FLUKE®

Calibration

Fluke Calibration Products and Services Short Form Catalog

Six measurement disciplines, one reliable source

▶ Electrical

▶ RF

▶ Temperature

▶ Pressure

▶ Flow

▶ Software

Fluke Calibration is a world leader in precision calibration instrumentation and software for electrical, RF, temperature, pressure and flow measurements.

Fluke Corporation was founded in 1948, specializing in electrical test and measurement products. Early in its history, Fluke recognized that the very best electrical metrology would be needed to support its products and undertook to develop this capability. From this activity, the calibration business was born. Over the years, many breakthrough calibration products were introduced, establishing Fluke as a leader in electrical metrology. In 2001, Fluke's calibration business expanded into the temperature field with the acquisition of Hart Scientific, and then into pressure and gas flow with the acquisition of DH Instruments (2007), followed by Ruska and Pressurements (2010).

Fluke Calibration brings together the original Fluke electrical calibration business, Hart Scientific, DHI, Ruska and Pressurements in one unified, worldwide organization. The unified business's unmatched breadth and depth in metrology put us in a unique position to deliver today's and tomorrow's calibration solutions to customers who demand the very best, supported by an organization they can count on over the long term.

At the same time, we carry forward the tradition of discipline-specific measurement expertise and customer driven focus that come with our small, high performance company heritage.

This catalog is designed to provide you with an "at-a-glance" look at the wide range of standards, calibrators, software, and support services offered by Fluke Calibration. For the latest, fully detailed product information and a host of other useful resources, please visit our new unified website, www.flukecal.com.

Once you've had a chance to use this catalog and our website to inform yourself, we hope you'll also make use of our most important asset, our worldwide team of experienced calibration and metrology experts, who are ready to review your specific needs and work with you to offer the most effective solutions. They can be reached via the website or using contact information on the back of this catalog.

Sincerely,

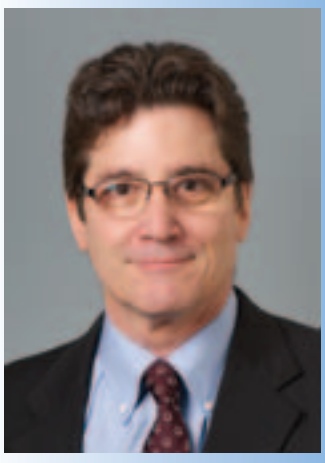
Martin Girard
General Manager, Fluke Calibration

HART SCIENTIFIC

DHI DH Instruments

RUSKA

Pressurements



FLUKE®
Calibration

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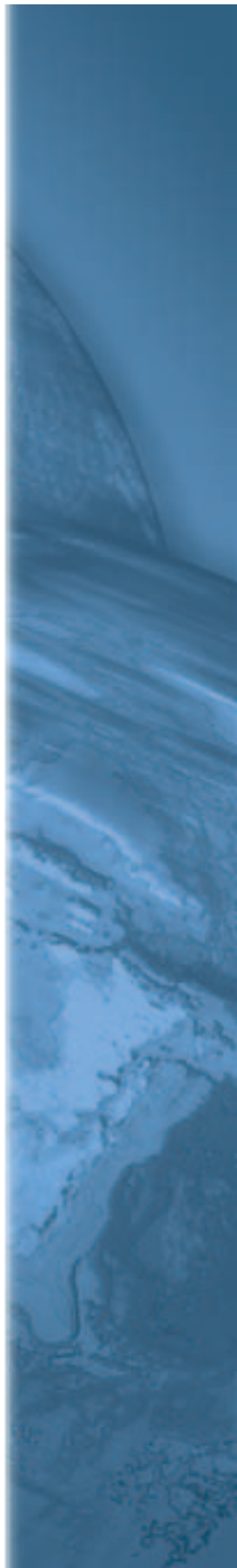


Electrical calibration

Electrical calibration refers to the process of verifying the performance of, or adjusting, any instrument that measures, sources, or tests electrical parameters. This discipline is usually referred to as dc and low frequency ac electrical metrology. Principal parameters include voltage, current, resistance, inductance, capacitance, time and frequency. Other parameters, including electrical power and phase, are also in this segment of metrology. Ratiometric comparisons of similar parameters are often performed to compare a known parameter to an unknown similar parameter.

Electrical calibration involves the use of precise devices that evaluate the performance of key properties for other devices called units under test (UUTs). Because these precise devices have thoroughly known performance characteristics compared to the UUT, performance evaluation and/or calibration adjustment of the UUT to identify or minimize errors is possible. Typically, the performance of such precision devices should be four or more times better than the UUT.

These precision devices fall into two broad categories. Electrical signal sources are often referred to as either calibrators or standards. Precision measurement devices are often classified as reference digital multimeters, measurement standards, or ratio bridges.

Product highlights

5522A Multi-Product Calibrator

Robust, transportable wide workload coverage

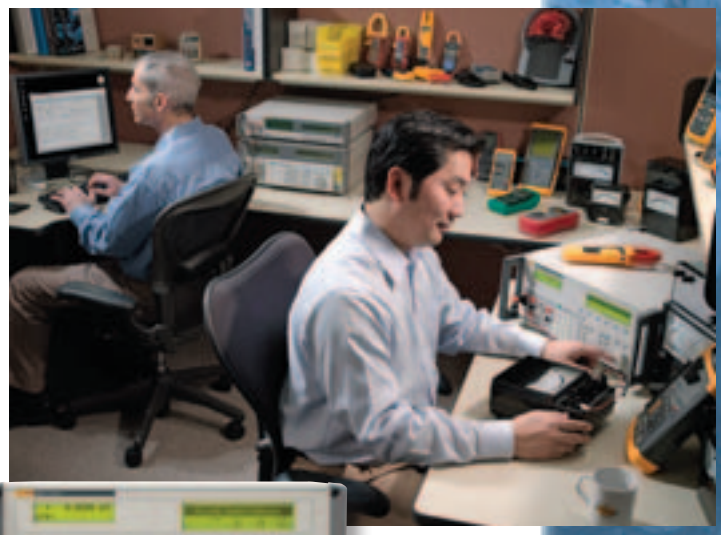
The 5522A Multi-Product Calibrator addresses a wide calibration workload and comes with internal and external protection features that protect it against damage and make it easier to transport for on-site or mobile calibration. The 5522A can also be fully automated with MET/CAL® *Plus* Calibration Management Software. It is the ideal calibrator for metrology professionals who need to calibrate many different types of electronic equipment and want a transportable instrument that offers them a high return on investment.

The 5522A sources direct voltage and current, alternating voltage and current with multiple waveforms and harmonics, two simultaneous voltage outputs or voltage and current to simulate dc and ac power with phase control, resistance, capacitance, thermocouples and RTDs. The 5522A can also measure thermocouple temperature, and pressure using one of 29 Fluke 700 Series pressure modules. Two options add the capability to calibrate oscilloscopes, either 600 MHz or 1.1 GHz. And the 5520A-PQ Power Quality Option enables the 5522A to calibrate power quality instrumentation to the standards of the IEC and other regulatory agencies.

- Calibrates a wide variety of electrical test equipment
- Robust protection circuits prevent costly damage from operator error
- Redesigned carrying handles make the 5522A easy to transport
- Rugged carrying case with built-in handles and wheels and removable front/rear access doors for in-situ calibration in almost any environment
- Remarkably affordable

5080A Multi-Product Calibrator

Calibration solutions for your analog and digital workload



High compliance with reliable accuracy enables the 5080A to calibrate even difficult-to-calibrate analog meters, as well as a wide range of digital multimeters, clamp meters, and wattmeters. Options for calibrating oscilloscopes and megohm meters extend workload coverage even more. The 5080/CAL software enables automated calibration and is easy to learn and operate. Fluke quality and usability are built in, with robust protection circuitry, multiple language displays, and much more. Best of all, the 5080A is an excellent value that will fit your budget.

- High compliance
- Protection circuitry
- Calibrates a wide workload, including analog meters and 3.5 and 4.5 digit DMMs
- Optional 5080/CAL software for easy-to-use, automated calibration

Electrical calibration

DC/LF Electrical Calibrators

5700A/5720A Multifunction Calibrators

Taking accuracy to a new level.

- The highest accuracy calibrator, it will support instruments of up to 8.5 digits in measurement performance
- Artifact Calibration permits the lowest cost of support and highest confidence in performance
- Optional wideband output to 30 MHz

5522A Multi-Product Calibrator

Robust, transportable wide workload coverage.

- Calibrates a wide variety of electrical test equipment with more than 14 functional capabilities
- Accuracies intended to support DMMs to 6.5 digits
- Robust protection circuits prevent costly damage from operator error
- Optional oscilloscope calibration to 1100 MHz
- Easy to transport

5080A High Compliance Multi-Product Calibrator

Solutions for your analog and digital workload.

- High compliance for difficult-to-calibrate instruments
- Robust protection circuits prevent costly damage from operator error
- Calibrates a wide workload, including analog meters and 3.5 and 4.5 digit DMMs
- Options for oscilloscope and megohm meter calibration

5500A Multi-Product Calibrator

Solutions that match your workload and budget.

- Flexibility, accuracy and value
- Calibrates a wide variety of electrical test equipment, more than 14 categories of instrumentation including 3.5 and 4.5 digit DMMs
- Optional oscilloscope calibration

9100 Universal Calibration System

A high-value multi-product calibrator.

- Calibrates over 15 different categories of general-purpose test equipment
- Options for power meter, insulation/continuity tester and oscilloscope calibration
- Semi-automated and fully automated procedure modes for maximum throughput

Specialty Calibrators

6105A/6100B Electrical Power Standards

The most accurate, comprehensive and flexible sources of electrical power quality and energy signals.

- Power calibration with voltage to 1008 V and current to 21 Amps, and optionally up to 80 Amps
- Voltage and current accuracies better than 0.005 % (50 ppm)
- Programmable harmonic distortion up to 100 harmonics
- Includes other power quality testing phenomena
- Complex measurements generating a wide variety of signals

52120A Transconductance Amplifier

Test and calibrate, at full current range, power standards, power and energy meters, PQ analyzers, high-current clamp meters and Rogowski coils. Delivers:

- 120 A standalone
- 240 A or 360 A with parallel operation
- 3000 A or 6000 A with accessory coils
- Industry-leading amplifier accuracy:
  - 100 PPM dc – 850 Hz (used with 61XX EPS)
  - 150 PPM dc (used with dc/lf calibrator)
  - 1000 PPM ac (used with dc/lf calibrator)
- Frequency capability, dc to 10 kHz

Phasor Measurement Unit Calibrator

Fast, automated, IEEE C37.118.1-compliant calibrations.
System includes:

- PMU control unit
- GPS receiver
- PMU test and calibration software
- Fluke 6135 Electrical Power Standard
- Configured server PC

Available early 2012

5320A Multifunction Electrical Tester Calibrator

Verify and calibrate electrical test tools with a single instrument.

