



**The Introtek Advantage** provides products of unsurpassed quality, functionality and dependability that are manufactured to the highest medical device standards and backed by a three-year warranty.

## BD8/BD9 Series Integral Sensors

*The BD8/BD9 integral sensors combine BD3 electronics with a free-entry sensor head for air bubble, air-in-line and liquid level sensing.*



**I**ntrotek BD8/BD9 Integral sensors combine BD3 electronics with a free-entry sensor head. Constructed of soft polyurethane, the BD8 is recommended for rigid tubing. The rigid epoxy or ABS plastic BD9 is recommended for flexible tubing.

### TECHNOLOGY

Introtek air bubble detectors and liquid level sensors utilize high-frequency acoustic energy to monitor tubing or vessels for the presence of air, air bubbles, foam or liquid. The sensor's piezoelectric crystals are placed in direct contact with the desired point of detection. Air detection sensors and electronics emit pulses of ultrasonic energy which are sent through tubing and returned within a specified "window" of time. If air is present, the ultrasonic signal does not arrive within this "window" of time and a warning or dry signal is immediately transmitted.

### HIGHLIGHTS

- ◆ Non-invasive technology does not contact the fluid or require a break in the tubing.
- ◆ Integral design facilitates integration into user's product design and minimizes connections.
- ◆ Fastest air bubble detection circuitry available.
- ◆ No coupling agents required.
- ◆ Low cost, premium performance.
- ◆ Low power consumption.
- ◆ 5, 12 or 24 VDC operation.
- ◆ Reliable surface mount components.
- ◆ Built in self-test and fail-safe logic.
- ◆ High EMI and RFI noise immunity.
- ◆ Not affected by color of fluid.
- ◆ Can be used by a wide range of rigid and soft tubing.
- ◆ Custom manufactured systems are available.
- ◆ Air detection threshold or bubble size can be user-specified.

#### INTROTEK CERTIFICATIONS



### APPLICATIONS

- ◆ Air bubble, air-in-line and liquid level sensing
- ◆ Patient-connected medical devices, including:
  - Apheresis
  - Auto-transfusion
  - Infusion pumps
  - Perfusion-based "life support" devices
  - Heart-lung bypass
  - Dialysis
  - Cardiac assist pumps
- ◆ Immunoassay and diagnostic equipment
- ◆ Liquid and chemical dispensing
- ◆ Blood processing equipment

# BD8/BD9 Integral Sensors

## SENSOR PART NUMBER

Please contact an Introtek Application Specialist to determine the optional configuration for your application.

## FUNCTIONAL SPECIFICATIONS

### Input Voltage:

5 VDC, 12 VDC, 24 VDC ( $\pm 10\%$ )

### Current consumption:

40 mA maximum; 50 mA with LED option.

### Self-test Input:

Provides an electronic check for false wet output signal.

### Response Time:

Wet to Dry (liquid to air) 200  $\mu$ S maximum

Dry to Wet (air to liquid) 11 mS minimum

### Output Pulse Width:

The output will continue to indicate the presence of air for a minimum of 11 milliseconds after the bubble has passed through the sensor to allow fast moving bubbles to be detected.

### Liquid:

Bubbles will be detected in almost any liquid, however, groups of micro-bubbles or foam will also be detected as bubbles.

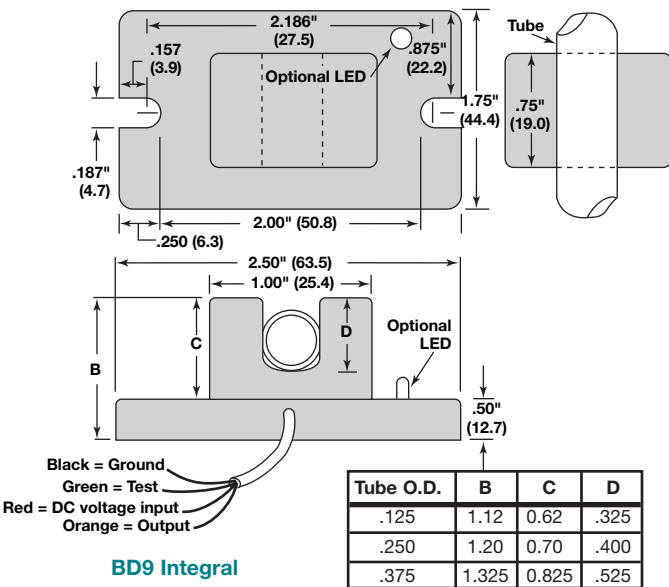
### Temperature Limits:

Operating: +41° to +140° F (+5° to +60° C)

### Humidity:

0 to 95% Non-Condensing

inches (mm)



### BD9 Integral

Dimensions shown in parentheses are millimeters.

Consult factory for dimensions of other sensor sizes.

## VALIDATION TESTING

The BD8/BD9 Integral Sensors were designed to be tested in conjunction with the following specifications:

### Electrical Fast Transients:

IEC 61000-4-4:2004

### Radiated Emissions, Group 1, Class B:

CISPR 11

### Electrostatic Discharge:

IEC 61000-4-2:2002

### Radiated Immunity:

IEC 61000-4-3:2002

### Power Frequency Magnetic Fields:

Performed per IEC 60601-1-2:2004

### General Safety Requirements:

IEC 60601-1:1988

## OPTIONS

- ◆ Open collector output
- ◆ LED alarm status output
- ◆ Reverse output logic
- ◆ Custom OEM designs
- ◆ Custom response times

## THREE-YEAR WARRANTY

All Introtek systems are warranted free of defects in materials or workmanship for three full years from the date of original factory shipment.

If returned within the warranty period; and, upon factory inspection of the unit, the cause of the malfunction is determined to be defective material or workmanship; then, Introtek will repair or replace the system at no cost to the purchaser (or owner) other than transportation.

Introtek shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of the equipment. There are no other warranties expressed or implied, except special written warranties covering some Introtek products.



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