High Accuracy Portable Calibrator C150

Superior Accuracy compared to Fluke!

Ergonomic design and embedded software make this high accuracy on-site multifunction calibrator an easy to use high performance tool.





C150 Features

- Simultaneous Measurement and Source or Dual Measurement Channels
- Rugged IP54 Construction for On-Site Use
- Quick Connect Terminals
- Data Acquisition
- Automatic Calibration on HART Protocol Transmitter
- 21 CFR part 11 compliant
- Measure and Generate Voltage, Current, Frequency, Resistance Signals, Resistive Probes and Thermocouples
- Pressure Measurements when used with optional External Pressure Module for Absolute or Relative Pressure
- Backlit Display with Adjustable Contrast Settings

OPTIONAL DATACAL SOFTWARE PROVIDES:

- Instrument Configuration
- Calibration
- Data Management
- Virtual Instrument

TRACEABLE TO NIST

ONE YEAR 1 WARRANTY

The new Wahl C150 Calibrator is a high accuracy instrument which integrates all the necessary functions for calibration and maintenance of processes, making it the ideal instrument for maintenance, quality control, and calibration.

This robust and reliable calibrator combines the functions of several units in one instrument:

- Simulation, Emission
- Pressure, Temperature, Process Signal Measurements.

A Bluetooth® interface and quick access to functions makes this a high performance instrument perfect for on site use.

IP 54 rated, and fully protected by an anti-shock boot, with integrated quick connect terminals and a high-contrast backlit display, it is comfortable to use in all conditions.

C150 Calibrator is supplied with 6 testing leads with crocodile clips, quick battery charging system, neck strap, and stand for desktop use, User Manual on CD Rom, attache style professional carrying case, and NIST Calibration Certificate.

For complete specifications please visit www.palmerwahl.com and click: Test & Calibration > Calibrators: Temperature > Portable Calibrators

Buy it, you'll like it; GUARANTEED! *

* USA Customers only

Calibration Services Available

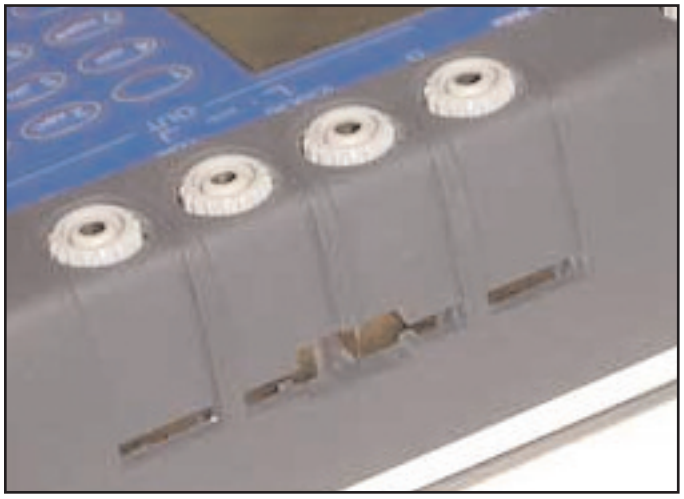
High Accuracy Portable Calibrator
C150

FUNCTIONS

QUICK CONNECT SYSTEM: This unique system is easy to use by pressing down on the top of the terminal, and inserting bare wires with a diameter up to 3 mm (or 10AWG), or compensated thermocouple connectors, and then releasing.

Wires are held tight between 2 brass plates which provide thermal stability to create excellent cold junction compensation for thermocouples.

This system also allows 4mm banana plugs and security connectors to be connected on the front panel.



FUNCTIONS: The C150 allows the following physical values to be measured and simulated:

- Voltage
- Current
- Resistance
- Temperature by Thermocouples, RTD's and Thermistors
- Pressure measurement when used with optional external pressure module (simulation requires user supplied pressure pump)
- Frequency/counting from signal and dry contacts

Allows scaling of process signals and corrections to temperature probes.

