

# Cal Power

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## FLUKE®

Calibration

## 1523/1524 Reference Thermometers



Measure, graph and record  
three sensor types with one tool



# Finally, a reference thermometer as versatile as you are

The 1523/24 Reference Thermometers from Fluke Calibration measure, graph, and record PRTs, thermocouples, and thermistors. These thermometer readouts deliver exceptional accuracy, wide measurement range, logging, and trending, all in a handheld tool you can take anywhere.

The 1523/24 lets you handle field applications, laboratory measurements, and data logging with ease. And with the dual channel measurement capabilities of the model 1524, you can do twice the work in half the time.



## Three sensor types

- PRTs: -200 °C to 1000 °C
- Thermocouples -200 °C to 2315 °C
- Precision thermistors: -50 °C to 150 °C

## Accuracy

- PRTs: up to  $\pm 0.011$  °C
- Thermocouples :  $\pm 0.24$  °C for J,K,L,M
- Precision thermistors:  $\pm 0.002$  °C

## Fast mode

- PRTs: 0.45 seconds per sample
- Thermocouples: 0.3 seconds per sample
- Thermistors: 0.3 seconds per sample

## Two models

- 1523: Single channel standard model; memory for 25 readings and statistics
- 1524: Two channels; memory for logging 15,000 measurements; real-time clock for time and date stamps

## Graphical display

- 128x64 backlit LCD graphic display
- Plot and scale trends in real time
- Simultaneous dual channel readings

## Make accurate, consistent measurements... anywhere.

You need accuracy for compliance, product yields, energy savings, and consistent results. The 1523/24 uses current reversal, a technique used in high-end instruments that eliminates thermal EMFs, for precision temperature measurements. Specifications are guaranteed from -10 °C to 60 °C ambient. Special precision resistors and a highly stable reference voltage source keep 1523/24 accuracy virtually insensitive to environmental temperature.

Like all Fluke handheld tools, the 1523/24 Reference Thermometers endure rigorous testing in temperature extremes and under harsh conditions of vibration, so you can take it anywhere you need to go. An optional magnetic hanger allows you to hang the thermometer for easy viewing while freeing your hands to focus on the job.



## INFO-CON connectors ensure correct temperature conversion

Inside the INFO-CON, a memory chip keeps calibration information for the attached probe. Simply plugging in the probe uploads the information to the readout, ensuring the correct temperature conversion for accurate, hassle-free measurements.

Probes may be locked by password to specific channels and readouts for security or for system calibration traceability. Plug any thermocouple with mini-thermocouple jacks into an optional universal thermocouple adapter for convenient measurement. Each thermocouple adapter or standard connector supports reference junction compensation (RJC) with its own internal precision thermistor.

