

# Acuity

Laser Measurement

## Acuity™ Touch Panel Display User's Manual



Manual p/n LLL009010 – Rev. 2.0  
For use with Acuity products  
June 29, 2009

Acuity  
A product line of Schmitt Industries, Inc.  
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Portland, OR 97210  
[www.acuitylaser.com](http://www.acuitylaser.com)

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1. Contact your Acuity distributor or call Schmitt Industries, Inc. to obtain a return merchandise authorization (RMA) number within the applicable warranty period. Schmitt Industries will not accept any returned product without an RMA number.
2. Ship the product to Schmitt Industries, postage prepaid, together with your bill of sale or other proof of purchase. your name, address, description of the problem(s). Print the RMA number you have obtained on the outside of the package.

This device complies with:

FCC Part 15, Class A, CE Mark  
CISPR22, CNS13438, EN55022, ICES-003, VCCI

operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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# 1. Introduction

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## 1.1 General Overview

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The Acuity™ Touch Panel Display (TPD) is a stand-alone user interface for use with Acuity laser distance sensors. These fully-enclosed units replace panel meters, alphanumeric displays and analog controllers by providing a modern interface through a full-color LCD and touch screen. The Touch Panel Display communicates with one or two Acuity sensors using their serial interfaces. Sensors can be easily configured using on-screen buttons to display and scale their distance outputs. Relative dimensions can be measured using a tare function. With dual RS232 serial inputs from two acuity sensors, the Panel serves as a thickness gauge and display, an application which previously demanded a PC computer and custom software programming. Using a single RS485 serial interface, the Panel can transmit thickness and dimensional information to external devices.

## 1.2 Definition of Terms

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Sensor – The complete distance measuring device. It can refer to models AR200, AR700, AR1000 or AR3000

Target – The object of measurement. The relative distance from the sensor to the target is measured by the sensor.

TPD – Touch Panel Display abbreviation

## 1.3 Quick Start Instructions

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This will get the Touch Panel Display operating for quick measurements using a single laser sensor to confirm proper system functionality. Once the TPD and sensor are operational, further detailed instructions can be found in the Acuity™ Touch Panel Display user's manual to assist the operator with learning the full capabilities of the Acuity AccuRange™ system.

### 1.3.1 Power connections

To operate the TPD with an Acuity™ laser sensor, both items must be connected to an appropriate power supply. The TPD and sensor may utilize the same 12-24V DC power supply and it is recommended that a TPD be ordered with optional Acuity Connectivity Kits to simplify these connections.



**Figure 1. Terminal blocks on rear of TPD**

For custom installations connect the Supply and Ground lines to TPD. Make sure your power supply is unplugged from its source. Locate the double terminal block on the rear panel of the TPD. Connect the Ground to the right terminal block. Connect the Supply voltage (12-24 VDC, <1A) to the left terminal block.

Be sure that your Acuity laser sensor is properly wired with the appropriate power supply. For detailed installation instructions consult documentation furnished with each Acuity product.

### 1.3.2 Serial Communications Connections

The TPD requires serial interface connections with your Acuity sensor. Locate the triple terminal block on the rear panel of the TPD that is immediately next to the five-block terminal.

Connect TX-, RX- and Ground leads according to the following illustration:



**Figure 2. Function of individual RS232 terminal blocks**

### 1.3.3 Activation

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Turn on the power source to both the TPD and the sensor(s). At the opening screen with the large Acuity logo, touch the screen with your finger or stylus pen to continue to the configuration. Never touch sharp metal objects or pens to the TPD screen.

Follow the menu sequence to SELECT MODEL. Once you select the appropriate series (AR200, AR700, etc.), Select the exact measurement model (Ex: AR200-25, AR200-50, etc.). Following your selection, press RUN and on the subsequent screen, press LASER ON.

Be sure that the laser sensor is aimed at a target within its appropriate measurement range. The TPD measurement screen will now display the measured value from the sensor.

For detailed instructions and setup, consult the appropriate chapters of this manual.

## 2. General Description

---

The Acuity™ Touch Panel Display (TPD) is a stand-alone user interface for use with Acuity laser distance sensors. These fully-enclosed units replace panel meters, alphanumeric displays and analog controllers by providing a modern interface through a full-color LCD and touch screen. The Touch Panel Display communicates with one or two Acuity sensors using their serial interfaces. Sensors can be easily configured using on-screen buttons to display and scale their distance outputs. All on-screen instructions are in the English language. Relative dimensions can be measured using a tare function. The individual distance readings from two sensors can be displayed simultaneously on the screen. Furthermore, with dual RS232 serial inputs from two acuity sensors, the Panel serves as a thickness gauge and display, an application which previously demanded a PC computer and custom software programming. Using a single RS485 serial interface, the Panel can transmit thickness and dimensional information to external devices.

The TPD firmware can be upgraded through the on-board USB port with new revisions that are downloaded from the Acuity website free of charge.

### 2.1 Principles of Operation

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The TPD communicates with Acuity sensors via an RS232 serial interface to display and process distance data from Acuity brand laser sensors. The TPD can accept up to two serial connections to two sensors. The unit can perform mathematical operations using the data from two sensors to calculate dimensional information for objects. The TPD can output calculated data via an RS485 signal.

