

# Autonics LASER DISPLACEMENT SENSOR [SENSOR HEAD] BD SERIES INSTRUCTION MANUAL

Thank you for choosing our Autonics product.  
Please read the following safety considerations before use.

## ■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.  
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

- ⚠ Warning** Failure to follow these instructions may result in serious injury or death.
- ⚠ Caution** Failure to follow these instructions may result in personal injury or product damage.

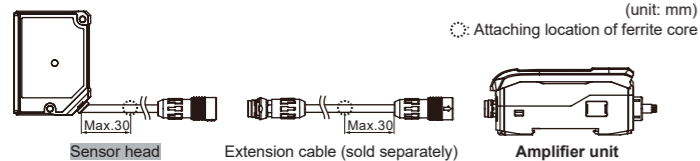
### ⚠ Warning

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)  
Failure to follow this instruction may result in personal injury, economic loss or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**  
Failure to follow this instruction may result in explosion or fire.
- Do not disassemble or modify the unit.**  
Failure to follow this instruction may result in fire.
- Do not connect, repair, or inspect the unit while connected to a power source.**  
Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring. [Amplifier unit]**  
Failure to follow this instruction may result in fire.

### ⚠ Caution

- Do not stare at the laser emitter. [Sensor head]**  
Failure to follow this instruction may result in eye damage.
- Use the unit within the rated specifications.**  
Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.**  
Failure to follow this instruction may result in fire.
- Mount the ferrite core to specified position before using. [Sensor head, Extension cable]**  
Failure to follow this instruction may result in output with noise.

## ■ Model



### ○ Sensor head

Model	Beam shape	Reference distance (Maximum measurement range)	Spot diameter		
			Near	Reference	Far
BD-030	Standard	30mm (20-40mm)	Approx. 290×790μm (at 25mm)	Approx. 240×660μm (at 30mm)	Approx. 190×450μm (at 35mm)
BD-065	Standard	65mm (50-80mm)	Approx. 360×1590μm (at 55mm)	Approx. 290×1180μm (at 65mm)	Approx. 210×830μm (at 75mm)
BD-100	Standard	100mm (70-130mm)	Approx. 480×1870μm (at 80mm)	Approx. 410×1330μm (at 100mm)	Approx. 330×950μm (at 120mm)

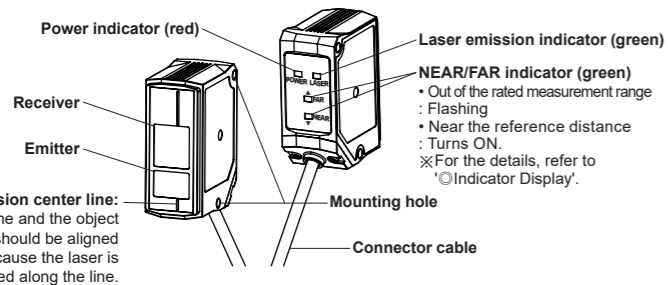
### ○ Amplifier unit

Model	Compatible sensor head
BD-A1	BD series sensor head: 1

### ○ Extension cable (sold separately)

Model	Length
CID6P-1-SI-BD	1m
CID6P-2-SI-BD	2m
CID6P-5-SI-BD	5m
CID6P-10-SI-BD	10m

## ■ Unit Description



## ■ Manuals

For the detail information and instructions, please refer to user manual for communication, and be sure to follow cautions written in the technical descriptions (catalog, website). Visit our website ([www.autonics.com](http://www.autonics.com)) to download manuals.