Compatible with HART transmitters by inserting a 250 ohm resistance, which allows uninterrupted digital data transfer.

Stores data and can send them to PC for analysis.

HART Protocol: C150 works with HART Protocol instruments:

- Connection of 1 to 15 analog sensors with 24V power supply
- Compatibility with Protocols «HART 5» and «HART 6». Setting and configuration of these sensors through the C150
- Loop supply with insertion of 250 ohm internal resistance
- "Verify" HART menu option: Verification of the current loops and the detectors (manually or automatically). All the information is stored in the Verification report.
- Loop current and detectors can be adjusted from the C150
- HART Instrument status: Some information about the behavior of the instrument during test can be displayed: overload loop, out of limit variable.

CALIBRATION:

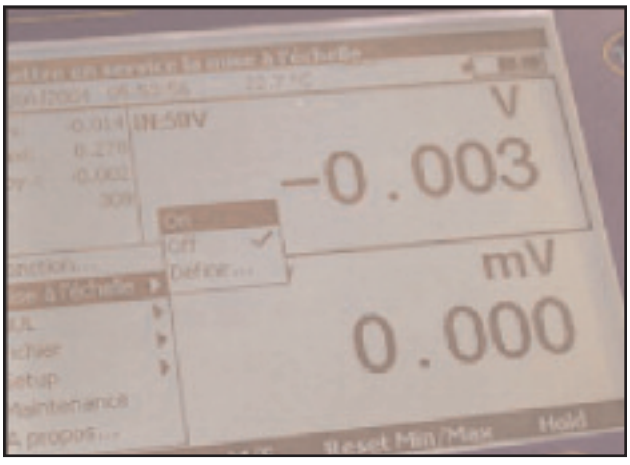
Sensor Calibration: Calibration coefficients can be implemented in order to correct sensors. C150 is able to generate calibration reports.

Electronic Devices Calibration: Calibration can be performed by comparison (2 probes and temperature source driven) or using signal generation. Two methods are available: manual or automatic, with uncertainty taken into account. Calibration setpoints are entered by user.

Transmitter Mode: The measured value is emitted as a 4-20mA or voltage signal to drive dry blocks and baths.

DISPLAY: C150 dual display continuously displays the measurement value, the emitted value, the gauge and the used functions. On the top line, date, time and external temperature are indicated.

During measuring, average, maximum, minimum and the number of measurements are displayed on the left. During emission, this part of screen displays all details of ramps, steps and constant value emission functions.



Test & Calibration Portable Calibrator

Functions and performances: @23°C +5°C
Uncertainty is in % of reading (C150 display) = fixed value

DC Current: Measure

Range	Measuring Range	Resolution	Accuracy (1 year)	Remarks
0-20mA	0mA/24mA	0.1µA	0.007% + 0.8µA	Rin < 30Ω
4-20mA	3mA/24mA	0.1µA	0.007% + 0.8µA	Rin < 30Ω
100mA	0mA/100mA	0.1µA	0.009% + 2µA	Rin < 30Ω

C150 can measure up to 100mA with/without loop supply (24V)
Temperature Coefficient < 7 ppm/°C from 0°C to 18°C and 28°C to 50°C.
- Loop supply = 24V ±10%
- HART® Compatibility: Input Impedance Rin = 280Ω
- Display with linear or quadratic scaling

To see the full line of Wahl Calibrators please visit www.palmerwahl.com and click: Test & Calibration

DC Current: Emission

Range	Resolution	Accuracy (1 year)
24mA	1µA	0.007% + 0.8µA
4-20mA	1µA	0.007% + 0.8µA
0-20mA	1µA	0.007% + 0.8µA

Temperature Coefficient < 7 ppm/°C from 0°C to 18°C and 28°C to 50°C.
Specifications given for:
C150 active mode (+24V ON) ←→ DUT passive mode (+24V OFF)
C150 passive mode (+24V OFF) ←→ DUT active mode (+24V ON)
Emission output with or without 24V loop feed