## 2.2 Mechanical Dimensions

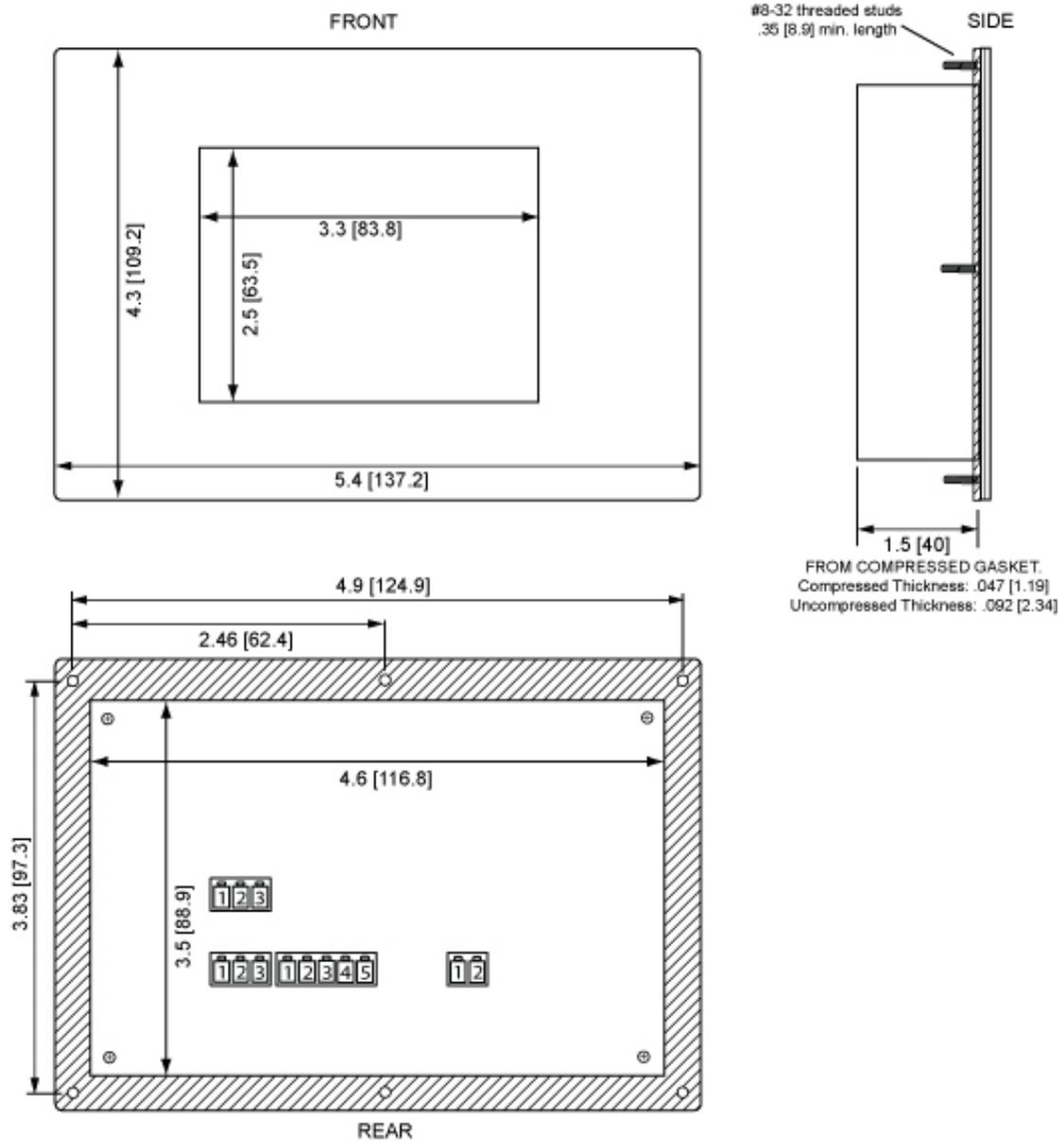


Figure 3. Mechanical Dimensions of TPD

## 2.3 Contents

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Your Touch Panel Display includes the following items:

- 1 Touch Panel Display unit, including five terminal blocks for attaching wires to the rear panel
- 2 meters of 5-conductor, shielded cable. This cable is 24 AWG and has a PVC jacket. The cable is stripped and the ends of the wire leads are tinned.
- 1 threaded, waterproof strain relief. This strain relief is designed to fit Acuity Connectivity Kits
- A Quick Start Guide
- This User's Manual (part number LLL009010)

## 2.4 Mounting

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The TPD may be mounted in an electrical panel or free-standing on a workbench. When panel-mounted with the attached foam gasket, the unit is water-resistant to NEMA-4X, IP65. Use the mechanical drawing located in section 2.2.

## 2.5 Laser Safety

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Although there are no lasers in the Touch Panel Display and therefore it requires no laser safety precautions, this product is used with Acuity laser sensors. Laser devices should not be aimed at the human eye. Installers of laser sensors should follow precautions set forth by ANSI Z136.1 Standard for the Safe use of Lasers or by their local safety oversight organization.

## 2.6 TPD Maintenance

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The Touch Panel Display requires little maintenance from the user. The front screen should be kept clean of dust buildup as a part of regular preventative maintenance. Use compressed air to blow off abrasive dust particles before wiping with a soft cloth. If your TPD does not function according to specifications, contact Schmitt Industries. Do not attempt to loosen any screws or open the housing.

Occasionally, Acuity will provide firmware upgrades for the TPD on its website. Instructions for installing this firmware on the TPD are provided in section 5.

TPD Specifications

Go to: <http://www.acuitylaser.com/pdf/Touch-Panel-Display.pdf>

## 3. Installation and Checkout

### 3.1 Mounting

The TPD may be mounted in an electrical panel or free-standing on a workbench. Remove the six nuts threaded to the mounting bolts on the rear side of the Display. Be sure to drill holes in the appropriate spot on the panel door and also cut out a rectangular opening large enough to accommodate the metal housing of the TPD. Use the mechanical drawing located in section 2.2. Secure the TPD to the panel by tightening the six nuts back onto the threaded bolts such that the foam gasket compresses underneath the bezel. When panel-mounted with the attached foam gasket, the unit is water-resistant to NEMA-4X, IP65.

### 3.2 Cabling

The TPD requires power and data communications connections directly or through an optional Connectivity Kit. Direct connection requires that the user make the appropriate connections to the appropriate terminal block on the rear of the TPD.

Below is a description of the terminal block connections on the rear of the TPD.



Figure 4. Rear of TPD showing connection blocks for Sensor 1 and Sensor 2

### 3.2.1 Direct connections

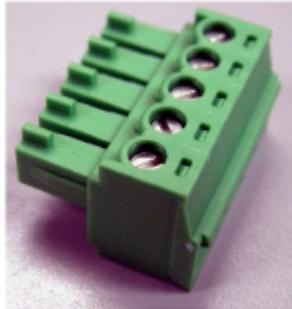
For direct connection to a power source and an Acuity sensor, please refer to the instruction in the Quick Start Guide, Sections 1.3.1 and 1.3.2 .

The physical connections to the TPD are accomplished through two-part Phoenix connector assemblies. The male connectors on the rear of the TPD have the specifications in the below table.

Male connector	Phoenix Contact P/N	Phoenix Description
Serial 232 (3 pin)	1803439	MCV 1.5/3-G-3.81
Serial RS422/485 (5 pin)	1803455	MCV 1.5/5-G-3.81
Power (2 pin)	1803426	MCV 1.5/2-G-3.81

The mating female connectors have the specifications in the below table.

Female connector	Phoenix Contact P/N	Phoenix Description
Serial 232 (3 pin)	1803581	MC 1.5/3-ST-3.81
Serial RS422/485 (5 pin)	1803604	MC 1.5/5-ST-3.81
Power (2 pin)	1803578	MC 1.5/2-ST-3.81



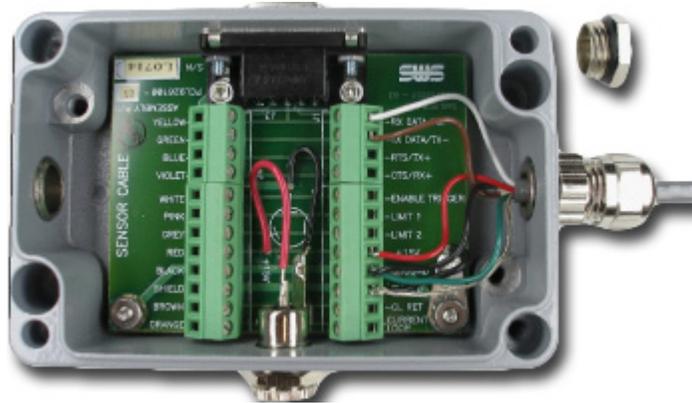
**Figure 5. Mating screw terminal connector (5 pin version)**

### 3.2.2 Connections using the Connectivity Kit

The Acuity Connectivity kit is a housed connection terminal that makes it easy to connect the individual wire leads from Acuity sensors to an AC Power supply and a PC computer, via a serial cable with DB9 connector. The Connectivity kit includes a second set of terminal blocks, making it possible to connect Acuity sensors to external devices, such as the TPD, electronic switches, PLC's and networks.

To connect a sensor the TPD through a Connectivity Kit, open the Connectivity Kit enclosure lid by loosening the four corner screws. Remove the blind plug from entry hole (see photo below) Insert the extra wire harness (Part number CBA901001, supplied with TPD) through the hole and thread the strain relief hand tight into enclosure. Insert the five individual wires into the terminal block as follows:

Connectivity Kit	CBA901001 Cable
RX Data	White
TX Data	Brown
+15VDC	Red
Ground	both Green and Black from cable
Shield	Shield wire from cable, and Black from enclosure lug



**Figure 6. Connectivity Kit (AQ700001 shown)**

Pull the cable jacket back into the box of the Connectivity kit slightly, then wrench tighten both parts of the strain relief, starting with the inner portion first.