- Calibrate megohm meters, earth resistance testers, ground bond testers, hipots and many more types of electrical safety testers
- Uses less bench space than custom solutions
- Built-in graphical calibration help guide
- LAN, GPIB, RS-232 interfaces for PC based automation

525B Temperature/Pressure Calibrator

Superior accuracy and functionality in an economical benchtop package.

- A calibrator to address process industry instrumentation
- Simulates and measures all ANSI thermocouples, as well as L and U types, and provides cold junction compensation to enable calibration of a wide variety of thermocouple instrumentation
- Direct input for storage of ITS-90 RTD constants
- RTD source uncertainties to 0.03 °C

Electrical calibration

Oscilloscope Calibrators

9500B Oscilloscope Calibrator

The highest performance, fully automated, upgradeable oscilloscope calibration workstation.

- Full automation provides totally hands-free calibration
- Bandwidths of 600 MHz, 1000 MHz, 3200 MHz, and 6400 MHz
- A fast edge of 25 ps to address bandwidths up to 14 GHz
- Connect up to five channels simultaneously

55XX Series Oscilloscope Calibration Options

Calibrate your digital and analog oscilloscopes with any of three different options.

- Leveled sine wave generator with optional bandwidths of 300 MHz, 600 MHz and 1100 MHz for verifying oscilloscope bandwidth
- DC and square wave voltage generators for calibrating voltage gain
- Horizontal time base calibration functions
- Edge source including a 300 ps fast edge with low aberrations for verifying dynamic response
- Fast edge risetime pulse generator (< 1 ns) for checking pulse response

Precision Multimeters

8508A Reference Multimeter

Reference standard accuracy and stability, in one functionally versatile, easy-to-use solution.

- 8.5 digit resolution, exceptional linearity and low noise and stability
- Optional front/rear inputs with unique ratio measurement option
- Broad range of measurement capabilities
- 365 day stability as low as 2.7 ppm, 24-hour stability of 0.5 ppm, transfer uncertainty of 0.12 ppm

8845A/8846A Precision Multimeters

Precision and versatility for bench or systems applications.

- 6.5 digit resolution
- Basic V dc accuracy of up to 0.0024 %
- Dual display

8808A Digital Multimeter

Versatile multimeter for manufacturing, development and service applications.

- 5.5 digit resolution
- Basic V dc accuracy of 0.015 %
- Dual display

Electrical Standards

732B/734A DC Reference and Transfer Standards

The simple way to maintain and disseminate your volt.

- A primary standard for traceability of dc voltage to better than 1 ppm
- Complete mechanical and electrical independence of each of its four standards
- Battery powered for easy shipping

792A AC/DC Transfer Standard

Support for your most demanding ac traceability requirements.

- A primary standard that is accurate, fast and easy to use
- Fully traceable performance with ac/dc difference to better than 10 ppm
- Nine ranges from 22 mV to 1000 V (with external range resistor)

5790A AC Measurement Standard

Automated ac measurement with precision that is easy to use.

- Direct ac measurements to 22 ppm, or ac/dc difference measurements to 15 ppm
- Digital voltmeter style operation that features a fully autoranging instrument that selects the best voltage range for the measurement you are making
- Robust 1200 V input protection on all voltage ranges
- Optional 30 MHz wideband measurement

742A Resistance Standard

High accuracy working standard for on-site resistance calibration.

- Small and rugged standard resistors with six-month stabilities to 2.5 ppm
- Open air use so no oil or air baths required
- 18 °C to 28 °C operating range
- Standard values from 1 ohm to 100 Megohms

A40B Series Precision Current Shunts

Precision, low inductance shunts for dc and ac current metrology.

- Simplifies calibration/verification of precision calibrators and current sources
- Shunts sized for current from 1 mA to 100 A
- Usable from dc to 100 kHz
- Ultra low phase shift to support power quality instrument metrology

A40/A40A Current Shunts

- AC current transfer measurements from 2.5 mA to 20 A
- Frequency between 5 Hz to 100 kHz
- Compatible with 792A and 5790A

752A Reference Divider

Setting the standard for ratio accuracy and ease of use.

- 10:1 and 100:1 divider outputs
- Output uncertainty 0.2 ppm and 0.5 ppm
- Built-in calibration bridge

720A Kelvin-Varley Divider

A primary standard for ratio measurements.

- 0.1 ppm resolution, seven decades
- 0.1 ppm of input absolute linearity
- Built-in self-calibration bridge

910/910R GPS Controlled Frequency Standard

Cesium controlled frequency standard that uses GPS technology and connectivity to provide primary standard traceability from any location.

- Unique traceability feature means no more re-calibrations
- Two high-stability models to meet your application and fit your budget
- Built-in rubidium atomic clock (910R)
- Up to 13 outputs, maximizing cost efficiency

908/909 Frequency References

Stable frequency references for test systems and calibration labs.

- Accurate reference "atomic clock" in automated test systems
- Affordable and very cost effective
- Designed for portability with optional carrying case

RF calibration

RF and microwave calibration refers to the process of verifying the performance of, or adjusting/deriving corrections for, any instrument or component that will be used in the measurement or testing of RF and microwave parameters. This discipline is usually referred to as RF and microwave metrology. Principal parameters include RF voltage, RF power, impedance, modulation, distortion, time, frequency and phase. High dynamic range ratiometric comparisons are often performed and results are expressed in the logarithmic “dB” form.

As with any other calibration, RF and microwave calibration compares a device or unit under test (DUT or UUT) to a traceably calibrated standard or reference device. The process typically involves comparing a measuring UUT to a reference source; a sourcing UUT with a measuring reference; or quite commonly a measuring UUT with a measuring reference, using a stable but unknown source.

In each case, the uncertainty or stability of the reference should significantly exceed the specified performance of the device or unit under test. RF metrologists typically look for performance margins of 4:1, or the slightly relaxed margin of 10 dB.

Precision devices that are commonly used in RF and microwave calibration fall broadly into four categories:

Sourcing instruments. Reference signals and/or modulation sources, frequency references, pulse or arbitrary waveform generators, reference attenuators.

Measuring instruments. Power sensors, spectrum analyzers, measuring receivers, oscilloscopes, RF voltmeters, frequency counters.

Source-measure instruments. Vector or scalar network analyzers.

Precision components

- Power splitters, power dividers or couplers, attenuating pads.
- Inter-series, polarity or sacrificial cables and adapters.
- Short, open, load or sliding terminators.
- Reflection bridges or directional couplers.

RF References

9640A RF Reference

A unique blend of accuracy, stability, resolution, purity, dynamic range and low noise.

The Fluke 9640A is an RF reference source, reference attenuator, reference local oscillator and frequency counter and is the key component in a simplified, streamlined RF and microwave calibration system.

- Takes the central role and typically halves the cost of a higher capability RF calibration system and delivers certified accuracy directly to the UUT via a single signal connection
- Via MET/CAL software and an extensive procedure library, realizes "walk away" automation and a new level of efficiency for spectrum analyzer calibration
- A highly integrated and robust solution for on-site RF calibration and a GPIB emulating drop-in replacement for the legacy HP3335 RF source and attenuator
- Performs 80 to 100 percent of tests required on high performance high frequency spectrum analyzers
- Also calibrates power sensor linearity, millivoltmeters, signal level meters, modulation analyzers, receivers and counter/timers

9640A-LPNX RF Reference

With higher performance, state-of-the-art phase noise or timing jitter, the LPNX version of the 9640A RF Reference addresses the most demanding RF calibration and local oscillator applications.

- –138 dBc/Hz at 1 GHz and 5 kHz to 100 kHz offset
- Optional drop-in GPIB emulation of the legacy HP8662/3 RF sources
- Optional 9600FLT 1GHz phase noise filter for high margin calibrations at > 5 MHz offset

RF Systems

RF Calibration Custom System Solutions

Based upon the 9640A and MET/CAL calibration software, Fluke Calibration can help to define, and can supply and support a custom RF calibration system and automating MET/CAL procedures, tailored to your exacting requirements.

A Fluke RF calibration system can include:

- Pre-owned instruments or components and instruments from other manufacturers up to 50 GHz
- RF source and measurement instruments
- MET/SUPPORT Gold procedure library or custom written RF calibration procedures
- Optional floor standing, bench or ruggedized equipment racks and secure storage of associated RF components

Target calibration workload can include:

- Bench, handheld and high performance spectrum analyzers
- RF, modulation, pulse, function and arbitrary waveform sources
- Measuring receivers, modulation analyzers and radio test sets
- Oscilloscopes and RF voltmeters
- Timer counter and precision frequency sources
- RF and microwave components

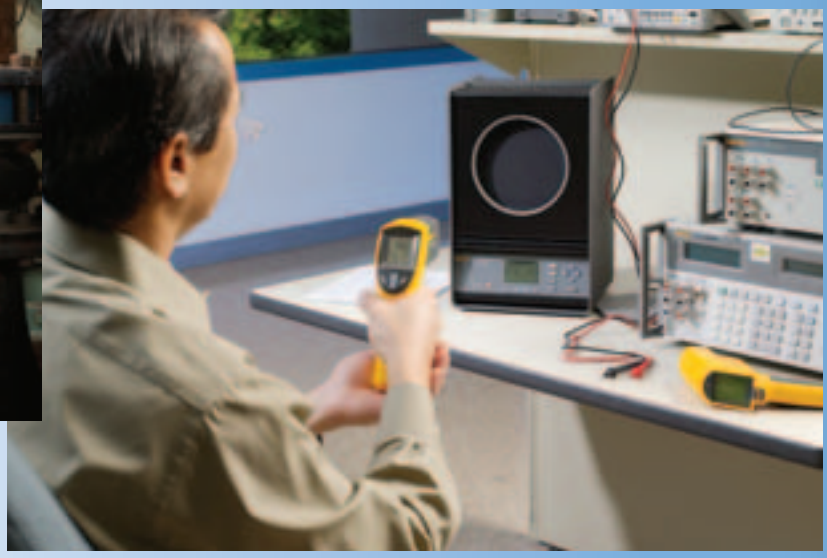
See also Oscilloscope Calibration and Frequency Reference products listed under Electrical Calibration products in this catalog.

