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D-2 Incorporated

Ultra-Low Power
Conductivity
Temperature
Depth Sensor

Part Number: OC-CTD-ULP-XW-DDD
Revision Date: 12APR23
Drawing Number: 310-001REVULP2



The D-2 Inc. Ultra-Low Power Conductivity Temperature and Depth Sensor, with Novel Hybrid Conductivity Sensor. The latest in Solid State Electronics & Processing, Direct Serial Data, USB, RS-232. SRAM Data Storage. Full Ocean Depth Precision and Resolution.

Features of the ULP-CTD Sensor

Extremely Low Power Usage of: 50 mW

Novel New Hybrid 100% Internal Field Free Flushing Conductivity Sensor

High Speed Sheathed Thermistor \sim TC = 60 mS (2 mm Diameter) with Integral Temperature Reference Standard

Industry Standard Silicon Pressure Sensor Full Thermally Compensated

2 or 1 CTD Data Frames/Second Sampling, User Selectable

Real Time Clock with Programable Interval Sampling as required & 128 Mbit data storage

Compatible with commercial wireline telemetry packages available from third parties.

Features Continued...

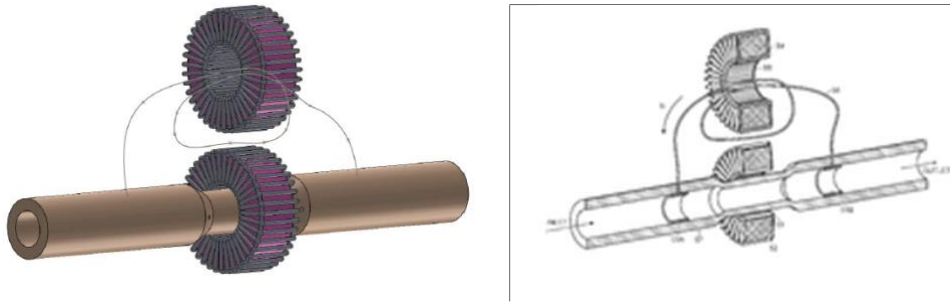
Each sensor calibrated over the range of 2.6 to 6 S/m in a computer-controlled bath, using natural seawater; water sample at each point is compared to IAPSO seawater

500 m Delrin, 3400 m Aluminum, 7000 m 17-4PH SS Depth Construction.

Options:

- 1) Depth Range
- 2) High Speed Thermometer <40 mS (1 mm Diameter Sheath)
- 2) Plug in Battery Pack
- 3) Wireline Telemetry with Bi-Directional Control Command Channel

D-2 Hybrid Conductivity Sensor



The D2 CTD utilizes a new Hybrid Conductivity Sensor. The Hybrid sensor is a completely novel concept in oceanographic conductivity/salinity measurement. It has the same performance advantage of a 3 electrode sensor where the end electrodes are electrically tied together ensuring there is no external electric field. Common tied end cell electrodes coupled with a novel inductive drive, eliminates the need for additional center electrode, or other electrodes in the measurement field. The two-electrode sensor with inductive drive is hence called a Hybrid as it incorporates the best aspects of both the electrode type & inductive type conductivity sensors each have a history of performance in oceanographic conductivity measurements.

As the two outside electrodes are shorted together electrically the outside potential of the sensor is “zero” hence there is no current flow outside the path of the internally shorted end electrodes. The inductive drive creates a current that flows through the center measurement region, the current flows in direct proportion to the conductivity of sea water. This current is collected by the end electrodes and passed through a simple current to voltage transformer. The rate at which current flows in the sensor is then in direct proportion to the conductivity of sea water and the magnitude to the drive signal. The drive signal level can be precisely controlled, and the collection electrodes and shorting path can be constructed to have very low impedance as compared to the external sea water path, hence the ‘all’ of the current flows through the shorted electrode path, and, therefore the current measurement transformer. The result is a two-electrode cell that is ½ the length of a traditional 3-electrode cell and has a large center diameter. A sensor that can free pass water through the cell without the need for a pump in almost all applications. In applications where a pump is needed, say for biological control, this can be easily added as the sensor measurement volume is 100% enclosed in the unit and the addition of tubing and a pump will not affect the calibration. The sensor is fully described in US Patent #9,410,910.

