HART SCIENTIFIC

A Fluke Company

Industrial Temperature Calibration

Hart Scientific,
The World Leader in Temperature Calibration

Hart Scientific, a Fluke company, is the world's leading manufacturer of temperature calibration and measurement equipment and its full product offering includes everything from fixed-point cells and maintenance furnaces, SPRTS, precision readouts, and 1-mK calibration baths, to portable dry block units and data loggers.

Hart Scientific's industrial product line offers everything from dry-well temperature calibrators and Micro-Baths, ice-point and infrared calibrators as well as software to automate your temperature calibration process. Hart Scientific is the only source you need to remember to calibrate temperature devices like RTDs, thermocouples, and SPRTs.

Field Dry-Wells

- **Small and light-weight for exceptional portability**
- **Removable multi-well inserts accommodate all probe sizes**
- **Extreme speed to temperatures from –25°C to 650°C**
- **Stability from ±0.02°C!**

You know there's a lot more to an "industrial" or "in-field" dry-well than just temperature range and stability. At Hart Scientific, we've designed three fast, portable, flexible and high-performing field dry-well calibrators reaching temperatures as low as –25°C and as high as 650°C.

Each unit has easily-adjustable heating and cooling rates that allow for actuation testing of thermal switches. An easy-to-use software package is also included with each unit for computer control through a Windows© interface.

Four removable inserts are available for high-volume calibrations, each holding six probes in different diameters. And of course, the performance of all Hart dry-wells can be maximized by using a companion reference thermometer from Hart Scientific, the world's thermometry leader.

Model 9103

For below-ambient temperatures, you can't beat the 9103. In normal room temperatures it cools to –25°C without any refrigerant. (Even lower temperatures are possible in a cooler ambient environment.) On the upper end, this unit reaches 140°C so you can meet critical sterilization points. With accuracy of ±0.25°C, stability of ±0.05°C, and uniformity better than ±0.3°C, this unit can be used in the field or in the lab.

Model 9140

The model 9140 has a temperature range of 33°C to 350°C, and reaches maximum temperature in just 12 minutes. At less than 3 kg, it's small enough to easily carry in one hand but still has outstanding performance - stability is ±0.1°C and uniformity is 0.1°C in the smaller wells.

Model 9141

This popular upright unit does calibrations up to 650°C, weighs less than 4 kg, and heats up to 650°C in only 12 minutes. Just 12 cm wide, this unit is amazing. You can control all functions from the front panel or hook it up to your PC with its built-in RS-232 port. It has an optional carrying case, a NIST-traceable certificate of calibration (like all Hart dry-wells), and the best price for its performance in the world.

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Handheld Dry-Wells

- **Smallest dry-wells in the world**
- **Ranges from –10°C to 375°C and the speed to get there quickly!**
- **Accuracy to ±0.25°C and stability to ±0.05°C with a Hart Scientific controller**
- **RS-232 interface and Hart's Interface-*it* software included**

Hart's line of handheld dry-wells takes portability to a new level. They're the smallest, lightest, best-performing, and easiest to use dry-wells in the world. Our competitors keep trying but their imitations just don't measure up!

Together, these two units cover temperatures from –10°C to 375°C. Each one is truly small enough to be "hand held" and each one achieves temperatures quickly. Most importantly, both models include control electronics designed by Hart Scientific, so you get excellent stability, display accuracy, and ease of use.

Model 9100S

The 9100S is small (6 x 13 x 15 cm), light (1.1 kg), inexpensive, and so easy to use, anyone can learn to use one in less than 10 minutes. It has a range to 375°C and is perfect for checking RTDs, thermocouples, and bimetal thermometers in the field - or anywhere you like. Choose from four fixed-block options.

Calibrated display accuracy ranges from ±0.25°C at low temperatures to ±0.5°C at 375°C. Stability ranges from ±0.07°C to ±0.3°C. And maximum temperature can be achieved in less than 10 minutes. Of course you get a traceable calibration certificate with each unit - without paying extra.