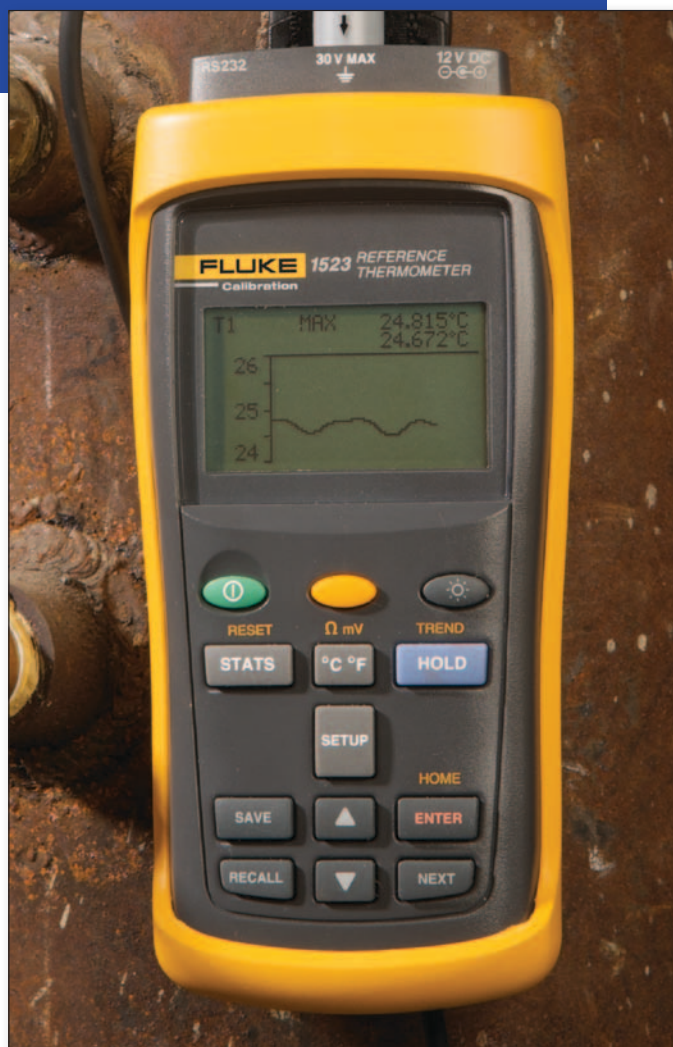


## Monitor trends in the lab or in the field

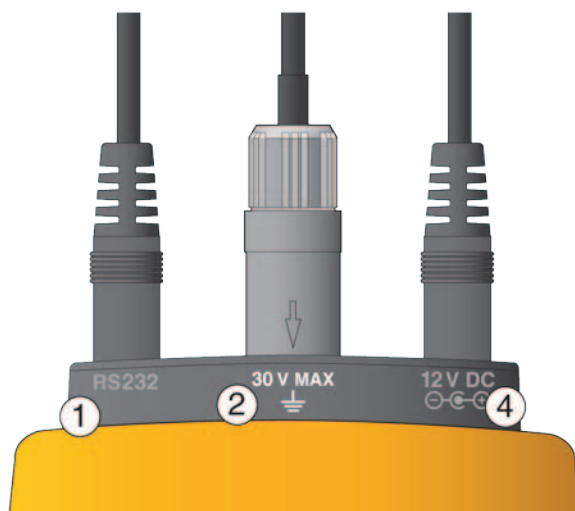
See trends graphically on the 1523/24 thermometer's 128x64 backlit LCD display. You can change the graph's resolution at the touch of a button. Now it's easy to see when the temperature is stable, without statistics or long delays, or monitor processes over time to verify correct operation.

Document on demand up to 25 readings and associated statistics for easy retrieval. You can view the data through the display or by uploading it to a PC via RS-232 connection and 9940 software, included free. To monitor and log more data over time, use a PC and optional LogWare II software.

RS-232-to-USB adapters are available for those who prefer USB connectors. Battery power lasts at least 20 hours on three AA batteries, or use the dc power adapter for extended periods of measurement. Power saving features can be enabled or disabled for longer battery life or greater convenience.



# Two models let you make the best choice for your application



## 1523 single-channel thermometer

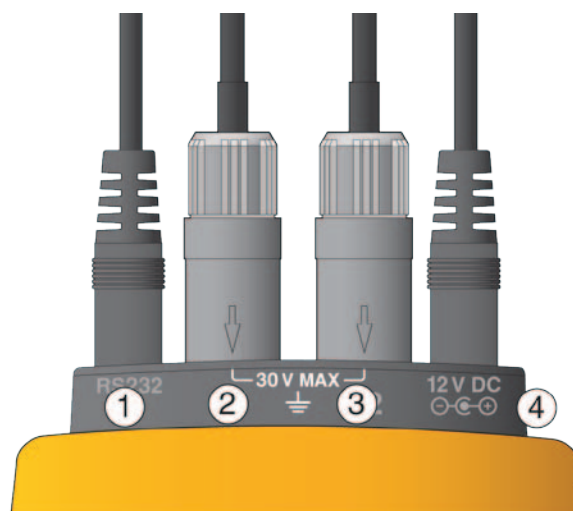
- ① External power adapter connection, for continuous use without changing batteries. Alternatively, 3 AA batteries will last more than 20 hours in the field.
- ② Channel 1 sensor connector (PRT, thermocouple, or thermistor)
- ④ RS-232 serial interface connector. For PC communications, uploading and downloading data from memory and from the probe SMART connectors.

## 1523 single-channel thermometer

The 1523 Reference Thermometer is a versatile single-channel thermometer that measures, graphs and records three sensor types with one tool. Support for PRTs/RTDs, thermocouples, and thermistors provide flexibility to choose the right probe for the job.

## 1524 two-channel thermometer

The new 1524 Reference Thermometer helps you do twice the work in half the time. Two channels and three sensor types and high-speed measurement make you more productive and make model 1524 the one reference thermometer you need to own. It has all the features of the 1523, and it's a data logger too. A real-time clock and memory for 15,000 time and date stamped measurements mean everything you are going to need is in this package. Log up to seven times per second, or once every hour or other options in between. Download the data to a PC for analysis when you need it.



