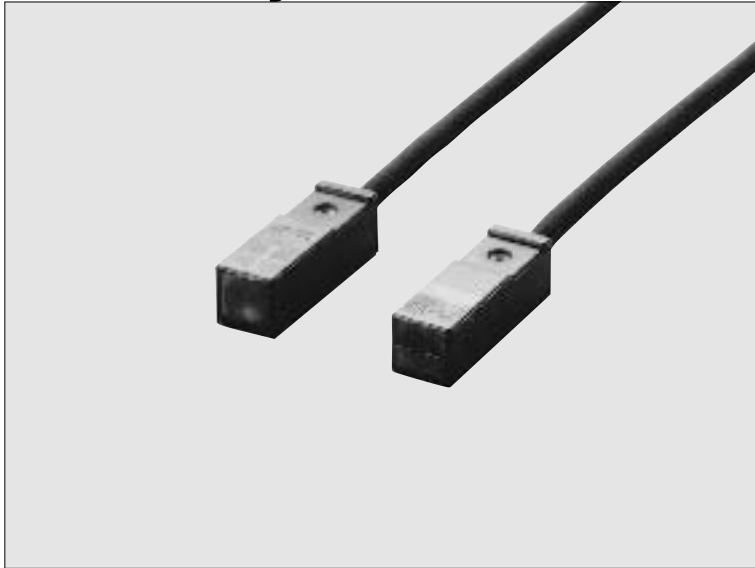


# GL-6

SERIES

## Miniature Inductive Proximity Sensor

Amplifier Built-in

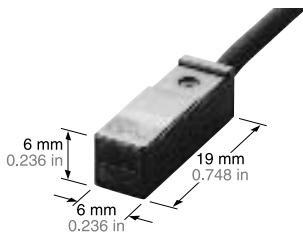


High performance in surprisingly small body at low cost



### Extremely small

Mountable in a tight space as the sensor is just  $6 \times 6 \times 19$  mm  $0.236 \times 0.236 \times 0.748$  in in volume. It is optimum for use as a component in an equipment.

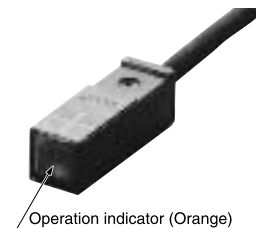


### Low price

The **GL-6** is available at a surprisingly low price.

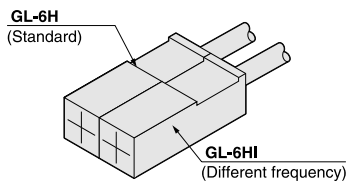
### Operation indicator

Despite its compactness, **GL-6** incorporates an operation indicator (orange) for operation check.



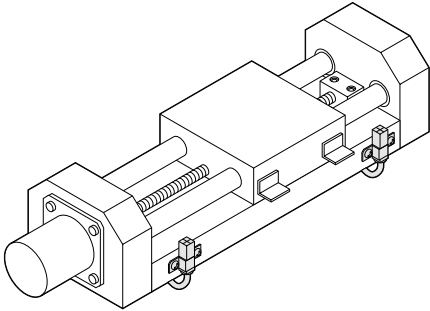
### Close mounting

Two sensors can be mounted close together because different frequency type are available.

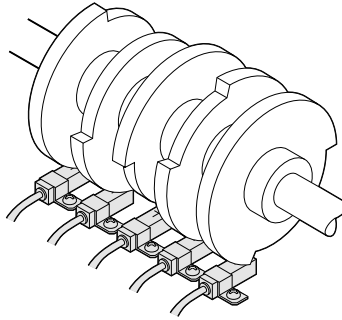


## APPLICATIONS

### Observing table over-run



### Sensing cam positions



## ORDER GUIDE

Type	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
Front sensing			<b>GL-6F</b>	NPN open-collector transistor	Normally open
			<b>GL-6FI</b>		Normally closed
			<b>GL-6FB</b>		Normally open
			<b>GL-6FIB</b>		Normally closed
Top sensing			<b>GL-6H</b>		Normally open
			<b>GL-6HI</b>		Normally closed
			<b>GL-6HB</b>	Normally open	
			<b>GL-6HIB</b>	Normally closed	

Notes: 1) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object. The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.  
 2) 'I' in the model No. indicates a different frequency type.

### 5 m 16.404 ft cable length type

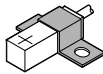
5 m 16.404 ft cable length type (standard: 1 m 3.281 ft) is also available.

#### • Table of Model Nos.

Type	Standard	5 m 16.404 ft cable length type
Front sensing	<b>GL-6F</b>	<b>GL-6F-C5</b>
	<b>GL-6FI</b>	<b>GL-6FI-C5</b>
	<b>GL-6FB</b>	<b>GL-6FB-C5</b>
	<b>GL-6FIB</b>	_____
Top sensing	<b>GL-6H</b>	<b>GL-6H-C5</b>
	<b>GL-6HI</b>	<b>GL-6HI-C5</b>
	<b>GL-6HB</b>	<b>GL-6HB-C5</b>
	<b>GL-6HIB</b>	_____

### Accessory

• **MS-GL6-1** (Sensor mounting bracket)

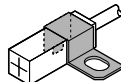


## OPTION

Designation	Model No.	Description
Sensor mounting bracket	<b>MS-GL6-2</b>	The brackets are useful to mount sensors side by side.

### Sensor mounting bracket

• **MS-GL6-2**



Screw, nut or washer are not attached.

# GL-6

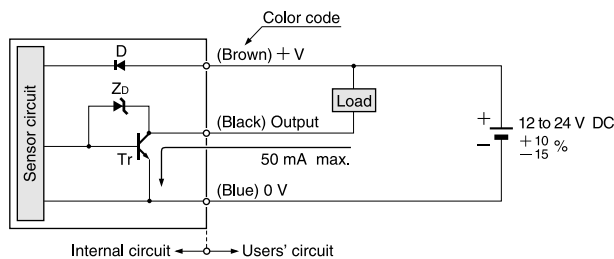
## SPECIFICATIONS

Type		Miniature							
		Front sensing				Top sensing			
Item	Model No.	Different frequency		Different frequency		Different frequency		Different frequency	
		GL-6F	GL-6FI	GL-6FB	GL-6FIB	GL-6H	GL-6HI	GL-6HB	GL-6HIB
Max. operation distance (Note)		1.6 mm 0.063 in ± 15 %							
Stable sensing range (Note)		0 to 1.2 mm 0 to 0.047 in							
Standard sensing object		Iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in							
Hysteresis		15 % or less of operation distance							
Supply voltage		12 to 24 V DC $\pm 10\%$ / $-15\%$ Ripple P-P10 % or less							
Current consumption		15 mA or less							
Output		NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 50 mA sink current) 0.4 V or less (at 16 mA sink current)							
Utilization category		DC-12 or DC-13							
Output operation		Normally open	Normally closed	Normally open	Normally open	Normally open	Normally open	Normally closed	Normally closed
Max. response frequency		400 Hz							
Operation indicator		Orange LED (lights up when the output is ON)							
Environmental resistance	Pollution degree	3 (Industrial environment)							
	Protection	IP67 (IEC), IP67g (JEM)							
	Ambient temperature	- 10 to + 55 °C + 14 to + 131 °F, Storage: - 30 to + 80 °C - 22 to + 176 °F							
	Ambient humidity	45 to 85 % RH, Storage: 35 to 95 % RH							
	EMC	EN 50081-2, EN 50082-2, EN 60947-5-2							
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure							
	Insulation resistance	50 MΩ, or more, with 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 - 10 to + 55 °C + 14 to + 131 °F: within ± 10 % of sensing range at 20 °C + 68 °F							
	Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage							
Material		Enclosure: Polyallylate							
Cable		0.08 mm <sup>2</sup> 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long							
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable.							
Weight		10 g approx.							
Accessory		<b>MS-GL6-1</b> (Sensor mounting bracket): 1 pc.							

