Panasonic
INDUSTRY

NEW

Network Function Integrated Type

Laser Displacement Sensor

HL-G2 SERIES

Product Features

FDA Conforming to FDA regulations

High-precision Displacement Sensors Made Easier to Use

2024.3

Network Function Integrated Type

Laser Displacement Sensor

HL-G2

Resolution*2

0.5 µm 0.020 mil

Class-top*1 Linearity*2

±0.05 % F.S.

Class-top*1 Sampling Period

100 µs
(Fastest)

Measuring Range*2

25 to 400 mm
0.984 to 15.748 in

Temperature Characteristic

0.03 % F.S./°C

*1: According to our company's survey, as of February 2024.
*2: Specifications vary depending on models.

HL-G2

New Standard for Displacement Sensors: Offering Both High Accuracy and Convenience

01 Industry's top-class*1 measuring performance
High-precision Measurement

The **HL-G2** series boasts the industry's top-class*1 performance such as resolution*2 of 0.5 µm 0.020 mil, linearity*2 of ±0.05 % F.S., sampling period of 100 µs (fastest) and temperature characteristic of 0.03 % F.S./°C. The **HL-G2** sensors deliver the performance rivaling those of displacement meters of one class above, thanks to the optimized and balanced devices, optical system, mechanisms and algorithm. The organic EL display offers excellent visibility. The display language can be selected from English, Japanese and Chinese (simplified Chinese).

*1: According to our company's survey, as of February 2024.
*2: Specifications vary depending on models.

02 Built-in controller and communication unit
Easy-to-use Integrated Models

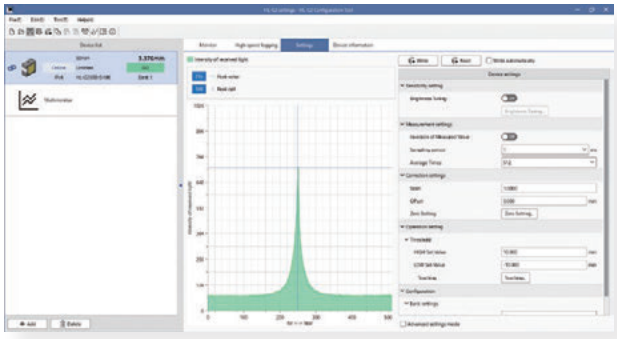
The integrated models feature built-in controllers to facilitate model selection and reduce installation space and cost. The communication type models have built-in communication units for easy connection to a PLC, while the analog output type models are suitable for applications that require continuous acquisition of measurement data from sensors.

EtherNet/IP
SLMP Seamless Message Protocol
Modbus TCP
Modbus RTU

* Communication function is provided only in the communication type models.
* EtherNet/IP is a registered trademark of ODVA (Open DeviceNet Vendor Association).
* SLMP is a registered trademark of Mitsubishi Electric Corporation.
* Modbus is a registered trademark of Schnelder Electric USA Inc.

03 Simple and intuitive operations
Setting Tool Software

By using the PC installed with the "**HL-G2 Configuration Tool**" configuration tool software (free to download), parameters can be set easily and simultaneously in multiple **HL-G2** units. Since settings can be made in real time while confirming actual data, the time required for adjustment can be reduced.



Easy-to-use setting tool software

Large Product Lineup

Five different measuring ranges and two different output types available

Output Type Product Lineup

Communication type

HL-G2□□B-S-MK

* Communication system can be switched between EtherNet/IP and RS-485 by changing the cable.
* Cables are sold separately.

Analog output type

HL-G2□□B-A-MK

* Cables are sold separately.

Lineup of Measuring Ranges

HL-G203B-□-MK

Measurement center distance
30 mm 1.181 in
Measurement range
±5 mm ±0.197 in
Beam diameter
40 µm × 1,000 µm
1.575 mil × 39.370 mil
approx.
Resolution 0.5 µm 0.020 mil

Measurement range
25 to 35 mm 0.984 to 1.378 in
Linearity: ±0.075 % F.S.

Limited range **27.5 to 32.5 mm 1.083 to 1.280 in**
Linearity: ±0.05 % F.S.

HL-G205B-□-MK

Measurement center distance
50 mm 1.969 in
Measurement range
±10 mm ±0.394 in
Beam diameter
60 µm × 2,000 µm
2.362 mil × 78.740 mil
approx.
Resolution 1.5 µm 0.059 mil

Measurement range
40 to 60 mm 1.575 to 2.362 in
Linearity: ±0.075 % F.S.

Limited range **45 to 55 mm 1.772 to 2.165 in**
Linearity: ±0.05 % F.S.

HL-G208B-□-MK

Measurement center distance
85 mm 3.346 in
Measurement range
±20 mm ±0.787 in
Beam diameter
90 µm × 3,000 µm
3.543 mil × 118.110 mil
approx.
Resolution 2.5 µm 0.098 mil

Measurement range
65 to 105 mm 2.559 to 4.134 in
Linearity: ±0.075 % F.S.

Limited range **75 to 95 mm 2.953 to 3.740 in**
Linearity: ±0.05 % F.S.

HL-G212B-□-MK

Measurement center distance
120 mm 4.724 in
Measurement range
±30 mm ±1.181 in
Beam diameter
100 µm × 4,000 µm
3.937 mil × 157.480 mil
approx.
Resolution 4 µm 0.157 mil

Measurement range
90 to 150 mm 3.543 to 5.906 in
Linearity: ±0.075 % F.S.

Limited range **105 to 135 mm 4.134 to 5.315 in**
Linearity: ±0.05 % F.S.

HL-G225B-□-MK

Measurement center distance
250 mm 9.843 in
Measurement range
±150 mm ±5.906 in
Beam diameter
300 µm × 8,000 µm
11.811 mil × 314.961 mil
approx.
Resolution 15 µm 0.591 mil

Measurement range
100 to 400 mm 3.937 to 15.748 in
Linearity: ±0.25 % F.S.

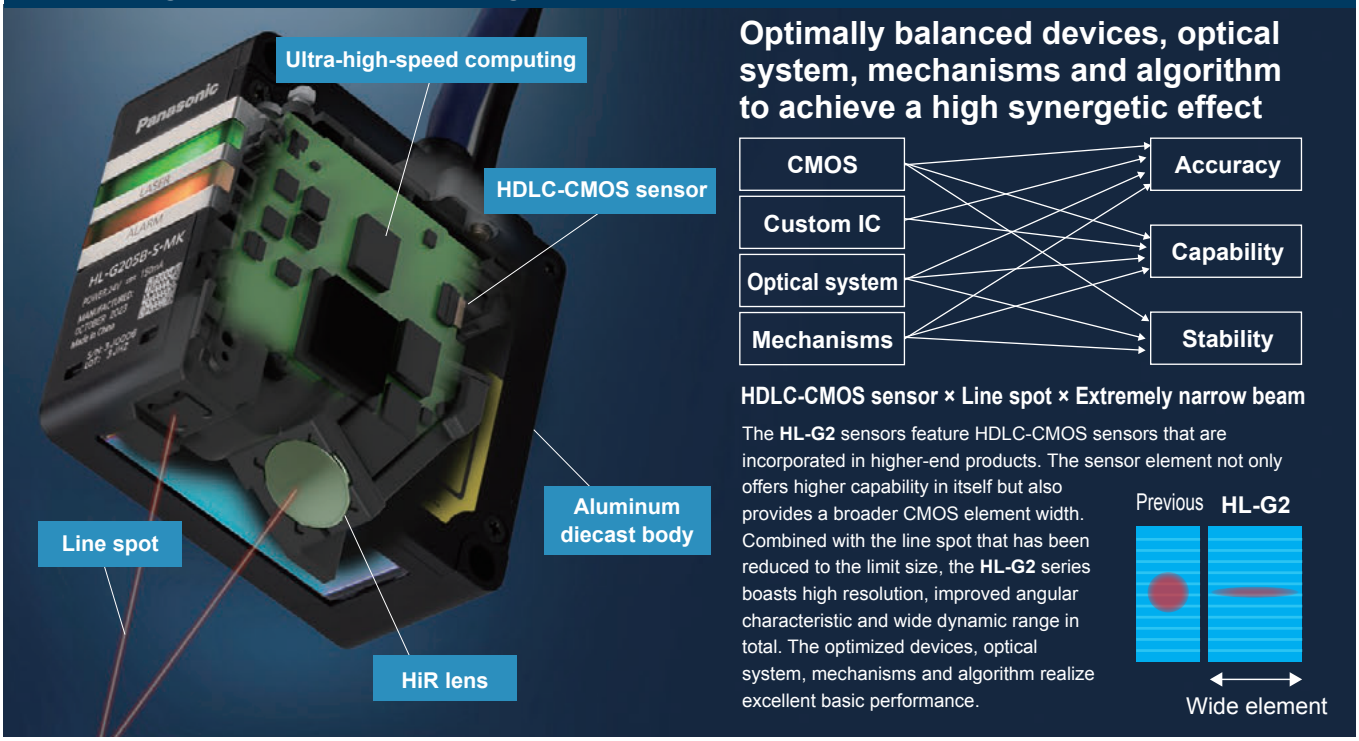
Limited range **200 to 300 mm 7.874 to 11.811 in**
Linearity: ±0.15 % F.S.

0 | 100 3.937 | 200 7.874 | 300 11.811 | 400 15.748 mm in

01 Industry's top-class* measuring performance
High-precision Measurement

*: According to our company's survey, as of February 2024.

Realizing performance rivaling those of displacement meters of one class above



Optimally balanced devices, optical system, mechanisms and algorithm to achieve a high synergetic effect

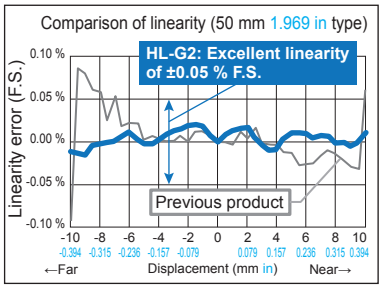
HDLC-CMOS sensor × Line spot × Extremely narrow beam

The **HL-G2** sensors feature HDLC-CMOS sensors that are incorporated in higher-end products. The sensor element not only offers higher capability in itself but also provides a broader CMOS element width. Combined with the line spot that has been reduced to the limit size, the **HL-G2** series boasts high resolution, improved angular characteristic and wide dynamic range in total. The optimized devices, optical system, mechanisms and algorithm realize excellent basic performance.

