

Bauske, Shelly A.

From: Buentello, Marc <Marc.Buentello@nustarenergy.com>
Sent: Thursday, September 01, 2016 1:20 PM
To: Bauske, Shelly A.
Subject: NuStar Energy - Request for Variance to Permit
Attachments: NuStar 12in 600# Compact Prover 16501-12-1290-01-001-Certification.pdf



I contacted Emerson concerning the calibration date issues on the submitted paper work. I have attached the correct paperwork for the equipment, documenting its then current calibration at the time of our water draw certification. I apologize for this oversight.

In reference to the question concerning calibration frequency for the volumetric tank used for water draw certification, API states:

6.3 Calibration Frequency

6.3.1 General

All field standard test measures to be used for prover calibrations in the United States shall have a "Report of Calibration," issued by NIST. The report shall be within the last five years not to exceed five years). A test measure's recalibration volume will be evaluated in accordance with Annex A.

Annex A (informative)

Calibration Frequency of Test Measures

Historically, calibration frequencies were not defined in industry standards. The industry implemented a frequency of three years for most test measures based upon best practices and not on test measure calibration stability (performance).

In recent years, the certification of test measures has been greatly improved due to:

- improved communications between NIST and the petroleum industry,
- improved calibration laboratory facilities,
- direct mass calibration of test measures up to 100 gal,
- gravimetric transfer calibration of test measures over 100 gal to 500 gal,
- improved test measure uncertainty by implementing five run calibrations,
- improved calculations for laboratory uncertainty analysis,
- NIST providing historical control charts,
- digital methodology allows for the instantaneous verification of calibration results.

A review of the historical data indicates that a majority of recalibrations agree with NIST expectations. Those expectations are based upon the uncertainty of the calibration process. Additionally, when frequency was extended to five years there was no indication of an increase in the number of measures that do not meet these expectations. Therefore, for this standard, the recalibration frequency has been extended from three years to five years.

Thank you for your patience and understanding for allowing the submission of the correct documentation.

Marc Buentello
Sr Manager, Dynamic Flow Measurement



19003 IH-10 West
San Antonio, TX 78257
Office: 210-918-2105
RightFax: 210-918-5658

✉ Marc.Buentello@nustarenergy.com

6 WM-14-155 Filed 09/01/2016 Pages: 19
API standards and updated calibration reports
NuStar Pipeline Operating Partnership L.P.



Compact Prover Calibration Certificate

Daniel Measurement and Control, Inc.
5650 Brittnore Rd., Houston TX 77041



Customer Name: Nustar Logistics
Customer Address: 513-A Main St.
Sunray, TX 79086

Customer's Order No.: 4501420057
Customer's Tag No.:
Serial Number: 1804-18501-1-1
Prover Model No.: P121C6A1A122AAE
Daniel Order No.: 18501
Prover Size: 12
Calibration fluid: Water

Test Measure NIST Seal #: 7227
Flow Tube Material: A
Coef. of Exp. for Test Measure(Sq): 0.0000265
Flow tube I.D.(D)inch: 12.25
Wall Thickness(I)inch: 0.875
No. of Runs: 3
Test Measure Volume-in³: 3462.7
Base temperature, T_b: 80 ° F

Certification Number: 18041850111
Date: 4/28/2016
Estimated Uncertainty: 0.02% (Percent Repeatability)
Error Band: 0.02% (Percent Repeatability)
Coverage Factor: K=2
Confidence Level: Approximately 95 %
Calibration Procedure: T-00101 Rev G

RUN NUMBER

1	2	3	4	5
75.00	75.50	75.60		
75.00	75.40	75.60		
72.70	73.50	74.00		
31.6	34.4	31.6		
14.75	15	14.75		

SECTION A - MANUAL ENTRIES
Average prover temperature, T_p:
Test measure temperature, T_m:
Correction for thermal expansion of detector mount, T_d:
Water pressure-psig, P
Test Measure Scale Reading

1	2	3	4	5
75.40	75.70	75.60		
75.40	75.60	75.60		
73.10	73.50	74.10		
32.2	34.6	32.2		
-13.5	-13.75	-13.75		

SECTION B - CALCULATED ENTRIES

Gross Water draw volume V_m-gallons
Temp. differential correction factor, T_{mp} (A³ P¹ 12.1)
Correction factor for (T_m, T_p, & T_d), C_{ss}:
Correction factor for C_{pl}:
Correction factor C_{ps}:
Prover volume - V_{ip}
Percent Repeatability (%)

1	2	3	4	5
15.0537	15.0548	15.0537	0.0000	0.0000
1.000000	1.000014	1.000000	1.000000	1.000000
1.000208	1.000211	1.000215	0.999177	0.999177
1.000101	1.000110	1.000101	1.000000	1.000000
1.000016	1.000017	1.000016	1.000000	1.000000
15.0550	15.0562	15.0552	0.0000	0.0000
			0.00797	