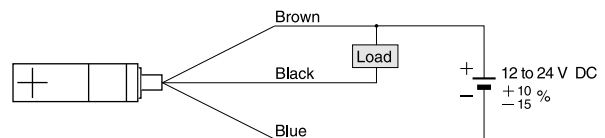
Note: The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.  
 The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or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

## I/O CIRCUIT AND WIRING DIAGRAMS

### I/O circuit diagram



### Wiring diagram

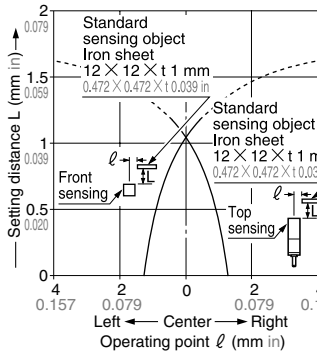


Symbols ... D : Reverse supply polarity protection diode  
 Zp: Surge absorption zener diode  
 Tr : NPN output transistor

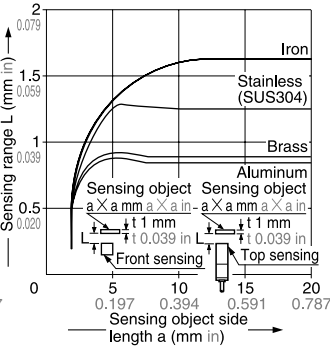
Note: The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

## SENSING CHARACTERISTICS (TYPICAL)

### Sensing field



### Correlation between sensing object size and sensing range



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

## PRECAUTIONS FOR PROPER USE



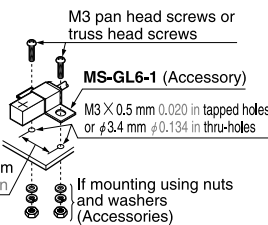
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

### Mounting

- Mount the sensor with the attached sensor mounting bracket **MS-GL6-1** or the optional sensor mounting bracket **MS-GL6-2**.

- Screws, nuts or washers are not supplied. Please arrange them separately.

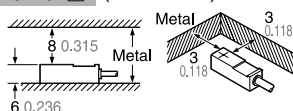
- To mount the sensor with a nut, the hole diameter should be  $\phi 3.4$  mm  $\phi 0.134$  in.



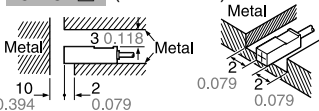
### Influence of surrounding metal

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

#### GL-6F□ (Unit: mm in)



#### GL-6H□ (Unit: mm in)

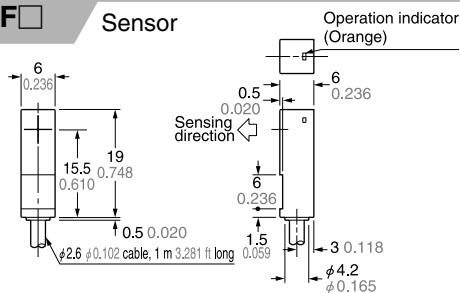


### Wiring

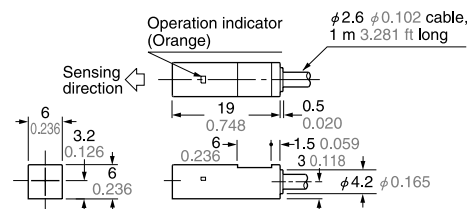
- The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

## DIMENSIONS (Unit: mm in)

### GL-6F□ Sensor

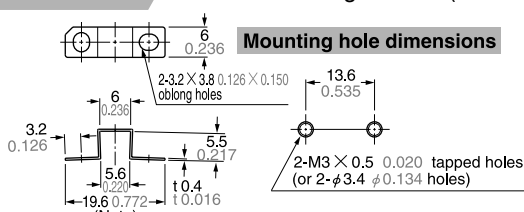


### GL-6H□ Sensor



### MS-GL6-1

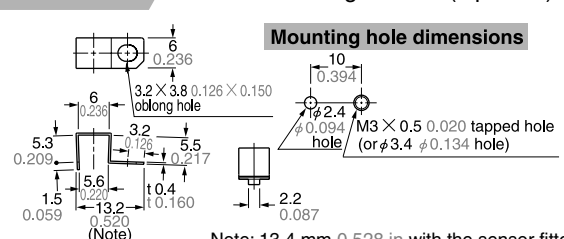
#### Sensor mounting bracket (Accessory)



Note: 20 mm 0.787 in with the sensor fitted.

### MS-GL6-2

#### Sensor mounting bracket (Optional)



Note: 13.4 mm 0.528 in with the sensor fitted.

### 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.

	GL-6F□, GL-6H□		GL-6F□	GL-6H□
	Between 'I' type and non 'I' type	Between two 'I' types or two non 'I' types	A	B
A	0 mm (Note 2)	13 mm 0.512 in		
B	15 mm 0.591 in	25 mm 0.984 in		

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

2) Close mounting is possible for up to two sensors. When mounting three sensors or more, at an equal spacing, in a row, the minimum value of dimension 'A' should be 3.5 mm 0.138 in.

### Sensing range

- The sensing range is specified for the standard sensing object (iron sheet  $12 \times 12 \times 1$  mm  $0.472 \times 0.472 \times 1$  mm).

With a non-ferrous metal, the sensing range is obtained by multiplying with the correction coefficient specified on the right. Further, the sensing range also changes if the sensing object is smaller than the standard sensing object (iron sheet  $12 \times 12 \times 1$  mm  $0.472 \times 0.472 \times 1$  mm) or if the sensing object is plated.

### Correction coefficient

Model No.	GL-6F□ GL-6H□
Metal	
Iron	1
Stainless steel (SUS304)	0.76 approx.
Brass	0.55 approx.
Aluminum	0.52 approx.

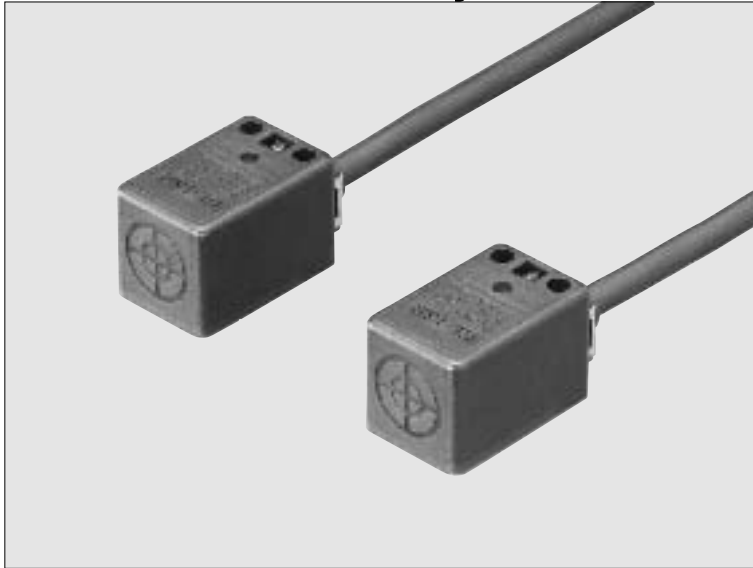
### Others

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

# GL-18H/18HL SERIES

## Rectangular-shaped Top Sensing Inductive Proximity Sensor

Amplifier Built-in



High performance sensing at a low price



Conforming to EMC Directive

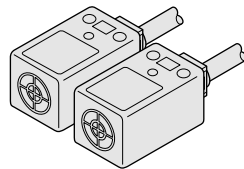
### Low price

It provides high performance at a low price.

### Different frequency type

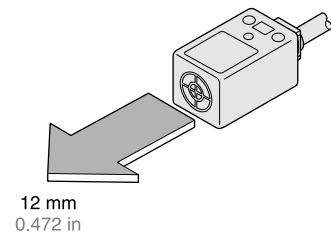
Two sensors can be mounted close together because different frequency types are available.

(The long sensing range type, **GL-18HL(B)**, and its different frequency type, **GL-18HLI**, can be mounted 20 mm 0.787 in away from each other.



