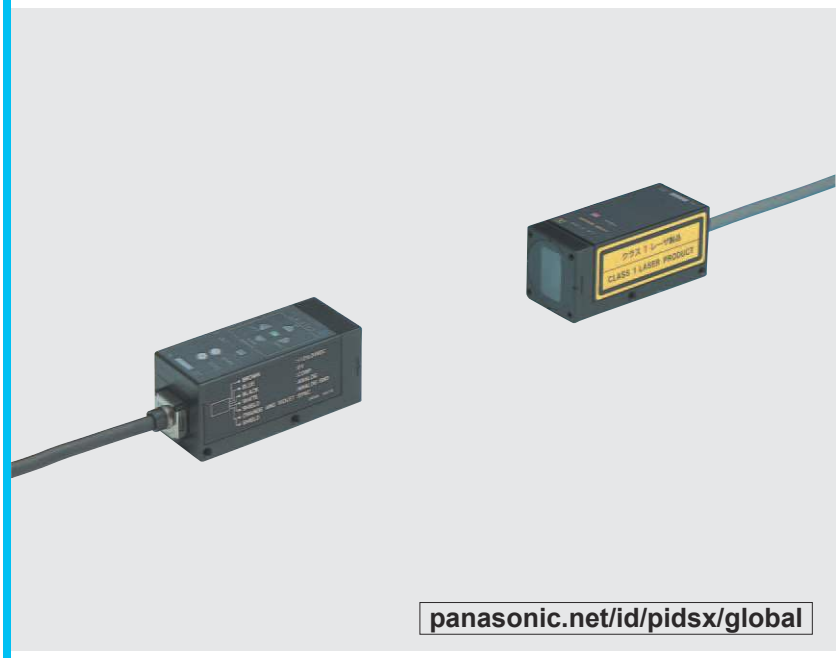
Laser Collimated Beam Sensor

LA SERIES

Related Information
■ General terms and conditions..... F-7
■ About laser beam..... P.1499~
■ Sensor selection guide ..... P.1055~
■ General precautions P.1501



panasonic.net/id/pidsx/global

CE Conforming to EMC Directive

FDA Conforming to FDA regulations (**LA-511** only)

LA-510 is classified as a Class 1 Laser Product in IEC / JIS standards.
LA-511 is a Class I Laser Product in FDA regulations 21 CFR 1040.10.
Do not look at the laser beam through optical system such as a lens.

“Class 1” laser beam sensor safe for your eyes

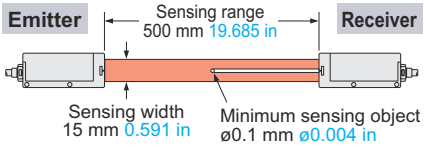
BASIC PERFORMANCE

Safe laser beam — LA-510

This laser collimated beam sensor conforms to the Class 1 laser stipulated in IEC 60825-1 and JIS C 6802. Hence, safety measures such as protective gear are not necessary.

Precise sensing in wide area

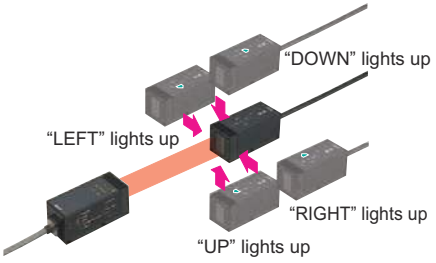
Sensing area: 15 × 500 mm 0.591 × 19.685 in
Minimum sensing object: ø0.1 mm ø0.004 in
Repeatability: 10 µm 0.394 mil or less



FUNCTIONS

Easy laser beam alignment

Four monitoring LEDs help you to easily align the emitter and the receiver.



Receiver front face

The monitoring system checks whether the incident beam falls evenly on all the four receiving elements in the receiver window.

VARIETIES

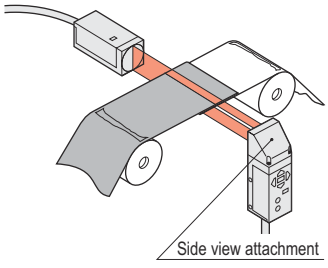
FDA Class I type — LA-511

LA-511 conforms to FDA Class I. It is approved for use in U.S.A. by FDA.

