



QUICK START GUIDE

Kestrel 5000 Environmental Meter

Kestrel 5100 Racing Weather Meter

Kestrel 5200 Professional Environmental Meter

Measurements and Features 5

Getting to Know Your Kestrel 7

Buttons 8

Kestrel Options Menu 8

Kestrel Menu Navigation 9

Weather Mode Screen 10

Getting Started 11

Altimeter and Barometer 12

Using Min/Avg/Max 13

Connecting to Devices Using Link..... 14

Connecting to Computers Using USB Cable..... 14

Creating, Viewing, & Exporting Data Logs..... 15

Measuring Air Flow 17

Measuring Evaporation Rate..... 17

Weather Glossary..... 18

Impeller Replacement 20

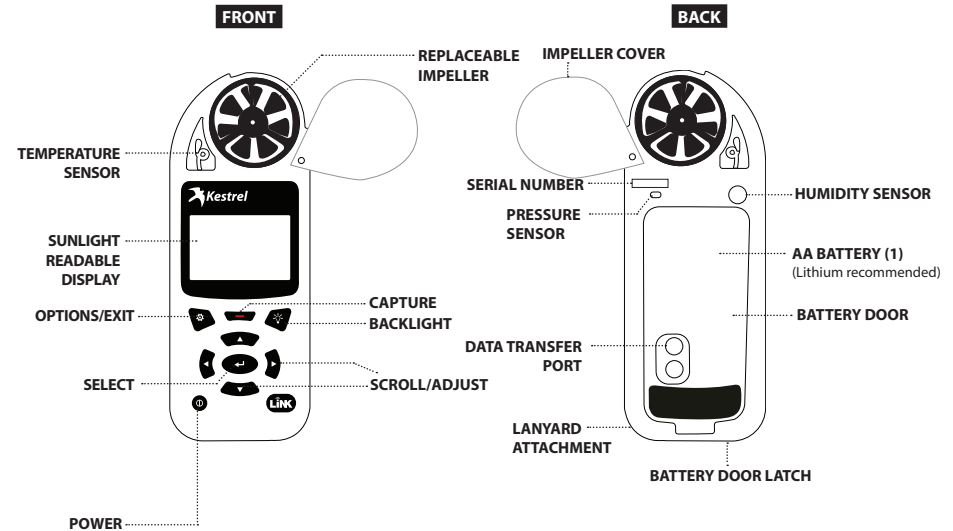
Warranty Certificate..... 21

MEASUREMENTS	Icon	5000 Environmental	5100 Racing	5200 Professional	5500 Weather	5400 HST
Wind Speed Air Speed (mph fpm Bft m/s km/h kt)		•	•	•	•	•
Temperature (°F °C)		•	•	•	•	•
Wind Chill (°F °C)		•	•	•	•	•
Relative Humidity (%)		•	•	•	•	•
Heat Stress Index (°F °C)		•	•	•	•	•
Dewpoint Temp (°F °C)		•	•	•	•	•
Wet Bulb Temp (°F °C)		•	•	•	•	•
Station Pressure (inHg hPA psi mb)		•	•	•	•	•
Barometric Pressure (inHg hPA psi mb)		•	•	•	•	•
Altitude(m ft)		•	•	•	•	•
Density Altitude (m ft)		•	•	•	•	•
Wind Direction (Cardinal Points, Degrees)					•	•
Crosswind (mph fpm Bft m/s km/h kt)					•	•
Headwind Tailwind (mph fpm Bft m/s km/h kt)					•	•

• optional

MEASUREMENTS	Icon	5000	5100	5200	5500	5400
		Environmental	Racing	Professional	Weather	HST
Moisture Content Humidity Ratio (Grains) (gpp, g/kg)			•	•		
Air Density (lb/ft ³ , kg/m ³)			•	•		
Relative Air Density (RAD) (%)			•	•		
Evaporation Rate (lb/ft ² /hr, kg/m ² /hr)				•		
Volume Air Flow (%)				•		
Delta T (°F °C)				•		
Wet Bulb Globe Temperature (WBGT) (°F °C)						•
Thermal Work Limit (TWL) (°F °C)						•
Globe Temperature (°F °C)						•
Naturally Aspirated Wet Bulb Temp (°F °C)						•
FEATURES		5000	5100	5200	5500	5400
		Environmental	Racing	Professional	Weather	HST
LiNK Connectivity & Kestrel LiNK Mobile App	N/A	•	•	•	•	•
Backlit Display switchable white or Night-Vision preserving red	N/A	•	•	•	•	•