Net Prover base volume at T_b in °F and 0 psig
Downstream 15.0555 Gallons
Upstream 14.9321 Gallons

Calculations based on the following formulae:

$$V_{ip} = (V_m \times T_{mp} \times C_{ss}) / (C_{pl} \times C_{ps})$$

$$C_{ss} = \text{Correction factor for test measure, prover, \& invar rod}$$

$$1 + (T_m - T_b) S_q$$

$$(1 + (T_p - T_b), 0.000120)(1 + (T_d - T_b), 0.000008)$$

$$C_{pl} = \text{compressibility reduction factor for water}$$

$$1 / (1 - (0.0000032 \times P))$$

$$C_{ps} = \text{pressure correction factor for prover}$$

$$1 + (P \times D) / (28.566 \times t)$$

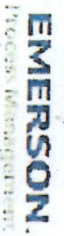
Statement of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the prover calibrated.



Calibrator: Clifton Vaughn
Title: Lab Technician

Approver: Davey Malby
Title: Engineering Manager

This prover has been calibrated using standards with accuracies traceable through National Institute of Standards and Technology to the SI. Derived from natural physical constants, derived from ratio measurements, or compared to consensus standards.
This certificate shall not be reproduced except in full, or without the written permission of Daniel Measurement and Control, Inc.
Form T00101A Revision C



Compact Prover Volumetric Calibration Data Sheet
 Daniel Measurement and Control, Houston, TX, USA



Customer: NUSTAR Logistics
 Serial No.: 1604-16501-1-1
 Model No.: PA106A1A1Z2-4AE
 Cust. Order No.: 4501420057

Calibrated Measure's Volume: 3462.7 mL @ 60°F
 Test Measure NIST Seal #: 7227

This form is a supplement to Certification Number 16041650111
 Date: April-28-2016
 NIT: Tank Serial No. 15143-11

Units of Measure: Temp °F Pressure kPa psig Scale Increments

1.50 mL (In3)

mL (In3)
 (Circle One)

Downstream Volume Runs

	1	2	3	4	5
Inlet (T1)	75.00	75.60	75.60		
Outlet (T2)	75.00	75.40	75.60		
Prover Temp (Tp)	75.00	75.50	75.60		
Test Measure Temp (Tm)	75.00	75.40	75.60		
Sensor Mounting Temp (Td)	72.70	73.50	74.00		
Water Pressure (P)	31.60	34.40	31.60		
Test Measure Scale Reading	14.75	15.0	14.75		
Pass Time (sec)	1:46.22	3:17.66	1:45.31		

Upstream Volume Runs

	1	2	3	4	5
1	75.40	75.80	75.60		
2	75.40	75.60	75.60		
3	75.40	75.70	75.60		
4	75.40	75.60	75.60		
5	73.10	73.50	74.10		
6	32.20	34.60	32.20		
7	-13.50	-13.75	-13.75		
8	1:50.00	3:29.37	1:50.78		

Tp = SVP water temperature, Average of T1 and T2
 Tm = Temperature of water in Test Measure
 P = Water pressure during test draw
 Td = Temperature of Displacer position sensors

Calibration Identification Numbers

Inlet Thermometer 34022K
 Outlet Thermometer 3G8183
 Tank Thermometer 3YD223
 Sensor Thermometer 21460126
 Pressure Gauge 299003971

21460126

Calibrator [Signature]

Witness [Signature]

Leak Detector Test Results

0 Inches in 5 Minutes



UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-8361

REPORT OF CALIBRATION

FOR

A FIFTEEN (15) GALLON VOLUME PROVER
(Graduated Neck Type)

February 25, 2014

Manufacturer: Seraphin
Rancocas, NJ

NIST Seal Number: 7227
NIST Valve Seal No.: 001049
Material: Stainless Steel
Serial Number: 11888A

submitted by

Daniel Measurement and Control
5650 Brittmooore Road
Houston, TX 77041

(Reference: Purchase Order Number 4105014539; dated December 18, 2013)

The volume of the prover described above was measured by the gravimetric method [1] and the standards used in this calibration are traceable to the System International through national standards. The gravimetric method uses the weight of the fluid necessary to fill the prover and the fluid density to calculate the volume. The fluid used was water from a reverse osmosis system and the prover was leveled using the vertical surface of the neck.[#]

The contained volume was drained from the prover by opening the valve at the bottom of the vessel. When this flow finished, the valve was held open for 30 seconds to complete the drain procedure. The delivered volume is for the scale reading of zero (0) and has been corrected for the reference temperature in Table 1 assuming a volumetric coefficient of expansion of 0.0000477 per °C (0.0000265 per °F) for the prover material.

1 Bean, V. E., Espina, P. I., Wright, J. D., Houser, J. F., Sheckels, S. D., and Johnson, A. N., "NIST Calibration Services for Liquid Volume," NIST Special Publication 250-72, National Institute of Standards and Technology, November 24, 2009.