OPTIONS

Versatile mounting

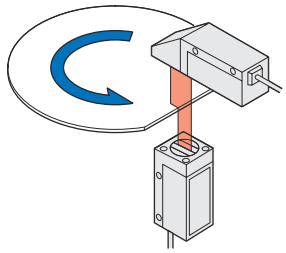
The side view attachment (optional) enables versatile mounting styles.



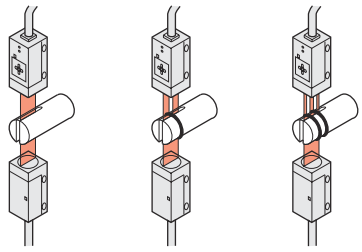
FIBER SENSORS
LASER SENSORS
PHOTOELECTRIC SENSORS
MICRO PHOTOELECTRIC SENSORS
AREA SENSORS
LIGHT CURTAINS / SAFETY COMPONENTS
PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC ELECTRICITY PREVENTION DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY CONSUMPTION VISUALIZATION COMPONENTS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS
Selection Guide
Laser Displacement
Magnetic Displacement
Collimated Beam
Digital Panel Controller
Metal-sheet Double-feed Detection
HL-T1
LA
LD

APPLICATIONS

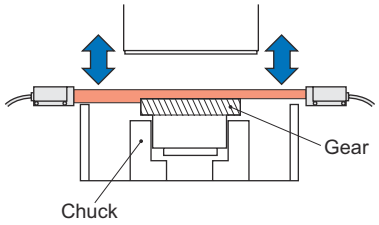
Accurate positioning of orientation flat



Counting number of O-rings

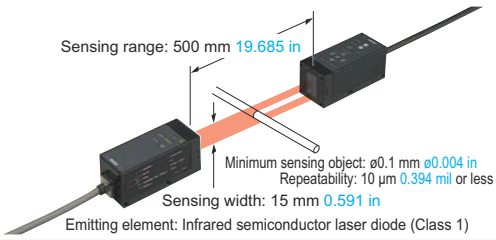


Positioning gear on polishing machine



ORDER GUIDE

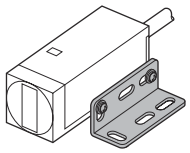
Laser collimated beam sensors

Type	Appearance	Model No.	Conforming standards / regulations	Output
Class 1 type		**LA-510**	IEC and JIS standards	NPN open-collector transistor (Comparative output) Analog voltage • Output voltage: 1 to 5 V
		LA-511	FDA regulations	

Note: The model No. with "**P**" shown on the label affixed to the product is the emitter, "**D**" shown on the label is the receiver.

Accessory

• **MS-LA1** (Sensor mounting bracket)



Set of two L-shaped brackets and four M4 (length 8 mm 0.315 in) screws with washers.

Note: 2 sets are required to mount the emitter / receiver.

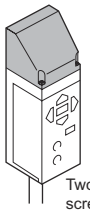
OPTIONS

Designation	Model No.	Description
Side view attachment (Note 1)	**LA-SV1**	Versatile mounting is possible as the laser beam can be bent at a right angle. • Sensing range: 500 mm 19.685 in • Minimum sensing object: ø0.1 mm ø0.004 in • Repeatability: 20 µm 0.787 mil or less
Digital panel controller (Note 2)	**CA2-T2**	This is a very small controller which allows two independent threshold level settings. • Supply voltage: 24 V DC ±10 % • No. of inputs: 1 No. (sensor input) • Input range: 1 to 5 V DC • Output: NPN open-collector transistor • Main functions: Threshold level setting function, zero-adjust function, scale setting function, hysteresis setting function, start / hold function, auto-reference function, power supply ON-delay function, etc.

Notes: 1) Mount **LA-SV1** on either the emitter or the receiver. If it is mounted on both sides, the monitor LEDs may not light off perfectly.
2) For further details, refer to p.1143~ the ultra-compact digital panel controller **CA2** series.

Side view attachment

• **LA-SV1**



Two M3 (length 10 mm 0.394 in) screws with washers are attached.

