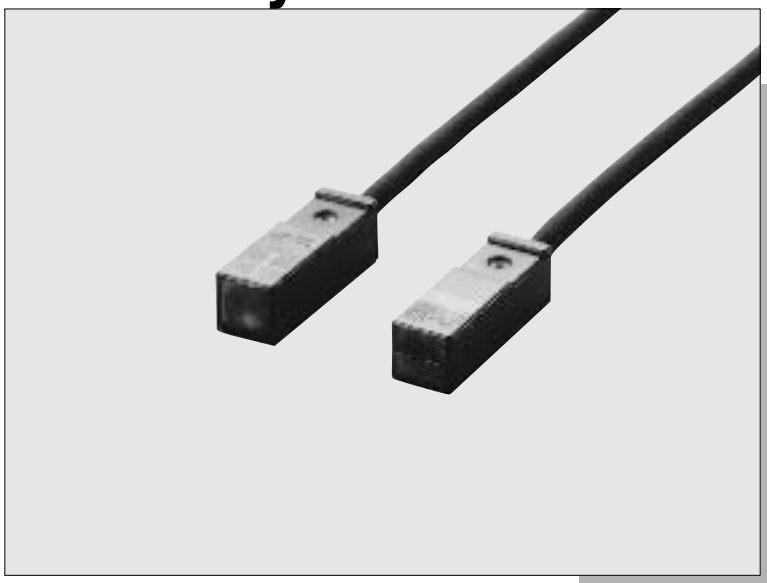
GL-6 SERIES

Miniature Inductive Proximity Sensor

EN FIN DE VIE

Amplifier Built-in

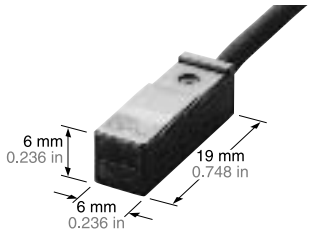


High performance in surprisingly small body at low cost

CE Conforming to EMC Directive

Extremely small

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

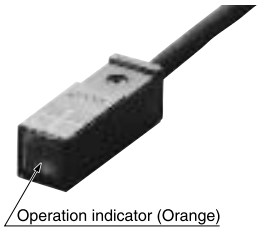


Low price

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

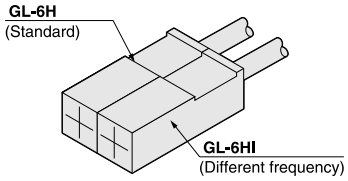
Operation indicator

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



Close mounting

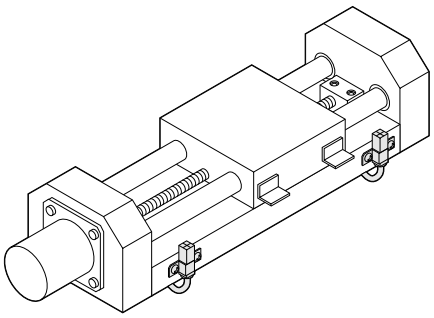
Two sensors can be mounted close together because different frequency type are available.



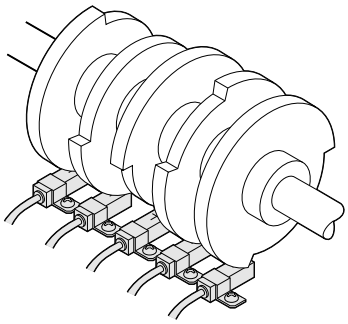
GL-6

APPLICATIONS

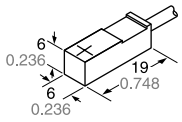
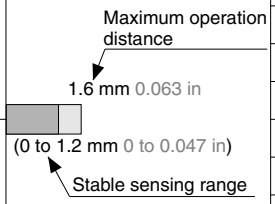
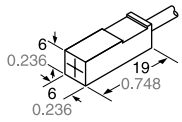
Observing table over-run



Sensing cam positions



ORDER GUIDE

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

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

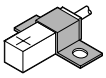
5 m 16.404 ft cable length type (standard: 1m 3.281 ft) is also available.

• Table of Model Nos.

Type	Standard	5 m 16.404 ft cable length type
Front sensing	**GL-6F**	**GL-6F-C5**
	GL-6FI	**GL-6FI-C5**
	GL-6FB	**GL-6FB-C5**
	GL-6FIB	———
Top sensing	**GL-6H**	**GL-6H-C5**
	GL-6HI	**GL-6HI-C5**
	GL-6HB	**GL-6HB-C5**
	GL-6HIB	———

Accessory

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

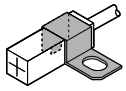


OPTION

Designation	Model No.	Description
Sensor mounting bracket	**MS-GL6-2**	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

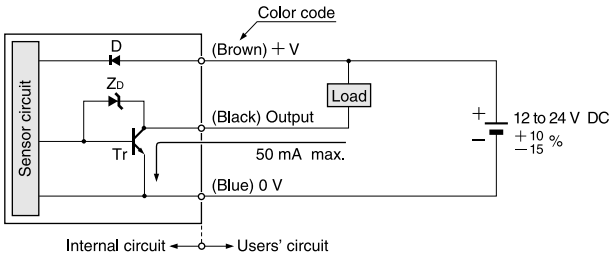
SPECIFICATIONS

Item \ Type	Miniature							
	Front sensing				Top sensing			
		Different frequency		Different frequency		Different frequency		Different frequency
Model No.	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 $^{+10}_{-15}$ % 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 closed	
Max. response frequency	400 Hz							
Operation indicator	Orange LED (lights up when the output is ON)							
Environmental resistance: Pollution degree	3 (Industrial environment)							
Environmental resistance: Protection	IP67 (IEC), IP67g (JEM)							
Environmental resistance: Ambient temperature	− 10 to + 55 °C + 14 to + 131 °F, Storage: − 30 to + 80 °C − 22 to + 176 °F							
Environmental resistance: Ambient humidity	45 to 85 % RH, Storage: 35 to 95 % RH							
Environmental resistance: EMC	EN 50081-2, EN 50082-2, EN 60947-5-2							
Environmental resistance: Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure							
Environmental resistance: Insulation resistance	50 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure							
Environmental resistance: Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each							
Environmental resistance: Shock resistance	1,000 m/s² acceleration (100 G approx.) in X, Y and Z directions for three times each							
Sensing range variation: Temperature characteristics	Over ambient temperature range − 10 to + 55 °C + 14 to + 131 °F: within ± 10 % of sensing range at 20 °C + 68 °F							
Sensing range variation: Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage							
Material	Enclosure: Polyalylate							
Cable	0.08 mm² 3-core oil, heat and cold resistant cabtyre cable, 1 m 3.281 ft long							
Cable extension	Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.							
Weight	10 g approx.							
Accessory	**MS-GL6-1** (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.