• optional



BUTTONS

Button	Name	Function
ⓘ	POWER	Turns Kestrel on and off. Press for on, hold for two seconds to turn off.
⚙️	OPTIONS/ EXIT	Enter the main Options menu or exit a menu.
⬅️	SELECT	Access Settings on any measurement screen or select a menu option to enter its submenu or confirm a task.
▲▼	UP/DOWN	Scroll up and down through measurement screens or menus. Adjust values when entering text in name menus.
◀▶	LEFT/ RIGHT	Scroll options left and right. Adjust values in combo menus and setting submenus.
—	CAPTURE	In Weather Mode, manually capture all environmental values.
💡	BACK-LIGHT	Turn backlight on or off. (Also turns off automatically after one minute.)

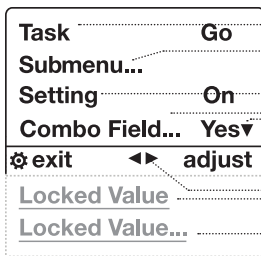
KESTREL OPTIONS MENU

Most system-wide and weather setup options are accessed from the main Options menu by pressing the ⚙️ button from any Weather Measurement Screen or the main Targeting Screen.

- **BLUETOOTH**
 - » Bluetooth On/Off
- **DATA PORT**
- **MEMORY OPTIONS**
 - » Clear Log
 - » Auto Store
 - » Store Rate
 - » Overwrite
- **GRAPH SCALE**
- **DISPLAY**
 - » Auto Shutdown
 - » Contrast
 - » Backlight
- **SYSTEM**
 - » Time & Date
 - » Measurements
 - » Units
 - » Lang
 - » Batt
 - » Factory Restore
- **ABOUT**
 - » Version
 - » Legal

KESTREL MENU NAVIGATION

TYPES OF MENU ITEMS



» Tasks are executed by highlighting the field and pressing Select.

» The presence of a submenu is indicated by a "... following a field.

» Highlight the field and press Select to enter a submenu.

» Adjust a setting by pressing left or right.

» An arrow indicates there are additional fields off screen.

» Adjust the value of a Combo Field by pressing left or right.

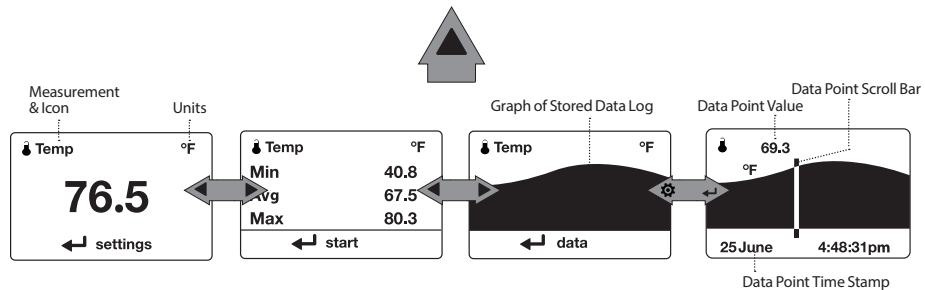
» Enter the Combo Field sub menu by pressing select.

» Navigation buttons indicate available actions on the current screen.

» Locked values are either driven by another value or cannot be edited on the current screen.

» Locked values may have submenus which are entered by pressing select.

MORE MEASUREMENTS



Current Measurement Screen

Press **SELECT** to enter settings menu for that measurement.

Min Ave Max Screen

Press **SELECT** to start, stop and clear the Min/Avg/Max tracking.

Data Graph Screen

Press **SELECT** to enter the Data Log Detail Screen to view logged data points.

Data Points Screen

Press LEFT/RIGHT to scroll through data points. Press **OPTIONS** to exit Data Log Details Screen.

MORE MEASUREMENTS

- » The **▲▼** UP/DOWN buttons navigate between all weather measurements set to "On" in Options|Measurements.
- » The **◀▶** LEFT/RIGHT buttons scroll between the three display screens for the measurement.
- » The **⚙️** **OPTIONS** button exits the **settings** submenu and Data Log Detail Screen.

