# Cylindrical Inductive Proximity Sensor Amplifier Built-in

# GX-U SERIES GX-FU SERIES GX-N SERIES

Related Information
■ General terms and conditions..... F-17
■ Glossary of terms..... P.1386~
■ Sensor selection guide..... P.757~
■ General precautions ..... P.1405

panasonic-electric-works.net/sunx


2-wire type available | Oil resistant | Metal embedding possible

## Improved performance, environmental resistance, and operability

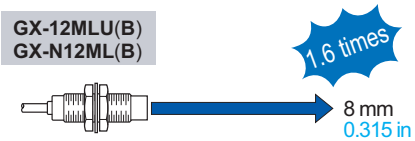
## BASIC PERFORMANCE

### About four times more robust in tightening

As the sensor can be securely tightened, it does not get loose due to vibration or shock.


### Long sensing range

**GX-12MLU(B)/N12ML(B)** feature 1.6 times longer sensing range than previous model [**GX-12ML(B)**]. It can be mounted at a sufficient distance from the object.




## ENVIRONMENTAL RESISTANCE

### Spatter-resistant type available DC 2-wire type

As the enclosure is entirely coated by fluorine resin, the sensor can be safely used at a place where welding spatters fly around.
Both the pigtail cable and the mating cable are also spatter-resistant.

GX-F□U-J

## FUNCTIONS

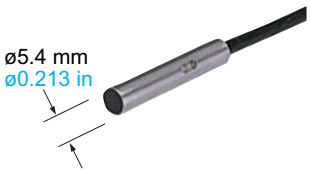
### Visible 2-color indicator

The normally open type [**GX-(F)□U(-J)**] is equipped with a 2-color indicator. (The normally closed type and **GX-N□** have the operation indicator instead.)
The operation is easily observable from any direction because the entire sensor tail (transparent, **GX-5SU(B)**: enclosure) lights up.

## VARIETIES

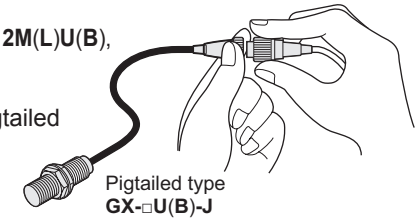
### Compact size: ø5.4 mm ø0.213 in

**GX-5SU(B)** is just 5.4 mm 0.213 in in diameter, the smallest in existing DC two-wire sensors. It saves you space.




### Simple wiring DC 2-wire type

The wiring cost is considerably reduced as it is DC 2-wire type.
Further, each of **GX-12M(L)U(B)**, **GX-18M(L)U(B)**, **GX-30M(L)U(B)** is available as a pigtailed model that makes replacement easy and quick.



Pigtailed type
**GX-□U(B)-J**

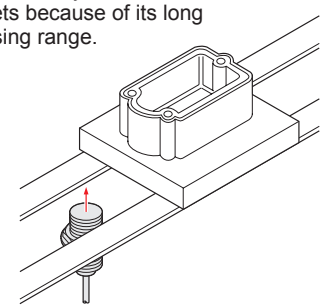
FIBER SENSORS
LASER SENSORS
PHOTOELECTRIC SENSORS
MICRO PHOTOELECTRIC SENSORS
AREA SENSORS
LIGHT CURTAINS
PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC CONTROL DEVICES
ENDOSCOPE
LASER MARKERS
PLC / TERMINALS
HUMAN MACHINE INTERFACES
ENERGY CONSUMPTION VISUALIZATION COMPONENTS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS

Selection Guide
Amplifier Built-in
Amplifier-separated

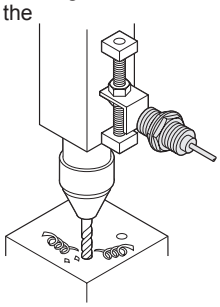
GX-F/H
GXL
GL
GX-U/GX-FU/GX-N
GX

## APPLICATIONS

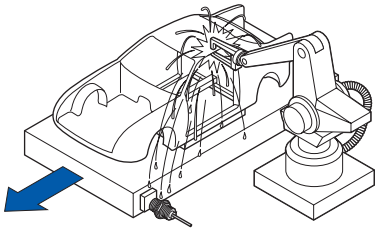
**Detecting traveling aluminum pallets**
It can reliably detect even aluminum pallets because of its long sensing range.



**Controlling depth of drilling**
By detecting the dog, the sensor decides the depth of the drilled hole.



**Positioning object at welding station (GX-F□U-J only)**
It can be safely used even where welding sparks (spatter) fly around.



## ORDER GUIDE

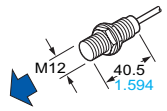
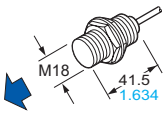
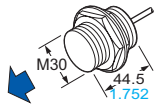
### DC 2-wire type

| Type | | | Appearance (mm in) | Sensing range (Note) | Model No. | Output | Output operation |
|---|---|---|---|---|---|---|---|
| DC 2-wire | Shielded type | Non-threaded type | ø5.4 ø0.213, 30 1.181 | 1.5 mm 0.059 in ← Maximum operation distance<br>(0 to 1.2 mm 0 to 0.047 in) ← Stable sensing range | GX-5SU | Non-contact DC 2-wire type | Normally open |
| | | | | | GX-5SUB | | Normally closed |
| | | Threaded type | M8, 30 1.181 | 2 mm 0.079 in<br>(0 to 1.6 mm 0 to 0.063 in) | GX-8MU | | Normally open |
| | | | | | GX-8MUB | | Normally closed |
| | | | M12, 40.5 1.594 | 3 mm 0.118 in<br>(0 to 2.4 mm 0 to 0.094 in) | GX-12MU | | Normally open |
| | | | | | GX-12MUB | | Normally closed |
| | | | M18, 41.5 1.634 | 7 mm 0.276 in<br>(0 to 5.6 mm 0 to 0.220 in) | GX-18MU | | Normally open |
| | | | | | GX-18MUB | | Normally closed |
| | | | M30, 44.5 1.752 | 10 mm 0.394 in<br>(0 to 8 mm 0 to 0.315 in) | GX-30MU | | Normally open |
| | | | | | GX-30MUB | | Normally closed |
| | Non-shielded type | Threaded type | M8, 30 1.181 | 4 mm 0.157 in<br>(0 to 3.2 mm 0 to 0.126 in) | GX-8MLU | | Normally open |
| | | | | | GX-8MLUB | | Normally closed |
| | | | M12, 40.5 1.594 | 8 mm 0.315 in<br>(0 to 6.4 mm 0 to 0.252 in) | GX-12MLU | | Normally open |
| | | | | | GX-12MLUB | | Normally closed |
| | | | M18, 41.5 1.634 | 15 mm 0.591 in<br>(0 to 12 mm 0 to 0.472 in) | GX-18MLU | | Normally open |
| | | | | | GX-18MLUB | | Normally closed |
| | | | M30, 44.5 1.752 | 22 mm 0.866 in<br>(0 to 17.6 mm 0 to 0.693 in) | GX-30MLU | | Normally open |
| | | | | | GX-30MLUB | | Normally closed |

Note: 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.

# ORDER GUIDE

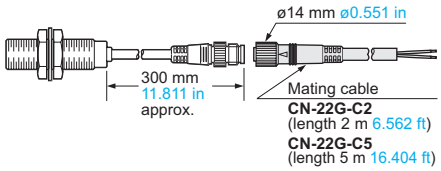
## Spatter-resistant of DC 2-wire type (Pigtailed type)

| Type | Appearance (mm in) | Sensing range (Note) | Model No. | Output | Output operation |
|---|---|---|---|---|---|
| DC 2-wire / Shielded type / Threaded type |  | 3 mm 0.118 in ← Maximum operation distance<br>(0 to 2.4 mm 0 to 0.094 in) ← Stable sensing range | **GX-F12MU-J** | Non-contact DC 2-wire type | Normally open |
| |  | 7 mm 0.276 in<br>(0 to 5.6 mm 0 to 0.220 in) | **GX-F18MU-J** | | |
| |  | 10 mm 0.394 in<br>(0 to 8 mm 0 to 0.315 in) | **GX-F30MU-J** | | |

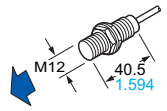
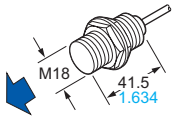
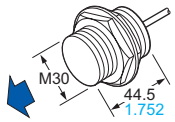
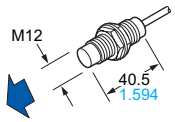
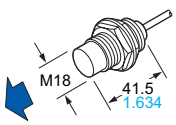
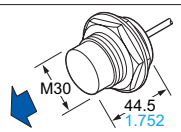
Note: The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.