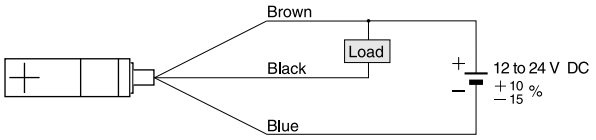
I/O CIRCUIT AND WIRING DIAGRAMS

I/O circuit diagram



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

Wiring diagram

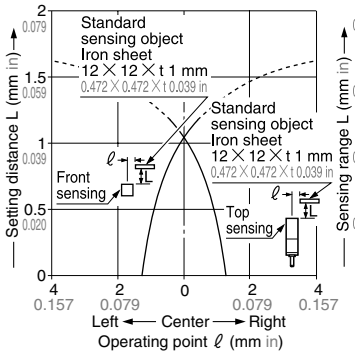


Note: The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

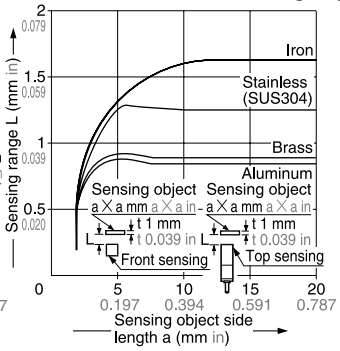
GL-6

SENSING CHARACTERISTICS (TYPICAL)

Sensing field



Correlation between sensing object size and sensing range



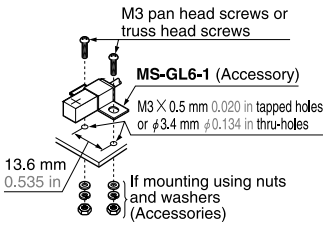
As the sensing object size becomes smaller than the standard size (iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in), the sensing range shortens as shown in the left figure.

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

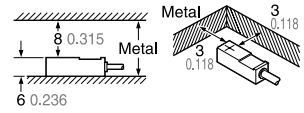
- Mount the sensor with the attached sensor mounting bracket **MS-GL6-1** or the optional sensor mounting bracket **MS-GL6-2.**
- Screws, nuts or washers are not supplied. Please arrange them separately.
- To mount the sensor with a nut, the hole diameter should be ϕ3.4 mm ϕ0.134 in.



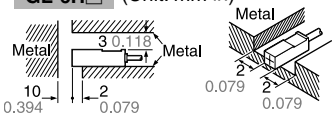
Influence of surrounding metal

- 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

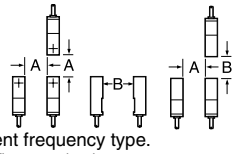
- The output does not incorporate a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

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

GL-6F□ **GL-6H□**



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 × 12 × t 1mm 0.472 × 0.472 × 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 changes if the sensing object is smaller than the standard sensing object (iron sheet 12 × 12 × t 1 mm 0.472 × 0.472 × t 0.039 in) or if the sensing object is plated.

Correction coefficient

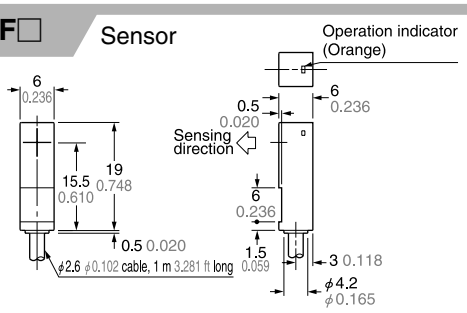
Model No. / Metal	GL-6F□ GL-6H□
Iron	1
Stainless steel (SUS304)	0.76 approx.
Brass	0.55 approx.
Aluminum	0.52 approx.

Others

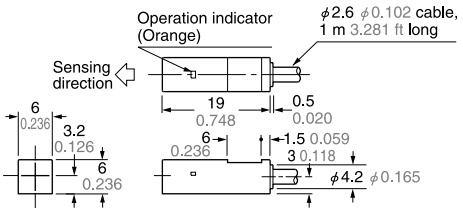
- Do not use during the initial transient time (50 ms) after the power supply is switched on.

DIMENSIONS (Unit: mm in)

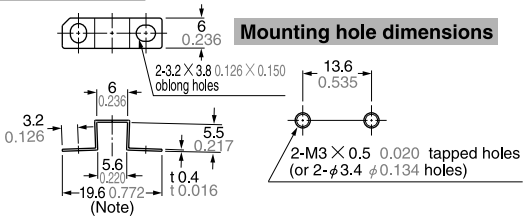
GL-6F□ Sensor



GL-6H□ Sensor

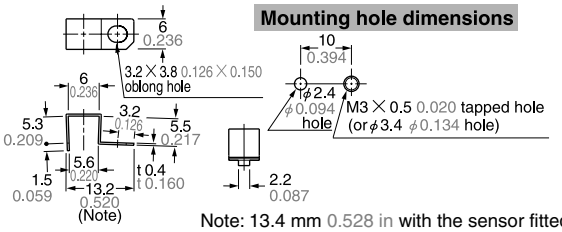


MS-GL6-1 Sensor mounting bracket (Accessory)



Note: 20 mm 0.787 in with the sensor fitted.

MS-GL6-2 Sensor mounting bracket (Optional)

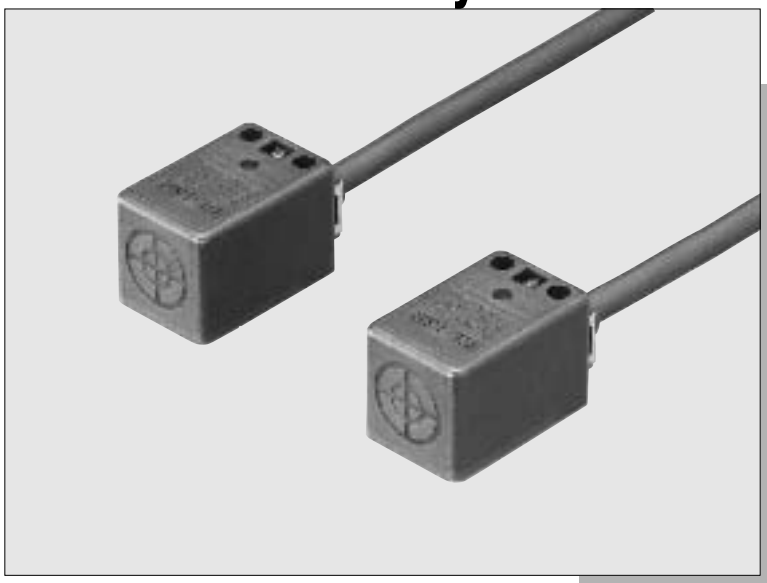


Note: 13.4 mm 0.528 in with the sensor fitted.

GL-18H/18HL SERIES

Rectangular-shaped Top Sensing Inductive Proximity Sensor

Amplifier Built-in



High performance sensing at a low price

CE Conforming to EMC Directive

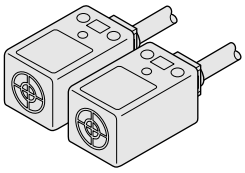
Low price

It provides high performance at a low price.