Insert the five wire leads into the terminal blocks of the TPD as shown below:

TPD RS-232 Block	CBA901001 cable	
#1 RS-232 R	Brown (TX Data)	
#2 RS-232 T	White (RX Data)	
#3 RS-232 G	Green Data GND	
TPD Power Block	CBA901001 Cable	
#1 +12V	Red +15VDC	
#2 GND	Black Ground	

**Figure 7. Wire connection to TPD terminal blocks**

A second sensor can be connected to top RS232 Block on the TPD. If using a Connectivity Kit, the second cable needs only the three RS-232 conductors attached as shown, connected to the second RS-232 port on the TPD. Power connection to TPD is supplied only by the FIRST Connectivity Kit.

### 3.3 RS485 Multipoint Output Connection

The Acuity TPD includes a single RS485 interface designed for transmitting measured or calculated distance data (as displayed on the screen) to an external device. The RS485 block is a full duplex port with separate receive (R+, R-) and transmit (T+, T-) pairs. The T+, T- send the laser data using the

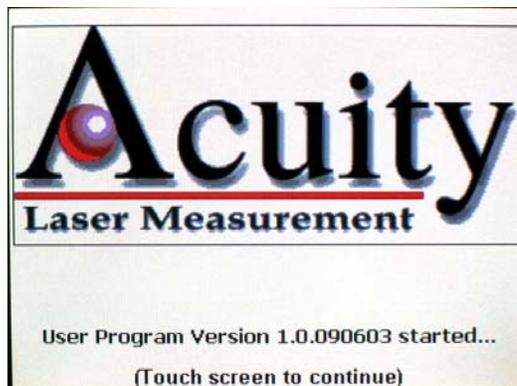
physical RS485 / RS422 signaling levels. RS485 protocols are ideal for transmitting serial data over long distances.

The TPD (R+, R-) pair is not functional for communication with an external device and hence is not used with this version of TPD.

### 3.4 Verifying Operation

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After turning on the power to both the sensor and the TPD, the user should see the greeting screen:

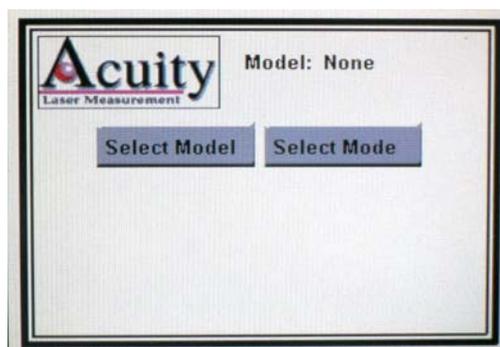


As instructed, touch the screen to continue to the Display screen and then press Setup

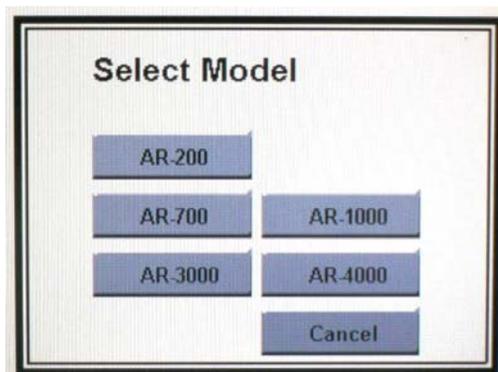
#### 3.4.1 Select the correct model

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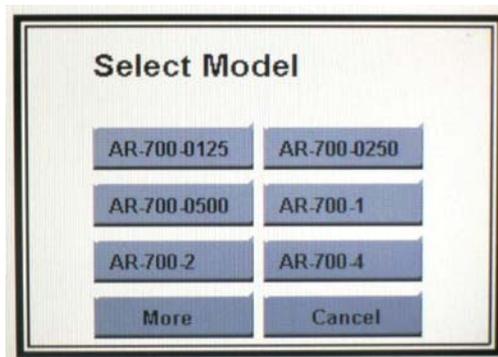
If this is the first time you are connecting your sensor to the TPD, it will not automatically recognize the sensor and its configuration and it will be necessary to program the TPD to properly communicate with your device.



Press the Select Model button to setup the sensor you have connected to the TPD.



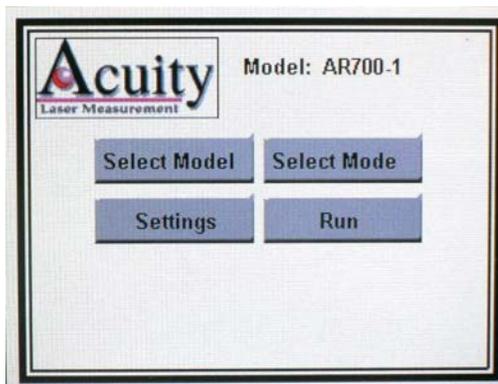
**Select** the sensor series from the screen listing and **press the corresponding button.**



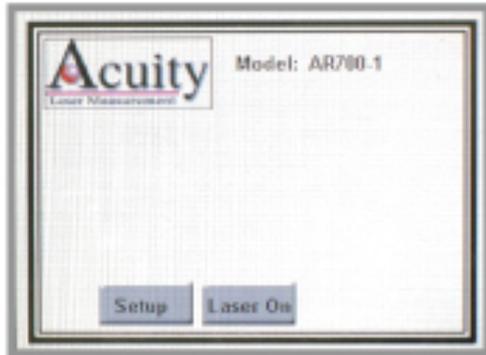
**Select** the sensor series from the screen listing and press the corresponding button.

### 3.4.2 Run the Sensor

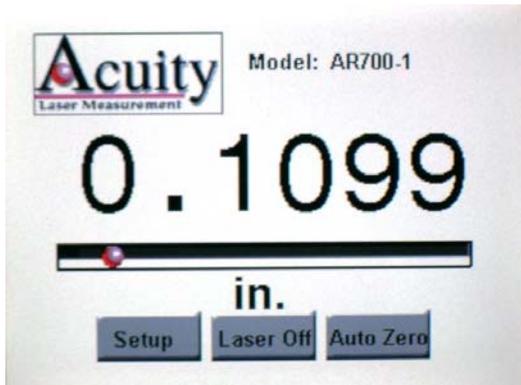
The TPD will confirm your sensor model selection at the top of the screen. To begin displaying the sensor output on the TPD...



**Press the Run Button**



**Press the Laser On button**



The display screen will become active and distance measurements will appear if the laser sensor is aimed at a target within its measurement span.

Once a sensor has been selected using the software as described in this section, the TPD will restore the settings in use at the last session. The TPD will display the measurement screen upon power up using the stored sensor settings.

The screen displays measurement results and a row of buttons at the bottom. Touching the Laser Off button turns the sensor laser off and the TPD ceases displaying measurement values. Touching the Laser On button turns the sensor laser On and the TPD begins displaying measurement values

The central area of the screen is comprised of the sensors measured value, a measurement scale and moving ball (Position indicator) within a scale, both of which are displayed below the measured value. The ball moves back and forth within the scale to simulate the position of the target distance relative to the sensor.

The second button displayed on the Measurement screen is the Setup button. Touching the Setup button will display a screen with four selections as seen in.

### 3.5 Troubleshooting

The TPD should display distances measured by the sensor to a target within the sensor's measurement span. Trouble shooting steps are below:

Symptom	Probable Cause	Correction
The TPD does not turn on and/or the welcome screen does not appear.	No power to the TPD  Improper voltage supplied to the TPD  Power connections reversed	Verify that there is 12-24 Volts DC Supply and Ground attached to the two-block terminal block on the rear of the TPD.  Try removing and re-applying the supply power to cycle the TPD.
Distance readings do not appear on the display screen.	The Acuity sensor is not connected. The Acuity sensor does not have power.  The sensor is attached to the incorrect terminal blocks.  The Acuity sensor is connected to another terminal device.  The sensor is not aimed to a target in the span.	Attach the Acuity sensor according to Section 3.2 Supply the appropriate DC voltage to the sensor according to its specifications.  Be sure that your sensor is attached to the terminal blocks for Sensor 1.  The sensor can only communicate with one device at a time, the TPD or a computer, but not both.  Aim the sensor's laser spot at a target within its specified measurement span.
"COMM ERROR" is displayed	Communication error between sensor and TPD	Press the Laser Off button followed by pressing the Laser On button. This action should return the

		display to the sensor measured value.
"SYNC" is displayed	Power may have been disrupted to the sensor. The sensor is not in range  A communication error occurred	Apply proper voltage to the sensor.  Aim the sensor at a target within its span.  Press the Setup button followed by pressing the Run button. Now press the Laser On button to reestablish communication with the sensor.

