NVLAP
CALIBRATION
NVLAP LAB CODE 105016-0

FLUKE
Calibration

Certificate of Calibration
Fluke Park Laboratory

Certificate Number:	C0B07006		
Status:	As-Found: New As-Left: In Tolerance	**Date of Calibration:**	06 Nov 2020
		Date Due:	
Manufacturer:	Fluke	**Temperature:**	20.0 to 26.0 °C
Model:	9144	**Relative Humidity:**	20 to 70 %RH
Serial Number:	C0B853	**Pressure:**	95 to 103 kPa
Options:		**Issue Date:**	07 Nov 2020
Description:	Field Metrology Well with Process Readout		
Procedure:	HCT301 - 1		

Customer:	FLUKE DO BRASIL LTDA
Location:	SAO PAULO, BR
PO Number:	12317
RMA/SO Number:	32073577

This calibration is traceable to the International System of Units (SI) through recognized national metrology institutes (NIST, NRC, PTB, NPL, etc.), ratiometric 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 of calibration may contain data that is not covered by the Scope of Accreditation. The unaccredited measurement points are indicated by the * symbol or confined to clearly marked sections.

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 a coverage factor *k* such that the coverage probability corresponds to approximately 95 % and k = 2.

The calibration interval (date due) is the responsibility of the end user.

Comments:

APROVADO
Responsável: RENATO
Padrão: J001A03BS
Data: 07/01/2021
Validade: 06/01/2022

Approved Signatory

Amacy Rico

FLUKE
Calibration
Cert # : C0B07006
Date Cal: 06 Nov 2020
Date Due:
S/N : C0B853
877-355-3225 www.flukecal.com

Cert: C0B07006
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Standards Used

Description	Serial Number	Due-Date
1560 Digital Thermometer	A26031	NCR
1560 Thermometer, "Black Stack" Base Unit	B08223	NCR
2562-H Precision Digital Thermometer	8A244	13-Mar-2021
2562-H Precision Digital Thermometer	A44587	05-Dec-2020
5628 Platinum Resistance Thermometer	2095	19-Aug-2021
5628 Platinum Resistance Thermometer	2743	11-Aug-2021
1529-R Digital Thermometer	A54849	25-Mar-2021
3591 Standard Resistor Set	A9A001	10-Nov-2020
5610 Thermistor Probe	A890201	09-Dec-2020
5610 Thermistor Probe	B092010	08-Jan-2021
Field Metrology Well Test Station	5	NCR

Quality Manuals

This calibration has been completed in accordance with:

The Fluke Corporate Quality Manual, QSD 111.00, Revision 122 and/or

The Fluke 17025 Quality Manual, QSD 111.41, Revision 007

The instrument described herein consists of a heat source component and a built-in process readout component. Thi calibration pertains to both components.

The heat source component was calibrated by direct measurement of generated temperatures using the pertinent referenc standards listed in the "Standards Used" section of this report. The calibration was performed using test insert Model 914x INST as described in the user manual. This insert is similar to insert "C" but is designed to accommodate the test PRTs and ai in the performance of the axial gradient calibration. The temperature accuracy test is self-explanatory. The axial differentia temperature test is more complex. Due to the nature of the axial differential temperature characteristic and the influence c the test equipment on the test result, this test utilizes tolerances which do not precisely match the instrument specificatior However, the unique tolerances used are intended to determine the axial differential temperature tolerance status based o the published specifications. The temperature observations were performed in both increasing and decreasing directions.

The calibration uncertainties are shown at a coverage factor of 2 (k=2). All known significant sources of uncertainty hav been considered. Any limitations or remarks pertaining to this instrument and/or calibration are shown below. Additionall measured values greater than the manufacturer's specification limits, if any, are identified along with the corresponding dat on the data pages of this report. When using the instrument in a calibration process, it is recommended that the instrumer specifications be used as the contribution of the instrument rather than the calibration uncertainties. The instrumer tolerances are shown on the report at a confidence interval of approximately 95%.

Decision Risk: This certificate employs the decision rule defined by Fluke FCM 7008.1, paragraph 2d Revision: 002.

NOTE: The instrument referenced herein is known to have an air density dependency related to elevation. This dependenc affects axial gradient performance only. The dependency is approximately 0.0003 °C/m. The cumulative result may approac the instrument axial gradient specification when differences in elevation exceed 600 m. The elevation for American Fork, U is approximately 1400 m and for Everett, WA is approximately 159 m.

The sections labeled Temperature Stability, Axial Differential Temperature and/or Maximum Hysteresis contain data that ar not covered by the NVLAP Scope of Accreditation.