Different frequency type

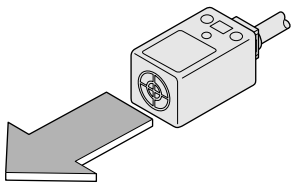
Two sensors can be mounted close together because different frequency types are available.

(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

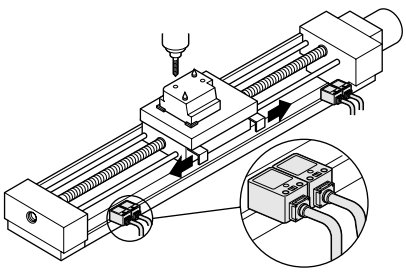
GL-18HL□ offers a long sensing range of 12 mm 0.472 in.
(**GL-18H**□: 5 mm 0.197 in)



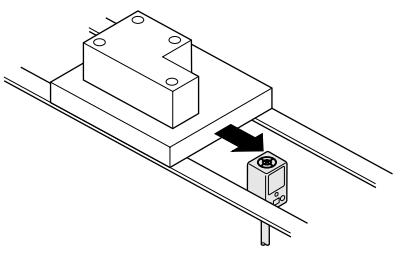
12 mm
0.472 in

APPLICATIONS

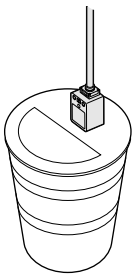
Detecting over-run of moving table



Positioning metal pallet

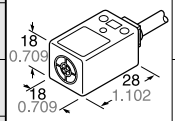


Detecting aluminum lid



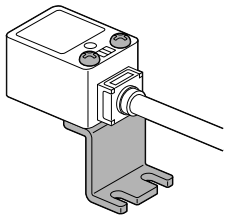
GL-18H/18HL

ORDER GUIDE

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

Accessory
• **MS-GL18HL**
(Sensor mounting bracket)



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

SPECIFICATIONS

Item \ Type		Standard			Long sensing range		
			Different frequency			Different frequency	
Model No.		**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 • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less (at 100 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 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/s² acceleration (100 G approx.) in X, Y and Z directions for three times each					
Sensing range variation	Temperature characteristics	Over ambient temperature range − 25 to + 70 °C − 13 to + 158 °F: within ± 10 % of sensing range at 20 °C + 68 °F					
	Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage					
Material		Enclosure: Polyalylate					
Cable		0.3 mm² 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 mm², or more, cable.					
Weight		45 g approx.					
Accessory		———			**MS-GL18HL** (Sensor mounting bracket): 1 set		

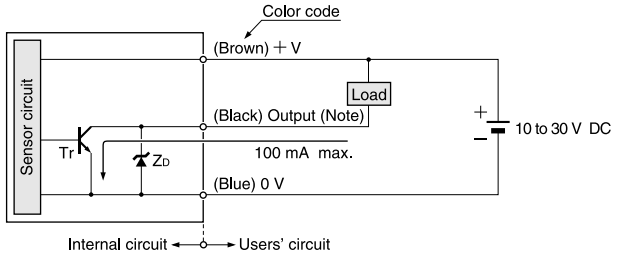
Note: The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or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

GL-18H/18HL

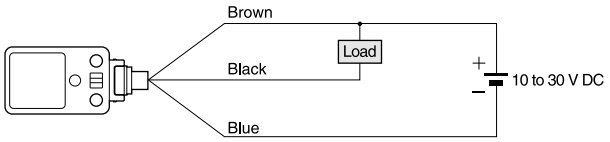
I/O CIRCUIT AND WIRING DIAGRAMS

GL-18H□ GL-18HL□

I/O circuit diagram



Wiring diagram



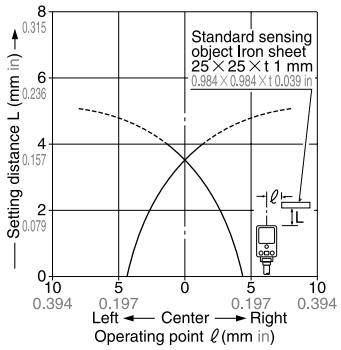
Note: Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated.
Further, the output is not incorporated with a short-circuit protection circuit.
Do not connect it directly to a power supply or a capacitive load.

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

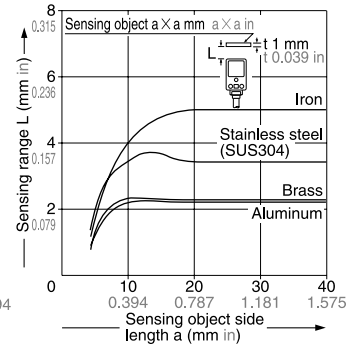
SENSING CHARACTERISTICS (TYPICAL)

GL-18H□

Sensing field



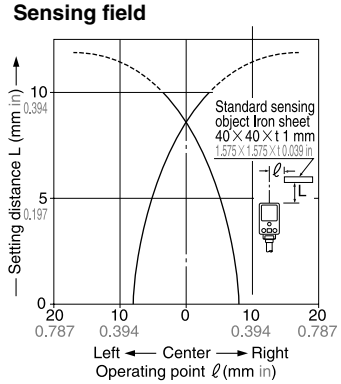
Correlation between sensing object size and sensing range



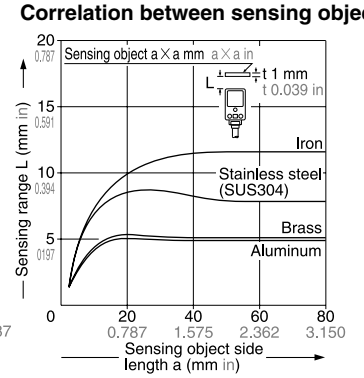
As the sensing object size becomes smaller than the standard size (iron sheet 25×25×t 1 mm 0.984×0.984×t 0.039 in), the sensing range shortens as shown in the left figure.

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 40×40×t 1 mm 1.575×1.575×t 0.039 in), the sensing range shortens as shown in the left figure.

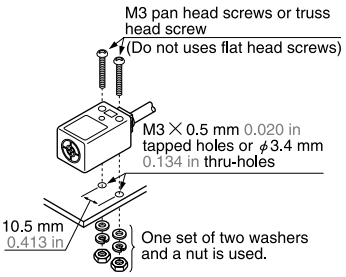
GL-18H/18HL

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.

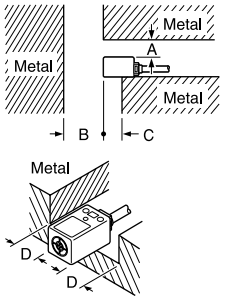
Mounting

- The tightening torque should be 0.5 N·m or less.
- To mount the sensor with a nut, the thru-hole diameter should be ϕ3.4 mm ϕ0.134 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.



