T-Chain

The T-Chain is a parameter sensing string of sensors that can collect detailed data on elements such as temperature and pressure. PME is currently designing T-Chain's oxygen sensor.

Temperature

The T-Chain produces detailed thermal data that can be used to determine water column stratification, mixing, internal tides, and other information.

The T-Chain consists of a single electrical cable with one or more temperature nodes molded at fixed, user-specified locations. Each node contains a thermistor within an Inconel protective tube and electronics. Data are transmitted up the chain in a digital format. The chain can be connected to LDS, various PME loggers and circuits, and to some types of Campbell data loggers.

Features

1. Wide thermal range, 0 to 36 degrees C
2. Rapid response to temperature, approximately 2 seconds
3. High measurement accuracy, +/- 0.010 degrees C
4. 16 bit resolution, approximately 0.0005 degrees C
5. Rapid data rate, 1 scan of all nodes per second
6. Low measurement noise, RMS sub-millidegree
7. Up to 60 nodes
8. 165 meter maximum depth

The T-Chain consists of a single polyurethane sheathed cable with Kevlar core. Digital thermistor nodes are located at user-specified intervals. The thermistor and electronics are housed in a hermetically sealed Inconel 625 metal tube and metal case, which is then molded into a polyurethane elastomer node. This provides the best possible mechanical protection and water proofing integrity, while maintaining a fast response time.

The T-Chain can be either a simple hanging type suspended from the water surface or a water-level adjusting type, where the thermistors are distributed in two sections at the top and bottom of the T-Chain, allowing coverage of the entire water column as the water level rises and preventing the T-Chain from laying on the lake bottom.

The single cable T-Chain can accommodate many nodes at user-specified intervals. This new design requires just one digital channel on a data logger, unlike other T-chains that require one channel for each thermistor.

Parameter	Specification
Sensed Parameter	Temperature
Range	0 to 35 deg C
Accuracy	+/- 10 mdeg C
RMS Noise	Less than 0.5 mdeg C
Resolution	Approx. 0.5 mdeg C
Maximum Data Rate	1 scan of all nodes per second
Sensor Time Constant	Better than 2 seconds
Number of Sensors	Up to 60
Total length of Sensing Element	200m overall length
Maximum Depth of a Node	165m
Maximum Span Between Nodes	30m
Minimum Span Between Nodes	25cm
Absolute Accuracy	+/- 0.010 deg C with sub-ranged calibration
Relative Accuracy	+/- 0.005 deg C
Thermal Noise	0.00015 deg C (not including 16 bit quantization noise)
Resolution	1 part in 2^16 (approximately 0.0005 deg C)
Range	0 to 36 deg C

Pressure

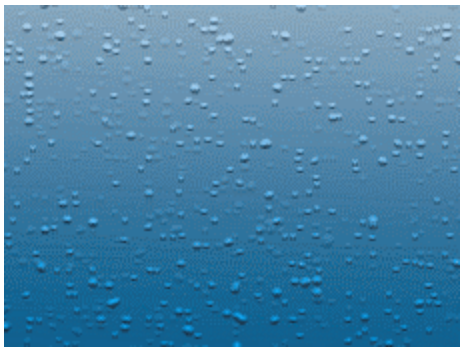
The T-Chain's Pressure Transducer is a strain-gage transducer that converts pressure into a format that can be uploaded along the T-Chain. This Pressure Transducer is only compatible with PME's T-Chain.

The Pressure Transducer is designed to be the last sensor on a T-Chain and must be located at the end of the T-Chain opposite the under water connector. This sensor is an absolute pressure sensor and is available in three pressure ranges.

Specifications

Full Scale Absolute Pressure	5, 10, 20 bar
Accuracy	0.5% FS (5, 10 bar) 1 % FS (20 bar)

Oxygen



The T-Chain Oxygen Sensor is currently being developed by PME. If you would like to be placed on our notification list please e-mail Kristin at kristinhead@pme.com.

T-Chain Data Logger

The PME logger is designed to interface with PME's temperature chain as a stand-alone product. The picture shows the outer submersible container and birdcage that hold the logger. One temperature sensor (node) temperature chain is also shown. The logger's capacity and endurance depend upon the number of nodes on the chain, the sampling interval, and the capacity of the compact flash card. With a 128 Meg flash and sampling 41 nodes each minute the logger capacity is approximately 2 years.

The logger and chain are completely submersible. The logger 'birdcage' is designed to connect to a customer-supplied buoy and cable system. The birdcage has no sharp corners towards the bottom so that 3rd party cables such as fishing lines have a chance to slide over it without snagging.

The heart of the logger is a Persistor CF2 single board computer. PME supplies source code for PME's simple logging program. Customers can adapt this source code to their own purposes. Adaptation is relatively easy, but requires the purchase of inexpensive 3rd party software.

The logger is designed to be deployed beneath the water surface. However, the logger must be brought to the surface to refresh the batteries and obtain measurements.

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