- Large-capacity tanks for higher productivity
- Calibrations up to 300 °C
- Built-in cooling coils for extended low range
- Stability to ±0.001 °C

Comparison calibrations require a heat source that's stable and uniform, and for moderately high temperatures nothing provides a better heat source than a Hart oil bath.

Hart oil baths are stable to ±0.001 °C and do not require calibration blocks or use of special calibration techniques to achieve that stability. The specifications of all Hart baths are "true" specifications representing the performance you can expect to achieve in your lab under your operating conditions. Other companies advertise specs that they know you will never see in your lab. When their baths fail to perform, they blame it on you.

Hart baths are built using a unique tank design that guarantees the best uniformity possible in a liquid bath. This, coupled with the industry's best-selling digital bath controller, achieves uncompromised performance and ease of use.

Not only does Hart's digital controller have features like its "Super-Tweak" high-resolution mode so you can dial in the exact temperatures you want, it also lets you completely automate the calibration process using your PC and Hart's 9938 MET/TEMP II software (see page 81).

You'll love these baths, and once you've got one you'll never buy anything else. There's a bath to match any temperature range, depth, price, and performance you need.

Uncertainty evaluation and statistical process control with a bath

Considerable emphasis is placed on uncertainty analysis and statistical process control (SPC) in the calibration lab. If you're using a calibration bath in your process, you may be wondering how to include the bath in the process evaluation. Basically, there are three approaches.

The first is to "calibrate" the bath to ensure that it meets published specifications and include the published specifications with the "type B" uncertainties in your evaluation just as you might do with any other instrument.

The second approach is to thoroughly test the bath stability and uniformity, perform statistical analysis of the results' uncertainties, and include the results with the "type A" uncertainties in your evaluation. This is often a better method and will provide more realistic results.

The third avenue is to use a "check standard" instrument in the process in such a way that the bath characteristics are included in the check-standard data, which is evaluated statistically and included with the "type A" evaluation. This approach is somewhat more time-consuming but will provide realistic results. When used in conjunction with the second method above, the best results will be obtained.

Hot Baths

Specifications	6020	6022	6024
Range	40 °C to 300 °C[†]		
Stability	±0.001 °C at 40 °C (water) ±0.003 °C at 100 °C (oil 5012) ±0.005 °C at 300 °C (oil 5017)		
Uniformity	±0.002 °C at 40 °C (water) ±0.004 °C at 100 °C (oil 5012) ±0.012 °C at 300 °C (oil 5017)		
Temperature Setting	Digital display with push-button data entry		
Set-Point Resolution	0.01 °C; high-resolution mode, 0.00018 °C		
Display Temperature Resolution	0.01 °C		
Digital Setting Accuracy	±1 °C		
Digital Setting Repeatability	±0.02 °C		
Heaters	350 and 1050 watts		
Access Opening (call for custom openings)	127 x 254 mm (5 x 10 in)		184 x 324 mm (7.25 x 12.75 in)
Depth	305 mm (12 in)	464 mm (18.25 in)	337 mm (13.25 in)
Wetted Parts	304 stainless steel		
Power	115 VAC (±10 %), 50/60 Hz, 10 A or 230 VAC (±10 %), 50/60 Hz, 5 A, specify		
Volume	27 liters (7.2 gallons)	42 liters (11.2 gallons)	
Weight	32 kg (70 lb.)	36 kg (80 lb.)	
Size (HxWxD)	648 x 406 x 508 mm (25.5 x 16 x 20 in)	813 x 406 x 508 mm (32 x 16 x 20 in)	699 x 483 x 584 mm (27.5 x 19 x 23 in)
Automation Package	Interface-*it* software and RS-232 computer interface are available for setting bath temperature via remote computer. For IEEE-488, add the 2001-IEEE to the automation package.		

[†]External cooling required for operation below 40 °C. Cooling coils are built into the bath walls. Tubing ports are accessible at the back of the bath for circulating chilled fluid or shop air to boost cooling.

Ordering Information

6020 Standard Bath, 20 °C to 300 °C
6022 Standard Bath, 20 °C to 300 °C, deep
6024 Standard Bath, 20 °C to 300 °C, high capacity
2001-6020 Automation Package for 6020
2001-6022 Automation Package for 6022
2001-6024 Automation Package for 6024
2001-IEEE Add for IEEE-488 (requires Automation Package)

2007 Access Cover, 127 x 254 mm (5 x 10 in), SST (6020, 6022)
2009 Access Cover, 184 x 324 mm (7.25 x 12.75 in), Stainless Steel (6024)
2070 Bath Cart, 6020, 6022 (312 mm [12.3 in] H)
2072-2450 Bath Cart, 6024 (216 mm [8.5 in] H)

2023 Fast-Start Heater, 419 mm (16.5 in) (6022)
2024 Fast-Start Heater, 343 mm (13.5 in) (6020, 6024)
2069 8X Magnifier Scope, with mounts

Periodic bath testing

All calibration apparatus should either be tested or calibrated. Calibration baths are no different. Although the accuracy is often of secondary importance, bath instability and non-uniformity directly affect calibration uncertainties.

To ensure continued performance, these bath characteristics should be tested periodically. The tests should be carried out at all temperatures commonly used and under typical conditions.

Additionally, since the goal of the tests is to determine the contribution to uncertainty, these tests should be conducted only over the "calibration zone" used in your process, not over the entire zone available. The tests can be conducted with several sensors or with a single sensor moved from one location to the next.

Map the differences and include them in your uncertainty analysis. In most cases, with a Hart bath, the values observed will be significantly smaller than the published specifications.