



Displacement Sensors BD Series

The perfect Solution for High Precision Displacement Measurement

Accurate Displacement Measurement on Various Materials

Displacement Sensors BD Series

Smart manufacturing and assembly are becoming standard in industries and displacement sensors are revolutionizing the way products are processed. Displacement sensors can measure thickness, width, level difference, disparity, curve, and evenness of target objects by detecting the amount of displacement in target objects. In actual applications, displacement sensors can be used to measure the level of air pressure in tires to check the height of automobiles during quality control, detect foreign objects on conveyor belts, check the finish quality of products, and more. Stable and accurate measurement is possible regardless of the material or shape of targets, offering an ideal solution for line quality control across diverse industrial environments.

Main Features

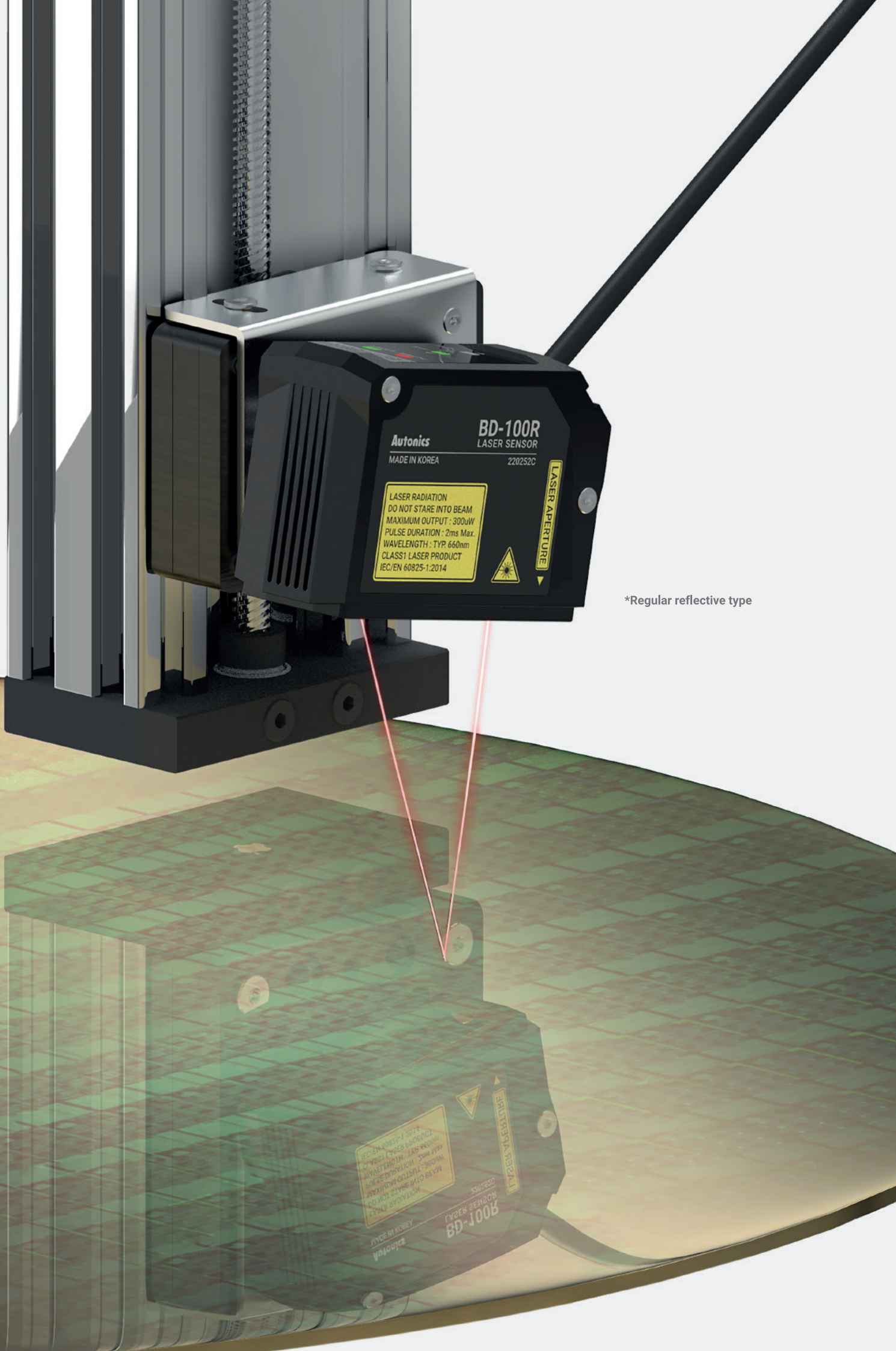
- Maximum resolution: 1 μm (vary by model)
- Interconnection of up to 8 sensor amplifier units: Mutual interference prevention function and auto channel sorting
- Various calculation functions supported (addition, subtraction, average)
- Various filter functions for stable measurement (movement average, differential, median)
- Auto sensitivity adjustment (1-point, 2-point teaching)
- Easy maintenance with detachable sensor head/amplifier unit
- Dedicated software provided (atDisplacement)
- IP67 protection structure (IEC)

