Panasonic **INSTRUCTION MANUAL**

Collimated Beam Sensor Ultra-compact Laser/Class 1

HL-T1 Series

MJE-HLT1 No.0104-00V

Thank you for purchasing our product. Be sure to read this manual before use in order to ensure the safe and proper operation of this product. Keep this manual at hand for your reference after reading it through.

WARNING
- This product is intended to detect the objects and does not have the control function to ensure safety such as accident prevention.
- Do not use the product as a sensing device to protect human body.
- Please use the products that comply with local laws and standards for human body protection specified by e.g., OSHA, ANSI and IEC.
- Do not use the product in the atmosphere of flammable gas, to prevent explosion.
- Avoid observing beams in a dark surrounding environment.
- Do not look at beams using an optical device such as an optical telephoto system.
- Never attempt to disassemble, repair, or modify this product.
- Control or adjustment according to procedures other than those provided in this Installation Instructions Manual and the separate User's Manual may cause exposure to hazardous emitted laser beams.

For detailed information, refer "our web site : https://industry.panasonic.com/ ".
You can download the Manual from our Website.

Getting Started

Check the following items before using this product.

. Sensor head model
Check the model name of product at the top of sensor head. The model number is provided with the name of the product.

. Bundled Items
Make sure that the following items are in the package.
Common to HL-T1□□□A/HL-T1□□□F
- Sensor Head Emitter × 1
- Sensor Head Receiver × 1
- Sensor head-controller connection cable(**CN-HLT1-1**) × 1
- Sensor head mounting bracket set (**MS-HLT1-1** or **MS-LA3-1**) × 2
- Chinese explanatory label × 1
- Light beam alignment stickers × 2
- Instruction Manual (This publication) × 1

Included only with HL-T1□□□A
- Korean explanatory label × 1

Included only with HL-T1□□□F
- Japanese / English explanatory label, label for opening section, caution label, label for protective casing (one each)

1 Cautions on Handling Laser Light

1. IEC/EN/JIS/GB/KS
- For the purpose of preventing any injury which may occur to the user by the use of the laser product in advance, the following standards have been established by the IEC Standards, EN Standards, JIS Standards, GB Standards and KS Standards.
  IEC : IEC 60825-1:2014
  EN : EN 60825-1:2014/A11:2021
  JIS : JIS C 6802:2014
  GB : GB 7247.1-2012
  KS : KS C IEC 60825-1:2014(**HL-T1□□□A only**)
  These standards classifies laser products according to the level of hazard and provide the safety measures for respective classes.
  Classification according to IEC 60825-1:2014(EN 60825-1:2014/A11:2021)

Classification	Summary of hazard evaluation
Class 1	A laser that is safe when operated under operating conditions that can be reasonably foreseen.

※When an unexpected failure occurs, dangerous radiation may be generated. Therefore, pay special attention to safety.

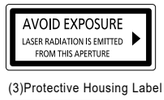
- The Japanese / English explanatory label shown below is affixed on **HL-T1□□□A**. Replace this label with an appropriate label included in the package as necessary.
  ・Explanatory label

2. FDA
About Export to the United States
- If this product is exported to the US as a component of a machine or instrument, it is governed by the regulations for laser standards of the FDA(Food and Drug Administration). Use a device which complies with FDA regulations conforming type.
  The models which comply with FDA regulations conforming type are as follows.

HL-T1001F HL-T1005F HL-T1010F

- With the objective of preventing the occurrence of injuries to persons using laser products before they happen, the FDA (Food and Drug Administration) has stipulated the following standard. PART 1040.10, 1040.11
- In this standard, laser products are classified in accordance with the degree of danger of the laser, and preventive safety measures have been stipulated which should be executed for each class. (See the list of required items for laser products.)
  HL-T1□□□F Classification (FDA) Class Ⅱ
- The following label is affixed to this product based on the FDA regulations.

