



TransTech
Systems, Inc.



PQI 380+
Pavement Quality Indicator

Operator's Handbook

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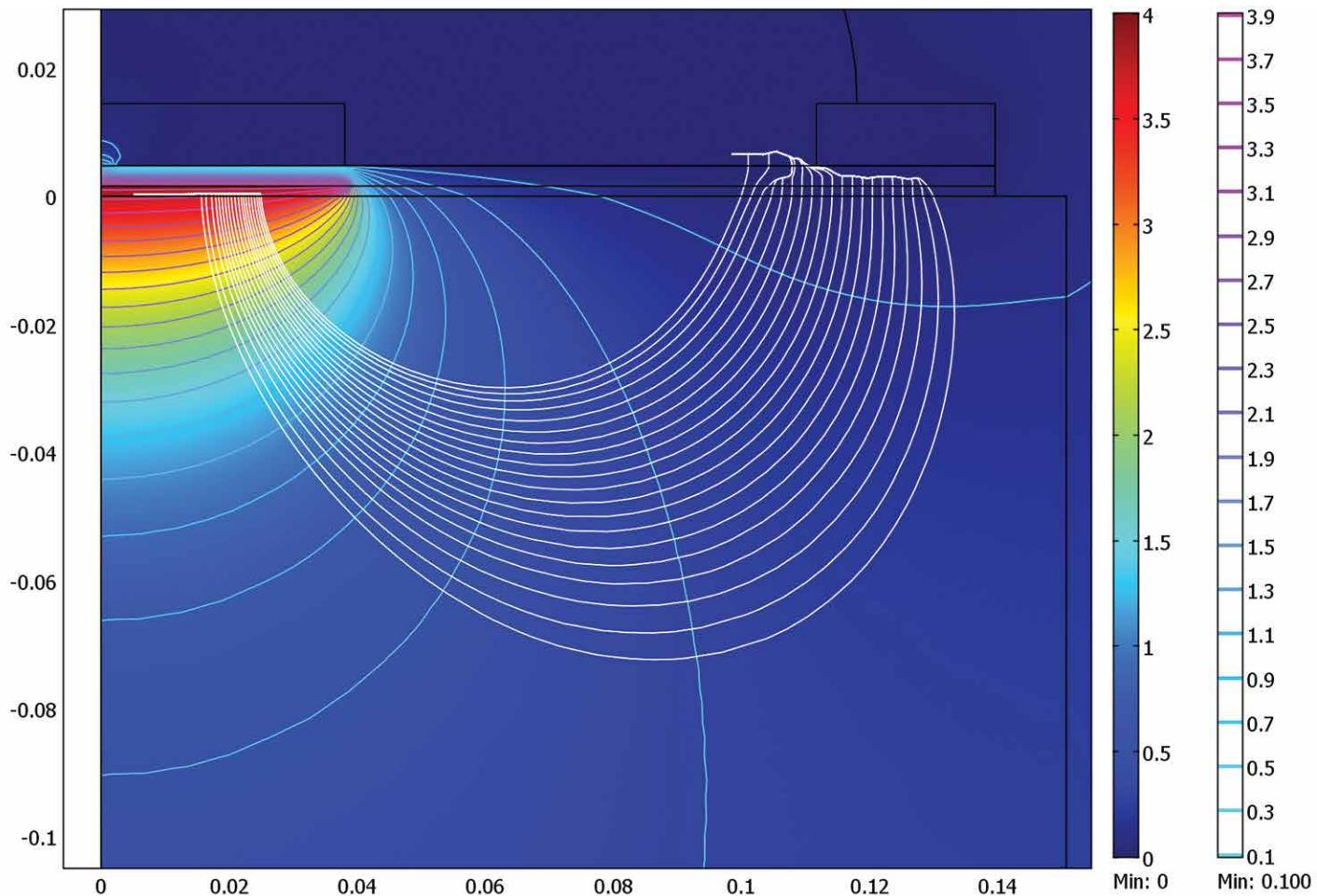
Introduction

TransTech's Pavement Quality Indicator model PQI 380 Plus utilizes state of the art technology to achieve accurate asphalt pavement density readings. Its primary features are:

- No special license or radioactive materials required
- Lightweight and easy to use
- 7.5 hours of portable operation
- Measures density in common units (lb/ft^3 or kg/m^3)
- Relative moisture detection and correction when necessary
- Stores infinite records
- Data download via USB flash drive (semicolon delimited text file format)

Measurement Technology

The PQI 380 Plus uses impedance spectroscopy to measure the electrical response of asphalt from which the density is calculated. As shown in the Comsol simulation below, the electrical field transmits through the material from the sensor plate of the PQI 380 Plus. The impedance is then measured and used in the calculation of the density for that specific aggregate.



Application Summary

The PQI 380 Plus is intended primarily for use on newly-laid asphalt pavements with lift thickness ranging from 0.75 inches to 6 inches. **The calibration of the PQI 380 Plus to a density standard (core) is very important for the reliability and consistency of the density measurements for each material.**

Safety

Every effort has been made to make the PQI 380 Plus convenient to use and inherently safe.

The PQI 380 Plus uses non-nuclear, low-voltage direct current to obtain measurements, therefore, there are no badges, licensing, storage or transport concerns. Like any instrument, however, the user should exercise care and common sense in its use to prevent mishaps.

Warning

Do not use the unit on or near electrical wiring.

A potential shock hazard exists if contact is made with the exposed wiring.

Warning

Use care in handling the unit. Personal injury can occur through improper handling.

Take proper care to avoid accidentally dropping the unit.

Warning

Unauthorized disassembly of the unit will void the warranty.

Warning

Shipping the gauge with the batteries inside is not recommended.

Caution

Charging the gauge overnight or unattended is not recommended

Caution

Turn the unit off when not in use and during transport.

Caution

Be sure not to switch standardization plates with other gauges. Check the Serial Numbers located on the gauge and on the plate to be sure they match.

Disclaimer: TransTech Systems reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on TransTech Systems products previously or subsequently sold.

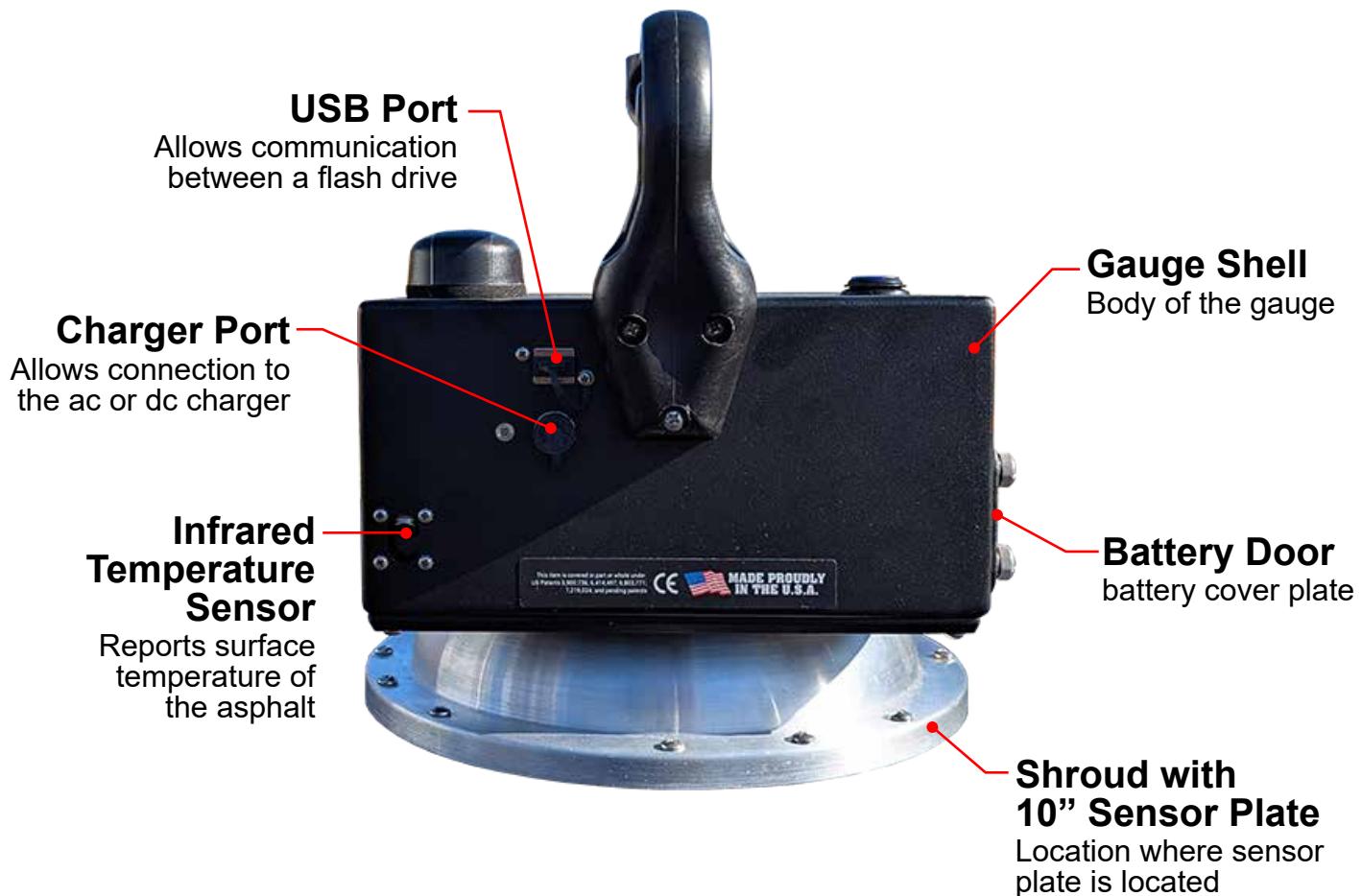
Controls & Components - Contents

The PQI 380 Plus is packaged and shipped with the following components. Contact TransTech Systems customer service if any of the parts are missing.

- PQI 380 Plus Unit
- Standardization Plate
- Storage/Shipping Case
- Operators Quickstart Guide
- PQI 380 Plus Handle
- 120/220V AC to 12V DC Battery Charger
- 12V DC Car Charger
- Battery Pack



Gauge Features

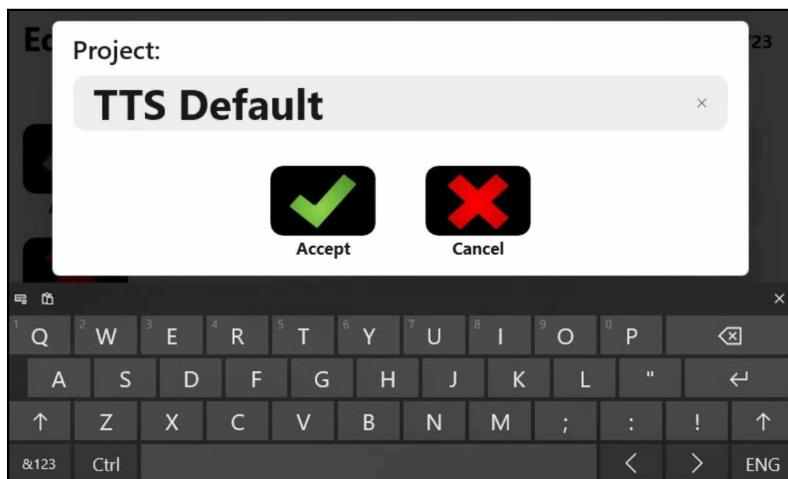


External / Internal Controls



External controls on the PQI 380 Plus consist of an ON/OFF switch and a 800 x 480 LCD capacitive touchscreen for navigating through the user interface and entering alpha/numeric data.

Be sure not to drag your finger from one button to the next. A firm yet light touch is all that is needed to navigate from screen to screen.



Unique yet consistent icons are located on most screens for easy one touch navigation. When data input is required of the operator the screen will display the above keyboard. Toggle from upper to lower case letters using the **Up Arrow** button. Once editing is completed, tap **Accept** to save and return to the previous screen.

Status Bar

The **Status Bar** is located at the top right of the screen (excluding the keyboard screens) and will continuously update the remaining voltage of the batteries while displaying the date, time and status of the GPS when enabled.



Power Save - Auto Shut Down

If the PQI 380 Plus is left on for an hour without any buttons being pressed, it will shut itself down, to conserve battery run time.

Setting up the PQI 380 Plus

Prior to using the PQI 380 Plus for the first time the gauge will need to be configured to take measurements and record data correctly.

The following steps must be completed before operating the PQI 380 Plus:

1. Installing and charging the battery
2. Starting the software
3. Set the local time / set date
4. Set up the GPS
5. Select units of measurement
6. Define the asphalt being tested (Mix)
7. Define project information (Project)
8. Select measurement mode

Installing Battery



You will find a plate on the left side of the PQI 380 Plus with 4 spring loaded bolts.

1. Turn each bolt approximately 2 full turns until the spring releases
2. Remove the plate from the gauge
3. Next you will find a wire with a connector, disconnect the battery from the gauge
4. Then pull the nylon strap to slide the battery out of the compartment.
(Do not pull the battery by the connector wire, doing so could damage the battery)

Charging Battery

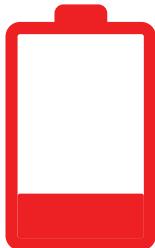
1. Turn the PQI 380 Plus unit OFF
2. Connect the charger to the charger connector located on the back of the PQI 380 Plus
3. Plug the charger into a standard AC outlet
4. The red indicator lamp will turn green to indicate that the batteries are charged (approx. 4hrs)
5. Unplug charger from the power source before disconnecting the charger from the gauge.

Battery Care Tips

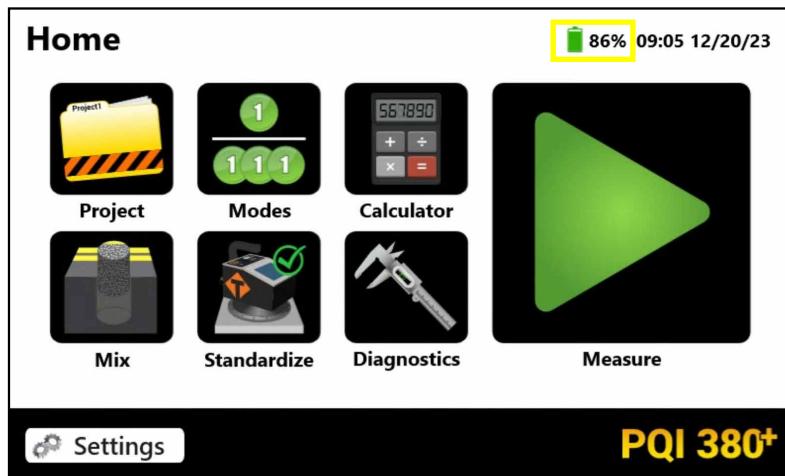
- Whenever uncertain about the battery charge level or condition, recharge it
- The battery will self-discharge and should **NOT** be left uncharged for more than 30 days
- An occasional complete discharge followed by a full recharge is recommended
- **NEVER** drop the battery as this can damage the internals
- **DO NOT** store the battery in a freezer or expose to extreme heat
- Battery should be fully charged before use

Battery Voltage

Battery voltage can be viewed on the status bar located at the top of all screens. A fully charged battery will display **100%**. The battery voltage will decrease as the PQI 380 Plus is used. A yellow battery icon will be displayed at **20%** and a red, low battery icon will be displayed at **10%**.

