

NEW

Ultra High-speed · High-precision Laser Displacement Sensor

Small beam spot type HL-C20□
HL-C235CE-W
Linear beam spot type HL-C20□-MK
HL-C235CE-WMK



NEW

HL-C205B(-MK)
HL-C205C(-MK)



NEW

HL-C208B(-MK)
HL-C208C(-MK)



NEW

HL-C235CE-W(MK)

A fusion of high speed
and high precision

HL-C2 SERIES

Announcing three new sensor head models

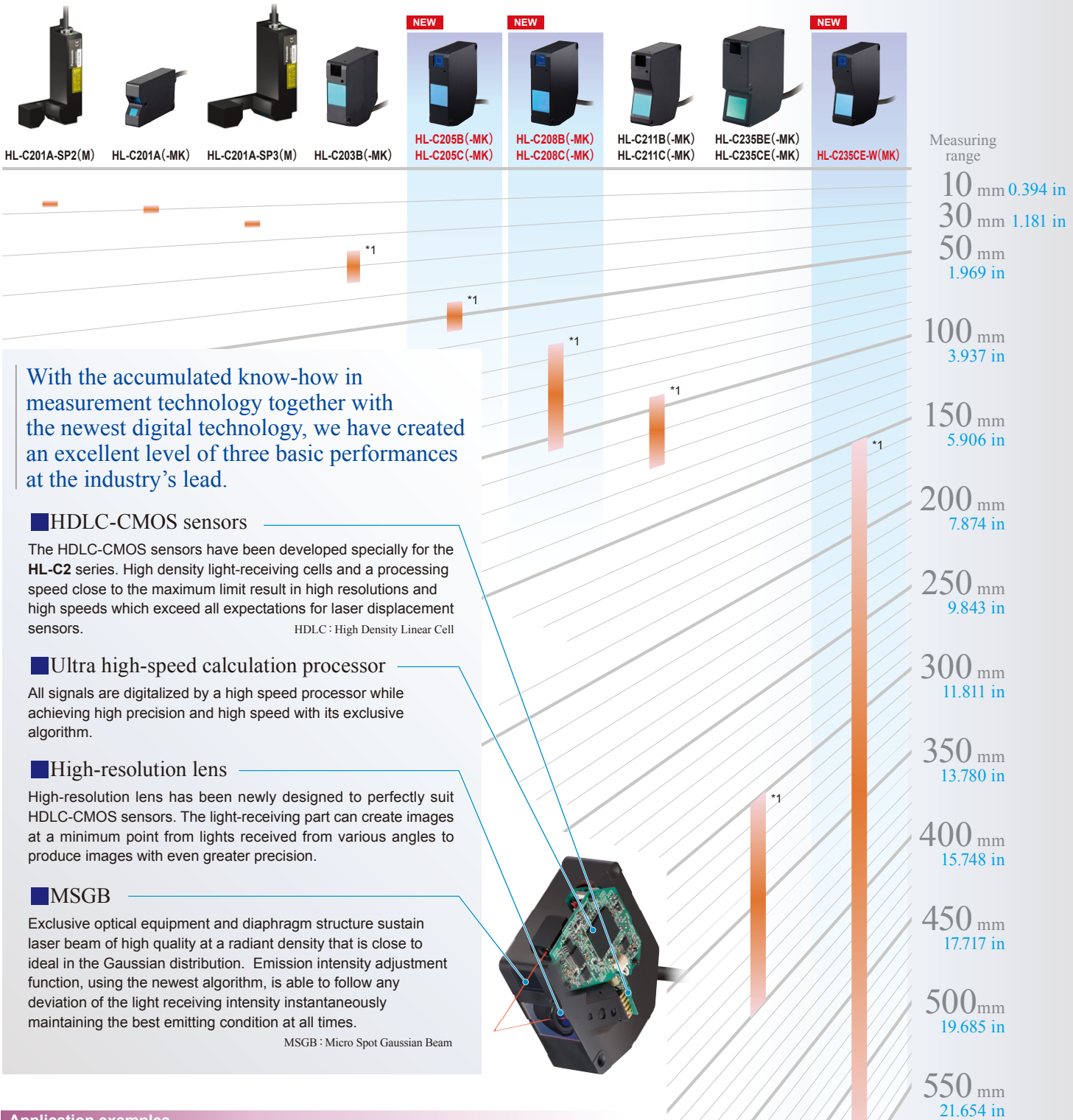
50mm **85mm** **350mm**
1.969 in 3.346 in 13.780 in

Measurement center distance

At the industry's leading edge*, basic performance to attend every need

* As of November 2012, internally investigated, using our laser displacement sensors with a measurement center distance of 30 mm 1.181 in.

We offer a comprehensive lineup covering both short and long ranges.



