

Acuity Touch Panel Display Software Manual

For Software Version 2.x

Introduction

The Acuity Touch Panel Display (TPD) is an industrial panel PC that can configure and display the outputs of our single point laser measurement sensors. Among its many features are:

- Support for up to six sensors with our new 8" TPD model, shown on the screen at the same time. The 7" TPD model can now support up to four sensors with two needing RS232 serial-to-USB adapters
- Dual-sensor thickness measurement mode
- Three sensor plane measurement mode
- Visual alerts when measurements are approaching or exceeding desired limits
- Measurement logging and output to a USB drive
- Real-time stream of outputs via RS232 serial connection
- Easy calibration of measurements to match known distances and standards
- Easy software updates using an Ethernet connection or a USB drive

The Acuity TPD makes collecting and displaying Acuity sensor outputs a simple task, and in certain applications, it can be used as a standalone integration solution for companies on a budget.

In this manual, we will be describing the features of the TPD software screen by screen. If you have any additional questions or would like to discuss customization options, please reach out to our sales team at acuitysales@acuitylaser.com, and they will connect you with a representative for additional technical support.

Note: The following figures and screenshots will reflect what is seen on the 8" touch panel. The 7" touch panel will show options and tabs for four sensors (a, b, c, d) instead of six (a, b, c, d, e, f).

Description of Touch Panel Display Functions

The Acuity TPD has three main screens:

- Sensor Configuration Screen – Allows the user to connect to sensors and adjust the settings on the sensors themselves.
- Measurement Screen – Displays the output of connected sensors. This screen is also where the user will find options to calibrate these outputs and save current settings to user defined profiles for future recall.
- Application Settings Screen – Allows the user to adjust settings of the TPD software. Most of the TPDs features are controlled here. This screen is also where the user will find options to update and reset the software.

Let's look at each in detail.

Sensor Configuration Screen

The Sensor Configuration Screen allows the user to connect sensors to the TPD and adjust selected parameters from the TPD.

There are six or four tabs at the top of the screen, depending on the TPD version. When a sensor is successfully connected to a serial port, that port's tab will be green. If the TPD is unable to communicate with a sensor that has been enabled on a serial port, that port's tab will be red. If no sensor is enabled for a serial port, that port's tab will be gray. The "Back" button in the upper right-hand corner brings you back to the Measurement Screen.



Figure 18: Sensor A is Enabled and Connected



Figure 19: Sensor A is Enabled and Not Connected



Figure 20: Sensor A is Not Enabled

When first accessing the Sensor Configuration Screen or when accessing a port without any sensor enabled, you will be prompted to select an Acuity sensor from a dropdown list. Selecting a sensor will bring up a check box that allows you to enable the sensor as well as several options for that sensor, most of which will remain grayed out until the sensor is connected.

Before enabling a sensor, please check that the sensor is connected to the corresponding TPD port and powered on.

The TPD will search for the baud rate of the sensor. If the TPD successfully connects to the sensor, the Baud Rate will update and the TPD will read "Connected" next to it. If the TPD is unable to connect to the sensor, the TPD will time out after attempting to connect and an error message will populate next to the Baud Rate drop down.

