Fits perfectly with applicable tube sizes!

Detects liquid and air bubbles without fail!

Tube outer diameter

ø2 mm ø0.078 in

ø3 mm ø0.125 in

ø4 mm ø0.156 in
Experience its ease of use!
Optical bubble sensor is handy, simple, and precise!

Simply attach the sensor with your hand!
Hassle-free one-touch attachment without using tools!

For Ø2 mm, Ø3 mm, Ø4 mm tubes
Perfect fit into applicable tubes without obstructing flow rate.
Compatible with tubes in inch size

High speed detection
0.8 mm 0.032 in air gaps are reliably detected by optical technology at a response time of 20 μs*.
Ideal for traceability of the analysis process.

Fingertip size
Allows for installation in a narrow space.

5 to 24 V DC compliant
Allows for direct power supply from PC board.

No requirement of sensitivity adjustment
Can be used immediately after installation by built-in amplifier.
Equipped with two outputs, Liquid-absent-ON and Liquid-present-ON.
Optical bubble sensor is handy, simple, and precise!

**Applications**

- Allows for close proximity attachment
- Hassle-free one-touch attachment without using tools!
- Simply attach the sensor with your hand!
- Perfect fit into applicable tubes without obstructing flow rate.
- Compatible with tubes in inch size:
  - For ø2 mm, ø3 mm, ø4 mm tubes
- No requirement of sensitivity adjustment
  - 0.8 mm
  - 0.032 in
- *Refer to the specifications for detection conditions,
  - BE-A201 has a response time of 30 μs.
  - High speed detection
  - Fingertip size
  - 5 to 24 V DC compliant
- In the case of BE-A201:
  - BE-A301 (NPN output type)
  - BE-A301P (PNP output type)
  - Transparent resin tube
  - (PFA equivalent)
  - Outer diameter ø2 mm ø0.078 in × inner diameter ø1 mm ø0.039 in
  - Liquid-absent-ON / Liquid-present-ON (equipped with two outputs)
- In the case of BE-A301:
  - BE-A401 (NPN output type)
  - BE-A401P (PNP output type)
  - Transparent resin tube (equivalent to flexible PVC)
  - Outer diameter ø4 mm ø0.156 in × inner diameter ø2.4 mm ø0.394 in
  - Liquid-absent-ON / Liquid-present-ON (equipped with two outputs)

- Push down the tube into the sensor.
- Stretch the tube and insert it into the sensor.

**Liquid dispensing instrument**

- Model No.: BE-A301 (NPN output type)
  - BE-A301P (PNP output type)
- Applicable tube: Transparent resin tube (PFA equivalent)
  - Outer diameter ø3 mm ø1/8 in × inner diameter ø2 mm ø1/16 in
- Output operation: Liquid-absent-ON / Liquid-present-ON (equipped with two outputs)

- Model No.: BE-A401 (NPN output type)
  - BE-A401P (PNP output type)
- Applicable tube: Transparent resin tube (equivalent to flexible PVC)
  - Outer diameter ø4 mm ø5/32 in × inner diameter ø2.4 mm ø3/32 in
- Output operation: Liquid-absent-ON / Liquid-present-ON (equipped with two outputs)

**Clinical laboratory instrument**

- Empty detection inside the tank
- Air bubble detection after pumping
- To dispensing nozzle

**Experience its ease of use!**
# SPECIFICATIONS

## Type

<table>
<thead>
<tr>
<th>Item</th>
<th>BE-A201</th>
<th>BE-A301</th>
<th>BE-A401</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type for ø2 mm</td>
<td>a0.078 in tube</td>
<td>a0.125 in tube</td>
<td>a0.156 in tube</td>
</tr>
<tr>
<td>NPN output</td>
<td>BE-A201</td>
<td>BE-A301</td>
<td>BE-A401</td>
</tr>
<tr>
<td>PNPN output</td>
<td>BE-A201P</td>
<td>BE-A301P</td>
<td>BE-A401P</td>
</tr>
</tbody>
</table>

Detectable air gap (Note 2) 0.8 mm ± 0.032 in or more

Sensing object Liquid (Note 3)

Applicable tube dia. (OD×ID)(Note 4) ø2 mm × ø1 mm ø3 mm × ø2 mm ø4 mm × ø2.4 mm

Applicable tube type (Note 4) Transparent resin tube (equivalent to PFA)

