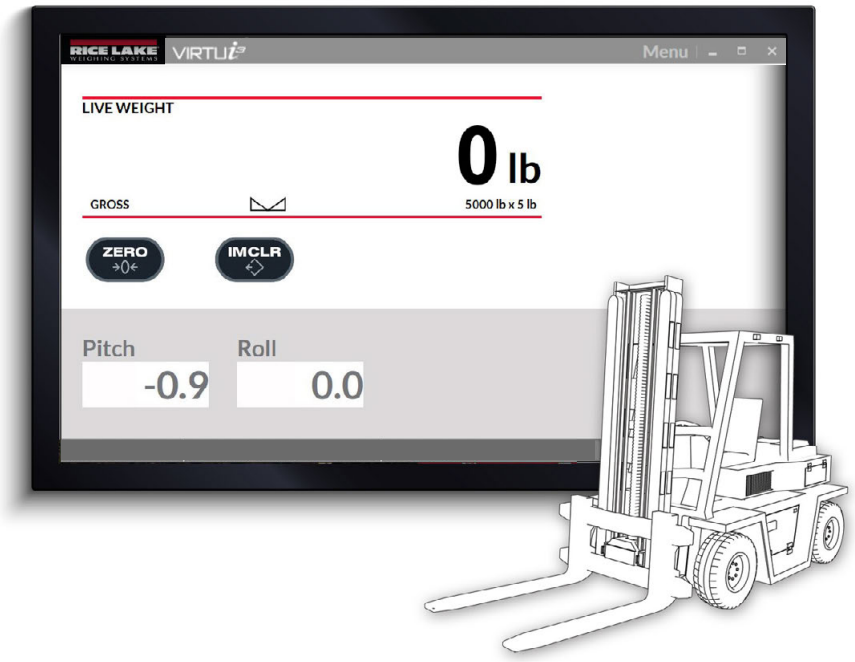
VIRTUi®3 for Windows®

Forklift Scale PC Program

Technical Manual



December 12, 2024

RICE LAKE WEIGHING SYSTEMS

PN 192745 Rev D

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1.0 Introduction . . . 9
1.1 Overview . . . 9
1.1.1 Features . . . 9
1.1.2 System Requirements . . . 9
2.0 Installation . . . 10
2.1 Junction Box Serial Port Configuration . . . 11
3.0 Operation . . . 12
3.1 Launching VIRTUi3 . . . 12
3.2 VIRTUi3 User Interface . . . 13
3.2.1 Diagnostic Event . . . 14
3.2.2 VIRTUi3 Mini Indicator for Static Mode . . . 14
3.2.3 VIRTUi3 Mini Indicator for In-motion Mode . . . 15
3.3 Ticket Printing . . . 15
4.0 VIRTUi3 Menu . . . 16
4.1 How to Access the VIRTUi3 Menu . . . 16
4.2 About Menus Options . . . 17
4.3 Scale Communications . . . 18
4.4 User Mode . . . 19
4.5 Printer Communications . . . 20
4.6 Mini Indicator Settings . . . 20
4.7 Scale Settings . . . 21
4.8 Diagnostics . . . 22
4.9 Scale Terminal . . . 23
4.10 JBox (Junction Box) Type . . . 23
4.11 Save and Restore Settings . . . 24
5.0 Calibration . . . 25
5.1 Calibration Overview . . . 25
5.1.1 Calibration Preparation . . . 25
5.1.2 Devices Used for Lifting of Calibration Weights . . . 25
5.2 Calibration Process Using VIRTUi3 Virtual Indicator . . . 26
5.2.1 Rezero Scale . . . 26
5.2.2 Calibration Selection . . . 26
5.2.3 Two Point Calibration . . . 27
5.2.4 Linear Point Calibration . . . 32
6.0 Scale Tests . . . 36
6.1 Test Operational Elements . . . 37
6.2 Pre-Test Diagnostics . . . 38
6.3 Single Weight Accuracy Test . . . 39
6.3.1 Single Weight Accuracy Test Result Examples . . . 41
6.4 Corner Weight Accuracy Test . . . 42
6.4.1 Corner Weight Accuracy Test Result Examples . . . 44
6.5 Fork Angle Test . . . 45
6.5.1 Fork Angle Test Result Examples . . . 47
6.6 Scale Health Test . . . 48
6.6.1 Performing Scale Health Test . . . 49
6.6.2 Scale Status Test Result Examples . . . 51
6.6.3 Troubleshooting Scale Status Test Failed Results . . . 52

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Contents

6.7 Scale Test - Log Files . . . 53
6.7.1 Viewing Log Files . . . 53
6.7.2 Saving Log Files . . . 53
6.7.3 Single Weight Accuracy Test Entry Examples . . . 55
6.7.4 Corner Weight Accuracy Test Entry Examples . . . 56
6.7.5 Fork Angle Test Entry Examples . . . 57
6.7.6 Health Test Entry Examples . . . 59

7.0 Appendix . . . 60

7.1 Error Messages . . . 60
7.1.1 Invalid Data Errors . . . 60
7.1.2 Load Cell Overload . . . 60
7.1.3 Load Cell Underload . . . 61
7.1.4 Angle Invalid . . . 61
7.2 Junction Box Firmware Update . . . 62

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Revision History

This section tracks and describes manual revisions for awareness of major updates.

Revision	Date	Description
D	December 12, 2024	Revision History Established; Software version 3.2.0.4

Table i. Revision Letter History

Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at www.ricelake.com/training or obtained by calling 715-234-9171 and asking for the training department.

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1.0 Introduction

VIRTUi^3 for Windows® provides a user interface for the CLS forklift scale. It is a virtual indicator utilizing a device that may already be present in an application. VIRTUi^3 provides the user access to weight indication, calibration, configuration and diagnostics all in one package. This manual will aid in software installation and understanding of the software functions.

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1.1 Overview

The VIRTUi^3 PC program interfaces with the Rice Lake Weighing Systems' CLS series junction box. It is used to display weight information, calibrate, configure and perform diagnostics.

A Windows PC VIRTUi^3 server runs in the background and communicates with a CLS series junction box. Its primary function is to support the VIRTUi^3 client application along with having the ability to send EDP commands for printing tickets and reports.

1.1.1 Features

- Virtual indicator: Field streams live weight or final "capture in motion" weight depending on scale configuration
- Zero button, print button (static and in-motion modes), in-motion clear button (in-motion mode)
- Pitch and roll angles displayed
- Visual step-by-step calibration procedure
- Scale Test and Diagnostics menus for field testing
- Emulates command/response format of the CLS protocol from the junction box
- Available EDP command server for customer use

1.1.2 System Requirements

- Windows 8.1, Windows 10, Windows 11 or equivalent Windows Server® operating system
- 1.6 GHz processor or faster
- 100 MB HD space needed for installation
- Microsoft.NET framework 4.6.2 (included with installer)
- 8 GB ram or greater
- Serial port connection (for digital weight indicators)
- Optional printer

NOTE: 32 bit or 64 bit versions.

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2.0 Installation

VIRTUi3 version 3.2.0.0 and higher installs a client and server from a single software package. In previous software versions each instance had to be installed separately.

The VIRTUi3 client displays live data when connected and configured to the junction box. The VIRTUi3 server runs in the background and communicates with the CLS forklift junction box. The server streams weight data through an applicable port and has the ability to process some EDP commands.

1. Download VIRTUi3 software from ricelake.com and unzip the file if necessary.
2. Launch **VIRTUi3.Combined.Installer.exe**.
3. Read the Rice Lake Weighing Systems License Agreement. Enable the check box below the agreement if the terms are acceptable.

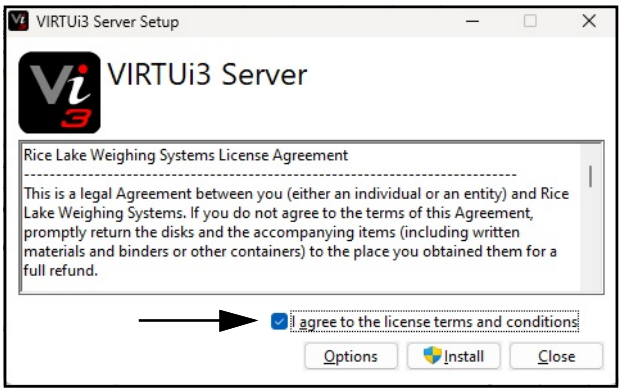

Figure 2-1. VIRTUi3 Server Setup Installation Window

4. (Optional) Perform the following to change the installation location:
   - Select **Options**, then **Browse** to install VIRTUi3 software in a user specified file location.
   - Select **OK** to return to the previous window.

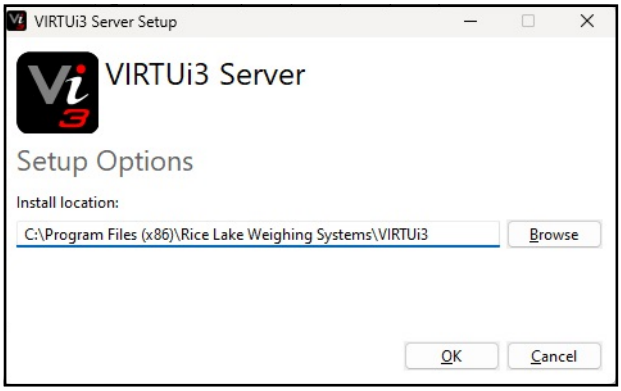

Figure 2-2. VIRTUi3 Server Installation Options

5. The Installation Successfully Completed window displays, select **Close**. VIRTUi^3 Server is successfully installed.

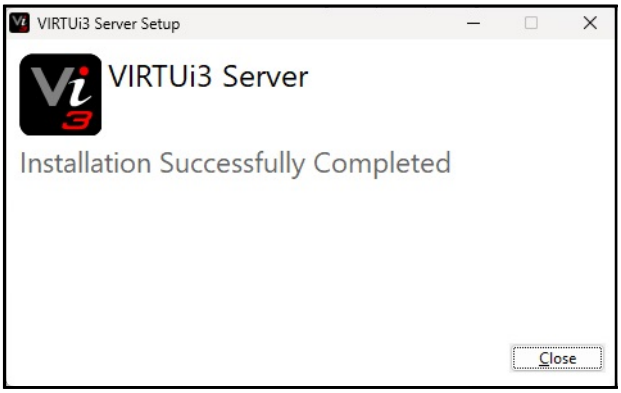

Figure 2-3. VIRTUi3 Server Setup Window Completed

NOTE: Once installed, VIRTUi^3 creates the following services:

- ***Web server on port 9015 used by VIRTUi^3 client application***
- ***Single frame server on port 30355***
- ***Stream frame server on port 30356***
- ***Print ability using configured port 10000***

IMPRORTANT: Ensure listed ports are not being used by other services and/or blocked by firewalls.

2.1 Junction Box Serial Port Configuration

The junction box port type must be set to **CMD**.

NOTE: Ensure ECHO is set to OFF.

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3.0 Operation

This section describes the VIRTUi3 interface.

3.1 Launching VIRTUi3

1. Launch the VIRTUi3 application from Windows Start® menu.

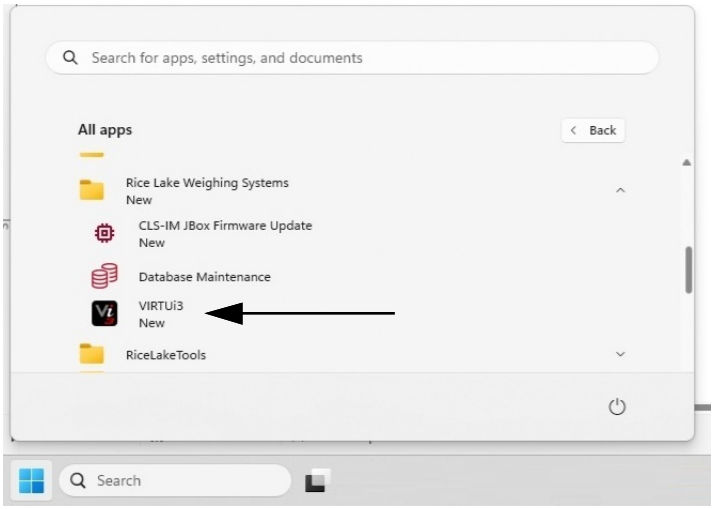

Figure 3-1. VIRTUi3 Start Shortcut

2. By default VIRTUi3 software opens in mini indicator mode. Select **X** to close mini indicator mode and open standard the full-size application.

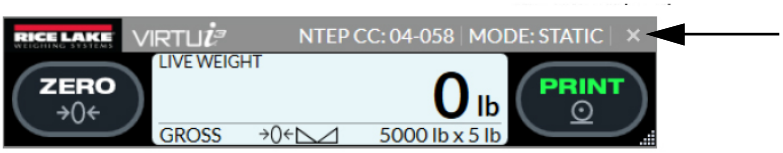

Figure 3-2. VIRTUi3 Mini Indicator

NOTE: See Section 4.6 on page 20 for information about disabling mini indicator mode at start-up.

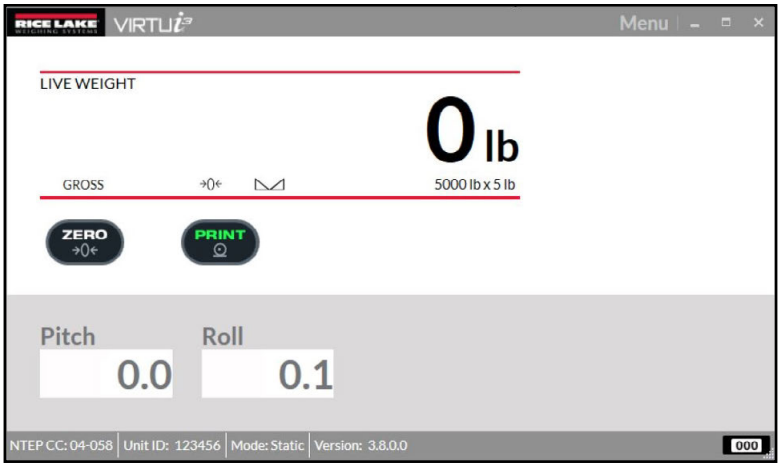

Figure 3-3. Full-Size VIRTUi3 Application

3.2 VIRTUi³ User Interface

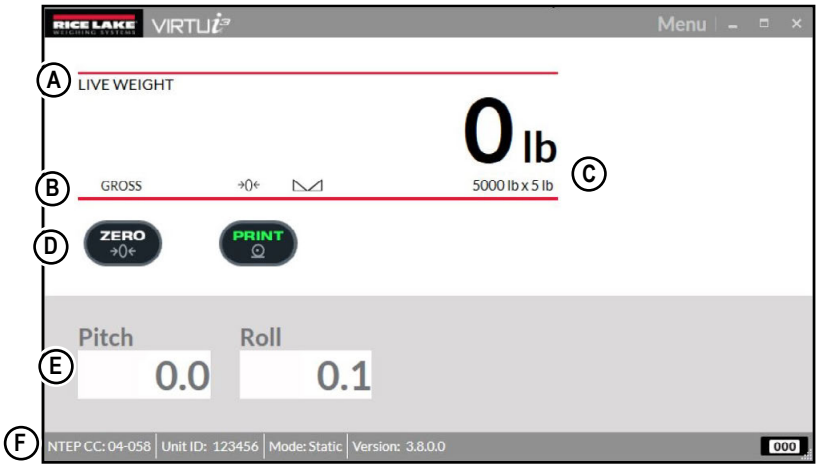

Figure 3-4. VIRTUi³ Main Screen for Static

Item	Function	Description
A	Weight Display Type	The weight display area provides either live weight or final weight and is distinguished by a prompt in the top left corner of the display area. Common display items include: • ***+/-999999:*** *Valid weight display* • ***Invalid:*** Invalid weight display • **~~~~~~~:** Pitch or roll exceeded tolerances. • ΛΛΛΛΛΛΛ: Load cell overload • _____: Load cell underload Various other scale error state conditions are represented in the weight display area.
B	Annunciators	Annunciators indicate live weight, final weight, gross mode (**GROSS**), net mode (**NET**), center of zero (→0←), stability (◺◿) and angle condition ( ).
C	Scale Capacity and Count By	The capacity and count by is displayed in the bottom right corner of the weight display area.
D	ZERO	Zeros the scale.
	PRINT	Prints the ticket.
	IMCLR	Recaptures the final weight (in-motion mode only).
E	Pitch and Roll	The pitch and roll display area shows the live pitch and roll angle data received from the junction box. A valid angle data is represented as **+/-99.9**.
F	Status Bar	Displays the version number, the current mode distinguishes if the user interface is in static mode or in-motion and the unit ID number which is entered during the calibration process (Section 5.0 on page 25).

Table 3-1. VIRTUi³ Element Descriptions

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3.2.1 Diagnostic Event

A ***Diagnostic Cell Overload Event*** condition displays when a diagnostic event is triggered in the junction box. See Section 4.8 on page 22 and Section 7.0 on page 60 for more information.