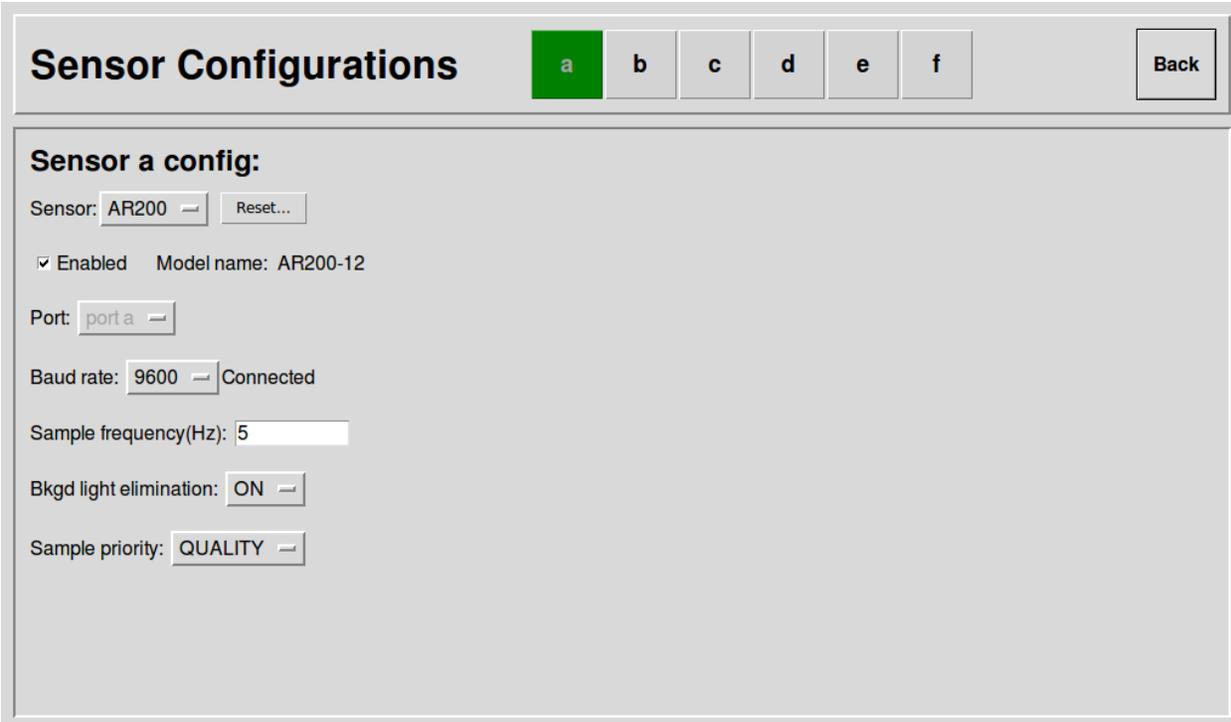


Figure 21: Sensor Configuration Screen for Sensor A – Connected Successfully

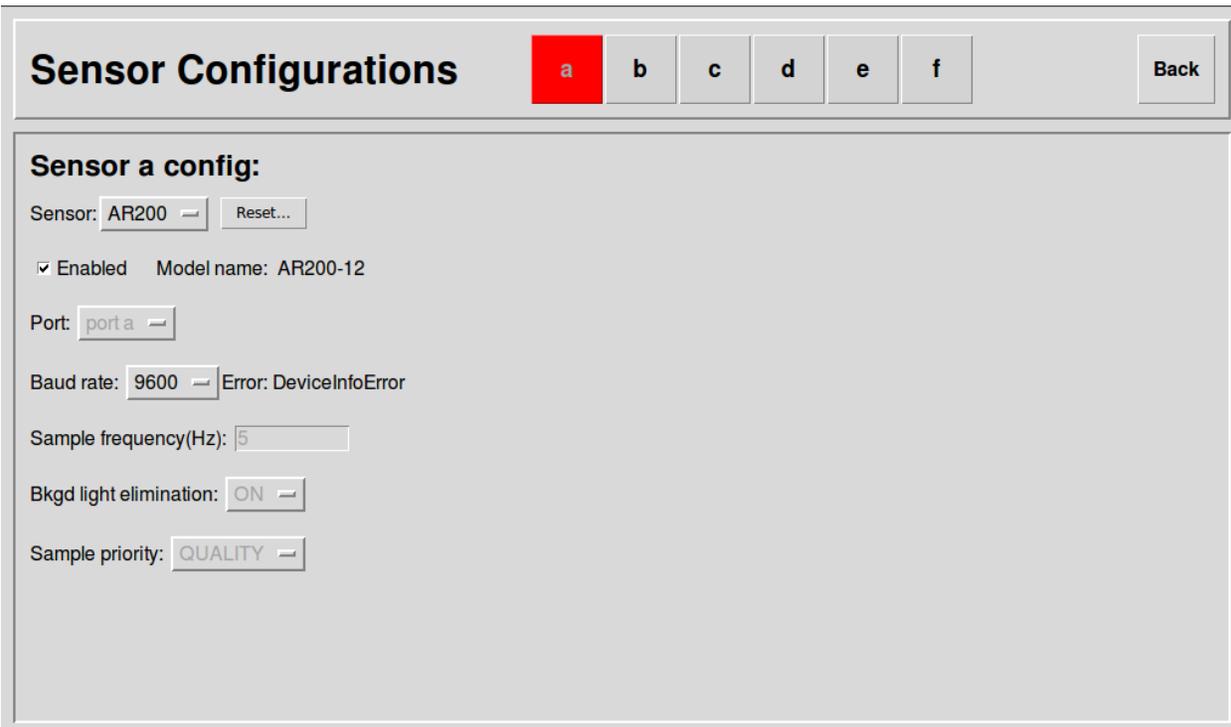


Figure 22: Sensor Configuration Screen for Sensor A – Connection Error

Connection Troubleshooting Tips – If a sensor is unable to connect:

- Check all cables are connected correctly between the sensor and the TPD.
 - If using an Acuity Connectivity Kit, double check that the wires of the sensor cable are connected to the correct terminals within the kit.
- Check that the sensor is powered on with an appropriate voltage.
- If you are still having trouble connecting to the TPD, reset the sensor to factory settings
 - Check the sensor's manual for instructions on how to reset the sensor.

The “Back” button brings you back to the measurement screen.

Sensor Parameters

Once a sensor is connected, selected sensor parameters will become available to adjust. Whenever you adjust these parameters the TPD will save the parameters to the sensor's flash memory so that it will remain in that configuration even in the event of a power cycle.

The “Reset...” button next to the sensor selection dropdown will allow the user to reset the connected sensor to factory settings. To learn more about the other adjustable parameters displayed, please refer to the sensor's manual.

Note: Sensor parameters not included in the TPD software can be adjusted by connecting a sensor to a PC using a serial to USB converter as per the sensor's manual.

Note: The “Reset...” button will reset all sensor parameters to factory settings, ***even the ones that are not able to be adjusted through the TPD software.***

One parameter is shown that is never able to be adjusted: the Port parameter. Ports A-F (A-D on the 7” touch panel) are locked to sensors A-F (A-D), respectively, on this touch panel. This is not an error.

Measurement Screen

The Measurement Screen displays the output of the sensor or sensors.



Figure 1: Example of Measurement Screen

The control bar at the top contains several buttons:



Figure 2: Measurement Screen Control Bar

1. Quit/Save Button – This button will read “Quit” or “Save” depending on the following circumstances:
 - a. Save – The button will read “Save” when the current settings have not been saved to a Profile. Pressing the “Save” button will save the current settings to the current Profile. Once the settings are saved to the current Profile, the button will read “Quit.”
 - b. Quit – The button will read “Quit” when the current settings are the same as those in the current Profile. Pressing the “Quit” button will shut down the TPD software.
2. Start/Stop Button – Starts or stops the measurement stream.
3. Profile Drop-Down – This drop-down list will allow the user to select a previously saved settings Profile or to create a new Profile to save the current settings. Profiles can only be changed while the measurement stream is stopped.
4. Tare All – Sets the output of all sensors to zero based on the current measurements. Pressing this button again returns all sensors to the default measurement.

5. Current Tab – Shows the current output of all sensors. Measurements update and replace previous values based on the settings chosen.
6. List Tab – Shows the output of all sensors in a list that scrolls as new measurements are taken.
7. Graph Tab – Shows the output of all sensors in a graph.
8. App Settings Button – Takes the user to the Application Settings Screen. *(Unavailable while measurements are streaming)*
9. Sensor Configs Button – Takes the user to the Sensor Configuration Screen. *(Unavailable while measurements are streaming)*

Underneath the control bar is the output window. The contents of the output window will change based on the tab chosen, the number of sensors connected, and the settings chosen. Let's look at the output windows tab by tab.

Current Tab

The Current Tab shows the current output of all sensors. This is the main display mode of the TPD. It allows the user to constantly monitor the output of all sensors at once. If there is more than one sensor or sensor combination, the window will be broken into panes to display each output.

Single Sensor

When a pane shows the output from a single sensor, it will show the following information:

