



**FLUKE®**

**Calibration**

# Industrial temperature calibration selection guide

**Look inside for:**

**Field metrology wells**

**Infrared calibrators**

**Handheld and field dry-wells**

**Micro-baths**

**Environmental monitoring**

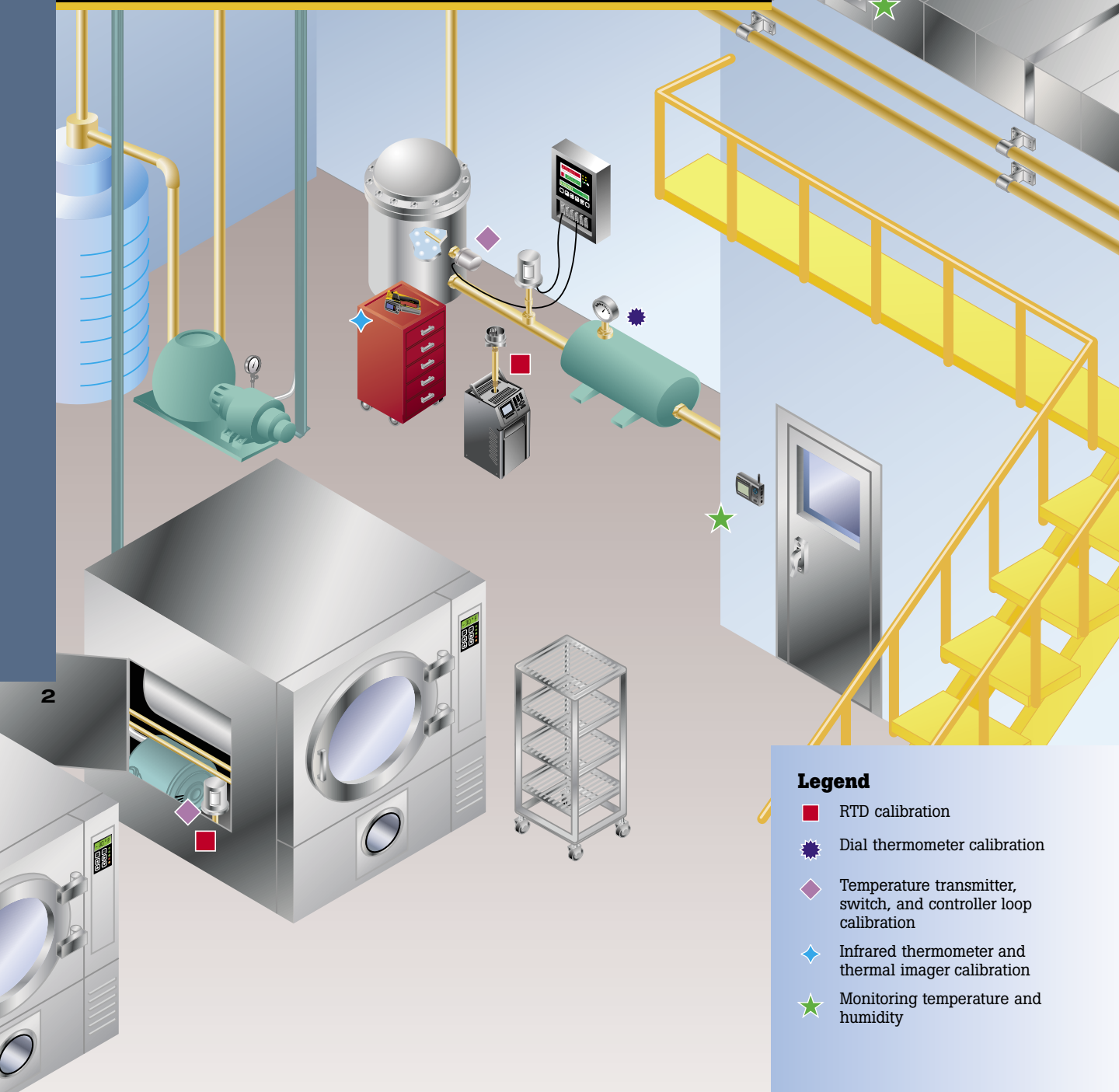
**Thermometer readouts**

**Reference sensors**

# Temperature measurement and calibration

*Tools for industrial instrumentation and calibration technicians*

# Selection guide



## Legend

- RTD calibration
- ⚙ Dial thermometer calibration
- ◆ Temperature transmitter, switch, and controller loop calibration
- ◆ Infrared thermometer and thermal imager calibration
- ★ Monitoring temperature and humidity

# Selection guide

**FLUKE**®

Calibration

|               | Field metrology wells                                                             |                                                                                   |                                                                                   | NEW! Precision infrared calibrators                                               |                                                                                   | Handheld dry-wells                                                                  |                                                                                     |
|---------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|               |  |  |  |  |  |  |  |
| Model         | 9142/9142P<br>page 4                                                              | 9143/9143P<br>page 4                                                              | 9144/9144P<br>page 4                                                              | 4180<br>page 6                                                                    | 4181<br>page 6                                                                    | 9100S<br>page 8                                                                     | 9102S<br>page 8                                                                     |
| Range         | -25 °C to 150 °C<br>4-20 mA                                                       | 33 °C to 350 °C<br>4-20 mA                                                        | 50 °C to 660 °C<br>4-20 mA                                                        | -15 °C to 120 °C                                                                  | 35 °C to 500 °C                                                                   | 35 °C to 375 °C                                                                     | -10 °C to 122 °C                                                                    |
| Best accuracy | ± 0.2 °C                                                                          | ± 0.2 °C                                                                          | ± 0.35 °C                                                                         | ± 0.35 °C                                                                         | ± 0.35 °C                                                                         | ± 0.25 °C                                                                           | ± 0.25 °C                                                                           |
| Applications  | ◆                                                                                 | ◆                                                                                 | ◆                                                                                 | ◆                                                                                 | ◆                                                                                 | ■                                                                                   | ■                                                                                   |

|               | Field dry-wells                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | Sensors                                                                             |                       |
|---------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------|
|               |  |  |  |  |  |  |                       |
| Model         | 9009<br>page 9                                                                    | 9103<br>page 10                                                                   | 9140<br>page 10                                                                   | 9141<br>page 10                                                                   | 9150<br>page 10                                                                   | PRT<br>page 15                                                                      | Thermistor<br>page 15 |
| Range(s)      | -15 °C to 350 °C                                                                  | -25 °C to 140 °C                                                                  | 35 °C to 350 °C                                                                   | 50 °C to 650 °C                                                                   | 150 °C to 1200 °C                                                                 | -200 °C to 670 °C                                                                   | 0 °C to 100 °C        |
| Best accuracy | ± 0.2 °C                                                                          | ± 0.25 °C                                                                         | ± 0.5 °C                                                                          | ± 0.5 °C                                                                          | ± 5 °C                                                                            | See pages 14-15                                                                     | See pages 14-15       |
| Applications  | ■ ◆                                                                               | ■ ◆                                                                               | ■ ◆                                                                               | ■ ◆                                                                               | thermocouples                                                                     | ◆ ■ ◆                                                                               | ◆ ■ ◆                 |