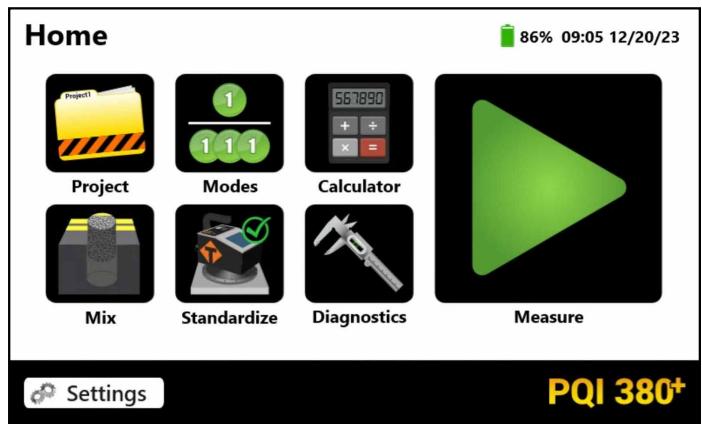


Low Battery Indicator



The gauge will continue to operate until the battery can not supply enough voltage to complete a measurement. Once this happens, the gauge will automatically shut down and will not restart until charged. Depending on the condition of the battery, once the voltage drops below 6 volts, the gauge may be able to take about 12 to 15 additional readings. **It is important to re-charge the battery after each use.**

Starting the Software



After powering on, the PQI 380 Plus initializes for a few minutes while displaying multiple splash screens. At the end of boot up the Home screen is displayed. The Home screen will display seven options, **Project**, **Modes**, **Calculator**, **Mix**, **Standardize**, **Diagnostics** and **Measure**.

Home Menu



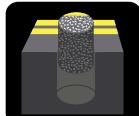
Project

Project button opens
the Project screen



Standardize

Standardize button opens
the Standardization screen



Mix

Mix button opens
the Mix screen



Calculator

Calculator button opens the
built in calculator screen



Modes

Modes button opens
the Modes screen



Diagnostics

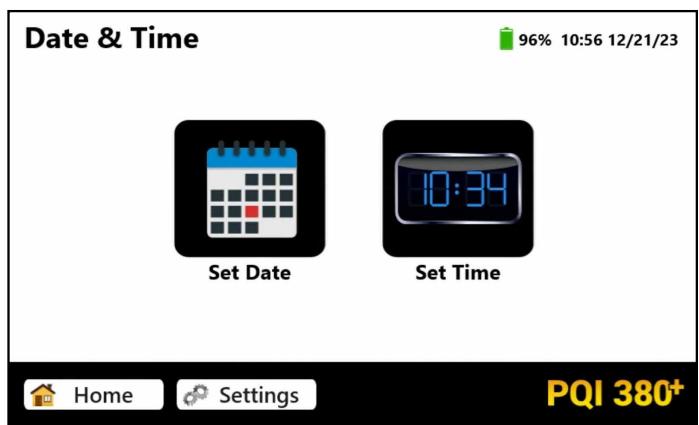
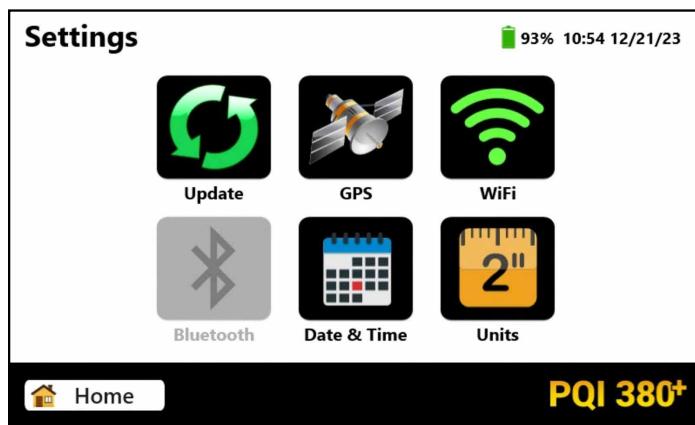
Diagnostics opens
the diagnostics screen



Measure

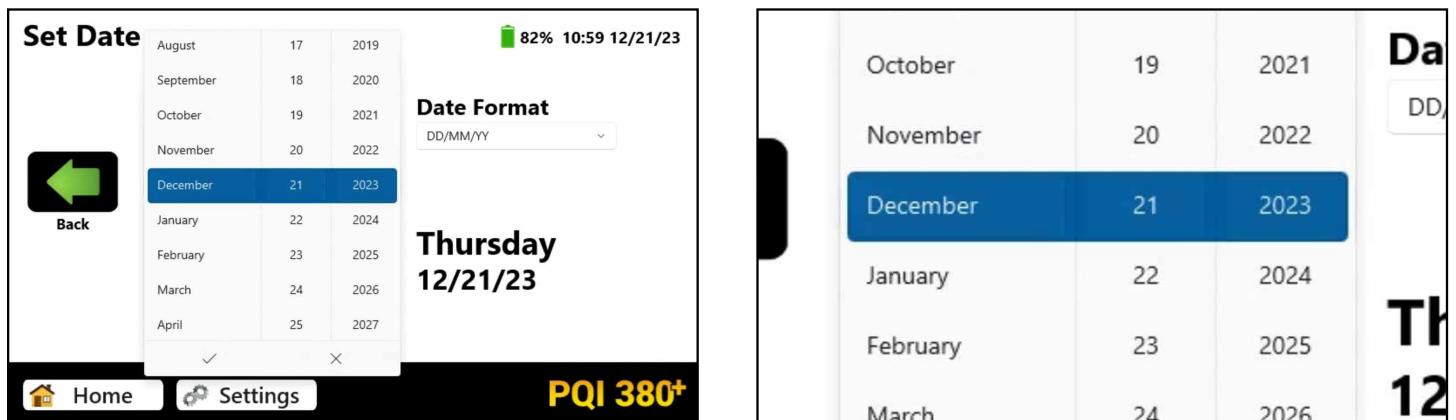
Measurement button opens
the measurement screen

Local Time and Change Date Format



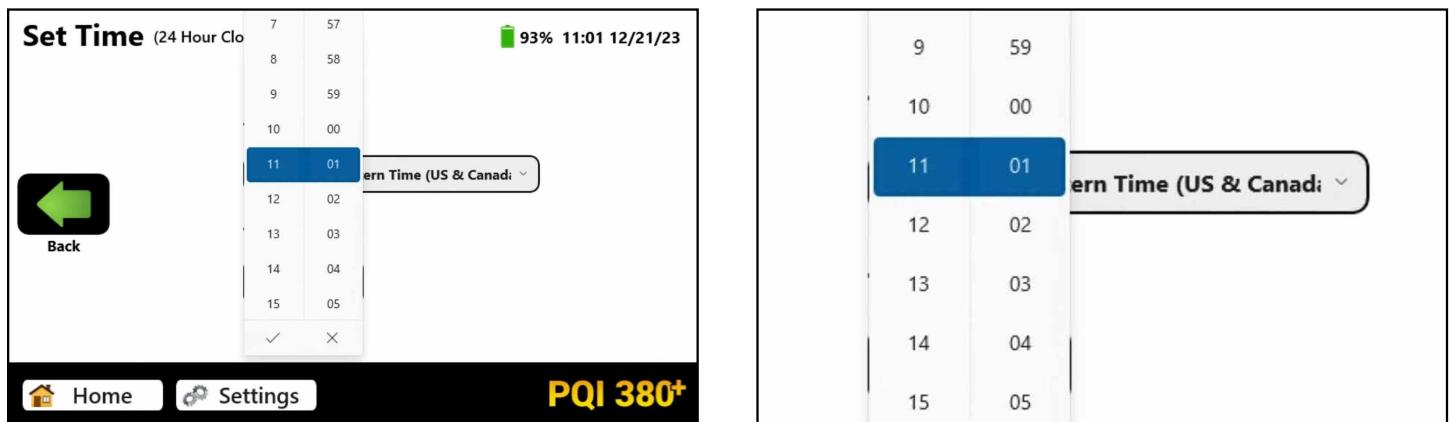
To change the date and time, tap the **Settings** button. From the Settings screen tap **Date & Time**. Once in the Date & Time screen tap either **Set Date** or **Set Time**.

Set Date



To set the date, tap the **Set Date** button. Then tap anywhere on the date bar and a scroll wheel will pop up allowing you to set the month, day, and year. Once you are satisfied with your entry, tap the check mark at the bottom to accept. (**Note: the date will be preset at the factory**)

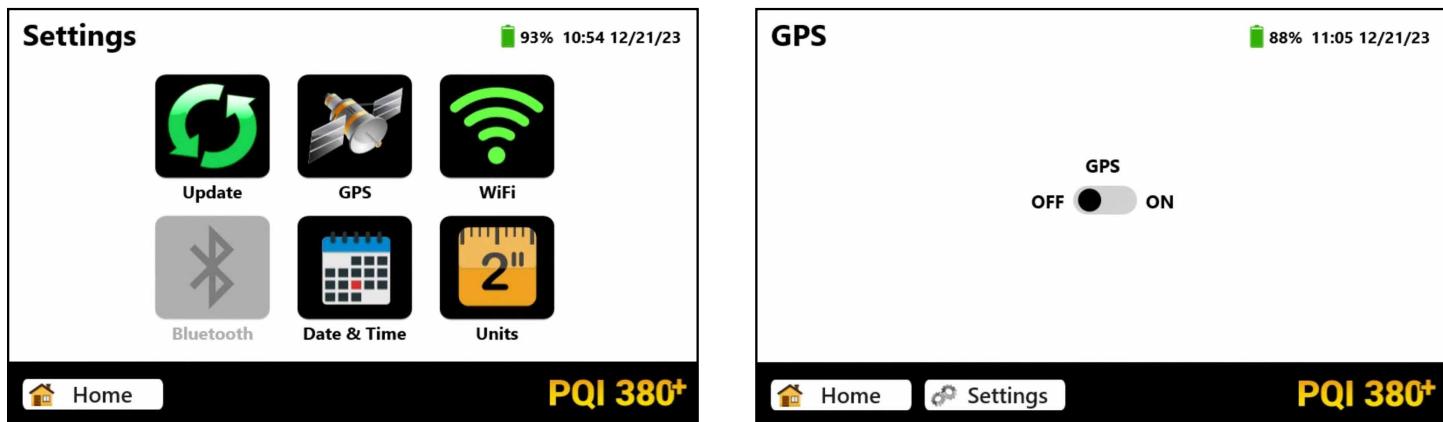
Set Time



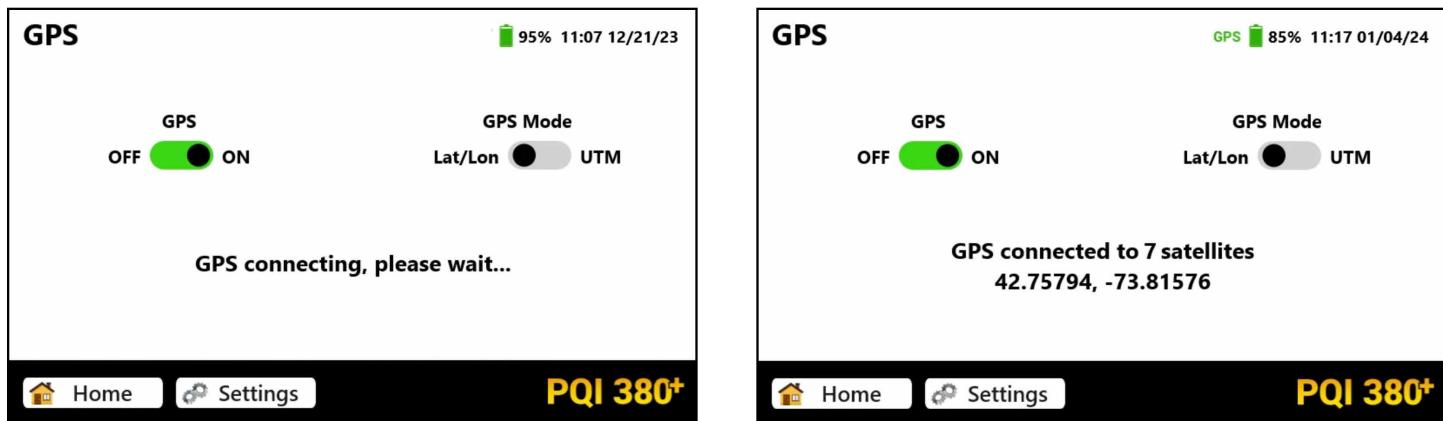
To set the time, tap the **Set Time** button. The time will display in 24 hour format as well as the time zone. Tap anywhere on the time and a scroll wheel will pop up allowing you to change the time. Once satisfied with your entry tap the check mark at the bottom to accept. If a change to the Time Zone is needed tap on the current Time Zone and a drop down menu will open. Tap the correct time zone and your selection will automatically be saved.

Setup the GPS

Setting up the GPS is nothing more than turning it on and waiting to connect to satellites. The GPS feature can take up to 15 minutes to connect to satellites depending on your location. From the Settings screen, tap **GPS**. GPS status can be toggled ON or OFF. If the GPS is set to OFF tap the toggle switch once to turn it ON.



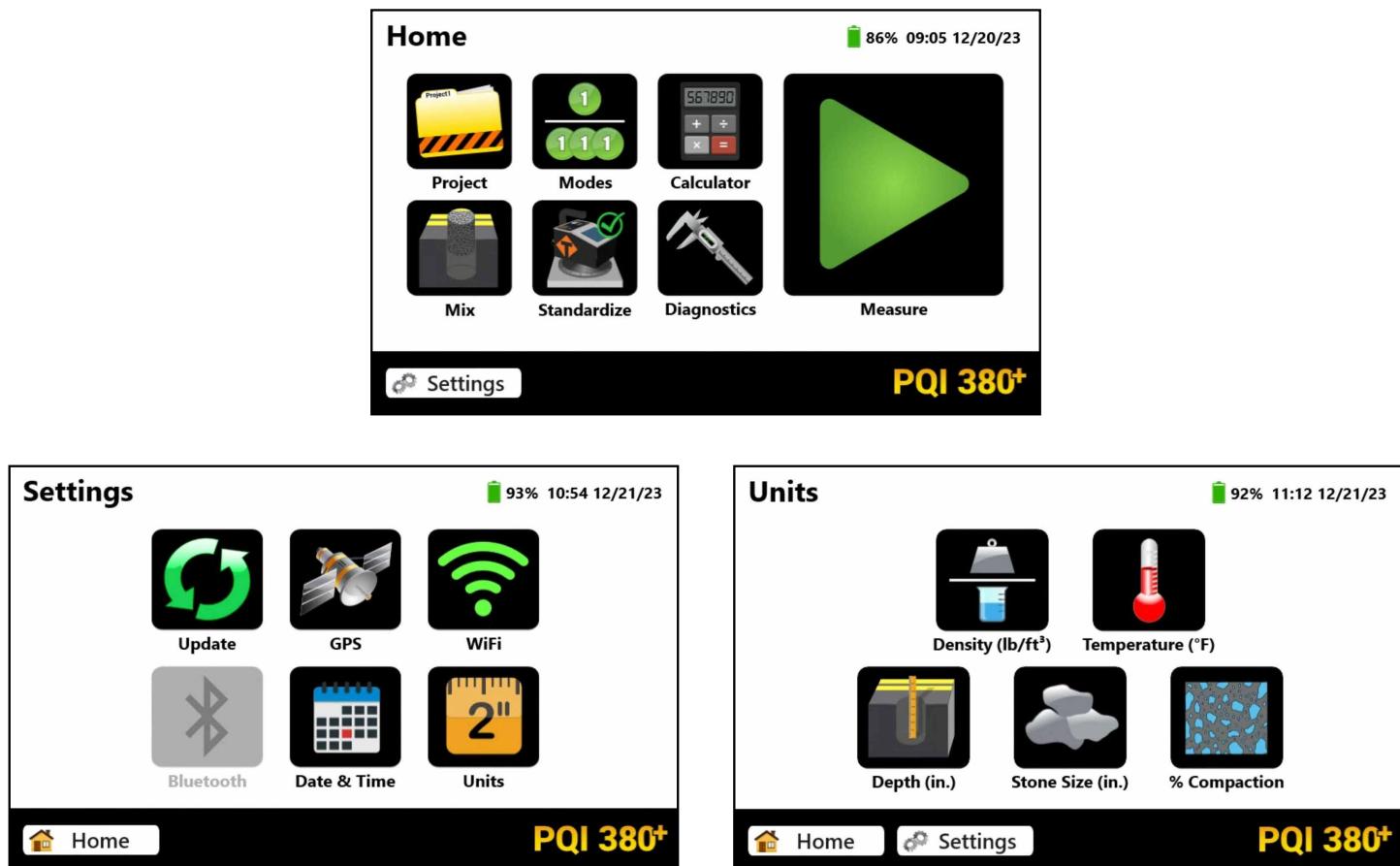
Once the GPS is enabled and connected the GPS icon will be displayed on the status bar.



