10 mm Unitrode™ Dielectric/Conductivity Sensor Specifications

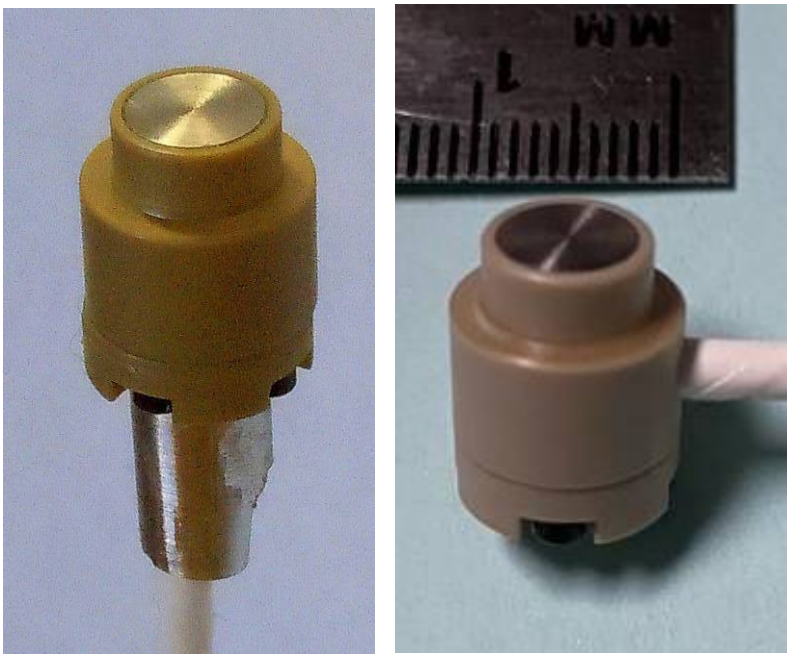

Figure 1
10-mm Unitrode Dielectric/Conductivity Sensor
Rear Exit (left), Side Exit (right)

DESCRIPTION

Suitable for R&D, QA/QC and manufacturing applications with repetitive operations, the 10 mm Unitrode is designed for use in presses, molds or harsh environments where a tiny, reusable dielectric sensor is desired. It may be mounted with the top surface flush with a platen or mold, insuring no interference with the flow of material during processing. The sensor is constructed with a steel electrode embedded in a high temperature polymer insulator. No integrated thermocouple is available.

The 10 mm Unitrode is rated for operation up to 200 °C, and its signal is routed through a 10-foot (3 m) long Teflon insulated coaxial cable to a standard dielectric sensor connector. The single electrode of this sensor requires a nearby grounded metal surface for proper operation.

SPECIFICATIONS (Available with side or rear exit conduit)

Dimensions

Diameter	: 10.0 mm (0.393″)
Height	: 12.7 mm (0.500″)
Length, conduit	: 3 meters (10′) nominal
Diameter, electrode	: 5.8 mm (0.230″)
Area, electrode	: 0.264 cm^2

Cable Configuration : Side exit or rear exit

Composition:

Electrode	: Stainless steel
Insulator	: High temperature thermoplastic
Cabling	: Teflon insulated

Operational:

Temperature, maximum	: 200 °C (392 °F)

Sensor Parameters:

A/D ratio	: 0.264 cm^2 / (mold gap in cm)

Note—A/D ratio is typically determined by experiment and varies with exact mold and mounting configuration

Base capacitance	: Determined by experiment

Thermocouple : None

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OPERATING MODES

The 10 mm Unitrode may be used with all Lambient Technologies dielectric instruments in either mid-conductivity or high-conductivity mode. The sensor makes a bulk measurement of material between the central electrode, shown close-up in Figure 2, and the surrounding, grounded mold and/or the opposite mold face. Figure 3 illustrates the sensor in relation to the mold. Maximum depth of measurement is about 2 mm, and the A/D ratio depends on the distance D to the upper platen.

