

Panasonic

NEW

Compact

Laser Displacement Sensor

New models

Measure distances as long as 250mm

Diffuse reflection type

Ideal for measuring mirrored objects

Specular reflection type

Diffuse reflection type HL-G125□

Specular reflection type HL-G10□A□

CE
Conforming to
EMC Directive

FDA
Conforming to
FDA regulations



Extensive selection

A total of 8 models accommodate a variety of applications



Diffuse reflection type

HL-G103□

Measurement range: $30 \pm 4 \text{ mm}$ $1.181 \pm 0.157 \text{ in}$
 Resolution: $0.5 \mu\text{m}$ 0.020 mil
 Linearity: $\pm 0.1 \% \text{ F.S.}$
 Beam diameter: $0.1 \times 0.1 \text{ mm}$ $0.004 \times 0.004 \text{ in}$



Controlling the height of a dispenser nozzle

Specular reflection type

HL-G103A□ NEW

Measurement range: $26.3 \pm 2 \text{ mm}$ $1.035 \pm 0.079 \text{ in}$
 Resolution: $0.5 \mu\text{m}$ 0.020 mil
 Linearity: $\pm 0.2 \% \text{ F.S.}$
 Beam diameter: $0.1 \times 0.1 \text{ mm}$ $0.004 \times 0.004 \text{ in}$



Measuring HDD surface fluctuation

Diffuse reflection type

HL-G105□

Measurement range: $50 \pm 10 \text{ mm}$ $1.969 \pm 0.394 \text{ in}$
 Resolution: $1.5 \mu\text{m}$ 0.059 mil
 Linearity: $\pm 0.1 \% \text{ F.S.}$
 Beam diameter: $0.5 \times 1.0 \text{ mm}$ $0.020 \times 0.039 \text{ in}$



Inspecting processed food quantities

Specular reflection type

HL-G105A□ NEW

Measurement range: $47.3 \pm 5 \text{ mm}$ $1.862 \pm 0.197 \text{ in}$
 Resolution: $1.5 \mu\text{m}$ 0.059 mil
 Linearity: $\pm 0.2 \% \text{ F.S.}$
 Beam diameter: $0.1 \times 0.1 \text{ mm}$ $0.004 \times 0.004 \text{ in}$



Positioning of wafer

Diffuse reflection type

HL-G108□

Measurement range: $85 \pm 20 \text{ mm}$ $3.346 \pm 0.787 \text{ in}$
 Resolution: $2.5 \mu\text{m}$ 0.098 mil
 Linearity: $\pm 0.1 \% \text{ F.S.}$
 Beam diameter: $0.75 \times 1.25 \text{ mm}$ $0.030 \times 0.049 \text{ in}$



Detecting presence of O-ring

Specular reflection type

HL-G108A□ NEW

Measurement range: $82.9 \pm 10 \text{ mm}$ $3.264 \pm 0.394 \text{ in}$
 Resolution: $2.5 \mu\text{m}$ 0.098 mil
 Linearity: $\pm 0.2 \% \text{ F.S.}$
 Beam diameter: $0.2 \times 0.2 \text{ mm}$ $0.008 \times 0.008 \text{ in}$

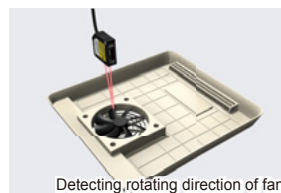


Measuring the eccentricity of a metal shaft

Diffuse reflection type

HL-G112□

Measurement range: $120 \pm 60 \text{ mm}$ $4.724 \pm 2.362 \text{ in}$
 Resolution: $8 \mu\text{m}$ 0.315 mil
 Linearity: $\pm 0.1 \% \text{ F.S.}$
 Beam diameter: $1.0 \times 1.5 \text{ mm}$ $0.039 \times 0.059 \text{ in}$

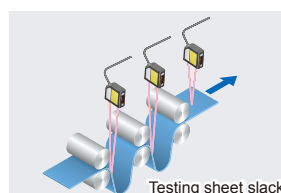


Detecting rotating direction of fan

Diffuse reflection type

HL-G125□ NEW

Measurement range: $250 \pm 150 \text{ mm}$ $9.843 \pm 5.906 \text{ in}$
 Resolution: $20 \mu\text{m}$ 0.787 mil
 Linearity: $\pm 0.3 \% \text{ F.S.}$
 Beam diameter: $1.75 \times 3.5 \text{ mm}$ $0.069 \times 0.138 \text{ in}$



Testing sheet slack


SPECIFICATIONS

For more information about I/O circuit diagrams and communication specifications of the high-function type, refer to the **HL-G1** catalog or our website.

Item	Model No.	Type	Diffuse reflection type					Specular reflection type		
		Standard type	HL-G103-A-C5	HL-G105-A-C5	HL-G108-A-C5	HL-G112-A-C5	HL-G125-A-C5	HL-G103A-RA-C5	HL-G105A-RA-C5	HL-G108A-RA-C5
		High function type	HL-G103-S-J	HL-G105-S-J	HL-G108-S-J	HL-G112-S-J	HL-G125-S-J	HL-G103A-RS-J	HL-G105A-RS-J	HL-G108A-RS-J
Measurement center distance			30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 in	120 mm 4.724 in	250 mm 9.843 in	26.3 mm 1.035 in	47.3 mm 1.862 in	82.9 mm 3.264 in
Measuring range			±4 mm ±0.157 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±60 mm ±2.362 in	±150 mm ±5.906 in	±2 mm ±0.079 in	±5 mm ±0.197 in	±10 mm ±0.394 in
Resolution			0.5 μm 0.020 mil	1.5 μm 0.059 mil	2.5 μm 0.098 mil	8 μm 0.315 mil	20 μm 0.787 mil	0.5 μm 0.020 mil	1.5 μm 0.059 mil	2.5 μm 0.098 mil
Linearity			±0.1 % F.S.				±0.3 % F.S.	±0.2 % F.S.		
Temperature characteristics			±0.08 % F.S. / °C							
Light source			Red semiconductor laser, Class 2 (Class 1 for specular reflection type) (IEC / JIS / FDA, Laser Notice No. 50) Max. output: 1 mW (0.39mW for specular reflection type) Peak emission wavelength: 655 nm 0.026 mil							
Beam diameter (Note 2)			0.1 × 0.1 mm 0.004 × 0.004 in	0.5 ×1.0 mm 0.020 × 0.039 in	0.75 × 1.25 mm 0.030 × 0.049 in	1.0 × 1.5 mm 0.039 × 0.059 in	1.75 × 3.5 mm 0.069 × 0.138 in	0.1 × 0.1 mm 0.004 × 0.004 in		0.2 × 0.2 mm 0.008 × 0.008 in
Receiving element			CMOS image sensor							
Supply voltage			24 V DC ±10 % including ripple 0.5 V (P-P)							
Current consumption			100 mA max.							
Sampling rate			200 μs, 500 μs, 1 ms, 2 ms							
Analog output	Voltage		Output range: 0 to 10.5 V (normal) / 11 V (at alarm), Output impedance: 100 Ω							
	Current		Output range: 3.2 to 20.8 mA (normal) / 21.6 mA (at alarm), Load impedance: 300 Ω max.							
Output (OUT 1, OUT 2, OUT 3)			Judgment output or alarm output (setting selectable) NPN transistor, open-collector / PNP transistor, open-collector (selectable)							
			<In case of using NPN output> • Maximum sink current : 50 mA • Applied voltage : 3 to 24 V DC (between output and 0 V) • Residual voltage : 2 V or less (at 50 mA of sink current)				<In case of using PNP output> • Maximum source current : 50 mA • Residual voltage : 2.8 V or less (at 50 mA of source current)			
	Output operation		Open when the output is ON.							
	Short circuit protection		Incorporated (automatic restoration)							
Output polarity setting input			NPN open collector output operates when 0 V is connected. PNP open collector output operates when 24 V DC is connected.							
Timing input			NPN output operates when 0 V is connected and NPN is set (depending on settings). PNP output operates when external power + is connected and PNP is set (depending on settings).							
Multi input			Zero set, zero set off, reset, memory switching, teaching, saving, and laser control according to the input time. In case NPN output is selected, function varies according to the time 0 V is connected NPN. In case PNP output is selected, function varies according to the time external power + is connected.							
Communications interface (high-function type only)			RS-422 or RS-485 (selectable) Baud rate: 9,600 / 19,200 / 38,400 / 115,200 / 230,400 / 460,800 / 921,600 bps Data length 8 bit, stop bit length 1 bit, without parity check, BCC check, termination code: CR							
Indicator	Laser emission		Green LED (lights up during laser emission)							
	Alarm		Orange LED (lights up when this product cannot measure because of insufficient or excessive light intensity)							
	Output		Yellow LED x 3							
Digital display			Red LED 5.5 digit display							
Protection			IP67 (IEC)							
Ambient temperature			−10 to +45 °C +14 to +113 °F (No dew condensation), Storage: −20 to +60 °C −4 to +140 °F (No dew condensation)							
Material			Enclosure: PBT, front cover: acrylic, cable: PVC							
Cable			Standard type: 0.1 mm ² 10-core cabtyre cable, 5 m 16.404 ft long, high functionality type: 14-core cabtyre cable with connector, 0.5 m 1.640 ft long							
Cable extension			Extension up to total 20 m 65.617 ft is possible with optional cable (Cable for standard type cannot be extended).							
Weight	Standard type		Net weight: 70 g approx. (not including cable), 320 g approx. (including cable), gross weight: 380 g approx.							
	High functionality type		Net weight: 70 g approx. (not including cable), 110 g approx. (including cable), gross weight: 160 g approx.							
Accessory			Warning label: 1 set							

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were as follows: supply voltage 24 V DC, ambient temperature +20 °C +68 °F, sampling rate 500 µs, average number of samples: 1024, measurement center distance, object measured is made of white ceramic and analog measurement values.
2) This beam diameter is the size at the measurement center distance. These values were defined by using 1/e² (13.5 %) of the center light intensity. The results may be affected if there is a slight leakage of light outside the normal spot diameter and if the periphery surrounding the sensing point has a higher reflectivity than the sensing point itself.