GPS formatting can also be toggled from the **Latitude/Longitude (LAT-LON)** to **Universal Transverse Mercator (UTM)**. Initially the display will read Sats 0 for both formats until connections have been made. The above examples show a connection to five satellites (Sats 5) in both formats. GPS locations will appear on the bottom right corner of all reading mode screens and will store with each reading when enabled.

Select Measurement Units

From the Home screen, tap the **Settings** button on the task bar. Then tap **Units**.



Density, Temperature, Depth, Stone Size and % Compaction can be toggled independently between system international (SI “metric”) and U.S. customary units. For example, you can set the density to **lb/ft³** while temperature is set to **celsius**, depth is set to **inches** and stone size is set to **millimeters**. Simply tap any one of the icons to toggle the unit for that category.

Mix Details

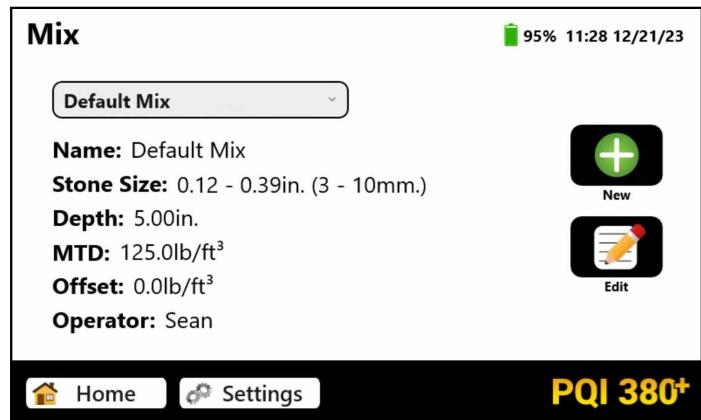
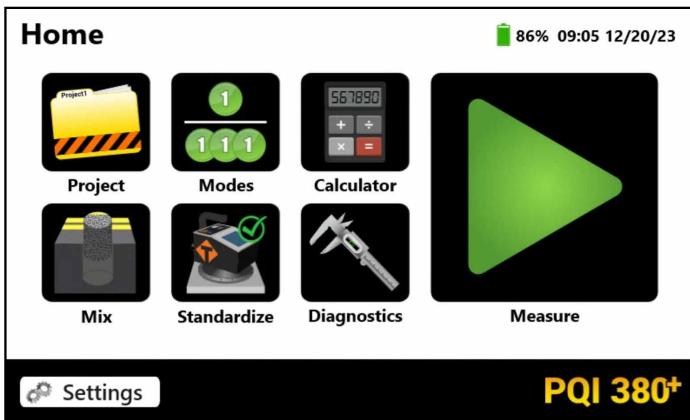
The density determined by the PQI 380 Plus is highly material dependent so it is extremely important that the mix information for each mix design are input accurately into the gauge.

Note: **Readings taken prior to accurately setting up the mix details section of the gauge will result in incorrect density and compaction results.**

The PQI 380 Plus is configured to store unique mixes that are identified by user entered descriptions. The default mix stored in a new PQI 380 Plus will have generic mix name (i.e. Default Mix), the stone size will all be set to 9.5mm (0.375in.) at a depth of 5 inches with a Maximum Theoretical Density (MTD) of 125lb/ft³. **Readings taken prior to editing the default information on a mix that does not resemble the default information will result in incorrect density and compaction.**

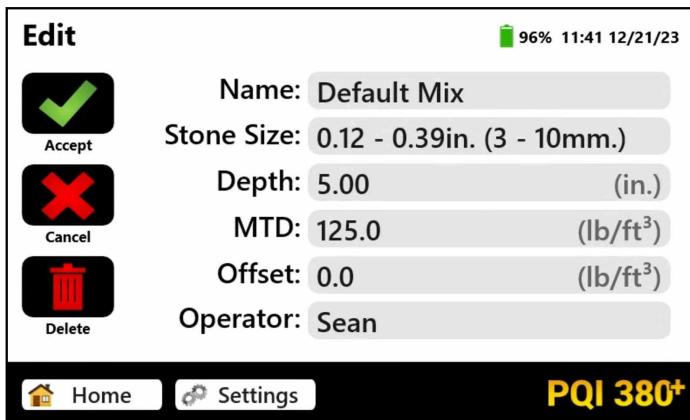
Editing Mix Details

From the Home screen, tap **Mix** to enter the Mix screen. The active mix name is shown in the drop down menu. To edit the details of this mix, tap **Edit**.



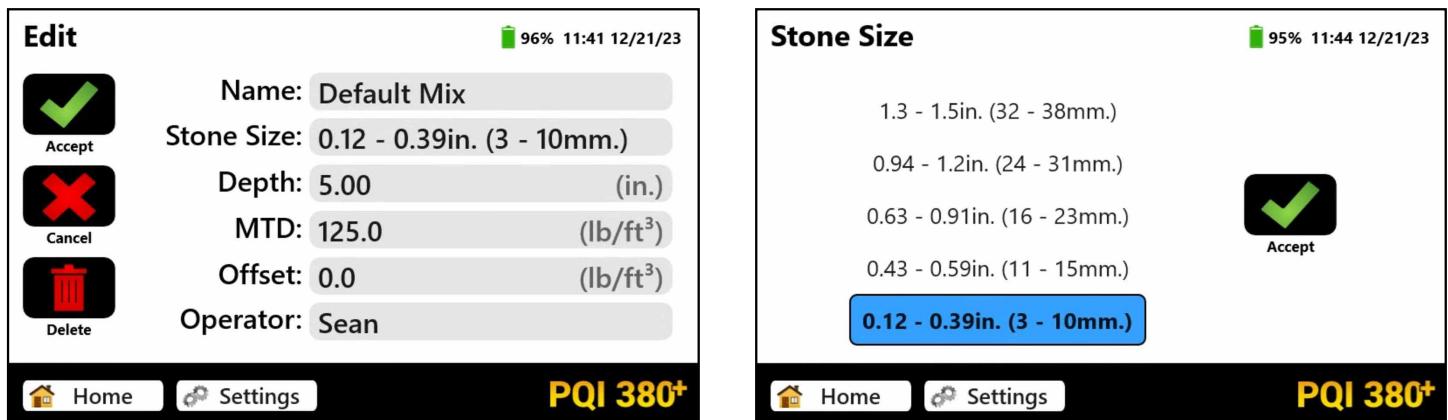
Editing Mix Details - Mix Name

In the Edit Mix screen there are six fields labeled **Name**, **Stone Size**, **Depth**, **MTD**, **Offset** and **Operator**. By tapping one of these fields, you will enter the corresponding screen which will allow you to edit and save information for that mix value.



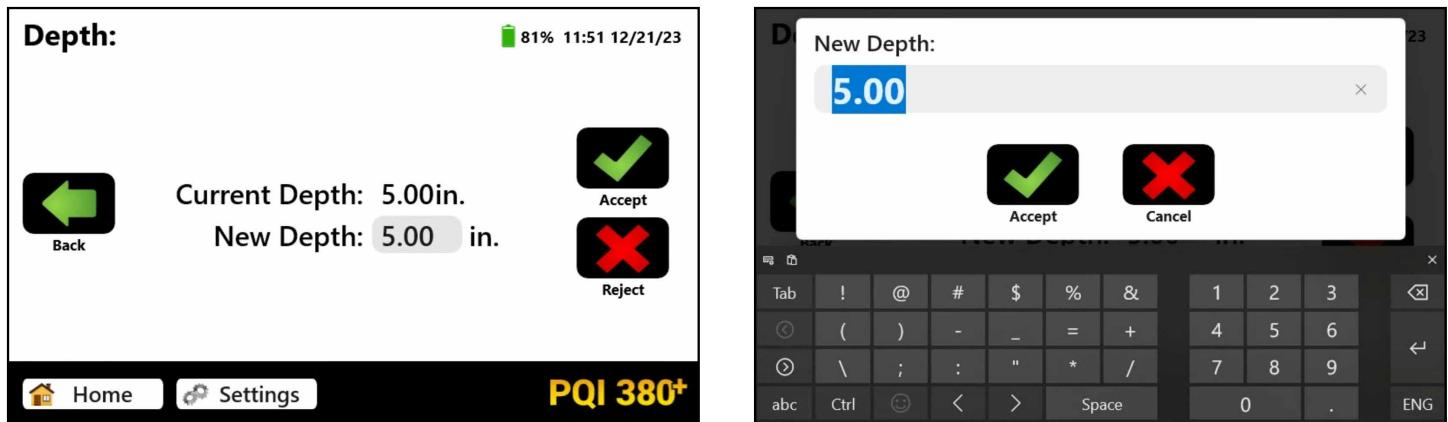
For example tap the gray shaded **Name** field, the keyboard will pop up allowing you to change the mix name. Tap the “x” on the right side of the field if you would like to start over with a new name. Tap the **Up Arrow** to toggle from lowercase to uppercase letters. Once editing has been completed, tap **Accept** to return to the Edit Mix screen.

Editing Mix Details - Stone Size



Tap the **Stone Size** field to enter the Stone Size screen. There are five options for aggregate sizes listed in millimeters (inches). If, however, you do not see your specific stone size listed choose the closest stone size available. For example, if your mix has an aggregate size of 20mm (0.79in), select **16mm - 23mm (0.63 - 0.91in.)**. Tap **Accept** after you made your selection to return to the Edit Mix screen.

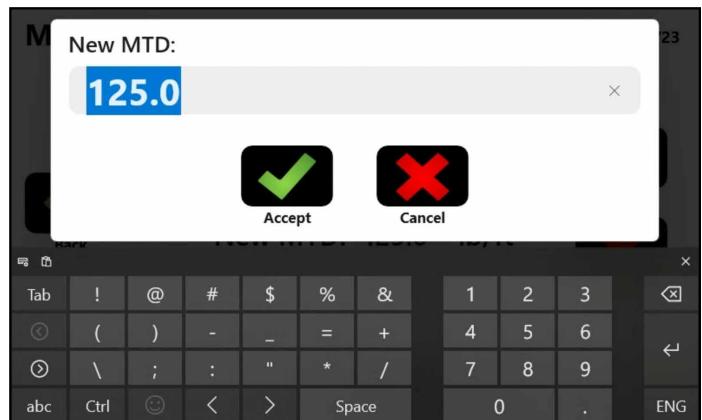
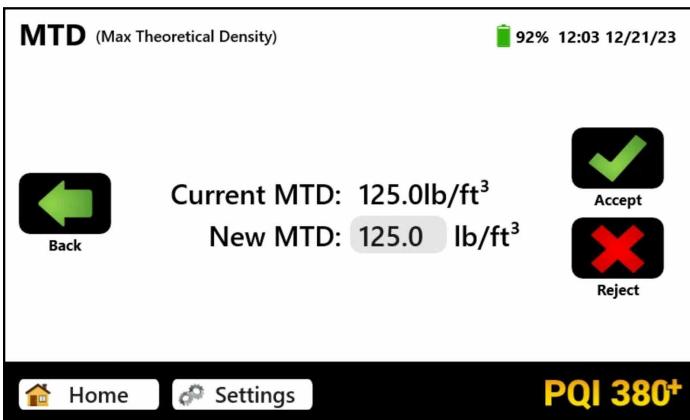
Editing Mix Details - Depth



Tap the **Depth** field to enter the Depth screen. Tap the **New Depth** field and a keyboard will pop up. Enter the depth of the asphalt mat on the numeric keypad in the units you previously selected for the depth. Once the correct value has been entered, tap **Accept** to return to the Depth screen. If you are satisfied with your new depth value, tap **Accept** to save your entry and return to the Edit Mix screen.

**An out of range Warning will display for depths entered outside of the following range:
0.75in - 6.0in (19.05mm - 152.4mm)**

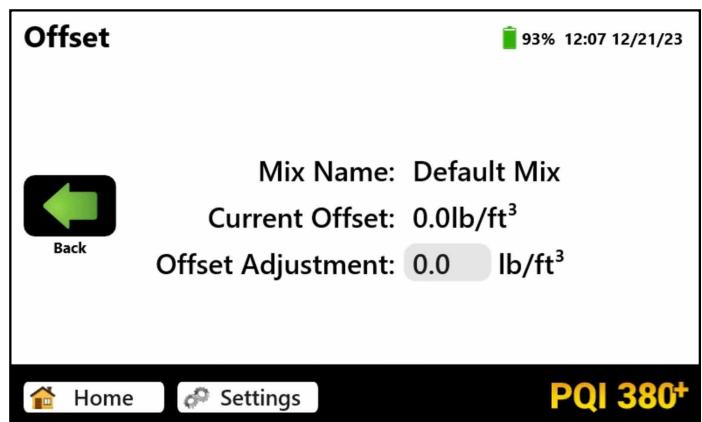
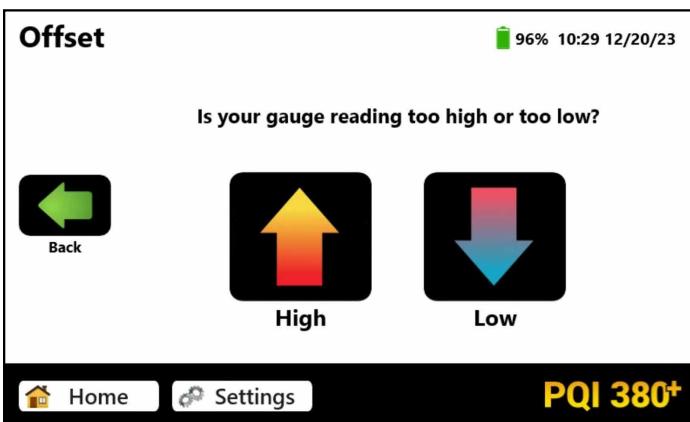
Editing Mix Details - Maximum Theoretical Density (MTD)



Tap the **MTD** field to enter the MTD screen. Tap the **New MTD** field and a keyboard will pop up. Enter the Maximum Theoretical Density (MTD) of the mix on the numeric keypad in the units you previously selected. The MTD is provided from the asphalt mix designer and is a key value in determining the percent compaction. Once the correct value has been entered, tap **Accept** to return to the MTD screen. If you are satisfied with your new MTD value, tap **Accept** to save your entry and return to the Edit Mix screen.

