Agriculture Product Line
User Guide
Kestrel 5000AG Livestock Environmental Meter
Kestrel 5400AG Cattle Heat Stress Tracker

www.kestrelinstruments.com
Your Kestrel Weather/Environmental Meter is designed to provide accurate measurement of current conditions only. Depending on your location and environment, conditions may change rapidly.

Rapid temperature and humidity changes (i.e., moving your meter from indoors to outdoors) may cause inaccurate readings of temperature and humidity as well as all readings that rely on either of these values. Before relying on readings from your Kestrel Meter, be sure to wait until your unit’s readings have stabilized, indicating it has equilibrated to its new environment. Forcing air over the sensors by waving or slinging your meter through the air can help speed that process.

To maximize the accuracy and reliability of your readings:
- Ensure that your Kestrel Meter is in good repair and within factory calibration.
- Take readings frequently and carefully according to the guidelines above.
- Allow your meter’s readings to stabilize after significant changes in temperature or humidity (i.e., changing location from indoors to outdoors).
- Allow a margin of safety for changing conditions and reading errors (2-3% of reading is recommended).

Use care and good judgment when referring to your Kestrel Meter to make any decisions regarding safety, health or property protection.

To reduce the risk of injury or death to persons or animals, read and follow these guidelines!

Your Kestrel Weather/Environmental Meter may provide one or more of these measurements relating to estimation of danger of injury to people or animals from heat or cold: Heat Stress Index, Wind Chill Index, Wet Bulb Globe Temperature (“WBGT”), Temperature-Humidity Index (THI), Heat Load Index (HLI), Accumulated Heat Load Units (AHLU). Note that guidance tables based on these values are based on typical physiological response. Certain individuals/animals may be more susceptible to harm relating to environmental conditions and require additional precautions. For example, high producing dairy cows; heavier finished cattle; and individuals/animals that are very young or elderly, with asthma or respiratory conditions, or who have not become acclimatized to hot conditions are likely to be more prone to heat injury.

- Biological factors (breed, acclimation, heat sensitivity, diet, health, coat color, etc.) can modify an individual animal’s response to given environmental conditions with severe and extreme conditions sometimes resulting in death. The use of a Kestrel Meter does not replace the need for animal observation and monitoring.
- In the case of human heat illness, remember the rule – “Cool first, transport second.” An inexpensive ice bath can mean the difference between life and death.

Be prepared: know yourself and those you are responsible for, know what to do in the event of a heat or cold injury, and know when to seek guidance of medical professionals.

Your Kestrel Weather/Environmental Meter is not a medical device. It is only one source of information and must be employed with care and good judgment.
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We recommend that ONLY Lithium AA batteries be used in your Kestrel Weather/Environmental Meter to provide the widest operating temperature range and to avoid damage caused by leaking lead-acid batteries. If you must use conventional AA batteries, please do not store your Kestrel Meter with the batteries in place. Damage caused by battery corrosion is not covered under warranty.

**WARNING:** Lithium is a toxic substance and ingestion may cause serious injury or death. Keep lithium batteries out of the reach of children and animals. If swallowed, immediately seek medical help. Have doctor phone 24-hour hotline at (202) 625-3333, call collect if necessary. Dispose of batteries properly and according to local regulations. Do not puncture or burn batteries. If the battery compartment does not close securely, stop using the product and keep it away from children and animals.

**WARNING:** Utilizing the alert light and buzzer in your Kestrel Cattle Heat Stress Tracker places a higher demand on the battery. To ensure the alert light and buzzer operate when needed, replace the battery when a third or less of battery life remains, as indicated on start up.

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**BATTERIES**

This User Guide contains all the information you need to get started using your Kestrel meter. For additional information, FAQ’s, chat, and e-mail support, visit [www.kestrelinstruments.com](http://www.kestrelinstruments.com).

For more information on cattle heat stress visit us at [www.cattleheatstress.com](http://www.cattleheatstress.com).

For questions about your Kestrel Meter, contact us at (800) 784-4221 Toll Free North America (610) 447-1555

