



Weighing Technology

# User Manual

**MODEL TSH**

**High Precision Bench Scale**

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## 1 YOUR NEW SCALE

Congratulations on your purchase of the TSH High Precision Bench Scale. This Scale offers a combination of versatility, accuracy and simplicity in an easy to use and easy to maintain package. Advanced menu driven operating software, large memory capacity and an easy to use menu structure allows the scale to be configured for almost any application. To obtain the best performance and greatest utilization from your scale, read this instruction booklet completely and carefully.

Please enter the Serial Number, which is located on the scale serial plate. Retain this information for future reference.

**SERIAL NUMBER** \_\_\_\_\_

## 2 FEATURES

- Easy to read, 7 inch LCD Graphics Color display
- Automatic Calibration
- Multiple Tare Weights
- No Moving Parts
- Positive Overload Stops (most models)
- Large Memory Capacity
- Eight Unit Conversions Standard
- High Accuracy Parts Counting on Many Models
- Automatic or Numeric Entry Tare
- Sealed “Click-Type” Control Panel
- Abuse Resistant Stainless Steel Load Cell (most models)
- Automatic Zero Tracking
- Full Text and Floating Point Entry
- On Line Help
- Optional Analog Output
- Optional Battery Operation
- Optional Configurable Communication Options
  - USB
  - RS232
  - Ethernet
  - WiFi
  - Bluetooth
- Optional Multiple Platforms
- Optional Parts Counting
- Optional Setpoints
- Optional Time and Date
- Optional Weight Average Function
- Optional Windows Interface Software

### **3 PRECAUTIONS**

- 1) Prevent inflammables and liquids from entering scale head.
- 2) Always use the included wall transformer when using AC outlet. NEVER replace the wall transformer with a plug. This could cause electrical shock and severely damage to the scale.
- 3) Allow clearance on all sides of scale platform for accurate weighing.
- 4) Do not drop large loads on scale platform.
- 5) NEVER EXCEED THE RATED CAPACITY OF THE SCALE.
- 6) Do not pull on the connecting electrical cables.
- 7) Make sure that the scale and ramps are properly secured to the floor (most models).

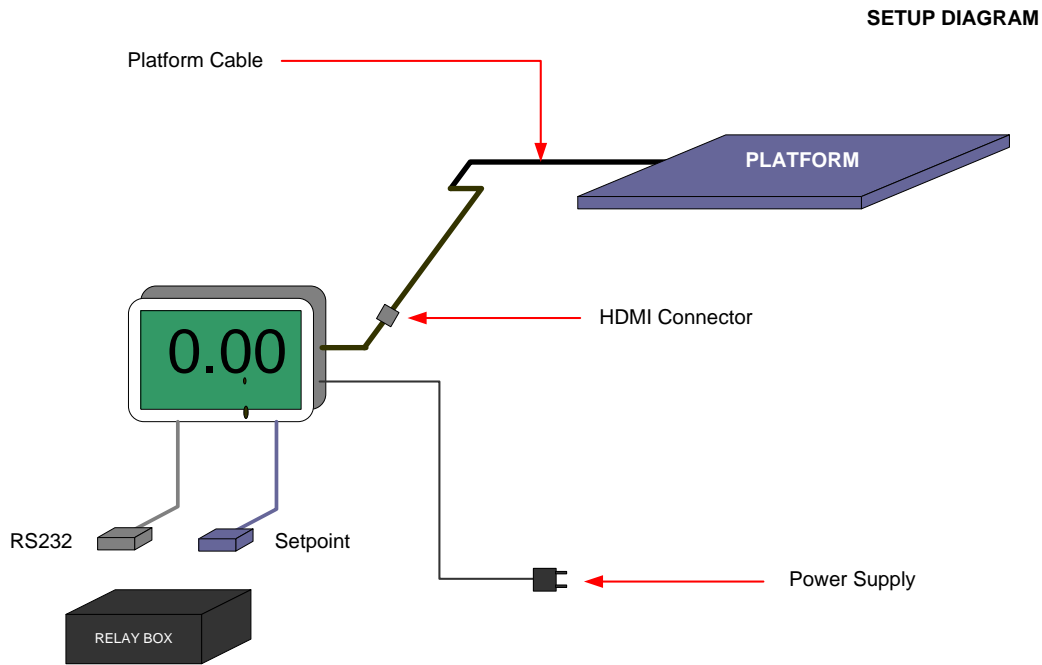
### **4 BEST CONDITIONS FOR WEIGHING**

- 1) The scale should be level.
- 2) Best operating temperature is about 68 degrees F.
- 3) The weighing area should be kept clean and dry.
- 4) The surface that the scale is resting on should be of solid construction and not prone to vibrations.
- 5) Don't install the scale near heater or air conditioner vents.
- 6) Avoid drafts.
- 7) Utilize a stable AC power supply. Avoid heavy motorized equipment on the same power line.
- 8) Do not operate the scale in close proximity of RF transmitters like cell phones and walkie-talkies.
- 9) Warm-up the scale before use, or leave on "ready" mode.

## 5 INITIAL SETUP

### 5.1 Setup the scale as described in the following diagram

#### 5.1.1 SETUP FOR STRAIN GAGE SCALES (Regular Scales)



**Platform Cable** – Connects the PLATFORM to the INDICATOR through HDMI connector.

**Power Supply** – Connects the INDICATOR to your power outlet. Supplies power to the whole system

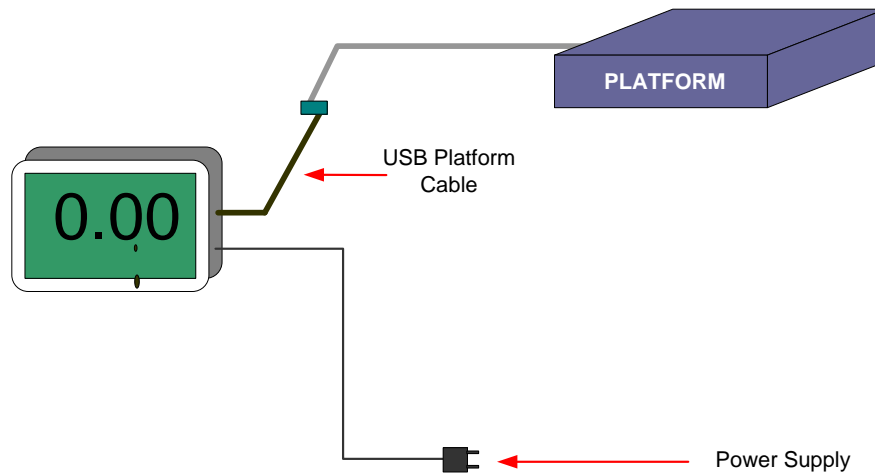
**RS232 (Optional)** – Connects to your PC/PLC RS232 connector.

**Setpoint (Optional)** – Connects to the Relay Box enclosure.

**Relay Box (Optional)** – Contains AC Relays for controlling your system.

## 5.1.2 SETUP FOR ULTRA-HIGH PRECISION (TSH Model Scales)

### SETUP DIAGRAM



**Platform Cable** – Connects the PLATFORM to the INDICATOR

**Power Supply** – Connects the INDICATOR to your power outlet. Supplies power to the whole system

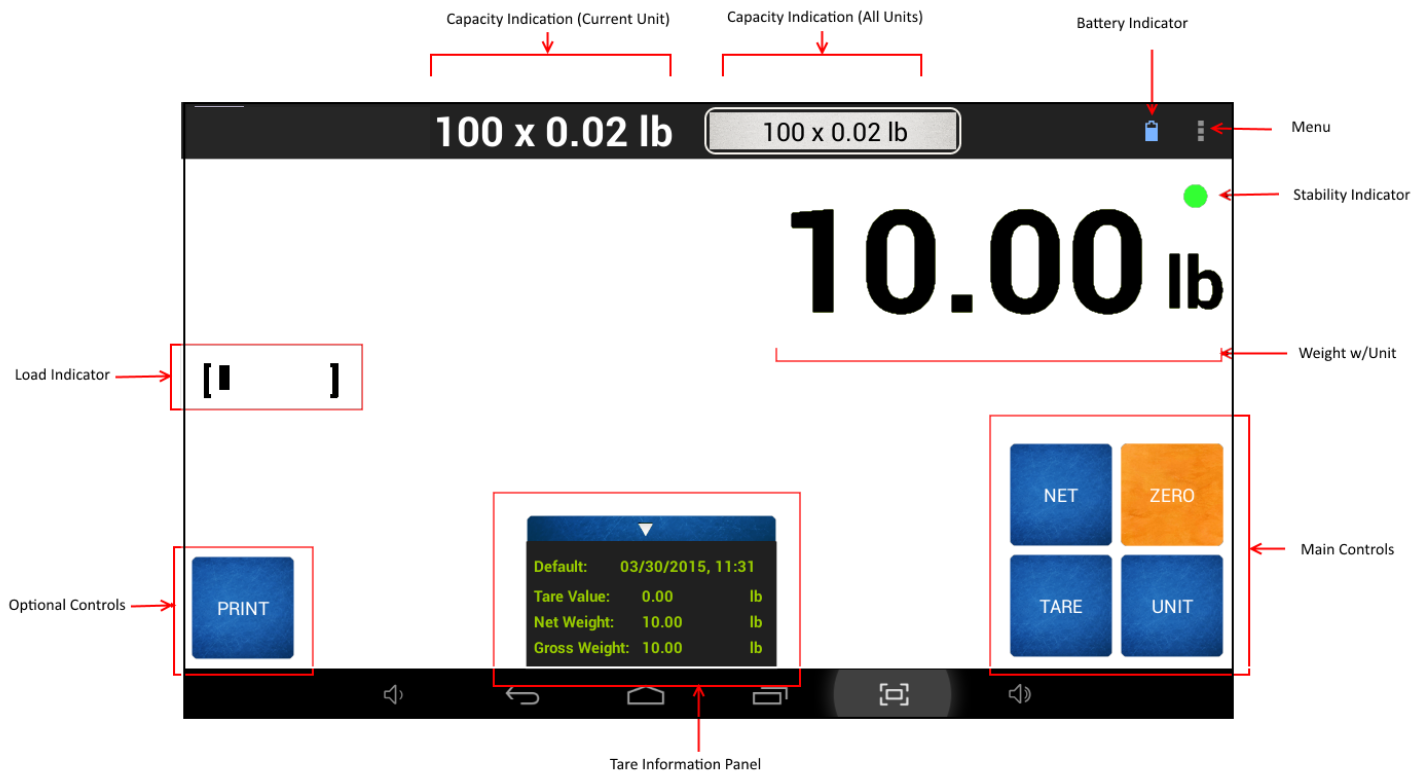
## 5.2 Power up the Scale

Plug the micro-USB end of the power adapter into the indicator chassis, and the other end into 110-117VAC. This is the only way to power up the indicator after shutting down. Wait for the indicator to boot up until it shows the main weight screen. Press the ZERO button if the scale is not showing ZERO.

