

MINI FIXED-POINT CELLS



Mini Fixed-Point Cells

Lower uncertainties than comparison calibrations

All ITS-90 fixed points from TPW to copper

Reduced equipment and annual recalibration costs

If cuteness were reason enough to buy a product, Hart's Mini Fixed-Point Cells would win you over easily. But there's a much better reason to buy them: they give you the least expensive, easiest-to-use fixed-point primary standards for your lab.

Mini cells eliminate the need for comparison calibrations. Temperatures of fixed-point cells are constant and intrinsic, so only the electrical parameters of the sensor under calibration need to be read. If you're calibrating industrial thermometers, thermocouples, or thermistors and want the most accurate calibration possible, these mini cells will give it to you. If you need a wide range of temperatures, mini cells cover the triple point of water (0.01°C) and every ITS-90 point from indium (156.5985°C) to copper (1084.62°C).

With mini cells, realization and maintenance are simple. Mini TPW cells can

be automatically realized and maintained in our Model 9210 Maintenance Apparatus (page 37). Realizing the triple point of water takes only five minutes, but the plateaus last all day.

The realization and maintenance of indium, tin, zinc, and aluminum cells are likewise automated through our Model 9260 Mini Fixed-Point Cell Furnace (page 36). Work with them at their designated freeze point, or use them at their melting point to simplify the calibration process even further. We published a paper, "The Comparison Between the Freezing Point and Melting Point of Tin," to help you understand and benefit from the easier procedure of using the melting point of your standard.

These mini cells are made from the same materials and with the same procedures as their full-size counterparts. In fact, they can achieve the same uncertainty levels as Hart's traditional fixed-

point cells. Probes as short as nine inches work with these cells. The specifications table (at right) gives you the immersion depth and uncertainty for each cell.

In addition to high-accuracy calibrations of RTDs and PRTs, these cells are perfect for validating the accuracy of SPRTs. If you're doing comparison calibrations with SPRTs, then you know the importance of occasionally checking their accuracy between their own recalibrations. Because these cells are easy to use and maintain, verification checks are simple and convenient.

You'll find these cells easier to use than you expect. You can have a free copy of Xumo Li's paper comparing freeze-point measurements with melting-point measurements, and if you want a high level of training in using metal freeze-point cells, you can attend one of Hart's in-depth training classes held in our lab in Utah.

Ordering Information

5901B	Mini WTP Cell
5914A	Mini Indium Cell
5915A	Mini Tin Cell
5916A	Mini Zinc Cell
5917A	Mini Aluminum Cell
5918A	Mini Silver Cell
5919A	Mini Copper Cell
9210	Mini TPW Maintenance Apparatus
9260	Mini Cell Maintenance Furnace (for In, Sn, Zn, Al cells)
9116	Three-Zone Freeze-Point Furnace (for Ag, Cu cells)
1904	Accredited Cell Intercomparison



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Primary Standards

Specifications

Model Number	Fixed-Point	Temperature (°C)	Immersion Depth (mm) ¹	Expanded Uncertainty (mK)	
				Cell Only ²	Simple Realization ²
5901B	Water T. P.	0.01	117	0.2	0.5
5914	Indium M. P.	156.5985	140	1.0	2.0
5915	Tin M. P.	231.928	140	1.4	3.0
5916	Zinc M. P.	419.527	140	1.6	4.0
5917	Aluminum M. P.	660.323	140	4.0	10.0
5918	Silver M. P.	961.78	140	7.0	20.0
5919	Copper M. P.	1084.62	140	15.0	40.0

¹ Distance from the bottom of the central well to the surface of the pure metal.

² "Cell Only" refers to the expanded uncertainty of the cell when realized by traditional methods and maintained using traditional maintenance devices. "Simple Realization" refers to the expanded uncertainty of the cell when realized using practical methods (melting points instead of freezing points or slush ice instead of an ice mantle, for example) and maintained using Hart's models 9210 and 9260 mini cell maintenance apparatus.

Test Results of Mini Zinc Cell

1. The absolute value of the new secondary standard was tested in two ways.

1.1. The freezing point of a new Mini Freeze-Point Zinc Cell was measured by using an SPRT calibrated by NIST, S/N: 5681-5-1027. The difference from NIST was determined to be -1.21 mK.

Date	Hart Data on New Cell			NIST Data [†] W(Zn)	Difference	
	R(Zn)	R _{TPW}	W(Zn)		ΔW(Zn)	Δt
6/28/96	64.8556589	25.2481072	2.56873350	2.56873772	-0.00000422	-1.21 mK

[†]NIST Test No. 256495, 29 February 1996

1.2. The mini zinc cell was compared with two traditional zinc cells, S/N: Zn07 and Zn08, by using an SPRT S/N: 5861-5-1016. The differences among the three cells were found to be within 0.65 mK.

Date	S/N of the cell	W(Zn)	ΔW(Zn)	Δt(Zn)
6/28/96	Zn-101 (mini cell, six 9s)	2.56891310		
4/25/96	Zn07 (primary standard)	2.56891082	0.00000228	0.65 mK
5/10/96	Zn08 (primary standard)	2.56891254	0.00000056	0.16 mK

2. The freezing curve lasted for more than 10 hours, and the melting curve for more than 40 hours.

