

Instruction Manual

Laser Beam Sensor LA-511

Thank you for purchasing our product.
To use this product safely and properly, please read this manual carefully.
Keep this manual at hand.



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.

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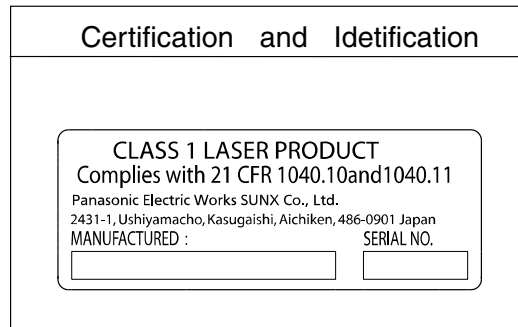
1 For safe use of laser products

- FDA (Food and Drug Administration, U.S.DHHS) part 1040 “Performance standards for light-emitting products” has been established for the purpose of preventing users from suffering injuries by laser products.

This product belongs to “Class 1 laser product” according to the degree of the hazard specified in the classification system of FDA Standards 21CFR 1040.10 and 1040.11.

- A label shown below is affixed on the left side of the projectors body in accordance with the requirements of said standards.

(The left side of a projector)

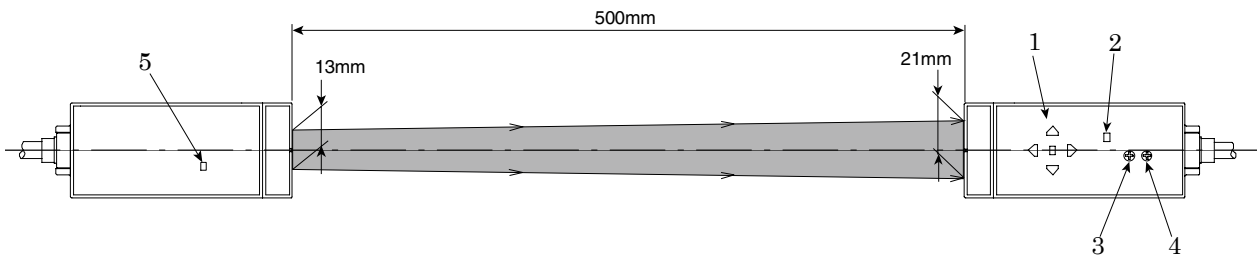


- CAUTION – The use of optical instruments with this product will increase eye hazard.
- Do not stare into beam directly in succession.
- CAUTION – Use of controls or adjustments or performance of procedure other than those specified herein may result in hazardous radiation exposure.
- This product has following radiation specifications.

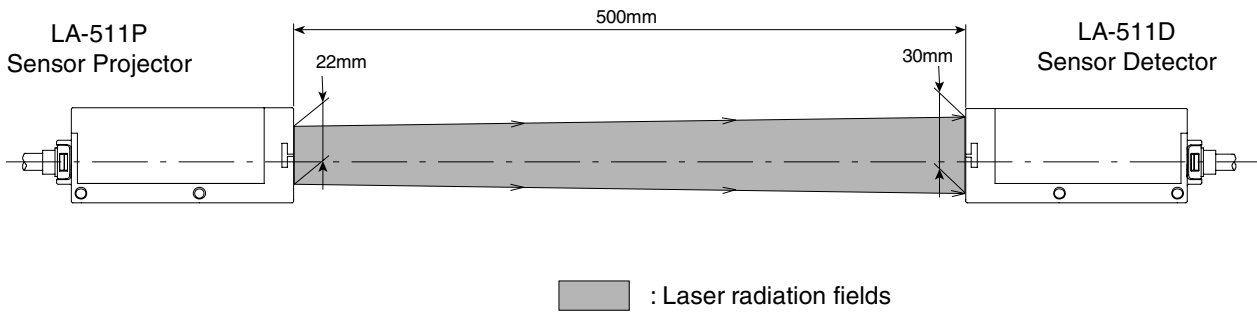
Item	Specifications
Wavelength	780nm
Pulse Duration	10 μ s
Max. Output of Laser	1.4mW

2 Laser Radiation Fields

VIEW FROM TOP



PLAN 1



- 1: MONITOR (Beam Alignment Monitor)
- 2: OUT (Operation Indicator)
- 3: SPAN (Span Adjustor)
- 4: SENS. (Comparison Level Adjustor)
- 5: POWER (Radiation Emission Indicator)