Temperature calibration

Temperature calibration refers to the calibration of any device used in a system that measures temperature. Most importantly, this usually means the temperature sensor, itself, which is typically a platinum resistance thermometer (PRT or PT-100), thermistor, or thermocouple. Readings from these thermometers are made by "thermometer readout" devices which measure their electrical outputs and convert them to temperature according to the International Temperature Scale of 1990 (ITS-90).

Thermometers are typically calibrated by placing them in a stable temperature environment (heat source) and comparing their output to that of a calibrated "reference thermometer" or "standard thermometer." Fluke Calibration provides three general categories of heat sources: industrial heat sources (dry-well calibrators, Micro-Baths, etc.) for field use; fluid baths and thermocouple furnaces for laboratory use; and fixed-point cells for "primary" calibrations. Fluke Calibration also offers a variety of reference thermometers, including SPRTs, and thermometer readout instruments.

In addition, Fluke Calibration provides laboratory and field solutions for calibrating the electronics used in temperature measurement circuits.



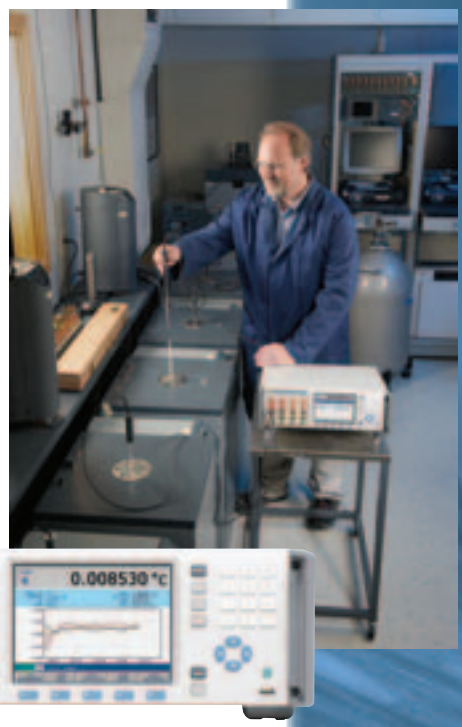
Product highlights

1594A/1595A Super-Thermometers

Thermometry bridge accuracy combined with time-saving features

The Fluke Calibration 1594A and 1595A Super-Thermometers combine the accuracy of complex and expensive bridges with innovative features that simplify measurement processes. They are accurate enough for the primary lab and economical enough for the secondary lab. With temperature-controlled internal reference resistors, six input channels, a large graphical display, and a multitude of temperature-specific measurement functions, PRT, thermistor and SPRT calibration (0 Ω to 500 kΩ) has never been so easy and economical. And with the built-in Ratio Self-Calibration function, you can verify or calibrate the Super-Thermometer's ratio accuracy in-house with the press of a button—no other single thermometry bridge can do so much.

- Calibrate SPRTs, PRTs, RTDs and thermistors (0 Ω to 500 kΩ)
- Accuracy as good as 0.06 ppm (0.000015 °C)
- "Ratio Self-Calibration" verifies and calibrates resistance ratio accuracy
- Automatic zero-power measurements calculate thermometer probe self-heating
- Temperature-controlled internal reference resistors
- Calibrated sensing current lowers overall instrument uncertainty
- Four input channels on the front panel accept sensors under test or external references
- Two dedicated external reference input channels on the rear panel



9142/9143/9144 Field Metrology Wells

Small temperature sources for big field applications

The 914X Series Field Metrology Wells extend high performance to the industrial process environment by maximizing portability, speed, and functionality with little compromise to metrology performance.

Field Metrology Wells are packed with functionality and are remarkably easy to use. They are lightweight, small, and quick to reach temperature set points, yet they are stable, uniform, and accurate. These industrial temperature loop calibrators are perfect for performing transmitter loop calibrations, comparison calibrations, or simple checks of thermocouple sensors. With the "process" option, there is no need to carry additional tools into the field. This optional built-in two-channel readout reads resistance, voltage, and 4–20 mA current with 24 volt loop power. It also has on-board automation and documentation. Combined, the three models (9142, 9143, and 9144—each with a "process" option) cover a wide temperature range of –25 °C to 660 °C.

- Lightweight, portable, and fast
- Cool to –25 °C in 15 minutes and heat to 660 °C in 15 minutes
- Built-in two-channel readout for PRT, RTD, thermocouple, 4–20 mA current
- True reference thermometry with accuracy to ± 0.01 °C
- On-board automation and documentation
- Metrology performance in accuracy, stability, uniformity, and loading

Temperature calibration

Standard Platinum Resistance Thermometers (SPRTs)

5681, 5683, 5684, and 5685 Quartz-Sheath SPRTs

The performance you expect from world-class SPRTs.

- Drift rates as low as 0.0005 K
- Proprietary gas mixtures ensures high stability
- Most experienced SPRT design team in the business

5698-25 Working Standard SPRT

High performance-to-price ratio.

- Conforms to ITS-90 SPRT Guidelines
- Drift rate typically 0.003 °C
- Calibration options by fixed point

5686-B Glass Capsule SPRT

Designed for metrology work requiring small SPRTs.

- Temperatures from -260 °C (13 K) to 232 °C
- Stability typically 0.001 °C over 100 °C range
- Miniature capsule package eliminates stem conduction

5699 High-Temperature Metal-Sheath SPRT

Affordable working standard SPRT.

- Range to aluminum point (660 °C)
- Inconel™ sheaths guard against contamination of sensor
- Drift rates less than 8 mK/year

ITS-90 Fixed-Point Cells

5901 Triple Point of Water Cells

Must-have, primary temperature standards.

- Easy-to-use, inexpensive standard with uncertainty better than ± 0.0001 °C
- Four sizes and two shells (glass and quartz) to choose from
- Isotopic composition of Vienna Standard Mean Ocean Water

ITS-90 Fixed-Point Cells

Best cell uncertainties commercially available.

- Every ITS-90 fixed point available from mercury to copper
- Plateaus last days (gallium for weeks and TPW for months)
- Manufactured and tested by Fluke Calibration's primary standards scientists

Mini Fixed-Point Cells

Least expensive, easiest-to-use fixed-point standards.

- Lower uncertainties than comparison calibrations
- All ITS-90 fixed points from TPW to copper
- Reduced equipment and annual recalibration costs

Cell Maintenance Apparatus

9114, 9115A, 9116A Freeze-Point Furnaces

Designed for maximum-length plateaus.

- Designed to extend plateaus
- High-stability OEM controllers, RS-232 included
- External cooling coils

9210 Mini Triple Point of Water Maintenance Apparatus

Simple supercool-and-shake realization and maintenance of the 5901B Mini TPW Cell.

- Easy preprogrammed realization
- Inexpensive fixed-point solution
- Training complete in less than an hour

9230 Gallium Cell Maintenance Apparatus

Realize and maintain the melting point of the 5943 Gallium Cell.

- One week plateau duration
- No hassle automatic realizations
- Used daily in our Primary Lab

9260 Mini Fixed-Point Cell Furnace

Inexpensive, easy-to-use fixed-point maintenance apparatus.

- Realize and maintain In, Sn, Zn and Al fixed-point cells
- Good introduction to fixed-point calibration
- User friendly and inexpensive

7012/7312 Triple Point of Water Maintenance Baths

Keep your cells up and running reliably for weeks at a time.

- Maintains TPW cells for up to six weeks
- Optional immersion freezer for simple cell freezing
- Up to 496 mm (19.5 in) of immersion depth

9117 Annealing Furnace

Keeps SPRTs and PRTs performing at their highest levels

- Relieves mechanical strain
- Guards against contamination
- Anneals both SPRTs and HTSPRTs

7196 LN_2 Comparison Calibrator

Lowest-cost calibration to -196 °C.

- Simple to use
- Uncertainty less than 2 mK

Temperature calibration

Thermometer Readouts

1594A/1595A Super-Thermometers

Thermometry bridge accuracy combined with time-saving features.

- Calibrate SPRTs, PRTs, RTDs and thermistors (0 Ω to 500 kΩ)
- Accuracy as good as 0.06 ppm (0.000015 °C)
- "Ratio Self-Calibration" verifies and calibrates resistance ratio accuracy

5430 Standard AC/DC Resistor

Best performance available in an ac/dc resistor.

- Long-term stability better than 2 ppm/year (< 1 ppm typical)
- Traceable ac and dc calibrations available
- National lab design proven for more than 25 years

1560 Black Stack Thermometer Readout

Accurate, expandable and configurable readout.

- Reads SPRTs, RTDs, thermistors, and thermocouples
- Any configuration you like up to eight modules
- High-accuracy reference thermometer (to ± 0.0013 °C)

1529 Chub-E4 Standards Thermometer

Lab-quality accuracy on four channels for PRTs, thermistors and thermocouples.

- Four channels for PRTs, thermistors, and thermocouples
- Displays eight user-selected data fields from any channel
- Logs up to 8,000 readings with date and time stamps

1502A/1504 Thermometer Readouts

Best performance thermometers in their price range.

- Single-channel reference thermometers
- Two models to choose from—reading PRTs or thermistors
- Best price/performance package

1523/1524 Reference Thermometers

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

- High accuracy: PRTs: ± 0.011 °C; Thermocouples: ± 0.24 °C; Thermistors: ± 0.002 °C
- A simple user interface to see trends quickly
- Smart connectors to load probe information automatically

1551A Ex and 1552A Ex "Stik" Thermometer

The best substitute for precision mercury-filled glass thermometers.

- Accuracy of ± 0.05 °C (± 0.09 °F) over full range
- Intrinsically safe (ATEX and IECEx compliant)
- Two models to choose from (-50 °C to 160 °C or -80 °C to 300 °C)

1620A Digital Thermometer-Hygrometer

The most accurate temperature and humidity graphical data logger on the market.

- Superior accuracy
- Network enabled
- Powerful logging and analysis tools

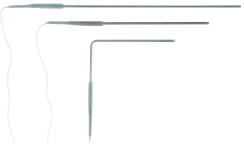
Secondary Standard PRTs

5626/5628 Secondary SPRT, PRT, Temperature Sensors

High-temperature secondary standards.

- -200 °C to 661 °C
- Meets all ITS-90 requirements for resistance ratios
- Rtp drift < 20 mK after 500 hours at 661°C

5608/5609 Secondary PRTs



Very stable thermometer from –200 °C to 670 °C.