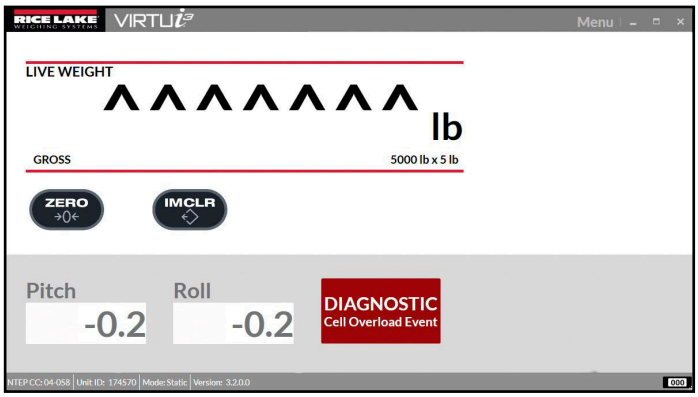


Figure 3-5. Diagnostic Event Message

3.2.2 VIRTUi³ Mini Indicator for Static Mode

Select the button in the bottom right corner to launch the VIRTUi³ mini indicator which can satisfy Legal for Trade NTEP requirements. This enables the operator to run other applications while still being able to display live weight information.

Figure 3-6. Launch VIRTUi³ Mini Indicator by Selecting the Identified Button

NOTE: The VIRTUi³ mini indicator for static mode is re-sizable.

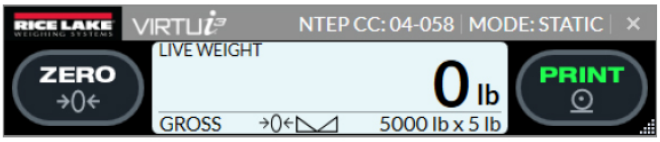
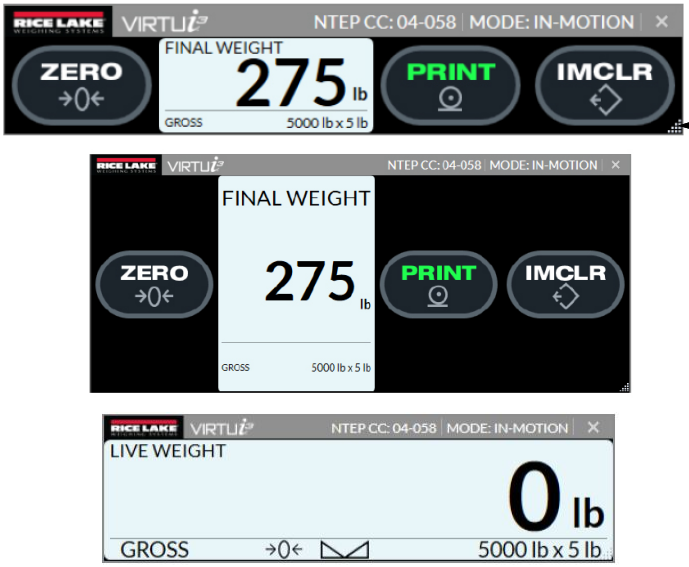


Figure 3-7. Mini indicator for Static Mode

3.2.3 VIRTUi^3 Mini Indicator for In-motion Mode

The VIRTUi^3 mini indicator supports in-motion forklift scales and provides the following user interface when launched with the junction box setup for an in-motion forklift scale. The following are examples of how the VIRTUi^3 Mini appears on different size displays and can be resized to a predetermined minimum and maximum height and width.



NOTE:

The resize icon allows the user to adjust the live weight display by pulling to the preferred size.

Figure 3-8. Live Weight Display Examples

3.3 Ticket Printing

Printing a weigh ticket is only supported when the user interface displays the PRINT button. A printout can be initiated by selecting the **Print** button. The button turns green to indicate the current weight information will result in a print transaction. Configure the printer port by modifying the Printer Communications settings in the options menu.

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4.0 VIRTUi3 Menu

VIRTUi3 contains a menu with several options. Each option opens a new display that provides settings or additional functionality.

4.1 How to Access the VIRTUi3 Menu

1. Select **Menu** from the application tool bar.

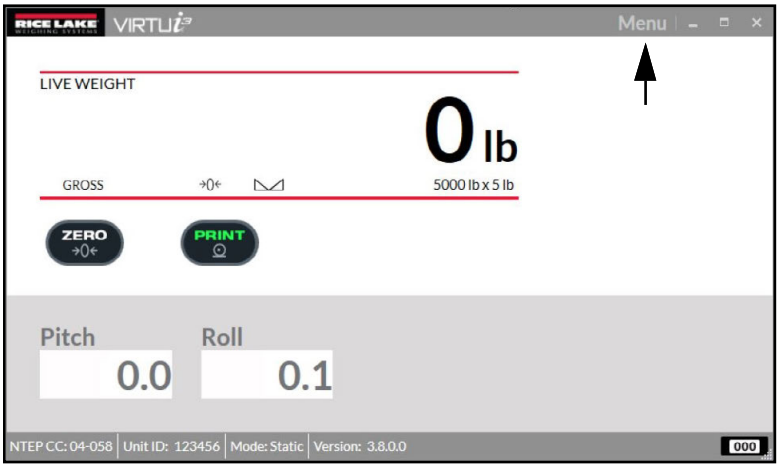

Figure 4-1. Menu Location in Tool Bar

2. The drop-down menu expands and displays the available options.
3. Select the desired option from the Menu.

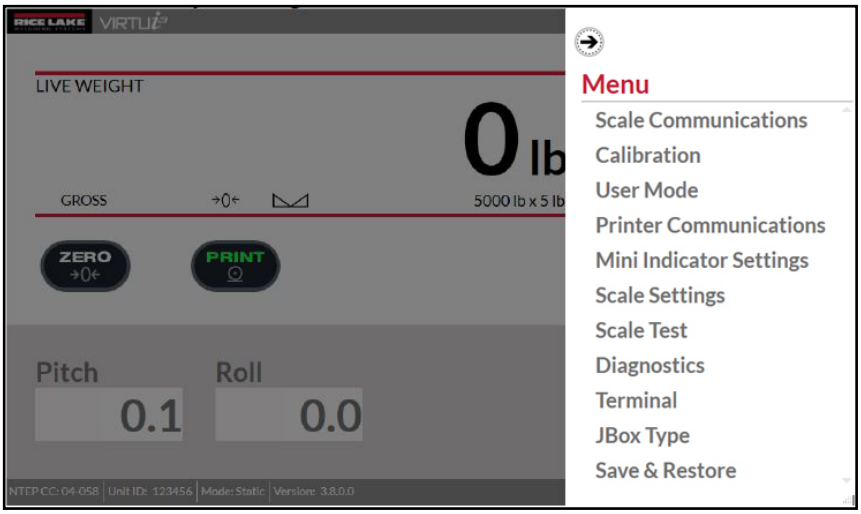

Figure 4-2. Menu Expanded

4.2 About Menus Options

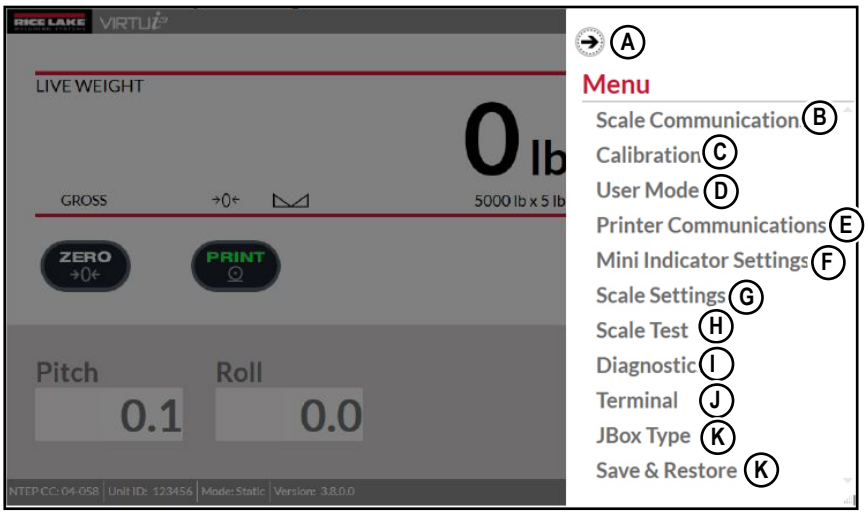

Figure 4-3. Menu Drop-Down Expanded

Item	Option	Description
A		Closes the menu.
B	Scale Communications	Opens scale communication settings (see Section 4.3 on page 18).
C	Calibration	Opens scale calibration functions (see Section 5.0 on page 25).
D	User Mode	Opens junction box operating mode settings (see Section 4.4 on page 19).
E	Printer Communications	Opens printer communication settings (see Section 4.5 on page 20).
F	Mini Indicator Settings	Opens mini indicator display settings (see Section 4.6 on page 20).
G	Scale Settings	Opens basic scale settings for Primary Units, Zero Range and Weight Threshold (see Section 4.7 on page 21).
H	Scale Test	Opens junction box and load cell test functions (see Section 6.0 on page 36).
	Diagnostics	Opens junction box and load cell diagnostic information (see Section 4.8 on page 22).
I	Terminal	Opens an EDP command terminal (see Section 4.9 on page 23).
J	JBox Type	Unlocks junction box in order to set specific User Modes (see Section 4.10 on page 23).
K	Save & Restore	Provides Save and Restore settings (see Section 4.11 on page 24).

Table 4-1. Menu Element Descriptions

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4.3 Scale Communications

Access scale communications settings by selecting **Scale Communications** from the menu. Scale Communications provides parameters that configure scale port settings.

To connect with Serial communication:

1. Configure the Com Port, Baud Rate (9600), Data Bits (8), Stop Bits (1) and Parity (None).
2. Select Connect .
3. Select to close the screen.

To connect with USB communication:

1. Open the COM Port drop-down menu without the USB cable connected and record available com ports.
2. Connect the USB cable to the device and PC.
3. Open the COM Port drop-down menu and then select the new com port.
4. Select Connect .
5. Select to close the screen.

NOTE: To release Com Port settings, open the COM Port drop-down menu select COM-None followed by Connect .

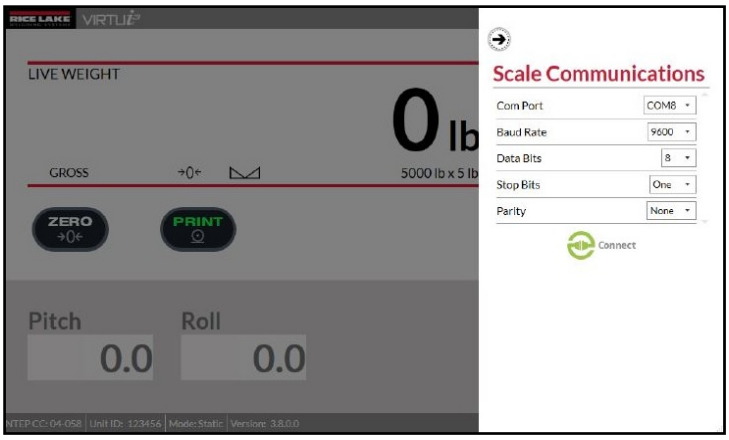

Figure 4-4. Menu - Scale Communications

4.4 User Mode

Access user mode settings by selecting **User Mode** from the menu. The junction box operates in various modes which are identified by a three digit number, for example: 100, 200, 600. These user modes allow an array of configuration parameters that are predefined to be changed in one step.

Access User Mode setting by selecting **User Mode** in the menu.

User Modes are defined as:

- 100 (1xx) modes include variations of static scales
- 200 (2xx) modes include variations of in-motion scales
- 600 (6xx) modes include variations of static scales compatible with the CLS-680.
- Other modes are customer or application specific

NOTE: Forklift scales and junction boxes ordered for In-Motion use are factory configured prior to shipping and do not require PassCalc setting.

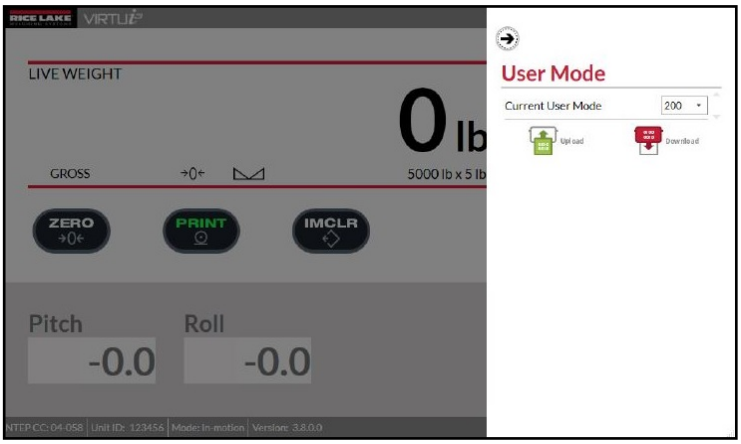

Figure 4-5. User Mode

Certain modes require the junction box to be unlocked prior to setting them. The junction box only needs to be unlocked once. After that, the user can change modes without having to unlock the unit again. To unlock the junction box mode, perform the following.

1. Select User Mode from the Menu.
2. Call Rice Lake Weighing Systems and provide the displayed PASSCALC Seed.
3. Enter the PASSCALC Result provided by Rice Lake Weighing Systems.
4. Select the associated **Upload** button next to the PASSCALC seed.
5. The user interface will refresh and display unlocked if successful.

NOTE: The unit must be in setup mode to perform this general setting.

Once the In-Motion forklift mode is unlocked, the junction box can be switched between Static and In-Motion modes.

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4.5 Printer Communications

Access printer communications settings by selecting **Printer Communications** from the menu. Set the ticket printer port setting (serial or TCPIP) using the drop down Port Type menu.

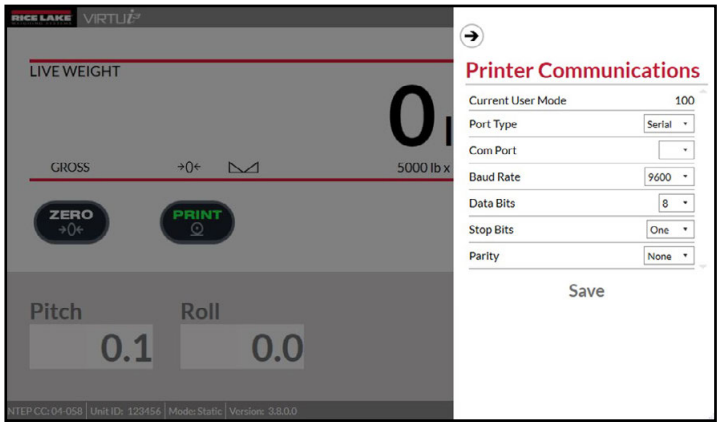

Figure 4-6. Printer Communications

4.6 Mini Indicator Settings

Access mini indicator settings by selecting **Mini Indicator Settings** from the menu.

Launch With Mini Indicator

To launch the mini indicator enable this setting first by checking the Launch box (Figure 4-7)

Force Position

Enable the Force Position checkbox (Figure 4-7) to force positional and size constraints for the mini indicator when it is launched. Perform the following steps to find the required settings.

1. Disable the **Force Position** setting in the mini indicator settings option tab.
2. Exit Mini Indicator settings and open mini indicator
3. Adjust mini indicator size and position settings.
4. Close the mini indicator to update the adjusted size and position settings.
5. Open Mini Indicator Settings.
6. Enable the **Force Position** setting in the mini indicator settings options tab (Figure 4-7).
7. Select **Save**.

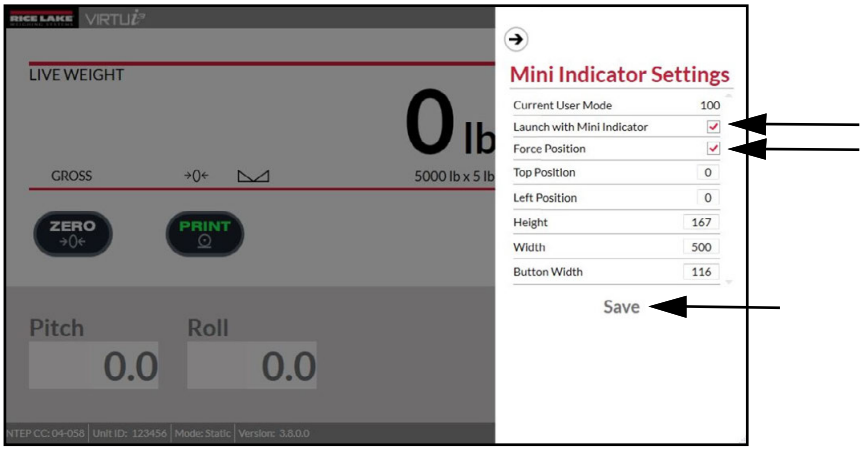

Figure 4-7. Options Menu - Mini-Indicator Settings

4.7 Scale Settings

Access scale settings by selecting **Scale Settings** from the menu. Adjust the required settings followed by selecting **Upload** to update the junction box.

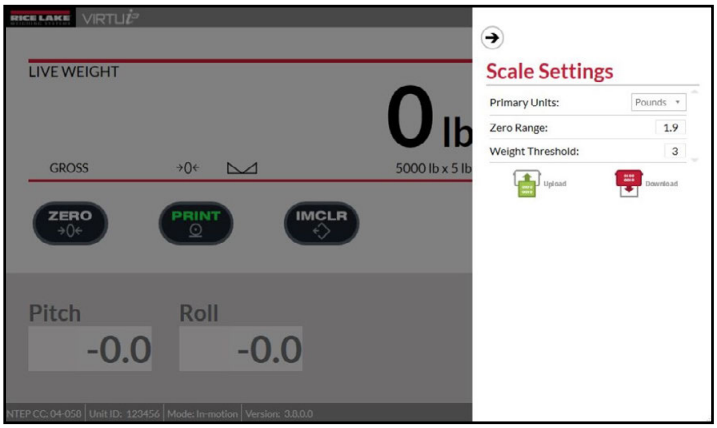

Figure 4-8. Scale Settings

Setting	Description
Primary Units	Identifies between pounds or kilograms (read only)
Zero Range	Specifies the range within which the scale can be zeroed
Weight Threshold	Specifies the minimum number of display divisions required to capture final weight

Table 4-2. Scale Settings Descriptions

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4.8 Diagnostics

Diagnostics displays data from the connected junction box involving hardware status and voltages and firmware version.There are two possible ways to access the Diagnostics menu. Under normal operation, the Diagnostic menu can be selected from the Menu. If a diagnostic event occurs, a red **DIAGNOSTIC Event** button appears next to the roll angle display box, which when selected, displays the Diagnostic menu.

