



1 and

NEW

Compact Laser Displacement Sensor

HL-G1 SERIES



Introducing the new standard in CMOS laser displacement sensors

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

2010.10 panasonic-electric-works.net/sunx

Panasonic Electric Works SUNX



High resolution of **0.5 µm 0.02 mil** Fast response Sampling rate **200 µs**

GLOBAL SUPPORT

Each model's interface supports not only Japanese and English, but also Chinese and Korean, providing a new level of support for devices and equipment in use worldwide.

HL-G1 SERIES

Introducing Panasonic Electric Works SUNX Panasonic brand starts from 2010/10/1

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.

High performance CMOS Laser Displacement Sensors

HL-G112

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

HL-G108

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

HL-G105

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

HL-G103

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



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.



A variety of high-end functions are included in a

Easy configuration using the digital display

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



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

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



I/O to accommodate multiple needs

Timing input and multi input

Inaddition to timing input select the desired input according to your application:

Zero set on/offReset

• Las

Laser control Teaching

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.



compact, self-contained body for exceptional ease of use.



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.

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.



Compact size despite the built-in controller and digital readout



Fewer model numbers to register

Support for both NPN and PNP polarity

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

GLOBAL Support

Smooth setup changes

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.

User-friendly

Delivering a new level of ease of use thanks to a dedicated application and display unit

(High functionality type only)



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, 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 for the **HL-G1** series

The GT02 / GT12 HMI operator pannel 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, see the Panasonic Electric Works SUNX website or a product catalog.

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



Software is available for download. URL: panasonic-electric-works.net/sunx

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

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.

Full Line-UP

Choose from four models according to your application.



ORDER GUIDE

Туре	Appearance	Measurement center distance and measuring range	Resolution	Beam diameter	Model No.	Laser class
Standard type	Standard type	30 ±4 mm	n 0.5 µm 7 in 0.020 mil	0.1 × 0.1 mm 0.004 × 0.004 in	HL-G103-A-C5	
High functionality type		1.181 ±0.157 in			HL-G103-S-J	
Standard type	rd ty type rd ty type rd ty type rd	50 ±10 mm	1.5 µm	0.5 × 1 mm 0.020 × 0.039 in 0.75 × 1.25 mm	HL-G105-A-C5	FDA: Class I
High functionality type		1.969 ±0.394 in	0.059 mil		HL-G105-S-J	
Standard type		85 ±20 mm	2.5 µm		HL-G108-A-C5	IEC: Class 2
High functionality type		3.346 ±0.787 in	0.098 mil	0.030 × 0.059 in	HL-G108-S-J	
Standard type		120 ±60 mm	8 µm	1.0 × 1.5 mm	HL-G112-A-C5	
High functionality type		4.724 ±2.362 in		0.039 × 0.059 in	HL-G112-S-J	

OPTIONS

Туре	Appearance	Model No.	Description		
Extension cable		HL-G1CCJ2	Length: 2 m 6.562 ft, Weight: 130 g approx.	2 ft, Weight: 130 g approx. 04 ft, Weight: 320 g approx. 14-core cabtyre cable with	
		HL-G1CCJ5	Length: 5 m 16.404 ft, Weight: 320 g approx.		
functionality type)		HL-G1CCJ10	Length: 10 m 32.808 ft, Weight: 630 g approx.	connector on both ends	
		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	32/64	Edition	Service Pack	NET	VisualStudio RunTime
08	WindowsXP		Professional	SP2 or later	Unnecessary	
03	WindowsVista	32bit	Enterprise			VS2008 (necessary)
	Windows7		Enterprise			
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 accommdates below language. You can select the language when installing. •Japanese •English •Korean •Chinese (upcoming)

INFORMATION OF INTERFACE CONVERTER

The communications interface converter of HL-G1 series is RS-422 or RS-485. We will recommend 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

Туре		Standard type					
Item Model No.		HL-G103-A-C5	HL-G105-A-C5	HL-G108-A-C5	HL-G112-A-C5		
Меа	surement center distance	30 mm 1.181 in	50 mm 1.969 in	85 mm 3.346 in	120 mm 4.724 in		
Mea	asuring range	±4 mm ±0.157 in	±10 mm ±0.394 in	±20 mm ±0.787 in	±60 mm ±2.362 in		
Res	olution	0.5 µm 0.020 mil	1.5 µm 0.059 mil	2.5 µm 0.098 mil	8 µm 0.315 mil		
Line	earity	±0.1 % F.S.					
Tem	prerature characteristics		±0.08 %	F.S. / °C			
Ligh	it source	Red semiconductor laser, Class 2 (IEC / JIS), Class II (FDA, Laser Notice No. 50) Max. output: 1 mW (Peak emission wavelength: 655 nm 0.026 mil)					
Bea	m 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		
Rec	eiving element		CMOS ima	age sensor			
Sup	ply voltage		24 V DC ±10 % includ	ding ripple 0.5 V (P-P)			
Cur	rent consumption		100 mA	or less			
San	npling rate		200 µs, 500 µ	ıs, 1 ms, 2 ms			
ut	Voltage	Output rar	nge: 0 to +10.5 V (normal), 1	1 V (alarm) Output impedan	ce: 100 Ω		
Ana	Current	Output range: 3	.2 to 20.8 mA (normal), 21.6	mA (alarm) Load impedance	e: 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="" npn="" of="" output="" using=""> • 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>					
	Output operation	Opened when the amount of light is insufficient.					
Short circuit protection Incorporated (automatic restoration)							
Output polarity setting input		NPN (PNP (open-collector output operate open-collector output operate	es when 0 V is connected. es when 24 V DC is connecte	ed.		
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, teaching, 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.					
tor	Laser emission	Green LED (lights up during laser emission).					
dica	Alarm	Orange LED lights up when this product cannot measure because of insuffienct light intensity.					
Ĕ	Measurement range	Three yellow LED					
Digi	tal display	Red LED 5 digit display					
	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 Ambient illuminance		35 to 85 % RH, Storage: 35 to 85 % RH					
		Incandescent light: 3,000 {x or less at the light-receiving face (Note 3)					
Ambient altitube		2,000 m 6561 ft or less					
nen	Pollution degree			2			
onr	Insulation resistance	20 MΩ, or more, wi	th 250 V DC between all sup	oply teminals connected toge	ther and enclosure		
nvir	Votage withstandability	1,000 V AC one min. between all supply terminals connected together and enclosure					
ш	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 hou					
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

