CLS-M2

Cargo Lift Scale

Installation & Service Manual

RICE LAKE®
WEIGHING SYSTEMS

PN 151718 Rev F

Contents

1.0 Introduction

The CLS-M Cargo Lift Scale is a rugged, dependable cargo lift scale that can withstand many years of repeated use. When mounted on a forklift, the CLS-M saves time and money by allowing you to weigh loads immediately instead of carrying the load to a floor scale.

This manual is for trained and qualified personnel responsible for installing and servicing the CLS-M Cargo Lift Scale. This manual covers information on the installation and service of the scale carriage, coiled interface cable and the power/communication box.

1.1 Safety

Safety Signals

Safety Symbol Definitions:

DANGER *Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.*

WARNING *Indicates a potentially hazardous situation that, if not avoided could result in death or serious injury, and includes hazards that are exposed when guards are removed.*

CAUTION *Indicates a potentially hazardous situation that, if not avoided may result in minor or moderate injury.*

Important *Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.*

General Safety

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in the Installation, Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing System dealer for replacement manuals. Proper care is your responsibility.

WARNING

Failure to heed may result in serious injury of death.

Some procedures described in this manual require work inside the power/communication box. These procedures are to be performed by qualified service personnel only.

Take all necessary safety precautions when installing the scale carriage including wearing safety shoes, protective eye wear, and using the proper tools.

Do not allow minors (children) or inexperienced persons to operate this unit.

Do not operate without all shields and guards in place.

Do not jump up and down on the scale.

Do not use for purposes other then weight taking.

Do not place fingers into slots or possible pinch points.

Do not use any load bearing component that is worn beyond 5% of the original dimension.

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Do not use near water.

Keep hands, feet and loose clothing away from moving parts.

1.2 Considerations Before Installation

1.2.1 Forklift Derating

Capacity Reduction Calculation

While the *CLS-M3* will fit most typical forklifts, there are considerations that must be taken into account prior to installation. Due to the extra weight of the *CLS-M3*, the net lifting capacity of the forklift is reduced by approximately 10 percent. Use the formula below to calculate the amount to down-rate the lifting capacity and determine the net capacity of the forklift.

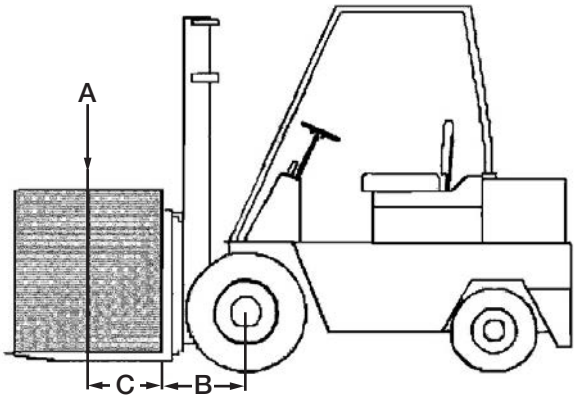
$$\text{Net Capacity} = \frac{A\,(B + C) - D\,(E + F)}{E + G + H}$$

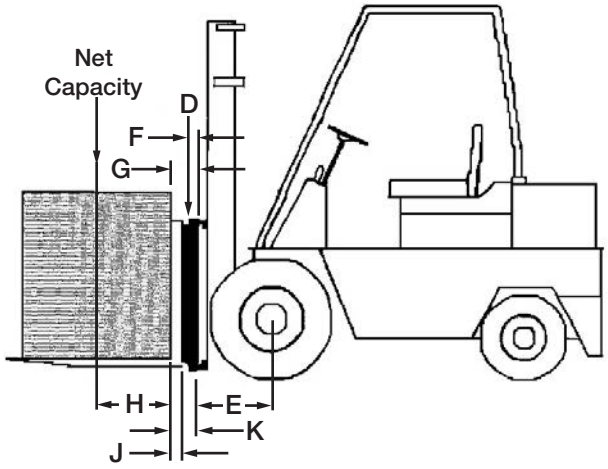
A = Truck Basic Capacity in pounds	B = Inches from front wheel center line to fork face
C = Inches from face to truck rating point (usually 24)	D = Weight of scale in pounds
E = Inches from front wheel center line to carriage face	F = Inches from carriage face to scale horizontal center of gravity (HCG)
G = J + K (inches from carriage face to rear face of load	H = Inches from fork face to new truck rating point
J = Thickness of fork	K = Thickness of scale

CLS Classes and ID Plates

During the initial sale or installation of the *CLS-M3*, remind the customer that they must have an updated ID plate on the forklift stating the new lifting capacity and center of gravity information. This is require3d per OSHA rules and regulations.

	28 inch	34 inch	38 inch
Vertical enter of gravity (VCG) of scale =	8.06	8.06	10.15
Horizontal center of gravity (HCG) of scale =	2.09	2.09	2.83
Effective thickness (ET) of scale =	4.55	4.55	6.06
Weight of scale =	392	420	987





1.2.2 Forklift Battery and CLS Installation

CAUTION

Take into consideration that the indicator power source will be connected directly to the battery of the forklift. Most typical is 12 volts for propane, gas and diesel forklifts.

12 volt systems must have a negative ground so ensure the forklift has a negative ground electrical system. The CLS will not operate on a positive ground forklift. Refer to the forklift users manual to further verify grounding requirements.

The standard CLS scales use 9-36V power supply for use on 12 V batteries. If the forklift is an electric system, make sure to install:

PN 166162 – DC-DC Converter, CLS

PN 166161 – Power Line Filter, CLS (for static protection)

1.3 Power / Communication Box Introduction

The *Power/Communication Box*, PN 132416, transmits data between the scale and the handheld device. The *CLS-M Operator Label*, PN 126343 (see Figure 1-2) on the box, provides information about the LED lights in the box and basic calibration and service instructions for users of the CLS-M. There is also a help line number to call if more detailed instruction is required.

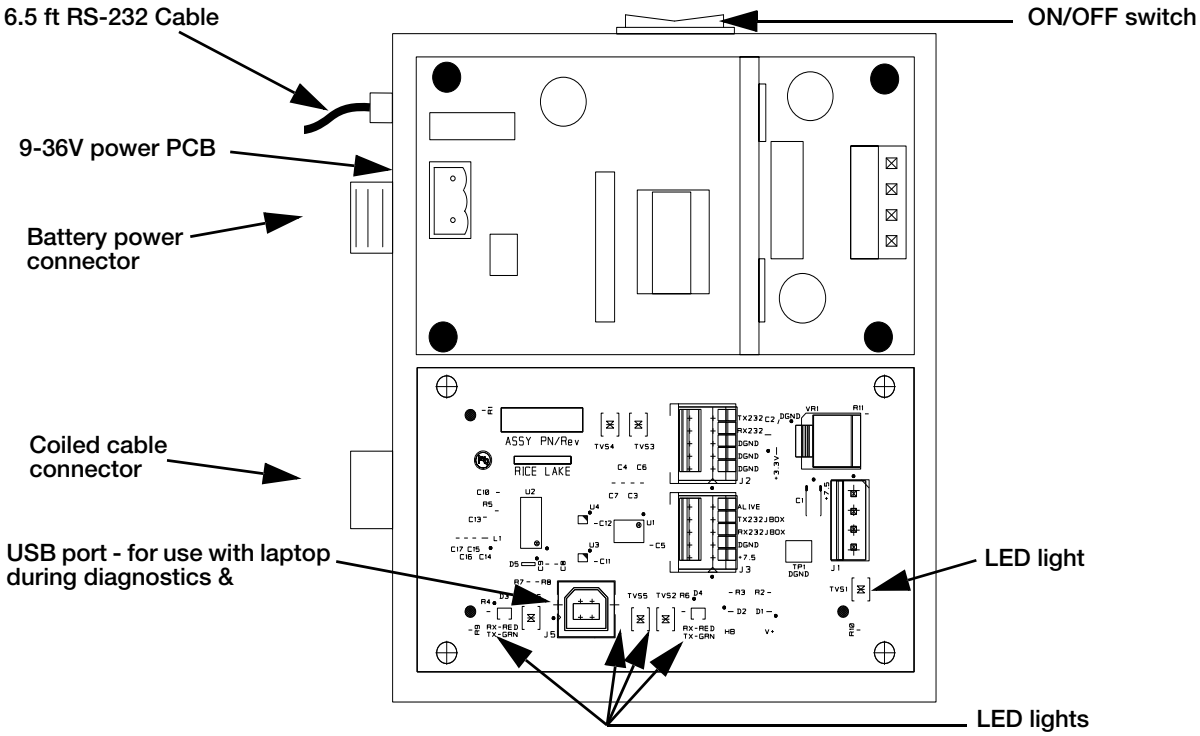


Figure 1-1. Power/Communication Box Schematic

CLS-M2 Forklift Scale

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Green LED "PWR" LED1
LED indicates COM PCB is receiving power from 9-36v DC board.
If off, check fuses, low forklift battery.

Green LED "HB" D2
Flashing LED Indicates heartbeat of the carriage J-Box. If not flashing, check for coiled cable damage or j-box error.

Red/Green LED "RS-232" D4
Green transmit, Red receive, indicates transmission through RS-232 port. If not flashing check CV61 power, restart Virtui2 audit trail and Virtui service using Virtui2 configurator, check coiled cable, COM PCB, and carriage j-box in that order.

Red/Green "USB" D3
Flashing indicates data communications through USB port.

Troubleshooting
Click on the about button in Virtui2.

Calibration and Service
Move carriage j-box sealing switch to SET position, connect USB cable and wait for device installation on PC. Open CLS-M Revolution Software. When complete carefully unplug USB cable, move calibration switch back into run position.

Contact Information
Call 1-888-225-7597 for dedicated forklift scale service and support.

PN 132420

Figure 1-2. Power/Communication J-Box Label

1.4 Accepting Weight Data to the Power/Communication J-Box Introduction

The power/communication box receives data from the load cell j-box through the *Coiled Interface Cable*, PN 125395.

Figure 1-3. Coiled Interface Cable Connecting the Power/Communication Box and Load Cell J-Box

1.5 iQube2 CLS Junction Box

The latest *CLS-M3* Series scales includes an updated version of the iQube2 junction box. This design is built to allow service technicians to easily service the unit in the field. Below is an overview of the new features and functions.

It also replaces the older style j-boxes, originally used in the *CLS-M3* Series scales. .

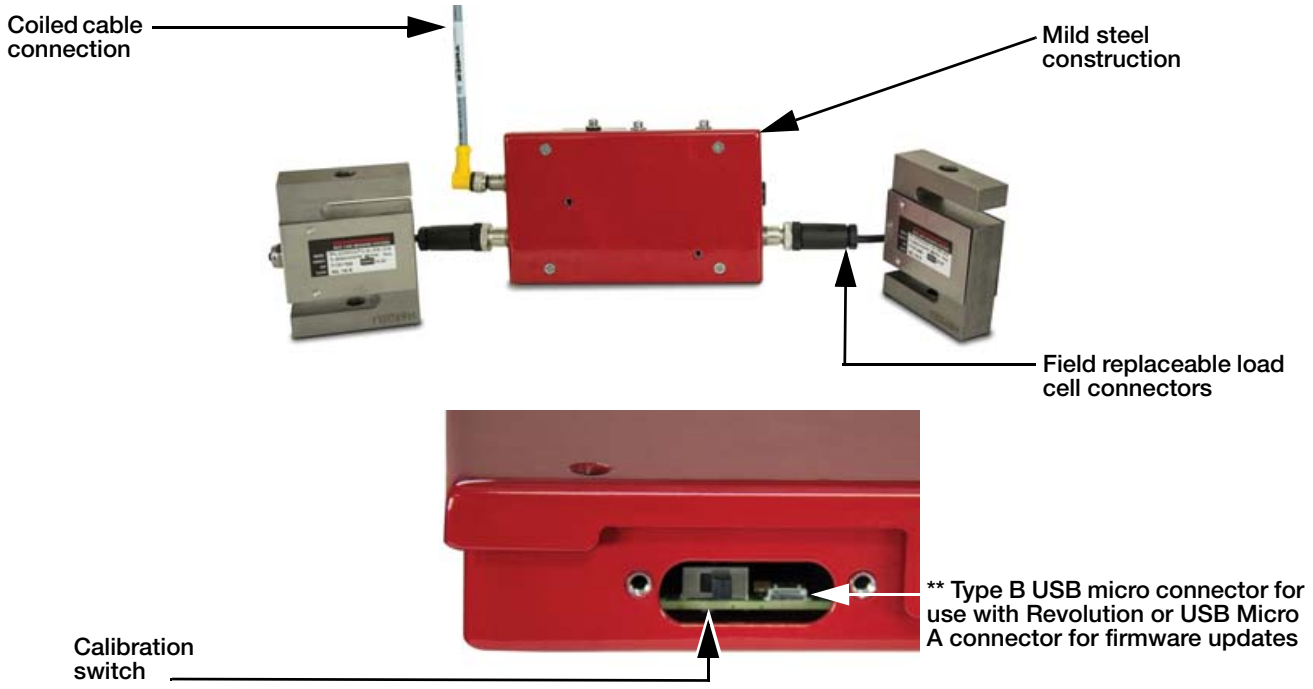


Figure 1. iQube2 Junction Box

** Allows for connection to Revolution from the front of the forklift, using Type B USB micro connector. A built-in USB driver allows easy interface capabilities. Simply connect to Revolution and select the new USB COM port generated. This can help eliminate the coiled cable and communication/power box. If updating firmware, switch to a USB Micro A connector.

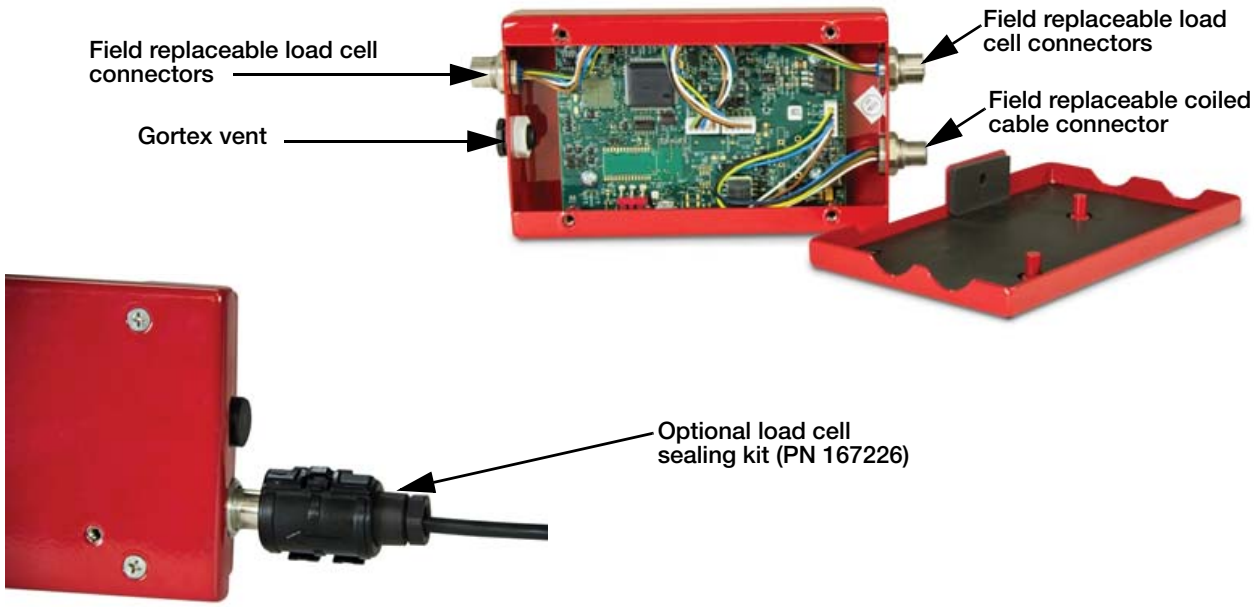


Figure 1-4. iQube2 Junction Box Component Parts

2.0 Scale Base Installation

This section describes procedures for installing the *Cargo Lift Scale* base.

WARNING ***Take all necessary safety precautions when installing the scale carriage, including wearing safety shoes and protective eyewear, and using the proper tools, which are listed in Section 2.4.***

The *Cargo Lift Scale* is shipped from the factory with the scale already calibrated and all settings stored in the j-box. Minimal adjustments and calibration might be necessary once the scale is installed onto the forklift. Those calibration steps are contained in Section 4.6 on page 36.

2.1 Before Installation

Before installing the *CLS* on a forklift, the forklift should be in good operating condition for optimal weighing accuracy. Look for the following items prior to installing the *CLS* onto a forklift:

- Inspect the forks for any damage.
- Check the locking pin on the forks for proper function.
- Check and adjust the lift chain so the heel of the forks have 1/2 to 1 inch of clearance from the floor when the carriage is down and the mast is vertical.
- The slot for the center pin should be clear of grease and debris.
- The top cleats of the forklift rest on the top of the scale and should remain clear of grease and debris that could alter the scale's performance.

The power/communication box will be connected directly to the battery of the forklift. The *CLS* scale works with 9-36 VDC power source.

CAUTION ***All systems must have a negative ground.***

2.2 Tools Needed to Install the CLS-M onto the Forklift

Once the forklift is deemed in good mechanical and operating condition, use the following tools to remove it from its shipping pallet and install onto the forklift.

Tool	Size	Purpose of Tool
Allen wrench	4 mm	For service only, to remove j-box
Cresent wrench	2 in adjustable	For adjusting the shim bolts and jam nuts.
Tin snips or band cutters	NA	To cut the plastic banding surrounding the CLS while on the pallet.
Torque wrench w/ 1/2" Allen	1/2 in	To tighten the cleats to 125 ft-lb.
Electric grinder		For grinding the center pin if necessary and the mounting bolts.
Wrench	7/16 in	To connect power/communication box to mounting plates.
Wrench & socket	9/16 in	To connect mounting plates to forklift carriage.
USB Type "A" to Type "B" Cable	6 ft min	Use with laptop for access to Revolution software for diagnostics, calibration and displayed weight.
Level	NA	To perform angle zero calibration.
Fish tape	6 ft min	Route power cable to forklift battery.
Crimping tool	NA	Battery connections.

Table 2-1. Recommended Tools for Unpacking and Installation of the CLS-M

2.3 Unpacking

The *CLS* is shipped upright on a sealed pallet with one or two scales per pallet, as shown in Figure 2-1.