### • Mating cable

| Model No. | Description | |
|---|---|---|
| **CN-22G-C2** | Length: 2 m 6.562 ft | 0.3 mm² 2-core flame-resistant, spatter-resistant cable with connector at one end<br>Cable outer diameter: ø3.6 mm ø0.142 in |
| **CN-22G-C5** | Length: 5 m 16.404 ft | |




## DC 3-wire type

| Type | Appearance (mm in) | Sensing range (Note) | Model No. | Output | Output operation |
|---|---|---|---|---|---|
| DC 3-wire / Shielded type / Threaded type |  | 3 mm 0.118 in ← Maximum operation distance<br>(0 to 2.4 mm 0 to 0.094 in) ← Stable sensing range | **GX-N12M** | NPN open-collector transistor | Normally open |
| | | | **GX-N12MB** | | Normally closed |
| |  | 7 mm 0.276 in<br>(0 to 5.6 mm 0 to 0.220 in) | **GX-N18M** | | Normally open |
| | | | **GX-N18MB** | | Normally closed |
| |  | 10 mm 0.394 in<br>(0 to 8 mm 0 to 0.315 in) | **GX-N30M** | | Normally open |
| | | | **GX-N30MB** | | Normally closed |
| Non-shielded type / Threaded type |  | 8 mm 0.315 in<br>(0 to 6.4 mm 0 to 0.252 in) | **GX-N12ML** | | Normally open |
| | | | **GX-N12MLB** | | Normally closed |
| |  | 15 mm 0.591 in<br>(0 to 12 mm 0 to 0.472 in) | **GX-N18ML** | | Normally open |
| | | | **GX-N18MLB** | | Normally closed |
| |  | 22 mm 0.866 in<br>(0 to 17.6 mm 0 to 0.693 in) | **GX-N30ML** | | Normally open |
| | | | **GX-N30MLB** | | Normally closed |

Note: 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.

# ORDER GUIDE

## 5 m 16.404 ft cable length type

5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) is also available for cable type.
When ordering this type, suffix "**-C5**" to the model No.
(e.g.) 5 m 16.404 ft cable length type of **GX-5SU** is "**GX-5SU-C5**".

## Pigtailed type

Pigtailed type (standard: cable type) is also available for DC 2-wire type.

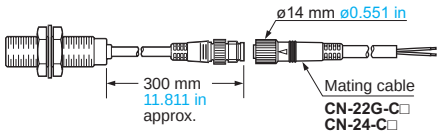
**• Table of Model Nos.**

| Type | | | Standard | Pigtailed type (Note) |
|---|---|---|---|---|
| DC 2-wire | Shielded type | Non-threaded type | **GX-5SU** | ——— |
| | | | **GX-5SUB** | ——— |
| | | Threaded type | **GX-8MU** | ——— |
| | | | **GX-8MUB** | ——— |
| | | | **GX-12MU** | **GX-12MU-J** |
| | | | **GX-12MUB** | **GX-12MUB-J** |
| | | | **GX-18MU** | **GX-18MU-J** |
| | | | **GX-18MUB** | **GX-18MUB-J** |
| | | | **GX-30MU** | **GX-30MU-J** |
| | | | **GX-30MUB** | **GX-30MUB-J** |
| | Non-shielded type | Threaded type | **GX-8MLU** | ——— |
| | | | **GX-8MLUB** | ——— |
| | | | **GX-12MLU** | **GX-12MLU-J** |
| | | | **GX-12MLUB** | **GX-12MLUB-J** |
| | | | **GX-18MLU** | **GX-18MLU-J** |
| | | | **GX-18MLUB** | **GX-18MLUB-J** |
| | | | **GX-30MLU** | **GX-30MLU-J** |
| | | | **GX-30MLUB** | **GX-30MLUB-J** |

Note: Please order the suitable mating cable separately for pigtailed type.

**• Mating cable**

| Model No. | Description | |
|---|---|---|
| **CN-22G-C2** | Length: 2 m 6.562 ft | 0.3 mm² 2-core flame-resistant, spatter-resistant cable with connector at one end<br>Cable outer diameter: ø3.6 mm ø0.142 in |
| **CN-22G-C5** | Length: 5 m 16.404 ft | |
| **CN-24-C2** | Length: 2 m 6.562 ft | 0.3 mm² 4-core oil, heat, cold resistant cable<br>Cable outer diameter: ø3.6 mm ø0.142 in |
| **CN-24-C5** | Length: 5 m 16.404 ft | |

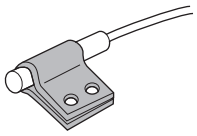


# OPTIONS

| Designation | Model No. | Description | |
|---|---|---|---|
| Sensor mounting bracket | **MS-SS5** | For **GX-5SU(B)** | The sensor is easily mounted with this bracket. |
| Protection cover | **MS-H12** | For **GX-12MU(B)**<br>For **GX-N12M(B)** | It protects the sensing surface from welding sparks (spatter), etc. |
| | **MS-H18** | For **GX-18MU(B)**<br>For **GX-N18M(B)** | |
| | **MS-H30** | For **GX-30MU(B)**<br>For **GX-N30M(B)** | |

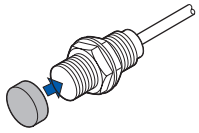
### Sensor mounting bracket

- **MS-SS5**



### Protection cover

- **MS-H12**
- **MS-H18**
- **MS-H30**



# SPECIFICATIONS

## DC 2-wire type

| Item | Model No. | Shielded type | | | | | Non-shielded type | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Non-threaded type | Threaded type | | | | Threaded type | | | |
| | Normally open | **GX-5SU** | **GX-8MU** | **GX-12MU** | **GX-18MU** | **GX-30MU** | **GX-8MLU** | **GX-12MLU** | **GX-18MLU** | **GX-30MLU** |
| | Normally closed | **GX-5SUB** | **GX-8MUB** | **GX-12MUB** | **GX-18MUB** | **GX-30MUB** | **GX-8MLUB** | **GX-12MLUB** | **GX-18MLUB** | **GX-30MLUB** |
| Max. operation distance (Note 2) | | 1.5 mm 0.059 in ±10 % | 2 mm 0.079 in ±10 % | 3 mm 0.118 in ±10 % | 7 mm 0.276 in ±10 % | 10 mm 0.394 in ±10 % | 4 mm 0.157 in ±10 % | 8 mm 0.315 in ±10 % | 15 mm 0.591 in ±10 % | 22 mm 0.866 in ±10 % |
| Stable sensing range (Note 2) | | 0 to 1.2 mm 0 to 0.047 in | 0 to 1.6 mm 0 to 0.063 in | 0 to 2.4 mm 0 to 0.094 in | 0 to 5.6 mm 0 to 0.220 in | 0 to 8 mm 0 to 0.315 in | 0 to 3.2 mm 0 to 0.126 in | 0 to 6.4 mm 0 to 0.252 in | 0 to 12 mm 0 to 0.472 in | 0 to 17.6 mm 0 to 0.693 in |
| Standard sensing object | | Iron sheet 6 × 6 × t 1 mm 0.236 × 0.236 × t 0.039 in | Iron sheet 8 × 8 × t 1 mm 0.315 × 0.315 × t 0.039 in | Iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in | Iron sheet 18 × 18 × t 1mm 0.709 × 0.709 × t 0.0 39 in | Iron sheet 30 × 30 × t 1 mm 1.181 × 1.181 × t 0.039 in | Iron sheet 20 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in | Iron sheet 30 × 30 × t 1 mm 1.181 ×1.181 × t 0.039 in | Iron sheet 50 × 50 × t 1 mm 1.969 × 1.969 × t 0.039 in | Iron sheet 70 × 70 × t 1 mm 2.756 × 2.756 × t 0.039 in |
| Hysteresis | | 20 % or less of operation distance (with standard sensing object) | | | | | | | | |
| Supply voltage | | 12 to 24 V DC $^{+10}_{-15}$ % Ripple P-P 10 % or less | | | | | | | | |
| Current consumption (Note 3) | | 0.8 mA or less | | | | | | | | |
| Output | | Non-contact DC 2-wire type<br>• Load current: 3 to 70 mA (Note 4)<br>• Residual voltage: 3 V or less (Note 5) | | | | | | | | |
| | Short-circuit protection | Incorporated | | | | | | | | |
| Max. response frequency | | 1.7 kHz | 1.2 kHz | 1.2 kHz | 500 Hz | 350 Hz | 1 kHz | 650 Hz | 350 Hz | 220 Hz |
| Operation indicator | | Normally closed type: Orange LED (lights up when the output is ON) | | | | | | | | |
| 2-color indicator | | Normally open type: Lights up in green under stable sensing condition, lights up in orange under unstable sensing condition | | | | | | | | |
| Environmental resistance | Protection | IP67 (IEC), IP67g (JEM) | | | | | | | | |
| | Ambient temperature | –25 to +70 °C –13 to +158 °F, Storage: –30 to +80 °C –22 to +176 °F | | | | | | | | |
| | Ambient humidity | 45 to 85 % RH, Storage: 35 to 95 % RH | | | | | | | | |
| | Voltage withstandability | 1,000 V AC for one min. between all supply terminals connected together and enclosure | | | | | | | | |
| | Insulation resistance | 50 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure | | | | | | | | |
| | Vibration resistance | 10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each | | | | | | | | |
| | Shock resistance | 1,000 m/s² acceleration (100 G approx.) in X, Y and Z directions for three times each | | | | | | | | |
| Sensing range variation | Temperature characteristics | Over ambient temperature range –25 to +70 °C –13 to +158 °F: within ±10 % of sensing range at +20 °C +68 °F | | | | | | | | |
| | Voltage characteristics | Within ±2 % for ±10 % fluctuation of the supply voltage | | | | | | | | |
| Material | | Enclosure: Brass (Nickel plated) [Stainless steel (SUS303) for **GX-5SU(B)**, **GX-8MU(B)** and **GX-8MLU(B)**]<br>Sensing part: Nylon [Polyalylate for **GX-5SU(B)**], Indicator part: Nylon [excluding **GX-5SU(B)**] | | | | | | | | |
| Cable | | 0.3 mm² [0.15 mm² for **GX-5SU(B)**, **GX-8MU(B)** and **GX-8MLU(B)**] 2-core oil, heat and cold resistant cabtyre cable, 2 m 6.562 ft long | | | | | | | | |
| Cable extension | | Extension up to total 50 m 164.042 ft is possible with 0.3 mm², or more, cable. | | | | | | | | |
| Weight (Note 6) | | Net weight: 20 g approx. | Net weight: 30 g approx. | Net weight: 55 g approx. | Net weight: 95 g approx. | Net weight: 220 g approx. | Net weight: 30 g approx. | Net weight: 55 g approx. | Net weight: 95 g approx. | Net weight: 220 g approx. |
| Accessories | | ——— | Nut: 2 pcs., Toothed lock washer: 1 pc. | | | | | | | |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.
3) It is the leakage current when the output is in the OFF state.
4) The maximum load current varies depending on the ambient temperature. Refer to "**I/O CIRCUIT AND WIRING DIAGRAMS**" for more details.
5) When the cable is extended, the residual voltage becomes larger.
6) The weight of the threaded type includes the weight of two nuts and one toothed lock washer.