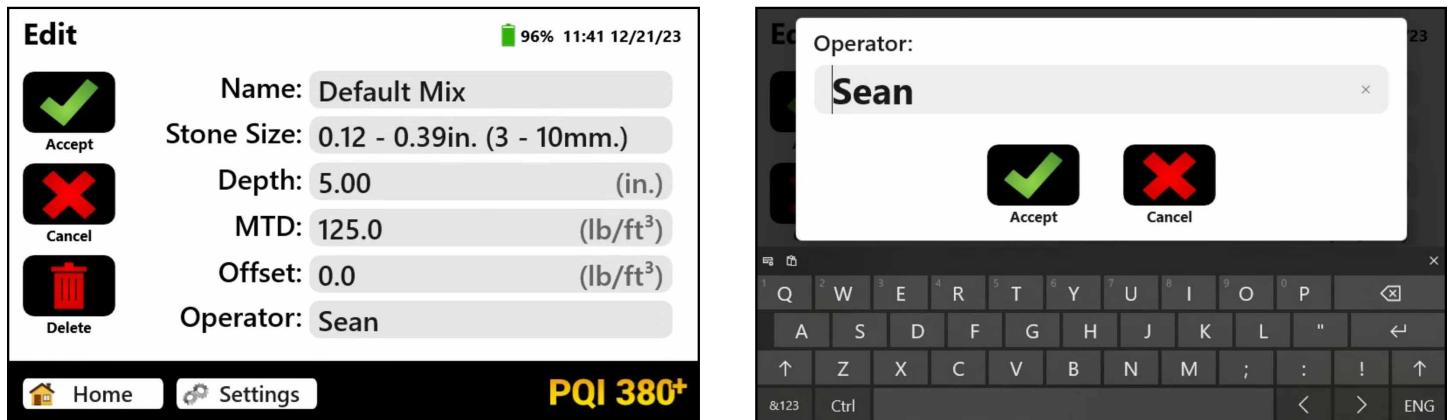
**An out of range Warning will display for an MTD entered outside of the following range:
100lb/ft³ - 200lb/ft³ (1601.8kg/m³ - 3203.7kg/m³)**

Editing Mix Details - Offset



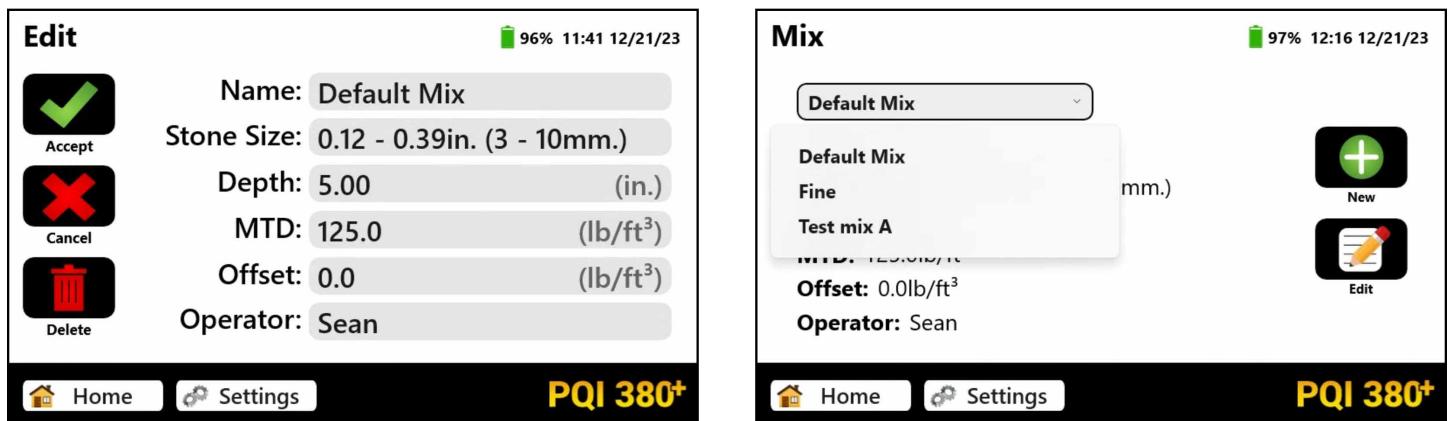
The offset for this material can be adjusted at a later time. **Measurements taken prior to adjusting the offset will not include the offset.** You will need to take a measurement to determine the offset. The offset feature will be revisited later in the calibration section of this document.

Editing Mix Details - Operator



Tap the **Operator** field and a keyboard will pop up. Enter your name as the operator of the gauge, then tap **Accept**. The gauge will return to the Edit Mix screen. Verify all mix information on this screen. Once you have verified the results of the mix, tap **Accept** to save the mix.

Editing Mix Details



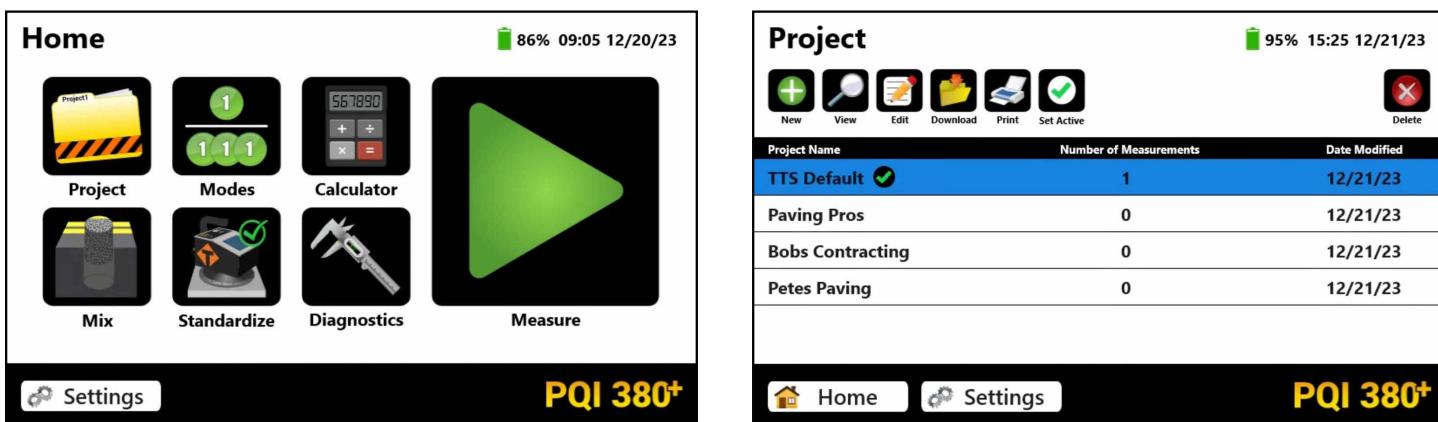
After tapping Accept from the Edit Mix screen the gauge will return to the **Mix** screen. Here you can tap the drop down menu to view and select different available mixes. **The CURRENT MIX that the gauge will use when taking readings is shown in the Name field. Prior to exiting this screen, be sure this is the mix you want and the information has been verified.** Tap **Home** on the task bar to return to the Home Screen. If the gauge is shutdown, the current mix prior to shutdown will remain the current mix when started back up.

Project Details

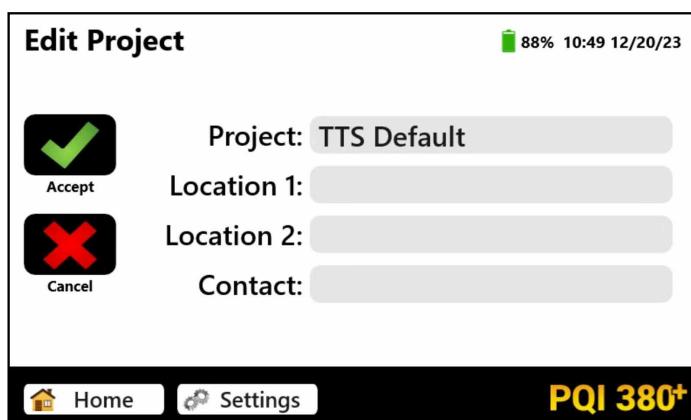
The PQI 380 Plus is configured to store unlimited unique projects that are identified by user entered descriptions. You may revisit each project at any given time to continue taking readings. Data from readings taken within each project will be saved in the order of which they were taken. If mix details change within a project (i.e. offset, stone size, etc) or project details are added, data for readings taken after the changes will continue to store on the same dat file in the order of which they were taken. Only by changing the project name itself will the data be stored on a separate dat file.

The default project saved in a new PQI 380 Plus will have the name **TTS Default**. The blue highlighted project with a check mark is the **CURRENT PROJECT**. Readings taken will save on a dat file using the **CURRENT PROJECT NAME**. If the gauge is shutdown, the current project prior to shutdown will remain the current project when the gauge is started back up.

Editing Project Details



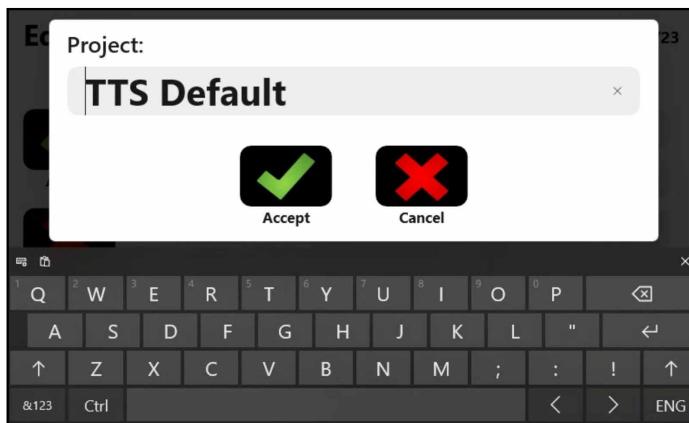
From the Home screen, tap **Project** to enter the Project screen. To edit the details of the blue highlighted project, tap **Edit**.



There are four fields labeled **Project**, **Location 1**, **Location 2**, and **Contact**. By tapping one of these labeled fields, the keyboard will pop up allowing you to edit and save information for that field.

Tap the gray shaded **Project** field, the keyboard will pop up allowing you to change the default name. Tap the 'x' on the right on the right side of the field to start over with a new name. Press the **Up Arrow** to toggle from lowercase to uppercase letters. Edit as many fields as needed. Once completed, tap **Accept** to return to the Edit Project screen.

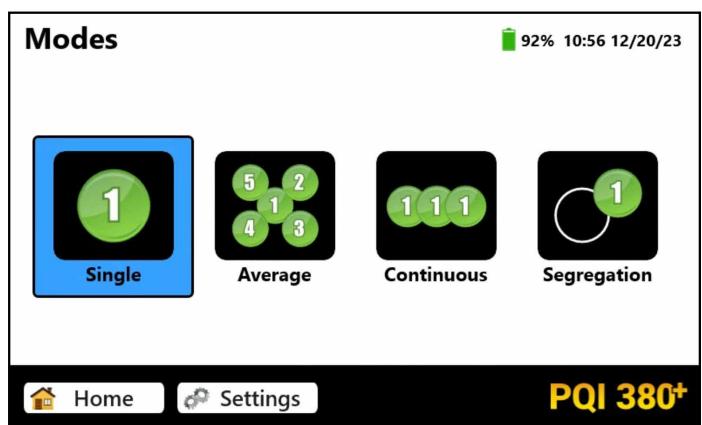
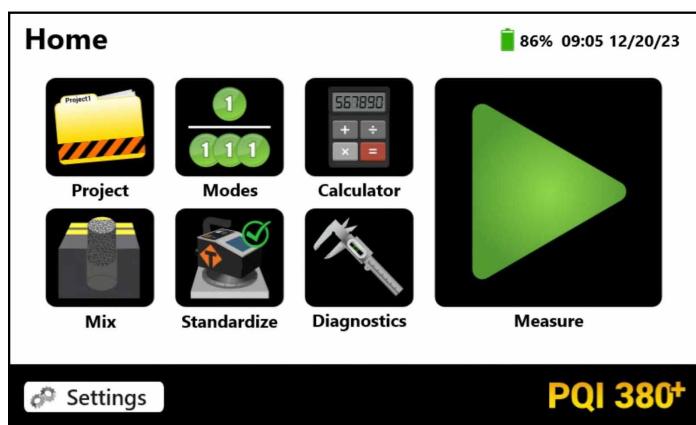
From the Edit Project screen tap **Accept** to save the project information and return to the Project screen. **Always take note of the project and mix names displayed on the bottom of your reading mode screens.**



Reading Modes - Selection and Definition

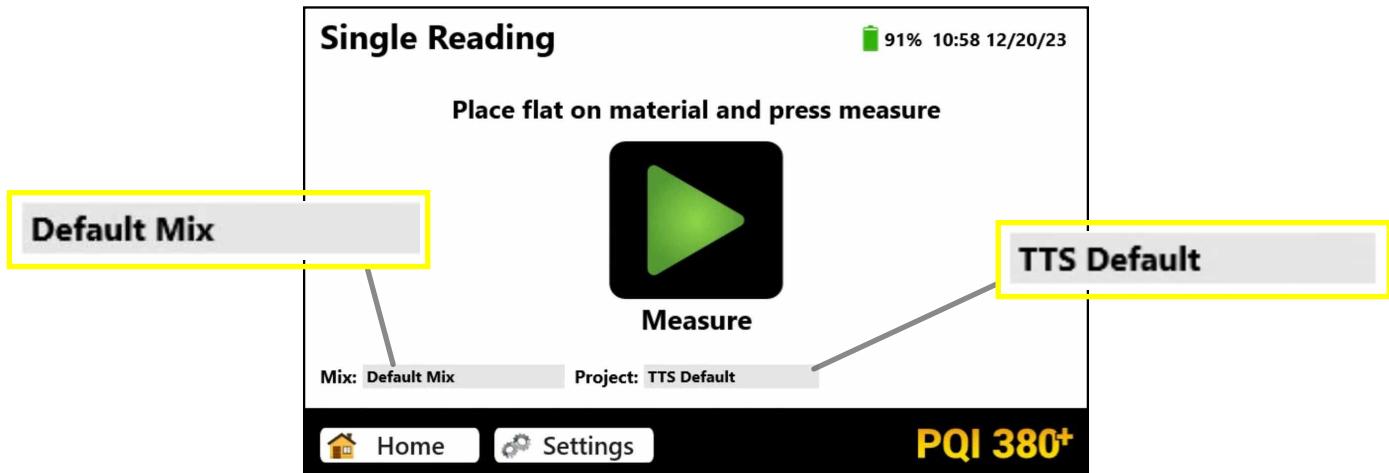
The PQI 380 Plus has four reading modes - **Single**, **Average**, **Continuous** and **Segregation**. **Continuous and Segregation mode will not save data.**

Reading Mode Selection

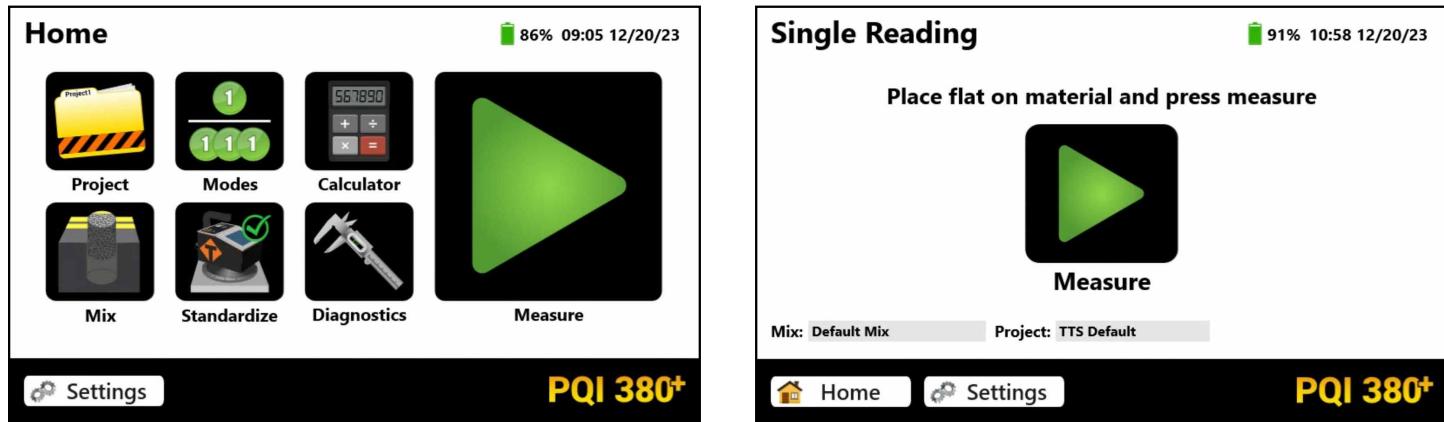


To select or change a reading mode tap **Modes** from the Home screen. Then tap the button of the mode you would like to use. Once selected the active mode be highlighted in blue and automatically redirect you to that reading mode screen and await a reading.

Take note and verify the mix and project names displayed in the bottom of all reading modes. Do not touch or hover over the gauge when it is taking a reading. Place the gauge on a flat and dry surface whenever possible.



