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EVALUATION REPORT

Orion-796-Series

Isotech

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The Orion Liquid Calibration bath is a deep immersion calibration bath that covers the temperature range -40° to +300°C with two variants:

Orion M: -40°C to +125°C
Orion H: +35°C to +300°C

The Orion M has built in refrigeration to facilitate the lower temperature and the Orion H is a heat only bath. The liquid is circulated using a variable speed stirring mechanism around the deep immersion, 470mm, calibration volume.

This evaluation report describes the performance of the Orion that can be used as a guide to the laboratory performance.

The performance of the bath will vary depending on liquid type, stirring speed and other outside influences. Due to the limitations of liquids and the inability to cover the full temperature range available, the liquids have been changed at certain temperatures to cover the full temperature range.

Stability

The stability of the Orion bath is variable with respect to temperature and liquid type.

The Absolute stability of the bath is the variation of temperature of the bath over a given time period. This is usually measured by a single thermometer either immersed directly in the liquid or into an equalising block. The thermometer is usually a fast response thermometer such as the Isotech 935-14-61 RTD.

Table 1 below outlines the Absolute stability of the Orion M using a 935-14-61 fast response thermometer immersed directly into the liquid to a depth of 300mm:

Temperature (°C)	Liquid	Absolute Stability (°C)
-40.00	Methanol	± 0.006
0.00	Methanol	± 0.006
50.00	C10 oil	± 0.002
125.00	C10 oil	± 0.003

Table 1.

Table 2 below shows the data for the Orion H.

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Temperature (°C)	Liquid	Absolute Stability (°C)
50	Water	± 0.002
125	VH oil	± 0.010
170	VH oil	± 0.015
230	VH oil	± 0.015
290	VH oil	± 0.015

Table 2.

Generally the performance of a liquid bath can be improved with the addition of an equalising block. It also provides a convenient method of support and ensures equal immersion depth for the thermometers. The smallest uncertainties are obtained if there are two thermometers connected to an instrument simultaneously and the ratio between the two recorded. This method of comparison calibration gives the smallest uncertainties.

Uniformity

The uniformity is the variation in temperature of the working volume of the liquid.

Test method

Two 935-14-61 thermometers were immersed to 300mm, one is withdrawn in 10mm steps to provide a thermal survey over a 150mm depth.

Temperature (°C)	Temperature variation (°C)
-40	± 0.004
0.0	± 0.005
125	± 0.007
250	± 0.007

Heat up and Cool down times

The Orion range has two different methods of cooling.

The Orion M has an automated internal refrigeration system to cool between the temperatures -40°C and +50°C. It also has an internal cooling coil to allow additional cooling across the rest of the temperature range. This cooling coil requires an external medium such as compressed air or water to operate. It is accessible from the rear panel of the bath.

The Orion H has no inbuilt refrigeration but uses the internal cooling coil mentioned above.

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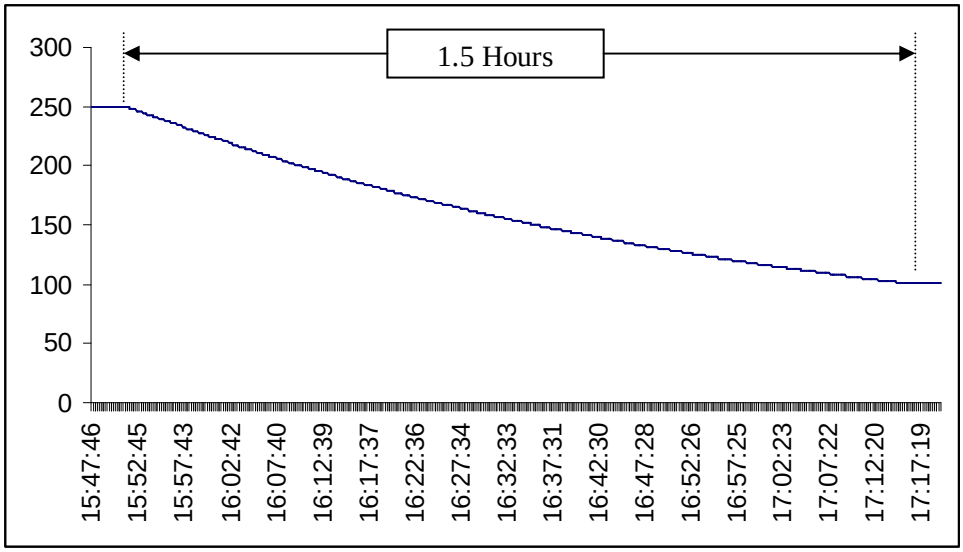
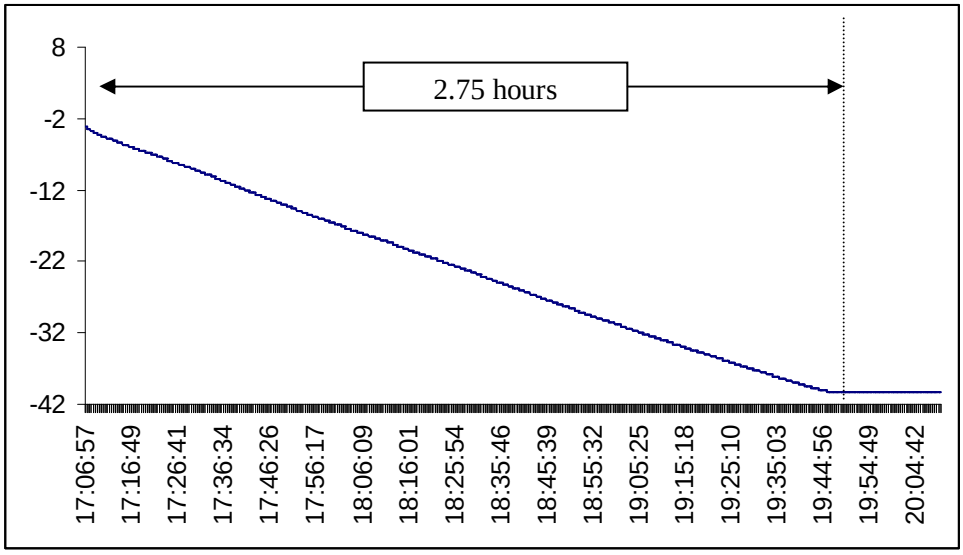
The graphs below demonstrate typical cooling times.