## SPECIFICATIONS

### Spatter-resistant of DC 2-wire type (Pigtailed type)

| Item \ Type | | Shielded type / Threaded type | | |
|---|---|---|---|---|
| Model No. | | GX-F12MU-J | GX-F18MU-J | GX-F30MU-J |
| Max. operation distance (Note 2) | | 3 mm 0.118 in ±10 % | 7 mm 0.276 in ±10 % | 10 mm 0.394 in ±10 % |
| Stable sensing range (Note 2) | | 0 to 2.4 mm 0 to 0.094 in | 0 to 5.6 mm 0 to 0.220 in | 0 to 8 mm 0 to 0.315 in |
| Standard sensing object | | Iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in | Iron sheet 18 × 18 × t 1 mm 0.709 × 0.709 × t 0.039 in | Iron sheet 30 × 30 × t 1 mm 1.181 ×1.181 × t 0.039 in |
| Hysteresis | | 20 % or less of operation distance (with standard sensing object) | | |
| Supply voltage | | 12 to 24 V DC $^{+10}_{-15}$ % Ripple P-P 10 % or less | | |
| Current consumption (Note 3) | | 0.8 mA or less | | |
| Output | | Non-contact DC 2-wire type<br>• Load current: 3 to 70 mA (Note 4)<br>• Residual voltage: 3 V or less (Note 5) | | |
| | Output operation | Normally open | | |
| | Short-circuit protection | Incorporated | | |
| Max. response frequency | | 1.2 kHz | 500 Hz | 350 Hz |
| 2-color indicator | | Lights up in green under stable sensing condition, lights up in orange under unstable sensing condition | | |
| Environmental resistance | Protection | IP67 (IEC), IP67g (JEM) | | |
| | Ambient temperature | –25 to +70 °C –13 to +158 °F, Storage: –30 to +80 °C –22 to +176 °F | | |
| | Ambient humidity | 45 to 85 % RH, Storage: 35 to 95 % RH | | |
| | Voltage withstandability | 1,000 V AC for one min. between all supply terminals connected together and enclosure | | |
| | Insulation resistance | 50 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure | | |
| | Vibration resistance | 10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each | | |
| | Shock resistance | 1,000 m/s² acceleration (100 G approx.) in X, Y and Z directions for three times each | | |
| Sensing range variation | Temperature characteristics | Over ambient temperature range –25 to +70 °C –13 to +158 °F: within ±10 % of sensing range at +20 °C +68 °F | | |
| | Voltage characteristics | Within ±2 % for ±10 % fluctuation of the supply voltage | | |
| Material | | Enclosure: Brass (Fluorine resin coated), Sensing part: Polyalylate (Fluorine resin coated), Indicator part: Polyalylate | | |
| Cable | | 0.3 mm² 2-core spatter-resistant cable, 0.3 m 0.984 ft long with round type connector | | |
| Cable extension | | Extension up to total 50 m 164.042 ft is possible with 0.3 mm², or more, cable. | | |
| Weight (Note 6) | | Net weight: 35 g approx. | Net weight: 75 g approx. | Net weight: 200 g approx. |
| Accessories | | Nut: 2 pcs. (Fluorine resin coated), Toothed lock washer: 1 pc. (Fluorine resin coated) | | |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.
3) It is the leakage current when the output is in the OFF state.
4) The maximum load current varies depending on the ambient temperature. Refer to "**I/O CIRCUIT AND WIRING DIAGRAMS**" for more details.
5) When the cable is extended, the residual voltage becomes larger.
6) The given weight includes the weight of two nuts and one toothed lock washer.

# SPECIFICATIONS

## DC 3-wire type

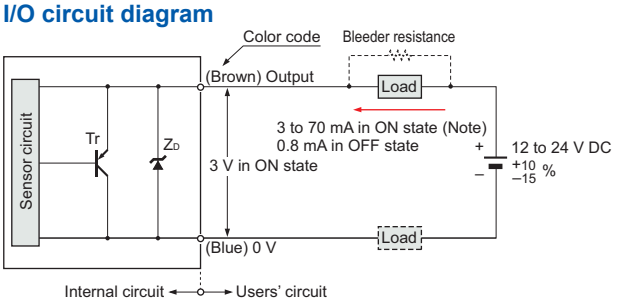
| Item \ Type | Shielded type | | | | | | Non-shielded type | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threaded type | | | | | | Threaded type | | | | | |
| Model No. | GX-N12M | GX-N12MB | GX-N18M | GX-N18MB | GX-N30M | GX-N30MB | GX-N12ML | GX-N12MLB | GX-N18ML | GX-N18MLB | GX-N30ML | GX-N30MLB |
| Max. operation distance (Note 2) | 3 mm 0.118 in ±10 % | | 7 mm 0.276 in ±10 % | | 10 mm 0.394 in ±10 % | | 8 mm 0.315 in ±10 % | | 15 mm 0.591 in ±10 % | | 22 mm 0.866 in ±10 % | |
| Stable sensing range (Note 2) | 0 to 2.4 mm 0 to 0.094 in | | 0 to 5.6 mm 0 to 0.220 in | | 0 to 8 mm 0 to 0.315 in | | 0 to 6.4 mm 0 to 0.252 in | | 0 to 12 mm 0 to 0.472 in | | 0 to 17.6 mm 0 to 0.693 in | |
| Standard sensing object | Iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in | | Iron sheet 18 × 18 × t 1 mm 0.709 × 0.709 × t 0.039 in | | Iron sheet 30 × 30 × t 1 mm 1.181 ×1.181 × t 0.039 in | | Iron sheet 30 × 30 × t 1 mm 1.181 ×1.181 × t 0.039 in | | Iron sheet 50 × 50 × t 1 mm 1.969 × 1.969 × t 0.039 in | | Iron sheet 70 × 70 × t 1 mm 2.756 × 2.756 × t 0.039 in | |
| Hysteresis | 20 % or less of operation distance (with standard sensing object) | | | | | | | | | | | |
| Supply voltage | 12 to 24 V DC $^{+10}_{-15}$ % Ripple P-P 10 % or less | | | | | | | | | | | |
| Current consumption | 10 mA or less | | | | | | | | | | | |
| Output | NPN open-collector transistor<br>• Maximum sink current: 100 mA<br>• Applied voltage: 30 V DC or less (between output and 0 V)<br>• Residual voltage: 1.5 V or less (at 100 mA sink current)<br>0.4 V or less (at 16 mA sink current) | | | | | | | | | | | |
| Output operation | Normally open | Normally closed | Normally open | Normally closed | Normally open | Normally closed | Normally open | Normally closed | Normally open | Normally closed | Normally open | Normally closed |
| Short-circuit protection | Incorporated | | | | | | | | | | | |
| Max. response frequency | 450 Hz | | 300 Hz | | 300 Hz | | 350 Hz | | 100 Hz | | 100 Hz | |
| Operation indicator | Orange LED (lights up when the output is ON) | | | | | | | | | | | |
| Environmental resistance: Protection | IP67 (IEC), IP67g (JEM) | | | | | | | | | | | |
| Environmental resistance: Ambient temperature | –25 to +70 °C –13 to +158 °F, Storage: –30 to +80 °C –22 to +176 °F | | | | | | | | | | | |
| Environmental resistance: Ambient humidity | 45 to 85 % RH, Storage: 35 to 95 % RH | | | | | | | | | | | |
| Environmental resistance: Voltage withstandability | 1,000 V AC for one min. between all supply terminals connected together and enclosure | | | | | | | | | | | |
| Environmental resistance: Insulation resistance | 50 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure | | | | | | | | | | | |
| Environmental resistance: Vibration resistance | 10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each | | | | | | | | | | | |
| Environmental resistance: Shock resistance | 1,000 m/s² acceleration (100 G approx.) in X, Y and Z directions for three times each | | | | | | | | | | | |
| Sensing range variation: Temperature characteristics | Over ambient temperature range –25 to +70 °C –13 to +158 °F: within ±10 % of sensing range at +20 °C +68 °F | | | | | | | | | | | |
| Sensing range variation: Voltage characteristics | Within ±2 % for ±10 % fluctuation of the supply voltage | | | | | | | | | | | |
| Material | Enclosure: Brass (Nickel plated), Sensing part: Nylon, Indicator part: Nylon | | | | | | | | | | | |
| Cable | 0.3 mm² 3-core oil, heat and cold resistant cabtyre cable, 2 m 6.562 ft long | | | | | | | | | | | |
| Cable extension | Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable. | | | | | | | | | | | |
| Weight (Note 3) | Net weight: 65 g approx. | | Net weight: 110 g approx. | | Net weight: 240 g approx. | | Net weight: 65 g approx. | | Net weight: 110 g approx. | | Net weight: 240 g approx. | |
| Accessories | Nut: 2 pcs., Toothed lock washer: 1 pc. | | | | | | | | | | | |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.
3) The given weight includes the weight of two nuts and one toothed lock washer.