Туре		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		
Res	olution	0.5 µm 0.020 mil	1.5 µm 0.059 mil	2.5 µm 0.098 mil	8 µm 0.315 mil		
Line	arity		±0.1 9	% F.S.			
Tem	prerature characteristics		±0.08 %	F.S. / °C			
Ligh	t source	Red semiconductor laser, Class 2 (IEC / JIS), Class II (FDA, Laser Notice No. 50) Max. output: 1 mW (Peak emission wavelength: 655 nm 0.026 mil)					
Bea	m 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		
Rec	eiving element		CMOS ima	age sensor			
Sup	ply voltage		24 V DC ±10 % includ	ding ripple 0.5 V (P-P)			
Curr	rent consumption		100 mA	or less			
San	npling rate		200 µs, 500 µ	s, 1 ms, 2 ms			
put	Voltage	Output rar	nge: 0 to +10.5 V (normal), 1	1 V (alarm) Output impedan	ce: 100 Ω		
Ana	Current	Output range: 3	.2 to 20.8 mA (normal), 21.6	mA (alarm) Load impedance	e: 300 Ω or less		
		Judgment output or alarm output (Setting can be selected.) Selectable NPN transistor open-collector or PNP transistor open-collector					
Output (OUT 1, OUT 2, OUT 3)		<in case="" npn="" of="" output="" using=""> 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="" output="" pnp="" using=""> Maximum source current : 50 mA Residual voltage : 2.8 V or less (at 50 mA of source current) </in></in>					
	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, teaching, 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.					
Con	nmunications interface	RS-422 or RS-485 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					
tor	Laser emission		Green LED (lights up	during laser emission)			
licat	Alarm	Orange LED lights up when this product cannot measure because of insuffienct light intensity.					
lnc	Measurement range	Three yellow LED					
Digi	tal display		Red LED 5	digit display			
	Protection	IP67					
e	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					
esis	Ambient illuminance	Incandescent light: 3,000 & or less at the light-receiving face (Note 3)					
Ambient altitube		2,000 m 6561 ft or less					
Pollution degree		2					
onm	Insulation resistance	20 MΩ, or more, with 250 V DC between all supply teminals connected together and enclosure					
nvire	Votage withstandability	1,000 V AC or	ne min. between all supply te	rminals connected together	and enclosure		
ш	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 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 (positively grounded)



*1



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.







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

I/O CIRCUIT AND WIRING DIAGRAMS

Communication specifications (High functionality type)

	DC 400	DS 485		
Communication method	R3-422	R3-400		
	Full duplex	Half duplex		
Synchronization method	Asynchronous com	nunication method		
Transmission code		SCI		
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	1 bit		
Parity check	None			
BCC	Ye	es		
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)



Note: Transmitted data cable or received data is twisted pair cable.

RS-485 connection (1:N)

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



Notes: 1) Transmitted data cable or received data is twisted pair cable. 2) The terminating resistance is built in the sensor.

- Make sure to set the terminating command of final senser unit ON. 3) The transmission line should be connected in series.
- 4) Connect to the device in accordance with its specifications.

SENSING CHARACTERISTICS (TYPICAL)



-0.4 -60.0 -30.0 0 30.0 60.0 -2.362 -1.181 (Center) 1.181 2.362 — Measuring distance L (mm in) → -0.4 -60.0 -2.362

-30.0

Ó

Measuring distance L (mm in)→

30.0 1.181 60.0

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 Japanes, English, Chinese, Korean warning label is packed with the sensor.

Beam diameter (Unit: mm in)



in FDA regulations. Do not look at the laser beam directly or through optical system such as a lens.

• This product is classified as a Class 2 Laser Product

in IEC / JIS standards and a Class II Laser Product



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 that has large differences in gaps, grooves and colors



Rotating object





DIMENSIONS (Unit: min in)

The CAD data in the dimensions can be downloaded from the website: panasonic-electric-works.net/sunx

HL-G1D-A-C5

Standard type

Model No.	Measurement center distance (<i>l</i>)	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

High functionality type

Model No.	Measurement center distance (<i>l</i>)	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

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



Extension cable (Optional)



