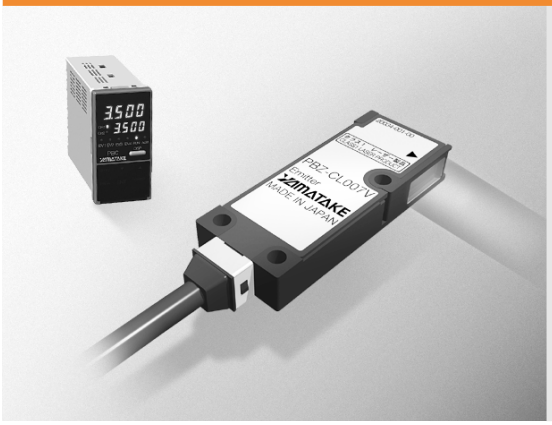
Edge Measurement Sensors (Parallel Laser Light Type)

PBZ Series

Edge position sensing for film, wafer or glass substrate.



- Integrated FDN algorithm. High accuracy (moving accuracy ±20μm) and high speed
- Linear image sensor system with light quantity drop detection. Includes full countermeasures against dirt buildup on the sensing face, previously a major problem for reliable detection
- Noise cancellation function. Tabs or other irregular projections can be ignored
- Automatic center setting function. Easy setup
- Integrated algorithm for transparent object detection. Reliable measurement of transparent objects
- Standard 2-channel input controller. Wiring man-hour reduction, saves space, and enables dual measurement computations
- RS-485 communications (for the PBC-201VBN2). Data can be transmitted to a PLC or touch panel
- Compact size (8mm wide x 20mm deep). Perfect for tight spaces

B MEASUREMENT SENSORS
B
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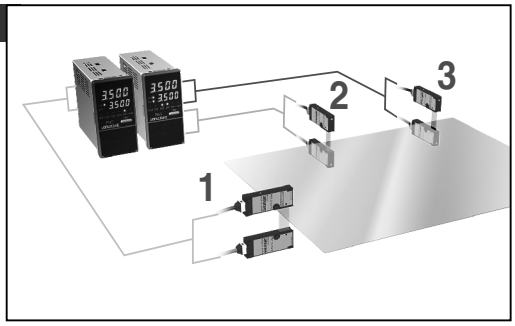
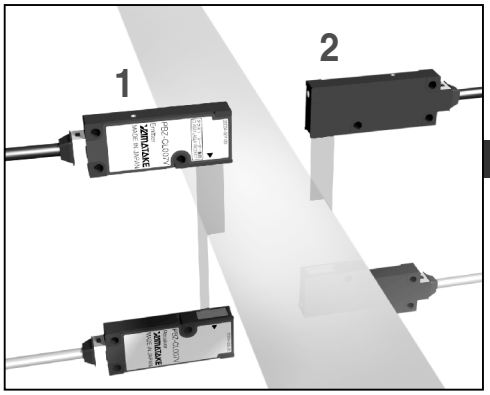
Glass substrate alignment

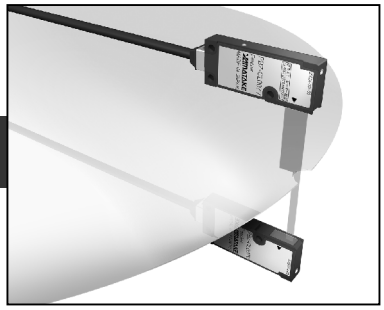
Using 3 sets of sensors and computing each edge measurement value, the X, Y and θ of a glass substrate can be measured without using image processing equipment.





Film meander measurement

By computing the input from 2 sets of sensors, meander and film width can be measured at the same time.



Wafer irregularity and notch position measurement

Highly transparent glass or gallium arsenide wafers can be reliably measured with high accuracy.

Edge Measurement Sensors (Diffusive LED Light Type)

PBZ Series

Measurement of boundary position between transparent and opaque film.