|               | Micro baths                                                                         |                                                                                     |                                                                                     | Thermometer readouts and environmental monitoring                                   |                                                                                     |                                                                                       |                                                                                       |
|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|               |  |  |  |  |  |  |  |
| Model         | 6102<br>page 11                                                                     | 7102<br>page 11                                                                     | 7103<br>page 11                                                                     | 1551A/1552A<br>page 13                                                              | 1523/1524<br>page 13                                                                | 1529<br>page 14                                                                       | 1620A<br>page 12                                                                      |
| Range         | 35 °C to 200 °C                                                                     | -5 °C to 125 °C                                                                     | -30 °C to 125 °C                                                                    | -200 °C to 300 °C                                                                   | -200 °C to 2315 °C                                                                  | -200 °C to 962 °C                                                                     | 15 °C to 35 °C<br>20%RH to 70%RH                                                      |
| Best accuracy | ± 0.25 °C                                                                           | ± 0.25 °C                                                                           | ± 0.25 °C                                                                           | ± 0.05 °C                                                                           | ± 0.015 °C                                                                          | ± 0.006 °C                                                                            | ± 0.25 °C<br>± 2 %RH                                                                  |
| Channels      | n/a                                                                                 | n/a                                                                                 | n/a                                                                                 | n/a                                                                                 | 1 or 2                                                                              | 4                                                                                     | 2                                                                                     |
| Applications  | ◆                                                                                   | ◆                                                                                   | ◆                                                                                   | ■ ◆                                                                                 | ◆ ◆                                                                                 | ◆ ◆                                                                                   | ★                                                                                     |

# Field metrology wells



## Fluke Calibration 9142, 9143, 9144 Field Metrology Wells

- Lightweight, portable, and fast
- Cool to  $-25^{\circ}\text{C}$  in 15 minutes and heat to  $660^{\circ}\text{C}$  in 15 minutes
- Built-in two-channel readout for PRT, RTD, thermocouple, 4–20 mA current
- True reference thermometry with accuracy to  $\pm 0.01^{\circ}\text{C}$
- Specifications guaranteed in an ambient range of  $13^{\circ}\text{C}$  to  $33^{\circ}\text{C}$
- On-board automation and documentation
- Metrology performance in accuracy, stability, uniformity, and loading

Field Metrology Wells offer accuracy, portability, and speed for nearly all field calibration applications. These units are packed with functionality and are remarkably easy to use. Field Metrology Wells are light weight, small, and quick to reach temperature set points, yet also stable, uniform, and precise. This industrial product line is perfect for transmitter loop, comparison calibration, or a simple check of a thermocouple sensor. There is no need to have to carry additional tools into the field as the “process” option offers a built-in readout for resistance, voltage, and mA measurement, 24V loop power, and on-board documentation.

## Typical applications:

- Loop calibration of temperature transmitters
- Thermocouple calibration or verification
- Calibrations of RTDs or PRTs
- Testing of thermostatic switches
- Verification of industrial thermometers

**Each unit includes:** Accredited report of calibration, insert, insert removal tool, power cord, user manual, 9930 Interface-*it* software, serial cable, test leads (process versions only), spare PRT connector (process version only)

**Recommended accessories:** carrying case, MET/TEMP II automated calibration software, reference temperature sensor

## Ordering Information

**9142-X** Field Metrology Well,  $-25^{\circ}\text{C}$  to  $150^{\circ}\text{C}$

**9142-X-P** Field Metrology Well, Process Version,  $-25^{\circ}\text{C}$  to  $150^{\circ}\text{C}$

**9143-X** Field Metrology Well,  $33^{\circ}\text{C}$  to  $350^{\circ}\text{C}$

**9143-X-P** Field Metrology Well, Process Version,  $33^{\circ}\text{C}$  to  $350^{\circ}\text{C}$

**9144-X** Field Metrology Well,  $50^{\circ}\text{C}$  to  $660^{\circ}\text{C}$

**9144-X-P** Field Metrology Well, Process Version,  $50^{\circ}\text{C}$  to  $660^{\circ}\text{C}$

**9142-CASE** Case, Carrying, Field Metrology Wells

**5616-12-A** PRT 305 mm x 6.35 mm

(11.75 in x 1/4 in) w/ NIST traceable calibration,  $-200^{\circ}\text{C}$  to  $420^{\circ}\text{C}$

**5609-12-A** PRT 305 mm x 6.35 mm

(11.75 in x 1/4 in) uncalibrated,  $-200^{\circ}\text{C}$  to  $660^{\circ}\text{C}$

**1923-4-7** Calibration, PRT  $-200^{\circ}\text{C}$  to  $660^{\circ}\text{C}$

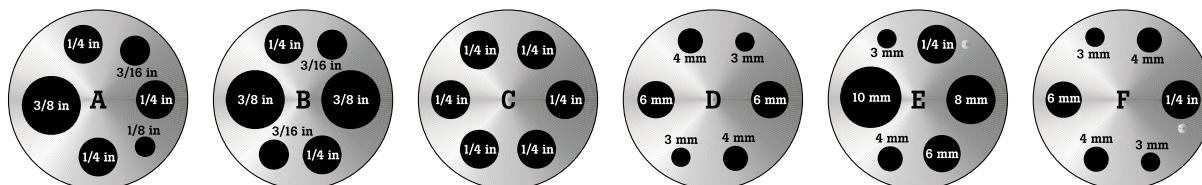
X = insert (interchangeable). Specify “A”, “B”, “C”, “D”, “E”, or “F”

# Field metrology wells

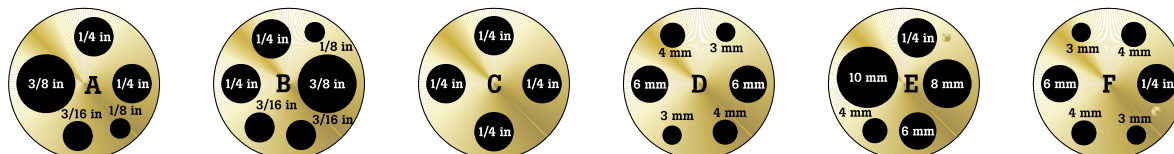
## Summary specifications for 9142, 9143, and 9144

