

# GX-N SERIES

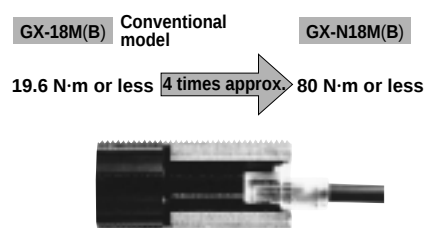
DC 3-wire Cylindrical Inductive Proximity Sensor **Amplifier Built-in**



**High performance and environmental resistance at low price**

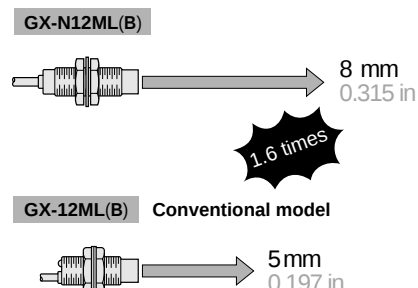
## Robust in tightening

The tightening torque has been improved to approx. four times greater than that of conventional models because of its thick case. As the sensor can be securely tightened, it does not get loose due to vibration or shock.



## Long sensing range

The **GX-N** series features 1.6 times longer sensing range than conventional models. Setting with enough margin is possible.

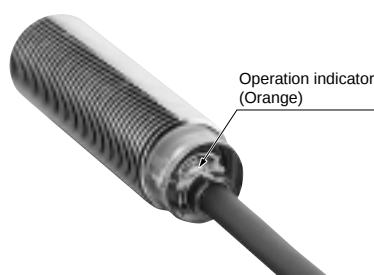


## Cost effective

It combines high reliability with cost effectiveness.

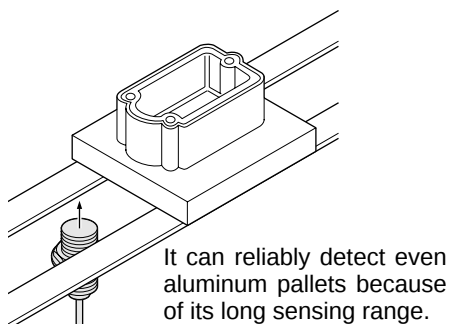
## Visible operation indicator

The operation indicator (orange) is easily observable from any direction since it is housed in the transparent tail section, which lights up brightly.

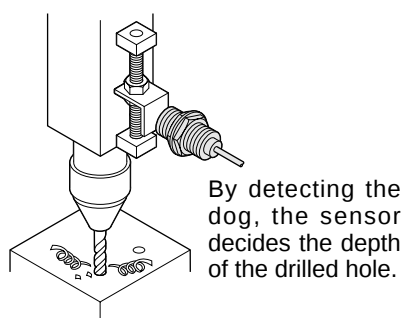


## APPLICATIONS

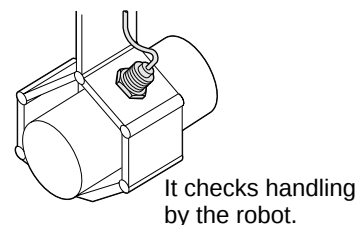
## Detecting traveling aluminum pallets



## Controlling depth of drilling



## Detecting workpiece in robot hand



## ORDER GUIDE

| Type              | Appearance (mm in) | Sensing range (Note)                                                                               | Model No. | Output                              | Output operation |
|-------------------|--------------------|----------------------------------------------------------------------------------------------------|-----------|-------------------------------------|------------------|
| Shielded type     |                    | Maximum operation distance<br>3 mm 0.118 in<br>(0 to 2.4 mm 0 to 0.094 in)<br>Stable sensing range | GX-N12M   | NPN<br>open-collector<br>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 |                    | 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.

# GX-N

## 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.

• Table of Model Nos.