### 3.5.1 Serial Communications Check

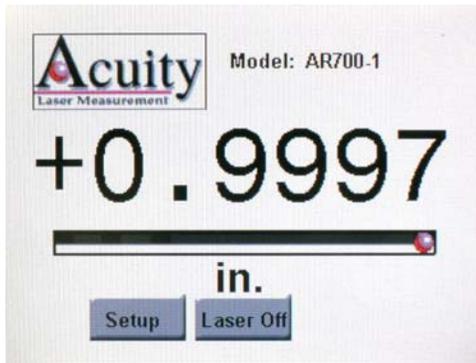
If no information is received over the serial cable to the TPD, check the power supply and serial wire connections. The sensor may be in a configuration that prevents serial communication, such as being set at the wrong baud rate.

To reset the sensor to the default: follow the instructions for the sensor in question and configure the serial communications to the following parameters (9600 baud, 8 bits, no parity, 1 stop bit), and enable serial RS232 communication. See the individual User's Manuals for your Acuity sensor to properly configure the device to these default settings.

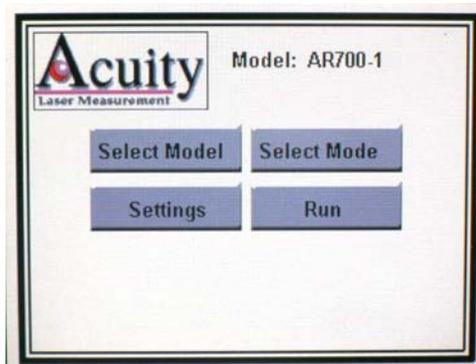
## 4. Performance Optimization using Settings

### 4.1 The Settings menu access

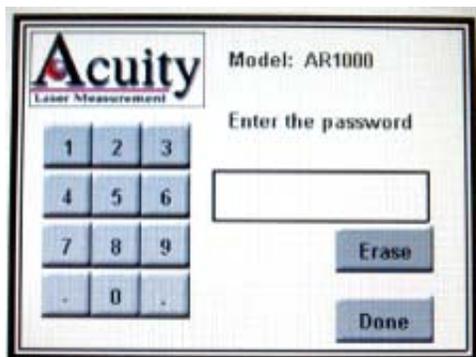
The Settings menu allows the user to make several system configurations through the TPD. Changes made through the various Settings Menu screens will affect the TPD, the sensor parameters, or both.



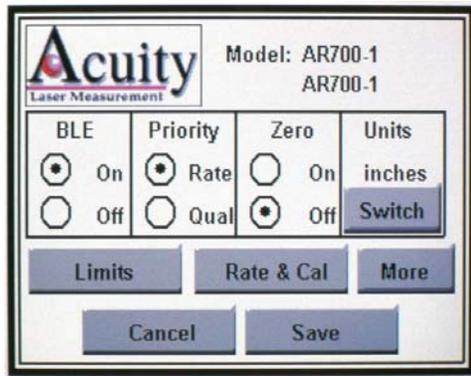
To access the Settings menu, **press Setup** on the display screen.



**Select** the Settings by pressing the **Settings** button.



Enter the Security Code: **2 4 6 8** and then **press the Done** button



This is the main Settings Screen. After settings are adjusted, **press the Save button** to return to the Modes screen.

## 4.2 Background Light Elimination (BLE)

Sample Priority is relevant to only AR200 and AR700 series sensors.

Background light Elimination is a feature on Acuity sensors whereby the sensor's detector will take a sample with the laser on and then with the laser off and automatically compensate for the effects of ambient light. BLE default setting is ON for Acuity sensors.

The TPD allows user's to configure their sensor's BLE setting through the main Settings screen. It is suggested that you leave BLE ON unless it becomes necessary to use the sensor at very high sampling rates. Because two samples are captured for every one output, the maximum frequency response of the sensor is halved.

## 4.3 Sample Priority

Sample Priority is relevant to only AR200 and AR700 series sensors.

Each sensor's scan cycle (detector camera scan) is checked for the correct exposure. The sensor controls the exposure by varying the strength of the laser beam and the camera's shutter time. For optimal speed performance, the laser power is increased before the shutter time is increased.

Shorter exposure times generally occur with more reflective targets, measurements that are closer to a sensor (shorter range), and with higher power lasers. Longer exposure times generally occur with less reflective targets, measurements that are farther from a sensor (longer range), and with lower power lasers.

When the exposure time is greater than the requested sample period, then the priority command determines how the camera's shutter time is calculated.

In Quality Priority mode the sample rate may be slowed down from the programmed value in order to attain the optimum shutter time. If the sample rate is slowed, then that rate is uncontrolled.

In Rate Priority mode the shutter time is limited in order to guarantee the programmed sample rate. If the exposure is too low, then the sample quality (accuracy) may be reduced. If the shutter time is limited in this mode, then there will only be only one scan cycle per sample (no averaging).

## 4.4 Zero Reference Function

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This function is relevant to using the TPD with any Acuity sensor.

The Zero reference setting is OFF in the default configuration of the TPD. Switching to ON will place the Auto Zero button on the main display screen.

When a user presses the Auto Zero button on the main display screen, the displayed measurements reference a newly-established zero point, plus any programmed offsets (typically none). The Zero Reference Function is similar to a "Tare" function.

After a new zero point is established, new measurements are shown as + or – that new zero point. This function is helpful in showing relative measurements instead of absolute measurements.

When a user presses the Zero Off button on the main display screen while in the Zero Reference mode, the TPD will return to the normal (absolute) sensor distance output, plus any programmed offsets.

## 4.5 Display Units

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This function is relevant to using the TPD with any Acuity sensor.

The default output units are the same as the default configuration for the particular sensor(s). It is possible to change the displayed output units by selecting between one of four units; inches, millimeters feet and meters.

To switch between these units, press the Switch button in the Units area of the Settings screen.

## 4.6 Setting Output Display Limits

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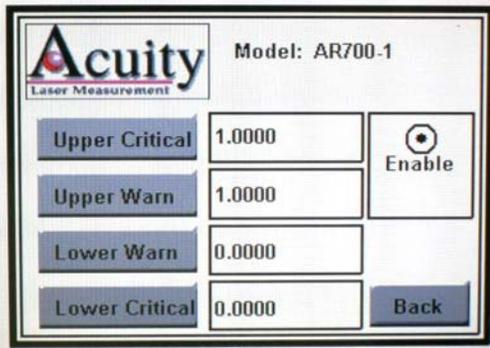
This function is relevant to using the TPD with any Acuity sensors.

The Limits menu allows users to change the color of the distance display font at different set points corresponding to levels of warning and criticality. This color change serves as a visual cue to the TPD viewer that a threshold distance has been exceeded. Above Upper Critical limit and Below the Lower Critical limit, the font will be red. Between the Critical and Warning limits, the font will be pink. Between the Upper and Lower Warning limits, the font will be black.