| Model                        | 9142/9142-P                                                                                                           | 9143/9143-P                               | 9144/9144-P                               |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------|
| Range                        | -25 °C to 150 °C                                                                                                      | 33 °C to 350 °C                           | 50 °C to 660 °C                           |
| Display accuracy             | ± 0.2 °C                                                                                                              | ± 0.2 °C                                  | ± 0.35 °C (420 °C)<br>± 0.5 °C (660 °C)   |
| Stability                    | ± 0.01 °C                                                                                                             | ± 0.02 °C (33 °C)<br>± 0.03 °C (350 °C)   | ± 0.03 °C (50 °C)<br>± 0.05 °C (660 °C)   |
| Heating time (max)           | 23 min                                                                                                                | 5 min                                     | 15 min                                    |
| Cooling time                 | 15 min to -25 °C                                                                                                      | 14 min to 100 °C                          | 25 min to 100 °C                          |
| Weight                       | 8.2 kg (18 lbs)                                                                                                       | 7.3 kg (16 lbs)                           | 7.7 kg (17 lbs)                           |
| Process version accuracy     | ± 0.01 °C at -25 °C<br>± 0.02 °C at 155 °C                                                                            | ± 0.02 °C at 50 °C<br>± 0.04 °C at 350 °C | ± 0.02 °C at 50 °C<br>± 0.07 °C at 660 °C |
| RTD inputs (process version) | 2-, 3-, 4-wire RTD. Resistance range of 0 to 400 ohms. Ni-120, PT-100 (385), PT-100 (3926), PT-100 (JIS), or $\Omega$ |                                           |                                           |
| TC inputs (process version)  | Type J, K, T, E, R, S, B, L, U, N, C, and mV                                                                          |                                           |                                           |
| mA specs (process version)   | Range: 0-24 mA with 24-28 VDC loop power<br>mA accuracy: 0.02% of rdg + 0.002 mA                                      |                                           |                                           |

### 9142 insert options



### 9143/9144 insert options



# Precision infrared calibrators

## Fluke Calibration 4180 and 4181 Precision Infrared Calibrators

### Accurate yet portable

- Combined temperature range of  $-15^{\circ}\text{C}$  to  $500^{\circ}\text{C}$
- Infrared display accuracy as good as  $\pm 0.35^{\circ}\text{C}$  on both units
- Convenient handle and weight of 9.5 kg (21 lbs) or less for portability

### Easy to get dependable results

- Each unit is given an accredited radiometric calibration for consistent, reliable, and traceable results
- Corrections for emissivity are performed automatically with no manual calculations
- Audio/visual stability indication provided for ease of use
- Stores thermometer calibration routines including temperature set-points, calibration distance, emissivity setting, and use of external aperture

### A superior target

- 152 mm (6 in) diameter target addresses critical size-of-source effect issues for infrared thermometers and thermal imager calibration requirements
- Stability as good as  $\pm 0.05^{\circ}\text{C}$  over 30 minutes for both models
- Uniformity as good as  $\pm 0.1^{\circ}\text{C}$  over the inner 127 mm (5 in) diameter

**Each unit includes:** Accredited radiometric report of calibration, protective target cover, manual, 9930 Interface-It software

**Recommended accessories:** Protective carrying case

Do you calibrate your infrared thermometers and thermal imagers? Even those infrared thermometers that cannot be adjusted can benefit from a calibration that demonstrates the consistency and validity of your results. A trusted calibration means less worry, fewer questions and more time being productive. The 4180 Series of Precision Infrared Calibrators for infrared thermometers and thermal imagers is fast, accurate, and easy to use. It comes with an accredited calibration from one of the world's most trusted temperature calibration laboratories, sample calibration procedures for Fluke thermometers built right in, and everything you need to get started making high-quality infrared thermometer calibrations. This is the perfect solution for any infrared thermometer or thermal imager within its temperature range.

## Ordering information

**4180** Precision Infrared Calibrator,  $-15^{\circ}\text{C}$  to  $120^{\circ}\text{C}$

**4181** Precision Infrared Calibrator,  $35^{\circ}\text{C}$  to  $500^{\circ}\text{C}$

**4180-CASE** Protective carrying case

**4180-DCAS** Protective carrying case  
with wheels



# Precision infrared calibrators

## Excellent performance

The 4180 reaches temperatures from  $-15^{\circ}\text{C}$  to  $120^{\circ}\text{C}$  and the 4181 has a temperature range from  $35^{\circ}\text{C}$  to  $500^{\circ}\text{C}$ . Check out the uniformity of the large six-inch targets shown in the thermal imager photo. The uniformity and stability are so good that variations can't be detected with a thermal imager. Uniformity is important in infrared temperature calibration work because an infrared thermometer will "see" as much as the entire target when placed at the appropriate calibration distance and each pixel of a thermal imager registers a temperature that needs to be both accurate and consistent across the imager.



## Why calibrate?

Business decisions costing thousands of dollars are based on the results of your measurements, so they had better be right! It can be very expensive to shut down a line for repairs and maintenance but it might be catastrophic if the shut down is unplanned. To stand by your recommendations with confidence, you should definitely have your thermometers calibrated.

## Application notes

For information on emissivity, size of source effect and radiometric calibration see the Fluke Calibration application note "Infrared Temperature Calibration 101" and have a look at our Guide to Infrared Thermometer Calibration to get started quickly with your new calibrator. You can download both documents from our web site.

## Summary specifications for 4180 and 4181

|                                                                                  | <b>4180</b>                                                                                                                                                     | <b>4181</b>                                                                                                                                                     |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Temperature range</b><br>(@ $23^{\circ}\text{C}$ ambient and 0.95 emissivity) | $-15^{\circ}\text{C}$ to $120^{\circ}\text{C}$                                                                                                                  | $35^{\circ}\text{C}$ to $500^{\circ}\text{C}$                                                                                                                   |
| <b>Infrared display accuracy</b>                                                 | $\pm 0.40^{\circ}\text{C}$ at $-15^{\circ}\text{C}$<br>$\pm 0.04^{\circ}\text{C}$ at $0^{\circ}\text{C}$<br>$\pm 0.55^{\circ}\text{C}$ at $120^{\circ}\text{C}$ | $\pm 0.35^{\circ}\text{C}$ at $35^{\circ}\text{C}$<br>$\pm 0.70^{\circ}\text{C}$ at $200^{\circ}\text{C}$<br>$\pm 1.6^{\circ}\text{C}$ at $500^{\circ}\text{C}$ |
| <b>Display resolution</b>                                                        | 0.01 °                                                                                                                                                          |                                                                                                                                                                 |
| <b>Target size</b>                                                               | 152 mm (6 in) dia.                                                                                                                                              |                                                                                                                                                                 |
| <b>Stability</b>                                                                 | $\pm 0.1^{\circ}\text{C}$ at $-15^{\circ}\text{C}$<br>$\pm 0.05^{\circ}\text{C}$ at $0^{\circ}\text{C}$<br>$\pm 0.1^{\circ}\text{C}$ at $120^{\circ}\text{C}$   | $\pm 0.05^{\circ}\text{C}$ at $35^{\circ}\text{C}$<br>$\pm 0.2^{\circ}\text{C}$ at $250^{\circ}\text{C}$<br>$\pm 0.4^{\circ}\text{C}$ at $500^{\circ}\text{C}$  |
| <b>Uniformity</b><br>(5.0-inch diameter zone at the center of the target)        | $\pm 0.15^{\circ}\text{C}$ at $-15^{\circ}\text{C}$<br>$\pm 0.1^{\circ}\text{C}$ at $0^{\circ}\text{C}$<br>$\pm 0.25^{\circ}\text{C}$ at $120^{\circ}\text{C}$  | $\pm 0.1^{\circ}\text{C}$ at $35^{\circ}\text{C}$<br>$\pm 0.5^{\circ}\text{C}$ at $250^{\circ}\text{C}$<br>$\pm 1.0^{\circ}\text{C}$ at $500^{\circ}\text{C}$   |
| <b>Heating time</b>                                                              | 15 min: $-15^{\circ}\text{C}$ to $120^{\circ}\text{C}$<br>14 min: $23^{\circ}\text{C}$ to $120^{\circ}\text{C}$                                                 | 20 min: $35^{\circ}\text{C}$ to $500^{\circ}\text{C}$                                                                                                           |
| <b>Cooling time</b>                                                              | 15 min: $120^{\circ}\text{C}$ to $23^{\circ}\text{C}$<br>20 min: $23^{\circ}\text{C}$ to $-15^{\circ}\text{C}$                                                  | 100 min: $500^{\circ}\text{C}$ to $35^{\circ}\text{C}$<br>40 min: $500^{\circ}\text{C}$ to $100^{\circ}\text{C}$                                                |
| <b>Stabilization time</b>                                                        | 10 minutes                                                                                                                                                      | 10 minutes                                                                                                                                                      |