(1)Aperture Label



(2)Warning Label(for the**HL-T1001F**)

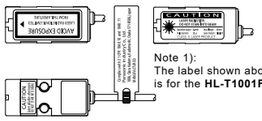
(For the **HL-T1005F**, **HL-T1010F**)

(3)Protective Housing Label

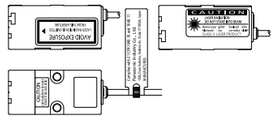
(4)FDA Certification and Identification Label

Label attachment positions

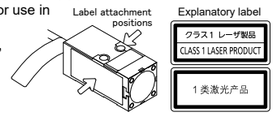
HL-T1001F、HL-T1005F



HL-T1010F



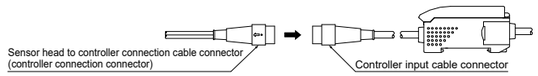
- **Laser Beam Attenuator**
  In case there may be a hazard that the eye can be exposed to the laser beam while working, fit the laser beam attenuator, provided as accessory, on the aperture of laser radiation.
- **Laser Beam Indicator**
  While the laser beam is being emitted, a green LED on the sensor head lights up.
  This LED can be checked even through the laser protective glass.
- **Export to foreign countries other than the US and use.**
  In the case of export to areas other than the US or use in those areas, replace the label on the model that complies to the FDA regulations conforming type, the **HL-T1□□□F**, with the supplied label.



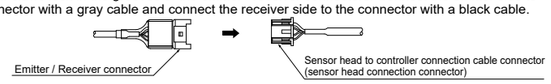
2 Connection

Connect the sensor head and controller by the following procedure, connect the power supply, then turn it on.

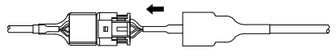
① Connection cable and controller
Insert the controller connection connector on the connection cable with the controller's input cable connector, inserting it until the ring on the outside of the connector locks.



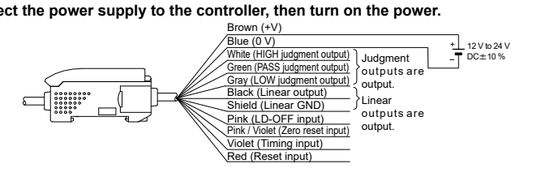
② Connection cable and sensor head
Insert the connection cable's sensor head connection connectors in the emitter / receiver connectors until their claws lock in the grooves of the emitter / receiver connectors. Connect the emitter side to the connector with a gray cable and connect the receiver side to the connector with a black cable.



③ The antistatic cover has been fitted on the connection cable.
After connecting the sensor head and connection cable, be sure to cover the connector with the anti-static cover.

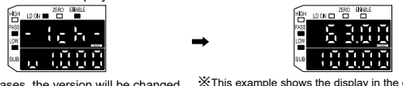


④ Connect the power supply to the controller, then turn on the power.



Notes:1) When high resolution is particularly necessary, use a stabilized power supply that is separate from any other power system.
2) If wiring is done incorrectly, it could cause damage, so carry out wiring correctly.
[Particularly in the case of the linear output (Black), do not bring it in contact with any other wire. In case not using the linear output, insulate cable core and shield cable each to prevent contacting of them.]

⑤ When the power is turned on, the following screen is displayed in the controller.
The controller's format is displayed in the top row and the number of channels is displayed after that. The software version is displayed on the bottom row. Operation switches to normal operation after this information is displayed for 3 seconds.



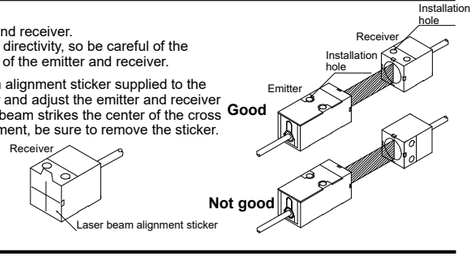
※In some cases, the version will be changed.

※This example shows the display in the case that the mode select switch is in the RUN position.
The numbers shown in the display are display examples.

3 Laser Beam Alignment

Align the laser beam.
① Install the emitter and receiver.
The laser beam has directivity, so be careful of the installation direction of the emitter and receiver.

②Affix the laser beam alignment sticker supplied to the front of the receiver and adjust the emitter and receiver so that the emitted beam strikes the center of the cross marks. After adjustment, be sure to remove the sticker.



4 Cautions

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.
- Installation of the sensor head and controller, and their removal, must always be performed with the controller's power turned off.
- If the cables are pulled, it could cause the wires in the cable to become disconnected, so exercise caution.