Digital panel controller

• **CA2-T2**

SPECIFICATIONS

Laser collimated beam sensors

Item \ Type		Class 1 type	
Conforming standards / regulations		IEC and JIS standards	FDA regulations
Model No.		**LA-510**	**LA-511**
Sensing width		15 mm 0.591 in	
Sensing range		500 mm 19.685 in	
Min. sensing object		ø0.1 mm ø0.004 in opaque object	
Repeatability		10 µm 0.394 mil or less	
Supply voltage		12 to 24 V DC ±10 % Ripple P-P 10 % or less	
Current consumption		Emitter: 35 mA or less, Receiver: 25 mA or less	
Comparative output		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between comparative output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)	
	Utilization category	DC-12 or DC-13	
	Response time	0.5 ms or less	
	Output operation	ON when the incident beam amount is less than the threshold level	
	Short-circuit protection	Incorporated	
Analog output		Analog voltage • Output voltage: 1 V (Darkest) to 5 V (Lightest) • Output impedance: 75 Ω	
	Slew rate	8 V/ms or more	
	Temperature characteristics	Within ±0.1 % F.S./°C (with respect to sensing range at ambient temperature +20 °C +68 °F)	
Remote interlock input		Laser is emitted when it is connected to 0 V, but not emitted when connected to +V or kept open	
Indicators	Operation	Red LED (lights up when the comparative output is ON)	
	Laser emission warning	Red LED (lights up when laser is being emitted)	
	Stable incident beam	Green LED (lights up under the stable light received condition)	
	Laser beam alignment	Yellow LED × 4 (light up when laser beam is misaligned)	
Adjusters	Threshold level	Adjustment of threshold level for the comparative output, 18-turn endless adjuster	
	Span	Adjustment of span for the analog voltage output, 18-turn endless adjuster	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Ambient temperature	0 to +50 °C +32 to +122 °F (No dew condensation), Storage: –20 to +70 °C –4 to +158 °F	
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH	
	Ambient illuminance	Incandescent light: 10,000 ℓx at the light-receiving face	
	EMC	EN 61000-6-2, EN 61000-6-4	
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure	
	Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each	
	Shock resistance	500 m/s² acceleration (50 G approx.) in X, Y and Z directions for three times each	
Emitting element		Infrared semiconductor laser diode (Maximum output: 1.7 mW, Peak emission wavelength: 780 nm 0.031 mil)	
Enclosure earthing		Capacitor earth	
Material		Enclosure: Die-cast zinc alloy, Top cover: PPO, Front protection cover: Glass	
Cable		0.2 mm² 5-core (emitter: 4-core) shielded cable, 3 m 9.843 ft long	
Cable extension (Note 2)		Extension up to total 50 m 164.042 ft is possible, for both emitter and receiver, with 0.3 mm², or more, cable. (Synchronization wire cannot be extended.)	
Net weight		Emitter: 290 g approx., Receiver: 280 g approx.	
Accessories		**MS-LA1** (Sensor mounting bracket): 1 set for emitter and receiver Adjusting screwdriver: 1 pc. Crimp contact: 2 pcs. Class 1 identification label: 1 pc. (**LA-510** only) Inspection slip: 1 pc. (**LA-511** only)	

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +20 °C +68 °F.
2) **LA-510** and **LA-511** are CE compliant and complies with EMC directives. EN 61000-6-2 is the applicable standard that covers immunities relating to use of this product, but in order to comply with this standard, the following conditions must be satisfied.

Conditions

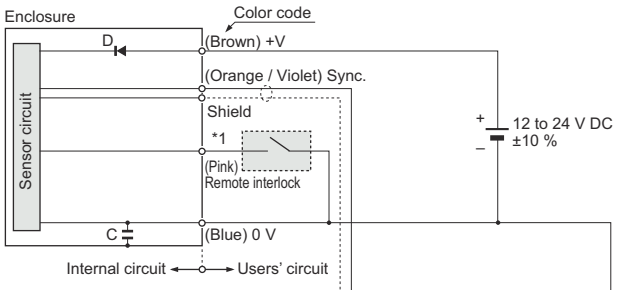
- This sensor should be connected less than 10 m 32.808 ft from the power supply.
- The signal line to connect with this sensor should be less than 30 m 98.425 ft.