With the accumulated know-how in measurement technology together with the newest digital technology, we have created an excellent level of three basic performances at the industry's lead.

HDLC-CMOS sensors

The HDLC-CMOS sensors have been developed specially for the HL-C2 series. High density light-receiving cells and a processing speed close to the maximum limit result in high resolutions and high speeds which exceed all expectations for laser displacement sensors.

HDLC: High Density Linear Cell

Ultra high-speed calculation processor

All signals are digitalized by a high speed processor while achieving high precision and high speed with its exclusive algorithm.

High-resolution lens

High-resolution lens has been newly designed to perfectly suit HDLC-CMOS sensors. The light-receiving part can create images at a minimum point from lights received from various angles to produce images with even greater precision.

MSGB

Exclusive optical equipment and diaphragm structure sustain laser beam of high quality at a radiant density that is close to ideal in the Gaussian distribution. Emission intensity adjustment function, using the newest algorithm, is able to follow any deviation of the light receiving intensity instantaneously maintaining the best emitting condition at all times.

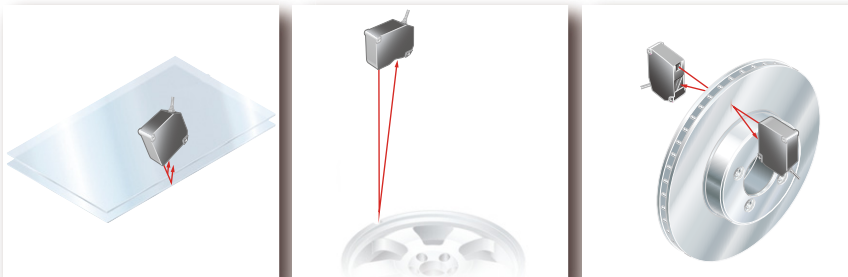
MSGB: Micro Spot Gaussian Beam

Application examples

Gap measurement using an exposure device

Detection of aluminum wheel grooves

Measurement of disk brake thickness



*1: Diffuse reflective

ORDER GUIDE

Sensor heads

Type	Appearance	Measurement center distance and measuring range	Resolution (Note)	Beam size	Model No.	
					IEC/JIS-conformed type	FDA-conformed type
Small beam spot type		At diffuse reflection 50±5 mm 1.969 ±0.197 in	0.05 µm (0.25 µm) 0.002 mil (0.010 mil)	ø70 µm ø2.756 mil approx.	HL-C205B (HL-C205BE)	—
Linear beam spot type				ø70 × 1,000 µm ø2.756 × 39.370 mil approx.	HL-C205B-MK (HL-C205BE-MK)	—
Small beam spot type				ø70 µm ø2.756 mil approx.	HL-C205C (HL-C205CE)	—
Linear beam spot type				ø70 × 1,000 µm ø2.756 × 39.370 mil approx.	HL-C205C-MK (HL-C205CE-MK)	—
Small beam spot type		At diffuse reflection 85±20 mm 3.346 ±0.787 in	0.15 µm (0.25 µm) 0.006 mil (0.010 mil)	ø100 µm ø3.937 mil approx.	HL-C208B (HL-C208BE)	—
Linear beam spot type				ø100 × 1,200 µm ø3.937 × 47.244 mil approx.	HL-C208B-MK (HL-C208BE-MK)	—
Small beam spot type				ø100 µm ø3.937 mil approx.	HL-C208C (HL-C208CE)	—
Linear beam spot type				ø100 × 1,200 µm ø3.937 × 47.244 mil approx.	HL-C208C-MK (HL-C208CE-MK)	—
Small beam spot type		At diffuse reflection 350 ±200 mm 13.780 ±7.874 in	2 µm 0.079 mil	ø400 µm ø15.748 mil approx.	HL-C235CE-W	—
Linear beam spot type				ø400 × 6,500 µm ø15.748 × 255.906 mil approx.	HL-C235CE-WMK	—

Note: Exports of models with a minimum resolution of under 0.25 µm 0.010 mil fall under Japanese Export Control defined by “Foreign Exchange and Foreign Trade Act.” However, export control does not apply to the models shown in parentheses on the condition that they are used in combination with a controller (e.g. HL-C2CE) to which the export control defined by “Foreign Exchange and Foreign Trade Act” does not apply. In such cases, the minimum resolution is 0.25 µm 0.010 mil. Please contact us for further details.

