

# FIELD DRY-WELLS



dry-well easy and productive to use—which is exactly how users describe our series of “field” dry-wells. These dry-wells work for you instead of you working for your dry-well.

These three units beat every other comparable dry-well in the industry in performance, size, weight, convenience, ease of calibration, software, and price. In addition, the heating and cooling rate of each of these dry-wells is adjustable from the front panel, thermal switches can be checked for actuation testing, and multiple-hole inserts are available for a variety of probe sizes.

Hart dry-wells are easy to calibrate. You don’t even have to open the case. This means less maintenance costs and less down time when they do need calibration.

Our *Interface-it* software lets you adjust set-points and ramp rates, log dry-well readings to a file, create an electronic strip chart, and perform thermal switch testing with data collection. The software is written for Windows and has a great graphical interface. It’s the best dry-well software in the industry. Regardless of whether you want basic software or a completely automated calibration system, we’ve got what you want. Read about all our great packages on page 80.

Every dry-well we ship is tested at our factory, and every unit comes with a NIST-traceable calibration. There’s no extra charge for the report, because we consider it an essential ingredient in our

Field Dry-Wells	Models 9103, 9140, and 9141
Less than eight pounds	
Accuracy to $\pm 0.25^{\circ}\text{C}$	
RS-232 and <i>Interface-it</i> software included	
Easy to recalibrate	

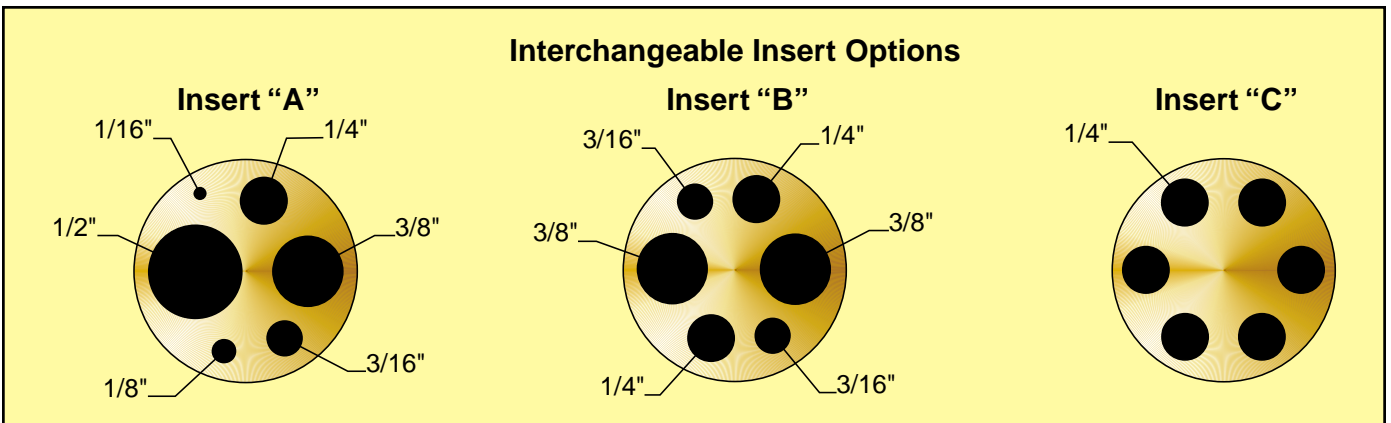
If you’ve been using dry-well calibrators, you know there’s a lot more to a dry-well than its temperature range and stability. Size, weight, speed, convenience, and software are also significant.

Dry-wells need to be portable, flexible, and suitable for high-volume cali-

brations or certifications. If they’re not, you’ll soon forget about the great stuff the sales rep told you and realize what you’ve really bought.

At Hart Scientific, we use dry-wells every day in our manufacturing and calibration work, and we know what makes a

Industrial



When ordering, replace the “X” with the appropriate insert letter. Order additional inserts as your applications require.

