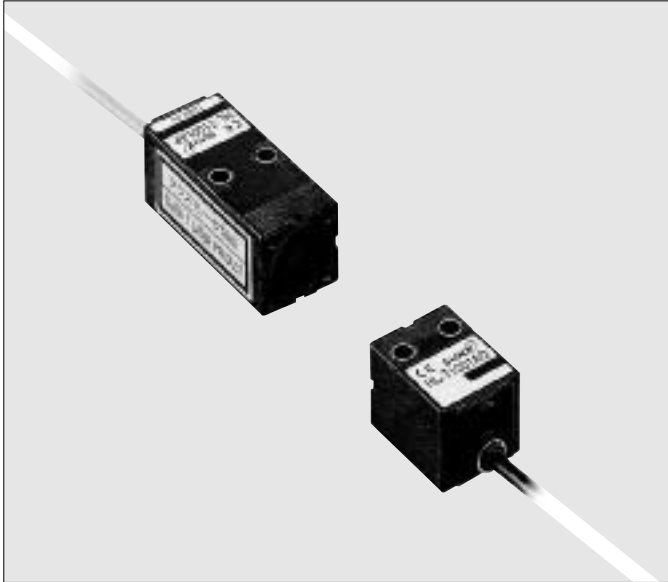


# HL-T1

SERIES

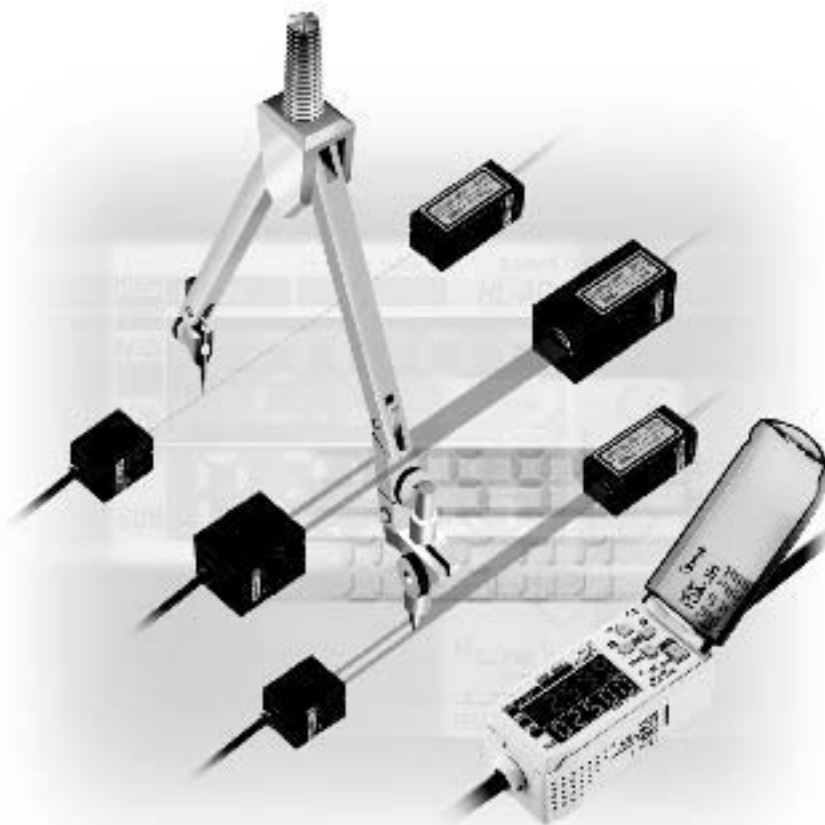
## Ultra-Compact Laser Collimated Beam Sensor



**Achieving the Ultimate  
Class 1**



**The industry's smallest sensor head**  
**A high-functionality intelligent controller**



# Advanced technology delivered in a compact body.

## The HL-T1 series of laser collimated beam sensors embody the ultimate evolution of performance, functionality and operability.

These new sensors, having the highest performance and capabilities never before available, were created to meet strict demands for miniaturization arising from production sites requiring the ultimate in space-savings: HL-T1005A with a sensing width of 5mm 0.197in, HL-T1010A with a sensing width of 10mm 0.394in and HL-T1001A with a beam diameter of  $\phi 1\text{mm}$   $\phi 0.039\text{in}$ .

This performance enables high-precision detection, multi-functional capabilities that can adapt to the many different conditions experienced at production sites, as well as a high degree of operability to facilitate ease of use. The HL-T1 series, the new standard in laser collimated beam sensors, enhances production innovations at every work site.

Min. sensing object:  $\phi 0.008\text{mm}$   $\phi 0.00031\text{in}$  (Sensing range at 0 to 500mm 19.685in)  
 Beam diameter:  $\phi 1\text{mm}$   $\phi 0.039\text{in}$  (Sensing range at 0 to 500mm 19.685in)  
 Sensing range: 2m 6.562ft

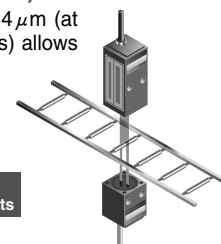


The ideal parallel light system has been successfully created using both a laser beam, with its superior directivity, and our unique optical technology. These features allow for ultra high-precision detection.

**The industry's smallest sensor head**  
 The most compact size and yet the highest level of performance in their class. These sensors save space.

**Long sensing range**  
 Long sensing range of 500mm 19.685in (HL-T1005A, HL-T1010A) and 2m 6.562ft (HL-T1001A) are available.

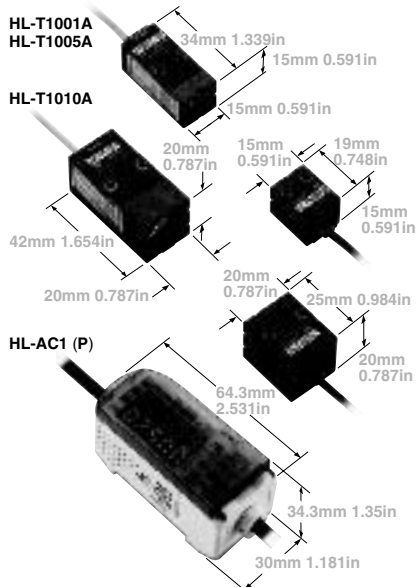
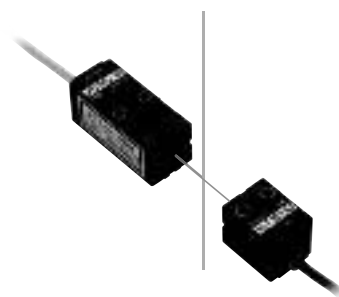
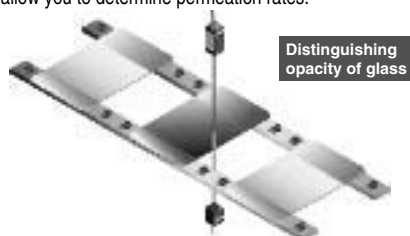
**Resolution of  $4\mu\text{m}$**   
 A high resolution of  $4\mu\text{m}$  (at an average 64 cycles) allows high-precision positioning and size judgment.

