

Kestrel® Pocket Weather® Meters **Certificate of Calibration – Air Speed**

Order #: 0123456
 Customer #: JOE01
 Instrument: Kestrel 5000 Environmental Meter
 Instrument Serial No: 1234567
 Calibration Date: 1-Oct-16

Customer PO#: PO243
 Customer Name: Joe Kestrel
 Manufacturer: Nielsen-Kellerman
 Impeller Serial No: IMP 7894561
 Recalibration Due: 1-Oct-17 12 Months

The above designated impeller was calibrated on the date shown in direct comparison to a Gill Model 1350 Single-Axis Ultrasonic Anemometer, Serial No. 0001. The Standard Anemometer is traceable to NIST (National Institute of Standards and Technology) and was last calibrated in the NIST Low Velocity Airflow Facility and NIST Dual Test-Section Wind Tunnel on 19-June-2015, NIST Test Report No.685-287002-15. The accuracy of the Standard is verified at regular scheduled intervals by comparison to or measurement against national standards, natural physical constants, consensus standards, or by ratio type measurements using self-calibrating techniques. The Standard's maximum combined uncertainty is $\pm 1.04\%$ within the airspeed range 706.6 to 3923.9 fpm (3.59 to 19.93 m/s), and $\pm 1.66\%$ within the airspeed range 166.6 to 706.6 fpm (0.85 to 3.59 m/s).

The Kestrel 5000 Environmental Meter


has a published Air Speed accuracy of \pm 3% in the range of 3.3 to 40.0 m/s

Point	Reference	Acceptable Limits				DUT as Found		Difference		
1	600.0 fpm	582.0	to	618.0	fpm	601	fpm	1.0	fpm	0.2%
2	1200.0 fpm	1164.0	to	1236.0	fpm	1150	fpm	-50.0	fpm	-4.2%
Point	Reference	Acceptable Limits				DUT as Left		Difference		
3	600.0 fpm	582.0	to	618.0	fpm	602.0	fpm	2.0	fpm	0.3%
4	1200.0 fpm	1164.0	to	1236.0	fpm	1195.0	fpm	-5.0	fpm	-0.4%

NOTES:

- Calibration was performed in a 12 x 12 in (30.5 x 30.5 cm) rectangular test section wind tunnel at an ambient temperature of $77 \pm 7^\circ\text{F}$ ($25 \pm 4^\circ\text{C}$) and $40 \pm 10\%$ relative humidity.
- Problems noted:
 - Instrument was received **in** tolerance for Air Speed.
 - Instrument was received **out of** tolerance for Air Speed.
 - No change was made to instrument.
 - Replacement Impeller, Serial No. IMP 9876543 was installed prior to "as Left" readings.
- The *maximum* recommended recalibration interval is 24 months. This instrument should be recalibrated sooner if it is frequently used at the extremes of the specified operational range. A shorter recalibration interval may also be required by user guidelines or advisable if maximum accuracy is required for the instrument application.

Technical Operator: 
 John Smith

Approved By: 
 Nils Steffensen, Director of Engineering

Kestrel Pocket Weather Meters
 A Division of Nielsen-Kellerman
 21 Creek Circle
 Boothwyn, PA 19061 USA
 610.447.1555 phone
 610.447.1577 fax
 www.nkhome.com

The above unit was tested according to NK's procedure number: NIST Verification 2008.10.01

This calibration certificate shall not be reproduced except in full without the written approval of Nielsen-Kellerman Co.

329005_Rev4_2016.1.13

Kestrel® Pocket Weather® Meters
Certificate of Calibration – Globe Thermistor

Order #: 0123456	Customer PO#: PO243
Customer #: JOE01	Customer Name: Joe Kestrel
Instrument: Kestrel 5000 Environmental Meter	Manufacturer: Nielsen-Kellerman
Instrument Serial No: 1234567	Impeller Serial No: IMP 7894561
Calibration Date: 1-Oct-16	Recalibration Due: 1-Oct-17 12 Months

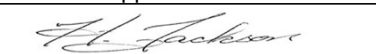
The above designated instrument was calibrated on the date shown in direct comparison to a Ametek Model DTI050 Digital Thermometer, Serial No. 2941072, Probe Serial No. 621609-06. The Standard Thermometer is traceable to NIST (National Institute of Standards and Technology) and was last calibrated on 18-December-2015. The accuracy of the Standard is verified at planned intervals by comparison to pressure standards traceable to NIST. The Standard's maximum combined uncertainty is $\pm 0.020^{\circ}\text{C}$.