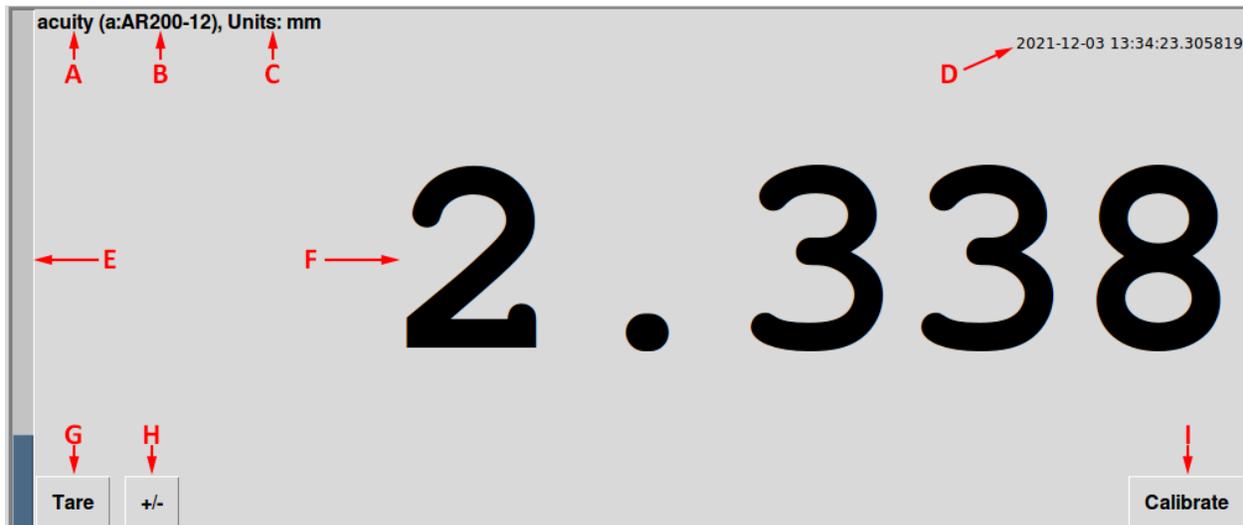


Figure 3: Single Sensor Output Pane

- A. Label – If labels were entered in the Application Settings Screen, they will be shown here. The default label is the sensor/port letter.
- B. Sensor ID – Shows the model of the sensor that the pane is displaying.
- C. Units – Shows the measurement units selected.
- D. Timestamp – Shows the timestamp for the current measurement and internal temperature if the sensor supports it.
- E. Range Bar – Shows where the target is within the sensor's range. This is not affected by calibration or taring.
 - a. The bar will be full at the far end and empty at the near end of the sensor's range.

- F. Output – The current measurement with all adjustments (units, decimal places, tare, +/-, calibration) defined by the user. This will also change color based on warnings and limits set, and it will show error states given by the sensor. See Figure 5 below for examples of how warnings, limits, and errors are displayed.
- G. Tare Button – Sets the output in the pane to zero based on the current measurement. Pressing this button again resets the pane to default.
- H. +/- Button – Changes the sign of the output from positive to negative or vice-versa.
- I. Calibrate Button – Enters the calibration menu or, if the output is already calibrated, clears the calibration. This is used to adjust the output for ease of understanding or to correct for mounting imperfections. See the Calibration Guide below for more information.

As you can see below, no matter if you have 1 or 6 sensors connected, every output pane contains the same information and controls.



Figure 4: Measurement Screen with Two Single Sensor Panes

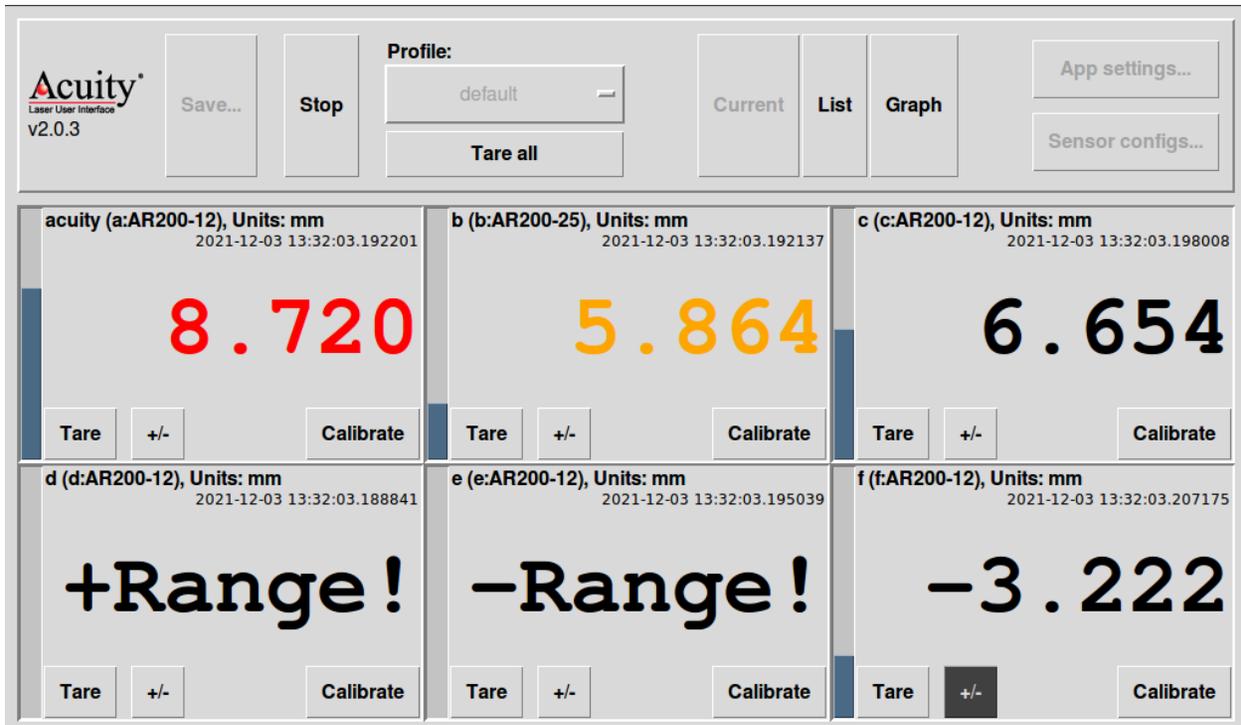


Figure 5: Measurement Screen with Six Single Measurement Panes and a Variety of Statuses

Dual Sensor Combination (Thickness)

The output pane for two sensors in either sum or difference combination mode is similar to the pane for a single sensor with the following differences:

