

# Stirred Liquid Baths

## 785 Parallel Tube

- Uncertainties to <1mK
- Physical separation of heating from Calibration Volume
- Three models covering -80 to 300°C

Isotech calibration baths employ sophisticated designs to ensure calibration to the smallest of uncertainties. In 1986 Isotech purchased the interests of H N Irving & Sons Temperature division which had specialised in providing high quality baths to NPL and other international laboratories.

The knowledge and concepts from this scientific instrument manufacturer were used in the development of the Isotech 815 and 915 Parallel Tube Liquid Baths. Whilst there is a higher cost compared to simple designs the quality and pedigree is unmatched.

The key feature is the physical separation of the chamber in which the liquid is heated or cooled from the chamber that contains the calibration volume in which the thermometers are placed.

The geometry of parallel tube is also important, with the shape and angle of the curves optimised for temperature uniformity.

The new Libra Model 785 achieves this with the same parallel tube assembly as used in the 915 packaged into a different case and now with internal refrigeration can be used to lower temperatures.

The cooling power varies dynamically with the benefit of giving greater stability at lower temperatures.



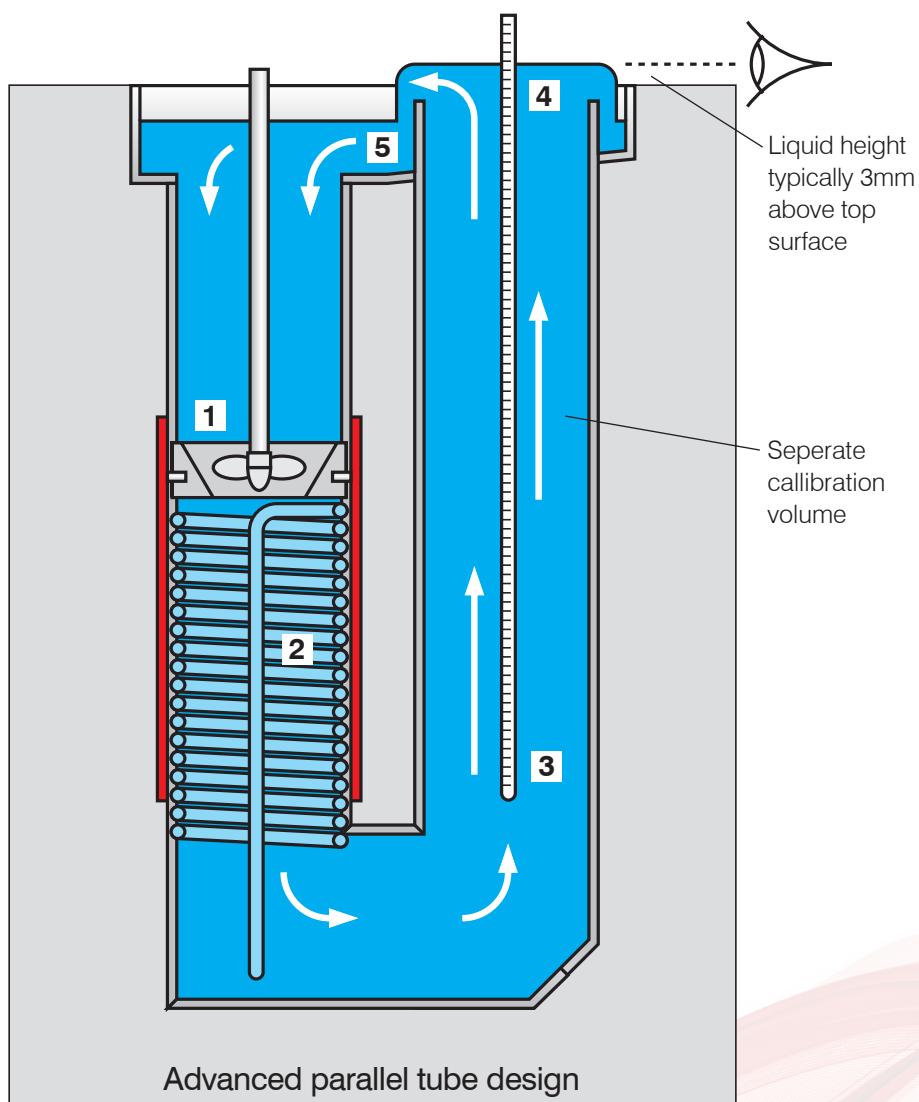
Whilst the bath has a maximum immersion of 485mm the fluid requirement is just 8.5 litres. This helps to lower operating costs as many other baths require a much larger volume of fluid, which in turn can be costly.