I/O CIRCUIT AND WIRING DIAGRAMS

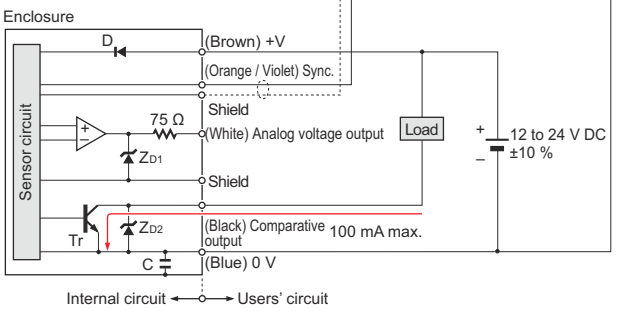
LA-510 LA-511 — Laser collimated beam sensor

I/O circuit diagram

Emitter

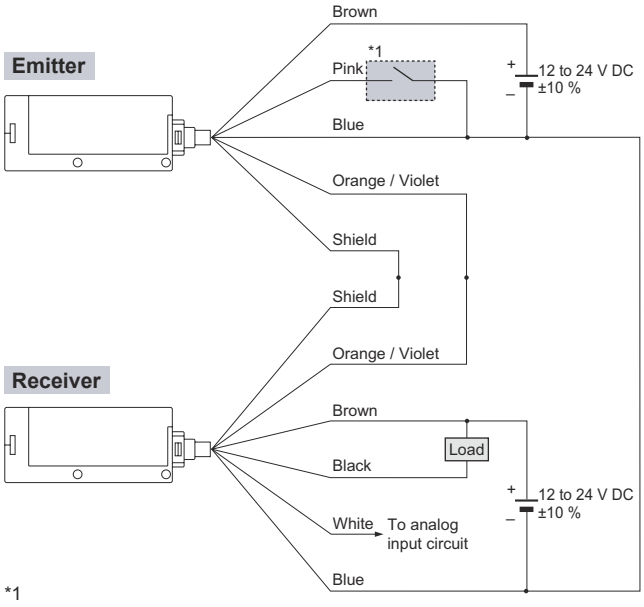


Receiver



Symbols … D : Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
C : Capacitor (0.022 μF)
Tr: NPN output transistor

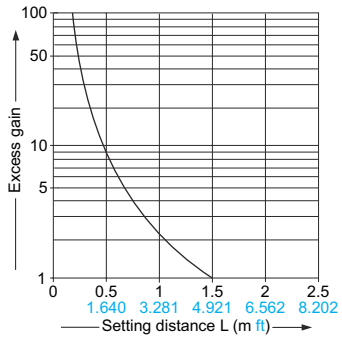
Wiring diagram



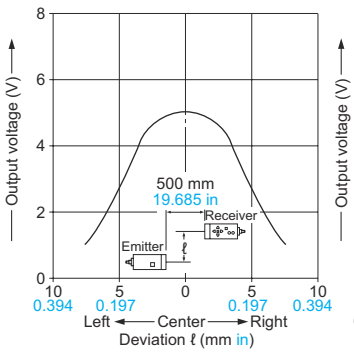
- Remote interlock
  Laser emission: Connection to 0 V
  Laser emission halt: Connection to +V, or open

SENSING CHARACTERISTICS (TYPICAL)

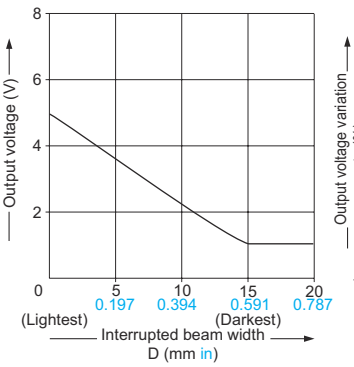
Correlation between setting distance and excess gain



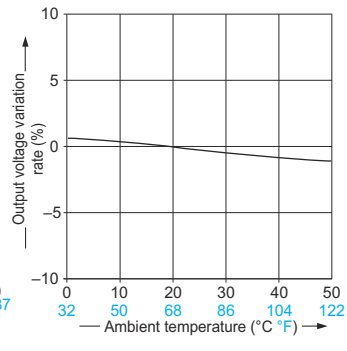
Correlation between transverse deviation and output voltage



Correlation between interrupted beam width and output voltage



Correlation between ambient temperature and output voltage variation rate



PRECAUTIONS FOR PROPER USE

Refer to p.1501 for general precautions and p.1499~ for information about laser beam.