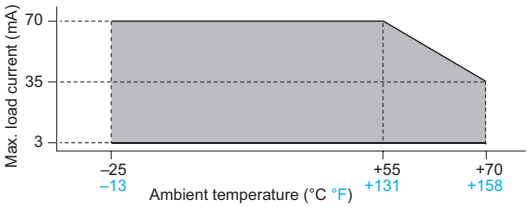
# I/O CIRCUIT AND WIRING DIAGRAMS

## GX-□U(B) — DC 2-wire type

### I/O circuit diagram

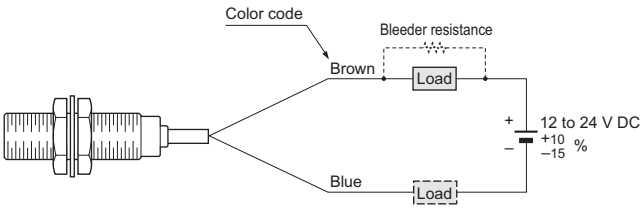



Note: The maximum load current varies depending on the ambient temperature.




Symbols ... ZD: Surge absorption zener diode
Tr : PNP output transistor

### Wiring diagram



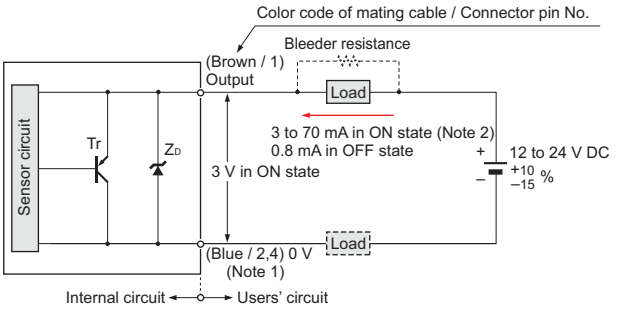

**Conditions for the load**

1) The load should not be actuated by the leakage current (0.8 mA) in the OFF state.
2) The load should be actuated by (supply voltage – 3 V) in the ON state.
3) The current in the ON state should be between 3 to 70 mA DC.

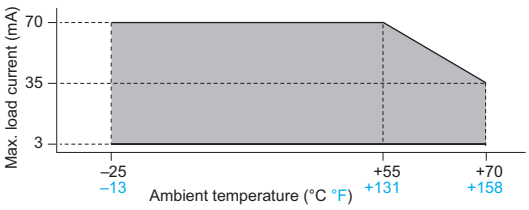
In case the current is less than 3 mA, connect a bleeder resistance in parallel to the load so that a current of 3 mA, or more, flows.

## GX-□U(B)-J GX-F□U-J — Spatter-resistant of DC 2-wire type

### I/O circuit diagram




Notes: 1) This is when the mating cable **CN-22G-C□** is connected. The connecter pins No.2 and No.4 are short-circuited inside the mating cable connecter. However, when the mating cable **CN-24-C□** is connected;
**GX-□U-J** (normally open): (Black / 4) 0 V
**GX-□UB-J** (normally closed): (White / 2) 0 V
2) The maximum load current varies depending on the ambient temperature.



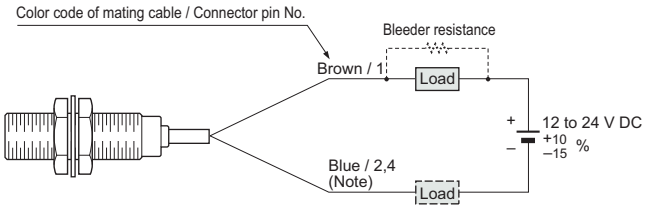

**Conditions for the load**

1) The load should not be actuated by the leakage current (0.8 mA) in the OFF state.
2) The load should be actuated by (supply voltage – 3 V) in the ON state.
3) The current in the ON state should be between 3 to 70 mA DC.

In case the current is less than 3 mA, connect a bleeder resistance in parallel to the load so that a current of 3 mA, or more, flows.

Symbols ... ZD: Surge absorption zener diode
Tr : PNP output transistor

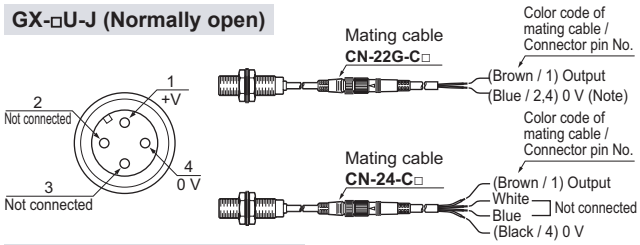
### Wiring diagram



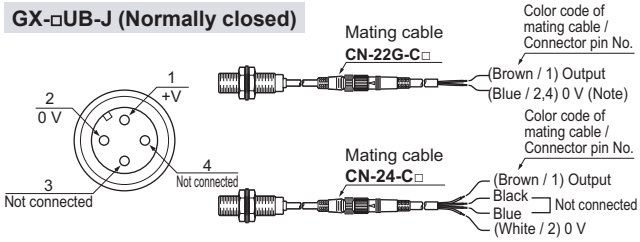

Note: This is when the mating cable **CN-22G-C□** is connected. The connecter pins No.2 and No.4 are short-circuited inside the mating cable connecter. However, when the mating cable **CN-24-C□** is connected;
**GX-□U-J** (normally open): Black / 4
**GX-□UB-J** (normally closed): White / 2

### Connector pin position

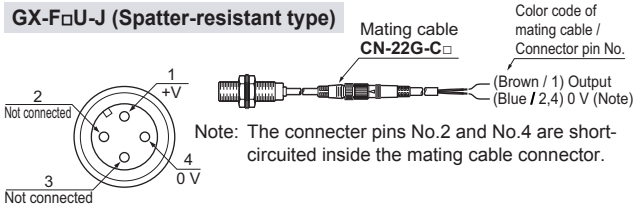
**GX-□U-J (Normally open)**




**GX-□UB-J (Normally closed)**




**GX-F□U-J (Spatter-resistant type)**



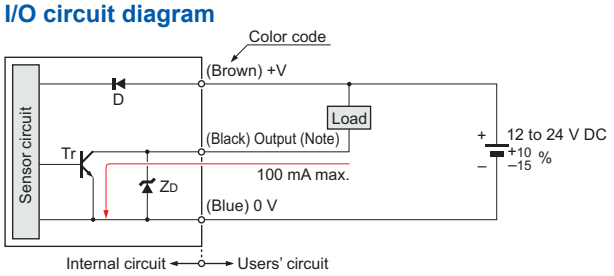

Note: The connecter pins No.2 and No.4 are short-circuited inside the mating cable connector.