## 5.3 Test the Scale

Put a test weight on the platform and make sure the tablet indicator is reading the correct weight of the object.

## 6 FRONT PANEL VIEW



### 6.1 Non-Interactive

WEIGHT W/UNIT	Weight on the platform in the current unit setting
CAPACITY INDICATORS	Shows the capacity of the scale based on the current and all units
STABILITY INDICATOR	Shows the stability of the weight, based on automatic and user defined filters
NET INDICATOR	Shows the “net” indicator if in the scale is in net weighing mode
LOAD INDICATOR	Shows how much load is on the platform relative to its maximum capacity
BATTERY INDICATOR	Shows the current status of the battery (charging/not charging)
TARE INFORMATION	Shows the information of the current tared weight, if any.

### 6.2 Interactive

MENU	For Settings and other options
MAIN CONTROLS	Shows the Main Control panel. Use this panel to perform main operations on the scale.
OPTION CONTROLS	Shows controls based on the options available on the scale



## 7 MAIN CONTROLS



- TARE** Pressing this key will tare any weight on the platform and switch the scale to the net mode. Holding this key down will clear any active tare weight.
- NET/GROSS** Will toggle the indicator between the net and gross mode. The net mode will show the weight on the platform minus any tared weight.
- UNIT** Pressing this key allows you to step through the various conversions. By default, the conversions available are pounds, kilograms, grams and ounces. There are four other conversions available that can be activated in the setup menu. This will add troy ounces, pennyweights, grains and a user defined conversion to the list.
- ZERO** Will zero the indicator.

## 8 COMMON OPTION CONTROLS

- PRINT** Pressing this button will send a weight print in ASCII format through any Print Option available. This works for RS232, USB, Ethernet, Wireless Ethernet and Bluetooth.

## 9 RS232 – QUICK OVERVIEW (optional feature)

### 9.1 Setup RS232

Connect the RS232 cable to your PC or PLC and setup the following Baud settings for Serial Port:  
Baud Rate: **9600**, Data Bits: **8**, Parity: **None**, Stop Bit: **1**, Flow Control: **None**

Press the PRINT button on the Front Panel to test the Print Function.

### 9.2 Using Terminal

Alternatively, you can use a terminal such as HyperTerminal or RealTerm to communicate with the scale. Just open a socket connection using the scale IP address and port number, and then type the following command:

**~\*P\*~** - To get the weight printed on your terminal.

Other supported commands are:

~\*W\*~ - Get a JSON string for the weight

~\*Z\*~ - Zero the scale

~\*U\*~ - Switch unit

Read more on [RS232 Communications Port](#).

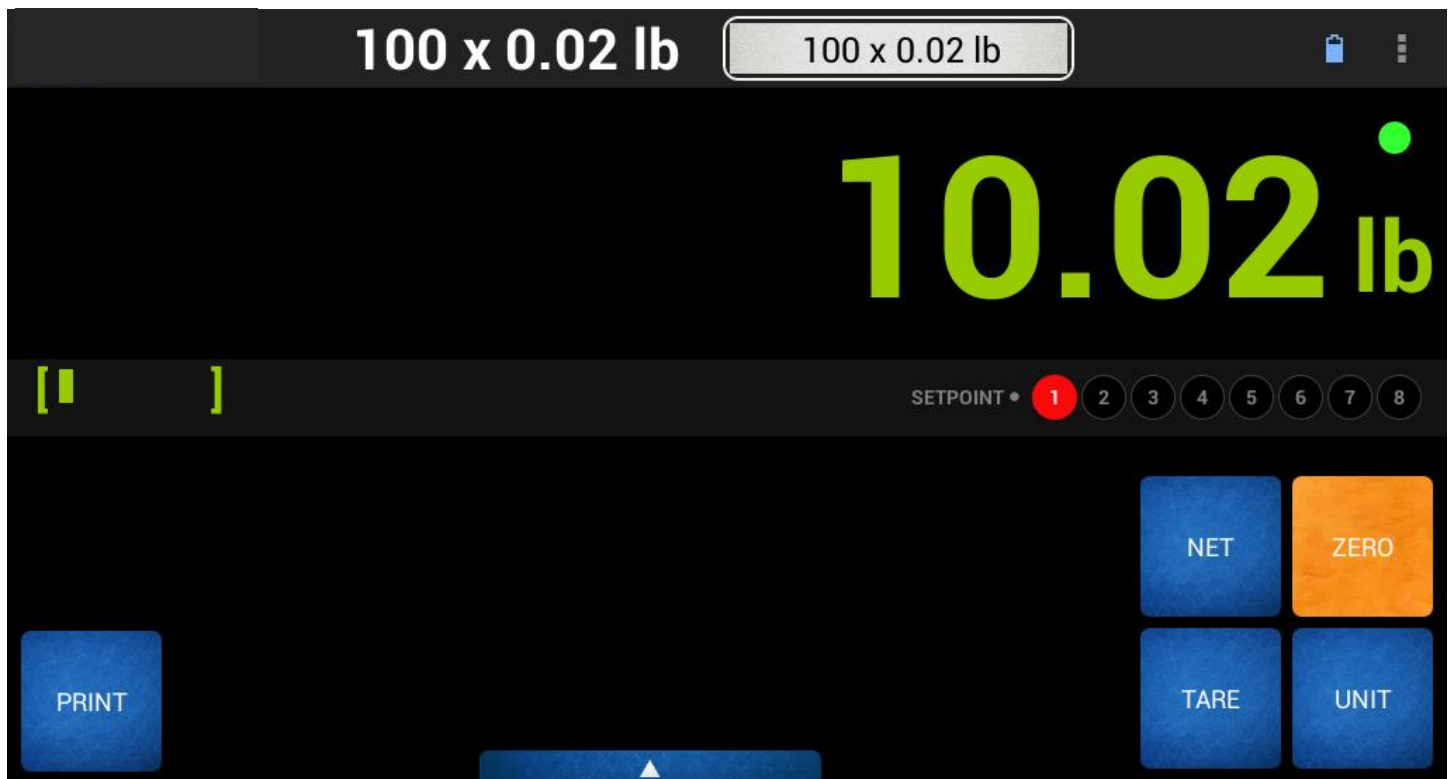
By default, the scale is configured to print out a Weight with Unit. For example, if the weight is reading 50.00lb, pressing the PRINT key will send the weight in ASCII as:

50.00lb

This is called the *Print Frame*. Different frame types can be selected to meet customer needs. For more information, read more on [Print Frames](#).

## 10 SETPOINT - QUICK OVERVIEW (optional feature)

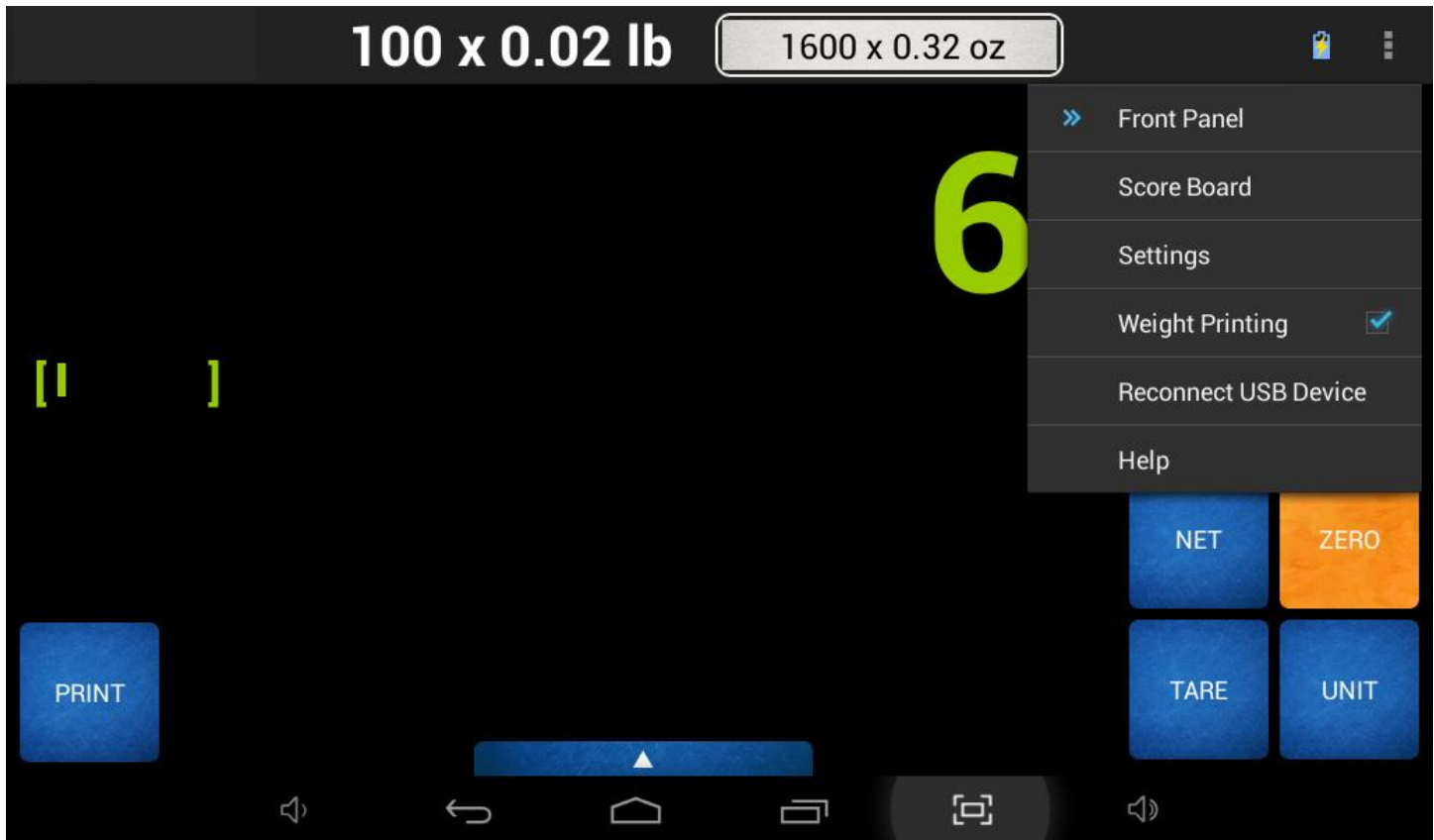
The scale has been setup to turn on Setpoint 1 if the weight is greater than 10lbs. To test this, place a weight greater than 10lbs on the scale. The scale will sound a tone and light up (1) on the Setpoint Indicator array.