[#] One level indication was made in line with the neck scale and the other 90° to that indication, as stated in API MPMS Chapter 4.7. The levels on the can were not used.

Table 1. Delivered volume for the tested vessel for a scale reading of zero.

	Volume Delivered
gal at 60 °F	14.9898
in ³ at 60 °F	3462.65

The volume measurement procedure was repeated 5 times with the neck scale filled approximately to zero each time. The repeatability of the 5 measurements was 21 parts in 10⁶ and the expanded uncertainty in the measured volume is $\pm 0.030\%$. It was calculated according to References [1] and [2] with a 95 % confidence level[†] and is traceable to NIST mass, temperature, pressure, and humidity standards, and a NIST water density determination.



Figure 1. Photographs of the volume prover.

² Taylor, B. N. and Kuyatt, C. E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results," NIST Technical Note 1297, National Institute of Standards and Technology (January 1993).

[†] Coverage factor of 1.96 for 12732 effective degrees of freedom.

The input data used for calculation of the prover volume are given in the spreadsheet attached to this report. The calibration and uncertainties presented here are only valid over the range of the NIST calibration of this test measure. When the test measure is applied by the customer to measure liquid volume, uncertainties beyond the NIST calibration must be considered, for example: leveling of the test measure, reading the meniscus, cleanliness of the test measure interior, drainage effects due to liquid viscosity, etc.

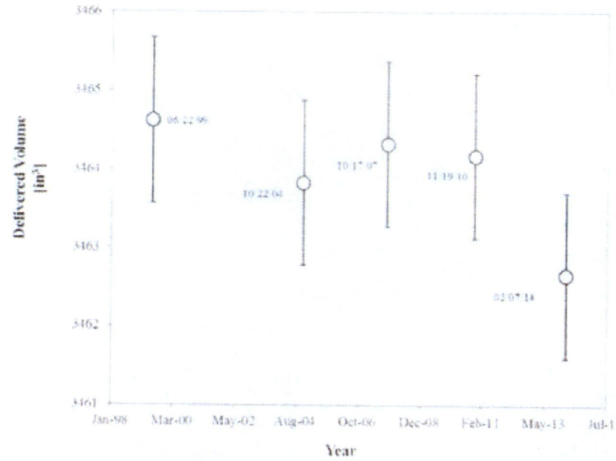


Figure 2. Calibration control chart for 15 gallon graduated neck test measure SN 11888A.

Table 2. Results of prior calibrations for the delivered volume.

Date	Delivered Volume [in ³]	Difference from Prior [in ³]	Degree of Equivalence [-]
02/07/14	3462.65	-1.51	-0.88
11/19/10	3464.17	-0.15	-0.09
10/17/07	3464.32	0.49	0.28
10/22/04	3463.83	-0.79	-0.46
06/22/99	3464.62	0.00	0.00

For the Director,
National Institute of Standards and Technology

Dr. John D. Wright
Project Leader
Fluid Metrology Group
Physical Measurement Laboratory
National Institute of Standards and Technology

Sherry Sheckels
Calibration Technician
Fluid Metrology Group
Physical Measurement Laboratory
National Institute of Standards and Technology

Name of Company: Daniel Measurements
NIST Seal Number: 7227
Serial Number: 11888A
Nominal Volume of Vessel: 15 gallons
Nominal Vol per Scale Div.: 0.5 cubic inches
Date Calibrated: 2/7/2014

Scale Capacity: 600 [kg]
Scale a1: 1.0010E+00 [1/kg]
Scale a2: -3.7728E-07 [1/kg²]
Cal Date: 2/6/2014

T13 a1: 1.529035E-02 [C]
T13 a2: 8.985190E-01 [1/C]
Cal Date: 1/28/2013

T14 a1: 1.168537E-02 [C]
T14 a2: 9.991000E-01 [1/C]
Cal Date: 1/29/2013

T13 a3: -3.1704E-03 [C]
T13 a4: 8.997000E-01 [1/C]
Cal Date: 1/28/2013

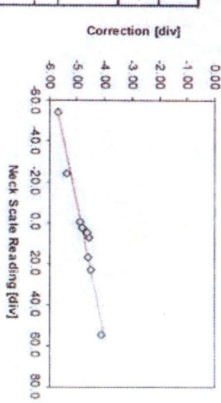
T14 a3: 0.000000E+00 [C]
T14 a4: 1.000000E+00 [1/C]
Cal Date: 1/29/2013

Corrected #1	Water Temperature		Water Density		Air Temperature		Barometric Pressure		Rel. Humidity		Air Density	
	Corrected #2	Average	Paterson & Morns	Corrected #3	Corrected #4	Average	[Pa]	[Pa]	[%]	[kg/m ³]	Jungfer & Dates	
27.084	27.089	27.087	996.490	21.881	21.909	21.895	101.100	101.100	25.1	1.19114	1.19114	
27.341	27.349	27.345	996.419	21.674	21.728	21.701	101.098	101.098	26.3	1.19181	1.19181	
27.351	27.359	27.355	996.416	22.644	22.850	22.747	101.096	101.096	26.7	1.18732	1.18732	
27.376	27.381	27.378	996.409	22.149	22.085	22.117	101.111	101.111	27.4	1.19000	1.19000	
27.374	27.378	27.376	996.410	21.305	21.349	21.327	101.098	101.098	28.8	1.19020	1.19020	