Pre-programmed steps

	0%	25%	50%	75%	100%
4-20mA linear	4	8	12	16	20
0-20mA linear	0	5	10	15	20
4-20mA quad	4	5	8	13	20
0-20mA quad	0	1.25	5	11, 25	20
4-20mA valves	3.8-4 -4.2		12		19, 20, 21

DC Voltage: Measure

Range	Measuring Range	Resolution	Accuracy (1 year)	Remarks
+100mV	10mV +100µV	1µV	0.005% + 2µV	Rin > 10MΩ
+1V	-100mV + 1V	10µV	0.005% + 8µV	Rin > 10MΩ
+10V	-1V + 10V	100µV	0.007% + 80µV	Rin = 1MΩ
+50V	-5V + 50V	1mV	0.007% + 0.5mV	Rin = 1MΩ

Rin = Input resistance

DC Voltage: Emission

Range	Measuring Range	Resolution	Accuracy (1 year)	Min Load
+100mV	-5mV + 100mV	1µV	0.005% + 2µV	1KΩ
+1V	-5mV + 1V	10µV	0.005% + 8µV	2KΩ
+10V	-100mV + 10V	100µV	0.007% + 80µV	4KΩ
+50V	-100mV + 50V	1mV	0.007% + 0.5mV	4KΩ

Frequency, counting: Measure

Range	Resolution	Accuracy (1 year)
10kHz	< 0.01 Hz	0.01% Rdg
100kHz	0.1 Hz	0.01%

Trigger level 1V
Unit scale in Pulse/min and Hz
Measurement on frequency signals or dry contacts
Counting will be performed on defined time or infinite time.

Frequency, pulse: Emission

Range	Resolution	Accuracy (1 year)
1000 Hz	0.01 Hz	0.01% Rdg
100 kHz	1 Hz	0.01% Rdg

Scale in Pulse/min and Hz
Pulse emission and dry contacts simulation
Max amplitude: 20V
(Selectable by user)

Resistance: Measure

Range	Input Range	Resolution	Accuracy (1 year)	Remarks
400Ω	0 to 400Ω	1mΩ	0.006%R + 8mΩ	4 wires
3600Ω	0 to 3600Ω	10mΩ	0.006%R + 50mΩ	4 wires
50KΩ	0 to 50KΩ	100mΩ	0.008%R + 1Ω	4 wires

Resistance measurement with 2, 3 or 4 wires with automatic recognition;
wires number displayed on the screen.

Resistance: Emission

Range	Output Range	Resolution	Accuracy (1 year)	Remarks
400Ω*	1 - 400Ω*	10mΩ	0.006%R + 8mΩ@1mA	**0.1mA/1mA
3600Ω*	1 - 3600Ω*	100mΩ	0.006%R + 50mΩ@0.1mA	**0.1mA/1mA
50KΩ*	1 - 50KΩ*	1Ω	0.008%R + 1Ω	**5µA/50µA

* DC Current, ** Iext of
Emission with pulsed current available: refer to the user manual for specifications.
Temperature Coefficient < 5ppm/°C from 0°C to 18°C and 28°C to 50°C.
Emission resistance: establishing time < 1ms: for compatibility with smart transmitters



This digital pressure module is connected through a RS485 serial cable to the digital input connector.
All data is digital.
Measurements are compensated in temperature due to a polynomial correction implemented into the EEPROM at factory.

Pressure: measurement with external digital sensor

Range	0-1 bar	0-3 bar	0-10 bar	0-30 bar	0-100 bar	0-300 bar	0-1000 bar
Absolute	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relative	Yes	Yes	Yes	Yes	N/A	N/A	N/A

Resolution: 0.02% of Full Scale
Accuracy: 0.05% of Full Scale for 10°C and 40°C,
-0.1% of Full Scale -10°C to +10°C and 40°C to 80°C.

Drop-down menus are used with the navigator.
On-screen diagrams graphically display probe and wiring connections.

