CONDUCTIVITY - TEMPERATURE TRANSFER STANDARD CT 01

IDRONAUT - *TECHNOLOGY IN SEARCH OF NEW DEPTHS*

On the occasion of the Oceanology International 2001 – Miami – April 3-5, 2001, Idronaut is proud to introduce the ***"Conductivity-Temperature Transfer Standard CT 01"*** which comes up to the line of the well proven, high performance oceanographic OCEAN SEVEN CTDs.

Philosophy of the system

The working principle is the following: once the calibration of the reference thermometer has been well determined (Hart Scientific and Rosemount, the main suppliers of Primary Standard Thermometers guarantee an accuracy much better than 0.001 °C in the measuring range of 0 ¸ 30 °C), the conductivity quartz cell is filled with standard sea water (1 ampoule is sufficient to wash the cell at least 10 times, as its internal volume is very small, 20 ml only).
Than the cell is placed in a unique High Precision Titanium Bath, designed and made exclusively by HART SCIENTIFIC for this specific application, of which medium term stability is better than 0.001 (from 0 to 30 °C).
After reaching the thermal stability of the conductivity cell, the system acquires the conductivity calibration according to the declared value of the sea water reference ampoule.
This Transfer Standard System represents a different and probably superior approach respect to the use of even the most accurate salinometer. In fact, the conductivity reference cell used is a big, massive quartz cell in which 7 rings of platinum are fused inside the quartz slots. Black platinum coating (sponge) is not required; this allows the easy cleaning of the cell. Conversely, the best salinometer uses a small glass cell with only four platinum platinized electrodes, which require frequent calibration with standard seawater ampoules.

The ***"Conductivity-Temperature Transfer Standard"*** is a compact and rugged instrument designed for the metrology laboratories to perform calibration of oceanographic CTDs probes. It combines a Primary Standard 100 ohm SPRT (Standard Platinum Resistance Thermometer), a large size Idronaut self flushing cell provided with seven internal rings of fused platinum in the quartz with a microprocessor controlled high resolution and high accuracy electronic amplifier.
Optionally, the ***"Conductivity-Temperature Transfer Standard"*** can become a redundant measuring system when equipped with two temperature and two conductivity sensors.
The high performance electronics collects and transmits the temperature and conductivity readings through the RS232C interface from 1 to 10 times per second. The functions of the ***"Conductivity-Temperature Transfer Standard"*** are managed by means of a simple communication protocol with the RS232C interface.

Features

- à Large size self flushing cell provided with seven internal rings of fused platinum in the quartz, specifically developed to make the re-calibration and checking easier by using a single ampoule of standard seawater.
- à High performance 24-bit digitizing circuits.
- à Temperature controlled oven conditions the electronics to obtain drift free measurements.
- à 0.1ppm Vishay resistors used as a reference for the CT electronic preamplifiers.
- à Redundant CT standard reference sensor pair.
- à Windows 98/2000 software simplifies system operations and automates the CTDs calibration.

CT Technical Specifications

Temperature

Sensor	Primary Standard 100 ohm SPRT (Standard Resistance Thermometer)
Range	-5 to +45 °C
Accuracy	0.001 °C (*****)
Resolution	0.0001 °C
Digital resolution	0.00000596 °C (23bits)
Stability	+/- 0.0003 °C/month
Sampling rate	from 1 to 10 Hz
Noise	< 0.0003 °C (1 Hz)
Excitation current	1.2 mA 10k Hz

Conductivity

Sensor	self flushing cell provided with seven internal rings of fused platinum in the quartz (16 mm diameter 110 mm length)
Range	0 to 70 mS/cm
Accuracy	0.001 mS/cm (*****)
Resolution	0.0001 mS/cm
Digital resolution	0.000008345 mS/cm (23bits)
Stability	+/- 0.001 °C/month
Sampling rate	from 1 to 10 Hz
Noise	< 0.0005 mS/cm (1 Hz)
AC excitation freq.	10k Hz
Cleaning	if the normal cleaning procedure (with the Idronaut conductivity cleaning solution) is not enough to completely remove the contamination (for instance carbonate), rotate a small swab inside the cell (20 mm diameter) wetted with 10% concentration of hydrochloric acid. Even a maximum 30% concentration can be used, if necessary.

(*****) Stated accuracy is dependent upon:
1) Physical primary standards accuracy such as triple point of water and melting point of Gallium.
2) Careful observation of methods used to perform calibration such as experimental technique.