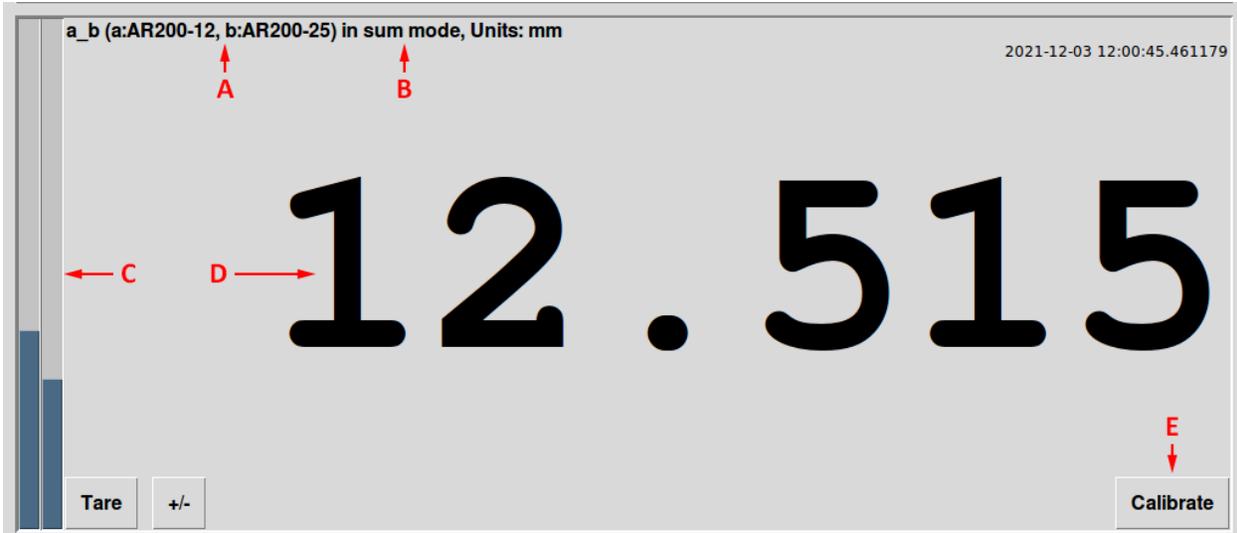


Figure 6: Dual Sensor Combination Output Pane

- A. Sensor ID – Shows both sensor models and the ports they are connected to.
- B. Combination Mode – Shows the selected combination mode (sum or difference). See the Application Setting Screen section for more details on the different modes.
- C. Range Bars – Shows where the targets of both sensors are in their ranges. Again, this is not affected by calibration, taring, or other user adjustments.
- D. Output – This is exactly like the output for a single sensor except that any errors shown will also show the letter of the sensor that is generating the error.
- E. Calibrate Button – See the Calibration Guide below

Like with single laser outputs, the TPD can show as many Dual Sensor Combination panes as it can handle (up to 3, depending on model) at the same time.

Plane Combination (3 Sensors)

The output pane for three sensors in plane mode is also very similar to the panes for single and dual sensors, but again, there are differences:

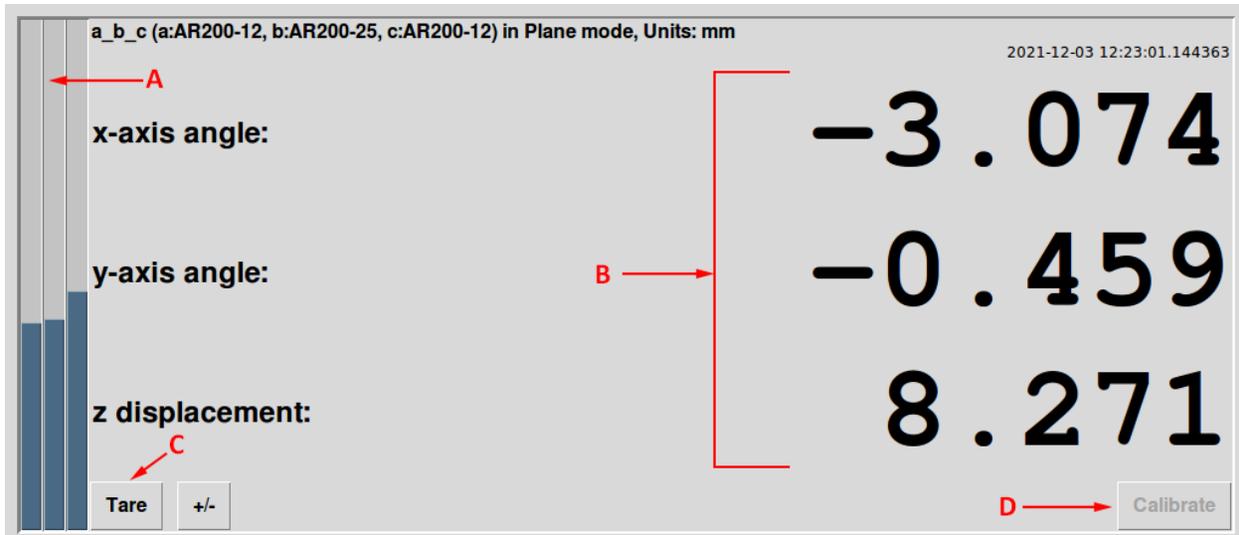


Figure 7: Plane Mode Output Pane

- A. Range Bars – There are three range bars for a Plane Combination pane, one for each of the sensors. Like with the other panes, these bars are unaffected by any user defined change in the output values.
- B. Output – This is the most obvious difference. There are three output values in a Plane Combination pane:
 - a. X-Axis Angle – The rotation of the plane with respect to the x-axis in degrees. The x-axis is defined by the values entered in the Position Tab in the Application Settings Screen.
 - b. Y-Axis Angle – The rotation of the plane with respect to the y-axis in degrees. The x-axis is defined by the values entered in the Position Tab in the Application Settings Screen.
 - c. Z Displacement – The displacement of the entire plane in the z-axis in units specified by the user.
- C. Tare Button – In plane mode, the tare button has increased importance. Like with single and dual sensor modes, it will set the current measurement to zero, but in plane mode, this is the only way to calibrate the output. Before taking useful data, the user will need to decide on an orientation of the plane to measure against and tare the output at that position.
- D. Calibrate Button – In plane mode, the Calibrate Button has no use.

Difference Mode

Difference mode determines the thickness of an object by comparing the distance measurement to a rigid, flat reference surface to the distance measurement of an object placed on that surface. This is useful when the reference surface vibrates or changes its distance with respect to the sensors over time.

The beams of the two sensors should be normal to the surface parallel to each other. One laser spot should land on the reference surface at all times, the other laser spot should land on the objects to be measured.

To use the guided calibration wizard in Difference mode, take the following steps:

1. Press the Calibrate button in the output pane of the sensor combination to be calibrated.
2. Press the Guided button.
3. Make sure both sensors are measuring to the reference surface and press OK
4. Place a gauge block or other thickness reference under ONE of the sensors against the reference surface and press OK
5. Enter the thickness of the thickness reference and press Enter to return to the Measurement Screen.

The TPD should now show the correct thickness of any object placed under one of the sensors.

Manual Calibration

Manual calibration is the same as for single-sensor measurement calibration for both Sum and Difference modes.

The Acuity TPD can display any combination of panes. With six sensors a user could have a single sensor taking measurements, two sensors calculating a thickness, and three lasers measuring the tilt and displacement of a plane all at the same time.