Diffuse reflective type

- Reference distance: 30/65/100/300/600 mm
- Accurate measurement with minimal influence from target color or material

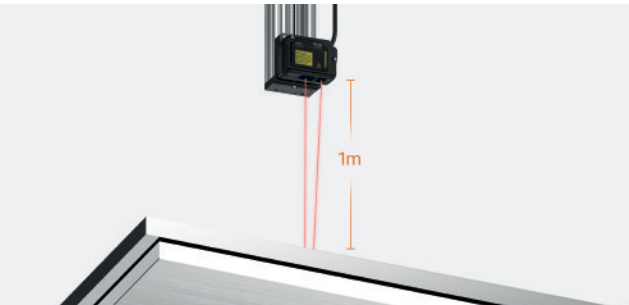
Regular reflective type

- Reference distance: 30/65/100 mm
- Stable measurement of reflective or transparent material
- Brackets for different installation angles



*Regular reflective type

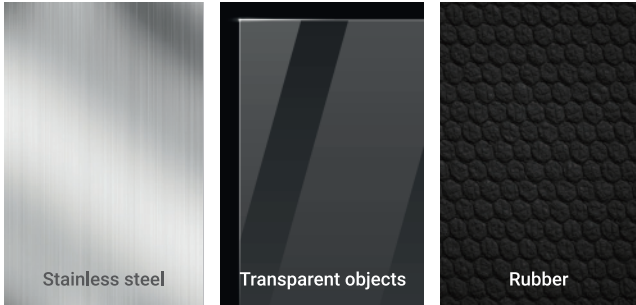
Main Features



Capable of Measuring up to 1 m

*BD-600 model

The *BD-600 model is capable of measuring up to 1 m suitable for in harsh environment including high temperatures, and also features easy measurement of width and step of thick steel plates.



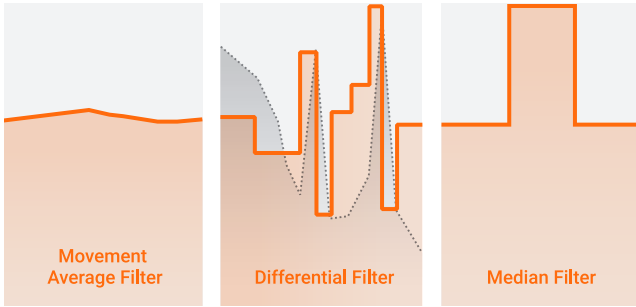
Accurate Displacement Measurement on Various Materials

The sensors can accurately detect various target materials including black/white paper, stainless steel, rubber, PCB, etc. The regular reflective type allows stable measurements on reflective and transparent materials.



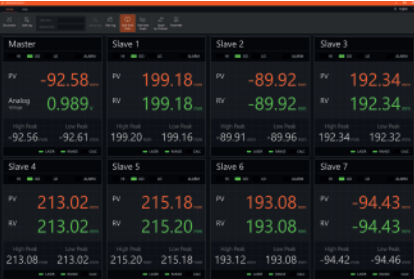
Calculation Function

Calculated measurements from 2 or more sensors can be used to measure thickness, level difference, surface disparity, and evenness of targets. Addition, subtraction, average calculations are supported.