Model 9102S

The 9102S covers temperatures from –10°C to 122°C. It also comes in a small package (10 x 14 x 18 cm) and achieves 0°C in just 10 minutes. Display accuracy is ±0.25°C and stability is ±0.05°C, both over the 9102S' full range.

Two wells accept removable 12.7-mm inserts for matching different probe sizes and allowing comparison calibrations. One 4.8-mm insert and one 6.4-mm insert are included. The 9102S also has a battery pack option that gives you approximately four hours of field use when AC power is unavailable.

Micro-Baths

- **Bath performance in a portable package**
- **No spills, no mess during transport**
- **High capacity for multiple or odd-shaped sensors**
- **Uniformity to ±0.02°C**

Hart Scientific is the recognized leader in fluid calibration baths, temperature control electronics, and product innovation. That is why we invented the Micro-Bath. Hart Micro-Baths provide spill free portability with superior stability and uniformity, and accommodate short, fat, bent, or otherwise odd-shaped sensors in their 1-litre, 6.4-cm-diameter stirred tanks.

Hart offers three models that collectively cover temperatures from –30°C to 200°C. Each uses Hart control electronics and features uniformity of ±0.02°C and calibrated display accuracy of ±0.25°C. Control features include thermal switch testing, ramp-rate adjustment, set-point memory storage, and an over-temperature safety cutout. RS-232 and Windows© software are included.

Model 6102 covers temperatures from 35°C to 200°C with stability of ±0.03°C at 300°C.
Model 7102 runs from –5°C to 125°C with stability of ±0.015°C at –5°C. And
Model 7103 ranges from –30°C to 125°C with stability of ±0.03°C at –30°C.

All below-ambient cooling is achieved through Peltier cooling, so no compressors are required and the units remain light-weight. For comparison calibrations, Hart also offers the most accurate portable reference thermometers in the world. Ask your local Hart distributor for information on Hart's Tweener, Chub-E4, or Little Lord Kelvin thermometers.

Lab Dry-Wells

- **Four models cover temperatures from –45°C to 700°C**
- **Display accuracy to ±0.1°C and stability to ±0.005°C**
- **High-capacity blocks for higher throughput**
- **Windows© software included - automation software available**

Hart's lab dry-wells are built for the demanding requirements of calibration laboratories. Each instrument features Hart's exclusive temperature controller and includes a multi-well block, designed for an optimal balance between speed, capacity, stability, uniformity, and accuracy. Temperatures are set with 0.01°C resolution.

Front panel controls provide automatic set and hold up to eight temperatures in the sequence, duration, and ramp rate of your choice. Each unit also has a "switch test" protocol that locks in the triggering temperature for thermal switches.

All models come with an RS-232 port and Hart's exclusive Interface-*it* software for convenient PC control of your dry-well. With a proper reference thermometer and Hart's optional MET/TEMP II software, you can automate the calibration of most common thermometer types - and any re-calibrations of the dry-well itself! Each unit comes originally with a certificate of traceable calibration at no extra cost.

Model 9105

The model 9105 dry-well has a temperature range from –25°C to 140°C with a stability of ±0.01°C and calibrated display accuracy of ±0.1°C. It has four drilled wells of fixed sizes and a central well that accepts removable inserts of virtually any size. Well-to-well uniformity in the drilled wells is better than ±0.05°C. Used with a reference probe, the model 9105 has the uniformity and stability to give you ±0.05°C calibration accuracy.

Model 9107

If you need ultracold temperatures, the model 9107 has the same great performance specifications as the 9105 but reaches –45°C (even in an ambient of 23°C) and provides stability at 0°C of ±0.005°C.

Model 9122A

Too many probes to calibrate and not enough time? The model 9122A lets you calibrate nine probes simultaneously and covers temperatures from 50°C all the way to 700°C.

The temperature in any of the nine test wells is accurate to ±0.2°C at 100°C and ±0.9°C at 660°C. This includes all errors such as uniformity between wells, repeatability, and the uncertainty of the NIST-traceable calibration performed in our factory. Compare your thermometer to the 9122A's display, or use it with a reference probe for comparison calibrations and even greater accuracy. For testing only one probe, use the center well for an accuracy of ±0.1°C up to 300°C and ±0.3°C at 660°C.