OPTIONS

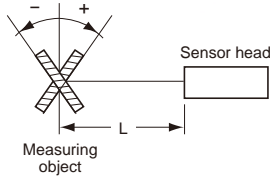
Type	Appearance	Model No.	Description	
Extension cable (for High function type)		HL-G1CCJ2	Length: 2 m 6.562 ft, Weight: 130 g approx.	14-core cabtyre cable with connector on both ends
		HL-G1CCJ5	Length: 5 m 16.404 ft, Weight: 320 g approx.	
		HL-G1CCJ10	Length: 10 m 32.808 ft, Weight: 630 g approx.	
		HL-G1CCJ20	Length: 20 m 65.617 ft, Weight: 1300 g approx.	

SENSING CHARACTERISTICS (TYPICAL)

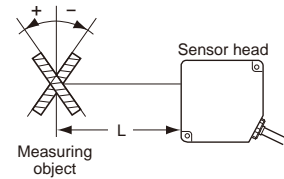
For sensing characteristics diagrams for the diffuse reflection type (other than the HL-G125□), refer to the HL-G1 catalog or our website.

Correlation between measuring distance and error characteristics

White ceramic
Vertical orientation



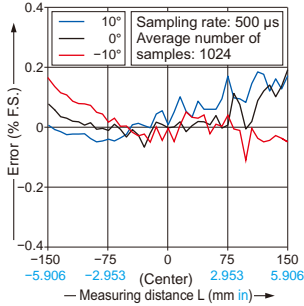
White ceramic
Horizontal orientation



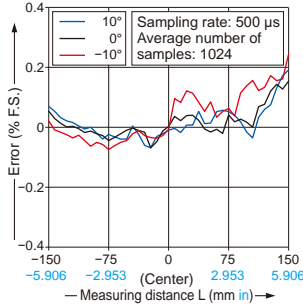
HL-G125□

Diffuse reflection type

Vertical positioning



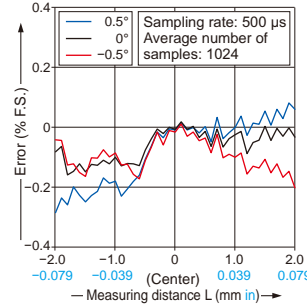
Horizontal positioning



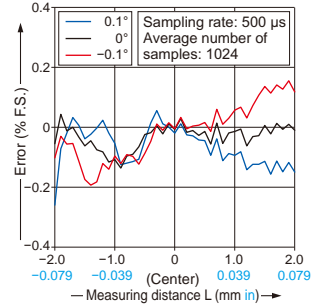
HL-G103A-R□

Specular reflection type

Vertical positioning



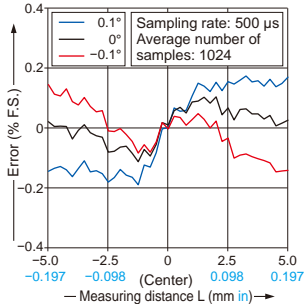
Horizontal positioning



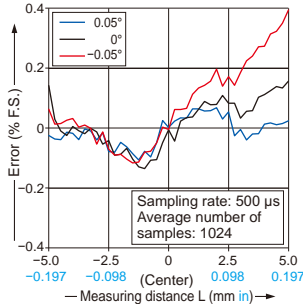
HL-G105A-R□

Specular reflection type

Vertical positioning



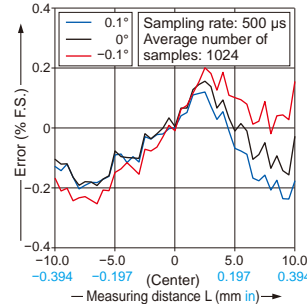
Horizontal positioning



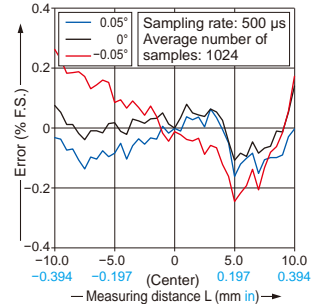
HL-G108A-R□

Specular reflection type

Vertical positioning



Horizontal positioning



PRECAUTIONS FOR PROPER USE

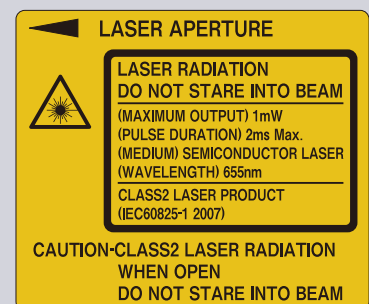


- This product has been developed / produced for industrial use.
- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.



- Do not operate products using methods other than the ones described in the instruction manual included with each product. Control or adjustment through procedures other than the ones specified may cause hazardous laser radiation exposure.
- The following label is attached to the product. Handle the product according to the instruction given on the warning label.
(The Japanese, English, Chinese, Korean warning label is packed with the sensor.)

- This product is classified as a Class 2 (specular reflection type: Class 1) Laser Product under IEC / JIS standards and FDA regulations. Do not look at the laser beam directly or through an optical system such as a lens.

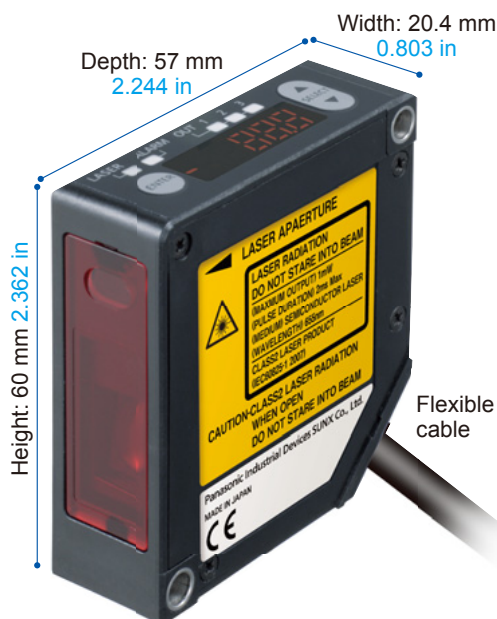
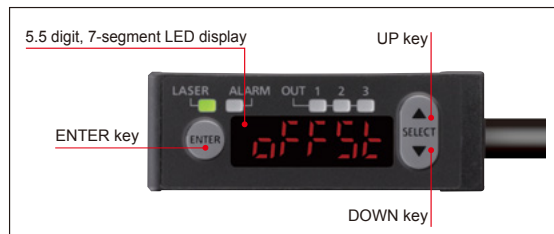


(A Class 2 label is shown above.)

A variety of high-end functions are included in a compact, self-contained body for exceptional ease of use

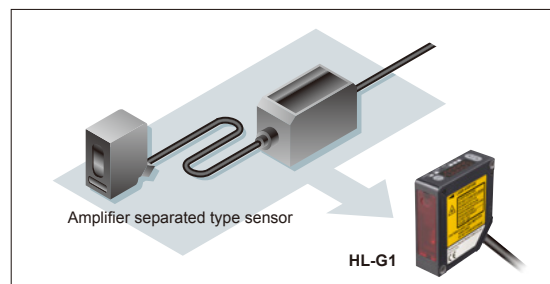
Easy input settings while looking at digital display

The built-in digital display makes it easy to perform sensor setting while checking displacement values.



Easy to embed in machines and production lines thanks to a built-in controller

Controller installation and mounting space is not required because controller function is included in sensor unit.



Lightweight body that can be installed on movable parts

Its lightweight resin body weighs 70 g approx., which can be installed on moving parts such as sliders and robot arms. Cable with superior flexibility is fitted as standard.