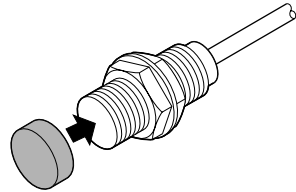
| Type              | Standard  | 5 m 16.404 ft cable length type |
|-------------------|-----------|---------------------------------|
| Shielded type     | GX-N12M   | GX-N12M-C5                      |
|                   | GX-N12MB  | GX-N12MB-C5                     |
|                   | GX-N18M   | GX-N18M-C5                      |
|                   | GX-N18MB  | GX-N18MB-C5                     |
|                   | GX-N30M   | GX-N30M-C5                      |
|                   | GX-N30MB  | GX-N30MB-C5                     |
| Non-shielded type | GX-N12ML  | GX-N12ML-C5                     |
|                   | GX-N12MLB | GX-N12MLB-C5                    |
|                   | GX-N18ML  | GX-N18ML-C5                     |
|                   | GX-N18MLB | GX-N18MLB-C5                    |
|                   | GX-N30ML  | GX-N30ML-C5                     |
|                   | GX-N30MLB | GX-N30MLB-C5                    |

## OPTIONS

| Designation      | Model No. | Description    |                                                                     |
|------------------|-----------|----------------|---------------------------------------------------------------------|
| Protection cover | MS-H12    | For GX-N12M(B) | It protects the sensing surface from welding sparks (spatter), etc. |
|                  | MS-H18    | For GX-N18M(B) |                                                                     |
|                  | MS-H30    | For GX-N30M(B) |                                                                     |

### Protection cover

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



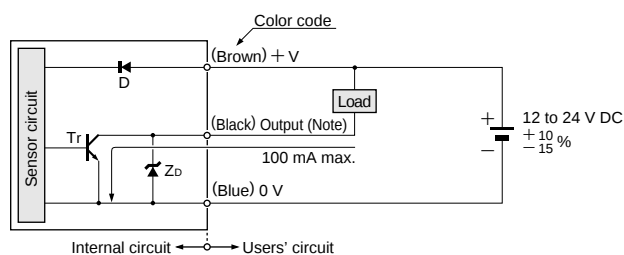
## SPECIFICATIONS

| Item                             | Type                        | Shielded type                                                                                                                                                                                                                         |                 |                                                           |                 |                                                           |                 | Non-shielded 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 1) |                             | 3 mm 0.118 in $\pm 10\%$                                                                                                                                                                                                              |                 | 7 mm 0.276 in $\pm 10\%$                                  |                 | 10 mm 0.394 in $\pm 10\%$                                 |                 | 8 mm 0.315 in $\pm 10\%$                                  |                 | 15 mm 0.591 in $\pm 10\%$                                 |                 | 22 mm 0.866 in $\pm 10\%$                                 |                 |
| Stable sensing range (Note 1)    |                             | 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<br>0.472 × 0.472 × t 0.039 in                                                                                                                                                                             |                 | Iron sheet 18 × 18 × t 1 mm<br>0.709 × 0.709 × t 0.039 in |                 | Iron sheet 30 × 30 × t 1 mm<br>1.181 × 1.181 × t 0.039 in |                 | Iron sheet 30 × 30 × t 1 mm<br>1.181 × 1.181 × t 0.039 in |                 | Iron sheet 50 × 50 × t 1 mm<br>1.969 × 1.969 × t 0.039 in |                 | Iron sheet 70 × 70 × t 1 mm<br>2.756 × 2.756 × t 0.039 in |                 |
| Hysteresis                       |                             | 20 % or less of operation distance                                                                                                                                                                                                    |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
| Supply voltage                   |                             | 12 to 24 V DC $\pm 10\%$ 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)                                                                                                                                                                                                               |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
|                                  | 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                                                                                                                                                                                                 |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
|                                  | Noise immunity              | Power line: 240 Vp, 0.5 $\mu$ s pulse width (with noise simulator)                                                                                                                                                                    |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
|                                  | Voltage withstandability    | 1,000 V AC for one min. between all supply terminals connected together and enclosure                                                                                                                                                 |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
|                                  | Insulation resistance       | 50 M $\Omega$ , 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/s <sup>2</sup> 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 $\pm 10\%$ of sensing range at + 20 °C + 68 °F                                                                                                                |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
|                                  | Voltage characteristics     | Within $\pm 2\%$ for $\pm 10\%$ fluctuation of the supply voltage                                                                                                                                                                     |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
| Material                         |                             | Enclosure: Brass (Nickel plated), Sensing part: Nylon, Indicator part: Nylon                                                                                                                                                          |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
| Cable                            |                             | 0.3 mm <sup>2</sup> 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 mm <sup>2</sup> , or more, cable.                                                                                                                                         |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |
| Weight (Note 2)                  |                             | 65 g approx.                                                                                                                                                                                                                          |                 | 110 g approx.                                             |                 | 240 g approx.                                             |                 | 65 g approx.                                              |                 | 110 g approx.                                             |                 | 240 g approx.                                             |                 |
| Accessories                      |                             | Nut: 2 pcs., Toothed lock washer: 1 pc.                                                                                                                                                                                               |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |                                                           |                 |

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) The given weight includes the weight of two nuts and one toothed lock washer.