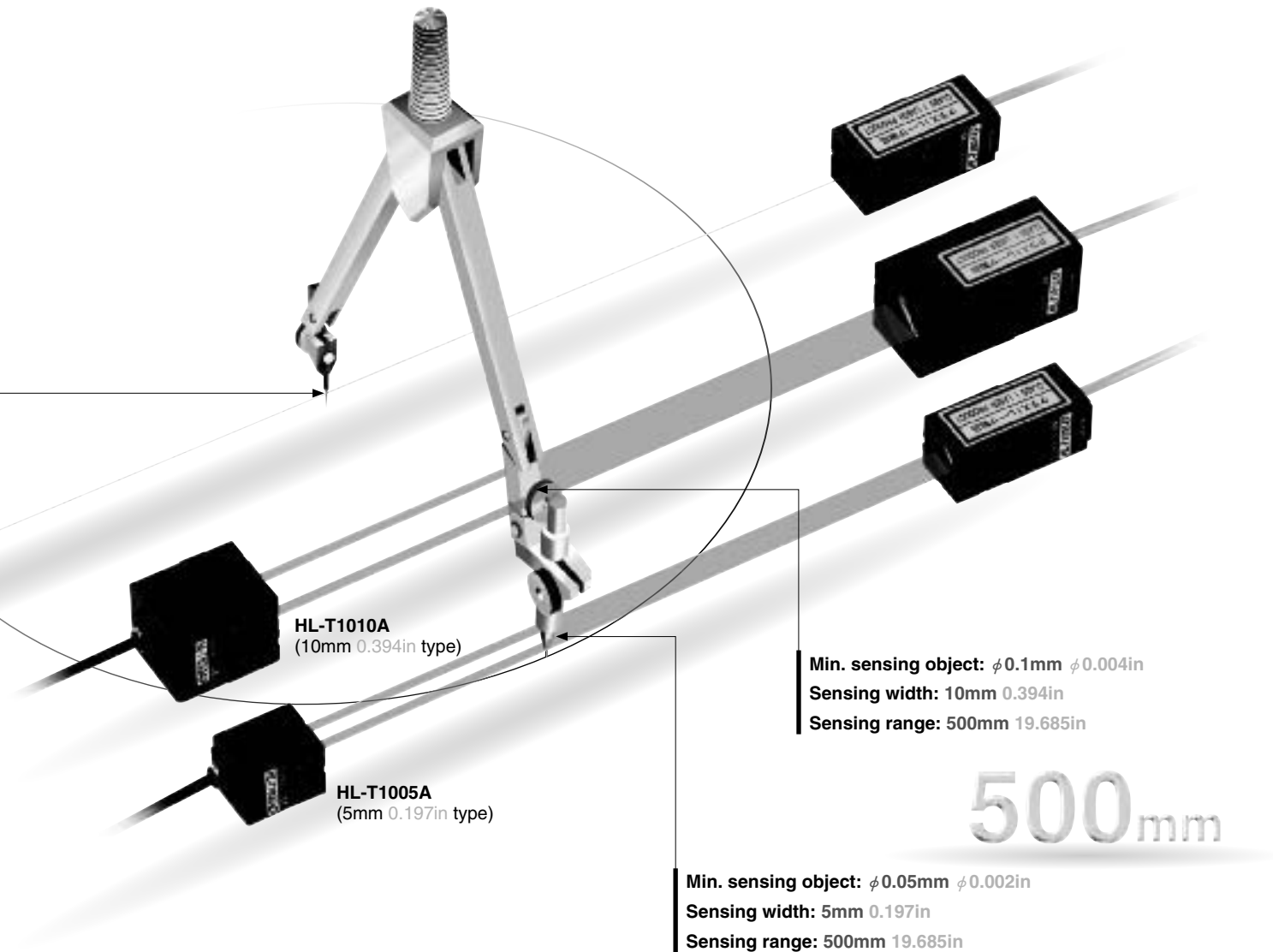


**Adoption of a Class 1 laser**  
 The adoption of a Class 1 laser (IEC/JIS) eliminates the need for safety countermeasures, so that these sensors can be used in photo-electric sensor applications with confidence.

**Minimum sensing object diameter  $\phi 8\mu\text{m}$ /HL-T1001A**  
 The laser with a beam diameter of  $\phi 1\text{mm}$   $\phi 0.039\text{in}$  can sense extremely small objects with dimensions in micrometers such as bonding wires.

**High-precision judgment even from minute differences in light intensity**  
 The sensors are sensitive to minute differences in light intensity, so that they can judge even the opacity of glass and turbidity of liquids. In addition, the amount of light received can be displayed as a percentage to allow you to determine permeation rates.





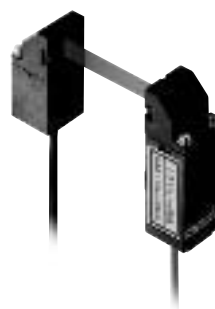
### A side view attachment is available, permitting space-saving installation (optional)

Mounting the side view attachment (optional) allows for a greater variety of different installation options, enabling additional space to be saved.

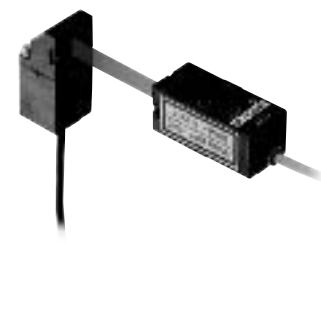
### FDA standards conforming types are available

FDA standards conforming types, most suitable for equipment used in the USA, are now available.

[ FDA : Class 2 ]  
 [ IEC/JIS: Class 1 ]

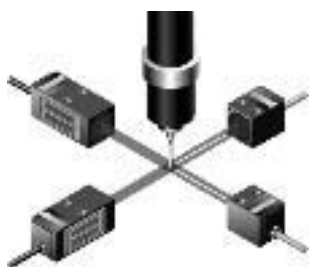


Mounted on both sides

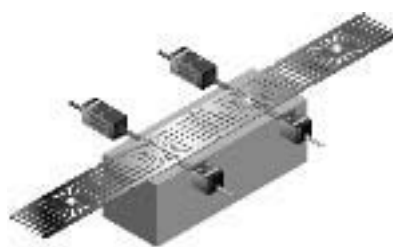


Mounted on one side only

## APPLICATIONS



Checking the positioning of chip components



Detecting defective lead frame seating



Sensing wafer position in wafer cassette

# 'Using advanced functionality with ease'

## The HL-T1 series has achieved this high performance goal.

Large, easy-to-view dual digital displays and easy-to-use four-way keys are incorporated into the unit's compact body. Features an intelligent controller that allows for easy utilization of its high performance features and advanced functionality. The fully equipped the HL-T1 series can adapt to every application with its convenient features – 3 types of teaching functions and a calculation function for use with two sensors.



**HL-AC1**  
(NPN output type)  
**HL-AC1P**  
(PNP output type)

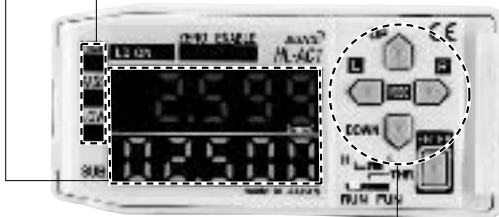
### Superior operability has been achieved

All settings can be easily performed by using the four-way keys and viewing the digital displays.

**Large dual digital display**

After power up, the measured value (red) and the threshold value (yellow) are displayed (digit height 7mm 0.276in)

**Judgment output indicators**  
HIGH/PASS/LOW 3-color display



Easy operation with four-way keys

### 3 types of teaching functions are now available

3 types of teaching functions are available: positioning teaching/2-level teaching/automatic teaching, thus enabling a variety of applications to be accommodated for many different types of production sites.

