Isothermal Technology

Parallel Tube Liquid Bath: Hydra
Model 798

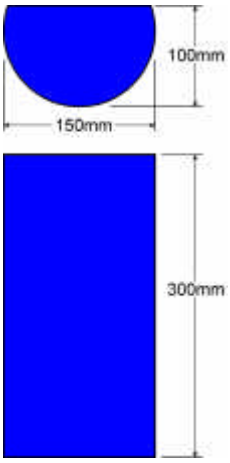
Evaluation Report

Maximum Immersion Depth of 300mm

Liquid Capacity Approximately 5L

Stability, +/-0.01°C See Graphs

Outstanding Vertical Profile



The Isotech Hydra Model 798 has been developed to offer good immersion depth, 300mm at an affordable price. The temperature range of the 798H is 30 to 200°C. The M and L models include internal refrigeration and extend the minimum temperatures to –40°C and -80°C respectively, with a maximum operating temperature of 125°C. Liquids are circulated by a propeller which mixes and forces the liquid down the rear of the calibration volume. The liquid flows up the front calibration voulme into a collection tray where it returns for circulation.

This evaluation report describes the performance of this bath, the intent is to provide a guide to the performance that can be expected in the calibration laboratory. When comparing uncertainties and bath performance it is important to check that the specifications being compared are like for like, if in doubt please contact Isotech for advice. There is no agreed International standard for the expression of comparison bath performance and some other parties, without accredited labs of their own, have made claims which can lead to disappointment when a laboratory needs to measure the actual bath performance to establish calibration uncertainty.

Isotech operates a UKAS Accredited Calibration Laboratory – equipped with bath's of our own manufacture – check our schedule, ask for a copy or visit http://www.isotech.co.uk

Performance Detail: Stability

On occasions, the bath's absolute stability is required and also the thermal profile needs to be evaluated, these for sensors whose length or mass is dissimilar to the reference standard.

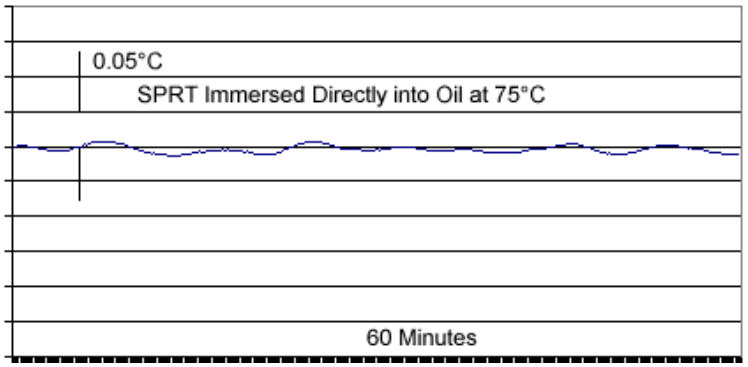
Stability or *absolute stability*, we define as the variation in temperature, with time, of the liquid in the calibration volume.

The stability was measured directly in the liquid – *Not* in the support or equalizing block

Stability at 75°C, measured in Liquid with a model 909/25 Ohm standard platinum resistance thermometer. (Oil)

Stability Values

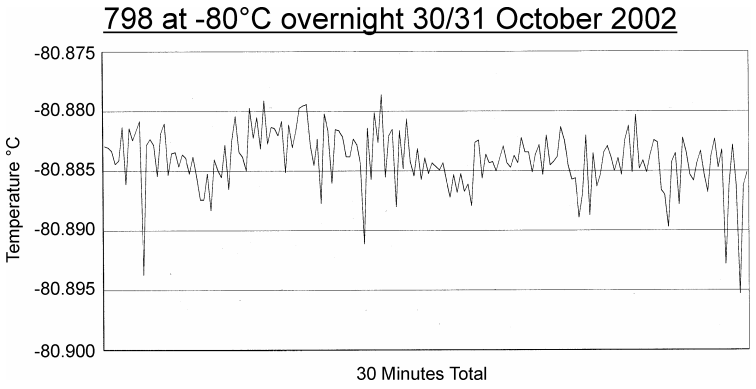
+/-0.01°C over a 60 minute period.



