NVLAP
CALIBRATION
NVLAP LAB CODE 105016-0

FLUKE
Calibration

Certificate of Calibration
Fluke Park Laboratory

Description:	Field Metrology Well with Process Readout	**Certificate Number:**	B9829035
Manufacturer:	Fluke	**Date of Calibration:**	29 Aug 2019
Model:	9142	**Date Due:**	
Serial Number:	B98922	**Temperature:**	20.0 to 26.0 °C
Status:	As-Found: New	**Relative Humidity:**	15 to 70 %RH
	As-Left: In Tolerance	**Pressure:**	95 to 103 kPa
Calibration:	Full	**Issue Date:**	29 Aug 2019
Procedure:	HCT301 - 1		
Customer:	FLUKE DO BRASIL LTDA SAO PAULO, BR	**RMA/SO Number:**	31810820
PO Number:	11660		

This calibration is traceable to the SI through recognized national metrological institutes (NIST, PTB, NPL, NIM, NRC, etc.), ratiometric techniques, or natural physical constants and is in compliance with ISO/IEC17025:2005 and ANSI/NCSL Z540.1. The calibration has been completed in accordance with the Fluke Corporate Quality System document QSD 111.0. Calibration certificates without identification of the authorizing person 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 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. 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 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:

APROVADO
Responsável: RENATO
Padrão: H001A03 BS
Data: 08/10/2019
Validade: 29/08/2021
S/N: B98922 Due: Cert: B9829035

Approved Signatory

Ivars Ikstrums

Standards Used

Description	Serial Number	Due-Date
1560 Thermometer, "Black Stack" Base Unit	B34609	NCR
1560 Thermometer, "Black Stack" Base Unit	B4C815	NCR
2562-H Precision Digital Thermometer	8A244	10-Mar-2020
2562-H Precision Digital Thermometer	B08077	15-Nov-2019
5628 Platinum Resistance Thermometer	1535	15-Jan-2020
5628 Platinum Resistance Thermometer	1902	25-Mar-2020
1529-R Digital Thermometer	B08261	28-Sep-2019
3591 Standard Resistor Set	A45009	01-Sep-2019
5610 Thermistor Probe	A521109	07-Sep-2019
5610 Thermistor Probe	A692906	24-Oct-2019
5700A DC Reference Standard	1616602	13-Sep-2019
Field Metrology Well Test Station	13	NCR

Quality Manuals

This calibration has been completed in accordance with:

The Fluke Corporate Quality Manual, QSD 111.00, Revision 122, Dated June, 2018 and/or

The Fluke 17025 Quality Manual, QSD 111.41, Revision 005, Dated Sept. 2014

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 "Test Equipment" 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 calibration data, internal calibration constants, and uncertainties ar shown on the following page(s) of this report. 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 process readout component was calibrated directly using laboratory transfer standards as listed in the "Test Equipment section of this report. The calibration data, internal calibration constants, and uncertainties are shown on the followin page(s) of this report.

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 out of tolerance indications, if any, are identified along with the corresponding data on the data pages of this repor Calibration uncertainties have been taken into account in the determination of tolerance status using risk analysis algorithm. When using the instrument in a calibration process, it is recommended that the instrument specifications be used as th contribution of the instrument rather than the calibration uncertainties. The instrument tolerances are shown on the repo at a confidence interval of 95%.

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

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As Found Data

No As Found Data Required

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Data: 08/10/2019
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As Left Data

Data ID: B9240140126589

Calibration Constants

TEMP 1	**0.060**
TEMP 2	**-0.035**
TEMP 3	**-0.111**
GRAD 1	**0.003**
GRAD 2	**-0.018**
GRAD 3	**0.003**

Control Constants

TEMP PB	**2.0**
TEMP INT	**30.0**
TEMP DER	**1.0**

Temperature Accuracy

Set-point °C	Actual °C	Error °C	Tolerance °C	Uncertainty	Pass/Fail
-25.000	**-24.995**	**0.005**	**±0.200**	**±0.025**	**P**
0.000	**-0.008**	**-0.008**	**±0.200**	**±0.025**	**P**
50.000	**49.999**	**-0.001**	**±0.200**	**±0.025**	**P**
100.000	**100.007**	**0.007**	**±0.200**	**±0.030**	**P**
150.000	**149.999**	**-0.001**	**±0.200**	**±0.030**	**P**

Temperature Stability

Set-point °C	Observed °C (2 Sigma)	Tolerance °C	Uncertainty	Pass/Fail
-25.000	**0.002**	**±0.010**	**±0.0040**	**P**
150.000	**0.002**	**±0.010**	**±0.0055**	**P**

Axial Differential Temperature

Set-point °C	Target °C	Actual °C	Error °C	Tolerance °C	Uncertainty	Pass/Fail
-25.000	**0.000**	**0.004**	**0.004**	**±0.040**	**±0.020**	**P**
50.000	**0.000**	**0.006**	**0.006**	**±0.040**	**±0.020**	**P**
100.000	**0.010**	**0.003**	**-0.007**	**±0.040**	**±0.025**	**P**
150.000	**0.010**	**0.015**	**0.005**	**±0.040**	**±0.030**	**P**

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PRT Calibration Constants

REF1C0	-0.0002
REF1C100	0.0016

TC Calibration Constants

TCC0	-0.0434
TCC100	-0.0500
TCCRJ	10.2030

mA Calibration Constants

mAC4	-0.0087
mAC22	-0.0092

Nominal	Actual	Measured	Error	Tolerance	Uncertainty	Pass/Fail
PRT Test Data (Ω)						
0	0.00000	-0.00011	-0.00011	±0.00250	±0.00030	P
25	24.99749	24.99733	-0.00016	±0.00250	±0.00030	P
100	100.0067	100.0067	0.0000	±0.0060	±0.0010	P
200	200.0013	200.0005	-0.0008	±0.0120	±0.0015	P
400	400.0059	400.0053	-0.0006	±0.0240	±0.0025	P
4-Wire Test Data (Ω)						
100	100.0067	100.0085	0.0018	±0.0080	±0.0010	P
3-Wire Test Data (Ω)						
100	100.007	100.074	0.067	±0.120	±0.050	P
TC Test Data (mV)						
-10	-10.00000	-10.00021	-0.00021	±0.01250	±0.0020	P
0	0.00000	-0.00015	-0.00015	±0.01000	±0.0020	P
50	50.00000	49.99999	-0.00001	±0.02250	±0.0030	P
100	100.00000	99.99959	-0.00041	±0.03500	±0.0055	P
TCRJ Test Data (°C)						
25	25.000	24.999	-0.001	±0.350	±0.080	P
4-20 mA Test Data (mA)						
0	0.00000	0.00010	0.00010	±0.00200	±0.00060	P
4	4.00000	3.99998	-0.00002	±0.00280	±0.00060	P
12	12.00000	11.99981	-0.00019	±0.00440	±0.00090	P
20	20.00000	19.99984	-0.00016	±0.00600	±0.0012	P
22	22.00000	22.00046	0.00046	±0.00640	±0.0013	P

