

Going Above and Beyond

HL-C201F

10 mm
0.394 in
0.01 μm
0.0004 mil



HL-C203F

30 mm
1.181 in
0.025 μm
0.001 mil



HL-C211F5

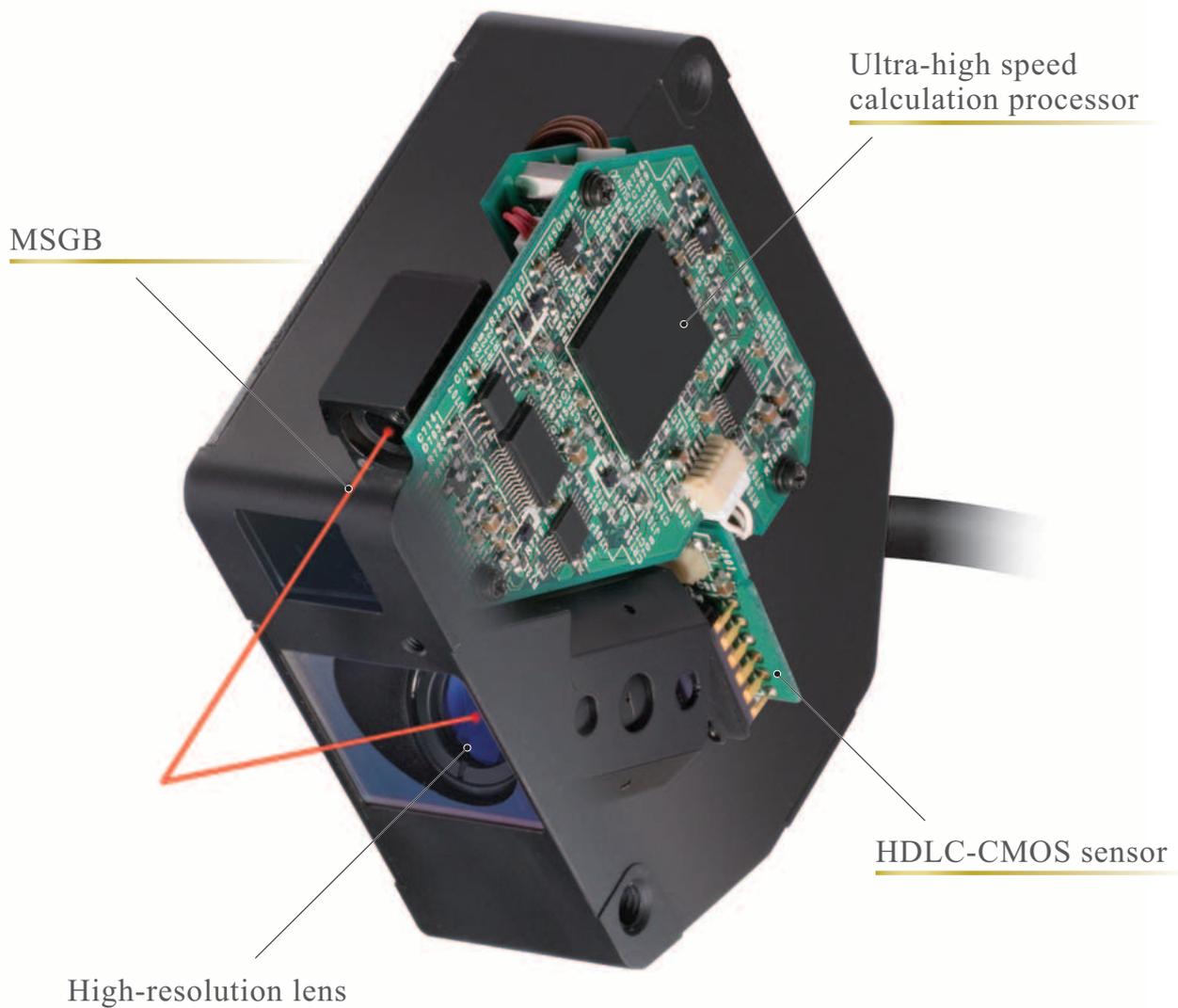
110 mm
4.331 in
0.1 μm
0.004 mil



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

Fusion of basis and innovation

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. The functionality and operability that underlie these technologies provide the highest satisfaction to our customers.



Sampling

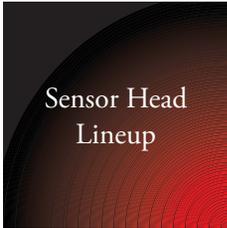
100kHz

Linearity

$\pm 0.03\%$

Resolution

0.025 μm



The Industry's leading edge of basic performance Three Lineups

Compact · Ultra high-precision

Particularly for specular reflection use, best suited for high precise measurement of the thickness and spacing of FPD glass

HL-C201F

Sampling	Linearity	Resolution
100 kHz	±0.02 %	0.01 μm

10 ±1 mm
0.394 ±0.039 in



Ultra high-precision

Flagship model combined with high-speed and high-precision by our exclusive technology

HL-C203F

Sampling	Linearity	Resolution
100 kHz	±0.03 %	0.025 μm

30 ±5 mm
1.181 ±0.170 in



Mid-range · High precision

Applicable from metal to rubber, range and precision achieved at a high usability

HL-C211F5

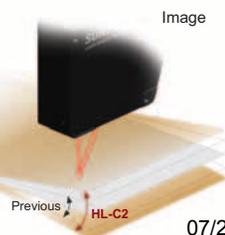
Sampling	Linearity	Resolution
100 kHz	±0.03 %	0.1 μm

110 ±15 mm
4.331 ±0.591 in



Additional detection even under tilted object

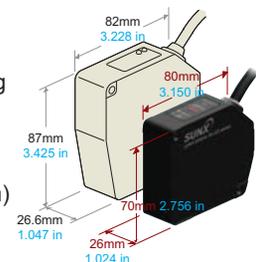
Tilt tolerance has increased to 1.5 times the previous model; therefore, further detection is possible even when there is a fluctuation in the position of the object. (Applicable to HL-C203F□)



07/2008

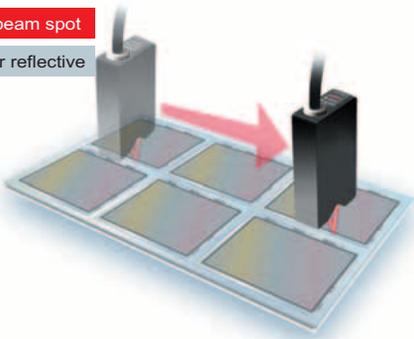
Compact sensor head to save space

The volume ratio has reduced by 23% (from previous model) producing a compact sensor head to enable installation space down to the minimum. (Applicable to HL-C203F□)



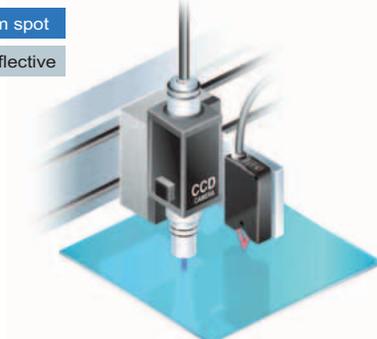
With the accumulated know-how in measurement technology together with the newest digital technology, SUNX has developed the industry's cutting edge **HL-C2** series to attend to every need from short to mid sensing range.

Linear beam spot
Specular reflective



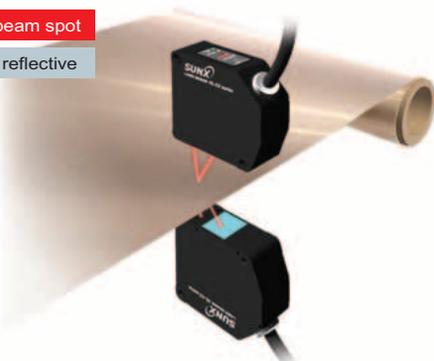
Measurement of the position of patterned glass

Small beam spot
Specular reflective



Control of the camera focus

Linear beam spot
Diffuse reflective



Measurement of the thickness of copper clad laminate

Small beam spot
Specular reflective



Measurement of HDD surface variations

Linear beam spot
Diffuse reflective



Measurement of the shape of a camshaft

Small beam spot
Diffuse reflective



Measurement of the heights of chip parts

Linear beam spot and small beam spot

Small beam spot works best for minuscule sensing objects such as connector leg pins or limited measuring positions. Linear beam spot is best suited for metal's cutting surface or surface that has patterns which may cause diffuse reflection.