Read more on Setpoint Operation [here](#).

## 11 QUICK MENU ITEMS

The Front Panel Menu items can be accessed using the Top Right menu button near the button indicator.



FRONT PANEL	- Directs you back to the Front Panel screen
SCORE BOARD	- Shows the Weight screen with large weight letters and minimal controls
SETTINGS	- Shows the Settings screen where main and optional parameters can be configured
[OPTION TOGGLE]	- Some options can be toggled right on the Quick Menu
RECONNECT USB DEVICE	- Mostly used for troubleshooting purposes.
HELP	- Shows the help screen (Currently not active)

## 12 SYSTEM OPERATION

### 12.1 General User Interface

The display is a user-friendly, touchscreen interface with quick access to common functions that you would use on a day-to-day basis. Right on the [Front Panel](#), you have access to the [Main Controls](#) and the [Quick Menu Items](#). If your scale is equipped with options, then you might find some additional items on the Front Panel. Some of them are listed under [Common Option Controls](#). The Quick Menu Items will allow you to access the inner workings of the scale such as Tares, Platform Management, System Setup, Diagnostics, etc.

Some of these settings will be described under this section. Other more advanced settings will be described in later versions of this manual. However, unless absolutely necessary or unless directed by a scale technician, try not to play with the advanced settings of these scale. You will run the risk of temporary or permanently disabling it.

## 12.2 Tare Settings (TBD)

## 12.3 Platform Setup

The Scale System revolves around one or more Platform Definitions that are configured and stored in memory. Most scales have only one weight platform. Each platform is fully configurable depending on the type of scale. If the scale is not an NTEP (Legal for trade), then there is a lot more freedom in configuring the platform. Some configuration parameters are scale capacity, displayed resolution, filtering, calibration and many other parameters which will be outlined in detail below. To access Platform Setup from the Front Panel, touch [QUICK MENU](#)->SETTINGS->MANAGE PLATFORMS.

### 12.3.1 Platform Management

The following screen lists all the platforms connected to the scale. As mentioned before most scales will have only one weight platform connected. This screen shows two platforms connected for informative purposes only.

The screenshot displays the Platform Setup interface. At the top, the scale's capacity and resolution are shown as '100 x 0.02 lb'. The interface is divided into a left sidebar and a main content area. The sidebar lists various settings categories: PLATFORM SETUP, Manage Platforms, Manage Units, Auto Zero, Accuracy, Advanced, OPTIONS SETUP, Parts Counting, Print Frames, Security, USB Communication, SYSTEM, and System Setup. The main content area shows two platform definitions. Platform 1 [ADC 0: Ch. 0] is 'Status: Calibrated' with a span of 8.5872, zero of 8223581, and a current RAW count of 8262930. It has 'INFO' and 'CALIBRATE' buttons. Platform 2 [ADC 0: Ch. 1] is 'Status: Not Calibrated' with a span of 12.0000, zero of 12345, and a current RAW count of 8333410. It also has 'INFO' and 'CALIBRATE' buttons. The bottom of the screen shows standard Android navigation icons.

Each Platform Definition displays some Platform properties to better inform you about the operational condition of the scale.

**Platform Name** Displays the name of the platform. In the screenshot above, “Platform 1” is the name of the first platform connected to the display. “Platform 2” is the second platform connected to the display. This name can be changed under the “Info” panel

**Platform Channel** Displays which channel the platform is connected to. In the above screenshot, Platform 1 is designated to [ADC 1: Ch. 0]. This means it is connected to A/D Converter #1 on Channel 0. Definitions for “A/D Converter” and “Channel 0” are beyond the current scope of this manual.

- Status** If you have performed a calibration and completed to the end, the status will show “Calibrated”. This doesn’t mean that the calibration is proper. You can only determine if the calibration is proper by weighing known weights.
- Span** Shows the Span Constant for the current platform connected. This will only change if a new calibration is performed.
- Zero** Shows the Zero Constant for the current platform connected. This will only change if a new calibration is performed.
- Current RAW Count** Shows the current load cell count being fed into the analog to digital converter (A/D Converter). If the last two digits are the only digits changing rapidly, it means the platform is in working condition. It’s not good if all the numbers are changing or if it is completely static. Also, pushing the platform will increment this number.

### 12.3.1.1 PLATFORM INFORMATION

To change the name of the platform or to view the configured capacity, resolution other properties of the platform, touch on the INFO button to view the properties of the platform.

### 12.3.1.2 PLATFORM CALIBRATION

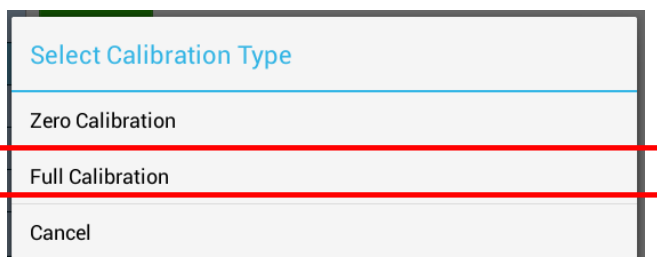
Calibration is used to set the Zero and Span values of the scale so that it reads correctly. Technically, calibration is a process that sets the lowest raw count reading from the platform to a Zero Condition (when the platform is empty) and adjusts the internal gain of the platform so that it associates the highest raw count reading to the full capacity.

To start the procedure, press the CALIBRATE button on the Platform definition. This process conveniently leads you through a Wizard for calibrating the platform. There is very little chance to perform an improper calibration if the process is completed by following what the instructions tell you in this wizard.

#### CALIBRATION TYPES

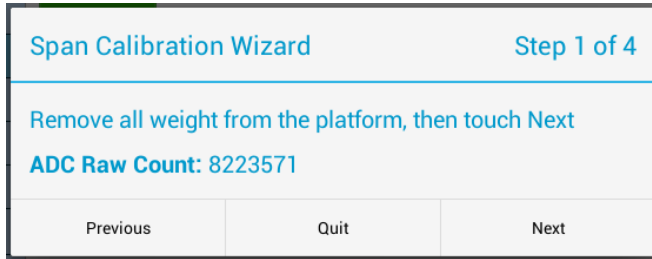
Full or Span Calibration is used to set the internal gain of the indicator so that it reads correctly. A calibrated weight is needed to perform Span Calibration. Any weight maybe used within the capacity range of the scale. A minimum weight of 10% of full capacity is needed. A weight of 50% of capacity is recommended. Using weights less than 10% of capacity is not recommended and may lead to improper calibration.

If your Platform Type is a Strain Gage scale, then you should never use Zero Calibration. Zero Calibration is only used for *Ultra Precision TSH Platforms*. Platform Type can be determined using the [INFO](#) button.

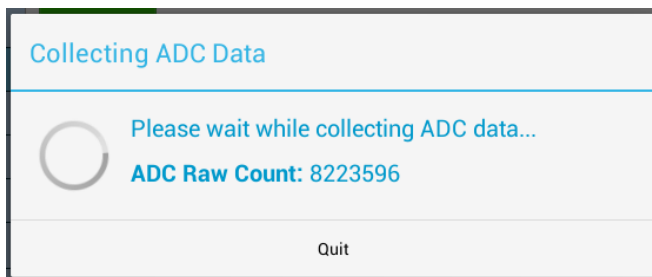


**FULL (SPAN) CALIBRATION (For Strain Gage and TSH Scales) - Select Full Calibration from the Calibration Type dialog box**

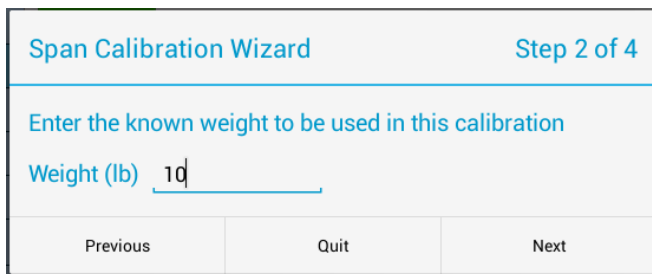
**STEP 1:** Remove all weight from the platform and touch NEXT.



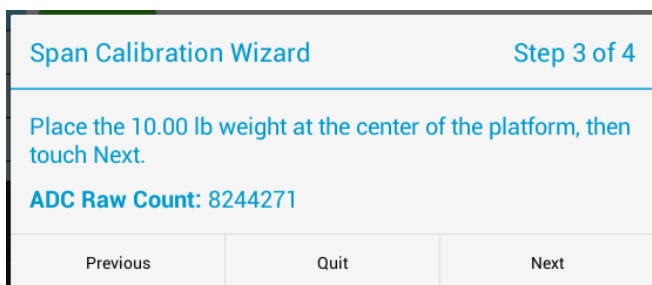
The next dialog shows that the Scale System is now collecting data from the platform. Wait for this process to complete. If it is taking exceptionally long (more than 2 minutes), then press the QUIT button and start the calibration process again.



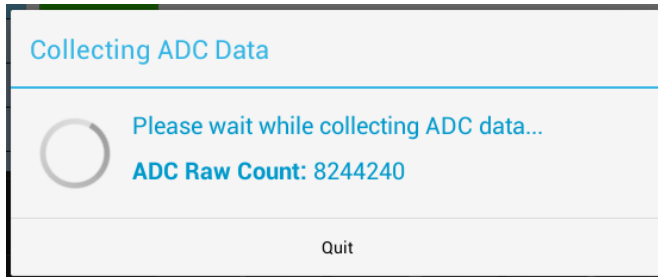
**STEP 2:** Enter the known weight you will be using for this calibration. Then touch NEXT. When using a known weight, please follow the guidelines as outline under the section for [Span Calibration](#).



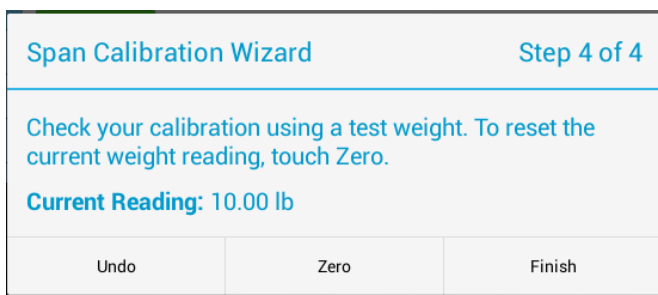
**STEP 3:** Now place the known weight on the platform and then touch NEXT as instructed by the following screenshot.