3 Major Specifications

Type	Thru-beam	
Item	Model No.	LA-511
Sensing Width	15mm	
Sensing Distance	500mm	
Repeat Accuracy	10μm or less	
Power Source	12 to 24V DC ±10%, Ripple : 10% P-P or less	
Current Consumption	60mA or less	
Output	Analog Voltage Output	<ul style="list-style-type: none"> • Output voltage : 1V (When all beam interrupted) to 5V (When all beam received) • Through rate : 8V/ms or over • Temperature characteristic : 0.1% of F.S. per 1°C • Output impedance : 75 ohms
	Comparison Output	<ul style="list-style-type: none"> • NPN transistor • open collector • Sink current : max. 100mA • Applied voltage : 30V DC or less • Residual voltage : 1V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)
	Output Operation	Dark-ON
	Short Circuit Protection	Provided
	Response Time	0.5ms or less
Remote Interlock Input	Laser radiated when connected to 0V, and radiation stopped when left opened or connected to +V.	
Indicator	Operation Indicator	Red LED lights when comparison output is in ON state.
	Radiation Indicator	Red LED lights when laser is radiated.
	Laser Beam Alignment Monitor	Green LED lights when beam received properly, and yellow LED lights when beam is deviated from center.
Adjustment Function	Analog Voltage Output	Span adjustment : with endless, 18 turn adjustor.
	Comparison Output	Comparison level adjustment : with endless, 18 turn adjustor.
Ambient Temperature	0 to +50°C (No dew condensation nor icing allowed) -20 to +70°C (storage)	
Ambient Humidity	35 to 85%RH	
Emitting Element	Invisible laser beam	
Ground	Line-bypass capacitor system	
Enclosure's Material	Enclosure : zinc die-casting, Top cover : PRO, Front protective cover : Glass	
Accessories	MS-LA1 (mounting bracket) : 2 sets, Screwdriver for adjustment 1 pc. Pressure terminals : 2 pcs.	

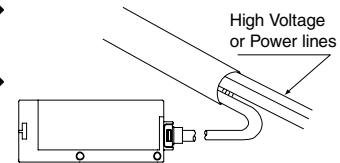
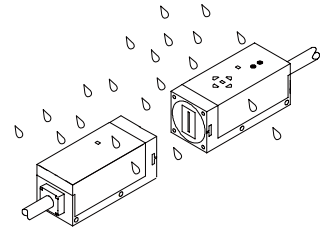
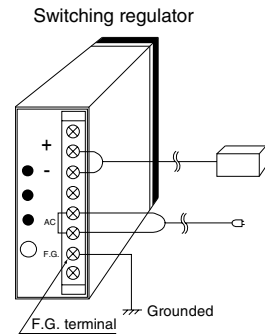
*In case of using this product as a CE marking conformity product, cable extension of the power wire and I/O wire must be within 30m.

- The models listed under '**3 MAJOR SPECIFICATIONS**' come with CE Marking. As for all other models, please contact our office.

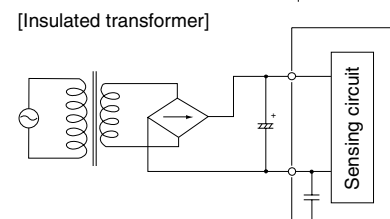
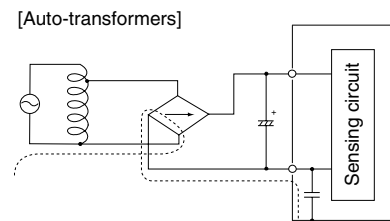
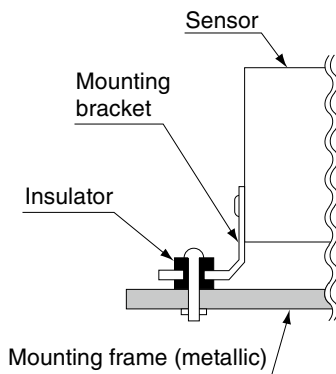


4 Cautions

- This product has been developed / produced for industrial use only.
- Always turn the power off before performing wiring.
- Connect each other's synchronization wires (Orange and Violet wires and its shields also) of the projector and detector. Do not let them contact with the other wires.
- Verify voltage fluctuation so that it should not exceed the rated value.
- When a switching regulator is used for the power source of the sensor, make sure to ground the frame ground (F.G.) terminal to an actual ground.
- If any device that may cause noise (switching regulator, inverter motor, etc.) is used near the sensor, make sure to ground the frame ground (F.G.) to an actual ground.
- Use sensors under a stable condition to be obtained after more than 10 minutes from power supply.
- Cable is extendable up to 50m by using 0.3mm² or bigger wire, expect for the sync, (Orange and Violet).
Use shielded cord for extension of the analog voltage output cord (White). In case of using this product as a CE marking conformity product, cable extension of the power wire and I/O wire must be within 30m.
- Do not use the sensor where there is excessive vapor, dust or corrosive gas, or in the situation where they could be exposed directly to water.
- Do not run sensor cables parallel to high-voltage lines or power lines, nor put them together in the same raceway.
Doing so may cause malfunctions from inductive interference.
- LA-511 employs a line-bypass capacitor system to enhance electrical noise resistance. If there is any equipment near the sensor such as supersonic welding machine which produces a high frequency noise, and in addition, if sensor mounting framework is electrically conductive, an insulation is required between the sensor and the framework.