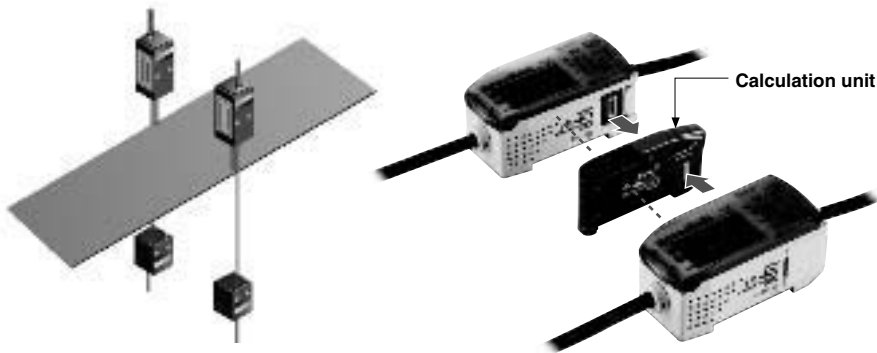
|                             |  |
|-----------------------------|--|
| <b>Positioning teaching</b> | The actual value measured at the time when teaching is performed is utilized as the threshold value. Best suited for high-precision positioning.   |
| <b>2-level teaching</b>     | In this teaching method, an intermediate level between the first and the second teaching levels is utilized as the threshold value. Minute differences, such as changes as small as the thickness of a sheet of paper between the sensing objects, can be detected when this teaching method is utilized.  |
| <b>Automatic teaching</b>   | With this teaching method, a series of periodic arbitrarily measurements are taken automatically and an intermediate value, between the maximum and minimum values obtained by this measurement, is utilized as the threshold value. The threshold value is therefore set in relation to the sensing object. Best suited for applications in which teaching must be performed without stopping the current flow of operations. |

## Intelligent controller; Facilitating a variety of different applications

### Calculations for 2 sensors are possible

The calculation unit (optional) just needs to be connected between the two controllers to enable calculations (addition and subtraction) to be carried out for two sensors. No digital panel controller is needed either.

#### Sheet width measurement



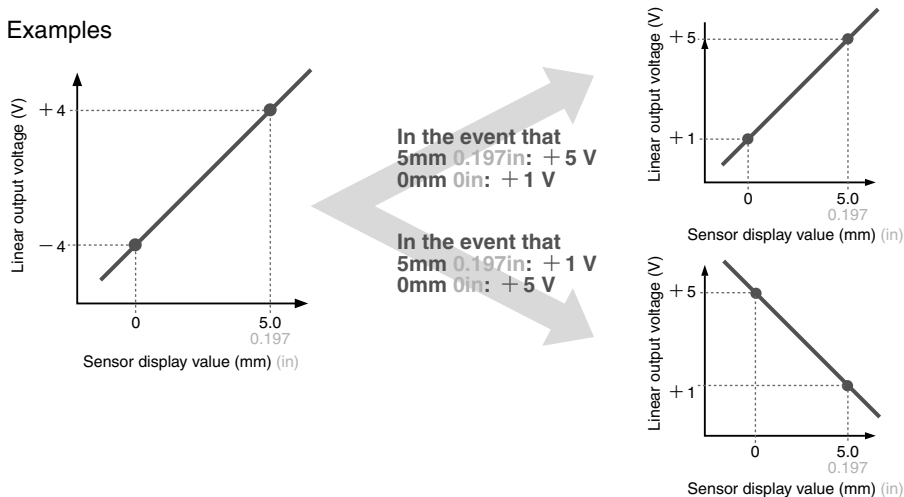
### Analog output is switchable between current/voltage

The analog output can be switched between either of two different outputs; current (4 to 20mA)/voltage ( $\pm 4V$ ). With the monitor focus function, the output can be adjusted over the range from  $-5V$  to  $+5V$ , or from  $0V$  to  $+5V$ , facilitating connectivity with a variety of output devices.

#### Monitor focus function

The linear output is fully adjustable over the following range (current: 4 to 20mA/voltage  $\pm 4V$ ). The usage of the monitor focus function together with selectable current/voltage switching for the linear output allows for compatibility with a variety of output devices.

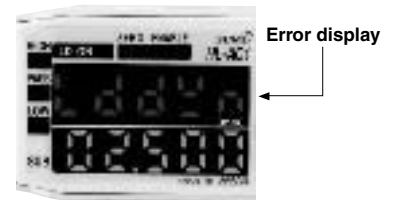
#### Examples



The linear output must be set by determining output values (maximum: current 0 to 23.5mA/voltage  $\pm 5.5V$ ) at two different points, for the arbitrary display value.

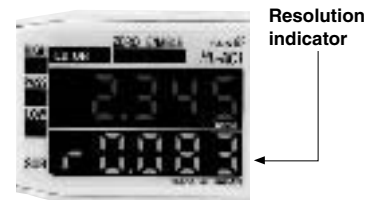
### Self-check for laser diode deterioration

The intelligent controller performs self-checking for laser diode deterioration. If the controller detects significant deterioration (end of diode life), an error will be displayed on the main digital display panel. This function enables users to prepare in advance for potential laser diode malfunctions.



### Detection resolution can be easily confirmed

The current resolution can be easily confirmed by setting the controller to indicate resolution display mode. By displaying the resolution, the marginal increment can be easily determined for the threshold value setting, helping to accurately determine whether sensing can be performed.



### Fully equipped with convenient functionality

A wide range of convenient features has been incorporated into the unit's compact body: standard received light setting/auto scaling setting/measurement processing (various timer and hold functions)/differentiation/monitor focus function. These features make the unit useful for a wide variety of applications.

# HL-T1

## SPECIFICATIONS

### Sensor heads

|  |  | Type  | Beam diameter $\phi$ 1mm $\phi$ 0.039in type   | Sensing width 5mm 0.197in type   | Sensing width 10mm 0.394in type           |
|--|--|---|--|--|---|
| Item   | Model No.  | IEC/JIS standards conforming type   | <b>HL-T1001A</b>   | <b>HL-T1005A</b>   | <b>HL-T1010A</b>                          |
|  |  | FDA standards conforming type   | <b>HL-T1001F</b>   | <b>HL-T1005F</b>   | <b>HL-T1010F</b>                          |
| Applicable controller  |  | <b>HL-AC1, HL-AC1P</b>  |  |  |   |
| Sensing range  |  | 0 to 500mm 19.685in   | 500 to 2,000mm 19.685 to 78.74in   | 500mm 19.685in   |   |
| Sensing width  |  | $\phi$ 1mm $\phi$ 0.039in   | $\phi$ 1 to $\phi$ 2.5mm $\phi$ 0.039 to $\phi$ 0.098in  | 5mm 0.197in  | 10mm $\phi$ 0.394in                       |
| Min. sensing object  |  | $\phi$ 8 $\mu$ m $\phi$ 0.315mil<br>opaque object   | $\phi$ 50 $\mu$ m $\phi$ 1.969mil<br>opaque object   | $\phi$ 0.05mm $\phi$ 0.002in opaque object   | $\phi$ 0.1mm $\phi$ 0.004in opaque object |
| Repeatability<br>(During the state in which light is half blocked) |  | 4 $\mu$ m 0.157mil<br>(Note 1)  | —  | 4 $\mu$ m 0.157mil (Note 1)  |   |
| Linear output resolution<br>(Note 2)                               |  | 4 $\mu$ m 0.157mil<br>(Notes 1, 3)  | —  | 4 $\mu$ m 0.157mil (Note 1)  |   |
| Emission indicator   |  | Green LED (lights up during laser emission)   |  |  |   |
| Interference prevention function                                   |  | Two units of sensors can be mounted closely. (When the controller interference prevention function is used)   |  |  |   |
| Environmental resistance   | Pollution degree   | 3 (industrial environment)  |  |  |   |
|  | Ambient temperature  | 0 to +50°C +32 to +122°F (No dew condensation), Storage: -25 to +70°C -13 to +158°F   |  |  |   |
|  | Ambient humidity   | 35 to 85% RH, Storage: 35 to 85% RH   |  |  |   |
|  | Ambient illuminance  | Incandescent light: 10,000lx at the light-receiving face  |  |  |   |
|  | EMC  | Emission: EN50081-2, Immunity: EN50082-2  |  |  |   |
|  | Voltage withstandability   | 1,000V AC for one min. between all supply terminals connected together and enclosure  |  |  |   |
|  | Insulation resistance  | 100M $\Omega$ , or more, with 250V DC megger between all supply terminals connected together and enclosure  |  |  |   |
|  | Vibration resistance   | 10 to 500Hz frequency, 1.5mm 0.059in amplitude in X, Y and Z directions for two hours each  |  |  |   |
| Shock resistance   | 300m/s <sup>2</sup> acceleration (30G approx.) in X, Y and Z directions for three times each |   |  |  |   |
| Emitting element   | IEC/JIS standards conforming type  | Red semiconductor laser Class 1 (IEC / JIS)<br>(modulated, max. output: 0.2mW)<br>(peak emission wavelength: 650nm)   | Red semiconductor laser Class 1 (IEC / JIS)<br>(modulated, max. output: 0.35mW)<br>(peak emission wavelength: 650nm)                   |  |   |
|  | FDA standards conforming type  | Red semiconductor laser Class 2 (FDA)<br>(modulated, max. output: 0.2mW)<br>(peak emission wavelength: 650nm)<br>(IEC / JIS: Class 1)   | Red semiconductor laser Class 2 (FDA)<br>(modulated, max. output: 0.35mW)<br>(peak emission wavelength: 650nm)<br>(IEC / JIS: Class 1) |  |   |
| Material   |  | Enclosure: Polyetherimide, Case cover: Polycarbonate, Front cover: Glass  |  |  |   |
| Cable  |  | 0.09mm <sup>2</sup> 0.004in <sup>2</sup> 3-core shielded cable with connector, 0.5m 1.64ft long   |  |  |   |
| Cable extension  |  | Extension up to total 10m 32.808ft is possible, with the optional cable. (Note 4)   |  |  |   |
| Weight   |  | Emitter: 15g 0.529oz approx., Receiver: 15g 0.529oz approx.   |  | Emitter: 30g 1.058oz approx., Receiver: 20g 0.705oz approx.  |   |
| Accessories  |  | <b>MS-HLT1-1</b> (Sensor head mounting bracket): One set of two brackets for both the emitter and the receiver<br><b>CN-HLT1-1</b> (Sensor head to controller connection cable): 1 No.<br>Laser beam alignment sticker: 2 Nos.<br>Label set (FDA standards conforming type only): 1 set |  | <b>MS-LA3-1</b> (Sensor head mounting bracket): One set of two brackets for both the emitter and the receiver<br><b>CN-HLT1-1</b> (Sensor head to controller connection cable): 1 No.<br>Laser beam alignment sticker: 2 Nos.<br>Label set (FDA standards conforming type only): 1 set |   |

