



## Certificate of Conformity

This instrument was produced under rigorous factory production control and documented standard procedures. It was individually visually inspected, leak tested and function tested for display, backlight, button and software performance. The accuracy of each of its primary measurements was individually calibrated and/or tested against standards traceable to the National Institute of Standards and Technology (“NIST”) or calibrated intermediary standards. This instrument is certified to have performed at the time of manufacture in compliance with the following specifications as they apply to this meter’s specific model, measurements and features.

### Methods Used in Calibration and Testing

#### Wind Speed:

The Kestrel Pocket Weather Meter impeller installed in this unit was individually tested in a subsonic wind tunnel operating at approximately 300 fpm (1.5 m/s) and 1200 fpm (6.1 m/s) monitored by a Gill Instruments Model 1350 ultrasonic time-of-flight anemometer. 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).

#### Temperature:

Temperature response is verified in comparison with a Eutechnics 4600 Precision Thermometer or a standard Kestrel 4000 Weather and Environmental Meter calibrated weekly against the Eutechnics 4600. The Eutechnics 4600 is calibrated annually and is traceable to NIST with a system accuracy of  $\pm 0.05$  °C.

#### Direction / Heading

The sensitivity of the magnetic directional sensor is verified at the component level by applying a magnetic field to the sensor and measuring the signal output at 4 points, as well as after assembly by orienting the unit to the cardinal directions and measuring the magnetic field output. In both cases the compass output must be accurate to within  $\pm 5$  degrees.

#### Relative Humidity:

Relative humidity receives a two-point calibration in humidity and temperature controlled chambers at 75.3% RH and 32.8% RH at 25° C. The calibration tanks are monitored with an Edgetech Model 2002 DewPrime II Standard Chilled Mirror Hygrometer. Following calibration, performance is further verified at an RH of approximately 43.2% against the Edgetech Hygrometer. The Edgetech Hygrometer is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of  $\pm 0.2\%$  RH.

#### Barometric Pressure:

Pressure response is verified against a Mensor Series 6000 Digital Barometer or a standard Kestrel 4000 Weather and Environmental Meter calibrated weekly against the Mensor Barometer. The Mensor Barometer is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of  $\pm 0.02\%$  F.S.

