

Analog Output Laser Sensors

HLA Series

High accuracy distance measurement by the direct reflection method.



■ **Detection of a distant and very small spot 1 to 2mm in diameter within measuring range (HLA-D130A)**

■ **High-accuracy distance measurement:**

- [HLA-D130A: Resolution of 0.06mm in the 30 to 130mm measuring range.]
- [HLA-D250A: Resolution of 0.3mm in the 50 to 250mm measuring range.]
- [HLA-D500A: Resolution of 0.5mm in the 100 to 500mm measuring range.]



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EXPLANATION OF FEATURES

● Minute spot from a long distance

Ability to detect a spot 1 to 2mm in diameter within the measuring range (HLA-D130A).

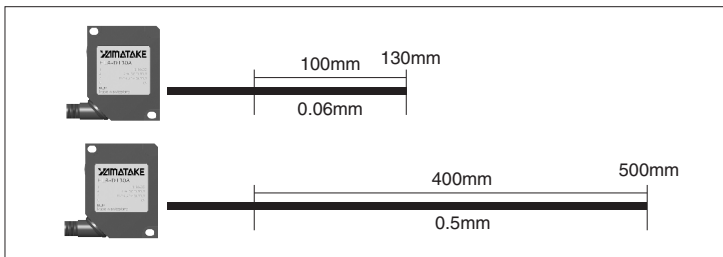


● High-accuracy distance measurement

Ability to measure distance from far away, with a long measuring range and high resolution.

Medium distance type (HLA-D130A): measuring range 30 to 130mm, resolution 0.06mm.

Long distance type (HLA-D500A): measuring range 100 to 500mm, resolution 0.5mm.



ORDER GUIDE

Type	Measuring range	Power supply	Output	Actuation	Catalog listing
Reflective sensor, analog distance output	30 to 130mm	18 to 28Vdc	Current output: 4 to 20mA, Voltage output: 0 to 10V, Alarm: PNP (Max. 100mA)	Alarm	HLA-D130A
	50 to 250mm				HLA-D250A
	100 to 500mm				HLA-D500A
Cable with connector	—	—	—	—	HLA-CN5P

SPECIFICATIONS

Type	Distance output, reflective		
Catalog listing	HLA-D130A	HLA-D250A	HLA-D500A
Power supply	18 to 28Vdc		
Current consumption	120mA		
Measuring range	30 to 130mm	50 to 250mm	100 to 500mm
Focal spot diameter	1 to 2mm	2mm	
Output	Alarm: PNP output with pull down resistor		
Output	Current output: 4 to 20mA (load resistance 400Ωmax), Voltage output: 0 to 10V (load resistance 10kΩmin), Alarm: 28V dc 100mA max.		
Resolution	0.06mm (with white paper)	0.3mm	0.5mm (with white paper)
Linearity	±0.2mm (with white paper)	±0.9mm	±1.5mm (with white paper)
Response time	10ms		
Light emitter	Laser diode, freq. 675nm, Class 2 (21CFR 1040.10)		
Indicators	Power (green), insufficient light (red)		
Ambient temperature	0 to +50°C		
Wiring	DIN connector: M12, 5 pins. (Brown: Vcc. Black: analog output. White: alarm output. Blue: 0V)		
Protective structure	IP66		

Notes 1: The alarm output provides a signal when either of the following two conditions occur:

- *Unsafe or faulty measurements due to insufficient light conditions
- *Out of range measuring

In the very close range, the state of the alarm output is undefined due to uncontrolled multiple laser beam reflections.

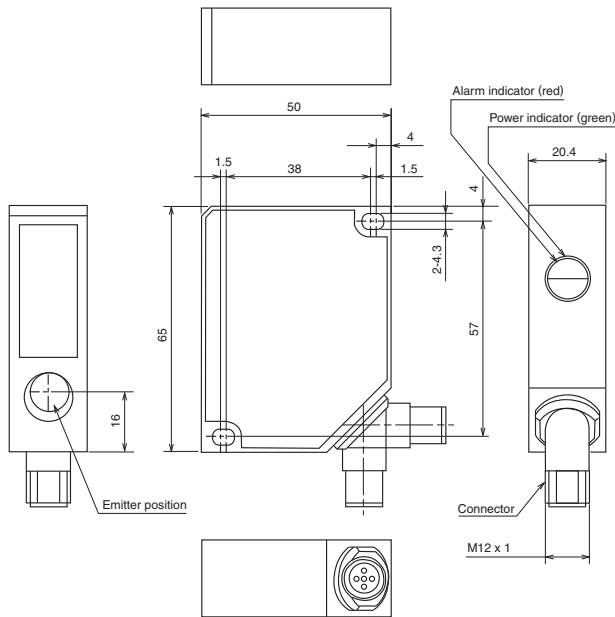
When the object is gone or positioned at out of sensing range output is set to followings if the last valid value was below 4.1mA/0.0625V then the output is set to 4mA/0V until another measurement is valid.
If the last valid value was above 4.1mA/0.0625V then the output is set to 20mA/10V until another measurement is valid.

Notes 2: After power on the sensor checks the current output (BK, PIN 4) for current.

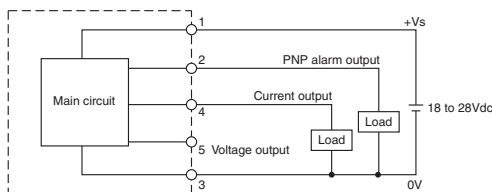
- If positive, the current output is automatically activated.
- If negative, the sensor will automatically switch to the voltage output (GY, PIN 5) after 100ms.