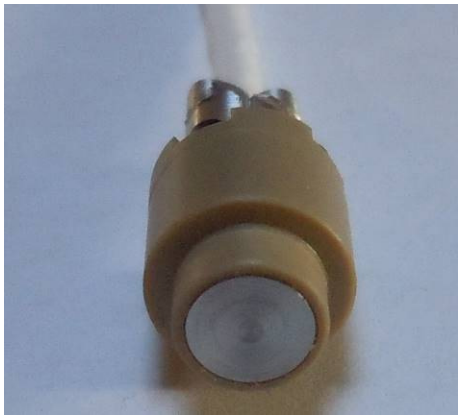

Figure 2
Close-up view of 10 mm Unitrode sensor head
(rear exit version shown)

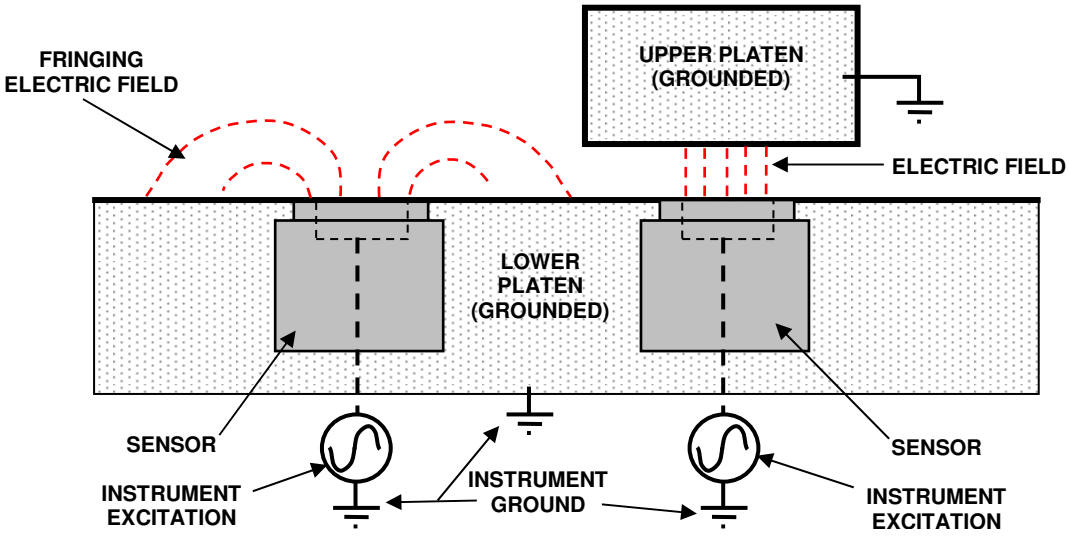

Figure 3
10 mm Unitrode sensor using nearby grounded surface as second electrode

FORM FACTORS

The 10 mm Unitrode may be specified with the cable exiting from the side or the rear as shown in Figures 4 and 5. Contact Lambient Technologies for current mechanical dimensions of the sensor.

