**Edge Measurement Sensors**

**PBZ Series** | Edge position sensing for film, wafers, and glass substrates

- **Integrated FDN algorithm**
  Enables high accuracy and reliable edge measurement.\(^1\)

- **Linear image sensor system with light level drop detection**
  Improved countermeasures against dirt buildup on the sensing surface, previously a major problem for reliable detection

- **Integrated algorithm for transparent object detection**
  Reliable measurement of transparent objects

- **Standard 2-channel input controller**
  Reduces time needed for wiring, saves space, allows two-measurement computations.

- **RS-485 communications (PBC-201VN2 and PBC-203VN2)**
  Enables data transmission to a PLC or touch panel.

- **Includes a variety of built-in functions**
  Noise cancellation,\(^2\) a countermeasure for protrusions on films
  Position change detection\(^3\) for glass substrate chip detection

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**FEATURES**

**Less loss of accuracy due to dirt on the sensing face**

The receiver uses our linear image sensor method to reduce the effects of dirt on the sensing face. Also, a light level drop detection function tells when the sensor requires maintenance.

**Conventional (Photoelectric Diode) method**

- The usual method is based on the change in PD linear output when the received light level drops due to blocking of the light. However, the output will also change if the received light level drops due to dirt on the lens (or greater opacity of the target object). This method requires air purging to prevent accumulation of dirt.

**Azbil’s linear image sensor method**

- The edge position is determined based on the brightness level of each pixel. Even when the overall received light level drops, the light received by each pixel changes uniformly, thus having no direct effect on measurement.

**Repeatability ±1 µm**

**High-accuracy measurement of the true edge position**

Azbil’s unique FDN algorithm enables high-accuracy measurement of the true edge position at any working distance (WD).**

\(^*1\) Repeatability: PBZ-CL007V ±1 µm, PBZ-CL030 ±5 µm or less

\(^*2\) PBC-201VN2 only

\(^*3\) PBC-203VN2 only

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**MEASUREMENT PRINCIPLE**

**Measurement details**

<table>
<thead>
<tr>
<th>Controller</th>
<th>Measurement details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PBC-201VN0</strong> for 7 mm sensor head</td>
<td>Edge position measurement (transparent and opaque objects)</td>
</tr>
<tr>
<td><strong>PBC-201VN2</strong> for 7 mm sensor head</td>
<td>✔</td>
</tr>
<tr>
<td><strong>PBC-203VN2</strong> for 30 mm sensor head</td>
<td>✔</td>
</tr>
</tbody>
</table>

Measurement and detection capabilities vary depending on the condition of the measurement target, the installation environment, and other factors. Before use, be sure to conduct sufficient checks and evaluations of the sensor’s operation in the actual situation.
**APPLICATION EXAMPLES**

**Wafer irregularity and notch position measurement**
Highly transparent glass or gallium arsenide wafers can be reliably measured with high accuracy. Linear image sensors enable measurement through a view port.

**Thickness measurement for films and sheets**
Two sensors can be connected per controller, enabling multiple-point calculations and simultaneous sensing of the roller and sheet material for highly accurate thickness measurement.

Measurement error caused by eccentricity and vibration of the roller can be cancelled out by using 2 pairs of sensor heads.

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

**Detection of burrs and nicks on film and sheets**
Burrs and nicks on a meandering film or sheet material can be detected by the same sensor. The sensor can be set in increments of 500 µs. For example, when using the PBC-201VN2, sheet material fed at a speed of 50 m/min can be measured at intervals of approx. 0.4 mm. The sensor can detect a size of several tens of micrometers or more.

**XYθ measurement of glass substrates**
Glass substrate X and Y measurements can be computed from edge measurements from three pairs of sensor heads, and then θ can be determined by internal computation.

Whether measurement or detection is possible depends upon target object conditions, installation environment, and other factors. Before use, carefully check sensor operation in the actual situation.
### SPECIFICATIONS

#### Sensor heads

<table>
<thead>
<tr>
<th>Catalog listing</th>
<th>Shape</th>
<th>Compatible controllers</th>
<th>Detection type</th>
<th>Sensing distance</th>
<th>Sensing width</th>
<th>Repeatability</th>
<th>Catalog listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBZ-CL007V</td>
<td></td>
<td>PBC-201VN0</td>
<td>Thru-scan</td>
<td>10 to 300 mm</td>
<td>7 mm</td>
<td>±1 µm</td>
<td>PBZ-CL007V</td>
</tr>
<tr>
<td>PBZ-CL030H</td>
<td></td>
<td>PBC-201VN2</td>
<td></td>
<td>10 to 500 mm</td>
<td>30 mm</td>
<td>±5 µm</td>
<td>PBZ-CL030H</td>
</tr>
<tr>
<td>PBZ-CL030V</td>
<td></td>
<td>PBC-203VN2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PBZ-CL030V</td>
</tr>
</tbody>
</table>