1. **INSTALL BATTERY.** Slide the battery door latch and open door. Insert the provided AA lithium battery as indicated by the label. Replace the battery door, ensuring it "clicks" fully into place.
2. **POWER ON KESTREL.** Press **⏻** to power on Kestrel.
3. **ENTER OPTIONS MENU.** Press **⚙️** to enter the Options Menu.
4. **SET AUTO STORE RATE.** Scroll to and select **Memory Options**. Scroll to **Auto Store** and ensure it is set to **ON**. Scroll to **Store Rate** and adjust to desired frequency of automatic weather data logging.
5. **SET OVERWRITE.** Scroll to and select **Memory Options**. Scroll to **Overwrite** and set to **On** to allow the data log to wrap once full and to **OFF** to stop logging when full.
6. **SET GRAPH SCALE.** Scroll to and select **Graph Scale**. Scroll to and select the desired measurement type. Adjust the **Set High** and **Set Low** values to bound the desired display values.
7. **SET AUTO SHUTDOWN.** Scroll to and select **Display**. Scroll to **Auto Shtdwn** and choose a time window after which the Kestrel will shut down without any button presses.
8. **SET BACK LIGHT COLOR.** Scroll to and select **Display**. Scroll to **Backlight** and set to either **White** or **Red**. White is very bright and ideal for any dim light use. Red is reduced brightness and a wavelength selected to preserve adapted night vision for true dark operations.
9. **SET DATE AND TIME.** Scroll to and select **System**. Scroll to and select **Time & Date**. Adjust the time and date.
10. **TURN ON/OFF MEASUREMENT SCREENS.** Scroll to and select **System**. Scroll to and select **Measurements**. Set measurement screens to either **On** or **Off** as desired.
11. **SET UNITS.** Scroll to and select **System**. Scroll to and select **Units**. To change all units select **Global**, then set **Global to Imperial** or **Metric**, and then scroll to **Apply** and select **Go**. To set units individually, scroll to each measurement type in the **Units** submenu and set to the desired units. Units can also be set in the **Settings** menu for each measurement.
12. **SET LANGUAGE.** Scroll to and select **Lang**. Adjust to desired language: **English, Deutsche, Francais, Espanol**.

The Kestrel employs a stable, accurate pressure sensor to measure station pressure, the unadjusted air pressure in your location.

- » To use your Kestrel to measure barometric pressure (station pressure adjusted for local elevation), you must enter a correct reference value for your altitude. Accurate barometric readings require that no elevation changes be made while taking measurements.
- » To use your Kestrel to measure altitude changes (changes in station pressure associated with changes in elevation), you must enter a correct reference value for your starting barometric pressure. Accurate altitude readings depend on stable, weather related barometric air pressure while measurements are taken.
- » Synched values between the Altitude and Barometer measurement screens allow reference value updates on either screen to automatically update reference values on the other.

□ *Note! You cannot use your Kestrel as a barometer and altimeter simultaneously.*

SETTING REFERENCE VALUES ON BARO MEASUREMENT SCREEN:

- » Scroll to the **Baro** measurement screen and select **Settings**.
- » Adjust either the Altitude or the Barometric Pressure value to a local, known value obtained from a mapping reference, GPS, or accurate weather station in the same location.

SETTING REFERENCE VALUES ON ALTITUDE MEASUREMENT SCREEN:

- » Scroll to the **ALTITUDE** measurement screen and select **Settings**.
- » Adjust either the Altitude or the Barometric Pressure value to a local, known value obtained from a mapping reference, GPS, or accurate weather station in the same location.

□ *Note! You should enter new reference values whenever you are using the Altimeter or Barometer functions and your location or the weather conditions have changed.*

Pressing the right scroll button from any Current Measurement Screen will open the Min/Avg/Max Screen. The capture process is linked for all measurement screens, capturing Min/Avg/Max values on one measurement screen will capture Min/Avg/Max values over the same time period for all measurements. Each new Min/Avg/Max capture overwrites the previously captured value from all measurements.

CAPTURING MIN/AVG/MAX VALUES:

- » Scroll to the Min/Avg/Max Screen of the desired measurement. This can be done by scrolling right from the desired Current Measurement Screen or scrolling vertically from another measurement's Min/Avg/Max Screen.
- » Press Select to **Start** a new Min/Avg/Max capture.
- » Press Select to **Stop** the capture time period and view Min, Avg, and Max values.
- » Press Select to **Clear** the Min/Avg/Max values.