# I/O CIRCUIT AND WIRING DIAGRAMS

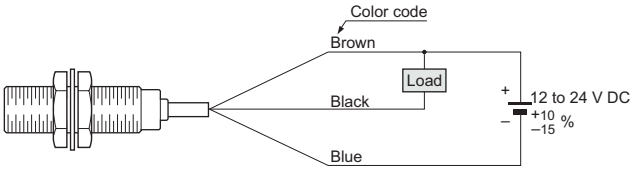
## GX-N□

DC 3-wire type (NPN output)

### I/O circuit diagram




### Wiring diagram



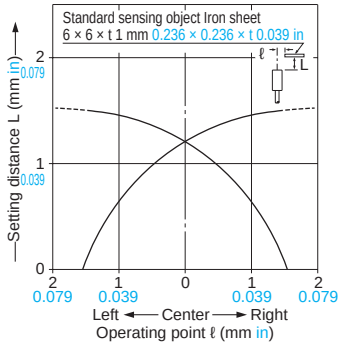

Note: If a capacitive load is directly connected to the output, malfunction may occur.

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

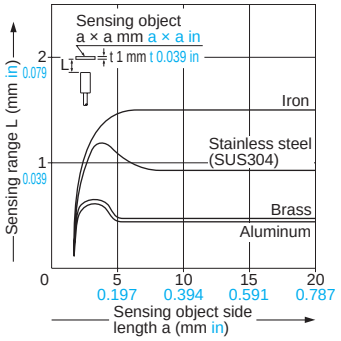
# SENSING CHARACTERISTICS (TYPICAL)

## GX-5SU GX-5SUB

### Sensing field



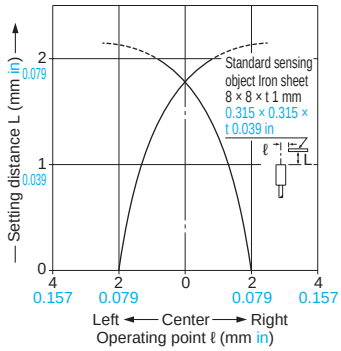

### Correlation between sensing object size and sensing range



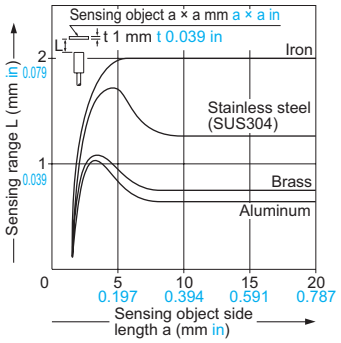

As the sensing object size becomes smaller than the standard size (iron sheet 6 × 6 × t 1 mm 0.236 × 0.236 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-8MU GX-8MUB

### Sensing field



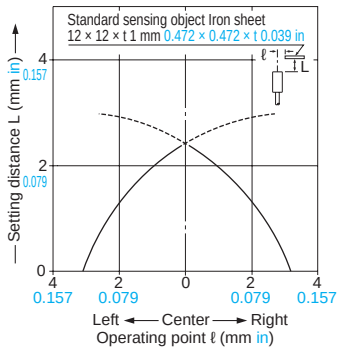

### Correlation between sensing object size and sensing range



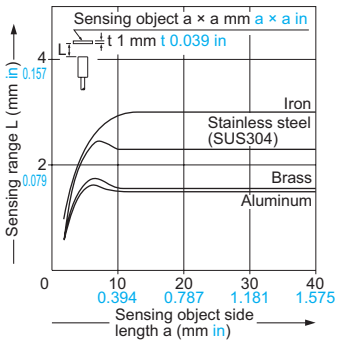

As the sensing object size becomes smaller than the standard size (iron sheet 8 × 8 × t 1 mm 0.315 × 0.315 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-12MU(B) GX-F12MU-J

### Sensing field




### Correlation between sensing object size and sensing range

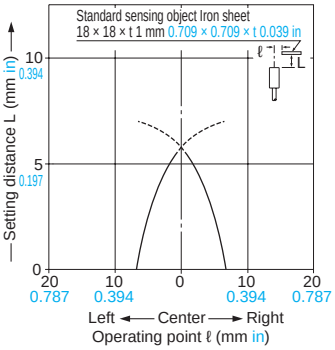



As the sensing object size becomes smaller than the standard size (iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in), the sensing range shortens as shown in the left figure.

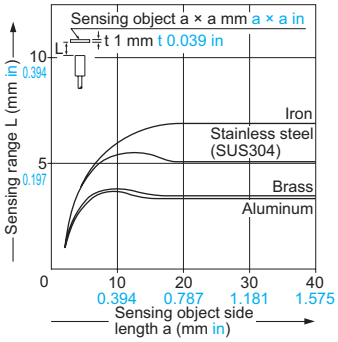
# SENSING CHARACTERISTICS (TYPICAL)

## GX-18MU(B) GX-F18MU-J

### Sensing field



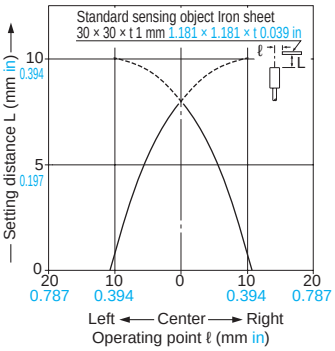

### Correlation between sensing object size and sensing range



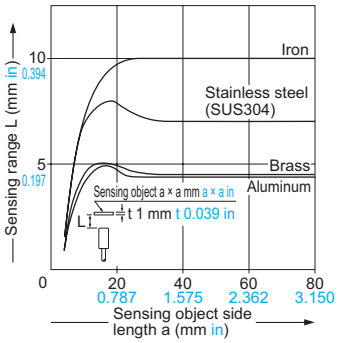

As the sensing object size becomes smaller than the standard size (iron sheet 18 × 18 × t 1 mm 0.709 × 0.709 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-30MU(B) GX-F30MU-J

### Sensing field



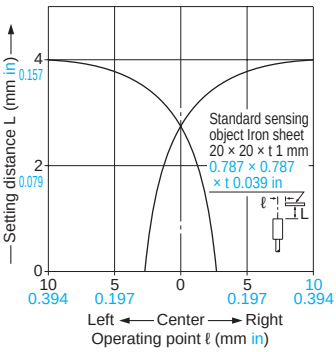

### Correlation between sensing object size and sensing range



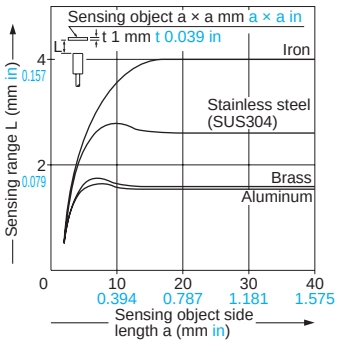

As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1 mm 1.181 × 1.181 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-8MLU GX-8MLUB

### Sensing field



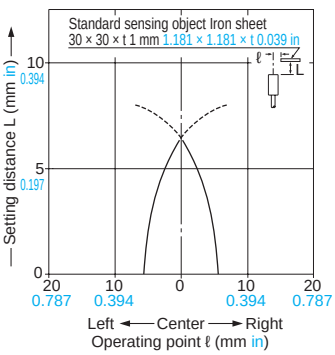

### Correlation between sensing object size and sensing range



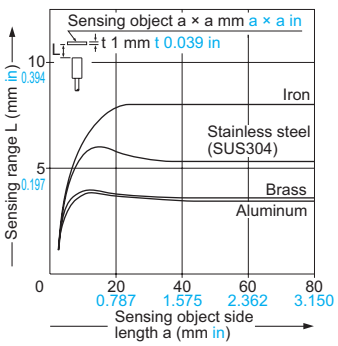

As the sensing object size becomes smaller than the standard size (iron sheet 20 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-12MLU GX-12MLUB

### Sensing field




### Correlation between sensing object size and sensing range

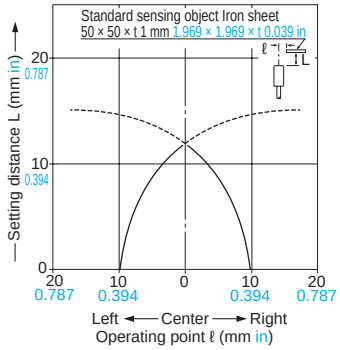



As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1 mm 1.181 × 1.181 × t 0.039 in), the sensing range shortens as shown in the left figure.