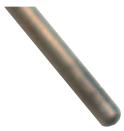
- 5608: –200 °C to 500 °C (80 mm minimum immersion)
- 5609: –200 °C to 670 °C (100 mm minimum immersion)
- Calibration not included, NVLAP-accredited calibration optional, lab code 200348-0

Secondary Reference PRTs

5615 Secondary Reference Temperature Standards

- –200 °C to 420 °C
- Calibrated accuracy ± 0.010 °C at 0 °C
- NVLAP-accredited calibration included, lab code 200706-0

5616 Secondary Reference PRT



- –200 °C to 420 °C
- Excellent stability: ± 0.007 °C
- Calibrated accuracy ± 0.011 °C at 0 °C

Thermistor Standards

5640 Series Thermistor Standards Probes

- Accuracy to ± 0.001 °C
- Affordable system accuracy to ± 0.004 °C or better
- NIST-traceable calibration included from manufacturer

High Temperature PRT

5624 Platinum Resistance Thermometer

- Temperature range of 0 °C to 1000 °C
- Accuracy of ± 0.05 °C to 962 °C (includes short-term stability and calibration uncertainty)
- Long-term drift of 0.01 °C at 0°C after 100 hours at 1000 °C

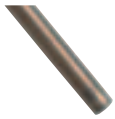
Thermocouple Standards

5649/5650 Type R and Type S Thermocouple Standards

- 0 °C to 1450 °C
- Two sizes available, each with or without reference junction
- Optional fixed-point calibration, uncalibrated accuracy is the greater of ± 0.6 °C or ± 0.1 % of reading

Precision Industrial PRTs

5627A Precision Industrial PRTs



- Vibration and shock resistant
- NVLAP-accredited calibration included, lab code 200706-0

Fast Response PRTs

5622 Fast Response PRTs

- Time constants as fast as 0.4 seconds
- Available as DIN/IEC Class A PRTs or with NVLAP-accredited calibration, lab code 200348-0
- Small probe diameters ranging from 0.5 mm to 3.2 mm

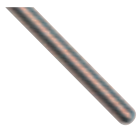
Small Diameter Indust. PRTs

5618B Small Diameter Industrial RTD

- Small diameter sheath, 3.2 mm (0.125 in)
- Excellent stability
- Includes ITS-90 coefficients

Full Immersion PRTs

5606 and 5607 Full Immersion PRTs



- Transition junction designed to withstand full temperature range of probe
- 5606: -200 °C to 160 °C
- 5607: 0 °C to 450 °C
- Calibration accuracy of ± 0.05 °C

Secondary Thermistor Probes

5610/5611/5611T/5665 Secondary Reference Thermistor Probes

- Short-term accuracy to ± 0.01 °C; one-year drift < ± 0.01 °C
- Accredited NVLAP calibration optional
- Flexible Teflon and silicone coated fast-response models

Temperature calibration

Compact Calibration Baths

6330/7320/7340/7380 Compact Temperature Calibration Baths

Compact baths with the stability and uniformity required for thermometer calibration.

- Stability and uniformity each better than ± 0.008 °C
- Metrology-level performance in lab-friendly sizes
- Convenient use on benchtops or on matching carts

6331/7321/7341/7381 Deep-Well Compact Baths

Ample immersion depth and great stability, in a high value compact bath.

- 457 mm (18 in) of depth with just 15.9 liters (4.2 gal) of fluid
- Perfect for liquid-in-glass thermometers with optional LIG kit
- Fast, quiet, compact (yet deep), and economical

7312 Triple Point of Water Maintenance Bath

Keep your cells up and running reliably for weeks at a time.

- Maintains TPW cells for up to six weeks
- Optional immersion freezer for simple cell freezing
- Independent cutout circuit protects cells from breaking

Standard Calibration Baths

6020/6022/6024 High Temperature Calibration Oil Baths

Stable, uniform heat sources for calibrations up to 300 °C.

- Stability as good as 0.001°C
- Large-capacity tanks for higher productivity
- Built-in cooling coils for external cooling sources

6050H Extremely High Temperature Calibration Salt Bath

Designed for high-temperature calibration—up to 550 °C.

- Eliminates messy sand baths
- Electronically adjustable temperature cutouts
- Stability of ± 0.008 °C at 550 °C

7008/7040/7037/7012/7011 Cold Temperature Calibration Baths

High stability means low calibration uncertainties—no other bath performs this well.

- Stability to ± 0.0007 °C
- Best digital temperature controller available
- "Super Tweak" function provides set-point resolution to 0.00003 °C

7060/7080 Really Cold Temperature Calibration Baths

Chill to –40, –60, or –80 °C without external coolants.

- Self-contained refrigeration—no LN2 or chiller required
- Temperatures as low as –80 °C in real metrology baths
- Stability of ± 0.0025 °C at –80 °C

Special Application Baths

6054/6055/7007 Deep-Well Baths

Extra-deep wells for thermometry work requiring extra tank depth and ultimate stability.

- Constant liquid levels through concentric-tube design
- Special design for sighting LIG thermometers
- Depth up to 60 cm (24 in)

7009/7108/7015 Resistor Baths

Three size options for any quantity of resistors.

- Stability to ±0.0007 °C
- Independent high- and low-temperature cutout circuit

Bath Controllers

2100 and 2200 Benchtop Temperature Controllers

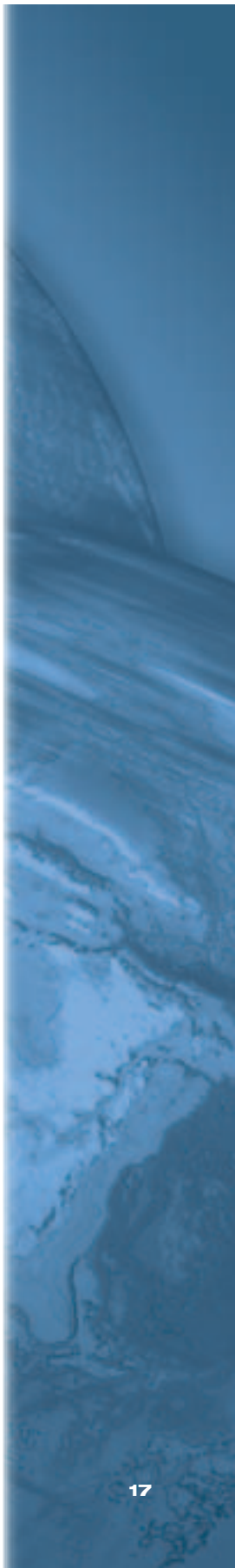
Most stable temperature controllers available

- Resolution as high as 0.00018 °C
- RS-232 interface included for automating applications

7900 Controller for Rosemount-Designed Baths

All the features of the Fluke Calibration 2100 Controller

- Installs easily
- Two independent over-temperature cutout circuits



Temperature calibration

Metrology Wells

9170/9171/9172/9173 Metrology Well Calibrators

Accurate enough for lab use yet rugged and portable.

- Best-performing industrial heat sources (accuracy, stability, uniformity) in the world
- –45 °C to 700 °C
- Immersion depth to 203 mm (8 in)
- Optional ITS-90 reference input reads PRTs to ± 0.006 °C

Field Metrology Wells

9142/9143/9144 Field Metrology Wells

Small dry wells for big field applications.

- Lightweight, portable, and fast
- Cool to –25 °C in 15 minutes and heat to 660 °C in 15 minutes
- Built-in two-channel readout for PRT, RTD, thermocouple, 4-20 mA current

Dual-Block Dry-Well

9011 High-Accuracy Dual-Well Calibrator

Widest temperature range available in a single dry-well.

- Combined range from –30 °C to 670 °C, one unit—two blocks
- Two independent temperature controllers (hot and cold side)
- Stability to ± 0.02 °C

Field Dry-Well Calibrators

9103/9140/9141 Field Dry-Well Calibrators

Great performance in portable instruments.

- Lightweight and very portable
- Accuracy to ± 0.25 °C
- RS-232 and Interface-*it* software included

Micro-Baths

6102/7102/7103 Micro-Bath Thermometer Calibrators

Portable and extremely stable.

- World's smallest portable calibration baths
- Calibrates sensors of any size or shape
- Stability to ± 0.015 °C

Handheld Calibrators

9100S/9102S Handheld Dry-Wells

World's smallest, lightest and most portable dry-wells.

- Smallest dry-wells in the world
- Ranges from –10 °C to 375 °C
- Accuracy to ± 0.25 °C, stability of ± 0.05 °C at 0 °C

9009 Industrial Dual-Block Thermometer Calibrator

Double your productivity or cut your calibration time in half.

- Temperatures from –15 °C to 350 °C in one unit
- Two wells in each block for simultaneous comparison calibrations
- Rugged, lightweight, water-resistant enclosure

Infrared Calibrators

4180/81 Precision Infrared Calibrators

Accredited performance for point-and-shoot calibrations.
- Calibrated radiometrically for meaningful, consistent results.
- Accredited calibration included
- Accurate, reliable performance from –15 °C to 500 °C

9132 and 9133 Portable Infrared Calibrators

Precision when you need it for infrared temperature calibration.
- Certify IR pyrometers from –30 °C to 500 °C (–22 °F to 932 °F)
- Large 57 mm (2.25 in) black-body target
- RTD reference well for contact temperature measurement

Thermocouple Furnaces

9150 Thermocouple Furnace

Convenient, portable thermocouple furnace.
- 150 °C to 1200 °C
- Stability of ± 0.5 °C over full range
- NIST-traceable calibration included
- RS-232 port standard

9112B Thermocouple Calibration Furnace

Horizontal furnace with unmatched stability and uniformity to 1100 °C.
- Combined stability and uniformity better than ± 0.4 °C
- Five-hole isothermal block included for best stability and uniformity
- RS-232 serial interface standard
- High capacity for simultaneous comparison calibrations

Zero-Point Dry-Well

9101 Series Metrology Well Calibrators

Ice-point reference without the ice.
- ± 0.005 °C stability in a portable ice-point reference
- Easy re-calibration for long-term reliability
- Ready light frees user's time and attention

Surface Probe Calibrator

3125 Surface Probe Calibrator

Milled aluminum for a smooth and true calibration work area with maximum thermal conductivity.
- Calibrates surface sensors up to 400 °C
- Uses Fluke Calibration 2200 Controller for excellent accuracy and stability
- NIST-traceable calibration included

Pressure calibration

Pressure calibration is the comparison of the output of a device used to measure pressure with that of another pressure measurement device, or pressure measurement standard. This usually involves plumbing the unit under test (UUT) to the standard device and generating a common pressure in the measurement circuit. The outputs of the devices are compared at one or more pressures, typically from the lowest to highest readings of the UUT's full scale range, or the range over which it is normally used.