Various Filters

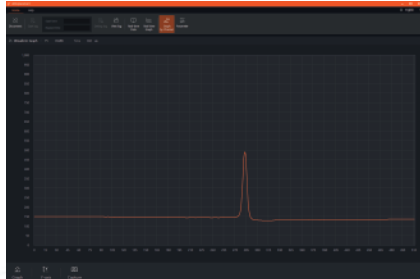
Movement average, differential, and median filters allow for accurate and stable correction in measurement values in the event of sudden changes from mechanical noise or other variables.



Live Data



Live Graph



Wave Graph

Dedicated Software 'atDisplacement'

Dedicated software 'atDisplacement' offers user-friendly interface with live data, life graphs and wave graphs for easy monitoring of various measurement values in real-time. Set values can be immediately checked during the setting.

Maximum 1 μ m Resolution

for stable and precise measurements

Maximum 0.1 % Full Scale Linearity

for high accuracy measurements

Maximum 0.05 % of Full Scale Temperature Property

for minimal impact from temperature change

Max 330 μ s Measurement Cycle

for detection of fast moving targets

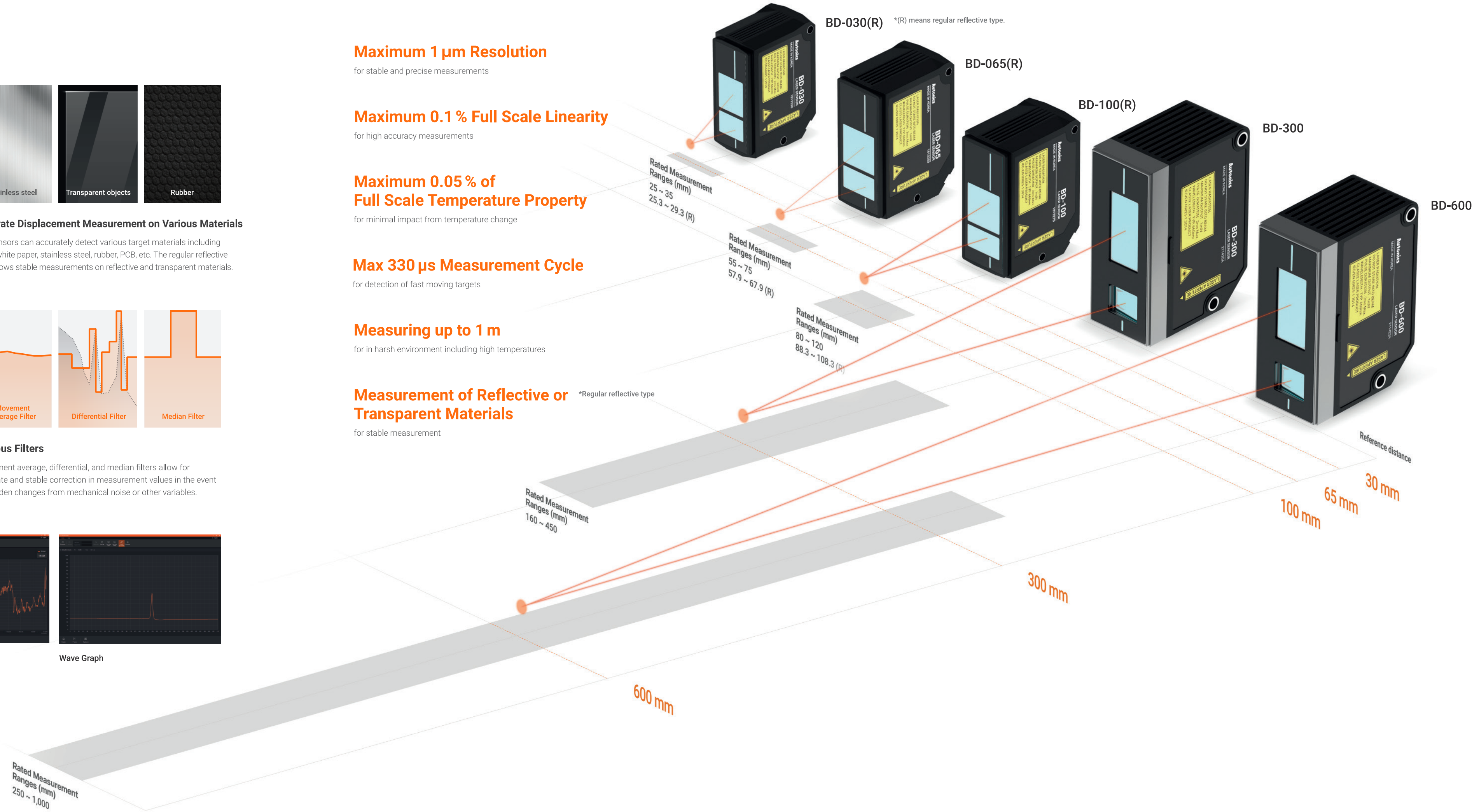
Measuring up to 1 m

for in harsh environment including high temperatures

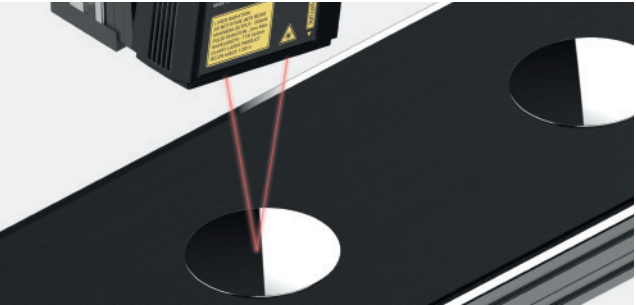
Measurement of Reflective or Transparent Materials

for stable measurement

*Regular reflective type

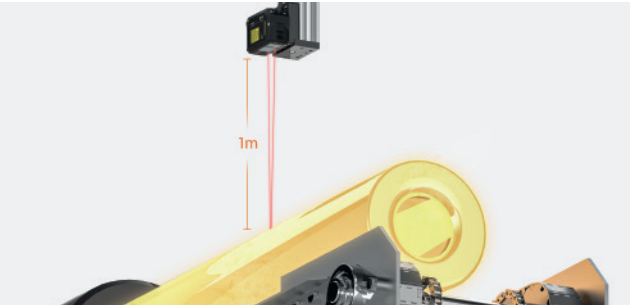


Applications



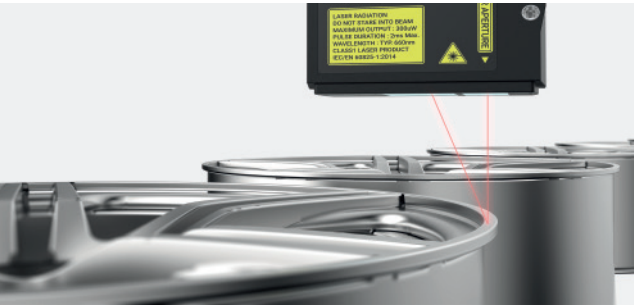
Transparent Objects

Check for evenness or presence of transparent objects with the regular reflective type.



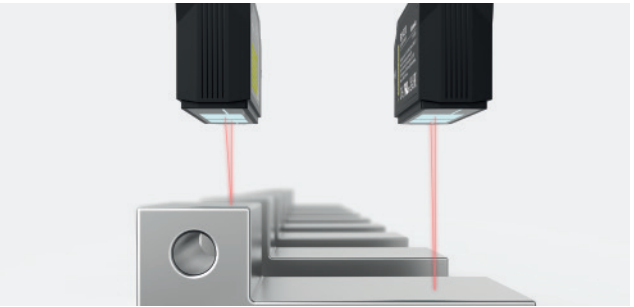
Long Distance

Measure up to 1 m even in harsh environment including high temperatures.