Controllers

Type		Appearance	Model No. (Note)
RS232C-compatible	NPN output		HL-C2C (HL-C2CE)
	PNP output		HL-C2C-P (HL-C2CE-P)
Ethernet-compatible	NPN output		HL-C21C (HL-C21CE)
	PNP output		HL-C21C-P (HL-C21CE-P)

Note: Exports of models with a minimum resolution of under 0.25 µm 0.010 mil fall under Japanese Export Control defined by “Foreign Exchange and Foreign Trade Act.” However, export control does not apply to the models shown in parentheses on the condition that they are used in combination with a controller (e.g. HL-C2CE) to which the export control defined by “Foreign Exchange and Foreign Trade Act” does not apply. In such cases, the minimum resolution is 0.25 µm 0.010 mil. Please contact us for further details.

Options

Designation	Appearance	Model No.	Description
ND filter		HL-C2F01	When the amount of reflected light is large at the time that a specular reflection sensor is installed, reducing the amount of laser light to an appropriate level enables a higher precision measurement. (Light detection rate: 98 %)
Sensor head extension cable		HL-C2CCJ2	Length: 2m 6.562 ft, Weight: 0.2 kg approx.
		HL-C2CCJ5	Length: 5m 16.404 ft, Weight: 0.4 kg approx.
		HL-C2CCJ10	Length: 10m 32.808 ft, Weight: 0.7 kg approx.
		HL-C2CCJ20	Length: 20m 65.617 ft, Weight: 1.4 kg approx.
		HL-C2CCJ30	Length: 30m 98.425 ft, Weight: 2.0 kg approx.
			Cabletyre cable with connector on both ends Cable outer diameter: ø6.6 mm ø0.260 in Connector outer diameter: ø14.7 mm ø0.579 in max.

Sensor heads

Item	Model No.	Type	Small beam spot type									
		IEC/JIS-conformed type	HL-C205B(E)		HL-C205C(E)		HL-C208B(E)		HL-C208C(E)		HL-C235CE-W	
		FDA-conformed type	—		—		—		—		—	
Setup mode (Note 3)			Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	
Measurement center distance			50 mm 1.969 in	46 mm 1.811 in	50 mm 1.969 in	46 mm 1.811 in	85 mm 3.346 in	81.4 mm 3.205 in	85 mm 3.346 in	81.4 mm 3.205 in	350 mm 13.780 in	
Measuring range (Note 4)			±5 mm ±0.197 in	±5 mm ±0.197 in	±5 mm ±0.197 in	±5 mm ±0.197 in	±20 mm ±0.787 in	±6 mm ±0.236 in	±20 mm ±0.787 in	±6 mm ±0.236 in	±200 mm ±7.874 in	
Resolution [Average number of samples] (Note 5)			HL-C205B / HL-C205C: 0.2 μm 0.008 mil [256], 0.05 μm 0.002 mil [4,096]				HL-C208B / HL-C208C: 0.6 μm 0.024 mil [256], 0.15 μm 0.006 mil [4,096]				HL-C208BE / HL-C208CE: 0.6 μm 0.024 mil [256], 0.25 μm 0.010 mil [4,096]	8 μm 0.315 mil [256], 2 μm 0.079 mil [4,096]
Linearity (Note 6)			±0.03 % F.S.				±0.03 % F.S.	±0.1 % F.S.	±0.03 % F.S.	±0.1 % F.S.	±0.04 % F.S. (-200 to 0 mm), (-7.874 to 0 in), ±0.08 % F.S. (0 to +200 mm) (0 to 7.874 in) (F.S. = ±200 mm ±7.874 in)	
Temperature characteristics			0.01 % F.S./°C									
Light source			Red semiconductor laser (Peak emission wavelength: 658 nm 0.026 mil)									
			Max. output: 1 mW	Max. output: 5 mW	Max. output: 1 mW	Max. output: 5 mW	Max. output: 1 mW	Max. output: 5 mW	Max. output: 5 mW	Max. output: 5 mW	Max. output: 5 mW	
			IEC/JIS-conformed type	Class 2 (IEC / JIS)	Class 3R (IEC / JIS)	Class 2 (IEC / JIS)	Class 3R (IEC / JIS)	Class 2 (IEC / JIS)	Class 3R (IEC / JIS)	Class 3R (IEC / JIS)	Class 3R (IEC / JIS)	
		FDA-conformed type	—		—		—		—		—	
Beam size (Note 7)			ø70 μm ø2.756 mil approx.				ø100 μm ø3.937 mil approx.				ø400 μm ø15.748 mil approx.	
Receiving element			Linear image sensor									
Indicator			Laser emission	Green LED (lights up during laser emission)								
			Measuring range	Yellow LED (lights up when near the measurement center distance, blinks when within the measuring range, and lights out when outside of the measuring range.)								
Environmental resistance			Pollution degree	3 (Industrial environment)								
			Protection	IP67 (IEC) (excluding the connector)								
			Ambient temperature	0 to +45 °C +32 to +113 °F (No dew condensation), Storage: -20 to +70 °C -4 to +158 °F								
			Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH								
			Ambient illuminance	Incandescent light: 3,000 lx at the light-receiving face (Note 8)								
			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	196 m/s ² acceleration (20 G approx.) in X,Y and Z directions for three times each								
Cable			Cable type, 0.5 m 1.640 ft long with connector									
Cable extension			Extension up to total 30 m 98.425 ft is possible, with optional cable.									
Material			Enclosure, Case cover: Die-cast aluminum, Front cover: Glass									
Weight			300 g approx. (including cable)									
Accessory			Warning label: 1 set									

