally open      |  |
|         | Top se        | 6 0.236                             |                             | GX-H6B-P                     |                               | No weedly, along a |  |
|         | Ĕ             | 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) Model N (Note 2 |           | Output                        | Output operation |
|----------------|---------|-------------------------------------|--|-----------|-------------------------------|------------------|
|                | пg      | ~~                                  |  | GX-F8A    |                               | Normally open    |
|                | sensing | 7.4 0.291                           |  | GX-F8AI   | NPN open-collector transistor | Normally open    |
| =              | Front s | 8 0.315 0.906                       |  | GX-F8B    |                               | Normally closed  |
| NPN out        | ᄩ       | 00000                               |  | GX-F8BI   |                               | Normally closed  |
|                | б       |                                     |  | GX-H8A    |                               | Normally ones    |
|                | sensing | 8.2 0.323<br>8 0.315<br>25<br>0.984 | Maximum                                | GX-H8AI   |                               | Normally open    |
|                | Top se  |                                     | operation distance                     | GX-H8B    |                               | Normally closed  |
|                | Ĕ       |                                     | 2.5 mm 0.098 in                        | GX-H8BI   |                               |                  |
|                | БC      | (0 to 2.1 mm 0 to 0.083 in)         | (0 to 2.1 mm 0 to 0.083 in)            | GX-F8A-P  |                               | Normally open    |
|                | sensing |                                     | 3.4 0.291 Stable sensing range         | GX-F8AI-P | PNP open-collector transistor |                  |
| +              | Front s | 8 0.315 0.906                       |  | GX-F8B-P  |                               | No               |
| PNP output     | F       | 0.010                               |  | GX-F8BI-P |                               | Normally closed  |
| N <sub>O</sub> | g       | <u></u>                             |  | GX-H8A-P  |                               | N                |
|                | sensing |                                     |  | GX-H8AI-P |                               | Normally open    |
|                | Top se  | 8.2 0.323                           |  | GX-H8B-P  |                               | Normally closed  |
|                | ĭ       | 8 0.315 0.984                       |  | GX-H8BI-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.

# **ORDER GUIDE**

# GX-12 type

| Ту         | /ре           | Appearance (mm in)        | Sensing range (Note 1)                         | g range (Note 1) Model No.<br>(Note 2) |                                  | Output operation |
|------------|---------------|---------------------------|--|--|----------------------------------|------------------|
|            | ng            |                           |  | GX-F12A                                |                                  | Normally open    |
|            | Front sensing | 7.1 0.280                 |  | GX-F12AI                               |                                  | Normally open    |
| ¥          | ont s         | 12<br>27.8<br>1.094       |  | GX-F12B                                | NPN open-collector<br>transistor | Normally closed  |
| outpr      | F             | 0.472 1.094               |  | GX-F12BI                               |                                  | Normally closed  |
| NPN output | g             |                           |  | GX-H12A                                |                                  | Normally open    |
|            | Top sensing   | 12 0.472                  | Maximum  | GX-H12AI                               |                                  | Normally open    |
|            |               | 27.4<br>12 0.472<br>1.079 | operation distance                             | GX-H12B                                |                                  | Normally closed  |
|            | ř             | 12 0.472                  | 4.0 mm 0.157 in<br>(0 to 3.3 mm 0 to 0.130 in) | GX-H12BI                               |                                  |                  |
|            | ng            |                           |  | GX-F12A-P                              |                                  | Name II          |
|            | sensing       | 7.1 0.280                 |  | GX-F12AI-P                             | PNP open-collector transistor    | Normally open    |
| =          | Front s       | 27.8                      | Stable sensing range                           | GX-F12B-P                              |                                  | Normally closed  |
| PNP output | Į,            | 0.472 1.094               |  | GX-F12BI-P                             |                                  | Normally closed  |
| NP 0       | б             |                           |  | GX-H12A-P                              |                                  | Namello          |
| Ф.         | sensing       | 12 0.472                  |  | GX-H12AI-P                             |                                  | Normally open    |
|            | Top se        | 27.4                      |  | GX-H12B-P                              |                                  | Namedia          |
|            | <u> </u>      | 12 0.472 27.4 1.079       |  | 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.<br>(Note 2) | Output                        | Output operation |
|            | βι      |                    |                        | GX-F15A               |                               | Namali           |
|            | sensing | 8 0.315            |                        | GX-F15AI              |                               | Normally open    |
| =          | Front s | 31.5               | ^                      | GX-F15B               |                               | Name III. da a d |
| NPN out    | F       | 15 0.591 1.240     |                        | GX-F15BI              | NPN open-collector            | Normally closed  |
|            | б       |                    |                        | GX-H15A               | transistor                    | Normally open    |
|            | sensing | 16.5 0.650         | Maximum                | GX-H15AI              |                               |                  |
|            | Top se  | 29.5               | operation distance     | GX-H15B               |                               | Normally closed  |
|            | Ĕ       | 15 0.591 1.161     | 5.0 mm 0.197 in        | GX-H15BI              |                               |                  |
|            | б       | 8 0.315            |                        | GX-F15A-P             |                               | Namali           |
|            | sensing |                    |                        | \                     | GX-F15AI-P                    |                  |
| +=         | Front s | 31.5               | Stable sensing range   | GX-F15B-P             | PNP open-collector transistor | No               |
| utbn       | F       | 15 0.591 1.240     |                        | GX-F15BI-P            |                               | Normally closed  |
| PNP output | б       |                    |                        | GX-H15A-P             |                               | No               |
|            | nsin    | 16.5 0.650         |                        | GX-H15AI-P            |                               | Normally open    |
|            | Top se  | 29.5               |                        | GX-H15B-P             |                               |                  |
|            | 1       | 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.