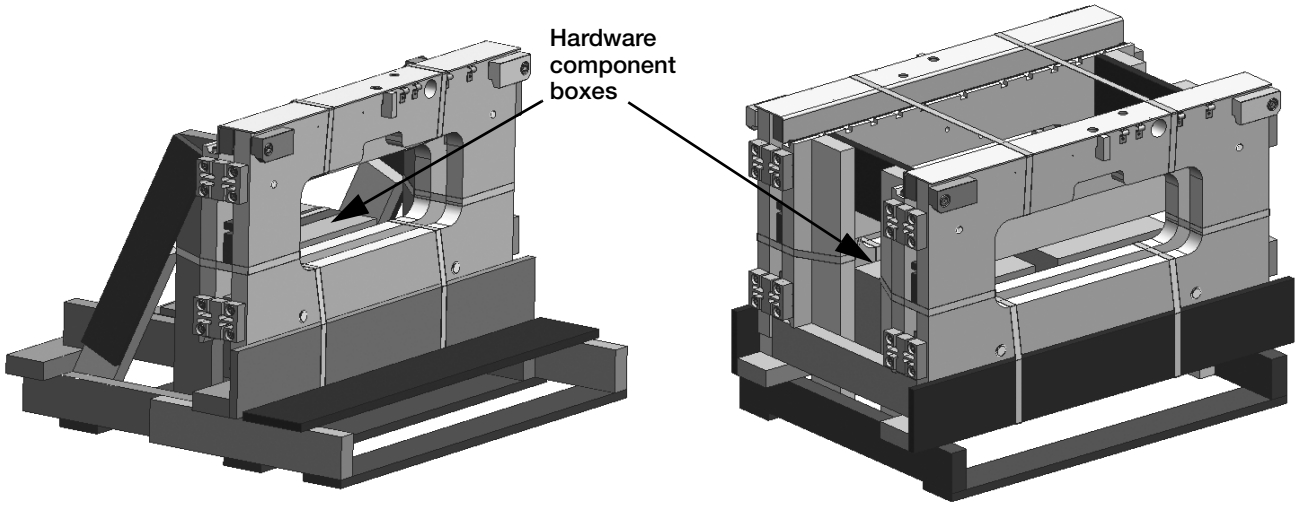


Figure 2-1. CLS-M Packaging

Upon receipt of the shipping pallet, inspect it for any visible signs of damage. Immediately after unpacking, visually inspect the contents to ensure all components are included and undamaged. The shipping pallet should contain the following:

- One or two scale carriage assemblies with cover plate
- Hardware component boxes, which include:
  - Two cleats with four bolts
  - One coiled interface cable
  - One power cable and hardware for battery connection
  - One power/communication box
  - One mounting kit for power/communication box with hardware

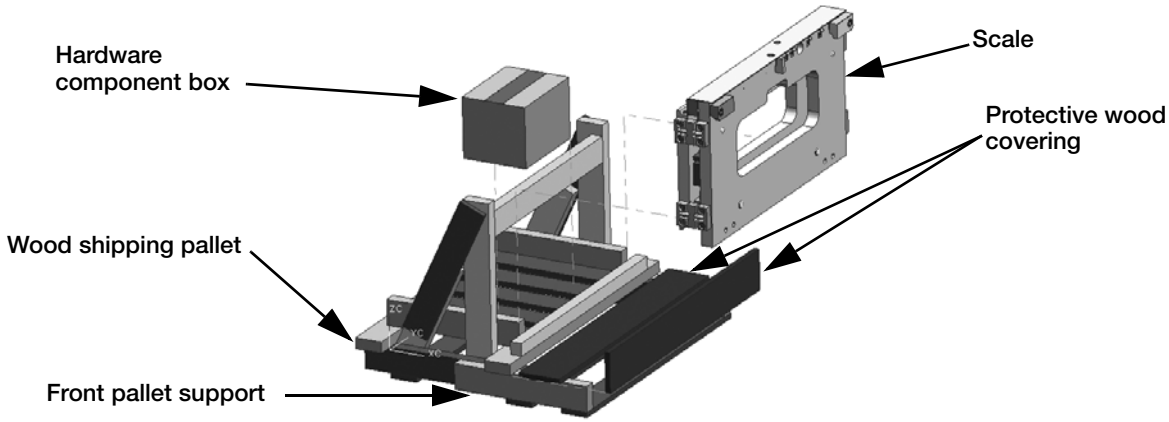
***Note** To ensure that all products received from the manufacturer are in good shape upon arrival, it is recommended to fully inspect all contents and properly fill out the bill of lading.*

If any parts were damaged in shipment, notify the shipper immediately.

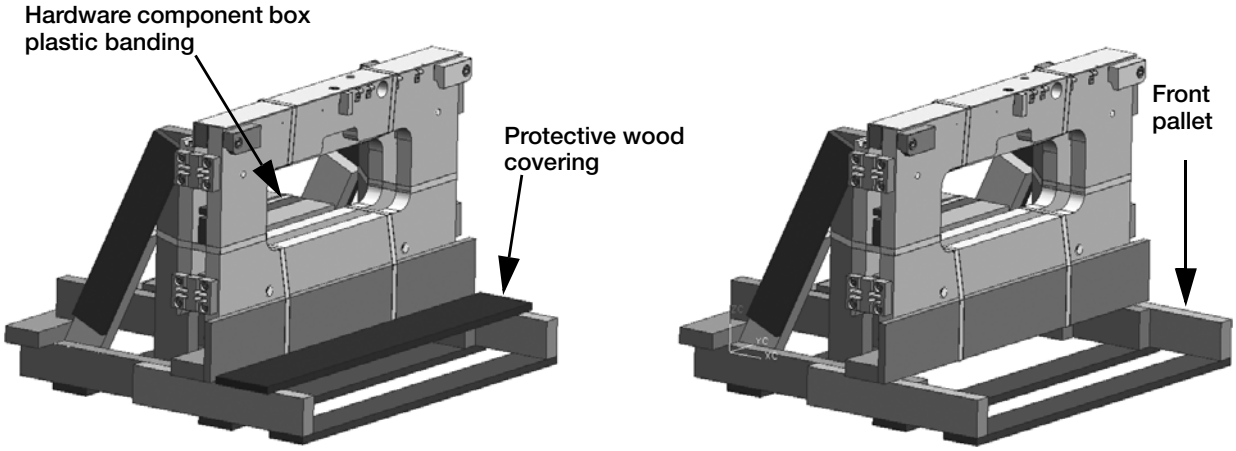
2.3.1 Unpacking a One Scale Configuration

The scale is shipped in an upright position as illustrated in Figure 2-2. The upright position allows for ease of installation. The power/communication box and accessories are located in a hardware component box.

1. Clip plastic band holding hardware component box in place and remove box.
2. Remove protective wood piece from the front of the scale.
3. Remove the front pallet support.
4. Clip the remaining plastic bands that are encircling the scale.
5. Remove the protective wood piece which protects the front of the scale.



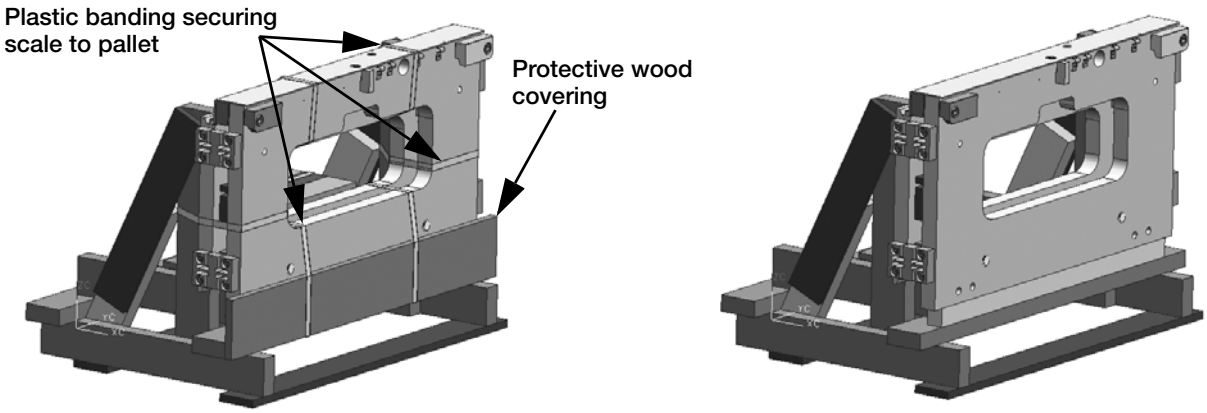
Exploded view of components



Step 1: Clip plastic band securing hardware component box

Step 2: Remove protective wood covering

Step 3: Remove front pallet support



Step 4: Clip remaining plastic bands

Step 5: Remove protective wood

Scale is now ready for installation

Figure 2-2. Scale Component Parts on Shipping Pallet for One Scale

2.3.2 Unpacking a Two Scale Configuration

The scales are shipped in an upright position as illustrated in Figure 2-3. The upright position allows for ease of installation. The power/communication box and accessories are located in a hardware component box.

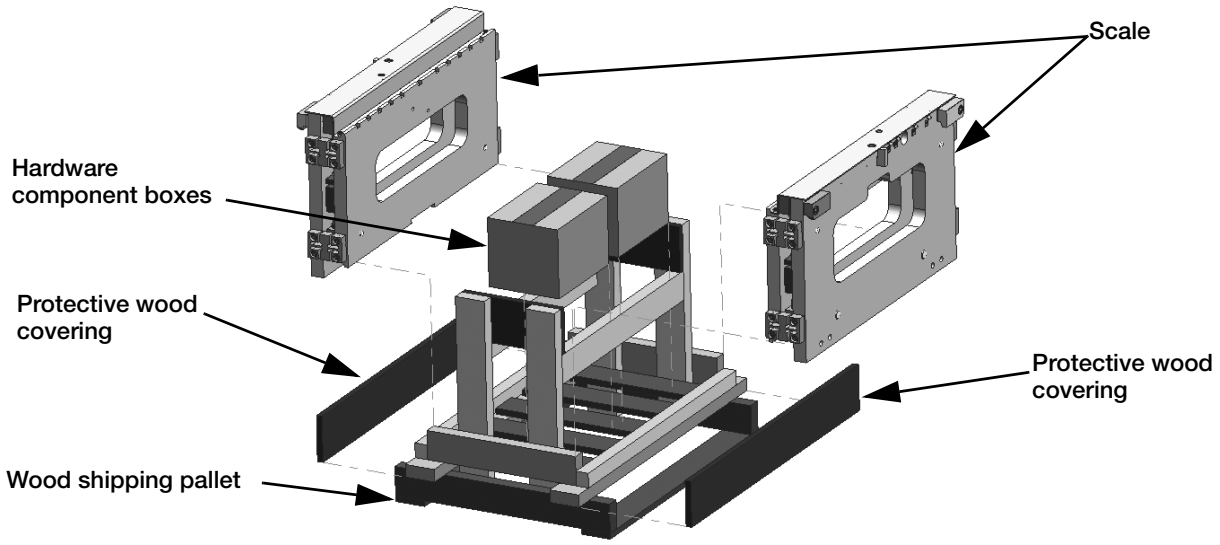
WARNING ***When installing from a two scale configuration, complete all of steps for scale one before clipping plastic bands securing second scale to the shipping pallet.***

1. Clip top plastic bands.
2. Clip plastic band securing cardboard boxes to shipping pallet.
3. Remove the cardboard boxes.
4. Clip plastic bands from scale one.
5. Remove protective wood covering for scale one.

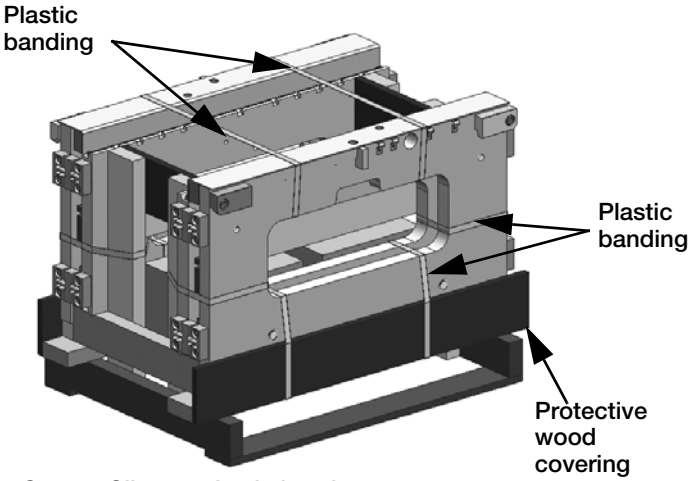
Scale one is ready for installation.

6. Once scale one has been installed, clip plastic bands from scale two.
7. Remove protective wood covering for scale two.

Scale two is now ready for installation.



Exploded view of components



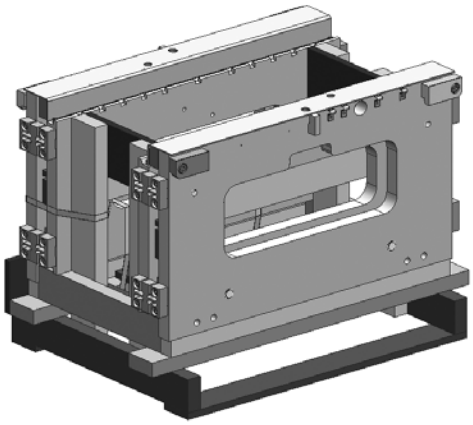
Step 1: Clip top plastic bands

Step 2: Clip plastic band to release hardware component boxes

Step 3: Remove hardware component boxes

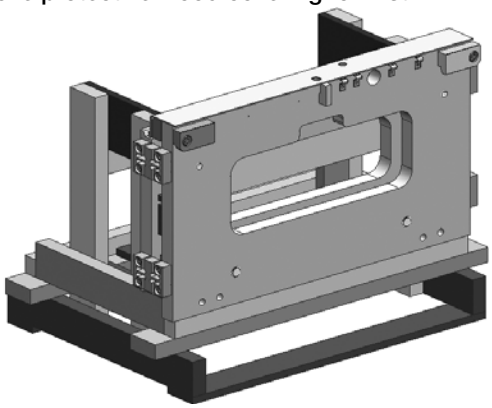
Step 4: Clip plastic bands from first scale

Step 5: Remove protective wood covering for first



Scale one is ready for installation.

DO NOT clip the plastic band from scale two until scale one is installed



Step 6: Clip plastic bands from scale two.

Step 7: Remove protective wood covering for second scale.

Scale two is ready for installation.

Figure 2-3. Scale Component Parts on Shipping Pallet for Two Scales

2.4 Scale Base Installation

Use the following steps to install the scale base to the forklift.

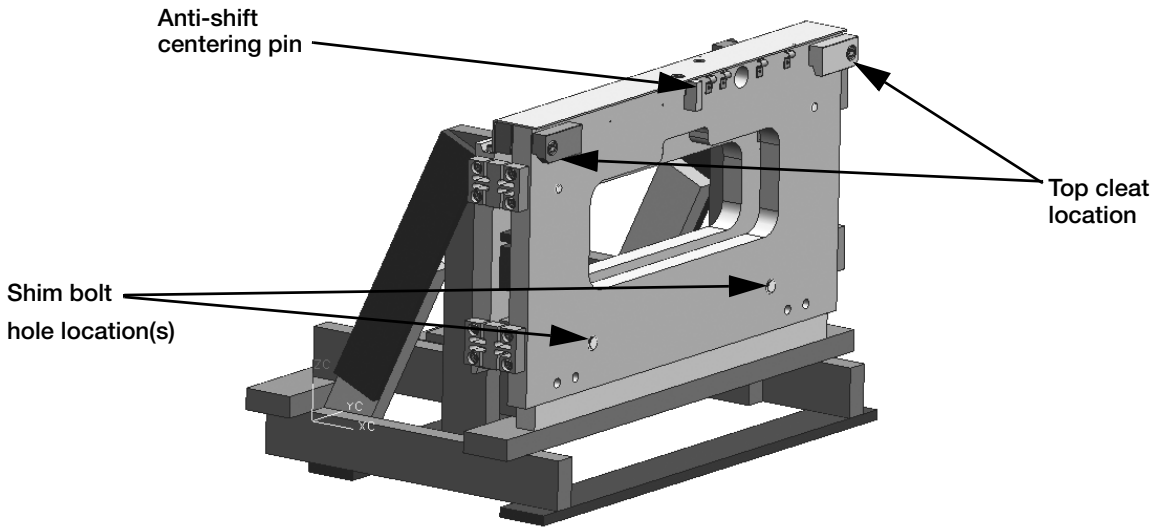


Figure 2-4. Anti-shift Centering Pin, Shim Bolts and Top Cleat Locations (One Scale Configuration Shown)

CAUTION ***Verify that the shim bolts are flush with the back plate of the scale. Not doing so will place the entire scale out of alignment when attaching it onto the forklift and will make it difficult to make final adjustments once the scale is mounted onto the forklift.***

1. Making sure the forks are removed from the forklift, move the forklift in close to the pallet and scale.
2. Ensure the anti-shift centering pin on the scale assembly is aligned with the center notch on the forklift carriage.

Note ***The scale's centering pin should be aligned with the middle notch of the forklift carriage. Verify that the centering pin is adjusted so that the pin is located well within the center notch area of the carriage. The centering pin should not touch the bottom of the notch on the original carriage, as this will cause side to side tilting of the scale. The outside top cleats provide support to the scale assembly and the centering pin only helps to position the scale on the forklift carriage. The centering pin should not bear any weight. If it does, the use of a grinder to grind down the centering pin will help remedy that.***

3. Tilt the mast forward slightly to catch the scale assembly.
4. Carefully and slowly raise the scale carriage slightly so the top cleats (cleat location shown in Figure 2-4) of the scale hook onto the forklift carriage. If they do not hook, push the scale toward the forklift as it is being raised.
5. Tilt the mast back to secure the connection and raise the scale to shoulder height.
6. Attach the bottom cleats to the bottom of the scale assembly (see Figure 2-5 for bottom cleat location), so that the lip of the cleat is behind the scale carriage.
7. Torque the bottom cleat retaining bolts to 125 ft-lb.

WARNING ***Failure to properly torque the bottom plate retaining bolts may result in bodily harm or damage to equipment.***

8. Adjust the shim bolts so there is a minimal clearance between the bottom cleats and the scale carriage of 0.020-inch thickness. This can be measured by using the included feeler gauge.

Note ***Failure to adjust shim bolts to proper clearance of 0.020 inches may result in binding, poor accuracy or improper fit of attachment to forklift.***

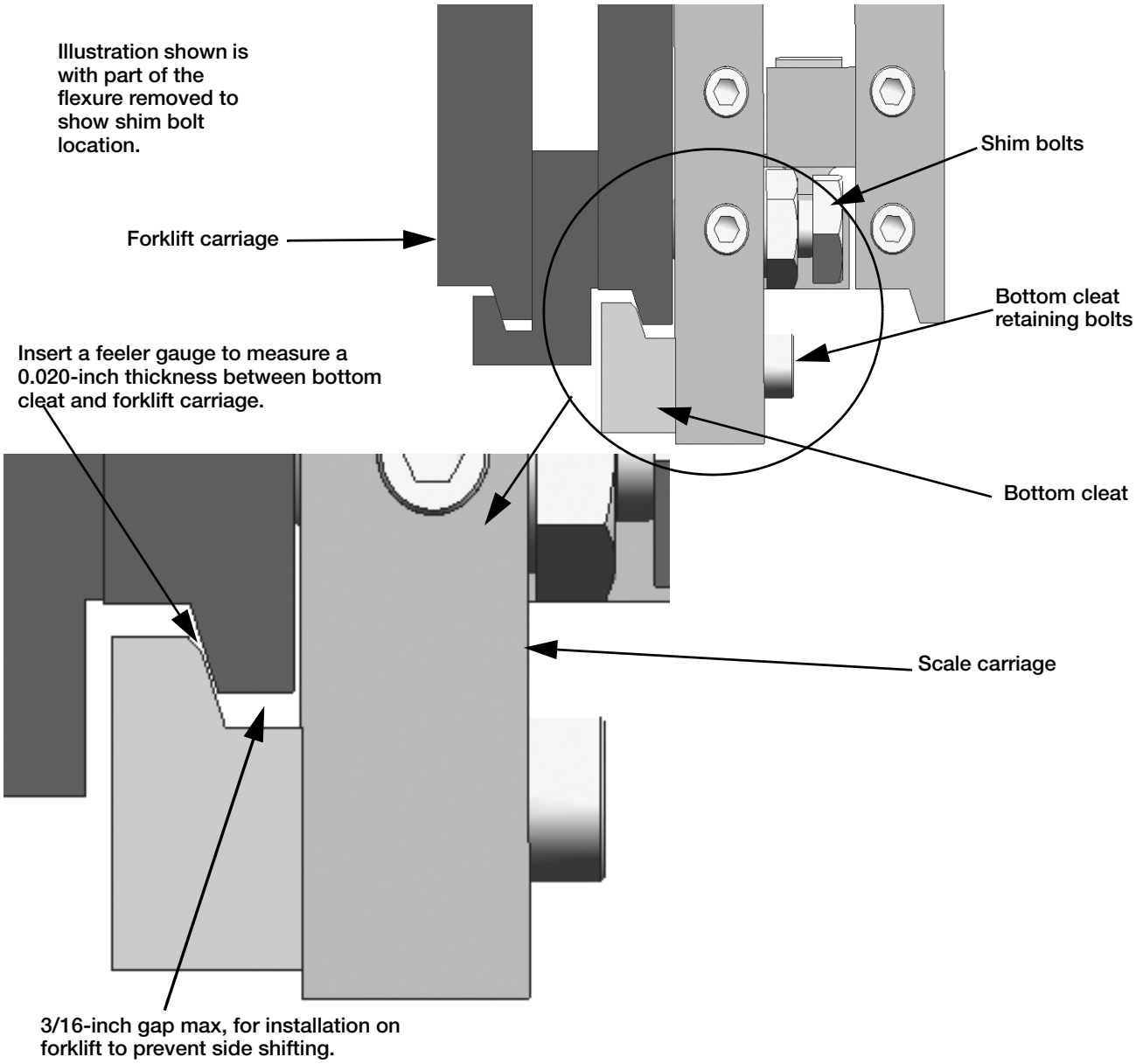


Figure 2-5. Bottom Cleat Location and Assembly

9. Upon successful installation and calibration verification, seal the carriage j-box and load cell quick disconnects for Weights and Measurements approval.