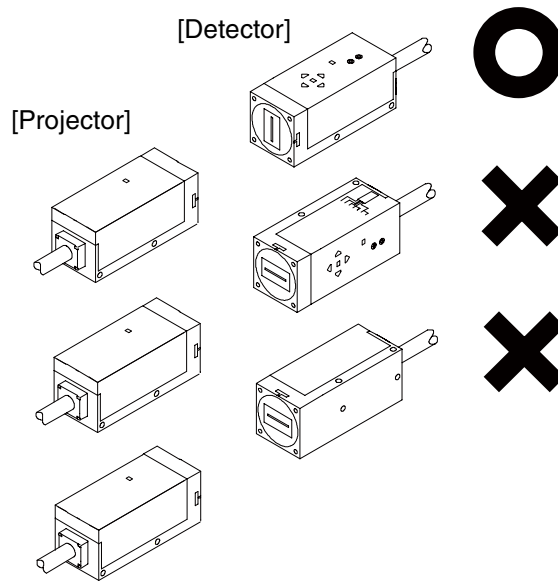
Beside, do not use a power source with an auto-transformer as it may result in a failure to danger if any fault happen at internal circuit.



- Dangerous – Do not disassemble.

5 Mounting

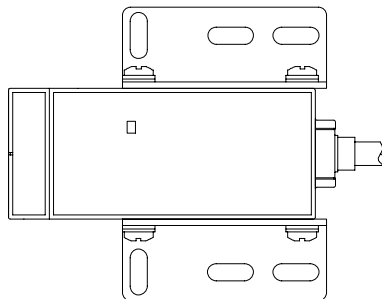
- Since laser beam has a directional property, special care must be taken to the direction of the sensor when mounting.



(Note 1) The tightening torque should be $1.17\text{N}\cdot\text{m}$ {12kgf·cm} or less.

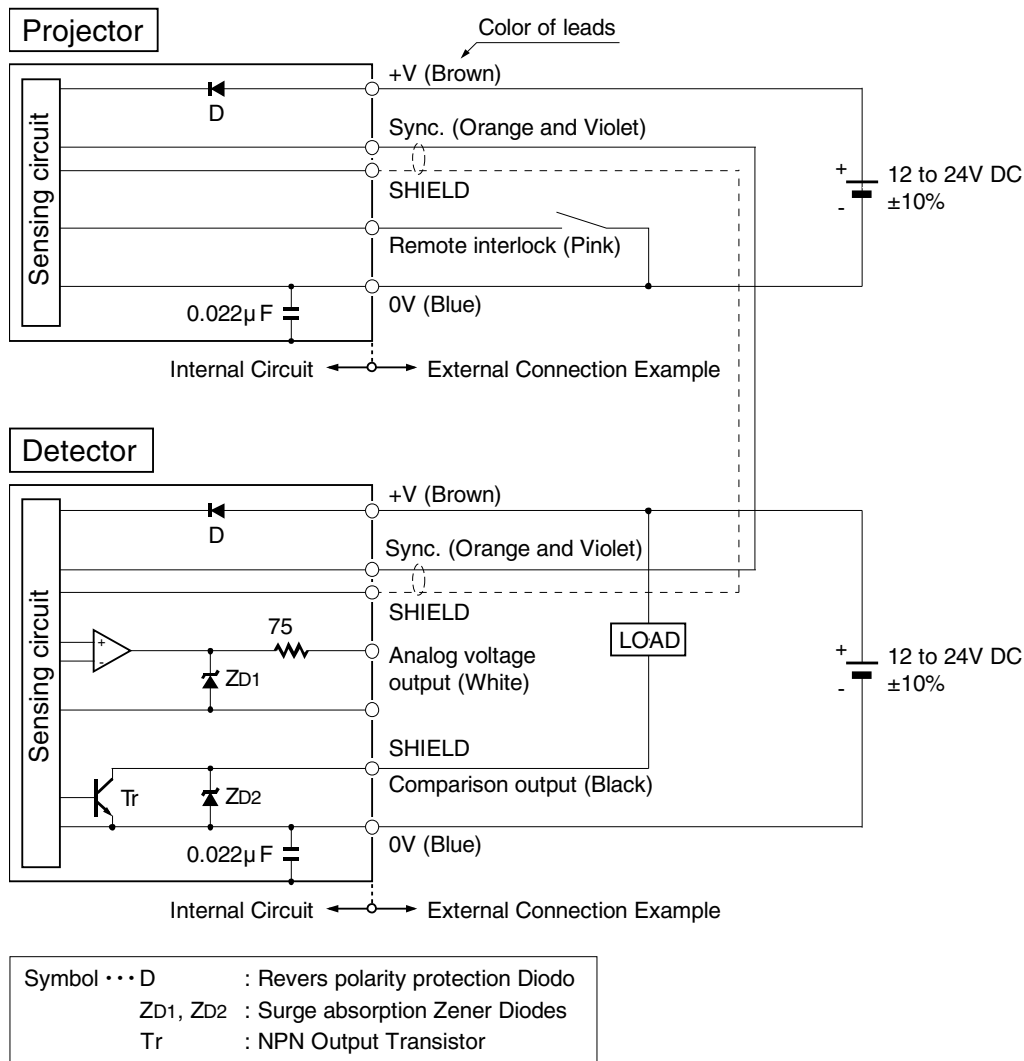
(Note 2) When mounting sensors using provided mounting brackets, secure firmly both sides of the sensors with a pair of brackets.