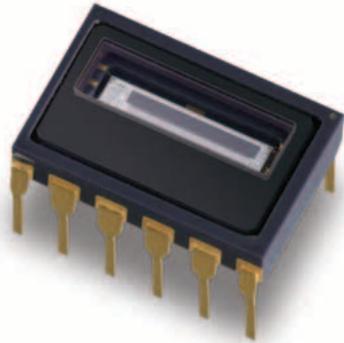
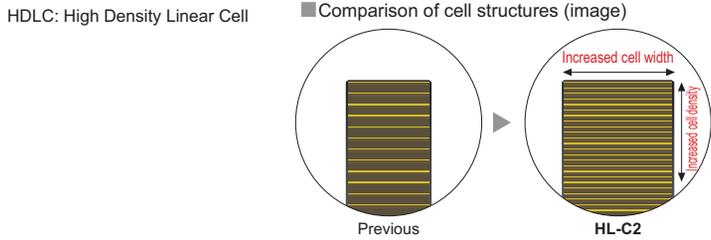
Compatible with diffuse reflective and specular reflective

Selecting a suitable sensor may be difficult depending on the surface of the object. Even under such conditions, with just one sensor head setup mode can be selected while assuring stable sensing operation.
(HL-C201F□ is compatible with specular reflective only)

HDLC-CMOS sensors

Resolution Sampling

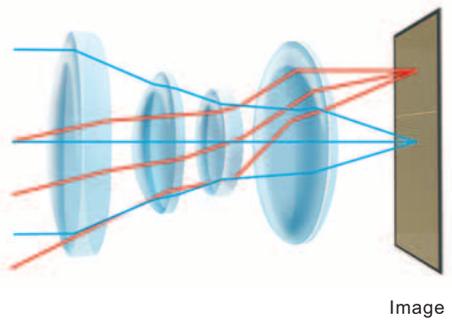
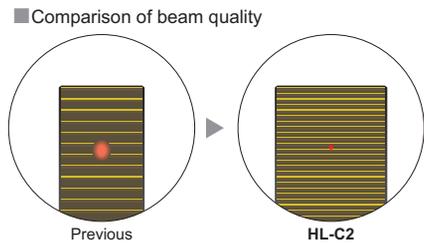
The HDLC-CMOS sensors have been developed specially for the **HL-C2** series. High density light-receiving cells and a processing speed close to the maximum limit result in high resolutions and high speeds which exceed all expectations for laser displacement sensors.



High-resolution lens

Resolution Linearity

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.

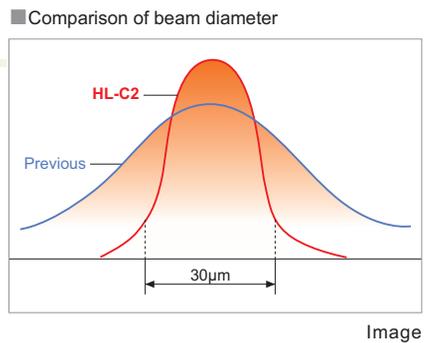


MSGB

Linearity Resolution

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.

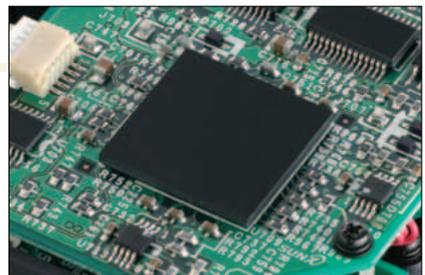
MSGB: Micro Spot Gaussian Beam



Ultra high-speed calculation processor

Sampling

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





Controller

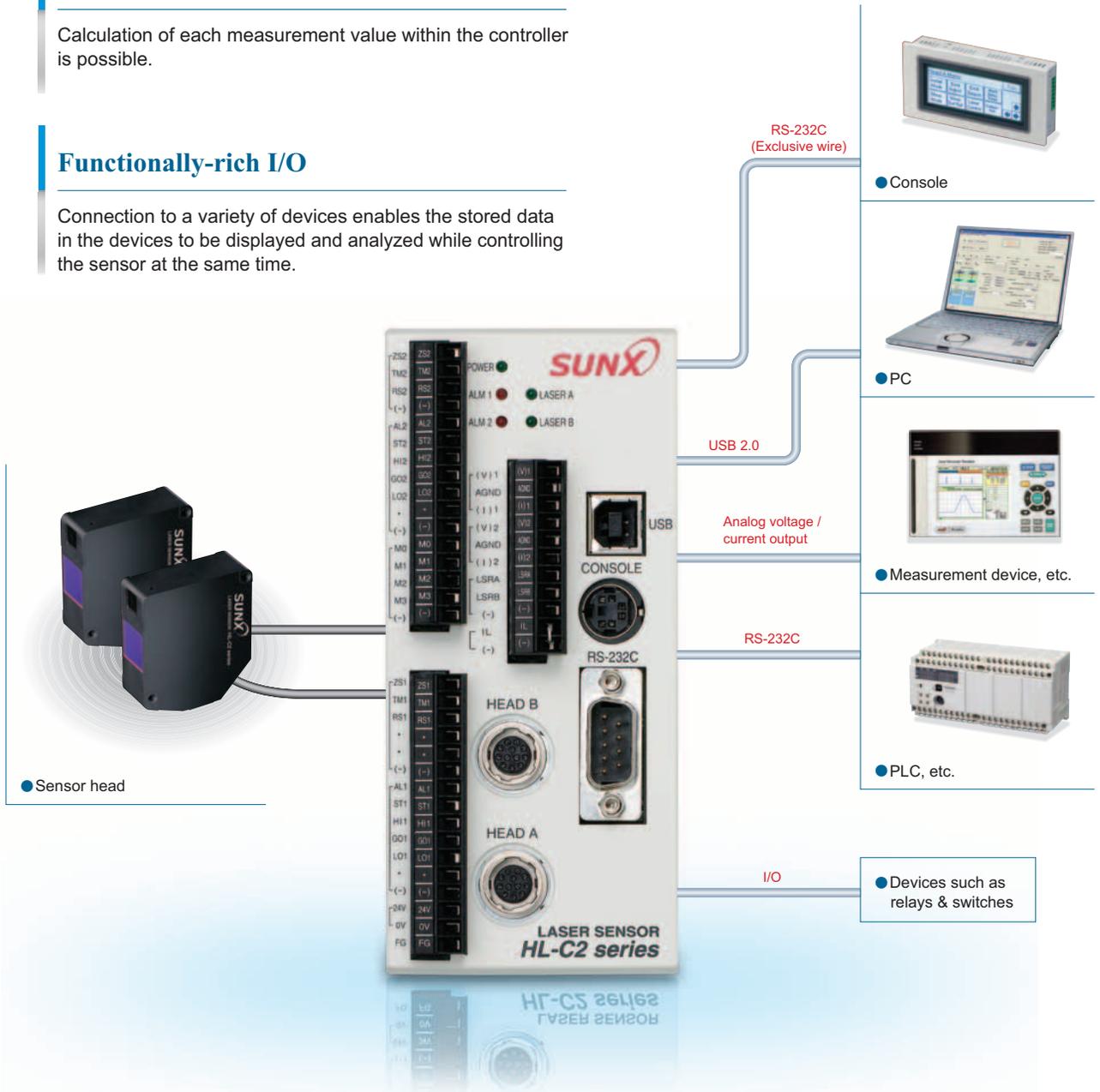
Compact with a wide array of functions

2 sensor heads connection

Calculation of each measurement value within the controller is possible.

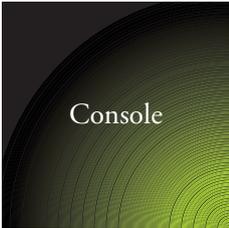
Functionally-rich I/O

Connection to a variety of devices enables the stored data in the devices to be displayed and analyzed while controlling the sensor at the same time.



Data buffering function

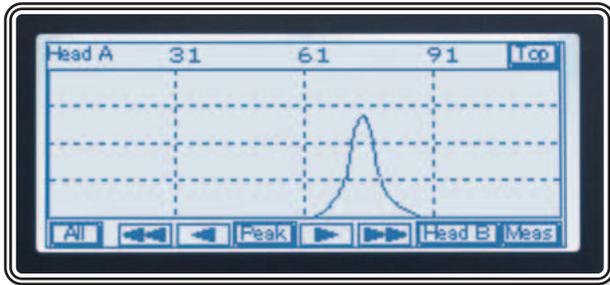
Using this function, about 65,000 pieces of measurement value data can be temporarily stored. All of these stored data can be utilized for comparison or analysis by loading them into computers.



Easy operation and simple display by a touch panel

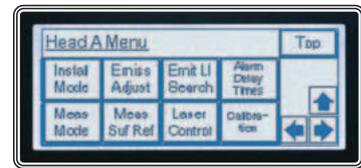
Light receiving intensity in waveform display

Measurement values as well as wavelength of the light intensity are displayed.



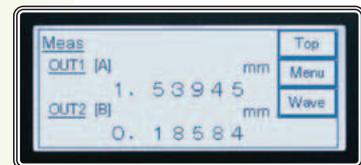
Condition setting function

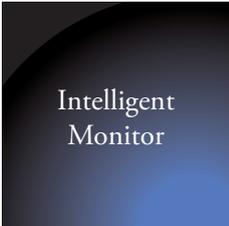
Sensor head function and output conditions are displayed on the menu for which the order can be set easily.