2.5 Connect the Coiled Interface Cable to J-Box

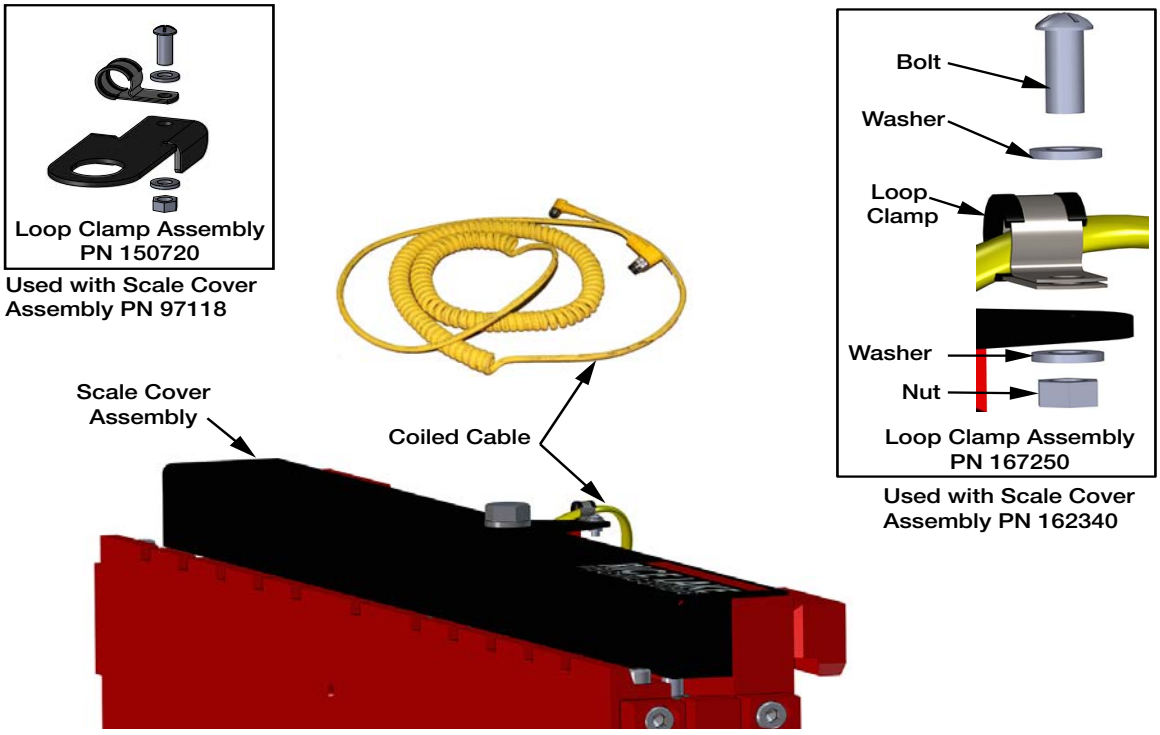


Figure 2-6. Connecting the Coiled Cable

1. Loosen the bolt holding the cover to the scale assembly and remove cover. See Figure 2-6.
2. Assemble loop clamp kit to the coiled interface cable.
3. Route the coiled cable through clips on backside of carriage toward middle. For proper coiled cable routing, tighten clips. Set the other end of the cable aside until the power/communication box is installed (See Section 3 on page 14).
4. Push the coiled interface cable through the hole in the scale and connect it to the j-box. See Figure 2-6.
5. Position the scale cover assembly and the loop clamp assembly to the scale and secure with the bolt and washer.

Note ***After successful installation (Section 2.0 and Section 3.0) and calibration (Section 5.0), replace the cover on the scale assembly and secure with bolt and washer.***

2.6 Install Forks onto Scale Assembly

The forks need to be installed onto the scale assembly.

1. Align a fork to the center of the scale assembly making sure it is over the top of the assembly.
2. Lift the carriage slightly to set the fork, and then slide the fork to the side of the scale. Let it stop in the 2nd notch from the end and latch it in place.
3. Repeat process for other fork, sliding it the opposite direction on the scale.

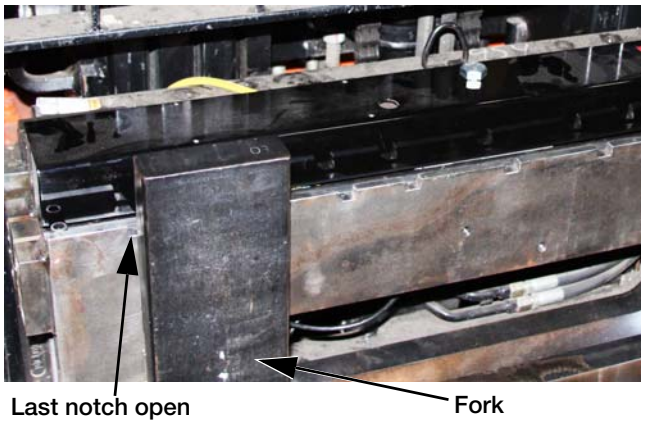


Figure 2-7. Fork Attachment

Note ***For accurate weighing, it is best to leave forks at the second notch from the outside edge of the scale.***

3.0 Power/Communication Box Hardware Setup

3.1 Mounting the Power/Communication Box

To mount the Power/Communication Box, you will need the contents from the *Plate Assembly Kit* (PN 125759). Mounting plates will span the bars of the overhead guard to secure the box to the inside of the overhead guard. The layout of the overhead guard will determine the orientation of the mounting plates. They will need to span across at least 2 of the braces. Typical location for Power/Communication Box will be the upper right hand corner of overhead guard.

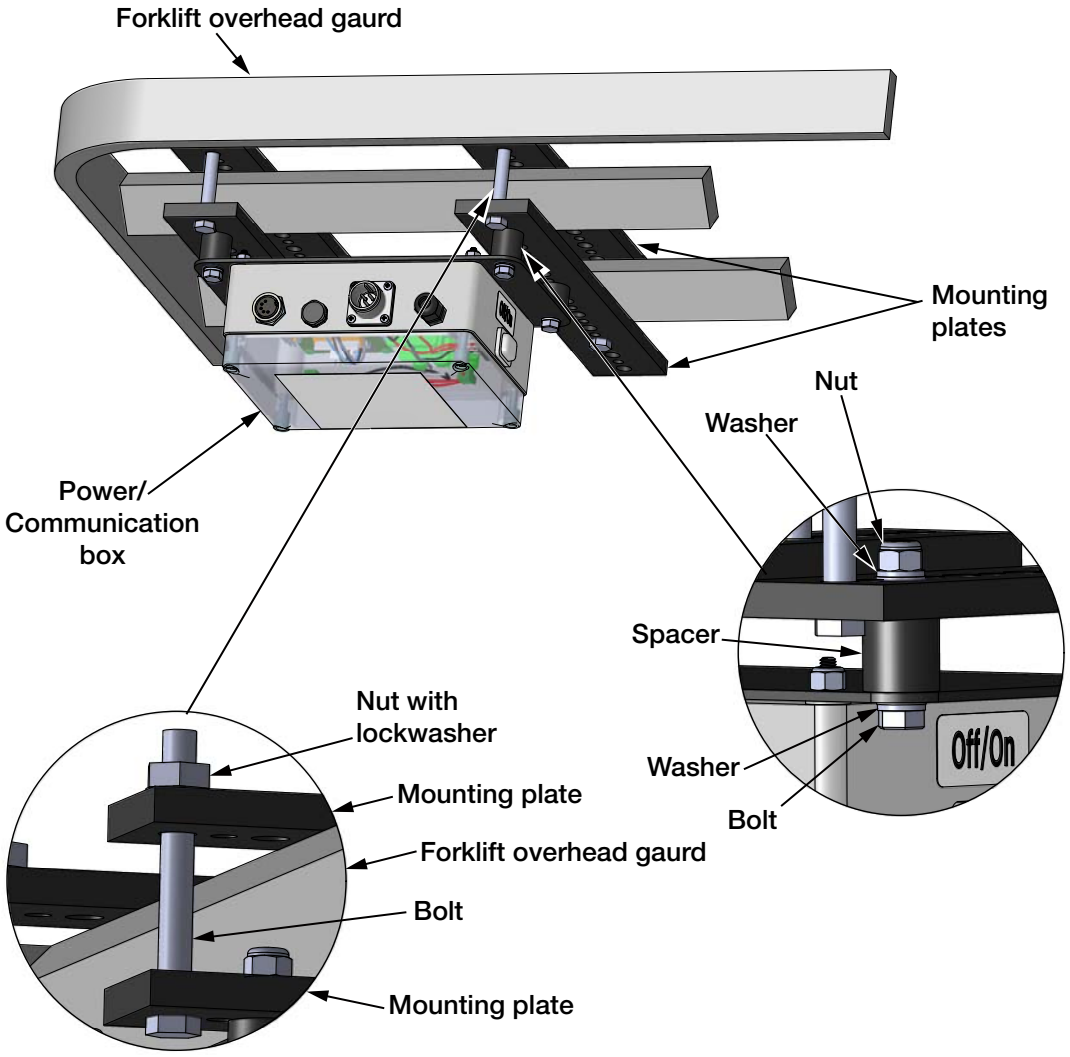


Figure 3-1. Power/Communication Box Installation

1. When deciding the location, hold the plates with Power/Communication Box to the inside of the overhead guard and decide the best holes to use for installation of the Power/Communication Box to the mounting plates.
2. After holes for use are determined, using the (4) spacers from the kit, align the Power/Communication Box mounting holes with the selected holes of two mounting plates.
3. Secure with (4) 1/4-20 x 1 3/4" Cap Screws, (8) washers and (4) Nuts.
4. Place remaining two mounting plates on the top of forklift overhead guard at the desired location.
5. Align the Power/Communication Box assembly with top plates and secure to top plates using (4) 3/8-16 x 3" bolts, lockwashers and nuts (included in kit). Tighten until snug.

Note ***Orientation and placement of power/communication j-box mounting plates will vary dependant on forklift overhead guard assembly.***

Typical location for Power/Communication J-Box is right hand side of overhead guard.

3.2 Cable Connections

CAUTION *DO NOT connect Coiled Interface Cable into Power/Communication Box until power hook-up is complete.*

3.2.1 Supplying Power to the Power/Communication Box From the Forklift Battery

CAUTION *The indicator power source will be connected directly to the battery of the forklift. Most typical is 12 volts for propane, gas and diesel forklifts.*

12 volt systems must have a negative ground so ensure the forklift has a negative ground electrical system. The CLS-M Cargo Lift Scale will not operate on a positive ground forklift.

Refer to the forklift user's manual for further verification of grounding requirements.

The power/communication box draws its power from the forklift battery. After it is mounted, run the power cable along the shortest path that provides protection for the cable away from moving or hot objects and pinch points, to the forklift battery. Secure the cable at several points with cable ties.

Cable is required to run inside the roll cage tubing, provided there are access holes for this purpose, with the use of a fish tape. If the cable is run through a hole in a tube or panel, be sure the cable is protected against chaffing.

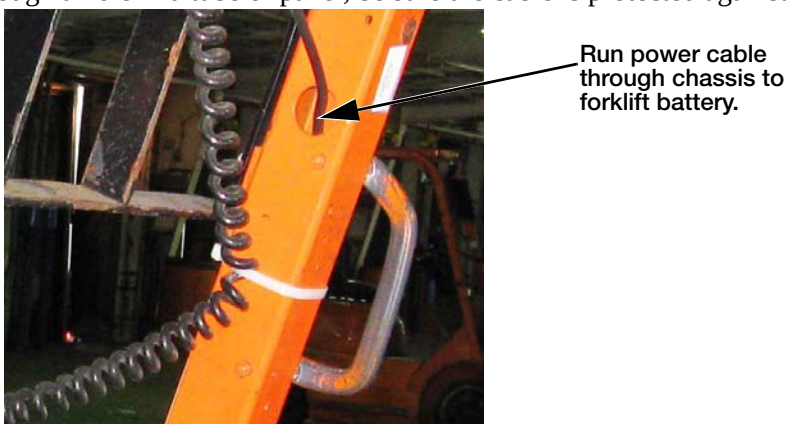


Figure 3-2. Routing Power Cable to the Forklift Battery

Note *Each installation is unique, it will depend on model and style of the forklift.*
When routing cables do not obstruct the view of OSHA labels on the forklift.
Avoid running wires anywhere they could potentially be damaged. It is suggested you:

- *Do not let the cable touch or run along anything that gets very hot, such as exhaust.*
- *Keep the cable away from moving parts, including control linkages and fan blades.*
- *Do not place the cable where it will be pinched by the compartment cover when closed.*
- *Do not run the cable up against, or directly across the ignition wires.*
- *Do not let the cable come in contact with engine fluids.*
- *Secure the cable with cable ties at several points to prevent movement or loosening.*
- *Inspect the cable often to ensure it has suffered no damage.*

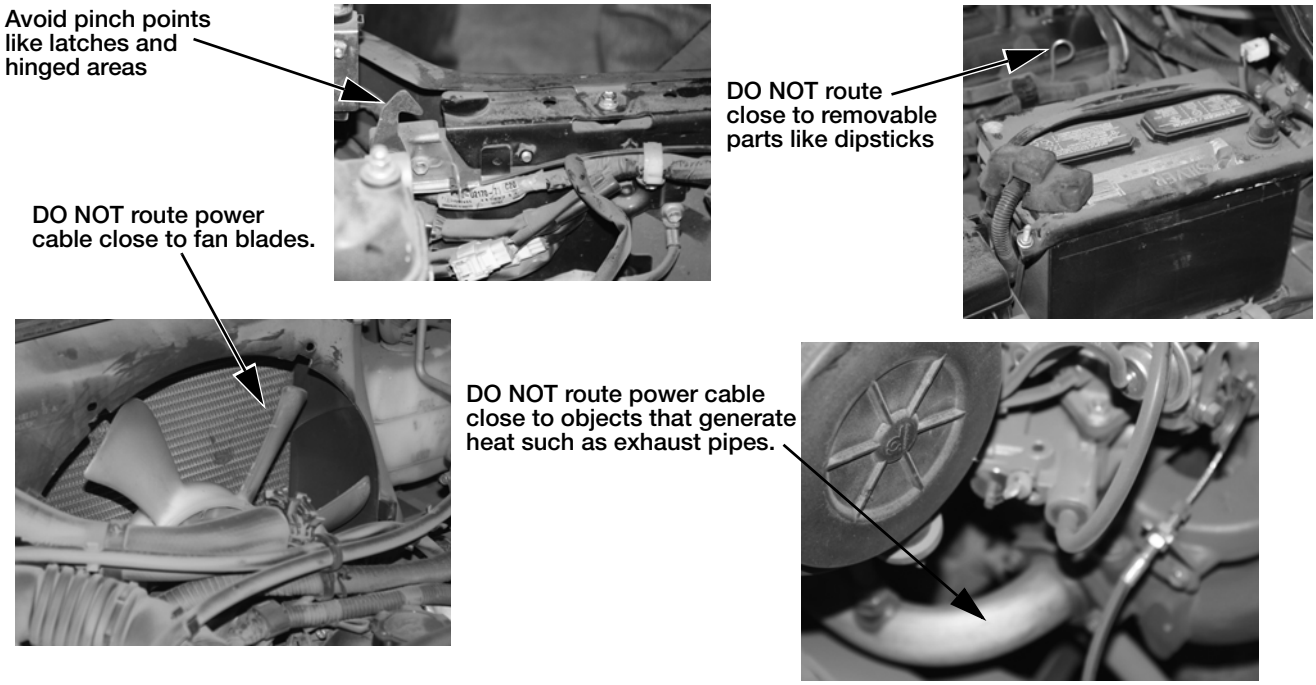


Figure 3-3. Areas to Avoid When Running Power Cable

3.2.2 Power Cable To Battery Connection

1. An in-line fuse is also included with the CLS-M Cargo Lift Scale. The fuse comes enclosed in an in-line fuseholder (shown in Figure 3-4) with a terminal connector, connect the fuse assembly to the power cable assembly using the terminal connectors.

Figure 3-4. In-line Fuse (PN 130129)

2. If required, prepare the battery end of the fuse holder for connection by attaching the terminals to the three wires. Ensure there is enough wire exposed, slip the terminal over the wire and use a crimping tool to secure terminal to the wire.

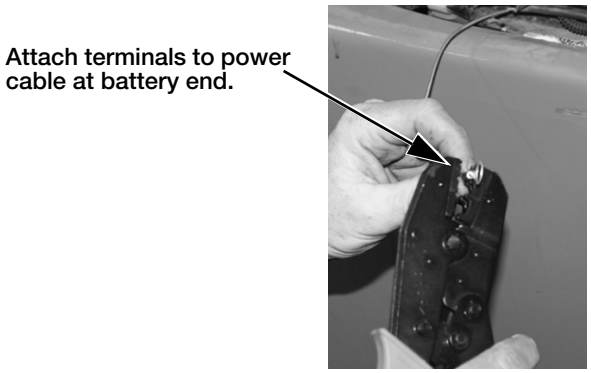


Figure 3-5. Attach Terminals to Power Cable - Battery End

3. Lift the boot from the positive battery cable (if present) and remove the nut from the clamp that connects the cable to the battery post.

4. Place the positive (red) wire terminal end over the stud from the positive battery clamp and replace the nut to secure the wire to the clamp.

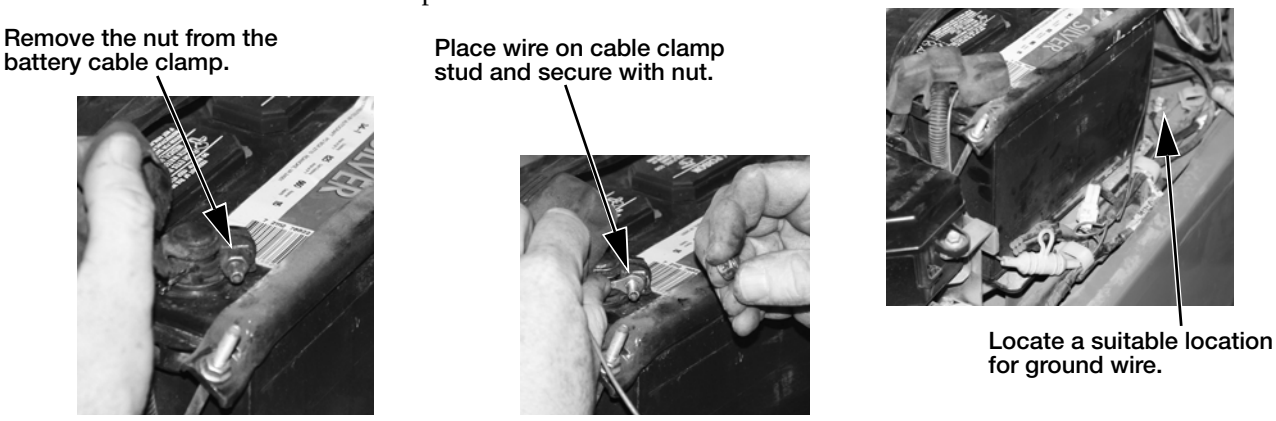


Figure 3-6. Connect Positive Wire to Battery Cable

5. Follow the same procedure to connect the negative (black) wire to the negative battery cable clamp.
6. Connect ground (blue) wire to a suitable location on the chassis.
7. After the connections are made at the battery, connect the cable to the power/communication box.

Note ***Supplied termination hardware includes (3) 1/4" eyelets for 1/4" bolts.***

Wire Color	Signal
Red	Positive on battery
Black	Negative on battery
Blue	Chassis ground

Table 3-1. Power Hookups to Forklift Battery

3.2.3 Routing the Serial Communications Cable

CAUTION ***DO NOT plug the coiled interface cable into the Power/Communication Box until power hookup is completed.***

Figure 3-7. Coiled Interface Cable

Special care should be taken when routing the coiled interface cable. To ensure that the cable is installed properly and away from situations that could cause it harm use the following steps:

1. Mount the Power/Communication Box to the forklift per instructions in Section 3.1.
2. The cable was connected to the load cell j-box during the scale installation. Retrieve the cable and route to the Power/Communication Box from the forklift scale.

