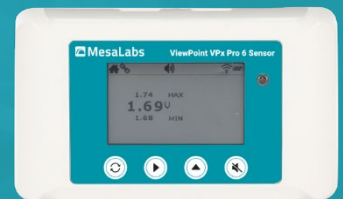




VPx PRO 6 PROBE

ACCURACY SPECIFICATION SHEET & CALIBRATION POLICY



Introduction

The Mesa Labs, Inc. (“MLI”) Lakewood, CO manufacturing facility is an ISO/IEC 17025:2017-accredited calibration laboratory. Mesa Labs Continuous Environmental Monitoring probe and sensor products are produced in Lakewood, CO and calibrated to an NIST¹ -traceable standard with an ILAC-MRA² ISO/IEC 17025:2017 certification (Certificate No. L22-169). Thus, calibrated probes may be placed directly into service without recalibration or re-verification in the field.

Annual Calibrations

MLI recommends an annual in-field calibration service or the exchange of installed probes for NIST-traceable calibrated probes, with an accompanying NIST Certificate of Calibration. With a properly installed and calibrated probe, and under normal operating conditions within the probe’s rated application range, calibrations are valid for twelve (12) months after the issuance of the NIST Certificate of Calibration.

Calibration Acceptance Criteria

The acceptance criteria are set such that no data point in the empirical data set can be outside of these criteria.

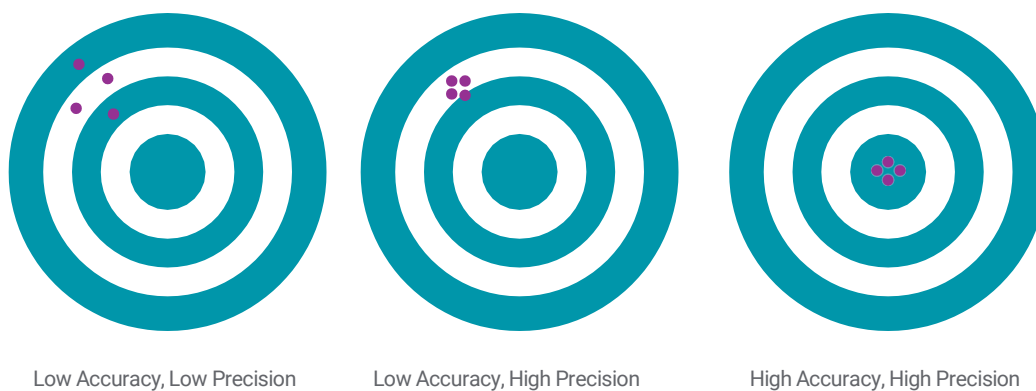
The pass/fail acceptance criteria for each probe are listed as the Accuracy specification. As part of Mesa Labs’ calibration process, the value of the probe reading, when compared to a NIST-reference meter, must be within the stated Accuracy to be accepted. If the probe does not meet Mesa Labs’ acceptance criteria, the calibration is not successful and is rejected.

Calibration Terms and Definitions

Product descriptions are intended to be used as a simplified product reference aid or guide. At no point is a product description intended to supersede or set precedent for the product specification listed below in this document or as stated in any product specification sheet. If available, please refer to the individual product specification sheet for additional specifications.

A note of clarification: The terms “accuracy” and “precision” are often incorrectly interchanged. Accuracy is the difference between the measured and reference value. Precision is the variance in the measured value. Refer to Figure 1 for a pictorial illustration of accuracy versus precision.

Figure 1. Accuracy vs. Precision



¹ NIST - National Institute of Standards and Technology

² ILAC MRA – International Laboratory Accreditation Cooperation Mutual Recognition Arrangement