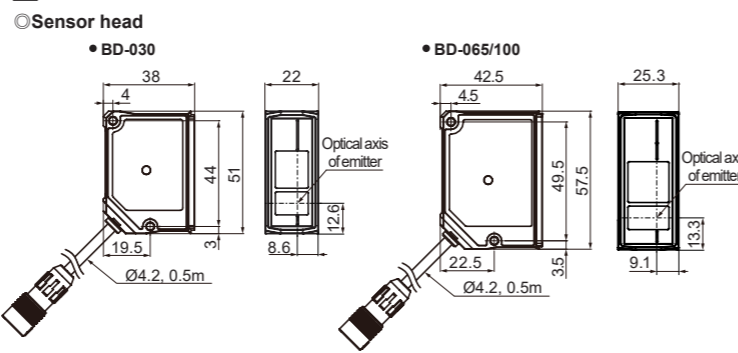
※The above specifications are subject to change and some models may be discontinued without notice.  
※Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions (catalog, website).

## ■ Specifications

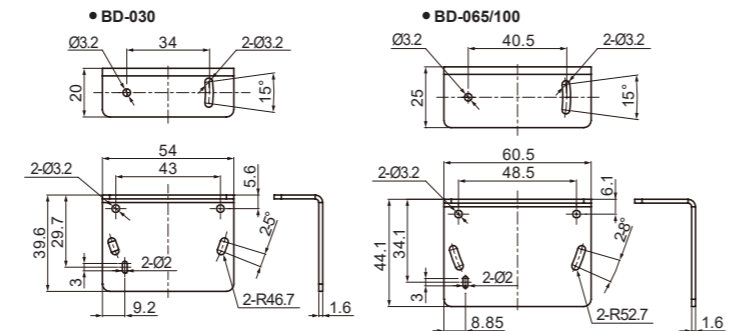
Sensor Head Model	BD-030			BD-065			BD-100		
	Near (25mm)	Reference (30mm)	Far (35mm)	Near (55mm)	Reference (65mm)	Far (75mm)	Near (80mm)	Reference (100mm)	Far (120mm)
Spot diameter (unit: μm)	Approx. 290×790	Approx. 240×660	Approx. 190×450	Approx. 360×1590	Approx. 290×1180	Approx. 210×830	Approx. 480×1870	Approx. 410×1330	Approx. 330×950
Resolution <sup>*1</sup>	1μm			2μm			4μm		
Reference distance	30mm			65mm			100mm		
Maximum measurement range	20 to 40mm			50 to 80mm			70 to 130mm		
Linearity <sup>*1, *2</sup>	0.1% F.S. (in 25 to 35mm)			0.1% F.S. (in 55 to 75mm)			0.15% F.S. (in 80 to 120mm)		
Temperature Characteristics <sup>*3</sup>	0.05% F.S./°C			0.06% F.S./°C					
Power supply <sup>*4</sup>	Red semiconductor laser (wavelength: 660nm, IEC 60825-1:2014)								
Light Source	Optical method			Diffuse reflection					
	Laser class			Class 1 (IEC/EN), Class I (FDA(CDRH) CFR Part 1002)			Class 2 (IEC/EN), Class II (FDA(CDRH) CFR Part 1002)		
Output	Max. 300μW			Max. 1mW					
Operation indicators	Power indicator: red LED, Laser emission indicator: green LED, NEAR/FAR indicator: green LED								
Connection	Connector type								
Insulation resistance	Over 20MΩ (at 500VDC= megger)								
Noise immunity	Square shaped noise by noise simulator (pulse width: 1μs) ±500V								
Dielectric strength	1,000VAC 50/60Hz for 1 minute								
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours								
Shock	300m/s <sup>2</sup> (Approx. 30G) in each X, Y, Z direction for 3 times								
Environment	Ambient illumination								
	Max. Incandescent lamp 10,000lx								
	Ambient temperature								
-10 to 50°C, storage: -15 to 60°C									
Ambient humidity									
Under 85%RH, storage: under 85%RH									
Protection structure	IP67 (IEC Standards, except connector of extension cable)								
Material	Case: Polycarbonate, Sensing part: Glass, Cable: Polyvinyl chloride								
Amplifier unit compatibility	BD Series amplifier unit: 1								
Accessory	Ferrite core (made by TDK co. ZCAT2132-1130), Mounting bracket, Bolt, Nut								
Approval	CE, RoHS								
Weight <sup>*5</sup>	Approx. 209g (approx. 56g)			Approx. 233g (approx. 68g)			Approx. 233g (approx. 68g)		