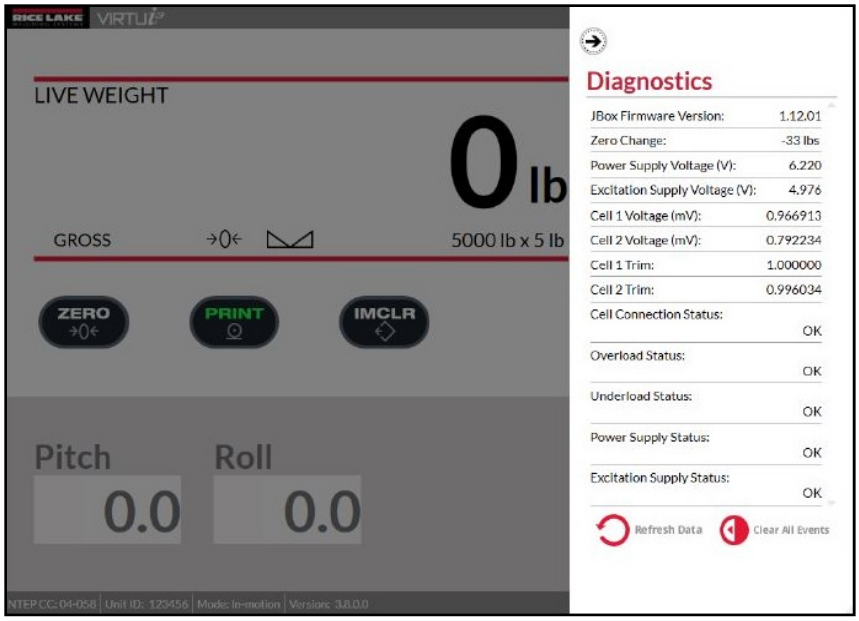

Figure 4-9. Diagnostics Menu

Test	Description
JBox Firmware Version	Displays the firmware of the junction box.
Zero Change	Displays change in zero.
Power Supply Voltage (V)	Lists power supply voltage.
Excitation Supply Voltage (V)	Lists excitation supply voltage.
Cell 1 Voltage (mV)	Lists load cell 1 value in millivolts.
Cell 2 Voltage (mV)	Lists load cell 2 value in millivolts.
Cell 1 Trim	Lists load cell 1 trim value.
Cell 2 Trim	Lists load cell 1 trim value.
Cell Connection Status	Lists the status of load cell connection: • OK • SC1 = Load cell 1 disconnected. • SC2 = Load cell 2 disconnected.
Overload Status	Lists overload status.
Underload Status	Lists underload status.
Power Supply Status	Lists the status of power supply.
Excitation Supply Stat	Lists the status of the excitation supply.

4.9 Scale Terminal

Access the scale terminal by selecting **Terminal** from the menu. The scale terminal sends EDP commands to the junction box and receive associated responses.

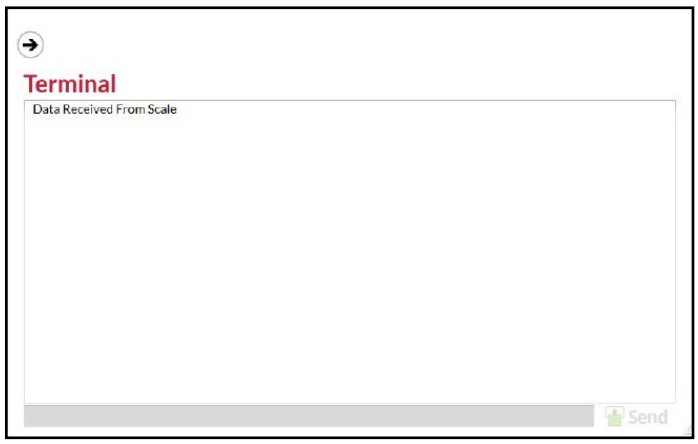

Figure 4-10. Scale Terminal Settings

4.10 JBox (Junction Box) Type

Access junction box type settings by selecting **JBox Type** from the menu. Certain user modes require the junction box to be unlocked prior to setting them. The junction box needs to be unlocked only once, after which User Modes can be changed without unlocking again. Perform the following steps to unlock the junction box type.

1. 1. Provide RLWS representative the displayed Passcalc Seed.
2. 2. Enter Passcalc result provided by RLWS representative.
3. 3. Click the upload button to update the JBox.
4. 4. The UI will refresh and display unlocked if successful.

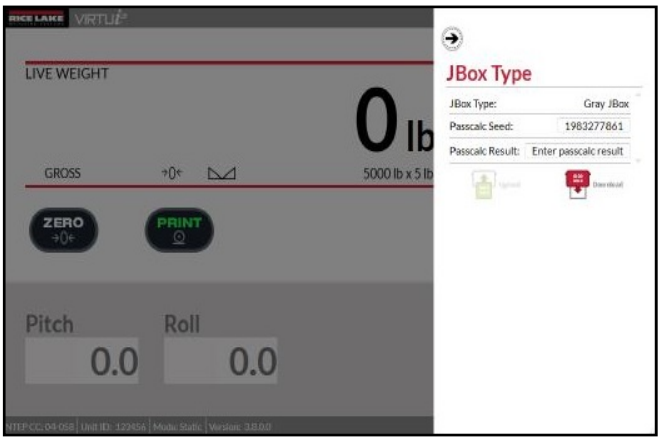

Figure 4-11. Junction Box Type

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4.11 Save and Restore Settings

Access save and restore settings by selecting **Save & Restore** from the menu. Using the Save & Restore setting allows the user to save a dump all command response to a file and save/restore junction box calibration settings.

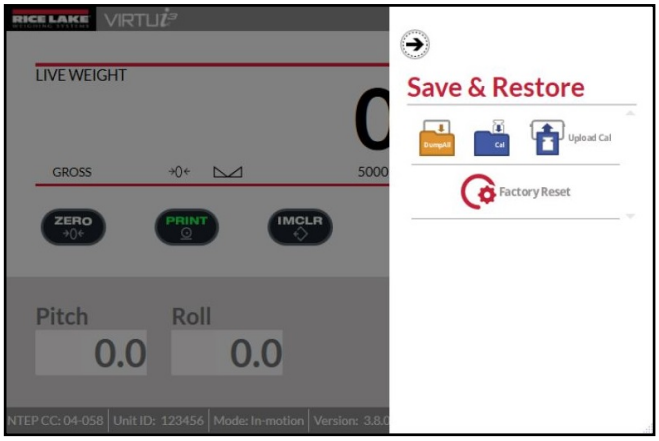


Figure 4-12. Save and Restore

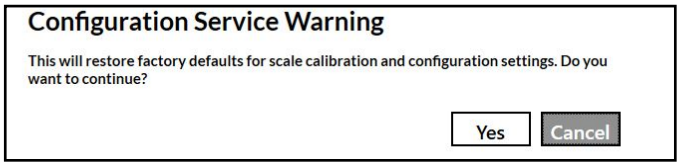
Function	Description
	Saves the DUMPALL EDP command response to a file (.txt).
	Save the DUMP.CAL EDP command response to a file (.cal).
	Uploads data from a selected calibration file (.cal) to the junction box.
	Restores factory defaults for calibration and configuration settings. ***NOTE: Unit must be in setup mode to restore factory defaults.*** ***A configuration service warning is displayed prior to restoring factory defaults.*** 

Table 4-3. Save And Restore Functions

5.0 Calibration

The CLS forklift must be properly calibrated to get accurate readings. A slight percentage variation can result in inaccurate weights. Calibration is accomplished by using a two point calibration. Once the two point calibration is complete, a pitch offset calibration and linear calibration can follow as needed.

5.1 Calibration Overview

Perform the following steps to calibrate the CLS forklift.

1. Enter Serial Number of CLS forklift.
2. Level the scale and calibrate the pitch and roll.
3. Perform a zero calibration.
4. Perform a two point calibration.
   - Enter the test weight value
   - Calibrate cell #1
   - Calibrate cell #2
   - Rezero (optional)
5. Perform pitch offset calibration (option for static mode).
6. Multi-point linear calibration (optional)
   - Enter the test weight value
   - Calibrate linear point #1
   - Repeat additional multi points if desired
7. Finish and save.

5.1.1 Calibration Preparation

IMPORTANT: There are several important tips that should be noted prior to calibrating the CLS In-Motion Forklift Scale.

- ***The test weights used to calibrate the CLS Forklift scale cannot Exceed 2500 lb***
- ***Use a level to ensure the forklift tines are level prior to calibration***
- ***Exercise the load cells prior to calibration by lifting weights***
- ***Follow calibration sequences in order, otherwise errors will occur***

5.1.2 Devices Used for Lifting of Calibration Weights

There are many techniques and devices used for lifting the test weights during the calibration process. For the best performance, Rice Lake Weighing Systems recommends the following methods and devices.

Two Pair of Straps, Slings, Chains, Fork Sleeves with Hooks

The use of two straps, chains or fork sleeves with hooks are recommended methods used to lift weights during the calibration process. Place the devices on each fork before zero calibration step. For best performance, devices used to lift the weight should be less than 10-20 lb each.

One Single Strap Sling, Chain, Fork Sleeve with Hook

The use of a single device requires the known weight of the device to be added during the calibration process.

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5.2 Calibration Process Using VIRTUi3 Virtual Indicator

Scale calibration can be performed during runtime by accessing the calibration flyout menu via the application top tool bar (Figure 4-2 on page 16). The calibration menu provides access to calibration wizards two point and linear calibration and the ability to rezero the scale.

5.2.1 Rezero Scale

The rezero scale button allows the user to rezero the scale after it's calibrated.

5.2.2 Calibration Selection

1. Select Calibration to enter the calibration menu.

Figure 5-1. Calibration Menu

2. Select a calibration process:
   - Two point calibration , see Section 5.2.3 on page 27.
   - Linear calibration , see Section 5.2.4 on page 32.

NOTE: If both calibration boxes are grayed out in Figure 5-1, this indicates there is no connectivity.

5.2.3 Two Point Calibration

At minimum, a two point calibration process is required. The two point calibration process requires a known weight to be loaded on each fork independently. By loading each fork with a known weight, the scale acquires both the span calibration and trim values to account for differences between each fork.

1. Access Two Point Calibration.
2. Enter the unit serial number between 1 - 999999.

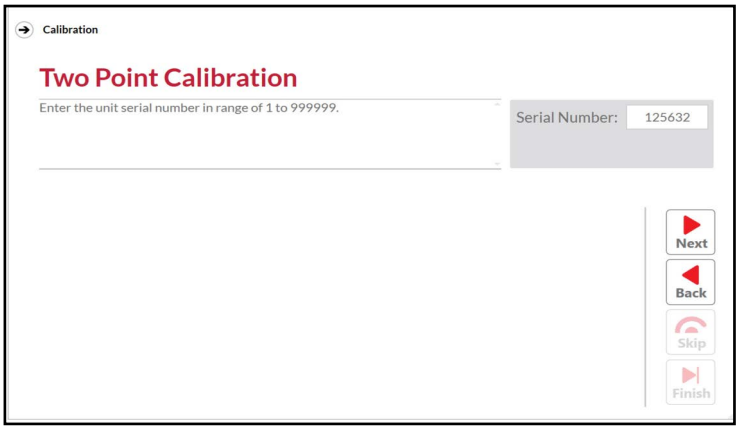

Figure 5-2. Enter Serial Number

3. Select Next.
4. Level the pitch and roll angles of the scale carriage using a level.

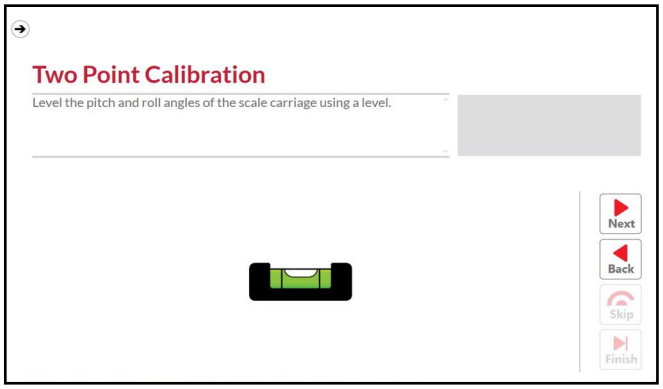

Figure 5-3. Level Scale Carriage

5. Select Next.

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6. Place a calibration strap, chain or channel across both forks to ensure proper digital trimming during the calibration process. If a single strap, chain or channel cannot be placed across both forks, enter the total of the device and calibration weight into the span weight value in the span text box.

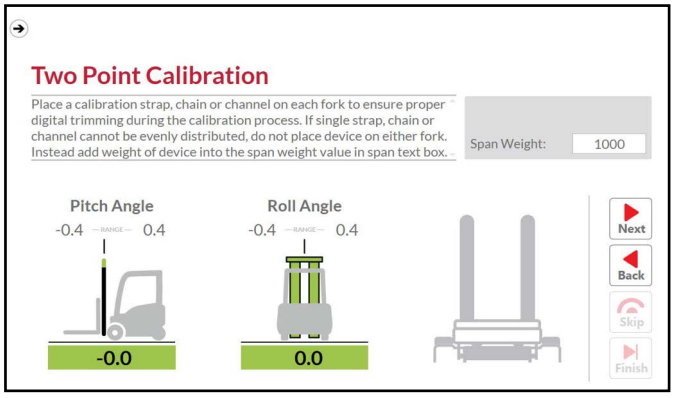

Figure 5-4. Add Span Weight Value

7. Select Next.

8. Attach the calibration weight to fork 1. Lift the forks to freely suspend the calibration weight.

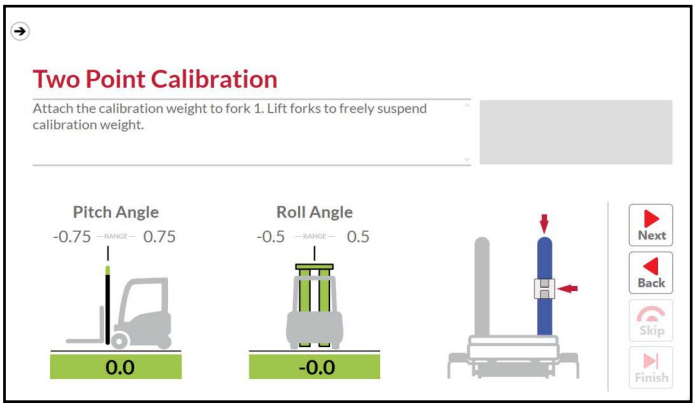

Figure 5-5. Add Weight to Fork 1

9. Select Next.

10. Attach the calibration weight to fork 2. Lift the forks to freely suspend the calibration weight.

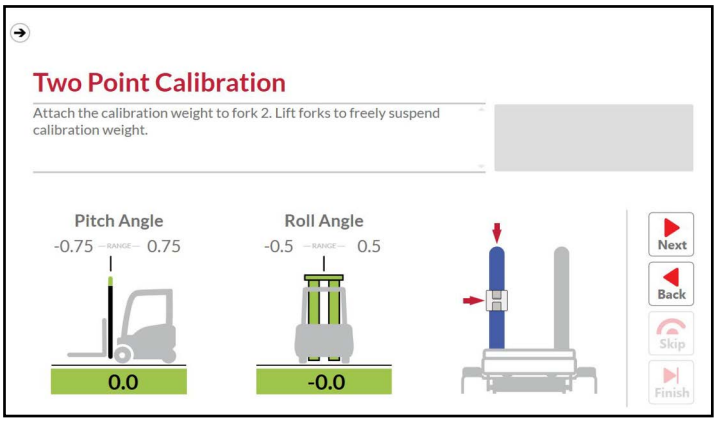

Figure 5-6. Add Weight to Fork 2

11. Select Next.

NOTE: At this point the two point calibration is complete. Select → to return to the weight indication.

12. Select Next to perform the pitch off-set calibration process.

NOTE: Off-set Calibration is required for in-motion and optional for static applications

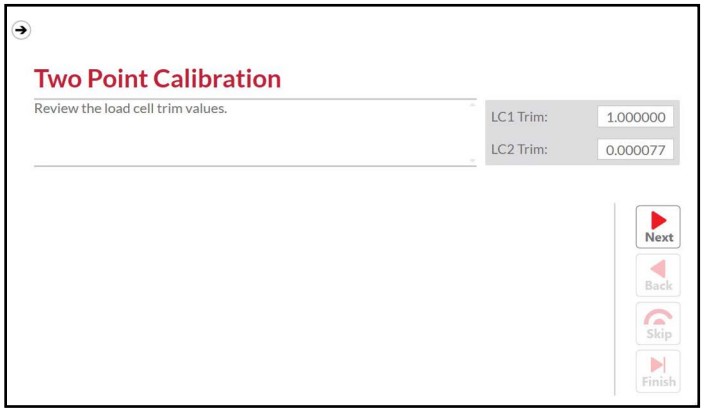

Figure 5-7. Review Load Cell Trim Values

13. Remove all calibration weights and devices from both forks. Adjust pitch and roll angles so both are as close as possible to 0°.

