Panasonic®

INSTRUCTION MANUAL

High Speed, Multi-Point Laser Displacement Sensor
Sensor Head
HL-D301B / HL-D301C

CMJE-HLD301(05) No.0049-64V

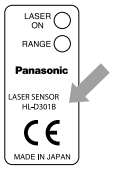
Thank you very much for purchasing Panasonic products. Read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

⚠ 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.
- Be careful not to directly watch or touch the direct laser beam or reflected laser beam.
- The product was developed and manufactured for industrial use.

BEFORE USE

- Before using the product, check the sensor head model and contents of packing.



- **Sensor head model**
  Check the model name of product at the top of sensor head.
  The product name you purchased is indicated.

- **Packing**
  Check that all of the following components are included in the package.
  - 1 sensor head unit
  - 1 Instruction manual
  - Laser warning labels: 1 set

- **Contact for CE**
  Panasonic Marketing Europe GmbH Panasonic Testing Center
  Winsbergring 15, 22525 Hamburg,Germany

1 DESCRIPTION

- This product is the special sensor head of the high speed, multi-point laser displacement sensor **HL-D3** series.
- When the **HL-D3** series controller is connected, the height, step, etc. of the target object can be measured at a high speed and high accuracy based on the principle of the light plane intersecting method (triangle projection measurement) using the line laser.
- This product does not apply to the export control specified in the “Foreign Exchange and Foreign Trade Control Law”.

2 CAUTIONS ON HANDLING LASER LIGHT

- 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, JIS Standards, GB Standards and FDA Standards.

  IEC : IEC 60825-1-2007
  JIS : JIS C 6802-2011
  GB : GB 7247.1-2012
  FDA : PART 1040.10

  These standards classifies laser products according to the level of hazard and provide the safety measures for respective classes.

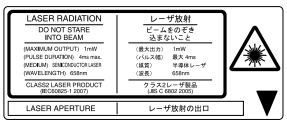
- **Laser hazardous class**
  Classification according to IEC 60825-1-2007 (JIS C 6802-2005)

Class	Model	Description of hazardous evaluation
Class 2	**HL-D301B**	Visible beam, low power. Blink response of eye affords protection.
Class 3R	**HL-D301C**	Direct intrabeam viewing is hazardous, but risk is lower than for 3B.

- **WARNING label**

<HL-D301B>

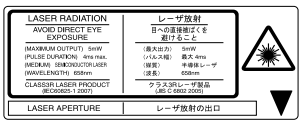
In Japanese / English



In Chinese / Korean

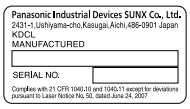
<HL-D301C>

In Japanese / English

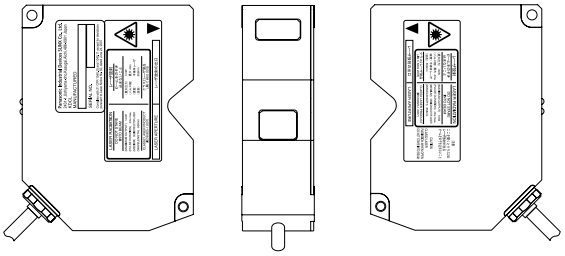


In Chinese / Korean

- **FDA certification label**



<Label position>



- Install the product so the laser beam comes higher or lower than eye level in order not to watch the beam directly during operation. Laser safety distance (Nominal Ocular Hazard Distance: NOHD) is approx. 0.1m. The laser beam must be terminated at the end of its path by a diffuse reflector or an absorber.
- Please contact our company if the system breaks down. It is not equipped with a function that stops laser radiation automatically during disassembling the sensor head. The users therefore may be exposed to laser beam in disassembling the sensor head.
- When this product is used in China, affix the Chinese warning label (accessory) on the label in the product.
- Do not use the system in the manner other than specified in this Instruction Manual.