Read	Weight Dry		Weight Full		Weight Drained		Scale Reading		Uncorrected Prover Volume	
	Corrected	Read	Corrected	Read	Corrected	Read	Corrected	Read	Corrected	Read
92.9910	93.0827	148.6221	148.7653	93.0242	93.1158	17.5	0.000143	0.056808	0.056775	17.5
92.9910	93.0827	148.5407	148.6949	93.0232	93.1148	8.0	0.000066	0.056808	0.056776	8.0
92.9910	93.0827	148.4978	148.6420	93.0230	93.1147	3.0	0.000025	0.056807	0.056774	3.0
92.9910	93.0827	148.5188	148.6530	93.0227	93.1144	5.5	0.000045	0.056807	0.056775	5.5
92.9910	93.0827	148.4740	148.6181	93.0248	93.1165	0.0	0.000000	0.056807	0.056773	0.0

Ref. Temp. [C]	Thermal Expansion Corrected Prover Volume		Temperature		Water Density		Kin. Visc.	
	Contained	Delivered	Paterson & Morns	CRC & Kell	Paterson & Morns	CRC & Kell	Paterson & Morns	CRC & Kell
15.56	0.05677677	0.05674347	14.9988	14.9900	3464.73	3462.70	0.66	1.015
	0.05677623	0.05674391	14.9987	14.9902	3464.70	3462.73	1.04	1.560
	0.05677392	0.05674180	14.9981	14.9895	3464.56	3462.60	0.77	0.508
	0.05677488	0.05674316	14.9984	14.9900	3464.62	3462.68	0.39	27.308
	0.05677515	0.05674116	14.9984	14.9894	3464.63	3462.56	1.32	8.318E-06
	0.0567754	0.0567427	14.9985	14.9898	3464.65	3462.55		-3.851E-05 [m ³]
	0.029	0.030	0.029	0.030	3462.35	3462.35		23.5
	0.029	0.030	0.029	0.030	Repeatability [x 10 ⁻³]	Repeatability [x 10 ⁻³]		55
					Averages, Therm. Exp. & Viscosity Corrected	Averages, Therm. Exp. & Viscosity Corrected		19.0
					Expanded Uncertainty [%]	Expanded Uncertainty [%]		50.9
								4.1

Estimation of Uncertainty		k = 1.96		V _g = 12732		95% confidence, Taylor & Kuyatt	
X _i	Value	1/V _g δV/δX _i	Value of 1/V _g δV/δX _i	u _i /X _i for k=1	1/V _g V/δX _i u _i [x 10 ⁻⁴]		
h	— [m ³]	1/V	0 [1/m ³]	2.0E-06 [m ³]	0.1		
m ₁	148.67 [kg]	1/(m ₁ ·m ₂)	0.02 [1/kg]	5.8E-03 [kg]	102.0		
m ₂	93.08 [kg]	-1/(m ₁ ·m ₂)	-0.02 [1/kg]	5.8E-03 [kg]	-102.0		
ρ _w	1000 [kg/m ³]	-1/ρ _w	-1E-03 [m ³ /kg]	2.0E-03 [kg/m ³]	-2.0		
β _w	2.0E-04 [1/C]	-(T _w ·T _{ref})	-23.3 [C]	3.3E-07 [1/C]	-7.7		
β ₁	4.8E-05 [1/C]	-(T _w ·T _{ref})	-11.1 [C]	7.0E-07 [1/C]	-8.2		
T _w	27.3 [C]	β _w ·β ₁	2E-04 [1/C]	4.0E-02 [C]	6.1		
ρ _{ref}	1.19 [kg/m ³]	1/ρ _{ref}	1E-03 [m ³ /kg]	2.0E-03 [kg/m ³]	2.0		
V					48.8		



Calibration Certificate

Certificate: 826

Equipment Information

Equipment ID: 01412137	Site:
Description: 0-3000 P.S.I., 0-120 F.	Department: Compact Provers
Model No: PRESS. & TEMP. RECORDER	Location: B-9 PROVER ASSEMBLY
Manufacturer: FOXBORO	Custodian:
Size / Range:	Technician: TOMAS ESCOBEDO
Serial No: 01412137	Status: Active

Calibration Summary

Calibrated: 03/11/2016	Frequency: SemiAnnual	Temp: 72°F	As Found: In Tolerance
Next Cal: 09/11/2016		Humidity: 0%	Result: Pass
Remarks: PROVERS: NO ADJ. IN TOL.3/11/16,			