Model 9127

For higher-speed work between 35°C and 600°C, the model 9127 is one of our most popular instruments. It has a "smart" controller that automatically adjusts fan speed at specific set-point temperatures for maximum stability.

The 9127 has an accuracy of ±0.15°C up to 300°C and ±0.5°C to 600°C. Resolution is 0.01°C and stability ranges from ±0.01°C to ±0.05°C. Four multi-hole inserts are available for accommodating many thermometer sizes. Uniformity between holes is typically ±0.05°C.

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Thermocouple Furnaces

- **Compact, upright model for field work; horizontal model for lab work**
- **Provides temperature to 1200°C (upright model) or 1100°C (horizontal model)**
- **Certificate of traceable calibration included**
- **RS-232 and Interface-*it* software included**

Whether you want to calibrate thermocouples in the field or in your lab, we have an outstanding temperature source for you. Hart's 9150 field thermocouple furnace and 9112A lab thermocouple furnace both come with certificates of traceable calibration, RS-232 interface and Windows control software, and a European CE mark. Both models are also compatible with Hart's MET/TEMP II software for automated calibrations of thermocouples.

Model 9112A

Need the most accurate thermocouple calibrations possible? The Hart model 9112A thermocouple furnace gives you temperatures to 1100°C and stability from ±0.05°C to ±0.1°C - at an excellent price.

With a five-hole standard block and custom blocks available, the 9112A doesn't limit the size and shape of sensors you can calibrate. Further, you get metrology-level stability, and uniformity that is better than 0.3°C at 1100°C.

The 9112A employs a special heater pattern for temperature uniformity and rapid heat rates, embedded in a refractory ceramic-fiber material. Guide tubes guide your probes to the heart of the furnace for calibration in a completely optimized environment.

Model 9150

With a temperature range to 1200°C and stability better than ±0.5°C over its entire range, the 9150 has a display accuracy of ±5°C. Well-to-well uniformity is better than ±1°C, so comparison calibrations can be performed with total uncertainties better than ±2°C.

This furnace doesn't use fixed blocks that limit the size of the thermocouples you test. With four interchangeable blocks to choose from (and custom blocks available), you can check multiple thermocouples from 1.6 to 12.7 mm in diameter.

The 9150 uses Hart's own microprocessor-based controller for great stability. Up to eight common set-points can be stored in memory, and you can easily set ramp rates through the front panel. Heat-up and cool-down speeds have been maximized for improved throughput.

Infrared Calibrators

- **Temperatures available from –30°C to 500°C**
- **Large 57-mm targets**
- **RTD reference well for traceable temperature verification**
- **Light, compact designs for easy portability**

Whether you're using in-line or handheld infrared pyrometers, you need good calibration standards to verify their accuracy and stability. Hart's two portable IR calibrators provide stable blackbody targets for calibrating non-contact IR thermometers from –30°C to 500°C.

Both units feature 57-mm blackbody targets, which offer a large field of view area for optical variations in infrared thermometers. The emissivity of the targets is 0.95 (±0.02), and the temperature can be controlled in set-point increments of 0.1°. For even higher precision, a well is located directly behind the blackbody surface for contact calibration of the blackbody.

Model 9132

For high-temperature IR calibrations, the 9132 provides a stable blackbody to 500°C. With accuracy to ±0.8°C and stability to ±0.1°C, this new portable IR unit can certify most handheld pyrometers.

Short heating and cooling times mean you won't have to wait long to get your work done. From room temperature to 500°C, the 9132 achieves stability within 30 minutes.

Model 9133

For calibrating IR guns at cold temperatures, the 9133 reaches –30°C in normal ambient conditions with solid-state cooling technology. With a conveniently located dry gas fitting on the front bezel, the 9133 won't build up ice on the target. At the upper end of its range, the 9133 provides stable temperatures to 150°C.

With heating and cooling times of about 15 minutes from ambient to either extreme, the 9133 gets you to temperature quickly and performs when it gets there. Just compare your IR devices to the temperature display of this unit - it's factory calibrated to be within ±0.4°C.