- Using diffusive LED light and a CMOS linear image sensor, the boundary between a transparent object and an opaque one can be easily determined by an integrated sensor, a task that was difficult in the past
- Noise cancellation function. Tabs or other irregular projections can be neglected
- Automatic center setting function. Easy setup
- Standard 2 channel input controller. Wiring man-hour reduction, saves space, and enables dual measurement computations
- RS-485 communications. Data can be transmitted to a PLC or touch panel

B MEASUREMENT SENSORS
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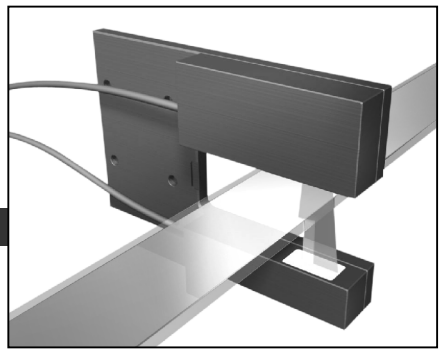
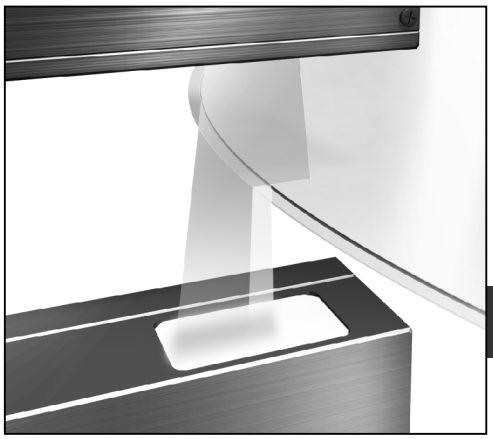


Film edge measurement

The boundary between transparent and opaque film or between transparent and semitransparent film can be precisely determined.



BGF/DAF-attached wafer irregularity and notch position measurement

Even a BGF/DAF-attached wafer can be reliably measured.

SPECIFICATIONS

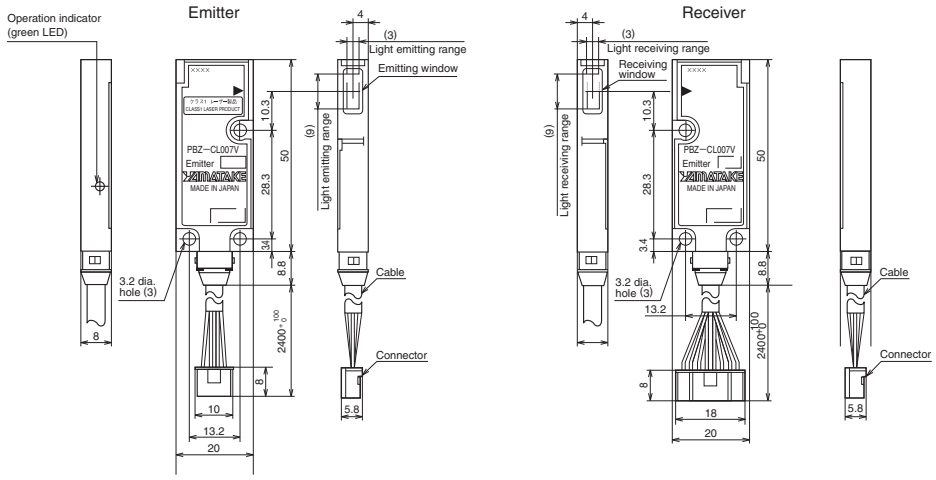
	Parallel laser light type			Diffusive LED light type	
	Sensor	Controller		Sensor	Controller
Catalog listing	PBZ-CL007V	PBC-201VN0	PBC-201VN2	PBZ-ECL008V	PBC-211VN2
Measurement width	7mm			8mm/14mm (selectable by parameter)	
Measurement distance	10 to 300mm			50mm	
Working distance (WD) (Note 1)	10 to 290mm			19mm/37mm	
Moving accuracy	±20μm max. (Note 2)			When 8mm: ±50μm/When 14mm: ±100μm (Note 4)	
Repeatability	±1μm max. (Note 3)			±10μm max. (Note 5)	
Analog output response time	500μs			1ms	
Temperature performance of sensor	0.1%FS/˚C	—		0.1%FS/˚C	—
Operating temperature range	0 to 45˚C			0 to 45˚C	
Operating ambienthumidity	30 to 85% RH			—	30 to 85% RH
Power supply voltage	—	24Vdc ± 10%		—	24Vdc ± 10%
Analog output	—	1 to 5Vdc or ±5V: 2 outputs		—	1 to 5Vdc or ±5V:2 outputs
Event output	—	Sink type transistor output:4 points		—	Sink type transistor output: 4 points
External input	—	2 points		—	2 points
Digital indication	—	7-segment 4-digit		—	7-segment 4-digit
Light source	Visible semiconductor laser:JIS Class 1		—	Infrared LED	—
Sealing	IP40	—	—	IP40	—
Communications	—	—	RS-485 (optional)	—	RS-485