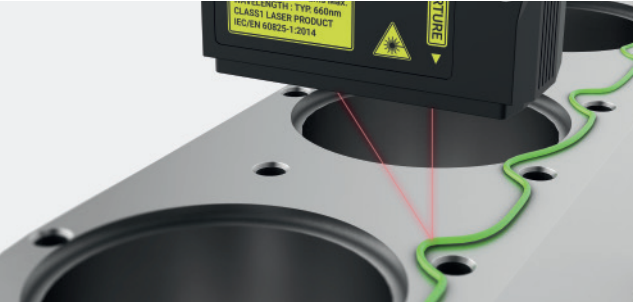
Evenness

Check for evenness or wear of targets by measuring the distance of the target.



Level Difference

Check the level difference of targets using calculations from multiple sensors.



Height

Check for size disparity, curves, or vibration on targets by measuring the height of the target.









Thickness

Check the thickness of targets using calculations from multiple sensors.

Specifications

[Laser Displacement Sensors BD Series]

Diffuse Reflective Type

Model	BD-030	BD-065	BD-100	BD-300	BD-600
Beam shape	Standard				
Spot diameter (near)	≈ 290×790 μm (25 mm)	≈ 360×1,590 μm (55 mm)	≈ 480×1,870 μm (80 mm)	≈ 990×1,000 μm (160 mm)	≈ 1,140×1,175 μm (250 mm)
Spot diameter (reference)	≈ 240×660 μm (30 mm)	≈ 290×1,180 μm (65 mm)	≈ 410×1,330 μm (100 mm)	≈ 490×510 μm (300 mm)	≈ 860×830 μm (600 mm)
Spot diameter (far)	≈ 190×450 μm (35 mm)	≈ 210×830 μm (75 mm)	≈ 330×950 μm (120 mm)	≈ 365×355 μm (450 mm)	≈ 800×775 μm (1,000 mm)
Resolution ⁰¹⁾	1 μm	2 μm	4 μm	20 μm	40 μm
Reference distance	30 mm	65 mm	100 mm	300 mm	600 mm
Max. measurement range	20 to 40 mm	50 to 80 mm	70 to 130 mm	160 to 450 mm	250 to 1,000 mm
Rated measurement ranges ⁰²⁾	25 to 35 mm	55 to 75 mm	80 to 120 mm	160 to 450 mm	250 to 1,000 mm
Linearity ⁰³⁾	± 0.1% of F.S.	± 0.1% of F.S.	± 0.15% of F.S.	± 0.25% of F.S.	± 0.25% of F.S. (250 to 600 mm) ± 0.5% of F.S. (600 to 1,000 mm)
Temperature characteristic ⁰⁴⁾	0.05% of F.S./°C	0.06% of F.S./°C		0.08% of F.S./°C	
Light source	Red semiconductor laser (wavelength: 660 nm, IEC 60825-1:2014)				
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	≤ 300 μW		≤ 1 mW		
Laser Pulse duration	2 ms Max.				
Material	Case: PC, Cable: PVC, Sensing part: Glass			Front case: AL, Rear case: PC, Cable: PVC, Sensing part: Glass	
Approval	CE UK   			CE UK   	
Unit weight (packaged)	≈ 56 g (≈ 209 g)	≈ 68 g (≈ 233 g)	≈ 68 g (≈ 233 g)	≈ 151 g (≈ 330 g)	≈ 153 g (≈ 332 g)




01) When measuring white paper in stop state at the reference distance with belows.
[Conditions] reference temperature 25°C, reference distance response time (BD-030 / 065 / 100) 1 ms, (BD-300 / 600) 2 ms, average 128 times

02) The rated measurement range guarantees linearity.

03) Measurement error for linear displacement of white matte paper in the rated measurement range.

04) Value measured by using an aluminum jig fix the sensor head and non-glossy white paper.