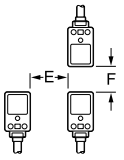
	GL-18H□	GL-18HL□
A	5 mm 0.197 in	25 mm 0.984 in
B	20 mm 0.787 in	60 mm 2.362 in
C	0 mm 0 in	20 mm 0.787 in (Note)
D	5 mm 0.197 in	30 mm 1.181 in

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.

Sensing range

- The sensing range is specified for the standard sensing object. With a non-ferrous metal, the sensing range is obtained by multiplying with the correction coefficient specified below. Further, the sensing range also changes if the sensing object is plated.

Correction coefficient

Metal \ Model No.	GL-18H□	GL-18HL□
Iron	1	1
Stainless steel (SUS304)	0.68 approx.	0.65 approx.
Brass	0.45 approx.	0.42 approx.
Aluminum	0.43 approx.	0.41 approx.

Wiring

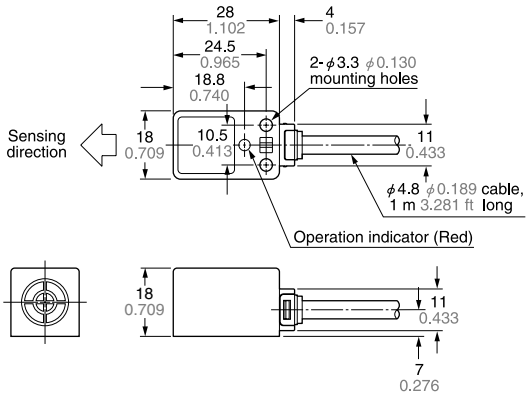
- Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated.
Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

Others

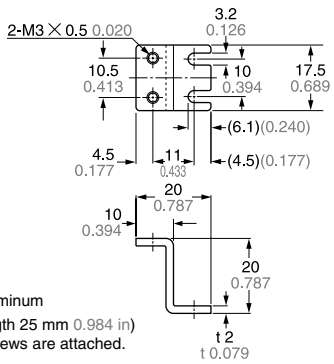
- Do not use during the initial transient time (50 ms) after the power supply is switched on.

DIMENSIONS (Unit: mm in)

GL-18H□ GL-18HL□ Sensor



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

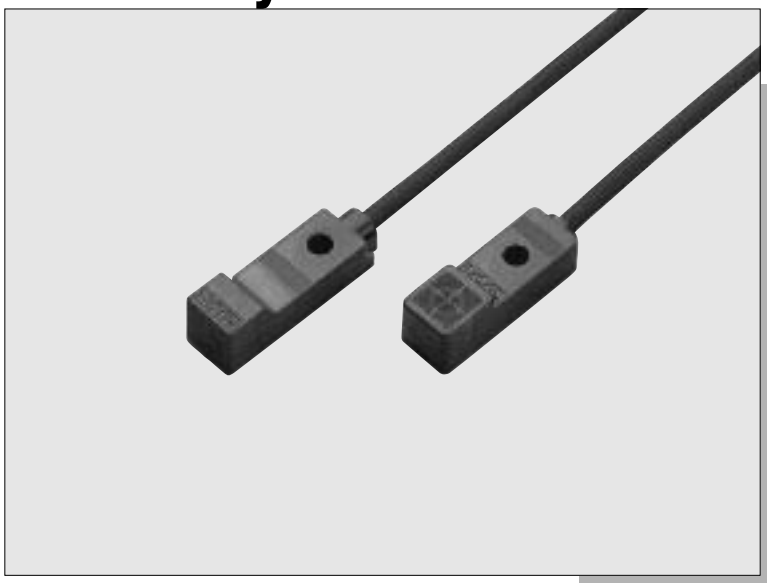


Material: Aluminum
Two M3 (length 25 mm 0.984 in) pan head screws are attached.

GL-8/8U SERIES

Low Price & Compact Inductive Proximity Sensor

Amplifier Built-in



Wide variety!
Low price!

CE Conforming to EMC Directive

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.

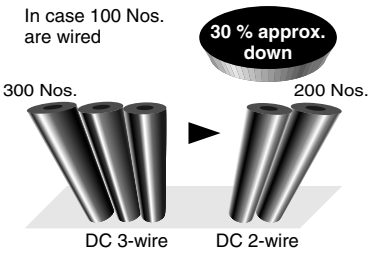
The **GL-8/8U** series is available in units of ten sensors.

Easy handling DC 3-wire type

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

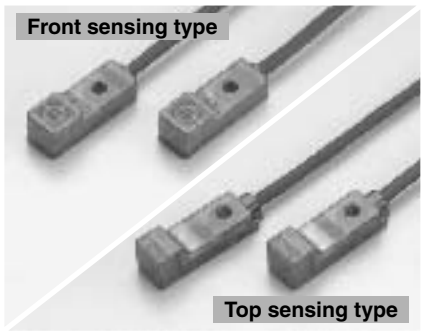
Energy-efficient and wire-saving DC 2-wire type

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



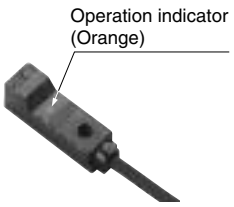
Wide variety

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.



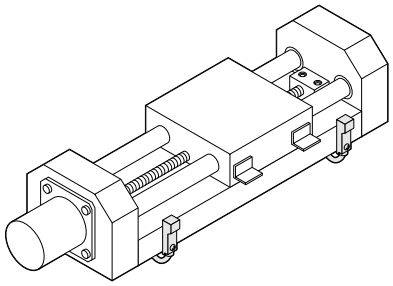
Waterproof

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

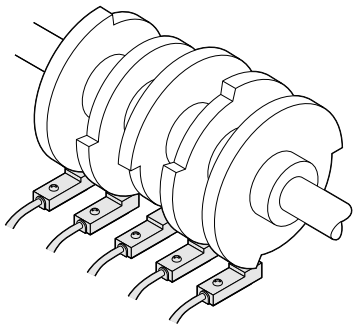
GL-8/8U

APPLICATIONS

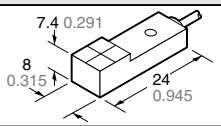
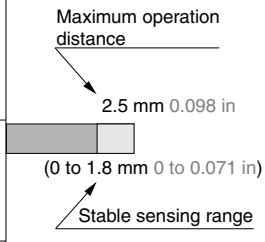
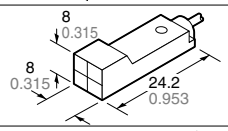
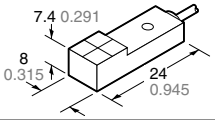
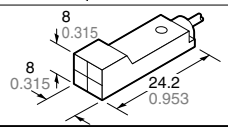
Detecting table over-run



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
				GL-8FB ✕ 10		
				GL-8FIB ✕ 10		
	Top sensing			**GL-8H ✕ 10**		Normally open
				GL-8HI ✕ 10		
				GL-8HB ✕ 10		Normally closed
				GL-8HIB ✕ 10		
DC 2-wire	Front sensing			**GL-8FU ✕ 10**	Non-contact DC 2-wire type	Normally open
				GL-8FUI ✕ 10		
				GL-8FUB ✕ 10		Normally closed
				GL-8FUIB ✕ 10		
	Top sensing			**GL-8HU ✕ 10**		Normally open
				GL-8HUI ✕ 10		
				GL-8HUB ✕ 10		Normally closed
				GL-8HUIB ✕ 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 & 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	———
	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	———
	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	———

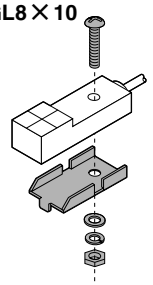
GL-8/8U

OPTION

Designation	Model No.
Sensor mounting bracket	**MS-GL8 × 10**

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

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.