FIBER SENSORS

PHOTO-ELECTRIC SENSORS

LIGHT CURTAINS PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

MEASURE-MENT SENSORS STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS PLC / TERMINALS

HUMAN MACHINE INTERFACES

VISUALIZATION COMPONENTS FA COMPONENTS

MACHINE VISION SYSTEMS

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

LASER SENSORS

PHOTO-ELECTRIC SENSORS

AREA SENSORS LIGHT CURTAINS

PRESSURE / SENSORS

PARTICULAR SENSORS SENSOR OPTIONS

MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

ENDOSCOPE LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY

COMPONENTS MACHINE

VISION SYSTEMS CURING SYSTEMS

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

# **ORDER GUIDE**

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

| Ту      | /pe           | Appearance (mm in) | Sensing range (Note 1)      | Model No.<br>(Note 2) | Output                        | Output operation               |
|---------|---------------|--------------------|-----------------------------|-----------------------|-------------------------------|--------------------------------|
|         | ng            |                    |                             | GX-FL15A              |                               | Normally open                  |
|         | sens          | 8 0.315            |                             | GX-FL15AI             |                               | Tromaily open                  |
| NPN out | Front sensing | 31.5               |                             | GX-FL15B              |                               | Normally closed                |
|         | 고             | 15 0.591           |                             | GX-FL15BI             | NPN open-collector            | Normally closed                |
|         | g             |                    | Maximum                     | GX-HL15A              | transistor                    | Normally open  Normally closed |
|         | sensing       | 16.5 0.650         |                             | GX-HL15AI             |                               |                                |
|         | Top se        | 29.5               | operation distance          | GX-HL15B              |                               |                                |
|         | ř             | 15 0.591 1.161     | 8.0 mm 0.315 in             | GX-HL15BI             |                               |                                |
|         | βL            |                    | (0 to 6.7 mm 0 to 0.264 in) | GX-FL15A-P            |                               | Normally open                  |
|         | sensing       | 8 0.315            |                             | GX-FL15AI-P           | PNP open-collector transistor |                                |
| ±       | Front s       | 31.5               | Stable sensing range        | GX-FL15B-P            |                               | Name allered                   |
| output  | F.            | 15 0.591           |                             | GX-FL15BI-P           |                               | Normally closed                |
| PNP o   | б             | `                  |                             | GX-HL15A-P            |                               |                                |
| ₫       | sensing       | 16.5 0.650         |                             | GX-HL15AI-P           |                               | Normally open                  |
|         | Top se        | 29.5               |                             | GX-HL15B-P            |                               |                                |
|         | ĭ             | 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 possible. |   |  |  |  |
| mounting<br>bracket | MS-GL6-2  |   |   |  |  |  |
|                     | 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

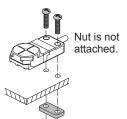


· MS-GL6-2 Nut is not attached.





· MS-GXL15



#### **Aluminum sheet**

- · MS-A15F
- · MS-A15H



## SPECIFICATIONS

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

|  | Туре                        | NPN (  | output  | PNP output                                    |                        |  |  |  |
|--|-----------------------------|--|---|---|------------------------|--|--|--|
|  | Front sensing               | 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            |  |  |  |
| Мах.   | operation distance (Note 3) | 1.6 mm 0.063 in ± 8 %  |   |   |                        |  |  |  |
| Stab   | le sensing range (Note 3)   |  | 0 to 1.3 mm   | 0 to 0.051 in                                 |                        |  |  |  |
| Stan   | dard sensing object         |  | Iron sheet 12 × 12 × t 1 mr   | m 0.472 × 0.472 × t 0.039 in                  |                        |  |  |  |
| Hysteresis 20 % or less of operation distance (with standard sensing object) |                             |  |   |   | )                      |  |  |  |
| Repe   | eatability                  | Along  |   | ensing axis: 0.04 mm 0.0016 in                | or less                |  |  |  |
| Supp   | oly voltage                 |  | 12 to 24 V DC <sup>+10</sup> <sub>-15</sub> %                       | Ripple P-P 10 % or less                       |                        |  |  |  |
| Curr   | ent consumption             |  | 15 mA   | or less                                       |                        |  |  |  |
| Output   |                             | NPN open-collector transistor  • Maximum sink current: 100  • Applied voltage: 30 V DC o  • Residual voltage: 2 V or les | or less (between output and 0 V)                                    | PNP open-collector transistor                 |                        |  |  |  |
| Utilization category   |                             |  | DC-12 (   | or DC-13                                      |                        |  |  |  |
|  | Output operation            | Normally closed  | Normally closed   | Normally closed                               | Normally closed        |  |  |  |
| Max.   | response frequency          |  | 400   | ) Hz  |                        |  |  |  |
| Ope  | ration indicator            | Orange LED (lights up when the output is ON)   |   |   |                        |  |  |  |
|  | Pollution degree            | 3 (Industrial environment)   |   |   |                        |  |  |  |
| e  | Protection                  | IP68 (IEC), IP68g (JEM) (Note 4, 5)  |   |   |                        |  |  |  |
| Environmental resistance   | Ambient temperature         | -2!  | -25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F |   |                        |  |  |  |
| resi   | Ambient humidity            |  | 35 to 85 % RH, Sto  | rage: 35 to 95 % RH                           |                        |  |  |  |
| ental  | EMC                         |  | EN 609  | 947-5-2                                       |                        |  |  |  |
| onme   | Voltage withstandability    | 1,000 V AC   | for one min. between all supply                                     | terminals connected together ar               | nd enclosure           |  |  |  |
| Envir  | Insulation resistance       | 50 MΩ, or more, wit  | th 500 V DC megger between al                                       | I supply terminals connected tog              | ether and enclosure    |  |  |  |
| Е  | Vibration resistance        | 10 to 500 Hz frequer   | ncy, 3 mm 0.118 in amplitude (M                                     | flax. 20 G) in X, Y and Z direction           | ns for two hours each  |  |  |  |
|  | Shock 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           |  |  |  |
| Sens   | 0                           | Over ambient temperatu   |   | +158 °F: Within ± 8 % of sensing              | range at +23 °C +73 °F |  |  |  |
| varia  |                             | Within $\pm 2$ % for $^{+10}_{-15}$ % fluctuation of the supply voltage  |   |   |                        |  |  |  |
| Mate   | erial                       |  | Enclosure: PBT, Ind   | icator part: Polyester                        |                        |  |  |  |
| Cabl   | е                           | 0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  |   |   |                        |  |  |  |
| Cabl   | e extension                 | 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 v  | weight                      | 15 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.
  - (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.