Ice-Point Calibrator

- **Bath-quality stability in a portable dry reference**
- **Easy recalibration for long-term stability**
- **Solid-state cooling technology**

Need a reliable source for checking thermometers at 0°C or to provide an ice-point reference for thermocouples? Hart Scientific has the perfect solution.

Hart's **model 9101** has three 152-mm-deep test wells - all stable to ±0.005°C. One well accommodates changeable inserts for varying probe diameters (a well-sizing tube set is included; the other two wells are 6.35 mm in diameter). Since the unit is completely self-contained and doesn't require any user settings, you can run it on demand for instant access to an accurate, traceable zero point.

The **9101** takes advantage of the latest solid-state cooling technology. Our solid-state cooler is run by an adjustable electronic controller that can be recalibrated in your lab for convenient recertification. Simply place a certified standards thermometer in one of the wells and, if needed, adjust the **9101** controller until the standards thermometer reaches equilibrium at 0°C.

Less costly than refrigerated baths, more accurate and less problematic than ice baths, and more durable than competitive units using sealed water cells, the Hart **model 9101** zero-point dry-well is a great choice for any calibration lab.

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Dual-Block Dry-Wells

- **"Hot" and "cold" dry-blocks conveniently together in one unit**
- **Two models to choose from - one for the lab, one for the field**
- **Proprietary Hart Scientific temperature controllers for maximum performance**

Heating and cooling technologies won't allow the same temperature block to provide both extreme high temperatures and extreme low temperatures. But nobody ever said we couldn't put two blocks in the same unit. So we did.

In fact, we did it twice - one style for lab use and one style for field use.

Both models use Hart controllers to provide the best possible stability and calibrated display accuracy. And within each model, the "hot" block and the "cold" block are independently controlled so you can use both at the same time. Two-point "zero" and "span" checks have never been easier. But that's not all they do.

Model 9009

For totally portable field operations, the 9009 comes in a light, water-tight ABS case and weighs just ten pounds. The hot block covers temperatures from 50°C to 350°C with accuracy to ±0.6°C and stability to ±0.05°C. The cold block covers temperatures from –15°C to 110°C with accuracy to ±0.2°C and stability to ±0.05°C.

Each block contains two wells that accept removable inserts, so you can size any probe from 1.6 mm to 11.1 mm. Test two probes against reference thermometers or test four probes against the calibrated display of the 9009. Most temperatures can be reached and stabilized within just 20 minutes.

Model 9011

If you need more temperature range and want a high-quality lab unit, the 9011 is your solution. Its cold block covers –30°C to 140°C with stability to ±0.02°C. And its hot block covers 50°C to 670°C with stability stability to ±0.06°C.

Both blocks accept six-hole inserts for perfect balance between capacity, uniformity, and flexibility. The cold block also includes four fixed-size pre-chill wells. As with all Hart dry-wells, custom inserts are available.

Automation Software

All Hart Micro-Baths and dry-wells (except the 9101 ice-point) have been optimized for use with our MET/TEMP II software. MET/TEMP II is a Windows-driven system that totally automates the calibration of temperature sensors. Your calibrations can run overnight - while you sleep.

MET/TEMP II controls Hart heat sources (such as dry-wells) and thermometer readouts. It reads your reference thermometer and your sensors under test and records the value of each unit. It then adjusts the temperature of your heat source to move it through the sequence of temperatures you've specified in your set-up.

Setting up the MET/TEMP II system takes just a few minutes. After the calibration is done, you have all the data you need for printing your calibration reports - which this software can also do for you. There is no other temperature calibration software in the world with this combination of ease of use and user control.

