

# 9190A Ultra-Cool Field Metrology Well

Ultra-cool dry-block calibrator  
with best-in-class stability

## Technical Data



The Fluke Calibration 9190A Ultra-Cool Field Metrology Well is the most accurate and stable, cold temperature dry-block on the market. It's ideal for applications that demand strict quality control and regulatory process compliance. These applications include on-location validation and calibration of RTDs, thermocouples, thermometers, and sensors used with process control equipment such as medical freezers, laboratory refrigerators, cold rooms, blood banks, sterilizers (autoclaves), and freeze dryers.

### Great for cleanroom environments

Calibration baths are the most stable and uniform temperature sources available, but they aren't a good fit for cleanrooms. The size of a bath limits its portability; it uses fluids that produce fumes that can easily be spilled. The 9190A Ultra-Cool Field Metrology Well is a great alternative. Its wide temperature range brackets the coldest and highest temperature ranges required for pharmaceutical, biomedical and food processing applications. The 9190A is small and lightweight, making it easy to transport. There are no fluids so cleanrooms stay clean. And the 9190A cooling and heating times are faster than a calibration bath—that means calibration work gets done more quickly.

### An accurate temperature source is critical for dependable process measurements

Unreliable process measurements can have a damaging impact on business, leading to poor product quality, recalls, fines, waste, and lost profits. Ultimately, measurements are only as good as the temperature sources used to calibrate the measurement equipment.

The 9190A Ultra-Cool Field Metrology Well incorporates the best technology and design expertise gained from decades of dry-block development experience. The 9190A conforms to EURAMET cg-13, guidelines for best measurement practices for temperature block calibrators. As a result, the 9190A specifications for accuracy, stability, axial (vertical) uniformity, radial (well-to-well) uniformity, loading, and hysteresis have been thoroughly and carefully defined and tested. With a 9190A Ultra-Cool Field Metrology Well, you can be confident you're using the most accurate and stable ultra-cool dry-block calibrator available. And that will have a positive impact on your business.

Calibration equipment  
accuracy and stability

Lower  
calibration  
uncertainty

Improved  
process  
control

Increased  
measurement  
reliability

Business  
results

*Accurate and stable calibration equipment impacts business results (e.g. quality, efficiency, less waste)*



## Features at a glance

### Wide temperature range

From  $-95\text{ }^{\circ}\text{C}$  to  $140\text{ }^{\circ}\text{C}$

### Excellent accuracy

**Accuracy using built-in reference thermometer readout:**

$\pm 0.05\text{ }^{\circ}\text{C}$  full range

**Display accuracy:**  $\pm 0.2\text{ }^{\circ}\text{C}$  full range

### Best-in-class stability

$\pm 0.015\text{ }^{\circ}\text{C}$  full range

### Fast cooling time

$23\text{ }^{\circ}\text{C}$  to  $-90\text{ }^{\circ}\text{C}$ : 80 minutes

$23\text{ }^{\circ}\text{C}$  to  $-95\text{ }^{\circ}\text{C}$ : 90 minutes

$140\text{ }^{\circ}\text{C}$  to  $23\text{ }^{\circ}\text{C}$ : 60 minutes

### Portability

Weights only 16 kg (35 lb)

Built-in front and back handles for easy two-handed carry

### Best measurement practices

Conforms to EURAMET cg-13 guidance on measurement practices for temperature block calibrators

### Ergonomics

- Two-handed carry; built-in handles on front and back
- All controls and inputs on the front panel

### Stability indicator

- Shows whether block temperature is stable and within limits defined by the user

### PC interface

- USB and RS-232 support remote operation from a computer

### Dual heater zone

- Active heater zone control compensates for differential temperatures between zones
- Minimizes axial temperature gradients

### Ramp-and-soak set-points

- Define up to eight set-point temperatures; automatically ramp to and "soak" at each set-point
- Specify soak time, number of cycles, and direction

### Fast time to temperature and small footprint

- Compact, efficient free piston Stirling cooler technology (FPSC)

## Optional process features

### Reference sensor control

- Set-point temperature control gets passed from the internal sensor to external reference PRT
- 9190A controls the well temperature based on its measurement and position inside the well
- Helps minimize the effects of the axial gradient when reference PRT is aligned with short sensors

### 4-20 mA connectors

- Power a 4-20 mA transmitter from the drywell
- Supplies 24 V dc loop power

### 4-wire PRT/RTD input

- Reads a 4-wire, 3-wire, or 2-wire PRT/RTD
- Accuracy  $\pm 0.02\text{ }^{\circ}\text{C}$
- 4-20 mA circuit fuses

### Thermocouple input

- Accepts common thermocouples with mini-jack termination
- Types: J, K, T, E, R, S, M, L, U, N, C

### Reference thermometer input

- Smart connector input accepts -A terminated reference PRTs
- Accuracy  $\pm 0.01\text{ }^{\circ}\text{C}$  at  $-95\text{ }^{\circ}\text{C}$