Measurement value data display function

Optimization of the setup of the sensor or light emitting intensity can be easily carried out. Functions such as hold and timer can also be inputted on the panel. White backlight enhances the overall visibility.





Waveform monitoring and function setting by computer at great convenience

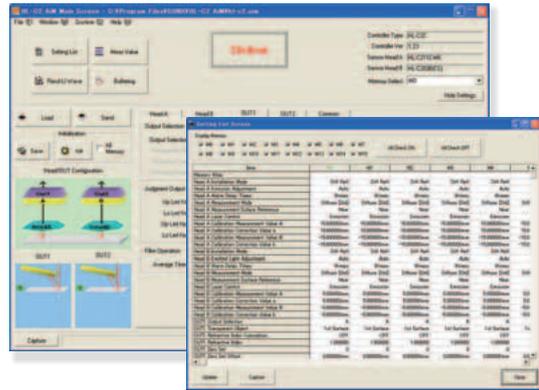


OS	: Microsoft Windows XP / Windows 2000
CPU	: Pentium Adapting CPU 1GHz or above
Memory	: 256MB or more
Hard disk	: 50MB or more of usable space
CD-ROM drive	: Required for installation
Display screen	: 1024 × 768 dot, 256 colors or above
Serial board	: RS-232C compliant, transmission speed 115.2kbps
USB board	: USB2.0 (USB1.1 compliant)

* System operation capabilities confirmed on English OS and Japanese OS.

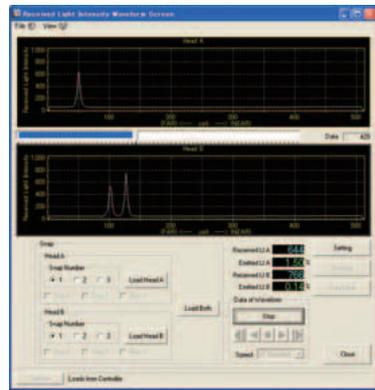
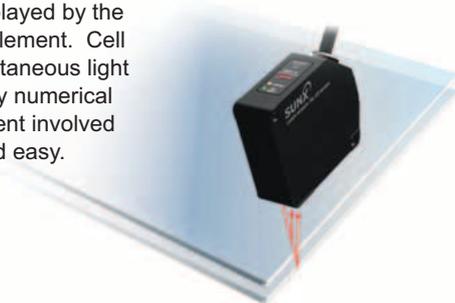
Measurement value display

Measurement value and output status are displayed. 16 condition settings stored in the controller can be displayed on a list.



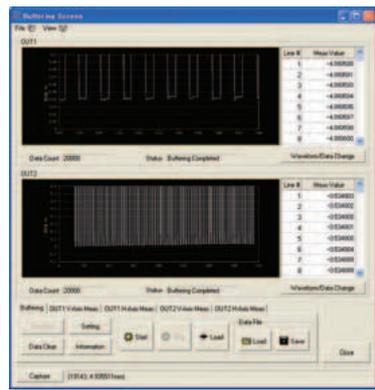
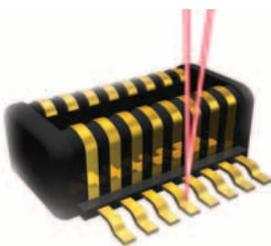
Light receiving intensity in waveform display

Light receiving intensity is displayed by the cell unit of the light receiving element. Cell position of the maximum simultaneous light receiving intensity displayed by numerical values helps to make adjustment involved in the setup of the sensor head easy.



Buffering display

Data stored in the controller by data buffering function can be loaded, and then waveform and data are displayed. Furthermore, procedures on how to store data, storage period, and storage amount can be set by the display.



ORDER GUIDE

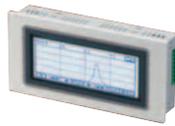
Sensor heads

Type	Appearance	Measurement center distance and measuring range	Resolution	Beam size	Model No.	Laser class		
Small beam spot type		10 ±1 mm 0.394 ±0.039 in	0.01 µm 0.0004 mil	ø20 µm 0.787 mil approx.	HL-C201F	FDA: Class I IEC: Class 1		
Linear beam spot type			0.25 µm 0.01 mil		HL-C201FE			
Linear beam spot type		30 ±5 mm 1.811 ±0.170 in	0.01 µm 0.0004 mil	20 × 700 µm 27.559 mil approx.	HL-C201F-MK			
			0.25 µm 0.01 mil		HL-C201FE-MK			
Small beam spot type		30 ±5 mm 1.811 ±0.170 in	0.025 µm 0.001 mil	ø30 µm 1.181 mil approx.	HL-C203F	FDA: Class II IEC: Class 2		
Linear beam spot type			0.25 µm 0.01 mil		30 × 1,200 µm 47.244 mil approx.		HL-C203FE	
Linear beam spot type				110 ±15 mm 0.000 ±0.591 in			0.025 µm 0.001 mil	ø80 µm 3.150 mil approx.
					0.25 µm 0.01 mil		HL-C203FE-MK	
Small beam spot type		110 ±15 mm 0.000 ±0.591 in	0.1 µm 0.004 mil	80 × 1,700 µm 66.929 mil approx.	HL-C211F	FDA: Class II IEC: Class 2		
Linear beam spot type			0.25 µm 0.01 mil		HL-C211FE			
			Linear beam spot type			0.1 µm 0.004 mil	ø80 µm 3.150 mil approx.	HL-C211F5
0.25 µm 0.01 mil						HL-C211F5E		
Linear beam spot type		110 ±15 mm 0.000 ±0.591 in	0.1 µm 0.004 mil	80 × 1,700 µm 66.929 mil approx.	HL-C211F-MK	FDA: Class II IEC: Class 2		
Linear beam spot type			0.25 µm 0.01 mil		HL-C211FE-MK			
			Linear beam spot type			0.1 µm 0.004 mil	ø80 µm 3.150 mil approx.	HL-C211F5-MK
0.25 µm 0.01 mil						HL-C211F5E-MK		

Controllers

Type	Appearance	Model No.	Applicable sensor head
High-resolution		HL-C2C	HL-C201F(-MK) HL-C203F(-MK) HL-C211F(-MK) HL-C211F5(-MK)
		HL-C2C-P	HL-C201FE(-MK) HL-C203FE(-MK) HL-C211FE(-MK) HL-C211F5E(-MK)
Low-resolution		HL-C2CE	HL-C201F(-MK) HL-C203F(-MK) HL-C211F(-MK) HL-C211F5(-MK)
		HL-C2CE-P	HL-C201FE(-MK) HL-C203FE(-MK) HL-C211FE(-MK) HL-C211F5E(-MK)

Compact console

Appearance	Model No.
	HL-C2DP-EX

Options

Designation	Appearance	Model No.	Description
Intelligent monitor		HL-C2AiM	Enables the waveform display of each measurement condition setting and of measurement values as well as monitoring of measurement data and light receiving intensity data.
ND filter		HL-C2F01	When the amount of reflected light is large at the time that a specular reflective 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.

SPECIFICATIONS

Sensor heads

Type		Small beam spot type						
Item	Model No.	HL-C201F(E)	HL-C203F(E)		HL-C211F(E)		HL-C211F5(E)	
Setup mode		Specular reflective	Diffuse reflective	Specular reflective	Diffuse reflective	Specular reflective	Diffuse reflective	Specular reflective
Measurement center distance		10 mm 0.394 in	30 mm 1.181 in	26.4 mm 1.039 in	110mm 4.331 in	106.7mm 4.201 in	110mm 4.331 in	106.7mm 4.201 in
Measuring range (Note 3)		±1 mm ±0.039 in	±5 mm ±0.197 in	±4.6 mm ±0.181 in	±15mm ±0.591 in	±14.5mm ±0.571 in	±15mm ±0.591 in	±14.5mm ±0.571 in
Resolution [Average number of samples] (Note 4)		0.04 μm 0.002 mil [256] 0.01 μm 0.0004 mil [4096] (HL-C201FE: 0.25 μm 0.010 mil [256])	0.1 μm 0.0004 mil [256] 0.025 μm 0.001 mil [4096] (HL-C203FE: 0.25 μm 0.010 mil [256])	0.4 μm 0.0002 mil [256] 0.1 μm 0.0004 mil [4096] (HL-C211FE and HL-C211F5E: 0.25 μm 0.010 mil [256])				
Linearity (Note 5)		±0.02% F.S.	±0.03% F.S.					
Temperature characteristics		0.01% F.S./°C						
Light source	Red semiconductor laser (Peak emission wavelength: 658 nm 0.026 mil)							
	Class 1 (IEC / JIS), Class I (FDA, Laser Notice No.50) Max. output: 0.1 mW	Class 2 (IEC / JIS), Class II (FDA) Max. output: 1 mW				Class 3R (IEC / JIS), Class IIIa (FDA) Max. output: 5 mW		
Beam size (Note 6)		ø20 μm 0.787 mil approx.	ø30 μm 1.181 mil approx.		ø80 μm 3.150 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						
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: Die-cast aluminum, Case cover: Die-cast aluminum, Front cover: Glass						
Weight		250 g approx. (including cable)			300 g approx. (including cable)			
Accessory		English warning label: 1 set [The FDA regulations conforming type includes a set of both the IEC label (written in English) and JIS label (written in Japanese)].						