Measurement Group 1

<u>Tolerance</u> ± 0.5%	<u>As Found</u> In Tolerance	<u>Result</u> Pass	<u>Procedures</u> Q-00045
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<u>Desc</u>	<u>Nominal</u>	<u>Limits</u>		<u>As Found</u>		<u>Result</u>	<u>As Left (Cal Status)</u>		
		<u>Upper</u>	<u>Lower</u>	<u>Actual</u>	<u>Error</u>		<u>Actual</u>	<u>Error</u>	<u>Result</u>
3000.0000	3015.0000	2985.0000	3000.0000	0000.0000	Pass	3000.0000	0000.0000	Pass	
0750.0000	0753.7500	0746.2500	0750.0000	0000.0000	Pass	0750.0000	0000.0000	Pass	
1500.0000	1507.5000	1492.5000	1500.0000	0000.0000	Pass	1500.0000	0000.0000	Pass	
2250.0000	2261.2500	2238.7500	2250.0000	0000.0000	Pass	2250.0000	0000.0000	Pass	
3000.0000	3015.0000	2985.0000	3000.0000	0000.0000	Pass	3000.0000	0000.0000	Pass	

Standard Equipment Used

<u>Equip ID</u>	<u>Model</u>	<u>Description</u>	<u>Cal Due</u>	<u>Cert</u>
2816	CHANDLER DEAD WEIGHT TESTER	50-10,000 P.S.I. D.W.TESTER	02/02/2017	

Notes:

Approved By:

Date:

Customer Information

Daniel Measurement & Control, Inc.
11100 Brittmoore Park Drive
Houston, TX 77041

PO #: 4105041110

Account #: DA1398

SO #: 114141

Instrument Identification

Instrument Id: **3Y0226**

Noun: Thermometer

Serial #: 3Y0226

Mfr: Miller & Weber

Model: T-3426/SAMA FP40Y

Accuracy: $\pm 0.2^{\circ}\text{F}$

Expanded Measurement Uncertainty at K=2: $\pm 0.05^{\circ}\text{F}$

Certification Information

Reason For Service: Calibration

Technician: Wayne Hutchinson

Type Of Calibration: Accredited

Cal Date: 09 SEP 15

As Found Condition: In Tolerance

Cal Due: 09 SEP 16

As Left Condition: Left As Found

Temperature: 22.0 °C

Procedure: 33K5-4-42-1 : Thermometers Rev 0, 01/06

Humidity: 45.0 %

Technician Remarks: Per Specification S-01923, rev. C

Quality Remarks: Calibration complies with ISO/IEC 17025:2005 & ANSI/NC SL Z540-1-1994 requirements.

This instrument has been calibrated using standards with accuracies traceable to the National Institute of Standards and Technology, derived from natural physical constants, derived from ratio measurements, or compared to consensus standards.

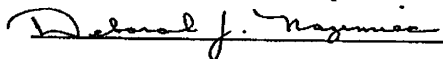
Reported uncertainties and/or test uncertainty ratios (TUR's) are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of K=2.

Statements of compliance, where applicable, are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

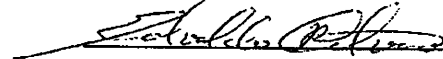
Certified Measurements, Inc.'s Quality System complies with the applicable requirements of ANSI/NC SL Z540-1 and ISO/IEC 17025.

The results contained herein relate only to the item calibrated. Calibration due dates appearing on the Certificate of Calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification.

This certificate shall not be reproduced except in full, without the written permission of Certified Measurements, Inc.



Deborah J. Nazimiec, Technical Manager



Edvaldo Calvao, President

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max
Indication at Known Temp.					
Temp °F	32.0	32.0	✓ Left as Found	31	33
	60.0	60.1	✓ Left as Found	59	61
	100.0	100.0	✓ Left as Found	99	101

End of Datasheet

Calibration Standards

<u>NIST Traceable #</u>	<u>Instrument ID#</u>	<u>Description</u>	<u>Model</u>	<u>Calibration Date</u>	<u>Date Due</u>
1000372622	05618	Platinum Resistance Thermometer	5618	10 APR 2015	31 OCT 2015
1000372730	25080	Thermometer Indicator	1502A	07 APR 2015	31 OCT 2015
1000376903	27842	Temp/Humidity Indicator with Probe	HMI 41/HMP 46	07 JUL 2015	31 JAN 2016

Customer Information

Daniel Measurement & Control, Inc.
11100 Brittmoores Park Drive
Houston, TX 77041

PO #: 4105041110

Account #: DA1398

SO #: 114141

Instrument Identification

Instrument Id: **4G8183**

Noun: Thermometer

Serial #: 4G8183

Mfr: Miller & Weber

Model: T-3426/SAMA FP40Y

Accuracy: $\pm 0.2^{\circ}\text{F}$

Expanded Measurement Uncertainty at K=2: $\pm 0.05^{\circ}\text{F}$

Certification Information

Reason For Service: Calibration

Technician: Wayne Hutchinson

Type Of Calibration: Accredited

Cal Date: 09 SEP 15

As Found Condition: In Tolerance

Cal Due: 09 SEP 16

As Left Condition: Left As Found

Temperature: 22.0 °C

Procedure: 33K6-4-42-1 : Thermometers Rev 0, 01/06

Humidity: 45.0 %

Technician Remarks: Per Specification S-01923, rev. C

Quality Remarks: Calibration complies with ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994 requirements.