Wait for the Scale System to collect the data for the known weight.



STEP 4: The Full Span Calibration is now complete. Press the FINISH button. Then go to the Front Panel and make sure the current weight shows the value of the test weight you just used for calibration.



If the Front Panel is showing a value other than the test weight, remove the test weight from the platform, then press the ZERO button, and then try placing the test weight again on the platform.

#### **ZERO CALIBRATION (For Ultra Precision TSH Scales only)**

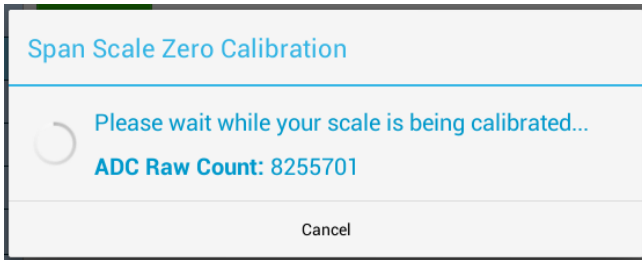
*\*PLEASE NOTE\* Do not perform this calibration for Regular Strain Gage scales. This could erase your current calibration.*

It is highly recommended to perform zero calibration after the arrival of the SAW Scale at the customer's location. This will enable the scale to acclimatize with the customer's environment and provide the customer with the most accurate readings during its operation.

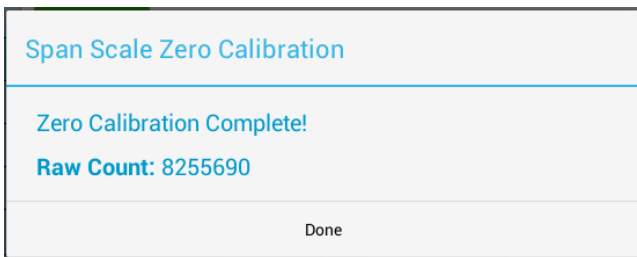
This procedure does not require any calibration weight. It takes only few minutes to perform. **Make sure the platform is empty.** Then select "Zero Calibration" from the "Select Calibration Type" dialog.



The scale will now try to calibrate the Zero Condition of the platform. You may cancel this operation at any time, however, you may have to start the process again.



Once the process completes, a dialog box like the screenshot below will appear. Just touch DONE and proceed to test the scale functionality.



## 12.3.2 Manage Units

### 12.3.3 Auto Zero

Auto Zero determines how the platform will zero on power up. The following selections apply.

- Auto Zero** With this option selected, the scale will automatically zero out any weight on the platform. This is a good option for environments not prone to power failures. Also, it is a great option if you always want to start the scale at zero regardless of what the state of the platform (loaded or unloaded).
  
- Last Zero** At initialization, the scale will zero out the platform to the last preserved zero state when the ZERO button was pressed. This means that the scale remember the last time the ZERO button was pressed. This results in the scale remembering the value of the weight currently on its platform when the scale is shut off. In addition to that, suppose the weight was changed after the scale was shut off, the next time the scale is turned out, it will show the new weight. ***This is an excellent option for environments prone to power failures. It is also an excellent option if you need to constantly monitor the weight on the platform without interruptions.***
  
- None** The scale will initialize the platform based on its previous state. It is not a recommended to leave the scale in this option. The scale may start up with an unknown state.



### 12.3.4 Accuracy

Sometimes the scale needs to work in a non-stable, noisy environment such as on a moving truck or vibrating floor or surface. For these environments, additional weight filtering process needs to take place to give you a more stable reading. The scale software engine provides several features to help in getting a better readability out of the scale such as Zero Tracking, Software Filter, Stability Control and Motion Detect. The settings for these features are entirely up to you. We cannot provide the best parameters for you because each scale operates in a unique environment. You will need to study the scale's behavior over time and make changes to the parameters accordingly. In the explanation below, this manual will go over some real world examples to give you hints on how to study the scale behavior to set these parameters.

#### 12.3.4.1 Zero Tracking

A scale sitting for long periods of time without weight on the platform is prone to drift from zero due to temperature changes and a number of other factors. Generally this is not a problem and you can press the ZERO button to return the reading to zero before weighing. Zero tracking, when enabled, will detect small reading changes over time and correct the platform back to zero.

**Active** Activates or deactivates Zero Tracking.

**Window** This is the range above or below the current ZERO point that needs to be continuously compensated (up to 20% of full capacity) to correct zero shift. For example, over two days, you notice that the scale has shifted in weight by 0.2lbs, even though there is no weight on the platform (and was originally reading perfect 0) or a weight that was constant over two days is now reading 0.2lbs over. This is known as "Zero Shift" and can be corrected using Zero Tracking. After studying the scale's behavior on this aspect, we can plug this 0.2lb range in this Window field. Now you will notice that your scale will zero out any deviations that falls within  $\pm 0.2$ lbs.

**Noise Count** Sometimes, the scale will produce spikes that may fall within the window range. These spikes may be the result of electrostatic discharge, or some electrical noise within the environment. They are extremely momentary and may only last a couple of milliseconds. This becomes problematic because we don't want the scale to perform zero tracking just because the scale produced a spike. So the noise count is the number of consecutive weight readings to finally determine if a shift has occurred. Set this to a reasonable number (such as 3 readings). Taking the example detailed in "Window", if the scale detects the 0.2lbs shift in 3 consecutive readings, it will take corrective action.

#### 12.3.4.2 Software Filter

The raw internal reading from the load sensor contains electronic noise and other factors that can cause the reading to be drifty and non-repeatable. All electronic scales incorporate some sort of filtering to compensate for this. Another use for filtering is to help stabilize a scale when it is used on a surface that is vibrating, in windy conditions, when subjected to RF interference or when used on a noisy power line. Your scale has two stages of filtering. The first is a electronic filter that is permanently enabled and the second is the software filter which is fully configurable.

In general, a low degree of filtering will cause the scale to be quick to react but prone to noise and vibrations. Heavy filtering will eliminate the noise and vibrations but the platform will react slowly to changes in weight. We have by

default set up the optimum filtering parameters for general use. These should only be changed in extreme circumstances.

There are four settable options on the setup screen.

**Active** Activates or deactivates Software Filter.

**Buffer** These are the number of averaging slots in the software filter. The higher this number, the slower the filtering process, the more accurate the weight reading.

**Window** Set's the weight value window at which you want the filtering to take place. The standard value for this field could be the scale's resolution. So if your scale is at a resolution of 0.02 lb, then set that value to this window. By default, the value has been set in factory.

If you set a lower value than the resolution of the scale, then the scale will be more stricter in its filtering and almost all values from the platform will be hitting the noise count giving you a much slower performance.

Set a higher value and the scale will be more lenient in its filtering allowing more noisy values to pass through for processing giving you a better performance but higher inaccuracy in readability. The best way to approach this window is determine the range of fluctuation with the default setting. For example, by observing the scale, you notice that your scale is varying by 1lb. If that is the case, then set the value here to 1lb. You will then get stable readings within this range.

**Noise Count** This is the noise count of filtering mechanism. This sets the number of weight values that need to be discarded before considering that the new weight value is a new value and not part of the current weight value averaging process. The higher this number, the less accurate the weight value, the faster your performance

### ***12.3.4.3 Stability Control***

If the scale display values are not stable due to a noisy or unstable environment and you do not want to estimate the actual value of the weight on the platform, the scale can estimate it for you.

Stability Control is not by any means a filtering mechanism. This feature should only be used if you know that the scale will always be unstable or in constant noise. What this feature does is lock in an appropriate weight based on the stability count and a stability window you have specified in this screen. The weight locked, may not be the most accurate weight of the object placed on the platform, but it is a best guess as computed by the Stability Control in this scale. Once the stability lock has been placed, the lock will not be removed until the platform experiences a weight change greater than the stability window.

There are four settable options on the setup screen.

**Active** Activates or deactivates Stability Control.

<b>Source</b>	This sets the primary source of readings that the Stability Control mechanism will use to estimate the best lock-in weight. There are two selections here.
<b>A/D Reading</b>	This selection makes the Stability Control mechanism take readings unfiltered and straight from the load cell. This is the fastest and the least complex selection and therefore the default.
<b>Filtered</b>	This selection is an advanced selection. With this selection, Stability control uses filtered weights based on parameters set by the Software filter. Selecting this option automatically activates software filter. Make sure the parameters in Software filter are properly set or the scale will behave erratically. Use this selection only if you know what you are doing.
<b>Window</b>	The Window field operates similarly as explained in the <a href="#">Software Filter</a> section.
<b>Count</b>	This number indicates the number of stable readings within the window set above to qualify a lock in. Suppose this number is set to 3, then the Stability Control mechanism will try to read 3 readings consecutively that are within the window above. If they fall within that window, then the weight will lock in, else, it will reset and start over until it gets 3 stable readings.

After Stability Control is activated, ***an unfilled square*** appears at the bottom left of the screen during normal weight readings. While the scale does not have a stable reading, the square will appear unfilled. As soon as a weight has been found, it will lock this weight and the square will be filled. Once the lock has been obtained, the reading will not budge until a weight change greater than the window set has occurred.

#### ***12.3.4.4 Zero/Motion Detect***

This scale can detect if there is motion on the platform and/or if the platform is at zero. This feature does not process, control or filter the scale weight reading in any way. It is there for determining if the given weight reading has a property of motion or zero. There are four settable options on the setup screen. The first three are for the Motion Detect setup. The fourth option controls the zero indicator on the main display. These menu items are as follows:

<b>Active</b>	Activates or deactivates motion detection.
<b>Motion</b>	The Motion field determines the range of weight at which you want to define “motion”. So if the scale has been set on a moving truck, and you have determined that the scale always is within a certain weight range when the truck is moving normally at normal speeds, you would want to set the Motion window at that range. For example, say you have put a weight on the scale that would read 20lbs on a stable surface. But on the truck it reads 18-23lbs. This means that your motion window is 5lbs. So now you know that you want to detect motion if and only if it is greater than 5lbs, so you can set the Motion window to 5lbs.
<b>Time</b>	This works along with Motion Window to detect a stable reading. The reading must be stable within the motion window for this length of time (in seconds) in order to be considered a stable reading. As long as the weight remains within specified motion window within this time, the scale would confirm that there is no motion detected. If the weight jumps out of the motion window, then the scale would register as “Motion Detected” and reset the time interval.
<b>Zero Window</b>	This controls how close the scale needs to be to the true zero point before lighting the zero indicator (ZR) on the bottom of the main display. For example, if you set the window to 1lb, then any weight from 0lb to 1lb will register as ZR (meaning ZERO condition).