- Notes: 1) **HL-C201F, HL-C203F, HL-C211F, HL-C211F5** fall under the Japanese Export Control. These products are introduced to limited countries only. Please refer to 'PRECAUTIONS FOR PROPER USE' on P.16.
 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 [an aluminum vapor deposition surface reflection mirror was used **HL-C201F(E)**] and digital measurement values.
 3) Measuring range at sampling periods of 20 μs and 10 μs is as follows.

Model No.	HL-C201F(E)	HL-C203F(E)		HL-C211F(E), HL-C211F5(E)		
Setup mode	Specular reflective	Diffuse reflective	Specular reflective	Diffuse reflective	Specular reflective	
Sampling	20 μs	+0.1 to +1.0 mm +0.004 to +0.039 in	0 to +5.0 mm 0 to +0.197 in	0 to +4.6 mm 0 to +0.181 in	+0.5 to +15.0 mm +0.020 to +0.591 in	+0.5 to +14.5 mm +0.020 to +0.571 in
	10 μs	+0.8 to +1.0 mm +0.032 to +0.039 in	+3.8 to +5.0 mm +0.150 to +0.197 in	+3.6 to +4.6 mm +0.142 to +0.181 in	+12.5 to +15.0 mm +0.492 to +0.591 in	+12.5 to +14.5 mm +0.492 to +0.571 in

- 4) The P-P value for the deviation in the digital measurement values at the measurement center range has been converted for the measurement center distance.
 5) Indicates error with respect to the ideal linear values for digital displacement output when standard objects were measured by SUNX. It may vary depending on the types of objects being measured.
 6) 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.

SPECIFICATIONS

Sensor heads

Type		Linear beam spot type					
Item	Model No.	HL-C201F(E)-MK	HL-C203F(E)-MK		HL-C211F(E)-MK	HL-C211F5(E)-MK	
Setup mode		Specular reflective	Diffuse reflective	Specular reflective	Diffuse reflective	Specular reflective	Diffuse reflective
Measurement center distance		10 mm 0.394 in	30 mm 1.181 in	26.4 mm 1.039 in	110mm 4.331 in	106.7mm 4.201 in	110mm 4.331 in
Measuring range (Note 3)		±1 mm ±0.039 in	±5 mm ±0.197 in	±4.6 mm ±0.181 in	±15mm ±0.591 in	±14.5mm ±0.571 in	±15mm ±0.591 in
Resolution [Average number of samples] (Note 4)		0.04 μm 0.002 mil [256] 0.01 μm 0.0004 mil [4096] (HL-C201FE-MK: 0.25 μm 0.010 mil [256])	0.1 μm 0.0004 mil [256] 0.025 μm 0.001 mil [4096] (HL-C203FE-MK: 0.25 μm 0.010 mil [256])		0.4 μm 0.0002 mil [256] 0.1 μm 0.0004 mil [4096] (HL-C211FE-MK and HL-C211F5E-MK: 0.25 μm 0.010 mil [256])		
Linearity (Note 5)		±0.02% F.S.		±0.03% F.S.			
Temperature characteristics		0.01% F.S./°C					
Light source		Red semiconductor laser (Peak emission wavelength: 658 nm 0.026 mil)					
		Class 1 (IEC / JIS), Class I (FDA, Laser Notice No.50) Max. output: 0.1 mW	Class 2 (IEC / JIS), Class II (FDA) Max. output: 1 mW			Class 3R (IEC / JIS), Class IIIa (FDA) Max. output: 5 mW	
Beam size (Note 6)		20 × 700 μm 0.787 × 27.560 mil approx.	30 × 1200 μm 1.181 × 47.244 mil approx.		80 × 1700 μm 3.150 × 66.929 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					
	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: Die-cast aluminum, Case cover: Die-cast aluminum, Front cover: Glass					
Weight		250 g approx. (including cable)			300 g approx. (including cable)		
Accessory		English warning label: 1 set [The FDA regulations conforming type includes a set of both the IEC label (written in English) and JIS label (written in Japanese)].					

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- 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 [an aluminum vapor deposition surface reflection mirror was used HL-C201F(E)-MK] and digital measurement values.
- 3) Measuring range at sampling periods of 20 μs and 10 μs is as follows.

Model No.	HL-C201F(E)-MK	HL-C203F(E)-MK		HL-C211F(E)-MK, HL-C211F5(E)-MK		
Setup mode	Specular reflective	Diffuse reflective	Specular reflective	Diffuse reflective	Specular reflective	
Sampling	20 μs	+0.1 to +1.0 mm +0.004 to +0.039 in	0 to +5.0 mm 0 to +0.197 in	0 to +4.6 mm 0 to +0.181 in	+0.5 to +15.0 mm +0.020 to +0.591 in	+0.5 to +14.5 mm +0.020 to +0.571 in
	10 μs	+0.8 to +1.0 mm +0.032 to +0.039 in	+3.8 to +5.0 mm +0.150 to +0.197 in	+3.6 to +4.6 mm +0.142 to +0.181 in	+12.5 to +15.0 mm +0.492 to +0.591 in	+12.5 to +14.5 mm +0.492 to +0.571 in

- 4) The P-P value for the deviation in the digital measurement values at the measurement center range has been converted for the measurement center distance.
- 5) Indicates error with respect to the ideal linear values for digital displacement output when standard objects were measured by SUNX. It may vary depending on the types of objects being measured.
- 6) 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.

SPECIFICATIONS

Controllers

Item	Type	NPN output type	PNP output type
	Mode No.	HL-C2C(E)	HL-C2C(E)-P
Connectable sensor head		Number of connectable units: Max. 2 units.	
Supply voltage		24 V DC \pm 10 % including ripple 0.5 V (P-P)	
Current consumption		500 mA approx. at 2 sensor heads connected 350 mA approx. at 1 sensor head connected (100 mA approx. is additionally required when the mini console is connected)	
Sampling cycle		10 μ s, 20 μ s, 40 μ s, 100 μ s, 200 μ s, 400 μ s, 1 ms, 2 ms	
Analog output	Voltage (Note 1)	Voltage output scale: -5 to $+5$ V/F.S (initial value) Output range during normal status: -10.0 to $+10.0$ V Output at abnormal status: -10.8 V or $+10.8$ V Resolution: 2 mV, Linearity: ± 0.05 % F.S. Max. 2 mA, output impedance 50 Ω , Response delay time: 1.5 μ s/V approx.	
	Current (Note 2)	Current output scale: 4 to 20 mA/F.S (initial value) Output range during normal status: 2 to 24 mA Output at abnormal status: 1 mA or 25 mA Resolution: 3 μ A, Linearity ± 0.05 % F.S. Load impedance: 250 Ω max., Response delay time: 10 μ s approx.	
Alarm output		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between alarm output and Common(-)) • Residual voltage: 1 V or less (at 100 mA sink current)	PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between alarm output and +V) • Residual voltage: 1 V or less (at 100 mA source current)
	Output operation	Opened when the amount of light is insufficient	
	Short-circuit protection	Incorporated	
Judgment output (HI, GO, LO)		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between judgment output to Common(-)) • Residual voltage: 1 V or less (at 100 mA sink current)	PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between judgment output to +V) • Residual voltage: 1 V or less (at 100 mA source current)
	Output operation	Opened at output operation	
	Short-circuit protection	Incorporated	
Strobe output		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between strobe output to Common(-)) • Residual voltage: 1 V or less (at 100 mA sink current)	PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between strobe output to +V) • Residual voltage: 1 V or less (at 100 mA source current)
	Output operation	Opened at data determination	
	Short-circuit protection	Incorporated	
Remote interlock input		Laser emission is delayed when connected to Common (-). Laser emission stop at open Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)	Laser emission is delayed when connected to IL (+). Laser emission stop at open Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)
Laser control input		Laser emission is stopped when connected to Common (-). Laser is emitted immediately after opened. Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)	Laser emission is stopped when connected to external power (+). Laser is emitted immediately after opened. Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)
Zero set input		Zero set is ON when connected with Common (-). Zero set turns to OFF after continuously connected to Common (-) for one second. Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)	Zero set is ON when connected with external power (+). Zero set turns to OFF after continuously connected to external power (+) for one second. Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)
Timing input		ON at/during connection to Common (-) (depending on analysis mode) Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)	ON at/during connection to external power (+) (depending on analysis mode) Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)
Reset input		Reset is done when connected to Common (-). Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)	Reset is done when connected to external power (+). Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)
Memory change input		Memory is specified when connected to Common (-). Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)	Memory is specified when connected to external power (+). Applied voltage: 30 V DC or less (Leak current: 0.1 mA or less)