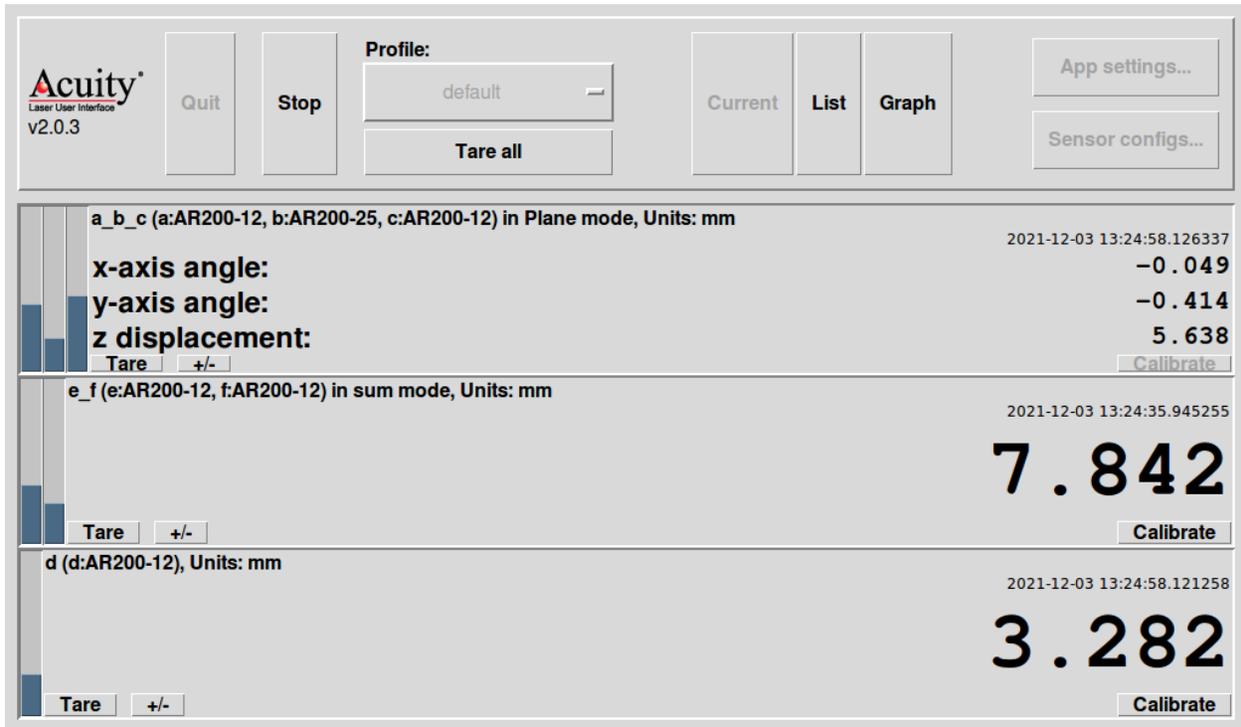


Figure 8: Measurement Window with All Possible Combinations at Once

Graph Tab

The Graph Tab shows the output (with all user defined adjustments) of all measuring sensors in a graph. A key is displayed to the right showing the color of each line and which sensor or combination is assigned to that line using the user defined labels or identification letter of the sensor.

By default, the y-axis range is set to the full range of the sensor/combination (for a single sensor/combination) or the full range all connected sensors/combinations cover (for multiple sensors)

For a single sensor/combination, the y-axis range can be adjusted by setting limits. After the limits are set, the graph will have a y-axis range from the lower to the upper limit. For multiple sensors/combinations, the y-axis range will be set from the lowermost lower limit to the uppermost upper limit.

Warning and limit values are shown on the graph as dotted lines with the limit shown as a densely dotted line and the warning shown as a more sparsely dotted line.