# Handheld dry-wells



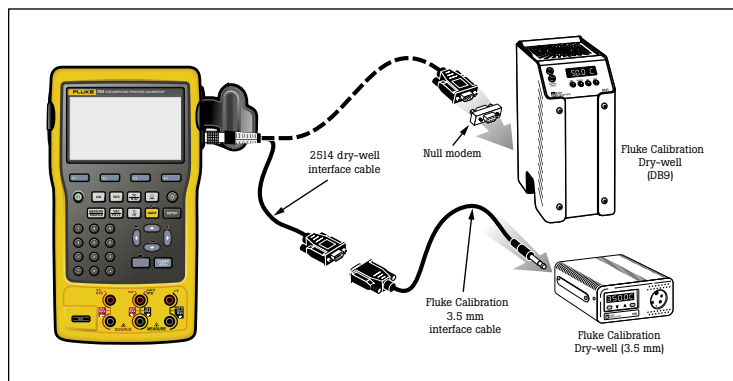
Temperature sensor calibration is easy with a handheld dry-well.

## Fluke Calibration 9100S and 9102S Handheld Dry-Well Temperature Calibrators

- A temperature source that you can take anywhere
- Fast and easy calibrations of temperature sensors
- 9100S model weighs only 2 lbs, 3 oz (1 kilogram)
- Temperature ranges from  $-10^{\circ}\text{C}$  to  $375^{\circ}\text{C}$
- Stability during calibrations to  $\pm 0.05^{\circ}\text{C}$
- Direct interface to the Fluke 754 Documenting Process Calibrator

Each unit includes RS-232 interface, instrument control software and a NIST-traceable calibration.

**Recommended accessories:** carrying case, additional inserts, reference temperature sensor and indicator, battery pack



Easily connect a Fluke 754 to a dry-well for a fully automated temperature calibration that includes the temperature transmitter and temperature sensor.

## Ordering information

**9100S** Handheld Dry-Well

**9300** Rugged Carrying Case, 9100

**9102S** Handheld Dry-Well, comes with your choice of two 3102 inserts

**9308** Hard Carrying Case, 9102/9132

**9320A** Battery Pack, 115V (9102S run time: 4 hrs)

**3102-1** Insert, AL 1/16 in (1.6 mm)

**3102-2** Insert, AL 1/8 in (3.2 mm)

**3102-3** Insert, AL 3/16 in (4.8 mm)

**3102-4** Insert, AL 1/4 in (6.4 mm) (Standard)

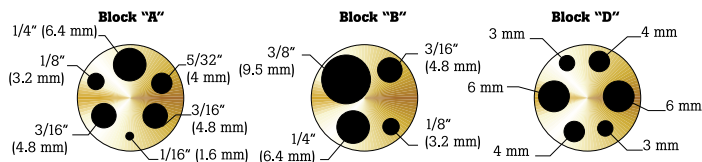
**3102-6** Insert, AL 3/8 in (9.5 mm) (Standard)

**3102-7** Insert, AL 7/16 in (11.1 mm) (Standard)

**3102-8** Insert, AL 5/32 in (4 mm) (Standard)

**2514** Dry-well interface cable to Fluke 754 Insert. Specify "A", "B", "D"

## 9100 fixed-block options





# Field dry-wells

## Fluke Calibration 9009 Industrial Dual-Block Calibrator

### Cut your calibration time in half

- Calibrate temperature sensors fast
- Independently controlled cold and hot blocks
- -15 °C to 110 °C (cold block), 50 °C to 350 °C (hot block)
- Self-contained in a rugged watertight case
- Four removable inserts,
- Direct interface to Fluke 754

Each unit includes four removable inserts, including two with holes that are 6.4 mm (1/4 in) and two with holes that are 4.8 mm (3/16 in) in diameter. Each unit also includes a power cord, insert removal tool, RS-232 interface, instrument control software and a NIST-traceable calibration

**Recommended accessories:** additional inserts, reference temperature sensor and indicator

Why calibrate thermometers? Because your performance will go up and your costs will come down. As suggested in the example in Table 1, the cost of inaccurate measurements can be quite high.

**Tip:** While you're checking your transmitter sensor at one temperature, the other well can be heating or cooling to your next set-point.

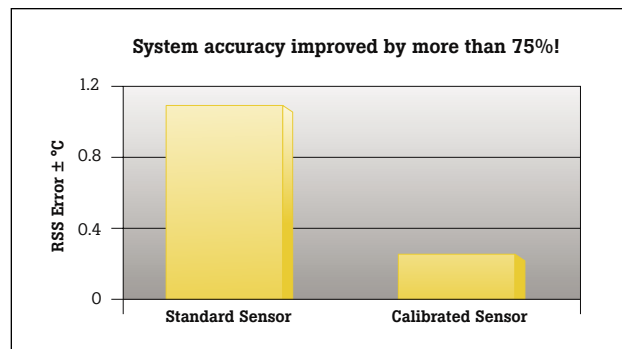


Now it's easy to work twice as fast.

#### High Cost of Not Calibrating a Sensor

|               |                        |
|---------------|------------------------|
| Process fluid | Water                  |
| Flow rate     | 100 gallons per minute |
| Control temp  | 38 °F                  |
| Energy cost   | Rate per kW-Hr         |
| Energy cost   | 70,812 (Rate) per year |

Table 1. Annual cost of energy due to a 1 °C temperature error



System accuracy improvement achieved with a calibrated Pt100 sensor.

## Ordering information

**9009-B** Dual Block Dry-Well (Black), -15 °C to 350 °C

**9009-Y** Dual Block Dry-Well (Yellow), -15 °C to 350 °C

**3102-1** Insert 1.6 mm (1/16 in)

**3102-2** Insert 3.2 mm (1/8 in)

**3102-3** Insert 4.8 mm (3/16 in)

**3102-4** Insert 6.4 mm (1/4 in)

**3102-5** Insert 7.9 mm (5/16 in)

**3102-6** Insert 9.5 mm (3/8 in)

**3102-7** Insert 11.1 mm (7/16 in)

**3102-8** Insert 4 mm (5/32 in)

**2514** Dry-well interface cable to Fluke 754

# Field dry-wells and furnaces



Fluke Calibration dry-wells interface directly to the Fluke 754 for fully automated calibration.



