

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!

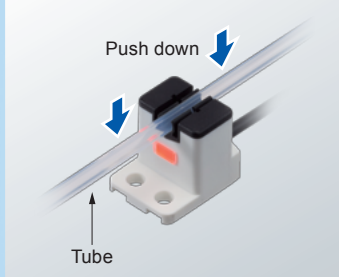
New proposals
for ease of use

One-touch attachment

Simply attach the sensor with your hand!

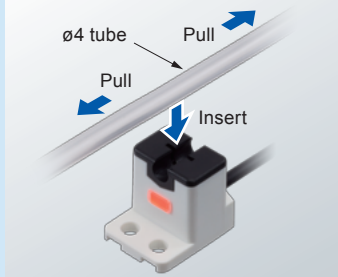
Hassle-free one-touch attachment without using tools!

In the case of BE-A201(P) / BE-A301(P)



- Push down the tube into the sensor.
- *Tube: Equivalent to PFA

In the case of BE-A401(P)



- Stretch the tube and insert it into the sensor.
- * $\phi 4$ tube: Equivalent to flexible PVC

New proposals
for ease of use

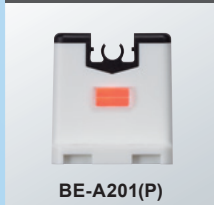
For small diameter tubes

For $\phi 2$ mm, $\phi 3$ mm, $\phi 4$ mm tubes

Perfect fit into applicable tubes without obstructing flow rate.

Compatible with tubes in inch size

$\phi 2$ mm tube type



BE-A201(P)

$\phi 3$ mm tube type



BE-A301(P)

$\phi 4$ mm tube type



BE-A401(P)



- Model No. : **BE-A201** (NPN output type)
BE-A201P (PNP output type)
- Applicable tube : Transparent resin tube
(Equivalent to PFA)
Outer diameter : $\phi 2 \text{ mm} \pm 0.2 \text{ mm}$
 $\phi 0.078 \text{ in} \pm 0.008 \text{ in}$
Inner diameter : $\phi 1 \text{ mm} \pm 0.2 \text{ mm}$
 $\phi 0.039 \text{ in} \pm 0.008 \text{ in}$
- Output operation: Liquid-absent-ON / Liquid-present-ON
(equipped with two outputs)

New proposals
for ease of use

High speed response time

High speed detection

0.8 mm 0.032 in air gaps are reliably detected by optical technology at a response time of $20 \mu\text{s}$ *.

Ideal for traceability of the analysis process.



*Refer to the specifications for detection conditions,
BE-A201(P) has a response time of $30 \mu\text{s}$.

New proposals
for ease of use

Ultra compact

Fingertip size

Allows for installation in a narrow space.



New proposals
for ease of use

For a wide-range of power supply voltages

5 to 24 V DC compliant

Allows for direct power supply from PC board.

New proposals
for ease of use

Built-in Amplifier

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.

Allows for
close proximity
attachment

Staggered pattern
(10 mm 0.394 in pitch)



Parallel pattern
(15.5 mm 0.610 in pitch)



ø3 mm ø0.125 in
tube type



Model No. : **BE-A301** (NPN output type)
BE-A301P (PNP output type)
Applicable tube : Transparent resin tube
(Equivalent to PFA)
Outer diameter: ø3 mm ±0.2 mm
ø1/8 in ±0.008 in
Inner diameter: ø2 mm ±0.2 mm
ø1/16 in ±0.008 in
Output operation: Liquid-absent-ON / Liquid-present-ON
(equipped with two outputs)