The comparison process can be performed in a chain from the highest level of fundamental pressure realization down to everyday pressure measurement devices, such as analog gauges, transducers and transmitters, to ensure that pressure measurements are accurate and comply with accepted or mandated standards.

The test fluid inside a pressure calibration system may be liquid or gas depending on the application. In general, gas (usually compressed nitrogen or air) is used for cleanliness and precision at lower pressures, and liquids (usually oil or water) are often used for safety, leak integrity, and ease of pressure generation at higher pressures above 7 to 21 MPa (1000 to 3000 psi). There is a great deal of overlap in the actual ranges for which liquid or gas may be used practically, as reflected in the range of Fluke Calibration instruments that are specialized for each type of test fluid.

Product highlights

7252 and 7252i High Performance Dual Output Pressure Controller/Calibrators

Unmatched performance, combining precision, stability, speed and affordability.

Series 7252 provides a unique and flexible approach to performing automated calibrations over a wide pressure range. The 7252 incorporates two pressure ranges with independent controllers for each range. Therefore, two calibrations can be performed at the same time. A wide variety of pressure range combinations can be provided from as low as 0 to 2.5 kPa up to 0 to 21 MPa (0 to 10 in$H_2$0 up to 0 to 3000 psi) providing maximum flexibility in a single instrument. Two different models are available, the 7252i and 7252. The 7252i features percent of reading performance from 25 % to 100 % of each installed range, whereas the economical 7252 provides 0.003 % of full scale precision for each range. Similar to the single output Series 7250, the 7252 also features an active matrix color screen display with enhanced navigation menus for ease of operation. The controller is capable of very quick active pressure control, and offers passive control mode for maximum stability.

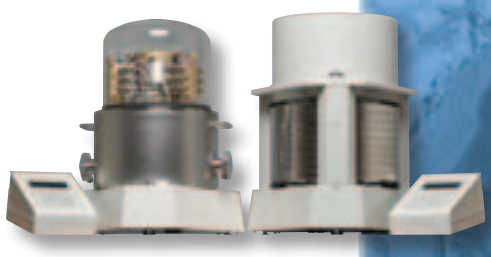
- Pressure ranges from 0 to 2.5 kPa and to 21 MPa (0 to 0.36 psi and to 3000 psi, 0 to 25 mbar and to 210 bar)
- Model 7252i provides advanced precision of 0.005 % of reading
- Model 7252 provides 0.003 % of full scale precision
- Measurement stability: 0.0075 % of reading per year
- Time to set point: less than 15 seconds with no overshoot
- Control stability: 10 ppm
- Languages: English, French, Chinese, German, Japanese, Spanish and Italian

PG7000™ Piston Gauges with AMH™ Automated Mass Handlers

Completely automated operation and data collection for best available measurement performance

PG7000™, already the world's most advanced piston gauge, becomes even more advanced with AMH™ automated mass handling technology. Tedious, error prone and wear inducing manual mass manipulation can be eliminated from high end piston gauge operation, over the full pressure range, in a bench top system, at a reasonable cost. The AMH system can be added to existing platforms or ordered with new installations. Two models are available to cover the complete PG7000 line of gas and oil operated piston gauges, including absolute mode with a vacuum reference. Thanks to the PG7000's unique system architecture, the exact level of automation appropriate for the application can be configured with standard components, from complete automation to simply automating mass handling. In all cases, PG7000's unified approach assures a simple, integrated system with a single local and remote interface.

- **Model AMH-38 with 38 kg mass set used with PG7601 or PG7607** gas piston gauges for automated mass handling with vacuum reference for defining absolute pressures—eliminates the need for time-consuming make and break of vacuum between test points
- **Model AMH-100 with up to 100 kg mass set used with PG7102, PG7202, PG7302 or PG7307** gas piston gauges for automated mass handling of gauge pressure to 110 MPa (16 k psi) gas and 500 MPa (72.5 k psi) oil
- Automated mass loading resolution down to 100 g, with mass tray to manually trim with 10 mg resolution
- Modular design allows use with existing manually operated PG7000 installations
- Simple removal of AMH and mass set to change or clean piston-cylinder module
- Fully automated with COMPASS® for Pressure Software, or user-developed automation with complete, intuitive remote command structure



Gas Pressure Controllers/ Calibrators

7250LP Low Pressure Controller/Calibrator

Specialized measurement and control for very low draft pressure range.

- Precision: 0.005 % of reading
- Control stability: 0.004 % of each range
- Resolution to 0.0001 in H_2O
- Full scale ranges from 0 to 10 in H_2O (2.5 kPa) to 0 to 100 in H_2O (25 kPa)

7250/7250i Gas Pressure Controllers/Calibrators

Combining advanced precision, stability, speed and affordability.

- Pressure ranges from 0 to 40 kPa and to 21 MPa (0 to 5 psi and to 3000 psi, 0 to 400 mbar and to 210 bar)
- Model 7250i provides precision of 0.005 % of reading
- Model 7250 provides 0.003 % of full scale precision
- Stability: 0.0075 % of reading per year
- Time to setpoint: 15 seconds with no overshoot

7250xi High Performance Gas Pressure Controllers/Calibrators

Unmatched precision and speed.

- Pressure ranges from 0 to 40 kPa and to 17 MPa (0 to 5 psi and to 2500 psi, 0 to 400 mbar and to 170 bar)
- Advanced precision of 0.005 % of reading from 5 % to 100 % of full scale
- Stability: 0.0075 % of reading per year
- Time to setpoint: 15 seconds with no overshoot

7252/7252i Dual Output Gas Pressure Controllers

A unique and flexible approach to performing automated calibrations over a wide pressure range.

- Two independent pressure measurement and control modules
- Two performance models available, 7252i and 7252
- Fast control: <15 seconds with zero overshoot
- Full scale ranges from 0 to 2.5 kPa and to 21 MPa (0 to 0.36 psi and to 3000 psi)

PPC4 Gas Pressure Controller/Calibrator

Wide rangeability and flexibility in a single controller. Ranges and accuracy classes can be selected to best suit the application.

- Up to two internal Quartz Reference Pressure Transducers (Q-RPTs) from absolute (vacuum) to 14 MPa (2000 psi)
- Full-scale standard class Q-RPTs provide 0.015 % full scale of selected range measurement uncertainty
- Standard class Q-RPTs provide 0.01 % reading measurement uncertainty
- Premium class Q-RPTs provide 0.008 % reading measurement uncertainty
- 4 ppm control precision as low as 1 kPa (0.15 psia) with large turndown
- Can use RPM4 reference pressure monitors as integrated remote pressure references for additional Q-RPT ranges

PPC4E Pressure Controller/Calibrator

Very wide rangeability and reliability at a great value, for everyday pressure calibration.

- Models available with 10:1 or 100:1 accurate measure and control range turndown for maximum workload coverage
- Absolute, gauge and bidirectional gauge modes included in most models
- Gauge calibration measurement uncertainty ± 0.02 % of selected range, with range options available from ± 1 kPa (± 0.15 psi) to 14 MPa (2000 psi)
- Absolute range of 1 kPa (0.15 psi) to 14 MPa (2000 psi)

High Pressure Controllers/ Calibrators

7350 High Pressure Gas Controller/ Calibrator

Safe, easy-to-use, and effective high pressure test and calibration.

- Ranges to 70 MPa (10k psi, 700 bar)
- Measurement precision to 0.01 % of range
- Control stability 0.007 % FS

PPCH-G High Pressure Gas Controller/ Calibrator

Wide rangeability and flexibility with precise high pressure gas control.

- Ranges to 100 MPa (15k psi)
- One or two internal Q-RPTs with large range turndown
- Can use RPM4 reference pressure monitors as integrated remote pressure references for additional Q-RPT ranges

7615 Hydraulic Pressure Controller/ Calibrator

Unique, high speed approach to high pressure calibration and testing.

- Ranges to 280 MPa (40k psi)
- Measurement precision to 0.01 % of range
- Available in a variety of fluids, including water
- High speed pressure control

PPCH Hydraulic Pressure Controller/ Calibrator

Wide rangeability and flexibility with precise high pressure hydraulic control.

- Ranges to 200 MPa (30k psi)
- One or two internal Q-RPTs with large range turndown
- High precision control over wide range
- Can use RPM4 reference pressure monitors as integrated remote pressure references for additional Q-RPT ranges

Reference Pressure Indicators

RPM4 Reference Pressure Monitor

Premium measurement performance in a compact and rugged instrument.

- One or two independent quartz reference pressure transducer modules (Q-RPTs) with individual self-defense systems (SDS™) to prevent over-pressure
- Infinite Ranging and AutoRange™
- Differential measurement mode (channel 1- channel 2)
- Dedicated version available for air data ranges units and features, RPM4-AD
- Can be used as integrated external reference pressure transducer for PPC pressure controller/calibrators

7050 Series Digital Pressure Indicators

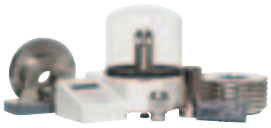
Unmatched precision with long term stability.

- Pressure ranges from 0 to 10 in H_2O and 0 to 1,500 psi (0 to 25 mbar and 0 to 100 bar)
- Model 7050i provides precision of 0.005 % of reading
- Model 7050 provides 0.003 % of full scale precision
- Active matrix color screen with enhanced navigation menus
- Model 7050LP provides precision of 0.005 % reading for very low draft pressure ranges

Pressure calibration

PG7000 Series Piston Gauges

PG7601 Absolute Gas Piston Gauge



Gas piston gauge with vacuum reference for defining absolute pressures.

- Gas pressure from 5 kPa to 7 MPa (0.7 psi to 1000 psi) gauge or absolute pressure
- Onboard measurement of test conditions, and real-time calculation and display of test pressure
- Compatible with PPC4 pressure controller and AMH-38 Automated Mass Handler

PG7102 Gas Piston Gauge

Gas piston gauge with 55 kg mass set for extended range measurement of gauge pressures.

- Gas pressures from 100 kPa to 11 MPa (15 to 1,600 psig)
- Onboard measurement of test conditions, and real-time calculation and display of test pressure
- Compatible with PPC4 pressure controller and AMH-100 Automated Mass Handler

PG7202 High Pressure Gas Piston Gauge

Gas piston gauge with oil-lubricated piston-cylinder for operation in high pressure gas or oil.