Stability at -80°C, measured in Liquid with a model 100 Ohm metal sheathed thermometer. (Methanol)

Stability Values

+/-0.010°



Comparison Stability

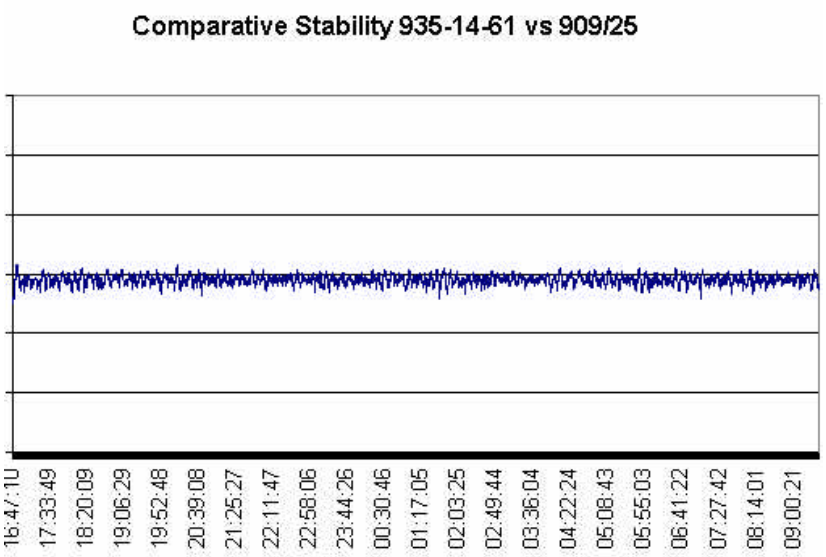
Comparison stability is the temperature variation over time of the difference between two thermometers in the calibration volume.

For example, in a comparison bath you would compare a unit under test to a Standard, if both thermometers are connected to a measuring device simultaneously then as both

thermometers "see" the same temperature variation the errors are eliminated - or reduced to the a value determined by the difference in time constants of the two probes.

Comparing the Glass Sheathed SPRT and the 100 Ohm industrial thermometer over 16 hours showed a comparison stability of better than +/- 0.005°C – and this includes the uncertainty of the measuring instrument.

Comparison stability better than +/-0.005°C as tested over 16 hours



Performance Detail: Vertical Temperature Gradient

Test Method
Two metal sheathed 100 Ohm thermometers are immersed 245mm, then withdrawn in 10mm steps to provide a thermal survey over a length of 150mm.

The probes are Isotech Model Type 935-14-61 and were immersed directly into the oil at temperatures of 50, 125 and 200°C.

This includes the measurement error, the immersion or stem conduction error will increase as the thermometer is withdrawn.

Temperature	Maximum Variation over 150mm
50°C	0.002°C
125°C	0.002°C
200°C	0.005°

Performance Detail: Horizontal Temperature Gradient

Test Method
The two 935-14-61 thermometers are supported by the standard probe support, and interchanged between the clamping positions of the probe support. The variation in temperature being recorded. The probes are immersed directly into the oil.

Temperature	Maximum Variation (Probes Separated 60mm)
50°C	0.001°C
125°C	0.001°C
200°C	0.002°

Conditions of Test

The graphs are from tests carried out under the following conditions,
Model: Isotech 798L.

Measuring Equipment:
Isotech TTI 2 Thermometer, resolution 0.01 (Statistics Mode)
Data recorded with CalNotePad Software, sampling rate 5 seconds
Thermometers Used: Isotech Model 909/25 Ohm Standard Platinum Resistance Thermometers, *SPRT*.
Isotech Model 935-14-61 Pt100 Metal Sheathed Thermometer.

Environmental:
Ambient Temperature 23°C variation better than +/-2°C
Supply Voltage 230VAC (Stable)

Results shown are typical for the above conditions and do not constitute a formal specification

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