## I/O CIRCUIT AND WIRING DIAGRAMS

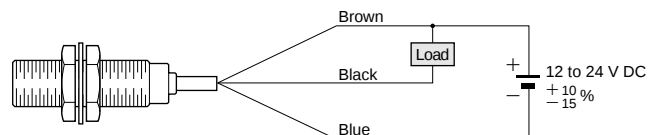
## I/O circuit diagram



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

## Wiring diagram

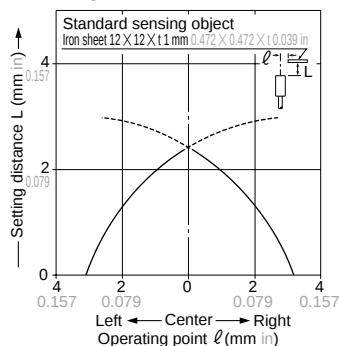


# GX-N

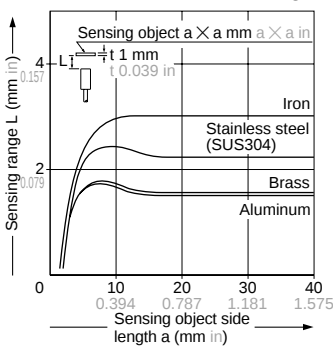
## SENSING CHARACTERISTICS (TYPICAL)

### GX-N12M GX-N12MB

#### Sensing field



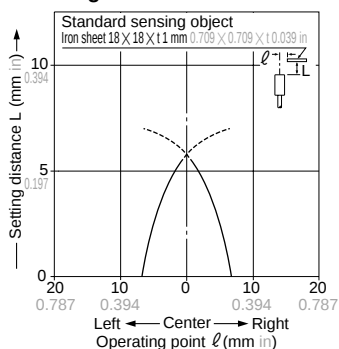
#### Correlation between sensing object size and sensing range



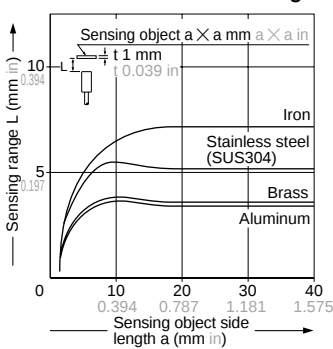
As the sensing object size becomes smaller than the standard size (iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in), the sensing range shortens as shown in the left figure.

### GX-N18M GX-N18MB

#### Sensing field



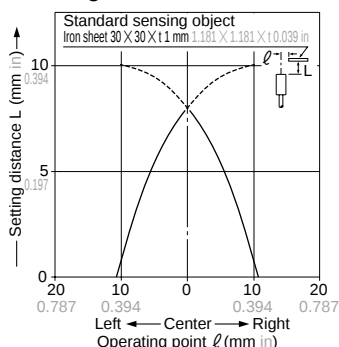
#### Correlation between sensing object size and sensing range



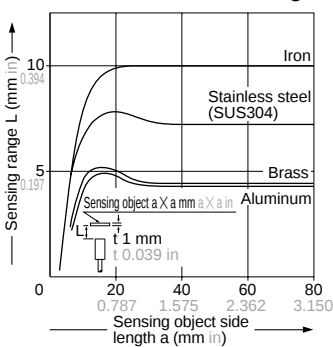
As the sensing object size becomes smaller than the standard size (iron sheet 18 × 18 × t 1 mm 0.709 × 0.709 × t 0.039 in), the sensing range shortens as shown in the left figure.

### GX-N30M GX-N30MB

#### Sensing field



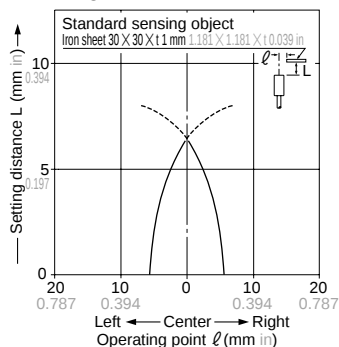
#### Correlation between sensing object size and sensing range



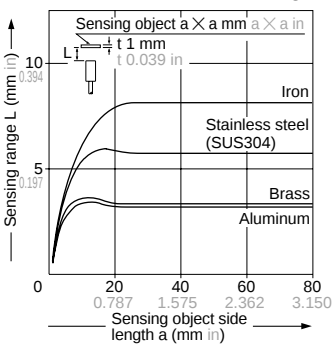
As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1 mm 1.181 × 1.181 × t 0.039 in), the sensing range shortens as shown in the left figure.