SPECIFICATIONS

Controllers

Item	Type	NPN output type	PNP output type
	Mode No.	HL-C2C(E)	HL-C2C(E)-P
Indicator	Power	Green LED (lights up at power on)	
	Sensor head A Laser radiation	Green LED (lights up during or immediately before laser emission of sensor head A)	
	Sensor head B Laser radiation	Green LED (lights up during or immediately before laser emission of sensor head B)	
	Alarm 1	Red LED (lights up when OUT1 can not be measured due to insufficient amount of light)	
	Alarm 2	Red LED (lights up when OUT2 can not be measured due to insufficient amount of light)	
RS-232C interface		Baud rate: 9,600, 19,200, 38,400, 115,200 bit/s	
USB interface		USB 2.0 Full-speed (USB 1.1 compatible) compliant	
Setting / data display		Compact console (optional)	
Environmental resistance	Ambient temperature	0 to +50 °C +32 to +122 °F (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F	
	Ambient humidity	35 to 85 %RH	
	Vibration resistance	10 to 55 Hz frequency (period: 1 min.), 0.75 mm 0.030 in amplitude in X, Y and Z directions for 30 min. each	
	Shock resistance	196 m/s ² acceleration (20G approx.) in X, Y, and Z directions for three times each	
Material		Case: Polycarbonate	
Weight		450 g approx.	
Accessory		CD-ROM: 1 pc., USB cable (2 m 6.562 ft long): 1 pc., Short bracket: 1 pc.	

Notes: 1) HL-C2C and HL-C2C-P fall under the Japanese Export Control. These products are introduced to limited countries only. Please refer to 'PRECAUTIONS FOR PROPER USE' on P.16.

2) The linearity is F.S.=20 V to digital measurement value. Response delay time is the period after update of measurement value.

3) The linearity is F.S.=16 mA to digital measurement value. Response delay time is the period after update of measurement value.

Compact console

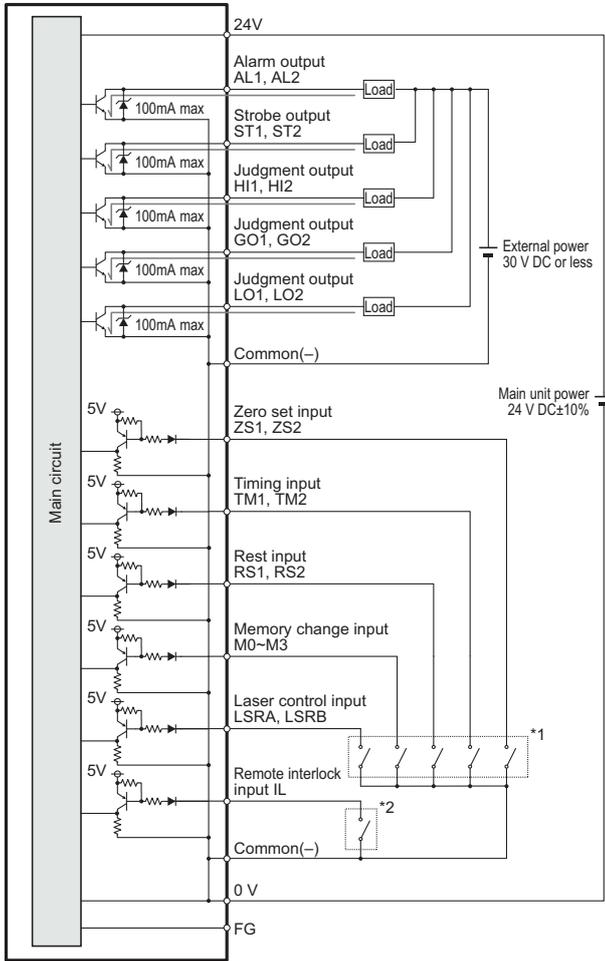
Item	Model No.	HL-C2DP-EX
Power		Supplied by controller
Display	Display element	STN monochrome LCD
	Back light	White LED
	Display range	-999.999999 to 999.999999
	Language	English
Touch panel	Operational force	0.5 N or less
	Lifetime	1,000,000 times or more (Note 1)
Environmental resistance	Environment resistance	IP65 (at initial status) (Note 2) Dust prevention and drip-proof at the front panel (waterproof packing is used at the contact surface to board)
	Ambient temperature	0 to +50 °C +32 to +122 °F (No dew condensation or icing allowed), Storage: -20 to +60 °C -4 to +140 °F
	Ambient humidity	20 to 85 %RH, Storage: 10 to 85 %RH
	Electrostatic noise resistance	5,000 V or more (panel surface)
	Vibration resistance	10 to 55 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y, and Z directions for 10 min. each
Shock resistance	98 m/s ² or more acceleration (10G approx.) in X, Y, and Z directions for four times each	
Material		Case: PPE, Front protective sheet: Polyester
Weight		230 g approx.
Accessory		Connector cable for connecting the controller to the console : 1 pc., Mounting bracket: 1 set

Notes: 1) This value indicates the average lifetime of the unit when used under a normal temperature of 25 °C **+77 °F**.

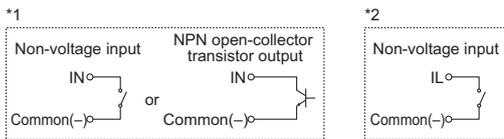
2) When reinstalling the console, replace the water proof packing. (Matsushita Electric Works, Ltd., Part No: AIGT181, 10 packs included)

I/O CIRCUIT AND WIRING DIAGRAMS (CONTROLLERS)

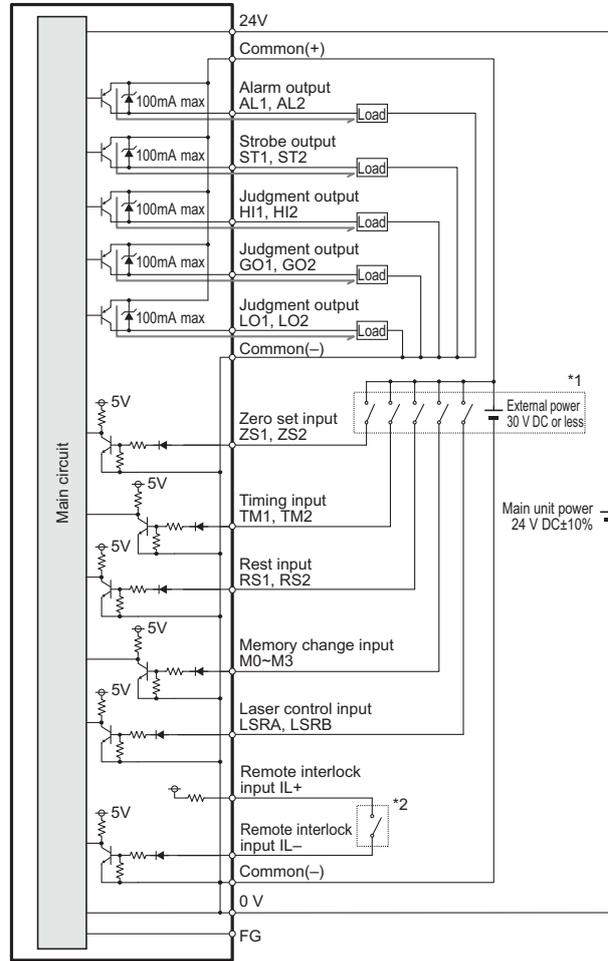
NPN output type



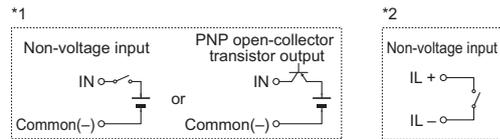
Controller internal circuit ← External connection example



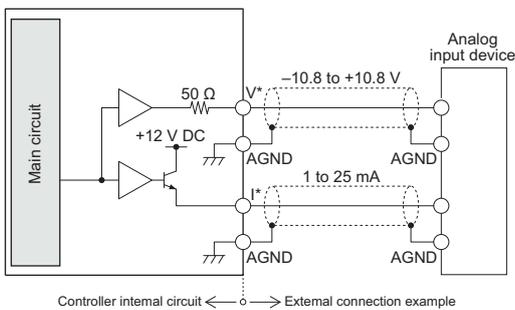
PNP output type



Controller internal circuit ← External connection example



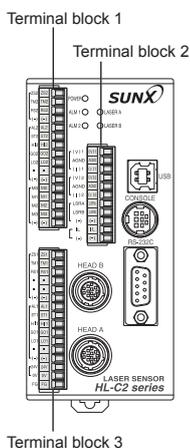
Analog output (Common in NPN output type and PNP output type)



- Notes: 1) Do not short-circuit analog output terminals or apply voltage to them.
2) Use shielded wires for analog outputs.