Industry's Top-class* Performance Realized by Devices, Optical system and Algorithm

Excellent Linearity: ±0.05 % F.S.

The line spot size and extremely narrow beam attain an excellent linearity of ±0.05 % F.S. (limited range) near the center. Furthermore, the optical design of the light receiving section and the CMOS angle adjustment assure uniform light collection over the entire range to realize an excellent linearity of ±0.075 % F.S. (standard).

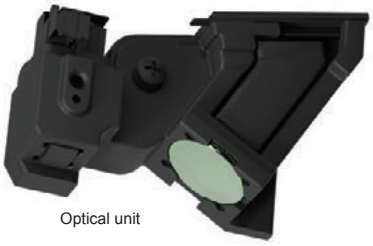


High-speed Response: Sampling period of 100 µs

The high-speed computing capability of the dedicated custom IC achieves a sampling period of 100 µs (fastest). The **HL-G2** series helps improve the responsiveness of applications that demand high-speed tracking.

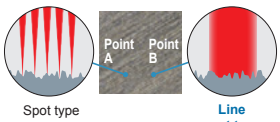
High Stability: Temperature characteristic of 0.03 % F.S./°C

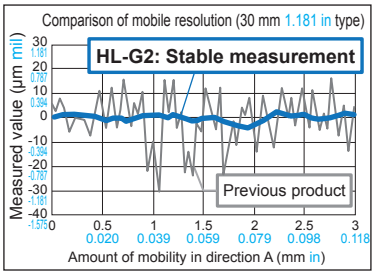
The **HL-G2** series features an aluminum diecast main unit body and optical unit and employs a glass lens. Various parts were reviewed and revamped to achieve extremely stable measurement even under an environment with temperature fluctuations.


Optical unit

Line Spot Highly Resistant to Changes in Surface Condition

The line spot resists adverse effects caused by a metal surface. The **HL-G2** series enables stable measurement without worries about fine surface irregularities of target objects.





02 Built-in controller and communication unit
Easy-to-use Integrated Models

Communication Units

Controllers

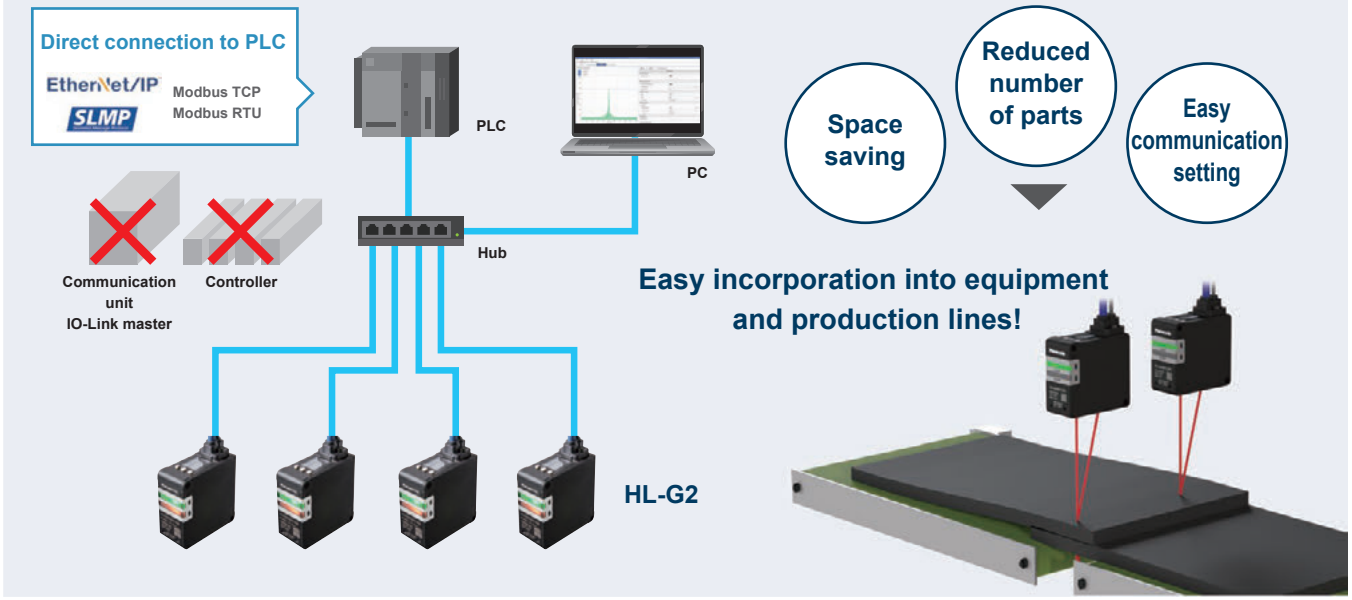
All-in-one Unit with Communication Unit and Controller

Network Function Integrated Type Displacement Sensor HL-G2

Direct connection to PLC

EtherNet/IP Modbus TCP

SLMP Modbus RTU



Space saving

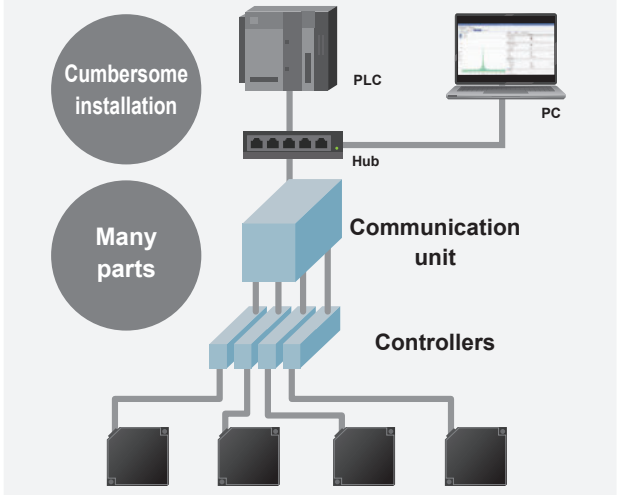
Reduced number of parts

Easy communication setting

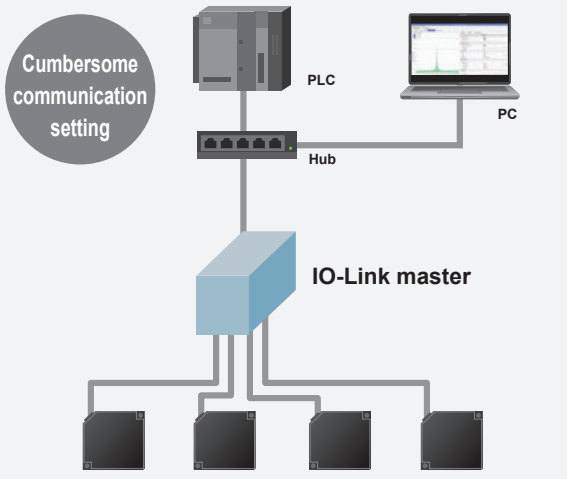
Easy incorporation into equipment and production lines!

Previous multi-sensor network control system

In case communication unit is used



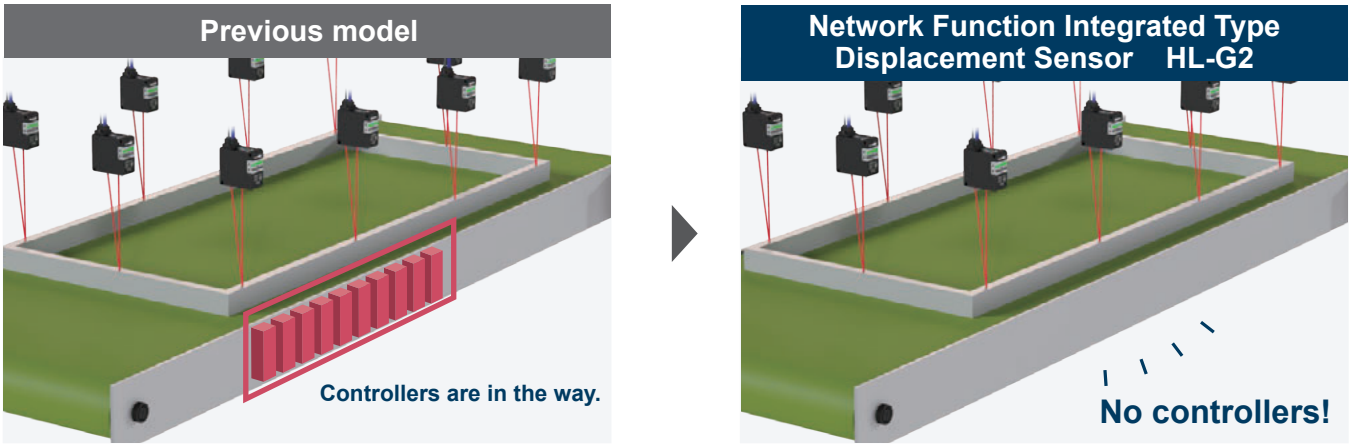
In case IO-Link is used



Benefits by the Reduced Number of Parts

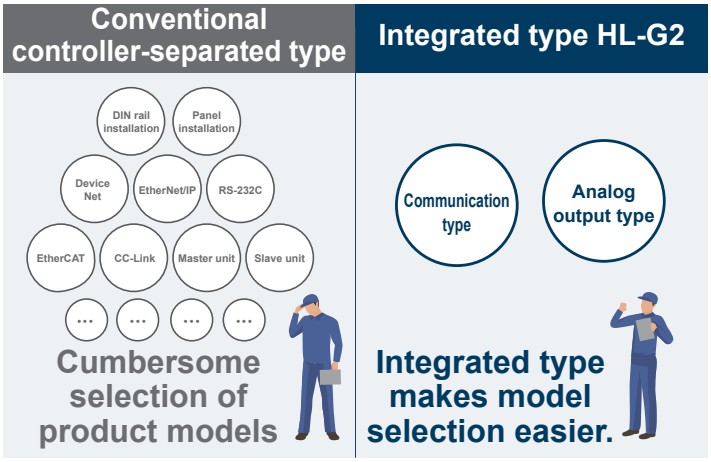
Reduced Installation Space: Easy to Add on

When multiple sensors were used, many spaces were required for the installation of connected controllers and communication units. The integrated type **HL-G2** models require less installation spaces and they can be easily added to existing lines without worries about installation spaces.