## Specifications

Base unit specifications	
Temperature range at 23 °C	–95 °C to 140 °C (–139 °F to 284 °F)
Display accuracy	± 0.2 °C full range
Accuracy with external reference <sup>[3]</sup>	± 0.05 °C full range
Stability	± 0.015 °C full range
Axial uniformity at 40 mm (1.6 in)	± 0.05 °C full range
Radial gradient	± 0.01 °C full range
Loading effect	(with a 6.35 mm reference probe and three 6.35 mm probes)
	± 0.006 °C full range
	(versus display with one 6.35 mm probe)
	± 0.25 °C at –95 °C
	± 0.10 °C at 140 °C
Operating conditions	0 °C to 35 °C, 0 % to 90 %
	RH (non-condensing) < 2000 m altitude
Environmental conditions for all specifications except temperature range	13 °C to 33 °C
Immersion (well) depth	160 mm (6.3 in)
Well diameter	30 mm (1.18 in)
Heating time <sup>[1]</sup>	–95 °C to 140 °C: 40 min
Cooling time <sup>[1]</sup>	23 °C to –90 °C: 80 min
	23 °C to –95 °C: 90 min
	140 °C to 23 °C: 60 min
Stabilization time <sup>[2]</sup>	15 min
Resolution	0.01
Display	LCD, °C or °F user selectable
Size (H x W x D)	480 mm x 205 mm x 380 mm (18.8 in x 8.0 in x 14.9 in)
Weight	16 kg (35 lb)
Power requirements	100 V to 115 V (± 10 %) 50/60 Hz, 575 W
	200 V to 230 V (± 10 %) 50/60 Hz, 575 W
System fuse ratings	115 V: 6.3 A T 250 V
	230 V: 3.15 A T 250 V
4–20 mA Fuse (–P model only)	50 mA F 250 V
Computer interface	RS-232, USB Serial, and 9930 Interface–It temperature calibration software included
Safety	IEC 61010-1, Installation Category II, Pollution degree 2
Electromagnetic environment	IEC 61326-1: Basic
Refrigerants	R32 (Difluoromethane)
	< 20 g, ASHRAE safety group A2L
	R704 (Helium)
	< 20 g, ASHRAE safety group A1

<b>-P Specifications</b>	
<b>Built-in reference thermometer readout accuracy (4-wire reference probe) <sup>[3]</sup></b>	$\pm 0.010\text{ }^{\circ}\text{C}$ at $-95\text{ }^{\circ}\text{C}$
	$\pm 0.013\text{ }^{\circ}\text{C}$ at $-25\text{ }^{\circ}\text{C}$
	$\pm 0.015\text{ }^{\circ}\text{C}$ at $0\text{ }^{\circ}\text{C}$
	$\pm 0.020\text{ }^{\circ}\text{C}$ at $50\text{ }^{\circ}\text{C}$
	$\pm 0.025\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
<b>Reference resistance range</b>	0 $\Omega$ to 400 $\Omega$
<b>Reference resistance accuracy <sup>[4]</sup></b>	0 $\Omega$ to 42 $\Omega$ : $\pm 0.0025\text{ }^{\circ}\text{C}$
	42 $\Omega$ to 400 $\Omega$ : $\pm 60\text{ ppm}$ of reading
<b>Reference characterizations</b>	ITS-90, CVD, IEC-751, resistance
<b>Reference measurement capability</b>	4 wire
<b>Reference probe connection</b>	6-pin din with INFO-CON technology
<b>Built-in RTD thermometer readout accuracy</b>	NI-120: $\pm 0.015\text{ }^{\circ}\text{C}$ at $0\text{ }^{\circ}\text{C}$
	PT-100 (385): $\pm 0.02\text{ }^{\circ}\text{C}$ at $0\text{ }^{\circ}\text{C}$
	PT-100 (3926): $\pm 0.02\text{ }^{\circ}\text{C}$ at $0\text{ }^{\circ}\text{C}$
	PT-100 (JIS): $\pm 0.02\text{ }^{\circ}\text{C}$ at $0\text{ }^{\circ}\text{C}$
<b>RTD resistance range</b>	0 $\Omega$ to 400 $\Omega$
<b>Resistance accuracy <sup>[4]</sup></b>	0 $\Omega$ to 25 $\Omega$ : $\pm 0.002\text{ }^{\circ}\text{C}$
	25 $\Omega$ to 400 $\Omega$ : $\pm 80\text{ ppm}$ of reading
<b>RTD characterizations</b>	PT-100 (385),(JIS),(3926), NI-120, resistance
<b>RTD measurement capability</b>	2-wire, 3-wire, and 4-wire RTD with jumpers only
<b>RTD connection</b>	4-terminal input
<b>Built-in TC thermometer readout accuracy <sup>[5]</sup></b>	Type J: $\pm 0.70\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type K: $\pm 0.75\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type T: $\pm 0.60\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type E: $\pm 0.60\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type R: $\pm 1.60\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type S: $\pm 1.60\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type M: $\pm 0.65\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type L: $\pm 0.65\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type U: $\pm 0.70\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type N: $\pm 0.75\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
	Type C: $\pm 1.00\text{ }^{\circ}\text{C}$ at $140\text{ }^{\circ}\text{C}$
<b>TC millivolt range</b>	-10 mV to 75 mV
<b>Voltage accuracy</b>	0.025 % of reading +0.01 mV
<b>Internal cold junction compensation accuracy</b>	$\pm 0.35\text{ }^{\circ}\text{C}$ (ambient of $13\text{ }^{\circ}\text{C}$ to $33\text{ }^{\circ}\text{C}$ )
<b>TC connection</b>	Miniature connectors (ASTM E1684)
<b>Built-in mA readout accuracy</b>	0.02 % of reading + 0.002 mA
<b>mA range</b>	Cal 4-22 mA, Spec 4-24 mA
<b>mA connection</b>	2 terminal input
<b>Loop power function</b>	24 V dc loop power
<b>Built-in electronics temperature coefficient</b> (0 $^{\circ}\text{C}$ to $13\text{ }^{\circ}\text{C}$ , $33\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$ )	$\pm 0.005\text{ }^{\circ}\text{C}$ of range per $^{\circ}\text{C}$