**Noise Count** This sets the noise count of the detect mechanism. This sets the number of weight values that need to be discarded before considering that the new weight value is a new value and not part of the current weight value averaging process. The higher this number, the less accurate the weight value, the faster your performance

After ZERO/MOTION DETECT is activated, go back to the Front Panel home screen and notice a tiny square indicator appears at the right of the screen near the bar graph. If the platform is moving, the square indicator turns into a 4-arrow indicator will show as it is seen here. If the platform is within the bounds of 'No Motion' as set here, then the tiny square indicator appears again.

*Note: The Motion/Detect feature is always turned on (even though it may show deactivated). This facilitates in showing the stability indicator on the top right corner of the weight.*

## 12.4 Options Setup

This section is detailed in another part of the manual. The section thoroughly describes each and every option that may or may not come standard with the scale. Proceed to the [Options Setup](#) for further details.

## 12.5 System Setup (TBD)

# Options Setup

## 13 OPTIONS CONFIGURATION

The following sections describe some of the common options available in the scale in great detail. Please read the relevant option you have available on the scale thoroughly to use its feature properly and accurately.

## 14 OPTIONAL RS232 COMMUNICATIONS PORT (SERIAL PORT)

The RS232 option is a fully capable, bi-directional communications port. The port can be configured to operate at a variety of baud rates and the output data frames are definable by the user. The printing of a frame can be initiated by pressing the print button, by an external command, upon reaching a setpoint, or continuously when the print stream mode is activated.

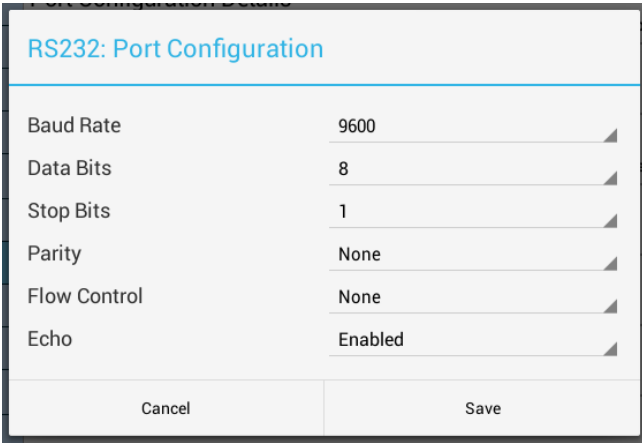
The communications port also contains an extensive external command interface allowing key presses, adding and editing memory slots and even scale calibration to be controlled from external equipment.

The RS232 Configuration screen can be accessed by going to *QUICK MENU->SETTINGS->RS232*.

100 x 0.02 lb		45 x 0.01 kg
Auto Zero	Port Configuration Details	
Accuracy	Baud: 9600 BPS, Data Bits: 8, Stop Bit: 1, Parity: None, Flow Control: None, Echo: Enabled	
Advanced	Print Stream Details	OFF
<b>OPTIONS SETUP</b>	Print at Stability Details	OFF
Print Frames	Active: No, Percent: 10.00, Timeout: 10.00s, Neg: No, Zero Ntfy: No, Control: Motion/Zero	
RS232	Print Accumulate	OFF
Security	Enable ASCII Printing	ON
Setpoint Controller	Turn ON to enable ASCII printing (ON) or data sent in binary format (OFF)	
<b>SYSTEM</b>	Enable Print Preceding Zeros	OFF
System Setup	Turn ON to enable Print Preceding Zeros. Eg: 25.00 will be printed as 025.00	
System Advanced		
Diagnostics		
Themes		

### 14.1 Configuring the Port

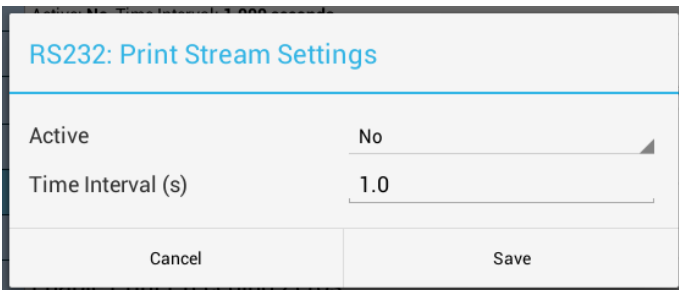
Baud rate and other parameters can be configured through the Port Configuration screen that can be accessed under menu PORT CONFIGURATION DETAILS. The options are shown below.



- BAUD RATE - Settable to 300 to 921600 bits per second (Default: 9600)
- DATA BITS - Seven or Eight (Default: 8)
- STOP BITS - One or Two (Default: 1)
- PARITY - Even, odd or none (Default: None)
- ECHO - When echo is enabled the scale will echo each character the scale receives back to the user (Default: Disabled)

## 14.2 Print Stream Mode

Print stream mode will continuously print the currently active print frame at fixed time intervals. Stream mode can be configured using PRINT STREAM DETAILS. The menu selection ACTIVE will enable or disable Print Stream Mode, and TIME INTERVAL (S) will be the number of seconds between the beginnings of each print frame. Avoid using time values of less than .2 seconds as it may slow down or lock up the scale.



When stream mode is enabled, use the print button or the external ~\*P\*~ command to start or stop the printing process. You can easily toggle Print Stream by using the ON/OFF button located at the Option Selection.

## 14.3 Printing at Stability Using Motion Detection and Stability Control

All our TSH digital indicators have the capability of detecting motion and/or stabilizing the weight and using it to control printed outputs. This can be useful in many applications. For example, if you wanted to print labels for several items, you could simply place each item on the platform, and when the scale gets a stable reading it will print the label automatically. The Motion Detect, Stability and printing at stability are fully configurable through their respective setup screens.

The Motion Detect indicator looks like an 'M' and it is located just to the right of the Zero Indicator / Bar Graph located on the bottom of the display. It is crossed out if there is no motion, and it is uncrossed if there is motion.

The Stability Control indicator looks like a circle and it is also located just to the right of the Zero indicator/Bar Graph located on the bottom of the display. The circle is unfilled when the weight is not stable and filled when the weight is stable.

Print at Stability configuration allows the user to choose what control they want to use to print. The user can choose Motion Detect only, Stability control only, or both Motion Detect and Stability control. Take a look at the Instructions Manual to see how the Motion Detect and Stability Control can be set.

Sending a PRINT command or pressing the PRINT button on the front panel will send a PRINT request to the scale, and the scale will only print if the motion and stability conditions are met.

## 14.4 Print at Stability Setup Screen

RS232: Print at Stability	
Active	No
Percent of Cap. above Zero	10.0
Timeout	10.0
Allow Negative Weights	No
Notify at Zero	No
Control	Motion/Zero
Cancel	Save

There are five settings that control this function:

### 14.4.1 Active

This will activate or deactivate this function. Select ACTV from the horizontal menu on the bottom of the screen, and then press ENTER to change this setting.

### 14.4.2 Percent of Capacity above Zero

This is the percent of full scale capacity, which, if the scale reading falls below, will not automatically print. For example, a 100lb full capacity scale set to 1% will not automatically print when there is less than 1lb on the platform. In most applications there is no purpose to generating a print after removing weight from the platform. This percent can be set to two decimal places.

### 14.4.3 Timeout

This is the time set by the user to timeout retrieval of the value after a certain period of time. By default, this value is 0, which means that the scale is never going to timeout to print a weight values. It will continue to look for a stable point to retrieve a weight value for printing. If the number is set other than 0, then this is the period that the scale will try to print a weight value, and if it fails, it will print "TIMEOUT" in ASCII on the terminal.

### 14.4.4 Allow Negative Weights

By setting this to "YES", the automated print will work on both sides of zero. When set to "NO" it will only work with positive weights. The user must take into consideration here that if this parameter is set to "NO", then when the scale is



reading zero, the output may be erratic even though the scale is stable. This is because the value 0 in the scale is not a true stable zero. The zero here may be a long decimal that goes beyond the resolution. In this case, the value maybe negative and therefore, impeding the printing process. It is recommended to set this to “YES” if the zero value is important.

#### **14.4.5 Notify At Zero**

If this option is set to “YES”, then each time the scale is zeroed or a zero command is sent through one of the communication ports, the indicator will wait for the scale to stabilize and detect if there is no motion. Once these conditions are detected, the word “ZERO” appears on the output terminal in ASCII.

CONTROL: This option can be switched between Motion, Stability, Motion and Stability based on your preferences. This determines how you want the Print at Stability to operate, whether based on Motion Detect, Stability Control or both. It is important that when you choose these options, these features need to be activated within the system to operate properly.

#### **14.5 Print Stream Mode with Print at Stability**

Print Stream and Print at Stability can work together. If you want the scale to print weights constantly, then activate both of these features together and they will work in tandem with each other.