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC SENSORS

SENSORS

LIGHT CURTAINS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS SIMPLE

SIMPLE WIRE-SAVING UNITS

VIRE-SAVING YSTEMS

MEASURE-MENT SENSORS

CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS UV CURING

\_\_\_\_\_

Selection Guide Amplifier Built-in Amplifier-

GX-F/H

GXL GL

GX-U/GX-FU/ GX-N

LASER SENSORS

PHOTO-ELECTRIC SENSORS

AREA SENSORS LIGHT CURTAINS

PRESSURE / FLOW SENSORS PARTICULAR

SENSOR OPTIONS

SENSORS

MEASURE-MENT SENSORS STATIC CONTROL DEVICES

ENDOSCOPE LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION COMPONENTS

MACHINE VISION SYSTEMS CURING SYSTEMS

Selection Guide

GXL GL GX-U/GX-FU/ GX-N GΧ

## SPECIFICATIONS

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

|                          |                   | Туре                     | NPN  | output  | PNP   | output  |  |  |  |
|--------------------------|-------------------|--------------------------|--|---|---|---|--|--|--|
|                          | (S No.            | Front sensing            | GX-F8A(I)  | GX-F8B(I)                                       | GX-F8A(I)-P                                   | GX-F8B(I)-P   |  |  |  |
| Item                     | Model P<br>(Note) | 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 %                           |   |   |  |  |  |
| Stab                     | le sensing        | range (Note 3)           |  | 0 to 2.1 mm                                     | 0 to 0.083 in                                 |   |  |  |  |
| Stan                     | dard sens         | ng object                |  | Iron sheet 15 × 15 × t 1 mn                     | n 0.591 × 0.591 × t 0.039 in                  |   |  |  |  |
| Hyste                    | eresis            |                          |  | 20 % or less of operation distant               | ce (with standard sensing object              | )   |  |  |  |
| Repe                     | eatability        |                          | Along  | sensing axis, perpendicular to s                | ensing axis: 0.04 mm 0.0016 in                | or less   |  |  |  |
| Supp                     | ly voltage        |                          |  | 12 to 24 V DC <sup>+10</sup> <sub>-15</sub> % I | Ripple P-P 10 % or less                       |   |  |  |  |
| Curre                    | ent consur        | nption                   |  | 15 mA   | or less                                       |   |  |  |  |
| Output                   |                   |                          | NPN open-collector transistor • Maximum sink current: 100 • Applied voltage: 30 V DC c • Residual voltage: 2 V or le | r less (between output and 0 V)                 |   | 100 mA<br>or less (between output and +V)<br>ess (at 100 mA source current) |  |  |  |
| Utilization category     |                   |                          |  | DC-12 c   | :-12 or DC-13                                 |   |  |  |  |
|                          | Output op         | eration                  | Normally open  | Normally closed                                 | Normally open                                 | Normally closed   |  |  |  |
| Max.                     | response          | frequency                |  | 500   | ) Hz  |   |  |  |  |
| Oper                     | ation indic       | ator                     |  | Orange LED (lights up                           | when the output is ON)                        |   |  |  |  |
|                          | Pollution         | degree                   | 3 (Industrial environment)   |   |   |   |  |  |  |
| ø                        | Protection        | 1                        |  | IP68 (IEC), IP68g (JEM) (Note 4, 5)             |   |   |  |  |  |
| Environmental resistance | Ambient t         | emperature               | -2   | 5 to +70 °C –13 to +158 °F, Stor                | age: -40 to +85 °C -40 to +185                | 5°F   |  |  |  |
| resis                    | Ambient I         | numidity                 |  | 35 to 85 % RH, Stor                             | rage: 35 to 95 % RH                           |   |  |  |  |
| ental                    | EMC               |                          |  | EN 609  | 947-5-2                                       |   |  |  |  |
| on me                    | Voltage v         | rithstandability         | 1,000 V AC   | for one min. between all supply                 | terminals connected together ar               | nd enclosure  |  |  |  |
| Invir                    | Insulation        | resistance               | 50 MΩ, or more, wi   | th 500 V DC megger between all                  | supply terminals connected tog                | ether and enclosure   |  |  |  |
| "                        | Vibration         | resistance               | 10 to 500 Hz freque  | ncy, 3 mm 0.118 in amplitude (M                 | ax. 20 G) in X, Y and Z direction             | ns for two hours each   |  |  |  |
|                          | Shock res         | sistance                 | 10,000 m/s   | <sup>2</sup> acceleration (1,000 G approx.)     | in X, Y and Z directions for three            | e times each  |  |  |  |
| Sens                     |                   | perature characteristics | Over ambient temperat  | ure range –25 to +70 °C –13 to +                | -158 °F: Within ± 8 % of sensing              | range at +23 °C +73 °F  |  |  |  |
| varia                    |                   | age characteristics      | Within $\pm 2$ % for $_{-15}^{+10}$ % fluctuation of the supply voltage  |   |   |   |  |  |  |
| Mate                     | rial              |                          | Enclosure: PBT, Indicator part: Polyester  |   |   |   |  |  |  |
| Cabl                     | е                 |                          | 0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  |   |   |   |  |  |  |
| Cabl                     | e extensio        | n                        | Extens   | ion up to total 100 m 328.084 ft is             | s possible with 0.3 mm <sup>2</sup> , or more | e, cable.   |  |  |  |
| Net v                    | veight            |                          |  | Front sensing type: 15 g approx.                | , Top sensing type: 20 g approx.              |   |  |  |  |
| Notes                    | : 1) Where        | e measurement o          | conditions have not been specifie  | d 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