Email: support@kestrelinstruments.com

Facebook: Fb.com/KestrelMeters

Twitter: @KestrelWeather

**WARNING:** This product and/or its included or branded accessories can expose you to chemicals, including lead, lead compounds and phthalate DEHP, which are known to the State of California to cause cancer and lead and lead compounds, bisphenol A (BPA), and phthalate DnHP, which are known to the State of California to cause birth defects or other reproductive harm. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)
<table>
<thead>
<tr>
<th>MEASUREMENTS</th>
<th>Icon</th>
<th>5000 Environmental</th>
<th>5000AG Livestock</th>
<th>5400 HST</th>
<th>5400AG Cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Direction (Cardinal Points, Degrees)</td>
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<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>Air Speed</td>
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<td>•</td>
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<td>•</td>
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<tr>
<td>(mph</td>
<td>fpm</td>
<td>Bft</td>
<td>m/s</td>
<td>km/h</td>
<td>kt)</td>
</tr>
<tr>
<td>Volume Air Flow (cfm, m³/hr, m³/m, m³/s, L/s)</td>
<td>🧪</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Crosswind</td>
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<td>fpm</td>
<td>Bft</td>
<td>m/s</td>
<td>km/h</td>
<td>kt)</td>
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<tr>
<td>Headwind</td>
<td>Tailwind</td>
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<td>fpm</td>
<td>Bft</td>
<td>m/s</td>
<td>km/h</td>
<td>kt)</td>
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<td>Temperature (°F</td>
<td>°C)</td>
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<td>•</td>
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<tr>
<td>Wind Chill (°F</td>
<td>°C)</td>
<td>🧪</td>
<td>•</td>
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<tr>
<td>Relative Humidity (%)</td>
<td>🧪</td>
<td>•</td>
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<td>•</td>
<td>•</td>
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<tr>
<td>Heat Stress Index (°F</td>
<td>°C)</td>
<td>🧪</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Temperature-Humidity Index (THI)</td>
<td>🧪</td>
<td>•</td>
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<td>•</td>
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<tr>
<td>Globe Temperature (°F</td>
<td>°C)</td>
<td>🧪</td>
<td>•</td>
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</tr>
<tr>
<td>Naturally Aspirated Wet Bulb Temp (°F</td>
<td>°C)</td>
<td>🧪</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Wet Bulb Globe Temperature (WBGT) (°F</td>
<td>°C)</td>
<td>🧪</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Heat Load Index (HLI)</td>
<td>🧪</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
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• optional
## MEASUREMENTS

<table>
<thead>
<tr>
<th>MEASUREMENT</th>
<th>Icon</th>
<th>5000 Environmental</th>
<th>5000AG Livestock</th>
<th>5400 HST</th>
<th>5400AG Cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulated Heat Load Units (AHLU)</td>
<td>![Icon]</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Dewpoint Temp (°F</td>
<td>°C)</td>
<td>![Icon]</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Wet Bulb Temp (°F</td>
<td>°C)</td>
<td>![Icon]</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Station Pressure (inHg</td>
<td>hPA</td>
<td>psi</td>
<td>mb)</td>
<td>![Icon]</td>
<td>•</td>
</tr>
<tr>
<td>Barometric Pressure (inHg</td>
<td>hPA</td>
<td>psi</td>
<td>mb)</td>
<td>![Icon]</td>
<td>•</td>
</tr>
<tr>
<td>Altitude (m</td>
<td>ft)</td>
<td>![Icon]</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Density Altitude (m</td>
<td>ft)</td>
<td>![Icon]</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Delta T (°F</td>
<td>°C)</td>
<td>![Icon]</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

## FEATURES

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>5000 Environmental</th>
<th>5000AG Livestock</th>
<th>5400 HST</th>
<th>5400AG Cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiNK Connectivity &amp; Kestrel LiNK Mobile App</td>
<td>N/A</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Backlit Display switchable white or Night-Vision preserving red</td>
<td>N/A</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

*optional*
GETTING TO KNOW YOUR KESTREL

*Only available on 5400 meters
### BUTTONS

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

### 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.

#### BLUETOOTH
- Bluetooth On/Off
- Conct

#### DATA PORT

#### MEMORY OPTIONS
- Mem Used
- Auto Store
- Store Rate
- Overwrite
- Clear Log

#### GRAPH SCALE

#### DISPLAY
- Auto Shutdown
- Contrast
- Backlight
- Alerts

#### SYSTEM
- Time & Date
- Compass Cal
- Measurements
- Units
- Lang
- Batt
- Factory Restore

#### ABOUT
- Version
- Legal

*Note*! Not all features listed available on all units.
WEATHER MODE SCREENS

MORE MEASUREMENTS

Measurement & Icon

Units

Graph of Stored Data Log

Data Point Value

Min Ave Max Screen

Data Graph Screen

Data Points Screen

Current Measurement Screen

Press ⬅️ SELECT to enter settings menu for that measurement.

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

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

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.
KESTREL MENU NAVIGATION

TYPES OF MENU ITEMS

<table>
<thead>
<tr>
<th>Task</th>
<th>Go</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submenu...</td>
<td>On</td>
</tr>
<tr>
<td>Setting</td>
<td>On</td>
</tr>
<tr>
<td>Combo Field...</td>
<td>Yes</td>
</tr>
<tr>
<td>exit</td>
<td>adjust</td>
</tr>
</tbody>
</table>

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.

HLI MEASUREMENT SCREEN

![HLI Measurement](image)

- HLI Measurement
- Selected Guideline: Current Zone

Note! While HLI and THI are measured in Fahrenheit and Celsius, the scale of both values is not comparable to standard temperature readings.

AHLU MEASUREMENT SCREEN

![AHLU Measurement](image)

- HLI Upper Limit Threshold
- AHLU Measurement
- Selected Guideline: Current Zone
GETTING STARTED

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 \( \text{\textdagger} \) to power on Kestrel.