SPECIFICATIONS

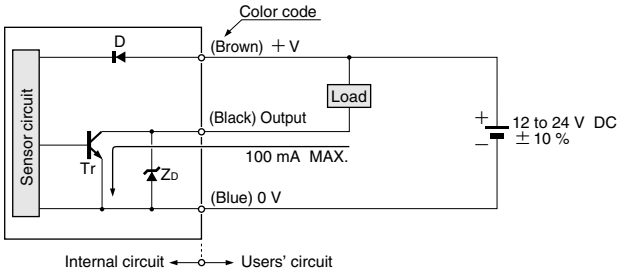
Item \ Type		DC 3-wire type				DC 2-wire type			
		Front sensing		Top sensing		Front sensing		Top sensing	
	Model No.	**GL-8F × 10**	**GL-8FB × 10**	**GL-8H × 10**	**GL-8HB × 10**	**GL-8FU × 10**	**GL-8FUB × 10**	**GL-8HU × 10**	**GL-8HUB × 10**
	Different frequency	**GL-8FI × 10**	**GL-8FIB × 10**	**GL-8HI × 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/s² acceleration (100 G approx.) in X, Y and Z directions for three times each							
Sensing range variation	Temperature characteristics	Over ambient temperature range − 25 to + 70 °C − 13 to + 158 °F: within $^{+15}_{-10}$% of sensing range at + 20 °C + 68 °F							
	Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage							
Material		Enclosure: Polyalylate							
Cable		0.15 mm² 3-core cabtyre cable, 1 m 3.281 ft long				0.15 mm² 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 mm², or more, cable.				Extension up to total 50 m 164.042 ft is possible with 0.3 mm², 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

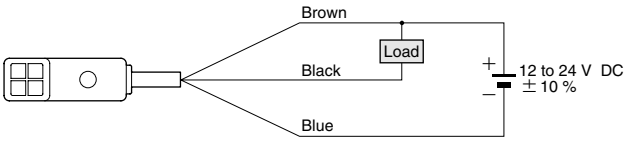
DC 3-wire type

I/O circuit diagram

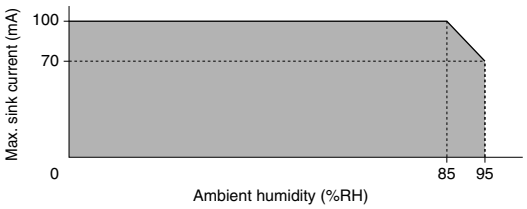


Symbols ... D : Reverse supply polarity protection diode
Z_D: Surge absorption zener diode
Tr : NPN output transistor

Wiring diagram

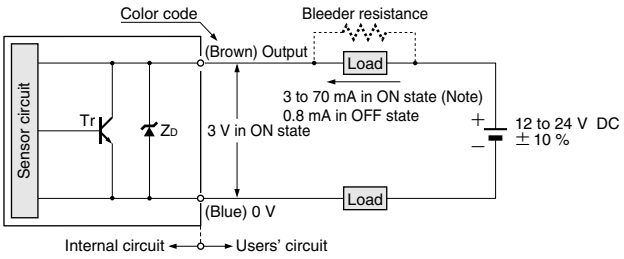


Note: When the ambient temperature is + 60 °C to + 70 °C + 140 °F to + 158 °F, the maximum sink current varies depending on the ambient humidity.



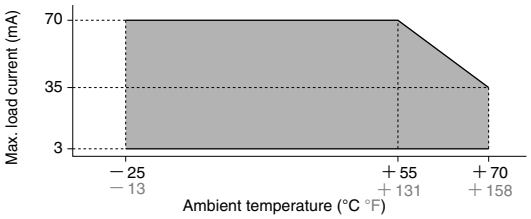
DC 2-wire type

I/O circuit diagram

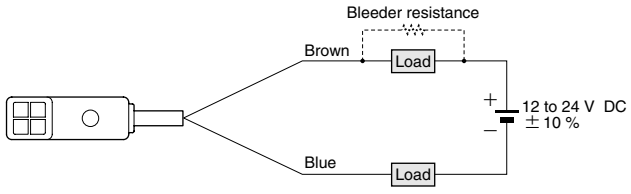


Symbols ... Z_D: Surge absorption zener diode
Tr : NPN output transistor

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



Wiring diagram



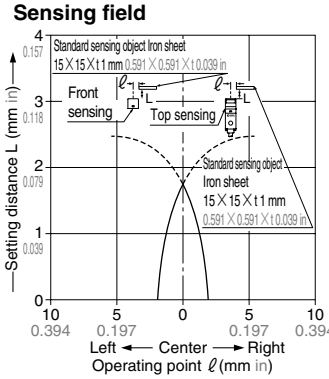
Conditions for the load

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.)

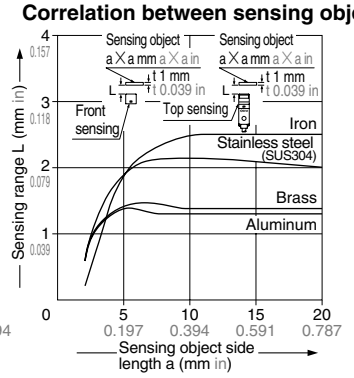
GL-8/8U

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 × 15 × t 1 mm 0.591 × 0.591 × t 0.039 in), the sensing range shortens as shown in the left figure.

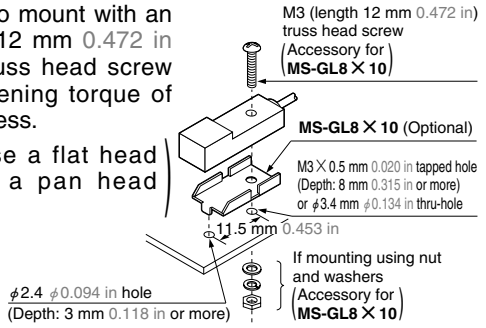
PRECAUTIONS FOR PROPER USE

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.

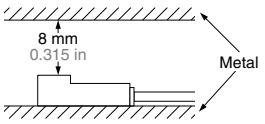
  Do not use a flat head screw or a pan head screw.