|  | Туре                        | NPN   | output  | PNP   | output   |  |  |
|--|-----------------------------|---|---|---|--|--|--|
|  | 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 sen   | nsing 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 20 % or less of operation distance (with standard sensing object) |                             |   |   |   |  |  |  |
| Repeatabi  | ility                       | Along   | sensing axis, perpendicular to s  | ensing axis: 0.04 mm 0.0016 in                          | or less  |  |  |
| Supply vol   | Itage                       |   | 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: 10           | ∩ mΔ  | PNP open-collector transistor • Maximum source current: | 100 m∆   |  |  |
|  |                             | l .   | or less (between output and 0 V)  | Applied voltage: 30 V DC (                              | or less (between output and +V) ass (at 100 mA source current) |  |  |
| 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 (JEM) (Note 4, 5)   |   |  |  |  |
| dmA  | 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, Sto  | rage: 35 to 95 % RH                                     |  |  |  |
| EMC  |                             |   | EN 609  | 947-5-2   |  |  |  |
| Ambi EMC Volta   | age withstandability        | 1,000 V AC  | for one min. between all supply   | terminals connected together an                         | d enclosure  |  |  |
| Insul  | lation resistance           | 50 MΩ, or more, w   | 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  |   | +158 °F: Within ±8 % of sensing                         | range at +23 °C +73 °F   |  |  |
| variation  | Voltage characteristics     |   | Within $\pm 2$ % for $^{+10}_{-15}$ % fluctuation of the supply voltage                                     |   |  |  |  |
| Material   |                             |   | Enclosure: PBT, Ind   | icator part: Polyester                                  |  |  |  |
| Cable  |                             | 0.15  | mm <sup>2</sup> 3-core oil, heat and cold res   | sistant cabtyre cable, 1 m 3.281                        | tlong  |  |  |
| Cable exte   | ension                      | Extens  | ion up to total 100 m 328.084 ft i  | s possible with 0.3 mm <sup>2</sup> , or more           | , cable.   |  |  |
| Net weight   | 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 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.

FIBER SENSORS

LASER SENSORS

Selection Guide

GXL GL

GX-U/GX-FU/ GX-N

GX

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC SENSORS AREA SENSORS

LIGHT CURTAINS PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS STATIC CONTROL DEVICES ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION

VISUALIZATION COMPONENTS FA COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