3. **ENTER OPTIONS MENU.** Press \( \text{\textdaggerdbl} \) 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 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 BACKLIGHT 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. **CALIBRATE THE COMPASS.**

    Kestrel 5400AG Cattle Heat Stress Tracker Only

    Scroll to and select **System.** Scroll to and select **Compass Cal.** Follow the on-screen instructions:
    
    » Place the base of the Kestrel on a flat surface at least 3 feet from any large metal objects.
    
    » Start the calibration routine. Rotate the Kestrel around its vertical axis 3 times, keeping the unit as vertical as possible and taking approximately 10 seconds per full rotation. You may need to restart the routine a few times until you get the timing correct.

    *Note: When taking compass readings, keep the Kestrel as vertical as possible for maximum accuracy.*

11. **TURN MEASUREMENT SCREENS ON/OFF.**

    Scroll to and select **System.** Scroll to and select **Measurements.** Set measurement screens to either **On** or **Off** as desired.

12. **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.

13. **SET LANGUAGE.** Scroll to and select **Lang.** Adjust to desired language: **English, Deutsche, Francais, Espanol.**
MEASURING AIR FLOW

Kestrel 5000AG Livestock Environmental Meter Only

Kestrel 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 traversing the duct. Capturing an average can be particularly helpful when measuring 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 THI, HLI, AHLU, AND WBGT

1. SELECTING THI AND HLI EQUATIONS.
   1. Scroll to the THI Current Measurement Screen and press select.
   2. Set THI Model to either NRC or YOUSEF (see Glossary/THI Menu for definitions).
   3. Your Kestrel Cattle Heat Stress Tracker offers the blended HLI equation (see Glossary/HLI Menu for definitions).

2. CONFIGURE HLI AND THI SETTINGS

HLI Available in Kestrel 5400AG Cattle Heat Stress Tracker Only

1. Scroll to HLI (or THI) Current Measurement Screen and press select.
2. To use the colored HLI/THI zones or categories, scroll to Zones and set to On. The zones increase from White to Black in order of severity of risk of heat injury.
3. To access a pre-saved HLI/THI guideline, scroll to Zones . . . and press select, then scroll to Guide . . . and press select. Follow the menu options to find your organizations suggested threshold guidelines for each zone. More detailed information on zones can be found in the Glossary/THI MENU and HLI MENU.
4. For information on setting custom zone settings see page 16.
5. Light or buzzer alerts are available in the Kestrel 5400AG Cattle Heat Stress Tracker only. To receive light or buzzer alerts when HLI or THI is above a zone threshold, scroll to and select Alerts . . . in the HLI/THI Settings menu. You may set Light and Buzzer individually. Selecting a zone for Light or Buzzer
will cause that alert to activate when conditions reach the threshold for the selected zone.

Warning: In addition to monitoring AHLU/HLI/THI values, please observe cattle for additional signs and symptoms of heat stress. Additional factors such as age, coat length, coat color, acclimation, health, and nutritional status interact with environmental factors and contribute to severity of heat stress on individual animals.

3. CONFIGURE AHLU SETTINGS
Kestrel 5400AG Cattle Heat Stress Tracker Only
Your Kestrel Cattle Heat Stress Tracker offers 3 AHLU screens. Each AHLU screen can be configured for different pen and cattle conditions.

1. Scroll to AHLU (1,2 or 3) Current Measurement Screen and press select.
2. Scroll to Pen Management . . . and press select. Default settings are set to “reference animal” as defined in the Glossary/AHLU Menu/Table 1. The reference animal has an HLI upper limit of 86. Set parameters for your pen conditions if they vary from reference animal. Set Manure Class based on your site's manure management practices (Glossary/AHLU Menu/Table 2 and 3). Set Shade based on the amount of shade available calculated at midday per Standard Cattle Unit (Glossary/AHLU Menu/Table 4). Set H2O Temp based on the temperature of the water in the troughs (Glossary/AHLU Menu/Table 5). Set Extra H2O to Yes if extra water troughs are installed during heat events (Glossary/AHLU Menu/Table 6). Set Heat Rations to Yes if your site implements a feeding strategy for heat stress management (Glossary/AHLU Menu/Table 6). Set Manure Clear to Yes if your site implements strategic manure clearing of wet deposition areas during heat events (Glossary/AHLU Menu/Table 6).

3. Scroll to Cattle Profile . . . and press select. Default settings are set to “reference animal” as defined in the Glossary/AHLU Menu/Table 1. The reference animal has an HLI upper limit of 86. Set parameters for your herd conditions if they vary from reference animal. Set Type based on cattle breed (Glossary/AHLU Menu/Table 7). Set Coat based on coat color (Glossary/AHLU Menu/Table 8). Set Days based on the number of days on feed for cattle (Glossary/AHLU Menu/Table 9). Set Health based on if cattle are healthy or sick/recovering/unacclimatised (Glossary/AHLU Menu/Table 10).

4. To use the colored AHLU zones or categories, scroll to Zones and set to On. The zones increase from White to Black in order of severity of risk.