#### **14.6 Test Software for RS232/USB/RS485**

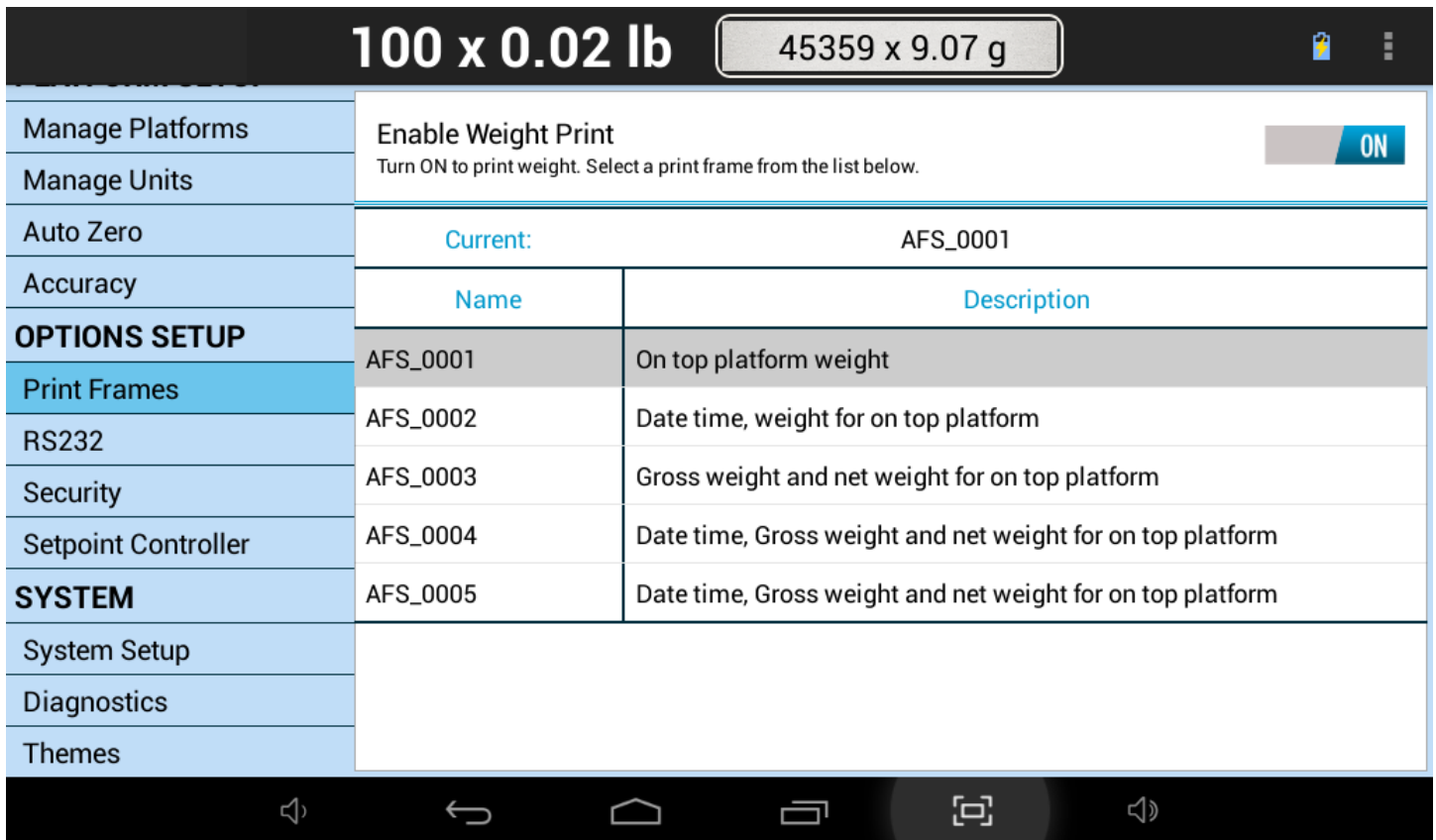
We provide some simple software to test out RS232/USB and other RS protocol connectivity mediums. The software can be obtained under the Software Downloads section of our website:

<http://www.arlyn scales.com/Software-Downloads-for-Industrial-Scales-s/45.htm>

## **15 PRINT FRAMES (ONLY W/RS232, USB, ETHERNET, WIFI, RS485 or BLUETOOTH)**

Print Frames can be considered as templates which the scale uses to format weight printouts before sending them out to the connected medium (PC, PLC, etc.) The current selected Print Frame tells the scale to print out Weight and Unit only.

You can select a different Print Frame to suit your needs. These are predefined Frame Scripts that allows you to print more information when the user presses the PRINT button. A customized Print Frame can be created for your needs if desired.



This topic will be further expanded upon in later versions of this manual.

## 16 OPTIONAL SETPOINT CONTROLLER

The setpoint controller gives your scale the capability to output a signal to external equipment when certain conditions are met. This is particularly useful in filling operations, either to sound alarms or to control filling machinery.

Setpoint definitions can be created, edited and deleted. Each has a text description, controlling parameters and a multi-line formula associated with it. In operation, if the displayed weight satisfies the formula, you may direct any of the outputs to switch on or off. You can create as many setpoint definitions as you like within limits of free memory

Setpoint definitions can be activated or deactivated, and up to four setpoint definitions can be activated at one time. When multiple setpoints are activated, each setpoint formula is evaluated in the order it was defined. If more than one setpoint shares the same output, then it is possible for one to overwrite the other.

With a little finesse in creating formulas, simple setpoints, filling control cycles, over and under check weighing and many other functions are possible.

### 16.1 Output Specifications and Notes

The setpoint controller has eight separate outputs and is expandable to sixteen. Each output is an open collector capable of sourcing 4.5ma or sink 10ma of current. Care must be taken not to exceed these values. This is sufficient to drive LEDs or sound buzzers. If higher output currents are needed then external relays need to be installed. We normally provide 117-240VAC, 10A Optically Isolated Relays and 5-60VDC, 3A Solid State Relays. Mechanical relays should be

avoided. Optical relays have some important advantages over mechanical relays; the actuation current for optical relays is usually less than 10ma but mechanical relay coils require currents often exceeding the limit. Optical relays have no mechanical switches to wear out and more importantly they isolate the scale from the load, thus protecting it from voltage spikes. If excessive noise is coupled back to the scale it could lock up or damage its microprocessor or memory.

It should be noted that when you command an “OFF” CONDITION, the output will be grounded. In most open collector (switched ground) wiring schemes this will actuate the external light or relay. To help eliminate this confusion, each setpoint formula has an optional INVERT function to invert the output.

Even though the output is an open collector, it differs from the standard open collector output in that the output will assume a high condition (3.3VDC) when it is switched on without the need for an external pull up resistor, allowing direct connection into any TTL level input.

## 16.2 Creating Setpoints and Formulas

To access setpoints, go to the QUICK MENU->SETTINGS->SETPOINT CONTROLLER. There you will see a list of all available setpoints or “None Defined” if none exist. The creation, editing and deletion of setpoints are similar to the creation of tares and parts counting samples.



**Create a new setpoint definition** by pressing the “+” icon on the top right corner of the Screen to open the *New Setpoint Definition* dialog box.

## 16.3 The Setpoint Definition Screen

The setpoint definition screen will show the description and controlling parameters for this setpoint definition.

Scale Droid

Name Setpoint 1 Value Weight

Invert OFF Negative OFF

Cycle OFF Platform Platform 1

Command	Expression	Value (lb)	Out
OFF	<	10.00	1
ON	>=	10.00	1

✕ + 📄

### 16.3.1 Invert

If it is ON then all outputs related to this setpoint will be inverted. This is useful when using the open collector output for the reasons stated earlier in this section.

### 16.3.2 Cycle

The cycle option is used to create an operation cycle as described [later in this section](#).

### 16.3.3 Negative

The Negative option is used to determine if the scale needs to evaluate negative weight values. If NEGATIVE = OFF, then the setpoint controller will not evaluate negative weights, as in it will treat both negative and positive weights the same. For example, if the display shows -10lbs or +10lbs, the setpoint evaluator will evaluate these values as positive values. If Negative=ON, then it will differentiate between the two values.

### 16.3.4 Platform

This option only works when the scale is equipped with multiple platforms. The user can select if the setpoint conforms to a particular platform. If it is the case, then the setpoint will only evaluate weights corresponding to that platform. For single platform scales, the option will just show Platform 1.



### 16.3.5 Value (Only for Parts Counting Scales)

This option only works when the scale is equipped with Parts Counting. The user is given a choice of whether the setpoint should respond to count value instead of weight value.

To change any of these options simply select the appropriate entry in the corresponding field label.

## 16.4 Creating and Editing Formulas

The formula is a list of up to 16 lines that are evaluated and acted upon in the order they are entered.

To access the formula list select EDIT in the lower menu and then press ENTER. All of the current formula lines will be displayed or “None Defined” if there aren’t any. Use the  icon to add a new command line. Use the Save icon  to save the current formula (list of command lines).

Each line consists of four parts. These are **Command**, **Expression**, **Value** and **Out**.

- *Command* is an action to take. The only two commands currently available are ON and OFF.
- *Expression* can be < (less than), <= (less than or equal to), > (greater than) and >= (greater than or equal to).
- *Value* is the setpoint weight or count value.
- *Out* is the output channel (1-8) that the *Command* will work on.

For example, a simple formula to activate the output when a certain weight is exceeded is made up of two lines as shown below:

Command	Expression	Value	Out	Comment
OFF	<	10.00	1	Start with the light off
ON	>=	10.00	1	Turn on if 10lbs or greater.

This can be interpreted as:

Line 1: Output #1 is off if weight is less than 5.00lb

Line 2: Output #1 is on if weight is greater than or equal to than 5.00lb

You will notice that every output possibility must be dealt with when creating a formula.

The next example represents a much more complicated definition. The scale would have three lights connected to three outputs and operate in an UNDER / ACCEPT / OVER check weighing scenario.

There will be a

- Red light connected to output #1 to indicate an “under” condition,
- Blue light connected to output #2 for an “accept” condition and,
- Green light connected to output #3 to show an “over” condition.

We can program the Red light to be on whenever the weight is less than 5lb, the Blue light to be on only between 5 and 10lb and the Green light to be on whenever the weight is above 10lb indicating an over condition. In practice, the user would start filling the container until the Blue light comes on.

It is less confusing to make a formula of this nature if you deal with the complete operation of one light at a time. We recommend laying the formula out on paper first and then enter it into the system.

Here it is:

Command	Expression	Value	Out	Comment
ON	>	0.00	1	Deal with “under” (Red) light first
OFF	>=	5.00	1	
OFF	<	5.00	2	Now the “accept” (Blue) light, to be
ON	>=	5.00	2	on only between 5 and 10lbs
OFF	>	10.00	2	
OFF	<=	10.00	3	Now the “over” (Green) light to be on
ON	>	10.00	3	Anytime the weight is above 10.00lb

When this formula is executed, the scale evaluates each line in order. This calculation is done in memory only, and the outputs are not affected until the formula is complete. The entire formula is evaluated on each and every display update, which is programmable through the system menu.

You may wonder why it is necessary to have to use an OFF condition at the beginning. This was done to increase flexibility as there may be many cases where the user wants the light to start in the on state, turn off during a certain weight range and on again when above that range. You have to specify every possible condition for the output when making formulas.

## 16.5 Cycle Mode

This last example will show an automated filling operation using the cycle option. The goal here would be to have Output #1 connected to a filling valve and the cycle starting with this valve in the off condition.

### Operational Steps:

- The user places a box on the scale below the filling apparatus.
- Press the ZERO key to zero out the weight of the box.
- Press the CYCLE key to start filling and have the setpoint controller switch the filling valve off when 5lb is reached.
- The user then removes the box from the scale and the output will remain off until the next cycle is initiated by pressing the CYCLE key.

Start in the setpoint definition screen by setting the **Cycle** field to “Yes”.

Here is the formula:

Command	Expression	Value	Out	Comment
OFF	<	5.00	1	Will actually go on as soon as the CYCLE key is pressed.
ON	>=	5.00	1	Switch off at 5lb and end cycle.

That’s all there is to it. The output will go off at 5lb and remain off until the next cycle.

## 16.6 Notes on Cycling Setpoints

The cycle function is used when it is desirable to “latch” the output to a specific state when a process is complete. Consider the following examples with and without the cycle option. In both cases the setpoint is set to fill a box to 5lb and then shut off.