Note ***Routing of cable will vary depending on forklift style. The preferred route for a single stage forklift is through the center of the mast.***

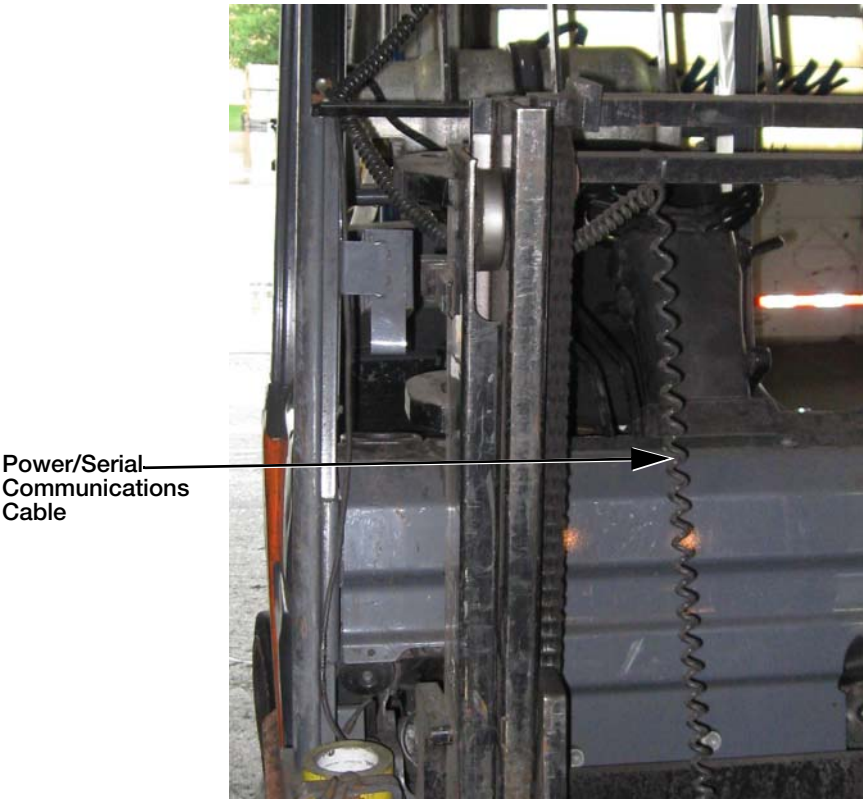


Figure 3-8. Signal Cable Located Between the Scale and the Indicator

3. Secure with cable ties at the bottom of the scale and at the top of the mast.
4. Slowly and carefully extend the mast to all positions to confirm that the cable isn't pulled too tight or that there are no pinch points along the way.
5. Check for proper signal cable clearance as the side shifter (if used), is moved back and forth.
6. After power hook-up is completed plug the power connector into the Power/Communication Box.

Note ***When routing cables do not obstruct the view of OSHA labels on the forklift.***

3.3 Powering the Power/Communication Box.

The Power/Communication Box contains the power supply board and the USB/Bluetooth Communication board.

1. To turn the Power/Communication Box on push the power switch on the side of the box. Switch will light when power is on.

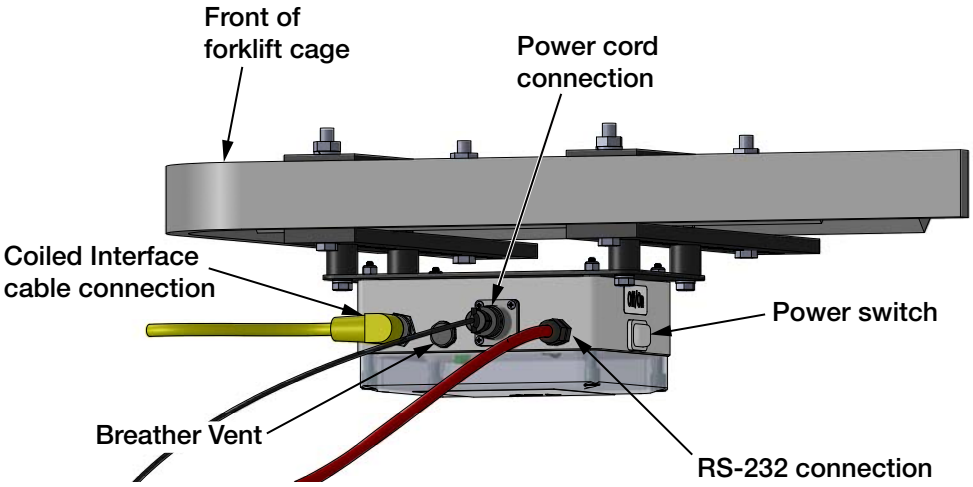


Figure 3-9. Power Switch on Power/Communication Box

There are four LED lights contained in the box that are visible through the clear cover. The label affixed to the clear cover indicates what each light signifies as follows:

CLS-M2 Forklift Scale

RICE LAKE WEIGHING SYSTEMS

Green LED "PWR" LED1
LED indicates COM PCB is receiving power from 9-36v DC board.
If off, check fuses, low forklift battery.

Green LED "HB" D2
Flashing LED Indicates heartbeat of the carriage J-Box. If not flashing, check for coiled cable damage or j-box error.

Red/Green LED "RS-232" D4
Green transmit, Red receive, indicates transmission through RS-232 port. If not flashing check CV61 power, restart Virtui2 audit trail and Virtui service using Virtui2 configurator, check coiled cable, COM PCB, and carriage j-box in that order.

Red/Green "USB" D3
Flashing indicates data communications through USB port.

Troubleshooting
Click on the about button in Virtui2.

Calibration and Service
Move carriage j-box sealing switch to SET position, connect USB cable and wait for device installation on PC. Open CLS-M Revolution Software. When complete carefully unplug USB cable, move calibration switch back into run position.

Contact Information
Call 1-888-225-7597 for dedicated forklift scale service and support.

PN 132420

Figure 3-10. Power/Communication Box Label

3.4 Check Scale for Accuracy

3.4.1 Using VIRTUi2®

The CV61 uses Rice Lake Weighing Systems Revolution and a forklift version of VIRTUi2 Software.

Use the Revolution software for simple trouble shooting and quick calibration. The VIRTUi2 software loads both VIRTUi2 configuration and a unique forklift version of VIRTUi2.

3.4.2 VIRTUi2 Configuration

VIRTUi2 configuration, in this application, is primarily used to start and stop services. This menu can be found under Tools/Services. The VIRTUi2 services are always running in the background interfacing the forklifts Communication/Power j-box connected with the RS-232 cable. The RS-232 LED will flash a green and red light to indicate there is a successful communication to Virui2 configuration.

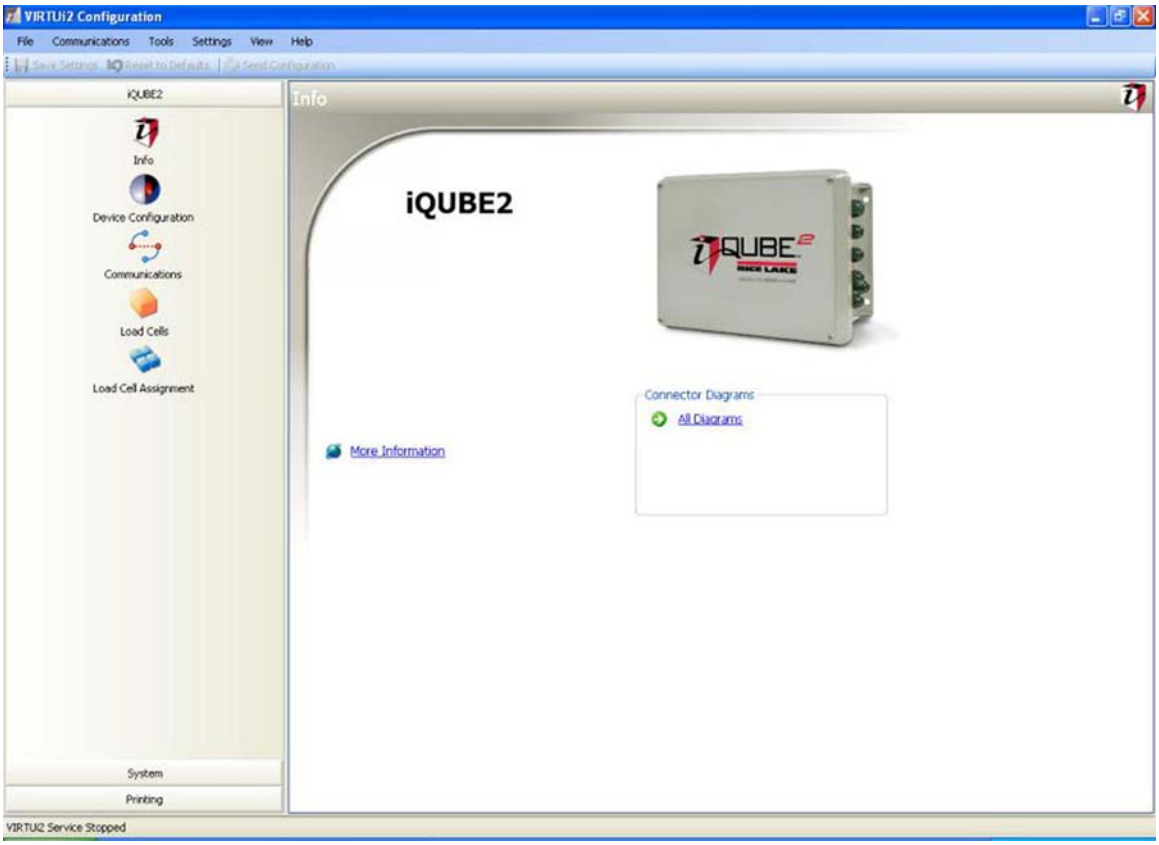


Figure 3-11. VIRTUi2 Home Screen

3.4.3 VIRTUi2 Forklift Software

VIRTUi2 is the NTEP primary display for this application on the Intermec CV61 touch screen mobile computer.

Virui2 Operator Mode:

Figure 3-12. VIRTUi2 Operator Mode

Item #	Function	Description
1	Print/Not Ready Button	When the scale is displaying a stable weight, the Print button will be green. Press the Green Print button to transmit the weight to the connected device
2	Zero Key	Press to zero the scale
3	Move Screen Tab	Using a stylus, click on the tab, to move the window on the PC.
4	More Key	Expands the VIRTUi2 software program to the Administrator mode.

Figure 3-13. VIRTUi2 More Screen

Function	Description
Hide Key	Returns screen back to operator mode
Tare Key	Tares the weight from the display, gross/net mode is activated.
G/N Key	Switch display between gross and net weight
Size + Key	Increase the size of the “weight display” font
Size - Key	Decreases the size of the “weight display” font
Size Reset Key	Returns weight window font back to default setting
About Key	**Not Password Protected.** Contains NTEP marking requirements, copyright, software version, installed components filenames and versions and other standard VIRTUi2 “About” setting that are not configurable in the field. See Figure 3-14.
Status Key	**Not Password Protected.** Displays a standard status bar that shows iQube^2 diagnostic event messages. This will perform a reset without displaying a message to the user.
Display Key	**Password protected.** Upon selecting, a standard size Login window will appear. See Figure 3-15. ***Password = 1931***
Reset Key	**Not Password protected.** Re-sets the Estes VIRTUi2 communication. Required if the scale operator loses the communications link to the VIRTUi2 service. Will return the display back to the start-up default location, the upper right hand corner. This will perform a reset without displaying a message to the user.
Exit Key	**Password protected.** Upon selecting, a standard size Login window will appear to exit the VIRTUi2 Software. ***User = Administrator*** ***Password = 3901***

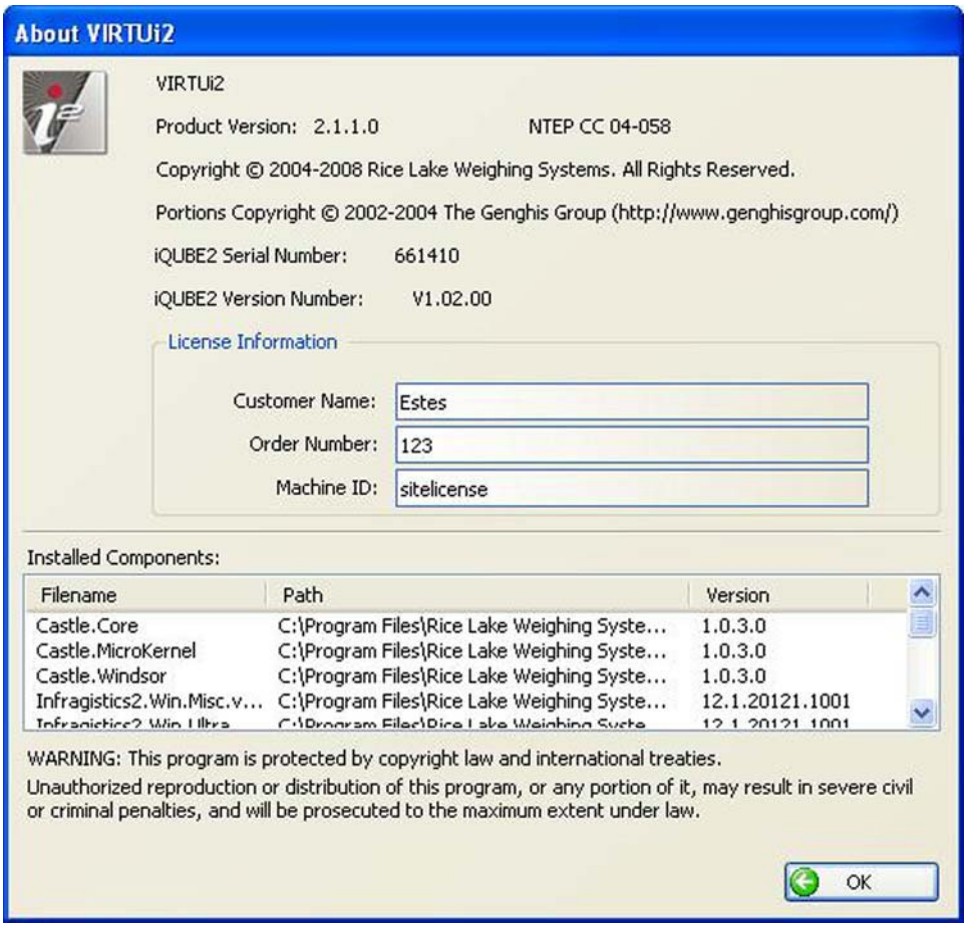


Figure 3-14. VIRTUi2 About Screen

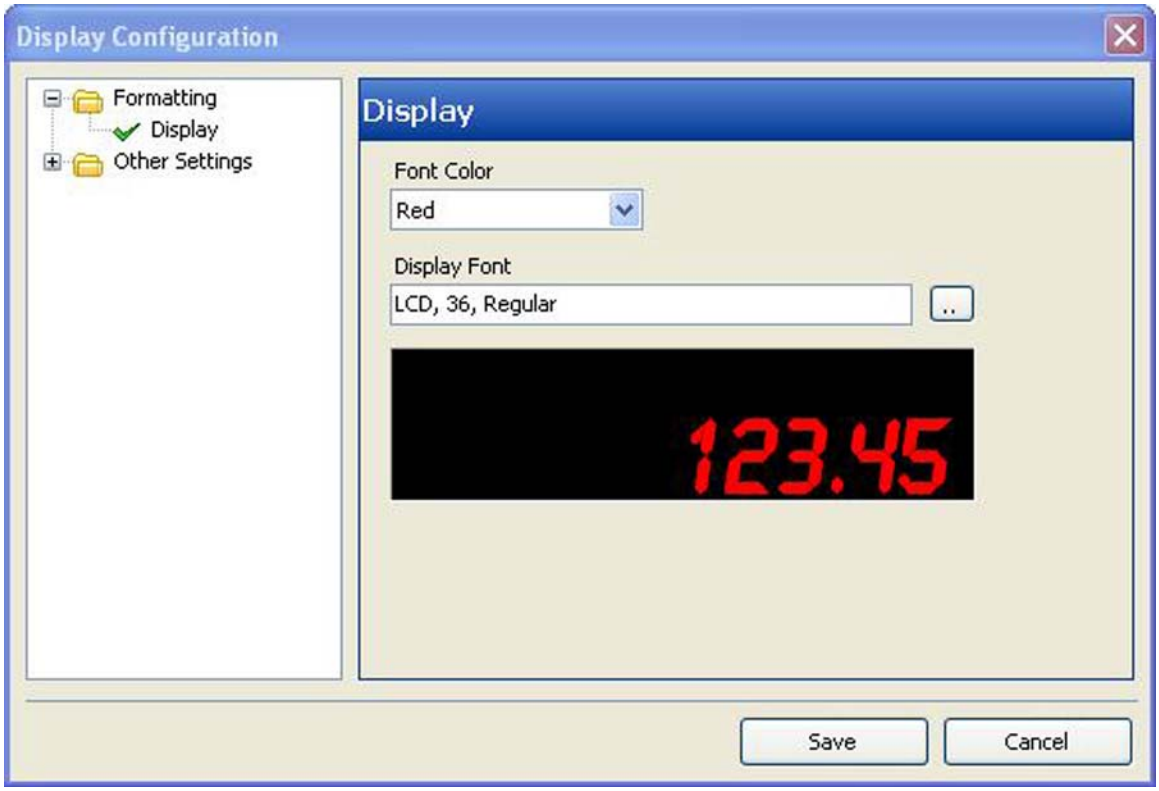


Figure 3-15. VIRTUi2 Display Screen

3.4.4 Restarting the VIRTUi2 Services

If communication is lost between the VIRTUi2 software and scale. The RS-232 LED on the COMPOW PCB may not be flashing, use the VIRTUi2 Configuration program to restart the services.

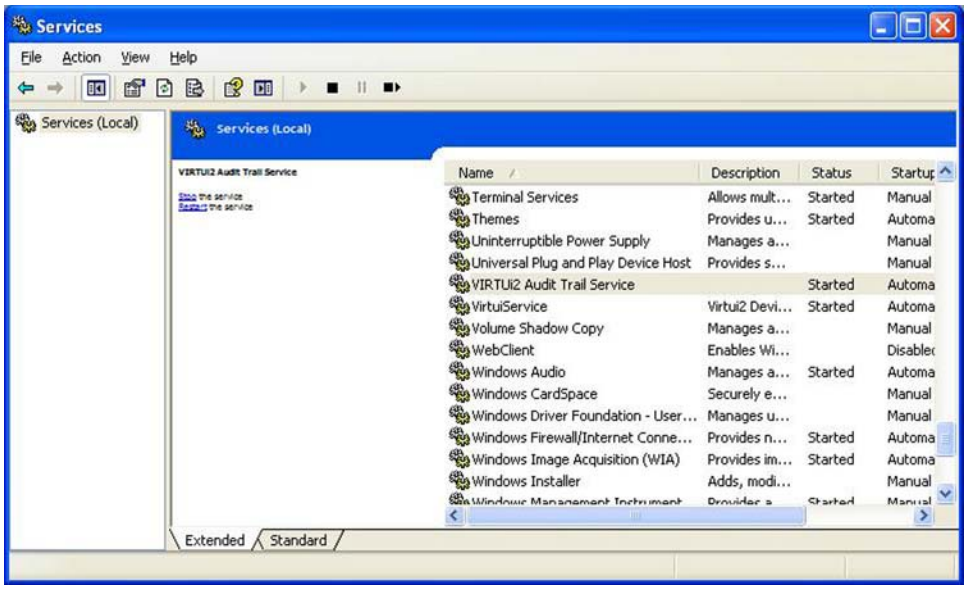


Figure 3-16. Restarting VIRTUi2

1. Select the VIRTUi2 Audit Trail Service, select the ***Restart*** the service function.
2. Select the VIRTUi2 Service, select the ***Restart*** the service function.

3.4.5 Initial Installation of Scale

Upon initial installation of the scale, set-up the COM Port and login to activate the program and start communication.