The **Kestrel 5000 Environmental Meter** has a published Globe Temperature accuracy of \pm N/A in the range of N/A

Point	Reference	Acceptable Limits	DUT as Found	Difference
1	-10.0 °C	-11.0 to -9.0 °C	-9.9 °C	0.1 °C
2	50.0 °C	49.0 to 51.0 °C	50.2 °C	0.2 °C

NOTES:

- Calibration was performed in a temperature-controlled chamber maintained at 25° C.
- There was no measurable air flow or solar load on the globe thermistor, in order to properly measure the air temperature without effects of the globe. Nominal time at each calibration value was 1 hour.
- Problems noted: None
- Instrument was received **in** tolerance for Temperature.
- Instrument was received **out of** tolerance for Temperature.
- No change was made to instrument.
- The *maximum* recommended recalibration interval is 24 months. This instrument should be recalibrated sooner if it is frequently used at the extremes of the specified operational range. A shorter recalibration interval may also be required by user guidelines or advisable if maximum accuracy is required for the instrument application.

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Kestrel[®] Pocket Weather[®] Meters **Certificate of Calibration – Pressure**

Order #: 0123456
 Customer #: JOE01
 Instrument: Kestrel 5000 Environmental Meter
 Instrument Serial No: 1234567
 Calibration Date: 1-Oct-16

Customer PO#: PO243
 Customer Name: Joe Kestrel
 Manufacturer: Nielsen-Kellerman
 Impeller Serial No: IMP 7894561
 Recalibration Due: 1-Oct-17 12 Months

The above designated instrument was calibrated on the date shown in direct comparison to a Vaisala PTB 210A Digital Barometer, Serial No. K1440002. The Standard Barometer is traceable to NIST (National Institute of Standards and Technology) and was last calibrated on 15-June-2016. The accuracy of the Standard is verified at planned intervals by comparison to pressure standards traceable to NIST. The Standard's accuracy is ± 0.15 hPa at +20°C defined as the root sum of the squares (RSS) of end point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

The **Kestrel 5000 Environmental Meter**

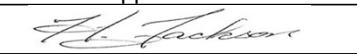
has a published Pressure accuracy of \pm **1.5 hPa** in the range of **700 - 1100 hPa, 25 °C**


Point	Reference	Acceptable Limits	DUT as Found	Difference
1	700.0 hPa	697.5 to 702.5 hPa	701.9 hPa	1.9 hPa 0.3%
2	1010.0 hPa	1008.5 to 1011.5 hPa	1012.1 hPa	2.1 hPa 0.2%
Point	Reference	Acceptable Limits	DUT as Left	Difference
1	700.0 hPa	699.0 to 701.0 hPa	700.2 hPa	0.2 hPa 0.0%
2	1010.0 hPa	1009.0 to 1011.0 hPa	1010.3 hPa	0.3 hPa 0.0%

NOTES:

Nominal time at each calibration value was 1 hour.

- Problems noted:
 - Instrument was received **in** tolerance for Pressure.
 - Instrument was received **out of** tolerance for Pressure.
 - No change was made to instrument.
 - Instrument was recalibrated per manufacturer's protocol.
- The *maximum* recommended recalibration interval is 24 months. This instrument should be recalibrated sooner if it is frequently used at the extremes of the specified operational range. A shorter recalibration interval may also be required by user guidelines or advisable if maximum accuracy is required for the instrument application.

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Kestrel® Pocket Weather® Meters
Certificate of Calibration – Relative Humidity

Order #: 0123456	Customer PO#: PO243
Customer #: JOE01	Customer Name: Joe Kestrel
Instrument: Kestrel 5000 Environmental Meter	Manufacturer: Nielsen-Kellerman
Instrument Serial No: 1234567	Impeller Serial No: IMP 7894561
Calibration Date: 1-Oct-16	Recalibration Due: 1-Oct-17 12 Months

The above designated instrument was calibrated on the date shown in direct comparison to an Edgetech Dew Master Standard Chilled Mirror Hygrometer, Serial Number 2A4411X. The Standard Hygrometer is traceable to NIST (National Institute of Standards and Technology) and was last calibrated on 11-Dec-2015 Test Report Number 2015.11121. The Standard's maximum combined uncertainty is ±0.050%RH. The procedures used for calibration conform to ASTM Publication #E104, Standard Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions.