- ※1: When measuring fixed non-glossy white paper (reference temperature: 25°C, reference distance, response time: 1ms, average 128 times).
- ※2: Value indicates the error with respect to the ideal straight line and the numbers in parentheses are the rated measurement ranges guarantee linearity.
- ※3: Value measured by using an aluminum jig fix the sensor head and non-glossy white paper.
- ※4: Using power from the amplifier unit.
- ※5: The weight is with packaging and the weight in parenthesis is only unit weight.
- ※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

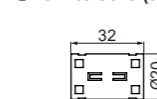
## ■ Dimensions



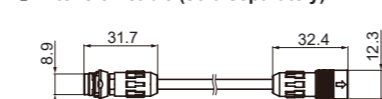
### ○ Brackets



### ○ Ferrite core (accessory)



### ○ Extension cable (sold separately)



## ■ Installation Procedures

For optimum measurement, install the sensor head according to the following procedure.

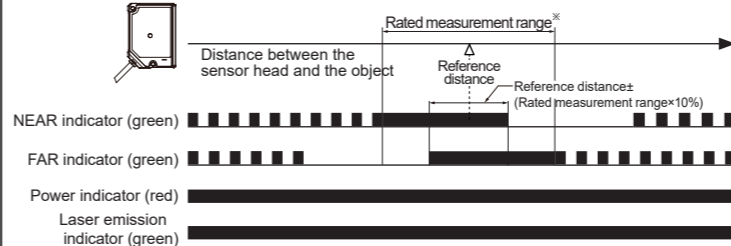
Order	Chapter	Description
1	Check reference distance and Select mounting location	As the distance between the sensor head and the object approaches the reference distance, accurate measurements can be made. Refer to 'Mounting Location' to select optimum mounting location.
2	Check the precautions about the measurement	In case of measuring moving or rotating object, it is needed to install the sensor head to correct direction. When measuring at narrow area or concave object, it is needed to set the position of the sensor head. For the details, refer to 'Installation Precautions'.
3	Check mounting method and mount	Mount to the panel directly or through the enclosed bracket. Refer to 'Mounting and Connecting Method' to mount the sensor head.
4	Check and apply the function of amplifier unit.	BD series support various settings and functions such as pitch light optimization, zero adjustment setting, automatic sensitivity setting, calculation through the amplifier unit.

## ■ Mounting Location

Select mounting location regarding displacement of the object, reference distance and measurement range. Mount sensor head where the object is located at the reference distance by checking the operation of indicators and displacement value.

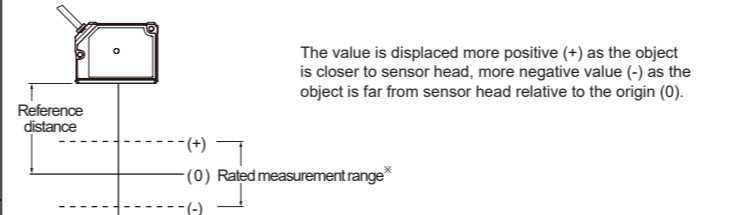
### ○ Indicator display

Check the operation of indicators to know distance between sensor head and the object.



- NEAR/FAR indicators turn on, off and cross-flashing by the distance between the sensor head and the object and the indicator are on both, it means the sensor head is located in optimum area near reference distance.
- Power indicator is on when power is supplied.
- Laser emission indicator is on during laser emission.
- ※The linearity guaranteed measurement range.