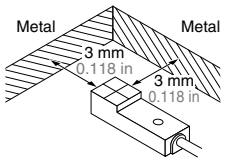


Influence of surrounding metal

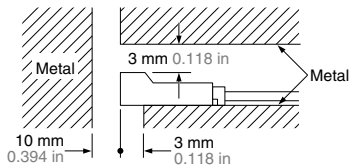
- When there is a metal near the sensor, keep the minimum separation distance specified below.

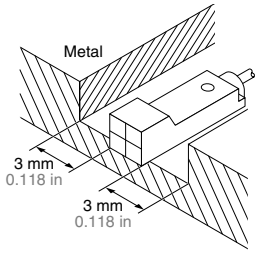
GL-8F□×10, GL-8FU□×10





GL-8H□×10, GL-8HU□×10

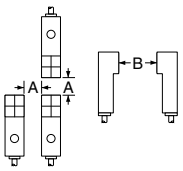




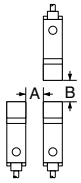
Mutual interference prevention

- 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 × 15 × t 1 mm 0.591 × 0.591 × 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 changes if the sensing object is smaller than the standard sensing object (iron sheet 15×15×t 1 mm 0.591×0.591×t 0.039 in) or if the sensing object is plated.

Correction coefficient

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

GL-8/8U

PRECAUTIONS FOR PROPER USE

Wiring

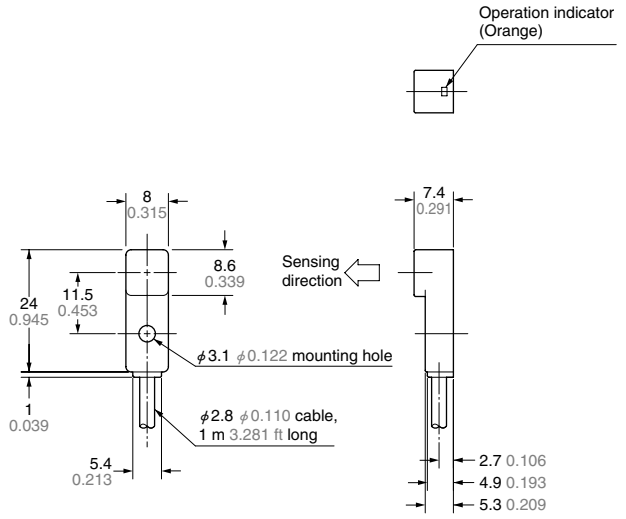
- Make sure that the power supply is off while wiring.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating 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

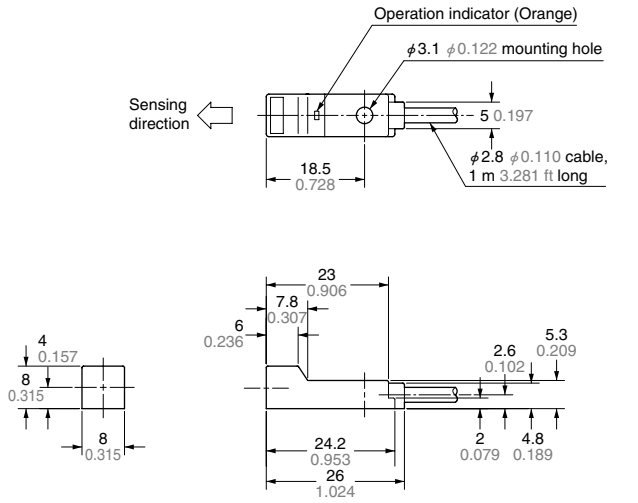
- Do not use during the initial transient time [200 ms (DC 2-wire type: 50 ms)] after the power supply is switched on.
- Take care that the sensor does not come in direct contact with oil, grease, or organic solvents, such as, thinner, etc.
- Make sure that the sensing end is not covered with metal dust,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

DIMENSIONS (Unit: mm in)

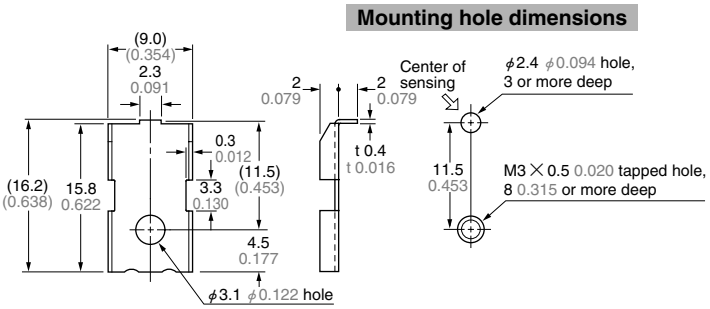
GL-8F□×10 GL-8FU□×10 Sensor



GL-8H□×10 GL-8HU□×10 Sensor



MS-GL8×10 Sensor mounting bracket (Optional)



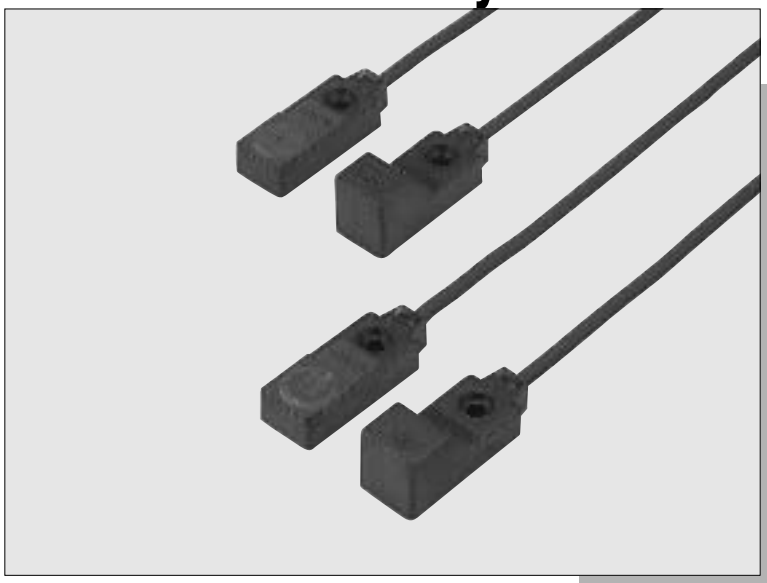
Material: Stainless steel (SUS304)

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

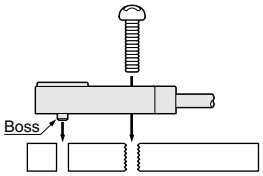


Wide variety with total cost reduction!

CE Conforming to EMC Directive

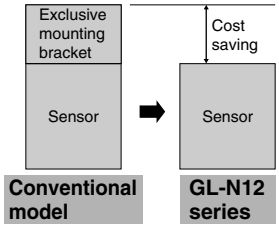
Exclusive mounting bracket is needless

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

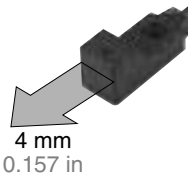
A wide variety of 16 types, front sensing type / top sensing type, normally open type / normally closed type, as well as, different frequency type, PNP output type, etc., is available.
You can choose from the vastly increased variety to suit your application.