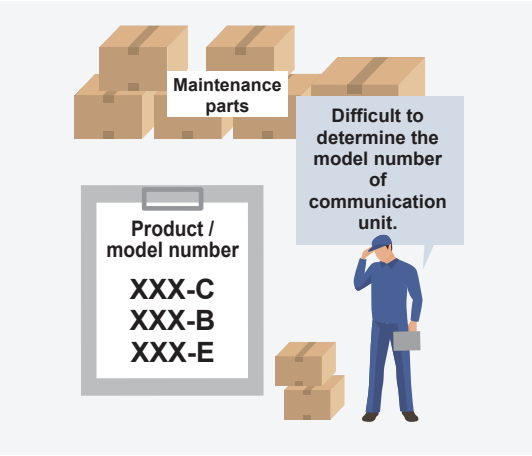


Easier Model Selection, Reduced Installation Space and Cost

In the case of a sensor product with a separate controller, the head, controller, communication unit and master / slave units each have their own model numbers, thus making it cumbersome to determine the model numbers when selecting products to use. The integrated type **HL-G2** models facilitate the selection and determination of product models.

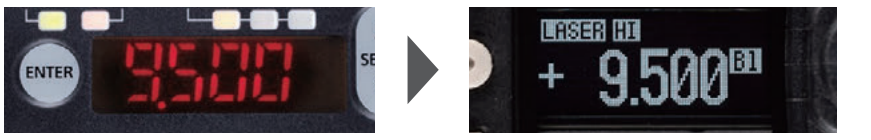


When there are many accessory parts for the sensors, it takes time and effort to find out the part numbers of alternative parts and maintenance parts. Use of the integrated type **HL-G2** models makes the management of model numbers easier.



Easy-to-see Organic EL Display and Multi-language Display Capability

The display section has an easy-to-see organic EL display. The display language can be selected from English, Japanese and Chinese (simplified Chinese). The multi-language display capability and easy-to-understand indications facilitate setting and operation.

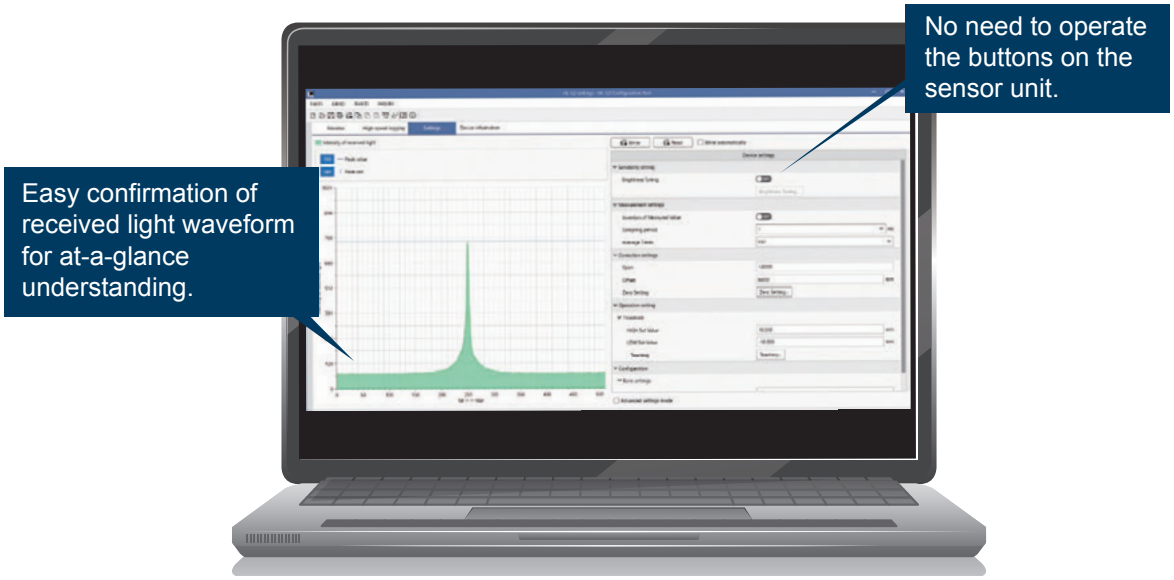


03 Simple and intuitive operation
Setting Tool Software

Setting Tool Software: HL-G2 Configuration Tool

* Supports communication type only.

Basic setting operations such as change / writing of settings, monitoring of received light waveform, image output of measured data / graph and high-speed logging can be performed intuitively, so even people unfamiliar with those operations can enter settings easily. Since the sensor settings can be saved to the computer under a name, it is easy to recover the sensor settings if they are accidentally changed, or to expand the settings when adding sensors for the same application.



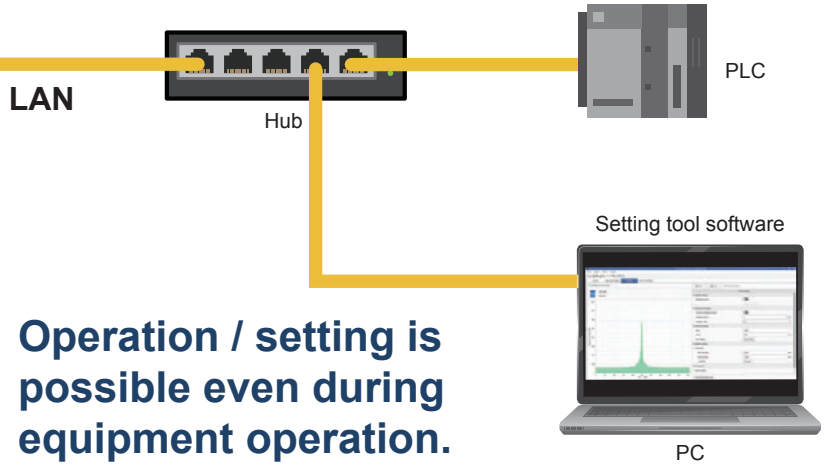
Free download from the website

The tool software is used by operators for performing operations such as for assessment at the time of installation, commencement of equipment operation and maintenance.

Setting Tool Software Can Be Operated Even During Equipment Operation*

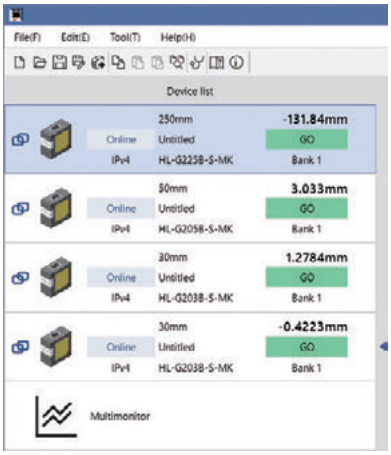
*: When Ethernet communication cable is used

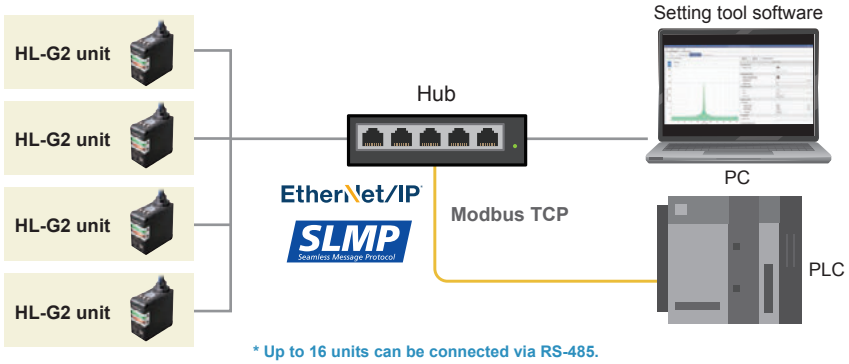
Each sensor can be connected to multiple upper-level devices so that the setting tool software can be connected and set even during equipment operation. In the case RS-485 communication is used, there is no need to change the connecting cable.



Operation / setting is possible even during equipment operation.

Single PC Used for Management of Multiple HL-G2 Units



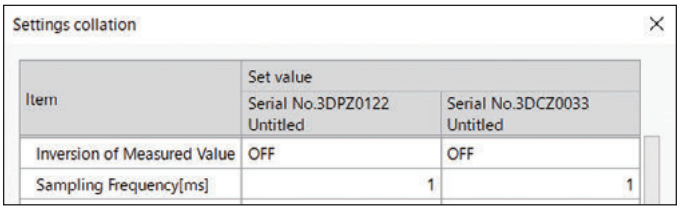


* Up to 16 units can be connected via RS-485.

By simply selecting the sensor to edit in the screen showing the list of connected sensors, its operating status can be checked and the settings can be changed.

Easy Comparison of Setting Conditions of Multiple Units

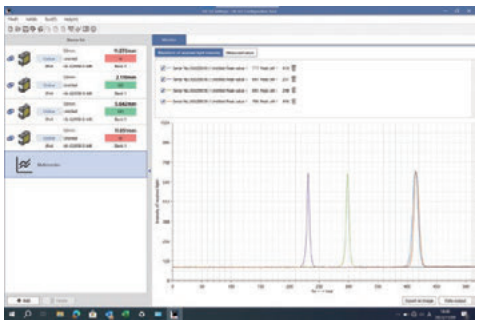
The settings of multiple **HL-G2** units can be compared side-by-side. This enables easy adjustment of parameters at a startup and in the case of equipment trouble.