The Main Display Screen with measured value within limits displayed in black

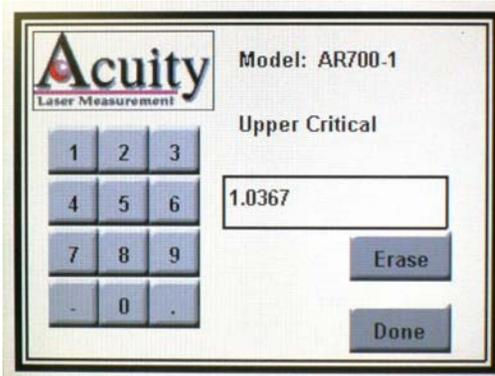
From the Settings Menu (see section 4.1, The Settings Menu Access), push the Limits button to access the Limits menu screen.



The Limits Screen displays each limit and allows users to enable or disable the function

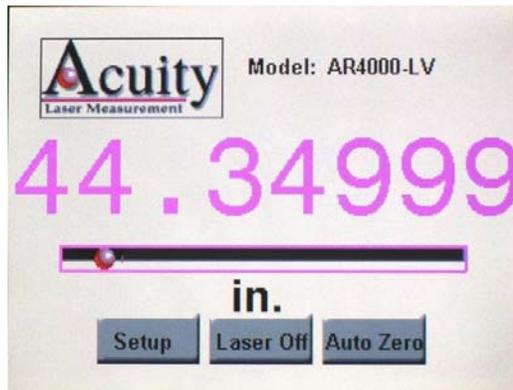
The Limits function is disabled in its default state, so it is necessary to enable it by pressing the Enable radio button.

The parameters corresponding to Upper Critical, Upper Warn, Lower Warn and Lower Critical are set in an identical manner. To set any of these limits, press the corresponding button to access its individual setting screen.

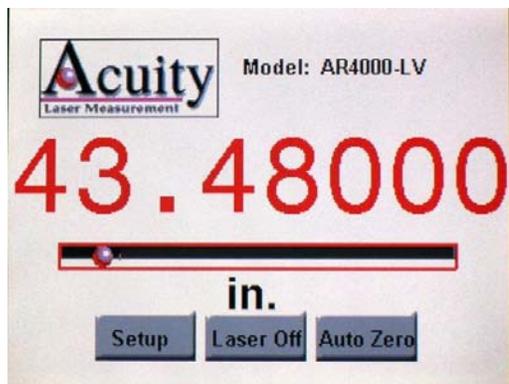


Use the numeric keypad to enter the desired distance for the limit.

Use the numeric keypad to enter the desired distance for the limit. The units of the numerical value are the same as those chosen on the Settings menu screen and they take into account any offset that may be programmed (Refer to Offsets



The Main Display Screen with a measured value that is between the Critical and Warning limits is displayed in Pink.

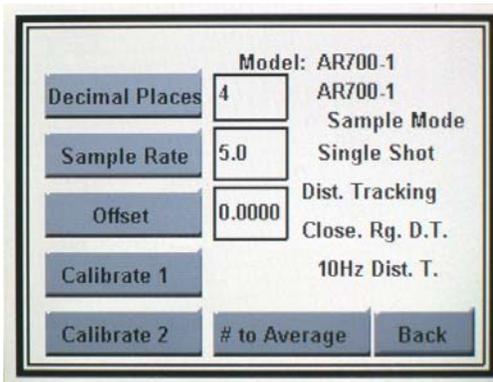


The Main Display Screen with a measured value that has exceeded the Upper or Lower Critical limits is displayed in Red

section 4.7.3). If you make a mistake, press the Erase button to remove the right-most digit. When finished, press the Done button to return to the Limits menu screen. Press the Back button to return to the primary Settings menu screen.

## 4.7 Rate and Calibration Settings

The Rate & Cal (Rate and Calibration) menu allows users to make several changes that affect the TPD and the sensor itself. Included, are altering the number of significant digits displayed beyond the decimal point, altering the sensor's sampling speed, providing a measurement offset, performing a calibration, specifying the number of distance samples to average before refreshing the display and controlling the sampling modes.



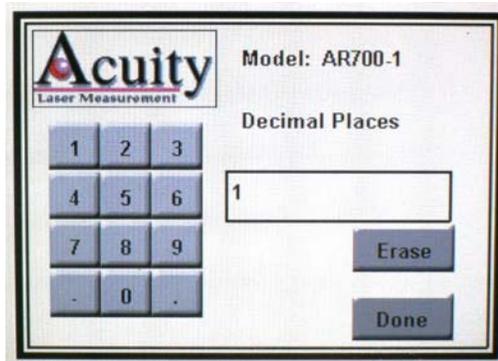
The Rate & Cal screen shows a variety of parameters that can be changed by the user.

### 4.7.1 Adjusting the Decimal Places

This function is relevant to using the TPD with any Acuity sensor.

The TPD will by default display measurements to four decimal places and it may be necessary to change the number of significant digits to properly match the resolution of the particular Acuity sensor attached to the TPD. See the specifications data sheet for the sensor you are using to verify the proper resolution.

To change the number of decimal places and to access the Decimal Places menu screen, press the Decimal Places button on the Rate & Cal screen. Use the numeric keypad to **enter the number of significant digits** to be displayed to the right of the decimal point and **press Done** when completed.



**Enter** the number of significant digits to be displayed to the right of the decimal point and **press Done** when completed.

### 4.7.2 Adjusting the Sample Rate

---

This function is relevant to using the TPD with any Acuity sensor.

The sampling rate refers to the number of distance samples transmitted by the sensor's serial interface to the TPD. However, the TPD may not adequately display the change in measurements at an equivalent speed due to processing (refresh rate) limitations. By default the Sample Rate will be the same as the default sample rate setting for the sensor attached to the TPD. In most cases, this is 5 Hz or lower.

### 4.7.3 Using an Offset

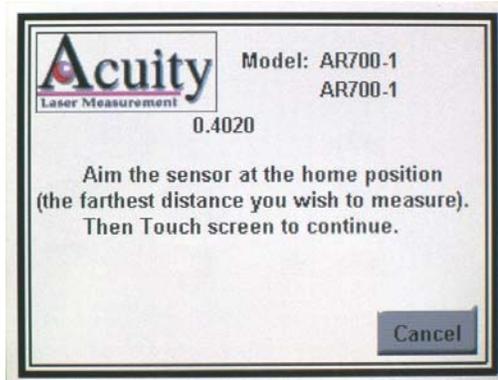
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An offset programmed into the Touch Panel Display will add (or subtract if the number is negative) the value to the displayed distance. The units of the offset are always the same units as the selected units. This function can be used just as effectively with single or two lasers. From the Rate & Cal screen, **Press the Offset button** to reach the Offset entry screen. Using the virtual numeric keypad, **Enter the desired offset** and **Press Done** to save the configuration.

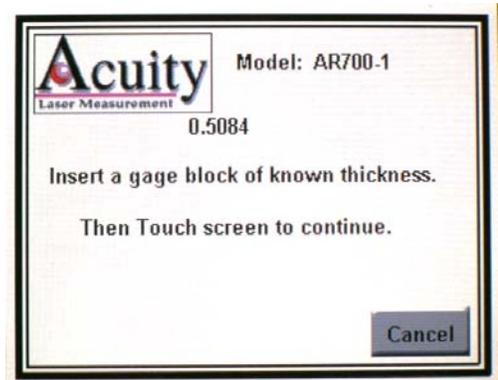
### 4.7.4 Calibrate Sensors

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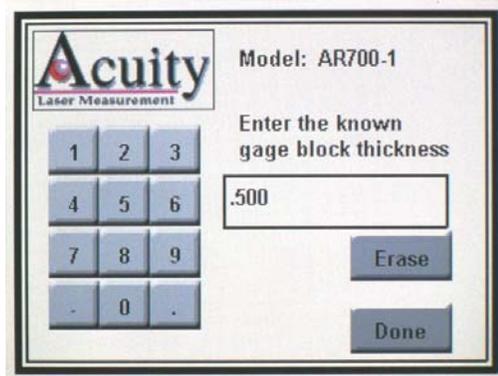
The TPD Calibration function will force the device to display a desired value when an object of known distance (or position) is placed in front of a laser sensor. Typically for short-range laser sensors, a gauge block is placed in the path of a laser to force the known value. The TPD calibration screens are easy to follow with on screen prompts. **Press either Calibrate 1 or Calibrate 2 button** on the Rate & Cal screen to enter the desired calibration setup. A screen with virtual keypad is displayed prompting the first action of aiming the sensor at a home position. Continue to follow these on screen prompts for a successful calibration.