APROVADO
Responsável: RENATO
Padrão: J001A03 BS
Data: 07/01/2021
Validade: 06/11/2022

Certificate of Calibration

Model: 9144
Serial No.: C0B853
Certificate No: C0B07006

As Found Data

No As Found Data Required

APROVADO
Responsável: RENATO
Padrão: J001A03BS
Data: 07/01/2021
Validade: 06/11/2022

As Left Data

Data ID: C0310041511750

Calibration Constants

TEMP 1	**-1.372**
TEMP 2	**-2.173**
TEMP 3	**-2.099**
GRAD 1	**-0.204**
GRAD 2	**-0.091**
GRAD 3	**-0.149**
GRAD 4	**-0.231**
GRAD 5	**-0.348**

Control Constants

TEMP PB	**18.0**
TEMP INT	**90.0**
TEMP DER	**30.0**

Temperature Accuracy

Set-point °C	Actual °C	Error °C	Tolerance °C	Uncertainty °C	Pass/Fail
50.000	**50.014**	**0.014**	**±0.350**	**±0.065**	**P**
200.000	**199.974**	**-0.026**	**±0.350**	**±0.070**	**P**
420.000	**419.987**	**-0.013**	**±0.350**	**±0.080**	**P**
550.000	**550.09**	**0.09**	**±0.42**	**±0.10**	**P**
660.000	**660.01**	**0.01**	**±0.50**	**±0.13**	**P**

Temperature Stability

Set-point °C	Observed °C (2 Sigma)	Tolerance °C	Uncertainty °C	Pass/Fail
50.000	**0.008**	**±0.030**	**±0.0045**	**P**
420.000	**0.025**	**±0.050**	**±0.0090**	**P**
660.000	**0.031**	**±0.050**	**±0.012**	**P**

Axial Differential Temperature

Set-point °C	Target °C	Actual °C	Error °C	Tolerance °C	Uncertainty °C	Pass/Fail
50.000	**0.000**	**-0.009**	**-0.009**	**±0.040**	**±0.045**	**P**
200.000	**0.047**	**0.044**	**-0.003**	**±0.140**	**±0.080**	**P**
420.000	**0.148**	**0.134**	**-0.014**	**±0.280**	**±0.11**	**P**
550.000	**0.196**	**0.111**	**-0.085**	**±0.340**	**±0.13**	**P**
660.000	**0.290**	**0.296**	**0.006**	**±0.400**	**±0.14**	**P**

Certificate of Calibration

Model: 9144
Serial No.: C0B853
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As Found Data

No As Found Data Required

APROVADO
Responsável: RENATO
Padrão: J001A0386
Data: 07/01/2021
Validade: 06/11/2022

As Left Data

Data ID: C0310041511750

PRT Calibration Constants	
REF1C0	0.0001
REF1C100	-0.0051

TC Calibration Constants	
TCC0	-0.0476
TCC100	-0.0328
TCCRJ	4.4461

mA Calibration Constants	
mAC4	-0.0078
mAC22	-0.0074

Nominal	Actual	Measured	Error	Tolerance	Uncertainty	Pass/Fail
PRT Test Data (Ω)						
0	0.00000	0.00006	0.00006	±0.00250	±0.00030	P
25	24.99902	24.99896	-0.00006	±0.00250	±0.00030	P
100	99.9988	99.9984	-0.0004	±0.0060	±0.0010	P
200	200.0002	199.9984	-0.0018	±0.0120	±0.0015	P
400	400.0259	400.0269	0.0010	±0.0240	±0.0025	P
4-Wire Test Data (Ω)						
100	99.9988	100.0005	0.0017	±0.0080	±0.0010	P
3-Wire Test Data (Ω)						
100	99.999	100.022	0.023	±0.120	±0.050	P
TC Test Data (mV)						
-10	-10.0000	-10.0008	-0.0008	±0.0125	±0.0020	P
0	0.0000	-0.0004	-0.0004	±0.0100	±0.0020	P
50	50.0000	49.9999	-0.0001	±0.0225	±0.0030	P
100	100.0000	99.9997	-0.0003	±0.0350	±0.0055	P
TCRJ Test Data (°C)						
25	24.968	24.915	-0.053	±0.350	±0.080	P
4-20 mA Test Data (mA)						
0	0.00000	0.00009	0.00009	±0.00200	±0.00060	P
4	4.00000	3.99998	-0.00002	±0.00280	±0.00060	P
12	12.00000	11.99991	-0.00009	±0.00440	±0.00090	P
20	20.0000	20.0000	0.0000	±0.0060	±0.0012	P
22	22.0000	22.0004	0.0004	±0.0064	±0.0013	P