Item	Set value	
	Serial No.3DPZ0122 Untitled	Serial No.3DCZ0033 Untitled
Inversion of Measured Value	OFF	OFF
Sampling Frequency[ms]	1	1

Multi-monitor Display Screen

Up to eight sensor units can be simultaneously monitored and displayed. In case of an application that uses multiple sensors, the light receiving conditions of the individual sensors can be compared.



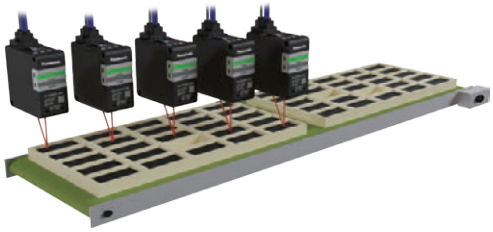
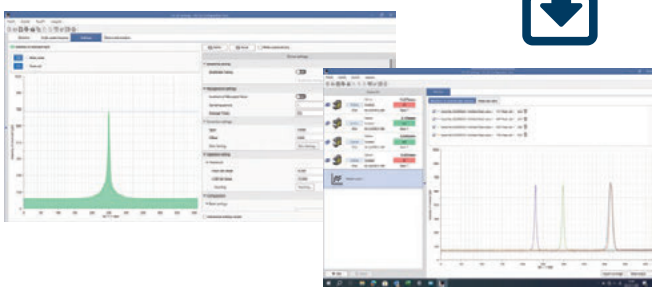


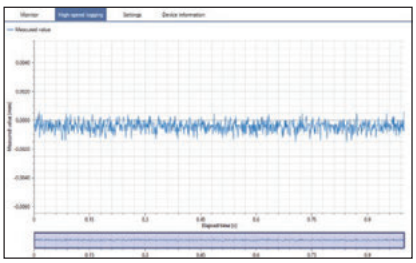
Image Output / Data Output

Measurement results can be output as image data (such as PNG) or CSV data.



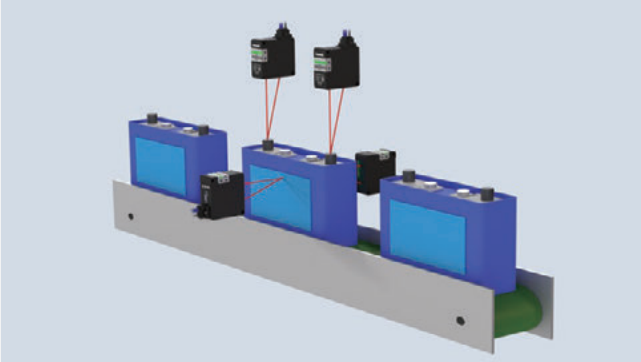
High-speed Logging

The value measured in each sampling cycle can be recorded for use in sensor performance evaluation and maintenance.



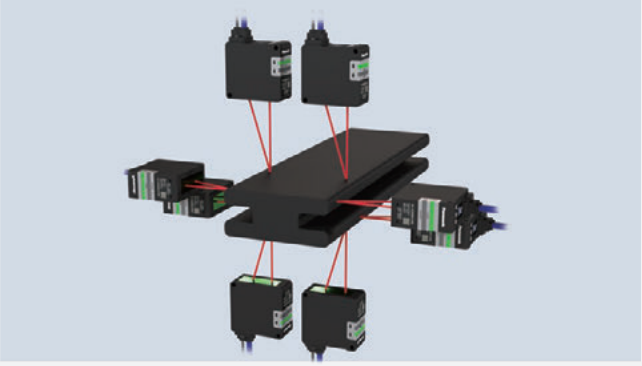
Applications

Inspection of battery shape



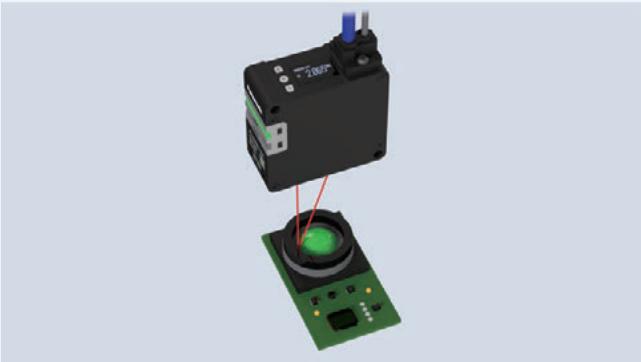
The **HL-G2** series can be used for the measurement of terminal heights in an inspection process. The **HL-G2** does not need a separate communication unit for communicating via network even for collecting measured data used for traceability.

Inspection of automobile part shape



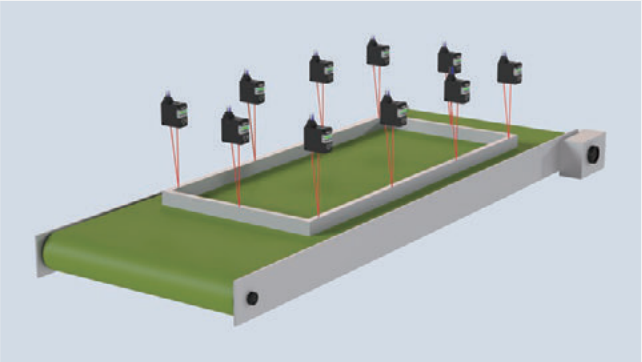
The **HL-G2** series can be used for the measurement of the dimensions of rubber parts. The improved optical design of the **HL-G2** sensors ensures stabler measurement of low-reflection parts as compared to previous products.

Inspection of camera actuator operating amount



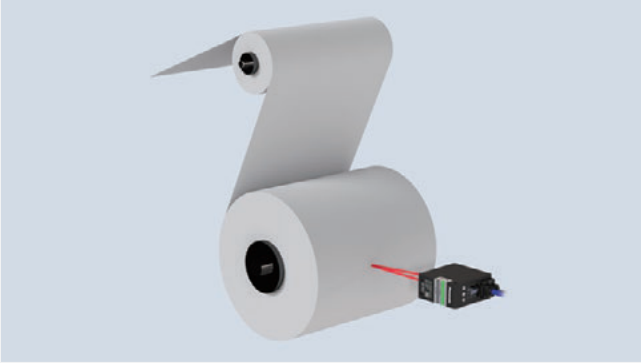
The **HL-G2** series can compare auto-focus actuator control current and value measured by the sensor for the confirmation of operation. The communication type models do not require an A/D conversion program so that numerical control is easier.

Inspection of flatness of metal frame



The **HL-G2** series can be used for the inspection of flatness of products. All **HL-G2** models feature a line spot specification, so they provide stable measurement performance even if the workpiece has hair lines or relatively rough surface.

Confirmation of remaining roll amount

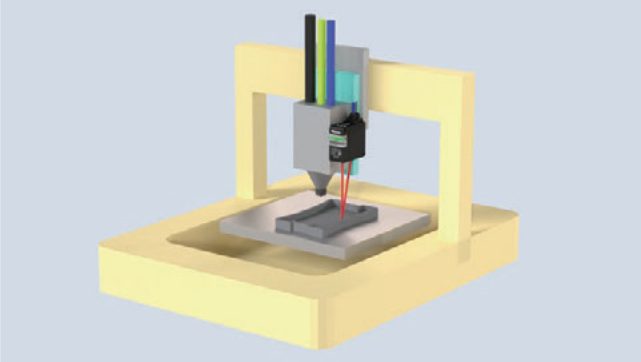


The **HL-G2** series can be used to check the remaining amount of workpieces in a roll-like shape. With a built-in communication unit, the **HL-G2** sensors can communicate via network for assuring traceability and collecting data at low cost.

Inspection of slitter blade surface runout

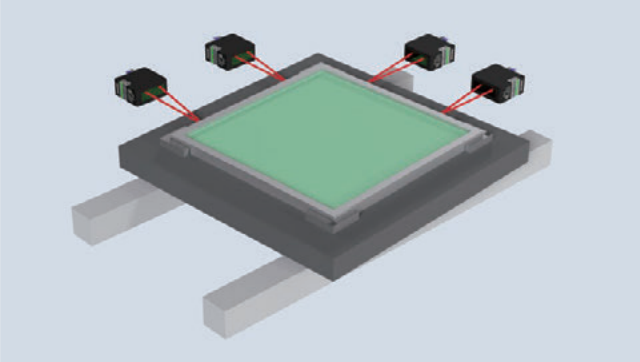
The **HL-G2** series can be used for the detection of slitter blade runout so that equipment abnormalities can be detected or data for predictive maintenance can be obtained. The **HL-G2** directly outputs numerical values using the communication function when data are obtained, thus eliminating the need to consider errors that may be generated during A/D conversion.

Control of dispenser height



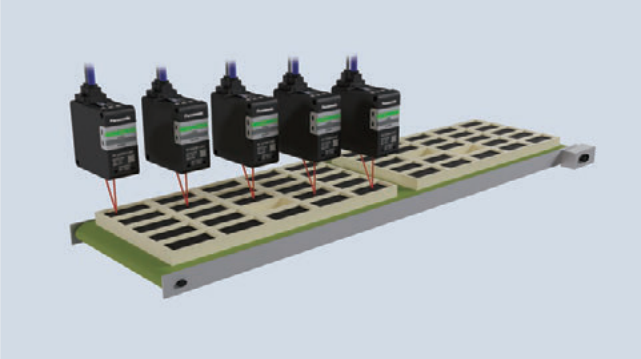
The **HL-G2** series can be used for the detection of the distance to workpiece for control purposes. The sensors perform sampling at high speeds so smoother equipment control is possible.