- » To change the resolution of the graph, scroll to and select **Graph Scale** in the Options menu. Scroll to and select the desired measurement type. Adjust the **Set High** and **Set Low** values to bound the desired display values.

EXPORTING DATA LOGS TO A MOBILE DEVICE:

- » Follow the links at www.kestrelinstruments.com to locate Kestrel LiNK in the App or Play store and install on your mobile device.
- » Follow the directions in the Kestrel LiNK app and in the section of this manual titled Pairing with a Computer, Mobile Phone or Tablet: to connect the mobile device to the Kestrel.
- » The Kestrel's new logged data will automatically be added to the app's log whenever the devices are connected.
- » To export logged data to a .csv file for further analysis, go to the **Stats** page of the app or the **Manage Data Logs** screen on the **Manage** page.
- » Hit the **Export Data** button. Choose a method for exporting the data and follow the in-app prompts to send.

Use one of the following two methods to connect your Kestrel to your computer.

- 1. Connect your LiNK-enabled Kestrel Meter to your computer wirelessly:**
 - » Purchase a Kestrel LiNK Dongle and install in your computer's USB port.
 - » Follow the instructions in the "Pairing with a Computer, Mobile Phone or Tablet" section of this manual along with the Kestrel LiNK program to pair the Kestrel and your computer.
- 2. Connect your Kestrel 5 Series Meter to your computer using a Kestrel USB Data Transfer Cable:**
 - » Purchase a Kestrel USB Data Transfer Cable.
 - » In the main Options menu, scroll to and select **Data Port** and set to **On**.
 - » Insert the USB Data Transfer Cable into an open USB port and the Data Transfer Port on the back of the Kestrel unit.

Once connected

- » Follow the directions in the Kestrel LiNK program to confirm the connection.
- » In the Kestrel LiNK software, choose a data log from the Logs window and click on the Export to File button.
- » Choose a file export directory on your computer and click on the Ok button.

MEASURING AIR FLOW

Professional Units Only

Kestrel Professional Meters can calculate air flow through a duct by combining user input information about the size and shape of the duct with the measured air velocity. In addition to reading the instantaneous Air Flow off the main measurement screen, a more accurate result may be obtained by capturing an average air flow on the Min/Ave/Max screen while transversing the duct. Capturing an average can be particularly helpful when remeasuring ducts with registers or dimensionally uneven air flow.

- » From any current measurement screen, scroll to **AIR FLOW** and select **Settings**.
- » Set Shape to match the shape of the duct, either **Rect** (rectangle) or **Circle**.
- » Input the dimensions of the duct by setting **Length** and **Width** for a **Rectangle** or **Diameter** for a **Circle** duct and press **exit**.

MEASURING EVAPORATION RATE

Professional Units Only

Kestrel Professional Meters can calculate a concrete evaporation rate (ACI 308) by combining a user input concrete temperature with measured air temperature, wind speed and relative humidity. Concrete mix temperature is generally measured with a probe or infrared thermometer and should be read at the time of making the evaporation rate measurement.

MEASURING EVAPORATION RATE:

- » From any current measurement screen, scroll to **EVAP** and select **Settings**.
- » Measure the temperature of the concrete mix and set **Mix Temp** to the correct value, then press **exit**.
- » To take a reading, hold the unit vertically, approximately 20 inches above the surface of the concrete while facing the rear of the unit directly into the wind. To avoid inaccurate Evaporation Rate readings due to thermal loading it is best to shade the Kestrel. (Be sure the source of shade is not obstructing the wind speed measurement.)
- » The ACI recommends taking a 6-10 second average of the evaporation rate to account for fluctuating wind speeds. To measure an average Evaporation Rate, scroll right from the Current Measurement Screen to the Min/Ave/Max Screen and press select to manually **start** and **stop** a capture.

DIRECTION – Compass heading in true or magnetic North.

WIND SPD – Wind Speed is the measurement of the wind passing through the impeller. For greatest accuracy, point the back of the Kestrel directly into the wind.

CROSWND – Crosswind uses the internal compass and a user selected heading to calculate the crosswind component of the full wind.

HEADWIND – Headwind uses the internal compass and a user selected heading or target direction to calculate the headwind component of the full wind.

