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Certificate #L2216

# Calibration Certificate

#2107441

(Level 4) ANSI/NCSL Z540.3-2006 & ISO/IEC 17025:2017 Accredited Calibration

## Customer

*Illiana Instrumentation Service LLC*  
 (7954)  
 1831 Govert Drive  
 Schererville, Indiana 46375  
 PO Number: 4096

## Instrument Profile

Manufacturer: *Fluke*  
 Model: 718 1G  
 Asset ID: 1614  
 Serial: 3204121  
 Description: *Pressure Calibrator, -1 to 1 psig*

## Calibration Information

†Requested Interval: 24 Months  
 Calibration Date: 07/02/2020  
 †Due Date: 07/02/2022  
 Temperature: 67.3 °F (19.6 °C)

Batch #: 1848439  
 Calibration Location: *Indiana Physical Lab*  
 Calibration Procedure: CP-0096  
 Relative Humidity: 46.2 %

## Instrument Condition

As Received: *In Tolerance*  
 As Returned: *In Tolerance*  
 Tolerance(s): *Manufacturer specification(s) unless otherwise specified.*  
 Phys. Damage: *Evidence of physical and/or cosmetic damage was noted during this calibration. See Technician Remarks for details.*

## Quality & Traceability Statements

### Level 4 Calibration

The results reported herein apply only to the calibration of the item described above. All calibration standards used in this calibration are traceable to the International System of Units (SI) through NIST or equivalent National Measurement Institute signatories to the CIPM MRA. Supporting documentations relating to this traceability is initiated by the Trace Number listed in the Calibration Standards section of this certificate. Additional documentation is available for review by a scheduled appointment. Our Quality System is accredited to ISO/IEC 17025:2017, ANSI/NCSL Z540-1:1994 and ANSI/NCSL Z540.3:2006 via the ANSI-ASQ National Accreditation Board. Details of our scope of accreditation are available at [www.anab.org](http://www.anab.org).

†Per the requirements of ISO-17025:2017, Cal Lab does not make recommendations for recall therefore the listed Due Date is dictated by the owner of this equipment. Although the item calibrated meets the conditions or specifications at the time of the calibration, due to a number of factors the due date of the item calibrated does not imply continuing conformance during the calibration interval. The parameters of this calibration are directly or indirectly covered under our current scope of accreditation unless otherwise noted.

The reported Estimated Measurement Uncertainty [EMU] is reported at a coverage factor of k=2, which for a normal distribution corresponds to a confidence level of approximately 95%. The EMU does include the resolution of the instrument calibrated, which in some cases, may be a dominate source of error, but does not include Type A contributors (repeatability/reproducibility studies) of the instrument calibrated unless specifically requested by the customer. The uncertainty values reflect the measurement processes uncertainty and may not reflect the measurement uncertainty listed on our scope of accreditation. Statements of compliance are further defined on the final page of this certificate.

For purposes of determining conformance with the listed specifications (tolerances), the observed value or a calculated value has been rounded "to the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the rounding method of ASTM Practice E 29 for Using Significant Digits in Test Data to Determine Conformance with Specifications.

This certificate may contain calibration data with results listed as either Pass or Fail. These attributes are typically listed as a functional check based on an applied measurand or verification, however, this is strictly Qualitative and should not be interpreted as a Quantitative measurement.

*Michael Mathews*

Calibration Technician

Michael Mathews

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*E. Guess*

Review & Approval

Esther Guess

Quality Manager

[esther.guess@callabco.com](mailto:esther.guess@callabco.com)



### Calibration Standard(s)

Description	Manufacturer	Model	ID#	Due Date	Traceability #
Reference Multimeter	Keithley	2002	1506	06/30/2020	2061182
Deadweight Tester, Mass Set	Ruska	2465-799	1529	06/30/2022	2092413
Deadweight Tester, Piston (0.2 to 25) psi	Ruska	2465-725	1532	05/31/2022	2092410
Weight Set, Class 6	Troemner	CLASS 6 1MG-100G	1666	05/31/2022	2092538
Pressure Indicator, Digital, 22-34 inHgA	Druck	DPI-740 (22-34 INHGA)	1986	07/31/2020	2055682
Temperature Meter	Fluke	52 II	2006	08/31/2020	2072430
Thermohygrometer, (Environmental Only)	Dickson	TM320	2394	11/30/2020	2061512

Indicates that this equipment is only used to monitor & record environmental conditions as listed in the Calibration Information Section.