Adjustment of alignment



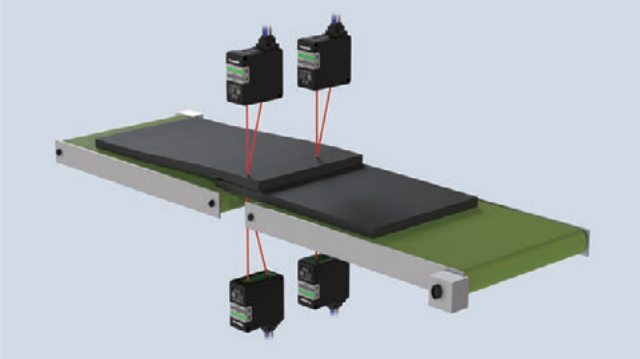
The **HL-G2** series measures the distances from four points and directly outputs numerical values for the adjustment of alignments in the XYθ directions at four points.

Detection of chips on a tray



The **HL-G2** series can be used for the detection of the presence / absence of substrates or thin workpieces on a tray. Because the **HL-G2** employs a CMOS system, it resists adverse effects caused by the color or reflectance of workpieces, thus contributing to stable detection.

Detection of overlapping rubber parts

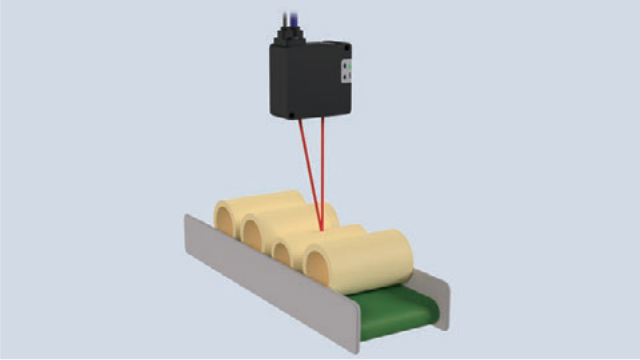


The **HL-G2** series can be used for the detection of overlapping rubber parts. The improved optical design of the **HL-G2** assures stabler detection of low-reflection workpieces as compared to previous products.

Correction of robot arm position

The **HL-G2** series can be used for the detection of the positional displacement of the tool attached to the robot arm. By measuring the tool at the appropriate origin, the **HL-G2** sensors can obtain data necessary for correcting the robot arm position relative to the robot axis.

Selection of resin parts



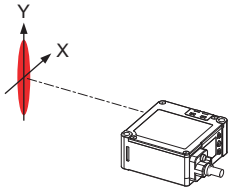
The **HL-G2** series can be used to measure the heights of products and eliminate different type products from the line. Since the **HL-G2** performs sampling faster than previous products, it offers improved responsiveness to a moving object.

ORDER GUIDE

Cables are not supplied with sensor units. Be sure to purchase optional cables.

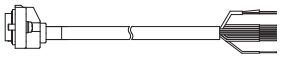
Type	Appearance	Measurement center distance and measurement range	Beam diameter (Note 2, 3)	Resolution	Linearity Limited range (top) Other (bottom)	Model No.
Communication type		30 mm ±5 mm 1.181 in ±0.197 in	X-axis: 40 µm 1.575 mil approx. Y-axis: 1,000 µm 39.370 mil approx.	0.5 µm 0.020 mil	±0.05 % F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in) ±0.075 % F.S.	**HL-G203B-S-MK**
		50 mm ±10 mm 1.969 in ±0.394 in	X-axis: 60 µm 2.362 mil approx. Y-axis: 2,000 µm 78.740 mil approx.	1.5 µm 0.059 mil	±0.05 % F.S. (45 mm to 55 mm) (1.772 in to 2.165 in) ±0.075 % F.S.	**HL-G205B-S-MK**
		85 mm ±20 mm 3.346 in ±0.787 in	X-axis: 90 µm 3.543 mil approx. Y-axis: 3,000 µm 118.110 mil approx.	2.5 µm 0.098 mil	±0.05 % F.S. (75 mm to 95 mm) (2.953 in to 3.740 in) ±0.075 % F.S.	**HL-G208B-S-MK**
		120 mm ±30 mm 4.724 in ±1.181 in	X-axis: 100 µm 3.937 mil approx. Y-axis: 4,000 µm 157.480 mil approx.	4 µm 0.157 mil	±0.05 % F.S. (105 mm to 135 mm) (4.134 in to 5.315 in) ±0.075 % F.S.	**HL-G212B-S-MK**
		250 mm ±150 mm 9.843 in ±5.906 in	X-axis: 300 µm 11.811 mil approx. Y-axis: 8,000 µm 314.961 mil approx.	15 µm 0.591 mil	±0.15 % F.S. (200 mm to 300 mm) (7.874 in to 11.811 in) ±0.25 % F.S.	**HL-G225B-S-MK**
Analog output type		30 mm ±5 mm 1.181 in ±0.197 in	X-axis: 40 µm 1.575 mil approx. Y-axis: 1,000 µm 39.370 mil approx.	0.5 µm 0.020 mil	±0.05 % F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in) ±0.075 % F.S.	**HL-G203B-A-MK**
		50 mm ±10 mm 1.969 in ±0.394 in	X-axis: 60 µm 2.362 mil approx. Y-axis: 2,000 µm 78.740 mil approx.	1.5 µm 0.059 mil	±0.05 % F.S. (45 mm to 55 mm) (1.772 in to 2.165 in) ±0.075 % F.S.	**HL-G205B-A-MK**
		85 mm ±20 mm 3.346 in ±0.787 in	X-axis: 90 µm 3.543 mil approx. Y-axis: 3,000 µm 118.110 mil approx.	2.5 µm 0.098 mil	±0.05 % F.S. (75 mm to 95 mm) (2.953 in to 3.740 in) ±0.075 % F.S.	**HL-G208B-A-MK**
		120 mm ±30 mm 4.724 in ±1.181 in	X-axis: 100 µm 3.937 mil approx. Y-axis: 4,000 µm 157.480 mil approx.	4 µm 0.157 mil	±0.05%F.S (105 mm to 135 mm) (4.134 in to 5.315 in) ±0.075 % F.S.	**HL-G212B-A-MK**
		250 mm ±150 mm 9.843 in ±5.906 in	X-axis: 300 µm 11.811 mil approx. Y-axis: 8,000 µm 314.961 mil approx.	15 µm 0.591 mil	±0.15 % F.S. (200 mm to 300 mm) (7.874 in to 11.811 in) ±0.25 % F.S.	**HL-G225B-A-MK**

Notes: 1) Unless otherwise specified, the above specifications are typical values measured under the following measurement conditions. They do not guarantee performance for all target objects.
Power supply voltage: 24 V DC, ambient temperature: 20 °C 68 °F, sampling cycle: 1 ms, average count: 512 times, measurement center distance, target object: visible light shielding ceramic
2) The X and Y axes of the beam diameter are specified as shown in the figure on the right.
3) The beam diameter is defined as $1/e^2$ (approx. 13.5 %) of the center light intensity. Due to leak light outside the defined range, the measurement values may be affected if the reflectance around the detecting point is higher than that of the detecting point.



OPTIONS

Cables are not supplied with sensor units. Be sure to purchase optional cables.

Type		Appearance	Model No.	Description	
Optional cable	Ethernet type		**CN-8E-C2**	Length 2 m 6.562 ft	Used with communication type sensor **HL-G2□B-S-MK**. Two M2.6 screws provided.
			CN-8E-C5	Length 5 m 16.404 ft	
	RS-485 type		**CN-8R-C2**	Length 2 m 6.562 ft	
			CN-8R-C5	Length 5 m 16.404 ft	
			CN-8R-C10	Length 10 m 32.808 ft	
			CN-8R-C20	Length 20 m 65.617 ft	
	Analog output type		**CN-8A-C2**	Length 2 m 6.562 ft	Used with analog output type sensor **HL-G2□B-A-MK**. Two M2.6 screws provided.
			CN-8A-C5	Length 5 m 16.404 ft	

Operating Environment for Configuration Tool Software HL-G2 Configuration Tool

The following operating environment must be assured in order to use the configuration tool software **HL-G2 Configuration Tool**. Confirm that your system satisfies the requirements and that the required devices have been arranged.

Item	Requirements
OS	Windows® 10 (32 bit / 64 bit), Windows® 11 (64 bit)
CPU	Intel® Core™ i3 1 GHz or faster
Memory	2 GB or more
Available hard disk space	200 MB or more
Screen resolution	1366 × 768 or higher (recommended)
Display language	Japanese, English, Chinese (Simplified), Korean
Communication interface	Ethernet, RS-485
Operating conditions	.NET Frameworks 4.8 or later must be installed.

Note: Compatibility not guaranteed if the OS version used is no longer supported by Microsoft Corporation.

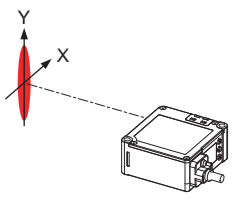
* Windows is a trademark or registered trademark of Microsoft Corporation in the United States and/or other countries.
* Intel Core is a trademark or registered trademark of Intel Corporation and its subsidiaries in the United States and/or other countries.