Notes: 1) In case of an average sampling rate of 64 times.

2) Value calculated with the linear output allowance factor ( $\pm 3\sigma$ ) when connected to the controller included in the calculation of the detection width.

3) This value was obtained by converting the range of linear output fluctuation ( $\pm 3\sigma$ ) into a sensing width, assuming that the smallest sensing object blocks the beam at the approximate center of the beam diameter of  $\phi$  1mm  $\phi$  0.039in.

4) The following types of extension cables are available (for extending the distance between the sensor head-controller connection cable and the controller itself)

**HL-T1CCJ4** (4m 13.123ft)  
**HL-T1CCJ8** (8m 26.247ft)

### Calculation unit

|                          |  | Model No.  | <b>HL-AC1-CL</b> |
|--------------------------|--|--|------------------|
| Item                     |  | <b>HL-AC1-CL</b>   |                  |
| Connected controller     |  | <b>HL-AC1, HL-AC1P</b>   |                  |
| Current consumption      |  | 12mA or less (supplied from the controller)  |                  |
| Connection method        |  | Connector  |                  |
| Connection indicator     |  | Orange LED (lights up when connected to the controller)  |                  |
| Environmental resistance | Ambient temperature  | 0 to +50°C +32 to +122°F (No dew condensation), Storage: -15 to +60°C +5 to +140°F                         |                  |
|                          | Ambient humidity   | 35 to 85% RH, Storage: 35 to 85% RH  |                  |
|                          | Voltage withstandability   | 1,000V AC for one min. between all supply terminals connected together and enclosure                       |                  |
|                          | Insulation resistance  | 100M $\Omega$ , or more, with 500V DC megger between all supply terminals connected together and enclosure |                  |
|                          | Vibration resistance   | 10 to 150 Hz frequency, 0.7mm 0.028in amplitude in X, Y and Z directions for 80minutes                     |                  |
| Shock resistance         | 300m/s <sup>2</sup> acceleration (30G approx.) in X, Y and Z directions for three times each |  |                  |
| Material                 |  | Enclosure: ABS, Indicator part: Acrylic  |                  |
| Weight                   |  | 50g 1.764oz approx.  |                  |

## SPECIFICATIONS

### Controllers

| Item                                    | Type  | NPN output  | PNP output   |  |  |
|---|---|---|--|--|--|
|   | Model No.   | HL-AC1  | HL-AC1P  |  |  |
| Applicable sensor head                  | HL-T1001A/F, HL-T1005A/F, HL-T1010A/F   |   |  |  |  |
| Supply voltage / Current consumption    | 12 to 24V DC $\pm$ 10% Ripple P-P 10% or less / 190mA or less (when connected to the sensor head)   |   |  |  |  |
| Measuring cycle                         | 150 $\mu$ s   |   |  |  |  |
| Linear output                           | Current / voltage output switchable (Note 1)<br>• During current output: 4 to 20mA/F.S., Maximum load resistance: 300 $\Omega$<br>• During voltage output: $\pm$ 4V/F.S., Output impedance 100 $\Omega$<br>(In the monitor focus function, it can also be set at $\pm$ 5V, 0 to 5V, etc.) |   |  |  |  |
|   | Temperature characteristics   | $\pm$ 0.2% F.S./ $^{\circ}$ C (Note 2)  |  |  |  |
| Settable average sampling rate (Note 3) | 1 / 2 / 4 / 8 / 16 / 32 / 64 / 128 / 256 / 512 / 1,024 / 2,048 / 4,096  |   |  |  |  |
| Judgment output (HIGH, PASS, LOW)       | NPN open-collector transistor<br>• Maximum sink current: 50mA<br>• Applied voltage: 30V DC or less (between judgment output and 0V)<br>• Residual voltage: 1.2V or less (at 50mA sink current)  |   | PNP open-collector transistor<br>• Maximum source current: 50mA<br>• Applied voltage: 30V DC or less (between judgment output and +V)<br>• Residual voltage: 2V or less (at 50mA source current)   |  |  |
|   | Utilization category  | DC-12 or DC-13  |  |  |  |
|   | Number of outputs   | HIGH / PASS / LOW 3 values output   |  |  |  |
|   | Output operation  | HIGH: ON when measured value > HIGH threshold value<br>PASS: ON when HIGH threshold value $\geq$ measured value $\geq$ LOW threshold value<br>LOW: ON when LOW threshold value > measured value   |  |  |  |
| Short circuit protection                | Incorporated  |   |  |  |  |
| Laser OFF input                         | 0V connection: Laser emission stop<br>Open: Laser emission<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)   | +V connection: Laser emission stop<br>Open: Laser emission<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)   |  |  |  |
| Zero reset input                        | 0V connection: Zero reset operates<br>Open: Zero reset ineffective<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)   | +V connection: Zero reset operates<br>Open: Zero reset ineffective<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)   |  |  |  |
| Timing input                            | 0V connection: Effective<br>Open: Ineffective<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)  | +V connection: Effective<br>Open: Ineffective<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)  |  |  |  |
| Reset input                             | 0V connection: Effective<br>Open: Ineffective<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)  | +V connection: Effective<br>Open: Ineffective<br>• Applied voltage: 30V DC or less (at 0.1mA leak current)  |  |  |  |
| Indicators                              | Laser emitting (LD ON)  | Green LED (lights up during laser emission)   |  |  |  |
|   | Judgment output   | HIGH: Orange LED (lights up when measured value > HIGH threshold value)<br>PASS: Green LED (lights up when HIGH threshold value $\geq$ measured value $\geq$ LOW threshold value)<br>LOW: Yellow LED (lights up when LOW threshold value > measured value)          |  |  |  |
|   | Enable (ENABLE)   | Green LED (lights up during normal operation)   |  |  |  |
|   | Zero reset (ZERO)   | Green LED (lights up when the zero reset function is enabled)   |  |  |  |
| Main digital display                    | 5 digit red LED display [RUN mode: Either the measured value (mm) or the hold value will be displayed.]<br>Reverse mode: The display orientation will be reversed.]   |   |  |  |  |
| Sub-digital display                     | 5 digit yellow LED display [RUN mode: Either the resolution or laser beam reception amount will be displayed.]<br>THR mode: The threshold value will be displayed., Reverse mode: The display orientation will be reversed.]  |   |  |  |  |
| Main functions                          | <ul style="list-style-type: none"> <li>Measured value display</li> <li>Setting value, light amount value resolution display</li> <li>Standard received light setting</li> <li>Automatic scaling</li> <li>Scaling</li> </ul>   | <ul style="list-style-type: none"> <li>Display reverse</li> <li>ECO display</li> <li>Display digits limitation</li> <li>Sample hold</li> <li>Peak hold</li> <li>Bottom hold</li> <li>Peak to peak hold</li> <li>Self peak hold</li> <li>Self bottom hold</li> </ul> | <ul style="list-style-type: none"> <li>Zero reset</li> <li>Initial reset</li> <li>ON-delay timer</li> <li>OFF-delay timer</li> <li>ONE SHOT timer</li> <li>Differentiation</li> <li>Sensitivity selection</li> <li>Threshold value direct setting</li> </ul> | <ul style="list-style-type: none"> <li>Positioning teaching</li> <li>2-level teaching</li> <li>Automatic teaching</li> <li>Hysteresis width variably</li> <li>Monitor focus</li> <li>Non-measuring time setting</li> <li>(A - B) calculation (Note 4)</li> </ul> | <ul style="list-style-type: none"> <li>(A + B) calculation (Note 4)</li> <li>Mutual interference prevention (Note 4)</li> <li>Laser deterioration detecton</li> <li>Key lock</li> <li>Zero reset memory</li> </ul> |
| Environmental resistance                | Pollution degree  | 3 (industrial environment)  |  |  |  |
|   | Ambient temperature   | 0 to + 50 $^{\circ}$ C + 32 to + 122 $^{\circ}$ F (No dew condensation), Storage: - 25 to + 65 $^{\circ}$ C - 13 to + 149 $^{\circ}$ F  |  |  |  |
|   | Ambient humidity  | 35 to 85% RH, Storage: 35 to 85% RH   |  |  |  |
|   | EMC   | Emission: EN50081-2, Immunity: EN50082-2  |  |  |  |
|   | Voltage withstandability  | 1,000V AC for one min. between all supply terminals connected together and enclosure  |  |  |  |
|   | Insulation resistance   | 20M $\Omega$ , or more, with 500V DC megger between all supply terminals connected together and enclosure   |  |  |  |
|   | Vibration resistance  | 10 to 150Hz frequency, 0.7mm 0.028in amplitude in X, Y and Z directions for 80 minutes  |  |  |  |
|   | Shock resistance  | 300m/s <sup>2</sup> acceleration (30G approx.) in X, Y and Z directions for three times each  |  |  |  |
| Material                                | Enclosure: Polybutylene terephthalate, Transparent cover: Polycarbonate   |   |  |  |  |
| I/O cable                               | 0.09mm <sup>2</sup> 0.004in <sup>2</sup> 10-core composite cable, 2m 6.562ft long   |   |  |  |  |
| I/O cable extension                     | Extension up to total 10m 32.808ft is possible, with 0.09mm <sup>2</sup> or more, cable. (Note 5)   |   |  |  |  |
| Weight                                  | 140g 4.938oz approx.  |   |  |  |  |