5. To access a pre-saved guideline, scroll to Zones . . . and press select, then scroll to Guide . . . and press select. Follow the menu options to find your organizations suggested threshold guidelines for each zone. More detailed information on zones can be found in the Glossary/AHLU MENU.
6. For information on setting custom zone settings see page 16.

7. To receive light or buzzer alerts when AHLU is above a zone threshold, scroll to and select Alerts... in the AHLU Settings menu. You may set Light and Buzzer individually. Selecting a zone for Light or Buzzer will cause that alert to activate when conditions reach the threshold for the selected zone.

8. Repeat steps 1 and 7 for all AHLU screens.

Note: The AHLU Current Measurement Screen will display the HLI Upper Limit threshold based on the selected pen and cattle conditions as part of the icon. If varying pen and cattle conditions were selected, each AHLU Current Measurement Screen will display a different AHLU icon value.

4. CONFIGURE WBGT SETTINGS.

Kestrel 5400AG Cattle Heat Stress Tracker Only

1. Scroll to the WBGT Current Measurement Screen and press select.

2. Set Type to either Indoor or Outdoor, depending on your environment.

3. To use the colored WBGT zones (also known as Flag Settings), scroll to Zones... and set to On. The zones increase from White to Black in order of severity of risk of heat injury.

4. To access one of the pre-saved WBGT guidelines, scroll to Zones... and press select, then scroll to Guide... and press select. Follow the menu options to find your organization’s WBGT guidelines. If additional workload or clothing inputs are required, set Workload and Clothing to appropriate values for your situation.

5. For information on setting custom threshold flag settings see page 16.

6. To receive light or buzzer alerts when WBGT is above a zone threshold, scroll to and select Alerts... in the WBGT Settings menu. You may set Light and Buzzer individually. Selecting a zone for Light or Buzzer will cause that alert to activate when conditions reach the threshold for the selected zone.

Warning: In addition to monitoring WBGT values, please refer to your state or organization’s requirements for measuring WBGT, heat acclimatization guidelines, work/rest ratios and water consumption.
Notes: The AHLU upper limit in the Cattle Heat Stress Tracker is 400. Dr. John Gaughan, University of Queensland, provided guidance on using this value.

To highlight the severity of conditions, if the Red Warning Zone is reached, the line indicating the current zone will flash. If the Black Warning Zone is reached, the measurement value will flash inverted.

If an alert is activated, pressing on the AHLU/HLI/THI Measurement Screen will deactivate the alert until the next higher threshold is reached or until the AHLU/HLI/THI measurement dips below the threshold and then raises above it again.

In the Options Menu under Display, there is an Alerts Test function which will activate the light and buzzer. When using the unit in a new situation, test the alerts to familiarize yourself with their intensity.

**HOW TO MEASURE WBGT, AHLU, HLI and THI ACCURATELY:**

» Differences in the reflectivity of ground surfaces such as grass or asphalt will impact measurements. Be sure to take measurements in the same solar/radiant heat environment as the people and animals you are monitoring.

» When changing environments (moving from an air conditioned room to outdoors or removing the unit from your pocket) the unit requires between 8-15 minutes to equilibrate to its surroundings before taking readings.

» Take measurements at least 3 feet off the ground and in the same wind or air flow conditions as the people or animals you are monitoring. Ensure the Kestrel is oriented into the wind and able to measure the full wind value. A tripod or pole mount and the Kestrel Rotating Vane Mount are ideal for ensuring accurate measurements.
If you do not wish to follow one of the WBGT, AHLU, HLI or THI guidelines pre-loaded into your Kestrel meter, you may set custom zones and zone thresholds. Your Kestrel allows you to activate and set up to six customized heat stress warning zones identified by color names on screen.

**SETTING CUSTOM HEAT STRESS ZONES:**
1. In the Settings Menu of the WBGT, AHLU, HLI or THI Current Measurement Screen, scroll to and select **Zones**.
2. Scroll to the colored zones you wish to edit and press select. Editing any value from a preset guideline in the Zone Settings Menu will automatically change the name of the guideline to **Custom**.
3. In the Zone submenu you can turn zones on or off by setting **Status** to **ON** or **OFF** as well as change the lower temperature bound of the zone by adjusting the **Threshold** value.
4. The threshold for a zone cannot be greater than the zone above or less than the zone below it.
5. Zone thresholds cannot be adjusted if the **Status** is set to **Off**.
6. If the **Status** of a zone is set to **OFF** and the thresholds of the zones above and below are set one tenth of a degree apart (the minimum resolution available) the **Status** of the intermediary zone cannot be set to **On**.

**Warning:** While the Kestrel LiNK app for mobile devices does have a threshold alerts feature, it does not currently synch with the zone thresholds set in the Kestrel 5400 which must be set separately.
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 reference value is no longer accurate (Ref Baro for Alt, Ref Alt for Baro) due to a change in weather or location.
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.