1. Open the VIRTUi2 Configuration Program. See Figure 3-11.
2. Select file then login

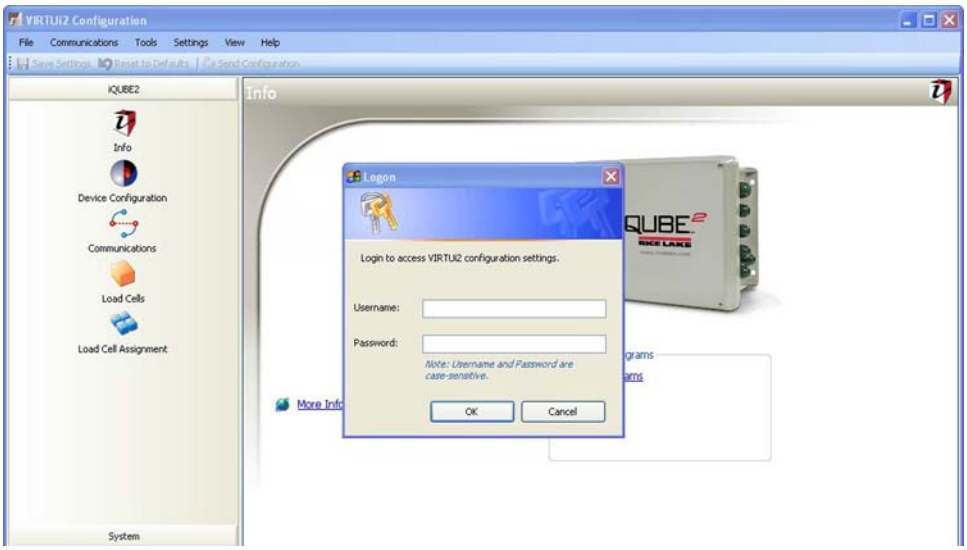


Figure 3-17. Enter Username and Password

3. Enter
   Username: Administrator
   Password: 3901
4. Select OK.
5. Select communications then connect.

3.4.6 Using Revolution

Note *When using a computer to check accuracy, complete Revolution install (Section 4.0) prior to beginning this section.*

Important *If using a mobile PC with VIRTUi2 installed, close VIRTUi2 prior to using Revolution (User Name – Administrator, Password – 3901). Then open the VIRTUi2 configuration and then the Revolution software.*

1. Test the scale for accuracy by applying a known weight.

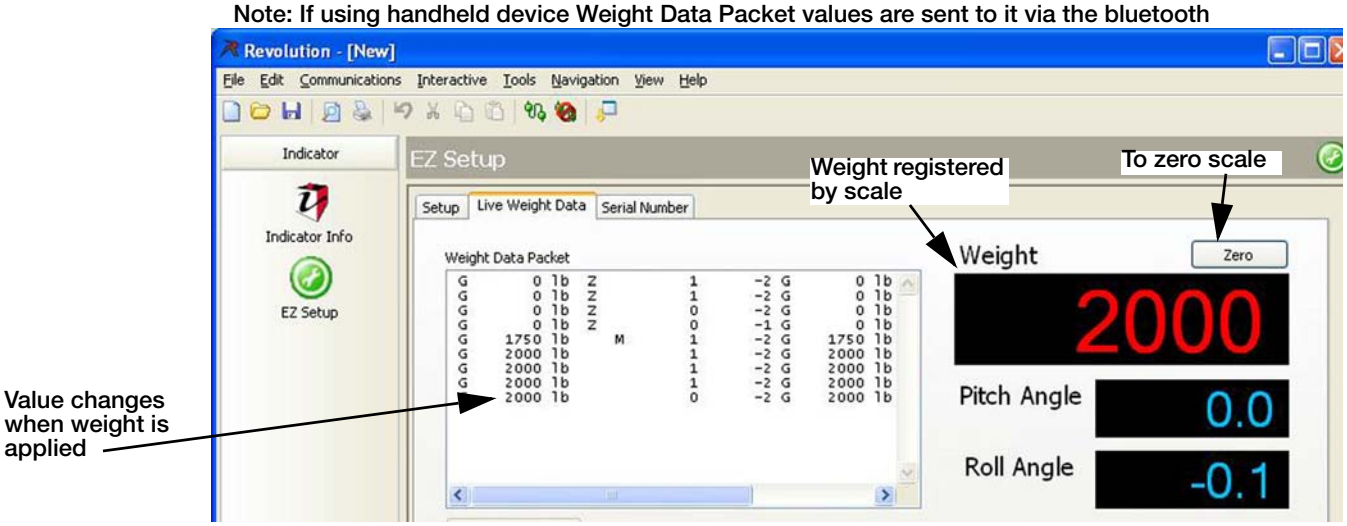


Figure 3-18. Live Data Screen with Weight Applied

2. If it weighs accurately no calibration is necessary, scale is ready for operation.
   If weight is not correct perform calibration. See Section 5.0.
3. Adjust forks to a perfectly level position using a level.
4. Verify pitch angle and roll angle is between -0.2 - + 0.2. See Figure 3-18.
5. Turn off the forklift after leveling forks, high vibration from the running engine will cause inaccurate readings.
6. If angle settings do not read the correct value, move the calibration switch, located on the carriage j-box, into the open position.

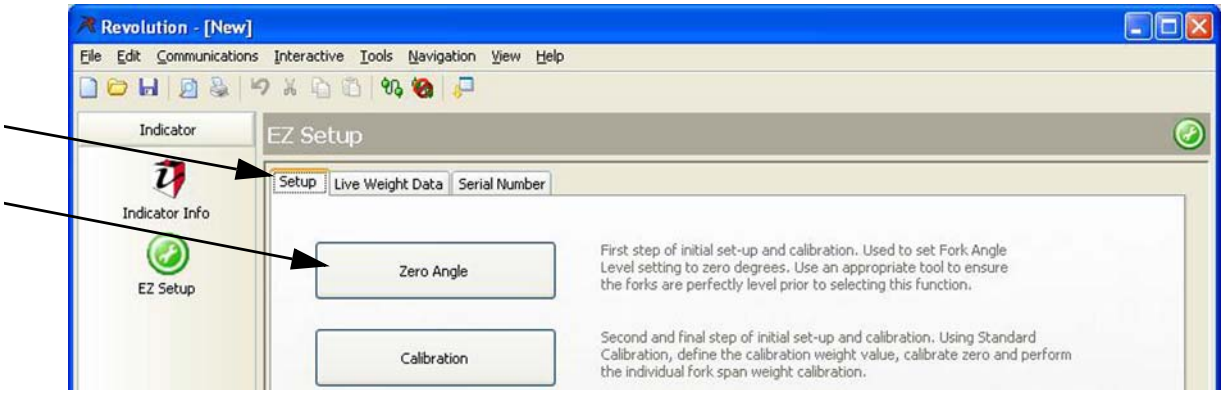


Figure 3-19. Setup Screen in Revolution

7. Using Revolution, in the ***EZ Setup*** mode, select the ***Setup*** tab.
8. Select the ***Zero Angle*** function.
9. Move the calibration switch back to the closed position.
10. View the pitch and roll angle settings in ***Live Weight Data*** screen. See Figure 3-18.
11. Upon successful installation and calibration, seal the carriage j-box and load cell quick disconnects for Weights and Measurements approval.

3.4.7 Upload Unit Serial Number

1. To check the serial number of the scale using Revolution, while in the ***EZ Setup*** mode, select the ***Serial Number*** tab.
2. Select the **Get Current Serial Number** button to get the current serial number.

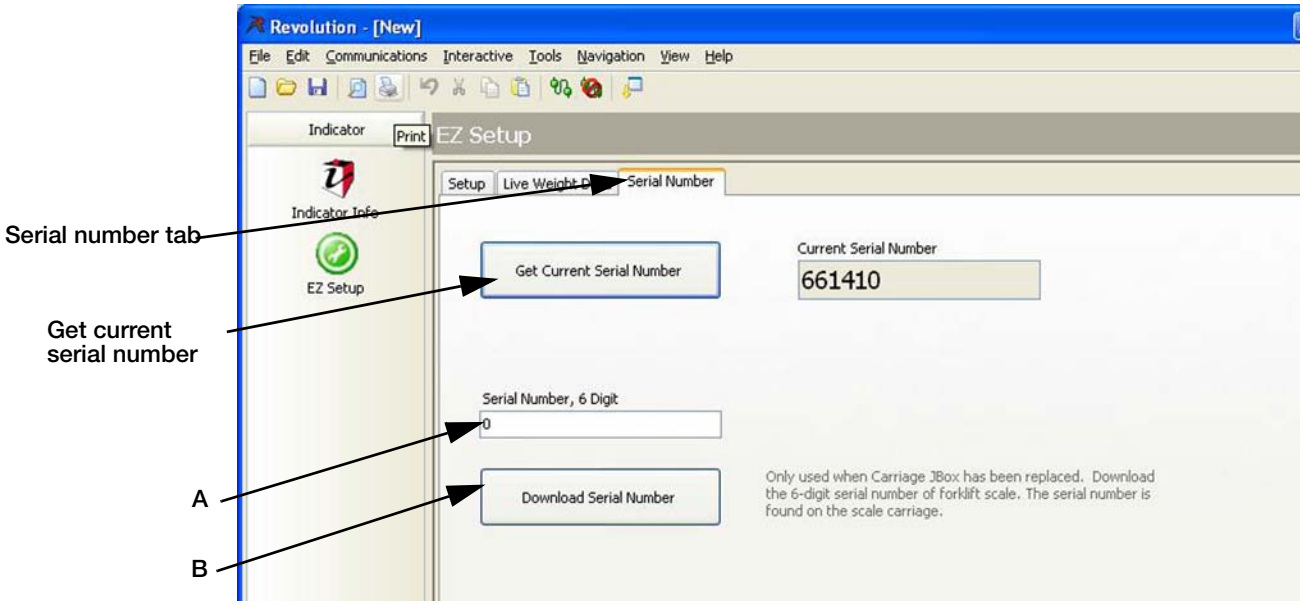


Figure 3-20. Setup Screen

3. If the j-box has been replaced and a new serial number must be entered, enter the new 6-digit serial number from the forklift scale (A) and press the **Download Serial Number** button (B) to save the new serial number. Once the serial is download, a message ***Serial Number sent to device*** is displayed on the screen and press **OK** to accept that number.

Note

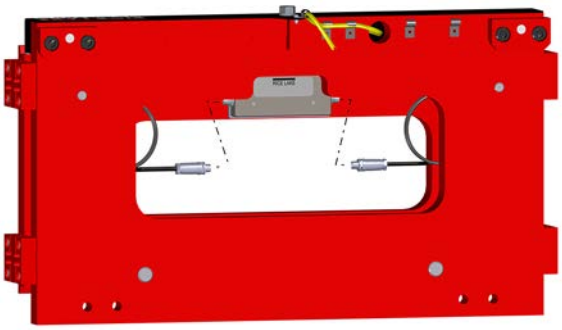
The Serial number of the Scale is pre-loaded in the J-Box at the factory, It does not need to be downloaded during installation. If J-Box is ever replaced (See Section 7.0) this procedure will need to be repeated.

The Serial number of the scale is located on the right side of carriage and also under the black cover plate on the scale assembly.

The upload and download of each configuration file is no longer required. The iQube2 junction box has default factory settings to communicate with the CLS-M forklift scale.

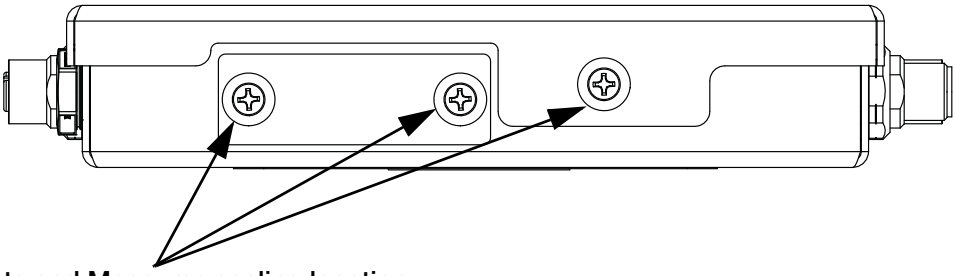
3.5 Weights and Measures Sealing

Weights and Measures personnel will inspect the j-box for proper sealing once installed on the forklift. The j-box must have the proper serial tag affixed to the box and lead wire sealing on the j-box.



View from back of scale

Weights and Measure seals



Weights and Measures sealing location

Figure 3-21. Sealing the J-Box for Weights and Measures

4.0 Revolution® Interface to CLS

Revolution is a tool to display weight, diagnostics and calibration (if required) of the *CLS* Scale using a Windows®-based computer.

4.1 Load USB Driver

Place the CD for the Revolution program into the CD drive of the laptop computer you will be using for setup and calibration of the scale.

1. Open the Revolution files and double click on ***CMD20814_Setup***.

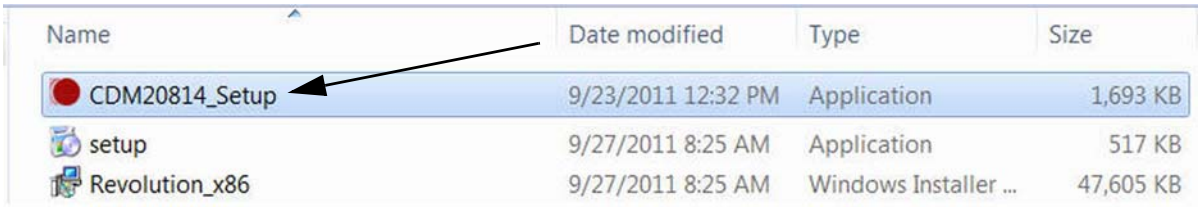
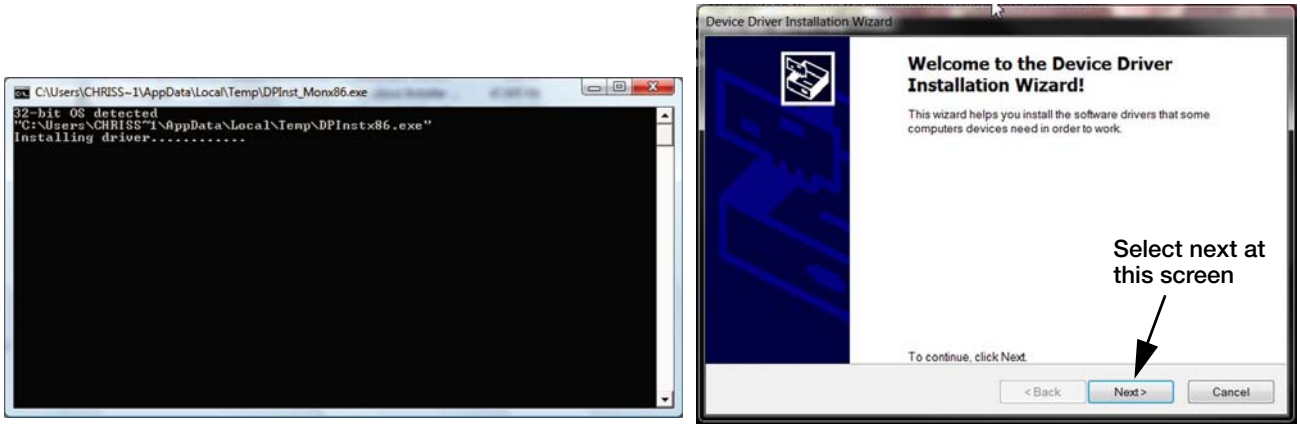


Figure 4-1. Download The USB Driver

2. Depending on your computer, one of the two windows below will appear.



32 bit **64 bit**

Figure 4-2. Download USB Driver Install Screens

3. The USB driver is downloaded when the 32 bit screen disappears, or when you click **Next** and **Finish** of the 64 bit screen.

Note ***If neither screen appears to show Revolution downloading, double click on the file again.***

4.2 Install Revolution on Computer with USB interface.

Place the CD for the Revolution program into the CD drive of the laptop computer you will be using for setup and calibration of the scale.

1. Autorun should pop up. Select open files in Explorer.

If Autorun doesn't appear, go to the CD drive in Windows Explorer to locate the files. The Revolution program can also be downloaded from the Rice Lake Weighing Systems website at http://www.ricelake.com/products/software. The CLS module can be found in version 3.3.9 or higher.

2. Double click on the setup file.

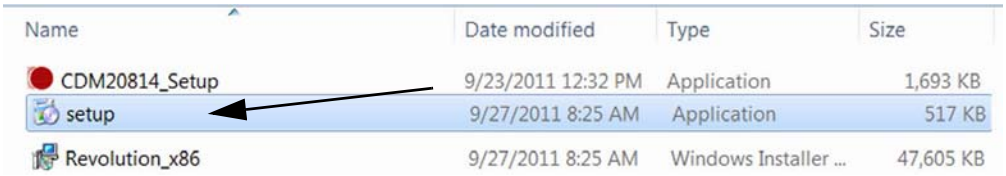


Figure 4-3. Setup File in Windows Explorer

3. The *Welcome to the Revolution Setup Wizard* screen pops up, click **Next** (Figure 4-4).

Figure 4-4. Welcome Screen

4. Then at the ***License Agreement*** (Figure 4-5) screen, read the agreement (A), select ***Agree*** (B) and click **Next** (C).

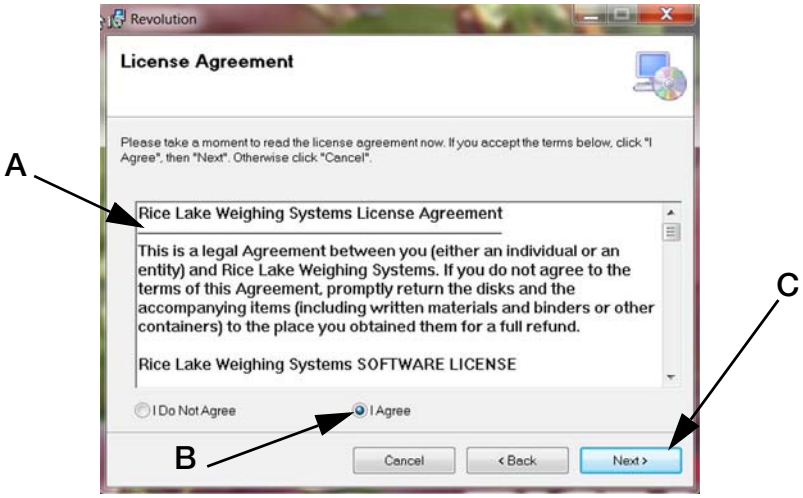


Figure 4-5. License Agreement Screen

5. The next screen is the ***Select Installation Folder*** (Figure 4-6). Select path to save to (A) and who can use it (B). Click **Next** (C).

