### General

This double-sided contact Caliper Sensor holds the paper by air jet from its bottom sensor unit for thickness measurement. To improve abrasion resistance, ceramics is employed in both contact surfaces, and the target section is manufactured in the form of sleigh. The Sensor also has a paper board-specific type using the same method. Even though a foreign substance enters the Sensor, sheet break occurs at minimum frequency. The Caliper Sensor uses eddy current not to be affected by the moisture percentage of the paper, ambient temperature changes or static electricity. Its computer-based automatic calibration function eliminates the effects of paper dust.

### Features

- **Double-sided contact measurement**
  The Caliper Sensor contacts both sides of the paper to allow accurate measurement down to the paper edges without being affected by tension or warping. Employment of ceramics in the contact surfaces improves the abrasion resistance characteristics.

- **Alignment error reducing structure/function**
  To prevent misalignment between the top and bottom sensor heads, the target and coil sections each have a unique structure and the frame is designed to absorb thermal expansion. Measurement errors due to the misalignment are corrected using the computer-based alignment correction function.

- **Optical switch-based retire function**
  When inserting paper between the sensor heads, an optical switch on the sensor head packages the paper to cause the target section to retire. This helps reduce paper breakage and protects the target section from mechanical damage.

- **Disturbance prevention**
  A differential coil eliminates the effects of ambient temperature changes, and a paper guide is provided to compensate for paper flapping. The effects of moisture content are eliminated by increasing the electrical conductivity of the target section and introducing a high-frequency current to it.

- **Protection function at top/bottom sensor heads**
  When splitting the top/bottom sensor heads for maintenance, the protection function detects the to cause the target section to retire.
Specifications

Measuring principle: Displacement measurement using eddy current
Measuring range:
- L: 0 to 200 μm
- H: 0 to 700 μm
  for paper board: 20 to 1200 μm
Detector: High-frequency differential coil
Measuring area: 25 × 31 (mm)
Measuring pressure: 10 kPa for typical setting
Ambient temperature: 0 to 50 °C
Paper temperature: 0 to 90 °C (50 °C or below at a position 10cm apart vertically from the paper surface)
Ambient humidity: 20 to 90 %RH, no dew condensation
Warm-up time: Approx. 2 hours

Performance Characteristics (2σ value)

Average value repeatability: ±1 μm
2σ value of average data per scan obtained when scanning is performed without inserting anything between the sensor heads.

Model and Suffix Codes

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Suffix Code</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM9C1</td>
<td>-VP</td>
<td>Caliper Sensor</td>
</tr>
<tr>
<td></td>
<td>-S4</td>
<td>For general atmosphere (gap: 4 mm) (*1)</td>
</tr>
<tr>
<td></td>
<td>-S8</td>
<td>For general atmosphere (gap: 8 mm) (*1)</td>
</tr>
<tr>
<td></td>
<td>-C5</td>
<td>Airjet Holder type (double-sided contact)</td>
</tr>
<tr>
<td></td>
<td>-C6</td>
<td>Airjet Holder paper board type (double-sided contact) (*2)</td>
</tr>
<tr>
<td></td>
<td>-L</td>
<td>LOW range</td>
</tr>
<tr>
<td></td>
<td>-H</td>
<td>HIGH range</td>
</tr>
</tbody>
</table>

*1: Select a desired measurement gap from the following:
  4 mm: “-S4”
  8 mm: “-S8”
  TOKUCHU Approval is required for the BM9F1-VP frame when the Basis Weight sensor having a specification of 8 mm gap is installed on the frame.

*2: The LOW range is not available for the air jet holder paper board type “-C6”. Also in actual application, the LOW range is not available for paper of low strength (below 100 μm).
  For details, contact a Yokogawa service engineer.

Considerations at Purchase

The Caliper Sensor has the following characteristics depending on the type.

- For thin paper such as tissue paper, paper break may occur during measurement.
- Gloss or wear or tear may be given to the measuring object.
- For the air jet holder type, measurement may not be allowed when the measuring object has strong tension or wrinkles.
- Since the air jet holder paper board type has a high contact surface pressure, paper of low strength may suffer breakage. Also this type of sensor may require maintenance work more often depending on the operating condition or paper type.

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