1. Application Range – All products are both designed for and tested in their stated application range. Calibrations will not be performed outside of the stated application range.
2. Standard Laboratory Calibration Points – The standard calibration points that are used unless a custom calibration is requested.
3. Product Code – The calibrated part number of the instrument. Any product ordered using a part number other than the calibrated part number will be delivered without a calibration being performed.
4. Resolution - Smallest increment of measurement change detectable by the device at the test measurement. Probe resolution is dependent on the final product configuration or selected electrical design and is often better than what can be displayed in software or on the product display.
5. Accuracy – Closeness of agreement between a measured quantity value and the reference standard.
6. Uncertainty – Evaluated from the statistical distribution of the results of a series of measurements or other information and is characterized by standard deviations. All components of uncertainty, including those arising from systematic effects, such as components associated with corrections and reference standards, contribute to the calculations.
7. As-Found Acceptance Criteria – Pass/Fail criteria for probes returned for as-found analysis.
8. As-Found Analysis – Measurement data recorded prior to repair or adjustment.
9. Precision – The variance in the measured value.
10. Sensor – A electronic device that senses or samples measurement data via a compatible probe; often a battery-operated wireless device or transmitter.
11. Probe – A device that is placed into an environment to measure certain parameters or conditions in the environment. Responds to a compatible sensor to allow measurements to be taken from that environment.
12. Paired Calibration – A calibration that is performed where the probe and sensor are calibrated as a paired instrument. Paired calibrations are often more accurate or precise than using separate product calibrations for sensors and probes.
13. RTD (Resistance Temperature Detector) - A type of probe used to measure temperature that is made from a pure material which allow for measurements with high accuracy and precision. RTDs also offer exceptional stability over time.
14. Thermistor – A type of probe whose resistance changes based on temperature. Thermistors have a narrower temperate range than RTDs and are less accurate.
15. Thermocouple – An electrical device that produces a temperature-dependent voltage between two dissimilar metals. Thermocouples operate over a wider temperature range but have lower accuracy and precision.

VPx Pro 6 Sensor-Compatible Input Probe Specifications

Standard RTD Probe

Application Range: -25 °C to +100 °C
 Product Code(s): CM-000188 (Probe, RTD, 1K ohm, SS, 4-Wire, 12ft, VPx Calibrated)
 Standard Laboratory Calibration Points: -25 °C, +4 °C, +40 °C

Range	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
-25°C to +100 °C	±0.35 °C	±0.085 °C	±0.435 °C

Ultra Low Cryogenic RTD Probe

Application Range: -200 °C to -20 °C
 Product Code(s): CM-000189 (Probe, RTD, 1K ohm, SS, 4-Wire, Cryo, 6ft, VPx Calibrated)
 CM-000079 (Probe, RTD, 1K ohm, SS, 4-Wire, Cryo, 12ft, VPx Calibrated)
 Standard Laboratory Calibration Points: 90 °C, -60 °C, -40 °C, or approx. -197 °C (LN2)

Range	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
-197 °C	±0.5 °C	±0.085 °C	±0.585 °C
-90 to -20 °C	±0.5 °C	±0.085 °C	±0.585 °C

Pyrogenic RTD Probe

Application Range: +90 °C to +300 °C
 Product Code(s): CM-000110 (Probe, RTD, 1K ohm, SS, 4-Wire, Pyro, 6ft, VPx Calibrated)
 Standard Laboratory Calibration Points: Paired Calibration using specified calibration point(s) within the application range.

Range	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
+90 °C to +300 °C	±1.00 °C	±0.088 °C	±1.088 °C

Notes: Paired calibration – VPx Sensor and Pyrogenic RTD are calibrated as paired instruments. Stated accuracy may vary with a paired calibration, see calibration certificate for specific measurement values.

Digital Snap I2C Temperature & Humidity Probe

Application Range: +10 °C to +40 °C and 10% RH to 90% RH
 Product Code(s): 72112 (G4 Temp/Humidity Probe)
 Standard Laboratory Calibration Points: +25 °C and 50% RH

Range	Resolution	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
+10 to +40 °C	±0.01 °C	± 0.40 °C	± 0.25 °C	± 0.70 °C
10% to 90% RH	±0.04% RH	± 2.00% RH	± 3.00% RH	± 5.0% RH

Notes: Because humidity calibration is a temperature-dependent measurement, it is recommended to not choose custom calibration points that are both extremes of the application range (for example, +10 °C & 10% RH) or (+40 °C and 90% RH). Calibrations requested at the extremes of the application range likely will not be performed or adjusted for calibration performance.