EXTERNAL DIMENSIONS

(unit: mm)



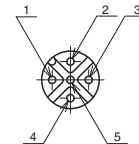
OUTPUT CIRCUIT



PIN LAYOUT



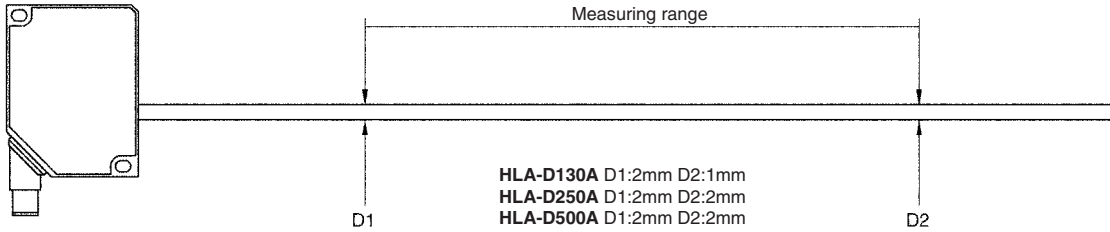
PIN LAYOUT AND WIRE COLOR OF HLA-CN5P



PIN No.	COLOR
1	BROWN
2	WHITE
3	BLUE
4	BLACK
5	GRAY

NOTES FOR USE OF HLA SERIES WITH ANALOG OUTPUT

1. Laser beam spot diameter



WARNING

Precautions related to laser light

- This is a JIS (Japan Industrial Standards) Class 2 laser product.
- Avoid looking directly at the laser beam or a specular reflection of the beam. Never point the beam toward someone's eye.
- Provide shielding so that the human body is not directly exposed to laser radiation.



- For safety, stop the laser beam at the end of its path with a diffuse reflecting or absorbing surface having suitable reflectance and temperature properties.
- If the installation conditions make the laser warning label difficult to read, before using the laser be sure to post the enclosed warning label in a place where its details can be read easily.

2. Precautions for use

2.1 Handling precautions

- Mount using M4 screws in the three mounting holes.
- Sensor requires about 75ms to stabilize after power is supplied.
- If installed outdoors, the sensor should be placed in a housing to prevent direct exposure to the sun or rain.
- Avoid installing the sensor where there is strong vibration or impact, since they might shift the optical axis out of alignment.
- Shield the lens so that it is not directly exposed to water or oil. If it is splashed, malfunction could result.
- Where there is heavy interference from ambient light, shade the sensor with a hood or change the mounting direction to prevent malfunction.
- In the sensor is used in a dusty place, put it in a sealed case or use air purging or other countermeasures to prevent dust from accumulating on the lens.
- The laser sensor is assembled with high precision. Never strike it with another object. In particular, if the lens surface is scratched or cracked, its properties may be impaired.
- If the lens is dirty, wipe it with a soft, dry, clean cloth. If it is especially dirty, clean it with pure alcohol.
- If multiple sensors are used close together, performance may be adversely affected. After installing and before use, check carefully to be sure there is no mutual interference.
- Highly reflective metal surfaces near the laser sensor may cause malfunction. Dull or paint nearby metal surfaces so that they are not reflective.

2.2 Precautions for wiring

- Be sure to turn off the power before mounting the sensor.
- Route the laser sensor wiring separately or in its own conduit. If it is put in the same conduit with high voltage lines or power lines, induction may cause malfunction or damage.
- When using a commercially available switching regulator, ground the frame ground terminal. Otherwise, switching noise could cause a malfunction.
- When using a load that generates an inrush current, such as a capacitive load or lamp load, connect a current-limiting resistor between the load and the output terminal. (Otherwise, the output short-circuit protection may be activated.)
- This sensor has miswiring protection, but it may be damaged by incorrect wiring involving the I/O lines. Be sure to wire correctly.

ABOUT LASER SENSORS

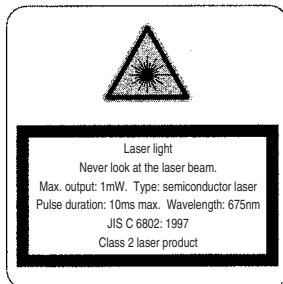
1. Safety standards for laser light

Even a small laser light can be powerful and potentially harmful to the human body. In Japan, in order to protect users of laser products, the "Radiation Safety Standards for Laser Products" (JIS C 6802) were issued as part of the Japanese Industrial Standards. According to JIS C 6802, which is based on the standards of the International Electrotechnical Commission (IEC), laser products are categorized by their level of risk, and the required safety measures for each level are specified.

Class	Risk Evaluation Summary
Class 1	Intrinsically safe design.
Class 2	Visible light with low output (400 to 700nm wavelength). Normally eyes are protected by eye aversion response.
Class 3A	Direct beam observation by optical means may be dangerous. Visible light output is 5W or less. Output of wavelengths other than visible light is up to 5 times that of Class 1.
Class 3B	Direct beam observation is dangerous. However, observation of diffuse reflection (unfocused light) of pulsed laser radiation is not dangerous. Under some conditions, an output of up to 0.5W can be safely observed.
Class 4	High output. There may be dangerous diffuse reflection. Laser may damage skin or cause fire.

2. Precautions for safe use of laser light

- Be sure to take measures for the use of this sensor so that laser light does not shine in someone's eyes, either directly or by reflection from a mirror-like surface.
- A label like the typical one shown below is affixed to the laser sensor. Be sure to following the instructions on the label when using the sensor.



Example of HLA label