**Cycle Off** - The output is on as the box fills and the scale monitors the process. At 5.00lb the output switches off. The user then removes the box from the scale. When he does that, the indicated weight falls below 5.00lb, the filling valve switches back on dumping material all over the platform.

**Cycle On** - When 5.00lb is reached the output switches off, and remains off until the user initiates the cycle again by pressing the ENTER key.

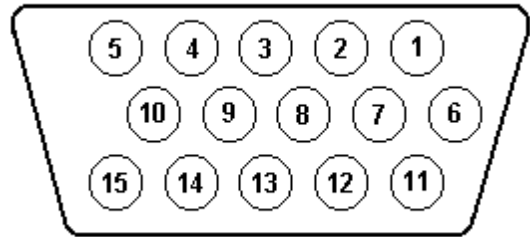
There are two other points concerning process cycles:

- There may only be one cycling setpoint definition active at any given time. All other activated setpoint definitions will work normally along with it.
- To abort the cycle, press the CYCLE key. The output will then obtain the same state it would have taken if the process had completed normally.

## 16.7 Output Connector and Pin Diagram

In most cases there will be a single cable with a 15 pin subminiature D type female connector added to the scale for interfacing to external equipment.

SETPOINT	PIN
1	8
2	7
3	6
4	11
5	12
6	13
7	14
8	15
POWER (3.3VDC)	10
GND	9

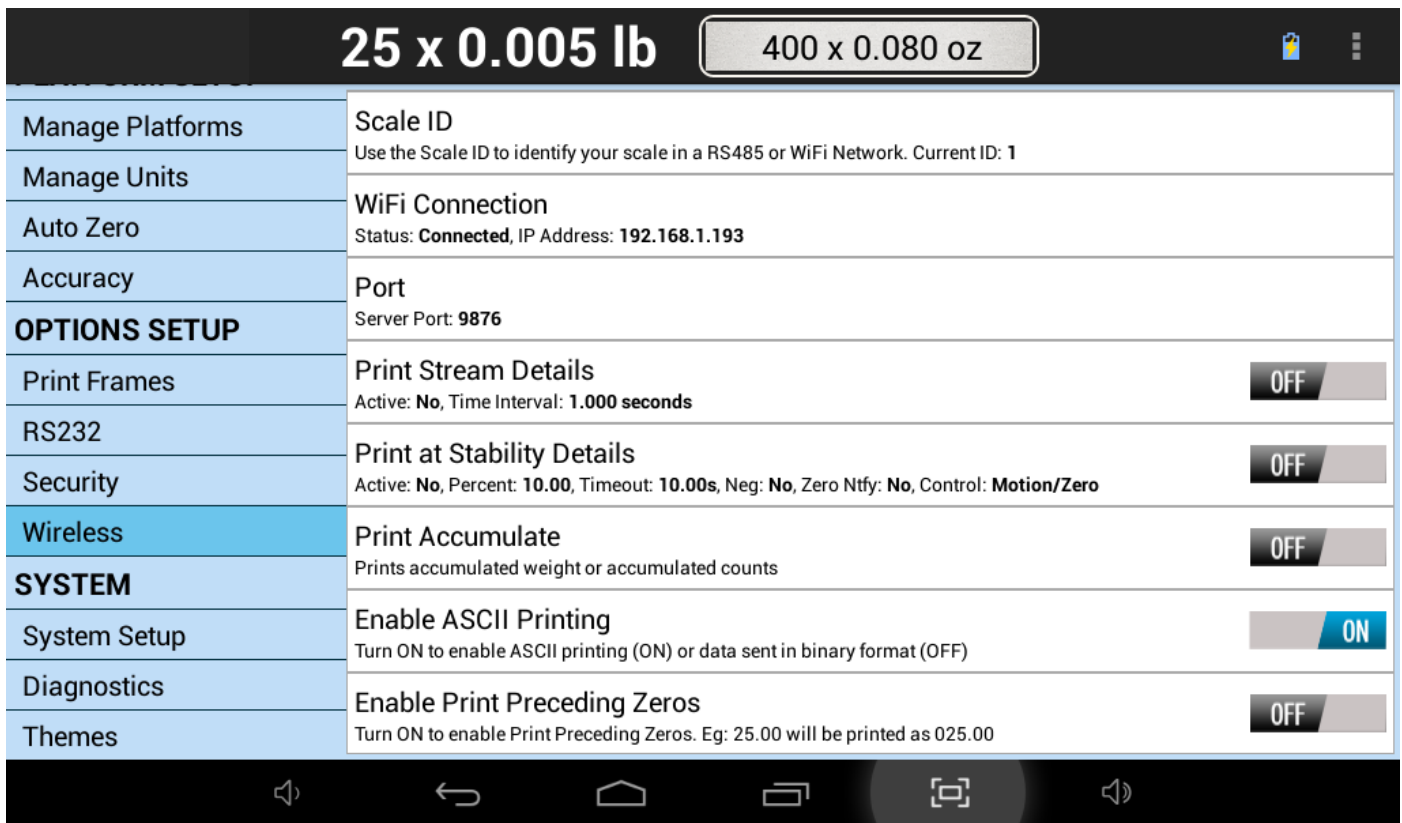


## 17 OPTIONAL TCP/IP CONNECTIVITY (Wireless, Ethernet)

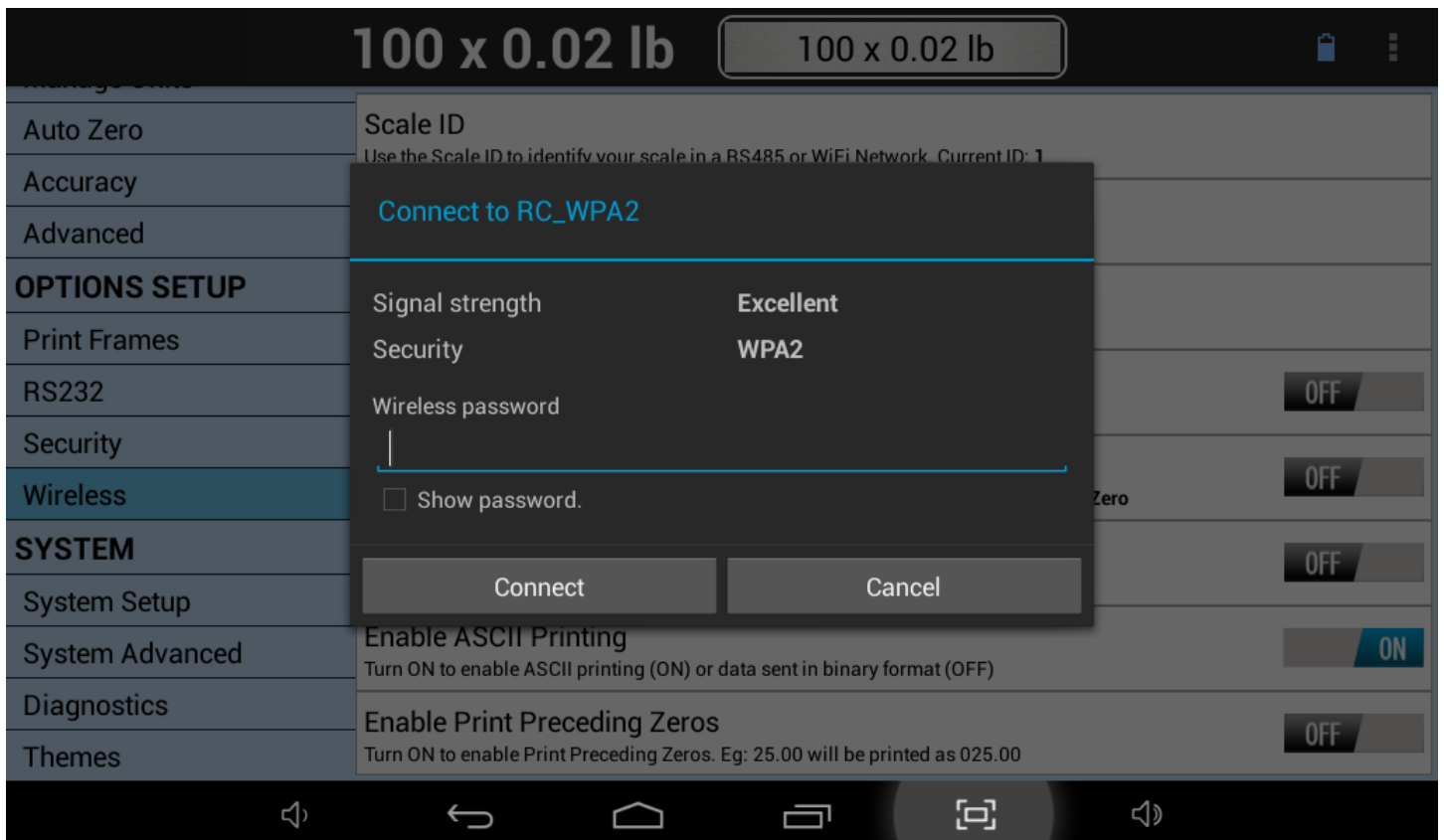
The TCP/IP connectivity option is a fully capable, bi-directional communication medium. The connection can be configured to support DHCP or static IP at a specific port number on your network. The printing of a frame can be initiated by pressing the print button, by an external command, upon reaching a setpoint, or continuously when the print stream mode is activated.

The communications port also contains an extensive external command interface allowing key presses, adding and editing memory slots and even scale calibration to be controlled from external equipment.

The TCP/IP Configuration screen can be accessed by going to *QUICK MENU->SETTINGS->WIRELESS*.

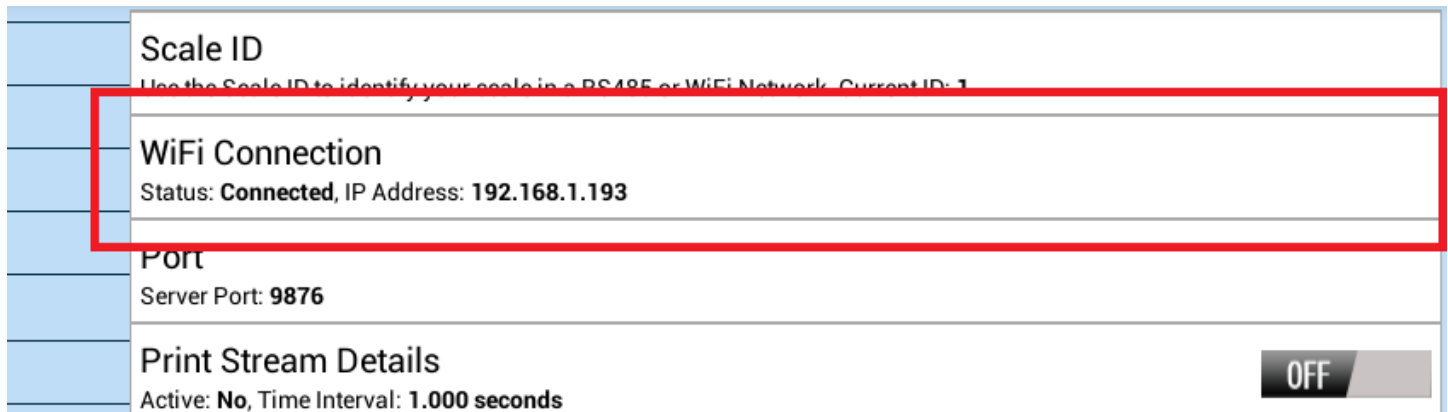


Press the Wifi Connection option. This will prompt the scale to scan your nearby Wifi access points. Touch on the one that you want to connect to. If you have security enabled for that SSID (such as WPA/WPA2), then the following screen will be presented.





