TRIPLE POINT OF WATER CELLS

Triple Point of Water Cells	Model 5901
Easy-to-use, low-cost primary standard	
Very accurate—uncertainty better than ±0.0001°C	

Did you know you can get an ITS-90 primary standard for less than $1,100?

You should be using this low-cost standard frequently to make sure your thermometer standards are in calibration.

The TPW is an intrinsic standard that does not need recalibration. It is the most accurate standard you can use, and you can learn to use it in an afternoon.

The ITS-90 assigns the TPW a value of 0.01°C (273.16K). Hart cells achieve this temperature with an expanded uncertainty of less than 0.0001°C. If you own a reference thermometer, you really should have a TPW cell to get the most out of your investment.

If you calibrate secondary standards, the TPW is one point you can calibrate by primary fixed-point method rather than less accurate comparison methods. If you're using a reference thermometer to comparison-calibrate industrial thermometers, you can make sure your reference isn't drifting by frequently checking it at the triple point of water.

Hart makes five triple point of water cells to suit your needs. A NVLAP-accredited cell intercomparison option is available for each. Intercomparison includes comparing the equilibrium value of the cell against that of a Hart cell that has been intercompared at NIST.

Hart's original **Model 5901** cell is used by many national temperature labs around the world. It has a wide mouth for facilitating freezing of the mantle using crushed dry ice. The rubber foot lets you rest the cell on your ice bath or holding fixture for extra stability and protection while you're using it.

The Hart **Model 5901A** is a full-size cell designed after the original NBS cell, which had a glass support arm. While the arm does not impact performance in any way, some users prefer this design because it facilitates lifting and carrying the cell. The arm can be used as a hook for supporting the cell in an ice bath. The handle is also used as a McLeod gauge for a strictly qualitative check of trapped air in the cell.

The Hart **Model 5901B** is a smaller cell that's easy to handle, accommodates shorter sensors, and can be maintained in an automatic maintenance device (see page 37). Despite this cell's diminutive size, it is made with the same materials and technology used to make the larger cells. The 5901B has an expanded uncertainty of 0.0002°C and a well diameter of 9 mm.

The Hart **Model 5901C** is designed like Hart's original 5901 cell with the exception of the well size, which is 13.6 mm rather than the standard 12 mm. It's a full 380 mm deep and has an expanded uncertainty of 0.0001°C.

All these cells are cylindrical borosilicate glass filled with highly pure water. The water is gas free with an isotopic composition equivalent to seawater.

Hart's newest TPW cell is the **Model 5931**. It uses a stainless steel shell so it's virtually unbreakable. It can be easily realized and maintained in a bath or dry-well calibrator and provides uncertainty better than ±0.001°C. (See page 23.)

A simple, time-saving method can be used with each Hart TPW cell for forming the ice necessary to generate the triple point. The smaller 5901B and 5931 models use the supercool-and-shake method, creating an ice slush, which remains stable all day. For the larger cells, the Model 2031 Immersion Freezer creates an ice mantle virtually automatically. Just fill the condensing reservoir of the 2031 with dry ice and alcohol, insert it into the cell, and return in under an hour to find a well-formed ice mantle. (Visit our Web site for a complete data sheet on the Model 2031.)

We also have baths for maintaining your water triple point cells. Not only will your cells be ready to use when you need them, but they're much safer if you maintain them in one of our constant-temperature baths.

Ordering Information

5901	12 mm TPW
5901A	12 mm TPW w/handle
5901B	9 mm Mini TPW
5901C	13 mm TPW
5931	TPW X Cell, SST
INSU-5901	TPW Insurance, 1 yr.
7312	TPW Maint. Bath
7012	TPW Maint. Bath
2028	Dewar
9210	5901B Maintenance Apparatus (page 37)
2031	Immersion Freezer
1904	Cell Intercomparison
2067-P	Large TPW Stand, gray

Technical Tip

How Loud Is Your Hammer?

A well-made water triple point cell makes a clicking sound when rotated end to end. The sound is caused by the "water hammer" effect and is the result of a lack of remnant air inside the cell. The loudness of the click is influenced by many factors, including the shape of the surface the water slaps against as well as the amount of remnant air in the cell.

Hart's triple point of water cells are all manufactured with the same technique and provide almost the same equilibrium temperature. The loudness of the click for the 5901A and 5901B, however, is greater than that for the 5901 and 5901C. This is mostly due to the shape of the cells.

Comparative loudness is only one of the indicators of performance for cells of similar shape. The best indicator of quality is a direct comparison of the equilibrium temperature among cells (such as shown on page 19).

Specifications	5901	5901A	5901B	5901C	5931
Expanded Uncertainty (k=2)	< 0.0001°C	< 0.0001°C	< 0.0002°C	< 0.0001°C	< 0.001°C
Reproducibility	0.00002°C	0.00002°C	0.00002°C	0.00002°C	0.0001°C
Dimensions	60 mm O.D. x 380 mm long, 12 mm I.D.	50 mm O.D. x 450 mm long, 12 mm I.D.	30 mm O.D. x 180 mm long, 9 mm I.D.	60 mm O.D. x 380 mm long, 13.6 mm I.D.	24 mm O.D. x 127 mm long, 5.84 mm I.D.
Immersion Depth (water surface to well bottom)	305 mm	305 mm	117 mm	305 mm	86 mm