- Notes: 1) HL-C205B, HL-C205C, HL-C208B, HL-C208C fall under the Japanese Export Control. These products are introduced to limited countries only. Please refer to 'PRECAUTIONS FOR PROPER USE' on P.7.
- 2) 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 40 μs, average number of samples: 256, measurement center distance, object measured is made of white ceramic and digital measurement values.
- 3) Use the ND filter HL-C2F01 (optional) when the amount of reflected light is large at the time that a specular reflective sensor is installed.
- 4) Measuring range at sampling periods of 20 μs and 10 μs is as follows.

Model No.		HL-C205□		HL-C208□		HL-C235CE-W
Setup mode		Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection
Sampling	20 μs	+0.5 to +5.0 mm +0.020 to +0.197 in	+0.5 to +5.0 mm +0.020 to +0.197 in	0 to +20 mm 0 to +0.787 in	0 to +6.0 mm 0 to +0.236 in	-70 to +200 mm -2.756 to +7.874 in
	10 μs	+4.7 to +5.0 mm +0.185 to +0.197 in	+4.6 to +5.0 mm +0.181 to +0.197 in	+18 to +20 mm +0.709 to +0.787 in	Measurement not possible	+100 to +200 mm +3.937 to +7.874 in

- 5) Minimum resolution is 0.25 μm 0.010 mil if these products are used with a controller to which the Japanese Export Control defined by "Foreign Exchange and Foreign Trade Act" does not apply.
- 6) Indicates error with respect to the ideal linear values for digital displacement output when standard objects were measured by our company. It may vary depending on the types of objects being measured.
- 7) 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.
- 8) Variance is ±0.03 % F.S. or less (HL-C235CE-W: ±0.08 % F.S. or less) depending on the ambient illuminance.

SPECIFICATIONS

Refer to our website or general catalog for specifications of controllers.

Sensor heads

Item	Model No.	Type	Linear beam spot type									
		IEC/JIS-conformed type	HL-C205B(E)-MK	HL-C205C(E)-MK		HL-C208B(E)-MK		HL-C208C(E)-MK		HL-C235CE-WMK		
		FDA-conformed type	—		—		—		—			
Setup mode (Note 3)			Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	
Measurement center distance			50 mm 1.969 in	46 mm 1.811 in	50 mm 1.969 in	46 mm 1.811 in	85 mm 3.346 in	81.4 mm 3.205 in	85 mm 3.346 in	81.4 mm 3.205 in	350 mm 13.780 in	
Measuring range (Note 4)			±5 mm ±0.197 in	±5 mm ±0.197 in	±5 mm ±0.197 in	±5 mm ±0.197 in	±20 mm ±0.787 in	±6 mm ±0.236 in	±20 mm ±0.787 in	±6 mm ±0.236 in	±200 mm ±7.874 in	
Resolution [Average number of samples] (Note 5)			HL-C205B-MK / HL-C205C-MK: 0.2 μm 0.008 mil [256], 0.05 μm 0.002 mil [4,096] HL-C205BE-MK / HL-C205CE-MK: 0.25 μm 0.010 mil [256]				HL-C208B-MK / HL-C208C-MK: 0.6 μm 0.024 mil [256], 0.15 μm 0.006 mil [4,096] HL-C208BE-MK / HL-C208CE-MK: 0.6 μm 0.024 mil [256], 0.25 μm 0.010 mil [4,096]				8 μm 0.315 mil [256], 2 μm 0.079 mil [4,096]	
Linearity (Note 6)			±0.03 % F.S.				±0.03 % F.S.	±0.1 % F.S.	±0.03 % F.S.	±0.1 % F.S.	±0.04 % F.S. (-200 to 0 mm), (-7.874 to 0 in), ±0.08 % F.S. (0 to +200 mm) (0 to 7.874 in) (F.S. = ±200 mm ±7.874 in)	
Temperature characteristics			0.01 % F.S./°C									
Light source			Red semiconductor laser (Peak emission wavelength: 658 nm 0.026 mil)									
			Max. output: 1 mW	Max. output: 5 mW	Max. output: 1 mW	Max. output: 5 mW	Max. output: 1 mW	Max. output: 5 mW	Max. output: 5 mW	Max. output: 5 mW	Max. output: 5 mW	
			IEC/JIS-conformed type	Class 2 (IEC / JIS)	Class 3R (IEC / JIS)	Class 2 (IEC / JIS)	Class 3R (IEC / JIS)	Class 2 (IEC / JIS)	Class 3R (IEC / JIS)	Class 3R (IEC / JIS)	Class 3R (IEC / JIS)	
		FDA-conformed type	—									
Beam size (Note 7)			70 × 1,000 μm 2.756 × 39.370 mil approx.				100 × 1,200 μm 3.937 × 47.244 mil approx.			400 × 6,500 μm 15.748 × 255.905 mil approx.		
Receiving element			Linear image sensor									
Indicator	Laser emission		Green LED (lights up during laser emission)									
	Measuring range		Yellow LED (lights up when near the measurement center distance, blinks when within the measuring range, and lights out when outside of the measuring range.)									
Environmental resistance	Pollution degree		3 (Industrial environment)									
	Protection		IP67 (IEC) (excluding the connector)									
	Ambient temperature		0 to +45 °C +32 to +113 °F (No dew condensation), Storage: -20 to +70 °C -4 to +158 °F									
	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH									
	Ambient illuminance		Incandescent light: 3,000 lx at the light-receiving face (Note 8)									
	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		196 m/s ² acceleration (20 G approx.) in X,Y and Z directions for three times each										
Cable			Cabletyre cable, 0.5 m 1.640 ft long with connector									
Cable extension			Extension up to total 30 m 98.425 ft is possible, with optional cable.									
Material			Enclosure, Case cover: Die-cast aluminum, Front cover: Glass									
Weight			300 g approx. (including cable)									
Accessory			Warning label: 1 set									