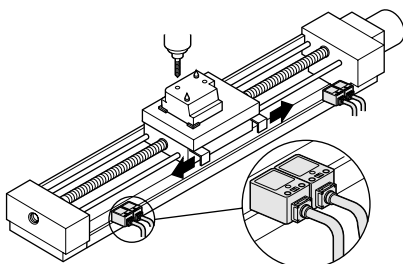
### Long sensing range

**GL-18HL□** offers a long sensing range of 12 mm 0.472 in. (**GL-18H□**: 5 mm 0.197 in)

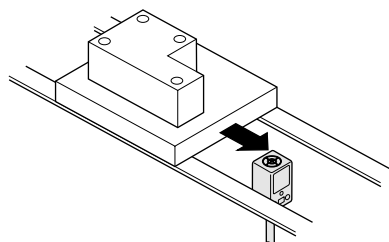


## APPLICATIONS

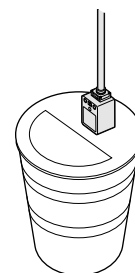
### Detecting over-run of moving table



### Positioning metal pallet



### Detecting aluminum lid



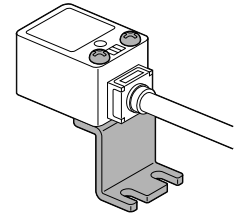
# GL-18H/18HL

## ORDER GUIDE

Type	Appearance (mm in)	Sensing range (Note)	Model No.	Output	Output operation
Standard		Maximum operation distance	<b>GL-18H</b>	NPN open-collector transistor	Normally open
		5 mm 0.197 in	<b>GL-18HI</b>		
		Stable sensing range	<b>GL-18HB</b>		Normally closed
(0 to 4 mm 0 to 0.157 in)		<b>GL-18HL</b>	Normally open		
12 mm 0.472 in		<b>GL-18HLI</b>	Normally open		
(0 to 10 mm 0 to 0.394 in)		<b>GL-18HLB</b>	Normally closed		
Long sensing range					
Different frequency					

### Accessory

- MS-GL18HL (Sensor mounting bracket)



Two M3 (length 25 mm 0.948 in) pan head screws are attached.

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.

## SPECIFICATIONS

Item	Type Model No.	Standard			Long sensing range		
		GL-18H	GL-18HI	GL-18HB	GL-18HL	GL-18HLI	GL-18HLB
Max. operation distance (Note)		5 mm 0.197 in ± 10 %			12 mm 0.472 in ± 10 %		
Stable sensing range (Note)		0 to 4 mm 0 to 0.157 in			0 to 10 mm 0 to 0.394 in		
Standard sensing object		Iron sheet 25 × 25 × t 1 mm 0.984 × 0.984 × t 0.039 in			Iron sheet 40 × 40 × t 1 mm 1.575 × 1.575 × t 0.039 in		
Hysteresis		15 % or less of operation distance					
Supply voltage		10 to 30 V DC Ripple P-P 10 % or less					
Current consumption		10 mA or less					
Output		NPN open-collector transistor					
		<ul style="list-style-type: none"> <li>• Maximum sink current: 100 mA</li> <li>• Applied voltage: 30 V DC or less (between output and 0 V)</li> <li>• Residual voltage: 1.5 V or less (at 100 mA sink current)</li> <li>0.4 V or less (at 16 mA sink current)</li> </ul>					
Utilization category		DC-12 or DC-13					
Output operation		Normally open	Normally closed	Normally open	Normally open	Normally closed	
Max. response frequency		1 kHz			500 Hz		
Operation indicator		Red LED (lights up when the output is ON)					
Environmental resistance	Pollution degree	3 (Industrial environment)					
	Protection	IP67 (IEC), IP67g (JEM)					
	Ambient temperature	− 25 to + 70 °C − 13 to + 158 °F, Storage: − 25 to + 70 °C − 13 to + 158 °F					
	Ambient humidity	45 to 85 % RH, Storage: 45 to 85 % RH					
	EMC	EN 50081-2, EN 50082-2, EN 60947-5-2					
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure					
	Insulation resistance	50 MΩ, or more, with 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 ± 10 % of sensing range at 20 °C + 68 °F					
	Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage					
Material		Enclosure: Polyallylate					
Cable		0.3 mm <sup>2</sup> 3-core oil resistant cabtyre cable, 1 m 3.281 ft long					
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable.					
Weight		45 g approx.					
Accessory						MS-GL18HL (Sensor mounting bracket): 1 set	

Note: The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.

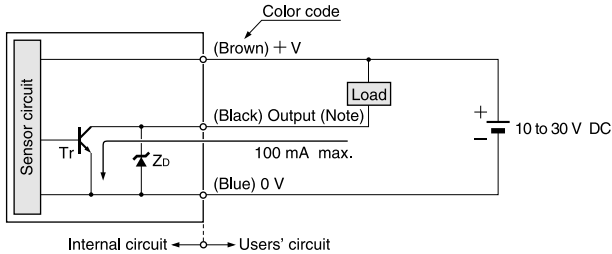
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.

# GL-18H/18HL

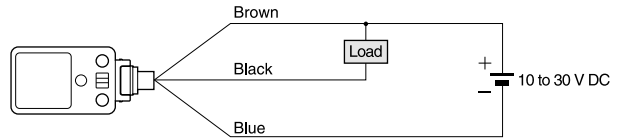
## I/O CIRCUIT AND WIRING DIAGRAMS

GL-18H□  
GL-18HL□

### I/O circuit diagram



### Wiring diagram



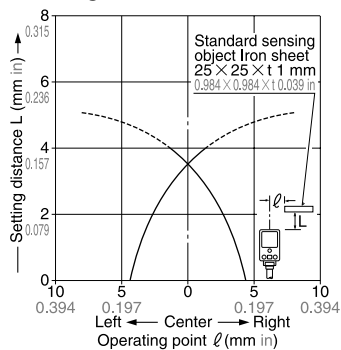
Note: Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated. Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

Symbols ... Z<sub>d</sub>: Surge absorption zener diode  
Tr : NPN output transistor

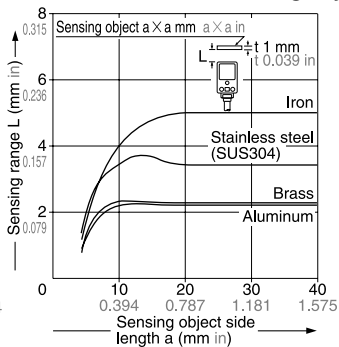
## SENSING CHARACTERISTICS (TYPICAL)

GL-18H□

### Sensing field



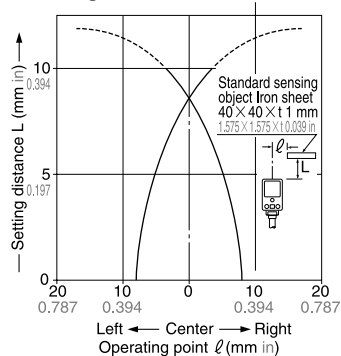
### Correlation between sensing object size and sensing range



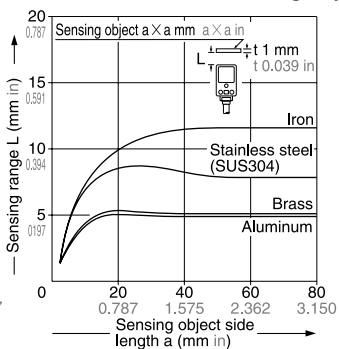
As the sensing object size becomes smaller than the standard size (iron sheet  $25 \times 25 \times t 1$  mm  $0.984 \times 0.984 \times t 0.039$  in), the sensing range shortens as shown in the left figure.

GL-18HL□

### Sensing field



### Correlation between sensing object size and sensing range



As the sensing object size becomes smaller than the standard size (iron sheet  $40 \times 40 \times t 1$  mm  $1.575 \times 1.575 \times t 0.039$  in), the sensing range shortens as shown in the left figure.

# GL-18H/18HL

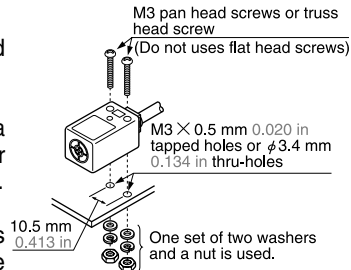
## PRECAUTIONS FOR PROPER USE



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.

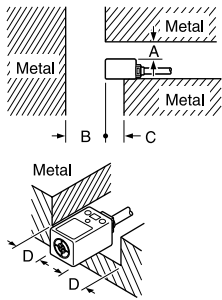
### Mounting

- The tightening torque should be 0.5 N·m or less.
- To mount the sensor with a nut, the thru-hole diameter should be  $\phi 3.4$  mm  $\phi 0.134$  in.
- Screws, nuts or washers are not supplied. Please arrange them separately.



### Influence of surrounding metal

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



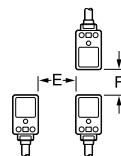
	GL-18H□	GL-18HL□
A	5 mm 0.197 in	25 mm 0.984 in
B	20 mm 0.787 in	60 mm 2.362 in
C	0 mm 0 in	20 mm 0.787 in (Note)
D	5 mm 0.197 in	30 mm 1.181 in

Note: When the GL-18HL□ is mounted on an insulator, or seated on the attached aluminum mounting bracket, the distance 'C' can be zero.