Laser collimated beam sensor

- This catalog is a guide to select a suitable product. Be sure to read the instruction manual attached to the product prior to its 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 laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

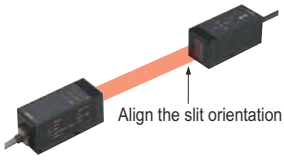
- This product is classified as a Class 1 Laser Product in IEC / JIS standards and a Class I Laser Product in FDA regulations 21 CFR 1040.10. Do not look at the laser beam through optical system such as a lens.
- The following label is enclosed with this product. Handle the product according to the instruction given on the warning label.

Class 1 type

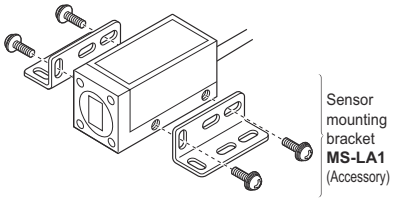
The English warning label based on FDA regulations is pasted on the FDA regulations conforming type.

Mounting

- The emitter and the receiver must face each other with proper slit orientation so that the beam can be received.



- The tightening torque should be 1.17 N·m or less. When mounting the sensor with the attached sensor mounting bracket, the sensor must be fixed on both sides.



Wiring

- In **LA-510** and **LA-511**, capacitor earth is used to enhance the noise characteristics. In case there is a high frequency noise generating equipment, such as, an ultrasonic welding machine, etc., near the sensor head and if the mounting base is electrically conducting (metallic, etc.), then insulate the sensor head from the mounting base.

Do not use a power supply having a single-winding transformer (auto-transformer) as this can be dangerous.

Safety standards for laser beam products

- A laser beam can harm human being's eyes, skin, etc., because of its high energy density. IEC has classified laser products according to the degree of hazard and the stipulated safety requirements.
  LA-510 and **LA-511** are identified as a "Class 1" laser products.

Classification by IEC 60825-1

Classification	Description
Class 1	Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.
Class 1M	Lasers emitting in the wavelength range from 302.5 nm to 4,000 nm which are safe under reasonably foreseeable conditions of operation, but may be hazardous if the user employs optics within the beam.
Class 2	Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation including the use of optical instruments for intrabeam viewing
Class 2M	Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. However, viewing of the output may be more hazardous if the user employs optics within the beam.
Class 3R	Lasers that emit in the wavelength range from 302.5 nm to 10^6 nm where direct intrabeam viewing is potentially hazardous but the risk is lower than for Class 3B lasers, and fewer manufacturing requirements and control measures for the user apply than for Class 3B lasers.
Class 3B	Lasers that are normally hazardous when direct intrabeam exposure occurs (i.e. within the NOHD). Viewing diffuse reflections is normally safe.
Class 4	Lasers that are also capable of producing hazardous diffuse reflections. They may cause skin injuries and could also constitute a fire hazard.

Note: Refer to p.1499~ for information about Laser Beam for the classification in FDA regulations.

Safe use of laser products

- For the purpose of preventing users from suffering injuries by laser products, IEC 60825-1 (Safety of laser products). Kindly check the standards before use. (Refer to p.1499~ for information about laser beam.)

Others

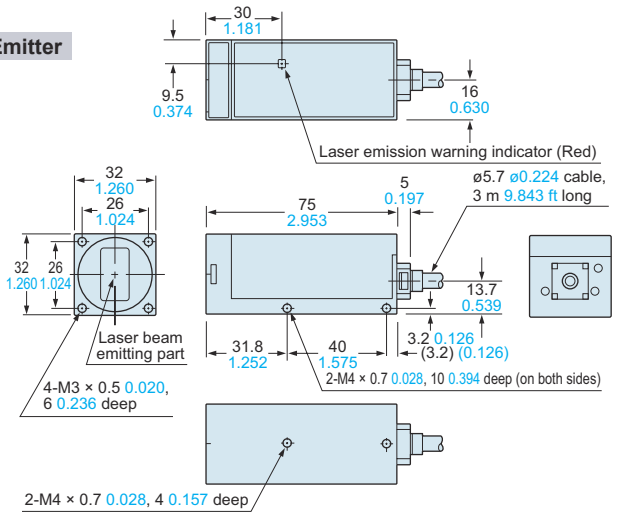
- The sensor's output is proportional to the amount of laser beam received. Since there is some variation in the light intensity at the center and the periphery of the sensing area, take care that "output = dimension" may not hold.
- For stable operation, use the sensor 10 min., or more, after switching on the power supply.