(Note 3) Apply the mounting brackets as shown in the illustration below, of which way will permit you to make beam alignment easily.



6 Connections

•I/O Circuit Diagram



(Note 1) Be careful in connecting the synchronous cord (Orange and Violet) so that it doesn't touch with the other ones.

(Connection using the provided pressure terminals is recommended.)

(Note 2) When the remote interlock cord is connected to 0V, laser is ready to radiate.

(Laser radiation stops when the cord is left opened or connected to +V.)

(Note 3) Use a connection device with high enough input impedance (1M ohms or more) if making use of analog voltage output.

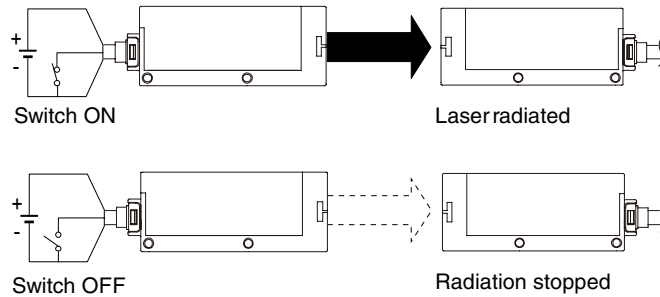
And connect the shield wire of analog voltage output to the common input (0V) of the connection device.

(Note 4) Insulate completely the end of unused cord wire always.

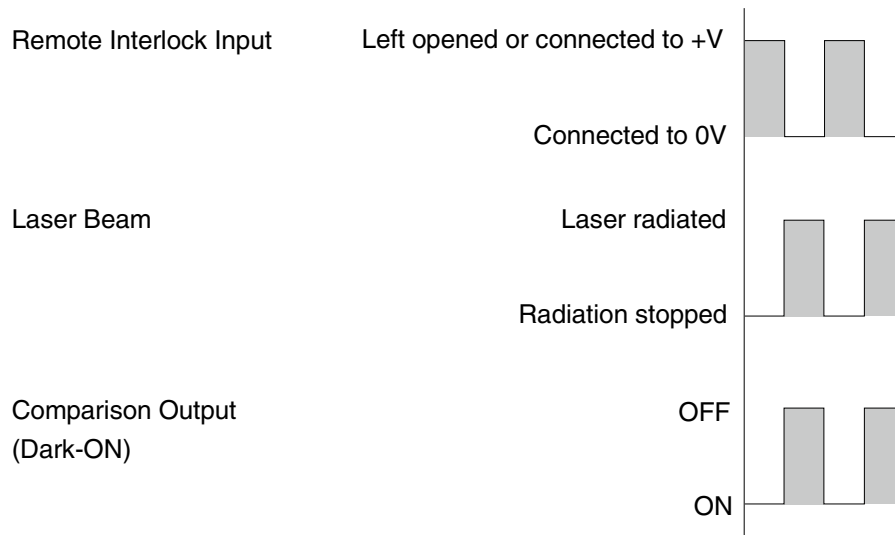
●Remote Interlock Input

When the remote interlock input (pink lead) is connected to 0V, the laser beam is emitted (when it is either opened or connected to +V, the laser emission goes out).

You can make use of this procedure as one of daily checks before starting operation or if you need to use a laser beam.

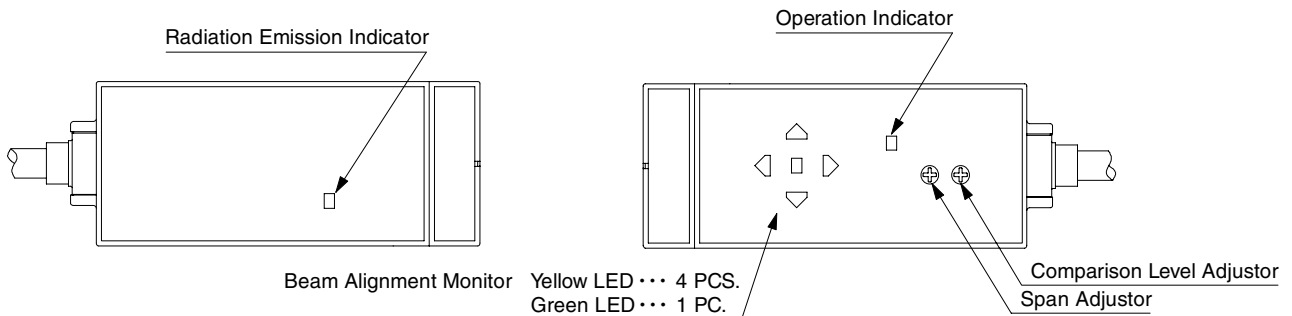


●Emitting the laser beam intermittently, you can check as well if the detection output is energized or the sensors operation is normal.



7 Adjustments

<Name and function of Each Section>



[Projector]

- Remote Interlock Cord:

As required by the requirements of the Radiation Safety Standards, laser radiation stops when it is left opened or connected to +V.