### Mutual interference prevention

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

	GL-18H□		GL-18HL□	
	Between 'I' type and non 'I' type	Between two 'I' types or two non 'I' types	Between 'I' type and non 'I' type	Between two 'I' types or two non 'I' types
E	0 mm (Note 2)	40 mm 1.575 in	20 mm 0.787 in	130 mm 5.118 in
F	20 mm 0.787 in	70 mm 2.756 in	40 mm 1.575 in	200 mm 7.874 in

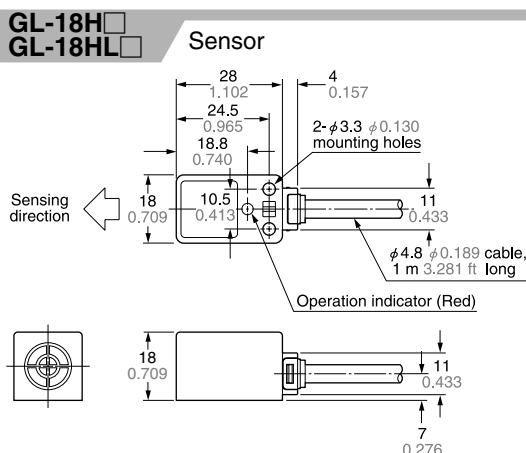


Notes: 1) 'I' in the model No. specifies the different frequency type.

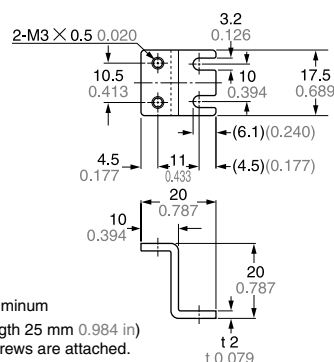
2) Close mounting is possible for up to two sensors.

When mounting three sensors or more, at an equal spacing, in a row, the minimum value of dimension 'E' should be 11 mm 0.433 in.

## DIMENSIONS (Unit: mm in)



### MS-GL18HL Sensor mounting bracket for GL-18HL□ (Accessory)





# GL-8/8U SERIES

## Low Price & Compact Inductive Proximity Sensor

**Amplifier Built-in**



**Wide variety!  
Low price!**



### Low price

The **GL-8/8U** series satisfies the need for a low price inductive proximity sensor. It is recommended to large volume users for cost reduction.

The **GL-8/8U** series is available in units of ten sensors.

### Easy handling

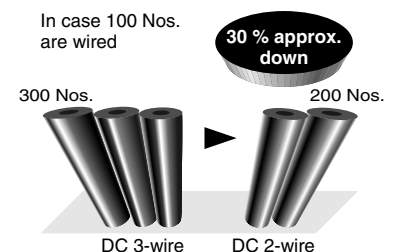
**DC 3-wire type**

Compared with the DC 2-wire type, there are no restrictions to connection device input conditions when wiring.

### Energy-efficient and wire-saving

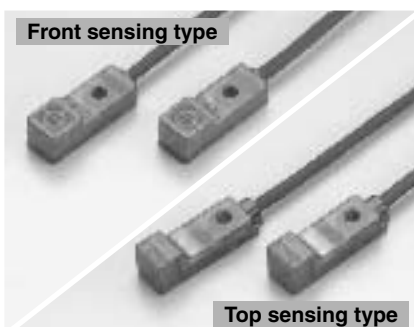
**DC 2-wire type**

Its electric current consumption is just 0.8 mA or less and the wiring workload is reduced by about 30 %.



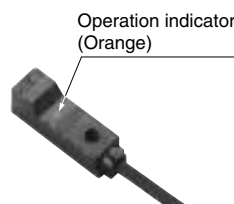
### Wide variety

A wide variety of 16 types, front sensing type / top sensing type, normally open type / normally closed type, as well as, different frequency type which allows close mounting of sensors, is available.



### Equipped with operation indicator

The **GL-8/8U** series is equipped with an operation indicator (orange) for operation confirmation.



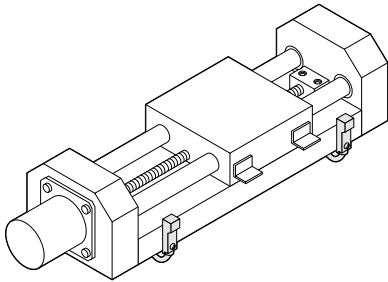
### Waterproof

Since the sensor has IP67 protection, it can withstand water splashes.

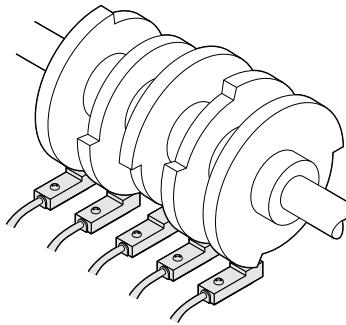


## APPLICATIONS

### Detecting table over-run



### Detecting cam position



## ORDER GUIDE

Type	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation			
DC 3-wire	Front sensing 		GL-8F × 10	NPN open-collector transistor	Normally open			
			GL-8FI × 10		Normally closed			
	Top sensing 		GL-8H × 10		Normally open			
			GL-8HI × 10		Normally closed			
	DC 2-wire		Front sensing 			GL-8FU × 10	Non-contact DC 2-wire type	Normally open
						GL-8FUI × 10		Normally closed
Top sensing 	GL-8HU × 10	Normally open						
	GL-8HUI × 10	Normally closed						

Notes: 1) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object. The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.  
2) 'I' in the model No. indicates a different frequency type.

**NOTE: Low price & compact inductive proximity sensors (GL-8/8U series) are available in units of ten.**

### 5 m 16.404 ft cable length type

5 m 16.404 ft cable length type (standard: 1 m 3.281 ft) is also available.

#### • Table of Model Nos.

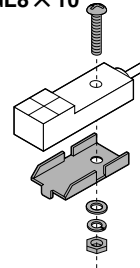
Type	Standard	5 m 16.404 ft cable length type	
DC 3-wire	Front sensing	GL-8F × 10	GL-8F-C5 × 10
		GL-8FI × 10	GL-8FI-C5 × 10
		GL-8FB × 10	GL-8FB-C5 × 10
		GL-8FIB × 10	—
DC 3-wire	Top sensing	GL-8H × 10	GL-8H-C5 × 10
		GL-8HI × 10	GL-8HI-C5 × 10
		GL-8HB × 10	GL-8HB-C5 × 10
		GL-8HIB × 10	—
DC 2-wire	Front sensing	GL-8FU × 10	GL-8FU-C5 × 10
		GL-8FUI × 10	GL-8FUI-C5 × 10
		GL-8FUB × 10	GL-8FUB-C5 × 10
		GL-8FUIB × 10	—
DC 2-wire	Top sensing	GL-8HU × 10	GL-8HU-C5 × 10
		GL-8HUI × 10	GL-8HUI-C5 × 10
		GL-8HUB × 10	GL-8HUB-C5 × 10
		GL-8HUIB × 10	—