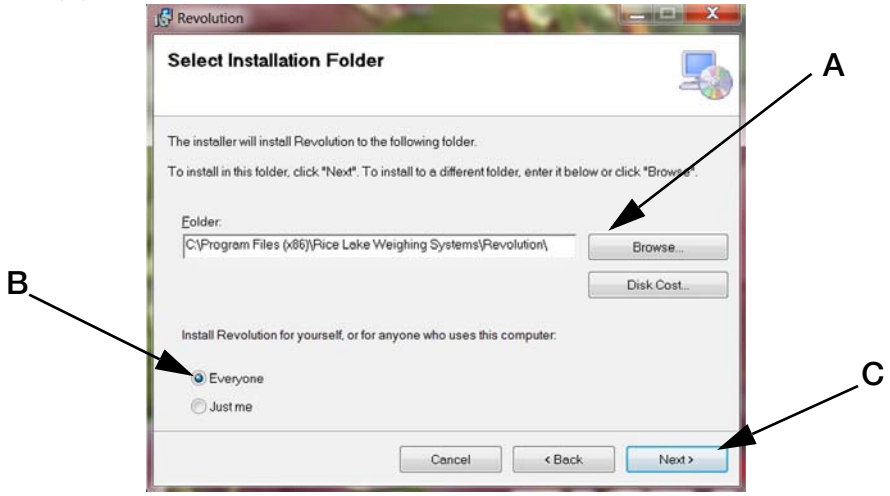


Figure 4-6. Select Installation Folder

6. Next is the ***Confirm Installation*** (Figure 4-7) screen. Click **Next.**

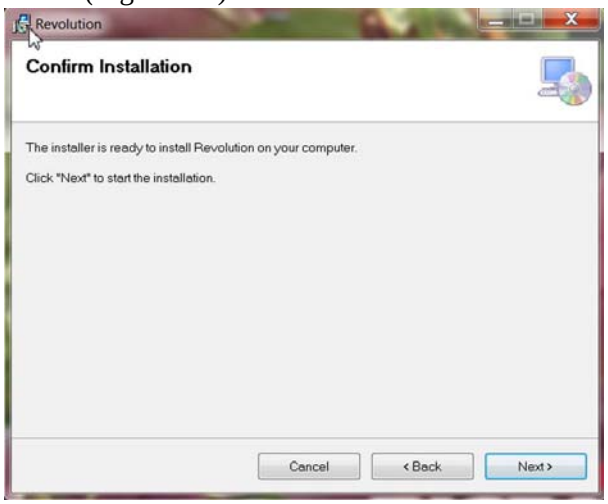


Figure 4-7. Confirm Installation Screen

7. The ***Installing Revolution*** (Figure 4-8) comes up. Wait for the download to complete.

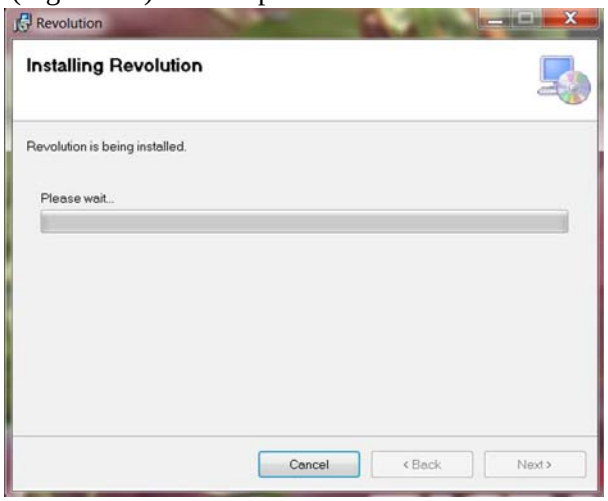


Figure 4-8. Installing Revolution Screen

8. When the ***Installation Complete*** (Figure 4-9) screen pops up, click **Close**.

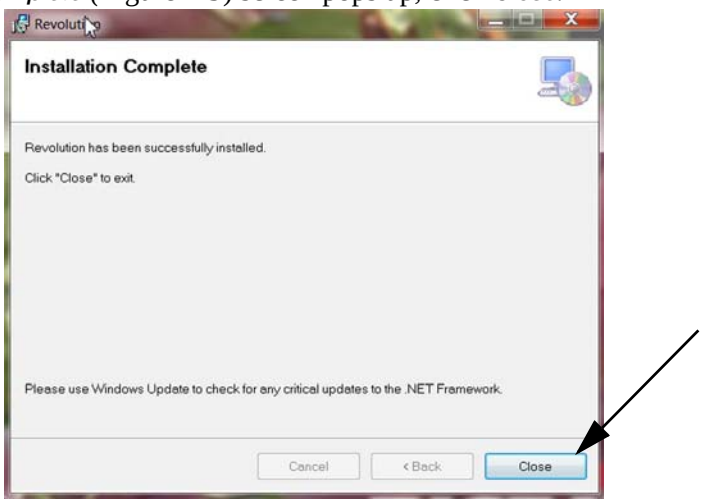


Figure 4-9. Installation Complete Screen

Revolution is now installed on the computer.

4.3 Connect to Computer and Use Revolution Scale Software

4.3.1 Connect USB Cord to the Power/Communication Box (PN 130551)

1. Power off power/communication box.
2. Loosen the (4) screws on the power/communication box and remove the cover (Figure 4-10).
3. Connect the USB cable to the power/communication box (Figure 4-10).

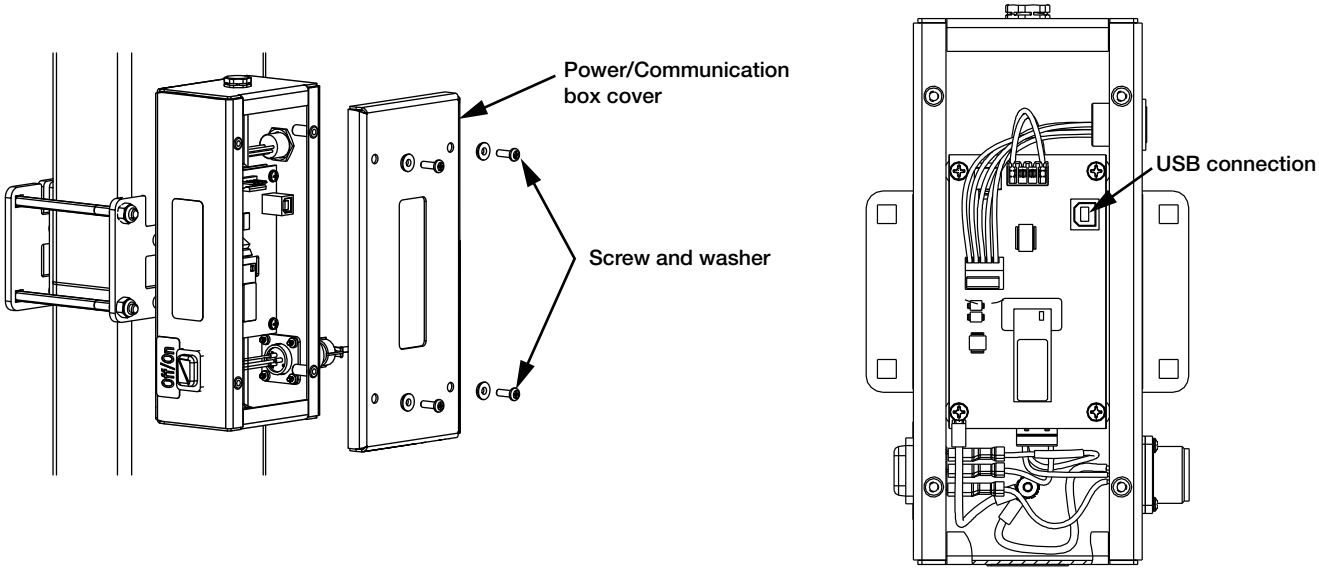


Figure 4-10. Connect USB to Power/Communication Box (PN 153616)

4.3.2 Connect USB Card to the iQube² Junction Box (PN 164071)

Use the following steps to connect the USB card.

1. Remove the calibration switch cover from the junction box.
2. Use a standard type A to micro type B USB cable (PN 163898) to connect to the iQube² junction box and PC as shown below in Figure 4-11.

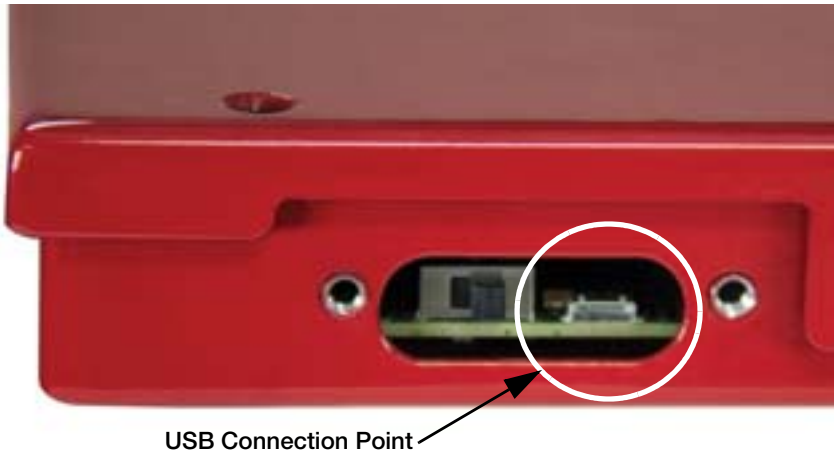


Figure 4-11. Micro B USB iQube² Junction Box Connection

4.3.3 Connect Computer to Power/Communication Box Via USB

1. Open the Revolution program on the computer.

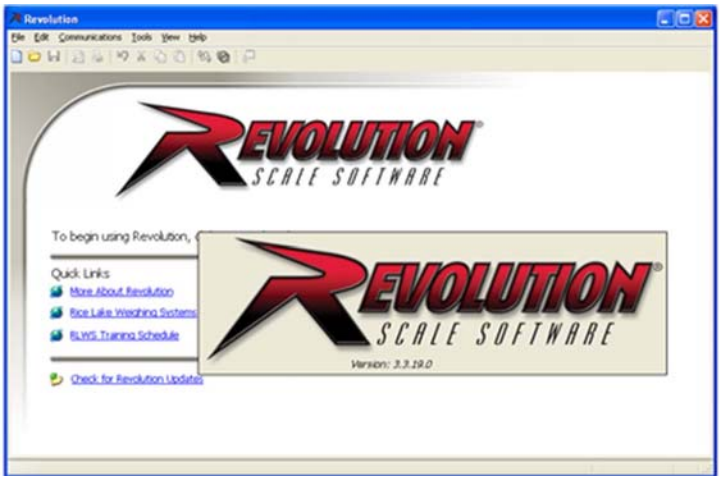


Figure 4-12. Revolution Screen at Open

2. Select ***File/New*** from the main toolbar.
3. Select the *CLS* Forklift option listed below for your model.

4. Press **OK**.

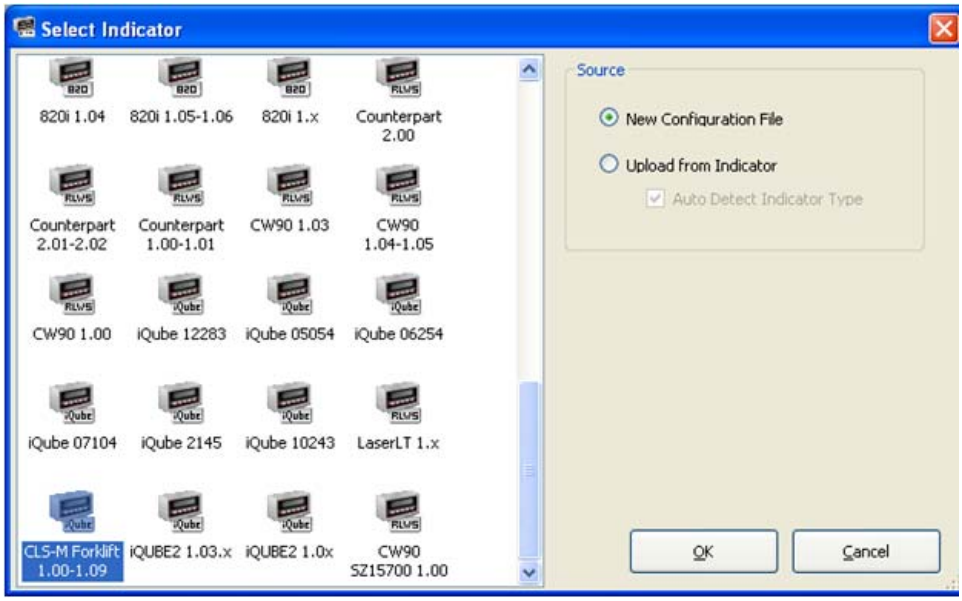


Figure 4-13. Open Revolution to CLS Module

5. Once selected, the main screen shown in Figure 4-14 is displayed.

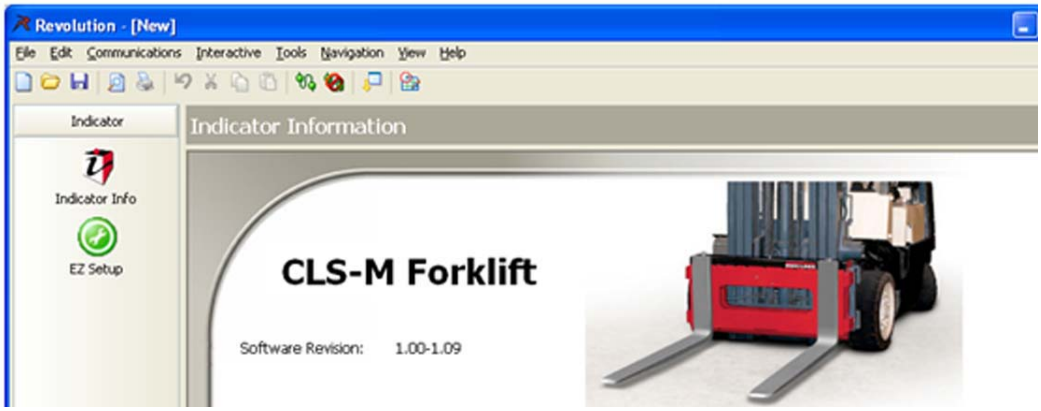


Figure 4-14. Main Menu

6. Plug the USB cable into a USB port on the computer.
7. Turn on the power/communication box. Wait for computer to recognize the new hardware.

Note ***Depending on what Windows version you are running, a balloon will appear in the lower left-hand portion of you screen indicating that new hardware was found and another will appear to let you know when it is functional.***

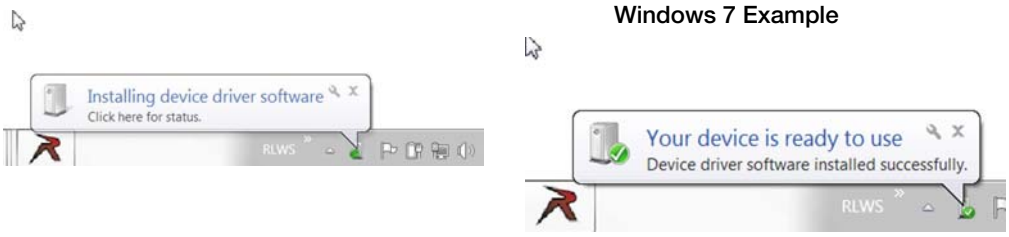


Figure 4-15. Computer Recognizing New Hardware on USB Drive

Note ***The first time you connect to the computer and use Revolution, you will need to select the USB Comm Port. Before turning on the power/communication box, select Tools/Options. Then select settings and drop down the Comm Port section. Make a note of which ports are currently available. When the USB Cable is connected, there will be a new port available, use that one for Step 6.***

8. Go to Tools/Options (Figure 4-16 A) and select ***Settings*** (B). Then choose the ***PC Comm Port*** (C) that will be used to connect the USB cable. (See Note above)
9. Click **OK** *(* Figure 4-16 D*)*.

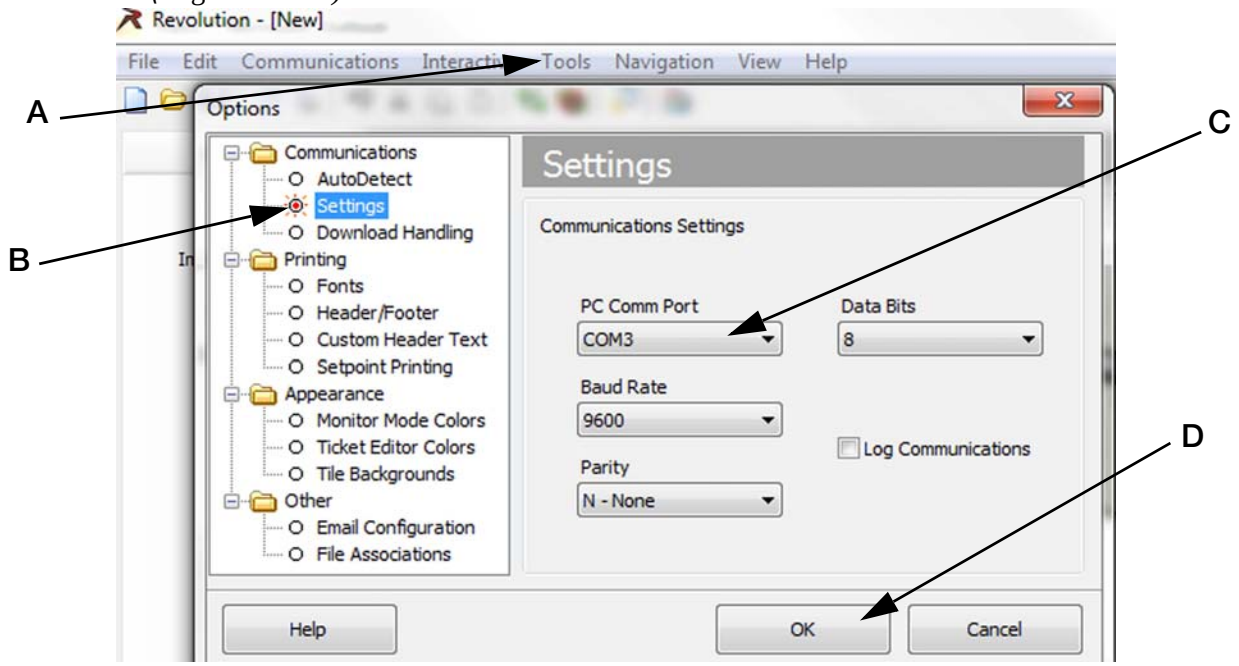


Figure 4-16. Options Screen to Select Comm Port for USB

10. Select the connect icon from toolbar (Figure 4-17 A). A pop-up box comes up momentarily (Figure 4-18 A) to indicate the computer is now indicated to the box.
11. If it comes up as ***Unable to Connect to Indicator*** (Figure 4-18 on page 34 B) verify the Comm Port is correct and that the power/communication box is turned on. Then select **GO** (Figure 4-18 on page 34 C) to connect.

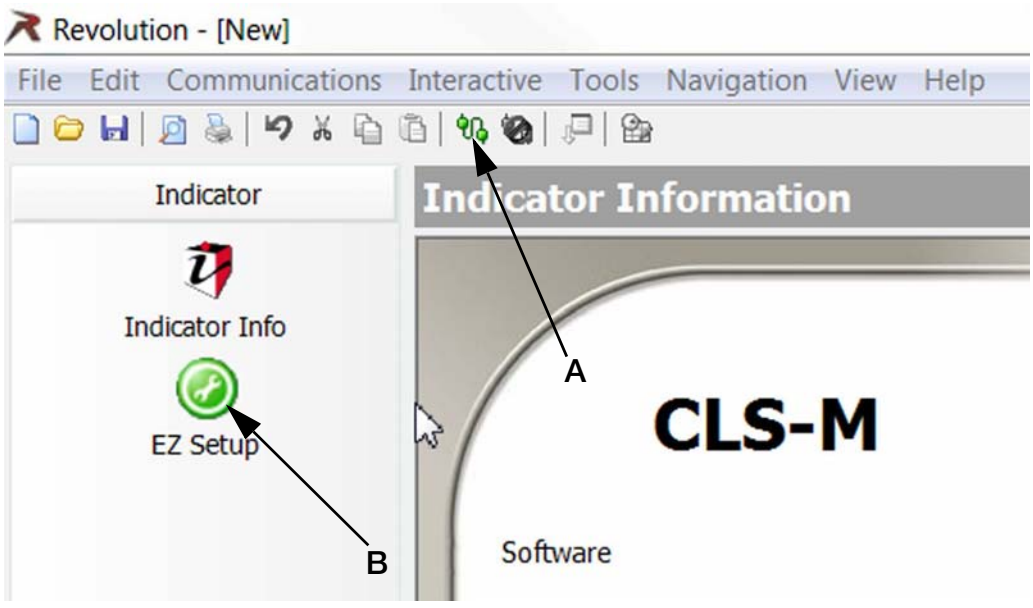


Figure 4-17. Connect Revolution to Power/Communication Box

12. Press **EZ Setup** button (B).

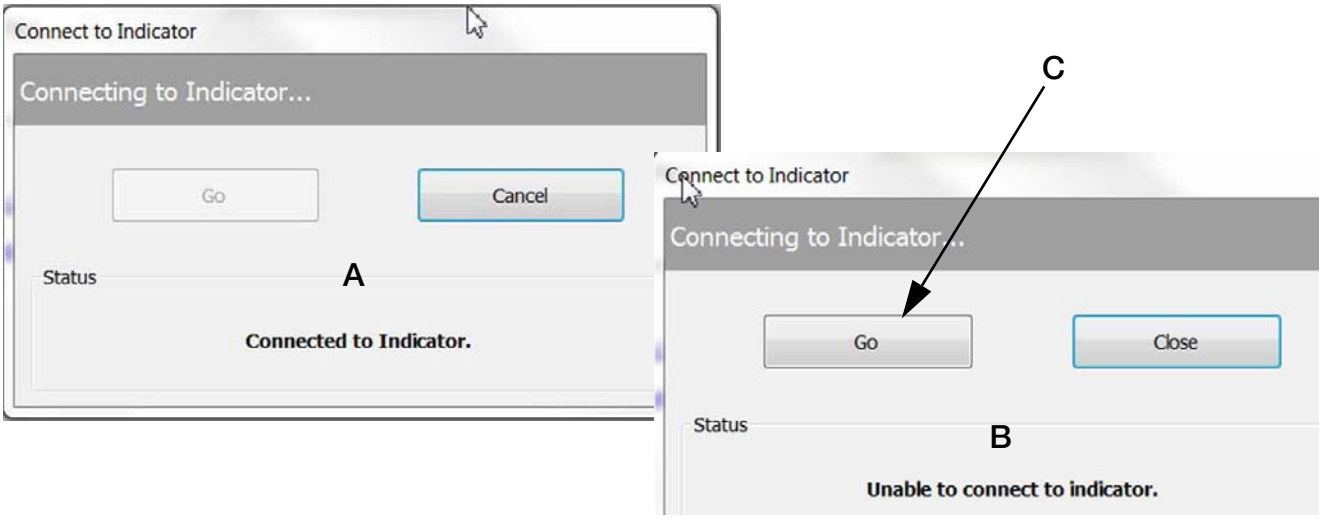


Figure 4-18. Connection Success/Failure

4.4 Live Weight Data

The second tab is the ***Live Weight Data*** screen. This screen is used during calibration of the scale to verify the weight values. The ***Live Weight Data*** screen will only operate with the calibration switch in the closed position.