# Ranges from $-25^{\circ}\text{C}$ to $650^{\circ}\text{C}$

Specifications	9103	9140	9141
Range	$-25^{\circ}\text{C}$ to $140^{\circ}\text{C}$ ( $-13^{\circ}\text{F}$ to $284^{\circ}\text{F}$ ) at $23^{\circ}\text{C}$ ambient	$35^{\circ}\text{C}$ to $350^{\circ}\text{C}$ ( $95^{\circ}\text{F}$ to $662^{\circ}\text{F}$ )	$50^{\circ}\text{C}$ to $650^{\circ}\text{C}$ ( $122^{\circ}\text{F}$ to $1202^{\circ}\text{F}$ )
Accuracy	$\pm 0.25^{\circ}\text{C}$	$\pm 0.5^{\circ}\text{C}$ (holes greater than 1/4" [6.35 mm]: $\pm 1^{\circ}\text{C}$ )	$\pm 0.5^{\circ}\text{C}$ to $400^{\circ}\text{C}$ ; $\pm 1.0^{\circ}\text{C}$ to $650^{\circ}\text{C}$ (holes greater than 1/4": $\pm 2^{\circ}\text{C}$ )
Stability	$\pm 0.02^{\circ}\text{C}$ at $-25^{\circ}\text{C}$ $\pm 0.04^{\circ}\text{C}$ at $140^{\circ}\text{C}$	$\pm 0.03^{\circ}\text{C}$ at $50^{\circ}\text{C}$ $\pm 0.05^{\circ}\text{C}$ at $350^{\circ}\text{C}$	$\pm 0.05^{\circ}\text{C}$ at $100^{\circ}\text{C}$ $\pm 0.10^{\circ}\text{C}$ at $500^{\circ}\text{C}$ $\pm 0.12^{\circ}\text{C}$ at $650^{\circ}\text{C}$
Well-to-Well Uniformity	$\pm 0.1^{\circ}\text{C}$ between similarly sized wells	$\pm 0.1^{\circ}\text{C}$ with similarly sized wells	$\pm 0.1^{\circ}\text{C}$ below $400^{\circ}\text{C}$ , $\pm 0.5^{\circ}\text{C}$ above $400^{\circ}\text{C}$ with similarly sized wells
Heating Times	18 minutes from ambient to $140^{\circ}\text{C}$	12 minutes from ambient to $350^{\circ}\text{C}$	12 minutes from ambient to $650^{\circ}\text{C}$
Cooling Times	20 minutes from ambient to $-25^{\circ}\text{C}$	15 minutes from $350^{\circ}\text{C}$ to $100^{\circ}\text{C}$	25 minutes from $650^{\circ}\text{C}$ to $100^{\circ}\text{C}$
Stabilization Time	7 minutes		
Immersion Depth	4.875" (124 mm)		
Inserts	Insert A, B, or C included (specify when ordering)		
Computer Interface	RS-232 included with free Interface- <i>it</i> software (Model 9930)		
Power	115 VAC ( $\pm 10\%$ ), 1.3 A or 230 VAC ( $\pm 10\%$ ), 0.7 A, switchable, 50/60 Hz, 150 W	115 VAC ( $\pm 10\%$ ), 4.4 A or 230 VAC ( $\pm 10\%$ ), 2.2 A, switchable, 50/60 Hz, 500 W	115 VAC ( $\pm 10\%$ ), 8.8 A or 230 VAC ( $\pm 10\%$ ), 4.4 A, switchable, 50/60 Hz, 1000 W
Size	5.63" W x 10.25" H x 9.63" D (143 x 261 x 245 mm)	6" W x 3.375" H x 7.75" D (152 x 86 x 197 mm)	4.3" W x 9.3" H x 7.3" D (109 x 236 x 185 mm)
Weight	12 lb. (5.7 kg)	6 lb. (2.7 kg)	8 lb. (3.6 kg)
NIST-Traceable Certificate	Data at $-25^{\circ}\text{C}$ , $0^{\circ}\text{C}$ , $25^{\circ}\text{C}$ , $50^{\circ}\text{C}$ , $75^{\circ}\text{C}$ , $100^{\circ}\text{C}$ , and $140^{\circ}$	Data at $50^{\circ}\text{C}$ , $100^{\circ}\text{C}$ , $150^{\circ}\text{C}$ , $200^{\circ}\text{C}$ , $250^{\circ}\text{C}$ , $300^{\circ}\text{C}$ , and $350^{\circ}\text{C}$	Data at $100^{\circ}\text{C}$ , $200^{\circ}\text{C}$ , $300^{\circ}\text{C}$ , $400^{\circ}\text{C}$ , $500^{\circ}\text{C}$ , and $600^{\circ}\text{C}$

quality program. You shouldn't have to pay extra for calibration procedures we perform anyway.

## Model 9103

The Model 9103 covers below-ambient temperatures as low as  $-25^{\circ}\text{C}$ . The 9103 is stable to  $\pm 0.02^{\circ}\text{C}$ , and its display is calibrated to an accuracy of  $\pm 0.25^{\circ}\text{C}$  at all temperatures within its range.  $0^{\circ}\text{C}$  is reached in just eight minutes, and  $100^{\circ}\text{C}$  is reached in six minutes, so your time is spent calibrating—not waiting.