I/O CIRCUIT AND WIRING DIAGRAMS (CONTROLLERS)

Terminal arrangement



Terminal block 1

Terminal		Function
NPN	PNP	
(V)1		Analog voltage output (for OUT1)
AGND		Analog ground
(I)1		Analog current output (for OUT1)
(V)2		Analog voltage output (for OUT2)
AGND		Analog ground
(I)2		Analog current output (for OUT2)
LSRA		Laser control input (for Head A) Laser stop during short circuit
LSRB		Laser control input (for Head B) Laser stop during short circuit
(-)		Common (-)
IL	IL-	Remote interlock Laser stop when opened.
(-)	IL+	Remote interlock common

Terminal block 2

Terminal		Function
NPN	PNP	
ZS2		Zero set input (for OUT2) ON during short circuit*
TM2		Timing input (for OUT2) ON during short circuit
RS2		Reset input (for OUT2) ON during short circuit
(-)		Common (-)
AL2		Alarm output (for OUT2)
ST2		Strobe output (for OUT2)
HI2		Judgment HI output (for OUT2)
GO2		Judgment GO output (for OUT2)
LO2		Judgment LO output (for OUT2)
•		Reserved terminal (Note)
(-)	(+)	Common (-) / Common (+)
M0		Memory change (16 ways)
M1		
M2		
M3		
(-)		Common (-)

* Turn off the terminal in case short circuit lasts for more than one second.

Note: Do not connect anything to the reserved terminals; they are connected to the internal circuit.

Terminal block 3

Terminal		Function
NPN	PNP	
ZS1		Zero set input (for OUT1) ON during short circuit*
TM1		Timing input (for OUT1) ON during short circuit
RS1		Reset input (for OUT1) ON during short circuit
•		Reserved terminal
•		Reserved terminal
(-)		Common (-)
AL1		Alarm output (for OUT1)
ST1		Strobe output (for OUT1)
HI1		Judgment HI output (for OUT1)
GO1		Judgment GO output (for OUT1)
LO1		Judgment LO output (for OUT1)
•		Reserved terminal (Note)
(-)	(+)	Common (-) / Common (+)
24V		24 V DC input for power supply
0V		Power supply ground 0 V
FG		Frame ground

* Turn off the terminal in case short circuit lasts for more than one second.

Note: Do not connect anything to the reserved terminals; they are connected to the internal circuit.

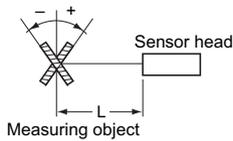
SENSING CHARACTERISTICS (TYPICAL)

HL-C201F(E)

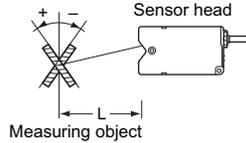
Correlation between measuring distance and error characteristics

Setup mode: Specular reflective

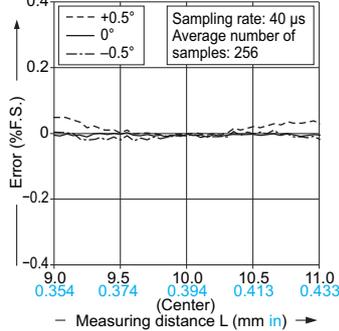
Aluminum vapor deposition surface reflection mirror (0°, ±0.5°)
Vertical orientation



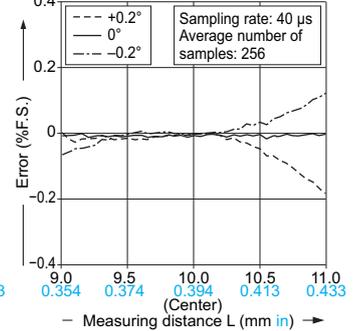
Aluminum vapor deposition surface reflection mirror (0°, ±0.2°)
Horizontal orientation



Vertical positioning



Horizontal positioning

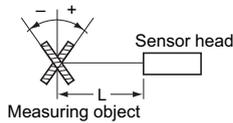


HL-C203F(E)

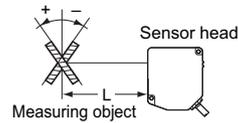
Correlation between measuring distance and error characteristics

Setup mode: Diffuse reflective

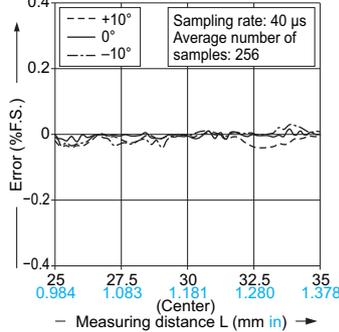
White ceramic (0°, ±10°)
Vertical orientation



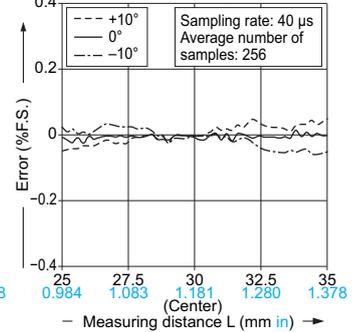
White ceramic (0°, ±10°)
Horizontal orientation



Vertical positioning

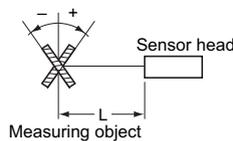


Horizontal positioning

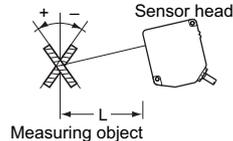


Setup mode: Specular reflective

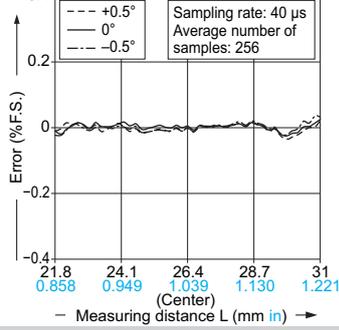
Aluminum vapor deposition surface reflection mirror (0°, ±0.5°)
Vertical orientation



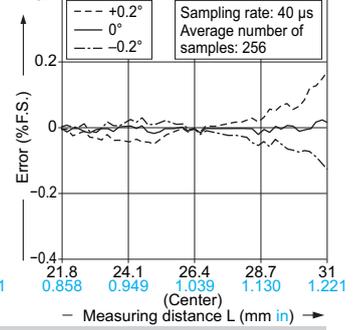
Aluminum vapor deposition surface reflection mirror (0°, ±0.2°)
Horizontal orientation



Vertical positioning



Horizontal positioning

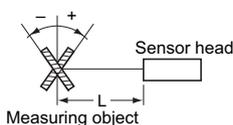


HL-C211F(E) HL-C211F5(E)

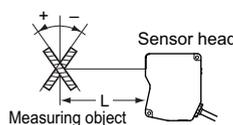
Correlation between measuring distance and error characteristics

Setup mode: Diffuse reflective

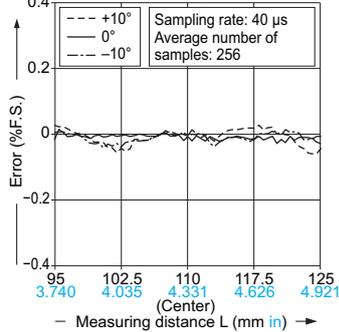
White ceramic (0°, ±10°)
Vertical orientation



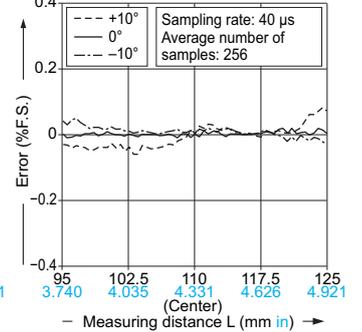
White ceramic (0°, ±10°)
Horizontal orientation



Vertical positioning

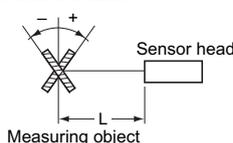


Horizontal positioning

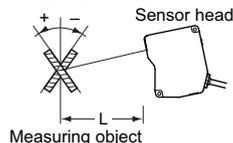


Setup mode: Specular reflective

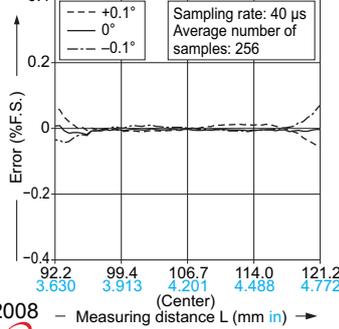
Aluminum vapor deposition surface reflection mirror (0°, ±0.1°)
Vertical orientation



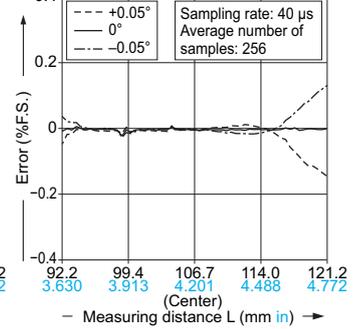
Aluminum vapor deposition surface reflection mirror (0°, ±0.05°)
Horizontal orientation



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.

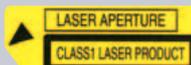
• Never use this product as a sensing device for personnel protection.
 • In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.
 • This product has been developed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



HL-C201F



(The English warning label is packed with the sensor head.)