Power Supply
- Use this product 10min. after the power is supplied. Immediately on supply of power, the electrical circuit has yet to stabilize, which may cause variation in measured values.
- After turning on the power, there is a muting period of approximately 5 sec., so exercise caution.
- Take care that the wrong wiring may damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- Make sure to use an isolation transformer for the DC power supply. If an auto-transformer (single winding transformer) is used, this product or the power supply may get damaged.
- In case a surge is generated in the used power supply, connect a surge absorber to the supply and absorb the surge.

Wiring
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Make sure to carry out the wiring in the power supply off condition.
- The linear output is not equipped with a protective circuit against short circuits. Do not connect the power supply or capacity load directly.
- When using the calculation unit, connect the mutual controller's linear GND.
- Be careful not to apply static electricity to the connector during wiring. Doing so could cause breakdown.
- Extend the cable between the sensor head and the controller using the exclusive cable, and keep the total length to within 10 meters. Be sure to use the exclusive extension cable (**HL-T1CCJ**□) to extend the cable from the sensor head. Use the same type of shielded cable for wiring from the controller.

Environment
- Avoid dust, dirt, and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not allow any water, oil, fingerprints, etc., which may refract light, or dust, dirt, etc., which may block light, to stick to the emitting/receiving surfaces of the sensor head. In case they are present, wipe them with a clean, soft cloth or lens paper.
- Prevent sunlight or light of the same wavelength or other interfering light from shining on the sensor head's light receiver. In cases where particular accuracy is required, install a shade plate, etc. so that the interference light will not strike the sensor head.
- If the regular reflection light from the workpiece is strong, such as in the case of a glass or mirror-surface item, the reflection light may disallow proper detection. In such a case, adjust the mounting angle so that the reflection light does not enter the emitter or receiver.
- When the sensor is mounted, stress should not be applied to the sensor cable joint and the connector part.
- This sensor is suitable for indoor use only.
- Avoid use at places subject to intense vibrations or shock.

Interchangeability
- The sensor head and controller are interchangeable. It is also possible to replace only the sensor head.

Mutual Interference
- Mutual interference can be prevented during use by using the sensor head and controller with a calculation unit (**HL-AC1-CL**) connected between them.

Display Values
- 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 receptor side, the "display value" does not equal "the actual dimensions", so caution is necessary.
  Use the displayed dimensional value as a criterion.

5 Major Specifications

Sensor heads

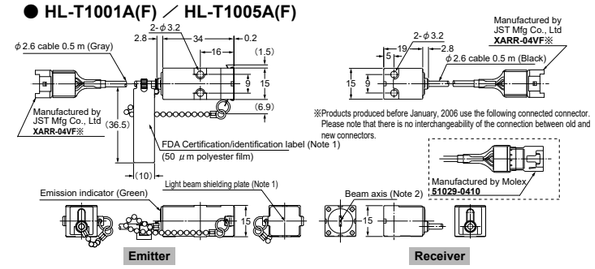
Item \ Model No.	Type	Beam diameter 1 mm type		Sensing width 5 mm type	Sensing width 10 mm type
	JIS/IEC standards conforming type	**HL-T1001A**		**HL-T1005A**	**HL-T1010A**
	FDA regulations conforming type	**HL-T1001F**		**HL-T1005F**	**HL-T1010F**
Applicable controller		**HL-AC1、HL-AC1P**			
Sensing range		0 mm to 500 mm	500 mm to 2,000 mm	500 mm	
Sensing width		ϕ1 mm	ϕ1 mm to ϕ2.5 mm	5 mm	10 mm
Min. sensing object		ϕ8 μm opaque object	ϕ50 μm opaque object	ϕ0.05 mm opaque object	ϕ0.1 mm opaque object
Repeatability (During the state in which light is half blocked)		4 μm(Note1)	———	4 μm(Note1)	
Linear output resolution (Note 2)		4 μm(Notes1,3)	———	4 μm(Note1)	
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	Ambient temperature	0 °C to +50 °C(No dew condensation), Storage: -25 °C to+70 °C			
	Ambient humidity	35 % RH to 85 % RH, Storage: 35 % RH to 85 % RH			
	Ambient illuminance	Incandescent light: 10,000 lx at the light-receiving face			
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance	100 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance	10 Hz to 500 Hz frequency, 1.5 mm amplitude in X, Y and Z directions for two hours each			
	Shock resistance	300 m/s^2 acceleration (30 G approx.) in X, Y and Z directions for three times each			
Emitting element		Red semiconductor laser modulated, max. output: 0.2 mW peak emission wavelength: 650 nm		Red semiconductor laser modulated, max. output: 0.35 mW peak emission wavelength: 650 nm	
Laser Class	JIS/IEC standards conforming type	Class 1 (IEC/EN/JIS/GB/KS)		Class 1 (IEC/EN/JIS/GB/KS)	
	FDA regulations conforming type	Class 1 (IEC/EN/JIS/GB) Class Ⅱ (FDA regulations) Maximum radiant energy per pulse: 5 nJ		Class 1 (IEC/EN/JIS/GB) Class Ⅱ (FDA regulations) Maximum radiant energy per pulse: 8.77 nJ	
Material		Enclosure: Polyestherimide, Case cover: Polycarbonate, Front cover: Glass			
Cable		0.09 mm^2 3-core shielded cable with connector, 0.5 m long			