**USING MIN/AVG/MAX**

Your Kestrel can be connected wirelessly to other LiNK-compatible devices. LiNK is powered by Bluetooth Smart®, also known as Bluetooth® LE, which is available in most iOS devices released after 2014 and Android devices released after 2015, as well as in a USB Dongle available from Kestrel that supports connectivity to Windows and Mac OS devices. LiNK-enabled Kestrel units can connect to mobile devices running Kestrel LiNK to install firmware updates. LiNK-enabled units can be run wirelessly to computers using the Kestrel Dongle.

**CONNECTING TO A COMPUTER, MOBILE PHONE OR TABLET:**
- On your phone or tablet, follow the links at [www.kestrelinstruments.com](http://www.kestrelinstruments.com) to locate Kestrel LiNK for iOS or Android in the App or Play store and install on your mobile device.
- OR
- On your computer, follow the links at [www.kestrelinstruments.com](http://www.kestrelinstruments.com) and install on your computer. Insert your Kestrel USB Dongle (available separately) into an open USB port.
- On the Kestrel, open the Options Menu and select **Bluetooth**. Set **Bluetooth** to **On**.
- On your Kestrel select **Conct** from the Bluetooth Options menu and set to **PC/Mobile**. In **PC/Mobile mode**, the Kestrel’s Status will change to **Available**, indicating that it is available for pairing with a computer or mobile device.
» Ensure the computer or mobile device is searching and in range. When Status changes from Available to Connected, the pairing is active and your Kestrel is ready to communicate.

CONNECTING TO A NEW LINK-COMPATIBLE DEVICE:
» Follow directions for your LiNK-compatible Device to power it on and put it in pairing mode.
» On the Kestrel, open the Options Menu and select Bluetooth. Set Bluetooth to On.
» Set Conct to Device.
» Scroll to Name and select New, then wait for the list of available devices in range to populate.
» Select a device from the available list. Once connected, the settings menu for that device will open, allowing you to manage the device’s settings.
» Exit to the Bluetooth menu. Status should indicate Connected, meaning the pairing is active and your Kestrel is ready to communicate.

CONNECTING TO/ADJUSTING A PREVIOUSLY PAIRED LINK-COMPATIBLE DEVICE:
» Follow the directions for connecting to a new device except instead of selecting New in the Name field, scroll left or right to find the desired device.
» Status will change to Searching. If the device is in range and in active pairing mode, a connection will be made and Searching will change to Connected, indicating that the pairing is active and your Kestrel is ready to communicate.

Note! LiNK range is typically 100 ft/30M line of sight. Shorter distances should be expected if there are obstacles such as walls or metal enclosures. Range is also impacted by the signal strength of the other device.

CONNECTING TO COMPUTERS USING USB CABLE:
All Kestrel 5 Series units can connect to a computer via the Data Transfer Port using the USB Data Transfer Cable available separately. Kestrel LiNK software is available for Windows and Mac for downloading logged weather data and installing firmware updates.
In addition to taking live measurements, your Kestrel 5 Series weather meter is a powerful data logger. The Kestrel will automatically create a time stamped data log of all measurements at the logging interval you set. Additional log points can also be captured manually. Logged data can be accessed four ways:

» Viewed on the Kestrel Meter on the Data Graph Screen and Data Log Detail Screens.
» Exported to an iOS or Android mobile device using the Kestrel LiNK mobile apps available in the App Store and Google Play Store. Requires a Kestrel LiNK-enabled meter and a compatible Bluetooth® Smart/LE devices.
» Exported to a PC or Mac using Kestrel LiNK software and a Kestrel USB Dongle (available separately). Requires a Kestrel LiNK-enabled meter
» Exported to your Windows or Mac computer using Kestrel LiNK software and a Kestrel USB Data Transfer Cable (available separately). All 5 Series Kestrel meters can connect to Kestrel LiNK using a Kestrel USB Data Transfer Cable.

**TURNING ON AND ADJUSTING AUTOMATIC DATA LOGGING:**

» In the main Options menu, scroll to and select **Memory Options**. Scroll to and select **Auto Store** and set to **ON**. Scroll to **Store Rate** and adjust to desired frequency of automatic weather data logging.
» In the Memory Options sub menu scroll to **Overwrite** and set to **On** to allow the data log to wrap once full and **Off** to stop logging when full.
» When **Auto Store** is set to **On**, the Kestrel unit will automatically begin logging at the rate set in **Store Rate**.

**MANUAL DATA LOGGING:**

» Individual data points can be added to the log at any time by pressing the Capture button.
» Manual capture simply adds every measurement to the data log at the capture time/date.

**VIEWING LOGGED DATA ON THE KESTREL METER:**

» Scroll to the Graph Data 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 Graph Data Screen.
» A graph of the most recently logged data points will be displayed and continue to grow at the selected store rate.
» To view individual data log points, or to view graph data older than what is shown in the Graph Data Screen, press Select to open the Data Log Detail Screen. Scrolling left or right will move the bar highlighting individual data points. Log values are shown in the upper left and the time stamp is shown along the bottom. Press Exit to return to the Graph Data Screen.
» 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.

EXPORTING DATA LOGS TO A COMPUTER:
» Follow the links at www.kestrelinstruments.com to download Kestrel LiNK to a PC or Mac computer. Install.