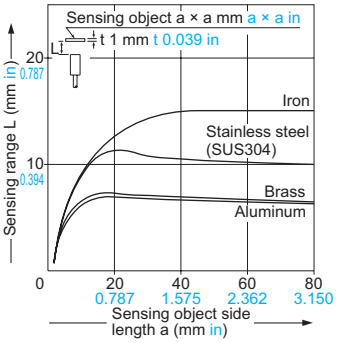
# SENSING CHARACTERISTICS (TYPICAL)

## GX-18MLU GX-18MLUB

### Sensing field



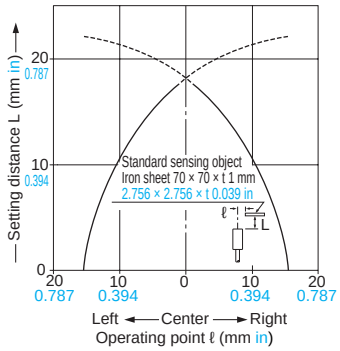

### Correlation between sensing object size and sensing range



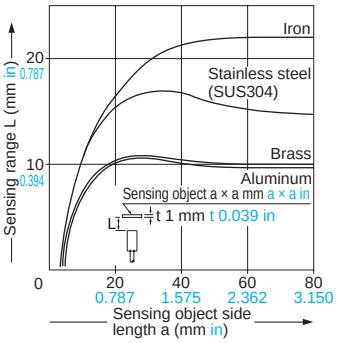

As the sensing object size becomes smaller than the standard size (iron sheet 50 × 50 × t 1 mm 1.969 × 1.969 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-30MLU GX-30MLUB

### Sensing field



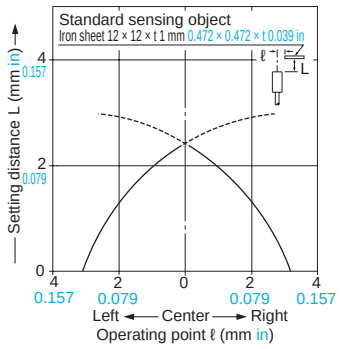

### Correlation between sensing object size and sensing range



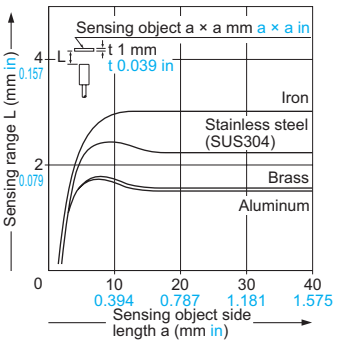

As the sensing object size becomes smaller than the standard size (iron sheet 70 × 70 × t 1 mm 2.756 × 2.756 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-N12M GX-N12MB

### Sensing field



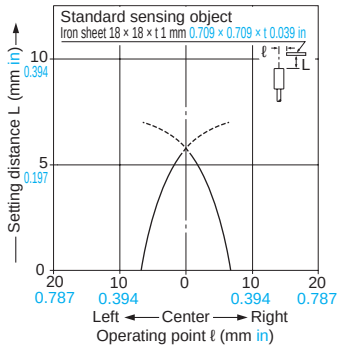

### Correlation between sensing object size and sensing range



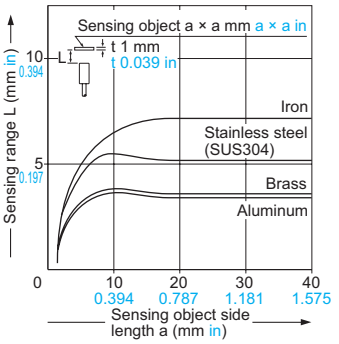

As the sensing object size becomes smaller than the standard size (iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-N18M GX-N18MB

### Sensing field




### Correlation between sensing object size and sensing range

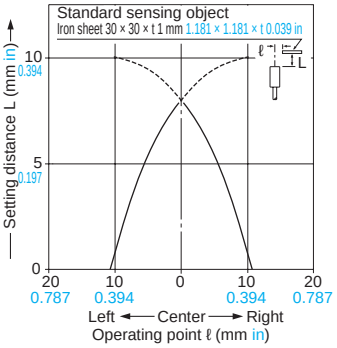



As the sensing object size becomes smaller than the standard size (iron sheet 18 × 18 × t 1 mm 0.709 × 0.709 × t 0.039 in), the sensing range shortens as shown in the left figure.

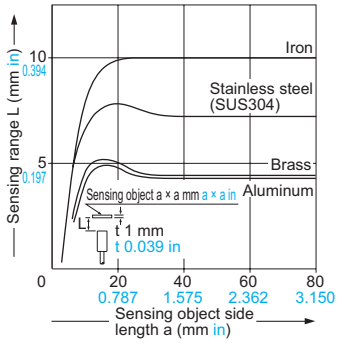
# SENSING CHARACTERISTICS (TYPICAL)

## GX-N30M GX-N30MB

### Sensing field



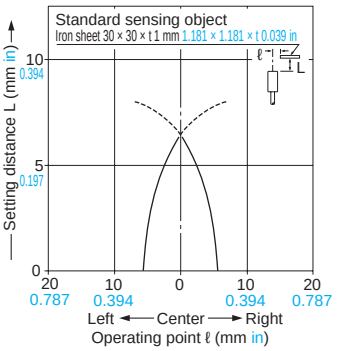

### Correlation between sensing object size and sensing range



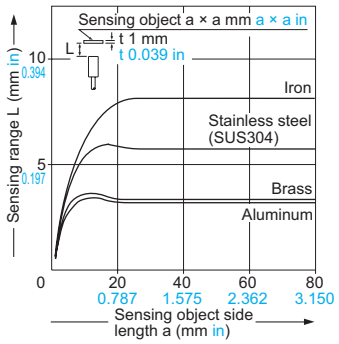

As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1 mm 1.181 × 1.181 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-N12ML GX-N12MLB

### Sensing field



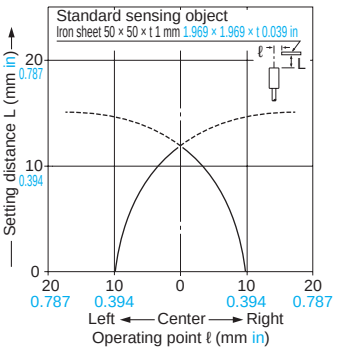

### Correlation between sensing object size and sensing range



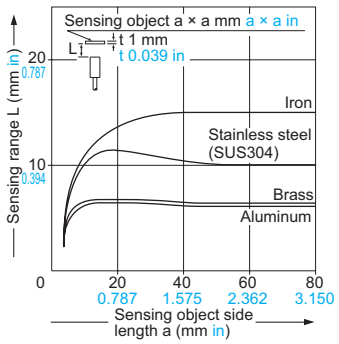

As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1mm 1.181 × 1.181 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-N18ML GX-N18MLB

### Sensing field



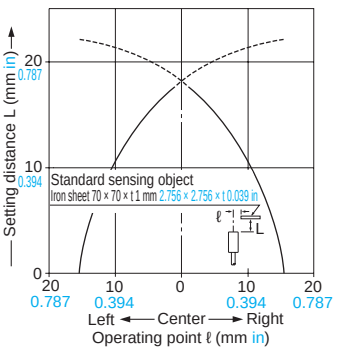

### Correlation between sensing object size and sensing range



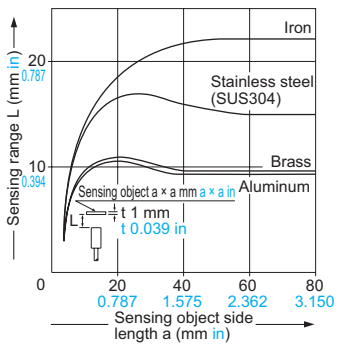

As the sensing object size becomes smaller than the standard size (iron sheet 50 × 50 × t 1 mm 1.969 × 1.969 × t 0.039 in), the sensing range shortens as shown in the left figure.

## GX-N30ML GX-N30MLB

### Sensing field




### Correlation between sensing object size and sensing range




As the sensing object size becomes smaller than the standard size (iron sheet 70 × 70 × t 1 mm 2.756 × 2.756 × t 0.039 in), the sensing range shortens as shown in the left figure.

# PRECAUTIONS FOR PROPER USE

Refer to General precautions.

## All models

- 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.

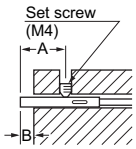
## Mounting

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

### Mounting with a set screw

- Tighten with the cup-point of a set screw (M4).

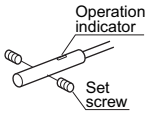
**<Non-threaded type>**

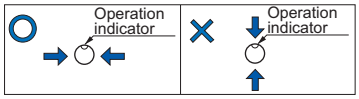



**Mounting hole process dimension**


| Model No. | A (mm in) | B (mm in) | C (mm in) | Tightening torque |
|---|---|---|---|---|
| GX-5SU(B) | 5 to 30 0.197 to 1.181 | 3 0.118 | ø5.5 $^{+0.2}_{0}$ ø0.217 $^{+0.008}_{0}$ | 0.78 N·m |

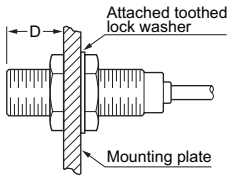
- Do not fix on the operation indicator or opposite to it.