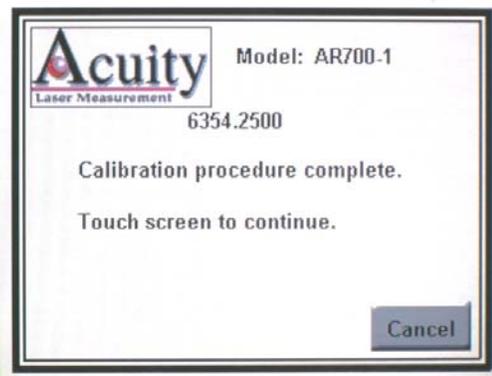
**Aim the laser sensor** at a reference surface (Zero point). This is typically a table surface or conveyor top. **Touch the screen.**



**Place** an object of known dimension (such as a gage block) in front of the laser sensor. **Touch the screen.**



**Enter** the thickness dimension of the gage block and **press Done.**



**Touch the screen to complete the calibration.**

If you are calibrating a second sensor repeat the previous steps after **pressing the Calibrate 2 button** for on the Rate & Cal screen.

## 4.8 Dual Sensors Configuration

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One of the TPD's most powerful features is its ability to accept inputs from two Acuity laser sensors simultaneously and automatically calculate target dimensions. It is not necessary for two identical sensors to be connected to the TPD to exploit this functionality.

The most common application which uses two laser sensors is material thickness or material width based on two, opposing laser sensors. Users should understand the many considerations. Information about the proper setup of opposing laser sensors can be found on the Acuity website at:

<http://www.acuitylaser.com/resources/synchronizing-laser-sensors.shtml>

Prior to configuring the TPD to automatically calculate the material dimensions, fixture both laser sensors so that the emitted laser spots are aligned. Separate the laser sensors to the desired positions.

### 4.8.1 Connect the second laser sensor

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Physically attach the wire leads of the second laser sensor to the female terminal screw connector and attach the connector to the mating male connector for "Sensor 2" on the rear of the TPD. Apply the appropriate electrical power to the second laser sensor as well.

A second Acuity Connectivity kit can be used for the second sensor, but it will not be necessary to draw a second power connection for the TPD.

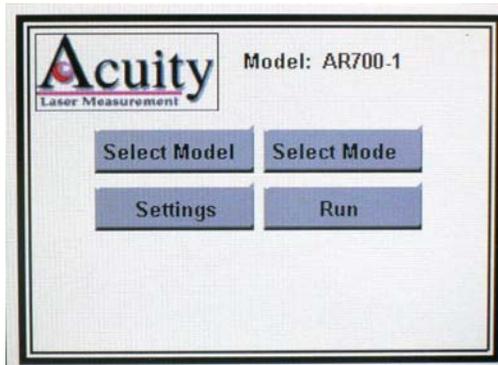
### 4.8.2 Configure the TPD for two sensors

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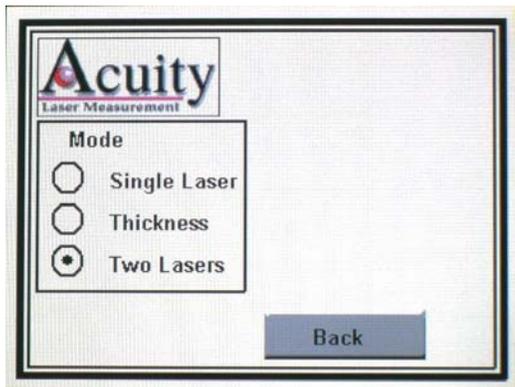
Apply power to the TPD and Touch the introductory screen to reach the main measurement screen. It is assumed that the user has already configured the

TPD for use with a single sensor. These instructions are for the configuration of the TPD for use with second sensor in a thickness application.

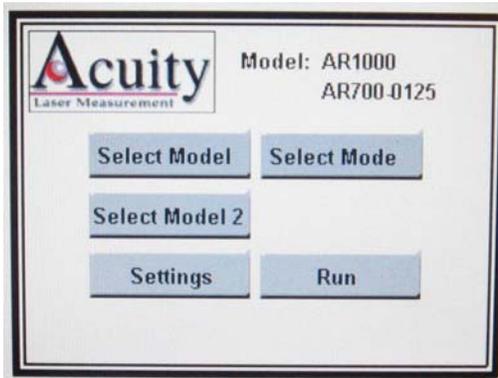
At the display of the main measurement screen, press the Setup button to reach the Settings menu...



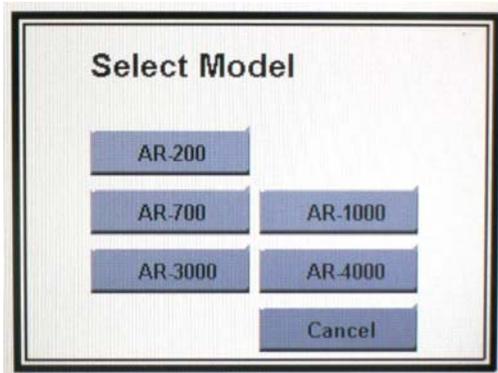
After, **press the Select Mode button**



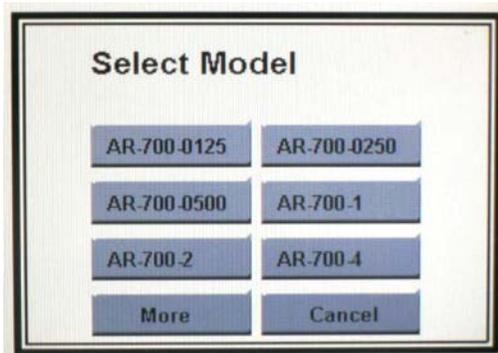
From the Mode menu screen, **press the Two Laser radio button and then press Back.**



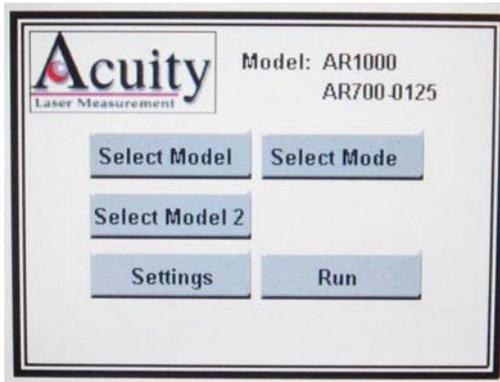
**Press the Select Model 2 button** to setup the second sensor you have connected to the TPD.



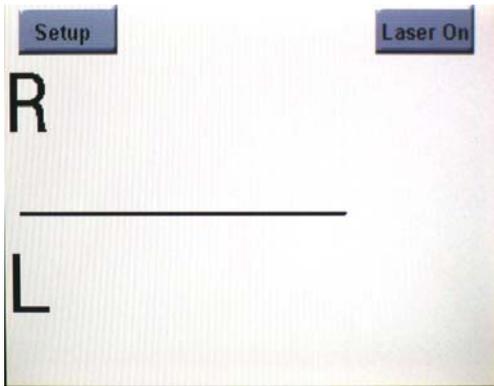
**Select** the sensor series from the screen listing and press the corresponding button.