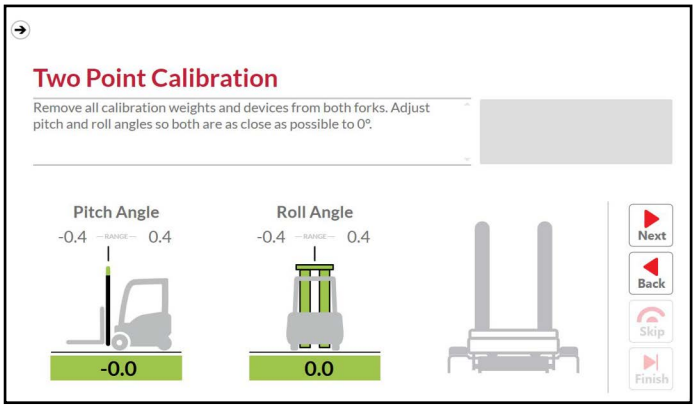

Figure 5-8. Remove Calibration Weights

14. Select Next.

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15. Remove all calibration weights and devices from both forks. Pitch forks forward to approximately +3º.

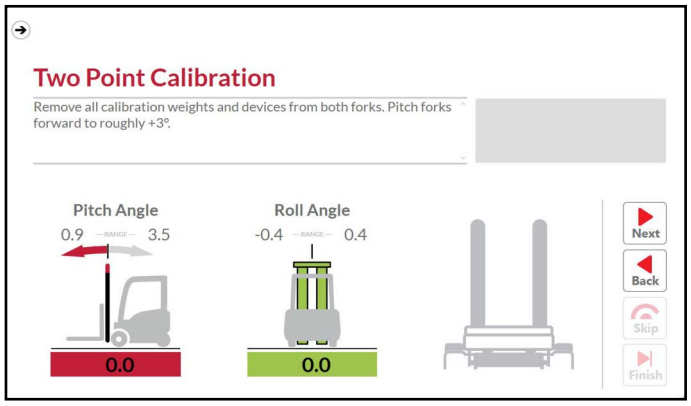

Figure 5-9. Pitch Forks +3º

16. Select Next.

17. Remove all calibration weights and devices from both forks. Pitch forks backward to approximately -5º.

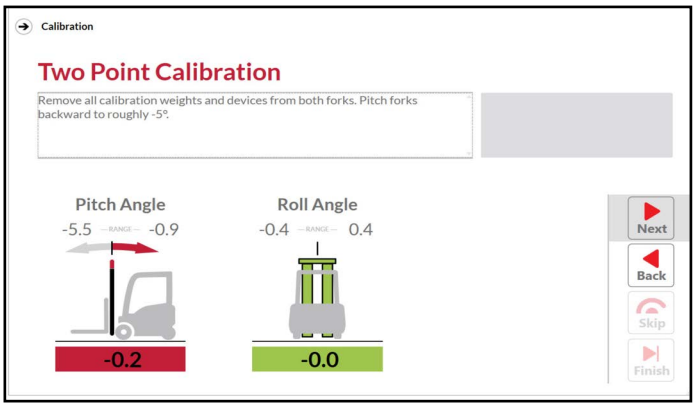

Figure 5-10. Pitch Forks -5º

18. Select Next.

19. Place weight on a pallet and lift with forks. Adjust the pitch and roll angles so both are as close as possible to 0º.

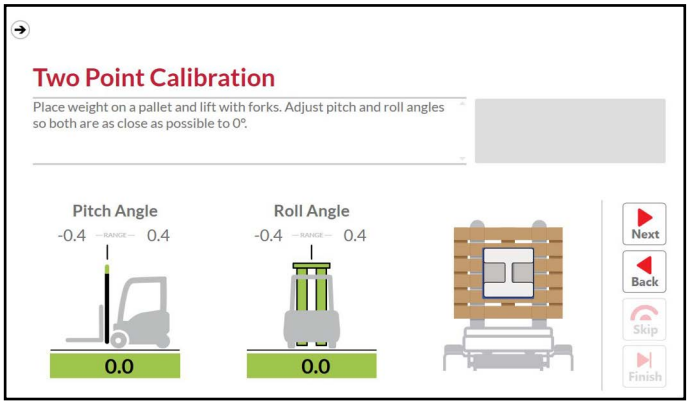

Figure 5-11. Bring Angles Close to 0º

20. Select Next.
21. Place weight on a pallet and lift with forks. Pitch the forks forward to approximately +3º.

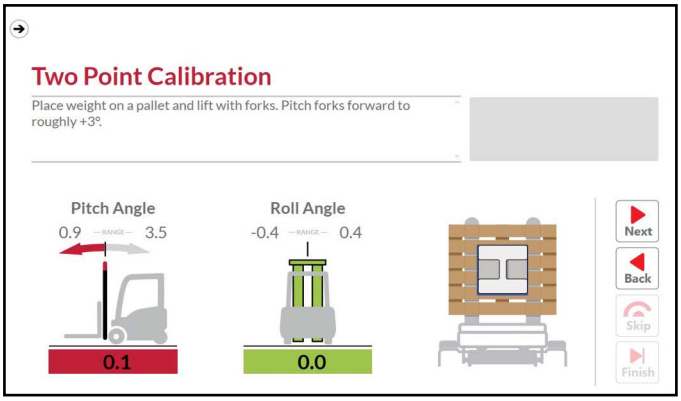

Figure 5-12. Pitch Forks +3º

22. Select Next.
23. Place weight on a pallet and lift with forks. Pitch the forks backward to approximately -5º.

NOTE: The pitch offset calibration is complete.

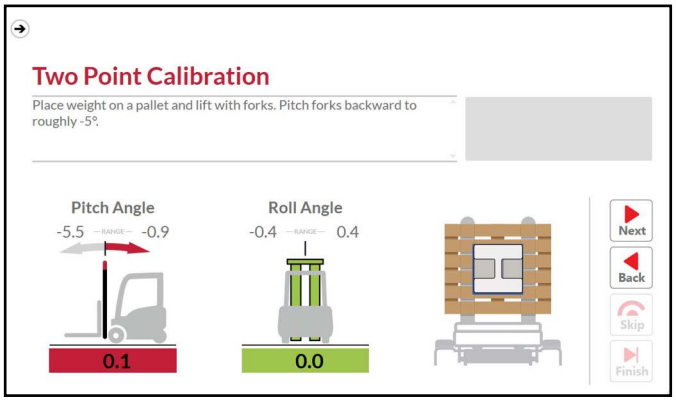

Figure 5-13. Pitch Forks -5º

24. Select Next to proceed to the 5 point linearization calibration process (Section 5.2.4 on page 32).

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5.2.4 Linear Point Calibration

Following the two point calibration (required), is a procedure to learn the characteristics of the scale while attached to the forklift. This is accomplished by moving the forklift mast forward and back one with no weight followed by the same process for a loaded lift. It is also recommended to follow the two point calibration with a multi point calibration (optional). This process allows two to five known weights to be calibrated as linear points.

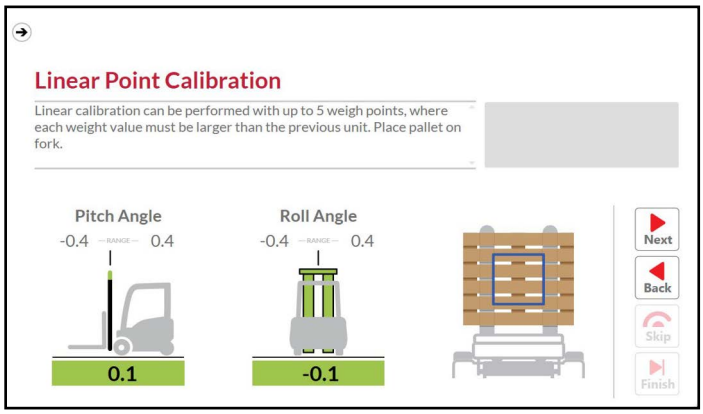

Figure 5-14. Linear Calibration Start

Perform Linear calibration with up to 5 weigh points, where each weight value must be larger than the previous weight.

1. Place a pallet on the forks.
2. Select

.
3. Enter the test weight value for linear point 1.
4. Place a test weight on the pallet.

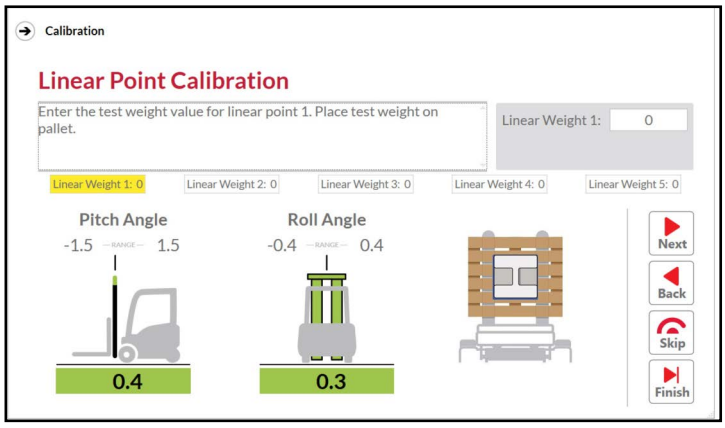

Figure 5-15. Linear Point 1

5. Select Next.
6. Enter the test weight value for linear point 2.
7. Place a test weight on the pallet.

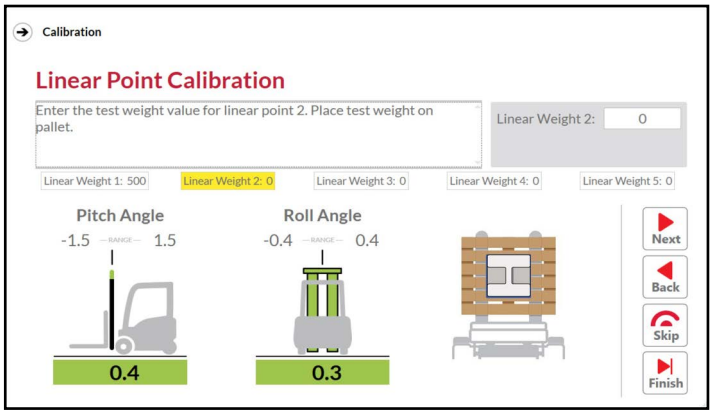

Figure 5-16. Linear Point 2

8. Select Next.
9. Enter the test weight value for linear point 3.
10. Place a test weight on the pallet.

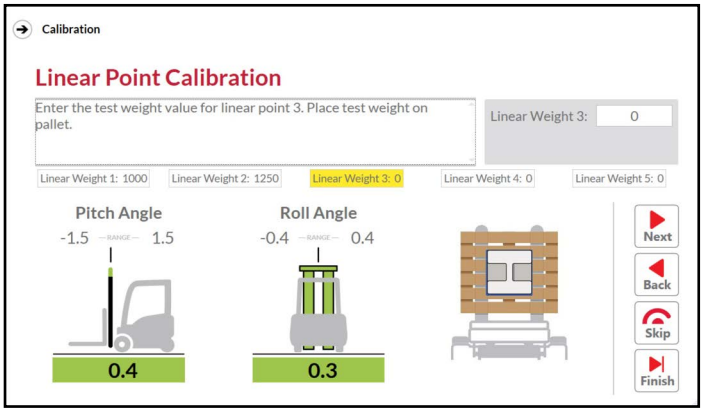

Figure 5-17. Linear Point 3

11. Select Next.

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12. Enter the test weight value for linear point 4.
13. Place a test weight on the pallet.

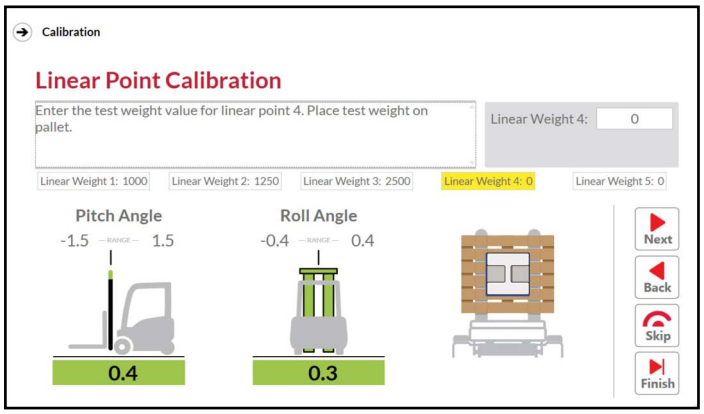

Figure 5-18. Linear Point 4

14. Select Next.
15. Enter the test weight value for linear point 5.
16. Place a test weight on the pallet.

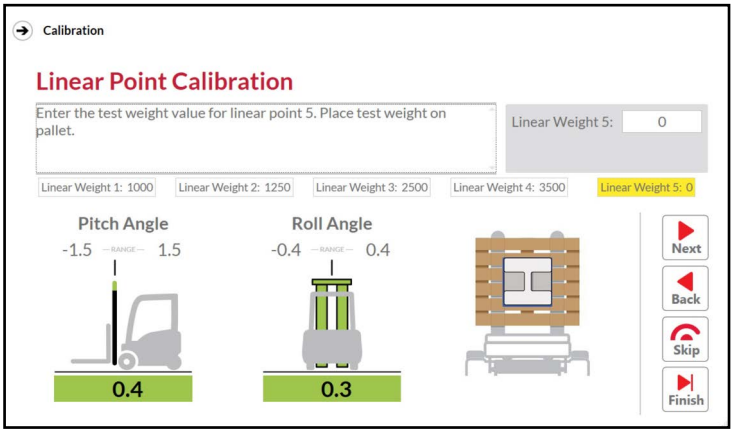

Figure 5-19. Linear Point 5

17. Select Next.

18. Remove all weight, including the pallet.

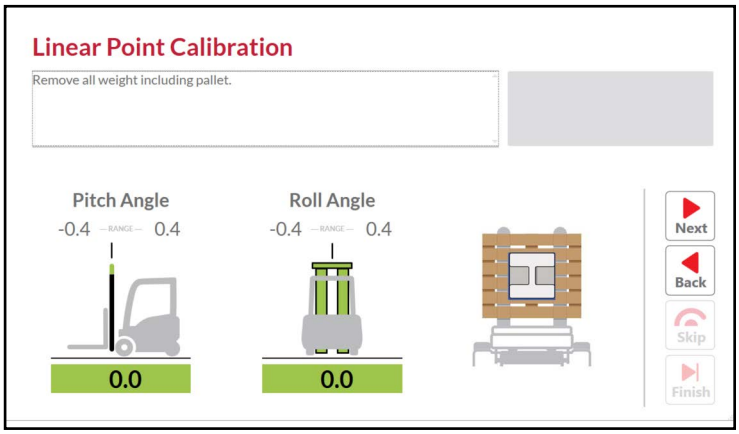

Figure 5-20. Remove All Weight

19. Select Next.

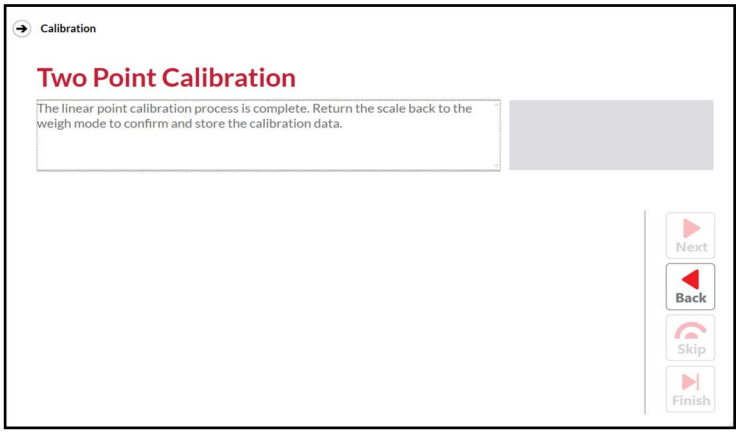

Figure 5-21. Linear Calibration Process Complete

20. The linear point calibration process is complete. Return the scale back to the weight mode to confirm and store the calibration data.

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6.0 Scale Tests

Access Scale Tests by selecting **Scale Tests** from the Menu. After selection, Scale Test opens in new window with the Home page displayed. The Home page provides a list of five user selectable tests that can aid verifying if a system is operating correctly. Performing tests typically involve user interaction and may require removing current weight or lifting tests weights in various positions on forks.