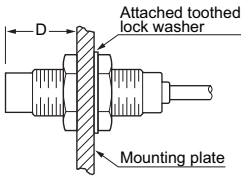




### Mounting with nut

**<Shielded of threaded type>**



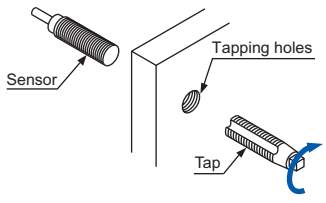

**<Non-shielded of threaded type>**




| Model No. | Dimension D (mm in) | Tightening torque |
|---|---|---|
| GX-8MU(B) | 3 to 10.3 0.118 to 0.406 | 5.9 N·m |
| | 10.3 0.406 or more | 11.8 N·m |
| GX-12MU(B) GX-F12MU-J GX-N12M(B) | 3.5 to 13.5 0.138 to 0.531 | 10 N·m |
| | 13.5 0.531 or more | 20 N·m |
| GX-18MU(B) GX-F18MU-J GX-N18M(B) | 4 to 18 0.157 to 0.709 | 45 N·m |
| | 18 0.709 or more | 80 N·m |
| GX-30MU(B) GX-F30MU-J GX-N30M(B) | 5 to 21 0.197 to 0.827 | 80 N·m |
| | 21 0.827 or more | 180 N·m |
| GX-8MLU(B) | 12 0.472 or more | 11.8 N·m |
| GX-12MLU(B) GX-N12ML(B) | 15 0.591 or more | 20 N·m |
| GX-18MLU(B) GX-N18ML(B) | 25 0.984 or more | 80 N·m |
| GX-30MLU(B) GX-N30ML(B) | 30 1.181 or more | 180 N·m |

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

- The root truncation of the threads is shallow owing to strengthening of the sensors against tightening. When tapping holes on equipment to fix the sensors, the prepared holes must be value in the table below.



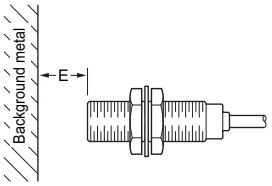

| Model No. | Prepared hole |
|---|---|
| GX-8MU(B) GX-8MLU(B) | ø7.2 mm ø0.283 in |
| GX-12MU(B) GX-12MLU(B) GX-F12MU-J GX-N12M(B) GX-N12ML(B) | ø11.2 mm ø0.441 in |

## Distance from surrounding metal

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

### Influence of surrounding metal

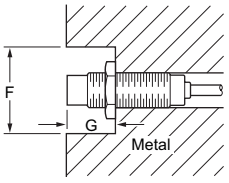
- The surrounding metal will affect the sensing performance. Keep the minimum distance specified in the table below.




| Model No. | E (mm in) |
|---|---|
| GX-5SU(B) | 4.5 0.177 |
| GX-8MU(B) | 4.5 0.177 |
| GX-12MU(B) GX-F12MU-J GX-N12M(B) | 8 0.315 |
| GX-18MU(B) GX-F18MU-J GX-N18M(B) | 20 0.787 |
| GX-30MU(B) GX-F30MU-J GX-N30M(B) | 40 1.575 |
| GX-8MLU(B) | 8 0.315 |
| GX-12MLU(B) GX-N12ML(B) | 22 0.866 |
| GX-18MLU(B) GX-N18ML(B) | 45 1.772 |
| GX-30MLU(B) GX-N30ML(B) | 75 2.953 |

### Embedding of the sensor in metal

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



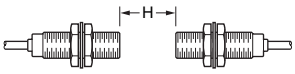

Note: With the non-shielded type, the sensing range may vary depending on the position of the nuts.

| Model No. | F (mm in) | G (mm in) |
|---|---|---|
| GX-5SU(B) | ø12 ø0.472 | 3 0.118 |
| GX-8MLU(B) | ø24 ø0.945 | 12 0.472 |
| GX-12MLU(B) GX-N12ML(B) | ø50 ø1.969 | 15 0.591 |
| GX-18MLU(B) GX-N18ML(B) | ø75 ø2.953 | 25 0.984 |
| GX-30MLU(B) GX-N30ML(B) | ø105 ø4.134 | 30 1.181 |

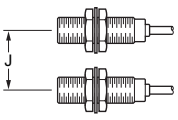
## Mutual interference

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

### Face to face mounting




### Parallel mounting




| Model No. | H (mm in) | J (mm in) |
|---|---|---|
| GX-5SU(B) | 19 0.748 | 14 0.551 |
| GX-8MU(B) | 20 0.787 | 15 0.591 |
| GX-12MU(B) GX-F12MU-J | 35 1.378 | 20 0.787 |
| GX-18MU(B) GX-F18MU-J | 70 2.756 | 45 1.772 |
| GX-30MU(B) GX-F30MU-J | 115 4.528 | 70 2.756 |
| GX-8MLU(B) | 60 2.362 | 45 1.772 |
| GX-12MLU(B) | 145 5.709 | 95 3.740 |
| GX-18MLU(B) | 250 9.843 | 165 6.496 |
| GX-30MLU(B) | 350 13.780 | 250 9.843 |
| GX-N12M(B) | 25 0.984 | 15 0.591 |
| GX-N18M(B) | 50 1.969 | 35 1.378 |
| GX-N30M(B) | 90 3.543 | 55 2.165 |
| GX-N12ML(B) | 120 4.724 | 70 2.756 |
| GX-N18ML(B) | 180 7.087 | 125 4.921 |
| GX-N30ML(B) | 290 1.417 | 190 7.480 |

# PRECAUTIONS FOR PROPER USE

Refer to General precautions.

## All models

### 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**

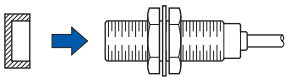
| Model No. \ Metal | Iron | Stainless steel (SUS304) | Brass | Aluminum |
|---|---|---|---|---|
| GX-5SU(B) | 1 | 0.63 approx. | 0.32 approx. | 0.30 approx. |
| GX-8MU(B) | 1 | 0.59 approx. | 0.32 approx. | 0.29 approx. |
| GX-12MU(B)<br>GX-F12MU-J | 1 | 0.75 approx. | 0.51 approx. | 0.49 approx. |
| GX-18MU(B)<br>GX-F18MU-J | 1 | 0.75 approx. | 0.50 approx. | 0.48 approx. |
| GX-30MU(B)<br>GX-F30MU-J | 1 | 0.69 approx. | 0.44 approx. | 0.42 approx. |
| GX-8MLU(B) | 1 | 0.64 approx. | 0.38 approx. | 0.38 approx. |
| GX-12MLU(B) | 1 | 0.67 approx. | 0.44 approx. | 0.43 approx. |
| GX-18MLU(B) | 1 | 0.68 approx. | 0.45 approx. | 0.43 approx. |
| GX-30MLU(B) | 1 | 0.67 approx. | 0.44 approx. | 0.43 approx. |
| GX-N12M(B) | 1 | 0.77 approx. | 0.52 approx. | 0.51 approx. |
| GX-N18M(B) | 1 | 0.73 approx. | 0.50 approx. | 0.48 approx. |
| GX-N30M(B) | 1 | 0.70 approx. | 0.45 approx. | 0.44 approx. |
| GX-N12ML(B) | 1 | 0.66 approx. | 0.44 approx. | 0.43 approx. |
| GX-N18ML(B) | 1 | 0.68 approx. | 0.46 approx. | 0.44 approx. |
| GX-N30ML(B) | 1 | 0.65 approx. | 0.44 approx. | 0.43 approx. |

### Protection cover (Optional)

- It protects the sensing surface from welding sparks (spatter), etc.

**Mounting method**

Protection cover Sensor



Material: Fluorine resin

| Model No. | Applicable model No. |
|---|---|
| MS-H12 | GX-12MU(B)<br>GX-N12M(B) |
| MS-H18 | GX-18MU(B)<br>GX-N18M(B) |
| MS-H30 | GX-30MU(B)<br>GX-N30M(B) |

Note: Mount the protection cover so that there is no gap between it and the sensing surface.

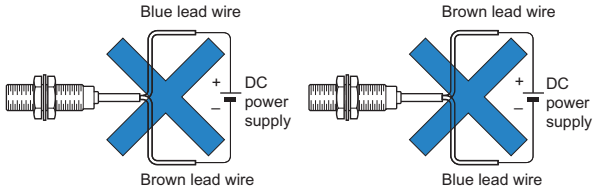
### Others

- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- Make sure that stress by forcible bend or pulling is not applied directly to the sensor cable joint.

## DC 2-wire type

### Wiring

- The sensor must be connected to a power supply via a load. If the sensor is connected to a power supply without a load, the short-circuit protection makes the sensor inoperable. (The output stays in the OFF state and the indicator does not light up.) In this case, rectify by connecting the power supply via a load. Now, the sensor becomes operable. Further, take care that if the power supply is connected with reverse polarity without a load, the sensor will get damaged.




- For series connection (AND circuit) or parallel connection (OR circuit) of sensors, take care of the following.

**Series connection (AND circuit)**

When all sensors are in the ON state, the load voltage $V_{RL}$ is given by:

$V_{RL} = V_{CC} - n \times 3$ (V)

(Vcc: supply voltage (24 V DC max.), n: number of sensors)

Make sure that the load can work properly at this voltage.