Cable extension	Extension up to total 10 m is possible, with the optional cable. (Note 4)	
Weight	Emitter: 15 g approx., Receiver: 15 g approx.	Emitter: 30 g approx., Receiver: 20 g approx.

Notes: 1) In case of an average sampling rate of 64 times.
2) Value calculated with the linear output allowance factor (±3σ) 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 (±3σ) into a sensing width, assuming that the smallest sensing object blocks the beam at the approximate center of the beam diameter of "1 mm .
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 (4 m)
HL-T1CCJ8 (8 m)

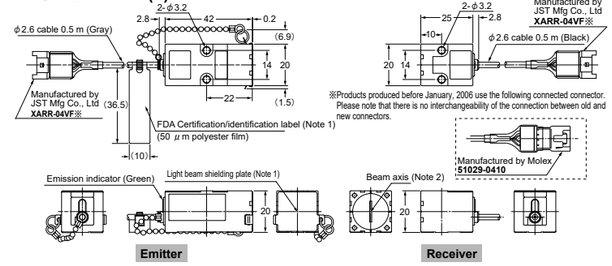
6 Dimension (Unit: mm)

● HL-T1001A(F) ／ HL-T1005A(F)



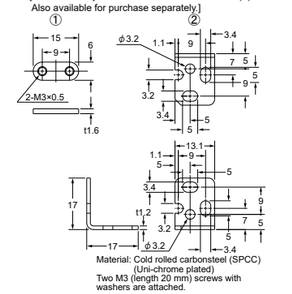
Notes: 1)JIS/IEC conforming products do not contain light beam shielding plate, or FDA certification/identification label.
2)The receiver of **HL-T1001A** (**F**) does not incorporate a slit.

● HL-T1010A(F)

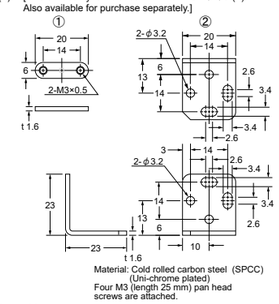


Note: JIS/IEC conforming products do not contain light beam shielding plate, or FDA certification/identification label.

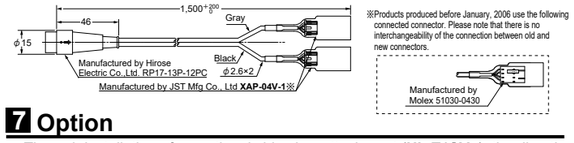
● MS-HLT1-1
Sensor head mounting bracket for **HL-T1001A** (**F**)/**HL-T1005A** (**F**)
[This accessory is included with the **HL-T1001A** (**F**)/**HL-T1005A** (**F**). Also available for purchase separately.]



● 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.]

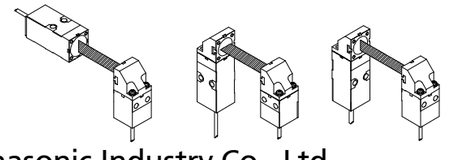


● CN-HLT1-1 Sensor head to controller connection cable
(This accessory is included with the sensor head. Also available for purchase separately.)



7 Option

- Through installation of an optional side view attachment (**HL-T1SV**□), the direction in which the laser beam shines can be changed.
- The optional side view attachment (**HL-T1SV**□) can be mounted on one side only, on either the emitter or the receiver, and used.
- Use the M2 (length: 6 mm) screws supplied with the side view attachment to mount it, and the tightening torque should be 0.08 N· m or less.



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