Selection Guide Amplifier Built-in Amplifierseparated

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

## SPECIFICATIONS

# GX-15 type

| Post    |                         |           |                             |   | NPN (  | output            |  |                    | PNP               | output           |                   |
|--|-------------------------|-----------|-----------------------------|---|--|-------------------|--|--------------------|-------------------|------------------|-------------------|
| Top sensing   GX-H15A(I)   GX-H15B(I)   G  |                         |           | Туре                        |   |  | Long sens         | sing range                             |                    |                   | Long sens        | sing range        |
| Max. operation distance (Note 3)   5.0 mm 0.197 in ± 8 %   8.0 mm 0.315 in ± 8 % (Note 4)   5.0 mm 0.197 in ± 8 %   8.0 mm 0.215 in m 0.00 5.0 mm 0.00 10 in in less   1.00 mm 0.00 10 in in less   1.00 mm 0.00 mm 0.00 10 in in less   1.00 mm 0.00 mm 0.  |                         | \         | 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     |
| Standard 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)   | Item                    | 1 \ 3     | 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     |
| Standard sensing object   Iron sheet 20 × 20 × t1 mm   | Max.                    | operati   | ion distance (Note 3)       | 5.0 mm 0.1  | 97 in ± 8 %  | 8.0 mm 0.315 ir   | ± 8 % (Note 4)                         | 5.0 mm 0.1         | 97 in ± 8 %       | 8.0 mm 0.315 ir  | ± 8 % (Note 4)    |
| The content of the  | Stab                    | le sens   | sing 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) |
| Repeatability Along sensing axis, perpendicular to sensing axis: 0.04 mm 0.0016 in or less  Supply voltage 12 to 24 V DC _110  | Stan                    | dard se   | ensing object               | l   |  |                   |  |                    |                   |                  |                   |
| Supply voltage  12 to 24 V DC <sup>10</sup> / <sub>15</sub> % Ripple P-P 10 % or less  Current consumption  15 mA or less  NPN open-collector transistor   | Hyst                    | eresis    |                             |   |  | 20 % or less of o | peration distance                      | ce (with standard  | sensing object    | )                |                   |
| Cutrent consumption   15 mA or less  | Repe                    | eatabili  | ty                          |   | Along  | sensing axis, pe  | erpendicular to s                      | ensing axis: 0.04  | 4 mm 0.0016 in    | or less          |                   |
| Output   | Supp                    | oly volta | age                         |   |  | 12 to 24          | 4 V DC <sup>+10</sup> <sub>-15</sub> % | Ripple P-P 10 %    | or less           |                  |                   |
| Output Public Projection   Normally open   N | Curr                    | ent con   | sumption                    |   |  |                   | 15 mA                                  | or less            |                   |                  |                   |
| Output operation   Normally open   Normally closed   Normally c  | Output                  |           |                             | Maximum     Applied vol   | Maximum sink current: 100 mA  Applied voltage: 30 V DC or less (between output and 0 V)  • Maximum source current: 100 mA  • Applied voltage: 30 V DC or less (between output and 0 V) |                   |  |                    |                   |                  |                   |
| Max. response frequency   250 Hz   150 Hz (Note 5)   250 Hz   150 Hz (Note 5)  | Utilization category    |           |                             |   |  |                   | DC-12 d                                | or DC-13           |                   |                  |                   |
| Pollution degree   3 (Industrial environment)  |                         | Outpu     | t operation                 | Normally open   | Normally closed  | Normally open     | Normally closed                        | Normally open      | Normally closed   | Normally open    | Normally closed   |
| Pollution degree 3 (Industrial environment)  Protection IP68 (IEC), IP68g (JEM) (Note 6, 7)  Ambient temperature -25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F  Ambient humidity 35 to 85 % RH, Storage: 35 to 95 % RH  EMC EN 60947-5-2  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 (Max. 20 G) in X, Y and Z directions for two hours each  Sensing range variation 1 Temperature characteristics Over ambient temperature range -25 to +70 °C -13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for ±10 / 15 % fluctuation of the supply voltage  Material Enclosure: PBT, Indicator part: Polyester  Cable extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.  | Max. response frequency |           |                             | 250   | Hz   | 150 Hz            | (Note 5)                               | 250                | ) Hz              | 150 Hz           | (Note 5)          |
| Protection    Protection   P68 (IEC), IP68g (JEM) (Note 6, 7)  | Ope                     | ration in | ndicator                    | Orange LED (lights up when the output is ON)  |  |                   |  |                    |                   |                  |                   |
| Ambient temperature  Ambient temperature  -25 to +70 °C -13 to +158 °F, Storage: -40 to +85 °C -40 to +185 °F  Ambient humidity  Storage: 35 to 95 % RH  EMC  EN 60947-5-2  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 (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Over ambient temperature range -25 to +70 °C -13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F within ± 2 % for −15 must find the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.  |                         | Polluti   | on degree                   | 3 (Industrial environment)  |  |                   |  |                    |                   |                  |                   |
| Vibration resistance  10 to 500 Hz frequency, 3 mm 0.118 in amplitude (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Temperature characteristics  Over ambient temperature range –25 to +70 °C –13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for +10 / 15 % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | φ                       | Protec    | ction                       | IP68 (IEC), IP68g (JEM) (Note 6, 7)   |  |                   |  |                    |                   |                  |                   |
| Vibration resistance  10 to 500 Hz frequency, 3 mm 0.118 in amplitude (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Temperature characteristics  Over ambient temperature range –25 to +70 °C –13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for +10 / 15 % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | stanc                   | Ambie     | ent temperature             |   | -2   | 5 to +70 °C –13   | to +158 °F, Stor                       | age: -40 to +85    | °C -40 to +185    | 5°F              |                   |
| Vibration resistance  10 to 500 Hz frequency, 3 mm 0.118 in amplitude (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Temperature characteristics  Over ambient temperature range –25 to +70 °C –13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for +10 / 15 % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | resis                   | Ambie     | ent humidity                |   |  | 35 t              | o 85 % RH, Sto                         | rage: 35 to 95 %   | RH                |                  |                   |
| Vibration resistance  10 to 500 Hz frequency, 3 mm 0.118 in amplitude (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Temperature characteristics  Over ambient temperature range –25 to +70 °C –13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for +10 / 15 % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | ental                   | EMC       |                             |   |  |                   | EN 609                                 | 947-5-2            |                   |                  |                   |
| Vibration resistance  10 to 500 Hz frequency, 3 mm 0.118 in amplitude (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Temperature characteristics  Over ambient temperature range –25 to +70 °C –13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for +10 / 15 % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | onme                    | Voltag    | e withstandability          | 1,000 V AC for one min. between all supply terminals connected together and enclosure |  |                   |  |                    |                   |                  |                   |
| Vibration resistance  10 to 500 Hz frequency, 3 mm 0.118 in amplitude (Max. 20 G) in X, Y and Z directions for two hours each  Shock resistance  10,000 m/s² acceleration (1,000 G approx.) in X, Y and Z directions for three times each  Temperature characteristics  Over ambient temperature range –25 to +70 °C –13 to +158 °F: Within ± 8 % of sensing range at +23 °C +73 °F  Within ±2 % for +10 / 15 % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long  Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | invir                   | Insula    | tion resistance             | 50  | MΩ, or more, wi  | th 500 V DC meg   | gger between all                       | supply terminal    | s connected tog   | ether and enclos | ure               |
| 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   | ш                       | Vibrat    | 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              |
| range variation  Voltage characteristics  Within ±2 % for <sup>+10</sup> <sub>-15</sub> % fluctuation of the supply voltage  Material  Enclosure: PBT, Indicator part: Polyester  Cable  0.15 mm² 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 mm², or more, cable.  |                         | Shock     | resistance                  |   | 10,000 m/s   | acceleration (1,  | 000 G approx.)                         | in X, Y and Z dir  | ections for three | e times each     |                   |
| variation     Voltage characteristics     Within ±2 % for <sup>+10</sup> <sub>-15</sub> % fluctuation of the supply voltage       Material     Enclosure: PBT, Indicator part: Polyester       Cable     0.15 mm² 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 mm², or more, cable.  |                         | 0         | Temperature characteristics | Over ar   | mbient temperat  | ure range –25 to  | +70 °C -13 to +                        | +158 °F: Within ±  | 8 % of sensing    | range at +23 °C  | +73 °F            |
| Cable 0.15 mm² 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 mm², or more, cable.  |                         |           | Voltage characteristics     | Within ±2 % for $^{+10}_{-15}$ % fluctuation of the supply voltage                    |  |                   |  |                    |                   |                  |                   |
| Cable extension Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.   | Mate                    | erial     |                             | Enclosure: PBT, Indicator part: Polyester   |  |                   |  |                    |                   |                  |                   |
|  | Cabl                    | е         |                             |   | 0.15 ו   | mm² 3-core oil, h | eat and cold res                       | sistant cabtyre ca | able, 1 m 3.281   | ft long          |                   |
| Net weight 20 g approx.  | Cabl                    | e exter   | nsion                       |   | Extens   | on 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.