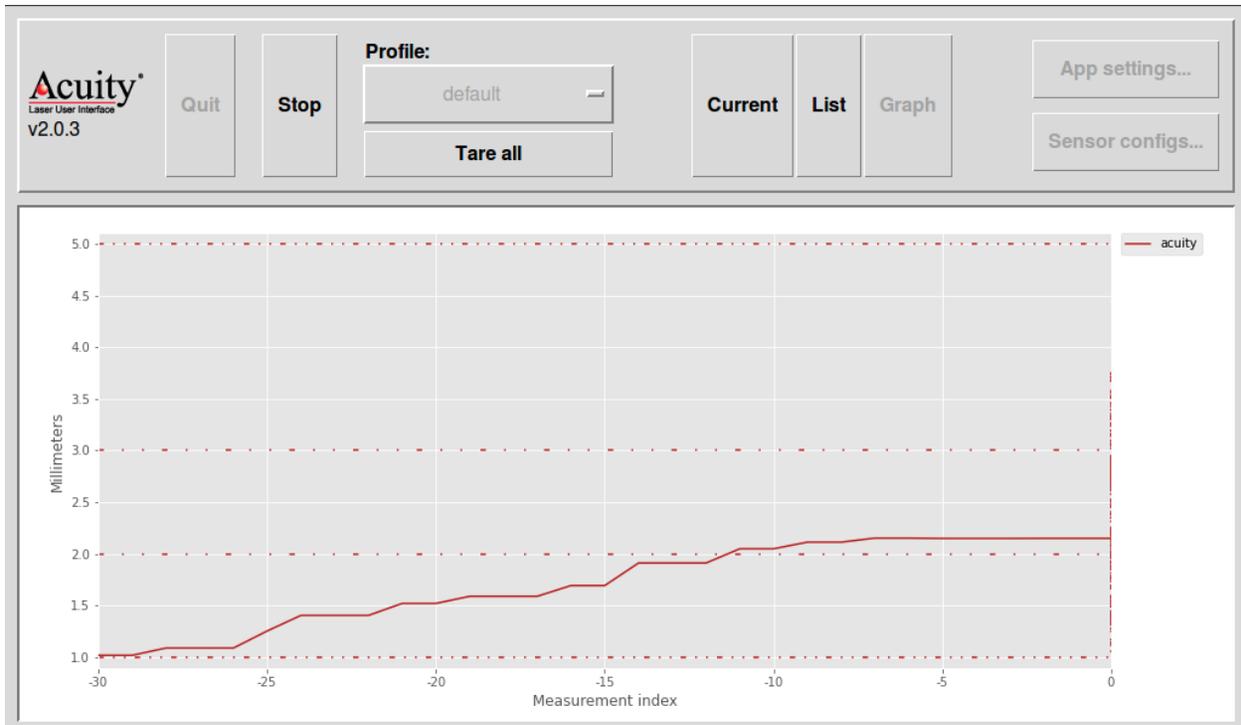


Figure 11: Graph Display with One Active Sensor and Limits and Warnings Set

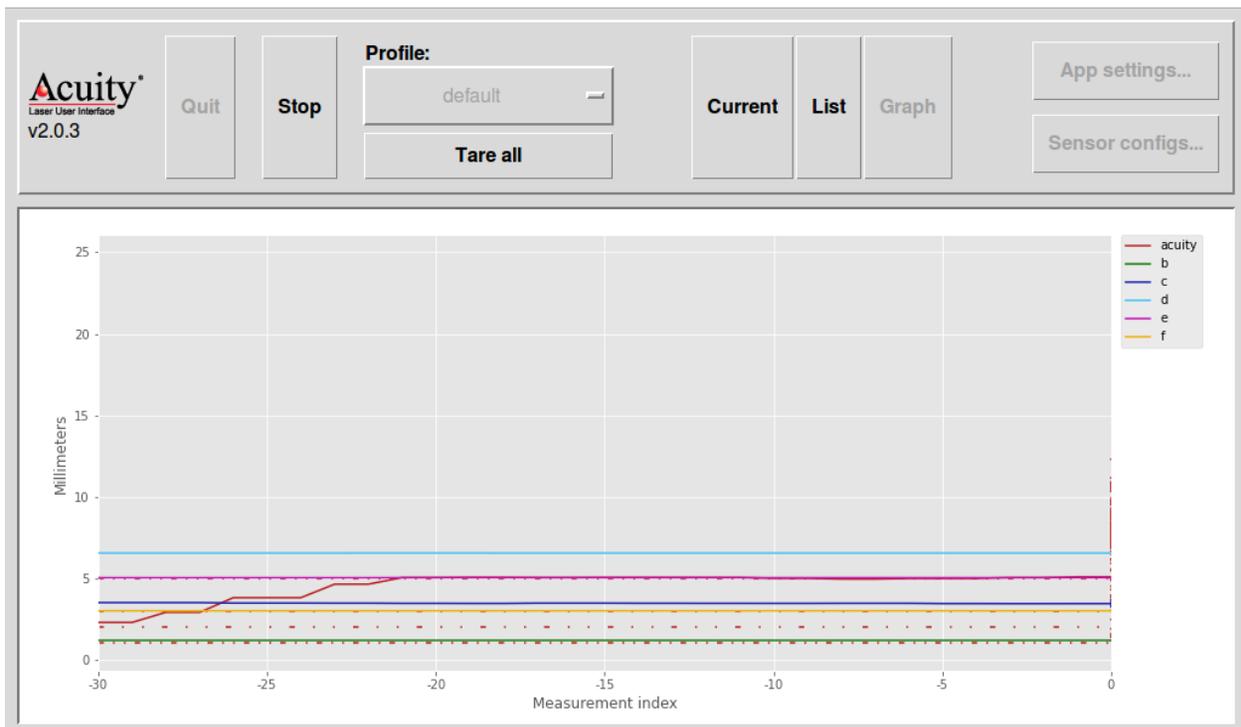


Figure 12: Graph Display with Six Active Sensors

Application Settings Screen

The Application Settings Screen allows the user to control and set parameters for many for the TPD software's features. At the top, you will see four tabs: General, Positions, Limits, and Utilities. The "Back" button in the upper right-hand corner will return you to the Measurement Screen.

General Tab

The General Tab is where the user can adjust most of the software settings. Below is a description of each setting and its function.

The screenshot shows the 'Application Settings' screen with the 'General' tab selected. The settings are organized into several sections:

- Distance units:** A dropdown menu set to 'inch decimal'.
- Temperature units:** A dropdown menu set to 'Fahrenheit'.
- Decimal places:** A dropdown menu set to '3'.
- Averaging:** A dropdown menu set to '25' and a dropdown menu set to 'rolling'.
- Output baud rate:** A dropdown menu set to 'None'.
- Logging:** Two checkboxes: 'Log measurements' (checked) and 'Use dual sensor hardware trigger' (unchecked).
- Custom log folder:** A text input field.
- Sensor display labels:** A section with labels 'a label:', 'b label:', 'c label:', 'd label:', 'e label:', 'f label:', 'a_b label:', 'c_d label:', 'e_f label:', 'a_b_c label:', and 'd_e_f label:', each followed by a text input field.
- Sessions:** A dropdown menu set to 'Average' and a checkbox 'Measure in sessions' (checked).
- Sensor combinations:** A section with checkboxes for 'a & b', 'c & d', 'e & f', 'a, b & c Plane mode', 'd, e & f Plane mode', and 'Synchronize all sensors'. Each checked combination has a 'Mode:' dropdown menu set to 'sum'.

Figure 13: General Tab in the Application Settings Screen

Distance Units – Sets the units that the TPD will use to display distance. Measurements between whole numbers are displayed in decimal format except for options labeled "Fractions" which are displayed in fractional format.

- Meter
- Foot Decimal
- Foot Fractions
- Inch Decimal
- Inch Fractions
- Centimeters (cm)
- Millimeters (mm)

Temperature Units – Sets the units of internal temperature measurements of the sensor if the sensor supports it. If the sensor does not support internal temperature measurements, the options will remain, but will have no effect.

- Celsius
- Fahrenheit

Decimal Places/Fractions – Sets the precision of the measurement in either decimal places or smallest fraction displayed. Note that the setting chosen does not increase or decrease the resolution of the sensor. If the sensor's resolution is better than the setting chosen, the TPD will round the number displayed to the nearest digit or fraction. If the sensor's resolution is worse than the setting chosen, the TPD in decimal format will display zeros for any unused digits.

Averaging – Sets/disables the TPDs averaging function. When enabled the number entry field allows the user to set the number of measurements to average (X).

- Rolling – Outputs a rolling average of the previous X measurements.
 - Ex. If X=3 and measurements are noted as m1 (first measurement), m2 (second measurement), etc.
 - 1st output – $m1/1$
 - 2nd output – $(m1 + m2)/2$
 - 3rd output – $(m1 + m2 + m3)/3$
 - 4th output – $(m2 + m3 + m4)/3$
 - 5th output – $(m3 + m4 + m5)/3$
 - Etc.
- Batch – Collects X measurements, and outputs the average of those X measurements. Then collects X more measurements before outputting the average of those X measurements.
 - Note #1 – Until the first X measurements are collected, the TPD will display the average of the measurements it has.
 - Note #2 – Once the first X measurements are collected, the TPD will only update once every X measurements.
 - Ex. If X=3 and measurements are noted as m1 (first measurement), m2 (second measurement), etc.
 - 1st output – $m1/1$
 - 2nd output – $(m1 + m2)/2$
 - 3rd output – $(m1 + m2 + m3)/3$
 - 4th output – $(m4 + m5 + m6)/3$
 - 5th output – $(m7 + m8 + m9)/3$
 - Etc.
- Off – No averaging (Default)

Output Baud Rate – Sends the measurements displayed by the TPD to another data collection device over an RS232 connection via a serial to USB connector at the selected baud rate in real time.