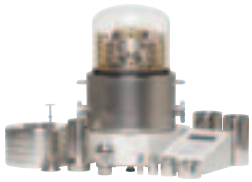
- Gas pressures from 100 kPa to 110 MPa (15 to 16,000 psig), oil pressures from 100 kPa to 200 MPa (15 to 30,000 psig)
- Gas operated, liquid lubricated for robust operation and low piston sink rates
- Onboard measurement of test conditions, and real-time calculation and display of test pressure
- Compatible with PPCH-G pressure controller and AMH-100 Automated Mass Handler

PG7302 Piston Gauge

Oil piston gauge for measurement of high gauge pressures.

- Oil pressures from 100 kPa to 500 MPa (15 psi to 75,000 psig)
- Onboard measurement of test conditions, and real-time calculation and display of test pressure
- Compatible with PPCH pressure controller and AMH-100 Automated Mass Handler

PG7000-AMH Automated Mass Handler



Automated Mass Handler for PG7000 Piston Gauges.

- Add to PG7000 Series piston gauge to fully automate pressure testing in gauge or absolute mode
- Designed and tested to provide years of reliable, maintenance free operation
- Reduce wear and possible mass value changes caused by manual mass handling

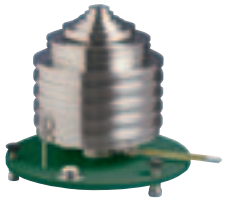
2400 Series Piston Gauges

2465A Absolute Gas Piston Gauge

Gas piston gauge capable of very low pressures, for defining gauge and absolute pressures.

- Gas pressure from 1.5 kPa to 7 MPa (0.2 psi to 1000 psi) gauge or absolute pressure
- Lightweight, compact system with small masses for reduced bench space, transportability and ergonomic mass handling
- Compatible with Autofloat Controller and WinPrompt and COMPASS software

2470 Gas Piston Gauge



Gas piston gauge capable of very low to high gauge pressures.

- Pressures ranges from 1.5 kPa to 20 MPa (0.2 psi to 3000 psig)
- Lightweight, compact system with small masses for reduced bench space, transportability and ergonomic mass handling
- Compatible with WinPrompt and COMPASS software

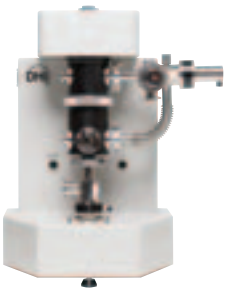
2482 Differential Piston Gauge

High precision differential pressure measurement at elevated line pressures.

- Measures differential pressures using a gas or oil medium
- Differential pressure to 210 kPa (30 psi, 2100 mbar) at static line pressure range to 20 MPa (2900 psi, 200 bar)
- Quickly and easily set differential pressures with lightweight masses
- Fully automated pressure control and pressure determination using WinPrompt software

Specialty Piston Gauges

FPG8601 Force-Balanced Piston Gauge



Gas pressure calibration system for very low gauge, differential and absolute pressures.

- Gas pressure from 0 to 15 kPa (113 Torr) in gauge, differential and absolute modes
- Measurement uncertainty to ± (5 mPa + 30 ppm of reading) in gauge and absolute differential mode, ± (8 mPa + 30 ppm of reading) in absolute mode
- Fully automated, including test execution, pressure control and reference and device under test data collection

PG9607 Gas Piston Gauge

Fully automated primary pressure reference for absolute and gauge pressures to 500 kPa.

- Gauge and absolute pressures from 11 to 500 kPa with a single piston-cylinder
- Large diameter 50 mm piston-cylinder with improved geometry allows direct traceability to dimensional measurements with very low uncertainties

PG9602 Gas Piston Gauge

Fully automated primary pressure reference for absolute and gauge pressures to 11 MPa.

- Gauge and absolute pressures from 10 kPa to 11 MPa
- Up to 100 kg mass load under vacuum bell jar for large turndown and overlap of piston-cylinder ranges

Manual Pressure Generation and Control

3990 Gas Pressure Control Pack

Precise, manual absolute and gauge pressure control for gas piston gauges and indicators.

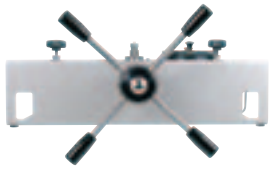
- Models from vacuum to 7 MPa and 20 MPa (1000 psi and 3000 psi)
- Self-contained for intuitive, easy use

GPC1 High Gas Pressure Controller

Precise, assisted manual control for high pressure gas piston gauges and indicators.

- Models to 70 MPa and 110 MPa (10k psi and 16k psi)
- Precise control to full pressure with simple, ergonomic push-button operation

MPG2 Hydraulic Pressure Generator/Controller



Precise, manual control for hydraulic piston gauges and indicators.

- Models to 100 MPa and 200 MPa (15k psi and 30k psi)
- Self-contained for intuitive and easy generation and precise control to full pressure

OPG1 Hydraulic Pressure Generator/Controller

Precise, assisted manual control for hydraulic piston gauges and indicators.

- Pressure to 200 MPa (30k psi)
- Precise generation and control to full pressure with simple, ergonomic push-button operation

Pressure calibration

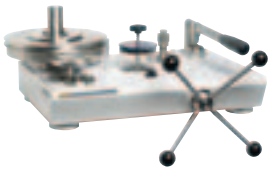
Industrial Deadweight Testers

P3000 Pneumatic Deadweight Tester

High performance gas deadweight testers, with unique suspended piston design for vacuum calibration.

- 0.015 % of reading accuracy standard (0.008 % optional)
- 3 to 500 psi (0.2 to 35 bar) pressure
- Optional low range 0.03 to 1 bar vacuum (1 to 30 inHg)
- Integrated vacuum and pressure pump available to 2 MPa (300 psi)

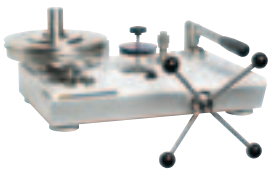
P3100 Hydraulic Deadweight Tester



Highly accurate oil deadweight tester, with quick and easy-to-use single and dual piston deadweight models.

- Pressure ranges to 140 MPa (20k psi, 1400 bar)
- 0.015 % of reading accuracy standard (0.008 % optional)
- Built-in pressure generation and adjustment
- Single or dual piston formats

P3200 Hydraulic Deadweight Tester



Hydraulic deadweight tester specially designed to use water as a test medium.

- Pressure ranges to 70 MPa (10k psi, 700 bar)
- 0.015 % of reading accuracy standard (0.008 % optional)
- Built-in pressure generation and adjustment is standard
- Single or dual piston formats
- Water media

P3800 Hydraulic Deadweight Tester

High performance and simplicity for very high pressure hydraulic calibration.

- Pressure ranges to 400 MPa (60k psi, 4000 bar)
- 0.02 % of reading accuracy standard (0.015 % optional)
- Includes hand pump and intensifier for generating and adjusting high pressures

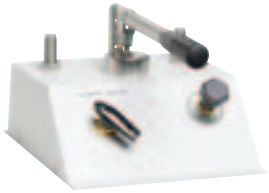
Pressure Gauge Calibrators

E-DWT-H Electronic Deadweight Tester

A digital alternative to the traditional deadweight tester.

- Set and measure pressure precisely without limitation of mass loading resolution
- Pressure measurement is insensitive to local gravity and orientation
- One year uncertainty of ± 0.02 % of reading
- Run onboard test routines and store calibration data for review and export to a PC

P5510 Pneumatic Comparison Test Pump



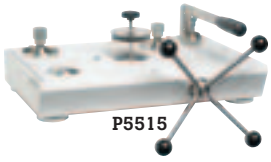
- Dual pressure/vacuum capability
- Pressure to 20 MPa (300 psi, 20 bar)
- Vacuum from 0 to 80 kPa (0 to 24 inHg, 800 mbar)
- Built-in pressure and vacuum generation

P5513 Pneumatic Comparison Test Pump

- Pressure range 0 to 210 MPa (3k psi, 210 bar)
- High pressure pneumatic operation
- Screw press for fine pressure adjustments
- High quality needle valves for fine control

P5514 and P5515 Series Hydraulic Comparison Test Pumps

P5514



P5515

- Compatible with a wide range of fluids
- P5514 Test Pump generates pressures to 70 MPa (10k psi, 700 bar)
- P5515 Test Pump generates pressures to 140 MPa (20k psi, 1400 bar)
- P5515 has a built-in hand pump for system priming and large volume applications

Air Data Calibration

7750i Air Data Calibrator

Air data test set with unequalled precision and long term stability and superior pressure control technology.

- High accuracy, RVSM compliant
- Accuracy to ± 2 feet, 0.02 knots
- True differential sensor for airspeed (Qc)

RPM4-AD Reference Pressure Monitor

Specialized pressure indicator for the absolute and differential pressure ranges in air data instruments.

- Fixed wing and rotary wing range versions
- True Pt, Ps, Qc operation

2468A Pitot/Static Primary Standard

Gas piston gauge specialized for air data absolute and differential pressure ranges.

- Pressure range: 0.4 to 103 inHg. Optional range: 3.4 to 400 inHg
- Accuracy to ± 0.5 feet, 0.003 knots
- Extended mass set covers entire air data range without the need to change pistons
- Compatible with Autofloat Controller and WinPrompt and COMPASS software

ADCS-601 Air Data Calibration System

Gas pressure calibration bench system for absolute and differential measurement in the air data range.

- Primary pressure calibration of the entire air data range
- Fully automated, including test execution, pressure control and reference and device under test data collection

Pressure Calibration Systems

7250Sys Multi-Range Pressure Calibration System

Turn-key automated gas pressure calibration system.

- Gas pressure measurement and control from low absolute to 17 MPa (2500 psi)
- Fully integrated multi-range pressure test and calibration systems with a single interface and single test port
- Select either an 8 range or the 12 range system for maximum performance and coverage

Custom Pressure Calibration Systems

Engineered custom systems integrate standard Fluke Calibration products into a complete system based on the user's specific requirements. These are often multi-range systems that include pressure generation and supply accessories, data acquisition hardware and software and/or test instrument connection manifolds. Custom systems include but are not limited to turn-key pressure calibration rack systems, portable calibration carts and automated pressure calibration bench systems.

Gas flow calibration

What is gas flow calibration?