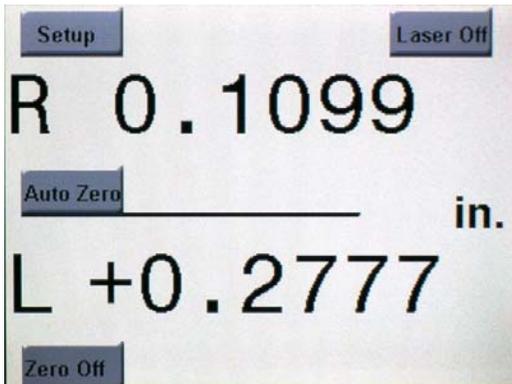
**Select** the sensor model from the screen listing.



Press the **Run** button to display the measurement screen.



The display screen is now set to display the measured value of both laser sensors. **Press** the **Laser On** button.

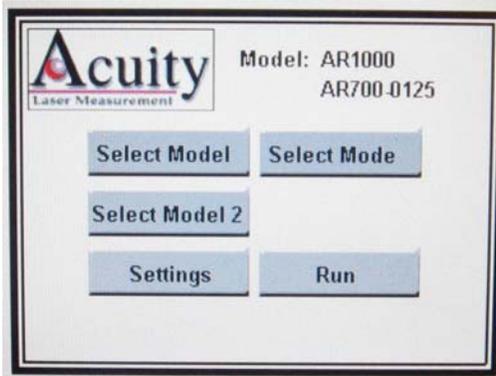


Both lasers values are displayed and if the Auto Zero function has been selected it is independent to each laser.

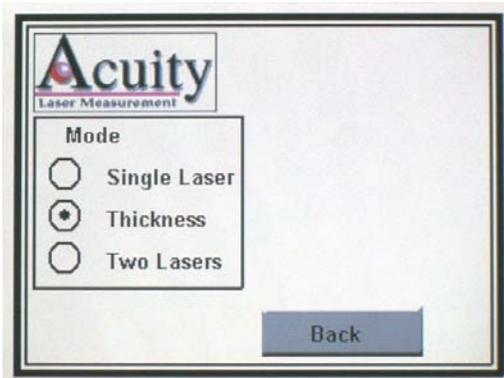
### 4.8.3 Configure the TPD to read thickness using two laser sensors

This section guides users through the necessary steps to configure the Touch Panel Display to perform the necessary mathematics to report dimensional information using the input from two Acuity laser sensors.

To read the proper dimension of an object placed between the two laser sensors, it is necessary to program the TPD with the known thickness of a reference material. This is accomplished by entering an offset equal the known thickness (width, etc.) of a calibrated standard, such as a gauge block.



From the Setup Menu,  
**Press the Select Mode  
button**

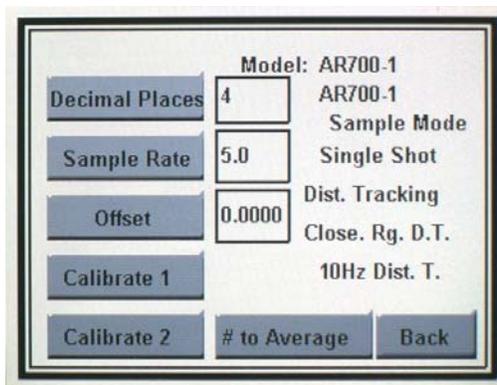


After pressing the Select  
Mode button, the Mode  
screen is displayed.  
Press the Thickness  
Radio button and then  
the Back button

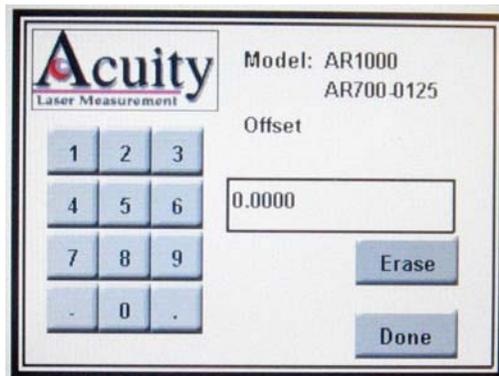
Return to the main measurement screen by **pressing Back, Run and Laser On** each of the subsequent screens.

At the main measurement screen, **press the Zero button**. The displayed dimension should be exactly equal to the dimension of the gauge block or reference standard target that is in the measurement paths of the opposing laser sensors.

From here, users can place objects and materials between the two laser sensors and the Touch Panel Display will report their dimension.



From the Rate and Cal menu screen, **press the Offset button**.



From this menu, **enter the offset** equal to the dimension of your gauge block. Be sure to use the same units (in., mm. etc.). **Press Done** when finished.

#### 4.8.3.1 Optimizing dual sensor thickness

Thickness measurements can present several challenges that should be addressed to optimize the performance of the system in the measurement application. For a full discussion of using laser sensors for thickness applications, read our report at:

<http://www.acuitylaser.com/resources/synchronizing-laser-sensors.shtml>

Users may choose to configure the TPD and the laser sensors to improve performance by increasing or decreasing the individual sampling speeds of the sensors. Also, data can be smoothed by averaging data samples through the “# to Average” from the Rate and Calibration screen.

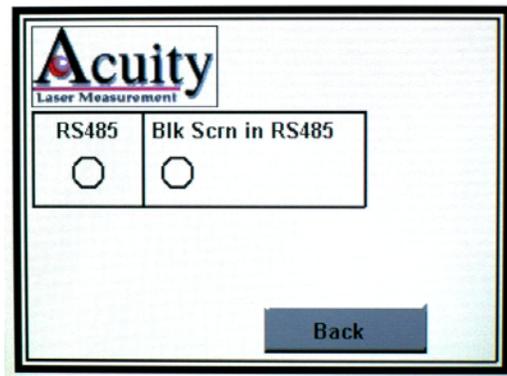
Depending on the individual sensor model selected, the TPD may permit a “Single Shot Mode” from the Rate and Calibration screen.

## 4.9 Using the RS485 Multipoint Output

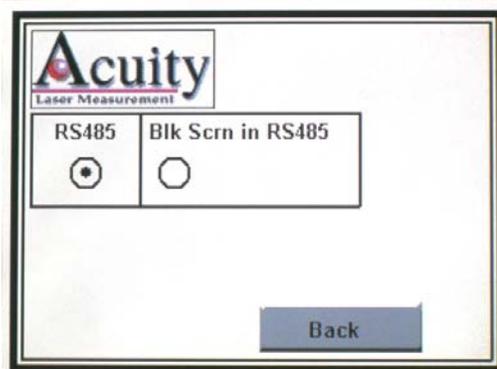
The RS485 block is a full duplex port with separate receive (R+, R-) and transmit (T+, T-) pairs. The T+, T- send the laser data using the physical RS485 / RS422 signaling levels.

The TPD (R+, R-) Pair are not functional for RECEIVING communications from an external device.

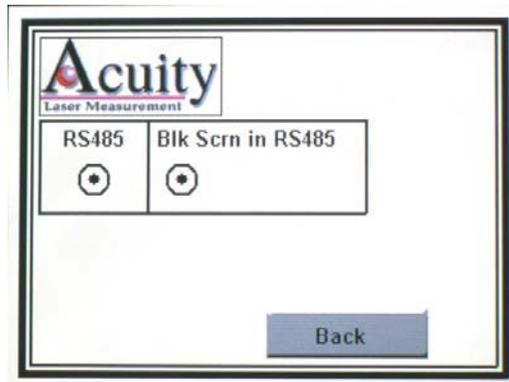
Once the RS485 connections have been completed and a digital output is needed. The following screens are used to activate the RS485 output.