Calibration Services Available

C150 Temperature Specifications

RTD: Measure and Emission						
Sensor	Input Range	Resolution	Accuracy/1year Measure	Output range	Resolution	Accuracy/1year Emission
Pt 50 (α = 3851)	-220°C + 850°C	0.01°C	0.006% R + 0.04°C	-220°C + 850°C	0.01°C	0.006% R + 0.04°C
Pt 100 (α = 3851)	-220°C + 850°C	0.01°C	0.006% R + 0.03°C	-220°C + 850°C	0.01°C	0.006% R + 0.035°C
Pt 100 (α = 3916)	-200°C + 510°C	0.01°C	0.006% R + 0.03°C	-200°C + 510°C	0.01°C	0.006% R + 0.035°C
Pt 100 (α = 3926)	-210°C + 850°C	0.01°C	0.006% R + 0.03°C	-210°C + 850°C	0.01°C	0.006% R + 0.035°C
Pt 200 (α = 3851)	-220°C + 850°C	0.01°C	0.006% R + 0.04°C	-220°C + 850°C	0.01°C	0.006% R + 0.04°C
Pt 500 (α = 3851)	-220°C + 850°C	0.01°C	0.006% R + 0.03°C	-220°C + 850°C	0.01°C	0.006% R + 0.04°C
Pt 1000 (α = 3851)	-220°C + 850°C	0.01°C	0.006% R + 0.03°C	-220°C + 850°C	0.01°C	0.006% R + 0.035°C
Ni 100 (α = 618)	-60°C + 180°C	0.01°C	0.006% R + 0.05°C	-60°C + 180°C	0.01°C	0.006% R + 0.04°C
Ni 120 (α = 672)	-40°C + 205°C	0.01°C	0.006% R + 0.05°C	-40°C + 205°C	0.01°C	0.006% R + 0.04°C
Ni 1000 (α = 618)	-60°C + 180°C	0.01°C	0.006% R + 0.05°C	-60°C + 180°C	0.01°C	0.006% R + 0.04°C
Cu 10 (α = 427)	-50°C + 150°C	0.10°C	0.006% R + 0.18°C	-50°C + 150°C	0.10°C	0.006% R + 0.1°C
Cu 50 (α = 428)	-50°C + 150°C	0.01°C	0.006% R + 0.05°C	-50°C + 150°C	0.01°C	0.006% R + 0.05°C

Resistive probes measurements in 2, 3 or 4 wires: automatic recognition of number of connected wires, with indication on screen
- Accuracies are given for 4 wires connected probes
- For RTD simulation accuracies are given for 1mA current, Admissible Measurement current: 0.01mA to 1mA
- Temperature coefficient: < 10% of accuracy / °C
- Take into account particular error of temperature sensor used and implementation conditions
- Establishing time: < 1ms for simulation (simulation on quick transmitters)