Typical Performance	Range	Resolution	Initial ACCURACY	Typical Stability
Conductivity	0 - 7 S/m	.00004 S/m	+/- 0.0003 S/m	+/- 0.0003 S/m/Month
Temperature	-5 - 35 °C	.0002 °C	+/- 0.001 °C	+/- 0.002 °C/Month
Pressure	User Set	.001% F.S.	+/- 0.015% F.S.	+/- 0.02% F.S. Year

D-2 Temperature Sensor

Sophisticated A/D acquisition electronics, ultra-stable thermistor, and state-of-the-art calibration provide the standards-level performance of an expensive AC bridge and platinum thermometer at a small fraction of the cost. The ULP-CTD is unaffected by shock and vibration. The highly accurate temperature measurement uses the same aged and thermal shock qualified thermistor as other leading instrument suppliers. The thermistor is combined with an ultra-stable resistance reference and mounted within the thermistor deployment sheath to ensure temperature homogeneity; this aspect is vitally important for deep ocean measures where extreme temperature precision is an absolute requirement.

The temperature sensor is available in two versions: a 2 mm outside diameter industry standard size, and a high speed 1 mm outside diameter best in the business response for the most demanding applications.

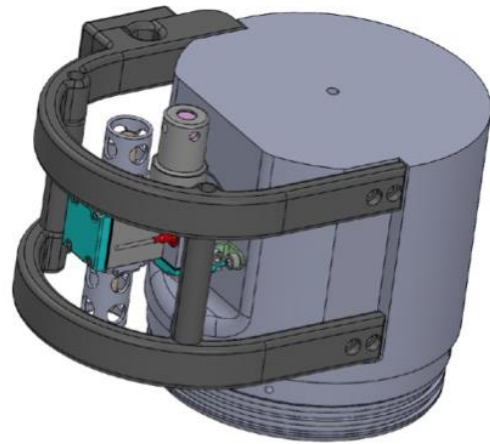
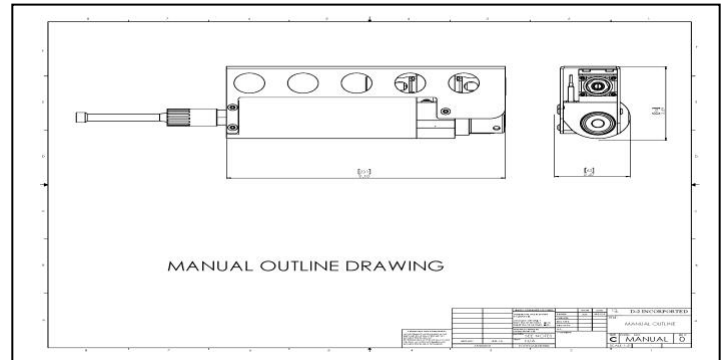
Real-time ULP-CTD data is transmitted via the RS-232 or RS-485 serial interface in ASCII characters. The D2 ULP-CTD must be externally powered, data can be logged in internal SRAM memory or it can be telemetered up a wire line using commercially wireline telemetry systems.

D-2 Depth Sensor

D2 ULP-CTD uses a high-accuracy, high-resolution pressure sensor. The D2 ULP-CTD's strain-gauge pressure sensor is offered in a wide range of full-scale values up to 1000 Bars. Pressure outputs are fully compensated for the effects temperature and is performed internally using state of the art techniques.

Development and Testing:

D-2 Hybrid CTD technology was developed in conjunction with the Office of Naval Research. Ongoing field testing is being completed by Woods Hole Oceanographic Institution and BIOS; see their latest data: <https://www.d-2.com/?p=1546>



ICE CTD

D-2 Inc Information:

ISO 9001 Certified manufacturer, all products are made in the USA at our facility.

For more Information:

Please contact D-2 Incorporated for additional specification information or quotation information. We hope to hear from you soon!

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