SPECIFICATIONS

Communication type

Item \ Type / Model No.		Communication type				
		HL-G203B-S-MK	**HL-G205B-S-MK**	**HL-G208B-S-MK**	**HL-G212B-S-MK**	**HL-G225B-S-MK**
Applicable regulations and certifications		CE Marking (EMC Directive, RoHS Directive), UKCA Marking (EMC Regulations, RoHS Regulations), FDA Regulation, TÜV SÜD Certification (U.S.A., Canada), Korea KC Mark				
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
Measurement range		±5 mm ±0.197 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±30 mm ±1.181 in	±150 mm ±5.906 in
Beam diameter (Note 2)(Note 3)		X-axis: 40 µm 1.575 mil approx. Y-axis: 1,000 µm 39.370 mil approx.	X-axis: 60 µm 2.362 mil approx. Y-axis: 2,000 µm 78.740 mil approx.	X-axis: 90 µm 3.543 mil approx. Y-axis: 3,000 µm 118.110 mil approx.	X-axis: 100 µm 3.937 mil approx. Y-axis: 4,000 µm 157.480 mil approx.	X-axis: 300 µm 11.811 mil approx. Y-axis: 8,000 µm 314.961 mil approx.
Resolution		0.5 µm 0.020 mil	1.5 µm 0.059 mil	2.5 µm 0.098 mil	4 µm 0.157 mil	15 µm 0.591 mil
Linearity	Limited range	±0.05 % F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in)	±0.05 % F.S. (45 mm to 55 mm) (1.772 in to 2.165 in)	±0.05 % F.S. (75 mm to 95 mm) (2.953 in to 3.740 in)	±0.05 % F.S. (105 mm to 135 mm) (4.134 in to 5.315 in)	±0.15 % F.S. (200 mm to 300 mm) (7.874 in to 11.811 in)
	Other than above	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.25 % F.S.
Temperature characteristics		0.03 % F.S./°C				
Measuring method		Diffuse reflection				
Light source		Red semiconductor laser: Class 2 [IEC / EN / JIS / GB / KS / FDA Laser Notice No. 56 (Note 4)] Maximum output: 1 mW, Peak emission wavelength: 655 nm				
Light receiving element		CMOS image sensor				
Power supply voltage		Power supply units with a current capacity of 500 mA or more, including 24 V DC ±10 %, ripple 0.5 V (P-P)				
Current consumption		150 mA or less (Note 5)				
Sampling cycle		100 µs, 200 µs, 500 µs, 1 ms, 2 ms				
Communication interface	Ethernet	• Only Auto Negotiation 10 M / 100 Mbps (Half Duplex / Full Duplex) supported. Communication may be unstable if connected to a device that does not support Auto Negotiation. • IEEE802.3u, 10BASE-T / 100BASE-TX RJ45 • Supported protocol: EtherNet/IP, Modbus TCP, and SLMP				
	RS-485	• Communication speed: 9,600 / 19,200 / 38,400 / 115,200 / 230,400 bps • Supported protocol: Modbus RTU • Maximum number of connected units: 16				
External input	IN 1	• Trigger input •The input conditions are interlocked with NPN / PNP setting of the control output <When NPN output is selected> • Source current: 1.5 mA approx. • Input conditions Invalid: 3 to 26.4 V DC or when released Valid: 0 to 1.5 V DC <When PNP output is selected> • Sink current: 2.5 mA approx. • Input conditions Invalid: 0 to 11 V DC or when released Valid: 19 to 26.4 V DC				
Indicators	Laser radiation	Green LED (Lit while laser beams are being emitted)				
	Alarm	Orange LED (Lit when measurement is not possible due to insufficient or excessive received light intensity, or due to excessive extraneous light)				
Display section		0.9 inch organic EL Measured value: signed 5-digit (maximum of 4 digits after the decimal point)				
Pollution degree		2				
Operating altitude(Note 6)		2,000 m 6561.680 ft or less				
Grounding method		Capacitor grounding				
Environmental resistance	Protection	IP67 (IEC)				
	Ambient temperature	-10 to +45 °C -14 to 113 °F (No icing allowed), Storage: -20 to +60 °C -4 to 140 °F (No icing allowed)				
	Ambient humidity	35 to 85 % RH (No condensation allowed), Storage: 35 to 85 % RH (No condensation allowed)				
	Ambient illuminance	Incandescent light: 3,000 ℓx or less at the light-receiving face				
	Insulation resistance	20 MΩ or higher, using 500 V DC megger				
	Withstand voltage	1,000 V AC between all terminals and case for 1 minute				
	Vibration resistance	10 to 55 Hz (period: 1 min.) frequency, 1.5 mm 0.059 in double 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 three times each				
Material		Product casing: Aluminum die casting, Front cover: Glass, Cable: PVC				
Weight		Net weight: 150 g approx., Gross weight: 200 g approx.				

Notes: 1) Unless otherwise specified, the above specifications are typical values measured under the following measurement conditions. They do not guarantee performance for all target objects.
Power supply voltage: 24 V DC, ambient temperature: 20 °C 68 °F, sampling cycle: 1 ms, average count: 512 times, measurement center distance, target object: visible light shielding ceramic
2) The X and Y axes of the beam diameter are specified as shown in the figure on the right.
3) The beam diameter is defined as 1/e^2 (approx. 13.5 %) of the center light intensity.
Due to leak light outside the defined range, the measurement values may be affected if the reflectance around the detecting point is higher than that of the detecting point.
4) This product complies with the FDA regulations (FDA 21 CFR 1040.10 and 1040.11) in accordance with FDA Laser Notice No. 56, except for complying with IEC 60825-1 Ed. 3.
5) Current consumption of the sensor only. External input current is not included.
6) Do not use or store this product in environments where ambient air is pressurized to an air pressure higher than the atmospheric pressure at an altitude of 0 m.



* Ethernet is a registered trademark of FUJIFILM Business Innovation Corp.
* EtherNet/IP is a trademark or a registered trademark of Open DeviceNet Vendors Association (ODVA).
* Modbus is a registered trademark of Schneider Electric USA Inc.
* SLMP is a registered trademark of Mitsubishi Electric Corporation.

SPECIFICATIONS

Analog output type

*Please see the previous page for the explanatory notes.

Item \ Type / Model No.		Analog output type				
		HL-G203B-A-MK	**HL-G205B-A-MK**	**HL-G208B-A-MK**	**HL-G212B-A-MK**	**HL-G225B-A-MK**
Applicable regulations and certifications		CE Marking (EMC Directive, RoHS Directive), UKCA Marking (EMC Regulations, RoHS Regulations), FDA Regulation, TÜV SÜD Certification (U.S.A., Canada), Korea KC Mark				
Measurement center distance		30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 i	120 mm 4.724 in	250 mm 9.843 in
Measurement range		±5 mm ±0.197 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±30 mm ±13.78 in	±150 mm ±5.906 in
Beam Diameter (Note 2)(Note 3)		X-axis: 40 µm 1.575 mil approx. Y-axis: 1,000 µm 39.370 mil approx.	X-axis: 60 µm 2.362 mil approx. Y-axis: 2,000 µm 78.740 mil approx.	X-axis: 90 µm 3.543 mil approx. Y-axis: 3,000 µm 118.110 mil approx.	X-axis: 100 µm 3.937 mil approx. Y-axis: 4,000 µm 157.480 mil approx.	X-axis: 300 µm 11.811 mil approx. Y-axis: 8,000 µm 314.961 mil approx.
Resolution		0.5 µm 0.020 mil	1.5 µm 0.059 mil	2.5 µm 0.098 mil	4 µm 0.157 mil	15 µm 0.591 mil
Linearity	Limited range	±0.05 % F.S. (27.5 mm to 32.5 mm) (1.083 in to 1.280 in)	±0.05 % F.S. (45 mm to 55 mm) (1.772 in to 2.165 in)	±0.05 % F.S. (75 mm to 95 mm) (2.953 in to 3.740 in)	±0.05 % F.S. (105 mm to 135 mm) (4.134 in to 5.315 in)	±0.15 % F.S. (200 mm to 300 mm) (7.874 in to 11.811 in)
	Other than above	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.075 % F.S.	±0.25 % F.S.
Temperature characteristics		0.03 %F.S./°C				
Measuring method		Diffuse reflection				
Light source		Red semiconductor laser: Class 2 [IEC / EN / JIS / GB / KS / FDA Laser Notice No. 56 (Note 4)] Maximum output: 1 mW, Peak emission wavelength: 655 nm				
Light receiving element		CMOS image sensor				
Power supply voltage		Power supply units with a current capacity of 500 mA or more, including 24 V DC ±10 %, ripple 0.5 V (P-P)				
Current consumption		150 mA or less (Note 5)				
Sampling cycle		100 µs, 200 µs, 500 µs, 1 ms, 2 ms				
Analog output		Output mode switchable by changing the setting				

	When voltage output is selected	When current output is selected
Output scale (Default value)	0 V to 5 V / F.S.	4 mA to 20 mA / F.S.
Normal output range	0 V to 5.25 V	3.2 mA to 20.8 mA
Alarm *1	5.3 V ± 20 mV	22 mA ± 100 µA
Indeterminate state	5.5 V ± 20 mV	23 mA ± 100 µA
Impedance	Output impedance: 100 Ω	Load impedance: 300 Ω or less
Resolution *2	± 2 mV	± 6 µA
Linearity *3	±0.05 % F.S.	±0.25 % F.S.
Temperature characteristics	0.005 % F.S./°C	0.01 % F.S./°C

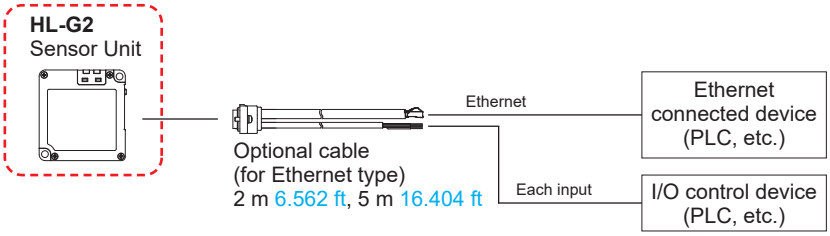
*1: The value that will be output when Alarm analog output is set to Alarm.
When set to Hold, the value immediately before alarm occurrence will be held.
*2: This refers to the repeatability of analog output only.
Static resolution and linearity error by measurement will be added.
*3: This refers to the linearity of analog output only.
Static resolution and linearity error by measurement will be added. This does not include the repeatability of analog output only.