- **Accuracy specifications** are measured at an ambient temperature of 23±2 °C under the conditions described below.
- **Standard target:** Red semiconductor laser (light emission peak 670 nm), JIS Class 1
- **Emitting range:** (Sensor heads)
  - 100 g or less each
  - 100 mm or less each (including connector cable)
  - Emitter: 300 g or less (including connector cable)
  - Receiver: 270 g or less (including connector cable)

#### Controllers

<table>
<thead>
<tr>
<th>Catalog listing</th>
<th>Shape</th>
<th>Compatibility sensor head</th>
<th>Specifications</th>
<th>Catalog listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBC-201VN0</td>
<td></td>
<td>PBZ-CL007V</td>
<td>24 VDC power, 2-channel connection for sensor head</td>
<td>PBC-201VN0</td>
</tr>
<tr>
<td>PBC-201VN2</td>
<td></td>
<td>PBZ-CL007V</td>
<td>24 VDC power, 2-channel connection for sensor head</td>
<td>PBC-201VN2</td>
</tr>
<tr>
<td>PBC-203VN2</td>
<td></td>
<td>PBZ-CL030H</td>
<td></td>
<td>PBC-203VN2</td>
</tr>
</tbody>
</table>

- **Digital output:**
  - Transistor outputs (4), 21.6–26.4 VDC, 50 mA max.
  - Outputs for judgment, hold, dirt (maintenance)
  - Off-delay (can be set from 0–70 ms in 10 ms increments)

- **Digital input:**
  - Non-voltage or open collector inputs (2)
  - Laser ON/OFF, or center adjustment (selectable)
  - Power reverse connection protection

- **Communications:**
  - RS-485 (9600/19200/38400/115.2 kbps)

#### PBZ-CL007V (Sensor heads)

- **Operating indicator (Green LED):**
  - Emitter: 300 g or less (including connector cable)
  - Receiver: 270 g or less (including connector cable)

- **Emitter and receiver:**
  - 100 g or less each
  - 100 mm or less each (including connector cable)

- **Mass:**
  - Emitter: 300 g or less (including connector cable)
  - Receiver: 270 g or less (including connector cable)

### PBZ-CBL02R (Extension cable for PBZ-CL007V)

- **Connector side:**
  - Heat-shrinkable tube
  - Cable: shrinkable

- **Sensor head side:**
  - Heat-shrinkable tube
  - Cable: shrinkable
PBZ-CL030V (Sensor head)

Emitter

Preloaded connector cable: approx. 200 mm

Receiver

Preloaded connector cable: approx. 200 mm

PBZ-CL030H (Sensor head)

Emitter

Preloaded connector cable: approx. 200 mm

Receiver

Preloaded connector cable: approx. 200 mm

PBZ-CBL□□□□-□E (Extension code for PBZ-CL03□ emitting side)

Controller side

Sensor head side

PBZ-CBL□□□□-□R (Extension code for PBZ-CL03□ receiving side)

Controller side

Sensor head side

* The digits represented by □□ are for code length (3 m = 03, 5 m = 05, 7 m = 07, 10 m = 10, and 20 m = 20).

Example: a model with a 3 m cable would be written PBZ-CBL03S-

CONTROLLER

(Unit: mm)

PBC-2□□VN□

Terminal arrangement

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal</th>
<th>Terminal No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power, 24 VDC</td>
<td>10</td>
<td>CH1 connector cable</td>
</tr>
<tr>
<td>2</td>
<td>Power, 0V</td>
<td>11</td>
<td>CH2 connector cable</td>
</tr>
<tr>
<td>3</td>
<td>FG</td>
<td>12</td>
<td>RS-485 SDA</td>
</tr>
<tr>
<td>4</td>
<td>Digital input</td>
<td>13</td>
<td>RS-485 SDB</td>
</tr>
<tr>
<td>5</td>
<td>Digital input</td>
<td>14</td>
<td>RS-485 GDA</td>
</tr>
<tr>
<td>6</td>
<td>Digital output 1</td>
<td>15</td>
<td>RS-485 RDA</td>
</tr>
<tr>
<td>7</td>
<td>Digital output 2</td>
<td>16</td>
<td>RS-485 SG</td>
</tr>
<tr>
<td>8</td>
<td>Digital output 3</td>
<td>17</td>
<td>CH1 analog output</td>
</tr>
<tr>
<td>9</td>
<td>Digital output 4</td>
<td>18</td>
<td>CH2 analog output</td>
</tr>
<tr>
<td>19</td>
<td>Analog GND</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For PBC-201VN0, CH1 or CH2 start input can be selected. For PBC-201VN2, in addition, bottom hold, laser ON/OFF or center adjustment can be selected. Terminal Nos. 4 and 5 are dedicated for laser ON/OFF and center adjustment respectively, for both channel 1 and channel 2 of the PBC-203VN2.