## Fluke Calibration 9103, 9140 and 9141 Field Dry-Wells and 9150 Thermocouple Furnace

Temperature sensor test and calibration

- Lightweight and very portable
- Accuracy to  $\pm 0.25^\circ\text{C}$
- RS-232 and Interface-it software included
- Interchangeable inserts
- 9103 goes as low as  $-25^\circ\text{C}$ .
- 9140 is 6 pounds (2.7 kg) and 9141 is 3.6 kg (8 pounds)
- 9140 and 9141 reach max temp in 12 minutes
- 9150 extends up to  $1200^\circ\text{C}$  covering a wide range of T/C types.
- Direct interface to Fluke 754

**Recommended accessories:** carrying case, additional inserts, reference temperature sensor and indicator

Each dry-well includes one of four available well inserts, an optional carrying case, RS-232 interface, instrument control software and a MIST-traceable calibration.

## Ordering information

**9103** Dry-Well,  $-25^\circ\text{C}$  to  $140^\circ\text{C}$

**9140** Dry-Well,  $35^\circ\text{C}$  to  $350^\circ\text{C}$

**9141** Dry-Well,  $50^\circ\text{C}$  to  $650^\circ\text{C}$

**9150** Thermocouple Furnace,  $150^\circ\text{C}$  to  $1200^\circ\text{C}$

**9316** Rugged Carrying Case for 9103

**9308** Rugged Carrying Case for 9140

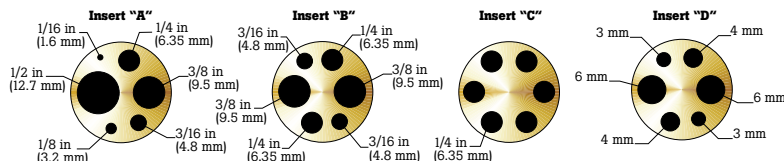
**9309** Rugged Carrying Case for 9141

**9315** Rugged Carrying Case for 9150

**2514** Dry-Well Interface Cable to Fluke 744

Insert (interchangeable). Specify "A", "B", "C", "D"

## 9103, 9140, 9141 and 9150 Insert Options



# Micro-baths

FLUKE®

Calibration

## Fluke Calibration 6102, 7102 and 7103 Micro-Baths

### Portability and extreme stability

- Temperature sensor calibration
- Stability to  $\pm 0.015^\circ\text{C}$
- Ranges from  $-30^\circ\text{C}$  to  $200^\circ\text{C}$
- Accepts oddly shaped sensors
- Exceptional bath portability
- Direct interface to Fluke 754

Each unit includes a stir bar, power cord, RS-232 interface, instrument control software and a NIST-traceable calibration.

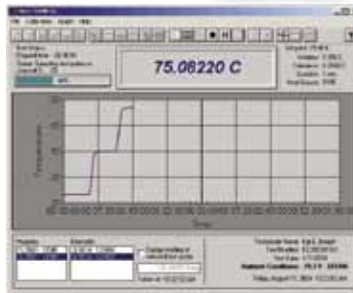
**Recommended accessories:** Fluid, case, reference probe and meter, extra stir bar, tank extension for LIG, MET/TEMP II



## Fluke Calibration MET/TEMP II Software

### Easy-to-use temperature calibration automation software

- Fully automated calibration of RTDs, thermocouples, thermistors and many heat sources
- Calibrates up to 100 sensors at up to 40 points
- Performs coefficient calculations and generates tables and reports
- Reports conform to ANSI and NCSL standards



**Each unit includes:** CD, RS-232 multiplexer box, adapter, and PC cable

## Fluke Calibration LogWare and LogWare II Data Logging and Analysis Software

### Turns any Fluke Calibration thermometer readout into a real-time data logger

- Calculates statistics and displays customized graphs
- User-selectable alarms, delayed start times, and sample intervals
- Logging intervals from 1 second to 24 hours
- User-settable alarm functions
- Choose LogWare II for readouts with more than one channel



See data logged in real-time.



**Tip:** For improved accuracy, use an external reference temperature indicator and sensor such as a 1521 and 5615-12-I combination.

## Ordering information

**7103** Micro-Bath,  $-30^\circ\text{C}$  to  $125^\circ\text{C}$

(includes a transport seal lid and a 2085 test lid)

**7102** Micro-Bath,  $-5^\circ\text{C}$  to  $125^\circ\text{C}$

(includes a transport seal lid and a 2082-P test lid)

**6102** Micro-Bath,  $35^\circ\text{C}$  to  $200^\circ\text{C}$

(includes a transport seal lid and a 2082-M test lid)

**5010-L** Silicone Oil, type 200.05, 1 liter

(usable range:  $-40^\circ\text{C}$  to  $130^\circ\text{C}$ )

**5013-L** Silicone Oil, type 200.20, 1 liter

(usable range:  $10^\circ\text{C}$  to  $230^\circ\text{C}$ )

**9317** Carrying Case for 7103

**9310** Carrying Case for 6102

**9311** Carrying Case for 7102

**9934-M** Software, LogWare, 1-channel, multi user

**9934-S** Software, LogWare, 1-channel, single user

**9935** LogWare II, multiple channel logging software

**9938** Software, MET/TEMP II

**2514** Dry-Well Interface Cable to Fluke 754

\* Software requires Windows® 98 or higher

# Environmental monitoring



## “DewK” 1620A High-Accuracy Thermo-Hygrometer

- Superior accuracy
- NEW! Network enabled
- NEW! Upgraded software
- Powerful logging and analysis tools
- Two interchangeable calibrated sensors
- Huge memory

Now you can easily monitor and record conditions throughout your entire facility with the DewK's new Ethernet and wireless capabilities, and set your upgraded LogWare III software to notify you immediately of changing conditions. The 1620A accepts inputs from up to two sensors, which may be mounted directly on the unit or remotely (up to 100 feet away). Each sensor comes with a NVLAP-accredited calibration for temperature and relative humidity from Fluke Calibration, containing its own NIST-traceable calibration data, so recalibration doesn't require the main unit.

The 1620A-S reads temperature to  $\pm 0.25$  °C over its calibrated range of 15 °C to 35 °C. Relative humidity readings are to  $\pm 2$  % RH from 20 % RH to 70% RH.

**Recommended accessories:** LogWare III software, protective case for spare sensor return for calibration

## 9936A LogWare III software

- Remote monitoring and logging
- Supports Ethernet, RS-232, and wireless communications
- Customizable graphs, alarms, email settings and statistics
- Support for hot-swapping sensors
- Exports data to HTML, RTF or ASCII
- Security features that include passwords, groups, and customizable permissions

If you really want to get the most out of your DewK, LogWare III is worth every penny. By adding Fluke Calibration's LogWare III software, you can simultaneously monitor an unlimited number of DewK sensors. The Windows-based software enables statistical and graphical analysis of real-time or previously recorded data, and can send emails to PDAs, pagers, and cell phones when triggered by user-defined events.