Notes: 1) Switching between current and voltage is accomplished by a switch on the bottom of the controller.

2) These are the temperature characteristics of the linear output when the sensor head is connected.

3) The judgment output and linear output and linear output response time is calculated by (Measuring cycle)  $\times$  (Set average sampling rate + 1).

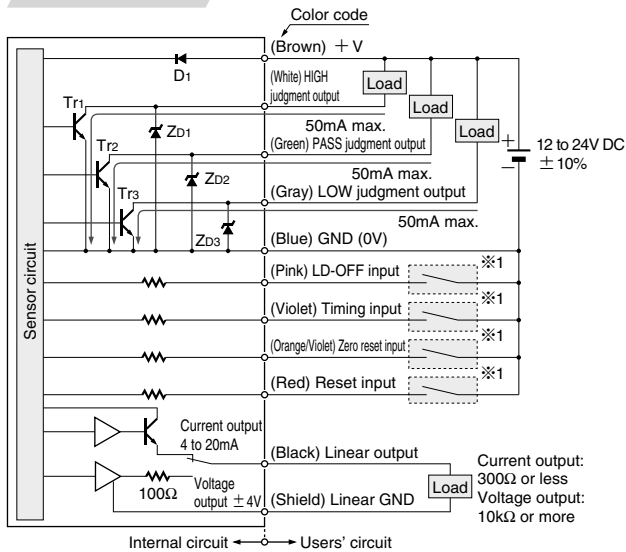
4) The calculation unit is necessary.

5) If the extension cable is longer than 10m 32.808ft, then it will not qualify for CE marking.

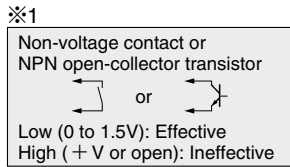
# HL-T1

## I/O CIRCUIT DIAGRAMS

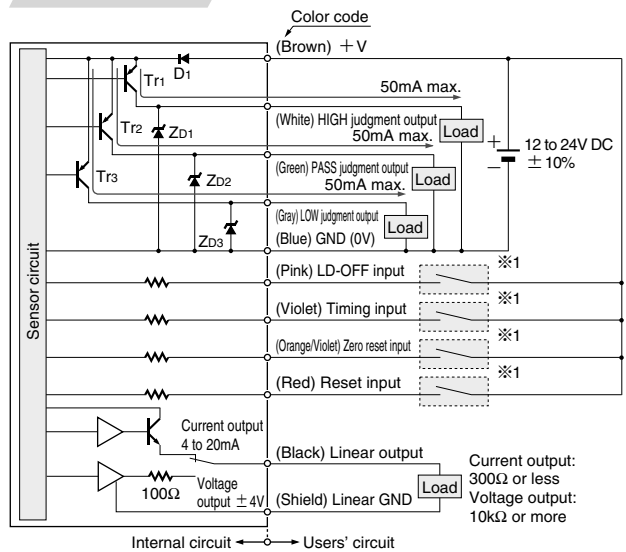
### HL-AC1 NPN output type



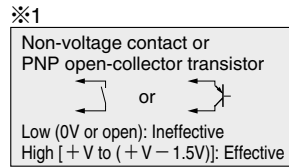
Symbols ... D: Reverse supply polarity protection diode  
 ZD1, ZD2, ZD3: Surge absorption zener diode  
 Tr1, Tr2, Tr3: NPN output transistor



### HL-AC1P PNP output type



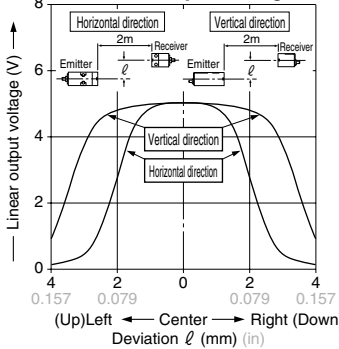
Symbols ... D: Reverse supply polarity protection diode  
 ZD1, ZD2, ZD3: Surge absorption zener diode  
 Tr1, Tr2, Tr3: PNP output transistor



## SENSING CHARACTERISTICS (TYPICAL)

### HL-T1001A HL-T1001F

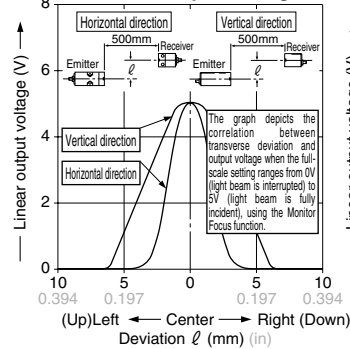
Correlation between transverse deviation and output voltage



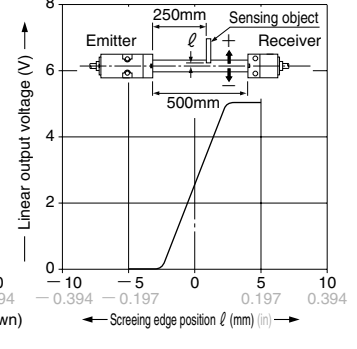
The left graph depicts the correlation between transverse deviation and output voltage when the full-scale setting ranges from 0V (light beam is interrupted) to 5V (light beam is fully incident), using the monitor focus function.