Thermocouples: Measure and Emission						
Type	Input Range	Resolution	Accuracy/1year Measure	Output range	Resolution	Accuracy/1year Emission
K	-250°C to -200°C -200°C to -120°C -120°C to +1372°C	0.2°C 0.05°C 0.05°C	0.50°C 0.15°C 0.0050% R + 0.08°C	-250°C to -50°C -50°C to + 120°C +120°C to + 1020°C +1020°C to + 1370°C	0.2°C 0.1°C 0.05°C 0.05°C	0.15% R 0.06°C 0.005% R + 0.05°C 0.007% R + 0.05°C
T	-250°C to -200°C -200°C to -100°C -100°C to +80°C +80°C to +400°C	0.2°C 0.05°C 0.05°C 0.05°C	0.50°C 0.05% R + 0.06°C 0.015% R + 0.07°C 0.06°C	-250°C to -100°C -100°C to + 0°C +0°C to + 400°C	0.2°C 0.05°C 0.05°C	0.1% R + 0.05°C 0.02% R + 0.06°C 0.055°C
J	-210°C to -120°C -120°C to +60°C +60°C to +1200°C	0.05°C 0.05°C 0.05°C	0.15°C 0.005% R + 0.07°C 0.0025% R + 0.06°C	-210°C to + 0°C +0°C to + 50°C +60°C to + 1200°C	0.05°C 0.05°C 0.05°C	0.03% R + 0.08°C 0.05% R + 0.07°C 0.005% R + 0.04°C
R	-50°C to +0°C +0°C to +150°C +150°C to +1768°C	0.5°C 0.2°C 0.1°C	+0.60°C +0.60°C +0.3°C	-50°C to + 0°C +0°C to + 350°C +350°C to + 1768°C	0.5°C 0.2°C 0.1°C	0.35% R + 0.4°C + 0.4°C + 0.25°C
S	-50°C to +150°C +150°C to +1450°C +1450°C to +1768°C	0.5°C 0.2°C 0.1°C	0.80°C 0.30°C 0.35°C	-50°C to + 0°C +0°C to + 350°C +350°C to + 1768°C	0.5°C 0.2°C 0.1°C	0.25% R + 0.4°C + 0.30°C + 0.25°C
B	+400°C to +900°C +900°C to +1820°C	0.2°C 0.1°C	0.005% R + 0.4°C 0.005% R + 0.2°C	+400°C to + 900°C +900°C to + 1820°C	0.2°C 0.1°C	0.005% R + 0.4°C 0.005% R + 0.2°C
U	-200°C to -100°C -100°C to + 660°C	0.05°C 0.05°C	+0.13°C +0.09°C	-200°C to + 400°C +400°C to + 600°C	0.05°C 0.05°C	+ 0.09°C + 0.11°C
N	-240°C to -190°C -190°C to -110°C -110°C to +0°C +0°C to -400°C +400°C to +1300°C	0.2°C 0.1°C 0.05°C 0.05°C 0.05°C	0.25% R 0.1% R 0.04% R + 0.06°C 0.08°C 0.005% R + 0.06°C	-240°C to -200°C -200°C to + 10°C +10°C to + 250°C + 250°C to + 1300°C	0.2°C 0.1°C 0.05°C 0.05°C	0.15% R + 0.10°C + 0.08°C 0.008% R + 0.05°C

Thermistors: Measure and Emission
Due to the 50Kohm range and the Steinhart-Hart equation, thermistors can be implemented in the C150.
The Steinhart-Hart equation is: $\frac{1}{T} = A + B(\ln(R)) = C(\ln(R))^3$ where A, B, C are usually calculated according to temperature at 0°C, 25°C, and 70°C.

Thermocouples: PlatineL, Mo, NiMo/NiCo, G, D, L, C:
For specifications, refer to the user manual which comes with the unit. Accuracy is given for reference @ 0°C
With use of internal RJ (except couple B) add an additional uncertainty of 0.3°C
CJC localization can be selected by keypad programming, except for thermocouple type B:
- External at 0°C, internal (temperature compensation of instrument's terminals)or by temperature programming
- Temperature coefficient: < 10% of accuracy /°C. Display unit: °C, and F

Calibration Services Available

PALMER Wahl INSTRUMENTATION GROUP
172 Years of Continued Innovation

(800) 421-2853 • FAX (828) 658-0728 • www.palmerwahl.com

C150 Functions

Test & Calibration Portable Calibrator

Other functions

FILE MENU: User can save up to 10 full configurations of the instruments and recall them as desired. Configurations can be saved and recalled in function of user and of use. Configurations include all programming done on instrument, as the range.

CONTRAST ADJUSTMENT: Screen's contrast can be adjusted as desired to fit with measurement environment.

SCREEN BACKLIGHTING: Time of backlighting can be programmed to save battery.



BATTERY LIFE: C150 Battery Life is 6 hours even in harsh conditions.

SCALING: In measurement and simulation, scaling allows process signals to be displayed in % of FS or in all other units. This function also allows sensors to be corrected after a calibration.

RELATIVE MEASUREMENT:

- Programming of a reference value different from the one of the instrument (NUL function).
- Subtracting of constant value by measuring or program ming it from a measured value (TARE function).