Laser is ready to radiate when it is connected to 0V.

- Radiation Emission Indicator:

This LED lamp glows while laser is energized.

[Detector]

- Comparison Level Adjustor:

The comparison level of the comparison output can be set as you like with the 18 turn adjustor.

- Span Adjustor:

Under all beam incoming state, the analog output voltage is set to +5V with the 18 turn adjustor.

- Comparison Output:

It turns on when the analog output voltage of the sensor becomes lower than the comparison level set with the comparison level adjustor.

- Operation Indicator:

When the comparison output is ON, the red LED glows.

- Beam Alignment Monitor:

This is available as a monitor when making beam alignment.

When beam axis is deviated from center, one or more yellow LED glows.

If overall beam is received, a green LED glows.

<Beam Alignment>

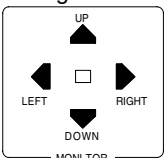
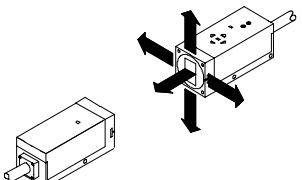
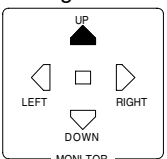
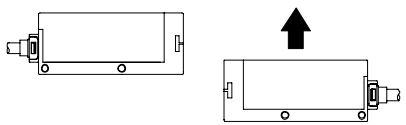
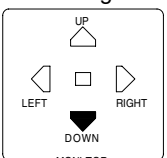
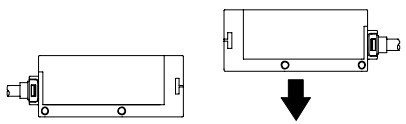
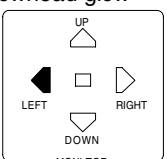
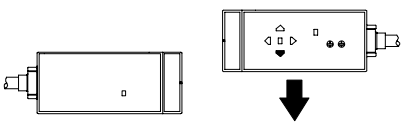
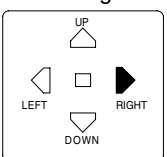
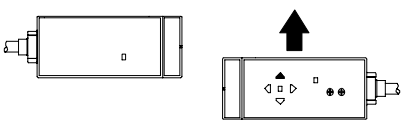
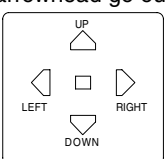
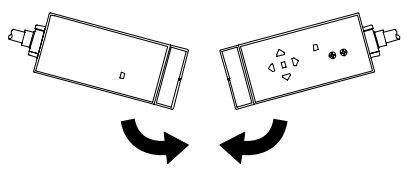
- Temporarily set projector and detector in their required position with the projecting eye facing the detector.

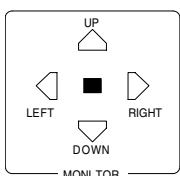
Make the following adjustments watching the beam alignment monitor on detector.

[Action of the beam alignment monitor]

- Move detector in the direction indicated by the yellow illuminated arrowheads until the indication going out.

[How to read the monitor and adjust beam axis] (▶ : glow, ▷ : go out)

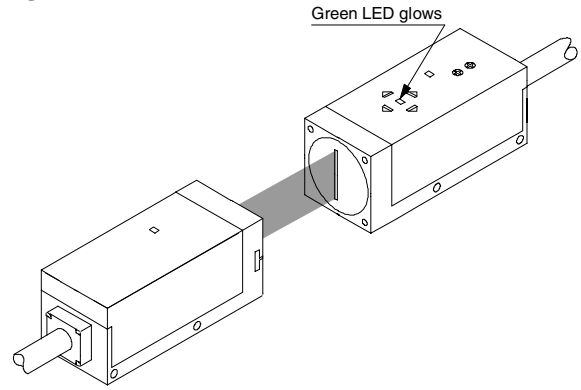
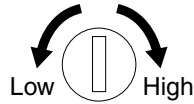
Monitor's condition	Adjustment
<p>All yellow LEDs glow</p> 	<p>Beam axis is deviated. Shorten the distance between sensors or move either one of sensors left and right, upward and downward, until any one of yellow arrowheads goes out.</p> 
<p>"UP" arrowhead glow</p> 	<p>Move detector upward evenly.</p> <p>[Projector] [Detector]</p> 
<p>"DOWN" arrowhead glow</p> 	<p>Move detector downward evenly.</p> 
<p>"LEFT" arrowhead glow</p> 	<p>Move detector to the left.</p> 
<p>"RIGHT" arrowhead glow</p> 	<p>Move detector to the right.</p> 
<p>All yellow arrowhead go out</p> 	<p>The laser beam does not hit the beam receiving eye of the detector in the right angle. Fixing the beam receiving plane in the position, tilt detector or projector in the vertical and horizontal planes.</p> 



- Adjustment works will be completed when a green LED glows at center under the condition that all yellow arrowheads remain extinguished.