### ○ Displacement indication



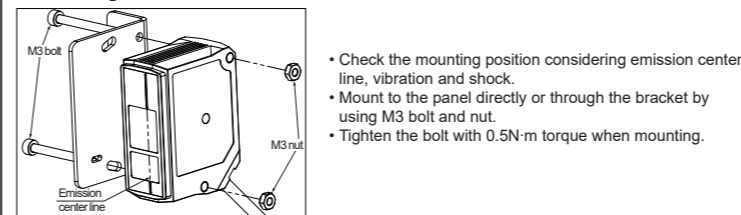
### ○ Indication by distance

Model	Reference distance	Rated measurement range <sup>*</sup>	Indication		
			NEAR ON	NEAR/FAR ON	FAR ON
BD-030	30	25 to 35	25 to 31	29 to 31	29 to 35
BD-065	65	55 to 75	55 to 67	63 to 67	63 to 75
BD-100	100	80 to 120	80 to 104	96 to 104	96 to 120

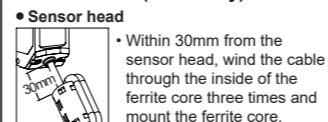
※The linearity guaranteed measurement range.

## ■ Mounting and Connecting Methods

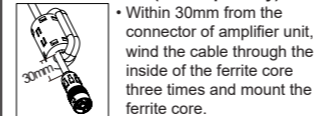
### ○ Mounting



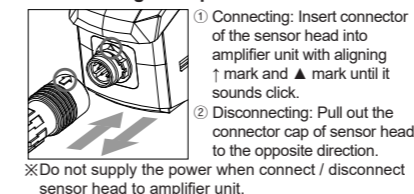
### ○ Ferrite core (accessory)



### ○ Extension cable (sold separately)



### ○ Connecting to amplifier unit



## ■ Installation Precautions

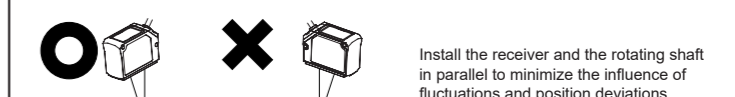
For stable measurement, mount the sensor head by referring to the below items.

### ○ Moving object measurement

#### 1. Object with material / color difference



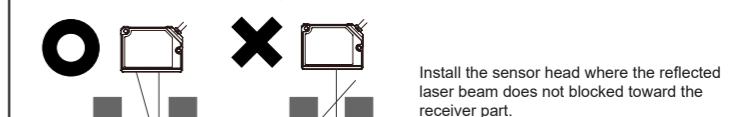
#### 2. Rotating object



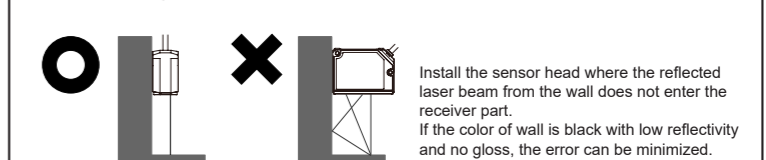
#### 3. Object with step



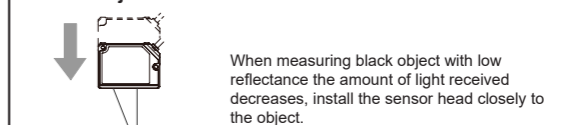
### ○ Narrow area or concave object



### ○ Wall mounting



### ○ Black object



## ■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- The power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Do not install where strong magnetic or electric field exist. Otherwise, the resolution may be adversely affected.
- Mutual optical interference between laser sensors and photoelectric sensors may result in malfunction.
- Mutual optical interference between laser sensors may result in malfunction.
- When connecting DC relay or other inductive load to the output, remove surge by using diode or varistor.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent surge and inductive noise. [Amplifier unit]
- For the optimized performance, it is recommended to measure after 30 minute from supplying power. [Amplifier unit]
- Since external disturbance light (sunlight, fluorescent lighting, etc.) can cause product malfunction, use the product with a light shield or slit. [Sensor head]
- When detecting with the maximum sensitivity, an error may occur depending on each characteristic deviation.
- This unit may be used in the following environments.
  - Indoors/Outdoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000m
  - Pollution degree 2
  - Installation category II