# GL-8/8U

## OPTION

Designation	Model No.
Sensor mounting bracket	<b>MS-GL8 × 10</b>

### Sensor mounting bracket • MS-GL8 × 10



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

**NOTE: Sensor mounting bracket (MS-GL8 × 10) is available in units of ten.**

## SPECIFICATIONS

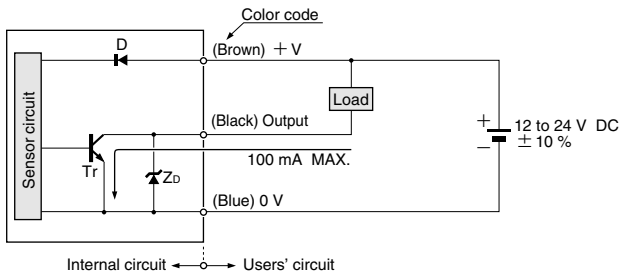
Item	Type	DC 3-wire type				DC 2-wire type			
		Front sensing		Top sensing		Front sensing		Top sensing	
		Model No.	GL-8F × 10	GL-8FB × 10	GL-8H × 10	GL-8HB × 10	GL-8FU × 10	GL-8FUB × 10	GL-8HU × 10
	Different frequency	GL-8FI × 10	GL-8FIB × 10	GL-8HI × 10	GL-8HIB × 10	GL-8FUI × 10	GL-8FUIB × 10	GL-8HUI × 10	GL-8HUIB × 10
Max. operation distance (Note 1)		2.5 mm 0.098 in ± 20 %							
Stable sensing range (Note 1)		0 to 1.8 mm 0 to 0.071 in							
Standard sensing object		Iron sheet 15 × 15 × t 1 mm 0.591 × 0.591 × t 0.039 in							
Hysteresis		20 % or less of operation distance							
Supply voltage		12 to 24 V DC ± 10 %							
Current consumption		15 mA or less				0.8 mA or less (Note 2)			
Output		NPN open-collector transistor • Maximum sink current: 100 mA (Note 3) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)				Non-contact DC 2-wire type • Load current: 3 to 70 mA (Note 4) • Residual voltage: 3 V or less (Note 5)			
Utilization category		DC-12 or DC-13							
Output operation		Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed	Normally open	Normally closed
Short-circuit protection		Incorporated							
Max. response frequency		1 kHz							
Operation indicator		Orange LED (lights up when the output is ON)							
Environmental resistance	Pollution degree	3 (Industrial environment)							
	Protection	IP67 (IEC)							
	Ambient temperature	- 25 to + 70 °C - 13 to + 158 °F, Storage: - 30 to + 80 °C - 22 to + 176 °F							
	Ambient humidity	35 to 95 % RH, Storage: 35 to 95 % RH							
	EMC	EN 50081-2, EN 50082-2, EN 60947-5-2							
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure							
	Insulation resistance	50 MΩ, or more, with 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 ± 15% of sensing range at + 20 °C + 68 °F							
	Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage							
Material		Enclosure: Polyallylate							
Cable		0.15 mm <sup>2</sup> 3-core cabtyre cable, 1 m 3.281 ft long				0.15 mm <sup>2</sup> 2-core cabtyre cable, 1 m 3.281 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.				Extension up to total 50 m 164.042 ft is possible with 0.3 mm <sup>2</sup> , or more, cable.			
Weight		13 g approx.				12 g approx.			

- 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) It is the leakage current when the output is in the OFF state.
- 3) When the ambient temperature is + 60 to + 70 °C + 140 to + 158 °F, the maximum sink current varies depending on the ambient humidity. Refer to 'I/O CIRCUIT AND WIRING DIAGRAMS' for more details.
- 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 according to the resistance of the cable.

## I/O CIRCUIT AND WIRING DIAGRAMS

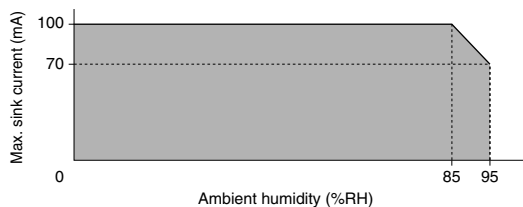
### DC 3-wire type

#### I/O circuit diagram

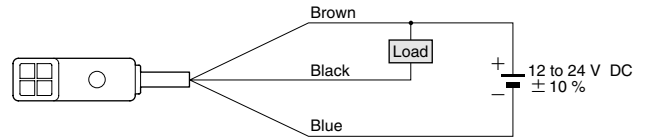


Symbols ... D : Reverse supply polarity protection diode  
 Zd: Surge absorption zener diode  
 Tr : NPN output transistor

Note: When the ambient temperature is +60 °C to +70 °C +140 °F to +158 °F, the maximum sink current varies depending on the ambient humidity.

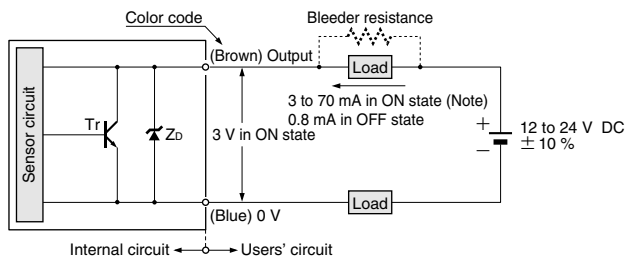


#### Wiring diagram



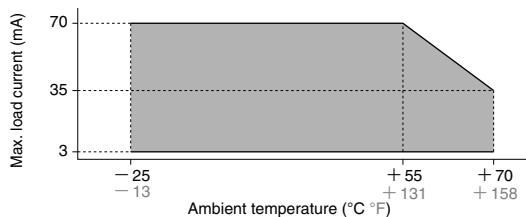
### DC 2-wire type

#### I/O circuit diagram

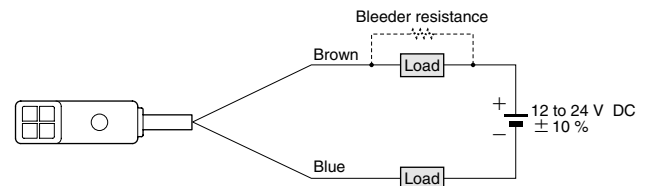


Symbols ... Zd: Surge absorption zener diode  
 Tr : NPN output transistor

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



#### Wiring diagram



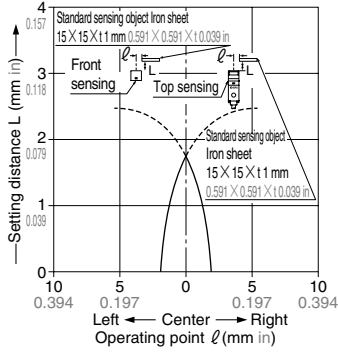
#### Conditions for the load

- 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.)

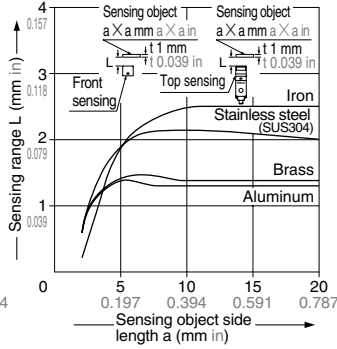
# GL-8/8U

## SENSING CHARACTERISTICS (TYPICAL)

### Sensing field



### Correlation between sensing object size and sensing range



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

## PRECAUTIONS FOR PROPER USE

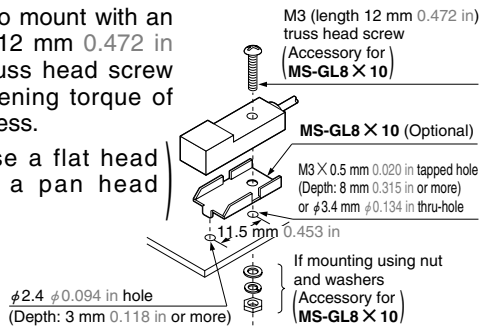


This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

### Mounting

- Make sure to mount with an M3 (length 12 mm 0.472 in or more) truss head screw with a tightening torque of 0.5 N·m or less.

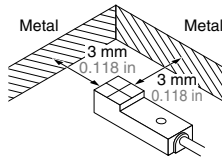
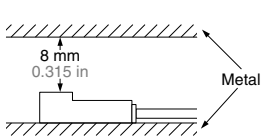
(Do not use a flat head screw or a pan head screw.)



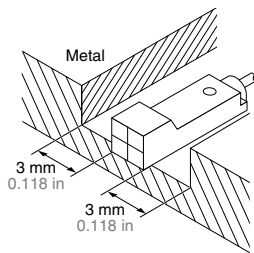
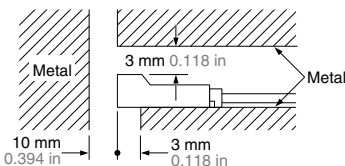
### Influence of surrounding metal

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

#### GL-8F□ × 10, GL-8FU□ × 10



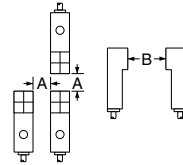
#### GL-8H□ × 10, GL-8HU□ × 10



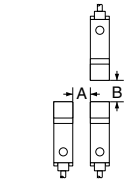
### Mutual interference prevention

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

#### GL-8F□ × 10, GL-8FU□ × 10



#### GL-8H□ × 10, GL-8HU□ × 10



		A	B
GL-8F□ × 10, GL-8FU□ × 10	Between 'I' type and non 'I' type	0 mm (Note 2)	15 mm 0.591 in
	Between two 'I' types or two non 'I' types	20 mm 0.787 in	40 mm 1.575 in
GL-8H□ × 10, GL-8HU□ × 10	Between 'I' type and non 'I' type	0 mm (Note 2)	15 mm 0.591 in
	Between two 'I' types or two non 'I' types	25 mm 0.984 in	40 mm 1.575 in

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

2) Close mounting is possible for up to two sensors. When mounting three sensors or more, at an equal spacing, in a row, the minimum value of dimension 'A' should be as given below.