Notes: 1. Working distance (WD) is the distance from receiver to object. For the diffusive LED light type, WD = 19mm when measurement width is 8mm, and WD = 37mm when measurement width is 14mm.
Notes: 2. This applies when the distance between emitter and receiver = 20mm, WD = 10mm, and the object position moves ±0.5mm from the center of measurement.
Notes: 3. This is an average of 20 times, when the distance between emitter and receiver = 20mm and WD = 10mm.
Notes: 4. Applies when the object position moves 0.5mm from the center of measurement at a predetermined WD.
Notes: 5. This is the average of 20 times at a predetermined WD.

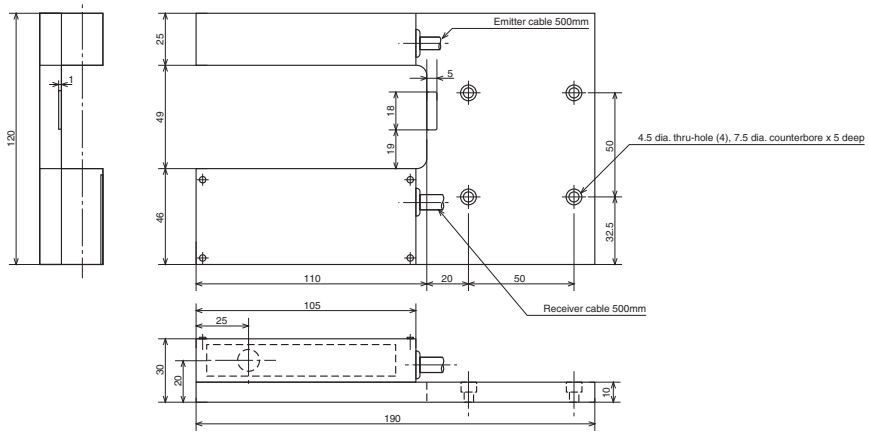
External Dimensions

(unit: mm)

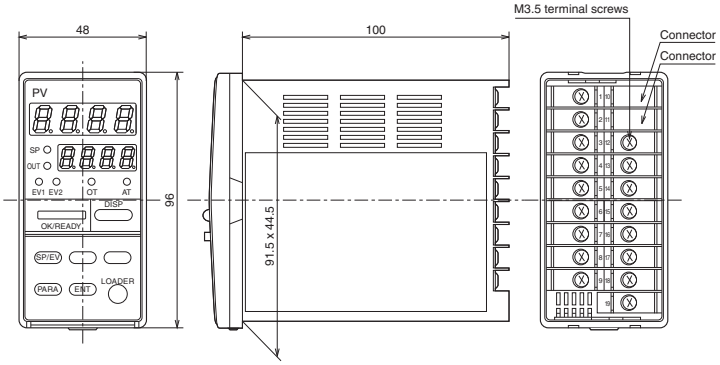
● Sensor of parallel laser light type: **PBZ-CL007V**



● Sensor of diffusive LED light type: **PBZ-ECL008V**



● Controller: **PBC-2□□VN□**



Terminal No.	Signal	Terminal No.	Signal
1	Power, 24Vdc	10	CH1 connector cable
2	Power, 0V	11	CH2 connector cable
3	FG	12	RS-485 SDA
4	CH1 start input	13	RS-485 SDB
5	CH2 start input	14	RS-485 RDA
6	Event output 1	15	RS-485 RDB
7	Event output 2	16	RS-485 SG
8	Event output 3	17	CH1 analog output
9	Event output 4	18	CH2 analog output
		19	Analog GND

PBZ Edge Measurement Sensors

■Overview

PBZ laser sensors are specialized for edge-position measurement of film, wafer or glass substrate by means of parallel laser beams and a CMOS linear image sensor.