System characteristics

Operating environment	Temperature 10-25 °C. Humidity 10 to 90% non-condensing
Warm-up	30 minutes
Oven temperature	Typical operating temperature 28 °C, temperature stability +/- 0.1 °C
Interfaces	RS-232C
Communications	Byte oriented proprietary communication protocol and a menu driven interface for maintenance access
Power supply	115 or 230 VAC ±15%, 50/60 Hz
Dimensions	480 x 350 x 190 mm
Weight	10 kg

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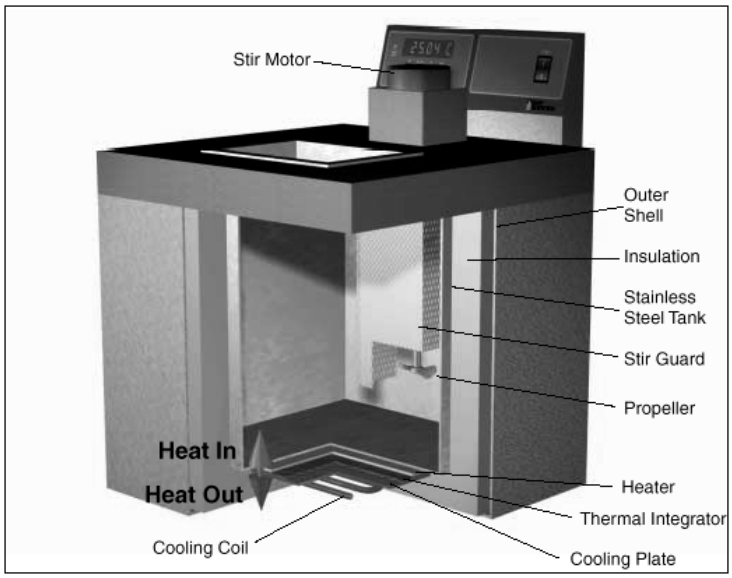
For Immediate Product Information Call:

MARCH 2001

HIGH PRECISION TITANIUM BATH

Two market leaders combine technologies to provide the best C.T. calibration system worldwide.

Hart Scientific's calibration baths are known around the world as the finest calibration baths made. Combined with the Idronaut ***"Conductivity-Temperature Transfer Standard"*,** you get the most advanced calibration system available.
Hart baths operate at temperatures as low as -10 °C. As in all Hart baths, each one is built using CFC free refrigerants. Hart's proprietary controller design and Idronaut's unique Titanium tank construction produce bath stabilities to ±0.001 °C or better. These baths are sufficiently stable and uniform that national labs use them for comparison calibrations and fixed-point maintenance.
This bath is fully automated with a bath interface package.



Controller
The first step in evaluating a bath is to look at its temperature controller. We designed our own proprietary control technology to deliver stability to ± 0.0001 °C with features that make your work more efficient. Our hybrid analog and microprocessor design is unique. Set-point resolution is 0.01 °C (0.002 °C on some models), and our "Super-Tweak" resolution mode shifts the controller display so you can adjust the bath set-point to the fifth decimal place. Although thermal noise in the bath is measured at four decimal places, the "Super-Tweak" function gets you closer to an absolute temperature than any other controller.
Eight of your most frequently used set-point temperatures are stored for quick recall and faster bath setup. Each Hart bath is fitted with a high-stability PRT or thermistor as the control sensor. Our controller uses special noise-rejection techniques to allow us to measure the very small resistance changes required for this level of bath stability. A proportional, integrating control function directs power to the bath heaters. Factory tuning eliminates most overshoot and allows the bath to achieve maximum stability within 10 to 15 minutes after reaching the set temperature.

Automation
Hart offers a number of options. You can select from an RS-232 interface or IEEE-488. The RS-232 packages come complete with Interface-*it* software so you can immediately start controlling your bath from a PC without any programming skills.

Heat Port Technology
A major factor in Hart's bath performance is our heat port technology. Hart improves bath uniformity and stability by reducing the heat paths from two to one. The cooling coil and the heater are sandwiched to the outside of the bath's Titanium tank.

Mixing
For mixing the bath fluid, Hart uses a carefully balanced stirring mechanism. The number of propellers and the pitch of the blades are adjusted to thoroughly mix the bath medium and eliminate both horizontal and vertical gradients. Our mixing scheme and the size and shape of our tanks all combine to deliver great performance.

Tank
This bath uses a Titanium grade 2 tank. The tank is manufactured and welded in our factory so we can control quality. Titanium tank guarantees no corrosion or rust due to the usage of salt water or corroding solutions.

Technical Specifications

Range	-10 to +110 °C
Stability	0 °C ± 0.001 °C; 25 °C ± 0.0005 °C; 100 °C ± 0.0008 °C
Uniformity	± 0.001 °C
Temperature setting	digital display with push-button data entry
Set-point resolution	0.002 °C high resolution 0.00003 °C
Display temperature	0.01 °C
Heaters	500 Watts / 1000 Watts
Access opening	162 x 292 mm
Depth	457 mm
Wetted parts	Titanium
Power	105 - 240V AC - 50/60 Hz
Volume	36 litres
Weight	68 kg
Size	737 x 686 x 394 mm
Interface	optional RS232C interface

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