IP67 protective enclosure protects from water and dust

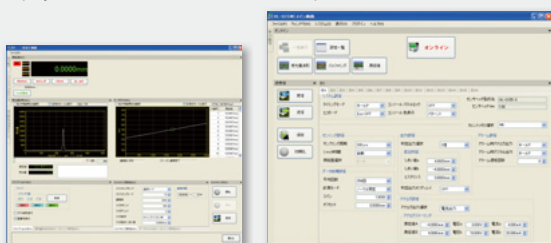
Thanks to its IP67 protective enclosure, the HL-G1 can be used in the presence of water and dust. Mounting holes are lined with metal sleeves, allowing the instrument to be tightened securely in place with up to 0.8 N·m of torque.



Software tool for sensor configuration and evaluation

In addition to configuring up to 16 sensors at once, this free tool makes it easy to gather data needed for analysis, such as received light waveform monitoring and data buffering. The interface language can be selected at the time of installation.

- **Data buffering**
Stores and displays measurement data, which can be superimposed on previously recorded data for easy comparison and analysis.
- **Received light waveform display**
Displays the amount of light received by cell from light-receiving element.
- **Measured value display**
Displays measured values as well as the output state for each terminal.



HMI screen data for sensor setting and data indication

The GT02 / GT12 series HMI can be used in combination with the HL-G1 to allow easy confirmation of sensor status and configuration of sensor settings from a remote location. Japanese, English, Chinese, and Korean are supported. For more information about the GT series, visit our website or refer to our catalog.

Select from the following HMI operator panels:

Power supply: 24 V
Communication port: RS422
(RS485)

- AIG02GQ14D
- AIG02MQ15D
- AIG12GQ14D / AIG12GQ15D
- AIG12MQ14D / AIG12MQ15D



Software is available for download.

Sensor configuration and evaluation software tool, HMI screen data, function blocks, etc.

Terms of use

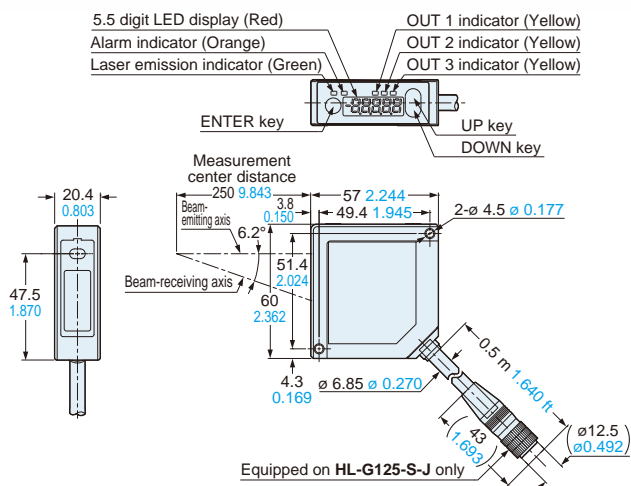
Panasonic Industrial Devices SUNX offers no warranty for this software and is not liable for any loss or damage suffered as a result of its use or operation, whether direct, indirect, incidental, consequential, or unforeseen.

DIMENSIONS (Unit: mm in)

For dimensions of the diffuse reflection type (other than the HL-G125□), refer to the HL-G1 catalog or our website. CAD data for dimensional diagrams can be downloaded from our website.

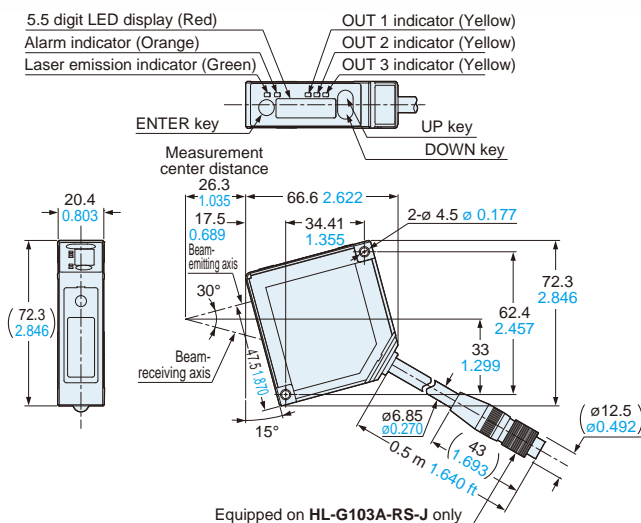
HL-G125-A-C5 HL-G125-S-J

Sensor head



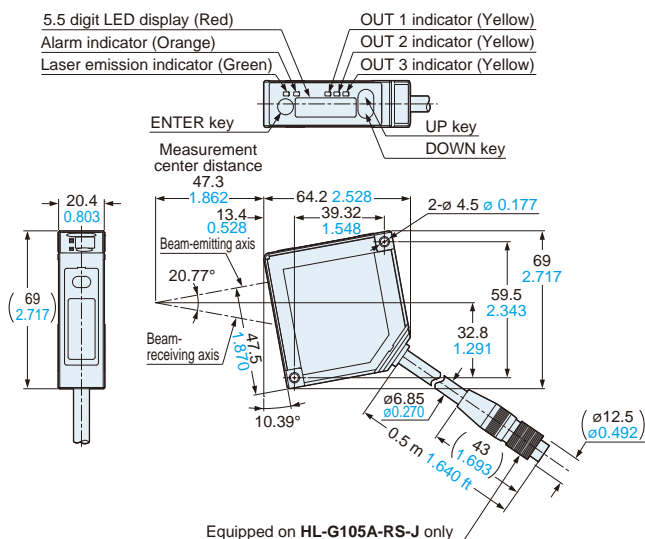
HL-G103A-RA-C5 HL-G103A-RS-J

Sensor head



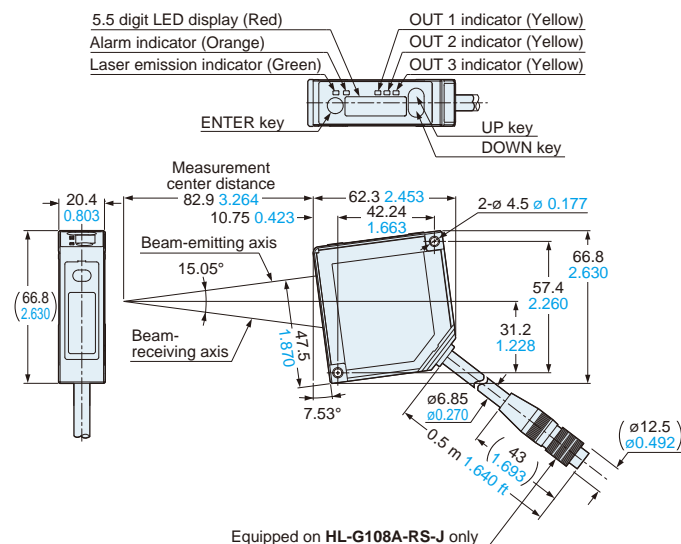
HL-G105A-RA-C5 HL-G105A-RS-J

Sensor head



HL-G108A-RA-C5 HL-G108A-RS-J

Sensor head

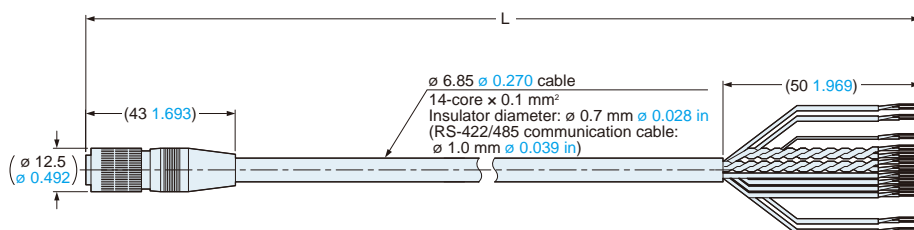


HL-G1CCJ□

Extension cable (optional)

Extension cable

Model No.	L
HL-G1CCJ2	2,000 ⁺²⁰⁰ ₀ 78.740 ^{+7.874} ₀
HL-G1CCJ5	5,000 ⁺⁵⁰⁰ ₀ 196.850 ^{+19.685} ₀
HL-G1CCJ10	10,000 ^{+1,000} ₀ 393.701 ^{+39.370} ₀
HL-G1CCJ20	20,000 ^{+2,000} ₀ 787.402 ^{+78.740} ₀



Related Information

- General terms and conditions..... F-17
- Glossary of terms / General precautions P.1397 / P.1405

- Sensor selection guide P.967~
- About laser beam..... P.1403~

NEW



CE
Conforming to
EMC Directive

FDA
Conforming to
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This product is classified as a Class 2 Laser Product in IEC / JIS standards and in FDA regulations 21 CFR 1040.10. Do not look at the laser beam directly or through optical system such as a lens.

Introducing the new standard in CMOS laser displacement sensors

This single instrument delivers both high-precision measurement and computer-driven data analysis.