Supply voltage 5 to 24 V DC ± 10 % Ripple P-P 10 % or less

Detectable air gap (Note 2) 0.8 mm ± 0.032 in or more

Notes:
1) When measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C ± 3.4 °F.
2) Sensing air gap refers to the width of an air bubble formed in the entire area of the inner diameter of the tube. Please note that this product cannot sense very small air bubbles or water drops. Refer to the figure 1 and 2.
3) Sensing is affected by dirt or residues adhered to the inner wall of the tube. Please maintain the tube regularly.
4) When detecting liquid, operate (in a bubble) or operate (in liquid).
5) When detecting bubble, operate (in bubble) or operate (in liquid).
6) Liquid being detected should also be kept within the rated ambient temperature range.
7) Sensing air gap refers to the width of an air bubble formed in the entire area of the inner diameter of the tube. Please note that measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C ± 3.4 °F.

## Environmental resistance

- Ambient temperature (Note 6) -25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +80 °C -22 to +176 °F
- Ambient humidity 35 to 85 % RH, Storage: 35 to 85 % RH
- Ambient illuminance Fluorescent light: 1,000 lx at the light-receiving face
- Insulation resistance 20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure
- Insulation resistance 10 to 150 Hz frequency, 0.75 ms or more in double amplitude or maximum acceleration
- Vibration resistance 10 to 150 Hz frequency, 0.75 ms or more in double amplitude or maximum acceleration
- Vibration resistance 10 to 150 Hz frequency, 0.75 ms or more in double amplitude or maximum acceleration
- Vibration resistance 10 to 150 Hz frequency, 0.75 ms or more in double amplitude or maximum acceleration
- Shock resistance 100 m/s² acceleration in X, Y, and Z directions three times each
- Emitter element Infrared LED (Peak emission wavelength: 855 nm ± 0.034 m, non-modulated)
- Material Enclosure: PBT, Tube holder: Polyamide, Indicator: Polycarbonate
- Cable 0.09 mm² 4-core cable 1 m 3.280 ft long
- Cable extension (Note 7) Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.
- Weight Net weight: 15 g approx., Gross weight: 25 g approx.
- Compliance EMC Directive compliance, RoHS Directive compliance

## Protection circuits

- Power supply reverse polarity protection
- Output reverse polarity protection
- Short-circuit protection

## Protection

- IP40 (IEC)

## Environmental resistance

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1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C ± 3.4 °F.
2) Sensing air gap refers to the width of an air bubble formed in the entire area of the inner diameter of the tube. Please note that this product cannot sense very small air bubbles or water drops. Refer to the figure 1 and 2.
3) Sensing is affected by dirt or residues adhered to the inner wall of the tube. Please maintain the tube regularly.
4) When using a tube out of specifications or it doesn’t have a smooth surface, please test sensing on the actual machine
5) Sensing air gap refers to the width of an air bubble formed in the entire area of the inner diameter of the tube. Please note that measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C ± 3.4 °F.
6) Liquid being detected should also be kept within the rated ambient temperature range.
7) Confirm that the power supply voltage at the end of cable is more than 4.5 V when using an extension of over 20 m 65.167 ft.

## DIMENSIONS (Unit: mm in)

**BE-A201**

- For ø2 mm: a0.078 in tube
- Operation indicator (Orange)
- 2 × ø3.5 × ø1.38 mounting holes
- ø2.5 mm ø0.098 in cable 1 m 3.280 ft long
- 4-core × ø0.09 mm² (AWG28)
- Insulator diameter: ø0.66 mm ø0.026 in

**BE-A301**

- For ø3 mm: a0.125 in tube
- Operation indicator (Orange)
- 2 × ø3.5 × ø1.38 mounting holes
- ø2.5 mm ø0.098 in cable 1 m 3.280 ft long
- 4-core × ø0.09 mm² (AWG28)
- Insulator diameter: ø0.66 mm ø0.026 in

**BE-A401**

- For ø4 mm: a0.156 in tube
- Operation indicator (Orange)
- 2 × ø3.5 × ø1.38 mounting holes
- ø2.5 mm ø0.098 in cable 1 m 3.280 ft long
- 4-core × ø0.09 mm² (AWG28)
- Insulator diameter: ø0.66 mm ø0.026 in

The CAD data can be downloaded from our website.