

Certificate Of Calibration Fluke Calibration, American Fork Temperature Laboratory

Certificate Number: 4500009552

Status: As-Found: Inoperative
As-Left: Pass

Model: 1524

Serial Number: 2377164

Options:

Description: Thermometer Readout

Procedure: AFC2008: Rev 001

Date of Calibration: 28 Jan 2022

Date Due: 28 Jan 2023

Temperature: 21 to 25 °C

Relative Humidity: 20 to 60 %rh

Pressure: 83.5 to 88.5 kPa

Issue Date: 06 Feb 2022

Customer: K&S TECHNICAL SERVICES

Location: NEWARK, DE

RMA/SO Number: 32358995

PO Number: 10365

This calibration is traceable to the International System of Units (SI) through recognized national metrology institutes (NIST, NRC, PTB, NPL, etc.), radiometric techniques, or natural physical constants and is in compliance with ISO/IEC 17025:2017. Calibration certificates without identification of the authorizing person are not valid. This certificate applies to only the item identified and shall not be reproduced except in full, without the specific written approval by Fluke Corporation. This certificate shall not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Measurement uncertainties at the time of calibration are given where applicable. They are calculated in accordance with the method described in the ISO Guide to the Expression of Uncertainty in Measurement (GUM). 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 %.

Calibration status should be interpreted as follows:

As-Found: Data collected before the unit was adjusted and / or repaired.

Found/Left: Data collected without any adjustment and / or repair performed.

As-Left: Data collected after the unit has been adjusted and/or repaired.

Comments: This calibration certificate was reviewed and approved electronically. No "As Found" data were taken because the instrument was received inoperative, repairs were made, an alignment was performed and "As Left" data taken.



Authorized By
Michael Coleman

Quality Manuals

This calibration has been completed in accordance with:

- Fluke Corporate Quality Manual, QSD 111.0
- Fluke 17025 Quality Manual, QSD 111.41

Fluke values feedback. Please contact us at <http://us.flukecal.com/about/contact>.

Method Used

The instrument described herein was calibrated as follows. The resistance (PRT, RTD, thermistor, and thermocouple reference junction) measurement function was calibrated by direct measurement of calibrated reference resistors. Voltage (thermocouple) measurement function was calibrated by direct measurement of a calibrated voltage source. The calibration data, measurement uncertainties, instrument adjustment parameters, and instrument settings are shown on the following pages.

The Calibration Data section is described as follows. Reference Value is the value indicated by the reference instrumentation. Measurement Result is the device-under-test (DUT) measurement result. Measurement Error is the DUT measurement error. Maximum Permissible Error is the DUT specification or tolerance as stated in the DUT manual. Expanded Uncertainty is the measurement uncertainty of the results as described on page 1. The measurement uncertainty accounts for all known uncertainties present at the time of calibration including long-term behavior of the calibration system, measurement precision, and contributions from the DUT. It is recommended that the DUT specification or tolerance be used as the contribution of the DUT rather than the calibration expanded uncertainty in any uncertainty analysis where the DUT is used.

Calibration uncertainties have been taken into account in the determination of status conditions using RDS (root-difference-square) method as described in Fluke FCM 7008.1. The possible Status results are Pass, Pass-Marginal, and Fail. Pass-Marginal status is indicated with a Pass-M and is applied when Measurement Error is within Maximum Permissible Error but is too close to determine a status of Pass with a false accept risk of 2% or less.

Standards Used:

Asset	Description	Cal-Date	Due-Date
1504-A86639	Fluke Calibration 1504 Digital Thermometer	11-Oct-2021	11-Oct-2022
3591-A842401	Fluke Calibration 3591 Reference Resistor Set	08-Jun-2021	08-Jun-2022
5610-A111807	Thermometrics 5610 Thermistor Probe	25-Oct-2021	25-Apr-2022

Calibration Results:

Description	Reference Value	Measurement Result	Measurement Error	Expanded Uncertainty	Maximum Permissible Error	Status
As Left Data						
Device Settings and Calibration Parameters						
L75_OHMS ADJ1: 0.0000						
L75_OHMS ADJ2: -0.1190						
LO_OHMS ADJ1: -0.0674						
LO_OHMS ADJ2: -0.3986						
MED_OHMS ADJ1: 7.2						
MED_OHMS ADJ2: -27.1						
HI_OHMS ADJ1: -5933						
HI_OHMS ADJ2: -74907						
MV ADJ1: 0.019						
MV ADJ2: -0.040						
Test ID: C2028134109765						
Resistance, L75_OHMS Range (Ω)						
0 Ω	0.00000	0.0000	0.00000	0.00040	0.00200	Pass
25 Ω	24.99920	25.0000	0.00080	0.00045	0.00300	Pass
75 Ω	74.99370	74.9934	-0.00030	0.00093	0.00500	Pass
Resistance, LO Range (Ω)						
75 Ω	74.99370	74.9934	-0.00030	0.00093	0.00500	Pass
100 Ω	99.99390	99.9940	0.00010	0.0012	0.00600	Pass
200 Ω	200.01310	200.0139	0.00080	0.0025	0.01000	Pass
400 Ω	400.01620	400.0145	-0.00170	0.0045	0.01800	Pass
Resistance, MED Range (k Ω)						
0.2 k Ω	0.2000130	0.200061	0.0000480	0.000064	0.0005200	Pass
0.4 k Ω	0.4000160	0.400004	-0.0000120	0.000063	0.0005400	Pass
10 k Ω	10.0004050	10.000576	0.0001710	0.00021	0.0015000	Pass
40 k Ω	40.0028560	40.002691	-0.0001650	0.0011	0.0045000	Pass
Resistance, HI Range (k Ω)						
40 k Ω	40.00290	40.0035	0.00060	0.0017	0.01200	Pass

Description	Reference	Measurement	Measurement	Expanded	Maximum	Status
	Value	Result	Error	Uncertainty	Permissible Error	
100 k Ω	99.99950	100.0008	0.00130	0.0042	0.03000	Pass
300 k Ω	300.00070	299.9914	-0.00930	0.013	0.09000	Pass
500 k Ω	500.01400	499.9760	-0.03800	0.034	0.15000	Pass
Voltage, mV Range (mV)						
-10 mV	-10.000000	-10.00159	-0.001590	0.0010	0.005500	Pass
0 mV	0.000000	0.00013	0.000130	0.0010	0.005000	Pass
25 mV	25.000000	25.00020	0.000200	0.0012	0.006300	Pass
75 mV	75.000000	74.99959	-0.000410	0.0016	0.008800	Pass
Resistance, Reference Junction (k Ω)						
10 k Ω	10.00250	10.0031	0.00060	0.0010	0.00500	Pass
Channel 2 Verification						
100 Ω	99.99390	99.9937	-0.00020	0.0012	0.00600	Pass
10 k Ω	10.0004050	10.000617	0.0002120	0.00021	0.0015000	Pass
100 k Ω	99.99950	99.9992	-0.00030	0.0042	0.03000	Pass