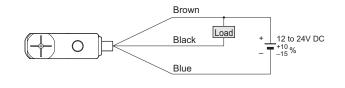
# I/O CIRCUIT DIAGRAMS

#### **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

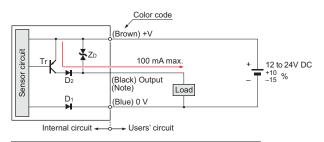
ZD: Surge absorption zener diode

Tr : NPN output transistor

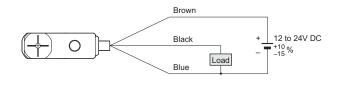
Note: The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

# 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

LASER SENSORS

PHOTO-ELECTRIC SENSORS

AREA SENSORS

LIGHT CURTAINS

PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

GXL

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

GX

FIBER

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC SENSORS AREA SENSORS

LIGHT CURTAINS PRESSURE / FLOW SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS

PARTICULAR

WIRE-SAVING SYSTEMS MEASURE-MENT SENSORS

STATIC CONTROL DEVICES ENDOSCOPE

LASER MARKERS PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

Selection Guide Amplifier Built-in Amplifierseparated

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

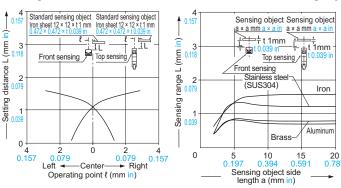
GX

# SENSING CHARACTERISTICS (TYPICAL)

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

#### Sensing field

# Correlation between sensing object size and sensing range † 0.157 Sensing object Sensing object As the sensing object size

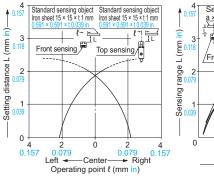


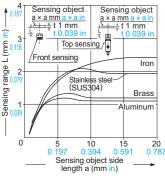
As the sensing object size becomes smaller than the standard size (iron sheet  $12 \times 12 \times t$  1 mm  $0.472 \times 0.472 \times t$  0.039 in), the sensing range shortens as shown in the left figure.

#### GX-8 type

#### Sensing field

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



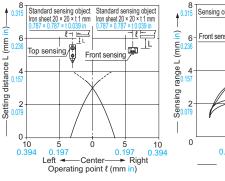


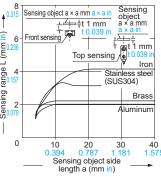
As the sensing object size becomes smaller than the standard size (iron sheet 15 × 15 × t 1 mm  $0.591 \times 0.591 \times t \cdot 0.039$  in), the sensing range shortens as shown in the left figure.

#### GX-12 type

#### Sensing field

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



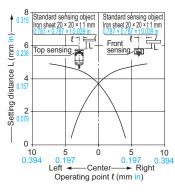


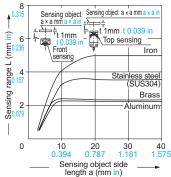
As the sensing object size becomes smaller than the standard size (iron sheet 20 × 20 × t 1 mm  $0.787\times0.787\times t~0.039$  in), the sensing range shortens as shown in the left figure.

#### GX-15 type

# Sensing field

# Correlation between sensing object size and sensing range





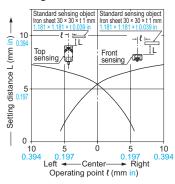
As the sensing object size becomes smaller than the standard size (iron sheet 20 × 20 × t 1 mm  $0.787\times0.787\times t~0.039$  in), the sensing range shortens as shown in the left figure.

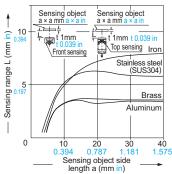
# SENSING CHARACTERISTICS (TYPICAL)

#### 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.

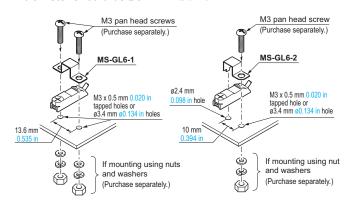
#### <When using MS-GX6-1 (recommended)>

- · 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

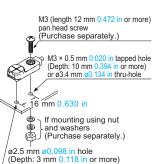
- The tightening torque should be 0.7 N m or less.
- To mount the sensor with a nut, the mounting hole diameter should be ø3.4 mm Ø0.134 in. Further, the hole in which the boss is inserted should be ø2.5 mm Ø0.098 in and 3 mm 0.118 in, or more, deep.

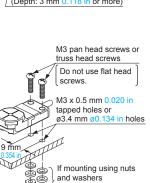
#### GX-15 type

- 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.







Selectio Guide

GXL

GL GX-U/GX-FU

GX

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

(Purchase separately.) MS-GXL15

(Sensor mounting bracket)

FIBER SENSORS LASER SENSORS

РНОТО

LIGHT CURTAINS

PRESSURE FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

COMPONENTS MACHINE

SYSTEMS

# FIBER

LASER SENSORS PHOTO-ELECTRIC SENSORS

MICR PHOTO ELECTR SENSOR

AREA SENSORS LIGHT CURTAINS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS PARTICULAR USE SENSORS

SIMPLE WIRE-SAVING UNITS WIRE-SAVING SYSTEMS

SENSOR OPTIONS

MEASURE-MENT SENSORS STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

Selection Guide Amplifier Built-in Amplifierseparated

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

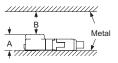
# PRECAUTIONS FOR PROPER USE

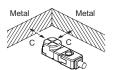
Refer to General precautions.