Gas flow calibration refers to the calibration of a flow sensing device such as a flow meter or flow controller by comparing its measurement against a flow measurement reference. Typically, the device, or unit under test (UUT), is pneumatically connected in series with the flow reference so they measure the same gas flow; then the indications of the two devices are compared.

molbloc™/molbox™ system components

Fluke Calibration's molbloc/molbox gas flow calibration system consists of molbloc flow elements that connect to a flow terminal (either molbox1+ or molbox RFM) so the terminal can use pressure and temperature measurements from around the flow element, combined with gas properties and prior molbloc calibration data, to determine and display the gas flow rate.

Mass flow vs. volume flow

A frequent topic of discussion and confusion surrounding gas flow measurement is that of mass flow versus volume flow. Flow meters and flow units used for flow measurements are used to measure and express either the amount of volume of gas or the amount of mass (number of moles or molecules) passing through the device. When performing a gas flow calibration, it is nearly always beneficial to use a mass flow reference measurement, because the mass flow rate stays constant throughout a flow system in steady state. Since gas is compressible, the volume flow rate varies at different locations in a flow system due to changes in density caused by changing temperature and pressure. molblocs are mass flow standards, which allow reliable comparisons to other flow devices. The molbox terminal is also able to calculate and express the flow rate in terms of volume flow at another point in the system to allow testing of volume-based devices.

Gas Flow Standards

molbox1+ Flow Terminal

0.125 % of reading—lowest uncertainty for gas flow calibration.

- Allows coverage of flow range from less than 1 sccm to over 5000 slm with a single user interface and transportable system
- Real-time flow measurements makes adjusting analog flow devices fast and easy
- No moving parts that cause pressure/flow fluctuations or threaten reliability
- Perform fully-automated flow calibrations using molbox terminal with COMPASS for Flow software
- Updated design with advanced features and even more robust internal pneumatic design

molboc-L Laminar Flow Element

Laminar flow elements for flow from 1 sccm to 100 slm.

- Traceable to primary gravimetric mass flow measurements
- Multiple gases supported
- Useable with existing molbox1+ and molbox RFM mass flow terminals and COMPASS software
- Integrated filter to protect against contamination
- Integral gas temperature conditioning and measurement

molbloc-S Sonic Nozzle Flow Element

Sonic nozzle based molblocs for gas flow up to 5,000 slm.

- Covers ranges up to 5,000 slm in N2 and air
- Multiple gases supported
- Useable with molbox1+, or existing molbox1 and molbox RFM mass flow terminals and COMPASS software
- Proven critical flow venturi (sonic) nozzle operating principle supported by primary gravimetric calibration

molbox RFM Reference Flow Monitor

Compact terminal for making mass flow measurements using molbloc-L and molbloc-S flow elements.

- Traceable to primary gravimetric mass flow measurements
- Economical alternative to molbox1+ terminal
- ± 0.5 % of reading uncertainty
- Covers the flow range of 1 sccm to 100 slm with molbloc-L, and up to 5000 slm with molbloc-S

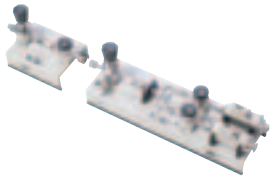
molstic Mounting Systems

Used to conveniently mount and protect molbloc elements, connect to units under test and provide flow and pressure control.

molstic-L used for molboc-L mass flow elements.

- Quick connector input for convenient connection to the gas supply
- 2 micron (0.5 micron for low flow) filter to protect the downstream components
- Adjustable regulator protects the molbox transducers against accidental overpressure

molstic-S used for molbloc-S mass flow elements.



- Available in either 1/2 inch or 1/4 inch system plumbing sizes
- Integrated flow shut-off/metering valves

Gas Flow Automation Accessories

MFC-CB™ Control Box

- Stand-alone unit for setting/reading analog mass flow controllers (MFCs) and mass flow meters (MFMs).
- Set and read 0 to 5 V or 4 to 20 mA on two (2) channels simultaneously
- Complete front panel local control and remote operation via RS-232 and IEEE-488 interfaces

MFC Switchbox™

- Supplies power and switches between up to five MFCs or MFMs on one molbox1+ or MFC-CB channel.
- Duplicates MFC channel without switching cables

Primary Gas Flow Standard

GFS Dynamic Gravimetric Mass Flow Standard

GFS™ is a true Primary Mass Flow Standard and makes the fundamental measurement of low gas mass flow rates practical.

- Covers the range of 0.2 to 200 mg/s in various gases (10 sccm to 10 slm N2)
- Measurements can be transferred higher flow ranges using Successive Addition method
- Flow measurement uncertainty as low as ± 0.013 % of reading

Calibration software

"Calibration software" refers to applications that automate all or part of a calibration process via computer control. Calibration software also allows users to manage their calibration and asset data.

If you've heard about the benefits of automated calibration and asset management but are puzzled about how everything fits together, call on Fluke Calibration for solutions.

Other types of calibration software from Fluke Calibration include data-logging software, software that generates calibration constants and references, and various add-on and plug-in software programs.

Why use calibration software?

Using software to automate all or part of the calibration process offers several important advantages.

Consistency – Software automation ensures that calibrations can be performed exactly the same way by multiple operators in multiple locations. This improves the quality of results, reduces errors and standardizes methods.

Efficiency – Automating the calibration process allows technicians to set up tests and then go on to perform other tasks, making more efficient use of their time. Calibrations are typically completed much more quickly, saving time and money. If the software is capable of calibrating multiple units under test simultaneously, automation increases throughput as well.

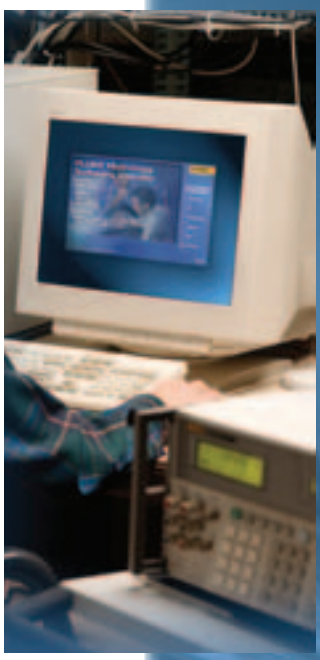
Documentation and reports – Calibration automation software typically includes features for documenting calibration procedures, storing calibration data, and producing reports, allowing users to eliminate paper records or spreadsheets.

Because Fluke Calibration software does such a good job of keeping accurate records of all parts of the calibration process, it also supports compliance with a wide variety of quality standards.

Product highlights

MET/CAL® *Plus* Calibration Management Software

The complete solution for automating calibration processes plus managing and reporting measurement assets



Calibration labs have their share of challenges: an increasing and more complex workload; fewer technicians; a growing list of quality standards. Above all, there's constant pressure to reduce costs.

Fluke MET/CAL® *Plus* calibration management software helps you to meet those challenges by managing and calibrating your workload more efficiently. It includes MET/CAL®—the industry-leading software for automated calibration and MET/TRACK®—a dedicated system to manage your test and measurement assets. It is the most complete software solution available to calibration professionals.

- Perform automated calibrations—including computer-aided, closed-case, and closed-loop calibrations—on all kinds of test and measurement tools and equipment
- Create, edit, test, and document calibration procedures with sample procedures to get you started
- Configure and report a wider range of measurement uncertainty parameters and include verification data to provide an audit trail and support further analysis
- Track asset information including calibration and maintenance history and status, traceability, users, customers, and location
- Analyze and report asset information; create and print ad hoc reports in Quick Report Builder or build your own reports using Crystal Reports Professional (included)
- Make data available to other corporate systems, and import asset and calibration data into MET/CAL *Plus*
- Meet the requirements of quality standards like ISO 9000, ANSI Z540.3, ISO/IEC 17025, NRC 10 CFR, and others

COMPASS® for Pressure Calibration Software

COMPASS® for Pressure is a universal platform for all of your pressure calibration software needs. From piston gauges calibrating individual devices in the cal lab to transfer standards characterizing racks of sensors in production, COMPASS® provides an off-the-shelf software tool to maximize the automation of your calibration and testing processes. The industry leading pressure calibration software enables you to advance from individual automated hardware components to a fully automated calibration system—quickly, and without consuming your internal engineering resources.

- Runs complete, automated calibration sequences on single or multiple units under test (UUTs), including leak testing and pretest exercising
- Compatible with transfer standards, piston gauges and data acquisition hardware from all manufacturers
- Full integration of Ruska piston gauges and controllers; replaces WinPrompt
- Export COMPASS® data directly to MET/TRACK® database, allowing MET/TRACK® software to manage all your assets. Supports multiple standards and customizable prompts
- Readily adapts level of automation to available hardware and UUTs
- Calculates in-and-out-of-tolerance conditions; reports linearity and hysteresis for each UUT
- Creates standard test data files that are easily imported into Microsoft® Excel and other software tools; also outputs to an external database
- Advanced onboard report editor with simple template editing to produce customized calibration reports in Microsoft Word® format
- Security options on hardware setups, data files and reports to assist in compliance with FDA 21 CFR Part 11
- Microsoft® Windows Vista and Microsoft® Windows 7 support
- Multiuser, networkable application and database; seat-based license available

Calibration software

Electrical/RF Calibration Software

MET/CAL®

The complete solution for automating calibration processes plus managing and reporting measurement assets.

- Perform fast, repeatable, and powerful calibration
- Full storage of calibration data
- Rich reporting capabilities
- Configure and report a wider range of measurement uncertainty parameters

Warranted Procedures for MET/CAL®

Fully tested, ready-to-go procedures designed to satisfy your needs.

- Optional calibration procedures for MET/CAL® *Plus* Calibration Software
- Warranted by Fluke Calibration to produce valid calibrations on the intended unit under test (UUT) for the specified model and revision level
- These procedures automate the calibration process under MET/CAL control

5080A/CAL

Easy-to-use standalone software for the 5080A Multi-Product Calibrator.

- Quickly calibrate a wide range of analog and digital workload
- Provides automated control of the calibrator; technician simply enters readings from the item being calibrated
- Easy-to-use procedure designer; simply select the type of signal needed to perform a test from a drop-down menu, enter the test level and set the test limits

Calibration Asset Management Software

MET/TRACK®

Manage metrology assets the easy way.