#### Approved By:

Michael Naughton, Engineering Manager

SENSORS													
SENSOR	4400	4400 w/ Bluetooth	4400 NV	4400 NV w/ Bluetooth	4600	4600 w/ Bluetooth	4600 NV	4600 NV w/ Bluetooth	ACCURACY (+/-)*	RESOLUTION	SPECIFICATION RANGE	OPERATIONAL RANGE	NOTES
Wind Speed   Air Flow	•	•	•	•	•	•	•	•	Larger of 3% of reading, less significant digit or 20 ft/min	0.1 m/s 1 ft/min 0.1 km/h 0.1 mph 0.1 knots 1 B	0.6 to 40.0 m/s 118 to 7,874 ft/min 2.2 to 144.0 km/h 1.3 to 85.6 mph 1.2 to 77.8 knots 0 to 12 B	0.6 to 60.0 m/s 118 to 11,811 ft/min 2.2 to 216.0 km/h 1.3 to 134.2 mph 1.2 to 116.6 knots 0 to 12 B	1 inch/25 mm diameter impeller with precision axle and low-friction Zytel® bearings. Startup speed stated as lower limit, readings may be taken down to 0.4 m/s   79 ft/min   1.5 km/h   0.9 mph   .8 kt after impeller startup. Off-axis accuracy -1% @ 5° off-axis, -2% @ 10°, -3% @ 15°. Calibration drift < 1% after 100 hours use at 16 MPH   7 m/s. Replacement impeller (NK PN-0001) field installs without tools (US Patent 5,783,753). Wind speed calibration and testing should be done with triangle on impeller located at the top front face of the Kestrel.
Ambient Temperature	•	•	•	•	•	•	•	•	0.9 °F 0.5 °C	0.1 °F 0.1 °C	-20.0 to 158.0 °F -29.0 to 70.0 °C	14.0 to 131.0 °F -10.0 to 55.0 °C	Hermetically-sealed, precision thermistor mounted externally and thermally isolated (US Patent 5,939,645) for rapid response. Airflow of 2.2 mph   1 m/s or greater provides fastest response and reduction of insulation effect. Calibration drift negligible. Thermistor may also be used to measure temperature of water or snow by submerging thermistor portion into material - remove impeller prior to taking submerged measurements and ensure humidity sensor membrane is free of liquid water prior to taking humidity based measurements after submersion.
Globe Temperature - Tg	•	•	•	•	•	•	•	•	°F 1.4 °C	0.1 °F 0.1 °C	-20.0 to 140.0 °F -29.0 to 60.0 °C	14.0 to 131.0 °F -10.0 to 55.0 °C	Temperature inside 1 inch/25 mm black powder coated copper globe converted to Tg equivalent for standard 6 in/150 mm globe. Closest equivalence obtained with airflow greater than 2.2 mph   1 m/s.
Relative Humidity	•	•	•	•	•	•	•	•	3.0 %RH	0.1 %RH	5 to 95% non-condensing	0 to 100%	Polymer capacitive humidity sensor mounted in thin-walled chamber external to case for rapid, accurate response (US Patent 6,257,074). To achieve stated accuracy, unit must be permitted to equilibrate to external temperature when exposed to large, rapid temperature changes and be kept out of direct sunlight. Calibration drift +/- 2% over 24 months. Humidity sensor may be recalibrated at factory or in field using Kestrel Humidity Calibration Kit (NK PN-0802).
Pressure	•	•	•	•	•	•	•	•	0.03 inHg 1.0 hPa/mbar 0.01 PSI	0.01 inHg 0.1 hPa/mbar 0.01 PSI	8.86 to 32.49 inHg 300.0 to 1100.0 hPa/mbar 4.35 to 15.95 PSI and 32.0 to 185.0 °F 0.0 to 85.0 °C	0.30 to 48.87 inHg 10.0 to 1654.7 hPa/mbar 0.14 to 24.00 PSI and 14.0 to 131.0 °F -10.0 to 55.0 °C	Monolithic silicon piezoresistive sensor provided with second-order temperature correction. Pressure sensor may be recalibrated at factory or in field. Adjustable reference altitude allows display of station pressure or barometric pressure corrected to MSL. Kestrel 4200 displays station pressure on a dedicated screen. Kestrel 2500 and 3500 display continuously updating three-hour barometric pressure trend indicator, rising rapidly, rising, steady, falling, falling rapidly. Kestrel 4000 series displays pressure trend through graphing function. PSI display on Kestrel 4000 series only.
Compass					•	•	•	•	5°	1° 1/16th Cardinal Scale	0 to 360°	0 to 360°	2-axis solid-state magnetoresistive sensor mounted perpendicular to unit plane. Accuracy of sensor dependent upon unit's vertical position. Self-calibration routine eliminates magnetic error from batteries or unit and must be run after every full power-down (battery removal or change). Readout indicates direction to which the back of the unit is pointed when held in a vertical orientation. Declination/variation adjustable for True North readout.