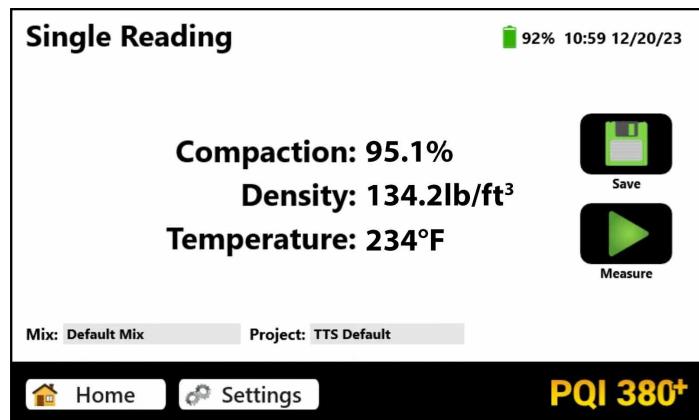
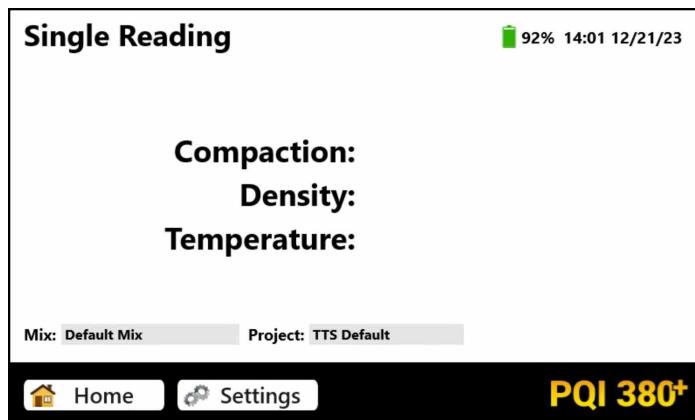
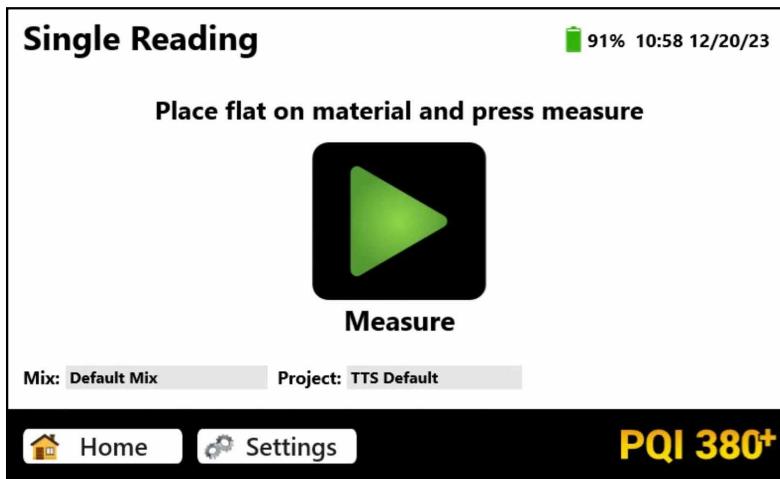
Reading Mode Definition



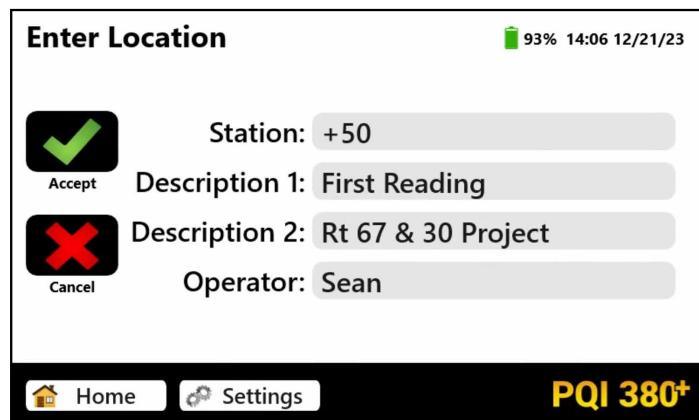
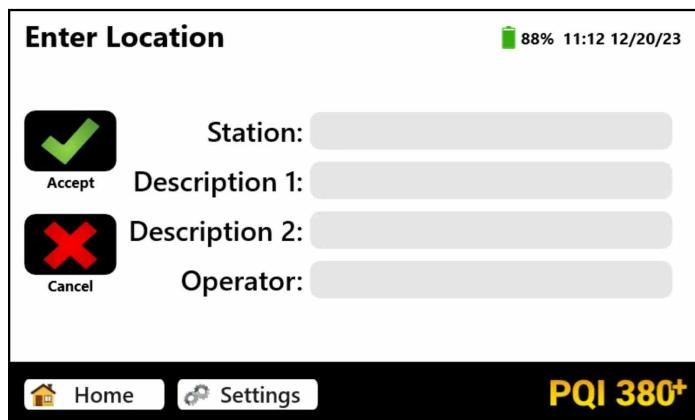
If you just started the gauge, the last reading mode selected before shutting down will remain the active mode. From the **Home** screen, tap **Measure** to enter the currently active reading mode screen to begin taking readings. The heading of the measurement screen will display the active mode (**Single Reading, Average Reading, Continuous Reading or Segregation Reading**).

Single Reading Mode

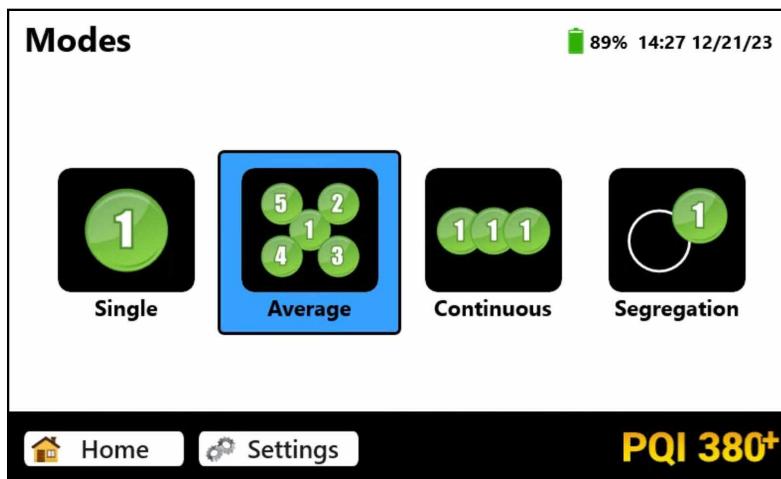
Tap **Measure**, the PQI 380 Plus will display the results. To save the result tap the **Save** button. To retake the measurement without saving (**previous measurement will be lost**) tap the **Measure** button.



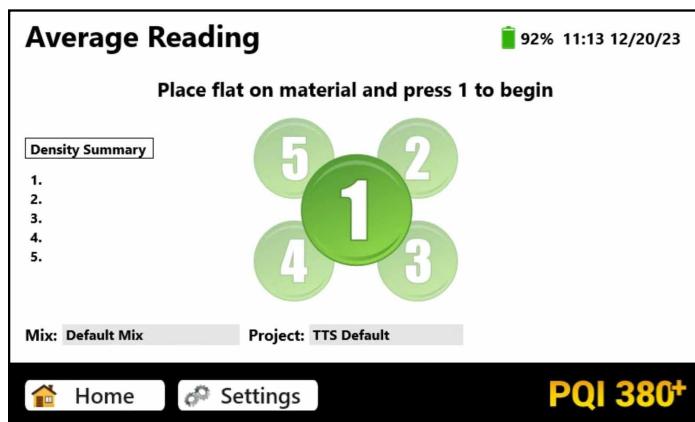
After tapping the save button the **Enter Location** screen will be displayed which will allow specific information to be stored for that reading. Tap **Accept** to immediately bypass this screen or when you have finished entering information for that specific reading.



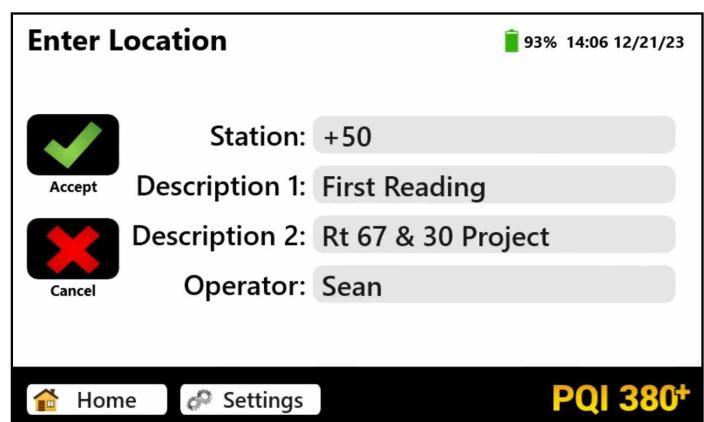
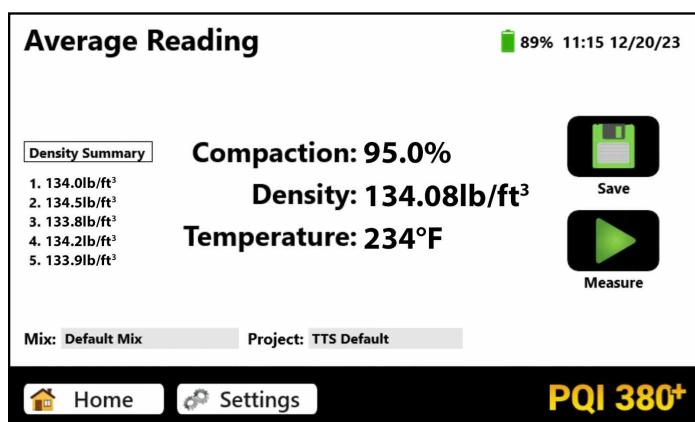
Average Reading Mode



The cloverleaf measurement pattern is displayed for your convenience with the highlighted position being the current position to measure.

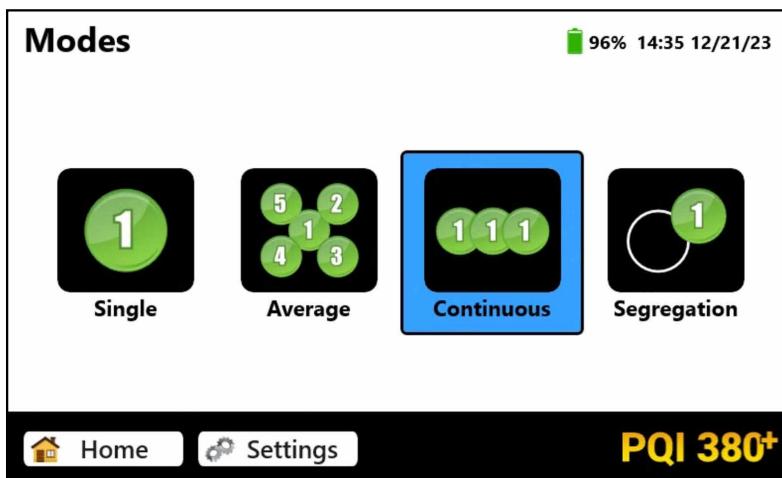


Position the gauge on a flat section of the asphalt and tap 1. **Do not touch the gauge while it is busy taking a measurement.** When reading 1 is complete, the density summary list will begin to populate and the gauge will prompt you to move to location 2. You will be given the option to cancel and retake each reading if needed. Move the gauge to position 2 and tap 2 to continue. Repeat these steps for the remaining three measurements.

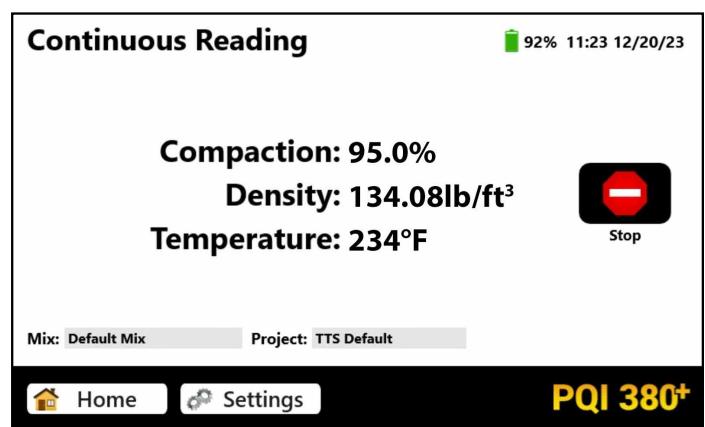
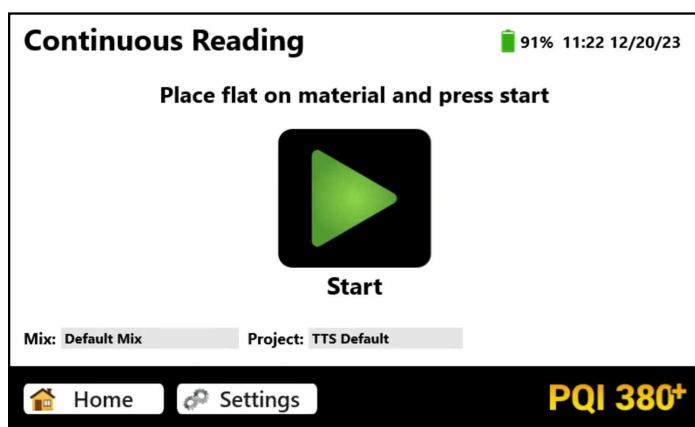


After the fifth reading the PQI 380 Plus will list the five individual readings under density summary. An average of the compaction, density and temperature are displayed in the center of the screen. **The gauge does not save individual readings to the project, only the average readings will be saved. If individual readings are needed, this will be the last time the screen will display them.** To retake the measurement without saving (**previous measurement will be lost**) tap the **Measure** button. To save the measurement tap the **Save** button. The gauge will then prompt you to enter the location where the measurement was taken. Tap **Accept** to immediately bypass this screen or when you have finished entering information for that reading.

Continuous Reading Mode

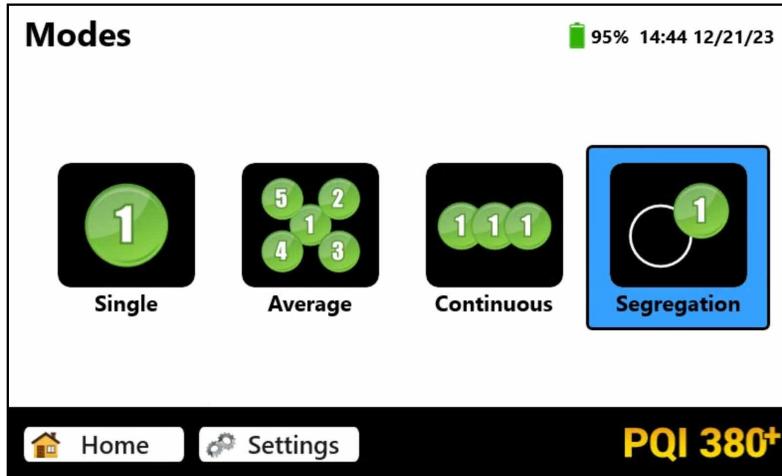


Data will NOT be saved for this mode. To begin taking continuous readings, tap **Start**.

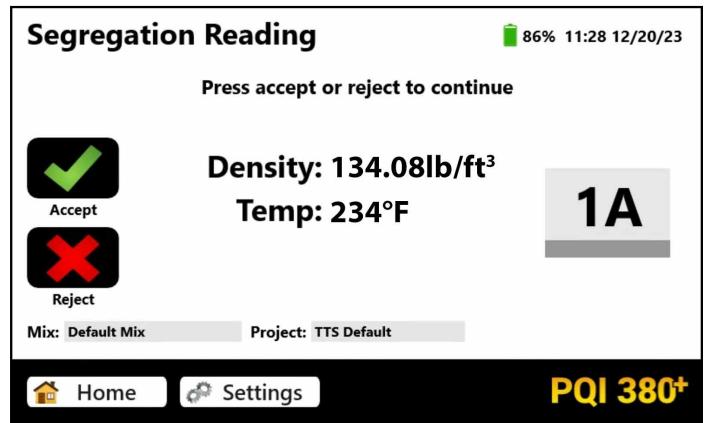
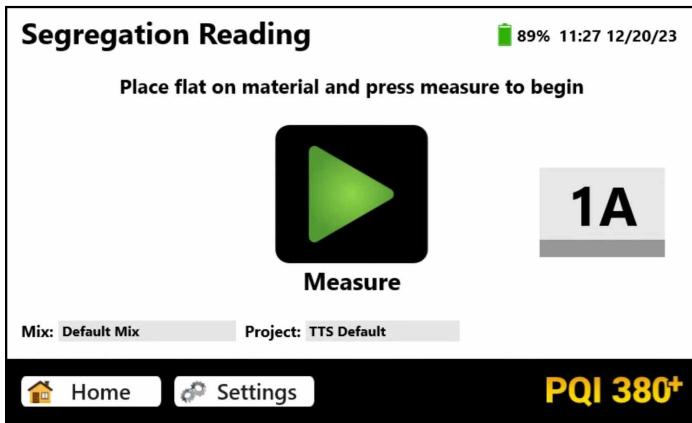


Once the start button has been tapped the continuous mode will begin. The values for compaction, density and temperature will update every few seconds until the **STOP** button is tapped. The temperature value will move side to side to indicate a new reading in the case of an exact result.