This instrument has been calibrated using standards with accuracies traceable to the National Institute of Standards and Technology, derived from natural physical constants, derived from ratio measurements, or compared to consensus standards.

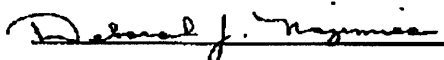
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Statements of compliance, where applicable, are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

Certified Measurements, Inc.'s Quality System complies with the applicable requirements of ANSI/NCSL Z540-1 and ISO/IEC 17025.

The results contained herein relate only to the item calibrated. Calibration due dates appearing on the Certificate of Calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification.

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Deborah J. Nazimiec, Technical Manager



Edvaldo Calvao, President

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max
Indication at Known					
Temp °F	32.0	32.1	✓ Left as Found	31.0	33.0
	60.0	60.1	✓ Left as Found	59.0	61.0
	100.0	100.0	✓ Left as Found	99.0	101.0

End of Datasheet

Calibration Standards

NIST Tracable #	Instrument ID#	Description	Model	Calibration Date	Date Due
1000372622	05618	Platinum Resistance Thermometer	5618	10 APR 2015	31 OCT 2015
1000372730	25080	Thermometer Indicator	1502A	07 APR 2015	31 OCT 2015
1000376903	27842	Temp/Humidity Indicator with Probe	HMI 41/HMP 46	07 JUL 2015	31 JAN 2016

Customer Information

Daniel Measurement & Control, Inc.
11100 Brittmoore Park Drive
Houston, TX 77041

PO #: 4105041110
Account #: DA1398
SO #: 114141

Instrument Identification

Instrument Id: 3Y0223

Noun: Thermometer

Serial #: 3Y0223

Mfr: Miller & Weber

Model: T-3426/SAMA FP40Y

Accuracy: $\pm 0.2^{\circ}\text{F}$

Expanded Measurement Uncertainty at K=2: $\pm 0.05^{\circ}\text{F}$

Certification Information

Reason For Service: Calibration

Technician: Wayne Hutchinson

Type Of Calibration: Accredited

Cal Date: 09 SEP 15

As Found Condition: In Tolerance

Cal Due: 09 SEP 16

As Left Condition: Left As Found

Temperature: 22.0 °C

Procedure: 33K5-4-42-1 : Thermometers Rev 0, 01/06

Humidity: 45.0 %

Technician Remarks: Per Specification S-01923, rev. C

Quality Remarks: Calibration complies with ISO/IEC 17025:2005 & ANSI/NC SL Z540-1-1994 requirements.

This instrument has been calibrated using standards with accuracies traceable to the National Institute of Standards and Technology, derived from natural physical constants, derived from ratio measurements, or compared to consensus standards.

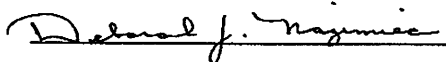
Reported uncertainties and/or test uncertainty ratios (TUR's) are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of K=2.

Statements of compliance, where applicable, are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

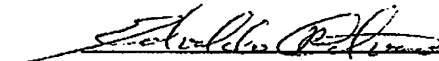
Certified Measurements, Inc.'s Quality System complies with the applicable requirements of ANSI/NC SL Z540-1 and ISO/IEC 17025.

The results contained herein relate only to the item calibrated. Calibration due dates appearing on the Certificate of Calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification.

This certificate shall not be reproduced except in full, without the written permission of Certified Measurements, Inc.



Deborah J. Nazimiec, Technical Manager



Edvaldo Calvao, President

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max
Indication at Known Temp.					
Temp °F	32.0	32.1	✓ Left as Found	31	33
	60.0	60.2	✓ Left as Found	59	61
	100.0	100.2	✓ Left as Found	99	101

End of Datasheet

Calibration Standards

<u>NIST Traceable #</u>	<u>Instrument ID#</u>	<u>Description</u>	<u>Model</u>	<u>Calibration Date</u>	<u>Date Due</u>
1000372622	05618	Platinum Resistance Thermometer	5618	10 APR 2015	31 OCT 2015
1000372730	25080	Thermometer Indicator	1502A	07 APR 2015	31 OCT 2015
1000376903	27842	Temp/Humidity Indicator with Probe	HMI 41/HMP 46	07 JUL 2015	31 JAN 2016

Your calibration records are available on-line at <http://www.cmimetrology.com>

Printed: 09 Sep 2015 11:53 AM

CERTIFIED MEASUREMENTS, INC.
Raising the Calibration Standard...