Digital Differential Pressure Probe

Application Range: ± 0.5 in H₂O (Inches of Water)
 Product Code(s): CM-000385 (Probe, VPx, Differential Pressure, Digital, Low Power, Calibrated)
 Standard Laboratory Calibration Point: 0.04 in H₂O

Range	Resolution	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
-0.5 ≤ P < +0.5 in H ₂ O	±0.00004 in H ₂ O	±0.01 in H ₂ O	±0.002 in H ₂ O	±0.015 in H ₂ O

Notes: An ISO/IEC 17025-accredited calibration is not available for this part. A NIST-accredited calibration will be provided.

4 – 20mA Analog Differential Pressure Probe

Application Range: ± 0.25 in H₂O (Inches of Water)
 Product Code(s): CM-000046 (VPx, 4-20mA Differential Pressure Assembly Only)
 Standard Laboratory Calibration Point: 0.04 in H₂O

Range	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
-0.25 ≤ P < +0.25 in H ₂ O	±0.01 in H ₂ O	±0.002 in H ₂ O	±0.015 in H ₂ O

Notes: An ISO/IEC 17025-accredited calibration is not available for this part. A NIST-accredited calibration will be provided.

VAISALA GMP251 4 – 20mA Analog Carbon Dioxide (CO₂) Probe

Application Range: 0.0% to 20.0% CO₂
 Product Code(s): CM-000373 (Probe, CO₂, 0-20%, 4-20mA, Calibrated, Only)
 Standard Laboratory Calibration Points: 5% and 20% CO₂

Range	Probe Accuracy	Uncertainty	As-Found Acceptance Criteria
0 ≤ P < 8% CO ₂	0.2% CO ₂	0.12% CO ₂	0.32% CO ₂
8 ≤ P ≤ 20% CO ₂	0.4% CO ₂	0.32% CO ₂	0.72% CO ₂

Notes: New probe calibrations are conducted by hardware manufacturer. An ISO/IEC 17025 accredited calibration is not available for this part. A NIST accredited calibration will be provided.

PureAire Oxygen Deficiency Monitor for O₂ Depletion Safety

Application Range: 0 – 25% O₂
 Product Code(s): 166088 (Oxygen Sensor PureAire with 4-20 WS)
 Standard Laboratory Calibration Points: N/A

Range	Accuracy	Uncertainty	As-Found Acceptance Criteria
0 ≤ P < 25% O ₂	± 0.25% O ₂	Not stated	N/A

Notes: The PureAire Oxygen Sensor is factory-calibrated against a NIST traceable reference standard by the manufacturer. The PureAire Oxygen Sensor is made of non-depleting zirconium oxide, will not experience drift over time, and does not require annual re-calibration.

FAQs

Q: I received my new calibrated product, and I am not confident in the calibration or accuracy. How can I quickly check that my product is measuring accurately?

A: Often the equipment that you intend to monitor has only had an initial calibration performed when it was first manufactured. After many years of use the calibration of this equipment then can drift and display different measurement values than what is displayed on a newly calibrated product. In these situations, it is best practice to trust the values reported from the most recently calibrated instrument.

It is important to consider the placement of a probe inside the environment to be monitored. Make sure the placement of the probe is located away from any fans or blowers. If possible, use a thermal buffer to reduce sensitivity to changes in the air.

You can attempt use another calibrated product to do a quick comparison check. When doing a comparison check make sure to verify the product accuracy specifications, bundle both probes together, keep the environment as stable as possible, and allow for a dwell time. Using the triple point of water is also useful in creating an environment for this purpose.

If you have just changed a probe, then a software calibration offset may have been applied in the past that is still present in the system. Make sure to zero out the calibration offset for this equipment.

Q: I received my new calibrated product, and I am missing a calibration certificate. How can I get this certificate?

A: A calibration certificate may have been distributed electronically or remotely uploaded. Check to see if a current calibration certificate exists in your software. If you require a physical copy, you can print one from your software.

It is possible a paper copy calibration certificate was provided but was accidentally thrown away with the packaging. Please contact your sales representative to obtain a duplicate copy.

Q: I received my new calibrated probe, and it was not calibrated with my custom set points. What should I do?

A: Contact your sales representative to verify your custom calibration points. It is possible custom calibration points are not available with the probe type you have selected.

Q: I received my new calibrated probe, but I am not sure the sensor electronics are accurate. How can I verify the accuracy of my sensor?

A: A calibrated key may be available to check the accuracy of the sensor electronics. Please contact your sales representative to obtain one.