

Freeze-Point Furnaces



- Designed for long plateaus
- Automated controllers, RS-232 included
- Top access to high-stability Hart controllers
- External cooling coils

Several companies manufacture freeze-point furnaces. Most of these furnaces are of adequate theoretical design and of reasonable quality. Most are priced similarly. However, there is a difference that can't be seen from specifications or price, and that's how well the furnace performs with the freeze-point cells they're designed to maintain.

Establishing and maintaining a freeze-point plateau is what these furnaces are supposed to be about. Nothing they do is more important than this performance issue.

Hart Scientific makes three freeze-point furnaces that, when combined with Hart freeze-point cells, produce the longest plateaus in the industry. A Hart furnace and cell can establish plateaus that range from 24 to 40 hours or more.

Fixed-point furnaces can also be used for comparison calibrations and for annealing. In these processes, stability and uniformity are very important, and nothing speaks more about stability and uniformity than the length of the plateaus

produced by the furnace. No other furnace beats a Hart furnace where it counts.

All three of these furnaces have external cooling coils for circulation of tap water at less than 60 PSIG and approximately 0.4 GPM to reduce heat load to the lab. They also come with RS-232 ports and have equilibration blocks available for comparison calibrations. IEEE-488 interface packages are also available, if that's your preference.

One of Hart's three fixed-point furnace models will meet your needs. Remember, the length of the plateau is the best measure of a furnace's performance. Call us for performance data on actual cell freezes and test data on furnace gradients.

9114

This furnace has a range of 100 °C to 680 °C, which includes the indium, tin, zinc, and aluminum fixed points, all in one furnace.

The 9114 furnace has an inlet for use of clean dry air or inert gas to initiate the supercool of a tin cell. Other furnaces

require the user to remove the hot and fragile tin cell from the furnace by hand before cooling. In a Hart furnace, you simply turn on your gas, monitor your cell during its supercool, and turn the gas off when the freeze begins.

The 9114 is a three-zone furnace with the best in Hart digital controller technology. Hart designs and builds proprietary controllers that have a reputation of being the best in the business. All of our fixed-point furnaces use them to achieve excellent stability and uniformity.

For easy access and visibility, all three zones are controlled from the top of the unit. The primary controller can be set in 0.01 °C increments, and actual temperature is readable to two decimal places.

The freezing and melting process can be automated using eight preset, user-programmable temperature settings. The top and bottom zones are slaved to the primary zone using differential thermocouples. A high-temperature PRT acts as the main control sensor for the best accuracy, sensitivity, and repeatability.

9115A

The 9115A Sodium Heat Pipe Furnace is specifically designed for maintenance of aluminum and silver freeze-point cells.

It has a temperature range of 550 °C to 1000 °C with gradients of less than ± 0.1 °C throughout. The sodium heat-pipe design provides a simple, yet uniform, single heating zone that ensures very uniform changes in states during heating and cooling.

Melting, freeze initiation, and plateau control for a variety of freeze-point cells are possible by entering up to eight set-points, ramp rates, and soak times. The controller displays temperature in degrees C or F, and temperature feedback is done via a thermocouple. Freeze-point plateaus of 8 to 10 hours are typical, and 24 hours are possible under controlled conditions.

External cooling coils are included for circulation of tap water to reduce chassis temperature and heat load to the lab. Temperature cutouts protect your SPRTs and the furnace from exposure to excessive temperatures.

9116

Designed to be used with thermocouples and HTSPRTs the 9116 can reach temperatures up to 1100°C. Primarily designed for use at the copper point, the 9116 may also be optimized at the factory for silver and aluminum fixed points. However to calibrate probes less than ~25 inches in length a 9114 must be used instead.

Freeze-Point Furnaces

Specifications	9114	9115A	9116
Temperature Range	100 °C to 680 °C	550 °C to 1000 °C	400 °C to 1100 °C
Temperature Stability	±0.03 °C	±0.25 °C	±0.5 °C
Temperature Uniformity	±0.05 °C (±0.1 °C in the pre-heat well)	+0.1 °C	less than +0.5 °C
Set-Point Accuracy	±0.5 °C	±3.0 °C	
Set-Point Resolution	0.01 °C	0.1 °C	
Display Resolution	0.01 °C	0.1 °C below 1000 °C 1 °C above 1000 °C	
Thermal Safety Cutout Accuracy	±5 °C	±10 °C	
Heater Power	End Zones: 1000 W each (at 230 VAC nominal) Primary Zone: 1500 W	2500 W	End Zones: 800 W each (at 230 VAC nominal) Primary Zone: 900 W
Exterior Dimensions (HxWxD)	838 x 610 x 406 mm (33 x 24 x 16 in)		
Power Requirements	230 VAC (±10 %), 50/60 Hz, 1 Phase, 12 A maximum		
Weight	92 kg (203 lb.)	82 kg (180 lb.)	68 kg (150 lb.)

The freezing and melting process may be automated using eight preset, user-programmable temperature settings. The top and bottom zones are slaved to the primary zone using differential thermocouples. A thermocouple acts as the main control sensor for the best accuracy, sensitivity, and repeatability.

The 9116 has all of the standard features found on other Hart freeze-point furnaces, including external cooling coils and an RS-232 port.

Ordering Information

9114	Metrology Furnace (includes Cell Support Container)
2125	IEEE-488 Interface (9114 only)
2126	Comparison Block, 9114
2940-9114	Cell Support Container, 9114
2127-9114	Alumina Block, 9114
2941	Mini Freeze-Point Cell Basket Adapter
9115A	Sodium Heat Pipe Furnace (includes Cell Support Container)
2940-9115	Cell Support Container, 9115A
9116	Three-Zone Freeze-Point Furnace (includes Cell Support Container)
2940-9116	Cell Support Container, 9116
2127-9116	Alumina Block, 9116



Protect platinum thermometers from metal ion contamination with a low-cost alumina block.

Specifications - 2127

Dimensions	2127-9114: 54 x 510 mm (2 x 20 in) 2127-9116: 54 x 510 mm (2 x 20 in)
Wells	Three: 8 mm ID x 488 mm (0.31 x 19.2 in)
Immersion Protection	Last 156 mm (6.1 in) in alumina
Well-to-Well Uniformity	10 mK at 660 °C in 9114
Temperature Range	Up to 1100 °C