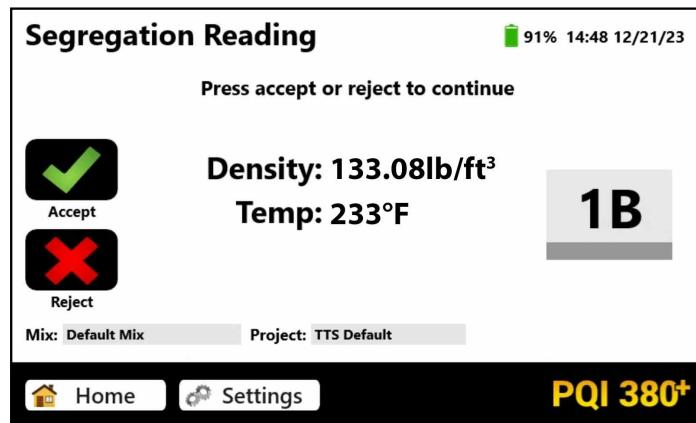
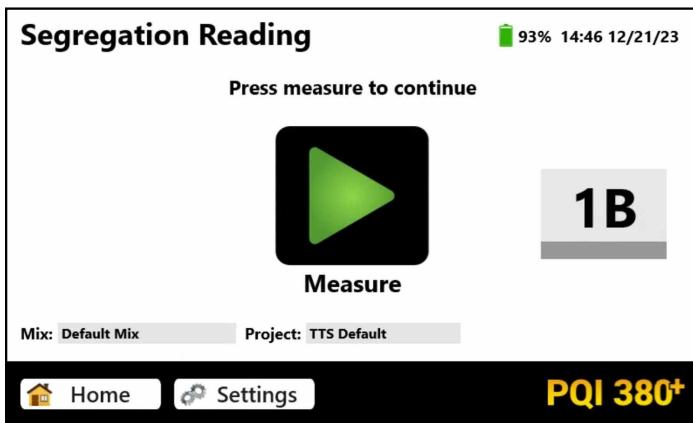
Segregation Reading Mode



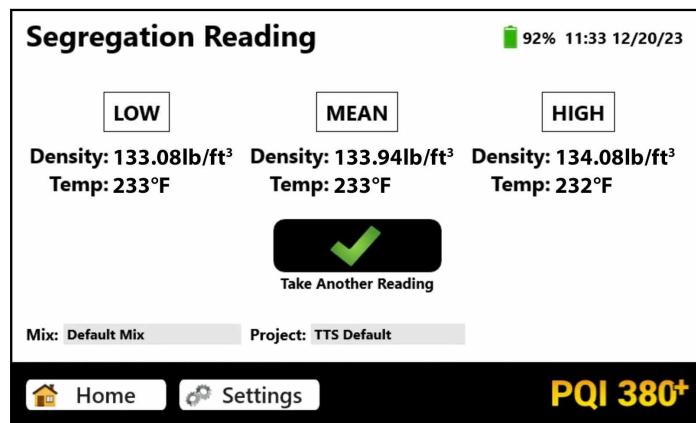
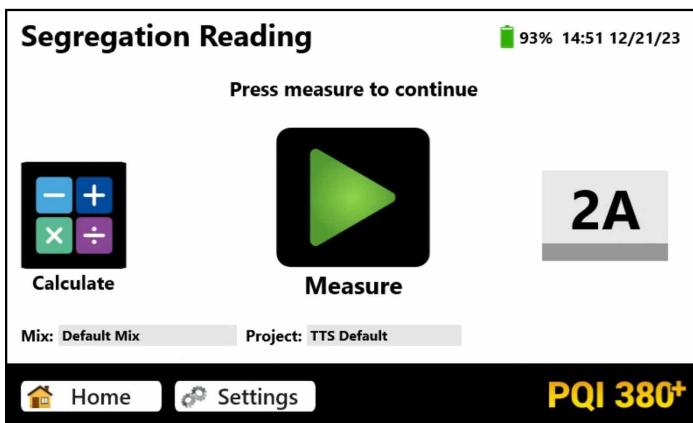
Data will NOT be saved for this mode. Be sure to write down the individual readings if you must make note of them. This mode mimics the PQI 300 where two readings ('A' and 'B') are taken for each location. **Segregation** is the separation of the coarse and fine aggregate particles in the asphalt mix. A segregated mix will usually result in density fluctuations in the finished mat. Segregation mode can be used to conveniently measure the density variations that result from mix segregation. The operation of segregation mode is patterned after test procedures used by a number of testing organizations. The PQI 380 Plus is used to take a number of readings at pre-determined locations on the mat and the variations in the readings are calculated after all readings have been taken.



Position the PQI 380 Plus on the first pre-determined location on the mat and tap **Measure** to obtain the first reading for location 1A. **If needed, write down the results of the reading at this time.** For every reading taken you will be given the option to **Accept** or **Reject** the reading. Two readings ('A' and 'B') are taken at each location and the average value is used. Taking the average of two readings is required for nuclear gauges, which exhibit poor repeatability. The PQI 380 Plus has excellent repeatability so two readings should not be required, however two readings are taken for compatibility with existing nuclear test procedures. If you are satisfied with the first reading, tap **Accept**.



The PQI 380 Plus will then prompt you to take the next reading in the same location, 1B. Tap **Measure**. Results of reading 1B for location 1 will display and wait to be accepted or rejected. **If needed, write down the results of the reading at this time.**



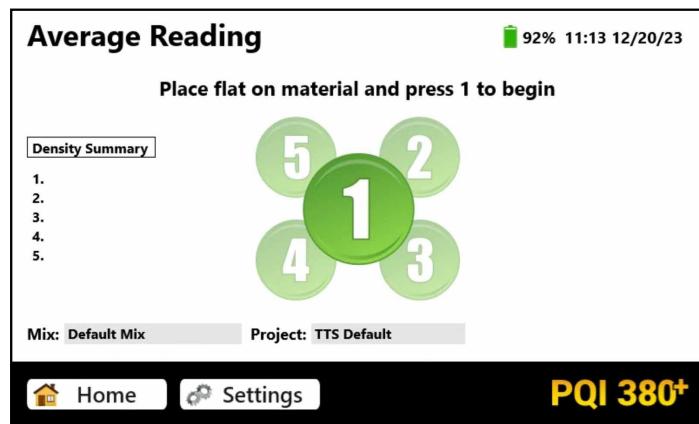
The PQI 380 Plus will then display a **Calculate** button and prompt for reading 1 at location two (2A). After the last pair of readings has been accepted, tap **Calculate**. The gauge will display density and temperature for the lowest, highest and mean readings.

Calibration - Core Calibration Method

The calibration of the PQI 380 Plus to each new mix is necessary for accurate and consistent readings. This is due to the various HMA mixtures being used in the field today. Changes in the aggregate type and size as well as changes in the binders produce a wide variety of electrical properties. Once calibrated to a standard (core) the PQI 380 Plus will maintain optimal precision and accuracy.

For optimal results, the **core calibration method** is the most accurate method when calibrating the PQI 380 Plus. The level of quality control from the plant to the mat will determine the number of test locations an operator should identify (one to five). The standard method for establishing a control strip as specified in **AASHTO TP 68** would be a total of five core locations. Remember the calibration will only be as good as the cores they are calibrated to. Therefore, the more test locations you have the more accurate the results.

Place the PQI 380 Plus in the first location on the asphalt mat. Using the sensor plate as a guide, draw a circle around the gauge with a crayon marker. Using the **Average Mode** on the PQI 380 Plus, tap **1** for the first reading. **(DO NOT TOUCH OR HOVER OVER THE PQI WHILE IT IS TAKING A READING)** **The gauge does not save individual readings, only the average readings will be saved.**

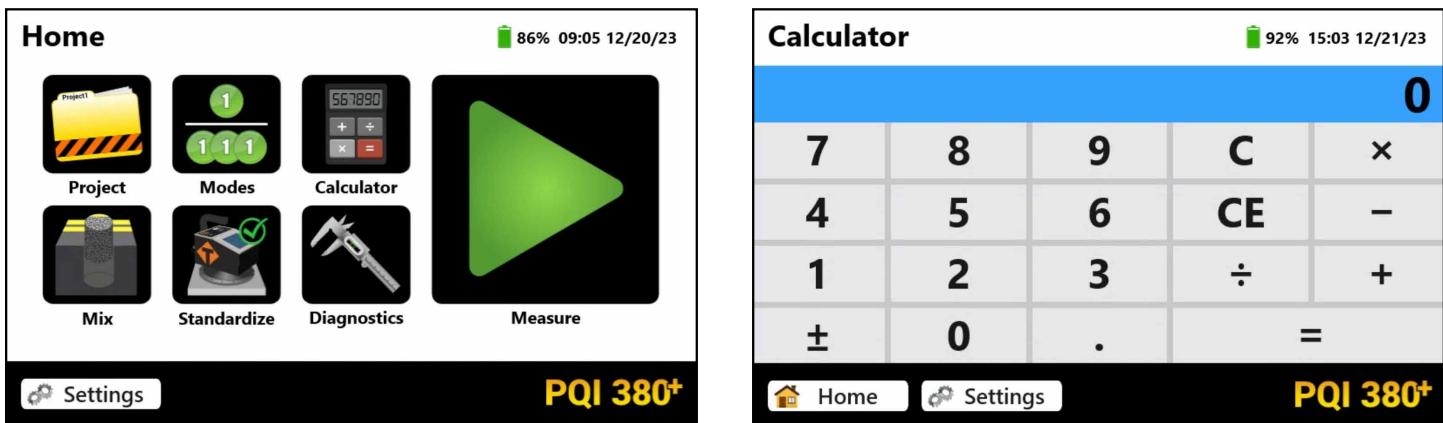


Move the PQI 380 Plus approximately 2 inches up and to the right. The average reading mode screen will also guide you to the proper location and reading number. Tap **2** to begin the second reading. Continue through the clover leaf pattern until you have completed five individual readings. After the fifth reading, the PQI 380 Plus will display all five individual readings for verification under the density summary portion of the screen. **If individual readings are needed write them down, this will be the last time the screen will display them.**

The average of these five individual readings will display in the center of the display. Write down the average PQI 380 Plus reading on the **Core Comparison Calibration Work Sheet** located at the back of this manual. Tap **Save** to store the average reading. You will then be prompted to enter location information.

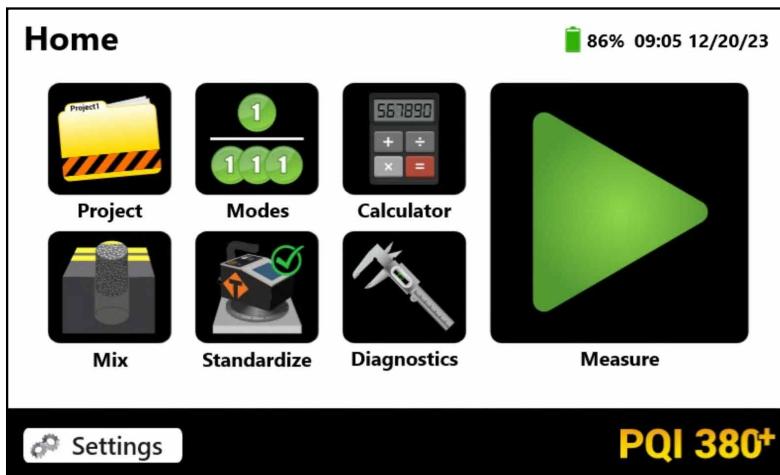
Calculating the Offset

Direct percent compaction of the test mat is achieved by obtaining physical samples (cores) from the locations previously tested. Once the core density lab reports are received enter the value for each core on the **Core Comparison Work Sheet**. Calculate the difference between the average PQI 380 Plus readings and the core density values. The five calculated differences (Core Density - PQI 380 Plus Average Density) will then be averaged to obtain one difference. This difference will be the **Offset** for that specific mix that will be stored in the gauge for that mix. Therefore, you will be adjusting the value of the PQI 380 Plus readings by that amount in order for the gauge to read the same as the core(s).



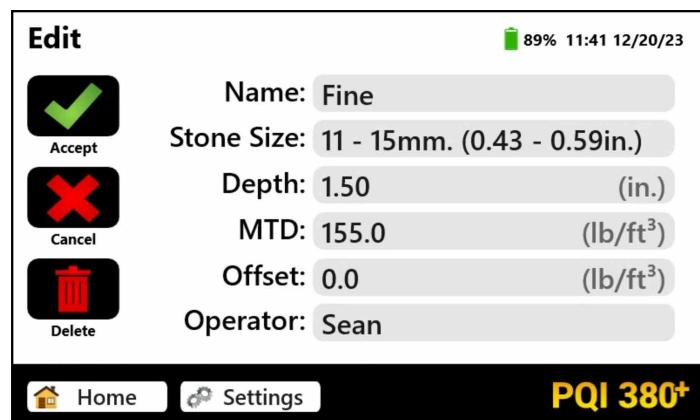
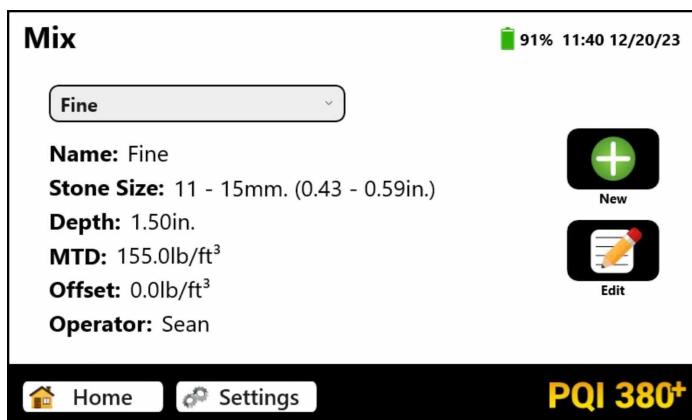
There is a built in calculator for your convenience if you do not have one handy. From the Home screen, tap **Calculator**. Once the numeric difference is calculated, determine whether the PQI 380 Plus is reading **too high** or **too low**. For example, if the PQI reads **155lb/ft³**, and you would like it to read **150lb/ft³**, the PQI is reading too high and the **adjusted value for the offset is 5**.

Editing Mix Details - PQI 380 Plus Offset Setup

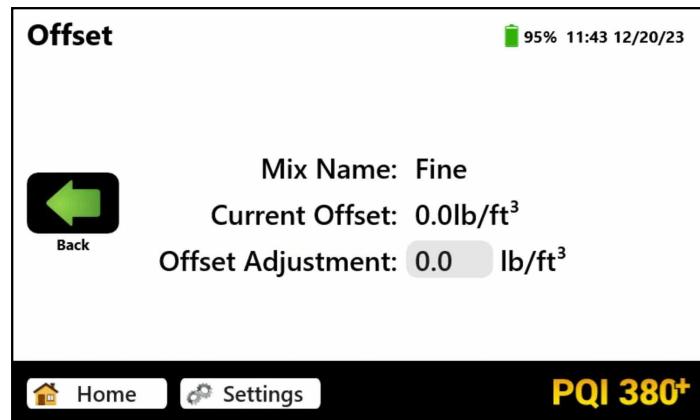
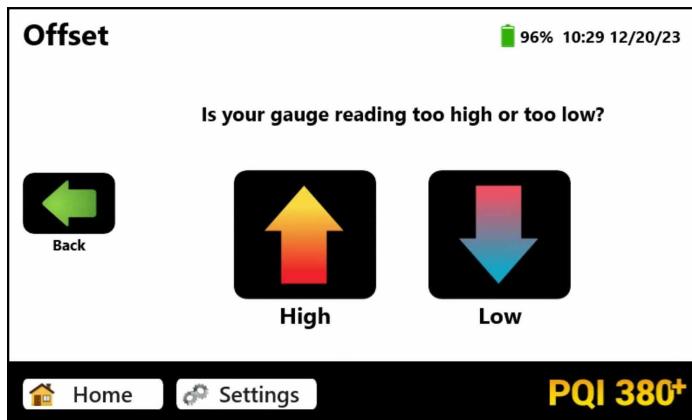


From the Home screen tap **Mix**.

