Optical Bubble Sensor
BE-A SERIES

Fits perfectly with applicable tube sizes!
Detects liquid and air bubbles without fail!
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.

*Refer to the specifications for detection conditions.
BE-A201 has a response time of 30 μs.
Optical bubble sensor is handy, simple, and precise! Allows for close proximity attachment.

- Staggered pattern (10 mm pitch)
- Parallel pattern (15.5 mm pitch)

No requirement of sensitivity adjustment. 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

High speed response time

New proposals for ease of use

For a wide range of power supply voltages

Built-in Amplifier

New proposals for ease of use

Allows for direct power supply from PC board.

Can be used immediately after installation by built-in amplifier.

Equipped with two outputs, Liquid-absent-ON and Liquid-present-ON.

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.

Allows for installation in a narrow space.

Experience its ease of use!

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

In the case of BE-A201 □ BE-A301 □ BE-A401 □

BE-A201 (NPN output type)
BE-A301P (PNP output type)

Transparent resin tube (PFA equivalent)
Outer diameter ø2 mm × inner diameter ø2 mm

Liquid-absent-ON / Liquid-present-ON (equipped with two outputs)

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

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

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

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

Applications

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Reagent/cleaning fluid tank
### SPECIFICATIONS

#### Dimensions (Unit: mm)

**BE-A201**
- **For ø2 mm tube**
  - Operation indicator (Orange)
  - 2 x ø3.5 mounting holes
  - Beam axis
  - Insulator diameter: ø0.66mm
  - Tube holder
  - 8.3
  - 14.7
  - 20

**BE-A301**
- **For ø3 mm tube**
  - Operation indicator (Orange)
  - 2 x ø3.5 mounting holes
  - Beam axis
  - Insulator diameter: ø0.66mm
  - Tube holder
  - 8.3
  - 14.7
  - 3.5

**BE-A401**
- **For ø4 mm tube**
  - Operation indicator (Orange)
  - 2 x ø3.5 mounting holes
  - Beam axis
  - Insulator diameter: ø0.66mm
  - Tube holder
  - 8.3
  - 14.8

The CAD data can be downloaded from our website.

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**Notes:**
1. Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23°C.
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 before use.
5. Actual response time may differ from specification (typical example using applicable tube) due to dimension, light transmission or surface state of test tube in use.
6. Liquid being detected should also be kept within the rated ambient temperature range. 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 4.5V when using an extension of over 20m.

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### DIMENSIONS (Unit: mm)

**BE-A201**
- For ø2 mm tube
  - Operation indicator (Orange)
  - 2 x ø3.5 mounting holes
  - Beam axis
  - Insulator diameter: ø0.66mm
  - Cable 1m long 4-core Ø0.09mm² (AWG28)

**BE-A301**
- For ø3 mm tube
  - Operation indicator (Orange)
  - 2 x ø3.5 mounting holes
  - Beam axis
  - Insulator diameter: ø0.66mm
  - Cable 1m long 4-core Ø0.09mm² (AWG28)

**BE-A401**
- For ø4 mm tube
  - Operation indicator (Orange)
  - 2 x ø3.5 mounting holes
  - Beam axis
  - Insulator diameter: ø0.66mm
  - Cable 1m long 4-core Ø0.09mm² (AWG28)

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**NPN output type:**
- **PNP output type:**
  - Maximum sink current: 50 mA
  - Applied voltage: max. 30 V DC (between output and +V)
  - Residual voltage: 2 V or less (sink current at 50 mA) 1 V or less (sink current at 16 mA)

**Output operation:**
- Switchable either Liquid-absent-ON or Liquid-present-ON

**Short-circuit protection:**
- Incorporated

**Response time:**
- When detecting bubble: 30 μs or less
- When detecting liquid: 80 μs or less

**Protection circuits:**
- Power supply reverse polarity protection
- Output reverse polarity protection

**Protection:**
- IP40 (IEC)

**Ambient temperature (note 6):**
- -25 to +55 °C (No dew condensation or icing allowed), Storage: -30 to +80 °C

**Ambient humidity:**
- 35 to 85 % RH, Storage: 35 to 85 % RH

**Ambient illumination:**
- Fluorescent light: 1,000 lx at the light-receiving face

**Voltage withstandability:**
- 1,000 V AC for between one min. between all supply terminals connected together and enclosure

**Vibration resistance:**
- 10 to 150 Hz frequency, 0.75 mm 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, non-modulated)

**Material:**
- Enclosure: PBT, Tube holder: Polyamide, Indicator: Polycarbonate

**Cable:**
- 0.09 mm² 4-core cable 1m

**Cable extension (Note 7):**
- Extension up to total 100 m is possible with 0.3 mm², or more, cable.

**Clamping torque:**
- max. 0.5N•m

**Weight:**
- Net weight: 15 g approx., Gross weight: 25 g approx.

**Compliant regulation:**
- EMC Directive compliance, RoHS Directive compliance

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