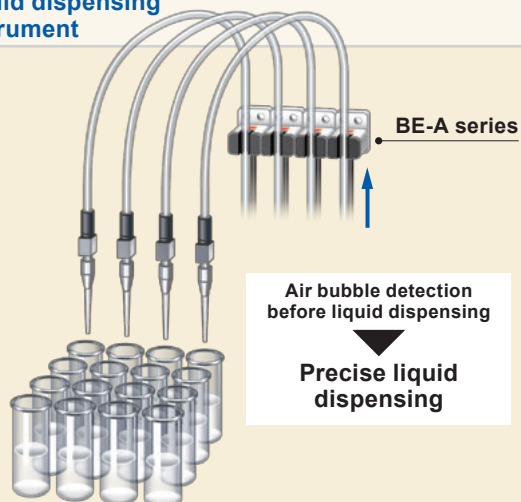
ø4 mm ø0.156 in
tube type



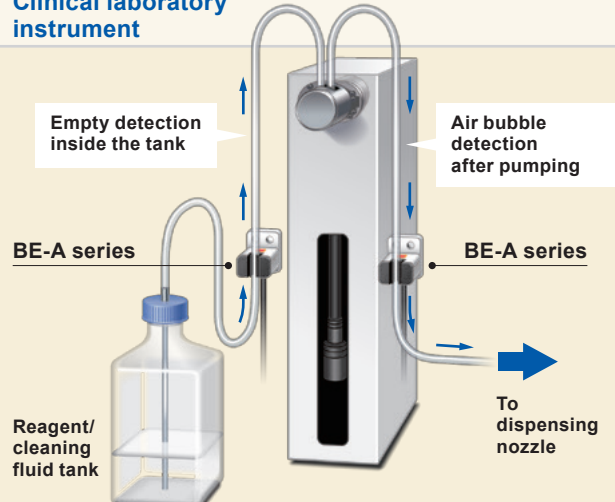
Model No. : **BE-A401** (NPN output type)
BE-A401P (PNP output type)
Applicable tube : Transparent resin tube
(equivalent to flexible PVC)
Outer diameter: ø4 mm ±0.15 mm
ø5/32 in ±0.006 in
Inner diameter: ø2.4 mm ±0.1 mm
ø3/32 in ±0.004 in
Output operation: Liquid-absent-ON / Liquid-present-ON
(equipped with two outputs)

Applications

Liquid dispensing instrument



Clinical laboratory instrument



SPECIFICATIONS

Item	Model No.	Type	for ø2 mm ø0.078 in tube	for ø3 mm ø0.125 in tube	for ø4 mm ø0.156 in tube
		NPN output	BE-A201	BE-A301	BE-A401
		PNP output	BE-A201P	BE-A301P	BE-A401P
Regulatory compliance			EMC Directive, RoHS Directive		
Detectable air gap (Note 2)			0.8 mm 0.032 in or more		
Sensing object			Liquid (Note 3)		
Applicable tube dia. (Note 4)	Outer dia.		ø2 mm ±0.2 mm ø0.078 in ±0.008 in	ø3 mm ±0.2 mm ø1/8 in ±0.008 in	ø4 mm ±0.15 mm ø5/32 in ±0.006 in
	Inner dia.		ø1 mm ±0.2 mm ø0.039 in ±0.008 in	ø2 mm ±0.2 mm ø1/16 in ±0.008 in	ø2.4 mm ±0.1 mm ø3/32 in ±0.004 in
Applicable tube type (Note 4)			Transparent resin tube (equivalent to PFA)		Transparent resin tube (equivalent to flexible PVC)
Supply voltage			5 to 24 V DC ±10 % Ripple P-P 10 % or less		
Current consumption			15 mA or less		
Output (Incorporated with 2 outputs)		<NPN output type> NPN open-collector transistor •Maximum sink current: 50 mA •Applied voltage: 30 V DC or less (between output and 0 V) •Residual voltage: 2 V or less (sink current at 50 mA) 1 V or less (sink current at 16 mA)	<PNP output type> PNP open-collector transistor •Maximum source current: 50 mA •Applied voltage: 30 V DC or less (between output and + V) •Residual voltage: 2 V or less (source current at 50 mA) 1 V or less (source current at 16 mA)		
	Output operation	Switchable either Liquid-absent-ON or Liquid-present-ON			
	Short-circuit protection	Incorporated			
Response time (Note 5)	When detecting bubble	30 µs or less	20 µs or less		
	When detecting liquid	80 µs or less			
Operation indicator			Orange LED (lights up with absent liquid)		
Protection circuits			Power supply reverse polarity protection , Output reverse polarity protection		
Environmental resistance	Protection	IP40 (IEC)			
	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			
	Voltage withstandability	1,000 V AC for between one min. between all supply terminals connected together and enclosure			
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 150 Hz frequency, 0.75 mm 0.030 in double amplitude or maximum acceleration 49 m/s², in X, Y and Z directions for two hours each			
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 mil , non-modulated)		
Material			Enclosure: PBT, Tube holder: Polyamide, Indicator: Polycarbonate		
Cable			0.09 mm² 4-core cabtyre cable 1 m 3.280 ft		
Cable extension (Note 7)			Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.		
Clamping torque			0.5N•m or less		
Weight			Net weight: 15 g approx., Gross weight: 25 g approx.		