Log measurements – When this option is checked, the TPD will save any measurements taken to its internal storage. Each measurement session will be saved to its own file. The log files can be downloaded to a USB drive from the Utilities tab.

- The TPD will keep these measurements until one of two events:
 1. The TPD is reset (Utilities tab)
 2. The TPD internal storage is filled. At which point, it will delete the oldest measurement log to make room.
- The maximum storage allotted for measurement logs is 300 MB split into six 50 MB files.

Sensor Display Labels – Allows the user to label the windows used to display each measurement.

- a through f labels – Labels windows of single sensor measurements
- a_b, c_d, and e_f labels – Labels windows of dual sensor combination measurements.
- a_b_c and d_e_f labels – Labels windows of three sensor combination measurements.
- 7" TPDs will only show a through d.

Sensor Combinations – Enables measurements that use 2 or 3 sensors in tandem.

- When a dual sensor combination (a & b, c & d, or e & f) is selected, the TPD will display a thickness measurement. The dropdown menu next to the selected combination has 2 options:
 - Sum – A thickness mode that uses 2 sensors pointed directly at each other with the object to be measured placed between the sensors.
 - Difference – A thickness mode that uses 2 sensors, side-by-side, pointing in the same direction. One sensor points at a target used to set a zero point. The other laser points at the object to be measured.
- When a three sensor combination (a, b, & c or d, e, & f) is selected, the TPD will use the measurements of the three sensors to determine the displacement and tilt of a plane.

Sessions - Only measures when the target is within the measurement range. Sessions will ignore range errors and only display and log statistics for a collection of measurements.

- When *Measure in sessions* is checked, measurements are only collected when the target is within the measurement range.
- When the *Start* button is tapped, and there is no target in the measurement range, the display shows 'Ready.'
- When the target enters the measurement range, the display shows 'measuring...'
- When the target leaves the measurement range, the display shows the statistics for the collected measurements.
- Statistics are displayed until a new target enters the measurement range.
- Statistics are logged if logging enabled.

- The *Limits value* determines the statistics function to use for triggering limits (Minimum, Maximum, Mode, or Average).
- The *Averaging* setting has no effect on the measurements when using *Measure in sessions*.
- If *Synchronize all sensors* is checked, a Session will begin when the target is detected on any single sensor or sensor pair. The Session will end when all sensors or sensor pairs detect no target.

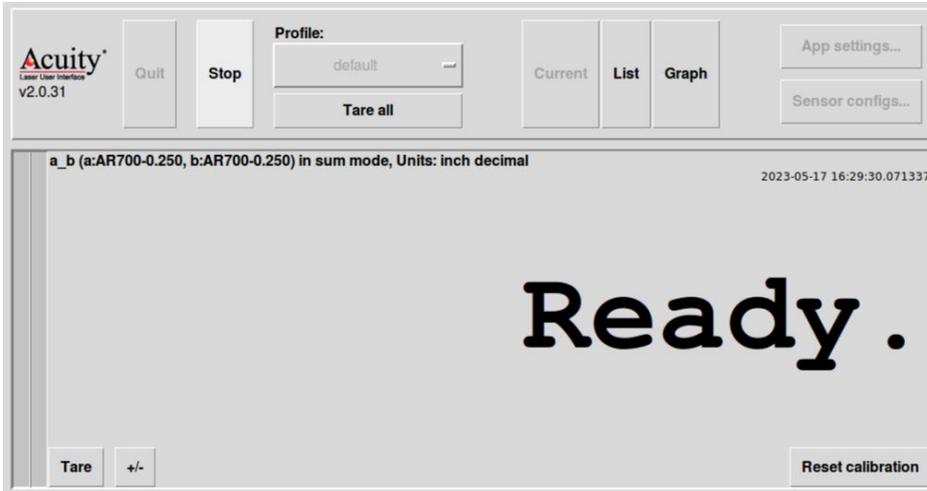


Figure 14: Session display after pressing Start.

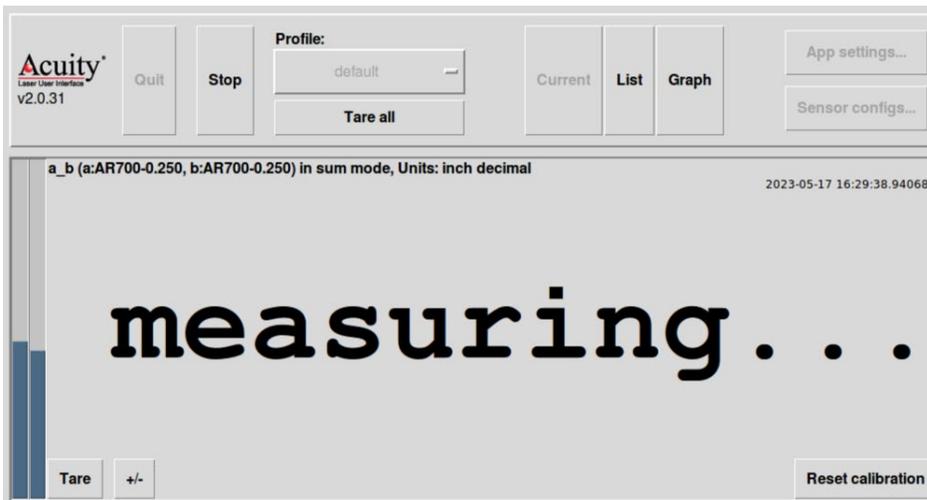


Figure 15: Session display during measurement.

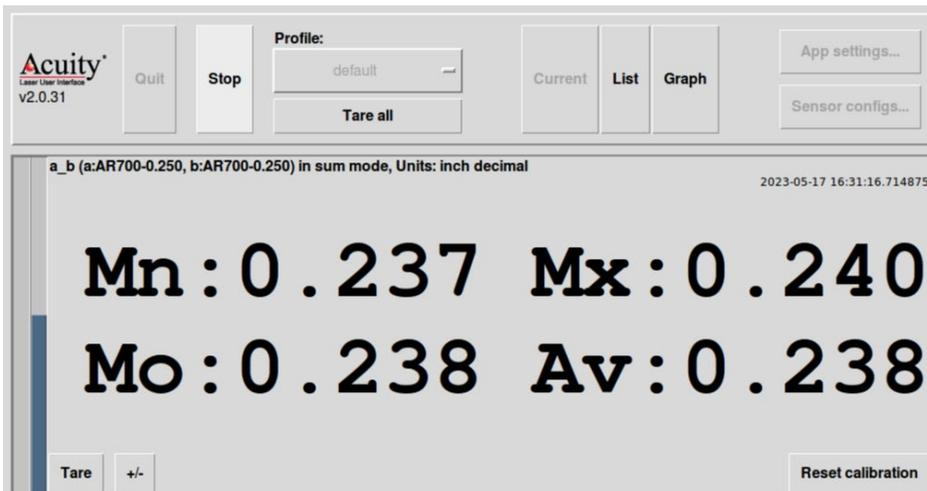


Figure 16: Session display after target leaves measurement range.