- Interface with MET/CAL, COMPASS®, Manual MET/CAL®, and MET/TEMP II
- Two types of data validation for critical data consistency
- Create and print ad hoc reports or build your own report
- Five levels of security

Software Support Program

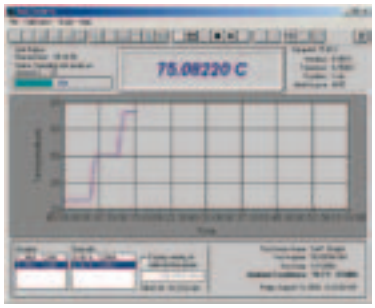
MET/SUPPORT℠ Gold

Annual support program for MET/CAL *Plus* Calibration Management Software. This premier support service helps you maximize your software investment over time.

- Software upgrades included
- Free access to thousands of Fluke Calibration warranted procedures
- Priority access to software support
- Discounts on training courses and custom calibration procedure development
- Members only web seminars

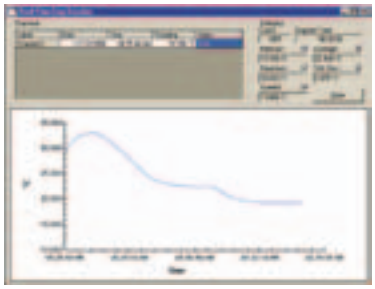
Temperature Calibration Software

MET/TEMP II



- Fully automated calibration of RTDs, TCs, thermistors, and many heat sources
- Calibrates up to 100 sensors at up to 40 points
- Performs coefficient calculations and generates tables and reports

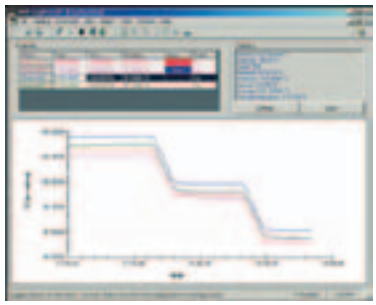
Log*Ware*



Turn a Fluke Calibration single-channel handheld or 1502A/1504 readout into a real-time data logger.

- Collects real-time data
- Calculates statistics and displays customizable graphs
- Allows user-selected start times, stop times and sample intervals

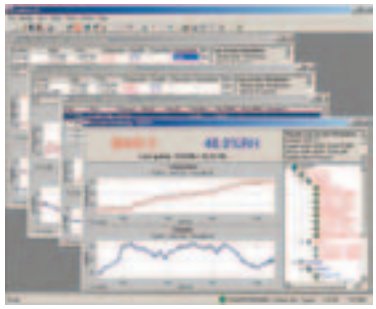
Log*Ware II*



Turn any Fluke Calibration multi-channel thermometer readout into a real-time data logger.

- Collects real-time data using Fluke Calibration multi-channel readouts
- Calculates statistics and displays customizable graphs
- Allows user-selected start times, stop times and sample intervals

Log*Ware III*



- Remotely monitors and logs a virtually unlimited number of concurrent log sessions into a central data repository
- Up to two temperature and two humidity inputs for each DewK
- Customize your graph trace color, alarms, and statistics as you go

Table*Ware*

Calculate-and-generate data software package for manually entered data.

- Generates temperature vs. resistance, temperature vs. ratio and temperature vs. EMF tables
- Calculates coefficients for RTDs, thermistors and thermocouples
- Generates coefficients, calculates residual values and generates useful tables

Calibration software

Pressure/Flow Calibration Software

COMPASS® for Pressure

Universal platform for automating pressure calibration.

- Integrated piston gauge support
- Runs complete automated calibration sequences
- Supports multiple units under test
- Automates virtually any pressure standard or device under test

COMPASS® for Flow

Macro-enabled mass flow calibration software package.

- Fully customizable
- Supports non Fluke Calibration flow references
- Performs complex real time flow computations, and allows you to alter test scenarios based on data collected

Mechanical/Dimensional Software

Manual MET/CAL®

The easy, efficient way to collect, store and report data consistently for manual calibration.

- Quickly and easily create, edit, test and run calibration procedures
- Input calibration test data into your computer – no more spreadsheets or paper and pencil
- Capture measurement uncertainty and TUR values

Service programs

Fluke Priority Gold CarePlan

The Fluke Priority Gold CarePlan is a comprehensive instrument calibration and repair support plan that minimizes your downtime and protects your investment in your Fluke calibrators. It's the "good as gold" priority customer service program that gives you all these extra privileges:

- Annual calibration included (standard or accredited) with guaranteed three-day in-house turnaround[1,2]
- Free repairs with guaranteed ten-day in-house repair (includes calibration)[2,3]
- Pre-paid, priority freight on return of instrument
- Special Priority Gold telephone help line or web support for member assistance
- Free product updates
- One-year, three-year and five-year plans available
- 10 % off on calibration product upgrades
- 20 % off any scheduled Fluke Calibration metrology training for any of your personnel
- Automatic 45-day and 15-day calibration due notification
- Free transit case for your instruments (Europe)

1. Three-day in-house turnaround not available in all countries; contact your local Fluke representative for details. Priority shipping times vary by country.
2. One-year and three-year Priority Gold CarePlans do not cover instrument repairs in the first 60 days and 30 days respectively after plan purchase. Five-year plans are eligible for immediate repair services covered under the program.
3. Instruments showing signs of failure due to physical abuse, improper operation or application do not qualify for free repair and will be repaired at 15 % discount from standard repair rates.

Silver CarePlan

The Fluke Silver CarePlan is a comprehensive instrument warranty support plan that puts you in charge of your operating costs and protects your investment in your new Fluke Calibration instrument.

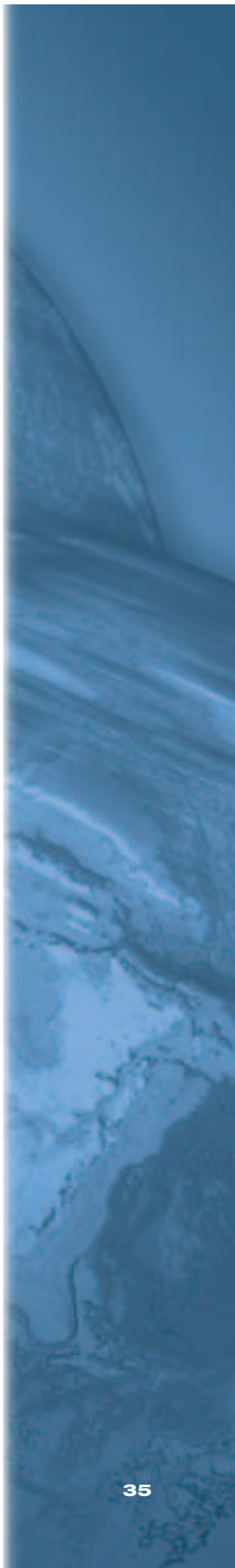
- Extended warranty coverage for your instrument
- Calibration included on repairs covered by your plan
- 15 % discount on regular calibrations during your factory and Silver CarePlan term
- 15 % discount on any out-of-plan service changes
- Free product updates (PCNs) performed at the time of repair
- One, two, and four-year plans available

Register your Fluke Calibration product online

Visit **www.flukecal.com/register-product** to register your product today!

Authorized Fluke Calibration Service Centers

Fluke Calibration offers calibration and repair services and support through our flagship metrology laboratories and service partners worldwide. To find the best solution for your calibration product you can visit **www.flukecal.com/service-centers**, call us at **877-355-3225**, or email us at **service@flukecal.com**.



Training

Training

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.

Instructor-led classroom courses

Our instructor-led courses cover a variety of metrology topics and range from one to five days in length. Held in various locations around the world, training from Fluke Calibration is a great way to maximize your investment in your calibration equipment.

Instructor-led web-based training

Our instructor-led web-based trainings offer the same great access to Fluke Calibration experts, with the added benefit of not having to travel. Instructor-led web-based trainings are designed to fit into your schedule, without disrupting your workflow. Courses are set up in anywhere from one to five parts, two hours each, held on consecutive days.

Self-paced online training

Our self-paced calibration and metrology training courses were developed by Fluke Calibration and other technical experts in the metrology community using proven instructional design components. At the start of each module, a brief tutorial describes how the course is laid out. The learning objectives are clearly stated. Topics are selected from easy-to-navigate menus and sub-menus. Embedded questions are presented frequently to increase retention. Engaging graphics, photos, formulas and tables support text material. A final post-test provides proof of competency. Tests are shuffled after each use. Most importantly, a certificate of completion satisfies documentation requirements.

Self-paced training tools

In addition to self-paced online training, Fluke Calibration offers several additional self-paced training tools for metrology software and dc/low frequency metrology. Our self-paced metrology software CD-ROMs give you the ability to learn at your own pace. The familiar web interface makes navigating this program easy, and upon successful completion of the course you will be provided with a completion certificate. Fluke Calibration also offers the only comprehensive text book on dc/low frequency metrology, *Calibration: Philosophy in Practice, Second Edition*. It covers real world concepts and applications, and is designed and written for the working technician.

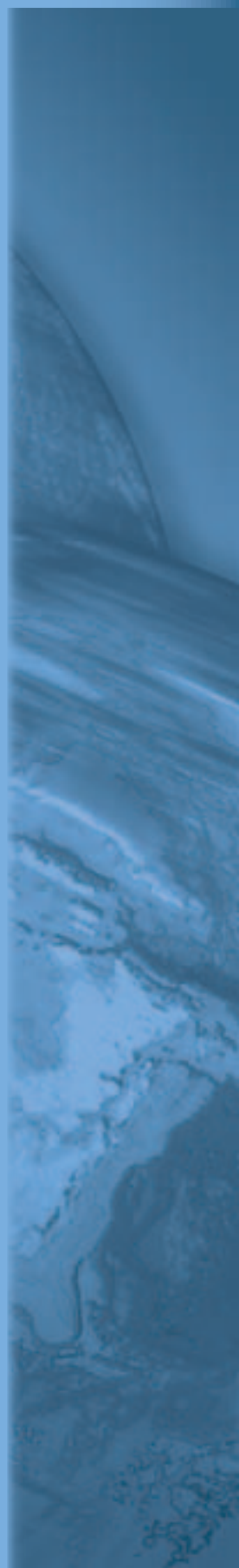
On-site training

Fluke Calibration instructor-led courses may also be taught at your facility. If you have a large number of students, or if the material you wish to discuss is considered confidential, you may find On-Site Training an attractive alternative. Contact your local Fluke Calibration representative to discuss specific requirements and arrangements, or email **training@flukecal.com** for a Fluke Calibration representative to contact you.

For an up-to-date course schedules, and pricing, and training resources visit: **www.flukecal.com/training**

FLUKE®

Calibration



FLUKE®
Calibration

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

Electrical | RF | Temperature | Pressure | Flow | Software

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