### GX-N12ML GX-N12MLB

#### Sensing field



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

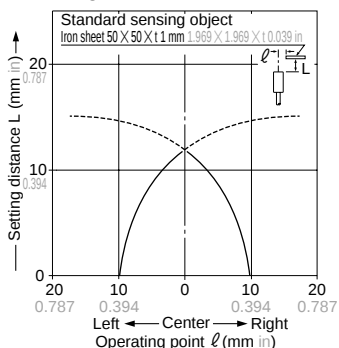


As the sensing object size becomes smaller than the standard size (iron sheet 30 × 30 × t 1 mm 1.181 × 1.181 × t 0.039 in), the sensing range shortens as shown in the left figure.

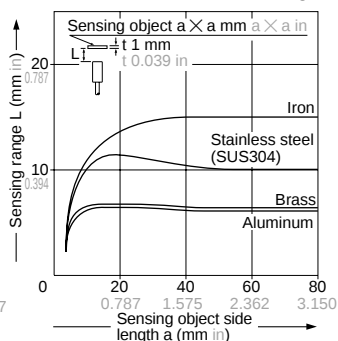
## SENSING CHARACTERISTICS (TYPICAL)

GX-N18ML  
GX-N18MLB

## Sensing field



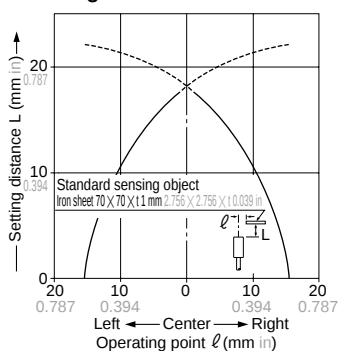
## Correlation between sensing object size and sensing range



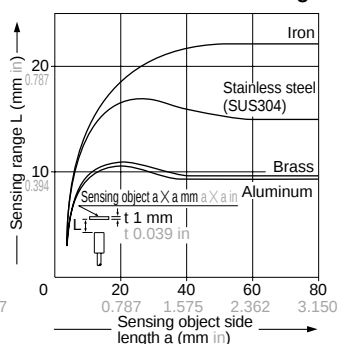
As the sensing object size becomes smaller than the standard size (iron sheet  $50 \times 50 \times t \text{ mm}$   $1.969 \times 1.969 \times t \text{ in}$ ), the sensing range shortens as shown in the left figure.

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  $70 \times 70 \times t \text{ mm}$   $2.756 \times 2.756 \times t \text{ in}$ ), the sensing range shortens as shown in the left figure.

# GX-N

## PRECAUTIONS FOR PROPER USE

Refer to [p.1152](#) for general precautions.

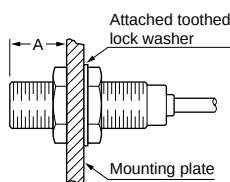


This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

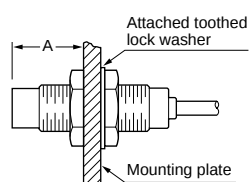
### Mounting

- The tightening torque should be as given below.

#### Shielded type



#### Non-shielded type



| Model No.   | Dimension A (mm in)        | Tightening torque |
|-------------|----------------------------|-------------------|
| 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-N18M(B)  | 4 to 18 0.157 to 0.709     | 45 N·m            |
|             | 18 0.709 or more           | 80 N·m            |
| GX-N30M(B)  | 5 to 21 0.197 to 0.827     | 80 N·m            |
|             | 21 0.827 or more           | 180 N·m           |
| GX-N12ML(B) | 15 0.591 or more           | 20 N·m            |
| GX-N18ML(B) | 25 0.984 or more           | 80 N·m            |
| GX-N30ML(B) | 30 1.181 or more           | 180 N·m           |

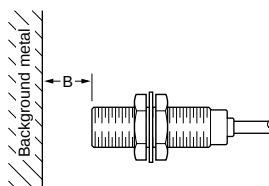
Note: Mount such that the nuts do not protrude from the threaded portion.