TEMP – Ambient Temperature is the temperature measured at the thermistor. For best results, ensure the thermistor is not exposed to direct sunlight and is exposed to good airflow.

CHILL – Wind Chill is a calculated value of the perceived temperature based on temperature and wind speed.

HUMIDITY – Relative Humidity is the amount of moisture currently held by the air as a percentage of the total possible moisture that the air could hold.

HEAT INDEX – Heat Index is a calculated value of the perceived temperature based on temperature and relative humidity.

DEW POINT – Dew Point is the temperature at which water vapor will begin to condense out of the air.

WET BULB – Wet Bulb is the lowest temperature that can be reached in the existing environment by cooling through evaporation. Wet Bulb is always equal to or lower than ambient temperature.

BARO – Barometric Pressure is the local atmospheric pressure (also called station or absolute pressure) adjusted to mean pressure. An accurate reading depends on a correct altitude input and unchanging altitude while measuring.

ALTITUDE – Altitude is the vertical distance above mean sea level associated with given atmospheric pressure. An accurate reading depends on correct initial barometric pressure input and stable barometric pressure while measuring.

STATION – Station Pressure (Absolute Pressure) is the pressure exerted by the atmosphere at the location.

DENS ALT – Density Altitude is the altitude at which the density of the theoretical standard atmospheric conditions (ISA) would match the actual local air density.

MOISTURE | HUM RATIO – Moisture Content or Humidity Ratio is the ratio between the mass of water vapor measured in the air to the mass of dry air with no water vapor. (Not available in

Environmental models)

DENSITY - Air density is the mass of the measured air per unit volume. (Not available in Environmental models)

RAD – Relative Air Density is the ratio of the measured air density to the air density at sea level using the International Civil Aviation Organization (ICAO) standard reference conditions. (Not available in Environmental models)

EVAP – Evaporation Rate (based on ACI 308) is a guide to how quickly concrete will lose moisture in the measured pour environment. (Not available in Environmental or Racing models)

AIR FLOW – Volume Air Flow is a measure of the volume of air passing through a duct of a shape and size defined by the user. (Not available in Environmental or Racing models)

DELTA T – Delta T is the difference between the wet bulb and the dry bulb temperature and is used to determine acceptable agricultural spraying conditions. (Not available in Environmental or Racing models)

IMPELLER REPLACEMENT

- Press only the sides of the impeller when removing and inserting to avoid damaging the precision hub bearing. [Figure 1].
- » Press FIRMLY on the impeller module to remove it.
- » Insert the new impeller so the side that has the small triangle (close to the perimeter) faces the front of the Kestrel when installed.

Figure 1



- » Orient one "arm" of the module straight up. [Figure 2]. The impeller can be pushed in from either side.

Figure 2



5-YEAR LIMITED PRODUCT WARRANTY

WARRANTY CERTIFICATE

Your Kestrel Weather/Environmental Meter is warranted to be free of defects in materials and workmanship for a period of FIVE YEARS from the date of its first consumer purchase. NK will repair or replace any defective meter or part when notified within the warranty period, and will return the meter via domestic ground shipping or NK's choice of method of international shipping at no charge. The following are excluded from warranty coverage: damage due to improper use or neglect (including corrosion); damage caused by severe or excessive impact, damage caused by failed or leaking batteries, crushing or mechanical harm; modifications or attempted repairs by someone other than an authorized NK repair agent; impeller failure not caused by a manufacturing defect; normal usage wear and failed batteries. Measurement accuracy is warranted to be within the specifications on the supplied Certificate of Conformity including specified drift since date of manufacture. If no warranty registration or proof of purchase is provided, the warranty period will be measured from the meter's date of manufacture.

Except for the warranties set forth herein, NK disclaims all other warranties, expressed, implied or statutory, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by applicable law are limited to the term of this warranty. In no event shall NK be liable for any incidental, special or consequential damages, including, but not limited to, loss of business, loss of profits, loss of data or use, whether in an action in contract or tort or based on a warranty, arising out of or in connection with the use or recalibration, performance of an NK product, even if NK has been advised of the possibility of such damages. You agree that repair, and (upon availability) replacement, as applicable, is your sole and exclusive remedy with respect to any breach of the NK Limited Warranty set forth herein.

All product liability and warranty options are governed exclusively by the laws of the Commonwealth of Pennsylvania.