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.
WEATHER GLOSSARY

DIRECTION – Compass heading in true or magnetic

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.

HEADWND – 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.

THI - The Temperature-Humidity Index (THI) is an index
combining the effects of temperature and relative
humidity to assess environmental heat stress on cattle
and other livestock. It has been used for over 4 decades to
manage heat stress in both dairy and beef cattle.

GLOBE TEMP – Globe Temperature is defined as the
temperature measured inside a 6-inch copper globe
painted black. On the Kestrel HST, the temperature inside
the 1-inch|25 mm globe is converted to the equivalent
temperature for a standard globe. The closest equivalence
will be obtained with airflow greater than 2.2 mph|1 m/s.

NWB TEMP – Natural Wet Bulb Temperature is a measure
evaporative cooling in an environment with unforced,
naturally occurring air flow.

WBGT – Wet Bulb Globe Temperature is a measure
of human heat stress resulting from the combination
of effects due to temperature, humidity, wind speed
(wind chill), and visible and radiant heat. Outdoor
WBGT is calculated from a weighted sum of Natural Wet
Bulb Temperature, Globe Temperature and dry bulb
Temperature.

HLI - Heat Load Index (HLI) is a measure incorporating
black globe temperature (solar radiation), relative
humidity, and wind speed. It was developed as an indicator
of the environmental heat load on cattle.

AHLU - Accumulated Heat Load Units (AHLU) is a measure
of accumulated heat by an animal above its HLI UPPER
LIMIT threshold.

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.

**STATION** – Station Pressure (Absolute Pressure) is the pressure exerted by the earth’s atmosphere at any given point.

**BARO** – Barometric Pressure is the local station (or absolute) pressure with the pressure differential associated with the location’s altitude above sea level subtracted. An accurate reading depends on an accurate initial altitude input and unchanging altitude while measuring.

**ALTITUDE** – Altitude is the change in vertical distance associated with a change in atmospheric pressure. An accurate reading depends on an accurate initial barometric pressure input and stable barometric pressure while measuring.

**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.

**DELTA T** – Delta T is the spread between the wet bulb temperature and the dry bulb temperature and is used to assess spraying conditions.

---

Your Kestrel Meter offers 2 accepted THI calculations. The NRC THI equation is defined as:

\[
\text{THI} = (1.8 \times \text{Tdb} + 32) - \left[ (0.55 - 0.0055 \times \text{RH}) \times (1.8 \times \text{Tdb} - 26) \right]
\]

(National Research Council, 1971) where Tdb is dry bulb temperature in °C and RH is relative humidity expressed as a %.

This is the equation referenced by Ontario Ministry of Agriculture, Food, and Rural Affairs; Journal of Dairy Science; and the University of Arizona.

The YOUSEF THI equation is defined as:

\[
\text{THI} = \text{Tdb} + (0.36 \times \text{Tdp}) + 41.2
\]

(Yousef, 1985) where Tdb is dry bulb temperature in °C and Tdp is dew point temperature in °C.

This is the equation referenced by Dairy Australia, University of Missouri, and USDA.

**Zones** - Preprogrammed zones available are:

**LWSI** (Livestock Weather Safety Index) zone thresholds:


<table>
<thead>
<tr>
<th>THI Color Code</th>
<th>THI Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>≤ 74</td>
</tr>
<tr>
<td>Red</td>
<td>75 - 78</td>
</tr>
<tr>
<td>Yellow</td>
<td>79 - 83</td>
</tr>
</tbody>
</table>

**Dairy** (Revised Temperature-Humidity Index for Lactating Dairy Cows) zone thresholds:


<table>
<thead>
<tr>
<th>THI Color Code</th>
<th>THI Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>&lt; 68</td>
</tr>
<tr>
<td>Red</td>
<td>68 - 71</td>
</tr>
<tr>
<td>Yellow</td>
<td>72 - 79</td>
</tr>
<tr>
<td>Black</td>
<td>≥ 80</td>
</tr>
<tr>
<td>Orange</td>
<td>≥ 84</td>
</tr>
</tbody>
</table>
**DairyAU (Dairy Australia) zone thresholds:**  

<table>
<thead>
<tr>
<th>THI Zone</th>
<th>Green THI &lt; 72</th>
<th>Red THI 78 - 81</th>
<th>Yellow THI 72 - 74</th>
<th>Black THI ≥ 82</th>
<th>Orange THI 75 - 77</th>
</tr>
</thead>
</table>

**Additional features found in Kestrel 5400AG Cattle Heat Stress Tracker Only**

**Alerts** - Light and/or Buzzer alerts can be set to **ON** by selecting appropriate zone.

---

**Your Cattle Heat Stress Tracker offers the blended HLI equation** which is defined as:

\[
HLI = S(BGT) \times HLIHI + (1 - S(BGT)) \times HLILO.
\]

*BGT* is defined as Black Globe Temp in °C (measured as Globe Temperature in your Kestrel). *RH* is defined as relative humidity expressed as %. *WS* is defined as Wind Speed in m/s. The blending function is defined as:

\[
S(BGT) = \frac{1}{1 + \exp\left(\frac{-(BGT - 25)}{2.25}\right)}
\]

*HLIHI* and *HLILO* are defined as:

- if \( BGT \) is below 25:
  \[
  HLILO = 1.3 \times BGT + 0.28 \times RH - WS + 10.66
  \]
- else
  \[
  HLIHI = 1.55 \times BGT + 0.38 \times RH - 0.5 \times WS + \exp(2.4 - WS) + 8.62
  \]

Where *exp* is the exponentiation function and the HLI value was taken as either *HLIHI* or *HLILO* depending on the *BGT* value.