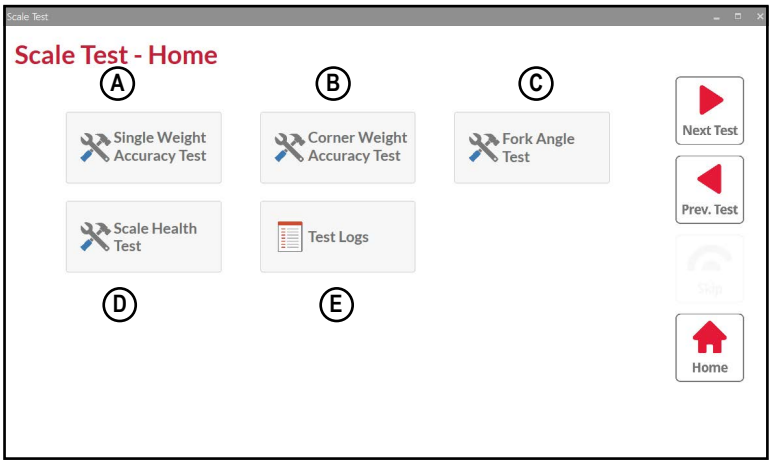

Figure 6-1. Test Functions Identified

Test Buttons

Item	Function	Description
A	Single Weight Accuracy Test	Tests the accuracy of a weight evenly lifted by both forks (see Section 6.3 on page 39).
B	Corner Weight Accuracy Test	Tests the accuracy of a weight on both forks one corner at a time (see Section 6.4 on page 42).
C	Fork Angle Test	Tests the pitch and roll status of the forks (see Section 6.5 on page 45).
D	Scale Health Test	Reports the scale health (see Section 6.6 on page 48).
E	Test Logs	Opens the test log which lists results of each performed test (see Section 6.7 on page 53)

Table 6-1. Test Function Descriptions

6.1 Test Operational Elements

Several screen elements are used to operate tests. Figure 6-2 displays the Single Weight Test with operational elements identified.

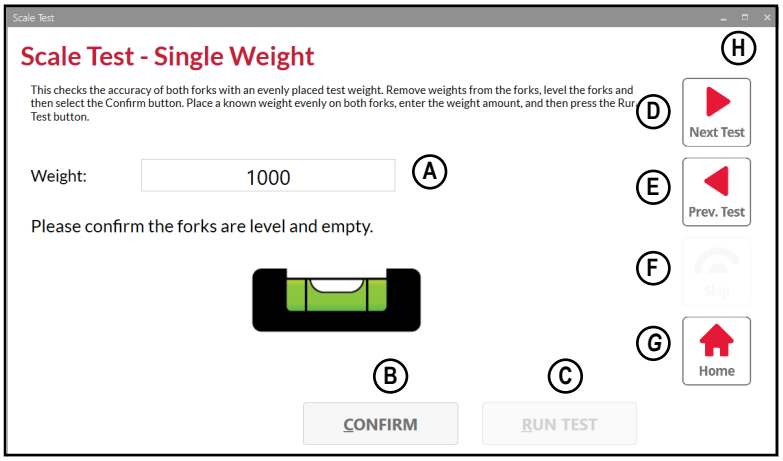

Figure 6-2. Test Operational Elements Identified

Item	Element	Description
A	Weight:	Configures weight value during testing. ***NOTE: Only used during Single and Corner Weight Accuracy Tests.***
B	CONFIRM	Confirms test selection and configured weight parameters (in Single and Corner Weight Accuracy Tests).
C	RUN TEST	Activates the test. ***NOTE: Some tests may require selecting this function several times.***
D	Next Test	Advances to the next test.
E	Prev. Test	Returns to the previous test.
F	Skip	Not used.
G	Home	Navigates to the Scale Test Home page.
H		Performs one the following: • Minimizes the Scale Test window. • Maximizes the Scale Test window. • Closes Scale Test window.

Table 6-2. Test Operational Elements Descriptions

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6.2 Pre-Test Diagnostics

Each tests preforms Pre-Test Diagnostics before activation and that checks the following:

Test	Description
Scale Weight	Displays the current weight measured by the scale. In addition, displays weight failure or error states: • ***Invalid:*** Invalid weight display • ***~~~~~~~:*** *Pitch or roll exceeded tolerances* • ***^^^^^^^:*** *Load cell overload* • ***_____:*** *Load cell underload*
Load Cell 1 mV	Displays raw mV from load cell 1.
Load Cell 2 mV	Displays raw mV from load cell 2.
The mV for cell 1	Lists the configured minimum and maximum mV values in relation to load cell 1.
The mV for cell 1	Lists the configured minimum and maximum mV values in relation to load cell 2.
Pitch Angle	Displays the calculated pitch angle in degrees. For test criteria see, Section 6.5 on page 45.
Roll Angle	Displays the calculated roll angle in degrees. For test criteria see, Section 6.5 on page 45.
UID	Displays the Unit ID. This value is configured from the factory as the forklift serial number.
User Mode	Displays the user mode number from junction box.

Table 6-3. Pre-Test Diagnostics

Results of Pre-Test Diagnostics are not displayed during tests and can be viewed in Test Logs (Section 6.7 on page 53). Faulty or disconnected communications will cause Pre-Test Diagnostics to fail.

Figure 6-3 displays Pre-Test Diagnostics occurring during the Single Weight Accuracy Test. The same text indication appears on each test.

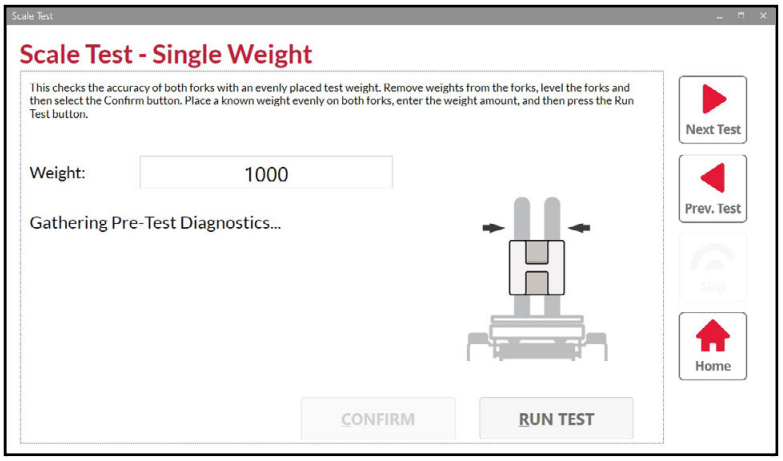
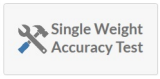


Figure 6-3. Gathering Pre-Test Diagnostics

6.3 Single Weight Accuracy Test

The Single Weight Accuracy tests involves configuring a weight value and testing it against a known weight lifted evenly between the two forks. The test passes when the configured weight value is measured at ± 1.05% compared to the known weight.

1. Select 

from the Scale Test Home page.
2. Remove weight and then level the forks.
3. Enter weight of the test weight into the **Weight** field.
4. Select **Confirm.**

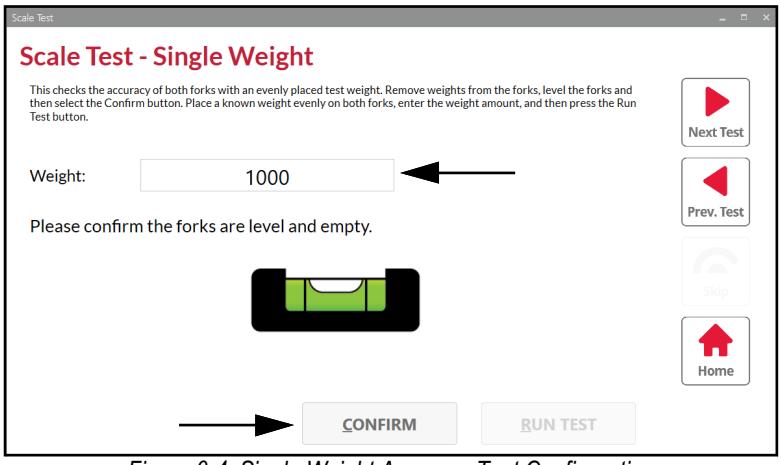


Figure 6-4. Single Weight Accuracy Test Configuration

5. Pre-Test Diagnostics processes.

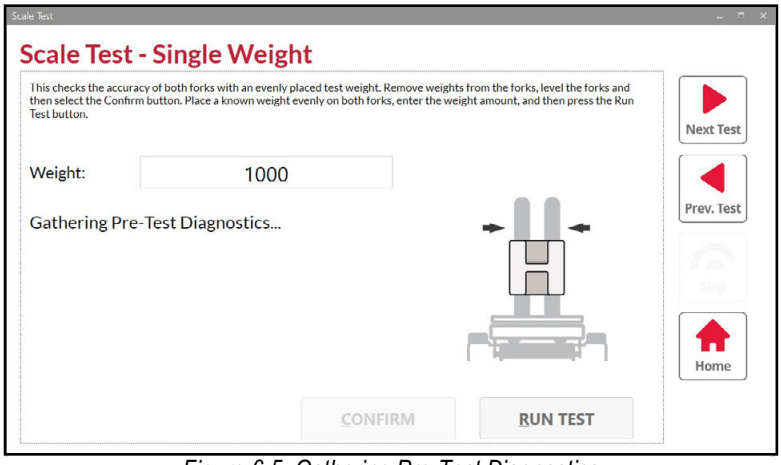


Figure 6-5. Gathering Pre-Test Diagnostics

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6. Pre-Test Diagnostics completes and **Run Test** becomes available.
7. Lift the weight evenly with both forks.
8. Select **Run Test**.

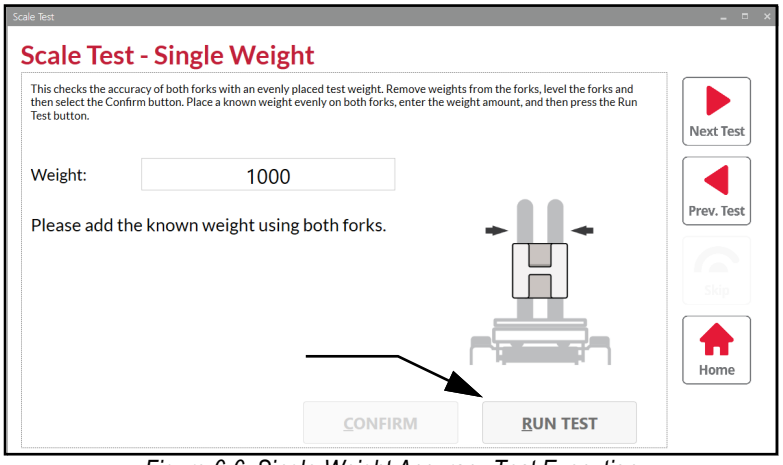


Figure 6-6. Single Weight Accuracy Test Execution

9. **Testing...** displays while the test occurs.

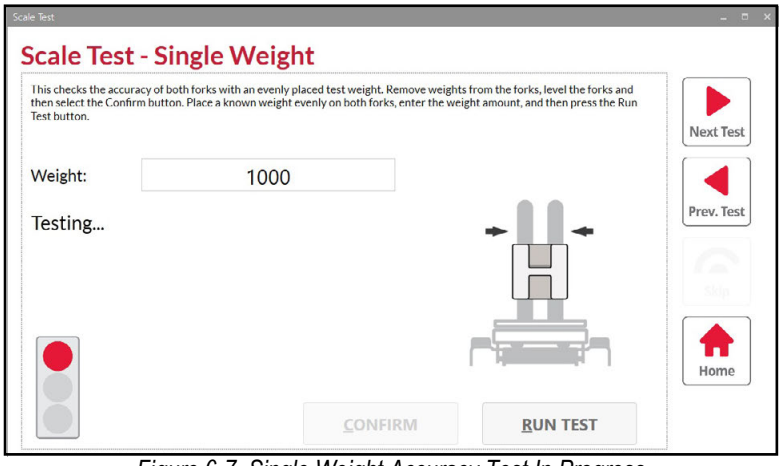


Figure 6-7. Single Weight Accuracy Test In Progress

10. The test completes and the results display (Section 6.3.1 on page 41).

6.3.1 Single Weight Accuracy Test Result Examples

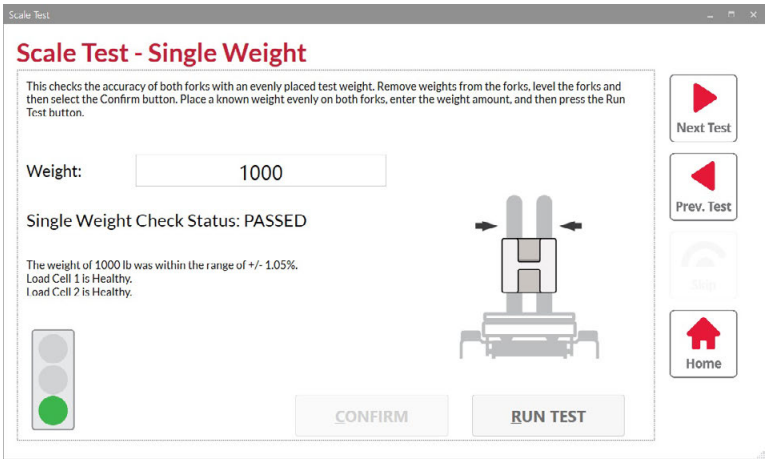
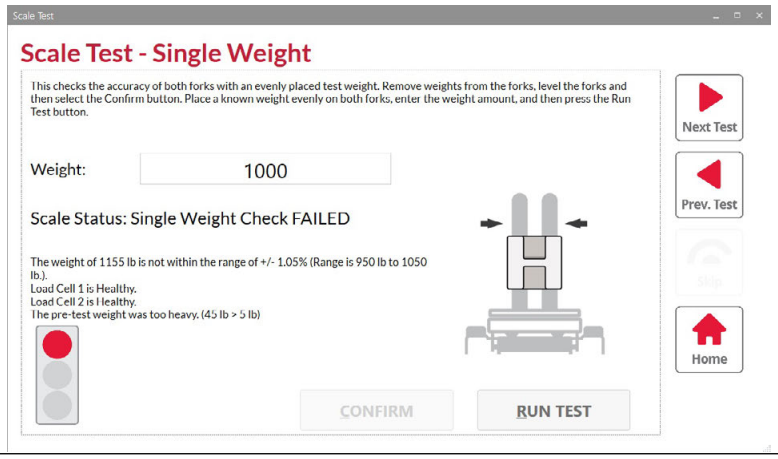
Test Result	Example
Pass	
Fail	The test failed for two reasons: • The measured weight is greater than the configured weight by ± 1.05% • The pre-test weight (when the scale must be empty) was greater than 5 lb. 

Table 6-4. Single Weight Test Result Examples

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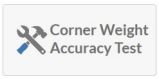
6.4 Corner Weight Accuracy Test

Corner Weight Accuracy test involves configuring a weight value and testing it against a known weight measured in four different positions on the forks. The test passes when the configured weight value is measured at ± 1.05% compared to the known weight at each position. This test may discover issues in either fork or to the position measurements were made.

1. Select 

from the Scale Test Home page.
2. Remove weight and then level the forks.
3. Enter the weight of the test weight into the **Weight** field.
4. Select **Confirm.**

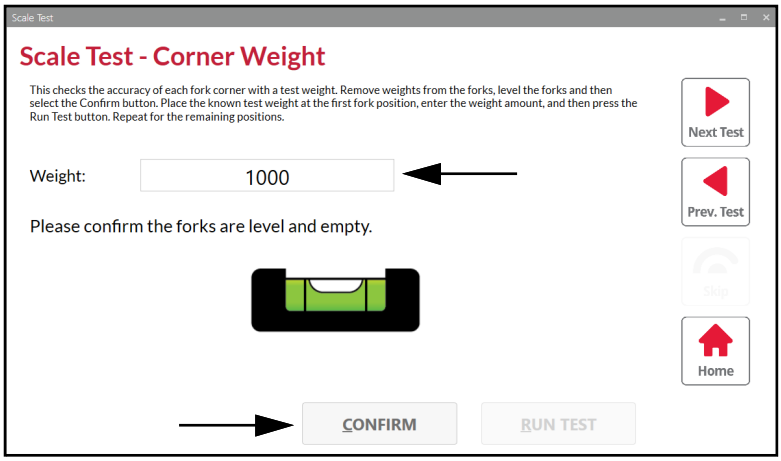


Figure 6-8. Corner Weight Accuracy Test Configuration

5. Pre-Test Diagnostics processes.

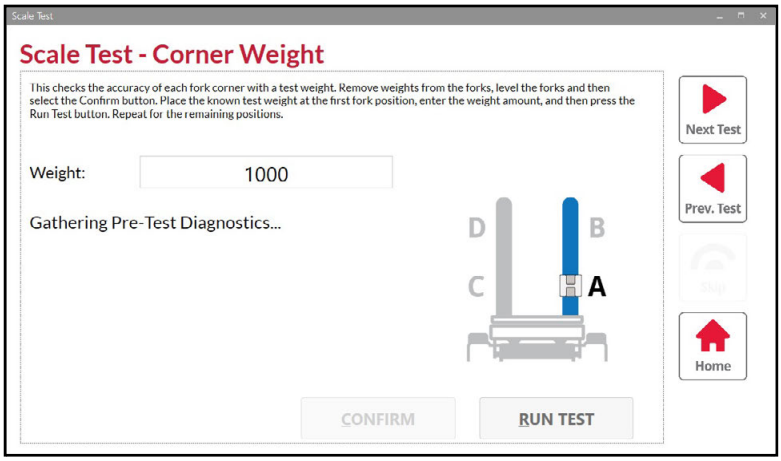


Figure 6-9. Gathering Pre-Test Diagnostics

6. Pre-Test Diagnostics completes and **Run Test** becomes available.
7. Position the test weight in the location indicated by the Corner Weight Test.
8. Lift the test weight.
9. Select **Run Test**.