HL-G112

- Measurement center distance: 120 mm **4.724 in**
- Measurement range: ± 60 mm **± 2.362 in**
- Resolution: 8 μ m **0.315 mil**

HL-G108

- Measurement center distance: 85 mm **3.346 in**
- Measurement range: ± 20 mm **± 0.787 in**
- Resolution: 2.5 μ m **0.098 mil**



HL-G105

- Measurement center distance: 50 mm **1.969 in**
- Measurement range: ± 10 mm **± 0.394 in**
- Resolution: 1.5 μ m **0.059 mil**

HL-G103

- Measurement center distance: 30 mm **1.181 in**
- Measurement range: ± 4 mm **± 0.157 in**
- Resolution: 0.5 μ m **0.02 mil**

High resolution of 0.5 μ m 0.02 mil

Thanks to high-precision measurement at a resolution of 0.5 μ m **0.02 mil** and an LED digital display that provides exceptional ease of use, the **HL-G1** series will see use in a variety of applications on production lines worldwide.

Fast

Setup is fast and efficient by using the built-in digital display to set measurement parameters such as sampling cycle and output options.

Compact

The **HL-G1** series features a compact design despite its built-in controller and digital readout. Thanks to our miniaturization technology, it can easily be installed on robot arms and in confined spaces.

User-friendly

The **HL-G1** series now features a user-friendly interface that offers improved ease of use when operating via computer software or HMI unit for more sophisticated operation and analysis.

FIBER SENSORS

LASER SENSORS

PHOTOELECTRIC SENSORS

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

LIGHT CURTAINS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

Laser Displacement

Magnetic Displacement

Collimated Beam

Digital Panel Controller

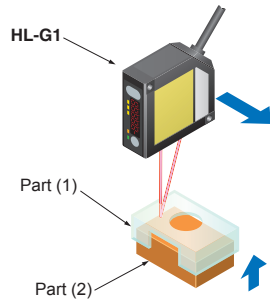
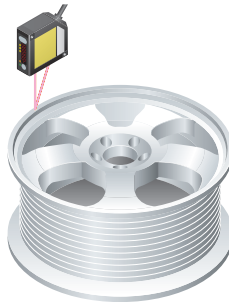
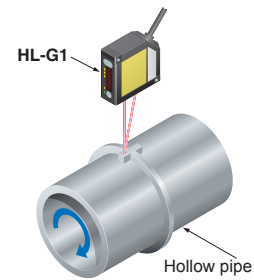
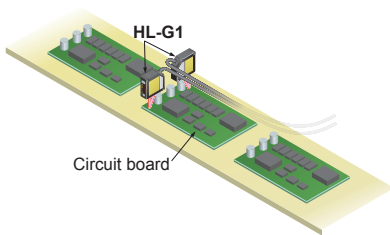
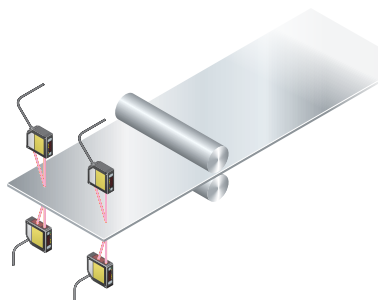
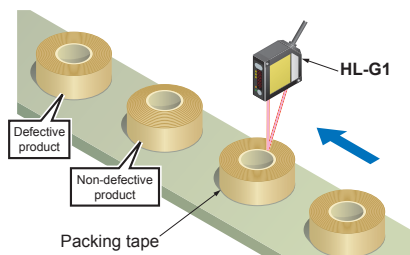
Metal-sheet Double-feed Detection

HL-G1

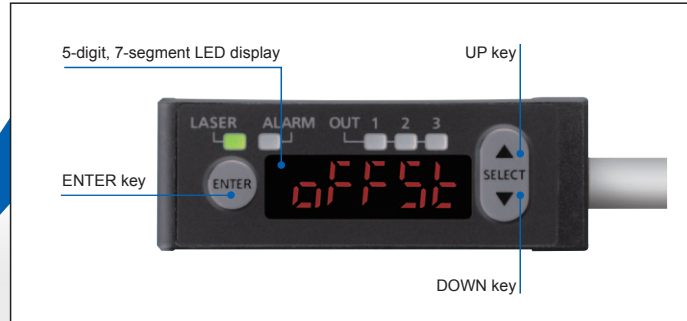
HL-C2

HL-C1

LM10

APPLICATIONS**Measurement of actuator part insertion depth****Detection of aluminum wheel grooves****Control of hollow pipe positioning****Detection of circuit board warpage****Measurement of sheet thickness****Measurement of packing tape thickness****BASIC PERFORMANCE****Easy configuration using the digital display**

The built-in digital display makes it easy to configure sensor operation while checking displacement values.

**Lightweight body that can be used on moving machinery**

The sensor's lightweight plastic body, which weighs 70 g approx., can be installed on moving parts such as sliders and robot arms. The sensor ships standard with flexible cables.

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HL-G1

HL-C2

HL-C1

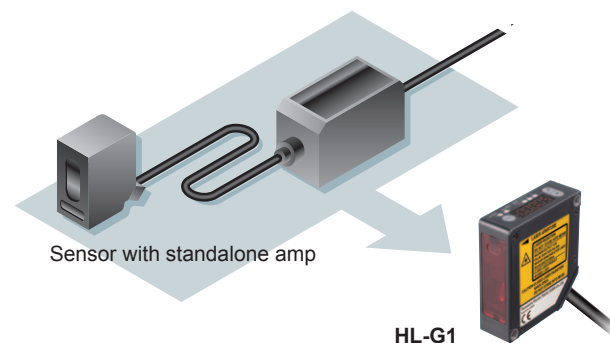
LM10

Compact

Compact size despite the built-in controller and digital readout.

**Easy to embed in machines and production lines**

As a self contained sensor, the **HL-G1** series offers a space saving configuration by removing the need for an external controller.

**IP67 dust- and water-proof protective enclosure**

Thanks to its IP67-rated protective enclosure, the **HL-G1** can be used in the presence of water and dust. Mounting holes are lined with metal sleeves, allowing the instrument to be tightened securely in place with up to 0.8 N·m of torque.

**FUNCTIONS****Timing input and multi input**

In addition to timing input select the desired input according to your application:

- Zero set on/off
- Reset
- Memory switching
- Laser control
- Teaching
- Saving

Support for both NPN and PNP polarity **GLOBAL SUPPORT**

A single model number accommodates both NPN and PNP wiring polarity, reducing the number of model numbers that must be registered for maintenance purposes.

Featuring 3 outputs and an analog 2 outputs

With three outputs, the **HL-G1** can be used to generate HI/GO/LOW judgment output or alarm output. The analog output can be used in both current and voltage modes.

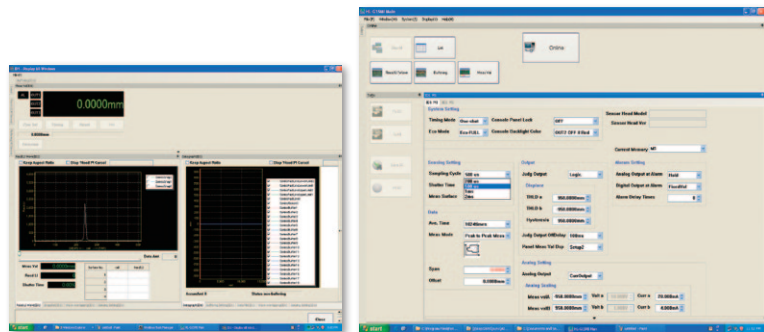
Memory switching function

Up to four groups of sensor settings can be stored for fast recall. Easy switching among setting groups allows smooth setup changes.

HIGH FUNCTIONALITY TYPE**Software tool for sensor configuration and evaluation****FREE DOWNLOAD**

In addition to configuring up to 16 sensors at once, this free tool makes it easy to gather data needed for analysis, including received light waveform monitoring and data buffering. The interface language can be selected at the time of installation.

- **Data buffering**
Stores and displays measurement data. Data can be superimposed on past measurement data and displayed for easy comparison and analysis.
- **Received light waveform display**
Displays the amount of light received across all cells of the detector element.
- **Measured value display**
Displays measured values as well as the output state for all terminals.

**HMI screen****FREE DOWNLOAD**

The **GT02 / GT12** HMI operator panel can be used in combination with the **HL-G1** to allow easy confirmation of sensor status and configuration of sensor settings from a remote location. Japanese, English, Chinese, and Korean are supported.

**Select from the following
HMI operator panels:**

Power supply: 24 V
Communications port: RS422
(RS485)

- AIG02GQ 14D
- AIG02MQ 15D
- AIG12GQ 14D/15D
- AIG12MQ 14D/15D



Refer to the programmable display **GT** series pages.



Multilingualization**GLOBAL SUPPORT**

Software tool and HMI screen data support not only Japanese and English, but also Chinese and Korean, providing a new level of support for devices and equipment in use worldwide.