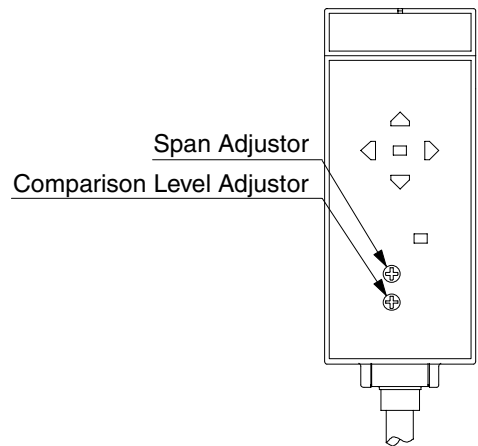
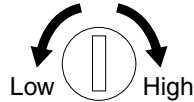
1. Place sensors in all beam incoming state.
On the monitor, the green LED glows and all yellow arrowheads remain extinguished.
2. Turn the span adjuster with the screwdriver provided to obtain +5V of analog output voltage.

As you turn it clockwise, analog output voltage getting high.



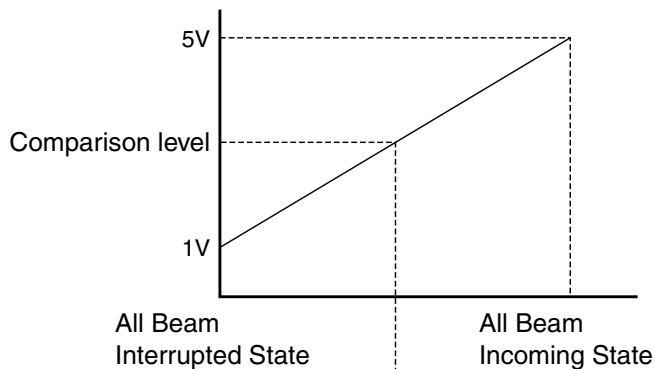
<Comparison Level Adjustment>

- Adjust the comparison level of the comparison output.
When the comparison level adjuster is turned clockwise, the level becomes high.

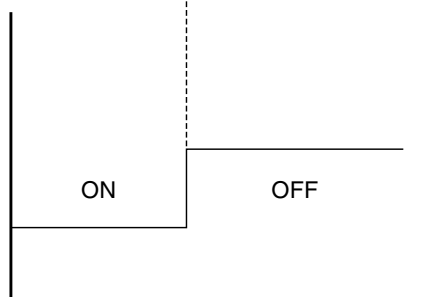


<Comparison Output Timing Diagram>

[Analog Output Voltage]

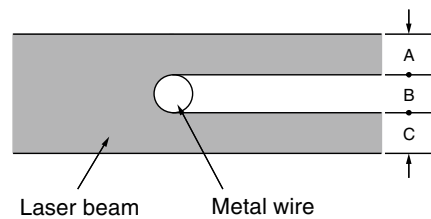


[Comparison Output]