Notes: 1) HL-C205B-MK, HL-C205C-MK, HL-C208B-MK, HL-C208C-MK fall under the Japanese Export Control. These products are introduced to limited countries only. Please refer to 'PRECAUTIONS FOR PROPER USE' on P.7.

2) 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 40 μs, average number of samples: 256, measurement center distance, object measured is made of white ceramic and digital measurement values.

3) Use the ND filter HL-C2F01 (optional) when the amount of reflected light is large at the time that a specular reflective sensor is installed.

4) Measuring range at sampling periods of 20 μs and 10 μs is as follows.

Model No.	HL-C205□-MK		HL-C208□-MK		HL-C235CE-WMK	
Setup mode	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection	
Sampling	20 μs	+0.5 to +5.0 mm +0.020 to +0.197 in	+0.5 to +5.0 mm +0.020 to +0.197 in	0 to +20 mm 0 to +0.787 in	0 to +6.0 mm 0 to +0.236 in	-70 to +200 mm -2.756 to +7.874 in
	10 μs	+4.7 to +5.0 mm +0.185 to +0.197 in	+4.6 to +5.0 mm +0.181 to +0.197 in	+18 to +20 mm +0.709 to +0.787 in	Measurement not possible	+100 to +200 mm +3.937 to +7.874 in

5) Minimum resolution is 0.25 μm 0.010 mil if these products are used with a controller to which the Japanese Export Control defined by "Foreign Exchange and Foreign Trade Act" does not apply.

6) Indicates error with respect to the ideal linear values for digital displacement output when standard objects were measured by our company. It may vary depending on the types of objects being measured.

7) 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.

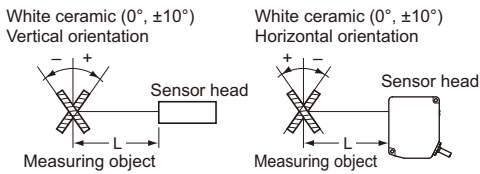
8) Variance is ±0.03 % F.S. or less (HL-C235CE-WMK: ±0.08 % F.S. or less) depending on the ambient illuminance.

SENSING CHARACTERISTICS (TYPICAL)