*Have everything you need at a glance with LogWare III.*

**1622A-S** “DewK” Thermo-Hygrometer with LogWare III Software and wireless kit

**1621A-S** “DewK” Thermo-Hygrometer with LogWare III Software

**1620A-S** “DewK” Thermo-Hygrometer

**9328** Protective Case for 1620A and two sensors

**2607** Protective Case for one spare sensor

**2626-S** Spare Sensor

**9936A** LogWare III Software

# Handheld thermometer readouts

## Fluke Calibration 1551A/1552A “Stik” Thermometers

### Probe and digital readout combined into one unit

- Accuracy of  $\pm 0.05\text{ }^{\circ}\text{C}$  ( $\pm 0.09\text{ }^{\circ}\text{F}$ ) over full range
- Intrinsically safe (ATEX and IECEx compliant)
- Two models to choose from ( $-50$  to  $160\text{ }^{\circ}\text{C}$  or  $-80$  to  $300\text{ }^{\circ}\text{C}$ )
- Optional data logging of up to 10,000 time-stamped measurements
- Display temperature in  $^{\circ}\text{C}$  or  $^{\circ}\text{F}$
- 300-hour battery life on three AAA batteries



**Recommended accessories:** 1551-CASE

## Fluke Calibration 1523/1524 Reference Thermometers

### Measure, graph and record three sensor types with one tool

- Measure RTDs, PRTs, thermistors and thermocouples
- High accuracy: PRTs up to  $\pm 0.011\text{ }^{\circ}\text{C}$  and thermocouples: up to  $\pm 0.24\text{ }^{\circ}\text{C}$
- 1523: Single channel with memory for 25 readings
- 1524: Two channels with datalogging of up to 15,000 time- and date-stamped measurements
- Graphical temperature trend feature
- Info-Con connectors store probe parameters
- 20-hour battery life on three AA batteries



**Recommended accessories:** PRT: 5609-9BND-P (no cal incl.), Thermistors: 5610-9-P, 2373-LPRT LEMO to mini-grabbers (4-wire), 2373-LTC LEMO to Universal TC Adapter, 2384-P Spare PRT INFO-CON Connector, 2384-T Spare TC INFO-CON Connector, 9935-S LogWare II software (single user).

### Summary specifications for 1551A, 1552A, 1523 and 1524

|                               | 1551A                                                                                                                                | 1552A                                                                                                                                 | 1523                                                                                                                                                                                      | 1524                                                                                                                                     |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensor types</b>           | Fixed thin-film RTD                                                                                                                  | Fixed wire-wound PRT                                                                                                                  | One input: RTDs, PRTs, thermocouples and thermistors                                                                                                                                      | Two inputs: RTDs, PRTs, thermocouples & thermistors                                                                                      |
| <b>Temperature range</b>      | $-50\text{ }^{\circ}\text{C}$ to $160\text{ }^{\circ}\text{C}$<br>( $-58\text{ }^{\circ}\text{F}$ to $320\text{ }^{\circ}\text{F}$ ) | $-80\text{ }^{\circ}\text{C}$ to $300\text{ }^{\circ}\text{C}$<br>( $-112\text{ }^{\circ}\text{F}$ to $572\text{ }^{\circ}\text{F}$ ) | $-200\text{ }^{\circ}\text{C}$ to $2315\text{ }^{\circ}\text{C}$<br>( $-328\text{ }^{\circ}\text{F}$ to $4199\text{ }^{\circ}\text{F}$ )                                                  | $-200\text{ }^{\circ}\text{C}$ to $2315\text{ }^{\circ}\text{C}$<br>( $-328\text{ }^{\circ}\text{F}$ to $4199\text{ }^{\circ}\text{F}$ ) |
| <b>Accuracy</b>               | $\pm 0.05\text{ }^{\circ}\text{C}$<br>(combined probe and readout; full range)                                                       | $\pm 0.05\text{ }^{\circ}\text{C}$<br>(combined probe and readout; full range)                                                        | PRT (readout only at $0\text{ }^{\circ}\text{C}$ ): $\pm 0.015\text{ }^{\circ}\text{C}$<br>Thermistor (readout only at $0\text{ }^{\circ}\text{C}$ ): $\pm 0.002\text{ }^{\circ}\text{C}$ | PRTs and thermistors: 0.001<br>Thermocouples: 0.01                                                                                       |
| <b>Temperature resolution</b> | Selectable: 0.1, 0.01, 0.001                                                                                                         | Selectable: 0.1, 0.01, 0.001                                                                                                          | PRTs and thermistors: 0.001<br>Thermocouples: 0.01                                                                                                                                        | PRTs and thermistors: 0.001<br>Thermocouples: 0.01                                                                                       |
| <b>Operating range</b>        | $-10\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$ ( $14\text{ }^{\circ}\text{F}$ to $122\text{ }^{\circ}\text{F}$ )      | $-10\text{ }^{\circ}\text{C}$ to $50\text{ }^{\circ}\text{C}$ ( $14\text{ }^{\circ}\text{F}$ to $122\text{ }^{\circ}\text{F}$ )       | $13\text{ }^{\circ}\text{C}$ to $33\text{ }^{\circ}\text{C}$ ( $55\text{ }^{\circ}\text{F}$ to $91\text{ }^{\circ}\text{F}$ )                                                             | $13\text{ }^{\circ}\text{C}$ to $33\text{ }^{\circ}\text{C}$ ( $55\text{ }^{\circ}\text{F}$ to $91\text{ }^{\circ}\text{F}$ )            |
| <b>Data logging</b>           | 10,000 time-stamped readings to internal memory (optional)                                                                           | 10,000 time-stamped readings to internal memory (optional)                                                                            | 25 readings w/stats                                                                                                                                                                       | 25 readings w/stats; 15,000 time and date stamped                                                                                        |
| <b>Communications</b>         | RS-232 stereo jack<br>(access calibration parameters only)                                                                           | RS-232 stereo jack<br>(access calibration parameters only)                                                                            | RS-232<br>(9940 I/O ToolKit software included)                                                                                                                                            | RS-232<br>(9940 I/O ToolKit software included)                                                                                           |
| <b>Size (HxWxD)</b>           | 114 mm x 57 mm x 25 mm<br>(4.5 in x 2.25 in x 1.0 in)                                                                                | 114 mm x 57 mm x 25 mm<br>(4.5 in x 2.25 in x 1.0 in)                                                                                 | 96 mm x 200 mm x 47 mm<br>(3.75 in x 7.9 in x 1.86 in)                                                                                                                                    | 96 mm x 200 mm x 47 mm<br>(3.75 in x 7.9 in x 1.86 in)                                                                                   |
| <b>Weight</b>                 | 196 g (7 oz)                                                                                                                         | 196 g (7 oz)                                                                                                                          | 650 g (22 oz)                                                                                                                                                                             | 650 g (22 oz)                                                                                                                            |
| <b>Calibration (included)</b> | NVLAP-accredited                                                                                                                     | NVLAP-accredited                                                                                                                      | NIST-traceable<br>(accredited available upon request)                                                                                                                                     | NIST-traceable<br>(accredited available upon request)                                                                                    |