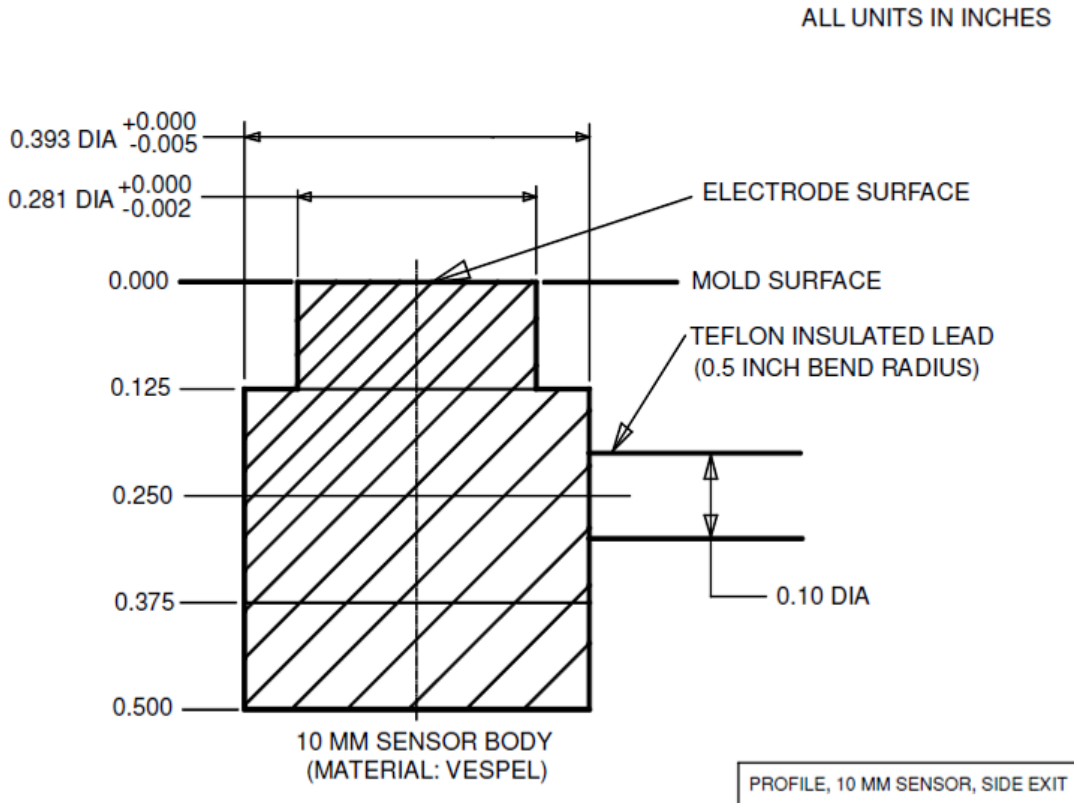

Figure 4
Nominal dimensions of 10-mm Unitrode, side exit

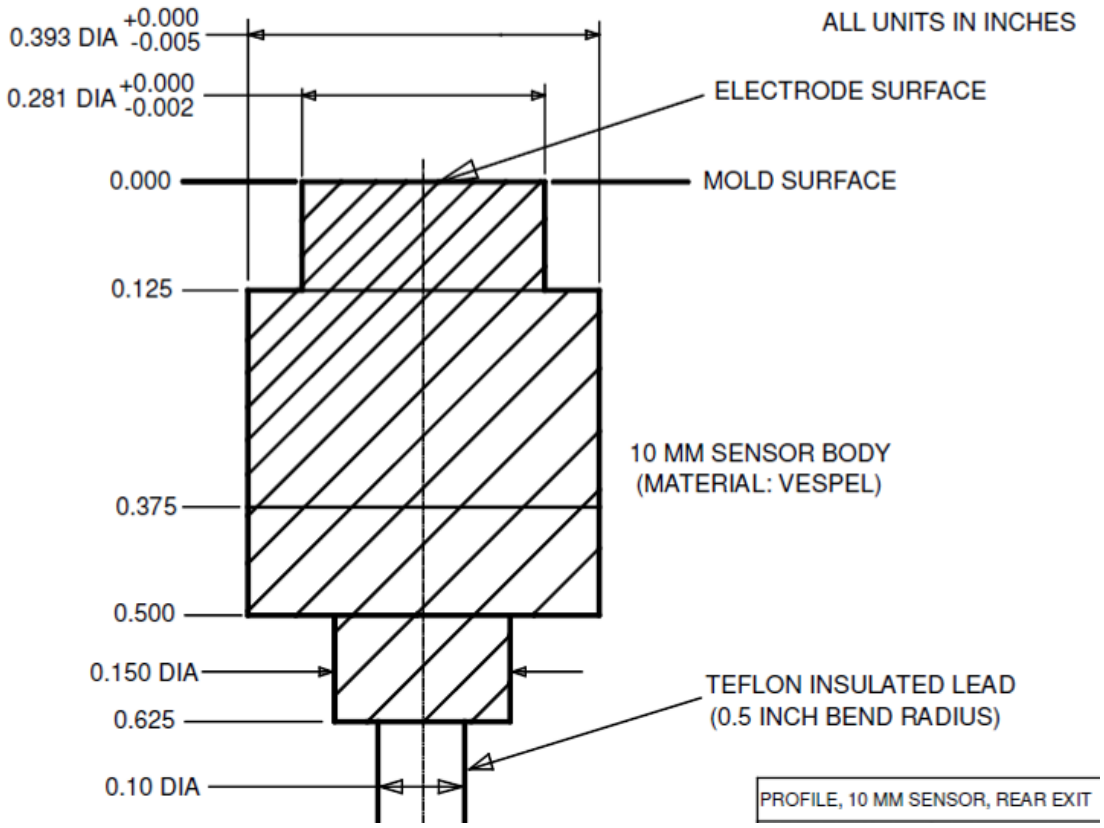

Figure 5
Nominal dimensions of 10-mm Unitrode, rear exit

INSTALLATION

The 10 mm Unitrode is designed for optimal mounting from the rear side of a mold or platen as shown in Figure 6.

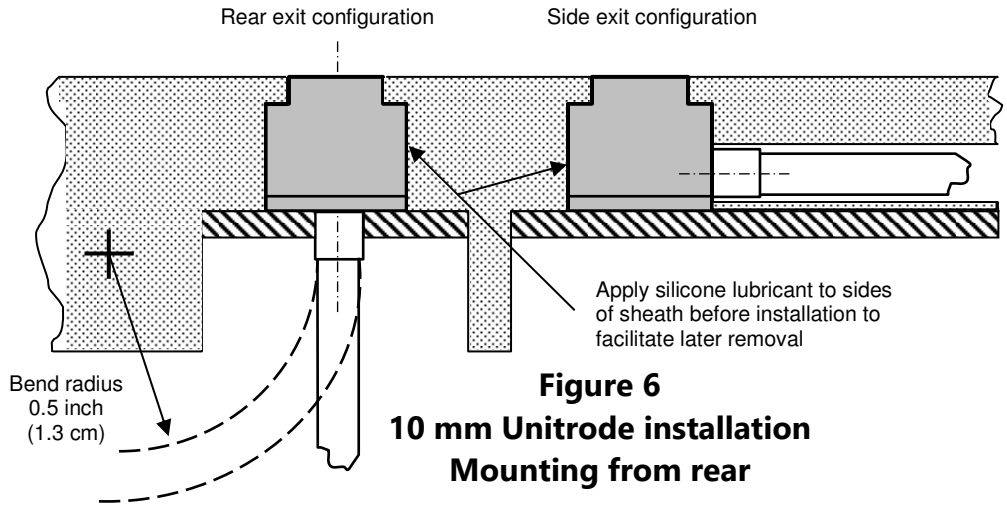

Figure 6
10 mm Unitrode installation
Mounting from rear

It is important to support the bottom plate of the sensor to prevent high pressures from pushing it out of position. To facilitate removal when necessary, silicone lubricant may be applied to the side of the sheath before installation.

CARE AND HANDLING

Always apply mold release to the surface of the sensor before use with curing material. A silicone based mold-release is recommended to reduce conductive effects on the measurement. Damage to the sensor may result if mold release is not used and cured material is peeled from the surface.

Do not apply excessive tension to sensor cable. Tugging the cable may damage the internal connections.

CLEANING

Careful use of a spatula or other scraping tool to remove samples will not damage the sensor, provided that mold release was applied to the sensor before curing.

Clean sensors with acetone, trichlorethlyene or other solvent to remove oils and contaminants. Solvents or water adsorbed onto the surface of the ceramic normally will not interfere with cure monitoring because it is released at elevated temperature, and would not be present at typical process temperatures.

At room temperature, however, adsorbed solvent or water will appear as an additional conductive component and may dominate the measurement. In this case the gains in air may be elevated (less negative, approaching 0 dB at low frequencies) and phases may be significantly negative. Heating the sensor above 100 °C for a short time should remove adsorbed material.

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