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C

+73.4 °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.

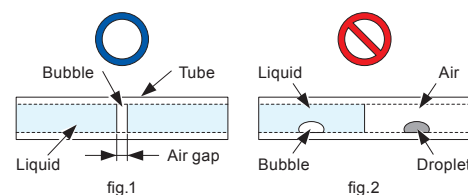
3) Sensing is affected by dirt or residues adhered to the inner wall of the tube. Please maintain the tube regularly.

4) When using a tube out of specifications or it doesn't have a smooth surface, please test sensing on the actual machine 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.

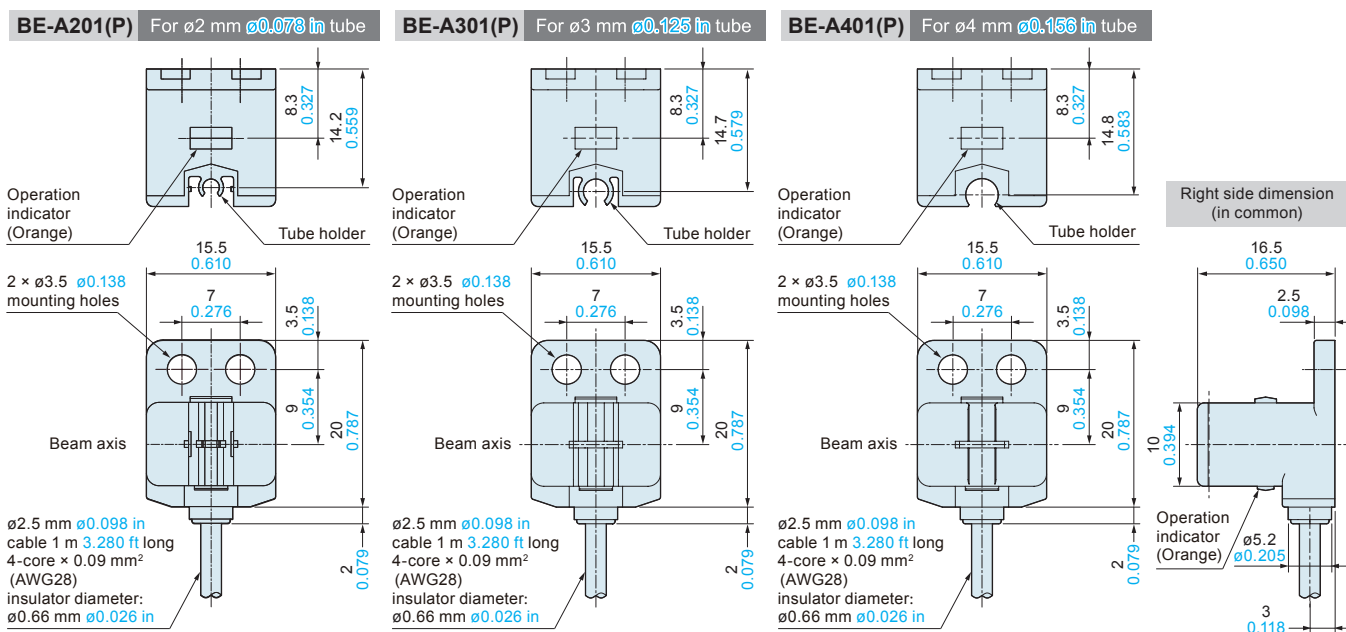
6) Liquid being detected should also be kept within the rated ambient temperature range.

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)

The CAD data can be downloaded from our website.



●If you have any question about Optical Bubble Sensor, please contact us by E-mail.

USA customers : usa-bmpj@ml.jp.panasonic.com
EURO customers : euro-bmpj@ml.jp.panasonic.com

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