### Technician Remarks

The sealing ring around the unit's housing is torn.

7/15/2020 EKG:

Certificate Amendment: Keithley 2002 added to standards. Druck DPI-740 updated to reflect due date extension. The previous issued certificate is now considered obsolete.

### Calibration Data

>>> For quick review, any Function/Attribute with an Out-of-Tolerance reading (OOT) has been highlighted. <<<

Function / Attribute	Nominal Value	As Found	OOT	As Left	OOT	Tolerance
Ascending Pressure	0.2000 psig	0.2002		0.2002		0.1995 to 0.2005 psig [EMU 0.000058 psig] [TUR 8.6:1]
Ascending Pressure	0.4000 psig	0.4003		0.4003		0.3995 to 0.4005 psig [EMU 0.000058 psig] [TUR 8.6:1]
Ascending Pressure	0.6000 psig	0.6003		0.6003		0.5995 to 0.6005 psig [EMU 0.000059 psig] [TUR 8.4:1]
Ascending Pressure	0.8000 psig	0.8003		0.8003		0.7995 to 0.8005 psig [EMU 0.000061 psig] [TUR 8.3:1]
Ascending Pressure	1.0000 psig	1.0002		1.0002		0.9995 to 1.0005 psig [EMU 0.000062 psig] [TUR 8.0:1]
Descending Pressure	0.8000 psig	0.8003		0.8003		0.7995 to 0.8005 psig [EMU 0.000061 psig] [TUR 8.3:1]
Descending Pressure	0.6000 psig	0.6003		0.6003		0.5995 to 0.6005 psig [EMU 0.000059 psig] [TUR 8.4:1]
Descending Pressure	0.4000 psi	0.4003		0.4003		0.3995 to 0.4005 psi [EMU 0.000058 psig] [TUR 8.6:1]
Descending Pressure	0.2000 psig	0.2002		0.2002		0.1995 to 0.2005 psig [EMU 0.000058 psig] [TUR 8.6:1]
Descending Vacuum	-0.2000 psig	-0.2000		-0.2000		-0.2005 to -0.1995 psig [EMU 0.000058 psig] [TUR 8.6:1]



**Calibration Data**

**Continued Data**

>>> For quick review, any Function/Attribute with an Out-of-Tolerance reading (OOT) has been highlighted. <<<

Function / Attribute	Nominal Value	As Found	OOT	As Left	OOT	Tolerance
Descending Vacuum	-0.4000 psig	-0.4001		-0.4001		-0.4005 to -0.3995 psig [EMU 0.000058 psig] [TUR 8.6:1]
Descending Vacuum	-0.6000 psig	-0.6001		-0.6001		-0.6005 to -0.5995 psig [EMU 0.000059 psig] [TUR 8.4:1]
Descending Vacuum	-0.8000 psig	-0.8004		-0.8004		-0.8005 to -0.7995 psig [EMU 0.000061 psig] [TUR 8.3:1]
Descending Vacuum	-1.0000 psig	-1.0002		-1.0002		-1.0005 to -0.9995 psig [EMU 0.000062 psig] [TUR 8.0:1]
Ascending Vacuum	-0.8000 psig	-0.8004		-0.8004		-0.8005 to -0.7995 psig [EMU 0.000061 psig] [TUR 8.3:1]
Ascending Vacuum	-0.6000 psig	-0.6001		-0.6001		-0.6005 to -0.5995 psig [EMU 0.000059 psig] [TUR 8.4:1]
Ascending Vacuum	-0.4000 psig	-0.4001		-0.4001		-0.4005 to -0.3995 psig [EMU 0.000058 psig] [TUR 8.6:1]
Ascending Vacuum	-0.2000 psig	-0.2000		-0.2000		-0.2005 to -0.1995 psig [EMU 0.000058 psig] [TUR 8.6:1]
Current, DC	4.000 mA	4.000		4.000		3.997 to 4.003 mA g: 3.998 to 4.002 mA [EMU 0.81 µA] [TUR 3.2:1]
Current, DC	12.000 mA	11.999		11.999		11.996 to 12.004 mA g: 11.997 to 12.003 mA [EMU 1.3 µA] [TUR 2.8:1]
Current, DC	24.000 mA	23.999		23.999		23.994 to 24.006 mA g: 23.995 to 24.005 mA [EMU 2.3 µA] [TUR 2.5:1]