Editing Mix Details - PQI 380 Plus Offset Setup

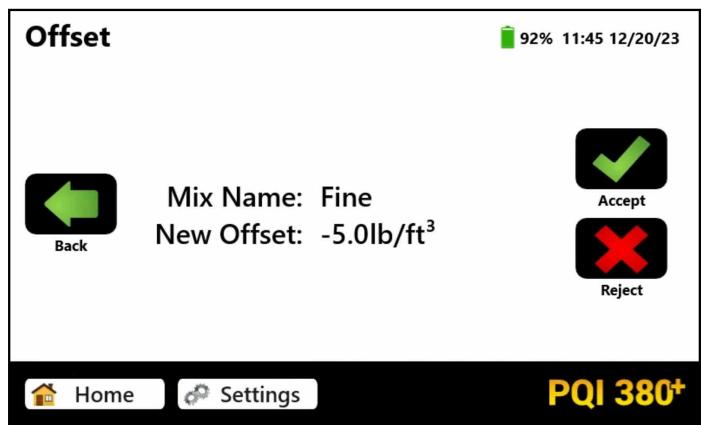
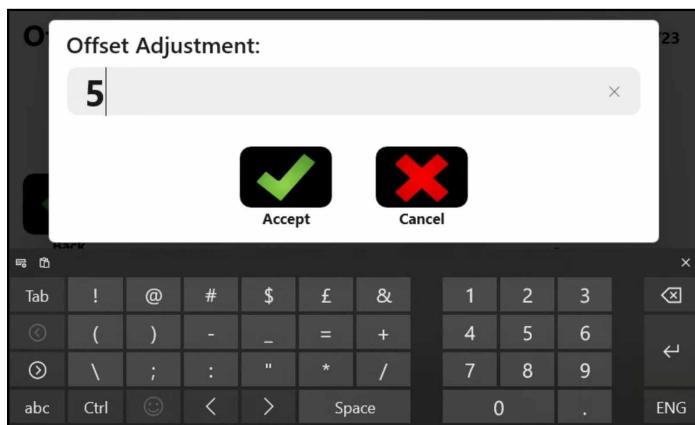


Be sure that the selected mix is the mix you wish to add the offset to. Tap **Edit**, then tap the gray shaded **Offset** field. In the previous step we determined that the PQI 380 Plus is reading too high and the adjusted value for the offset is 5.

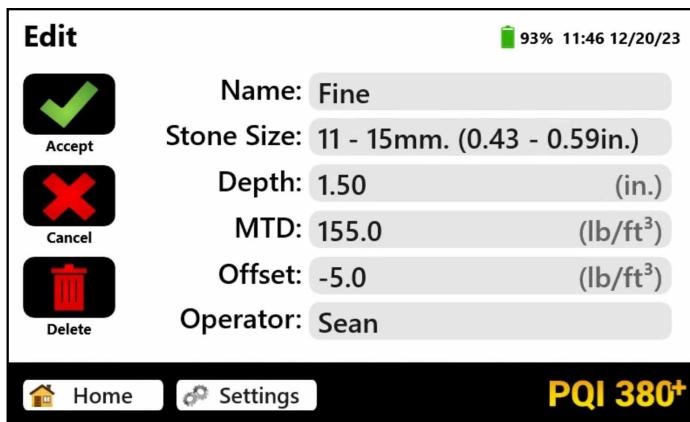


Tap **HIGH** to continue. The offset adjustment will display the selected mix name and the current offset value. Tap the **Offset Adjustment** field, they keyboard will pop up. Enter the adjusted value for the offset which we previously determined would be 5, then tap **Accept**.

Editing Mix Details - PQI 380 Plus Offset Setup



The adjusted value and new offset will be the same if the current offset was originally zero. If the current offset had been -1 and the adjusted value 5, then the new offset would be -6 for a PQI 380 Plus that was reading too high. Press **Accept**. Review your new offset then tap **Accept** to return to the Edit Mix screen.

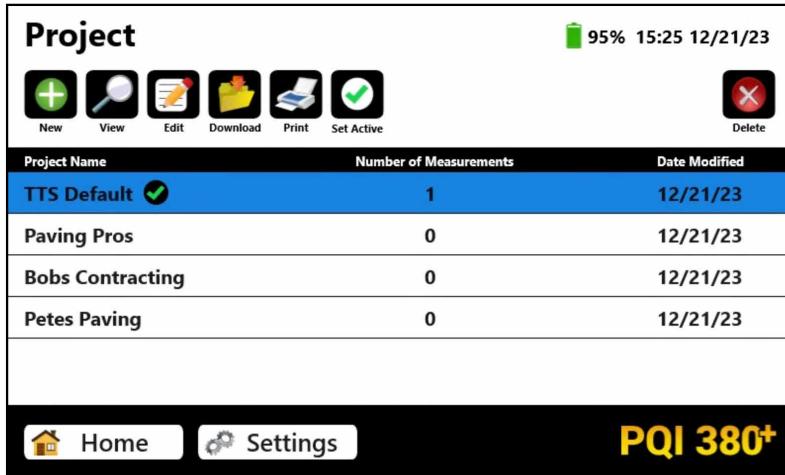


In the Edit Mix screen, verify the updated offset information for that mix. Once satisfied, tap **Accept** again to save your results and return to the Mix screen, then tap **Home** on the task bar return to the Home screen.

The offset for each mix can be adjusted at any time. Readings taken prior to a specific adjustment will not reflect that adjustment. Data files will record each offset used to calculate density for each reading.

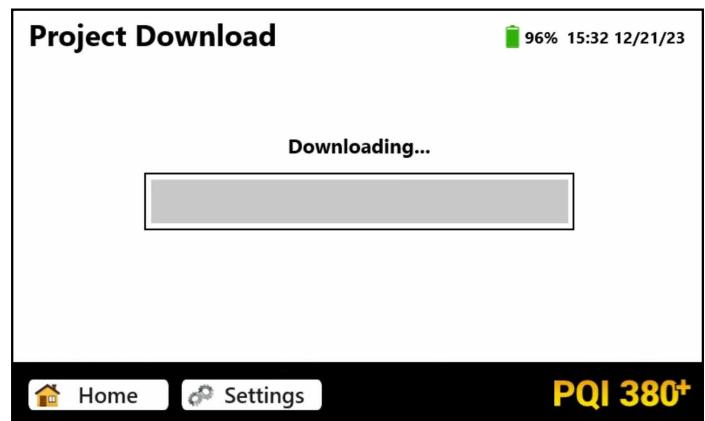
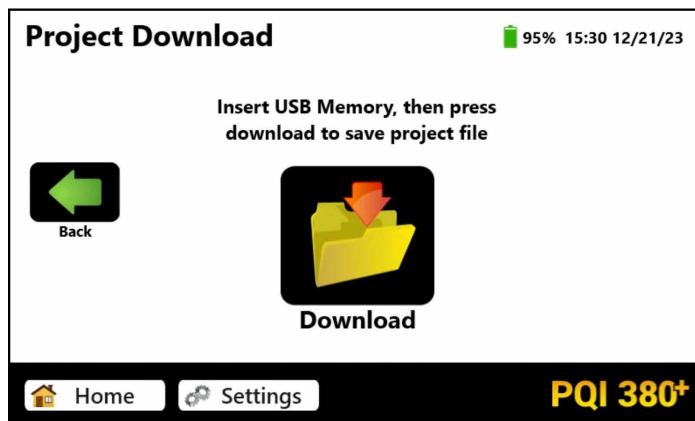
Downloading Project Data

From the Home screen, tap **Project**. This is where project files will be created, viewed, edited, downloaded, printed and deleted.



- Create new project
New
- View details of the data file
View
- Edit selected project
Edit
- Download selected project
Download
- Print selected project
Print
- Set Active project
Set Active
- Delete selected project
Delete

Select the project you would like to download, then tap **Download**.



You will be prompted to insert a USB flash drive into the USB port located on the back of the gauge. Once inserted tap **Download**. The gauge will then show a progress bar while it is downloading the file. Once completed it will return to the Project screen.

Uploading Project Data Onto Your Computer

Open an Excel spreadsheet and import the data by clicking **Import External Data** from the data menu, then click **Import Data**. Change the look in folder to the location you stored your data as well as changing the files of types to all files. Highlight and open your data file (ex. TTS Default.pqidat). Check delimited, click **Next**, check **Tab**, check **Semicolon**, click **Finish**. Highlight the beginning cell and click **OK**.

Column headings and data for each individual reading include the following:

Project Details: Proj Name, Location1, Location2, Contact;

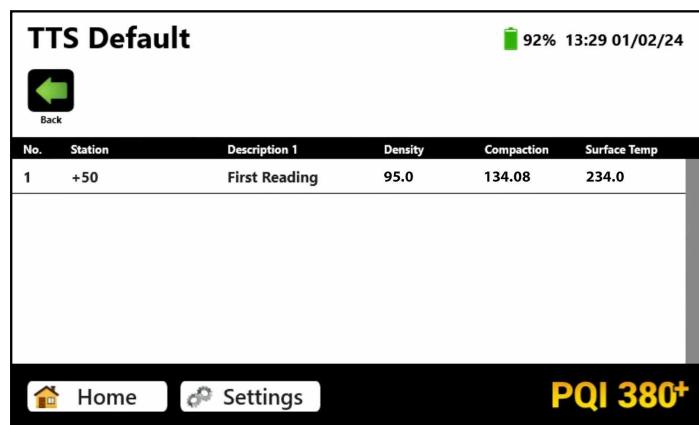
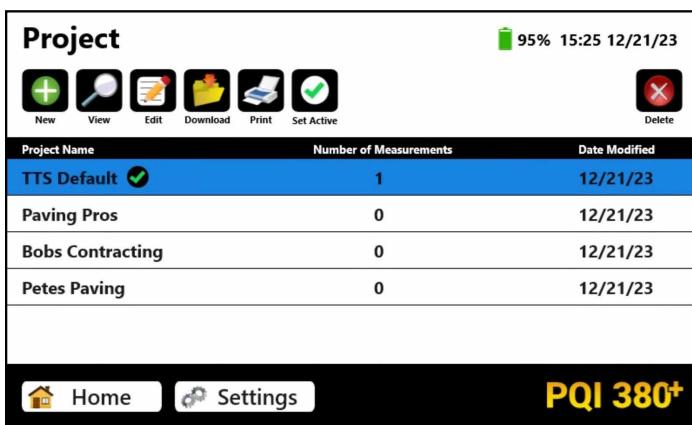
Mix Details: Mix Name, Stone Size, Depth, MTD, Offset, Mix Editor, Station, Description1, Description2, Operator, Density, Compaction, Surf Temp, GPS Coord, GPS Time, Date/Time, Voids, Mode, Type.

Printing a Project File

If you purchased the TransTech Systems portable printer for your PQI 380 Plus you will be able to print test results on-site directly from your gauge. Plug in your printer and from the Project screen, tap the project name to select it, then tap the **Print** button.

Viewing a Project File

Once you are in the Project screen you can view completed tests in your project files. Tap the desired project, then tap **View**. All of your tests saved to this project will be listed in the order they were taken. Only the most pertinent information will be shown in this view including: Test Number, Station, Description 1, Density, Compaction and Surface Temp. Tap the **Back** button to exit the Project View screen.



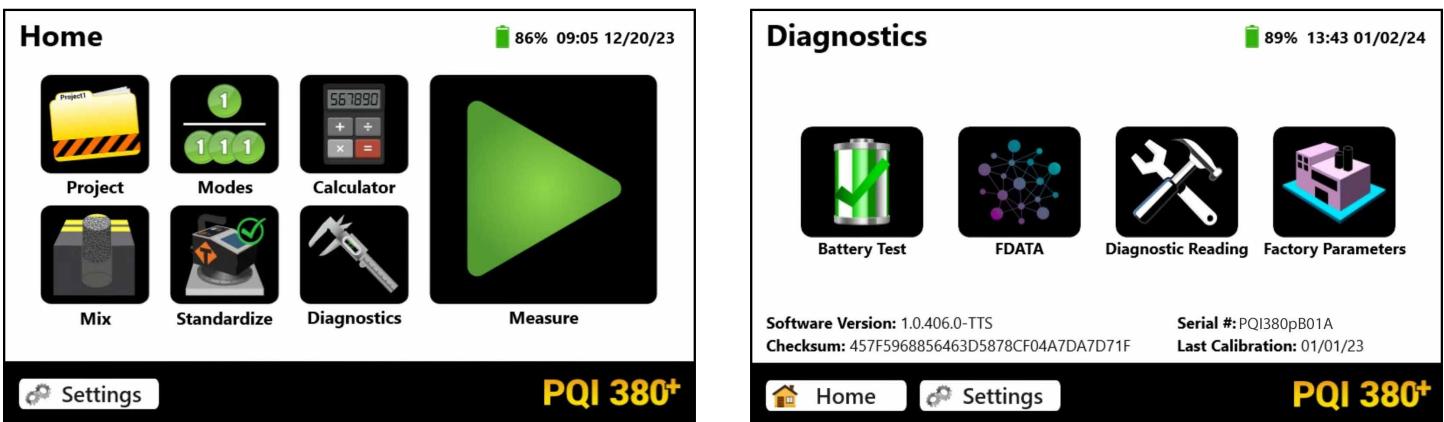
Deleting a Project File

If you want to delete a project, tap to highlight the project, then tap **Delete**. The project cannot be active if attempting to delete. You will then be prompted asking if you wish to delete only the measurement data or both the project and the measurement data. Once confirmed and deleted, you will no longer be able to retrieve the measurement data.



Maintenance and Troubleshooting

In the event that the PQI 380 Plus were to malfunction an internal diagnostics mode can be activated to provide necessary technical information to the factory. If a repair is required, **we strongly recommended that authorized factory service be obtained**. Unauthorized repair or maintenance by the user during the warranty period will void the unit's warranty.



From the Home screen, tap **Diagnostics**. From the Diagnostics menu, tap **Diagnostic Reading**. Place the gauge flat on the asphalt mat and tap **Measure**. Parameters from this display should be written down and relayed back to TransTech Systems or your distributor as a diagnostics tool.

Diagnostic Reading


 91% 13:47 01/02/24

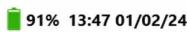
	Mix Name: Default Mix Depth: 5.0in. Stone Size: 0.12 - 0.39in. Formula Offset: 4.8000 Formula Slope: 0.94000 Manual Offset: 0.00000 Inner Slope: 1.00, 1.00, 1.00 Inner Offset: 1.0, 1.0, 1.0
	Outer Slope: 1.00, 1.00, 1.00 Outer Offset: 1.0, 1.0, 1.0 Density: Board Temp: Surface Temp: Magnitude: Phase:

Software Version: 1.0.406.0-TTS
Checksum: 457F5968856463D5878CF04A7DA7D71F

Serial #: PQI380pB01A
Last Calibration: 01/01/23

 Home  Settings **PQI 380⁺**

Diagnostic Reading


 91% 13:47 01/02/24

	Mix Name: Default Mix Depth: 5.0in. Stone Size: 0.12 - 0.39in. Formula Offset: 4.8000 Formula Slope: 0.94000 Manual Offset: 0.00000 Inner Slope: 1.00, 1.00, 1.00 Inner Offset: 1.0, 1.0, 1.0
	Outer Slope: 1.00, 1.00, 1.00 Outer Offset: 1.0, 1.0, 1.0 Density: 95.0lb/ft ³ Board Temp: 80.80°F Surface Temp: 234.0°F Magnitude: 9.47 Phase: 68.75

Software Version: 1.0.406.0-TTS
Checksum: 457F5968856463D5878CF04A7DA7D71F

Serial #: PQI380pB01A
Last Calibration: 01/01/23

 Home  Settings **PQI 380⁺**

Battery Test

The PQI 380 Plus gauge allows you to test the battery pack for total usable charge duration with continuous use. A brand new battery pack should achieve a 7 hour 30 minute run time +/- 30 minutes.