Positions Tab

The Positions tab is used to enter the relative locations of the lasers in a user determined x-y plane for use in plane measurement calculations. The information entered in this tab is not used in other modes.

- The measurement units are determined by the Distance Units parameter on the General tab.
- The z-axis positions are set when the user tares the Output Pane on the Measurement Screen.

The screenshot shows the 'Application Settings' window with the 'Positions' tab selected. The interface is divided into six columns, each representing a sensor (a through f). Each column contains two input fields: 'x:' and 'y:'. The 'Positions' tab is highlighted in the top navigation bar, and a 'Back' button is visible in the top right corner.

Figure 17: Positions Tab

Limits Tab

The Limits tab is used to enter warning and limit thresholds that allow the TPD to warn when a measurement is approaching a limit and alert when a limit has been exceeded by changing the color of the displayed measurement.

- Upper Limit: Highest value desired. Any measurement higher than this will be displayed in RED.
- Upper Warning: Values higher than this but less than the Upper Limit will warn the user by displaying in YELLOW
- Lower Warning: Values lower than this but more than the Lower Limit will warn the user by displaying in YELLOW
- Lower Limit: Lowest value desired. Any measurement lower than this will be displayed in RED.

Notes:

- The Upper Limit must be a value greater than the Lower Limit.
- If the Upper Warning is greater than the Upper Limit or the Lower Warning is less than the Lower Limit, the TPD will treat the sensor as if there is no warning value set.
- If the Upper Warning is less than the Lower Warning or the Lower Warning greater than the Upper Warning, the TPD will display every value between the limits as YELLOW.

The TPD allows limits to be set for single sensors and combinations, and the fields of the Limits Tab change depending on the selections made on the General Tab.

a sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>	b sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>	c sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>
d sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>	e sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>	f sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>

Figure 18: Limits Tab with Six Individual Sensors

Application Settings

General Positions **Limits** Utilities Back

d, e & f in Plane mode x axis angle: <input type="text"/> y axis angle: <input type="text"/> z displacement: <input type="text"/> Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>	a & b in sum mode Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>	c sensor Upper limit: <input type="text"/> Upper warning: <input type="text"/> Lower warning: <input type="text"/> Lower limit: <input type="text"/>
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Figure 19: Limits Tab with a Plane Combination, a Dual Sensor Combination, and a Single Sensor

Utilities Tab

The Utilities Tab is where the options are found to update and reset the TPD, copy data to a USB drive, and set the TPD's clock are found.

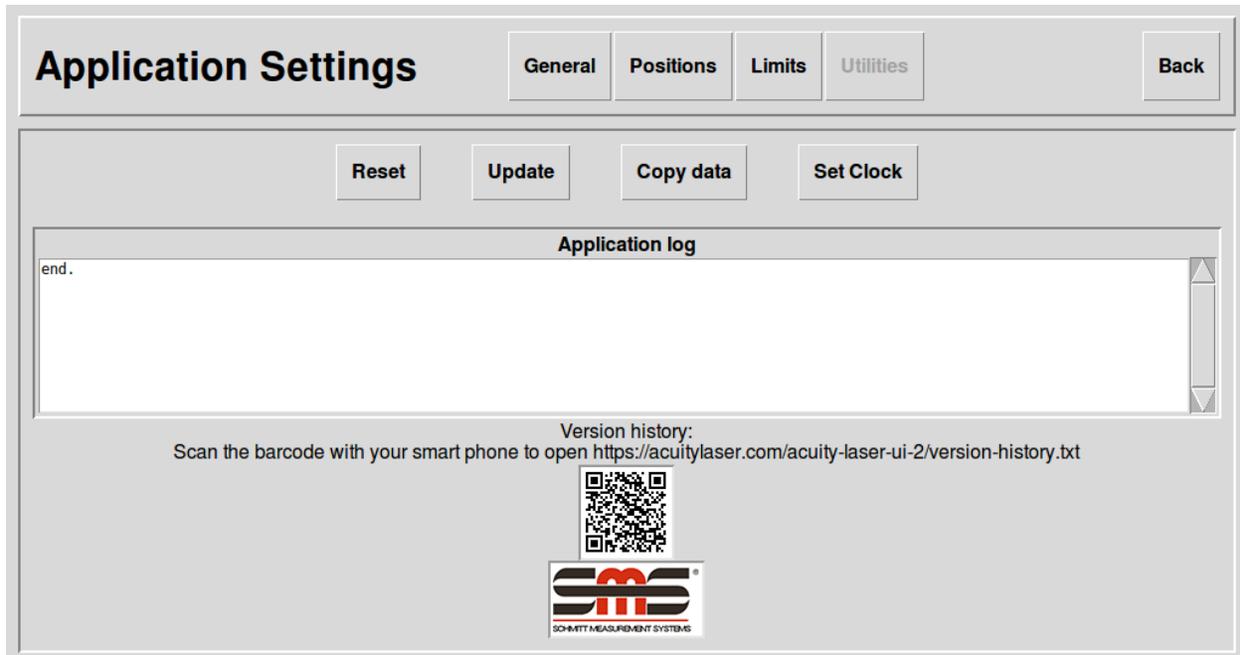


Figure 20: Utilities Tab

- **Reset Button:** Resets the TPD, erases all parameters entered, and deletes any measurement logs currently saved on the hard drive. This does not roll back any software update already installed.
- **Update:** Updates the TPD to the most recent version of its software.
 - There are two options to update the TPD:
 - **Internet:** Connect your TPD to your internet enabled network with an Ethernet cable. Either Ethernet port on the TPD can be used.
 - **Note:** Firewalls can disrupt the TPD connecting to the server. If this occurs, we suggest using the USB option.
 - **USB:** Download the update from the Acuity server onto a USB drive. Connect the USB drive to the TPD using any USB port. The TPD will detect the correct file and update itself. The latest update can be found at the link below.
 - acuitylaser.com/acuity-laser-ui-2/acuity-laser-ui.tar.gz
- **Copy Data:** Copies measurement and error logs to a connected USB drive. Just insert the drive and select.
 - **Note:** Measurement and error logs will be erased when the TPD is reset. Backup any data before resetting to avoid any loss of data.
- **Set Clock:** Sets the current time on the TPD. This ensures accurate timestamps when logging data.
- **Application Log:** This window shows TPD status updates that can assist in troubleshooting with technical support.