1. Select the ***Live Weight Data*** tab (Figure 4-19).

Note ***Weight data packet screen shows output format of CLS. Other displays include weight, pitch angle, roll angle, cell 1 and 2mV (Figure 4-19). This is the information that will be sent to the customer-supplied handheld device when attached through Bluetooth.***

To start streaming data, check the auto refresh box. If not checked, the refresh button will need to be selected after each change of weight to the load cell.

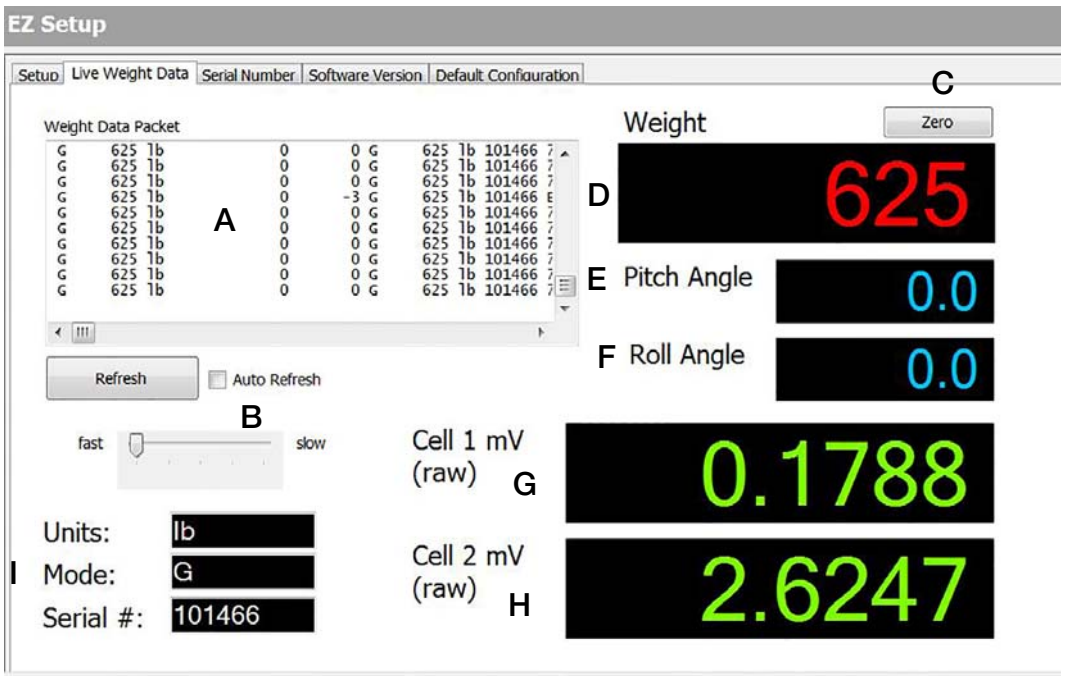


Figure 4-19. Revolution Live Weight Data Screen.

A. Weight Data Packet - output formats/displays the output protocol of the *CLS*.

B. Auto Refresh - when checked, it starts continuous streaming of data in the weight data packet.

C. Zero - used to zero the scale.

D. Weight - displays value of weight on scale.

E. Pitch Angle - angle of the scale in a front to back direction.

F. Roll Angle - angle of the scale in a side to side direction.

G. Cell 1 mV (raw)

H. Cell 2 mV (raw)

I. Units, Mode, Serial Number print string test boxes for confirmation of the weight data package.

4.5 Leveling Forklift Forks

1. Level the forks to 0° by placing a level on the forks and adjusting as required.

Note

Carriage j-box will need to be in setup mode (See Section 5.2 on page 46).

Turn off the forklift after leveling forks, high vibration from the running engine will cause inaccurate readings.

2. In the setup screen, press **Zero Angle** (Figure 4-20 A).
3. A pop-up appears as shown in Figure 4-20 B, press **OK** to close the pop-up box.

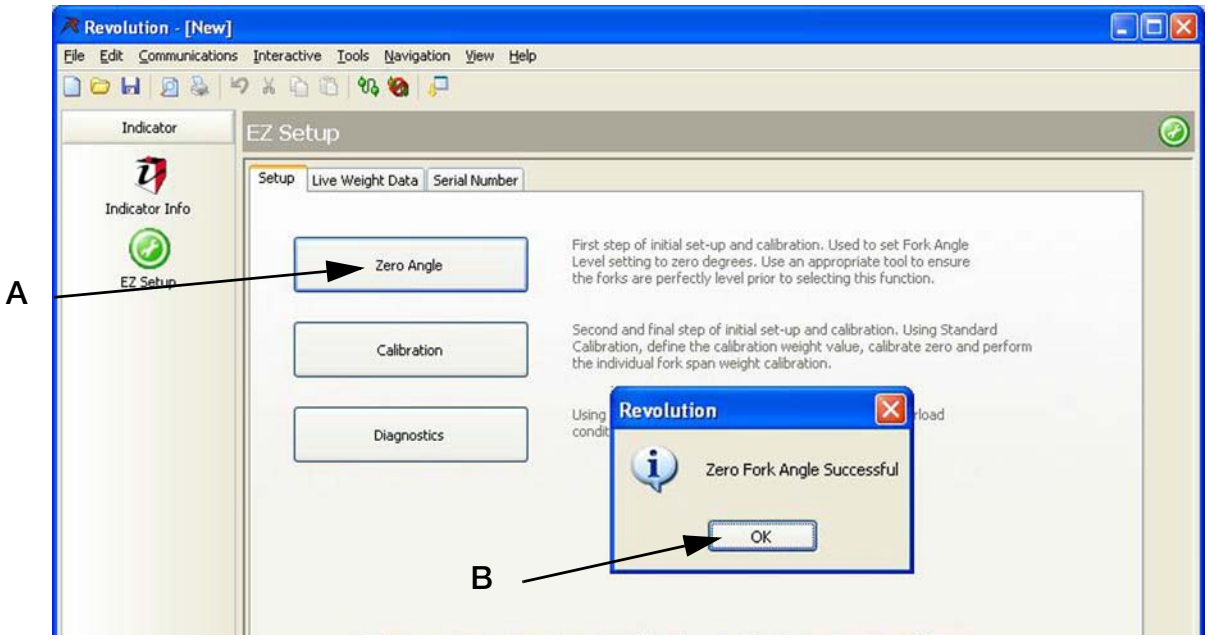


Figure 4-20. Zero Forks

Note

Forks should be level when testing calibration. A degree of tilt in either direction can cause errors in the use of the scale.

4.6 Standard Calibration

Note *The carriage j-box will need to be in setup mode (See Section 5.2 on page 46).*

1. Select ***Calibration*** from the ***EZ Setup*** screen.
2. Enter the six digit serial number of the scale (Figure 4-21 A). The serial number can be found on the top right cleat of the scale back plate or the serial tag installed on the scale. If the serial number is incorrect or 0, enter the correct serial number and press **Next** to store that number.

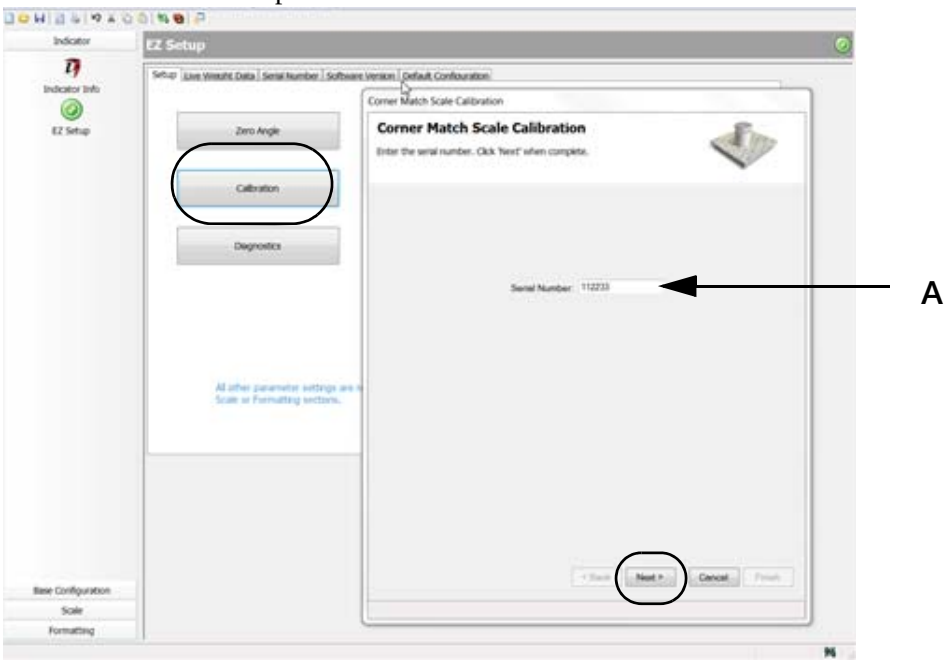


Figure 4-21. Enter Serial Number Information

3. Select ***Standard Calibration*** (Figure 4-22 B).
4. Press **Next** (Figure 4-22 C).

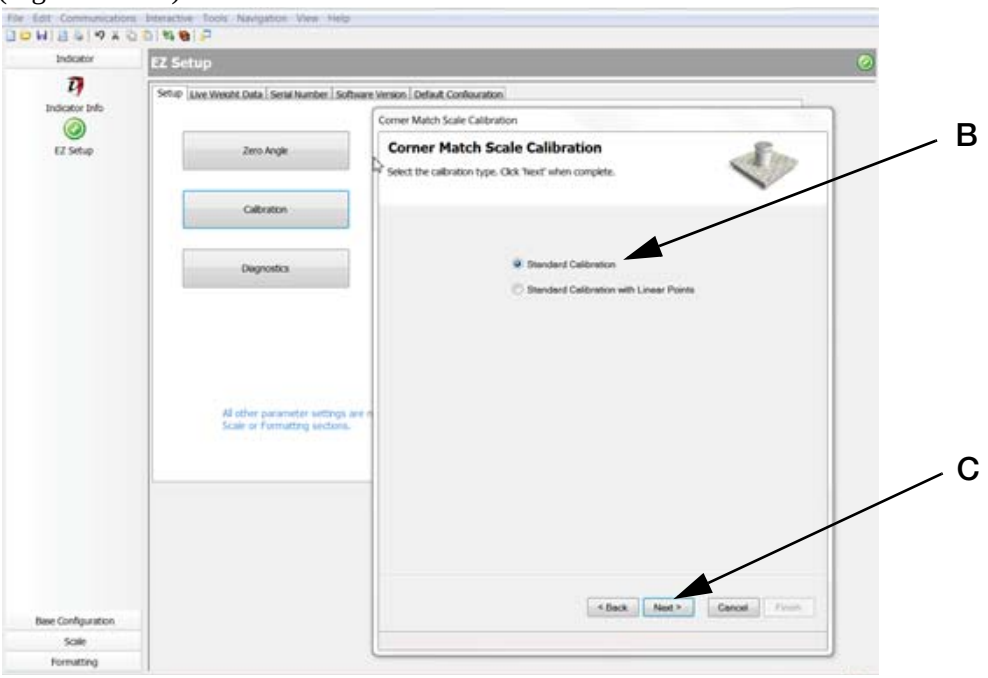


Figure 4-22. Enter Calibration

5. Enter the test weight value to be used and press **Next** (Figure 4-23 A).
   Certified Test Weight used during cell normalization must be checked.

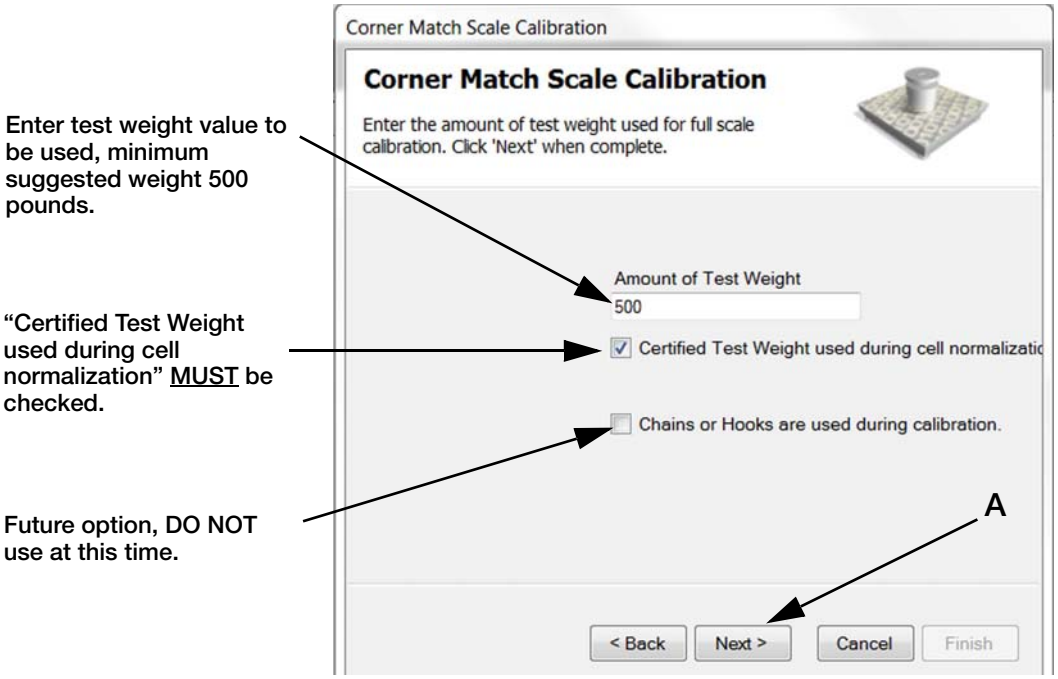


Figure 4-23. Enter Test Weight Value

6. The ***Corner Match Scale Calibration*** screen appears (Figure 4-24). Press **Calibrate Zero** (Figure 4-24 A).
7. Press **Next** (Figure 4-24 B).

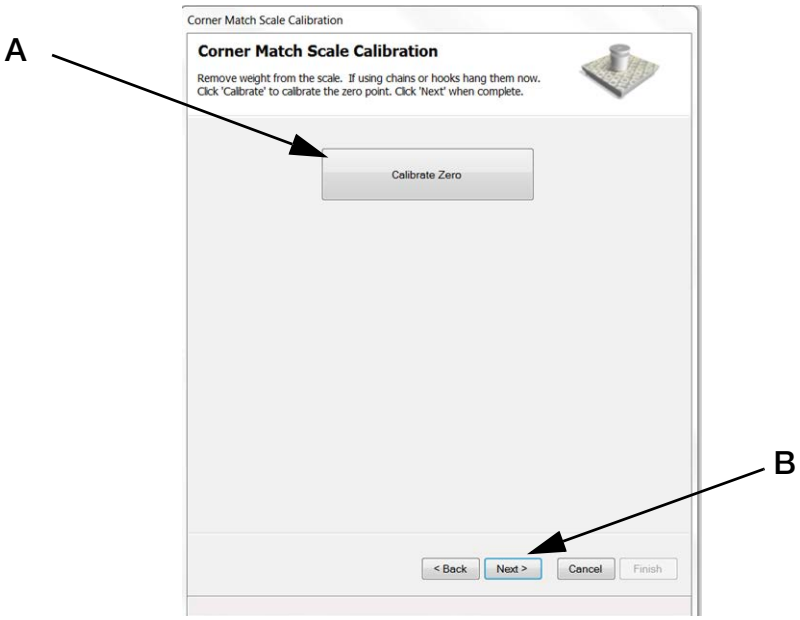
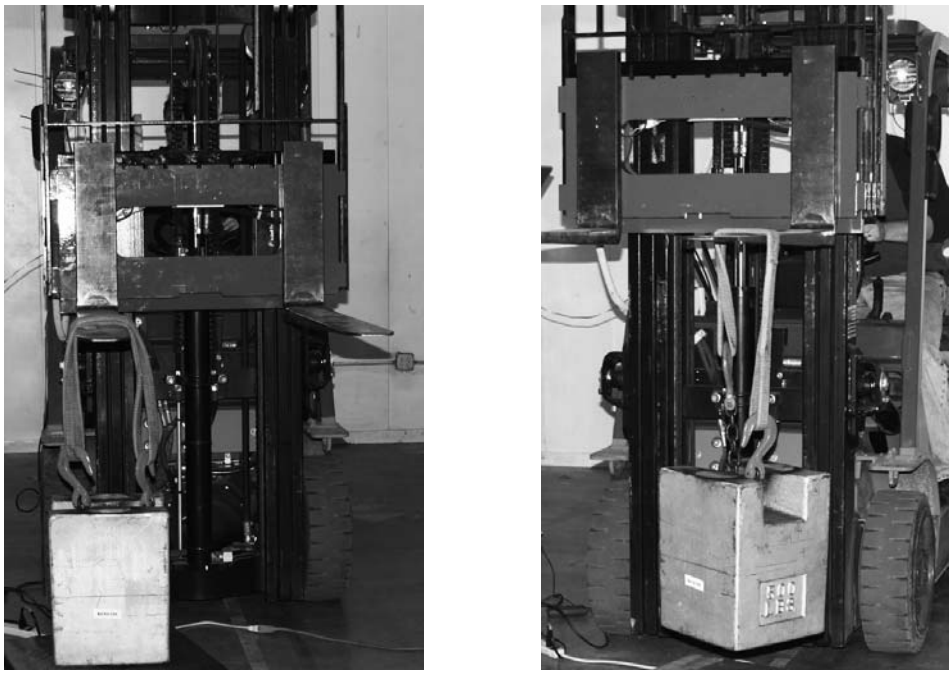


Figure 4-24. Calibrate Zero

8. Add known weight to load cell 1 (Left-hand load cell, see Figure 4-25).
9. Lift weight (allow it to stabilize if using hanging weight).

Note

Always shut forklift off when calibrating; high vibration can cause inaccuracies.
Make sure to calibrate forks in the correct order, or the calibration will not be successful.
Watch the pitch value to ensure it is close to zero. Adjust forks if necessary.



