



Certificate of Conformity

This instrument was produced under rigorous factory production control and documented standard procedures. It was individually inspected and leak tested and the functioning of the display, backlight, buttons and firmware were verified. The accuracy of each of its primary measurements was individually calibrated and /or validated according to documented standard test procedures against the standards detailed below. This instrument is warranted to perform at the date of first consumer purchase in compliance with the published specifications, including stated drift since the date of manufacture, for the specific measurements and features of its model number. (See Kestrel Limited Warranty for full warranty terms.)

Standards Used in Testing

Wind Speed:

The Kestrel Weather & Environmental 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 an Ametek DTI-050 Digital Temperature Indicator and STS Reference Sensor. The DTI-050 is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of $\pm 0.40C$.

Direction / Heading

The sensitivity of the magnetic directional sensor is verified after assembly by orienting the unit to the cardinal directions and confirming the

magnetic field output. The compass output is accurate to within ± 5 degrees as compared to a Suunto KB-14/360R G precision compass.

Relative Humidity:

Relative humidity is verified in comparison with an Edgetech HT120 Humidity Transmitter. The HT120 is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of $\pm 1.0\%RH$.

Barometric Pressure:

Pressure response is verified against a Vaisala PTB210A Digital Barometer. The Vaisala Barometer is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of $\pm 0.3hPa$.

Approved By:

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Nils Steffensen, Director of Engineering

Product Specifications for Kestrel 5400 Heat Stress Trackers

SENSORS

SENSOR	ACCURACY (+/-)	RESOLUTION	SPECIFICATION RANGE	NOTES
Wind Speed Air Flow	Larger of 3% of reading, least 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* 0.1 F/S*	0.6 to 40.0 m/s 118 to 7,874 ft/min 2.2 to 144.0 km/h 1.3 to 89.5 mph 1.2 to 77.8 knots 0 to 12 B* 2-131.2*	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 .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-0801) 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. Measuring wind speeds above 60 m/s / 134.2 mph can damage the impeller.
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	Airflow of 2.2 mph 1 m/s or greater provides fastest response and reduction of insolation effect. For greatest accuracy, avoid direct sunlight on the temperature sensor and prolonged sunlight exposure to the unit in low airflow conditions. Calibration drift is negligible for the life of the product. For further details, see Display & Battery Operational Temperature Limits.
Globe Temperature	2.5 °F 1.4 °C	0.1 °F 0.1 °C	-20.0 to 140.0 °F -29.0 to 60.0 °C	Temperature inside 1in 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	±2%RH	0.1 %RH	10 to 90% 25°C non-condensing	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 is typically less than ±0.25% per year.
Pressure	±1.5 mbar at 25°C, 700-1100 mbar/ ±0.044inHg at 77°F 20.67-32.48 inHg/ ±0.022 PSI 10.15-15.95 PSI	0.01 inHg 0.1 hPa mbar 0.01 PSI	25°C/77°F, 700-1100 mbar/20.67-32.48 inHg/10.15-15.95 PSI	Monolithic silicon piezoresistive pressure sensor with second-order temperature correction. Between 1100-1200 mbar, unit will operate with reduced accuracy. Sensor may not operate above 1200 mbar and can be damaged above 6,000 mbar or below 10 mbar. Calibration drift is negligible for the life of the product.
Compass	±5°	1° 1/16th Cardinal Scale	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	ACCURACY (+/-)	RESOLUTION	SENSORS EMPLOYED
Altitude	typical: 23.6 ft/7.2 m - 50 to 1100 mBar max: 48.2 ft/14.7 m - 300 to 750 mBar	1 ft 1 m	Pressure User Input (Reference Pressure)
Barometric Pressure	0.07 inHg 2.4 hPa mbar 0.03 PSI	0.01 inHg 0.1 hPa mbar 0.01 PSI	Pressure User Input (Reference Altitude)
Crosswind & Headwind/ Tailwind	7.1%	1 mph 1 ft/min 0.1 km/h 0.1 m/s 0.1 knots	Wind Speed Compass
Density Altitude	226 ft 69 m	1 ft 1 m	Temperature Relative Humidity Pressure
Dew Point	3.4 °F 1.9 °C 15-95% RH. Refer to Range for Temperature Sensor	0.1 °F 0.1 °C	Temperature Relative Humidity
Heat Index	7.1°F 4.0°C	0.1 °F 0.1 °C	Temperature Relative Humidity
Outdoor Wet Bulb Globe Temperature (WBGT)	3.2 °F 1.8 °C	0.1 °F 0.1 °C	Wind Speed Temperature Globe Temperature Relative Humidity Pressure
Thermal Work Limit (TWL)	10.9W/m2	0.1 °F 0.1 °C	Wind Speed Temperature Globe Temperature Relative Humidity Pressure
Wet Bulb Temperature - Psychrometric	1.3 °F 0.7 °C	0.1 °F 0.1 °C	Temperature Relative Humidity Pressure
Wet Bulb Temperature - Naturally Aspirated (NWB TEMP)	1.4 °F 0.8 °C	0.1 °F 0.1 °C	Wind Speed Temperature Globe Temperature Relative Humidity Pressure
Wind Chill	1.6 °F 0.9 °C	0.1 °F 0.1 °C	Wind Speed Temperature