Regular Reflective Type

Model	BD-030R	BD-065R	BD-100R
Beam shape	Standard		
Spot diameter (near)	≈ 100×100 μm	≈ 150×150 μm	≈ 200×200 μm
Spot diameter (reference)	≈ 100×100 μm	≈ 150×150 μm	≈ 220×220 μm
Spot diameter (far)	≈ 100×100 μm	≈ 150×150 μm	≈ 240×240 μm
Resolution ⁰¹⁾	1 μm	2 μm	4 μm
Reference distance	27.3 mm	62.9 mm	98.3 mm
Max. measurement range	24.9 to 29.7 mm	56.9 to 68.9 mm	86.3 to 110.3 mm
Rated measurement range ⁰²⁾	25.3 to 29.3 mm	57.9 to 67.9 mm	88.3 to 108.3 mm
Linearity ⁰³⁾	± 0.1% of F.S.		± 0.15% of F.S.
Temperature characteristic ⁰⁴⁾	± 0.05% of F.S./°C		± 0.06% of F.S./°C
Light source	Red semiconductor laser (wavelength: 660 nm, IEC 60825-1:2014)		
Optical method	Regular reflection		
Laser class	Class 1 (IEC/EN), Class I (FDA (CDRH) CFR Part 1002)		
Output	≤ 300 μW		
Laser Pulse duration	Max. 2 ms		
Material	Case: PC, Cable: PVC, Sensing part: Glass		
Approval	CE UK   		
Unit weight (packaged)	≈ 55 g (≈ 205 g)	≈ 66 g (≈ 228 g)	≈ 66 g (≈ 228 g)

01) When measuring mirror in stop state at the reference distance with belows.
[Conditions] reference temperature 25°C, reference distance response time 1 ms, average 128 times

02) The rated measurement range guarantees linearity.

03) Measurement error for linear displacement of white matte paper in the rated measurement range.

04) Value measured by using an aluminum jig fix the sensor head and non-glossy white paper.

Sold Separately

- Extension cable: [General type] CID6P-□-SI-BD, [Robot type] CIDR6P-□-SI-BD
- Fixing bracket: BK-BD-□

[Amplifier Unit BD-A1]



Up to 8 amplifier units (BD-A1) can be interconnected. Various functions are available including calculation, emitter/receiver optimization, zero-point setting, and auto-sensitivity adjustment.

Supported amplifier	Amplifier unit (BD-A1) ⁰¹⁾ ⁰²⁾
Power supply	From the amplifier unit (BD-A1)
Operation indicator	Power indicator (red), Laser emission indicator (green), NEAR/FAR indicator (green)
Insulation resistance	≥ 20 MΩ (500 VDC≒ megger)
Noise immunity	Square shaped noise by noise simulator (pulse width: 1μs) ±500V
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 minute
Vibration	1.5 mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours
Shock	300 m/s ² (≈ 30 G) in each X, Y, Z direction for 3 times
Ambient illumination	≤ 10,000 lx incandescent lamp
Ambient temperature	-10 to 50 °C, Storage: -15 to 60 °C (no freezing or condensation)
Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH (no freezing or condensation)
Protection structure	IP67 (IEC Standards, except connector of extension cable)




01) Sensor head model (regular reflective type) supports only over 5.0 firmware version of the amplifier unit (BD-A1) and communication converter (BD-C).

02) Sensor head model BD-300/600 supports only over 5.0 firmware version of the amplifier unit (BD-A1) and communication converter (BD-C).

[Communication converter BD-C] * Sold Separately



The BD-C communication converter allows RS232C and RS485 communication with PLCs, PCs, analog control devices, and other host devices.

Model	BD-CRS
Supported amplifier	Amplifier unit (BD-A1) ⁰¹⁾
Power supply	From the amplifier unit (BD-A1) (12 - 30 VDC≒)
Communication Protocol	Modbus RTU
Connection type	RS-232C, RS-485
Communication speed	9600, 19200, 38400, 115200 bps (default)
Function	Executes every BD-Series feature, sets parameter and real-time monitoring by external device (Master)
Protection structure	IP40 (IEC standard)
Material	Case: PC
Accessory	Side connector, Connector for RS485
Approval	CE UK   

01) Communication converter (BD-C) firmware 5.0 and later only supports amplifier unit (BD-A1) firmware 5.0 and later.

* The dimensions or specifications on this product guide may change and some models may be discontinued without notice.