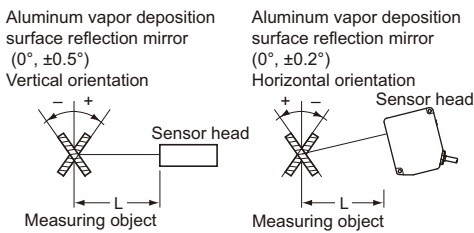
HL-C205B HL-C205C

Correlation between measuring distance and error characteristics

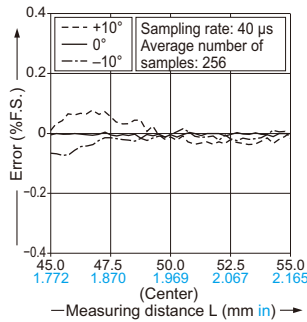
Setup mode: Diffuse reflection



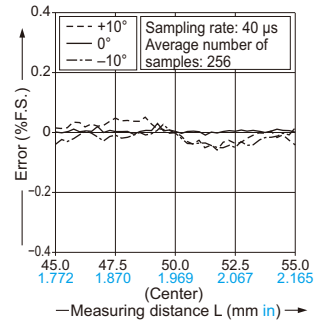
Setup mode: Specular reflection



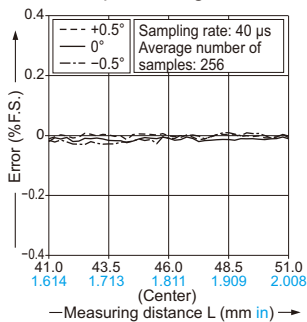
• Vertical positioning



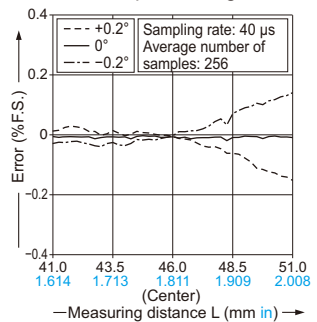
• Horizontal positioning



• Vertical positioning



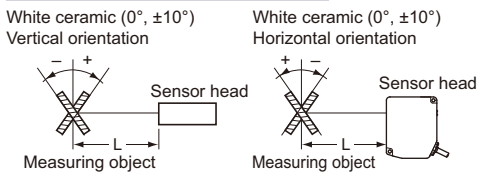
• Horizontal positioning



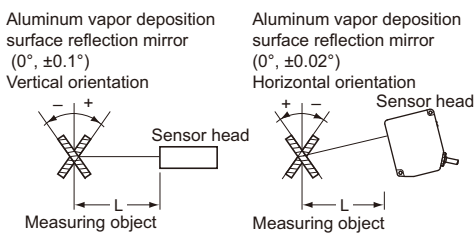
HL-C208B HL-C208C

Correlation between measuring distance and error characteristics

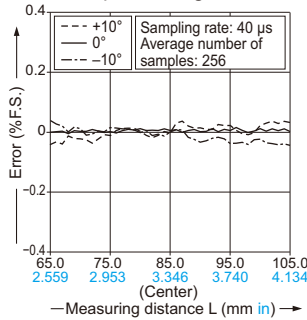
Setup mode: Diffuse reflection



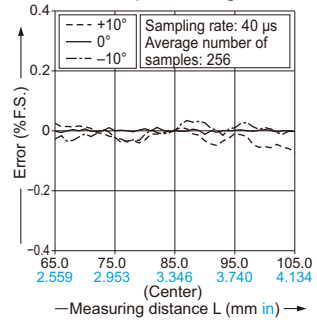
Setup mode: Specular reflection



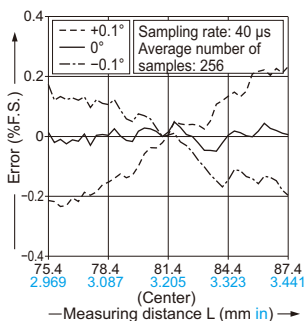
• Vertical positioning



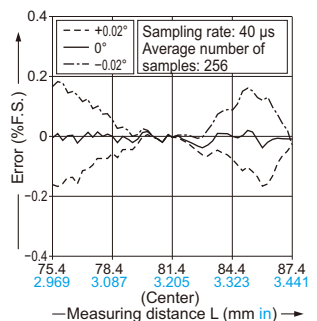
• Horizontal positioning



• Vertical positioning



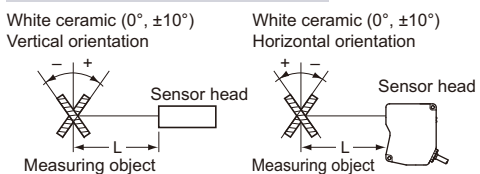
• Horizontal positioning



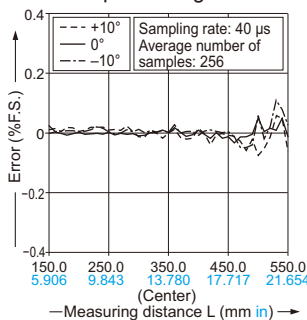
HL-C235CE-W

Correlation between measuring distance and error characteristics

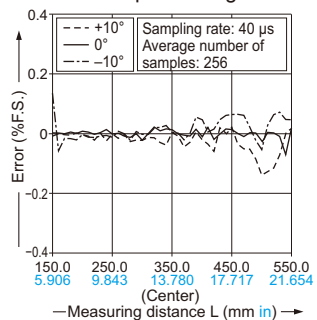
Setup mode: Diffuse reflection



• Vertical positioning



• Horizontal positioning



PRECAUTIONS FOR PROPER USE

- 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.