## 1524 two-channel thermometer

- ① External power adapter connection
- ② Channel 1 sensor connector (PRT, thermocouple, and thermistor)
- ③ Channel 2 sensor connector (PRT, and thermistor)
- ④ RS-232 serial interface connector

## Get the reference thermometer that's ready for anything

### Log

Log a series of measurements with time and date stamps.

### Stats

View the max, min, average, and standard deviation of a series of measurements.

### Hold

Freeze the screen.

### Save

Record a reading and its associated statistics.

### Trend

Plot data trends in a real-time graph.

### Recall

View documented readings and statistics.

### Backlight

Lights the display for easier viewing in low-light conditions.



# Applications

Calibration, loop checking, conformance testing, troubleshooting, maintenance, and repair are some of the varied duties that need a 1523/24 thermometer. Use it for a handy temperature reference in baths, dry-block calibrators, thermowells, clean rooms, engines, heat exchangers, furnaces, freezers, or anything else that must be calibrated, checked, or maintained.

## Calibration

Tolerances of RTDs, thermocouples, transmitters and temperature controllers improve over time. Calibrations determine which instruments to accept against their tolerances. If you make comparisons to an inaccurate reference standard, the risks of false accept and false reject increase. Test uncertainty ratios (TURs) that keep the reference four times more accurate than the test unit greatly reduce this risk. The 1523/24 lets you get better TURs on a wider range of workload.

The 1523/24 can also help boost cal lab productivity with fast sample rates and dual channel measurement. Accurately measure up to seven samples per second, or calibrate two sets of workload at the same time, with the two reference channels.

## Test and measurement

Testing the performance of internal and external combustion engines, turbines, steam systems, cooling towers, heat exchangers, and refrigeration systems requires measuring differences between inlet and outlet temperatures. The 1524 can simultaneously measure, calculate and record these differences.

The high sampling rate and logging capability of the 1524 make it easy to determine the response time of temperature sensors. In addition, graphing in the 1523/24 makes it easy to see temperature trends in a system and quickly identify stability.

With a precision thermistor in stainless steel or Teflon coating, the 1523/24 combines laboratory accuracy with speed, reliability, and intuitive measurement. And forget about waiting 20 minutes for equilibration; you can see graphically when the temperature trend is stable.

## Logging and validation

Whether you are testing a product, validating a process, troubleshooting or doing research, multi-channel logging with the 1524 can help you get the data you want, where, how and when you want it. Gather data independently of a computer. If space is a limitation, the compact size of the 1524 is ideal. In addition, you can choose your sample rate, monitor values in real time, directly transfer data to a computer, and record up to 15,000 time and date stamped measurements.



# Specifications

|  | 1523   | 1524  |
|--|--|---|
| Input Channels   | 1  | 2   |
| Logging  | 25 readings with statistics  | 25 readings with statistics<br>15,000 time and date stamped |
| Sample interval (normal):  | 1 second   | 1 second (simultaneous measurement)                         |
| Typical sample interval (fast mode)*:                                  | 0.3 seconds  | 0.3 seconds   |
| Sensor types   | PRTs, RTDs, Thermistors, and Thermocouples   |   |
| Thermocouple types   | C,E,J,K,L,M,N,T,U,B,R,S  |   |
| Operating temperature  | -10 °C to 60 °C (Best accuracy 13 °C to 33 °C)   |   |
| Power requirements   | 3 AA alkaline batteries  |   |
| Safety   | EN 61010-1:2001, CAN/CSA C22.2 No. 61010.1-04  |   |
| Size (HxWxL)   | 96 mm x 200 mm x 47 mm<br>(3.75 in x 7.9 in x 1.86 in)   |   |
| Weight   | 0.65 kg (1.4 lb)   |   |
| Environmental conditions for best accuracy: 13 °C to 33 °C             |  |   |
| Millivolt range and accuracy   | -10 mV to 75 mV<br>± (0.005 % + 5 µV)  |   |
| Resistance range and accuracy  | 0 Ω to 400 Ω ± (0.004 % + 0.002 Ω)<br>200 Ω to 50 kΩ ± (0.01 % + 0.5 Ω)<br>50 kΩ to 500 kΩ ± (0.03 %)                |   |
| Temperature coefficient, voltage (-10 °C to 13 °C, +33 °C to 60 °C)    | Temperature coefficient<br>(-10 °C to 13 °C , +33 °C to 60 °C):<br>± (0.001 %/°C + 1 µV/°C)                          |   |
| Temperature Coefficient, Resistance (-10 °C to 13 °C, +33 °C to 60 °C) | 0.0008 %/ °C + 0.0004 Ω (0 Ω to 400 Ω)<br>0.002 %/ °C + 0.1 Ω (0 Ω to 50 kΩ)<br>0.06 %/ °C + 0.1 Ω (50 kΩ to 500 kΩ) |   |
| Excitation current, resistance   | 1 mA (0 Ω to 400 Ω)<br>10 µA (0 Ω to 50 kΩ)<br>2 µA (50 kΩ to 500 kΩ)  |   |