### Distance from surrounding metal

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

#### Influence of surrounding metal

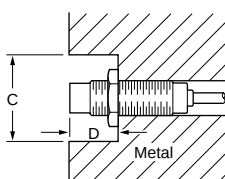
- The surrounding metal will affect the sensing performance. Keep the minimum distance specified in the table below.



| Model No.   | B (mm in)   |
|-------------|-------------|
| GX-N12M(B)  | 8<br>0.315  |
| GX-N18M(B)  | 20<br>0.787 |
| GX-N30M(B)  | 40<br>1.575 |
| GX-N12ML(B) | 22<br>0.866 |
| GX-N18ML(B) | 45<br>1.772 |
| GX-N30ML(B) | 75<br>2.953 |

#### Embedding of the sensor in metal

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



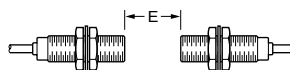
| Model No.   | C (mm in)      | D (mm in)   |
|-------------|----------------|-------------|
| GX-N12ML(B) | φ50<br>φ1.969  | 15<br>0.591 |
| GX-N18ML(B) | φ75<br>φ2.953  | 25<br>0.984 |
| GX-N30ML(B) | φ105<br>φ4.134 | 30<br>1.181 |

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

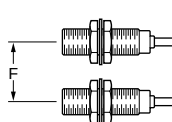
### Mutual interference

- 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.   | E (mm in)     | F (mm in)    |
|-------------|---------------|--------------|
| GX-N12M(B)  | 25<br>0.984   | 15<br>0.591  |
| GX-N18M(B)  | 50<br>1.969   | 35<br>1.378  |
| GX-N30M(B)  | 90<br>3.543   | 55<br>2.165  |
| GX-N12ML(B) | 120<br>4.724  | 70<br>2.756  |
| GX-N18ML(B) | 180<br>7.087  | 125<br>4.921 |
| GX-N30ML(B) | 290<br>11.417 | 190<br>7.480 |

### 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.

#### Correction coefficient

| Model No.                | GX-N12M(B)   | GX-N18M(B)   | GX-N30M(B)   | GX-N12ML(B)  | GX-N18ML(B)  | GX-N30ML(B)  |
|--------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Metal                    |              |              |              |              |              |              |
| Iron                     | 1            | 1            | 1            | 1            | 1            | 1            |
| Stainless steel (SUS304) | 0.77 approx. | 0.73 approx. | 0.70 approx. | 0.66 approx. | 0.68 approx. | 0.65 approx. |
| Brass                    | 0.52 approx. | 0.50 approx. | 0.45 approx. | 0.44 approx. | 0.46 approx. | 0.44 approx. |
| Aluminum                 | 0.51 approx. | 0.48 approx. | 0.44 approx. | 0.43 approx. | 0.44 approx. | 0.43 approx. |

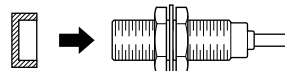
Note: The sensing range also changes if the sensing object is plated.

### Protection cover (Optional)

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

#### Mounting method

#### Protection cover Sensor



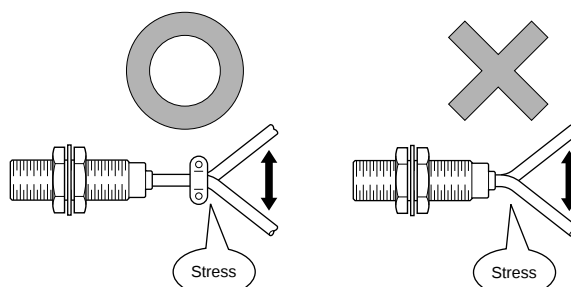
Material: Fluorine resin

| Model No. | Applicable model No. |
|-----------|----------------------|
| MS-H12    | GX-N12M(B)           |
| MS-H18    | GX-N18M(B)           |
| MS-H30    | GX-N30M(B)           |

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

### Others

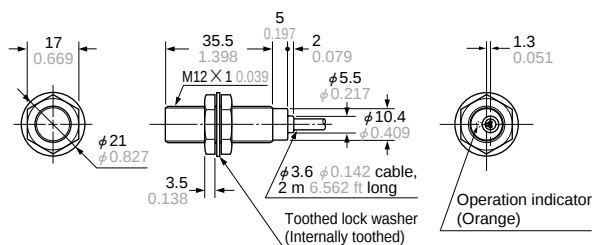
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- When the sensor is mounted on a moving base, stress should not be applied to the sensor cable joint.