#### Influence of surrounding metal

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

#### Front sensing type



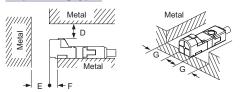


|   | GX-F6 type             | GX-F8 type      | GX-F12 type     | GX-F15 type    | GX-FL15 type           |
|---|------------------------|-----------------|-----------------|----------------|------------------------|
| Α | 6 mm 0.236 in (Note 1) | 7.4 mm 0.291 in | 7.1 mm 0.280 in | 8 mm 0.315 in  | 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 0.252 in.

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



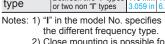
|   | GX-H6 type     | GX-H8 type     | GX-H12 type    | GX-H15 type    | GX-HL15 type          |
|---|----------------|----------------|----------------|----------------|-----------------------|
| D | 3 mm 0.118 in  | 4 mm 0.157 in  | 7 mm 0.276 in  | 6 mm 0.236 in  | 12 mm 0.472 in        |
| Е | 10 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<br>GX-H6     | Between "I" type<br>and non "I" type       | 0 mm<br>(Note 2)   | 15 mm<br>0.591 in  |
| type               | Between two "I" types or two non "I" types | 13 mm<br>0.512 in  | 25 mm<br>0.984 in  |
| GX-F8<br>GX-H8     | Between "I" type and non "I" type          | 0 mm<br>(Note 2)   | 15 mm<br>0.591 in  |
| type               | Between two "I" types or two non "I" types | 20 mm<br>0.787 in  | 35 mm<br>1.378 in  |
| GX-F12<br>GX-H12   | Between "I" type and non "I" type          | 0 mm<br>(Note 2)   | 25 mm<br>0.984 in  |
| type               | Between two "I" types or two non "I" types | 25 mm<br>0.984 in  | 50 mm<br>1.969 in  |
| GX-F15<br>GX-H15   | Between "I" type<br>and non "I" type       | 0 mm<br>(Note 2)   | 25 mm<br>0.984 in  |
| type               | Between two "I" types or two non "I" types | 45 mm<br>1.772 in  | 70 mm<br>2.756 in  |
| GX-FL15<br>GX-HL15 | Between "I" type and non "I" type          | 0 mm<br>(Note 2)   | 25 mm<br>0.984 in  |
| type               | Between two "I" types or two non "I" types | 110 mm<br>3.059 in | 170 mm<br>6.693 in |



Top sensing

Front sensing

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 in 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<br>No.<br>Metal       | GX-F6<br>GX-H6<br>type | GX-F8<br>GX-H8<br>type | GX-F12<br>GX-H12<br>type | GX-F15<br>GX-H15<br>type | GX-FL15<br>type | GX-HL15<br>type |  |  |
|--|-----------------------------|------------------------|------------------------|--------------------------|--------------------------|-----------------|-----------------|--|--|
|  | Iron                        | 1                      | 1                      | 1                        | 1                        | 1               | 1               |  |  |
|  | Stainless steel<br>(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)

GX-F6□

GX-F12

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

PHOTO-ELECTRIC SENSORS

LIGHT CURTAINS

PRESSURE FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

WIRE-SAVING SYSTEMS MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

ø3 ø0.118 cable, 1 m 3.281 ft long

ø3.1 ø0.122 mounting hole

3.1 5.8 0.12 0.228

ø6 ø0.236 screw seat, 1.4 0.055 deep

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION

VISUALIZATION COMPONENTS FA COMPONENTS

MACHINE VISION SYSTEMS

Selection Guide

GXL

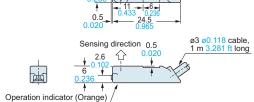
GL GX-U/GX-FU/ GX-N GX

GX-H8□

GX-H12□

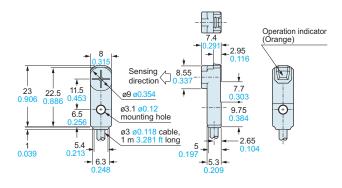
Sensor

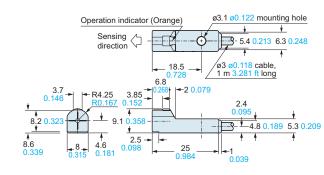
GX-H6□



Sensing direction ø3 ø0.118 cable, 1 m 3.281 ft long Operation indicator (Orange) 25

GX-F8□





Sensing direction

45.5 №

12

Operation indicator (Orange)

22.2

—16 – 0.630

27.4

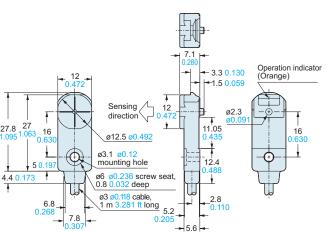
8.65 0.341-4.8 0.189 <del>-</del> 3 0.118 <del>-</del>