Model	All Models	785L	785M	785H
Temp Range		-80°C - 125°C	-40°C - 125°C	30°C - 300°C
Volume		98mm Diameter, 485mm Deep		
Absolute Stability Direct in Liquid	±0.0025°C (Water, 50°C)	±0.006°C (Ethanol, -80°C)	±0.006°C (Ethanol, -40°C)	±0.006°C (C10 Oil, 125°C)
Vertical Uniformity		From <1mK - See evaluation report		
Heating time		25°C to 125°C < 50 mins (C10 Oil)		30°C to 250°C < 150 mins (VH Oil)
Cooling time		0°C to -80°C < 300 mins (Ethanol)	10°C to -40°C < 180 mins (Ethanol)	-
Display Resolution (Whole Range):		0.01°C	0.01°C	0.01°C
Liquid Height (Above Surface)		3mm	3mm	3mm
Design		Parallel Tube: Separate Calibration and Mixing Chambers		
Communications		Includes Serial Interface, PC Cable and Software		
Dimensions		485mm wide, 525mm deep, 1150mm high		
Weight		78kg	68kg	48kg
Safety		Compliant to CE Regulations		
Power		2.8kW	1kW 108-130 or 208-240V, 50/60Hz	800W
How to Order		785L	785M	785H

Refer to Evaluation Report for Full Details

## 785 Operation

1. The Liquid Flows Down into the Mixing Chamber through an orifice plate, the flow rate of which is adjustable from the front panel.
2. Cooling / Heating Chamber, circular design for optimum flow and uniformity.
3. The calibration chamber is separate from the cooling / heating chamber.
4. The Liquid flows over a weir a little higher than the bath lid suiting total immersion liquid in glass thermometers.
5. The Liquid flows into a large volume liquid tray which caters for the expansion of the liquid as it is heated. The liquid re-circulates around the bath.
6. High Efficiency Thermal Insulation.



## Lowest Comparison Calibration Uncertainties

Isotech best practise for comparison calibration of resistance thermometers is to determine the resistance of the thermometer under test by directly comparing it to a Standard Platinum Resistance Thermometer.

The comparison is made using a thermometry bridge, such as the microK, to measure the resistance ratio of the two thermometers. An advantage of this approach is that if both thermometers are of the same type both will follow the same temperature fluctuations and the resistance ratio will remain very stable. This method can largely eliminate the effects of the bath stability, what is needed is temperature uniformity in the calibration volume, it needs to be isothermal.

The physical separation of the calibration chamber from the heating and cooling chamber along with the attention to the segments and contours provide an isothermal volume that is superior to other baths. The result a comparison bath providing the lowest comparison calibration uncertainties, reflected in our UKAS schedule.



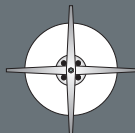
## Accessories for 785 & 915

These baths can be supplied with a range of accessories including equalising blocks, a support assembly for up to 12 LIG thermometers and a monocular to aid reading the scale of a L.I.G. Thermometer.

There are a range of supports to hold various fixed point cells, Slim and Optimal, allowing the bath to realise ITS-90 fixed point cells to sub mK uncertainties.

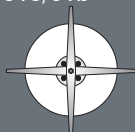
Refer to 'Liquid Selection Guide' on page 81 for information on liquids and important Health and Safety Information.

915/01a



Variable depth aluminium equalising block containing four drilled pockets 8mm diameter by 160mm deep in which temperature sensors can be placed and is suitable for use with silicon oils. The equalising block is suspended centrally within the calibration tube and is easily removed.

915/01b



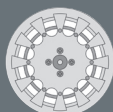
As an alternative to the above a copper equalising block, dimensionally the same as 915/01a, may be supplied. This block is more suitable for use in water and other liquids.

915/D

(915 only)

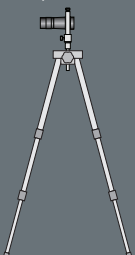
Increased depth Calibration Tube Assembly. Working volume is 100mm diameter by 530mm deep. This variant allows for the calibration of very long thermometers, typically the calibration of long liquid in glass thermometers.

915/02



This assembly will hold up to 12 liquid in glass thermometers (maximum diameter 12.7mm) radially and a centre mounted standard sensor. The assembly may be rotated allowing systematic calibration. The assembly is designed for partial or full immersion thermometer types.

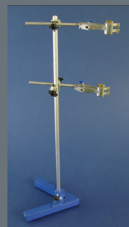
796/03



Monocular and Support. Useful for viewing and magnifying the liquid column within the thermometer being calibrated. This ancillary piece of equipment is used in conjunction with 915/02 Liquid in Glass Thermometer Support Kit.

796-05-03

Thermometer  
Stand Kit



**NOTE:** Read all safety information concerning liquids which you intend to use in the bath and use only approved liquids.

### Fixed Point Calibration ITS-90 Cell Basket Assemblies (Excluding Cells)

- 915-05-43 Small Mercury Cell Kit
- 915-05-44 Large Mercury Cell Kit
- 915-05-41 Small Water Triple Point Cell Kit
- 915-05-40 Large Water Triple Point Cell Kit
- 915-05-39 Small Gallium Cell Kit
- 915-05-38 Large Gallium Cell Kit
- 915-05-42 Slim Cell Kit