GL-8F□ × 10, GL-8FU□ × 10: 6 mm 0.236 in  
GL-8H□ × 10, GL-8HU□ × 10: 8.5 mm 0.335 in

### Sensing range

- The sensing range is specified for the standard sensing object (iron sheet  $15 \times 15 \times t 1 \text{ mm}$   $0.591 \times 0.591 \times t 0.039 \text{ in}$ ).

With a non-ferrous metal, the sensing range is obtained by multiplying with the correction coefficient specified on the right.

Further, the sensing range also changes if the sensing object is smaller than the standard sensing object (iron sheet  $15 \times 15 \times t 1 \text{ mm}$   $0.591 \times 0.591 \times t 0.039 \text{ in}$ ) or if the sensing object is plated.

### Correction coefficient

Model No.	All models
Metal	
Iron sheet	1
Stainless Steel (SUS304)	0.80 approx.
Brass	0.54 approx.
Aluminum	0.52 approx.

## PRECAUTIONS FOR PROPER USE

### Wiring

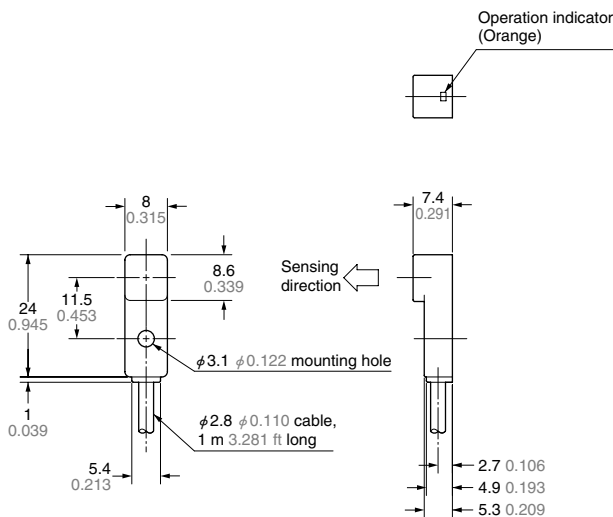
- Make sure that the power supply is off while wiring.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this sensor, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.

### Others

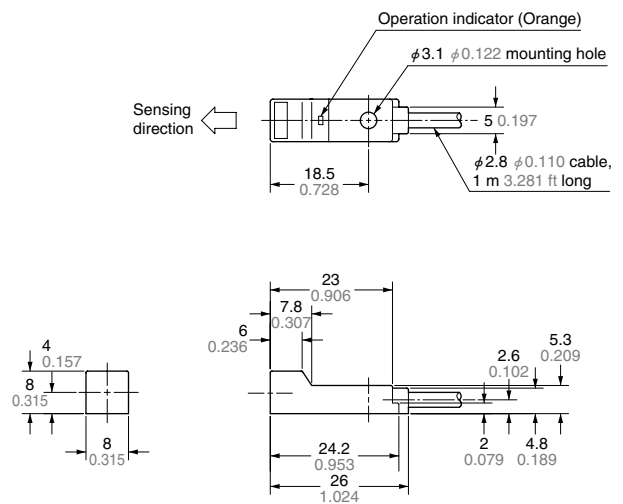
- Do not use during the initial transient time [200 ms (DC 2-wire type: 50 ms)] after the power supply is switched on.
- Take care that the sensor does not come in direct contact with oil, grease, or organic solvents, such as, thinner, etc.
- Make sure that the sensing end is not covered with metal dust, scrap or spatter. It will result in malfunction.

## DIMENSIONS (Unit: mm in)

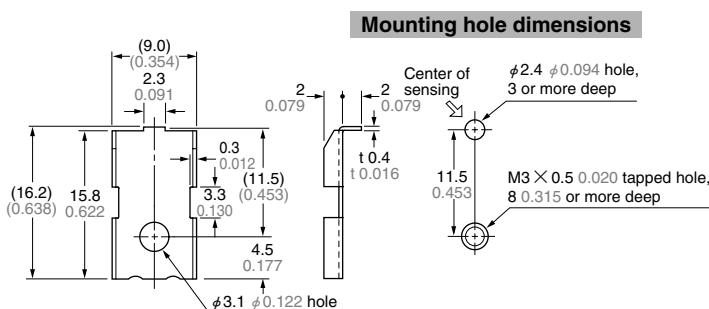
**GL-8F□ × 10**  
**GL-8FU□ × 10** Sensor



**GL-8H□ × 10**  
**GL-8HU□ × 10** Sensor



**MS-GL8 × 10** Sensor mounting bracket (Optional)



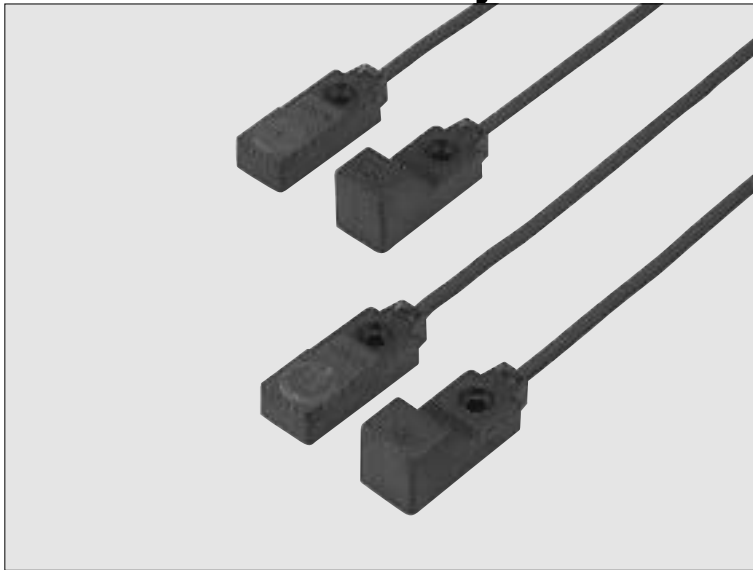
Material: Stainless steel (SUS304)

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

# GL-N12 SERIES

## Low Price Rectangular-shaped Inductive Proximity Sensor

Amplifier Built-in

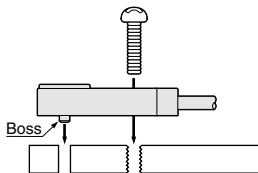


Wide variety with total cost reduction!



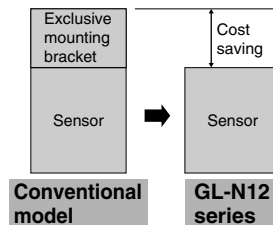
### Exclusive mounting bracket is needless

The **GL-N12** series can be reliably fixed even without an exclusive mounting bracket as a boss is provided on the bottom face of the sensor to prevent rotation.



### Low price

The **GL-N12** series is recommended to large volume users for cost reduction.



Cost saving is achieved as the exclusive mounting bracket is not required.

The **GL-N12** series is available in units of ten sensors.

### Wide variation

A wide variety of 16 types, front sensing type / top sensing type, normally open type / normally closed type, as well as, different frequency type, PNP output type, etc., is available.

You can choose from the vastly increased variety to suit your application.



Front sensing type

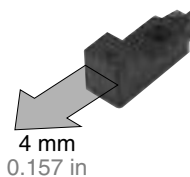


Top sensing type

### Long sensing range

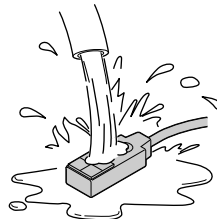
It achieves a sensing range of 4 mm 0.157 in with a 12 mm 0.472 in square-size sensing part.

It can reliably detect an object even if its position varies slightly.



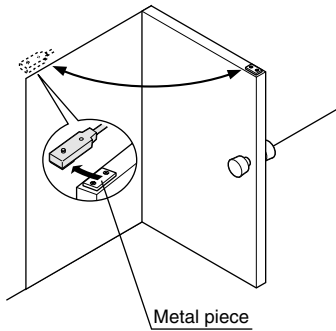
### Waterproof

Since the sensor has IP67 protection, it can withstand water splashes.