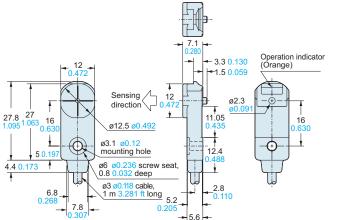
2.5 0.098

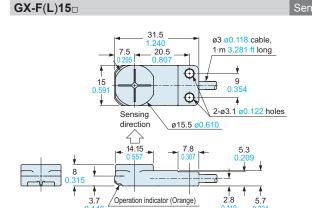
R6.25 R0.246

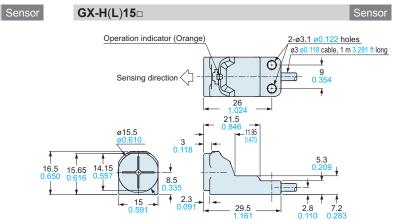
6.5 0.256

1.5 0.059









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 CONTROL DEVICES ENDOSCOPE

LASER MARKERS PLC / TERMINALS

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION

VISUALIZATION COMPONENTS FA COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

Selection Guide Amplifier Built-in Amplifier-

GX-F/H GXL

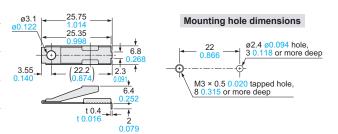
GL GX-U/GX-FU/ GX-N

GX

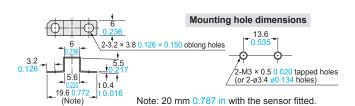
DIMENSIONS (Unit: mm in)

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

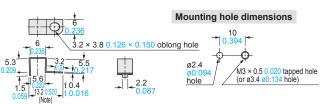
MS-GX6-1 Sensor mounting bracket for GX-6 type (Optional)



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

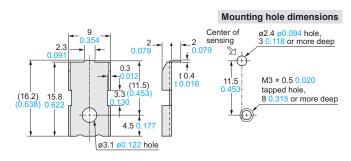


MS-GL6-2 Sensor mounting bracket for GX-6 type (Optional)



Note: 13.4 mm 0.528 in with the sensor fitted.

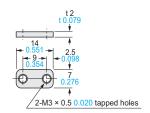
MS-GXL8-4 Sensor mounting bracket for GX-8 type (Optional)



Material: Stainless steel (SUS304)

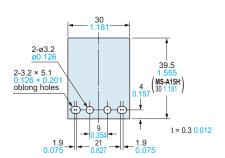
1 pc. each of M3 (length 12 mm 0.472 in) truss head screw, nut, spring washer and plain washer is attached.

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

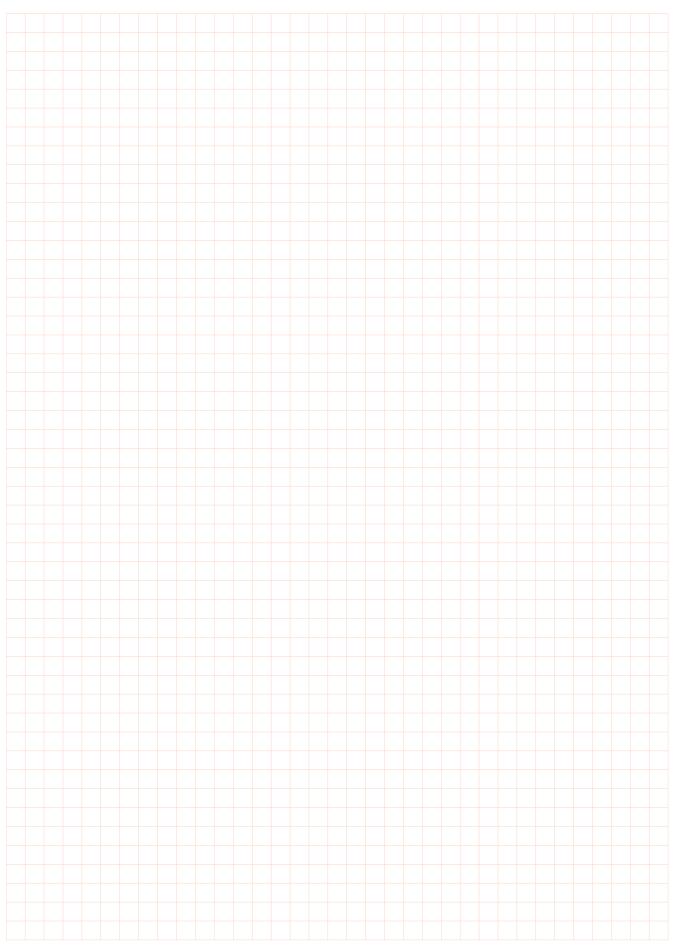


Material: SPCC

MS-A15F MS-A15H Aluminum sheet (Optional)



#### MEMC



# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Multiple Function Sensor Development Tools category:

Click to view products by Panasonic manufacturer:

Other Similar products are found below:

RD-KL25-AGMP01 PTC-04-DB-ACT PTC-04-DB-FL FRDM-K22F-SA9500 EV\_ICM-20649 MULTI-SENSE-GEVB BRKT-STBC-SA9500 3397 STEVAL-MKIT01V1 EVAL-CN0411-ARDZ KT-TVOC-200-TB200A KT-NmHc-200-TB200A SEN0344 PIM520 PIM518 PIM519 PIM510 103030375 ZSSC4132KIT ADIS16505-3/PCBZ SEN-16794 PIM502 SEN0359 4829 EV26Q64A EVAL-AD7746RDZ EVAL-AD7746HDZ AS7022-EVALKIT RTK0ESXB10C00001BJ MAX30134EVSYS# EV-CBM-PIONEER1-1Z EVAL-ADPD188BIZ-S2 EVAL-ADCM-1 EVAL-CN0507-ARDZ SI118X-KIT ALTEHTG2SMIP EVAL-CN0533-EBZ MIKROE-4305 MAX30101WING# MIKROE-4192 MIKROE-4049 OB1203SD-U-EVK OB1203SD-BT-EVK MIKROE-4037 101990644 MIKROE-4267 MIKROE-4330 ARG-LDKT EVAL-CN0503-ARDZ MIKROE-4131