- Integrated FDN algorithm High-accuracy edge measurement*1
- Linear image sensor system with light intensity drop detection Incorporates an effective countermeasure against the buildup of foreign matter on the sensing face, previously a major problem for reliable detection.
- Integrated algorithm for detection of transparent objects Transparent objects can be reliably measured.
- Standard 2-channel input controller Handles calculations for two inputs, reducing wiring man-hours and saving space
- RS-485 communications (for the PBC-201VN2/PBC-203VN2)
  Data can be transmitted to a PLC or touch panel
- Safety
  JIS Class 1 laser beam. No particular protective measures required.
- Multiple functions
  Noise cancellation function for ignoring projections on films*2
  Computation of θ for glass substrate alignment*3
  Displacement detection for identifying cracks on grass substrates*3

Notes:
*1. Repeat accuracy ±1 μmax. for PBZ-CL007V, ±5 μmax. for PBZ-CL030H/V
*2. Only for PBC-201VN0/2
*3. Only for PBC-203VN2

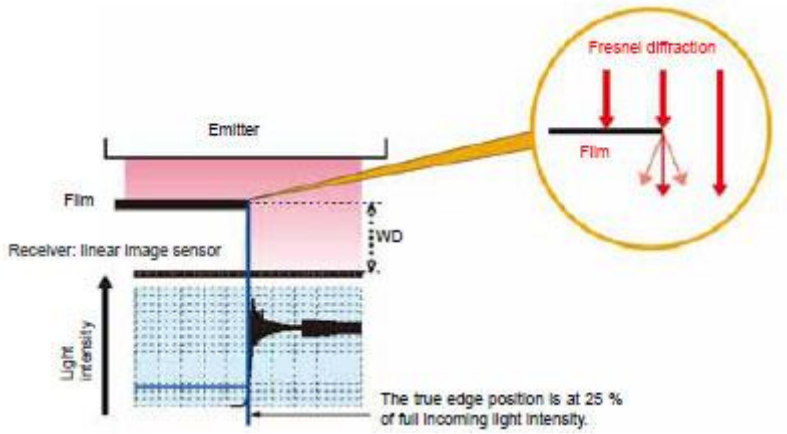
Measurement types

Controller model	Edge position (transparent or opaque) 	Shielded width 	Gap width 
PBC-201VN0 Controller for 7 mm sensor head	Available	—	—
PBC-201VN2 Controller for 7 mm sensor head	Available	Available	Available
PBC-203VN2 Controller for 30 mm sensor head	Available	—	—

■Repeat accuracy of ±1 μm - true edge position measurement with high accuracy

A proprietary FDN algorithm enables true edge position measurement with high accuracy at any working distance (WD).

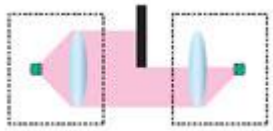
Note:
Repeat accuracy is ±1 μm for PBZ-CL007V, ±5 μm for PBZ-CL030H/V. Refer to the specifications below for the test conditions.



Fresnel diffraction
Light is diffracted at the thin edge of a knife or film. The distribution pattern of diffracted light intensity at the receiver depends on the WD, the distance between the edge and the receiver.