### HL-T1005A HL-T1005F

Correlation between transverse deviation and output voltage

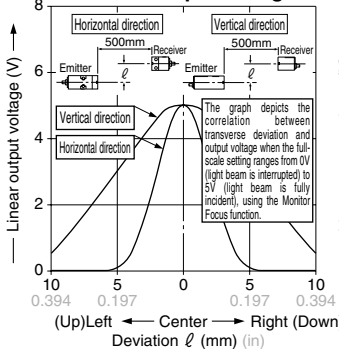


Correlation between interrupted beam width and output voltage

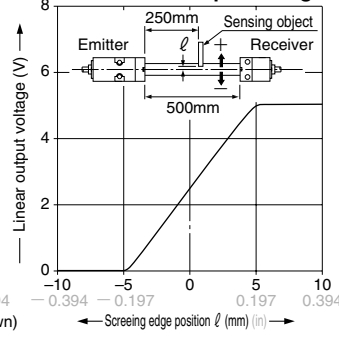


### HL-T1010A HL-T1010F

Correlation between transverse deviation and output voltage



Correlation between interrupted beam width and output voltage



## 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 standards, such as OSHA, ANSI or IEC etc., for personnel applicable in each region or country.



This product is equivalent to a IEC/JIS Standard Class 1 Laser device. Do not expose your eyes to the laser beam through optical instruments, like a lens.

- For more detailed product information, please refer to the instruction manual accompanying this product.

### Safety measures for laser beam products

- The safety standard IEC Publication 60825 specifies the use of laser beam products.  
Please read it carefully before using the laser beam sensor.

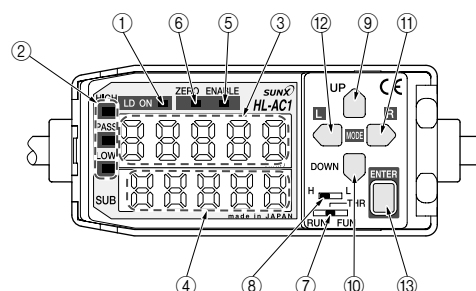
### Functions at a glance

| Function                           | Details   |
|------------------------------------|---|
| Zero reset function                | The following tasks can be done by executing zero reset.<br>• The display value can be set at "0".<br>• The linear output when the display reads "0" is made the center output value of the 2 points set by monitor focus. (In the default state, the current output is 12mA and the voltage output is 0V.)   |
| Auto scaling function              | The auto scaling function selects whether to display the laser beam reception amount in the main-digital display in mm units or in % units, and determines whether the amount of laser beam received or the amount of laser beam interrupted is displayed. With the set standard laser beam reception amount as the reference value, the current laser beam reception amount (laser beam interrupted amount) is scaled automatically and is displayed as well as being output.  |
| Standard received light setting    | This function registers and stores the current laser beam reception amount in memory as the standard laser beam reception amount. The laser beam reception amount during full laser beam entry becomes the 100% laser beam reception amount's full scale (F.S.). If this function is used, the display and the linear output are set on the full scale (F.S.) automatically. It can also be used to correct the laser beam reception amount when there is a change in the laser beam reception amount due to dirt, etc. on the front glass. |
| Scaling function                   | The scaling function is a function that changes the display value to the desired amount with respect to the setting value. At the desired distance, the display value can be input and changed.   |
| Hysteresis width setting           | This function sets the hysteresis to the desired value.   |
| Monitor focus function             | With this function, the linear output range and inclination, etc. with respect to the display value can be specified. Setting is done by determining the 2 output values with respect to the desired display values.  |
| Differential function              | This function makes the amount of change in the measured value an output value. Use this function when measuring if you are paying attention to changes in measured values, as when counting the number of work pieces, etc.  |
| Display reverse function           | The digital display's display direction can be selected. The forward direction or the reverse direction to match the direction of installation on the equipment can be selected.  |
| ECO display function               | This function makes the display dark and saves electric power.  |
| Display digits limitation function | This determines the number of display digits in the main-digital and sub-digital displays. If the number of digits is limited, the digits are turned off beginning with the lowest order digit.   |
| Zero reset memory function         | This selects whether or not to save the zero reset level in memory when the power is turned OFF. If you desire to reproduce the zero reset level from the previous operating session when you turn the power ON again, then enable this function. If this function is enabled, the zero reset level data are written into the EEPROM each time.   |
| Key lock function                  | The controller's key input can be disabled. Once the key input is disabled, the controller will not accept any key inputs until the key lock is released. Use this function to avoid changing the setting by mistake.   |

### Connection

- This product is made to satisfy the specifications when the sensor head is combined with the controller. In any other combination, not only may it not satisfy the specifications, but could be the cause of breakdown. So by all means, use it so that there is a combination of the sensor head and controller.

### Functional description



|   | Description  | Function  |
|---|--|---|
| ① | Laser emitting indicator (LD ON) (Green LED)                                 | Lights up when the sensor head is emitting laser beam.  |
| ② | Judgment output indicators (HIGH / PASS / LOW) (Orange / Green / Yellow LED) | HIGH: Orange LED (lights up when measured value > HIGH threshold value)<br>PASS: Green LED (lights up when HIGH threshold value ≥ measured value ≥ LOW threshold value)<br>LOW: Yellow LED (lights up when LOW threshold value > measured value)  |
| ③ | Main digital display (5 digit red LED)                                       | When in the RUN mode, it displays the measured value (mm/%)<br>During measurement hold, it displays the hold value (mm/%)<br>In Reverse mode, the top and bottom are displayed in reverse.  |
| ④ | Sub-digital display (5 digit yellow LED)                                     | When in the RUN mode, it displays the threshold value, voltage / current value, light reception amount or resolution. When in the THR mode, it displays the respective threshold values. In reverse mode, the top and bottom are displayed in reverse.  |
| ⑤ | Enable indicator (ENABLE) (Green LED)  | Lights up when operation is normal. Goes off when operation is abnormal (if the sensor head is not connected when the power is turned on).  |
| ⑥ | Zero reset indicator (ZERO) (Green LED)                                      | Lights up when the zero reset function is enabled.  |
| ⑦ | Mode select switch   | The following 3 modes can be selected.<br>• RUN mode: Measuring mode<br>• THR mode: The threshold values are set in this mode.<br>• FUN mode: Each of the settings are set in this mode.  |
| ⑧ | Threshold value select switch  | When in the THR / RUN mode, this switches the set threshold value (HIGH / LOW).   |
| ⑨ | Up key   | • RUN mode: Timing input<br>• THR mode: Changes the threshold value (forward direction)<br>• FUN mode: Changes the function setting value (forward direction)   |
| ⑩ | DOWN key   | • RUN mode: Press for 3 sec. or more: Standard light reception amount setting input<br>• THR mode: Changes the threshold value (reverse direction)<br>• FUN mode: Changes the function setting value (reverse direction)  |
| ⑪ | RIGHT key  | • RUN mode: Changes the contents of the sub-digital display (forward direction)<br>• THR mode: Changes the threshold value digit (forward direction)<br>• FUN mode: Sets function selection (forward direction)   |
| ⑫ | LEFT key   | • RUN mode: Changes the contents of the sub-digital display (reverse direction)<br>• THR mode: Changes the threshold value digit (reverse direction)<br>• FUN mode: Sets function selection (reverse direction)   |
| ⑬ | ENT key  | • RUN mode: Pressing for 1 sec. or more, executes zero reset. Pressing together with the RIGHT key for 3 sec. or more, cancels zero reset.<br>• THR mode: When threshold value is blinking, the threshold value is set. When the threshold value lights up, teaching is executed.<br>• FUN mode: When the set value is blinking, the value is set. When the setting is being initialized, pressing for a long time executes initialization. |