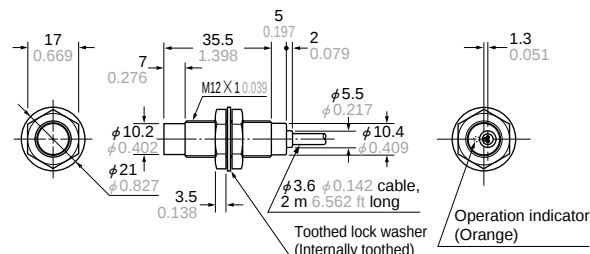
**DIMENSIONS (Unit: mm in)** The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

**GX-N12M  
GX-N12MB**

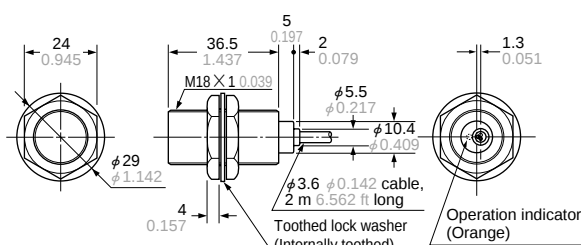
Sensor


**GX-N12ML  
GX-N12MLB**

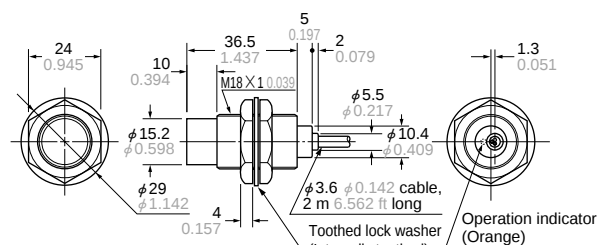
Sensor


**GX-N18M  
GX-N18MB**

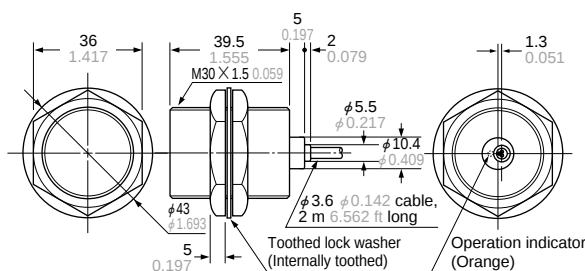
Sensor


**GX-N18ML  
GX-N18MLB**

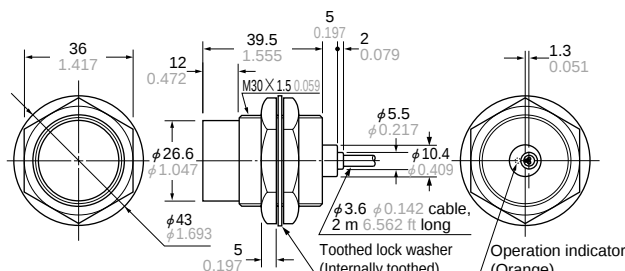
Sensor


**GX-N30M  
GX-N30MB**

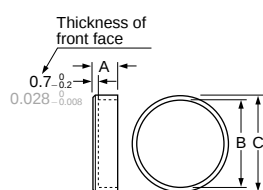
Sensor


**GX-N30ML  
GX-N30MLB**

Sensor


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

Protection cover (Optional)



Material: Fluorine resin

| Symbol    | A          | B               | C             | Applicable model No. |
|-----------|------------|-----------------|---------------|----------------------|
| Model No. |            |                 |               |                      |
| MS-H12    | 5<br>0.197 | φ11.5<br>φ0.453 | φ14<br>φ0.551 | GX-N12M(B)           |
| MS-H18    | 6<br>0.236 | φ17.5<br>φ0.689 | φ20<br>φ0.787 | GX-N18M(B)           |
| MS-H30    | 8<br>0.315 | φ29.4<br>φ1.157 | φ33<br>φ1.299 | GX-N30M(B)           |

Amplifier Built-in

GL-N12

GL-18H/18HL

GX-U/FU

GX-N

GX

Amplifier-separated

GA-10/GH