3 SPECIFICATIONS

Model No.		HL-D301B	HL-D301C
Measurement method		Diffuse reflection (Note 2)	
Measurement center distance		50mm	
Measurement range of height (Z axis)		±10mm	
Measurement Width	Near side	11.5mm	
	Measurement center	12.5mm	
	Far side	12.5mm	
Light source		Red semiconductor laser Class 2 (JIS/IEC/GB), Class II (FDA) (Note 3) Max output: 1mW Emission Peak wavelength: 658nm	Red semiconductor laser Class 3R (JIS/IEC/GB), Class IIIa (FDA) (Note 3) Max output: 5mW Emission Peak wavelength: 658nm
Beam diameter (Note 4)		50μm×15mm (within the measurement center distance)	
Light receiving element		CMOS 2D image sensor	
Shape waveform width data interval		25μm	
Unit of measurement output	Height (Z-axis) measurement range	0.1μm	
	Width (X axis)	1μm (Note5)	
Resolution	Height (Z-axis) measurement range	1μm (Note 6)	
	Width (X axis)	5μm (Note 5, 7)	
Linearity		±0.1%F.S. (Note 8)	
Temperarute characteristic		0.02%F.S./°C	
Indicator	Laser emission	Green LED: Lights up during laser emission.	
	Measurement range	Yellow LED: Near measurement center:ON, within measurement range:Blink, beyond the range:OFF (at the center of width direction)	
Protective structure		IP67 (except connector)	
Ambient illuminance		3,000*lx* or less (illuinance at beam receiving surface using incandescent lamp) No direct sunlight or its reflection allowed.	
Ambient temperature		0 to +45°C (No dew condensation or icing allowed), At storage: -20 to +70°C	
Ambient humidity		35 to 85%RH At storage:35 to 85%RH	
Vibration resistance		Endurance: 10 to 55Hz (cycle: 1 minute), Resistant amplitude of vibration: 1.5mm, in X, Y, and Z directions for 2 hours	
Shock resistance		196m/ s^2 in X, Y, and Z directions for 3 times	
Material		Main unit case / cover : Aluminum die-casting, Front Cover : Glass	
Cable length		0.5m	
Cable extension		Extendible to 20m long maximum using the optional extension cable.	
Weight		Approx. 500g (including cable weight)	

Notes: 1) Unspecified measurement conditions are subject to the followings. Powersupply: 24V DC, ambient temperature: 20°C, measurement mode: Multi-Zone Beam Control (MZBC), adjusting increment: Width 100μm,unit detection time: 100μs, measurement center distance, the number of average movements: 64 times, measurement object: white diffusive object (which is specified by us). Other setting is the same as initial setting.
2) For the mounting in a mirror reflection, refer to **HL-D3** series User’s Manual.
3) This is based on the FDA Standard, according to Laser Notice No. 50 of the FDA Standard.
4) The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
5) It is a value in which the sensor heads connected to a controller Ver.2.00 or higher.
6) The value is the average of height measurement in full width at the measurement center distance.
7) This is the measurement value of a pin gauge rounded surface in the edge position measurement X value (start of falling edge) calculation setting. The measurement object: white ceramic pin gauge (ø10mm), unit detection time: 200μs,measurement value extraction:base light intensity control, the number of average movements: 64 times, width smoothing: ±4, all others are the initial settings.
8) The value stands for an error with respect to the ideal line in the (full-scale) height measurement range, when measuring height at the center of width direction. The specification is within a height range of ±7.5mm. Otherwise, the range is ±0.2% of F.S.

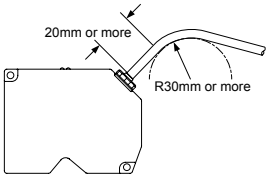
4 CAUTIONS

Connection

- Turn off the power of controller before connecting or disconnecting the connectors.
- When connecting or disconnecting the connectors, be sure to hold the connector area not to apply extra force to the cable.
- Be careful not to touch terminals or to let foreign matter get in the connector after disconnecting connectors.
- Be careful not to apply force to around the connector of standard cable and extension cable. Do not bend the cables near connectors. Failure to do so causes causes disconnection of the cable.
- When moving the sensor head during operation, install it so the cable not bend bend during movement. Use replaceable extensions cable in case the cable needs bend.

Wiring

- Do not run the sensor cable along (bundled in parallel) with other wirings. Keep it at least 100mm away from other wires. Run the cable so it is separate from high voltage and power circuit lines. If it is necessary to run the cable in parallel with them, shield it by running through a grounded electrical conduit.
- Install the product as far away as possible from noise source such as high-voltage lines, high-voltage device, power lines, power device, machines which generate a large starting and stopping surge, welding machines and inverter motor.
- Do not pull the cable using a force more than 29.4N when routing the cable with the sensor head and controller fixed. At least 20 mm is required from the cable connection to the bend. The bending radius must be 30 mm or more.
- Use only 1 extension cable for connection between one sensor head and a controller.



