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Certificate #L2216

Calibration Certificate

#2207039

(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: 4276*

Instrument Profile

*Manufacturer: Fluke
 Model: 700P09
 Asset ID: 1317
 Serial: 88750903
 Description: Pressure Module, 1500 psig*

Calibration Information

†Requested Interval: 3 Years

Calibration Date: 04/28/2022

†Due Date: 04/28/2025

Temperature: 70.3 °F (21.3 °C)

Batch #: 1923296

Calibration Location: Indiana Physical Lab

Calibration Procedure: CP-0096

Relative Humidity: 36.3 %

Instrument Condition

As Received: *In Tolerance*

As Returned: *In Tolerance*

Tolerance(s): *Manufacturer specification(s) unless otherwise specified.*

Phys. Damage: *No apparent evidence of physical or cosmetic damage noted during this calibration.*

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 documentation 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 National Accreditation Board. Details of our scope of accreditation are available at 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 dominant 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.



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Review & Approval
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Calibration Standard(s)

Description	Manufacturer	Model	ID#	Due Date	Traceability #
Thermohygrometer, (Environmental Only)	Dickson	TM320	2201	07/31/2022	2193861
Pressure Measurement Module, 0 to 1000 PSI	Fluke	PM200-G7M	2483	09/30/2022	2191229
Pressure Measurement Module, 0 to 300 psi	Fluke	PM200-G2M	2485	03/31/2023	2206307
Pressure Measurement Module, 0 to 500 psi	Fluke	PM200-G3.5M	2488	11/30/2022	2193126
Pressure Measurement Module, 0 to 3000 PSI	Fluke	PM200-G20M	2491	06/30/2022	2188466

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

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	300.0 psig	299.9		299.9		299.2 to 300.8 psig [EMU 0.084 psig] [TUR 8.9:1]
Ascending Pressure	600.0 psig	599.9		599.9		599.2 to 600.8 psig g: 599.3 to 600.7 psig [EMU 0.21 psig] [TUR 3.5:1]
Ascending Pressure	900.0 psig	899.9		899.9		899.2 to 900.8 psig g: 899.3 to 900.7 psig [EMU 0.21 psig] [TUR 3.5:1]
Ascending Pressure	1200.0 psig	1200.2		1200.2		1199.2 to 1200.8 psig g: 1199.4 to 1200.6 psig [EMU 0.61 psig] [TUR 1.2:1]
Ascending Pressure	1500.0 psig	1500.1		1500.1		1499.2 to 1500.8 psig g: 1499.4 to 1500.6 psig [EMU 0.61 psig] [TUR 1.2:1]
Descending Pressure	1200.0 psig	1200.1		1200.1		1199.2 to 1200.8 psig g: 1199.4 to 1200.6 psig [EMU 0.61 psig] [TUR 1.2:1]
Descending Pressure	900.0 psig	899.9		899.9		899.2 to 900.8 psig g: 899.3 to 900.7 psig [EMU 0.21 psig] [TUR 3.5:1]
Descending Pressure	600.0 psig	600.0		600.0		599.2 to 600.8 psig g: 599.3 to 600.7 psig [EMU 0.21 psig] [TUR 3.5:1]
Descending Pressure	300.0 psig	299.9		299.9		299.2 to 300.8 psig [EMU 0.084 psig] [TUR 8.9:1]



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:

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

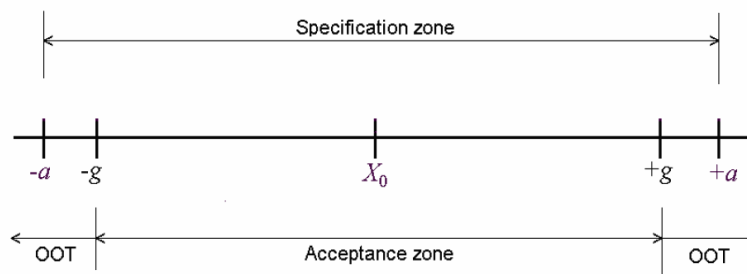
Determination of Guard-Band Tolerance Limits (g)

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