Terms of use

Panasonic Electric Works SUNX offers no warranty for this software and is not liable for any loss or damage suffered as a result of its use or operation, whether direct, indirect, incidental, consequential, or unforeseen.

ORDER GUIDE

Type	Appearance	Measurement center distance and measuring range	Resolution	Beam diameter	Model No.	Laser class
Standard type		30 ±4 mm 1.181 ±0.157 in	0.5 μm 0.020 mil	0.1 × 0.1 mm 0.004 × 0.004 in	HL-G103-A-C5	FDA / IEC: Class 2
High functionality type					HL-G103-S-J	
Standard type		50 ±10 mm 1.969 ±0.394 in	1.5 μm 0.059 mil	0.5 × 1 mm 0.020 × 0.039 in	HL-G105-A-C5	
High functionality type					HL-G105-S-J	
Standard type		85 ±20 mm 3.346 ±0.787 in	2.5 μm 0.098 mil	0.75 × 1.25 mm 0.030 × 0.059 in	HL-G108-A-C5	
High functionality type					HL-G108-S-J	
Standard type		120 ±60 mm 4.724 ±2.362 in	8 μm 0.315 mil	1.0 × 1.5 mm 0.039 × 0.059 in	HL-G112-A-C5	
High functionality type					HL-G112-S-J	

OPTIONS

Type	Appearance	Model No.	Description
Extension cable (for High functionality type)		HL-G1CCJ2	Length: 2 m 6.562 ft, Weight: 130 g approx.
		HL-G1CCJ5	Length: 5 m 16.404 ft, Weight: 320 g approx.
		HL-G1CCJ10	Length: 10 m 32.808 ft, Weight: 630 g approx.
		HL-G1CCJ20	Length: 20 m 65.617 ft, Weight: 1300 g approx.

OPERATING ENVIRONMENT OF SOFTWARE TOOL

Operating environment				
PC environment	PC/AT compatible			
OS	OS	32/64	Edition	Service Pack
	WindowsXP	32bit	Professional	SP2 or later
	WindowsVista		Business	—
	Windows7		Professional	
CPU	Intel Pentium4 2 GHz or more, either equaling or surpassing			
Graphics	XGA (1024 × 768 256 colors) or more			
Memory	1 GB or more			
Hard disk	Free space 100 MB or more			
USB interface	USB 2.0 full speed (USB 1.1 compatible)			

* This software accommodates below language. You can select the language when installing.
 •Japanese •English •Korean •Chinese

INFORMATION OF INTERFACE CONVERTER

The communications interface converter of **HL-G1** series is RS-422 or RS-485. We will recommend the HMI operator panel GT02 or GT12 (through mode) or the following interface converter when connecting to PC by USB.

LINEEYE CO., LTD.
 Interface converter (USB to RS-422/485) SI-35USB
 Website: <http://www.lineeye.com>

SPECIFICATIONS

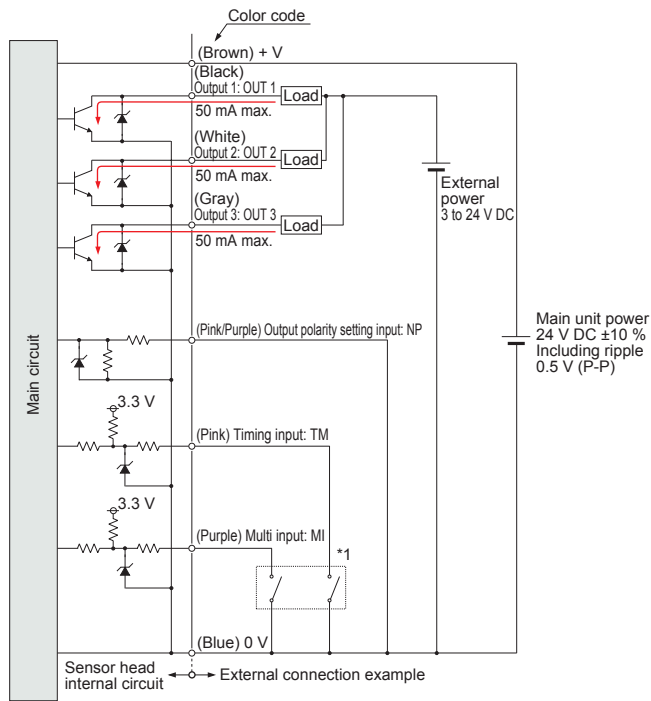
Type		Standard type			
Item	Model No.	HL-G103-A-C5	HL-G105-A-C5	HL-G108-A-C5	HL-G112-A-C5
Measurement center distance		30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 in	120 mm 4.724 in
Measuring range		±4 mm ±0.157 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±60 mm ±2.362 in
Resolution		0.5 μm 0.020 mil	1.5 μm 0.059 mil	2.5 μm 0.098 mil	8 μm 0.315 mil
Linearity		±0.1 % F.S.			
Temperature characteristics		±0.08 % F.S. / °C			
Light source		Red semiconductor laser, Class 2 (IEC / JIS / FDA, Laser Notice No. 50) Max. output: 1 mW (Peak emission wavelength: 655 nm 0.026 mil)			
Beam diameter (Note 2)		0.1 × 0.1 mm 0.004 × 0.004 in	0.5 × 1 mm 0.020 × 0.039 in	0.75 × 1.25 mm 0.030 × 0.049 in	1.0 × 1.5 mm 0.039 × 0.059 in
Receiving element		CMOS image sensor			
Supply voltage		24 V DC ±10 % including ripple 0.5 V (P-P)			
Current consumption		100 mA or less			
Sampling rate		200 μs, 500 μs, 1 ms, 2 ms			
Analog output	Voltage	Output range: 0 to +10.5 V (normal), 11 V (alarm) Output impedance: 100 Ω			
	Current	Output range: 3.2 to 20.8 mA (normal), 21.6 mA (alarm) Load impedance: 300 Ω or less			
Output (OUT 1, OUT 2, OUT 3)		Judgment output or alarm output (Setting can be selected.) Selectable NPN transistor open-collector or PNP transistor open-collector			
		<In case of using NPN output> • Maximum sink current : 50 mA • Applied voltage : 3 to 24 V DC (between output and 0 V) • Residual voltage : 2 V or less (at 50 mA of sink current)		<In case of using PNP output> • Maximum source current : 50 mA • Residual voltage : 2.8 V or less (at 50 mA of source current)	
	Output operation	Opened when the amount of light is insufficient.			
	Short circuit protection	Incorporated (automatic restoration)			
Output polarity setting input		NPN open-collector output operates when 0 V is connected. PNP open-collector output operates when 24 V DC is connected.			
Timing input		NPN output operates when 0V is connected and NPN is set. (It depends on the setting.) PNP output operates when external power + is connected and PNP is set. (It depends on the setting.)			
Multi input		Zero set, zero set off, reset, memory switching, teaching, saving, and laser control according to the input time. In case NPN output is selected, Function varies according to the time 0 V is connected NPN. In case PNP output is selected, Function varies according to the time external power + is connected.			
Indicator	Laser emission	Green LED (lights up during laser emission)			
	Alarm	Orange LED lights up when this product cannot measure because of insuffienct or excessive light intensity.			
	Measurement range	Three yellow LED			
Digital display		Red LED 5 digit display			
Environmental resistance	Protection	IP67			
	Ambient temperature	−10 to +45 °C +14 to +113 °F (No dew condensation), Storage: −20 to +60 °C −4 to +140 °F			
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH			
	Ambient illuminance	Incandescent light: 3,000 lx or less at the light-receiving face (Note 3)			
	Ambient altitude	2,000 m 6561 ft or less			
	Pollution degree	2			
	Insulation resistance	20 MΩ, or more, with 250 V DC between all supply teminals connected together and enclosure			
	Voltage withstandability	1,000 V AC one min. between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 55 Hz (period: 1 min.) frequency, 1.5 mm 0.059 in amplitude in X,Y and Z directions for two hours each			
	Shock resistance	500 m/s ² acceleration (50 G approx.) in X,Y and Z directions for three times each			
Material		Enclosure: PBT, Front cover: Acrylic, Cable: PVC			
Cable		0.1 mm ² 10-core cabtyre cable, 5 m 16.404 ft long			
Weight		Net weight: 70 g approx. (not including cable), 320 g approx. (including cable), Gross weight: 380 g approx.			
Accessory		Warning label: 1 set			

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were as follows: supply voltage 24 V DC, ambient temperature +20 °C **+68 °F**, sampling rate 500 μs, average number of samples: 1024, measurement center distance, object measured is made of white ceramic and digital measurement values.
- 2) This beam diameter is the size at the measurement center distance. These values were defined by using 1/e² (13.5 %) of the center light intensity. If there is a slight leakage of light outside the normal spot diameter and if the periphery surrounding the sensing point has a higher reflectivity than the sensing point itself, then the results may be affected.
- 3) The fluctuation by ambient illuminance is ±0.1 % F.S. or less.