\*See technical manual for sample interval details by sensor type and number of inputs.

| <b>1523/24 Accuracies with selected probes (± °C)</b>         |         |        |          |        |
|---|---------|--------|----------|--------|
| T(°C)   | 5616-12 | 5615-6 | 5627A-12 | 5610-9 |
| -200  | 0.014   | 0.025  | 0.027    | n/a    |
| 0   | 0.021   | 0.021  | 0.049    | 0.009  |
| 100   | 0.027   | 0.028  | 0.065    | 0.030  |
| 300   | 0.040   | 0.043  | 0.103    | n/a    |
| 420   | 0.050   | n/a    | 0.130    | n/a    |
| Includes readout accuracy, probe calibration, and probe drift |         |        |          |        |

## Equivalent temperature accuracies derived from primary specifications (Ω, mV)

| <b>Temperature, thermocouples</b>          |   |                               |
|--|---|-------------------------------|
| Type                                       | Range   | Measure accuracies            |
| B  | 600 °C to 800 °C<br>800 °C to 1000 °C<br>1000 °C to 1800 °C | 0.85 °C<br>0.68 °C<br>0.57 °C |
| C  | 100 °C to 550 °C<br>550 °C to 2300 °C                       | 0.32 °C<br>0.71 °C            |
| E  | -200 °C to 0 °C<br>0 °C to 950 °C                           | 0.52 °C<br>0.22 °C            |
| J  | -200 °C to 0 °C<br>0 °C to 1200 °C                          | 0.52 °C<br>0.23 °C            |
| K  | -200 °C to 0 °C<br>0 °C to 1370 °C                          | 0.61 °C<br>0.24 °C            |
| L  | -200 °C to 0 °C<br>0 °C to 900 °C                           | 0.36 °C<br>0.23 °C            |
| M  | -20 °C to 0 °C<br>0 °C to 400 °C<br>400 °C to 1400 °C       | 0.26 °C<br>0.25 °C<br>0.22 °C |
| N  | -200 °C to 0 °C<br>0 °C to 1300 °C                          | 0.72 °C<br>0.28 °C            |
| R  | -20 °C to 0 °C<br>0 °C to 500 °C<br>500 °C to 1750 °C       | 1.09 °C<br>0.97 °C<br>0.49 °C |
| S  | -20 °C to 0 °C<br>0 °C to 500 °C<br>500 °C to 1750 °C       | 1.05 °C<br>0.95 °C<br>0.56 °C |
| T  | -200 °C to 0 °C<br>0 °C to 400 °C                           | 0.60 °C<br>0.25 °C            |
| U  | -200 °C to 0 °C<br>0 °C to 400 °C                           | 0.54 °C<br>0.24 °C            |
| <b>Resolution:</b>                         |   |                               |
| <b>B, C, E, J, K, L, M, N, R, S, T, U:</b> |   | 0.10 °C                       |

**Note 1:** Accuracies are based on internal reference junction compensation. Refer to technical manual for equivalent accuracies with an external reference junction.

## Frequently asked questions

### How will the 1523/24 save time and money?

Trending data and an intuitive interface make it easy to decide, with little or no training, when the temperatures are stable. High sample rates mean quicker measurements. Fewer instruments are needed since the 1524 connects two probes and measures three sensor types. Finally, better accuracy means less rework.