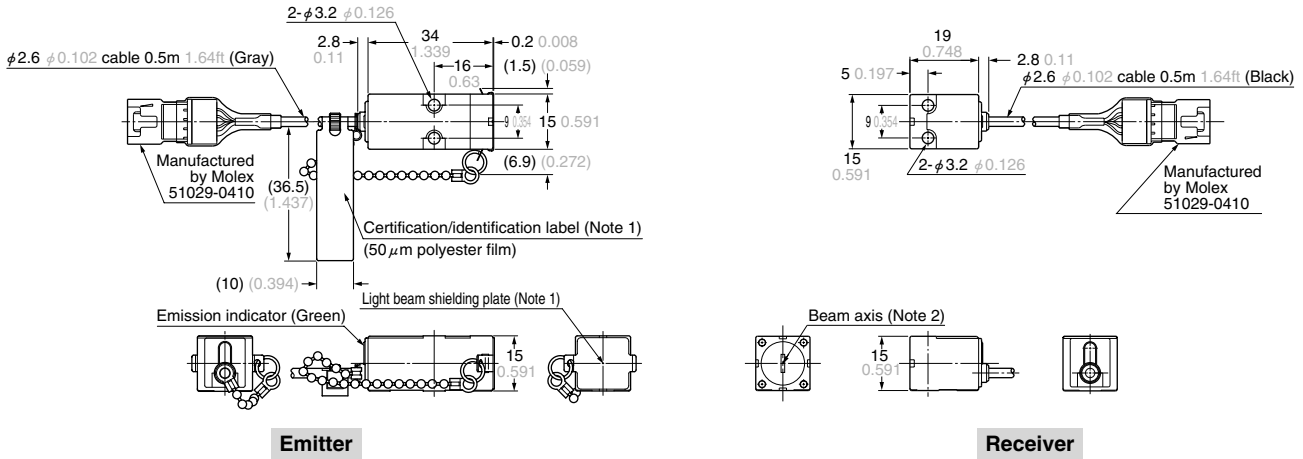
### Others

- This product outputs the judgment of the laser light analog quantity. Since there is variation in the light intensity between the center and the edges of the detection area, and emitter side and the receiver side, the 'display value' does not equal 'the actual dimensions', so caution is necessary. Use the displayed dimensional value as a criterion.
- If the object being measured has a mirror surface or is a transparent body, it may be impossible to measure it accurately, so please exercise caution.
- Absolutely do not attempt to disassemble this product.

# HL-T1

## DIMENSIONS (Unit: mm in)

### HL-T1001A (F) HL-T1005A (F) Sensor head

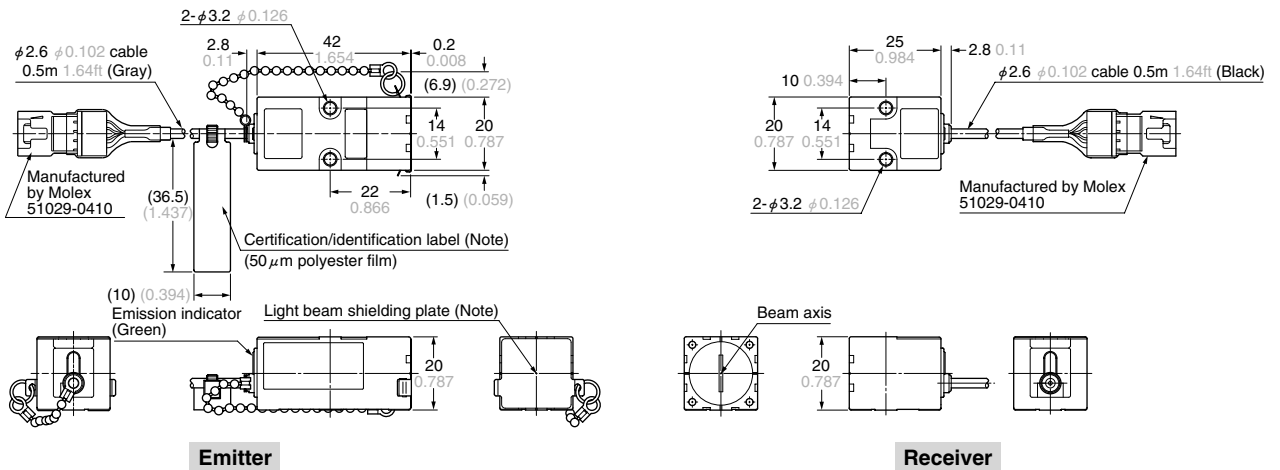


**Emitter**

**Receiver**

- Notes: 1) IEC/JIS conforming products do not contain light beam shielding plate, or certification/identification label.  
2) The receiver of **HL-T1001A (F)** does not incorporate a slit.

### HL-T1010A HL-T1010F Sensor head



**Emitter**

**Receiver**

- Note: IEC/JIS conforming products do not contain light beam shielding plate, or certification/identification label.

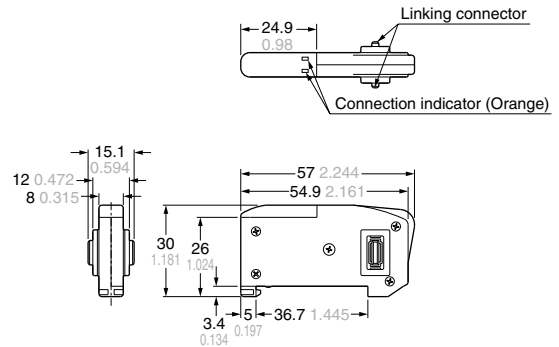
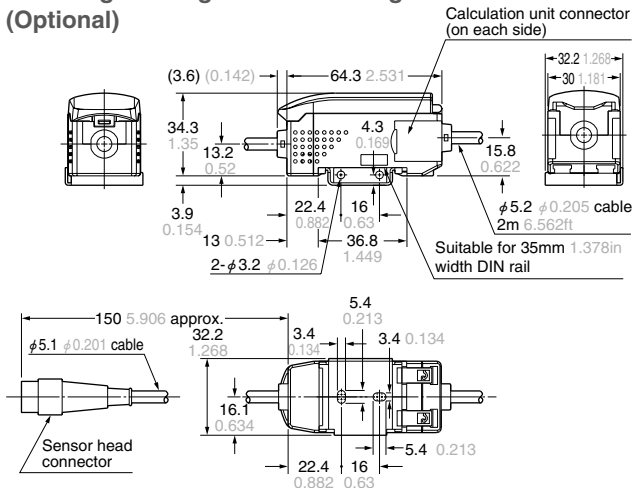
### HL-AC1 HL-AC1P Controller

Controller

### HL-AC1-CL Calculation unit (Optional)

Calculation unit (Optional)