## ANSI/NCSL Z540.3 Accredited Calibration Information

### Test Uncertainty Ratio (TUR)

Test Uncertainty Ratio (TUR) is defined as the ratio of the acceptable tolerance ( $T$ ) of the UUT, represented by the difference between the upper ( $T_U$ ) and lower ( $T_L$ ) tolerance limits, divided by 2 times  $EMU$  as expressed in the following formula:

$$TUR = \frac{T_U - T_L}{2 \cdot EMU}$$

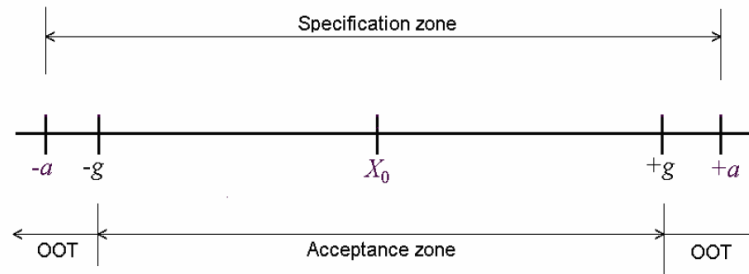
### Determination of Guard-Band Tolerance Limits ( $g$ )

Upper and lower guard-band tolerance limits  $T_{gU}$  and  $T_{gL}$  are derived from  $T_U$  and  $T_L$  by application of a  $Z\%$  guard band factor, as expressed in the following formulas:

$$T_{gU} = T_U - Z \cdot EMU$$

$$T_{gL} = T_L + Z \cdot EMU$$

Upper and lower limits on guard-band tolerance are found by first multiplying  $EMU$  by factors of  $Z$  and then either adding the result to the lower tolerance limit ( $T_L$ ) or subtracting it from the upper tolerance limit ( $T_U$ )



In the figure below is an example of how these triggers are depicted on this certificate.

The first line indicates the original tolerance, the second line indicates the Guard-Band tolerance reduced by 30%, the third line indicates the Estimated Measurement Uncertainty ( $EMU$ ) and the fourth line indicates the Test Uncertainty Ratio ( $TUR$ ).

Tolerance
999.945 to 1000.055 V
g: 999.951 to 1000.049 V
[EMU 19.9 mV]
[TUR 2.8:1]

### Determination of Z-Factor (Z%)

Guard-Bands are applied as requested by the customer to maintain consumer risk at or below levels provided by the 4:1 ratio yet should seek to minimize false rejects (i.e., producer risk) in efforts to lessen the burden on the user's quality system in investigating unwarranted nonconformance and potential equipment recall determination. Unless otherwise specified by the customer, Cal Lab's policy is to apply a Z-Factor of 30% of the Estimated Measurement Uncertainty ( $EMU$ ). With this percentage applied, this provides an acceptance zone to maintain a <2% Probability of False Accept, even if the  $TUR$  reaches a level of 1:1.

### Customer Requested Parameters/Triggers

The following are the parameters that were agreed upon during contract review by the Customer and Cal Lab.

Percent of  $EMU$  used to calculate Guard-Banded Tolerances: 30%

$TUR$  (minimum) used to trigger Guard-Banding 4:1