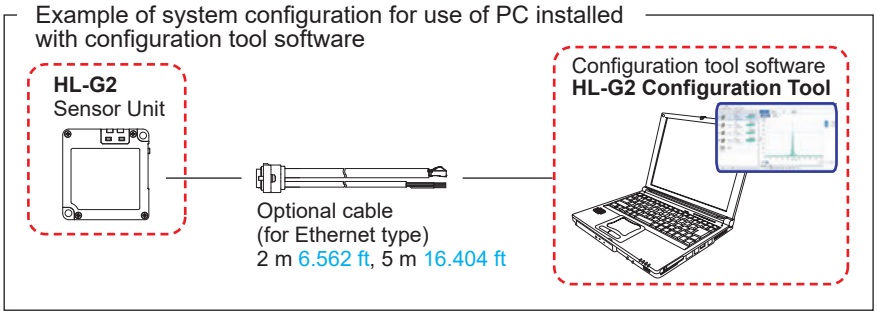
Control output	OUT 1 OUT 2 OUT 3	• Possible to switch over between NPN transistor open collector / PNP transistor open collector by changing the setting • Possible to switch over between judgment output and alarm output by changing the setting <When NPN output is selected> • Maximum sink current: 50 mA • Applied voltage: 26.4 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (at 50 mA sink current) • Leakage current: 0.1 mA or less <When PNP output is selected> • Maximum source current: 50 mA • Residual voltage: 2.8 V or less (at 50 mA source current) • Leakage current: 0.1 mA or less
	Output type	Possible to switch over between open and close when set to ON by changing the setting
	Protection	Equipped (Automatic recovery type) * This is not an overcurrent protection.
External input	IN 1 IN 2 IN 3	• Possible to switch over from trigger, zero setting, measured value resetting, laser stop, teaching, or bank by changing the setting • The input conditions are interlocked with NPN / PNP setting of the control output <When NPN output is selected> • Source current: 1.5 mA approx. • Input conditions Invalid: 3 to 26.4 V DC or open Valid: 0 to 1.5 V DC <When PNP output is selected> • Sink current: 2.5 mA approx. • Input conditions Invalid: 0 to 11 V DC or open Valid: 19 to 26.4 V DC
Indicators	Laser radiation	Green LED (Lit while laser beams are being emitted)
	Alarm	Orange LED (Lit when measurement is not possible due to insufficient or excessive received light intensity, or due to excessive extraneous light)
Display section		0.9 inch organic EL Measured value: signed 5-digit (maximum of 4 digits after the decimal point)
Pollution degree		2
Operating altitude(Note 6)		2,000 m 6561.680 ft or less
Grounding method		Capacitor grounding
Environmental resistance	Protection	IP67 (IEC)
	Ambient temperature	-10 to +45 °C -14 to 113 °F (No icing allowed), Storage: -20 to +60 °C -4 to 140 °F (No icing allowed)
	Ambient humidity	35 to 85 % RH (No condensation allowed), Storage: 35 to 85 % RH (No condensation allowed)
	Ambient illuminance	Incandescent light: 3,000 ℓx or less at the light-receiving face
	Insulation resistance	20 MΩ or higher, using 500 V DC megger
	Withstand voltage	1,000 V AC between all terminals and case for 1 minute
	Vibration resistance	10 to 55 Hz (period: 1 min.) frequency, 1.5 mm 0.059 in double 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 three times each
Material		Product casing: Aluminum die casting, Front cover: Glass, Cable: PVC
Weight		Net weight: 150 g approx., Gross weight: 200 g approx.

EXAMPLE OF SYSTEM CONFIGURATION

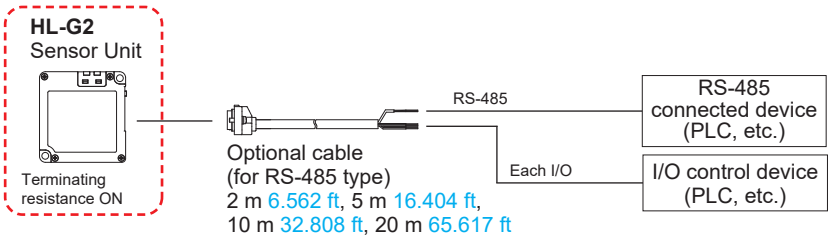
Communication type

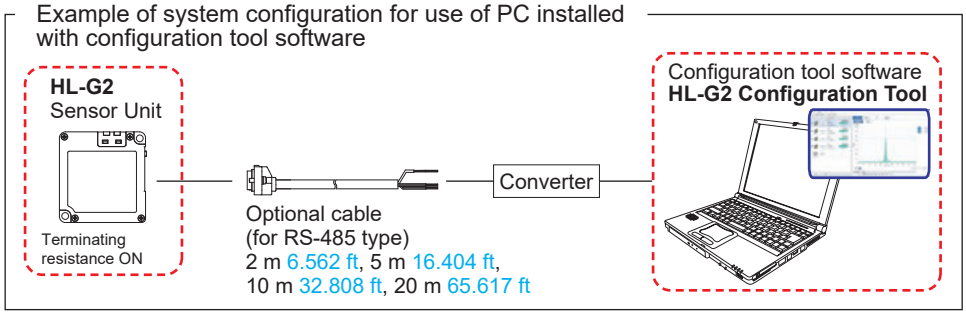
Ethernet communication





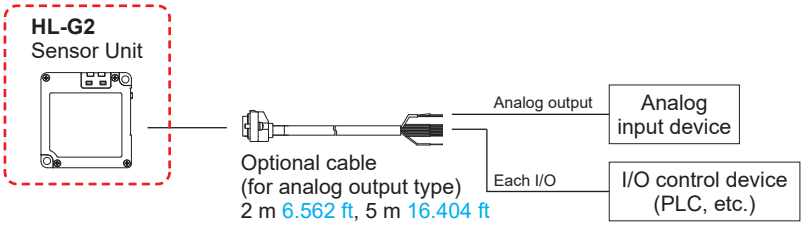
RS-485 communication





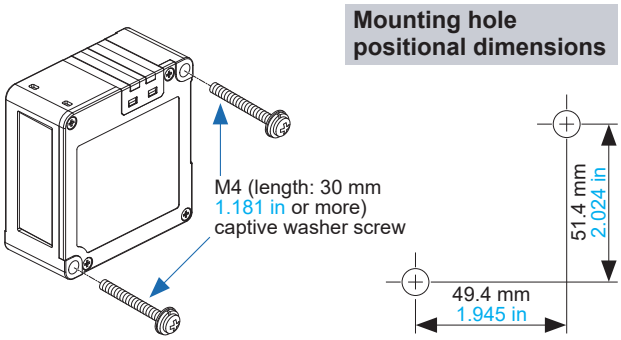
- RS-485 wiring allows connection of up to 16 devices.
- When RS-485 wiring is used for the converter, be sure to check for proper operation using actual equipment before using.

Analog output type

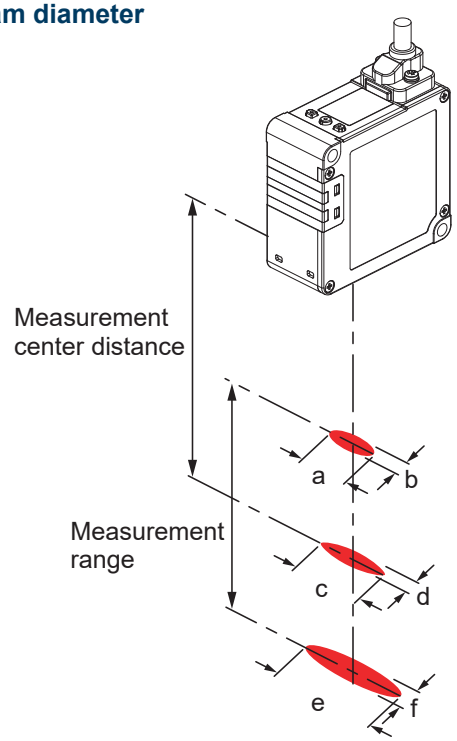


Sensor installation

- Use M4 screws with captive washers (length: 30 mm 1.181 in or longer) (not provided with product) for the installation of the product. The tightening torque should be 0.8 N·m or less.



Beam diameter



Model No.	Beam diameter (Unit: mm in)					
	a	b	c	d	e	f
HL-G203B-S-MK	0.7	0.1	1.0	0.04	1.3	0.1
HL-G203B-A-MK	0.028	0.004	0.039	0.002	0.051	0.004
HL-G205B-S-MK	1.2	0.2	2.0	0.06	2.8	0.2
HL-G205B-A-MK	0.047	0.008	0.079	0.002	0.110	0.008
HL-G208B-S-MK	2.0	0.3	3.0	0.09	4.0	0.2
HL-G208B-A-MK	0.079	0.012	0.118	0.004	0.157	0.008
HL-G212B-S-MK	2.8	0.3	4.0	0.1	5.2	0.3
HL-G212B-A-MK	0.110	0.012	0.157	0.004	0.205	0.012
HL-G225B-S-MK	2.5	0.7	8.0	0.3	13.5	0.5
HL-G225B-A-MK	0.098	0.028	0.315	0.012	0.531	0.020

- This catalog is a guide to select a suitable product. Be sure to read instruction manual attached to the product prior to its 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.

- Hazardous exposure to laser radiation may result if control or adjustment operations are performed based on procedures not specified in the product instruction manual or User's Manual.

- This product is classified as a Class 2 Laser Product under IEC / EN / JIS / GB / KS standards and FDA * regulations. Do not look at the laser beam directly or through an optical system such as a lens.
- Based on the safety standards for laser products, FDA / IEC (EN) standard certification / identification / warning labels are affixed to both sides of this product.

- This product is shipped with JIS, GB, and KS standard warning labels. Affix appropriate labels over the FDA / IEC (EN) labels as needed.