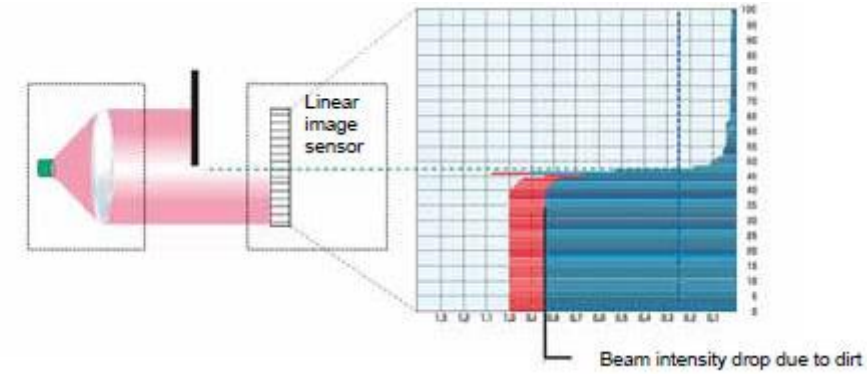
■ Unaffected by dust, etc. on the sensing face

A linear image sensor system prevents influence from beam attenuation due to dust on the sensing head. Also, a light intensity drop alarm function is helpful in determining how frequently maintenance is required.

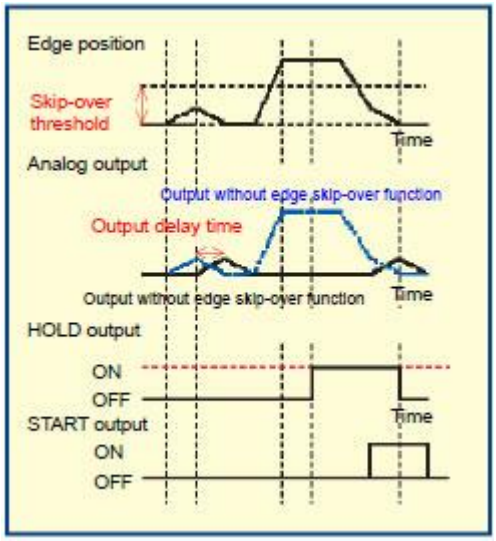


- Conventional (PD) system
  A drop in received light due to partial shading may change the linear output of the photodiode. In a conventional photodiode (PD) system, when the received light intensity drops due to a dirty lens (or because of the degree of transparency of the detected object), the output level changes. An air purge is required to prevent dust buildup on the lens.

- The azbil (linear image sensor) system
  The width of the shaded area is measured as intensity data for each pixel. In a linear image sensor system, even if the received light intensity falls, the output does not change if the distribution pattern of the light intensity received by the linear image sensor is the same.



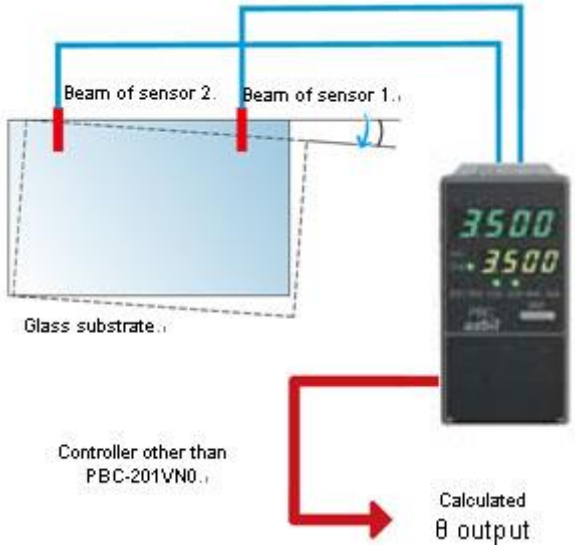
■ Noise cancellation function



The film edge can be measured alone, ignoring tabs or other projections. The presently measured value is compared with the value prior to a preset time (the output delay time). If the difference is more than a preset skip-over value, the measurement prior to the change is retained and an analog signal is output.