**Zones** - Preprogrammed zones available are:

**MLA (Meat & Livestock Australia Ltd) zone thresholds:**  
*Information provided from B.FLT.0344 Meat & Livestock Australia Ltd., published December 2008 (verified Oct 2016)*

<table>
<thead>
<tr>
<th>HLI Zone</th>
<th>Green HLI ≤ 70</th>
<th>Red HLI 86.1 - 95</th>
<th>Yellow HLI 70.1 - 77</th>
<th>Black HLI &gt; 95</th>
<th>Orange HLI 77.1 - 86</th>
</tr>
</thead>
</table>

**Alerts** - Light and/or Buzzer alerts can be set to **ON** by selecting appropriate zone.
The default AHLU setting uses an HLI Upper Limit Threshold of 86 based on a reference animal defined as:

**Table 1: Reference Animal**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle type</td>
<td>Bos taurus</td>
</tr>
<tr>
<td>Coat Color</td>
<td>Black</td>
</tr>
<tr>
<td>Health status</td>
<td>Healthy</td>
</tr>
<tr>
<td>Days on feed</td>
<td>80-130</td>
</tr>
<tr>
<td>Shade provision</td>
<td>No shade</td>
</tr>
<tr>
<td>Trough water temperature</td>
<td>20-30°C</td>
</tr>
<tr>
<td>Manure management class</td>
<td>Class 1</td>
</tr>
<tr>
<td>Extra water troughs installed</td>
<td>No</td>
</tr>
<tr>
<td>Heat load ration</td>
<td>No</td>
</tr>
<tr>
<td>Wet manure removal</td>
<td>No</td>
</tr>
</tbody>
</table>

86 is the HLI Upper Limit Threshold and the point when cattle with the above characteristics may start to accumulate heat. Users can modify pen and cattle characteristics by varying parameters within the 3 AHLU screens.

Pen Management - the following pen management parameters can be adjusted based on site conditions and will result in the noted HLI Upper Limit Threshold adjustment.

**Table 2: Manure Class**

<table>
<thead>
<tr>
<th>Criteria - Feedlots were previously subject to a 4-tiered classification scheme (classes 1-4) in Australia. In the future, all new or expanding feedlots are expected to operate at the equivalent of a Class 1.</th>
<th>Class 1 (Best Mgt Practices)</th>
<th>Class 2</th>
<th>Class 3 &amp; 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pen Foundation Preparation</td>
<td>Compacted base with uniform slope built in</td>
<td>Compacted base with uniform slope built in</td>
<td>Strip topsoil and grade to a durable uniform surface</td>
</tr>
<tr>
<td>Pen Slope</td>
<td>2.5 - 4% away from feeding area</td>
<td>2.5 - 4% away from feeding area</td>
<td>2 - 6% away from feeding area</td>
</tr>
<tr>
<td>Stocking Density (a measure of stocking intensity expressed in terms of m²/SCU)</td>
<td>10 15 20</td>
<td>10 15 20</td>
<td>10 15 20</td>
</tr>
<tr>
<td>Maximum Manure Removal Interval (weeks)</td>
<td>7 10 14</td>
<td>14 20 26</td>
<td>26</td>
</tr>
<tr>
<td>Maximum Manure Pack Depth (mm)</td>
<td>50</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>Under Fence Cleaning</td>
<td>monthly</td>
<td>quarterly</td>
<td>at each pen cleaning</td>
</tr>
<tr>
<td>Eliminate Wet Patches</td>
<td>weekly</td>
<td>monthly</td>
<td>at each pen cleaning</td>
</tr>
<tr>
<td>Repair Potholes</td>
<td>weekly</td>
<td>monthly</td>
<td>6 months</td>
</tr>
</tbody>
</table>

### Table 3: Manure Class HLI Adjustments

<table>
<thead>
<tr>
<th>Manure Management</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>0</td>
</tr>
<tr>
<td>Class 2</td>
<td>-4</td>
</tr>
<tr>
<td>Class 3 &amp; 4</td>
<td>-8</td>
</tr>
</tbody>
</table>