### What functions does it support?

Statistics: Average, Stdev, Max, Min

Functions: Temperature, temperature difference between channels, resistance, voltage

### Is the calibration NIST traceable?

Calibrations for the probes and the readouts are all NIST traceable. NVLAP accredited calibrations are also available upon request. Some probes come with accredited calibrations as standard.

### What's the difference between a NIST traceable and NVLAP accredited calibration?

Most industries require calibration results to be traceable to national standards. Sometimes there is an additional requirement for an accredited calibration certificate. Accreditation provides assurance that an appropriate quality program is in place and that training and procedures meet the technical requirements for the service provided. NVLAP is an accreditation body sponsored by NIST and recognized and accepted throughout the world. The Fluke Calibration temperature calibration NVLAP Lab Code is 200348-0.

### How should I choose a probe?

There are many choices in shape, size, and dimension to fit your application. To begin, you must know your temperature range and accuracy requirements.

Thermocouples offer the widest temperature range, and are especially useful for high temperatures. However, they are usually the least accurate temperature sensors.

PRTs provide the best combination of temperature range and accuracy and are the most frequently used reference sensor.

Thermistors are the most accurate secondary temperature standards, with some approaching the accuracy of a primary standard (SPRT). However, thermistor temperature ranges are more limited, often from 0 °C to 100 °C.

## Ordering information

| Model   | Description  |
|---------|--|
| 1523*   | Reference Thermometer, Handheld, 1 Channel   |
| 1524*   | Reference Thermometer, Handheld, 2 Channel, Data Logger  |
| 1523-P1 | 1523 Bundled with 5616 PRT (–200 °C to 420 °C, 100 ohm (1/4 in x 12 in)), Universal TC INFO-CON Connector, TPAK, and Case  |
| 1523-P2 | 1523 Bundled with 5628 PRT (–200 °C to 660 °C, 25 ohm (1/4 in x 12 in)), Universal TC INFO-CON Connector, TPAK, and Case   |
| 1523-P3 | 1523 Bundled with 5627A PRT (–200 °C to 420 °C, 100 ohm (12 in x 1/4 in)), Universal TC INFO-CON Connector, TPAK, and Case |
| 1524-P1 | 1524 Bundled, with 5616 PRT, Universal TC INFO-CON Connector, TPAK, and Case   |
| 1524-P2 | 1524 Bundled with 5628 PRT, Universal TC INFO-CON Connector, TPAK, and Case  |
| 1524-P3 | 1524 Bundled with 5627A PRT, Universal TC INFO-CON Connector, TPAK, and Case   |

### Calibration options

|          |  |
|----------|--|
| 1523-CAL | 1523 Accredited Calibration                              |
| 1524-CAL | 1524 Accredited Calibration                              |
| 1929-2   | System Verification, PRT with Readout, Accredited        |
| 1929-5   | System Verification, Thermistor with Readout, Accredited |
| 1930     | System Calibration, PRT with Readout, Accredited         |
| 1935     | System Calibration, Thermistor with Readout, Accredited  |

### Accessories

|             |   |
|-------------|---|
| 5610-9-P    | Probe, Precision Thermistor, Stainless Steel (1/8 in x 9 in), 0 °C to 100 °C                                    |
| 5615-6-P    | Probe, PRT, 100 ohm (3/16 in x 6 in), –200 °C to 300 °C   |
| 5609-9BND-P | Probe, PRT, 25 ohm (1/4 in x 12 in), 90 ° bend at 9 in, –200 °C to 660 °C, calibration required (i.e. 1924-4-7) |
| FLUKE80K1   | Probe, 80PK-1, Beaded Type K Thermocouple with 2373-LTC   |
| FLUKE80K3   | Probe, 80PK-3A, Surface Measurement Type K Thermocouple with 2373-LTC   |
| 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   |

### Included accessories

NIST traceable certificate of calibration, users guide, CD-ROM (contains technical manual), 12 V dc universal power supply, RS-232 cable, 9940 I/O ToolKit software

\*Requires an optional probe



## Recommended accessories

A wide array of accessories are available to help you maximize productivity, but the following are essential for most users.



**TPAK  
Magnetic  
Hanger**



**Calibrated  
Temperature  
Sensors**



**Universal  
RTD Adapter**



**Probe and  
Readout Case**



**Universal  
Thermocouple  
Adapter**

**FLUKE®**

**Calibration**

### **Fluke Calibration.**

*Precision, performance, confidence.™*

Electrical

RF

► Temperature

Pressure

Flow

Software

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