- Below mentioned products fall under Japanese Export Control, which is defined by "Foreign Exchange and Foreign Trade Act". Therefore, anyone who wishes to export or transfer these products outside of Japan is required to obtain the necessary license from the Ministry of Economy, Trade and Industry of Japan. Also, these products fall under international export control regulations, such as Nuclear Suppliers Group (NSG) guidelines 1.B.3.b.1 and Wassenaar Arrangement (WA) 2.B.6.b.1.a, and are objects of the regulation. Please comply with the export control in each country.

Products subject to control

- Sensor head: **HL-C205B, HL-C205B-MK, HL-C205C, HL-C205C-MK, HL-C208B, HL-C208B-MK, HL-C208C, HL-C208C-MK**
 - Controller: **HL-C2C, HL-C2C-P, HL-C21C, HL-C21C-P**
- Note: These products are introduced to limited countries only. Please contact our office for details.



- Do not operate products using methods other than those described in the instruction manual included with each product. Control or adjustment through procedures other than those specified may cause hazardous laser radiation exposure.
- The following labels are attached to the products. Handle each product according to the instruction given on the warning label.

HL-C205B(-MK) / HL-C208B(-MK)

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



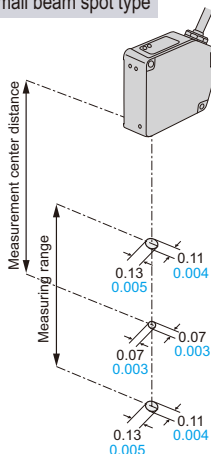
HL-C205C(-MK) / HL-C208C(-MK) / HL-C235CE-W(MK)

- This product is classified as a Class 3R Laser Product in IEC / JIS standards. Never directly look at or touch the laser beam or its reflection.

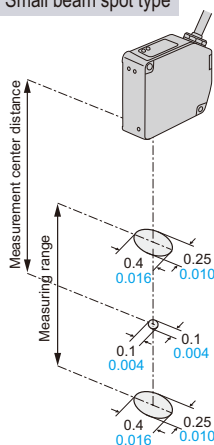


Beam size (Unit: mm in)

