Reversing Thermometer
RTM 4002
Instruction Manual

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INTRODUCTION

The RTM 4002 is a digital deep sea reversing thermometer with the outer dimensions of mercury instruments. It has the same positive features of classical reversing thermometers but without their disadvantages:

- The displayed value is the real sample value, it is no longer necessary to evaluate the real value under consideration of a secondary thermometer.

- Reading of value with maximum accuracy no longer needs optical magnification.

- The sample value is protected against inadvertent further reversing.

- One instrument with a range of -2 °C to 40 °C replaces a set of high precision mercury reversing thermometers.

GENERAL DESCRIPTION

The RTM 4002 is a reversing thermometer with a depth range of up to 10000 meters. The pressure housing is made of a glass tube closed at the ends by metal stoppers. One contains the platinum sensor and the other is the battery compartment.

The instrument is operated by a magnetic programming switch for complete stepping through of the operational modes "HOLD", "CONT" and "SAMP".
A battery test indicates the need for battery renewal.

OPERATIONAL INSTRUCTIONS

The instrument has two operational elements:

a) A magnetic switch behind the punctuated area which is activated by passing over that area with the magnetic bar provided.

b) An internal mercury switch which is activated by inverting the instrument.

ATTENTION:
There must be a time delay of at least one second between two activations of the magnetic switch.

ATTENTION:
The instrument is in normal (non reversed) mode if the *sensor head is pointing downwards*.

1. Putting into Operation

The instrument is delivered with mounted battery set and is in power down mode (deactivated with switched off LC-display).

a) Hold Modus
After single activation of the magnetic switch the instrument will be in hold mode. The display shows the last sampled value. After 10 seconds the instrument switches off to the power down mode.

b) Continuous Modus (Instrument non reversed)
Activation of the magnetic switch during hold mode leads to the continuous mode. For 60 seconds the instrument continuously measures the temperature and displays it in physical units on the LCD. After that time it switches off to the power down mode. The last sample value is held in memory.

ATTENTION:
If the temperature is greater than 19.999 °C it comes, according to the measuring principle, about every 10 seconds to a jerky change of displayed values for about 2 seconds. The displayed values during this time are not sample values and must not be used. Values out of memory are not influenced by this and remain correct.

c) Sample Modus
Activation of the magnetic switch during continuous mode leads to the sample mode. Although this mode is now not distinguishable from the power down mode it is prepared to take samples on reversing. By further activation of the magnetic switch or reversing of the instrument for less than 10 seconds you can control the operational mode. As long as the instrument is activated the display shows sample values and indicates the mode by showing "SAMP". No sample value will be held in memory.

On reversing, for more than 10 seconds however a sample value is held in memory and the instrument switches off to power down, it is not possible by further reversing to activate the sample mode. The sample value is thus protected against loss through new reversing by salvage or transportation of the instrument.

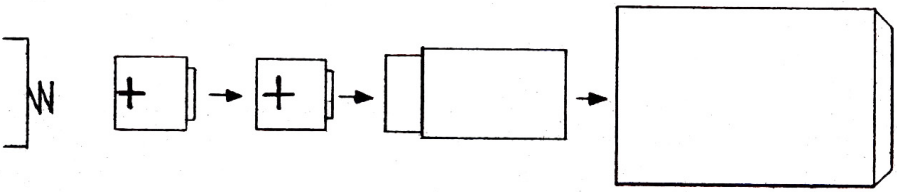
d) Hold Modus (Instrument reversed)
As described under a) but without further activation so making continuous mode impossible. The sample value is so protected against erasure.

2. BATTERY TEST

The battery test is done in reversed hold mode. The instrument is in working condition if under continuous activation of the magnetic switch no "BAT LOW" is displayed. If "BAT LOW" is displayed but disappears under non activation the instrument is in working conditions for some samples. But by the next opportunity the batteries should be replaced. If the "BAT LOW" remains, even under non activation, the instrument is not in working condition.

3. REPLACEMENT OF BATTERIES

The batteries are situated in a separate compartment outside the main pressure housing at the outer end of the stopper opposite to the sensor head. The main housing is not to be opened for replacement of batteries. The battery set consists of 2 lithium cells DL 1/3 N. To open the compartment turn the housing clockwise by simultaneously pulling the holder. Inside this holder are the two cells with minus terminals orientated to the front hole of the holder. The batteries are replaced in this order. The holder is then placed with the minus terminal in front into the battery case. Then push the case against the stopper by simultaneously turning clockwise. The compartment is sealed by an O-ring. For initialisation the magnetic switch is activated in 5 second intervals until the instrument is in sample mode. Then it is reversed for 15 seconds. After that it is in regular power down mode and can be used as described under 1.



Technical Specifications

Range	:	-2.000 ˚C to 40.00 ˚C
Resolution	:	±0.001 ˚C (-2.000˚C to 19.999 ˚C) ±0.01 ˚C (20.00 ˚C to 40.00 ˚C)
Accuracy	:	±0.00025 ˚C per month
Stability Time Constant	:	in water with v 0.2 m/sec T 0.9 = 2.3 sec
Batteries	:	2 pieces DL 1/3 N or equivalent sufficient for a minimum of 2700 samples. Replacement at least every 5 years.
Pressure Range	:	10 000 dbars
Storage Temperature	:	-10 ˚C to +80 ˚C
Outer Dimensions	:	327 mm length, 20 mm diameter
Weight	:	160 g

ATTENTION

Please do not place the magnetic bar near the activation area during storage. You might reduce battery capacity!