

Certificate of Calibration Fluke Park Laboratories Temperature Laboratory

Description: Metrology Well
Manufacturer: Fluke
Model: 9173
Serial Number:
Status: As-Found: New
 As-Left: In Tolerance
Calibration: Full
Procedure: HCT300 - 3

Certificate Number:
Date of Calibration: 26 Aug 2014
Date Due:
Temperature: 19.0 to 27.0 °C
Relative Humidity: < 60 %RH
Pressure: 95 to 103 kPa
Issue Date: 25 Sep 2014

Customer:

PO Number:

This calibration is traceable to the SI through recognized national measurement institutes, radiometric techniques, or natural physical constants and is in compliance with ISO17025:2005 and ANSI/NCSL Z540.1. The calibration has been completed in accordance with the Fluke Quality System document QSD 111.0. Calibration certificates without signatures are not valid. This certificate applies to only the item identified and shall not be reproduced other than in full, without the specific written approval by Fluke Corporation. This certificate shall not be used to claim product endorsement by the accreditation body.

This calibration certificate may contain data that is not covered by the Scope of Accreditation. The unaccredited test points, where applicable, are indicated by an asterisk (*), or confined to clearly marked sections. Functional tests are not accredited.

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in the ISO Guide to the Expression of Uncertainty in Measurement. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %.

Comments:



Approved Signatory

Certificate Number:

Date of Calibration: 26 Aug 2014

Standards Used

Model	Description	Serial Number	Due-Date
1560	Thermometer, "Black Stack" Base Unit	B14293	NCR
1560	Thermometer, "Black Stack" Base Unit	B14294	NCR
2562-H	Precision Digital Thermometer	A09358	11-Sep-2014
2562-H	Precision Digital Thermometer	B08077	11-Apr-2015
5628	Platinum Resistance Thermometer	1503	09-Sep-2014
5628	Platinum Resistance Thermometer	2739	15-Oct-2014
	Metrology Well Test Station	11	NCR

The instrument described herein was calibrated by direct measurement of generated temperatures using the reference standards listed in the "Test Equipment" section of this report. The calibration was performed using test insert Model 917x-INST as described in the user manual. This insert is similar to insert "C" but is designed to accommodate the test PRTs and aid in the performance of the axial gradient calibration. The calibration data, internal calibration constants, and uncertainties are shown on the following page(s) of this report. The temperature accuracy test is self-explanatory. The axial differential temperature test is more complex. Due to the nature of the axial differential temperature characteristic and the influence of the test equipment on the test result, this test utilizes tolerances which do not precisely match the instrument specification. However, the unique tolerances used are intended to determine the axial differential temperature tolerance status based on the published specifications. The temperature observations were performed in both increasing and decreasing directions. The value shown for maximum hysteresis is the maximum difference between two observations of the same temperature. The nominal temperature at which the maximum difference was observed is also shown.

The calibration uncertainties are shown at a coverage factor of 2 ($k=2$). All known significant sources of uncertainty have been considered. Any limitations or remarks pertaining to this instrument and/or calibration are shown below. Additionally, out of tolerance indications, if any, are identified along with the corresponding data on the data pages of this report. Calibration uncertainties have been taken into account in the determination of tolerance status using risk analysis algorithms. When using the instrument in a calibration process, it is recommended that the instrument specifications be used as the contribution of the instrument rather than the calibration uncertainties. The instrument tolerances are shown on the report at a confidence interval of 95%.

Certificate of Calibration

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Serial No.:

Certificate No:

As Found Data

No As Found Data Required

As Left Data

Data ID:

Temperature Accuracy

Calibration Constants		Set-point °C	Actual °C	Error °C	Tolerance °C	Uncertainty	Pass/Fail
TEMP 1	-1.372	50.000	50.054	0.054	±0.200	±0.025	P
TEMP 2	-2.635	100.000	100.011	0.011	±0.200	±0.025	P
TEMP 3	-4.588	200.000	199.974	-0.026	±0.200	±0.035	P
GRAD 1	-0.142	350.000	349.987	-0.013	±0.200	±0.040	P
GRAD 2	0.077	500.000	500.005	0.005	±0.250	±0.050	P
GRAD 3	0.821	660.000	659.961	-0.039	±0.250	±0.065	P

Temperature Stability

Control Constants		Set-point °C	Observed °C (2 Sigma)	Tolerance °C	Uncertainty	Pass/Fail
TEMP PBAND	6.0	50.000	0.0017	±0.0050	±0.0025	P
TEMP INT	100.0	100.000	0.0018	±0.0050	±0.0025	P
TEMP DER	10.0	660.000	0.0202	±0.0300	±0.0035	P

Axial Differential Temperature

Settings		Set-point °C	Target °C	Actual °C	Error °C	Tolerance °C	Uncertainty	Pass/Fail
GRAD PBAND	10.0	100.000	0.000	-0.005	-0.005	±0.050	±0.035	P
GRAD INT	150.0	350.000	0.000	-0.005	-0.005	±0.125	±0.055	P
GRAD RATIO	1.30	660.000	0.000	-0.010	-0.010	±0.200	±0.090	P

Maximum Hysteresis

Set-point °C	Observed °C	Tolerance °C	Uncertainty	Pass/Fail
200.000	0.005	±0.070	±0.0070	P