Diagnostics


 89% 13:43 01/02/24

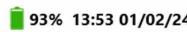
	Battery Test		FDATA		Diagnostic Reading		Factory Parameters
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Software Version: 1.0.406.0-TTS
Checksum: 457F5968856463D5878CF04A7DA7D71F

Serial #: PQI380pB01A
Last Calibration: 01/01/23

 Home  Settings **PQI 380⁺**

Battery Test


 93% 13:53 01/02/24

Last Test: 01/25/24 12:00AM
Results: 09:15:06





 Home  Settings **PQI 380⁺**

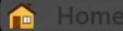
From the Diagnostics screen, tap **Battery Test**. This will take you to the Battery Test screen where you can start the battery test by tapping **Start Test**. This screen will also show the results of the last test run time. When initiating the test ensure that the gauge has been fully charged. Allow the test to run until it automatically shuts down. Then charge the gauge fully and go back to the Battery Test screen to see the results.

Battery Test


 92% 13:57 01/02/24

 Cancel

Status: In Progress
Elapsed Time: 00:00:05
Battery Level: 7.42V

 Home  Settings **PQI 380⁺**

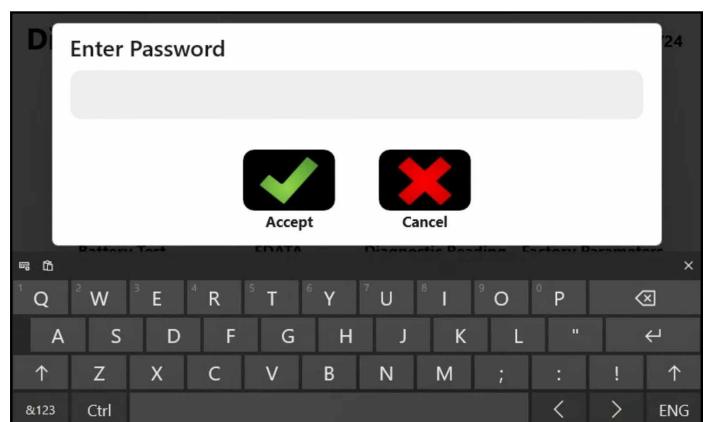
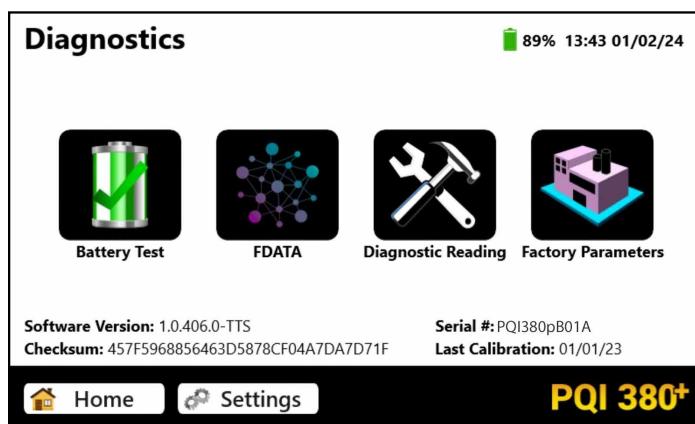
Factory Calibration

Yearly recalibration of the gauge is recommended to maintain consistency and accuracy for the electronic components.



If the gauge is past its calibration due date a yellow warning screen will appear during start up to remind you to send the gauge in for calibration. Only TransTech Systems or authorized distributors are able to perform this type of calibration.

Factory Parameters



The **Factory Parameters** button is located in the diagnostics screen. This feature is used for TransTech Systems in house diagnostics. If this button is tapped the keyboard will pop up with a password prompt. In certain circumstances TransTech Systems may provide you with the password to assist them in diagnosing your gauge.

Maintenance

The PQI 380 Plus has been designed to require a minimum of maintenance or service. Normal care in use should insure long and trouble free operation.

Keep the PQI 380 Plus bottom surface clean and dry:

For accurate readings, the PQI 380 Plus should have a clean, dry, smooth interface with the mat. Therefore, you should wipe the PQI 380 Plus sensor plate surface dry and clean after each reading. Also, before placing the PQI 380 Plus on the mat, you should check the surface of the mat to make sure there is no loose material on the surface, which would prevent the PQI 380 Plus from seating properly. If a buildup of asphalt begins to form on the sensor plate surface, clean the surface with WD-40 or a citrus cleaner.

Touchscreen:

Do not clean the touchscreen with abrasive products.

Apply window cleaner to a soft rag and wipe the surface clean.

Factory Calibration:

Yearly recalibration of the gauge is recommended to maintain consistency and accuracy for the electronic components.

Battery Care Tips:

- Whenever uncertain about the battery charge level or condition, recharge it.
- The battery will self-discharge and therefore should NOT be left uncharged for more than 30 days.
- An occasional complete discharge followed by a full recharge is recommended.
- NEVER drop the battery as this can damage the internals.
- DO NOT store the battery in a freezer or expose to extreme heat
- Battery should be fully charged before use

Troubleshooting

The chart below provides guidance to a few suspect conditions.

Problem	Remedy
Buttons Sticking / Frozen Software	Repress the frozen button firmly. Be sure not to drag your finger from one button to the next. If this does not work, reset the gauge by turning it off and then back on. You can also plug in a USB mouse to determine if the gauge is still active.
Incorrect Density Reading	Clean off sensor plate Check Current Mix Details- be sure you have selected the proper aggregate size and entered all details correctly Check Calibration- check your calculations for the adjusted value of the offset and that it was entered correctly Call Factory
Battery Problems / Gauge Keeps Shutting Down / Gauge Will Not Come On	Ensure battery pack is plugged in Check battery voltage- plug gauge into charger and wait for the green LED to illuminate to indicate a full charge Call Factory
Data is not recording	Check Current Project Name- data readings will store on the Current Project only, be sure you have the correct Project name set on the gauge (Verify the name of the Project and Mix on each reading screen)
GPS Communication Errors	Call Factory

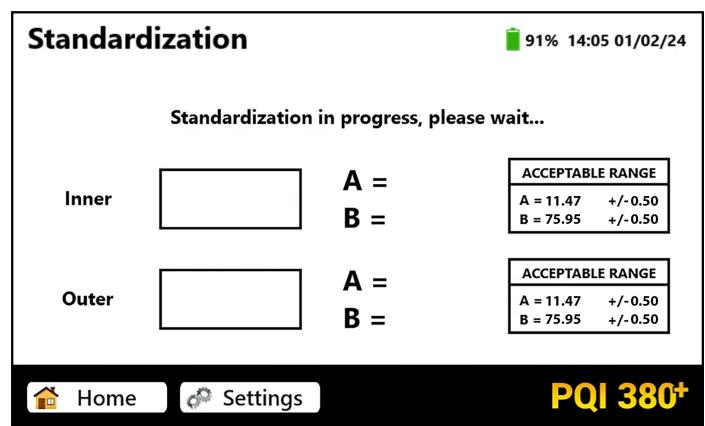
Standardization

To assure that the PQI 380 Plus's ability to make consistent measurements has not been compromised, a daily measurement should be taken on a reference material and tracked day to day for any unacceptable variations. A metallic plate has been installed in the bottom of the PQI 380 Plus carrying case that is suitable for this purpose.

Although this verification is referred to as a standardization of the gauge, the results of the standardization in no way influence the measurement of the gauge, they only serve to alert the user to a change in the way that the gauge is operating. Unexpected changes in the standardization values should be noted and discussed with product service at TransTech.

Standardizations are performed **inside the carry case**. Located at the bottom of the case is a steel plate. **Position the gauge on top of the plate inside the case. Be sure the gauge screen is facing you, if it is placed in the case backwards the handle will prevent proper seating you will get a false reading.** The case should not be on top of or around any large metal objects. From the Home screen, tap the **Standardize** button. Tap **Start**, to begin the standardization.

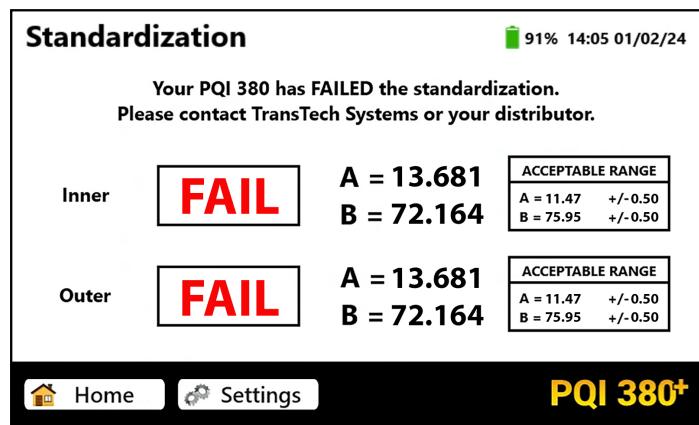
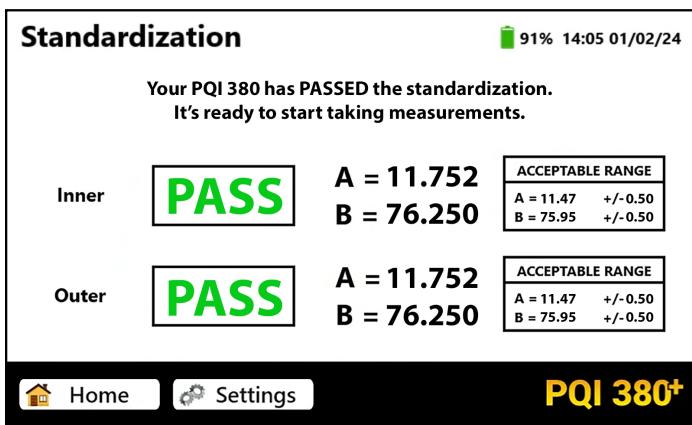
Do not touch the gauge while it is standardizing.



The acceptable range for the A and B values are displayed on the screen, however, the PQI 380 Plus will respond with a **PASS** or **FAIL** based on these ranges automatically.

Standardization

The result should read **PASS** for both inner and outer. If the result indicates a **FAIL** for either inner or outer, call TransTech Systems or your distributor.



If you receive a **FAIL**, prior to calling TransTech Systems try the following:

1. Reposition the gauge / case to another location (outside preferably)
2. Be sure that you are testing the gauge inside the carry case that was provided with the PQI. The gauge and case are paired during production to determine the standardization.
3. Do not place the case on the back or near an automobile as well as any other large metal objects and / or wires
4. Be sure that no foreign objects have adhered to the bottom of the gauge or on the steel plate
5. Shut off all cell phones within 10ft of the gauge

WARNING: THE STANDARDIZATION OF THE PQI 380 Plus WILL ONLY WORK WITH THE PLATE IT HAS BEEN ISSUED TO. IF YOU RECEIVE A FAIL RESULT, CHECK TO BE SURE THE SERIAL NUMBERS LOCATED ON THE GAUGE AND THE STANDARDIZATION PLATE ARE THE SAME.

WARNING: THE STANDARDIZATION OF THE PQI 380 Plus MAY GIVE A FALSE "FAIL" IF TEST IS TAKEN TOO CLOSE TO METAL OBJECTS, POWER LINES OR OTHER ELECTRICAL DEVICES THAT MAY BE TOO CLOSE TO THE GAUGE. TURN THE GAUGE OFF AND MOVE THE GAUGE AT LEAST 10 FEET FROM THESE OBJECTS. IF AFTER THESE PRECAUTIONS ARE TAKEN THE GAUGE STILL DISPLAYS A "FAIL" CONTACT YOUR DISTRIBUTOR.

Measurement Table

Company Name _____ Date _____
Job Site _____
Asphalt Mix _____ MTD _____

Core Comparison Calibration Work Sheet

1. Enter the core density readings and the average PQI 380 Plus readings for each location.
2. Subtract the PQI readings from the core density for each location.
3. Add the differences for each location = total difference.
4. Calculate the average difference (total difference ÷ 5). This is the adjusted value for the offset.

Location	1	2	3	4	5
Core Density					
PQI Readings					
Difference					

Total Difference	
Average Difference (Adjusted Value Offset)	

Measurement Table

Company Name _____ Date _____
Job Site _____
Asphalt Mix _____ MTD _____

Core Comparison Calibration Work Sheet

1. Enter the core density readings and the average PQI 380 Plus readings for each location.
2. Subtract the PQI readings from the core density for each location.
3. Add the differences for each location = total difference.
4. Calculate the average difference (total difference ÷ 5). This is the adjusted value for the offset.

Location	1	2	3	4	5
Core Density					
PQI Readings					
Difference					

Total Difference	
Average Difference (Adjusted Value Offset)	

Measurement Table

Company Name _____ Date _____

Job Site _____

Asphalt Mix _____ MTD _____

Core Comparison Calibration Work Sheet

1. Enter the core density readings and the average PQI 380 Plus readings for each location.
2. Subtract the PQI readings from the core density for each location.
3. Add the differences for each location = total difference.
4. Calculate the average difference (total difference ÷ 5). This is the adjusted value for the offset.

Location	1	2	3	4	5
Core Density					
PQI Readings					
Difference					

Total Difference	
Average Difference (Adjusted Value Offset)	

Measurement Table

Company Name _____ Date _____

Job Site _____

Asphalt Mix _____ MTD _____

Core Comparison Calibration Work Sheet

1. Enter the core density readings and the average PQI 380 Plus readings for each location.
2. Subtract the PQI readings from the core density for each location.
3. Add the differences for each location = total difference.
4. Calculate the average difference (total difference ÷ 5). This is the adjusted value for the offset.

Location	1	2	3	4	5
Core Density					
PQI Readings					
Difference					

Total Difference	
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Core Density					
PQI Readings					
Difference					

Total Difference	
Average Difference (Adjusted Value Offset)	

TransTech Systems Product Warranty

The Company warrants to the Purchaser that the product delivered hereunder will be free from defects in material or workmanship and be the kind and quality designated or specified in the contract or purchase order. This warranty shall apply only to defects appearing within one (1) year from the date of shipment by the Company.

If the product delivered hereunder does not meet the above warranty and if the Purchaser promptly notifies the Company, the Company shall thereupon correct any defect, including nonconformance with the specifications, either (at the Company's option) by repairing any defective or damaged parts of the product, replacing the product, or by making available the necessary repaired or replacement parts.

The liability of the Company under this warranty, for any loss, whether the claim is based on contract or negligence, shall not in any case exceed the cost of correcting defects in the product as herein provided, and upon the expiration of the warranty period, all such liability shall terminate. The foregoing shall constitute the exclusive remedy of the Purchaser and the exclusive liability of the Company. The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory.

No warranty of merchantability or of fitness for purpose shall apply. Unauthorized service shall void this warranty.

TransTech Systems Product Non-Warranty Return Policy

Non-warranty returns for TransTech Systems Inc. products must be made within twenty (10) days from the original date of shipment, unless otherwise indicated. Returned products must be in the original packaging, unused and in undamaged condition. Proof of purchase is required. Upon receipt of the product TransTech will inspect the product to the above mentioned criteria.

Unused products will be issued a credit to the Purchaser's account that was used to purchase the product. TransTech will not credit prepaid shipping cost. The original packing slip or invoice is required to be sent back with the product to be returned.

The Purchaser is responsible for shipping the product back to TransTech, carefully package the item(s) and include the packing slip and return manufacturing authorization number on the package. Prepay shipping is required – TransTech will not accept C.O.D.s.

Returns will be credited within 10 working days.

Proper Process of Warranty or Non-Warranty Shipments to TransTech Systems

For product returns (warranty or non-warranty), please follow the instructions below to assure prompt handling:

Call us for authorization (518-370-5558 or 800-724-6306), obtain a return manufacturing authorization number (RMA), and the return shipping address.

Indicate to our representative the reason for returning the product.

For Warranty Returns, Purchaser is responsible for shipping to TransTech's office. TransTech will pay ground shipping return to the Purchaser.



900 Albany Shaker Road, Suite 2
Latham, NY 12110
Phone: 518-370-5558
Toll Free: 1-800-724-6306
Fax: 518-370-5538
Email: inquiries@transtechsys.com
Web: www.transtechsys.com

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