• This product is classified as a Class 1 Laser Product in IEC / JIS standards and a Class I Laser Product in FDA regulations. Do not look at the laser beam through optical system such as a lens.
 • The following label is attached to the product. Handle the product according to the instruction given on the warning label.

HL-C203F, HL-C211F



(The English warning label is packed with the sensor head.)

• This product is classified as a Class 2 Laser Product in IEC / JIS standards and a Class II Laser Product in FDA regulations. Do not look at the laser beam directly or through optical system such as a lens.
 • The following label is attached to the product. Handle the product according to the instruction given on the warning label.

HL-C211F5



(The English warning label is packed with the sensor head.)

• This product is classified as a Class 3R Laser Product in IEC/JIS standards and a Class IIIa Laser Product in FDA regulations. Never look at or touch the direct laser beam and its reflection.
 • The following label is attached to the product. Handle the product according to the instruction given on the warning label.

• Below mentioned products fall under the 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 license from the Ministry of Economy, Trade and Industry of Japan.
 Also, these products fall under the international export control regime, such as NSG (Nuclear Suppliers Group) guidelines 1.B.3.b.1 and WA (Wassenaar Arrangement) 2.B.6.b.1.a, and are objects of the regulation. Please comply with the export control in each country.

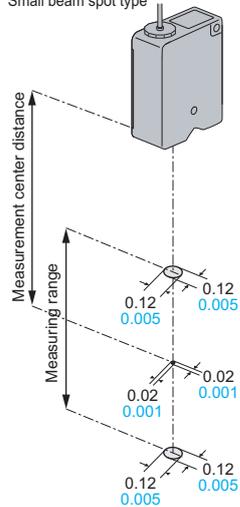
<Products subject to Control>

- Sensor head: **HL-C201F, HL-C201F-MK, HL-C203F, HL-C203F-MK, HL-C211F, HL-C211F-MK, HL-C211F5, HL-C211F5-MK**
- Controller: **HL-C2C, HL-C2C-P**

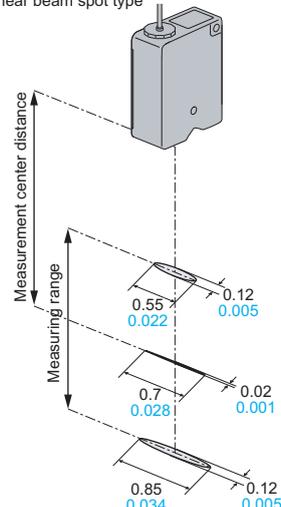
*These products are introduced to limited countries only. Please contact our office for details.

Beam size (Unit: mm in)

HL-C201F(E)
Small beam spot type

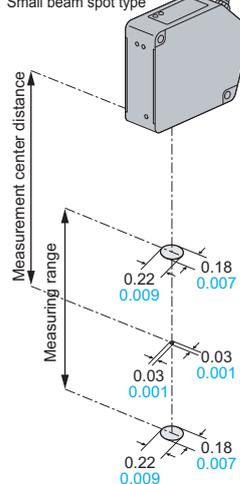


HL-C201F(E)-MK
Linear beam spot type

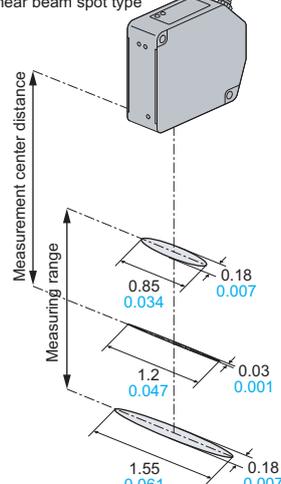


Beam size (Unit: mm in)

HL-C203F(E)
Small beam spot type

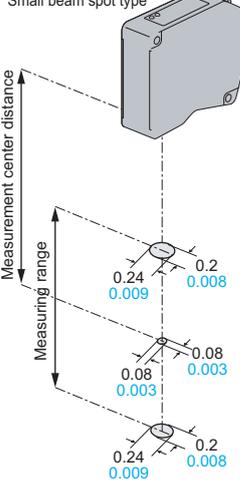


HL-C203F(E)-MK
Linear beam spot type

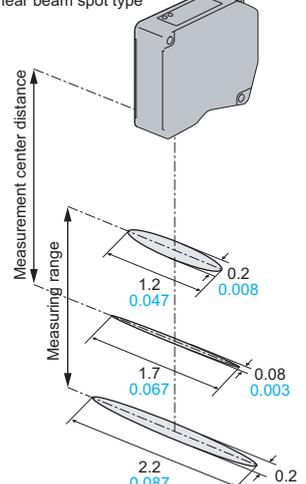


Beam size (Unit: mm in)

HL-C211F(E)
Small beam spot type



HL-C211F(E)-MK
Linear beam spot type

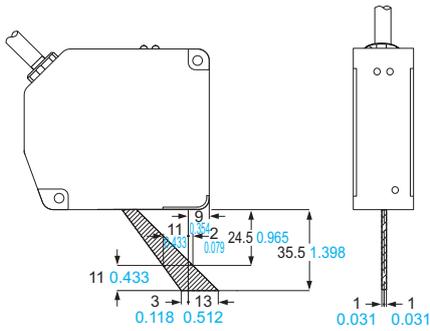


PRECAUTIONS FOR PROPER USE

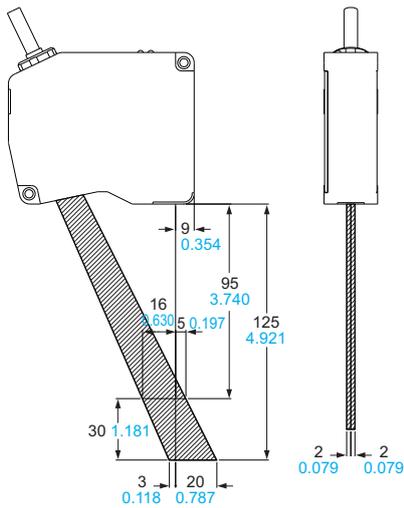
Mutual interference (Unit: mm in)

- When installing 2 or more sensor heads side by side, mutual interference will not occur if the laser spots from other sensor heads do not fall within the shaded areas of the sensor head in the figure below.

HL-C203F



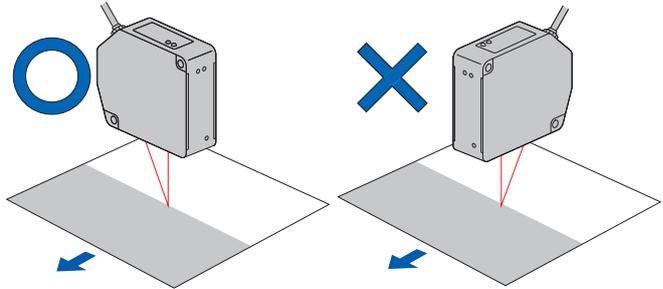
HL-C211F



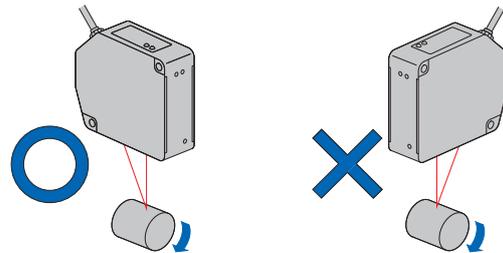
Sensor head mounting direction

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

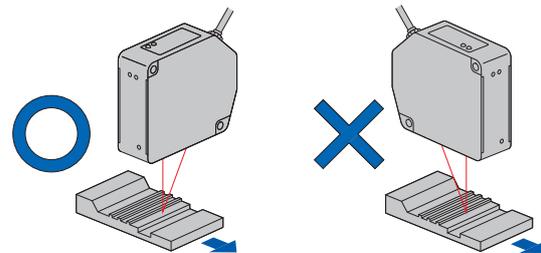
Object with variations in material or color



Rotating object



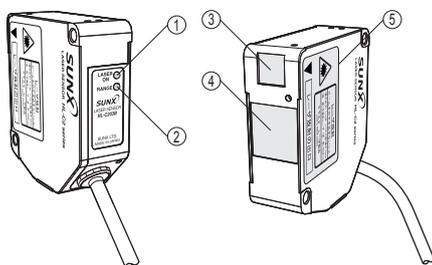
Object that has large differences in gaps, grooves and colors



PRECAUTIONS FOR PROPER USE

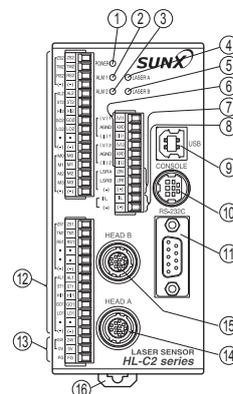
Fuctional description

Sensor head



	Description	Function
①	Laser emission indicator (Green LED)	Lights up during laser emission.
②	Measurement range indicator (Yellow LED)	Lights up when the target reaches at approximately center of the measurement. Blinks when the target enters within the measurement range. Turns off the light when the target goes out of the measurement range.
③	Light emitter	Emits the laser light.
④	Light receiver	Receives the laser specular light from a measurement target.
⑤	Warning label	Shows the laser emission position. Please read carefully before use.