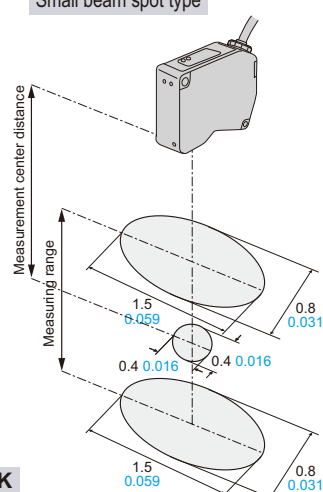
HL-C205□ Small beam spot type



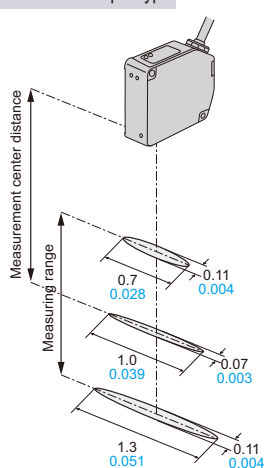
HL-C208□ Small beam spot type



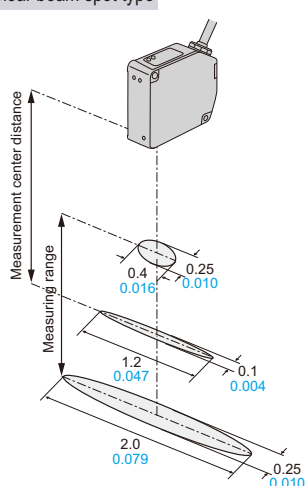
HL-C235CE-W Small beam spot type



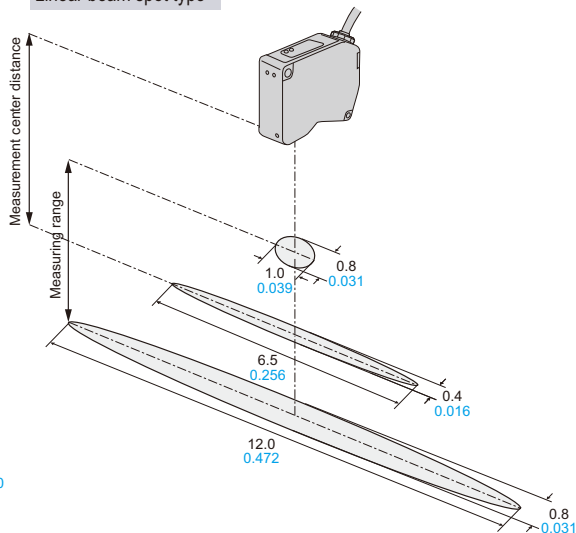
HL-C205□-MK Linear beam spot type



HL-C208□-MK Linear beam spot type



HL-C235CE-WMK Linear beam spot type



HL-C2

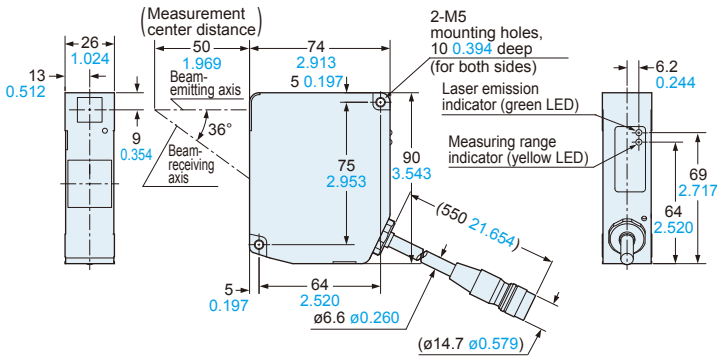
DIMENSIONS (Unit: mm in)

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

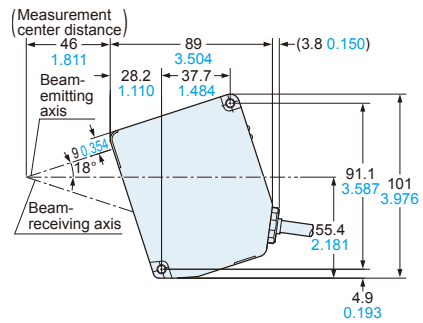
HL-C205 □ HL-C205 □-MK

Sensor head

Setup mode: Diffuse reflection



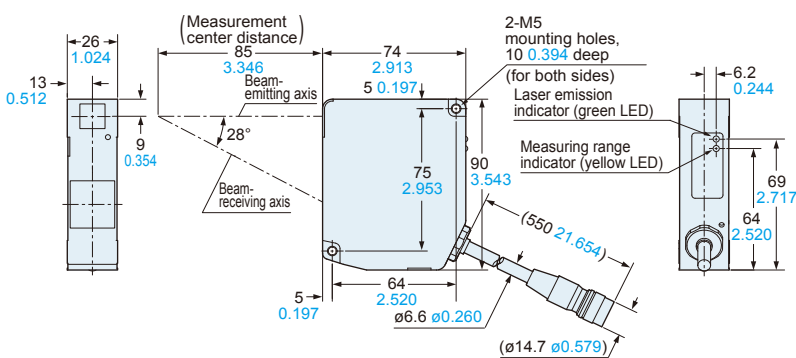
Setup mode: Specular reflection



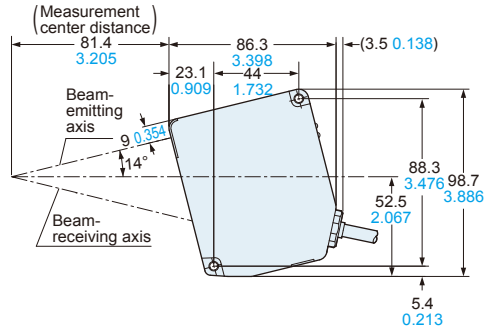
HL-C208 □ HL-C208 □-MK

Sensor head

Setup mode: Diffuse reflection

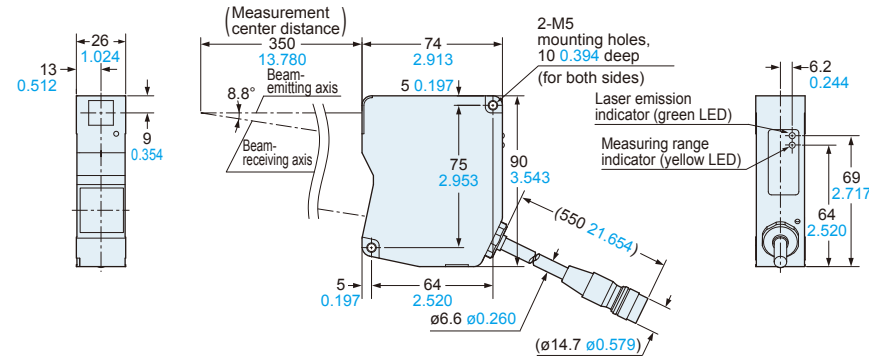


Setup mode: Specular reflection



HL-C235CE-W HL-C235CE-WMK

Sensor head



HL-C2C HL-C2C-P HL-C21C HL-C21C-P

Controller