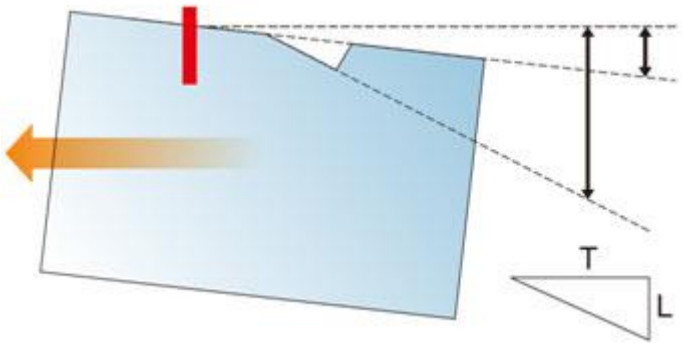
■ Computation of θ

Based on the displacement of the glass edge, the angle of inclination is computed and output.
Measurement range: ±3°.



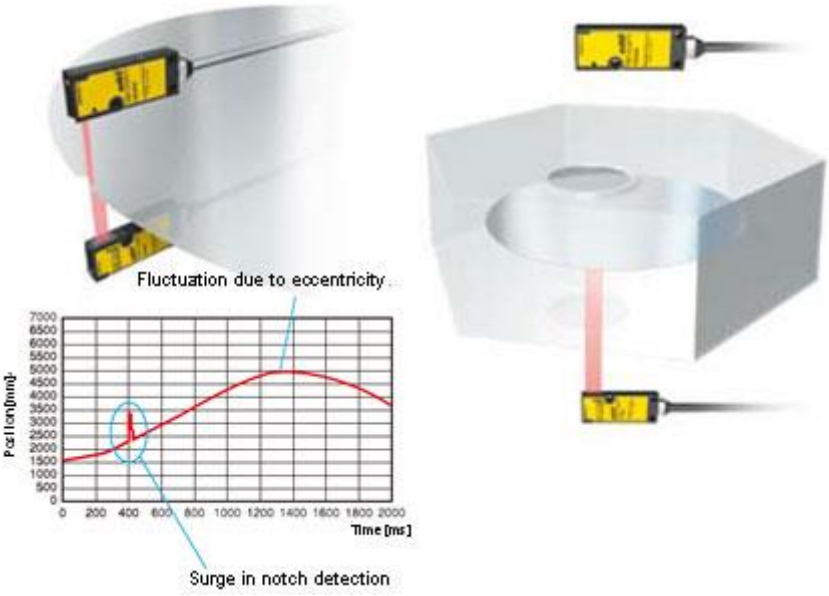
■ Chipping detection (displacement detection)

Displacement time (T) and displacement (L) can be preset. Digital output turns ON when displacement exceeds the preset amount.



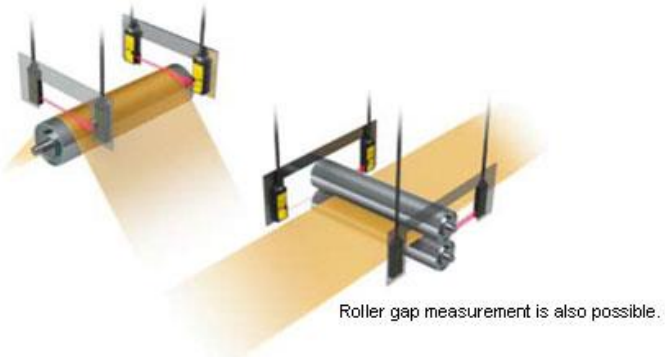
■ Applications

- Measurement of wafer eccentricity and notch position
  High accuracy and reliable measurement even for highly transparent targets such as glass wafers and GaAs wafers. Thanks to the linear image sensor, measurement is possible even through a view port.