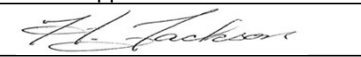
The Kestrel 5000 Environmental Meter

has a published Relative Humidity accuracy of ± 2% in the range of 10 to 90%, 25 °C

Point	Reference	Acceptable Limits	DUT as Found	Difference
1	32.8 %RH	29.8 to 35.8 %RH	34.2 %RH	1.4 %RH
2	75.3 %RH	72.3 to 78.3 %RH	72.1 %RH	-3.2 %RH
Point	Reference	Acceptable Limits	DUT as Left	Difference
1	32.8 %RH	29.8 to 35.8 %RH	32.9 %RH	0.1 %RH
2	75.3 %RH	72.3 to 78.3 %RH	75.0 %RH	-0.3 %RH

NOTES:

- Calibration was performed in a temperature-controlled chamber maintained at 25° C. Nominal time at each calibration value was 1 hour.
- Problems noted:
 - Instrument was received **in** tolerance for Relative Humidity.
 - Instrument was received **out of** tolerance for Relative Humidity.
 - No change was made to instrument.
 - Instrument was recalibrated per manufacturer's protocol.
- The *maximum* recommended recalibration interval is 24 months. This instrument should be recalibrated sooner if it is frequently used at the extremes of the specified operational range. A shorter recalibration interval may also be required by user guidelines or advisable if maximum accuracy is required for the instrument application.

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Kestrel® Pocket Weather® Meters **Certificate of Calibration – Temperature**

Order #: 0123456 Customer #: JOE01 Instrument: Kestrel 5000 Environmental Meter Instrument Serial No: 1234567 Calibration Date: 1-Oct-16	Customer PO#: PO243 Customer Name: Joe Kestrel Manufacturer: Nielsen-Kellerman Impeller Serial No: IMP 7894561 Recalibration Due: 1-Oct-17 12 Months
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The above designated instrument was calibrated on the date shown in direct comparison to a Ametek Model DTI050 Digital Thermometer, Serial No. 2941072, Probe Serial No. 621609-06. The Standard Thermometer is traceable to NIST (National Institute of Standards and Technology) and was last calibrated on 18-December-2015. The accuracy of the Standard is verified at planned intervals by comparison to pressure standards traceable to NIST. The Standard's maximum combined uncertainty is $\pm 0.020^{\circ}\text{C}$.

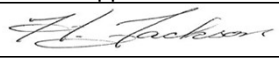
The Kestrel 5000 Environmental Meter


has a published Temperature accuracy of \pm 0.5 °C in the range of -29 to 70 °C

Point	Reference	Acceptable Limits	DUT as Found	Difference
1	-10.0 °C	-11.0 to -9.0 °C	-10.1 °C	-0.1 °C
2	50.0 °C	49.0 to 51.0 °C	50.1 °C	0.1 °C

NOTES:

- Calibration was performed in a temperature-controlled chamber maintained at 25° C. Nominal time at each calibration value was 1 hour.
- Problems noted: None
- Instrument was received **in** tolerance for Temperature.
- Instrument was received **out of** tolerance for Temperature.
- No change was made to instrument.
- The *maximum* recommended recalibration interval is 24 months. This instrument should be recalibrated sooner if it is frequently used at the extremes of the specified operational range. A shorter recalibration interval may also be required by user guidelines or advisable if maximum accuracy is required for the instrument application.

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Recalibration Certificate

Temperature

This certifies that the following Kestrel Pocket Weather Meter has been inspected and tested by Nielsen-Kellerman Co. at its facilities located at 21 Creek Circle, Boothwyn, PA 19061 USA.

Kestrel Information:

Inspected By:

MODEL NUMBER

SIGNED

SERIAL NUMBER

PRINT NAME

IMPELLER SERIAL NUMBER

DATE

Units	Maximum Range	Resolution	Accuracy (+/-)	Specification Range
°F	-49.0 to 257.0 °F	0.1	1.8 °F	-20.0 to 158.0 °F
°C	-45.0 to 125.0 °C	0.1	1.0 °C	-29.0 to 70.0 °C

Measures air, water and snow temperature. Thermally isolated, hermetically sealed, precision thermistor mounted externally (US Patent 5,939,645). Calibration drift negligible. NOTE: The liquid crystal display and batteries will not function below 14 °F / -10 °C, and damage to both may result if the unit temperature exceeds 131 °F / 55 °C. Readings may be taken beyond these functional limits, to the limits of the maximum ranges listed above, by maintaining the unit within these functional limits and exposing it to temperature extremes for the minimum time necessary to take a reading (30 seconds to 1 minute).

Methods Used in Calibration and Testing

Temperature response is verified in comparison with a Eutechnics 4600 Precision Thermometer or a standard Kestrel 4000 Pocket Weather Tracker calibrated weekly against the Eutechnics 4600. The Eutechnics 4600 is calibrated annually and is traceable to NIST with a system accuracy of +/- 0.05 °C.