The 9103 reaches temperatures  $50^{\circ}\text{C}$  below ambient, so  $-25^{\circ}\text{C}$  is reached under normal ambient conditions. Our competitors like to advertise their units as reaching  $-45^{\circ}\text{C}$  when they really mean  $-45^{\circ}\text{C}$  below ambient, which typically means it will go to  $-20^{\circ}\text{C}$ . Our unit doesn't require you to work in a walk-in freezer to achieve its full advertised range.

Choose one of three removable inserts sized for probes from 1/16 inch to

1/2 inch in diameter. Insert A handles a full range of probe sizes with a single well of each size. Insert B features two wells each of 3/8, 1/4, and 3/16 inches in diameter for doing comparison calibrations, and Insert C has six 1/4-inch-diameter wells for multiple probe calibrations.

A special adapter sleeve is also available for maintaining X Cells (page 23) in a 9103 Dry-Well.

## Model 9140

The Model 9140 has a temperature range of  $35^{\circ}\text{C}$  to  $350^{\circ}\text{C}$ , and it reaches its maximum temperature in 12 minutes. At six pounds, it's small enough to easily carry in one hand. It's truly a unique innovation in dry-wells.

The unit has a stability of  $\pm 0.05^{\circ}\text{C}$  or better and a uniformity of at least  $0.4^{\circ}\text{C}$  in the largest-diameter wells and  $0.1^{\circ}\text{C}$  in the smaller wells. Despite its small size, this unit performs.

Use the display—calibrated to  $\pm 0.5^{\circ}\text{C}$ —as your reference, or use an external thermometer for maximum calibration accuracy. With three removable inserts to choose from, the 9140 is as versatile as it is fast.

## Model 9141

Here's an upright unit you're going to love. It does calibrations up to  $650^{\circ}\text{C}$ , weighs only eight pounds, and heats up to  $650^{\circ}\text{C}$  in only 12 minutes—12! This dry-well does everything but get legs and walk to the job for you. (And we're working on one that does that too.)

This four-inch-wide dry-well 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. And just like the 9140, it works with all of our software described on page 78.

It has three removable well inserts available, an optional carrying case, a NIST-traceable calibration, and the best price in the industry.

# FIELD DRY-WELLS

Ranges from  $-25^{\circ}\text{C}$  to  $650^{\circ}\text{C}$

## Ordering Information 9103

- 9103-X Dry-Well (specify X, X = A, B, or C included insert)
- 3103-1 Insert, blank
- 3103-2 Insert A
- 3103-3 Insert B
- 3103-4 Insert C
- 3103-5 X Cell Sleeve, 9103
- 9316 Rugged Carrying Case

## Ordering Information 9140

- 9140-X Dry-Well (specify X, X = A, B, or C included insert)
- 3140-1 Insert, blank
- 3140-2 Insert A
- 3140-3 Insert B
- 3140-4 Insert C
- 9308 Rugged Carrying Case

## Ordering Information 9141

- 9141-X Dry-Well (specify X, X = A, B, or C included insert)
- 3141-1 Insert, blank
- 3141-2 Insert A
- 3141-3 Insert B
- 3141-4 Insert C
- 9309 Rugged Carrying Case
- 2032 Air Chiller, Dry-Well



Hart not only includes an RS-232 port on the 9103, 9140, and 9141, but also gives you free Windows control software (Interface-it) to automate your dry-well.

## Technical Tip

### Maximum Accuracy

To get the most accurate calibrations possible from a dry-well calibrator, you should use an external reference thermometer. If, however, you are *not* using an external reference, there are a few important things you should keep in mind.

First, you *are* using a reference. You're comparing the reading of your test probe against the display of the dry-well. The dry-well display is based on its own control sensor, usually located at the bottom of the well. Therefore, to make the best comparison, your test probe should be inserted to the same depth as the control sensor. This was the method used when the dry-well's display was calibrated at the factory.

Second, your test probe should fit snugly into one of the test wells. Again, this is how it was originally calibrated at

the factory. If your probe is too loose, thermal contact is poor and a large error has been introduced. Custom inserts are available to help solve this problem.

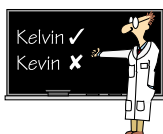
Third, you should not introduce fluids into the wells of a dry-block in an attempt to improve thermal contact. It is too dangerous. If thermal contact is so poor that you're thinking about doing this, consider buying a fluid bath instead. Micro-Baths are now available that are just as portable and easy to use as dry-wells.

The point is that the accuracy specs of your dry-well are based upon how the manufacturer calibrates it. If you're relying on those specs, you need to use the dry-well the same way they do—with a good, snug fit at the bottom of the well.



Calibrations using dry-wells can be improved by using an external reference such as the 1502 Tweener Thermometer.

Industrial



Read about our calibration training courses on page 152.



Call for custom inserts.



Don't forget a protective case.



Have you considered an external reference? See page 39.