### Ordering information

**1551A-9** Thermometer, Fixed RTD,  $-50\text{ }^{\circ}\text{C}$  to  $160\text{ }^{\circ}\text{C}$ , 4.8 mm x 229 mm (3/16 in x 9 in)

**1551A-12** Thermometer, Fixed RTD,  $-50\text{ }^{\circ}\text{C}$  to  $160\text{ }^{\circ}\text{C}$  ( $-58\text{ }^{\circ}\text{F}$  to  $320\text{ }^{\circ}\text{F}$ ), 6.35 mm x 305 mm (1/4 in x 12 in)

**1552A-12** Thermometer, Fixed PRT,  $-80\text{ }^{\circ}\text{C}$  to  $300\text{ }^{\circ}\text{C}$  ( $-112\text{ }^{\circ}\text{F}$  to  $572\text{ }^{\circ}\text{F}$ ), 6.35 mm x 305 mm (1/4 in x 12 in)

**1551A-CASE** Case, 1551-2, Carrying Note: Append “-DL” to any mainframe to include datalogging

**1523** Thermometer Readout, Handheld, 1 Channel

**1524** Thermometer Readout, Handheld, 2 Channel, Data Logger

**1523-CAL** 1523 Accredited Calibration

**1524-CAL** 1524 Accredited Calibration

**5610-9-P** Probe, Precision Thermistor, Stainless Steel,  $0\text{ }^{\circ}\text{C}$  to  $100\text{ }^{\circ}\text{C}$ , (1/8 in x 9 in)

**5616-6-P** Probe, PRT, 100 ohm,  $-200\text{ }^{\circ}\text{C}$  to  $300\text{ }^{\circ}\text{C}$ , 4.8 mm x 152.4 mm (3/16 in x 6 in)

**5609-12-P** Probe, PRT, 100 ohm,  $-200\text{ }^{\circ}\text{C}$  to  $660\text{ }^{\circ}\text{C}$ , 6.35 mm x 304.8 mm (1/4 in x 12 in)

**5609-9BND-P** Probe, PRT, 25 ohm,  $90^{\circ}$  Bend at 9 inches,  $-200\text{ }^{\circ}\text{C}$  to  $660\text{ }^{\circ}\text{C}$ , 6.35 mm x 304.8 mm (1/4 in x 12 in),

Note: 5609 is not calibrated: (Request 1924-4-7 Calibration)

**9935-S** Software, LogWare II, single user

**1523-CASE** Case, 1523/1524 Readout and probe carrying

**FLUKETPAK TPAK**, Meter Hanging Kit  
**2373-LPRT** Adapter, Lemo to Mini Grabbers (4-wire)

**2373-LTC** Adapter, Lemo to Universal TC (TC)

**2384-P** Smart Connector, PRT (Gray Cap), Spare

**2384-T** Smart Connector, TC (Blue Cap), Spare



# Precision thermometer readout



## Fluke Calibration 1529 Chub-E4 Thermometer

### Lab-quality accuracy on four channels

- Four channels for PRTs, thermistors and thermocouples
- Simultaneous measurement on four channels
- Displays eight user-selected data fields
- Logs up to 8,000 readings
- Battery provides eight hours of continuous operation
- Compatible with LogWare and MET/TEMP II software

**Recommended accessories:** PRT (5626-12-L, 5615-12-L, or 5627A-12-L), thermistor (5611T-L or 5610-L), rugged carrying case (holds 1529 and four probes), LogWare II multi-channel logging software (see page 11).

## Ordering Information

**1529** Chub-E4, 2 TC and 2 PRT/  
Thermistor Inputs

**1529-R** Chub-E4, 4 PRT/Thermistor  
Inputs

**1529-T** Chub-E4, 4 TC Inputs  
**2506-1529** IEEE Option

**9322** Rugged Carrying Case

**5611T-L** Flexible Teflon coated  
precision thermistor, 0 °C to 100 °C  
(32 °F to 212 °F)

**5610-9-L** Precision thermistor,  
0 °C to 100 °C (32 °F to 212 °F)

**5626-12-L** Secondary PRT,  
-200 °C to 660 °C (-328 °F to  
1220 °F), 12.7 mm x 6.35 mm  
(1/2 in x 1/4 in)

**5616-6-L** Probe, PRT, 100 ohm,  
-200 °C to 300 °C (-328 °F to 572 °F),  
4.8 mm x 152.4 mm (3/16 in x 6 in),  
(request calibration 1922-4-N)

**5616-9-L** Probe, PRT, 100 ohm,  
-200 °C to 420 °C (-328 °F to 788 °F),  
4.8 mm x 152.4 mm (3/16 in x 6 in),  
(request calibration 1922-4-8)

**5616-12-L** Secondary PRT, -200 °C to  
420 °C (-328 °F to 788 °F), 12.7 mm x  
6.35 mm (1/2 in x 1/4 in) (NIST-traceable  
cal included)

L = mini-spade lead wire  
termination

**9935** LogWare II, multiple channel  
logging software

## Summary specifications for 1529 PRT/RTD, 1529 Thermistor and 1529 Thermocouple

|                                            | 1529 PRT/RTD                                                                                                                                                                                                                     | 1529 Thermistor                             | 1529 Thermocouple                                                                        |                       |                      |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------|-----------------------|----------------------|
| Inputs                                     | 2 channels PRT/thermistor and 2 channels TC, or 4 channels PRT/thermistor, or 4 channels TC, specify when ordering; PRT/thermistor channels accept 2, 3, or 4 wires; TC inputs accept B, E, J, K, N, R, S, T, and Au-Pt TC types |                                             |                                                                                          |                       |                      |
| Temperature range                          | -189 °C to 960 °C<br>(-308 °F to 1760 °F)                                                                                                                                                                                        | -50 °C to 150 °C<br>(-58 °F to 302 °F)      | -270 °C to 1800 °C<br>(-454 °F to 3272 °F)                                               |                       |                      |
| Measurement range                          | 0 to 400 Ω                                                                                                                                                                                                                       | 0 to 500 kΩ                                 | -10 mV to 100 mV                                                                         |                       |                      |
| Characterizations                          | ITS-90, IEC-751 (DIN°385”), Callendar-Van Dusen                                                                                                                                                                                  | Steinhart-Hart, YSI-400                     | NIST Monograph 175, 3-point deviation function applied to NIST 175, 6th-order polynomial |                       |                      |
| Temperature accuracy, typical (meter only) | ± 0.006 °C at 0 °C<br>± 0.009 °C at 100 °C                                                                                                                                                                                       | ± 0.0025 °C at 0 °C<br>± 0.025 °C at 100 °C |                                                                                          | Ext. RJC              | Int. RJC             |
|                                            |                                                                                                                                                                                                                                  |                                             | K at 600 °C<br>T at 200 °C                                                               | ± 0.15 °C<br>± 0.1 °C | ± 0.4 °C<br>± 0.3 °C |
| Temperature resolution                     | 0.001°                                                                                                                                                                                                                           | 0.0001°                                     | 0.01 to 0.001°                                                                           |                       |                      |
| Operating range                            | 16 °C to 30 °C (60.8 °F to 86 °F)                                                                                                                                                                                                |                                             |                                                                                          |                       |                      |
| Logging intervals                          | 0.1, 0.2, 0.5, 1, 2, 5, 10, 30, or 60 seconds; 2, 5, 10, 30, or 60 minutes                                                                                                                                                       |                                             |                                                                                          |                       |                      |
| Communications                             | RS-232, IEEE-488 (GPIB) optional                                                                                                                                                                                                 |                                             |                                                                                          |                       |                      |
| Size (HxWxD)                               | 102 x 191 x 208 mm (4.0 x 7.5 x 8.2 in)                                                                                                                                                                                          |                                             |                                                                                          |                       |                      |
| Weight                                     | 2 kg (4.5 lb)                                                                                                                                                                                                                    |                                             |                                                                                          |                       |                      |
| Calibration                                | Accredited NIST-traceable resistance calibration and NIST-traceable voltage calibration                                                                                                                                          |                                             |                                                                                          |                       |                      |