SPECIFICATIONS

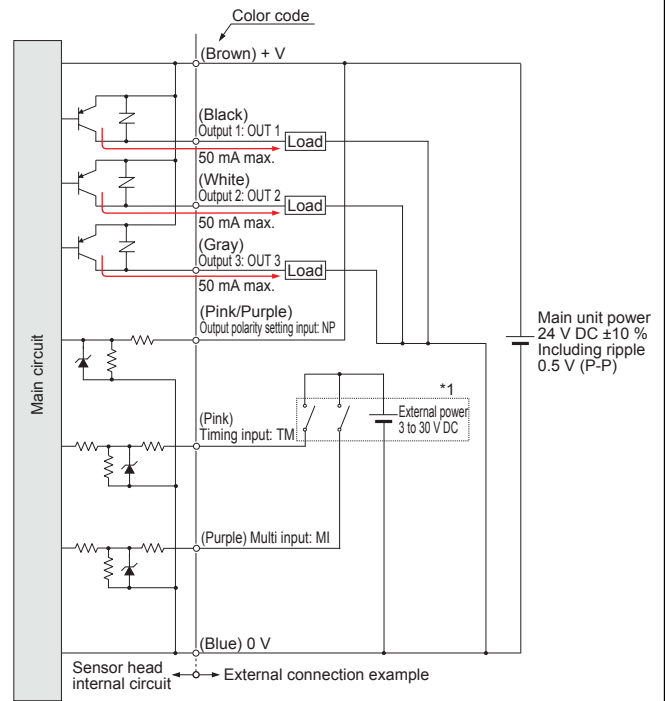
Type		High functionality type			
Item	Model No.	HL-G103-S-J	HL-G105-S-J	HL-G108-S-J	HL-G112-S-J
Measurement center distance		30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 in	120 mm 4.724 in
Measuring range		±4 mm ±0.157 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±60 mm ±2.362 in
Resolution		0.5 μm 0.020 mil	1.5 μm 0.059 mil	2.5 μm 0.098 mil	8 μm 0.315 mil
Linearity		±0.1 % F.S.			
Temperature characteristics		±0.08 % F.S. / °C			
Light source		Red semiconductor laser, Class 2 (IEC / JIS / FDA, Laser Notice No. 50) Max. output: 1 mW (Peak emission wavelength: 655 nm 0.026 mil)			
Beam diameter (Note 2)		0.1 × 0.1 mm 0.004 × 0.004 in	0.5 × 1 mm 0.020 × 0.039 in	0.75 × 1.25 mm 0.030 × 0.049 in	1.0 × 1.5 mm 0.039 × 0.059 in
Receiving element		CMOS image sensor			
Supply voltage		24 V DC ±10 % including ripple 0.5 V (P-P)			
Current consumption		100 mA or less			
Sampling rate		200 μs, 500 μs, 1 ms, 2 ms			
Analog output	Voltage	Output range: 0 to +10.5 V (normal), 11 V (alarm) Output impedance: 100 Ω			
	Current	Output range: 3.2 to 20.8 mA (normal), 21.6 mA (alarm) Load impedance: 300 Ω or less			
Output (OUT 1, OUT 2, OUT 3)		Judgment output or alarm output (Setting can be selected.) Selectable NPN transistor open-collector or PNP transistor open-collector			
		<In case of using NPN output> • Maximum sink current : 50 mA • Applied voltage : 3 to 24 V DC (between output and 0 V) • Residual voltage : 2 V or less (at 50 mA of sink current)		<In case of using PNP output> • Maximum source current : 50 mA • Residual voltage : 2.8 V or less (at 50 mA of source current)	
	Output operation	Opened when the amount of light is insufficient.			
	Short circuit protection	Incorporated (automatic restoration)			
Output polarity setting input		NPN open collector output operates when 0 V is connected. PNP open collector output operates when 24 V DC is connected.			
Timing input		NPN output operates when 0V is connected and NPN is set. (It depends on the setting.) PNP output operates when external power + is connected and PNP is set. (It depends on the setting.)			
Multi input		Zero set, zero set off, reset, memory switching, teaching, saving, and laser control according to the input time. In case NPN output is selected, Function varies according to the time 0 V is connected NPN. In case PNP output is selected, Function varies according to the time external power + is connected.			
Communications interface		RS-422 or RS-485 (selectable) Baud rate: 9,600/19,200/38,400/115,200/230,400/460,800/921,600 bps Data length 8 bit, Stop bit length 1 bit, Without parity check, BCC check, Termination code: CR			
Indicator	Laser emission	Green LED (lights up during laser emission)			
	Alarm	Orange LED lights up when this product cannot measure because of insuffienct or excessive light intensity.			
	Measurement range	Three yellow LED			
Digital display		Red LED 5 digit display			
Environmental resistance	Protection	IP67			
	Ambient temperature	-10 to +45 °C +14 to +113 °F (No dew condensation), Storage: -20 to +60 °C -4 to +140 °F			
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH			
	Ambient illuminance	Incandescent light: 3,000 lx or less at the light-receiving face (Note 3)			
	Ambient altitude	2,000 m 6561 ft or less			
	Pollution degree	2			
	Insulation resistance	20 MΩ, or more, with 250 V DC between all supply teminals connected together and enclosure			
	Voltage withstandability	1,000 V AC one min. between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 55 Hz (period: 1 min.) frequency, 1.5 mm 0.059 in amplitude in X,Y and Z directions for two hours each			
	Shock resistance	500 m/s ² acceleration (50 G approx.) in X,Y and Z directions for three times each			
Material		Enclosure: PBT, Front cover: Acrylic, Cable: PVC			
Cable		14-core cabtyre cable with connector, 0.5 m 1.640 ft long			
Cable extension		Extension up to total 20 m 65.617 ft is possible with optional cable.			
Weight		Net weight: 70 g approx. (not including cable), 110 g approx. (including cable), Gross weight: 160 g approx.			
Accessory		Warning label: 1 set			

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were as follows: supply voltage 24 V DC, ambient temperature +20 °C **+68 °F**, sampling rate 500 μs, average number of samples: 1024, measurement center distance, object measured is made of white ceramic and digital measurement values.
- 2) This beam diameter is the size at the measurement center distance. These values were defined by using 1/e² (13.5 %) of the center light intensity. If there is a slight leakage of light outside the normal spot diameter and if the periphery surrounding the sensing point has a higher reflectivity than the sensing point itself, then the results may be affected.
- 3) The fluctuation by ambient illuminance is ±0.1 % F.S. or less.

I/O CIRCUIT AND WIRING DIAGRAMS**I/O circuit diagrams****When selecting NPN output**

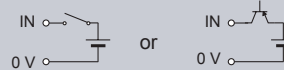
*1

Non-voltage contact

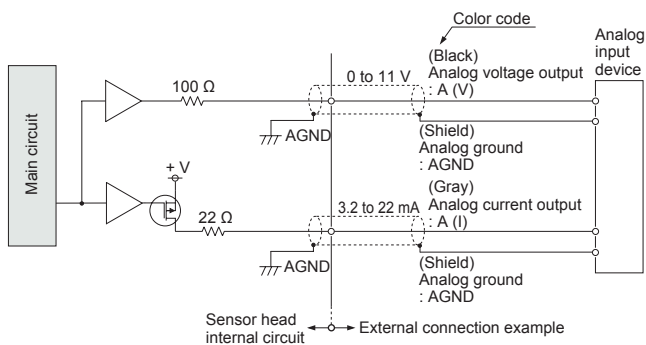
**When selecting PNP output**

*1

Non-voltage contact or PNP open-collector transistor output



High [+5 V to +30 V DC (source current 0.04 mA or less)] : Effective
 Low (0 to 0.6 V DC or open) : Ineffective

Analog output (common in NPN output type and PNP output type)

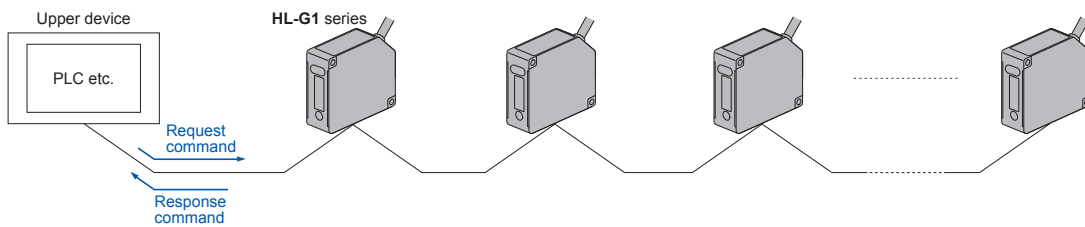
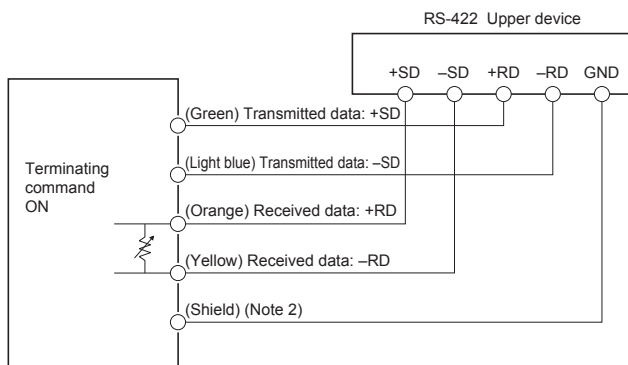
Notes: 1) Analog output is not equipped with the short-circuit protection.
 Do not short-circuit or apply voltage to them.
 2) Use shielded wires for analog outputs.