Controller



	Description	Function
①	POWER indicator	Lights up in green when electricity is provided to the controller.
②	ALM1 (Alarm) indicator	Abnormal condition indicator for OUT1. Lights up in red during dark status (poor light intensity) of OUT1 or the sensor head is in unconnected status.
③	ALM2 (Alarm) indicator	Abnormal condition indicator for OUT2. Lights up in red during dark status (poor light intensity) of OUT2 or the sensor head is in unconnected status.
④	LASER A indicator	Lights up in green during the laser radiation of Head A.
⑤	LASER B indicator	Lights up in green during the laser radiation of Head B.
⑥	Analog output terminal	Terminal for analog data output.
⑦	Laser control terminal	Stops laser emission in case of short-circuiting.
⑧	Remote interlock terminal	Stops laser emission when its opened.
⑨	USB connector	Used for communication with PC using USB.
⑩	Console connection connector	Used for connecting the mini console.
⑪	RS-232C connector	Used for communication with the control devices using RS-232C.
⑫	I/O terminal	Terminal for various I/O (Zero set input, Timing input, Reset input, Alarm output, Strobe output, and Judgment output) and memory change.
⑬	Power terminal	Terminal for power supply to the controller.
⑭	Sensor head A connection connector	Controller recognizes a sensor head which is connected to this connector as "Sensor head A" and starts operation.
⑮	Sensor head B connection connector	Controller recognizes a sensor head which is connected to this connector as "Sensor head B" and starts operation.
⑯	DIN rail mounting hook	Used for hooking/removing the sensor heads to/from the 35mm width DIN rail with one-touch simple operation.

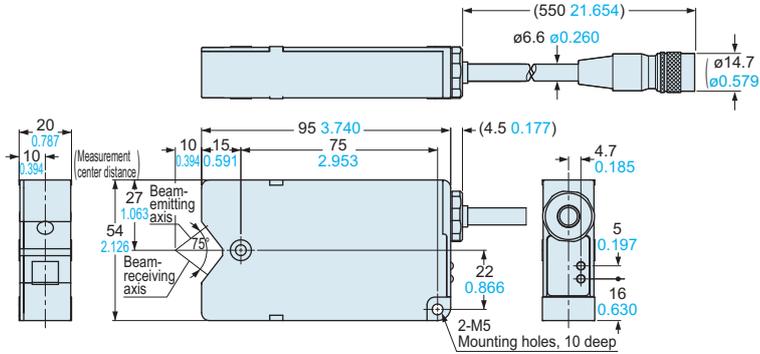
Note: In case of connecting one sensor head to the controller, be sure to connect the sensor head to ⑭ the sensor head A connection (HEAD A) side. If the sensor head is connected to ⑮ the sensor head B connection (HEAD B) side, the measurement cannot be performed.

DIMENSIONS (Unit: mm in)

HL-C201F(E) HL-C201F(E)-MK

Sensor head

Set mode: Specular reflective type

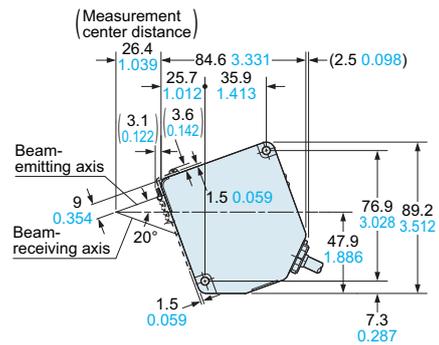
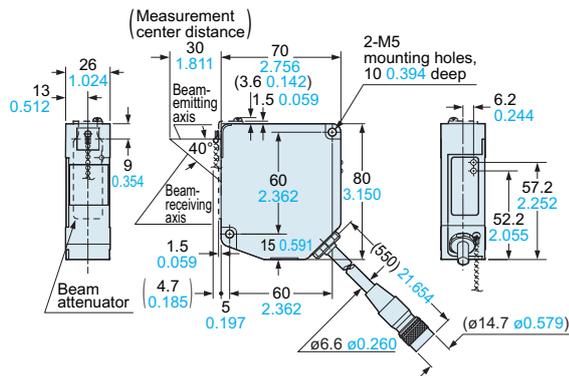


HL-C203F(E) HL-C203F(E)-MK

Sensor head

Set mode: Diffuse reflective type

Set mode: Specular reflective type

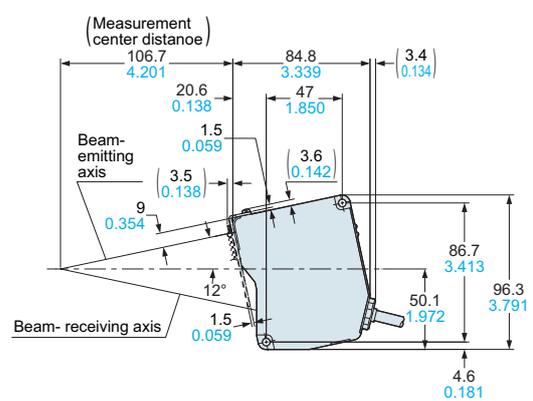
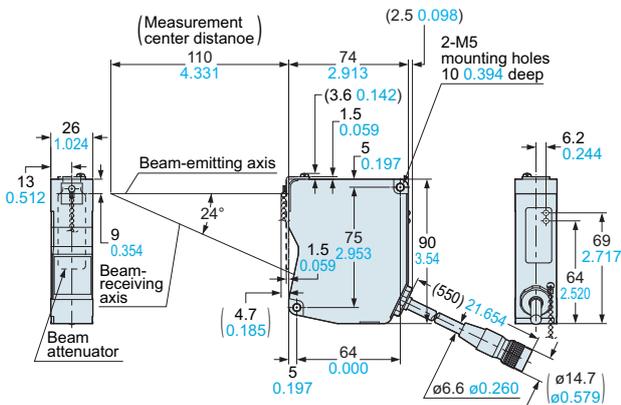


HL-C211F□(E) HL-C211F□(E)-MK

Sensor head

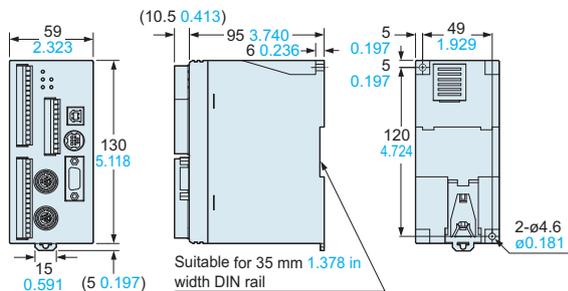
Set mode: Diffuse reflective type

Set mode: Specular reflective type

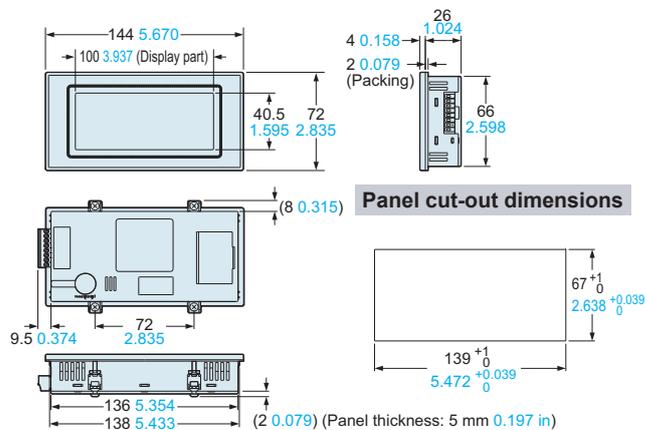


DIMENSIONS (Unit: mm in)

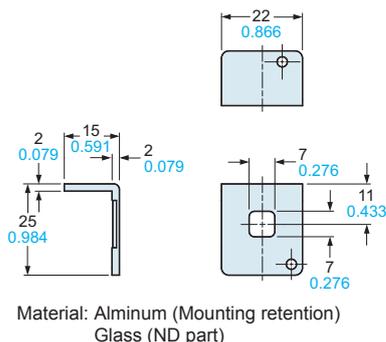
HL-C2C(E) HL-C2C(E)-P Controller



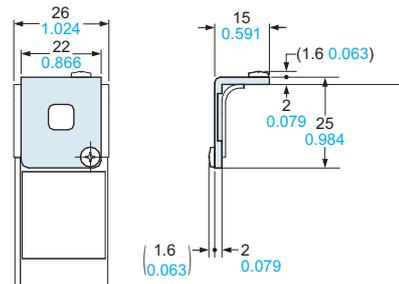
HL-C2DP-EX Compact console



HL-C2F01 ND filter



Mounting drawing with a sensor head



All information is subject to change without prior notice.



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