*: This product complies with the FDA regulations (FDA 21 CFR 1040.10 and 1040.11) in accordance with FDA Laser Notice No. 56, except for complying with IEC 60825-1 Ed. 3. (Class 2 laser products)

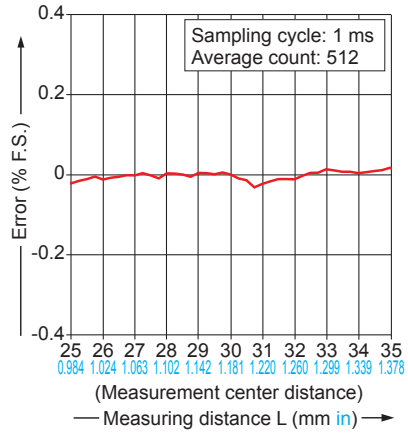
- This product has been developed / produced for industrial use only.
- This product is suitable for indoor use only.

SENSING CHARACTERISTICS (TYPICAL)

Refer to the **HL-G2** series specification catalog for other sensing characteristics.

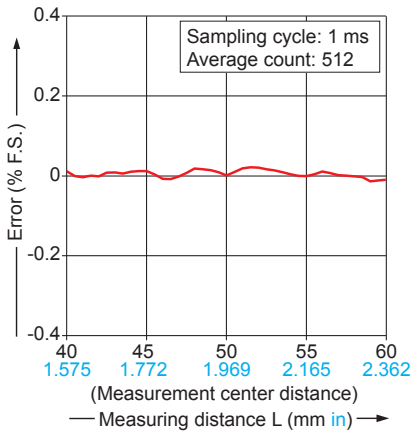
HL-G203B-S-MK — Communication type

• Horizontal placement



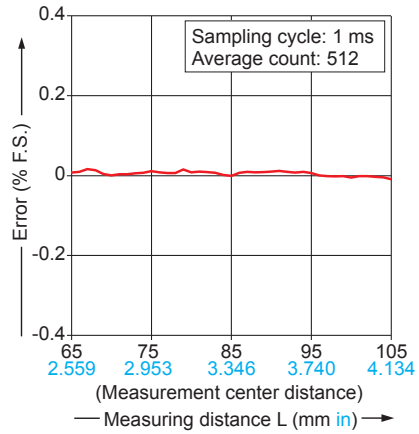
HL-G205B-S-MK — Communication type

• Horizontal placement



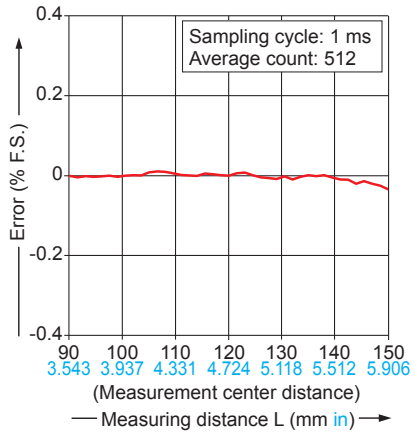
HL-G208B-S-MK — Communication type

• Horizontal placement



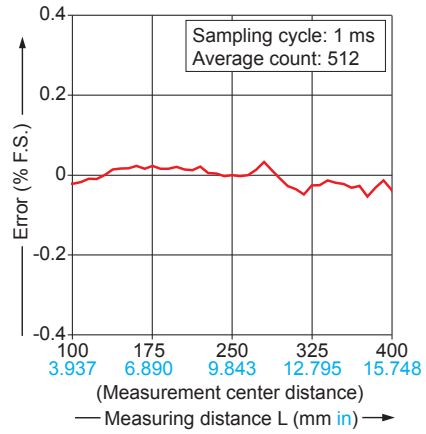
HL-G212B-S-MK — Communication type

• Horizontal placement



HL-G225B-S-MK — Communication type

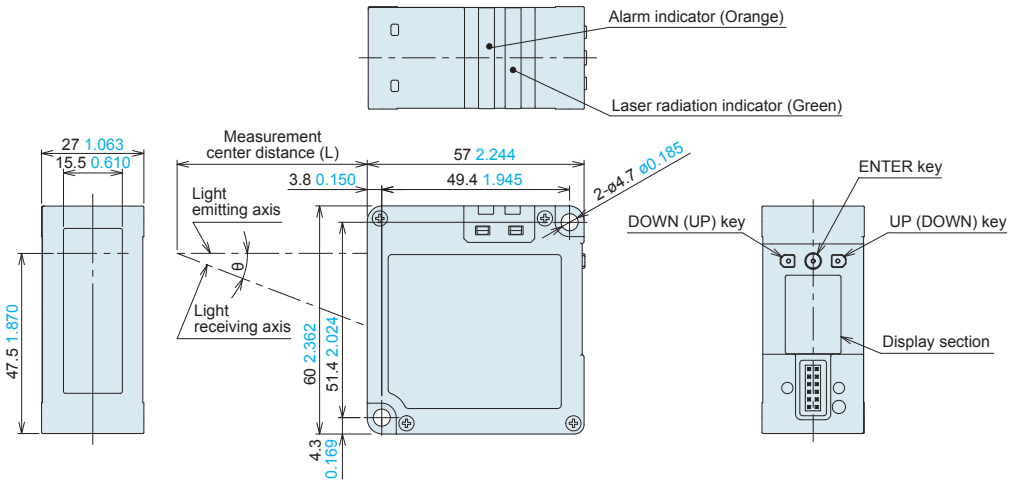
• Horizontal placement



HL-G2□B-S-MK HL-G2□B-A-MK

Sensor

Model No.	Measurement center distance (L)	θ
HL-G203B-S-MK HL-G203B-A-MK	30 1.181	30°
HL-G205B-S-MK HL-G205B-A-MK	50 1.969	24°
HL-G208B-S-MK HL-G208B-A-MK	85 3.346	17°
HL-G212B-S-MK HL-G212B-A-MK	120 4.724	13°
HL-G225B-S-MK HL-G225B-A-MK	250 9.843	6.5°

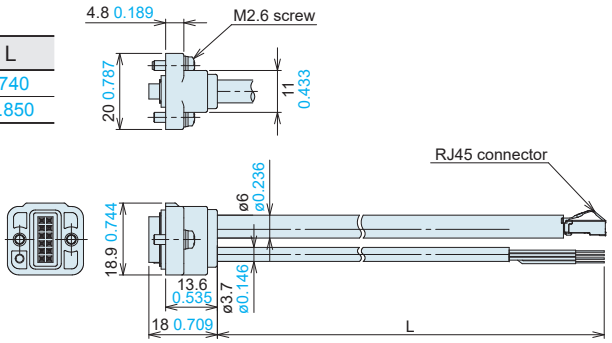


CN-8E-C□

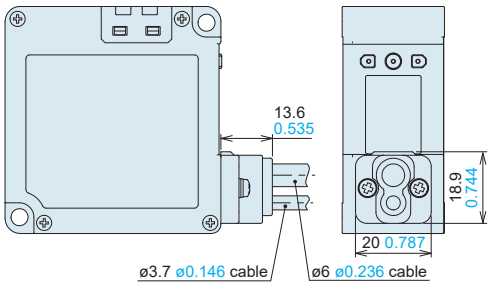
Optional Cable for Ethernet Communication (Sold Separately)

• Length L

Model No.	Length L
CN-8E-C2	2,000 78.740
CN-8E-C5	5,000 196.850



Installation diagram

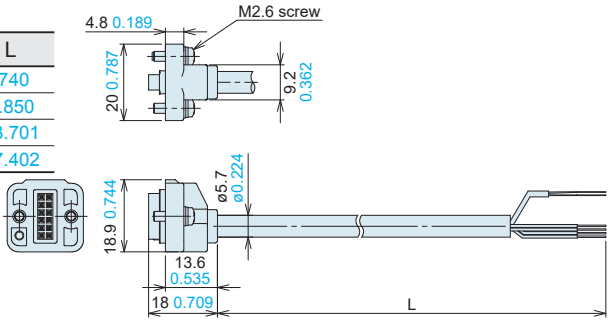


CN-8R-C□

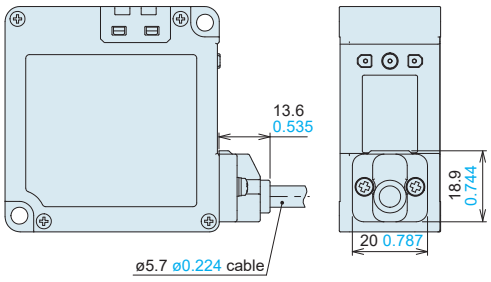
Optional Cable for RS-485 Communication (Sold Separately)

• Length L

Model No.	Length L
CN-8R-C2	2,000 78.740
CN-8R-C5	5,000 196.850
CN-8R-C10	10,000 393.701
CN-8R-C20	20,000 787.402



Installation diagram

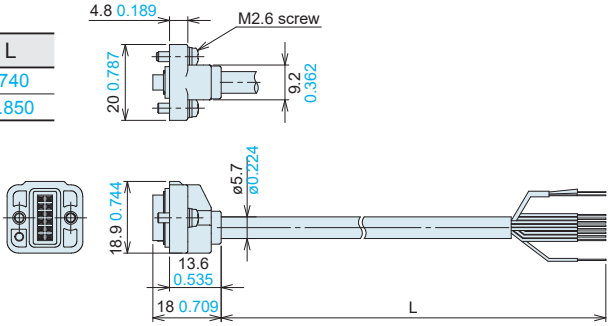


CN-8A-C□

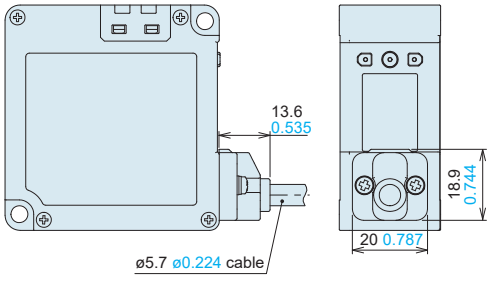
Optional Cable for Analog Output Type (Sold Separately)

• Length L

Model No.	Length L
CN-8A-C2	2,000 78.740
CN-8A-C5	5,000 196.850



Installation diagram



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Specifications are subject to change without notice.
No. CE-HLG2-FED-6 Printed in Japan
2024.3