CALCULATED MEASUREMENTS													
MEASUREMENT	4400	4400 w/ Bluetooth	4400 NV	4400 NV w/ Bluetooth	4600	4600 w/ Bluetooth	4600 NV	4600 NV w/ Bluetooth	ACCURACY (+/-)*	RESOLUTION	SPECIFICATION RANGE	SENSORS EMPLOYED	NOTES
Altitude	•	•	•	•	•	•	•	•	typical: 23.6 ft 7.2 m max: 48.2 ft 14.7 m	1 ft 1 m	typical: 750 to 1100 mBar max: 300 to 750 mBar	Pressure User Input (Reference Pressure)	Height above Mean Sea Level (MSL). Temperature compensated pressure (barometric) altimeter requires accurate reference barometric pressure to produce maximum absolute accuracy. Both accuracy specs corresponds to a reference pressure anywhere from 850 to 1100 mBar.
Barometric Pressure	•	•	•	•	•	•	•	•	0.07 inHg 2.4 hPa/mbar 0.03 PSI	0.01 inHg 0.1 hPa/mbar 0.01 PSI	Refer to Ranges for Sensors Employed	Pressure User Input (Reference Altitude)	Air pressure that would be present in identical conditions at MSL. Station pressure, compensated for local elevation provided by reference altitude. Requires accurate reference altitude to produce maximum absolute accuracy.
Crosswind & Headwind/Tailwind					•	•	•	•	7.1%	1 mph 1 ft/min 0.1 km/h 0.1 m/s 0.1 knots	Refer to Ranges for Sensors Employed	Wind Speed Compass	Effective wind relative to a target or travel direction. Auto-switching headwind/tailwind indication.
Density Altitude	•	•	•	•	•	•	•	•	226 ft 69 m	1 ft 1 m	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Local air density converted to equivalent elevation above sea level in a uniform layer consisting of the International Standard Atmosphere.
Dewpoint	•	•	•	•	•	•	•	•	3.4 °F 1.9 °C	0.1 °F 0.1 °C	15 to 95 % RH Refer to Range for Temperature Sensor	Temperature Relative Humidity	Temperature that a volume of air must be cooled to at constant pressure for the water vapor present to condense into dew and form on a solid surface. Can also be considered to be the water-to-air saturation temperature.
Heat Index	•	•	•	•	•	•	•	•	7.1 °F 4.0 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity	Perceived temperature resulting from the combined effect of temperature and relative humidity. Calculated based on NWS Heat Index (HI) tables. Measurement range limited by extent of published tables.
Thermal Work Limit (TWL)	•	•	•	•	•	•	•	•	10.9 W/m <sup>2</sup>	0.1 W/m <sup>2</sup>	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Estimated safe maximum continuously sustainable human metabolic rate (W/m <sup>2</sup> ) for the conditions and clothing factors. Based off of estimated metabolic output of typical human. On-screen zone warnings.
Outdoor Wet Bulb Globe Temperature (WBGT)	•	•	•	•	•	•	•	•	1.3 °F 0.7 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Measure of human heat stress defined as the combination of effects due to radiation, convection, and evaporative cooling. Outdoor WBGT is calculated from a weighted sum of natural wet bulb (T <sub>wb</sub> ), globe temperature (T <sub>g</sub> ), and dry bulb temperature (T <sub>d</sub> ). User settable on-screen warning zones.
Wet Bulb Temperature - Naturally Aspirated (T <sub>wb</sub> )	•	•	•	•	•	•	•	•	1.4 °F 0.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature Globe Temperature Relative Humidity Pressure	Similar to psychrometric wet-bulb temperature (see below). However, T <sub>wb</sub> only undergoes forced convection from the ambient air velocity. T <sub>wb</sub> is a measure of the evaporative cooling that the air will allow. This is accounted for by combining the effects of, mainly, relative humidity and windspeed.
Wet Bulb Temperature - Psychrometric	•	•	•	•	•	•	•	•	3.2 °F 1.8 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Temperature Relative Humidity Pressure	Temperature indicated by a sling psychrometer. Due to nature of the psychrometric ratio for a water-air system, this approximates the thermodynamic wet-bulb temperature. The thermodynamic wet-bulb temperature is the temperature a parcel of air would have if cooled adiabatically to saturation temperature via water evaporating into it.
Wind Chill	•	•	•	•	•	•	•	•	1.6 °F 0.9 °C	0.1 °F 0.1 °C	Refer to Ranges for Sensors Employed	Wind Speed Temperature	Perceived temperature resulting from combined effect of wind speed and temperature. Calculated based on the NWS Wind Chill Temperature (WCT) Index, revised 2001, with wind speed adjusted by a factor of 1.5 to yield equivalent results to wind speed measured at 10 m above ground. Measurement range limited by extent of published tables.

ADDITIONAL SPECIFICATIONS														
Display & Backlight	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Response Time & Display Update	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Max/Avg Wind	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Data Storage & Graphical Display, Min/Max/Avg History	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Data Upload & Bluetooth® Data Connect	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Clock / Calendar	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Auto Shutdown	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Languages	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Certifications	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Origin	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Battery Life	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Shock Resistance	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sealing	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Operational Temperature Limits	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Storage Temperature Size & Weight	•	•	•	•	•	•	•	•	•	•	•	•	•	•

\* NOTE: Accuracy calculated as uncertainty of the measurement derived from statistical analysis considering the combined effects from primary sensor specifications, circuit conversions, and all other sources of error using a coverage factor of k=2, or two standard deviations (22).  
Please note, these specifications are valid for all Kestrel 4400 and 4600 products with a serial number higher than 659340.  
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