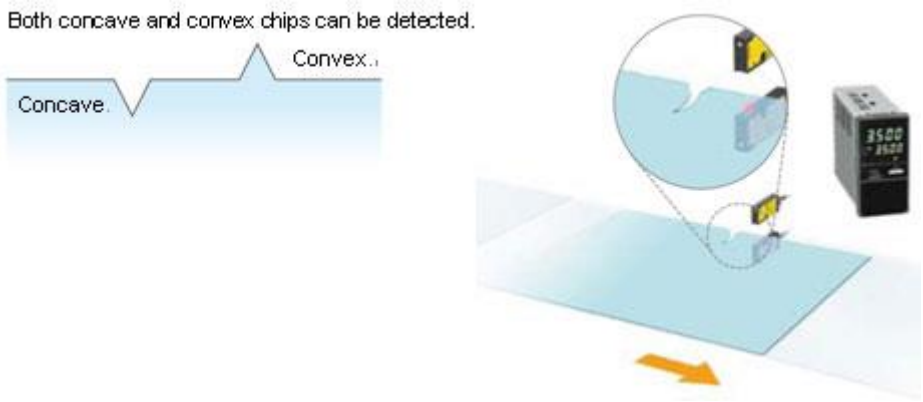


- Measurement of film meander
  By computing the input from 2 sets of sensors, meander and film width can be measured at the same time.

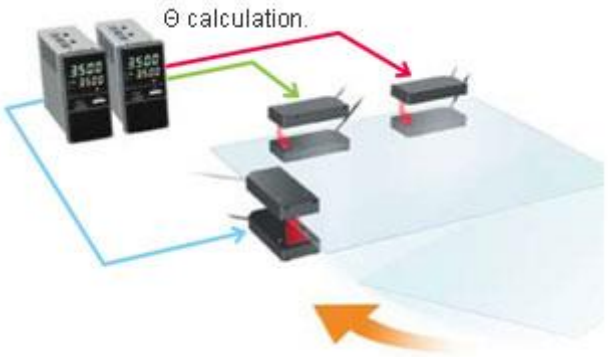
- Measurement of film and sheet thickness



- Detection of chips and cracks in glass substrates
  The displacement detection function detects edge chips and cracks in glass substrates on a conveyor.



- XYθ positioning of glass substrates
  In addition to the X and Y positions, the θ position of the glass substrate is also calculated using the input from 3 sets of sensor heads.



■ Specifications

	Parallel Laser Light Detection					
	Sensor	Controller		Sensor		Controller
Catalog listing	PBZ-CL007V	PBC-201VN0	PBC-201VN2	PBZ-CL030H	PBZ-CL030V	PBC-203VN2
Measurement width	7 mm			30 mm		
Measurement distance	10 to 300 mm			10 to 500 mm		
Working distance (WD)	10 to 290 mm			10 to 490 mm		
Moving accuracy	±20 µm max.*1			±50 µm max.*3		
Repeatability	±1 µm max.*2			±5 µm max.*4		
Analog output response time	—	500 µs		—		10 ms
Temperature characteristics of sensor	0.1 % FS/°C	—		0.1 % FS/°C		—
Operating temperature range	0 to 45 °C					
Operating ambient humidity	30 to 85 % RH					
Power voltage	—	24 Vdc ± 10 %		—		24 Vdc ± 10 %
Analog output	—	1 to 5 Vdc or ±5 V: 2 outputs		—		1 to 5 Vdc or ±5 V: 2 outputs
Event outputs	—	4 (sink transistor)		—		4 (sink transistor)
External inputs	—	2		—		2
Digital indication	—	7-segment 4-digit		—		7-segment 4-digit
Light source	Visible semiconductor laser: JIS Class 1	—		Visible semiconductor laser: JIS Class 1		—
Ingress protection	IP40	—		IP40		—
Communications	—	—	RS-485	—		RS-485
Total cable length between the sensor heads and controller	Max. 5 m			Max. 30 m		

All specifications above assume an opaque target inserted from the top or from the bottom. For data pertaining to other configurations, please contact Yamatake Corporation.

Notes:
*1. When emitter and receiver are 20 mm apart, WD = 10 mm, and the object moves ±0.5 mm from the center of the measurement beam.
*2. This is an average of 20 times, when emitter and receiver are 20 mm apart, WD = 10 mm, and the object is at the center (3.5 mm) of the measurement beam.
*3. When emitter and receiver are 100 mm apart, WD = 50 mm, and the object moves ±0.5 mm from the center of the measurement beam.
*4. This is an average of 20 times, when emitter and receiver are 100 mm apart, WD = 50 mm, and the object is at the center (15 mm) of the measurement beam.
WD (working distance) is the distance from receiver to object.