### Mounting drawing with a mounting bracket MS-HLAC1-1 (Optional)

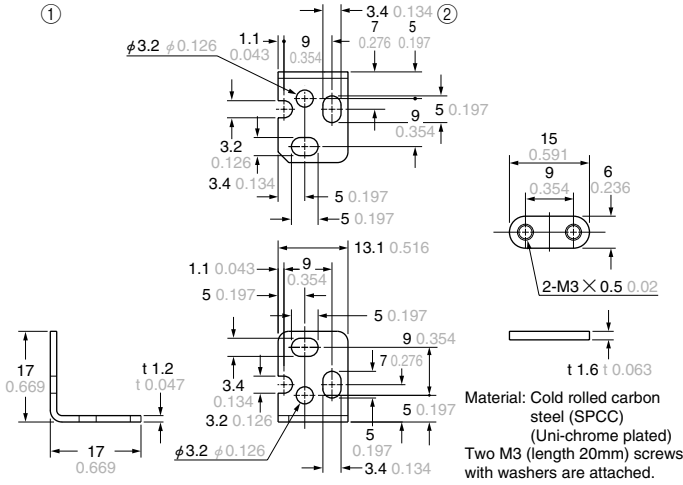


## DIMENSIONS (Unit: mm in)

### MS-HLT1-1

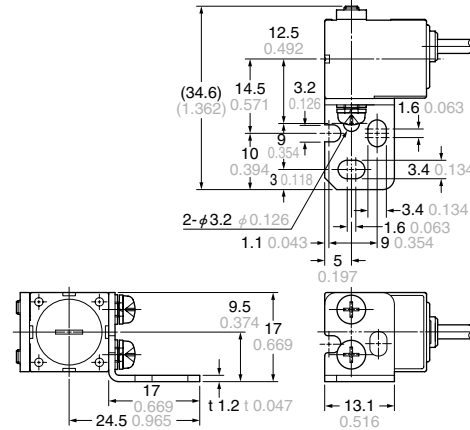
Sensor head mounting bracket for HL-T1001A (F)/HL-T1005A (F)

[This accessory is included with the HL-T1001A (F)/HL-T1005A (F). Also available for purchase separately.]



### Assembly dimensions

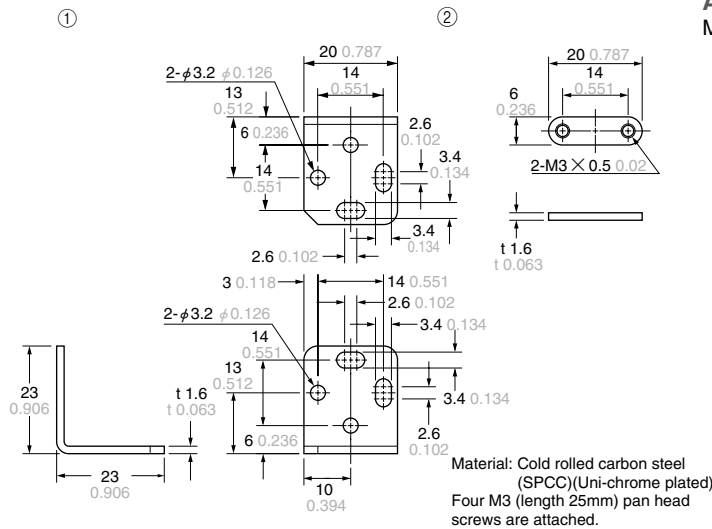
Mounting drawing with HL-T1005A's receiver



### MS-LA3-1

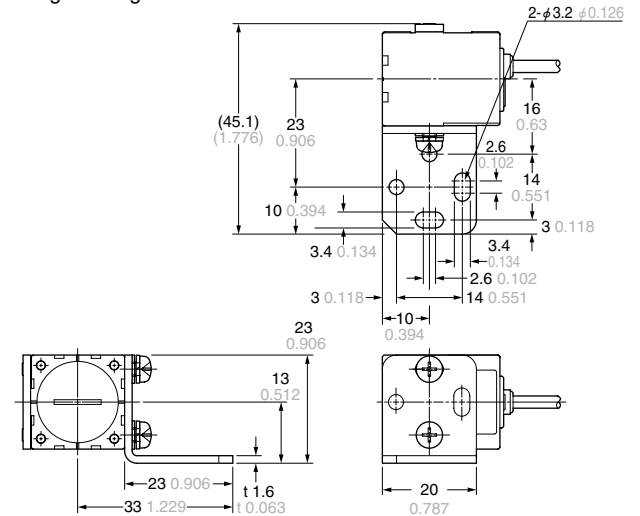
Sensor head mounting bracket for HL-T1010A (F)

[This accessory is included with the HL-T1010A (F). Also available for purchase separately.]



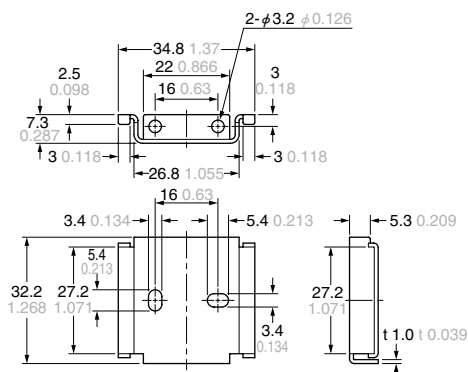
### Assembly dimensions

Mounting drawing with HL-T1010A's receiver



### MS-HLAC1-1

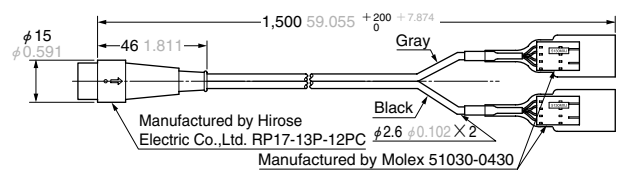
Controller mounting bracket (Optional)



### CN-HLT1-1

Sensor head to controller connection cable

(This accessory is included with the sensor head. Also available for purchase separately.)

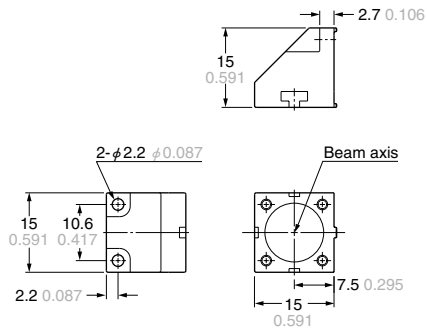


# HL-T1

## DIMENSIONS (Unit: mm in)

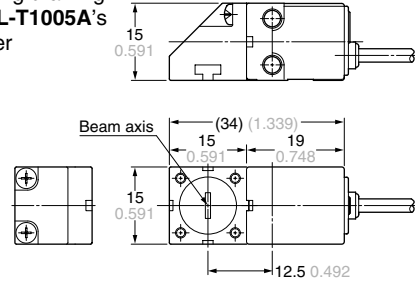
### HL-T1SV1

Side view attachment for **HL-T1001A(F)/HL-T1005A(F)** (Optional)



### Assembly dimensions

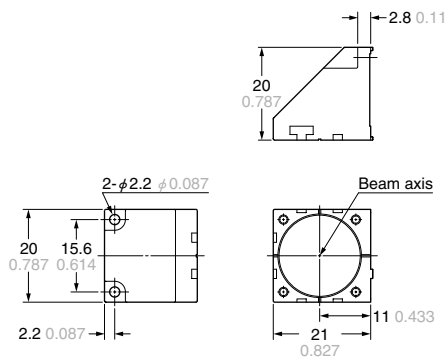
Mounting drawing with **HL-T1005A's** receiver



Material: Polyetherimide (Enclosure), Glass (Front cover)  
Two M2 (length 6mm 0.236in) screws with washers are attached.

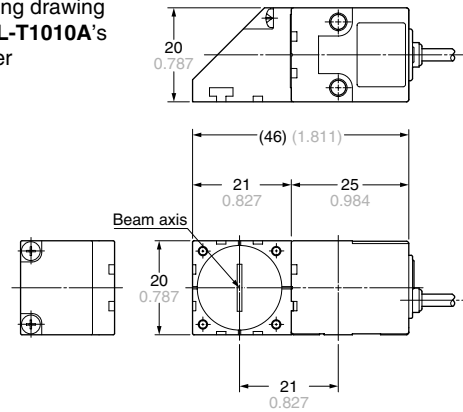
### HL-T1SV2

Side view attachment for **HL-T1010A(F)** (Optional)



### Assembly dimensions

Mounting drawing with **HL-T1010A's** receiver



Material: Polyetherimide (Enclosure), Glass (Front cover)  
Two M2 (length 6mm 0.236in) screws with washers are attached.