Explanation

• Wire Detection Example



• Incoming Beam Width = A+C

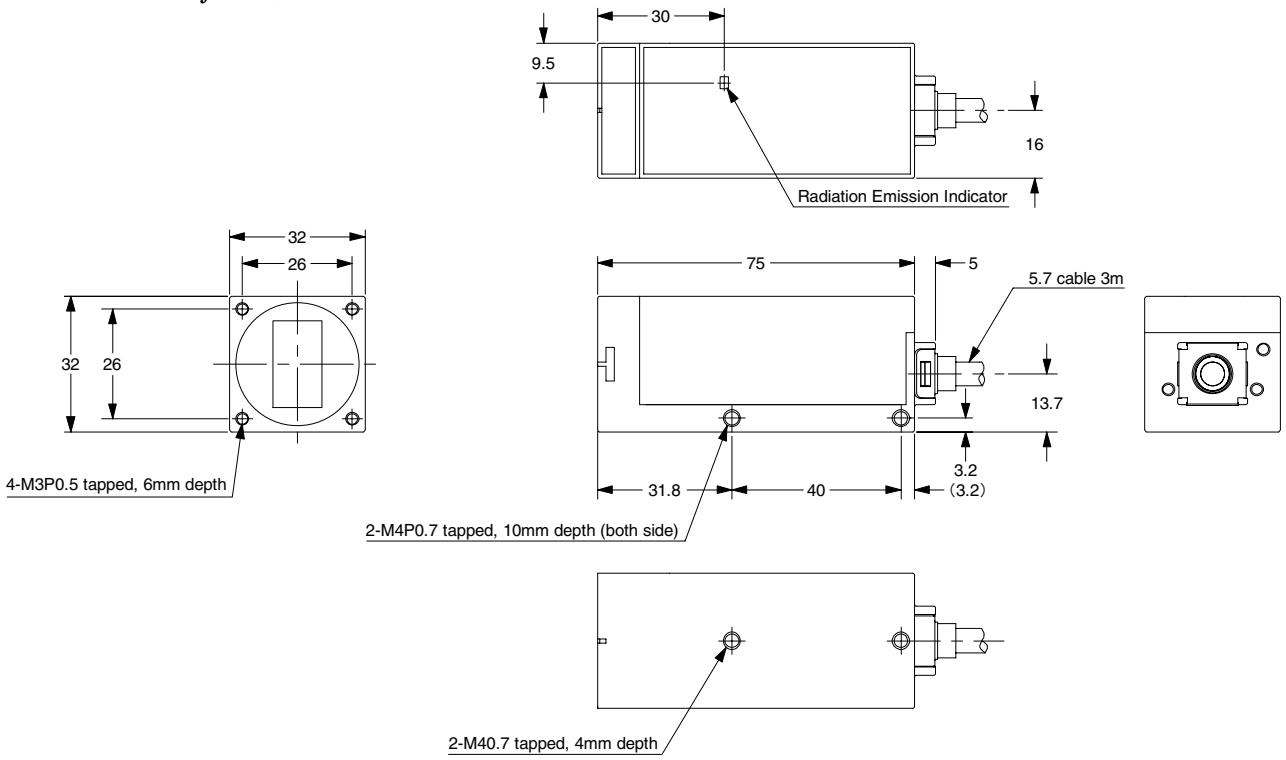
• Interrupted Beam Width = B

• All Beam Incoming State: The state that overall beam is received by detector.

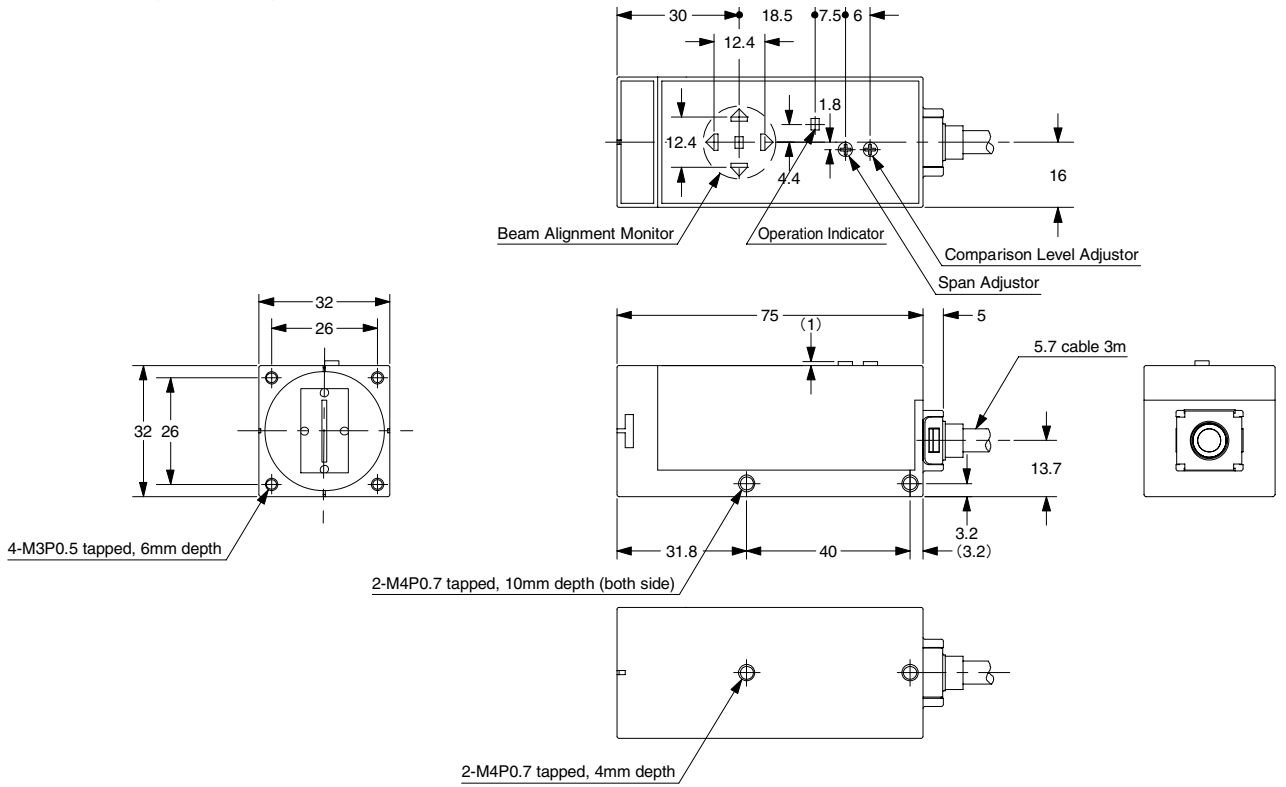
• All Beam Interrupted State: The state that overall beam is interrupted.