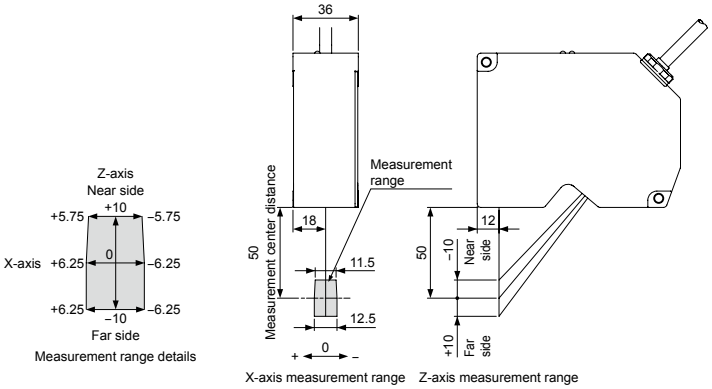
Warming up time

- Allow at least 30 minutes of warming up after turning on the power to ensure the performance of the product.

Environment

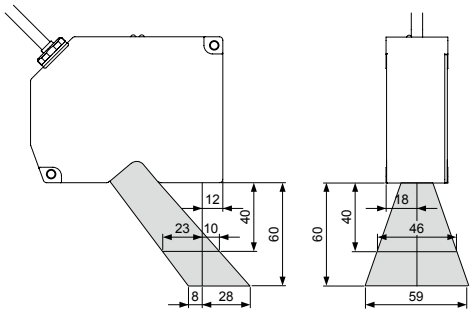
- The life of the semiconductor laser depends on the ambient temperature during use. When using the product near a heat source, take measures to lower the ambient temperature of the sensor head as possible. Mount the sensor on a device having good heat radiation because the sensor itself emits heat.
- Water, oil, or fingerprints on the emitter surface and receiver surface of sensor head reflects light. Dust and dirt on them block light. Keep them clean at all times. When cleaning these parts, wipe them off using a soft lint-free cloth or lens cleaning paper.
- Install the sensor head so ambient light such as sunlight or light with the same wavelength as laser beam should not enter the light receiver. If high accuracy is required, install a light shielding plate or the like on the sensor head.
- The controller and connectors are not structurally dustproof, waterproof, or corrosion-resistant. Do not use the product underwater or in the rain.
- Do not use the product in dusty places or that exposed to flammable or corrosive gases, droplet, direct sunlight, severe vibration or impact.

5 MEASUREMENT RANGE (Unit: mm)

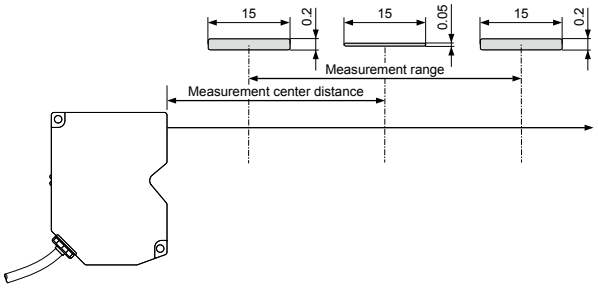


6 MUTUAL INTERFERENCE AREA (Unit: mm)

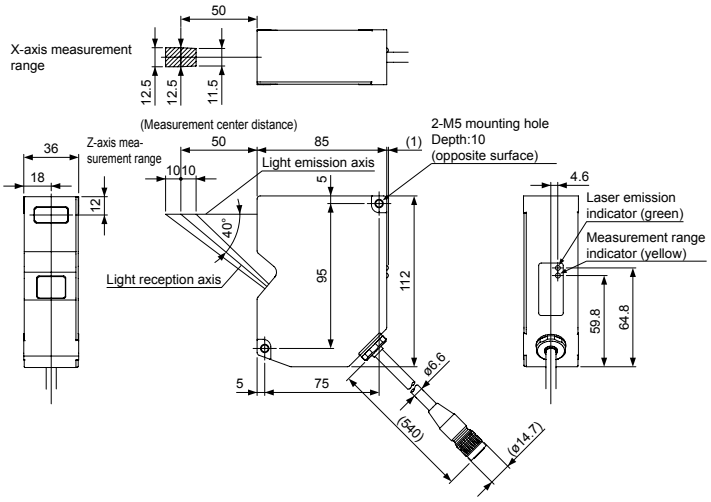
- When installing 2 or more sensor heads side by side, mutual interference occurs if the laser spots from other sensor heads fall within the shaded areas in the right figure.
  Install sensor heads so the laser spots from other sensor heads fall outside the shaded areas.



7 BEAM DIAMETER (Unit: mm)



8 DIMENSIONS (Unit: mm)



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