These radio buttons are used when an RS-485 digital output signal is required and the display screen is not needed for monitoring.



The RS485 radio button when selected enables the RS-485 output.



The radio button **BLK Scrn in RS485** is used when the RS-485 is enabled and when the screen's display is not needed, just the digital RS-485 output. This allows for a faster digital RS-485 output signal.

The Screen blackout function can improve the output speed of the RS485 communications by reducing the strain on the processor of the TPD.

## 5. Upgrading the TPD firmware

Acuity may change the firmware used in the Touch Panel Display to improve its functionality with Acuity sensors or to correct bugs. Owners of TPD's may choose to upgrade the installed firmware to take advantage of the improvements offered in new revisions. It is not necessary to purchase a new TPD to obtain the new firmware version. Instead, it can be uploaded to the TPD device by connecting it to a PC computer (Windows XP or Vista compatible) via a USB cable (not included).

Visit [www.acuitylaser.com/TPD/tpd-firmware-update.shtml](http://www.acuitylaser.com/TPD/tpd-firmware-update.shtml) to download the latest firmware version, the custom installer program and instructions.

With the power to the TPD OFF, plug a USB cable into the TPD and into a USB port on a PC computer.



**Figure 8 Location of USB port to connect to a PC computer**

When power is restored to the TPD, the USB communications are established and the PC computer will (for the first time) recognize the TPD as a new device. In most cases, it will recognize the hardware as a USB to RS232 converter. Follow all on-screen prompts to allow Microsoft Windows to automatically install the necessary drivers.

Run the Bitmap Loader entitled "ScreenUpdate" that was previously downloaded from the Acuity website. Within the Bitmap Loader screen, **select the serial port** that has been assigned to the connected Touch Panel Display. **Select "USB Autobaud"**. **Press the button for Select File** and locate the new firmware version BIN file. Typically, this file is located in the same folder as the Bitmap Loader. Finally, **press the Store into SLCD button**. The software will automatically delete the old firmware and install the new firmware. **Verify** the correct installation by connecting a laser sensor and checking for proper distance measurements and specific TPD functionality.

## Appendix 1 – Acuity part / model numbers chart

### AR4000 Model part / model numbers

P/N	Acuity Model	Description
AP4100000	AR4000-LIR	Infrared beam Laser Diode Based Rangefinder with 0-54' range, 0.1" accuracy. RS232 interface, NEMA-4/IP67 case. Includes sensor, 6' cables, manual.
AP4200000	AR4000-LV	Visible beam Laser Diode Based Rangefinder with 0-40' range, 0.3" accuracy. RS232 interface, NEMA-4/IP67 case. Includes sensor, 6' cables, manual.
AP6300000	AR4000-RET	Eye Safe Laser Diode Based Rangefinder with 3-54' range, 0.1" accuracy. For use with reflective tape (included), with RS-232 interface, in NEMA-4/IP67 case. Includes sensor, 6' cables, manual.

### AR3000 & AR1000 Model part / model numbers

AP1000232	AR1000 RS232	AR1000 laser distance sensor with RS232 output
AP1000422	AR1000 RS422	AR1000 laser distance sensor with RS422 output
AP3000232	AR3000 RS232, std	AR3000 distance measurement sensor with RS232, 2mrad laser
AP3000422	AR3000 RS422, std	AR3000 distance measurement sensor with RS422, 2mrad laser
AP3100232	AR3000 RS232, 10mrad	AR3000 distance measurement sensor with RS232, 10 mrad laser
AP3100422	AR3000 RS422, 10mrad	AR3000 distance measurement sensor with RS422, 10 mrad laser

### AR700 Model part / model numbers

AP7010001	AR700-0125	AR700-0125, 3.175 mm span, 1 mW visible diode, 83 mm case, 2m cable
AP7010002	AR700-0250	AR700-0250, 6.35 mm span, 1 mW visible diode, 83 mm case, 2m cable
AP7010005	AR700-0500	AR700-0500, 12.7 mm span, 1 mW visible diode, 83 mm case, 2m cable
AP7010010	AR700-1	AR700-1, 25.4 mm span, 1 mW visible diode, 83 mm case, 2m cable
AP7010020	AR700-2	AR700-2, 50.8 mm span, 1 mW visible diode, 83 mm case, 2m cable
AP7010040	AR700-4 1mW	AR700-4, 101.6 mm span, 1 mW visible diode, 83 mm case, 2m cable

AP7020040	AR700-4 5mW	AR700-4, 101.6 mm span, 5 mW visible diode, 83 mm case, 2m cable
AP7220060	AR700-6	AR700-6, 152.4 mm span, 5 mW visible diode, 132 mm case, 2m cable
AP7234060	AR700-6 RP	AR700-6RP, road profiling option, 152.4mm span, 20mW visible diode, Bandpass filter, 132 mm case, 2m cable
AP7220080	AR700-8 5mW	AR700-8, 203.2mm span, 5 mW visible diode, 132 mm case, 2m cable
AP7230080	AR700-8 20mW	AR700-8, 203.2mm span, 20 mW visible diode, 132 mm case, 2m cable
AP7234080	AR700-8 RP	AR700-8RP, road profiling option, 203.2mm span, 20mW visible diode, Bandpass filter, 132 mm case, 2m cable
AP7420120	AR700-12 5mW	AR700-12, 304.8 mm span, 5 mW visible diode, 257 mm case, 2m cable
AP7430120	AR700-12 20mW	AR700-12, 304.8mm span, 20 mW visible diode, 257 mm case, 2m cable
AP7220120	AR700-12C 5mW	AR700-12, 304.8mm span, 5 mW visible diode, 132 mm case, 2m cable
AP7230120	AR700-12C 20mW	AR700-12, 304.8 mm span, 20 mW visible diode, 132 mm case, 2m cable
AP7434120	AR700-12 RP	AR700-12RP, road profiling option, 304.8 mm span, 20mW visible diode, Bandpass filter, 132 mm case, 2m cable
AP7420160	AR700-16 5mW	AR700-16, 406.4 mm span, 5 mW visible diode, 257 mm case, 2m cable
AP7430160	AR700-16 20mW	AR700-16, 406.4mm span, 20 mW visible diode, 257 mm case, 2m cable
AP7620240	AR700-24 5mW	AR700-24, 609.6 mm span, 5 mW visible diode, 485 mm case, 2m cable
AP7630240	AR700-24 20mW	AR700-24, 609.6mm span, 20 mW visible diode, 485 mm case, 2m cable
AP7620320	AR700-32 5mW	AR700-32, 812.8 mm span, 5 mW visible diode, 485 mm case, 2m cable
AP7630320	AR700-32 20mW	AR700-32, 812.8 mm span, 20 mW laser diode, 485 mm case, 2m cable
AP7620500	AR700-50 5mW	AR700-50, 1.27 m span, 5 mW laser diode, 485 mm case, 2m cable
AP7630500	AR700-50 5mW	AR700-50, 1.27 m span, 20 mW laser diode, 485 mm case, 2m cable

## AR200 Model part / model numbers chart

AP2000600	AR200-6M	R= 18 – 24mm A= +/- 0.012 mm, L= 69.8mm
AP2001200	AR200-12M	R= 14 – 26mm A= +/- 0.024 mm, L= 69.8mm
AP2002500	AR200-25M	R= 21.5 – 46.5mm A= +/- 0.05 mm, L= 69.8mm
AP2005000	AR200-50M	R= 17 – 67mm A= +/- 0.10 mm, L= 69.8mm