8 Dimensions (Unit:mm)

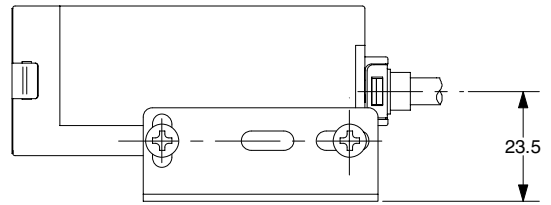
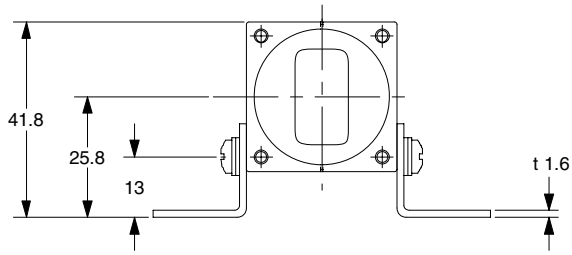
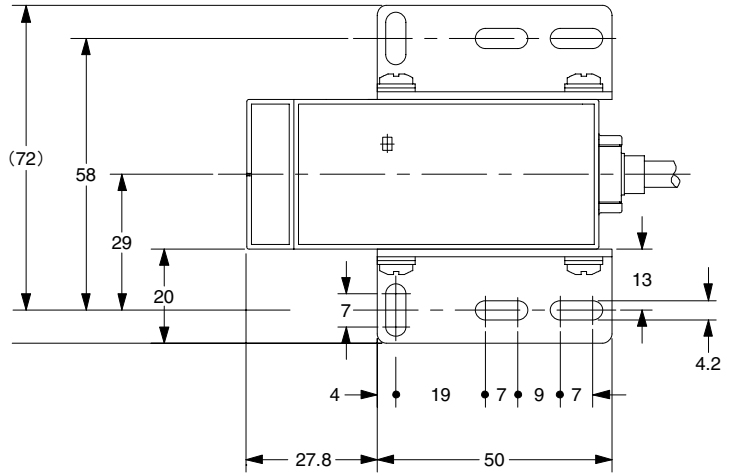
●LA-511P (Projector)



●LA-511D (Detector)

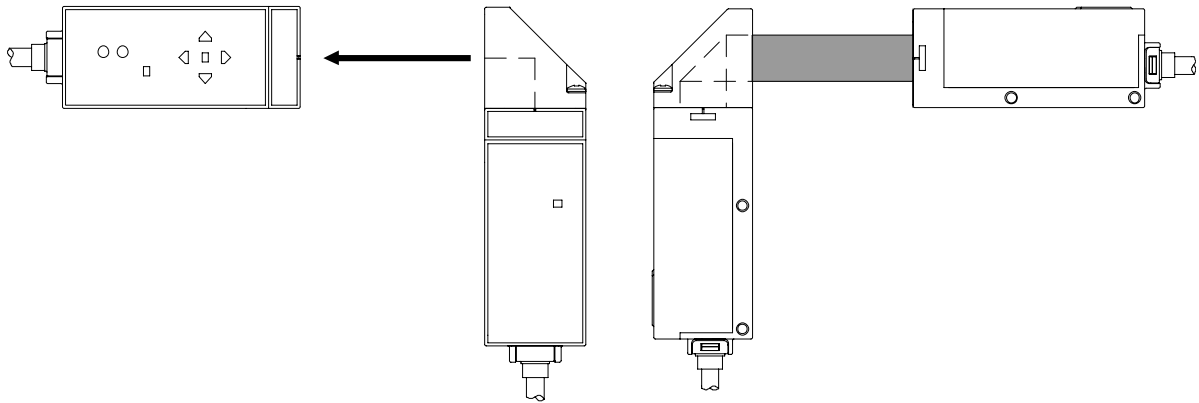


●LA-511+MS-LA1



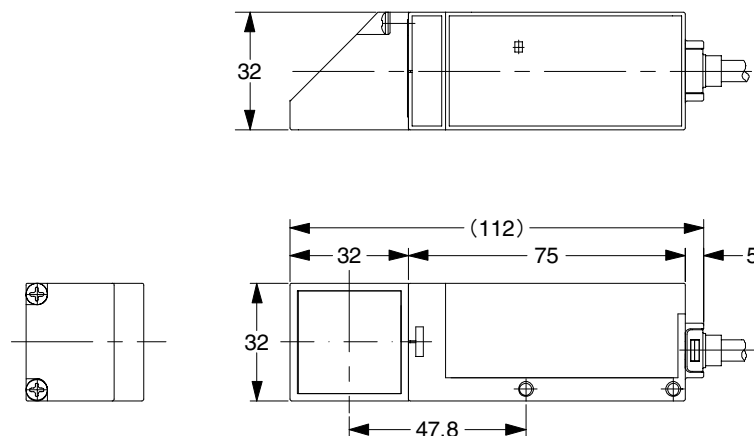
9 Side-View attachment (LA-SV1)(optionally available)

- When using the side-view attachment, mount it on either projector or detector.
If mounting the attachment on both units, one or more of yellow LED indicators, beam alignment monitor, may not go out.
- The side-view attachment always must be mounted under the condition that the radiation indicator is not glowing.
- The tightening torque should be $0.49\text{N}\cdot\text{m}$ { $5\text{kgf}\cdot\text{cm}$ } or less.
- Don't touch the side-view attachment on the interior, as detection performance may be adversely affected.
- Do not give the side-view attachment an excessive shock.
- Since laser beam has a directional property, be careful with the mounting direction of the side-view attachment and the sensor.



- Dimensions of LA-SV1 after set

Unit: mm



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