I/O CIRCUIT AND WIRING DIAGRAMS**Communication specifications (High functionality type)**

Communication method	RS-422	RS-485
	Full duplex	Half duplex
Synchronization method	Asynchronous communication method	
Transmission code	ASC II	
Baud rate	9,600/19,200/38,400/115,200/230,400/460,800/921,600 bps	
Data length	8 bit	
Stop bit length	1 bit	
Parity check	None	
BCC	Yes	
Termination code	CR	

The **HL-G1** can be connected to upper devices of RS-422/485.

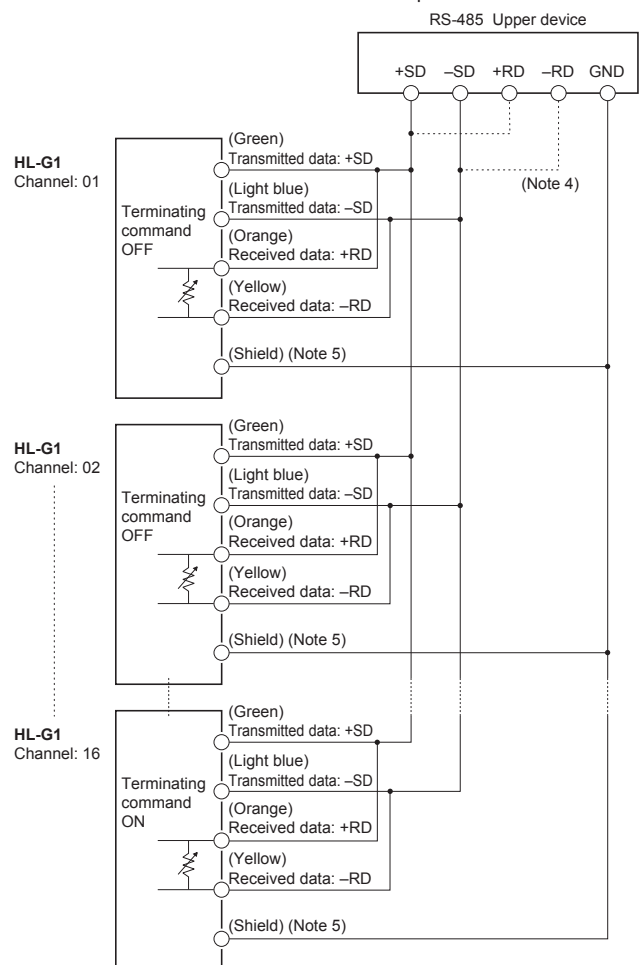
When upper device sends the request command, the **HL-G1** series send the response command.

**RS-422 connection (1:1)**

Notes: 1) Transmitted data cable or received data is twisted pair cable.
2) It is in common with 0 V inside the sensor.

RS-485 connection (1:N)

- Connectable up to 16 units.
- Please set the code of sensor with no overlaps.



Notes: 1) Transmitted data cable or received data is twisted pair cable.
2) The terminating resistance is built in the sensor.
3) The transmission line should be connected in series.
4) Connect to the device in accordance with its specifications.
5) It is in common with 0 V inside the sensor.

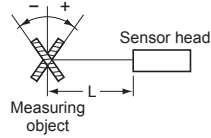
FIBER
SENSORSLASER
SENSORSPHOTO-
ELECTRIC
SENSORSMICRO
PHOTO-
ELECTRIC
SENSORSAREA
SENSORSLIGHT
CURTAINSPRESSURE /
FLOW
SENSORSINDUCTIVE
PROXIMITY
SENSORSPARTICULAR
USE
SENSORSSENSOR
OPTIONSSIMPLE
WIRE-SAVING
UNITSWIRE-SAVING
SYSTEMSMEASURE-
MENT
SENSORSSTATIC
CONTROL
DEVICES

ENDOSCOPE

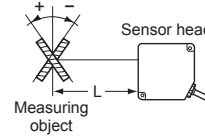
LASER
MARKERSPLC /
TERMINALSHUMAN
MACHINE
INTERFACESENERGY
CONSUMPTION
VISUALIZATION
COMPONENTSFA
COMPONENTSMACHINE
VISION
SYSTEMSUV
CURING
SYSTEMSSelection
GuideLaser
DisplacementMagnetic
DisplacementCollimated
BeamDigital Panel
ControllerMetal-sheet
Double-feed
Detection**HL-G1****HL-C2****HL-C1****LM10**

SENSING CHARACTERISTICS (TYPICAL)**Correlation between measuring distance and error characteristics**

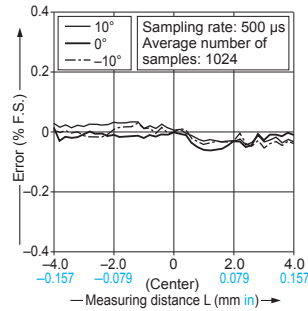
White ceramic ($0^\circ, \pm 10^\circ$)
Vertical orientation



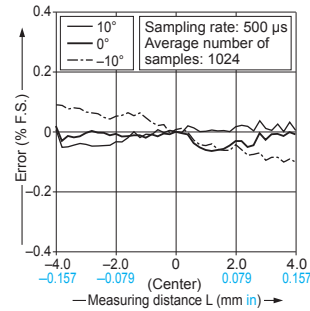
White ceramic ($0^\circ, \pm 10^\circ$)
Horizontal orientation

**HL-G103**

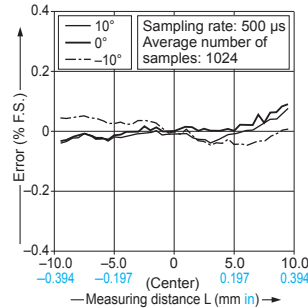
Vertical positioning



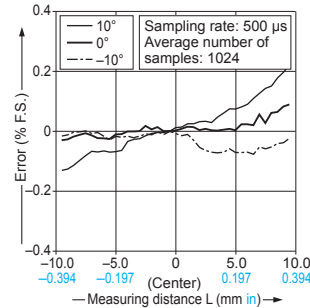
Horizontal positioning

**HL-G105**

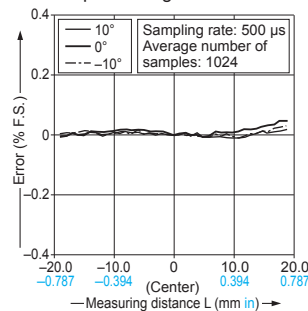
Vertical positioning



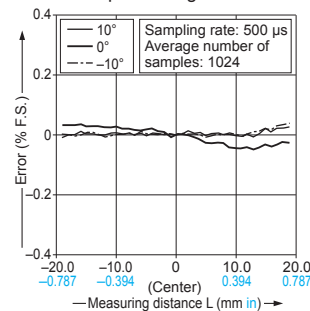
Horizontal positioning

**HL-G108**

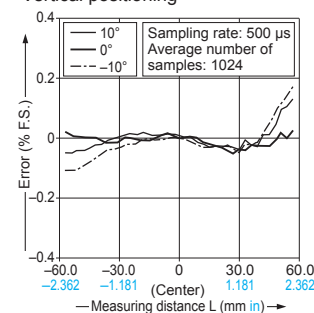
Vertical positioning



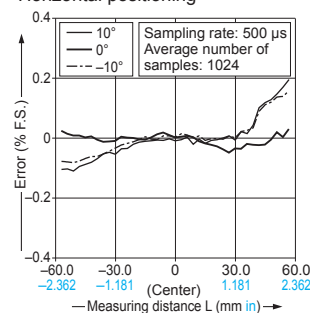
Horizontal positioning

**HL-G112**

Vertical positioning



Horizontal positioning



PRECAUTIONS FOR PROPER USE



- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.
- This product has been developed / produced for industrial use.



- Do not operate products using methods other than the ones described in the instruction manual included with each product. Control or adjustment through procedures other than the ones specified may cause hazardous laser radiation exposure.
- The following label is attached to the product. Handle the product according to the instruction given on the warning label.
(The Japanese, English, Chinese, Korean warning label is packed with the sensor.)



- This product is classified as a Class 2 Laser Product in IEC / JIS standards and FDA regulations. Do not look at the laser beam directly or through optical system such as a lens.