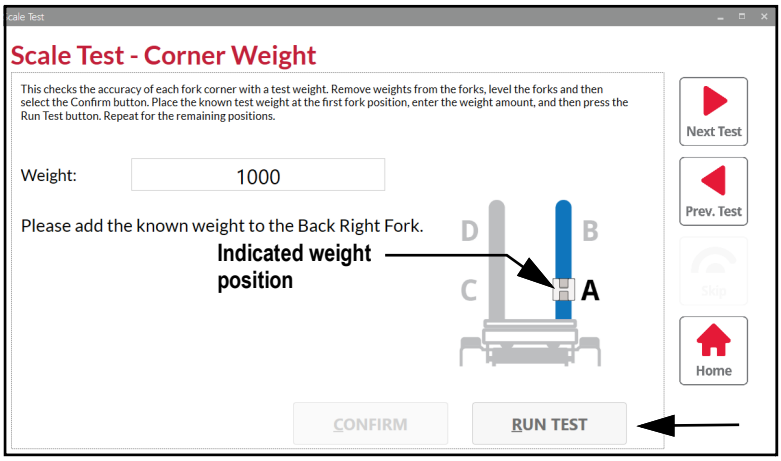


Figure 6-10. Corner Weight Accuracy Test Execution

10. **Testing...** displays while the system processes the weight.

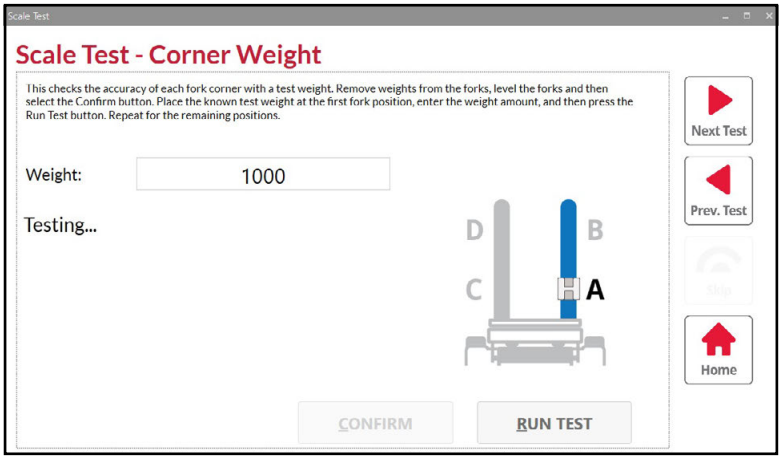


Figure 6-11. Corner Weight Accuracy Test In Progress

11. The display updates with the next position identified.
12. Lower the test weight.
13. Repeat Step 7 through Step 12 for positions **B** through **D**.
14. The test completes and the results display (Section 6.4.1 on page 44).

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6.4.1 Corner Weight Accuracy Test Result Examples

NOTE: View Log Files (see Section 6.7 on page 53) for detailed weight measurement results in each position.

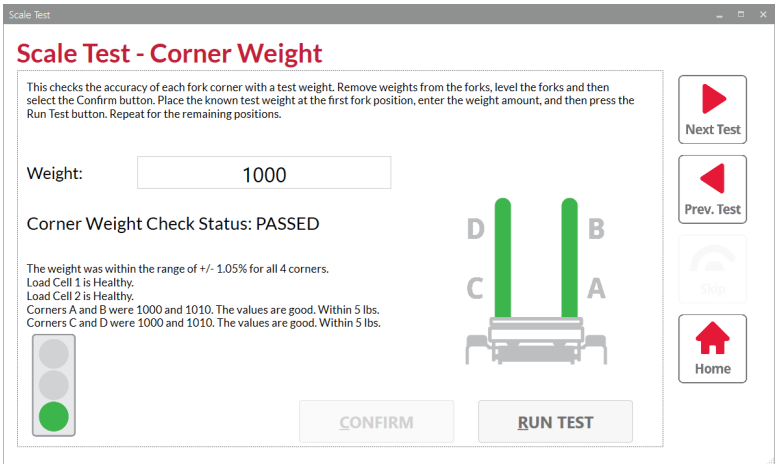
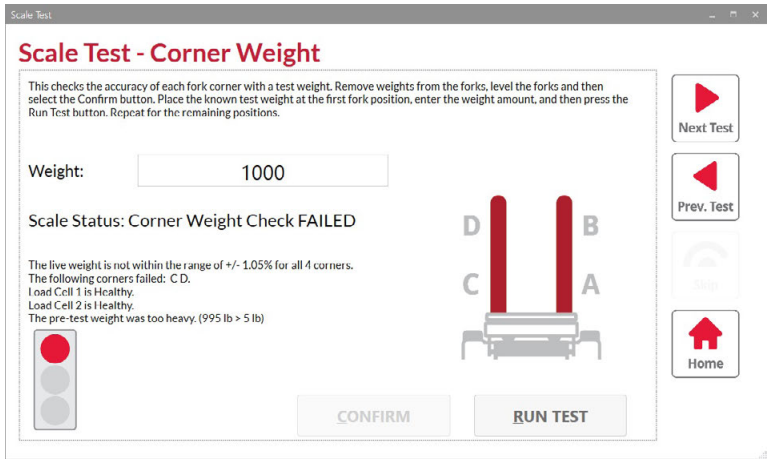
Test Result	Example
Pass	
Fail	The following example suggests load cells are not functioning on the left side. This could be result of loose cables or a faulty load cell. In addition debris, binding or damage caused to the left side of scale flexure can cause issues to the weight measurement on left side. 

Table 6-5. Corner Weight Test Result Examples

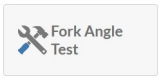
6.5 Fork Angle Test

The Fork Angle Test checks pitch and roll of the forklift and provides three possible results: Pass, Warning or Failed. The following table lists test criteria:

Pitch Test	
Test Result	**Result Criteria**
Pass	• ± 2 degrees.
Warning	• -2 to -7 degrees • 2 to 7 degrees
Failed	• -7 degrees or less • 7 degrees or greater

Roll Test	
Test Result	**Result Criteria**
Pass	• ± 2 degrees.
Warning	• -2 to -3 degrees • 2 to 3 degrees
Failed	• -3 degrees or less. • 3 degrees or greater

Table 6-6. Fork Angle Test Criteria

1. Select 

from the Scale Test Home page.
2. Level the forks and then select **Confirm.**

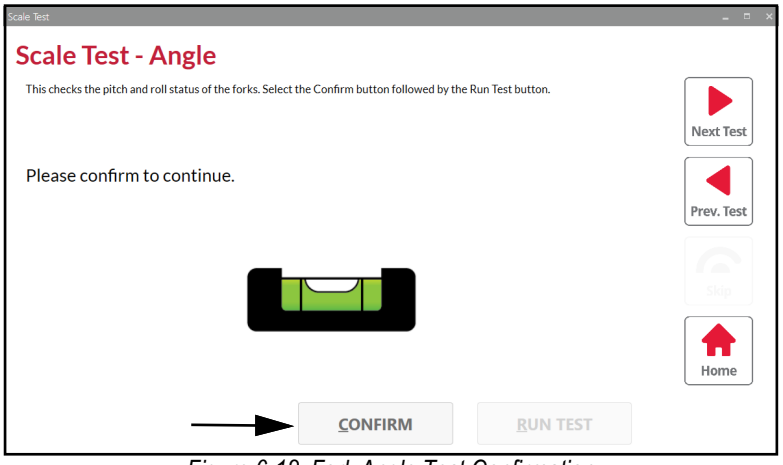


Figure 6-12. Fork Angle Test Confirmation

3. Pre-Test Diagnostics processes.

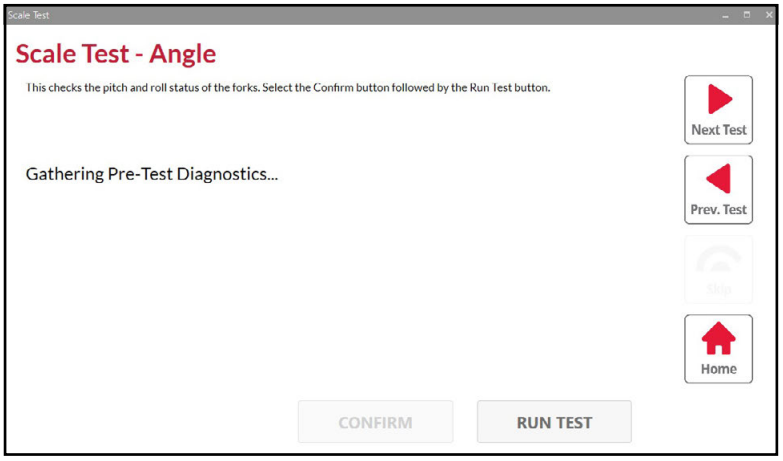


Figure 6-13. Gathering Pre-Test Diagnostics

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4. Pre-Test Diagnostics completes and **Run Test** becomes available.
5. Select **Run Test**.

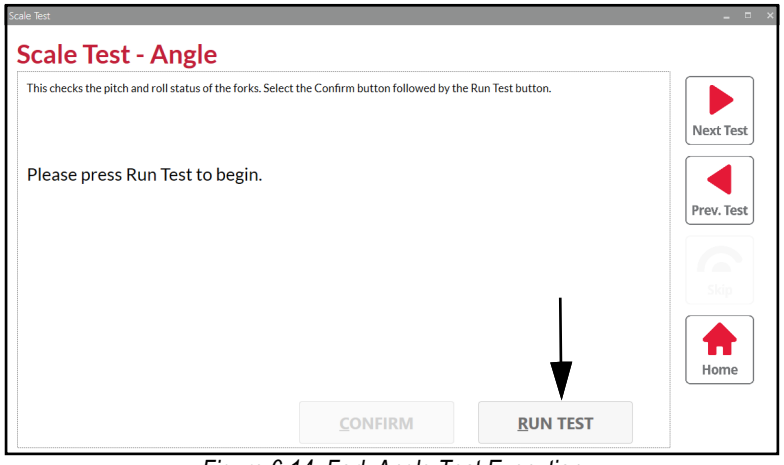


Figure 6-14. Fork Angle Test Execution

6. **Testing...** displays while the test occurs.

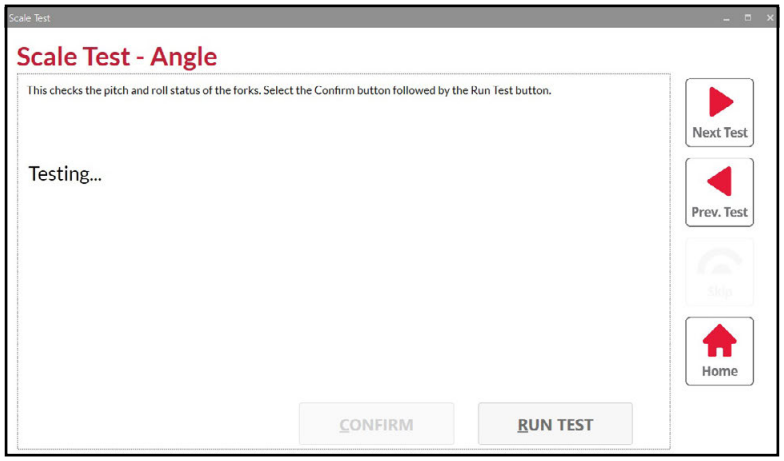


Figure 6-15. Fork Angle Test In Progress

7. The test completes and the results display (Section 6.5.1 on page 47).

6.5.1 Fork Angle Test Result Examples

NOTE: See Table 6-6 on page 45 for Fork Angle Test criteria.

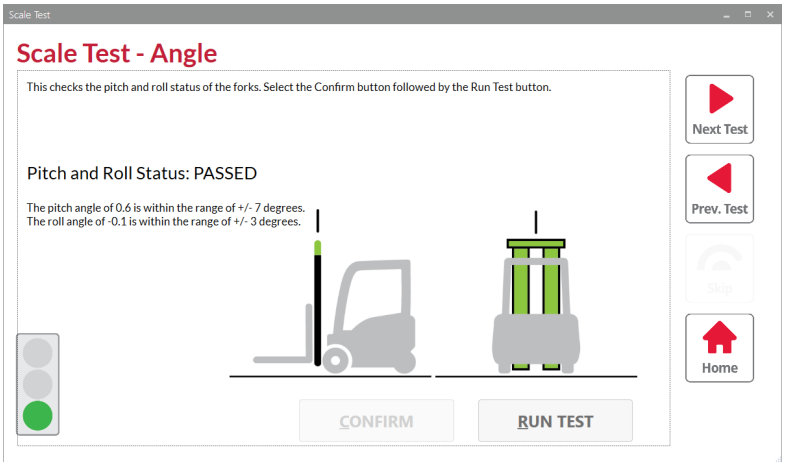
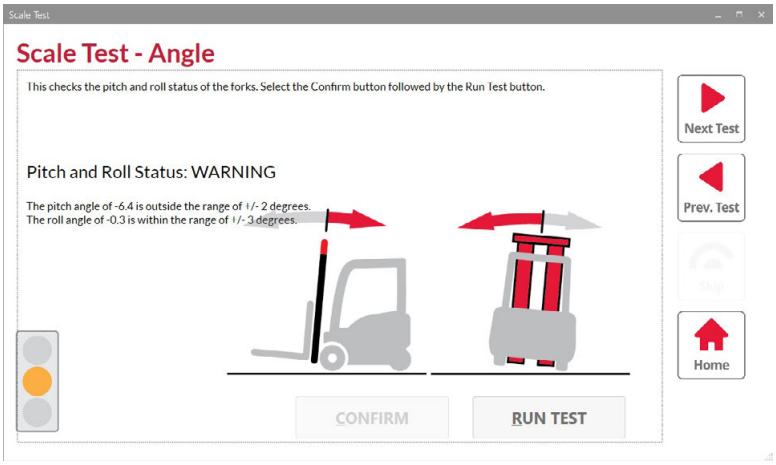
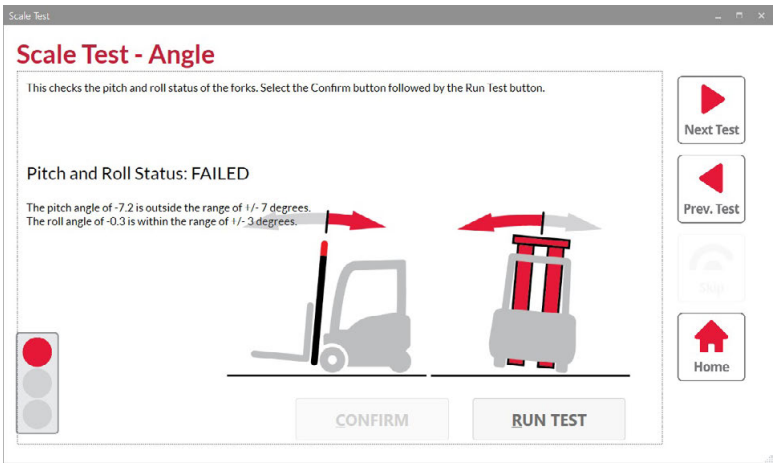
Test Result	Example
Pass	
Warning	A Warning issued due to pitch exceeding 2 degrees while remaining less than 7 degrees. 
Fail	The test failed due to pitch exceeding 7 degrees. 

Table 6-7. Fork Angle Test Result Examples

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6.6 Scale Health Test

Scale Health Test performs three groups of tests to check for a variety of potential issues:

- Pre-Test Diagnostics (Section 6.2 on page 38)
- Test Data (Table 6-8 on page 48)
- Additional Test Data (Table 6-9 on page 48)

NOTE: The overall test result (Passed or Failed) is displayed at the completion of the Scale Health Test. Individual test results are displayed in Log Files (Section 6.7 on page 53).

Test Data

Scale Health Test performs several to checks to identify potential issues with a scale.

Test	Description
Scale Weight	Displays the current weight measured by the scale. In addition, displays weight failure or error states: • ***Invalid:*** *Invalid weight display* • ***~~~~~~~****: Pitch or roll exceeded tolerances* • ***^^^^^^^****: Load cell overload* • ***_____****: Load cell underload*
Result	Displays the test result. *Results: PASSED, FAILED*
Result Description	A brief description of health test results. Common Result Descriptions include: • All Health Checks Passed. • Overload/Underload Status Error • Fork Level Status Error
Load Cell 1 mV	Displays raw mV from load cell 1.
Load Cell 2 mV	Displays raw mV from load cell 2.
Snapshot is Valid	Displays if streaming snapshot is valid. Results: True, False
Underload Status	Displays underload test status.
Overload Status	Displays overload test status.
Power Supply Status	Displays power supply test results.
Load Cell 1 Status	Displays raw mV from load cell 1.
Load Cell 2 Status	Displays raw mV from load cell 2.

Table 6-8. Scale Health Test - Test Data Descriptions

Additional Test Data

Additional Test Data include more data items as well as data items that were previously tested. Repeated data items are included to retest items at different intervals.

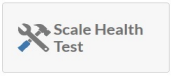
Test	Description
Scale Weight	Displays the current weight measured by the scale. In addition, displays weight failure or error states: • ***Invalid:*** *Invalid weight display* • ***~~~~~~~****: Pitch or roll exceeded tolerances* • ***^^^^^^^****: Load cell overload* • ***_____****: Load cell underload*
Max Load Cell 1:	Maximum theoretical mV load of load cell 1. ***NOTE: Does not display when scale weight it in an error state (for example, ^^^^^^^ or _____).***
Max Load Cell 2:	Maximum theoretical mV load of load cell 2. ***NOTE: Does not display when scale weight it in an error state (for example, ^^^^^^^ or _____).***
Load Cell 1 mV	Displays raw mV from load cell 1.