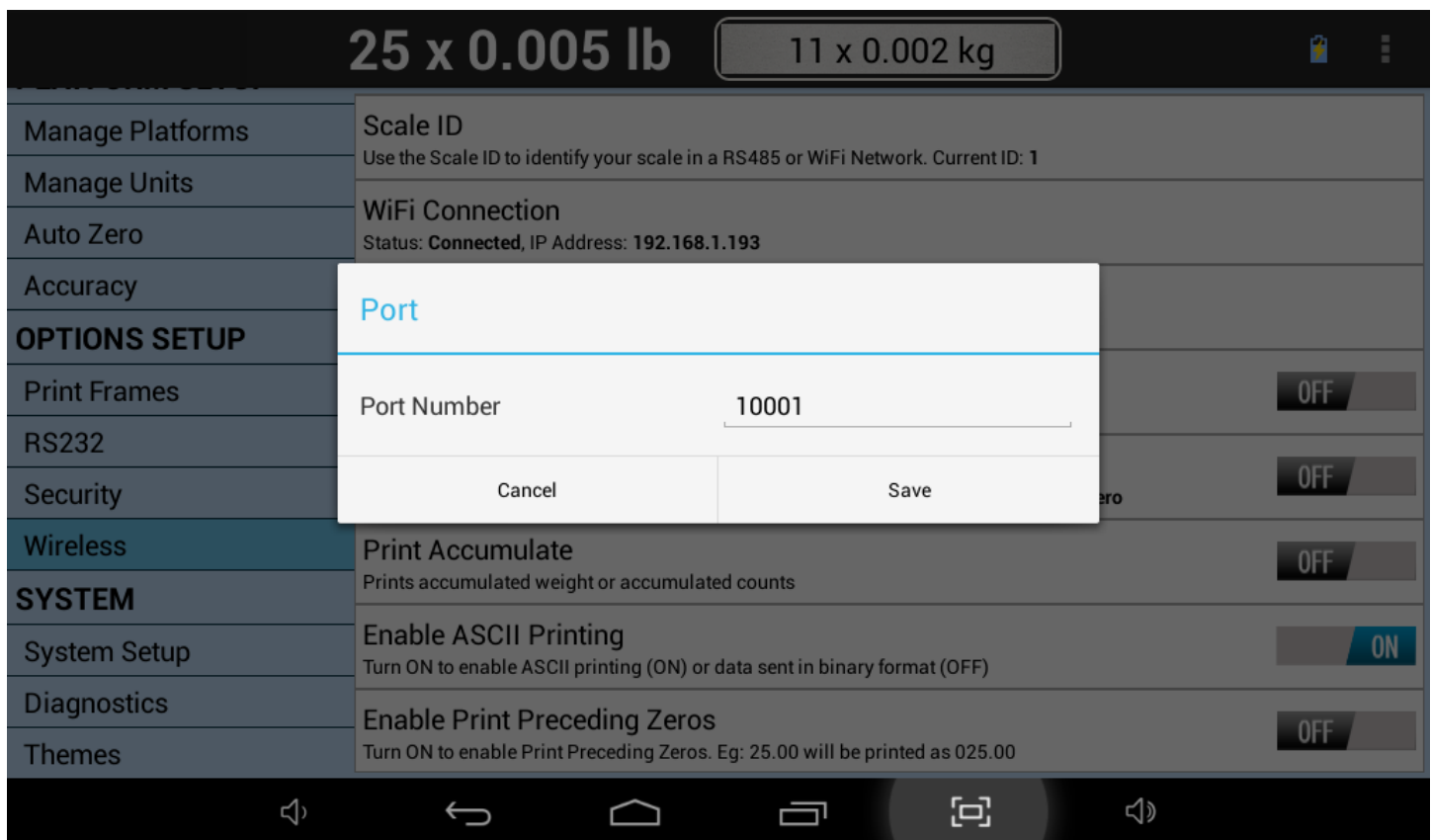
Enter the Wireless Password and press the Connect button. If the password is entered correctly, then after a about 30 seconds or so, you will see the **Status** changed to **Connected** and a valid **IP address** show up on the WiFi Connection row.




### 17.1 Setting the TCP/IP Socket Port

Next, we need to change the TCP/IP port that will allow you to open a socket connection into the tablet indicator. This part is not necessary, but we recommend you to do it so that you can be familiar with the interface.

By default, the port is 9876. To change this, touch the Port Row and you will see the following dialog come up.



Change the port number to **10001**. This will be easy to remember when making your connection. Once you complete this, press SAVE and then press the BACK button  to go to the main weight screen.

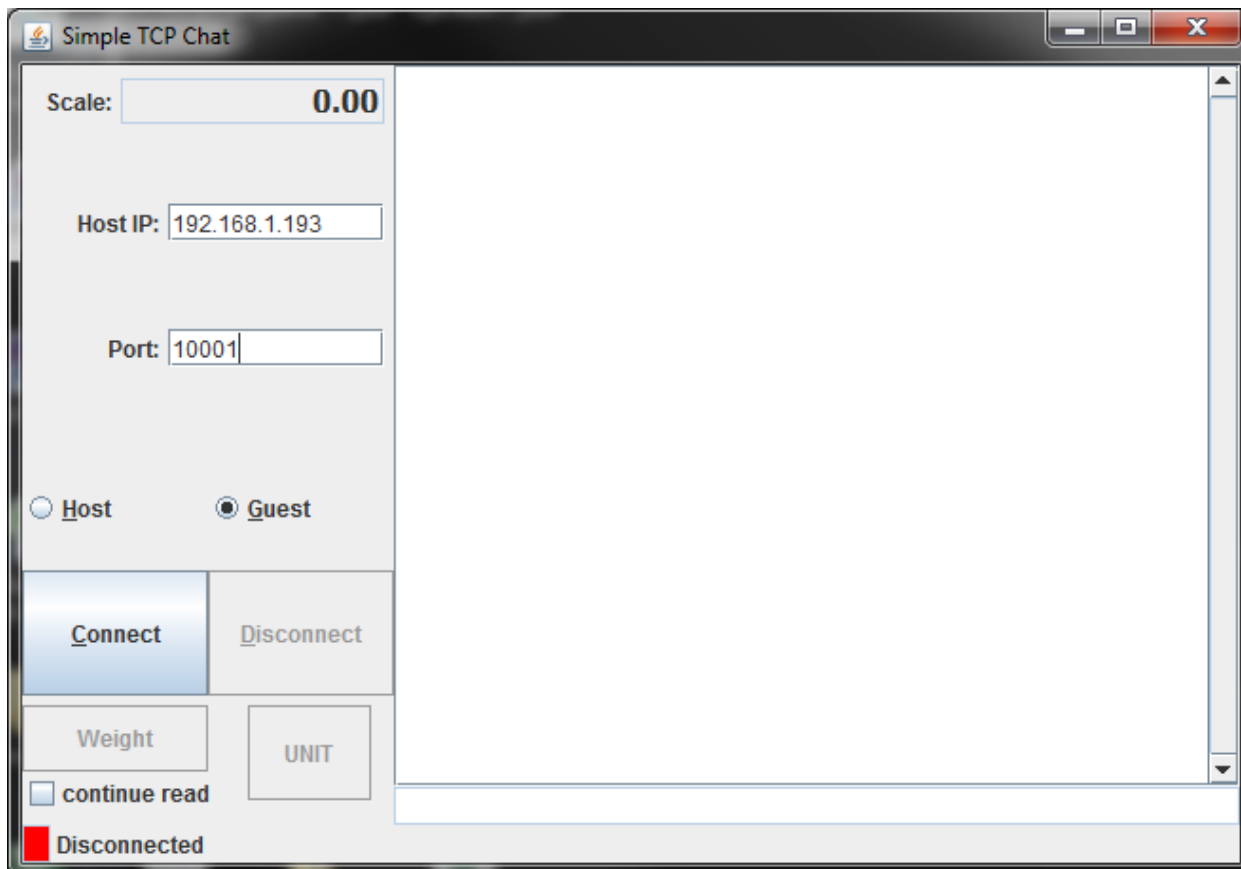
## 17.2 Test TCP/IP Communication.

### 17.2.1 Using ipchat Program

We have provided a software written in Java to test the TCP/IP socket connection. This can be accessed under Software Downloads at our website under the following address:

<http://www.arlyn scales.com/Software-Downloads-for-Industrial-Scales-s/45.htm>

Unzip the ipchat program on to your computer and run the ipchat.bat file. [Please note, the computer should be in the same subnet as the scale]



Press the CONNECT button. The scale should be successful connected. Then press the WEIGHT button. You should get a weight back.

### 17.2.2 Using Terminal

Alternatively, you can use a terminal such as HyperTerminal or RealTerm to communicate with the scale. Just open a socket connection using the scale IP address and port number, and then type the following command:

**~\*P\*~** - To get the weight printed on your terminal.

Other supported commands are:

- “~\*W\*~”** - Get a JSON string for the weight
- “~\*Z\*~”** - Zero the scale.
- “~\*U\*~”** - Switch unit

## 17.3 Notes

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- ➔ **We are the exclusive source for Intell-Lab™, Intell-Industrial™, Intell-Check™, Intell-Count™, Intell-Weigh™, Intell-Base™, Intell-Scan™ and Intell-Print™ laboratory, industrial, counting, analytical, precision and toploading balances, printers, peripherals and weighing equipment.**
- ➔ **We are the exclusive source for UWE weighing equipment in the US and the Caribbean.**
- ➔ **We are the exclusive source for Intell-Lift™ Straightpoint (UK), Ltd. products in North America, Mexico and the Caribbean.**

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