Front sensing type


Top sensing type

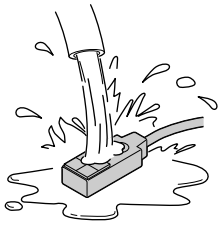
Long sensing range

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

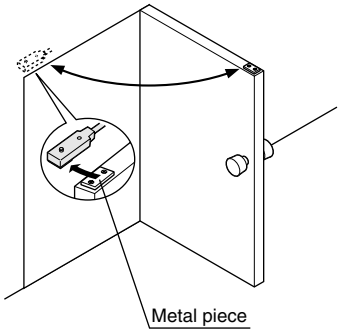
Since the sensor has IP67 protection, it can withstand water splashes.



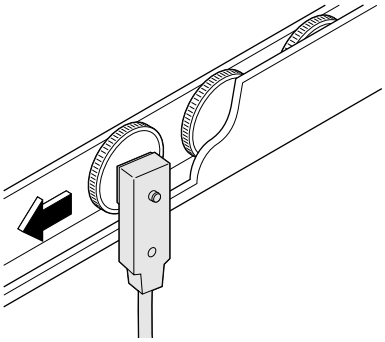
GL-N12

APPLICATIONS

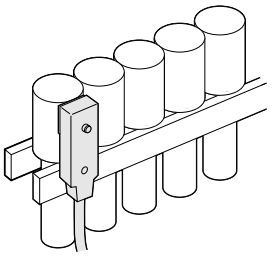
Confirming shutting / opening of door



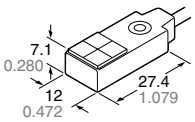
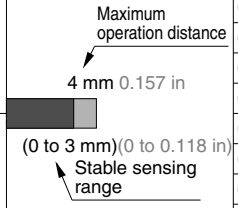
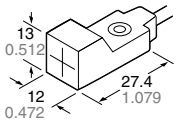
Detecting rolling coins



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	Front sensing	NPN output			**GL-N12F X 10**	NPN open-collector transistor	Normally open
					GL-N12FI X 10		
					GL-N12FB X 10		Normally closed
					GL-N12FIB X 10		
		PNP output			**GL-N12F-P X 10**	PNP open-collector transistor	Normally open
					GL-N12FI-P X 10		
					GL-N12FB-P X 10		Normally closed
					GL-N12FIB-P X 10		
	Top sensing	NPN output			**GL-N12H X 10**	NPN open-collector transistor	Normally open
					GL-N12HI X 10		
					GL-N12HB X 10		Normally closed
					GL-N12HIB X 10		
		PNP output			**GL-N12H-P X 10**	PNP open-collector transistor	Normally open
					GL-N12HI-P X 10		
					GL-N12HB-P X 10		Normally closed
					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.

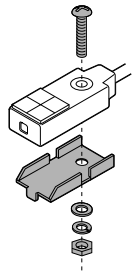
GL-N12

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-12F × 10** (Front sensing type) (cable length: 1 m 3.281 ft)
GL-12F-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 (ϕ9.5 × t 0.5 mm ϕ0.374 × 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	**GL-N12F × 10**	**GL-N12F-C5 × 10**
			GL-N12FI × 10	**GL-N12FI-C5 × 10**
			GL-N12FB × 10	**GL-N12FB-C5 × 10**
			GL-N12FIB × 10	—
		PNP output	**GL-N12F-P × 10**	—
			GL-N12FI-P × 10	—
			GL-N12FB-P × 10	—
			GL-N12FIB-P × 10	—
	Top sensing	NPN output	**GL-N12H × 10**	**GL-N12H-C5 × 10**
			GL-N12HI × 10	**GL-N12HI-C5 × 10**
			GL-N12HB × 10	**GL-N12HB-C5 × 10**
			GL-N12HIB × 10	—
		PNP output	**GL-N12H-P × 10**	**GL-N12H-P-C5 × 10**
			GL-N12HI-P × 10	—
			GL-N12HB-P × 10	**GL-N12HB-P-C5 × 10**
			GL-N12HIB-P × 10	—

GL-N12

SPECIFICATIONS

Item	Type	Boss type							
		NPN output				PNP output			
		Front sensing		Top sensing		Front sensing		Top sensing	
			Different frequency		Different frequency		Different frequency		Different frequency
Model No.	Normally open	GL-N12F X10 (Note 1)	GL-N12FI X10	GL-N12H X10	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 • Maximum sink current: 100 mA • 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)				PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1 V or less (at 100 mA source current) 0.4 V or less (at 16 mA source current)			
	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							
	Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each							
	Shock resistance	1,000 m/s² (100 G approx.) acceleration 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 $^{+15}_{-10}$ % of sensing range at 20 °C + 68 °F							
	Voltage characteristics	Within ± 2 % for ± 10 % fluctuation of the supply voltage							
Material		Enclosure: Polyalylate							
Cable		0.18 mm² 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 mm², or more, cable.							
Weight		20 g approx.							

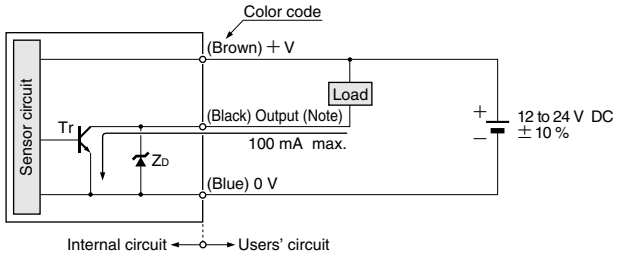
Notes: 1) The without boss type is also available.
The specifications are the same as for the with boss type. (However, max. response frequency: 500 Hz, operation indicator: Red LED)
2) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing 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

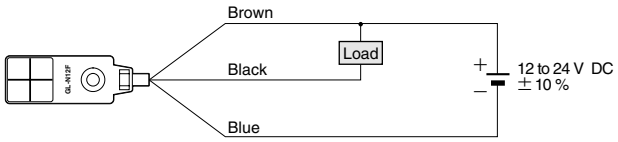
I/O circuit diagram



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

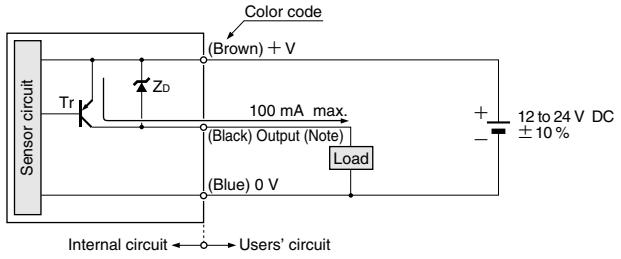
Note: Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated.
Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

Wiring diagram



PNP output type

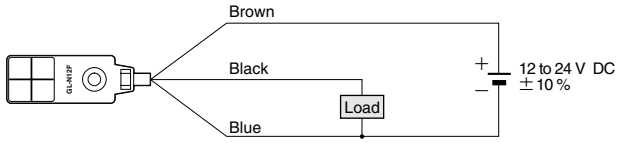
I/O circuit diagram



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

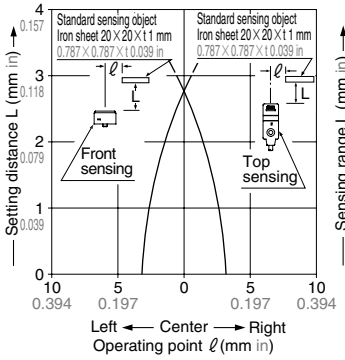
Note: Please carry out the wiring carefully since protection circuit against reverse power supply connection is not incorporated.
Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.