Dry-Well Specifications

Class	Model	Temp Range (°C)	Display Accuracy (°C)	Stability (±°C)	Block Type	Speed	Size in cm (H x W x D)	Weight (Kg)
Micro-Baths	6102	35 to 200	0.25	0.02 at 100	Silicone oil	23 °C to 200 °C: 40 min.	26 x 14 x 20	4.5
	7102	–5 to 125	0.25	0.015 at –5	Silicone oil	23 °C to 0 °C: 30 min.	31 x 18 x 24	6.8
	7103	–30 to 125	0.25	0.03 at –25	Silicone oil	23 °C to –20 °C: 45 min.	34 x 23 x 26	9.8
Handheld Dry-Wells	9100S	35 to 375	0.5 at 375	0.3 at 375	Fixed with 2-6 holes	23 °C to 375 °C: 9.5 min.	6 x 13 x 15	1.1
	9102S	–10 to 122	0.25	0.05	Two removable inserts	23 °C to 0 °C: 10 min.	10 x 14 x 18	1.8
Field Dry-Wells	9103	–25 to 140	0.25	0.02 at –25	Removable 6-hole insert	23 °C to –25 °C: 20 min.	26 x 14 x 25	5.7
	9140	35 to 350	0.5	0.05 at 350	Removable 6-hole insert	23 °C to 350 °C: 12 min.	9 x 15 x 20	2.7
	9141	50 to 650	1.0 at 650	0.12 at 650	Removable 6-hole insert	23 °C to 650 °C: 12 min.	24 x 11 x 19	3.6
Dual-Block Dry-Wells	9009	–15 to 110, 50 to 350	0.2 (cold block) 0.6 (hot block)	0.05	Two removable inserts, each block	23 °C to –15 °C: 16 min. 23 °C to 350 °C: 10 min.	18 x 27 x 25	4.5
	9011	–30 to 140, 50 to 670	0.25 at –30 0.65 at 600	0.02 at –30 0.06 at 600	One insert and four fixed wells (cold block); one insert (hot block)	23 °C to –30 °C: 20 min. 23°C to 670 °C: 30 min.	29 x 39 x 27	16.4
Lab Dry-Wells	9105	–25 to 140	0.1	0.01	1 removable insert, 4 fixed wells	23 °C to –25 °C: 15 min.	35 x 20 x 30	11.8
	9107	–45 to 140	0.1	0.005 at 0	1 removable insert, 4 fixed wells	23 °C to –45 °C: 35 min.	35 x 20 x 30	10.0
	9122A	50 to 700	0.3 at 660	0.04 at 660	4 removable inserts, 5 fixed wells	23 °C to 700 °C: 50 min.	35 x 20 x 30	11.3
	9127	50 to 600	0.5 at 600	0.05 at 600	Removable 6–8-hole insert	23 °C to 600 °C: 30 min.	35 x 20 x 30	11.3
Ice-Point Dry-Well	9101	0	0.05	0.005	Fixed with 3 wells	23 °C to 0 °C: 30 min.	31 x 22 x 15	5.4
Field Furnace	9150	150 to 1200	5	0.5	Removable 6-hole insert	23 °C to 1200 °C: 35 min.	32 x 21 x 32	13.0
Lab Furnace	9112A	300 to 1100	Used for comparison	0.1 at 1100	Removable 5-hole block	23 °C to 1100 °C: 5 hours	46 x 34 x 66	33.0
Infra red Calibrators	9132	50 to 500	0.8 at 500	0.3 at 500	57-mm blackbody, ε = 0.95 (±0.02)	23 °C to 500 °C: 30 min.	10 x 15 x 18	1.8
	9133	–30 to 150	0.4	0.1	57-mm blackbody, ε = 0.95 (±0.02)	23 °C to –20 °C: 15 min.	15 x 29 x 27	4.6

More Temperature Instruments from Hart

Hart Scientific not only manufactures first class industrial temperature measurement and calibration instrumentation, it manufactures everything needed in measuring and calibrating temperature. Its full product offering includes also everything from fixed point cells and maintenance furnaces, constant temperature baths, SPRTs, precision read-outs and data loggers. Hart is the world's leading manufacturer of temperature and measurement equipment. Hart Scientific's leading temperature calibration products, are available and backed up by technical support, customer service and a full accredited calibration lab through your local specially selected distributor.

For more information on the other products from Hart contact your local Hart distributor for any of the following documents:

- **Primary Standards,**
- **Constant Temperature Baths,**
- **Thermometry Readouts and Probes,**
- **Full Catalog**

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2074762 B-ENG-N Rev. A