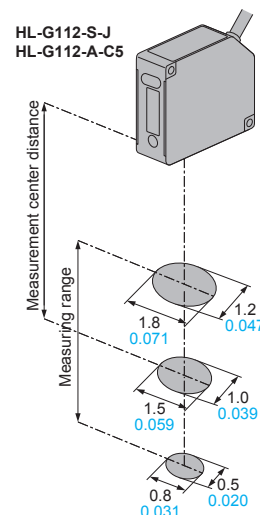
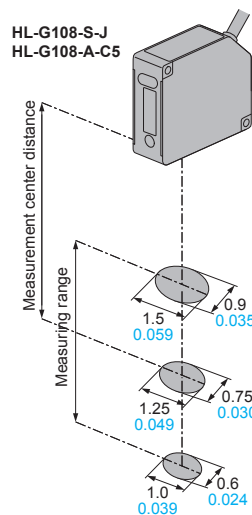
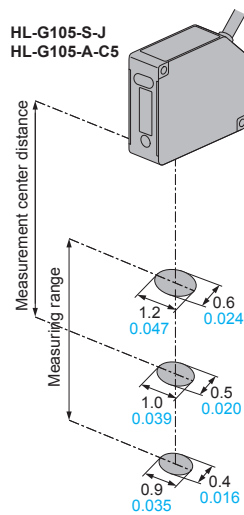
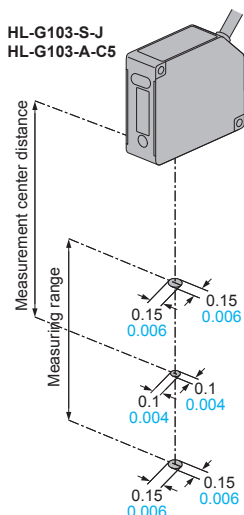
LAZAR APERTURE

LAZAR RADIATION
DO NOT STARE INTO BEAM

(MAXIMUM OUTPUT) 1mW
(PULSE DURATION) 2ms Max.
(MEDIUM) SEMICONDUCTOR LASER
(WAVELENGTH) 655nm
CLASS2 LASER PRODUCT
(IEC60825-1 2007)

CAUTION-CLASS2 LASER RADIATION
WHEN OPEN
DO NOT STARE INTO BEAM

Beam diameter (Unit: mm in)

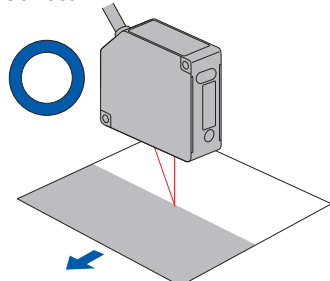


Sensor head mounting direction

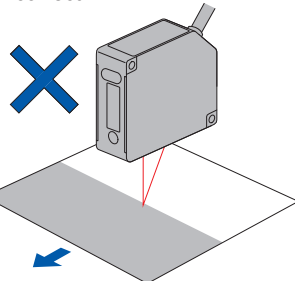
- To obtain the greatest precision, the sensor head should be oriented facing the direction of movement of the object's surface, as shown in the figure below.

Object with variations in material or color

<Correct>

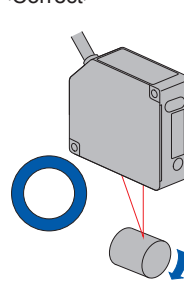


<Incorrect>

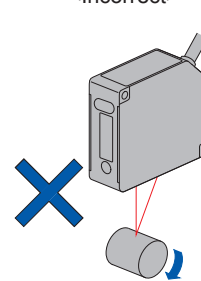


Rotating object

<Correct>

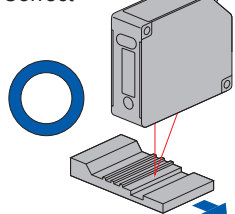


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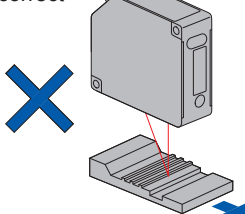


Object that has large differences in gaps, grooves and colors

<Correct>



<Incorrect>



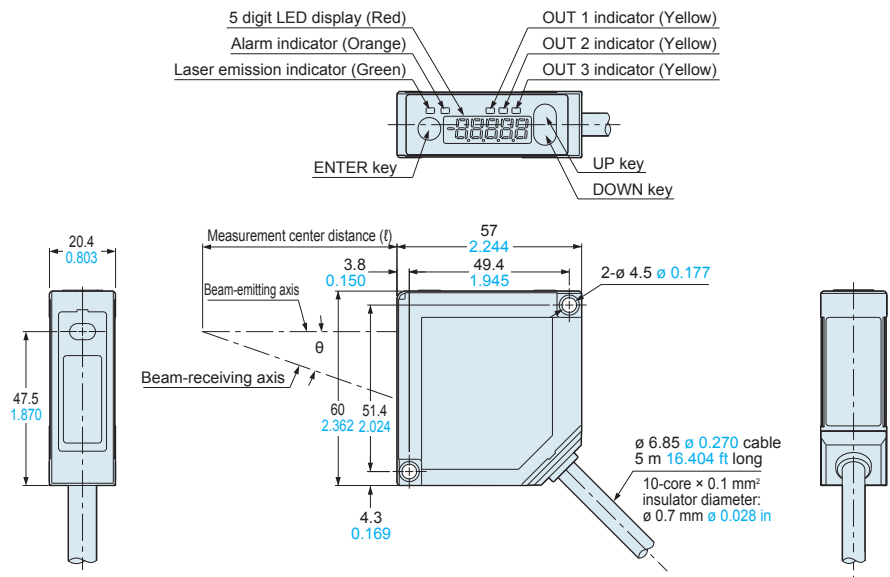
DIMENSIONS (Unit: mm in)

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

HL-G1□-A-C5

Sensor (Standard type)

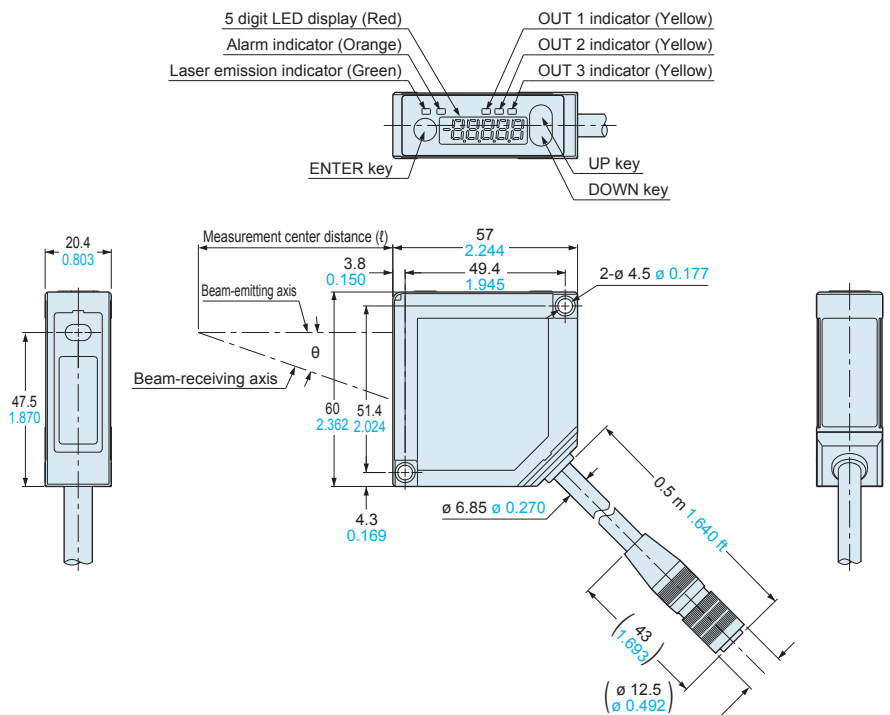
Model No.	Measurement center distance (ℓ)	θ
HL-G103-A-C5	30 mm 1.181 in	30°
HL-G105-A-C5	50 mm 1.969 in	21°
HL-G108-A-C5	85 mm 3.346 in	15°
HL-G112-A-C5	120 mm 4.724 in	11°



HL-G1□-S-J

Sensor (High functionality type)

Model No.	Measurement center distance (ℓ)	θ
HL-G103-S-J	30 mm 1.181 in	30°
HL-G105-S-J	50 mm 1.969 in	21°
HL-G108-S-J	85 mm 3.346 in	15°
HL-G112-S-J	120 mm 4.724 in	11°



HL-G1CCJ□

Extension cable (Optional)

Model No.	L
HL-G1CCJ2	2000 ⁺²⁰⁰ / ₀
HL-G1CCJ5	5000 ⁺⁵⁰⁰ / ₀
HL-G1CCJ10	10000 ⁺¹⁰⁰⁰ / ₀
HL-G1CCJ20	20000 ⁺²⁰⁰⁰ / ₀