Note: The output is generated normally even if the indicator does not light up properly.

**Parallel connection (OR circuit)**

When all sensors are in the OFF state, the load leakage current Icc is given by:

$I_{CC} = n \times 0.8$ (mA) (n: number of sensors)

Make sure that the load can work properly.

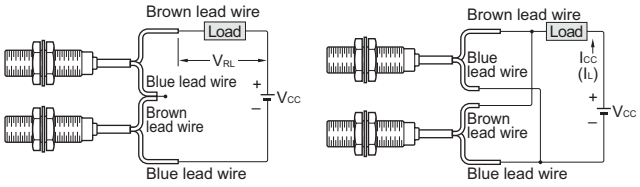
Note: The load current in the ON state is given by:

$$I_L = \frac{V_{CC} - 3V}{\text{Load resistance}} \text{ (mA)}$$

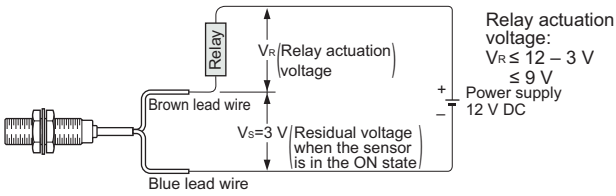
The load current must be

$3 \text{ mA} \times n \le I_L \le 70 \text{ mA}$

(n: number of sensors turned ON)

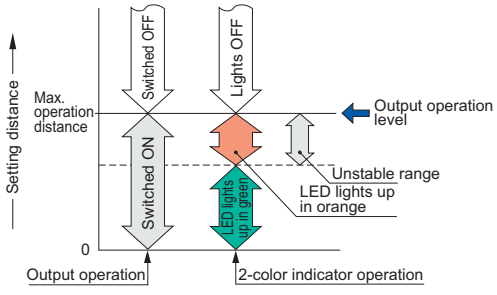



- The residual voltage of the sensor is 3 V. Before connecting a relay as the load, take care of its actuation voltage. (Some 12 V relays may not be usable.)




### 2-color indicator [GX-(F)□U(-J) only]

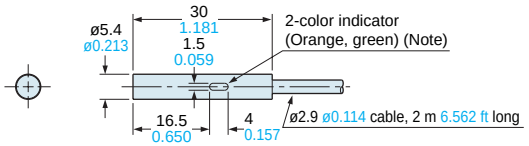
- When the sensing object is in the stable sensing range, the LED lights up in green, and when the sensing object is in the unstable sensing range, the LED lights up in orange. While the LED lights up in green, the sensing is performed stably without being affected by temperature drifts or voltage fluctuations.



# DIMENSIONS (Unit: mm in)

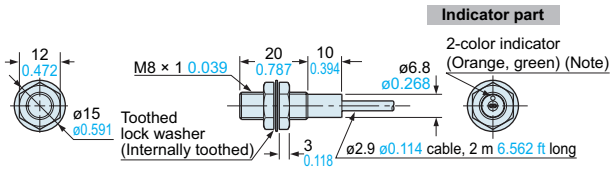
The CAD data in the dimensions can be downloaded from our website.

## GX-5SU GX-5SUB — Sensor



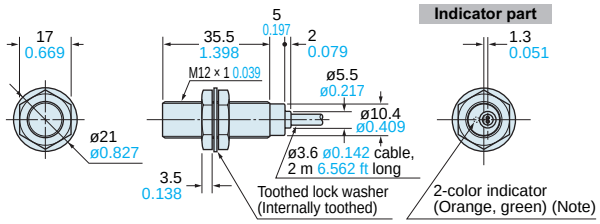

Note: **GX-5SUB** has an operation indicator (orange) instead of the 2-color indicator.

## GX-8MU GX-8MUB — Sensor



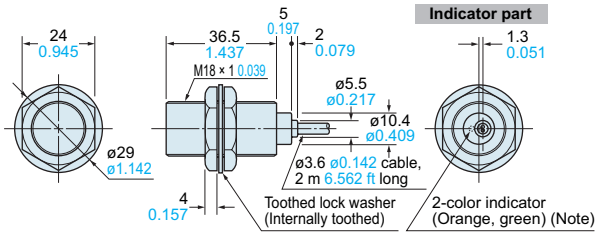

Note: **GX-8MUB** has an operation indicator (orange) instead of the 2-color indicator.

## GX-12MU(B) GX-N12M(B) — Sensor



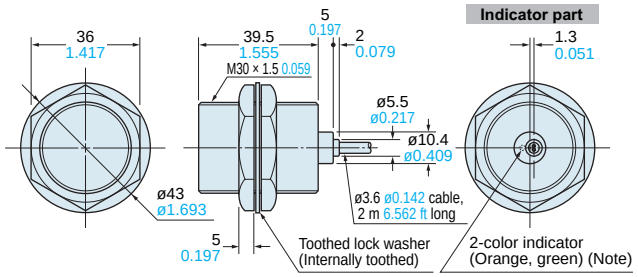

Note: **GX-12MUB** and **GX-N12M(B)** have an operation indicator (orange) instead of the 2-color indicator.

## GX-18MU(B) GX-N18M(B) — Sensor



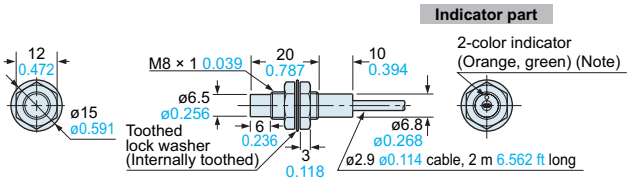

Note: **GX-18MUB** and **GX-N18M(B)** have an operation indicator (orange) instead of the 2-color indicator.

## GX-30MU(B) GX-N30M(B) — Sensor



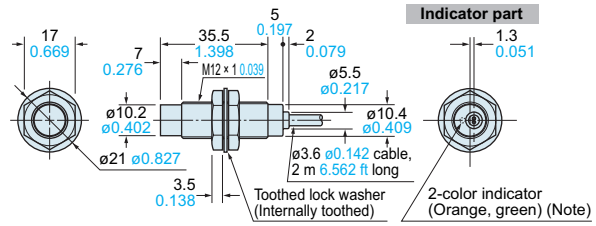

Note: **GX-30MUB** and **GX-N30M(B)** have an operation indicator (orange) instead of the 2-color indicator.

## GX-8MLU GX-8MLUB — Sensor



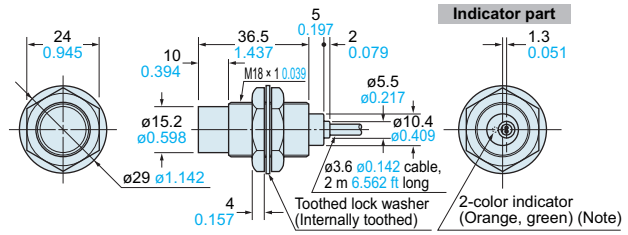

Note: **GX-8MLUB** has an operation indicator (orange) instead of the 2-color indicator.

## GX-12MLU(B) GX-N12ML(B) — Sensor



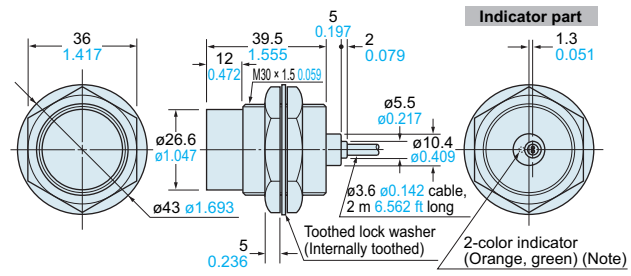

Note: **GX-12MLUB** and **GX-N12ML(B)** have an operation indicator (orange) instead of the 2-color indicator.

## GX-18MLU(B) GX-N18ML(B) — Sensor



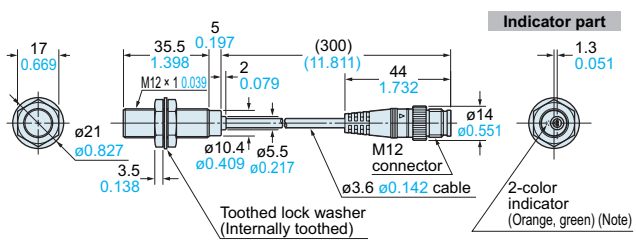

Note: **GX-18MLUB** and **GX-N18ML(B)** have an operation indicator (orange) instead of the 2-color indicator.

## GX-30MLU(B) GX-N30ML(B) — Sensor




Note: **GX-30MLUB** and **GX-N30ML(B)** have an operation indicator (orange) instead of the 2-color indicator.

## GX-12MU(B)-J GX-F12MU-J — Sensor




Note: **GX-12MUB-J** has an operation indicator (orange) instead of the 2-color indicator.