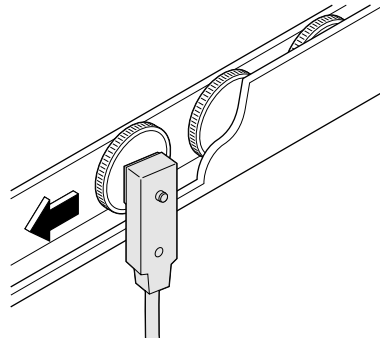


## APPLICATIONS

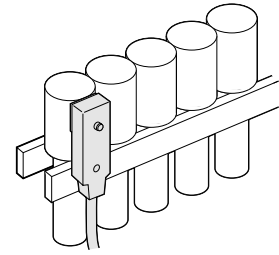
Confirming shutting / opening of door



Detecting rolling coins



Detecting metal parts on a feeder



## ORDER GUIDE

Type	Appearance (mm in)	Sensing range (Note 1)	Model No. (Note 2)	Output	Output operation
Boss type			GL-N12F X 10	NPN open-collector transistor	Normally open
			GL-N12FI X 10		Normally closed
			GL-N12FB X 10	PNP open-collector transistor	Normally open
			GL-N12FIB X 10		Normally closed
			GL-N12F-P X 10		Normally open
			GL-N12FI-P X 10	PNP open-collector transistor	Normally open
			GL-N12FB-P X 10		Normally closed
			GL-N12FIB-P X 10	NPN open-collector transistor	Normally open
			GL-N12H X 10		Normally closed
			GL-N12HI X 10		Normally open
	GL-N12HB X 10	NPN open-collector transistor	Normally closed		
	GL-N12HIB X 10		Normally open		
	GL-N12H-P X 10	PNP open-collector transistor	Normally open		
	GL-N12HI-P X 10		Normally closed		
			GL-N12HB-P X 10		
			GL-N12HIB-P X 10		

Notes: 1) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.  
 The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.  
 2) 'I' in the model No. indicates a different frequency type.

**NOTE: Low price rectangular-shaped inductive proximity sensors (GL-N12 series) are available in units of ten.**



# GL-N12

## ORDER GUIDE

Without boss type (Front sensing type, NPN output type and normally open type only) **Units of ten**

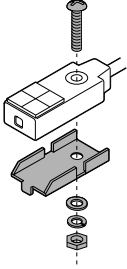
The without boss type is also available. (Standard: with boss type)

Model No.: **GL-N12F × 10** (Front sensing type) (cable length: 1 m 3.281 ft)

**GL-N12F-C5 × 10** (Front sensing type) (cable length: 5 m 16.404 ft)

**MS-GL12 × 10** (Sensor mounting bracket)

### • MS-GL12 × 10



1 pc. each of M3 (length 12 mm 0.472 in) pan head screw, plain washer, spring washer and rubber washer ( $\phi 9.5 \times t 0.5$  mm  $\phi 0.374 \times t 0.020$  in) is attached.

### 5 m 16.404 ft cable length type

5 m 16.404 ft cable length type (standard: 1 m 3.281 ft) is also available.

### • Table of Model Nos.

Type		Standard	5 m 16.404 ft cable length type	
Boss type	Front sensing	NPN output	<b>GL-N12F × 10</b>	<b>GL-N12F-C5 × 10</b>
			<b>GL-N12FI × 10</b>	<b>GL-N12FI-C5 × 10</b>
			<b>GL-N12FB × 10</b>	<b>GL-N12FB-C5 × 10</b>
			<b>GL-N12FIB × 10</b>	_____
	PNP output		<b>GL-N12F-P × 10</b>	_____
			<b>GL-N12FI-P × 10</b>	_____
			<b>GL-N12FB-P × 10</b>	_____
			<b>GL-N12FIB-P × 10</b>	_____
	Top sensing	NPN output	<b>GL-N12H × 10</b>	<b>GL-N12H-C5 × 10</b>
			<b>GL-N12HI × 10</b>	<b>GL-N12HI-C5 × 10</b>
			<b>GL-N12HB × 10</b>	<b>GL-N12HB-C5 × 10</b>
			<b>GL-N12HIB × 10</b>	_____
		PNP output	<b>GL-N12H-P × 10</b>	<b>GL-N12H-P-C5 × 10</b>
			<b>GL-N12HI-P × 10</b>	_____
<b>GL-N12HB-P × 10</b>			<b>GL-N12HB-P-C5 × 10</b>	
<b>GL-N12HIB-P × 10</b>			_____	

## SPECIFICATIONS

Item	Model No.	Type	Boss type							
			NPN output				PNP output			
			Front sensing		Top sensing		Front sensing		Top sensing	
			Different frequency		Different frequency		Different frequency		Different frequency	
	Normally open	GL-N12FX10 (Note 1)	GL-N12FI X10	GL-N12HX10	GL-N12HI X10	GL-N12F-P X10	GL-N12FI-P X10	GL-N12H-P X10	GL-N12HI-P X10	
	Normally closed	GL-N12FB X10	GL-N12FIB X10	GL-N12HB X10	GL-N12HIB X10	GL-N12FB-P X10	GL-N12FIB-P X10	GL-N12HB-P X10	GL-N12HIB-P X10	
Max. operation distance (Note 2)		4 ± 0.5 mm 0.157 ± 0.020 in								
Stable sensing range (Note 2)		0 to 3 mm 0 to 0.118 in								
Standard sensing object		Iron sheet 20 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in								
Hysteresis		20 % or less of operation distance								
Supply voltage		12 to 24 V DC ± 10 % Ripple P-P 10 % or less								
Current consumption		10 mA or less				15 mA or less				
Output		NPN open-collector transistor <ul style="list-style-type: none"> <li>• Maximum sink current: 100 mA</li> <li>• Applied voltage: 30 V DC or less (between output and 0 V)</li> <li>• Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)</li> </ul>				PNP open-collector transistor <ul style="list-style-type: none"> <li>• Maximum source current: 100 mA</li> <li>• Applied voltage: 30 V DC or less (between output and + V)</li> <li>• Residual voltage: 1 V or less (at 100 mA source current) 0.4 V or less (at 16 mA source current)</li> </ul>				
Utilization category		DC-12 or DC-13								
Max. response frequency		1.3 kHz								
Operation indicator		Orange LED (lights up when the output is ON)								
Environmental resistance	Pollution degree		3 (Industrial environment)							
	Protection		IP67 (IEC)							
	Ambient temperature		- 10 to + 55 °C + 14 to + 131 °F, Storage: - 25 to + 70 °C - 13 to + 158 °F							
	Ambient humidity		45 to 85 % RH, Storage: 35 to 95 % RH							
	EMC		EN 50081-2, EN 50082-2, EN 60947-5-2							
	Voltage withstandability		1,000 V AC for one min. between all supply terminals connected together and enclosure							
	Insulation resistance		50 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure							
	Shock resistance		10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each							
Sensing range variation	Temperature characteristics		Over ambient temperature range - 10 to + 55 °C + 14 to + 131 °F: Within $\pm 15\%$ of sensing range at 20 °C + 68 °F							
	Voltage characteristics		Within ± 2 % for ± 10 % fluctuation of the supply voltage							
Material		Enclosure: Polyallylate								
Cable		0.18 mm <sup>2</sup> 3-core cabtyre cable, 1 m 3.281 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		20 g approx.								

Notes: 1) The without boss type is also available.

The specifications are the same as for the with boss type. (However, max. response frequency: 500 Hz, operation indicator: Red LED)

2) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.

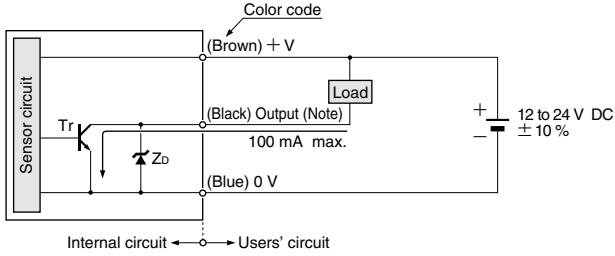
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.