510 North Houston Lake Blvd.
Centerville, Georgia 31028
Tel: 478.953.5171
Fax: 478.953.2688

Customer Information

Daniel Measurement & Control, Inc.
11100 Brittmoore Park Drive
Houston, TX 77041

PO #: 4105039040

Account #: DA1398

SO #: 113266

Instrument Identification

Instrument Id: **21460126**

Noun: Thermometer, Digital

Serial #: 21460126

Mfr: Fluke

Model: 51 Series II

Accuracy: $\pm (0.05\% \text{ of Reading} + 0.3^\circ\text{C})$ or $\pm (0.05\% \text{ of Reading} + 0.5^\circ\text{F})$

Expanded Measurement Uncertainty at K=2: $\pm 0.1^\circ\text{C}$ to 999.9°C . $\pm 0.4^\circ\text{C}$ above 999.9°C

Certification Information

Reason For Service: Calibration

Technician: Greg Altenburg

Type Of Calibration: Accredited

Cal Date: 10 JUL 15

As Found Condition: In Tolerance

Cal Due: 10 JUL 16

As Left Condition: Left As Found

Temperature: 25.0°C

Procedure: 33K5-4-561-1 : Thermometer 51/53 Series II Rev0,03/01

Humidity: 40.0 %

Quality Remarks: Calibration complies with ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994 requirements.

This instrument has been calibrated using standards with accuracies traceable to the National Institute of Standards and Technology, derived from natural physical constants, derived from ratio measurements, or compared to consensus standards.

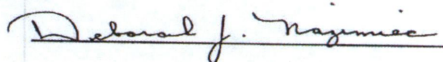
Reported uncertainties and/or test uncertainty ratios (TUR's) are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of K=2.

Statements of compliance, where applicable, are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

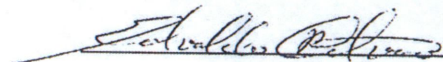
Certified Measurements, Inc.'s Quality System complies with the applicable requirements of ANSI/NCSL Z540-1 and ISO/IEC 17025.

The results contained herein relate only to the item calibrated. Calibration due dates appearing on the Certificate of Calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification.

This certificate shall not be reproduced except in full, without the written permission of Certified Measurements, Inc.



Deborah J. Nazimiec, Technical Manager



Edvaldo Calvao, President

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max
Temperature in °C ("K" T/C)							
" K " @ -3.554 mV	-100 °C	-99.7	✓	Left as Found	■	-100.4	-99.6
0.000 mV	0.0 °C	0.1	✓	Left as Found	■	-0.3	0.3
0.000 mV	32.0 °F	32.3	✓	Left as Found	■	31.5	32.5
0.000 mV	273.15 °K	273.3	✓	Left as Found	■	272.8	273.6
4.096 mV	100 °C	100.1	✓	Left as Found	■	99.6	100.4
8.138 mV	200 °C	200.1	✓	Left as Found	■	199.6	200.4
16.397 mV	400 °C	400.1	✓	Left as Found	■	399.5	400.5
24.905 mV	600 °C	600.1	✓	Left as Found	■	599.4	600.6
33.275 mV	800 °C	800.0	✓	Left as Found	■	799.3	800.7
41.276 mV	1000 °C	1000	✓	Left as Found	■	999.2	1001
52.410 mV	1300 °C	1300	✓	Left as Found	■	1299	1301
" J " TC @ 0.000 mV	0.0 °C	0.1	✓	Left as Found	■	-0.3	0.3
" T " TC @ 0.000 mV	0.0 °C	0.0	✓	Left as Found	■	-0.3	0.3
" E " TC @ 0.000 mV	0.0 °C	0.1	✓	Left as Found	■	-0.3	0.3
System with Probe Accy.							
Temp Indication °F	32.0	32.2	✓	Left as Found	■	30.2	33.8
°C	0.0	0.1	✓	Left as Found	■	-1.0	1.0
°C	100.0	100.0	✓	Left as Found	■	99.0	101.0

End of Datasheet

Calibration Standards

<u>NIST Traceable #</u>	<u>Instrument ID#</u>	<u>Description</u>	<u>Model</u>	<u>Calibration Date</u>	<u>Date Due</u>
1000360614	27606	Platinum Resistance Thermometer	12001-A-12-6-0-A	03 SEP 2014	30 SEP 2015
1000366768	27607	Platinum Resistance Thermometer	12001-A-18-10-0-0	29 DEC 2014	31 DEC 2015
1000372720	01590	1 ppm Super Thermometer	1590	07 APR 2015	31 OCT 2015
1000372727	2001	Calibrator, Multi-Product	5500A/SC300	27 APR 2015	30 APR 2016
1000374855	17112	Ice Point Dry-well	9101	18 MAY 2015	30 NOV 2015
1000376907	31345	Thermohygrometer, Digital	Thermo-Hygro-Clock	07 JUL 2015	31 JUL 2016

Your calibration records are available on-line at <http://www.cmimetrology.com>

Printed: 14 Jul 2015 10:19 AM

CERTIFIED MEASUREMENTS, INC.
Raising the Calibration Standard...