**Notes:**

<sup>[1]</sup> For ambient temperature of  $23\text{ }^{\circ}\text{C}$ .

<sup>[2]</sup> Time from when the SETPOINT is reached to when the unit is with in stability specification.

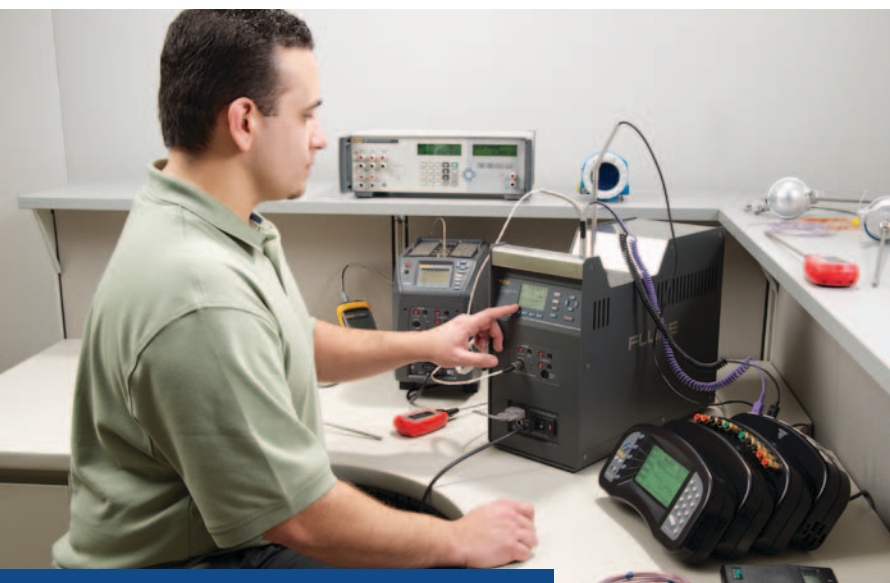
<sup>[3]</sup> The temperature range may be limited by the reference probe connected to the readout.

The built-in reference accuracy does not include the sensor probe accuracy. It does not include the probe uncertainty or probe characterization errors.

<sup>[4]</sup> Measurement accuracy specifications apply within the operating range and assume 4 wires for PRTs. With 3-wire RTDs add 0.05  $\Omega$  to the measurement accuracy plus the maximum possible difference between the resistances of the lead wires.

<sup>[5]</sup> The thermocouple input readout is sensitive to EM fields in the frequency range of 500 MHz to 700 MHz.





## Ordering Information

### 9190A Ultra-Cool Field Metrology Well

Model	Description
9190A-X	Ultra-Cool Field Metrology Well, -95 °C to 140 °C, with 9190-INSX
9190A-X-P	Ultra-Cool Field Metrology Well, -95 °C to 140 °C, with 9190-INSX, with Process Electronics

'X' in the above model numbers to be replaced with A, B, C, D, E, and F as appropriate for the desired insert. See the inserts illustration and listing below.

### Recommended accessories

Model	Description
9190-INSA	Insert "A" 9190, imperial miscellaneous holes
9190-INSB	Insert "B" 9190, imperial comparison holes
9190-INSC	Insert "C" 9190, 0.25 inch holes
9190-INSD	Insert "D" 9190, metric comparison holes
9190-INSE	Insert "E" 9190, metric miscellaneous holes with 0.25 inch hole
9190-INSF	Insert "F" 9190, metric comparison miscellaneous holes with 0.25 inch hole
9190-INSY	Insert "Y" 9190, custom insert Custom insert is based on a maximum of eight holes. Please contact your local sales representative if you have special requirements.
9190-INSZ	Insert "Z" 9190, blank

## Fluke Calibration.

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