DIMENSIONS (Unit: mm in)

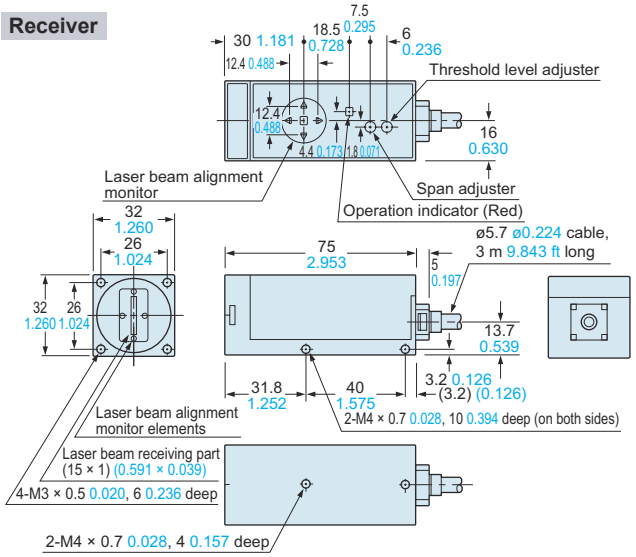
The CAD data in the dimensions can be downloaded from our website.

LA-510 LA-511 — Laser collimated beam sensor

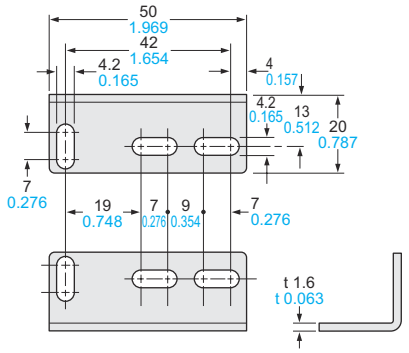
Emitter



Receiver



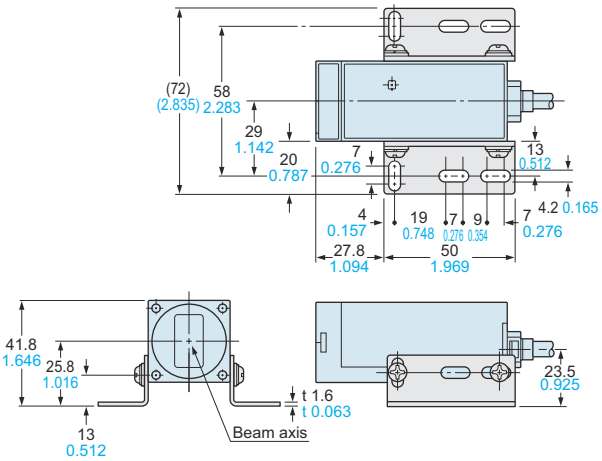
MS-LA1 — Sensor mounting bracket (Accessory for **LA-510** and **LA-511**)



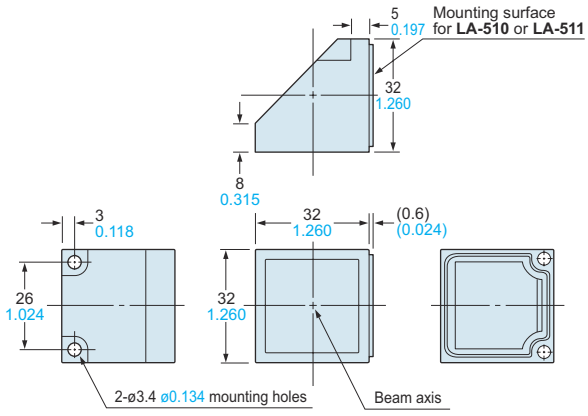
Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

Set of two L-shaped brackets and four M4 (length 8 mm 0.315 in) screws with washers

Assembly dimensions



LA-SV1 — Side view attachment (Optional)



Material: Glass (Front protection cover, Aluminum evaporated mirror)
Polyetherimide (Enclosure)

Two M3 (length 10 mm 0.394 in) screws with washers are attached.

Assembly dimensions