510 North Houston Lake Blvd.
Centerville, Georgia 31028
Tel: 478.953.5171
Fax: 478.953.2688

Specification Number: S-01919
 Title: Calibration Requirements for Thermal Probe

Appendix B (cont'd)

Documentation Requirements:

Calibration certificates must include the following information:

Cal. Co.	Daniel Emp	Documentation Requirement
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Model number & serial number of instrument calibrated
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Instrument ID number
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Date of calibration & calibration due date
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Method of calibration & procedure reference
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	"As-found" / "as-left" / "pass / fail" with actual results and data points
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Accuracy
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Uncertainty statement: Expanded uncertainty with $K = 2$
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Traceability references and certificates for service provider's instruments. (service provider's instruments shall be calibrated by a lab accredited in accordance with ISO-17025) requirements
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Service provider's certificate number and accreditation agency

Serial Number: 21460126

Daniel ID Number: 21460126

[Signature]
 Calibration Company Representative
[Signature]
 Daniel Employee:

7/14/2015
 Date:
7-21-15
 Date:

[Signature]
 (Cini Daniel)
 7/22/2015

Customer Information

Daniel Measurement & Control, Inc.
11100 Brittmoore Park Drive
Houston, TX 77041

PO #: 4105045648

Account #: DA1398

SO #: 116215

Instrument Identification

Instrument Id: **29908397/1**

Noun: Pressure Gage

Mfr: Stewarts

Model: 0-60 PSI Grade 3A

Accuracy: $\pm 0.25\%$ of Span

Expanded Measurement Uncertainty at K=2: ± 0.03 PSI

Serial #: 29908397/1

Certification Information

Reason For Service: Calibration

Type Of Calibration: Accredited

As Found Condition: In Tolerance

As Left Condition: Left As Found

Procedure: 33K6-4-427-1 : Pressure Gages Rev 0, 30 Jun 11

Technician Remarks: Per Daniel Meas. & Control specification # S-01922.

Quality Remarks: Calibration complies with ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994 requirements.

Technician: Harry Brown

Cal Date: 03 FEB 16

Cal Due: 03 FEB 17

Temperature: 21.6 °C

Humidity: 46.9 %

This instrument has been calibrated using standards with accuracies traceable to the National Institute of Standards and Technology, derived from natural physical constants, derived from ratio measurements, or compared to consensus standards.

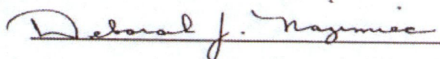
Reported uncertainties and/or test uncertainty ratios (TUR's) are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of K=2.

Statements of compliance, where applicable, are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

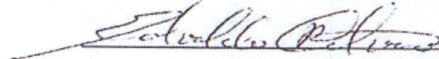
Certified Measurements, Inc.'s Quality System complies with the applicable requirements of ANSI/NCSL Z540-1 and ISO/IEC 17025.

The results contained herein relate only to the item calibrated. Calibration due dates appearing on the Certificate of Calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification.

This certificate shall not be reproduced except in full, without the written permission of Certified Measurements, Inc.



Deborah J. Nazimiec, Technical Manager



Edvaldo Calvao, President

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max
Indication at Known Pressure					
Units		PSI	■	-	■
Applied	6.00	5.99	✓	Left as Found	■ 5.85 6.15
	12.00	12.00	✓	Left as Found	■ 11.85 12.15
	18.00	18.02	✓	Left as Found	■ 17.85 18.15
	24.00	24.02	✓	Left as Found	■ 23.85 24.15
	30.00	29.96	✓	Left as Found	■ 29.85 30.15
	36.00	35.93	✓	Left as Found	■ 35.85 36.15
	42.00	41.88	✓	Left as Found	■ 41.85 42.15
	48.00	47.94	✓	Left as Found	■ 47.85 48.15
	54.00	53.99	✓	Left as Found	■ 53.85 54.15
	57.00	57.05	✓	Left as Found	■ 56.85 57.15

End of Datasheet

Calibration Standards

<u>NIST Traceable #</u>	<u>Instrument ID#</u>	<u>Description</u>	<u>Model</u>	<u>Calibration Date</u>	<u>Date Due</u>
1000379338	29977	Thermohygrometer,Digital	RH30	04 SEP 2015	30 SEP 2016
1000385826	27438	Precision Pressure Controller/Calibrator	DPI510	06 JAN 2016	31 JAN 2017

Maintenance Action

Maintenance Date: 03 FEB 16
Technician: Harry Brown

Labor Expended : 0.00
Additional Labor Required : 0.00
Total Labor (hours): 0.00

Instrument Defect

Pointer off zero, bent in multiple locations, showing signs of tampering.

Action Required

Partial disassembly to remove pointer, straighten and reset zero position before calibration.