SQUARE ROOT: In current measurement and simulation, this function takes into account a quadratic signal coming from a △P transmitter.

TRANSMITTERS TESTS: Transmitters can be verified using user procedures. 20 procedures can be stored as well as test results. Deviation curves are displayed. Allows test report editing.

COMPATIBILITY with 21 CFR part 11 standard: Password, logins, login, audit trail are necessary to use the device.

SIMULATION MENU: Simulation value is set by entering value on keypad or using the cursor to change the appropriate digit.

RAMPS GENERATION: Starting, ending and length time values of simple or cyclic ramps can be set to do simulation. Number of ramps can also be adjusted in case of cyclic ramps for any signals.

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* USA Customers only

STEPS SIMULATION:
2 modes are provided.

- Program mode: Starting value, number of steps and the length of time have to be set.
- Manual mode: User has approximately one hundred preset values.

In current simulation, user will have some additional preset values in function of range and according to 0%, 25%, 50%, 75% and 100% from selected gauge.
Choice is done between gauges:

- 0-20mA: linear or quadratic
- 4-20mA: linear or quadratic

SYNTHESIZER: With 100 values programmable values, the C150 allows complex curves to be generated.

TRANSMITTER FUNCTION: C150 is able to be used as a transmitter. Measurement input is copied on the output with scaling.

SWITCH TEST: For Temperature or Pressure the C150 can control electronic thermostats and pressure controllers trigger levels.

MEMORY: C150 can record data automatically or on user request. 10,000 data values can be stored and displayed on the screen as curve or list.

Main Characteristics	
USB Connection	Yes
Recommended Ambient Conditions	0°C + 50°C, 10 to 80% Relative Humidity
Maximum Ambient Conditions	-10°C + 55°C, 10 to 80% Relative Humidity
Rating	IP54
Power	Rechargeable NiMH Batteries
Dimensions	210 x 110 x 50mm (8.3 x 4.3 x 2.0in)
Weight	200g (7oz)

Included: C150 Calibrator is supplied with 6 testing leads with crocodile clips, quick battery charging system, neck strap, and stand for desktop use, User Manual on CD Rom, attache style professional carrying case, and NIST Calibration Certificate.

TRACEABLE TO NIST

ONE YEAR 1 WARRANTY

Calibration Services Available

DATACAL Calibration Management Software

DATACAL Software Main Functions

- INSTRUMENT CONFIGURATION
- DATA MANAGEMENT
- CALIBRATION
- VIRTUAL INSTRUMENT

Superior Accuracy compared to Fluke!



DATACAL Software can be used with:



C75 • C100 • C150



TC621 • TC622

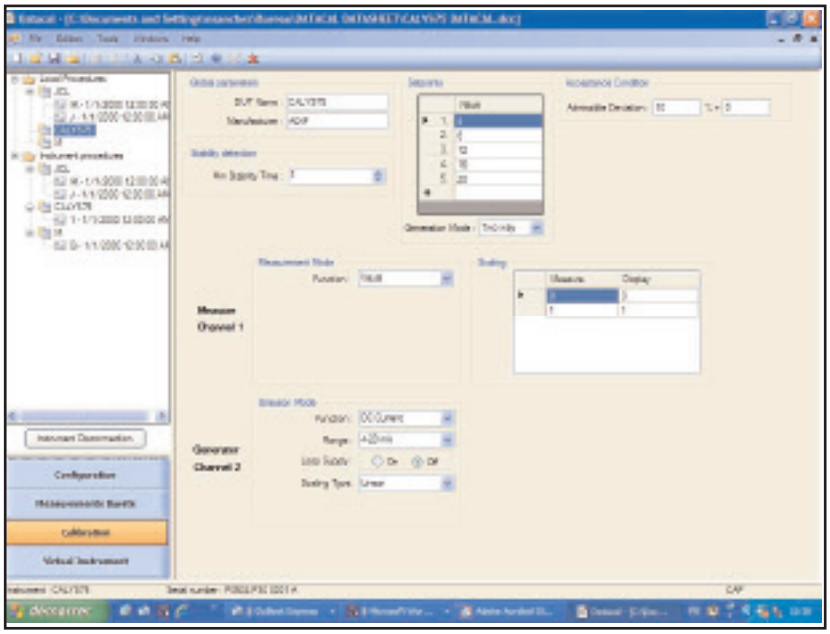


TM602 • TM612 • TM630

Instrument Configuration

Instruments can be 100% configured using DATACAL interface

- Input channel: quantity measured, type of sensor, scale, scaling value, display parameters, unit, tare, tare value.
- Output channel: quantity measured, period, start point, repeat function, ramp and steps function.
- Sensors: name, date of last calibration, type, unit, calibrated values.
- Measurement bursts: number of measures/burst, sampling period, trigger parameters, number of samples, frequency.
- Calibration procedures: number and values of setpoints, calibration types.



Create, modify and store an unlimited number of configuration profiles on computer.

DATACAL Calibration Management Software

Calibration

Paperless Calibration Procedures. Create complete calibration procedures directly with DATACAL and define:

- Calibration Method
- Adjustment Set Points
- Channels
- Sequence Mode
- Measurement or Simulation Function

Issue your own customized calibration certificates

After calibration of the instrument, the calibration report is sent back to DATACAL for processing and shaping.

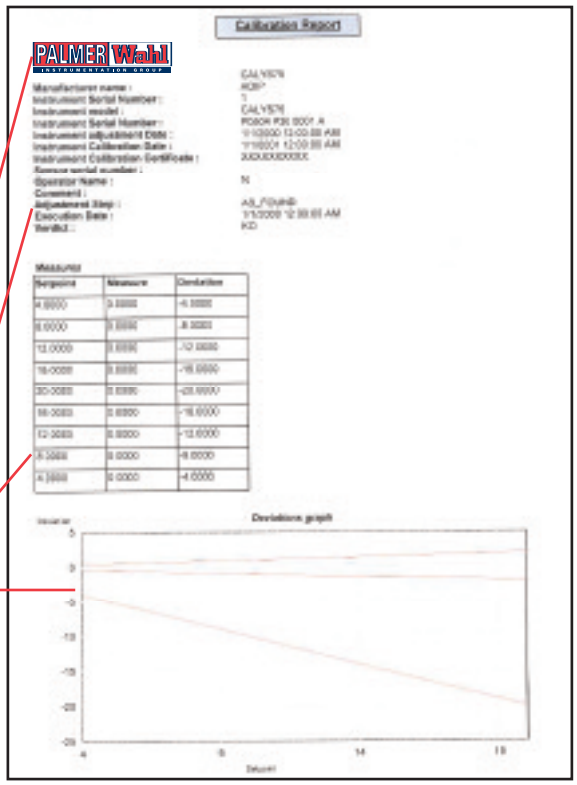
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Information field on measurement conditions

Instrument & sensor model and serial number
Adjustment and calibration date
Calibration certificate
Operator name

Table with measured values and deviation

Graphical display of values



Unlimited number of calibration procedures and reports stored on computer

Data Management

- Real-time processing of data
- Graphical and table display and monitoring of data
- Storage with unlimited capacity
- Easy printing from software
- Export all the data to spread sheets as .xls or .asci
- Erase data from device



Virtual Instrument

For real-time visual control of the instrument
Use the Virtual Instrument to:

- Display real-time measures
- Launch and stop simulations
- Detect mistakes immediately

Dry Blocks and Temperature Baths Driving

DATACAL uses the IN/IN function on the C150 to drive dry blocks and temperature baths and allows you to monitor this process directly from the computer:

- Create and store the whole driving procedure on DATACAL
- Download the procedure to the C150
- Launch the calibration process
- Upload the calibration results from the instrument to DATACAL
- Create report



Calibration Services Available