The above graph shows the cooling coil in use for the Orion H. The graph show a cool down time from 250°C to 100°C in a time of 90 minutes. The cooling medium was water under tap pressure. The liquid medium was Isotech VH oil.



The above graph shows the typical cool down data for the Orion M. The liquid medium was Methanol and the setpoint -40°C.

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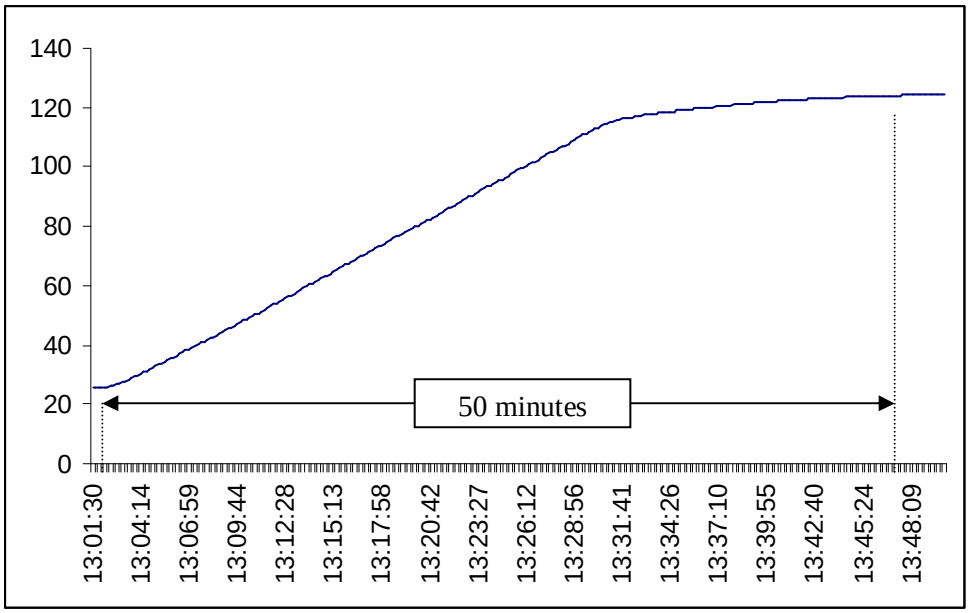
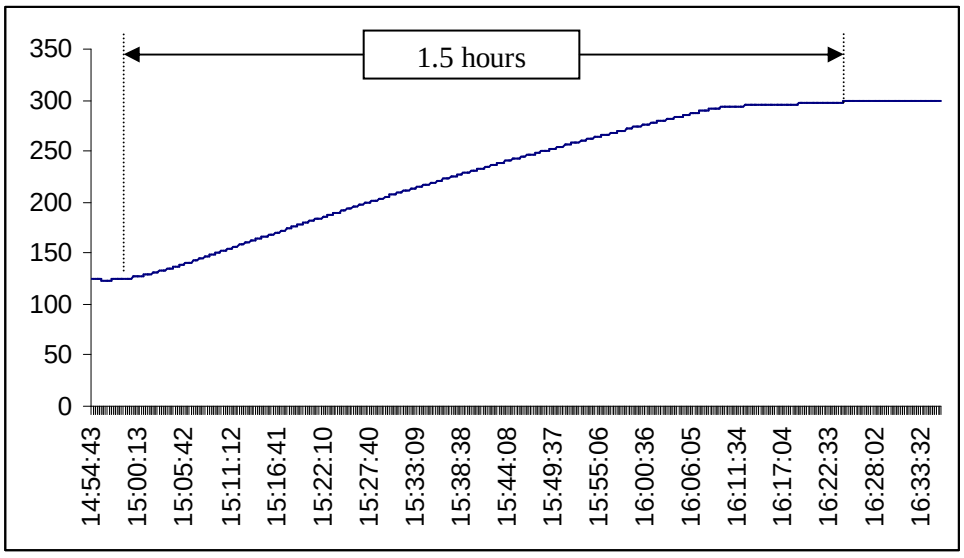


The above graph shows the warm up time of the Orion M to 125°C, the liquid medium is Isotech C10 oil.



The above graph shows the warm up time of the Orion H from 125°C to 300°C. The liquid medium is Isotech VH oil.

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