### Table 4: Shade

<table>
<thead>
<tr>
<th>Shade Provision</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Shade</td>
<td>0</td>
</tr>
<tr>
<td>Shade (1.5m²/SCU – 2m²/SCU) or (16 ft²/SCU - 21 ft²/SCU)</td>
<td>+3</td>
</tr>
<tr>
<td>Shade (2m²/SCU – 3m²/SCU) or (21ft²/SCU - 32 ft²/SCU)</td>
<td>+5</td>
</tr>
<tr>
<td>Shade (3m²/SCU – 5m²/SCU) or (32 ft²/SCU - 54 ft²/SCU)</td>
<td>+7</td>
</tr>
</tbody>
</table>

*SCU = A Standard Cattle Unit (SCU) is equivalent to an animal with a liveweight of 600 kg (1,323 lbs).*

### Table 5: H2O Temp

<table>
<thead>
<tr>
<th>Trough Water Temperature</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature of water in troughs = 15 – 20°C (59-68°F)</td>
<td>+1</td>
</tr>
<tr>
<td>Temperature of water in troughs = 20 – 30°C (68 - 86°F)</td>
<td>0</td>
</tr>
<tr>
<td>Temperature of water in troughs = 30 – 35°C (86 - 95°F)</td>
<td>-1</td>
</tr>
<tr>
<td>Temperature of water in troughs &gt; 35°C (&gt;95°F)</td>
<td>-2</td>
</tr>
</tbody>
</table>
Table 6: Extra H2O, Heat Rations, and Manure Clear as mitigation measures for heat load events

<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install Extra Water Troughs</td>
<td>+1</td>
</tr>
<tr>
<td>Implement Heat Load Feeding Strategy</td>
<td>+2</td>
</tr>
<tr>
<td>Strategic Clearing of High Manure Deposition Areas</td>
<td>+2</td>
</tr>
</tbody>
</table>

- Installing extra water troughs HLI adjustment only takes effect on upper limit threshold if no shade is provided when determining the HLI Upper Limit Threshold.

Cattle Profile - the following cattle profile parameters can be adjusted based on herd characteristics and will result in the noted HLI Upper Limit Threshold adjustment.

Table 7: Genotype

<table>
<thead>
<tr>
<th>Genotype</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bos Taurus Genotypes</td>
<td>0</td>
</tr>
<tr>
<td>Bos Indicus Cross (25%)</td>
<td>+4</td>
</tr>
<tr>
<td>Bos Indicus Cross (50%)</td>
<td>+7</td>
</tr>
<tr>
<td>Bos Indicus Cross (75%)</td>
<td>+8</td>
</tr>
<tr>
<td>Bos Indicus Genotypes</td>
<td>+10</td>
</tr>
<tr>
<td>Wagyu</td>
<td>+4</td>
</tr>
<tr>
<td>European Genotypes</td>
<td>+3</td>
</tr>
</tbody>
</table>

Table 7: Type

<table>
<thead>
<tr>
<th>Genotype</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Coat Color</td>
<td>0</td>
</tr>
<tr>
<td>Red Coat Color</td>
<td>+1</td>
</tr>
<tr>
<td>White Coat Color</td>
<td>+3</td>
</tr>
</tbody>
</table>

Table 8: Coat

<table>
<thead>
<tr>
<th>Coat Color</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Coat Color</td>
<td>0</td>
</tr>
<tr>
<td>Red Coat Color</td>
<td>+1</td>
</tr>
<tr>
<td>White Coat Color</td>
<td>+3</td>
</tr>
</tbody>
</table>

Table 9: Days

<table>
<thead>
<tr>
<th>Days on Feed</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days on Feed (0-80)</td>
<td>+2</td>
</tr>
<tr>
<td>Days on Feed (80-130)</td>
<td>0</td>
</tr>
<tr>
<td>Days on Feed (130+)</td>
<td>-3</td>
</tr>
</tbody>
</table>

Table 10: Health

<table>
<thead>
<tr>
<th>Health Status</th>
<th>HLI Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>0</td>
</tr>
<tr>
<td>Sick/Recovering/Unacclimatised</td>
<td>-5</td>
</tr>
</tbody>
</table>

Manual Offset - The Manual Offset function allows users to adjust their AHLU value in increments of 10. User must select Apply for AHLU to include the Manual Offset value.

Zones - Preprogrammed zones available are:

<table>
<thead>
<tr>
<th>MLA Meat &amp; Livestock Australia Ltd) zone thresholds:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information provided from B.FLT.0344 Meat &amp; Livestock Australia Ltd., published December 2008 (verified Oct 2016)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alert</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>White AHLU = 0</td>
<td>Red AHLU 50.1 - 100</td>
</tr>
<tr>
<td>Green AHLU .1 - 10</td>
<td>Black AHLU &gt; 100</td>
</tr>
<tr>
<td>Yellow AHLU 10.1 - 25</td>
<td></td>
</tr>
<tr>
<td>Orange AHLU 25.1 - 50</td>
<td></td>
</tr>
</tbody>
</table>

Alerts - Light and/or Buzzer alerts can be set to ON by selecting appropriate zone.
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.

Orient one “arm” of the module straight up. [Figure 2]. The impeller can be pushed in from either side.
5-YEAR LIMITED PRODUCT WARRANTY

Your Kestrel Weather/Environmental Meter is warrantied 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.