Table 6-9. Scale Health Test - Additional Test Data Descriptions

Test	Description
Load Cell 2 mV	Displays raw mV from load cell 2.
Pitch Angle	Displays the calculated pitch angle in degrees. For test criteria see, Section 6.5 on page 45.
Roll Angle	Displays the calculated roll angle in degrees. For test criteria see, Section 6.5 on page 45.
UID	Displays the Unit ID. This value is configured from the factory as the forklift serial number.
User Mode	Displays the user mode number from junction box.

Table 6-9. Scale Health Test - Additional Test Data Descriptions (Continued)

6.6.1 Performing Scale Health Test

1. Select 

from the Scale Test Home page.
2. Level the forks and then select **Confirm.**

Figure 6-16. Scale Status Test Confirmation

3. Pre-Test Diagnostics processes.

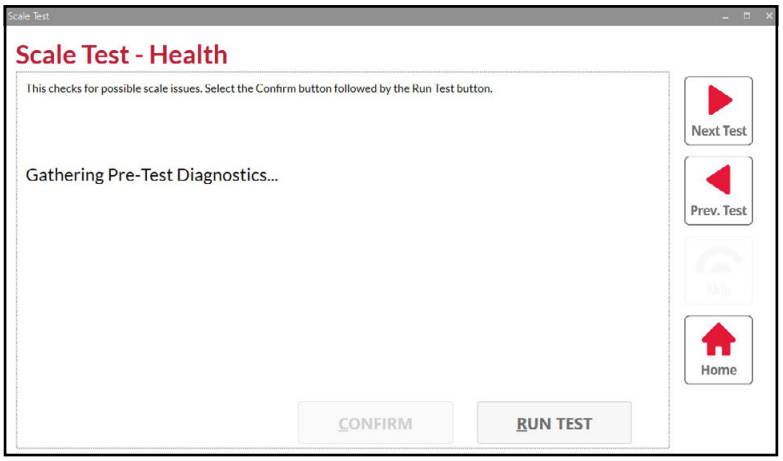


Figure 6-17. Gathering Pre-Test Diagnostics

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4. Pre-Test Diagnostics completes and **Run Test** becomes available.
5. Select **Run Test**.

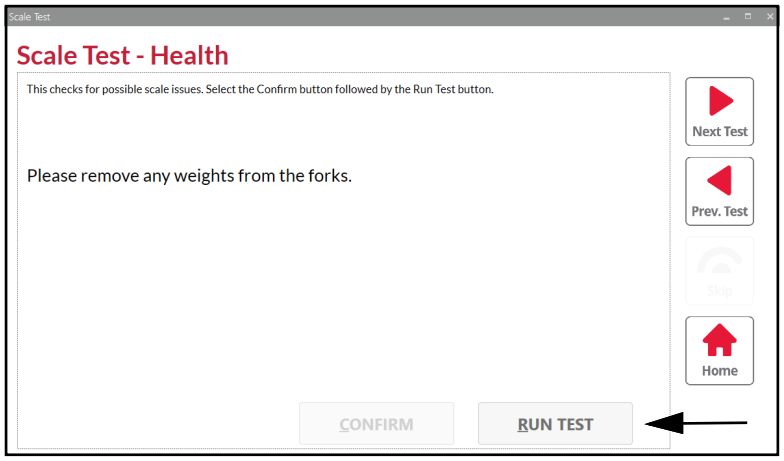


Figure 6-18. Scale Status Test Activation

6. **Testing...** displays while the test occurs.

Figure 6-19. Scale Status Test In Progress

7. The test completes and the results display (Section 6.6.2 on page 51).

6.6.2 Scale Status Test Result Examples

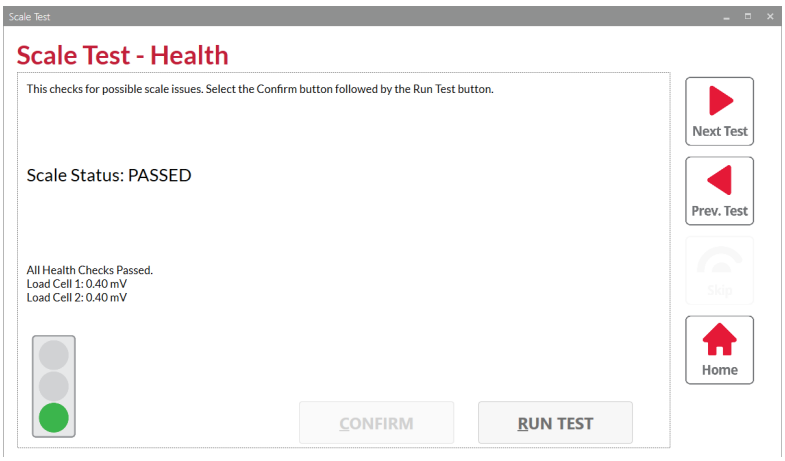
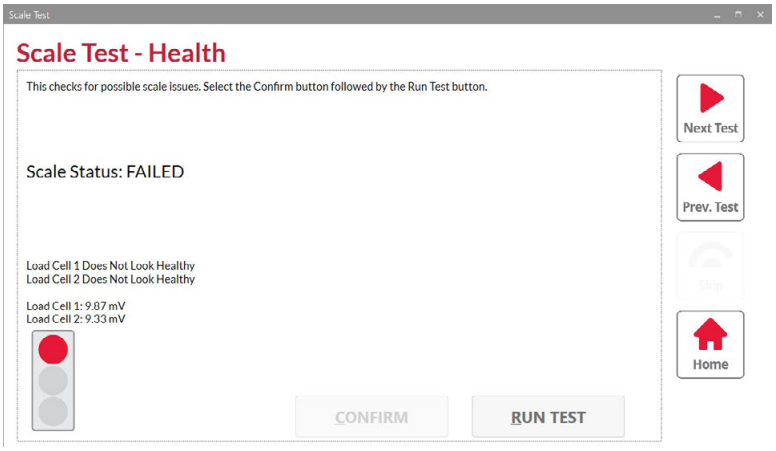
Test Result	Example
Passed	
Failed	Failed due unacceptable load cell mV value (exceeded 7 mV). 

Table 6-10. Scale Status Test Result Examples

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6.6.3 Troubleshooting Scale Status Test Failed Results

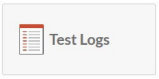
Message	Actions
Load Cell Does Not Look Healthy.	Verify load cell is functioning correctly, load cell connection and perform load cell resistance test.
The Scale Data is in invalid.	Verify load cell connection,
The Weight Data is invalid	Verify the setup switch is not enabled. Verify load cell is functioning correctly, load cell connection and perform load cell resistance test. Verify if the load cell is experiencing overload or underload. If load cells appear to be function correctly, recalibrate the scale.
Diagnostic Data Error Flag	Verify if Diagnostic Data errors are present (underload Error, overload error or Power Supply error). If present, Verify load cell is functioning correctly, load cell connection and perform load cell resistance test and calibration.
Load Cell Status (mV Range)	Load cell output inconsistent readings with defined load. Verify load cell condition, connection or overload/underload stops adjustment. ***NOTE: Load cell voltage range is considered faulty when under 0 or over 7.5 mV.***
Overload Status	The measured weight indication exceeds capacity limit. If no load status error is present, than overload status condition is potentially a calibration issue. Perform Single Weight or Corner Test, if no load cell status error occurs verify calibration.
Pitch and Roll Angles	Exceeds Pitch and Roll criteria ranges (Section 6.4 on page 42). Check junction box is securely mounted and verify calibration.
Power Supply Status	Verify power source supplying power to junction box is operating correctly.

Table 6-11. Scale Health Test Common Failure Messages

6.7 Scale Test - Log Files

Test Logs provide a history of tests results sorted from oldest to newest. Each test is added as an entry and provides details why a test passed or failed.

6.7.1 Viewing Log Files

1. Select 

from the Scale Test Home page.
2. The Log Files display.
3. Use the scroll bar to navigate to the desired entry.

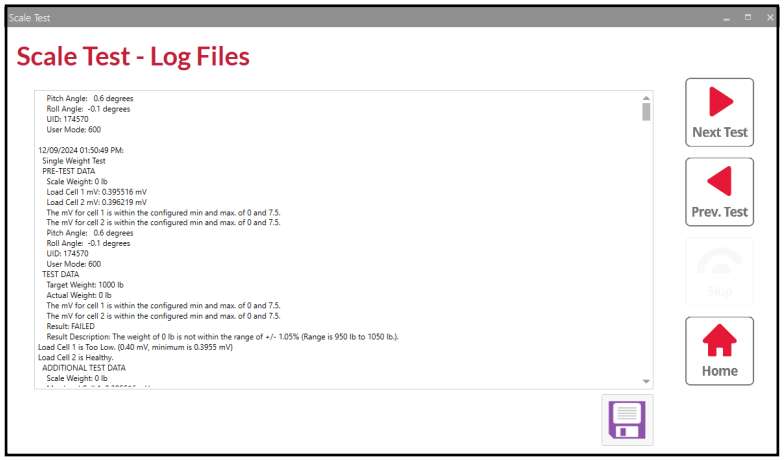


Figure 6-20. Scale Test Logs

NOTE: The log file may not load if there are two or Scale Test instances opened. If Error reading log file displays, close any additional Scale Test windows and try opening the log file again.

6.7.2 Saving Log Files

The Log Files may be saved as a text file (*.txt) for review outside of VIRTUi^3.

1. Access Log Files.
2. Select the **Save** button.

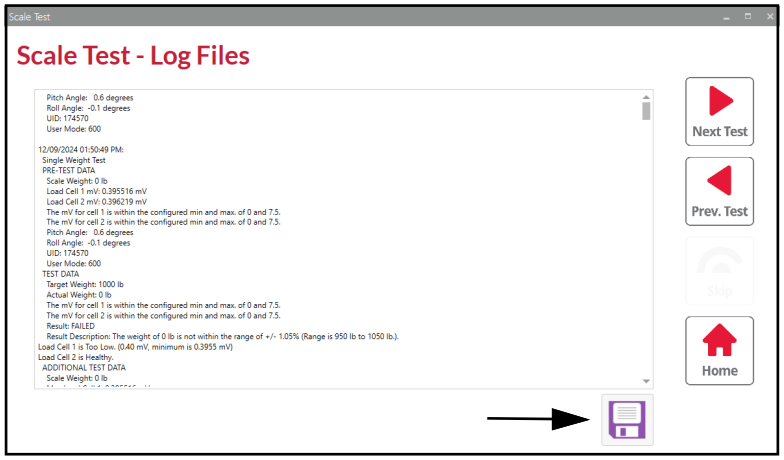


Figure 6-21. Scale Test Logs Save Button

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3. Save As window displays.
4. Navigate to desired file location.
5. Enter desired file name and then select **Save**.

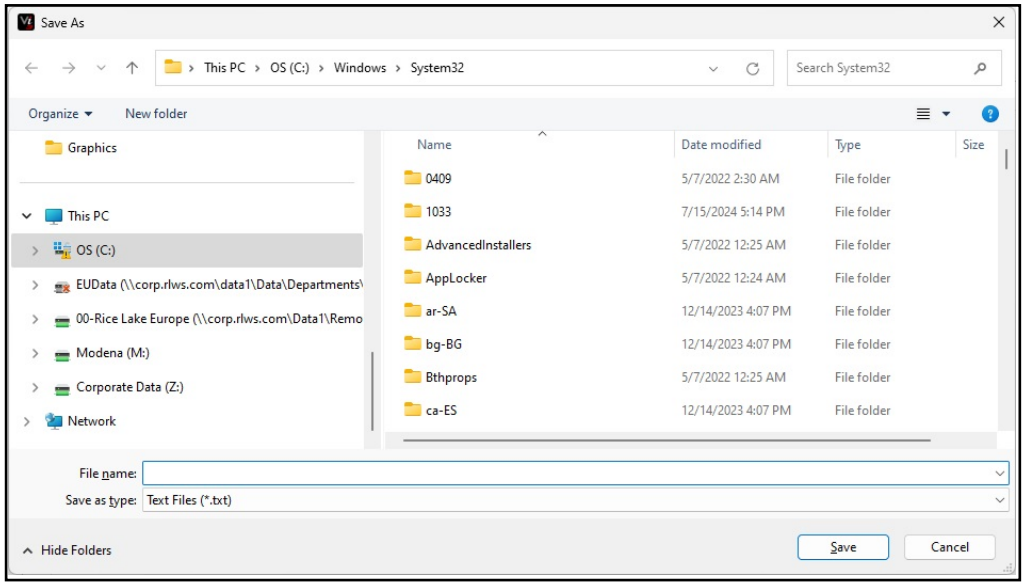

Figure 6-22. Save As Window

6. Open the saved test log file in a text editor such as Windows Notepad® to view.

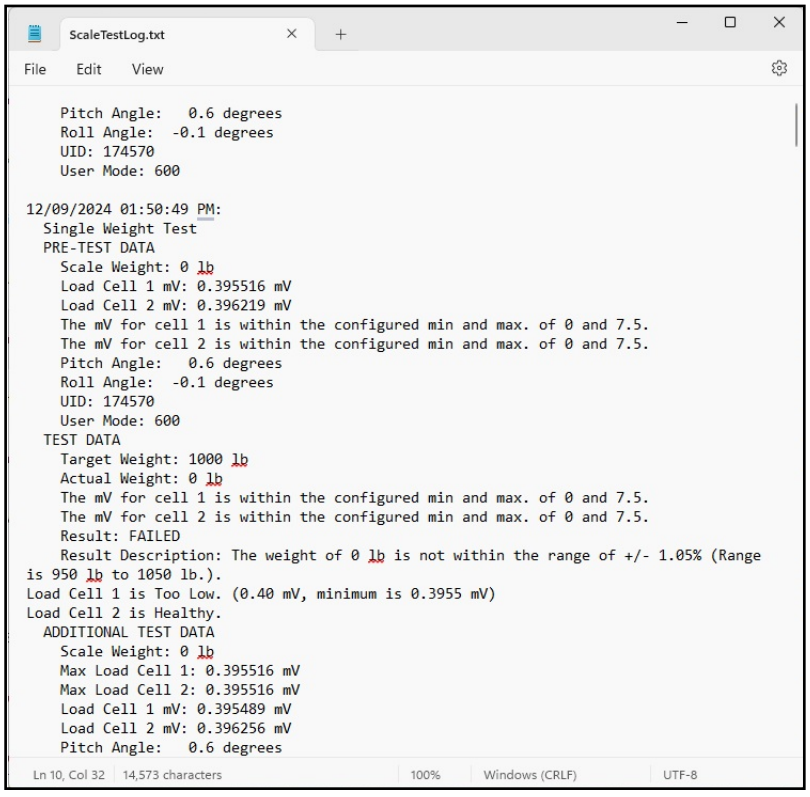

Figure 6-23. Test Log Text File

6.7.3 Single Weight Accuracy Test Entry Examples

12/09/2024 05:15:30 PM:
Single Weight Test
PRE-TEST DATA
Scale Weight: 0 lb
Load Cell 1 mV: 0.395618 mV
Load Cell 2 mV: 0.396505 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.7 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Target Weight: 500 lb
Actual Weight: 495 lb
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Result: PASSED
Result Description: The weight of 495 lb was within the range of +/- 1.05%.
Load Cell 1 is Healthy.
Load Cell 2 is Healthy.
ADDITIONAL TEST DATA
Scale Weight: 495 lb
Max Load Cell 1: 1.137747 mV
Max Load Cell 2: 1.137747 mV
Load Cell 1 mV: 1.117478 mV
Load Cell 2 mV: 0.452008 mV
Pitch Angle: 0.8 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

12/09/2024 05:16:17 PM:
Single Weight Test
PRE-TEST DATA
Scale Weight: 985 lb
Load Cell 1 mV: 1.894527 mV
Load Cell 2 mV: 0.451786 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.8 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Target Weight: 500 lb
Actual Weight: 985 lb
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Result: FAILED
Result Description: The weight of 985 lb is not within the range of +/- 1.05% (Range is 475 lb to 525 lb.).
Load Cell 1 is Too Low. (1.89 mV, minimum is 1.8945 mV)
Load Cell 2 is Too Low. (0.45 mV, minimum is 0.4518 mV)
The pre-test weight was too heavy. (985 lb > 5 lb)
ADDITIONAL TEST DATA
Scale Weight: 985 lb
Max Load Cell 1: 3.371289 mV
Max Load Cell 2: 3.371289 mV
Load Cell 1 mV: 1.894462 mV
Load Cell 2 mV: 0.451768 mV
Pitch Angle: 0.8 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

Figure 6-24. Single Weight Test Pass and Fail Examples

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6.7.4 Corner Weight Accuracy Test Entry Examples

12/09/2024 01:55:55 PM:
Corner Weight Test
PRE-TEST DATA
Scale Weight: 0 lb
Load Cell 1 mV: 0.395415 mV
Load Cell 2 mV: 0.396274 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Target Weight: 1000 lb
Actual Weight Right Back (A): 1010 lb
Actual Weight Right Front (B): 1010 lb
Actual Weight Left Back (C): 1010 lb
Actual Weight Left Front (D): 1010 lb
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Result: PASSED
Result Description: The weight was within the range of +/- 1.05% for all 4 corners.
Load Cell 1 is Healthy.
Load Cell 2 is Healthy.
Corners A and B were 1010 and 1010. The values are good. Within 5 lbs.
Corners C and D were 1010 and 1010. The values are good. Within 5 lbs.
ADDITIONAL TEST DATA
Scale Weight: 1010 lb
Max Load Cell 1: 1.909658 mV
Max Load Cell 2: 1.909658 mV
Load Cell 1 mV: 1.269947 mV
Load Cell 2 mV: 1.097227 mV
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