# Temperature sensors



## Each probe includes:

- Individual report of calibration
- Probe linearization coefficients
- Resistance vs. temperature table
- Termination to match your thermometer readout (see spec chart)

**Tip:** Improve the accuracy of your calibration by using an external reference thermometer. Calibrated temperature sensors and indicators can improve your results by a factor of 2 or more.

**Recommended accessories:** 2601 probe carrying case (for probes up to 12 in long), 2609 probe carrying case with handle (for probes up to 20 in long)

## Summary specifications

| PRT        |                   |                             |                                      |         |         |               |                        |
|------------|-------------------|-----------------------------|--------------------------------------|---------|---------|---------------|------------------------|
|            |                   |                             | Accuracy w/ Chub-E4 (includes drift) |         |         |               |                        |
| Model      | Range             | Type of Cal                 | -200 °C                              | 0 °C    | Max °C  | Dimensions    | Unique Selling Point   |
| 5626-12-X  | -200 °C to 661 °C | Accredited                  | ± 0.006                              | ± 0.009 | ± 0.037 | 6.35 x 305 mm | Best reference         |
| 5609-12-X  | -200 °C to 670 °C | Order 1930-4-7 <sup>†</sup> | ± 0.010                              | ± 0.011 | ± 0.054 | 6.35 x 305 mm | Highest temperature    |
| 5608-12-X  | -200 °C to 500 °C | Order 1930-4-R <sup>†</sup> | ± 0.010                              | ± 0.011 | ± 0.031 | 3.2 x 305 mm  | Excellent immersion    |
| 5616-12-X  | -200 °C to 420 °C | Traceable                   | ± 0.012                              | ± 0.013 | ± 0.035 | 6.35 x 298 mm | Best value             |
| 5615-12-X  | -200 °C to 420 °C | Accredited                  | ± 0.024                              | ± 0.014 | ± 0.041 | 6.35 x 305 mm | Accredited calibration |
| 5615-9-X   | -200 °C to 420 °C | Accredited                  | ± 0.024                              | ± 0.014 | ± 0.041 | 4.76 x 229 mm | Accredited calibration |
| 5615-6-X   | -200 °C to 300 °C | Accredited                  | ± 0.024                              | ± 0.014 | ± 0.041 | 4.76 x 152 mm | Smallest               |
| 5627A-12   | -200 °C to 420 °C | Accredited                  | ± 0.030                              | ± 0.050 | ± 0.125 | 4.76 x 305 mm | Most rugged            |
| 5627A-9    | -200 °C to 300 °C | Accredited                  | ± 0.030                              | ± 0.050 | ± 0.100 | 4.76 x 229 mm | Most rugged            |
| 5627A-6    | -200 °C to 300 °C | Accredited                  | ± 0.030                              | ± 0.050 | ± 0.100 | 4.76 x 152 mm | Most rugged            |
| Thermistor |                   |                             |                                      |         |         |               |                        |
| 5610-9-X   | 0 °C to 100 °C    | Traceable                   | N/A                                  | ± 0.009 | ± 0.023 | 3.2 x 229 mm  | High accuracy          |
| 5611T-X    | 0 °C to 100 °C    | Traceable                   | N/A                                  | ± 0.009 | ± 0.023 | 3 x 6100 mm   | Teflon, flexible       |

X= Lead termination. Specify "A" for 9142/9143/9144, "D" for Tweener, "L" for Chub-E4, and "T" for 1521/1522.  
Accuracy calculated at k=2 95% confidence interval  
<sup>†</sup>Calibration ordered separately. For individual probe calibration order the 1923-4-7 or 1923-4-R calibration.

Calibration and metrology training from Fluke Calibration can help you and your staff become more knowledgeable in a wide variety of disciplines. Instructors are experts who work in electrical, temperature, pressure and flow calibration, and who really want to help you learn the foundation and techniques of metrology that you can put to immediate use in your workplace. Fluke Calibration offers introductory, intermediate, and advanced level courses in a variety of formats to meet your needs.

## Training Seminars in American Fork, Utah

[www.flukecal.com/tempcal\\_training](http://www.flukecal.com/tempcal_training)

Get real training from real experts that lays out the basics and builds up to more advanced material for more advanced learners.

- Principles of Temperature Metrology
- Advanced Topics in Temperature Metrology
- Infrared Temperature Metrology
- Temperature Calibration Product Training

## Service

Some of the best service and lowest uncertainties are available in our primary and secondary calibration laboratories located in the US and Europe. We offer NVLAP accredited calibration services in the US and UKAS accredited calibration services are available in Europe. Don't forget to pay a visit to our calibration laboratory when you come for training.



**Fluke Calibration.** *Precision, performance, confidence.™*

|            |    |             |          |      |          |
|------------|----|-------------|----------|------|----------|
| Electrical | RF | Temperature | Pressure | Flow | Software |
|------------|----|-------------|----------|------|----------|

### Fluke Calibration

PO Box 9090, Everett, WA 98206 U.S.A.

### Fluke Europe B.V.

PO Box 1186, 5602 BD

Eindhoven, The Netherlands

### For more information call:

In the U.S.A. (877) 355-3225 or

Fax (425) 446-5116

In Europe/M-East/Africa +31 (0) 40 2675 200 or

Fax +31 (0) 40 2675 222

In Canada (800)-36-FLUKE or

Fax (905) 890-6866

From other countries +1 (425) 446-5500 or

Fax +1 (425) 446-5116

Web access: <http://www.flukecal.com>

©2011 Fluke Corporation.

Specifications subject to change without notice.

Printed in U.S.A. 9/2011 3246833B C-EN

Pub. ID: 11336-ENG, Rev 02

**Modification of this document is not permitted without written permission from Fluke Corporation.**