Wiring diagram

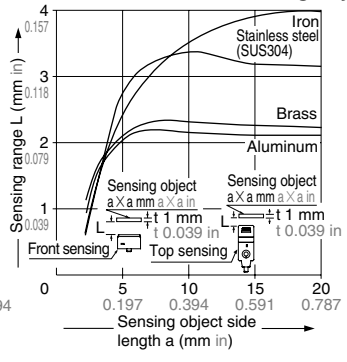


SENSING CHARACTERISTICS (TYPICAL)

Sensing field



Correlation between sensing object size and sensing range



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

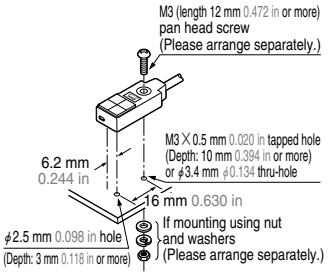
GL-N12

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 ϕ3.4 mm ϕ0.134 in. Further, the hole in which the boss is inserted should be ϕ2.5 mm ϕ0.098 in and 3 mm 0.118 in, or more, deep.

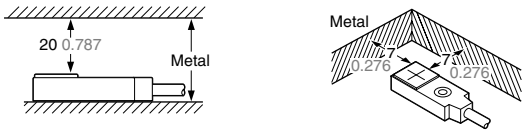


Influence of surrounding metal

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

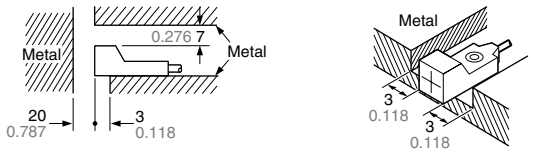
GL-N12F□×10

(Unit: mm in)



GL-N12H□×10

(Unit: mm in)

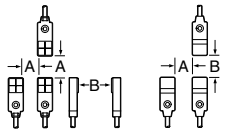


Mutual interference prevention

- 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	
	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

GL-N12F□×10 GL-N12H□×10



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 × 20 × t1mm 0.787 × 0.787 × 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 × 20 × t 1 mm 0.787 × 0.787 × t 0.039 in) or if the sensing object is plated.

Correction coefficient

Metal \ Model No.	GL-N12F□×10 GL-N12H□×10
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.

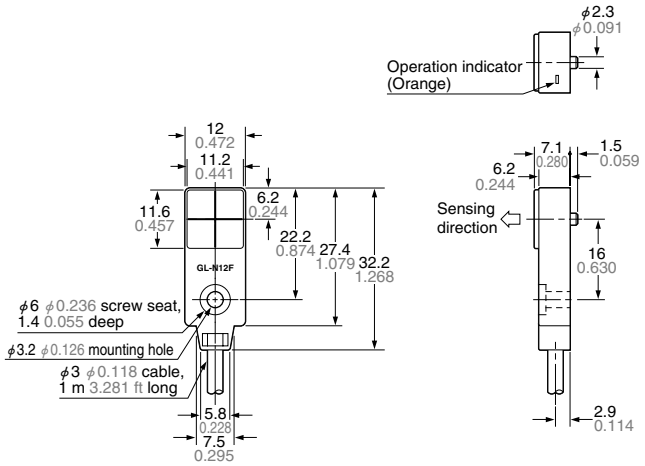
Others

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

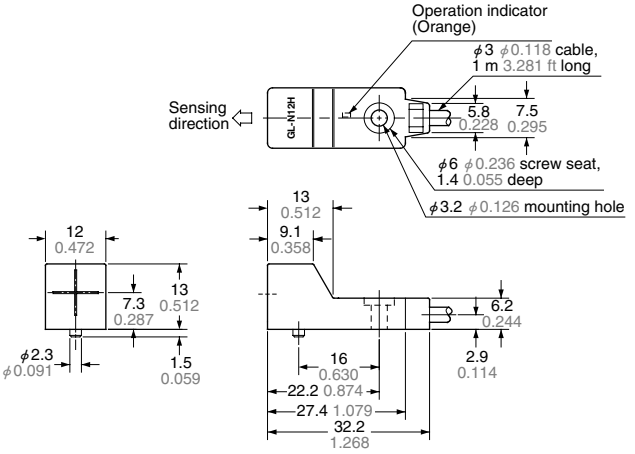
GL-N12

DIMENSIONS (Unit: mm in)

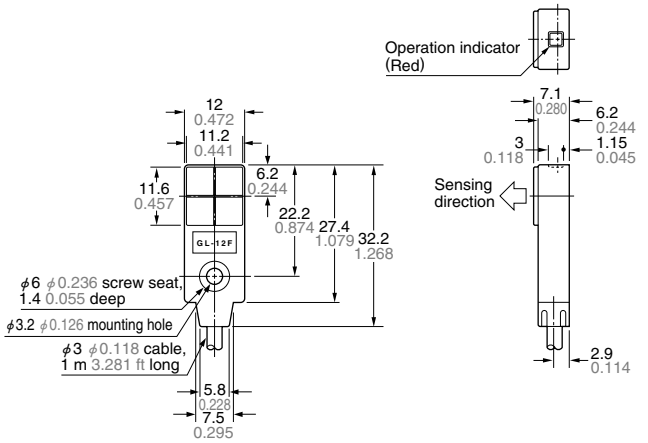
GL-N12F□×10 Sensor



GL-N12H□×10 Sensor

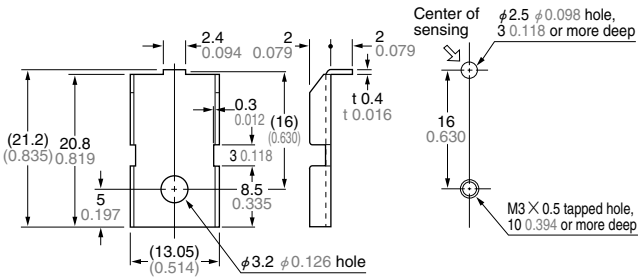


GL-12F×10 Sensor



MS-GL12×10 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 (ϕ9.5×t 0.5 mm ϕ0.374×t 0.020 in) is attached.