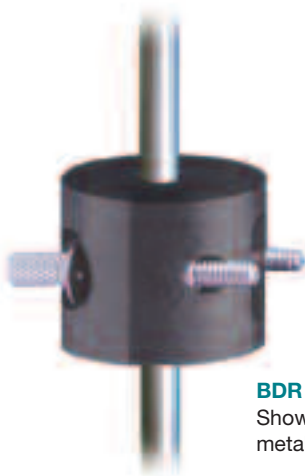




**The Introtek Advantage** provides products of unsurpassed quality, functionality and dependability that are manufactured to the highest medical device standards and backed by a three-year warranty.

## BDC/BDR Clamp-On Sensors

*BDC/BDR series clamp-on sensors detect air bubbles, air-in-line and liquid level in rigid tubing*



**BDR Sensor**  
Shown with rigid, metal tubing in place

Introtek BDR round clamp-on sensors are designed to work with a wide range of tubing materials and sizes. In conjunction with Introtek circuitry they provide the most reliable clamp-on bubble detection. BDR is recommended for applications where a mounting base is not a requirement.

Used for similar applications, BDC clamp-on sensors are available with a mounting base. Both sensors are designed to work with rigid 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.
- ◆ Low cost, premium performance.
- ◆ Wide range of sizes and mounting options.
- ◆ Fastest air bubble detection circuitry available.
- ◆ Not affected by fluid color or tubing material.
- ◆ Air detection threshold or bubble size can be user-specified.
- ◆ No field calibration is required.

### 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
- ◆ Chromatography and separations technology
- ◆ Immunoassay and diagnostic equipment
- ◆ Liquid and chemical dispensing
- ◆ Blood processing equipment

## BDC/BDR Series Sensor

### SENSOR PART NUMBER

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

### FUNCTIONAL SPECIFICATIONS

#### Sensor:

BDC and BDR Sensors are cast of a rigid epoxy resin and work well with rigid or less pliable tubing. Clamp-on style sensors must be sized to the exact tubing outside dimensions. It may be necessary to provide a tubing sample in order to provide an air detection system that meets application specifications.

The clamp-on style sensor works well as a dry-line sensor for many types of thin wall metal tubing with an outside diameter of 0.5 inches or greater. Due to the widely varying acoustic characteristics of metal tubing, we will require a tubing sample.

#### Application:

Since clamp-on style sensors are a rigid epoxy resin and are typically used with a rigid, less pliable tubing, it may be necessary to utilize the aid of a coupling agent to improve acoustic coupling. Typical coupling agents may include petroleum jelly, silicon grease, or teflon tape.

#### Liquid:

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

#### Calibration:

No field calibration is required.

#### Temperature limits:

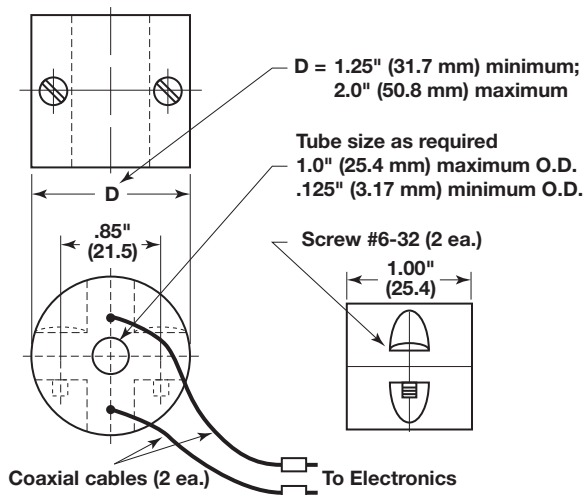
Operating: +41° to +140° F (+5° to +60° C)

Storage: -4° to +185° F (-20° to +85° C)

#### Humidity:

0 to 95% Non-Condensing

inches (mm)



Round clamp-on (no base)

### VALIDATION TESTING

The Clamp-on Sensor was 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

- ◆ Reverse logic output
- ◆ Custom Response Times
- ◆ Open collector output
- ◆ Custom OEM designs

### 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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