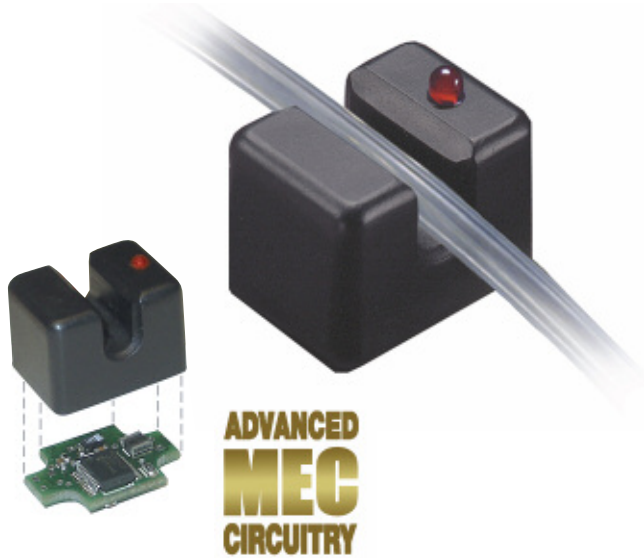




The Introtek Advantage provides products of unsurpassed quality, functionality and dependability that are manufactured to the highest medical device standards and backed by a three-year warranty.

AD8/AD9 Series Sensor

The AD8/AD9 ultrasonic air bubble, air-in-line and liquid level sensors from Introtek incorporate the latest generation MEC pulse-type ultrasonic circuitry



Introtek AD8 (for rigid tubing) and AD9 (for soft tubing) sensors incorporate the latest generation of pulse-type ultrasonic circuitry. Integral to the sensor's assembly, the Micro-Electronic Controller (MEC) features programmable algorithms for functionality control. Response times, time delays and other functions are programmable to specific requirements.

TECHNOLOGY

Introtek patented pulse-type ultrasound provides highly reliable, non-invasive air detection capabilities in critical applications where the safety of a patient or the integrity of a process is essential. Many of the variables which affect the accuracy of amplitude based or continuous wave ultrasound are greatly reduced if not eliminated by pulse-type technology.

HIGHLIGHTS

- ◆ **NEW ADU Series Sensor** for non-standard soft tube sizes between 1/8" and 3/8" where standard AD9 housings are not available; can eliminate tooling costs for low volume requirements for some odd-sized tubes.
- ◆ Compact design features integral MEC circuitry.
- ◆ Programmable micro-controller expands the circuit's functionality.
- ◆ High EMI and RFI noise immunity.
- ◆ Reliable pulse-type, non-invasive ultrasound.
- ◆ Air detection threshold or bubble size can be set to our customer's requirements.
- ◆ Accommodates a wide range of tubing sizes.
- ◆ Dry coupled; no coupling gel is required.
- ◆ Accuracy is not affected by fluid or tubing color.

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

AD8/AD9 Series Sensor

SENSOR PART NUMBER

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

FUNCTIONAL SPECIFICATIONS

Supply Voltage:

5.0 ±10% VDC (other supply voltages available upon request).

Supply Current:

15 mA without LED; 24 mA with LED

LED Indicator:

Bi-color LED indicates power on and liquid state.
Green color for Wet, Red color for Dry.
Other options possible.

Output Signal:

CMOS levels, programmable for High or Low on Wet
Output levels to within 0.5 V of power rails with 5mA loading
Open collector output available

Self-test Input:

Provides an electronic check for false wet output signals.

Response Time:

Air Detection (Wet to Dry): 215 μS typical
Liquid Detection (Dry to Wet): 46 mS typical

Operating Temperature:

+41° to +140° F (+5° to +60° C)

Humidity:

0 – 95% Non-Condensing

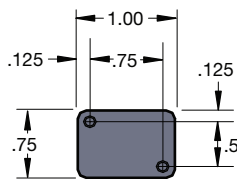
OPTIONS

- ◆ **ADU Series Sensor** for odd tube sizes between $\frac{1}{8}$ " and $\frac{3}{8}$ " OD.
- ◆ Bi-color LED
- ◆ Custom response times
- ◆ Reverse output logic

Four-Wire Color Code (Default Configuration)

— RED	Input DC Voltage (5.0 V)
— BLACK	Ground (Return)
— GREEN	Self-Test (Connect to Ground for Normal Operation)
— ORANGE	CMOS Logic Output

NOTE: Custom Assemblies and Provisions may require other system connections



AD8/AD9 Assembly
(Bottom Side View)

AD8/AD9 Typical Application Connection (Dimensions in inches)

VALIDATION TESTING

The Air Bubble Detection 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 IEC 60601-1-2:2007 (3rd Edition)

General Safety Requirements:

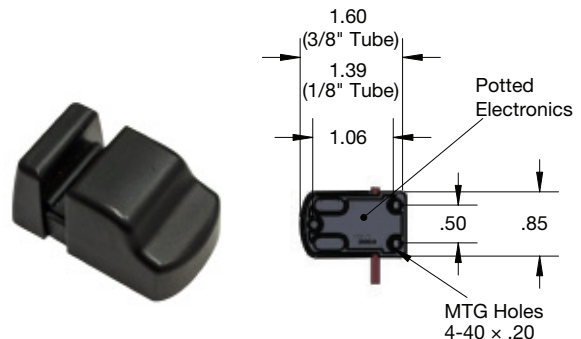
IEC 60601-1:2005+A1:2012 (E)

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, *with no modifications to the sensor; the original manufacturing label intact;* and, upon factory inspection of the unit, the cause of the malfunction is determined to be defective material or workmanship; INTROTEK will repair or replace the system at no cost to the purchaser (or owner) other than transportation. **If a unit is returned without an original label, the warranty is void.**

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.



ADU Series Sensor (Dimensions in inches)

INTROTEK

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Performance specifications are effective with date of issue and are subject to change without notice

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