ADDITIONAL PRODUCT INFO

Display & Backlight	Multifunction, multi-digit monochrome dot-matrix display. Choice of white or red LED backlight.
Response Time & Display Update	Display updates every 1 second. After exposure to large environmental changes, all sensors require an equilibration period to reach stated accuracy. Measurements employing RH may require longer periods particularly after prolonged exposure to very high or very low humidity. WBGT requires about 8 minutes to reach 95% accuracy and about 15 minutes to reach 99% accuracy after exposure to large environmental changes.
Data Storage & Graphical Display, Min/Max/Avg History	Logged history stored and displayed for every measured value. Manual and auto data storage. Min/Max/Avg history may be reset independently. Auto-store interval settable from 2 seconds to 12 hours, overwrite on or off. Logs even when display off except for 2 and 5 second intervals. Kestrel 5 series units hold over 10,000 data points.
Data Upload & Bluetooth® Data Connect Option	Wireless range up to 100ft. Connection requires optional USB data transfer cable or Kestrel Link Dongle or Kestrel LINK app. Employs Kestrel Link protocol for data transmission with Link supported devices. (Kestrel LINK for iOS/Android, Kestrel Link for PC/MAC).
Clock / Calendar	Real-time hours:minutes:seconds clock, calendar, automatic leap-year adjustment.
Auto Shutdown	User-selectable - Off, 15-60 minutes with no key presses.
Languages	English, French, German, Spanish.
Certifications	CE certified, RoHS and WEEE compliant. Individually tested to NIST-traceable standards.
Origin	Designed and manufactured in the USA from US and imported components. Complies with Regional Value Content and Tariff Code Transformation requirements for NAFTA Preference Criterion B.
Battery Life	AA Lithium, included. Up to 400 hours of use, reduced by backlight, alert light and buzzer, or Bluetooth radio transmission use.
Shock Resistance	MIL-STD-810g, Transit Shock, Method 516.5 Procedure IV; unit only; impact may damage replaceable impeller.
Sealing	Waterproof (IP67 and NEMA-6)
Display & Battery Operational Temperature Limits	14° F to 131° F -10 °C to 55 °C Measurements may be taken beyond the limits of the operational temperature range of the display and batteries by maintaining the unit within the operational range and then exposing it to the more extreme environment for the minimum time necessary to take reading.
Storage Temperature	-22.0 °F to 140.0 °F -30.0 °C to 60.0 °C.
Size & Weight	6.5 x 1.9 x 1.1 in / 16.5 x 4.5 x 2.8 cm, 4.8 oz / 136 g. (Lithium battery included)