12/09/2024 01:57:51 PM:
Corner Weight Test
PRE-TEST DATA
Scale Weight: 995 lb
Load Cell 1 mV: 0.863404 mV
Load Cell 2 mV: 1.470265 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Target Weight: 1000 lb
Actual Weight Right Back (A): 995 lb
Actual Weight Right Front (B): 995 lb
Actual Weight Left Back (C): 1225 lb
Actual Weight Left Front (D): 1225 lb
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Result: FAILED
Result Description: The live weight is not within the range of +/- 1.05% for all 4 corners.
The following corners failed: C D.
Load Cell 1 is Healthy.
Load Cell 2 is Too Low. (1.47 mV, minimum is 1.4703 mV)
The pre-test weight was too heavy. (995 lb > 5 lb)
ADDITIONAL TEST DATA
Scale Weight: 1225 lb
Max Load Cell 1: 2.699986 mV
Max Load Cell 2: 2.699986 mV
Load Cell 1 mV: 1.230286 mV
Load Cell 2 mV: 1.469369 mV
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

Figure 6-25. Corner Weight Test Pass and Fail Examples

6.7.5 Fork Angle Test Entry Examples

12/09/2024 05:06:46 PM:
Angle Test
PRE-TEST DATA
Scale Weight: 0 lb
Load Cell 1 mV: 0.395563 mV
Load Cell 2 mV: 0.396607 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Scale Weight: 0 lb
Result: PASSED
Result Description: The pitch angle of 0.6 is within the range of +/- 7 degrees.
The roll angle of -0.1 is within the range of +/- 3 degrees.
ADDITIONAL TEST DATA
Scale Weight: 0 lb
Max Load Cell 1: 0.395563 mV
Max Load Cell 2: 0.395563 mV
Load Cell 1 mV: 0.395590 mV
Load Cell 2 mV: 0.396552 mV
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

12/09/2024 05:08:16 PM:
Angle Test
PRE-TEST DATA
Scale Weight: 0 lb
Load Cell 1 mV: 0.395563 mV
Load Cell 2 mV: 0.396607 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Scale Weight: 0 lb
Result: WARNING
Result Description: The pitch angle of -6.4 is outside the range of +/- 2 degrees.
The roll angle of -0.3 is within the range of +/- 3 degrees.
ADDITIONAL TEST DATA
Scale Weight: 0 lb
Max Load Cell 1: 0.395563 mV
Max Load Cell 2: 0.395563 mV
Load Cell 1 mV: 0.395553 mV
Load Cell 2 mV: 0.396441 mV
Pitch Angle: -6.4 degrees
Roll Angle: -0.3 degrees
UID: 174570
User Mode: 600

Figure 6-26. Angle Test Pass and Warning Examples

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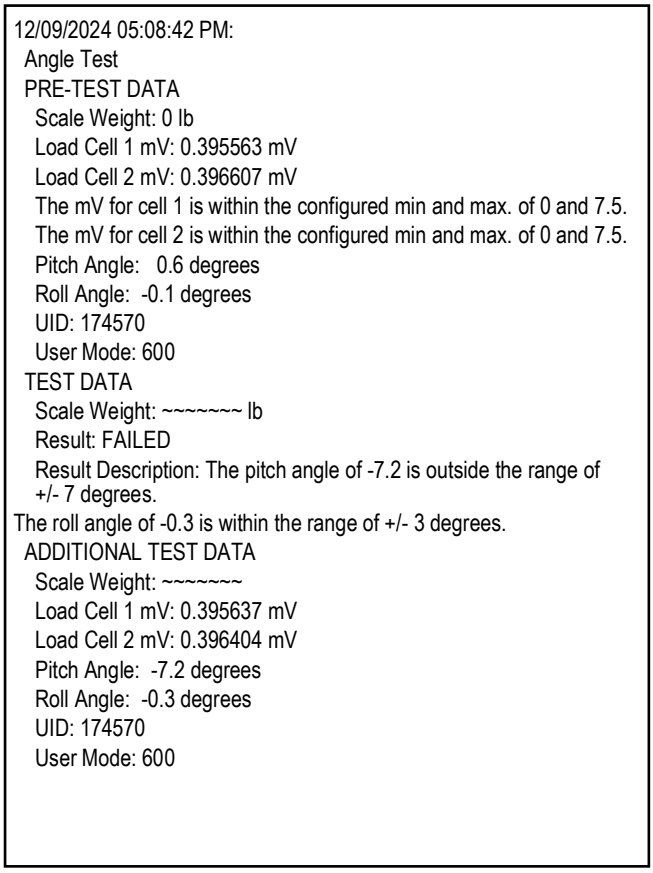

Figure 6-27. Angle Test Fail Example

6.7.6 Health Test Entry Examples

12/09/2024 05:09:43 PM:
Scale Health Test
PRE-TEST DATA
Scale Weight: 0 lb
Load Cell 1 mV: 0.395738 mV
Load Cell 2 mV: 0.396515 mV
The mV for cell 1 is within the configured min and max. of 0 and 7.5.
The mV for cell 2 is within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Scale Weight: 0 lb
Result: PASSED
Result Description: All Health Checks Passed.
Load Cell 1: 0.40 mV
Load Cell 2: 0.40 mV Indicator Data Error: No Error
Snapshot is Valid: True
Underload Status: OK
Overload Status: OK
Power Supply Status: OK
Load Cell 1 Status: 0.395710
Load Cell 2 Status: 0.396487
ADDITIONAL TEST DATA
Scale Weight: 0 lb
Max Load Cell 1: 0.395738 mV
Max Load Cell 2: 0.395738 mV
Load Cell 1 mV: 0.395710 mV
Load Cell 2 mV: 0.396487 mV
Pitch Angle: 0.6 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

12/09/2024 05:19:31 PM:
Scale Health Test
PRE-TEST DATA
Scale Weight: ^^^^^^^ lb
Load Cell 1 mV: 9.866320 mV
Load Cell 2 mV: 9.648698 mV
The mV for cell 1 is not within the configured min and max. of 0 and 7.5.
The mV for cell 2 is not within the configured min and max. of 0 and 7.5.
Pitch Angle: 0.7 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600
TEST DATA
Scale Weight: ^^^^^^^ lb
Result: FAILED
Result Description: Overload Status Error
Load Cell 1 Does Not Look Healthy
Load Cell 2 Does Not Look Healthy
Load Cell 1: 9.87 mV
Load Cell 2: 9.65 mV Indicator Data Error: No Error
Snapshot is Valid: True
Underload Status: OK
Overload Status: OK
Power Supply Status: OK
Load Cell 1 Status: 9.866310
Load Cell 2 Status: 9.648716
ADDITIONAL TEST DATA
Scale Weight: ^^^^^^^
Load Cell 1 mV: 9.866310 mV
Load Cell 2 mV: 9.648716 mV
Pitch Angle: 0.7 degrees
Roll Angle: -0.1 degrees
UID: 174570
User Mode: 600

Figure 6-28. Status Health Test Pass and Fail Examples

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7.0 Appendix

7.1 Error Messages

The following are common error messages that may display occur.

7.1.1 Invalid Data Errors

Failed Connections

Invalid displays in the live weight display when the indicator fails to connect or parse data.

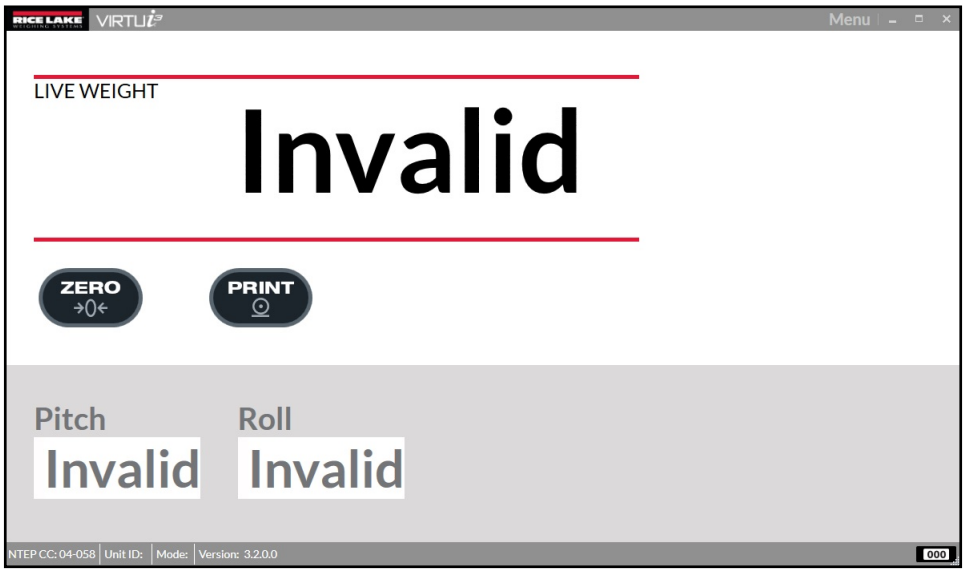

Figure 7-1. Invalid Data

7.1.2 Load Cell Overload

The live weight displays indicates when a load cell is overloaded. Typically occurs when gross value exceeds overload limit. Check configuration or signal input level.

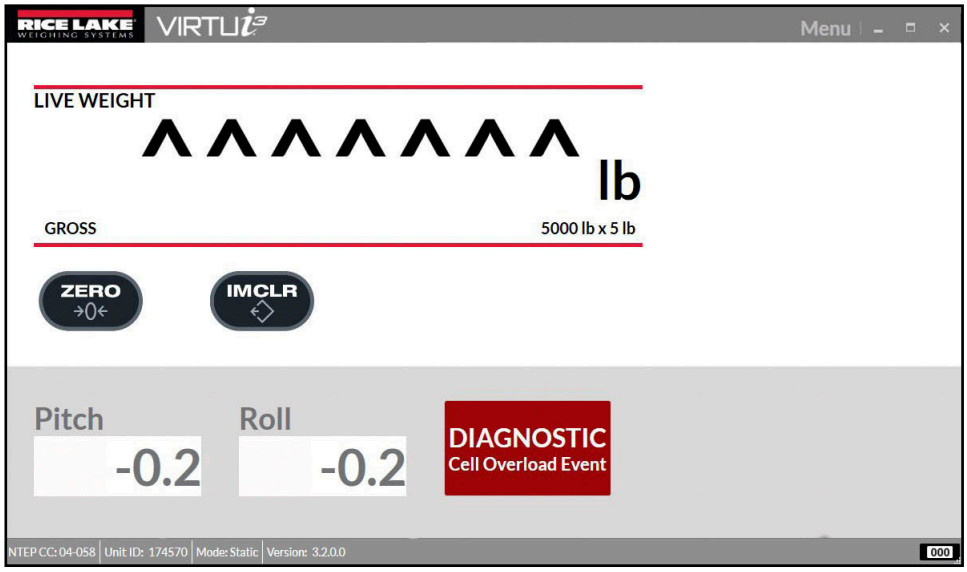

Figure 7-2. Cell Overload Warning

7.1.3 Load Cell Underload

The live weight displays indicates when a load cell is underloaded. Typically occurs when a gross value exceeds underload limit. Check configuration or signal input level.

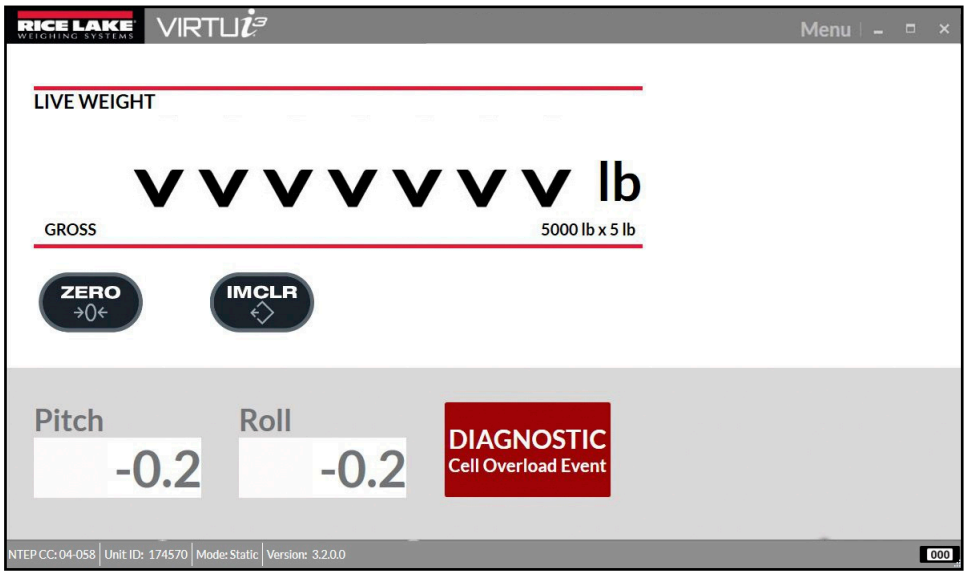

Figure 7-3. Cell Overload Warning

7.1.4 Angle Invalid

Pitch or roll values exceeded operating tolerances. Move forklift onto level ground and try again.

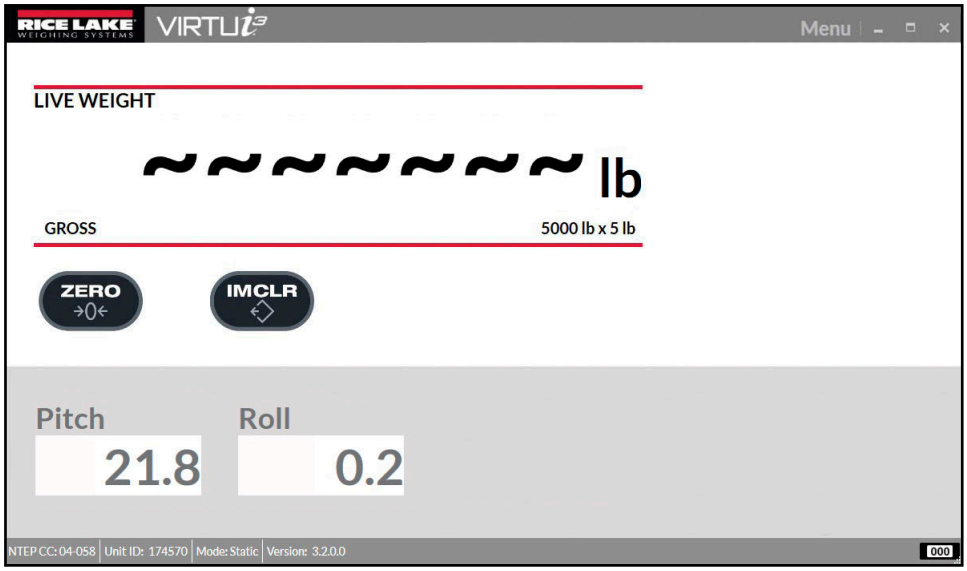

Figure 7-4. Invalid Angle

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7.2 Junction Box Firmware Update

The junction box firmware update tool is a stand alone application that is launched via the program files menu. Prior to using the firmware update tool, connect to the comm port ***COM-None*** via the Scale Communications menu. Close the VIRTUi3 Client to release the junction box communication port. Follow the instructions in the application.

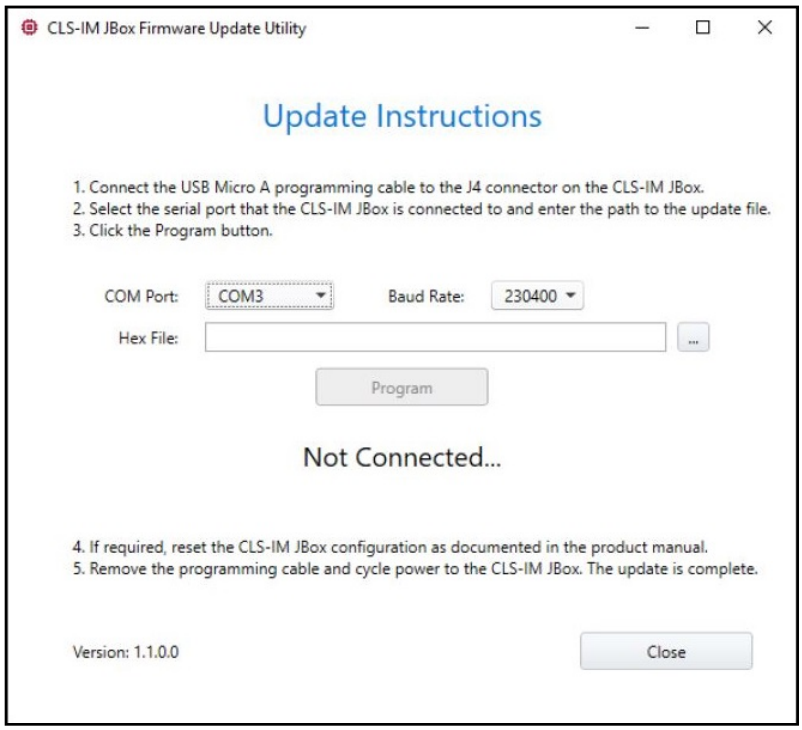

Figure 7-5. Firmware Update Screen

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