# GL-N12

## I/O CIRCUIT AND WIRING DIAGRAMS

### NPN output type

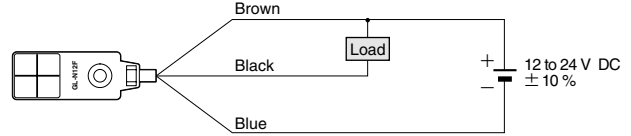
#### I/O circuit diagram



Symbols ... Zd: Surge absorption zener diode  
Tr: NPN output transistor

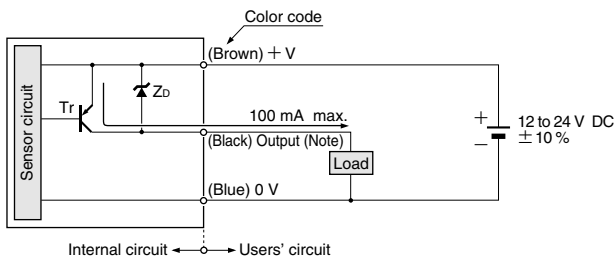
Note: Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated. Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

#### Wiring diagram



### PNP output type

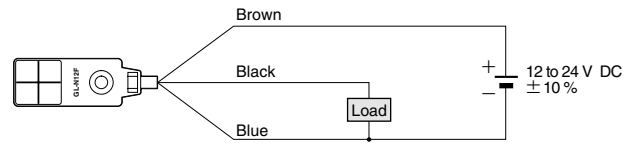
#### I/O circuit diagram



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

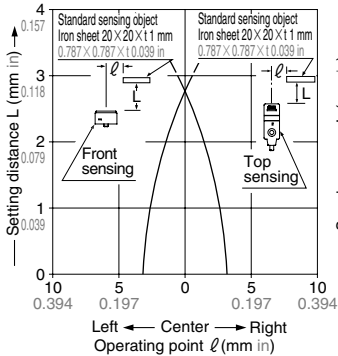
Note: Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated. Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

#### Wiring diagram

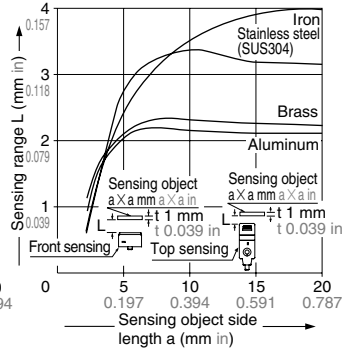


## SENSING CHARACTERISTICS (TYPICAL)

### Sensing field



### Correlation between sensing object size and sensing range



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

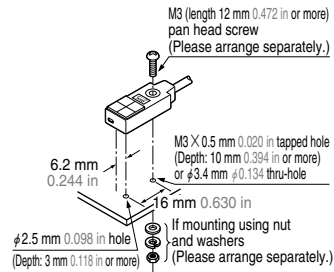
## PRECAUTIONS FOR PROPER USE



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 0.5 N·m or less.
- To mount the sensor with a nut, the mounting hole diameter should be  $\phi 3.4$  mm  $\phi 0.134$  in. Further, the hole in which the boss is inserted should be  $\phi 2.5$  mm  $\phi 0.098$  in and 3 mm 0.118 in, or more, deep.

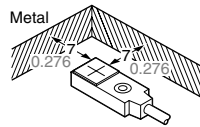
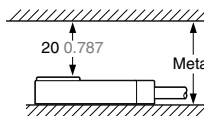


### Influence of surrounding metal

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

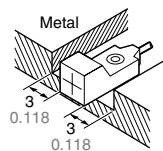
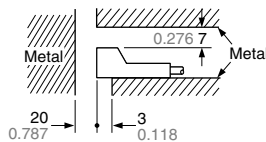
#### GL-N12F□×10

(Unit: mm in)



#### GL-N12H□×10

(Unit: mm in)



### Mutual interference prevention

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

	GL-N12F□×10, GL-N12H□×10		GL-N12F□×10	GL-N12H□×10
	Between 'I' type and non 'I' type	Between two 'I' types or two non 'I' types		
A	0 mm 0 in (Note 2)	25 mm 0.984 in		
B	25 mm 0.984 in	50 mm 1.969 in		

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

2) Close mounting is possible for up to two sensors.

When mounting three sensors or more, at an equal spacing, in a row, the minimum value of dimension 'A' should be 6.5 mm 0.256 in.

### Sensing range

- The sensing range is specified for the standard sensing object (iron sheet  $20 \times 20 \times t$  mm  $0.787 \times 0.787 \times t$  0.039 in).

With a non-ferrous metal, the sensing range is obtained by multiplying with the correction coefficient

specified on the right. Further, the sensing range also change if the sensing object is smaller than the standard sensing object (iron sheet  $20 \times 20 \times t$  mm  $0.787 \times 0.787 \times t$  0.039 in) or if the sensing object is plated.

### Correction coefficient

Model No.	GL-N12F□×10 GL-N12H□×10
Metal	
Iron	1
Stainless steel (SUS304)	0.79 approx. (Note 1)
Brass	0.56 approx. (Note 2)
Aluminum	0.53 approx.

Notes: 1) GL-12F×10 (Without boss type): 0.78 approx.

2) GL-12F×10 (Without boss type): 0.55 approx.

### Wiring

- Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated. Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

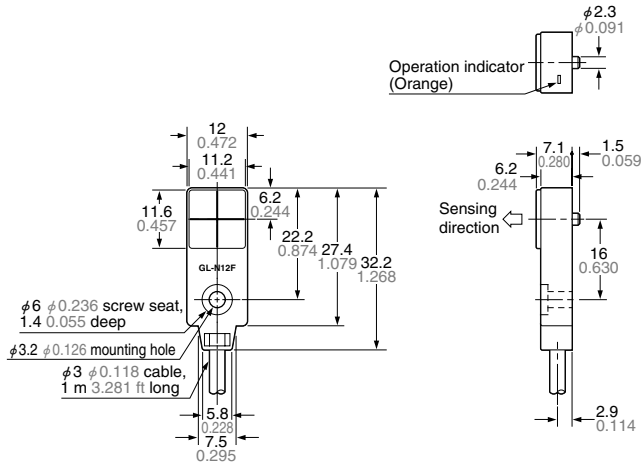
### Others

- Do not use during the initial transient time [50 ms (GL-12F×10: 10 ms)] after the power supply is switched on.

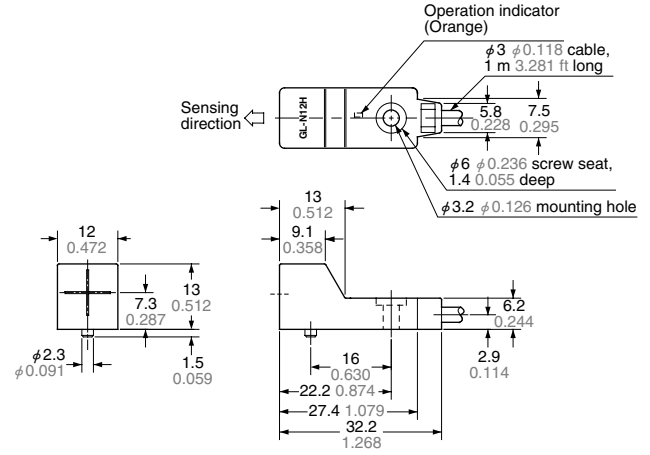
# GL-N12

## DIMENSIONS (Unit: mm in)

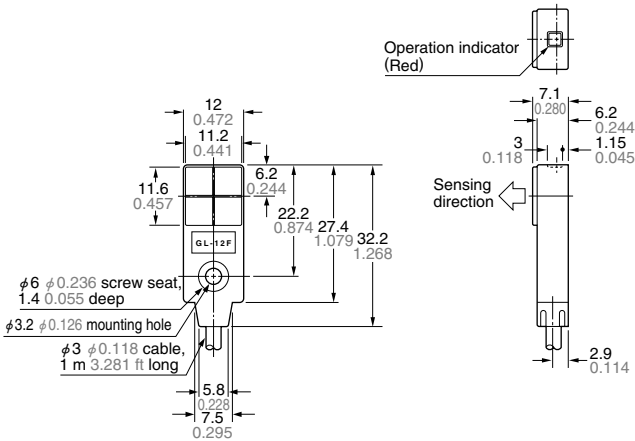
### GL-N12F $\square$ X 10 Sensor



### GL-N12H $\square$ X 10 Sensor

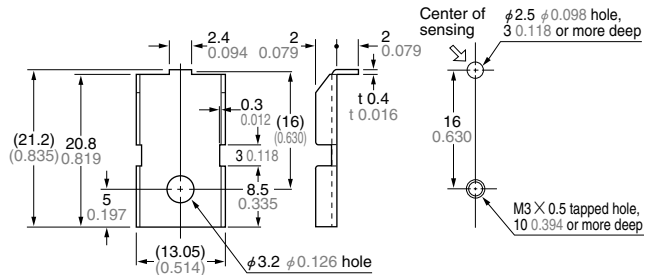


### GL-12F X 10 Sensor



### MS-GL12 X 10 Sensor mounting bracket (Optional)

#### Mounting hole dimensions



Material: Cold rolled carbon steel (SPCC)  
(Nickel plated)

1 pc. each of M3 (length 12 mm 0.472 in) pan head screw, plain washer, spring washer and rubber washer ( $\phi 9.5 \times t 0.5$  mm  $\phi 0.374 \times t 0.020$  in) is attached.