



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.

BD3 Series Pulsed Electronics

BD3 electronics incorporate Introtek's pulse-type ultrasonic technology into a circuit designed for OEM surface mount sensor applications



Introtek's BD3 electronics are designed for high volume O.E.M. applications which require surface mount technology, compact size and economical price. The BD3 board provides TTL/CMOS output.

TECHNOLOGY

Introtek's 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.
- ◆ Works with various sensor configurations to meet many applications.
- ◆ Low cost, premium performance and low power consumption.
- ◆ Fastest air bubble detection circuitry available.
- ◆ Reliable surface mount components.
- ◆ Built in self-test and fail-safe logic.
- ◆ High EMI and RFI noise immunity.
- ◆ Not affected by fluid color or changes in tubing material.
- ◆ Air detection threshold or bubble size can be user-specified.
- ◆ HCMOS/TTL output.
- ◆ 5, 12 or 24 VDC operation.

INTROTEK'S 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

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FUNCTIONAL SPECIFICATIONS

Response Time:

Wet-to-Dry (liquid to air) 200 microseconds maximum;
Dry-to-Wet (air to liquid) 11 milliseconds 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.

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

ELECTRICAL SPECIFICATIONS

Input Voltage:

5 VDC, 12 VDC, 24 VDC ($\pm 10\%$);
15 VDC maximum with LED option

Current consumption:

30 mA maximum; 40 mA with LED option

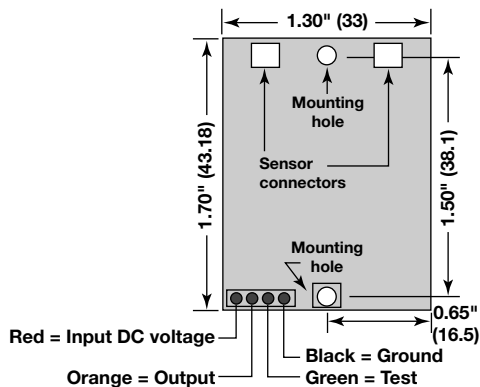
Output: HCMOS

Fluid indication = Logic high

Air indication = Logic low, non-latching

Self-test:

Holding the self-test input at ground potential allows normal operation. An open circuit or application of 2.0 to 24 VDC to the self-test input, will disable the internal transmitter, resulting in an output indication of air (low output). An internal pull-up provides a fail-safe to the test condition in case of a broken test lead.



BD3 Electronics

Dimensions shown in parentheses are millimeters.

VALIDATION TESTING

The BD3 Series Pulsed Electronics 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

- ◆ Open collector output
- ◆ LED alarm status output

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.