Load Cell #1
(Left Hand)

Load Cell #2
(Right Hand)

Figure 4-25. Load Cell #1 and #2

10. Press **Measure** (Figure 4-26 A).

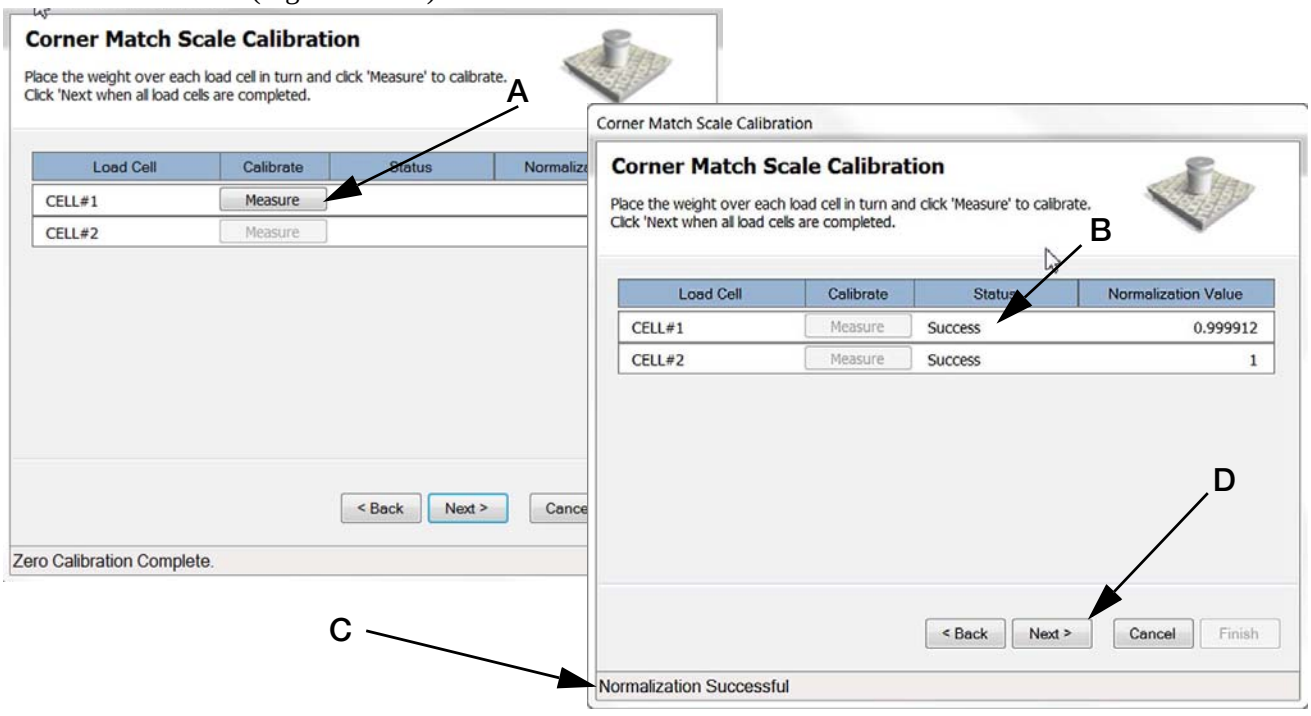


Figure 4-26. Load Cell Calibration

11. Load Cell #1 Status will read ***Success*** (Figure 4-26 B) and Load Cell #2 *Measure* will become available. Repeat steps 9-11 for Load Cell #2.
12. When both load cells have been calibrated (status reads Success for both Cell #1 and #2, Figure 4-26 B) and the ***Normalization Successful*** message appears (Figure 4-26 C). Press **Next** (Figure 4-26 D).

13. A message that you have successfully calibrated the scale will appear (Figure 4-27 A). Then press **Finish** (Figure 4-27 B).
Getting New Calibration appears at the bottom of the frame (Figure 4-27 C). When done, the pop-up box will disappear and calibration is complete.

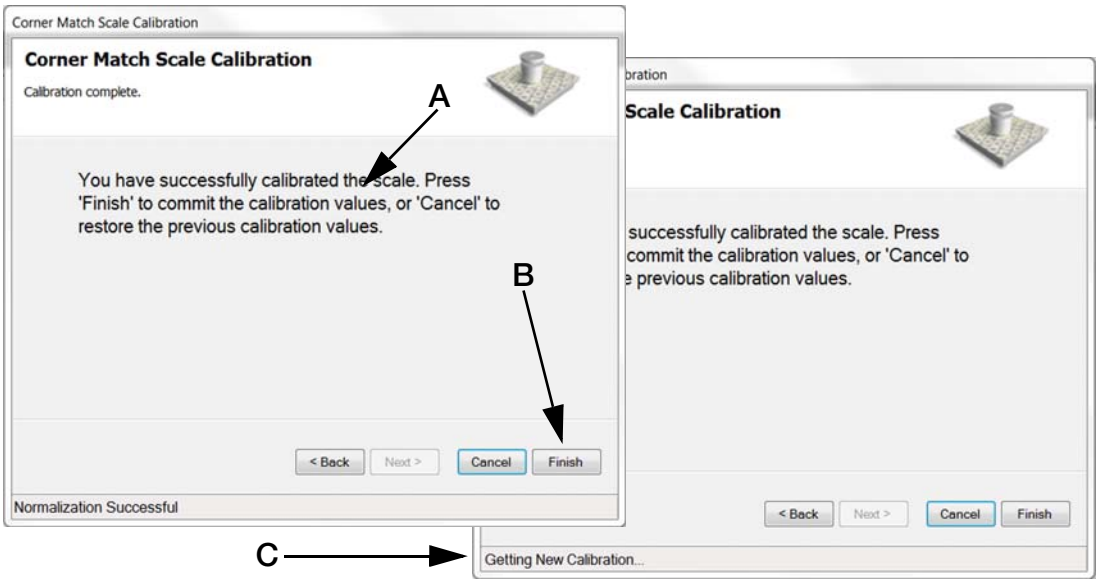


Figure 4-27. Finish Calibration

14. Place the calibration switch into the closed position (Figure 5-2 on page 46), toward the left hand side of j-box when standing in front of the scale (toward load cell #1).

4.6.1 Reading Data in Live Weight Screen

Once calibration is complete, select the *Live Weight Data* tab.

Figure 4-28. Revolution Live Weight Data Screen.

Important ***When moving the calibration switch in and out of calibration mode, it may take a few seconds for the Weight Data Packet and Weight window fields to update with accurate information.***

The mV, Pitch and Roll Angle functions are active whether the scale is in calibration or normal weighing mode. If the sealing switch is in calibration mode, the ***Weight*** may have held the last displayed weight value in memory. Move the sealing switch in normal weighing mode to continue to use the ***Live Weight Data*** feature correctly.

1. Place calibration switch into the closed position (Figure 5-2 on page 46), toward the left-hand side of the j-box when standing in front of the scale (toward load cell #1).
2. Test known weight amounts as specified in Section 4.3.3. When weight is on fork, the value will appear in the ***Weight*** box and the ***Weight Data Packet*** values will update.
3. If the scale is weighing correctly, carefully disconnect USB and replace clear cover.
4. Swivel the cover plate back to the correct position and secure with screw.
5. Upon successful installation and calibration verification, seal the carriage j-box for Weights and Measurements approval.
6. Re-install the scale cover plate. The scale is now ready for use.

4.7 EZ Setup/Upload Unit Serial Number

Figure 4-29 appears with several tabs: ***Setup, Live Weight Data, Serial Number, Software Version and Default Configuration***. ***Serial Number*** will be used for entering the current serial number of the scale in the following sections and allows the serial number to be downloaded in normal weighing mode.

All settings have been preset at the factory for communication with the hand-held device. DO NOT alter these settings, it will cause communication failure with the hand-held device.

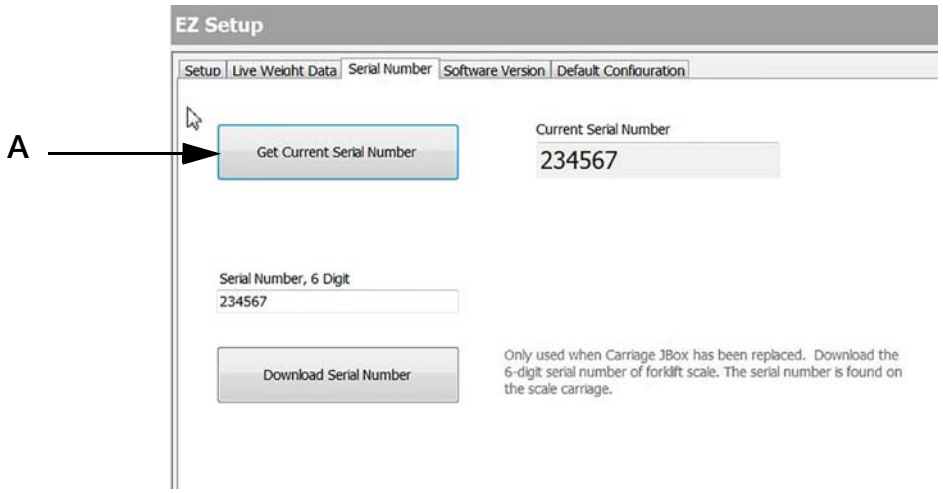


Figure 4-29. EZ Setup Screens - Setup

1. To check the serial number of the scale using Revolution while in the ***EZ Setup*** mode, select the ***Serial Number*** tab.
2. Select the **Get Current Serial Number** (Figure 4-29 A) button to get the current serial number.
3. If the j-box has been replaced and a new serial number must be entered, enter the new 6-digit serial number from the forklift scale and press the **Download Serial Number** button (B) to save the new serial number. Once the serial is download, a message ***Serial Number sent to device*** is displayed on the screen. Press **OK** to accept that number.

The serial number of the scale is pre-loaded in the j-box at the factory. It does not need to be downloaded during installation. If the j-box is ever replaced (See Section 7.0), this procedure will need to be repeated.

The serial number of the scale is located on the right side of the carriage and also under the black cover plate on the scale assembly.

The serial number (a 6-digit entry) screen typically displays 0 or the last serial number downloaded.

If installing a new serial number, uninstall the existing Revolution software program prior to upgrading.

The upload and download of each configuration file is no longer required. The iQube^2 junction box has default factory settings to communicate with the CLS forklift scale.

4.8 Software Version

Press **Get Current Software Version** to view the version of software installed on the iQube^2 junction box. This will also help you identify the part number of the j-box that is installed in the scale.

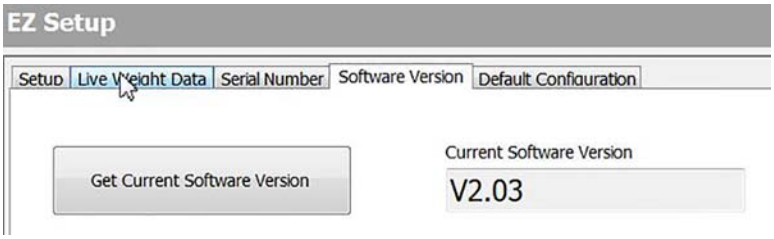


Figure 4-30. Software Version Tab

4.9 Default Configuration

The default configuration tab is used to set configuration and calibration values back to factory default. Use this feature if instructed by the factory or prior to replacing an *iQUBE* junction box in the field that appears to be working properly with Revolution, but not with the mobile computer or hand-held device.

Important ***Using the default configuration feature will require a new Zero Angle and Standard Calibration in the setup menu.***

Use the following steps to set up the default configuration.

1. Place the Calibration switch into the open position and press **Default Configuration.**

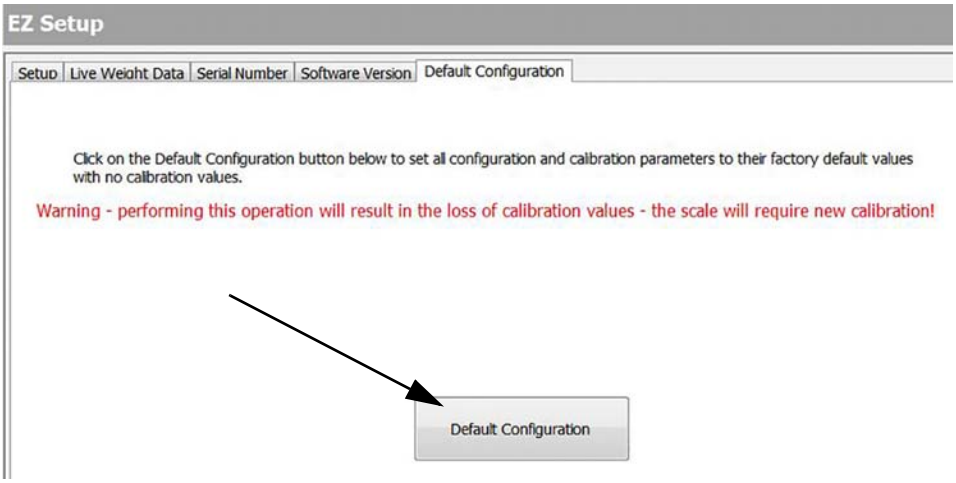


Figure 4-31. Default Configuration Tab

2. Select **Yes** to continue.

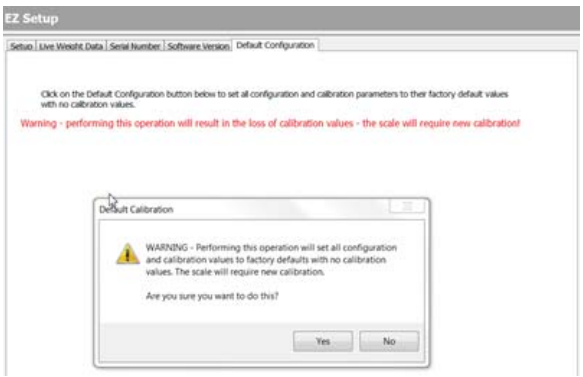


Figure 4-32. Continue on to Default Configuration

3. Select **OK** to exit out of the default configuration screen.

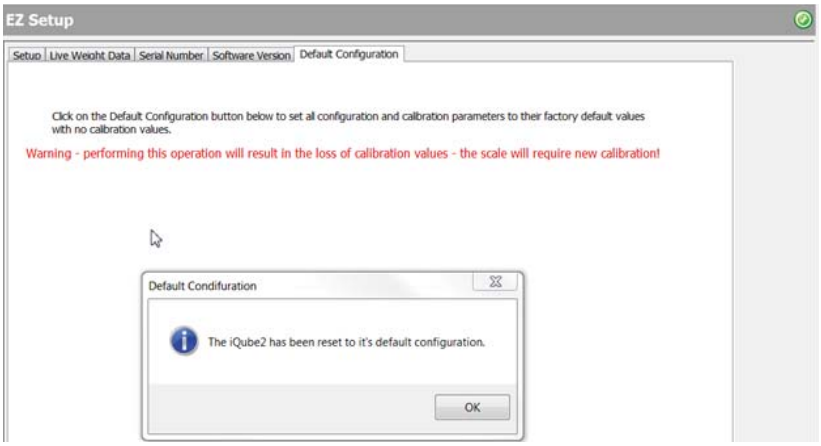


Figure 4-33. Exit Default Configuration

4.10 Diagnostics

Diagnostics works in setup or normal operating mode.

1. On the ***EZ Setup*** screen, select the **Diagnostics** button.

Note ***Selecting Auto refresh will continuously display data communications for each screen.***

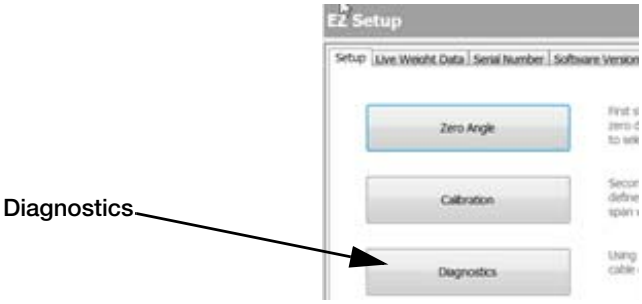
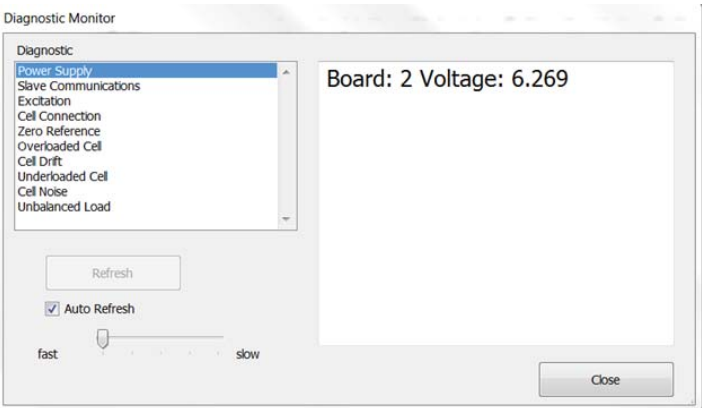


Figure 4-34. Select Diagnostics



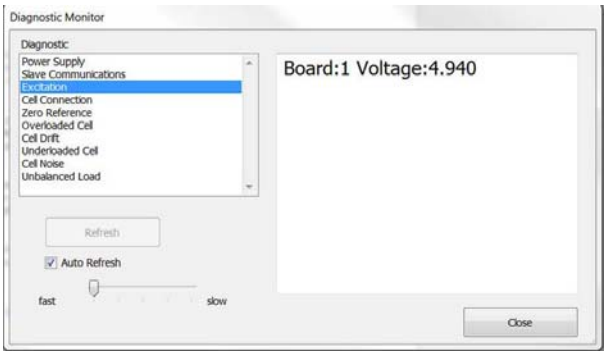
Power Supply:

Look for a voltage range between 6.2 and 6.5

Figure 4-35. Diagnostic Monitor Display

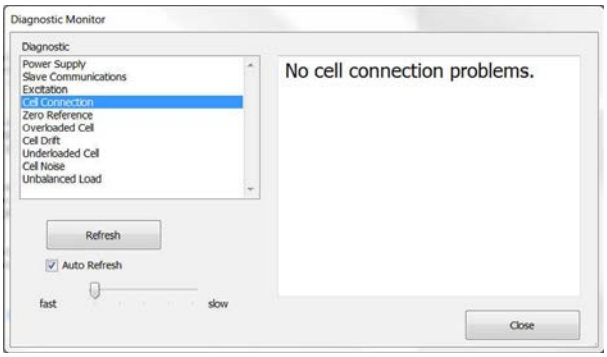
Slave Communications:

Not applicable to CLS software



Excitation:

Not Applicable to CLS M software



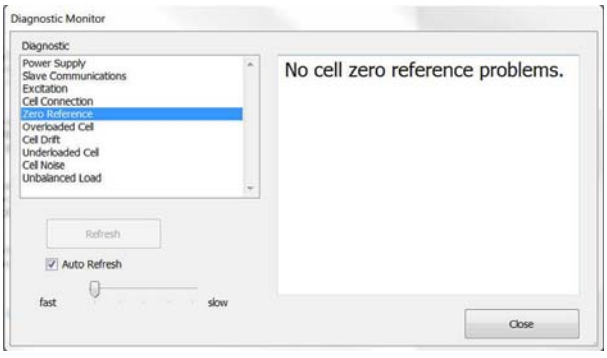
Cell Connection:

Tests correct load cell cable connections

Scans each load cell to display connection issues.

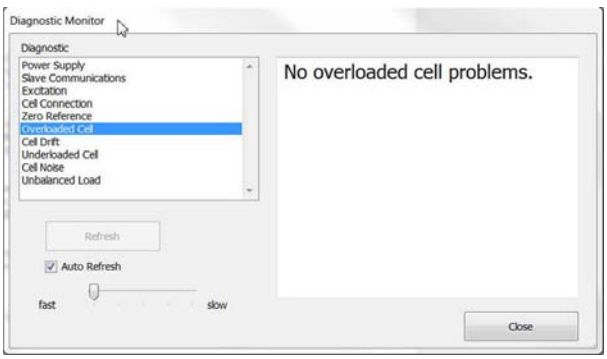
If one load cell connection error is found, will flash between *No cell connection problems* and Scale: SC1 Cell:1 or 2.

While standing in front of the forklift, cell 1 is located on the left, cell 2 is located on the right.



Zero Reference:

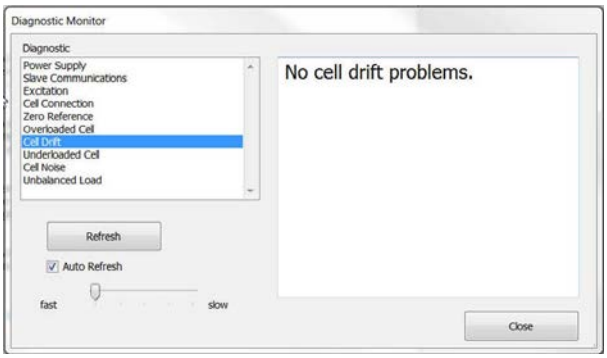
Not Applicable to CLS software



Overload Cell:

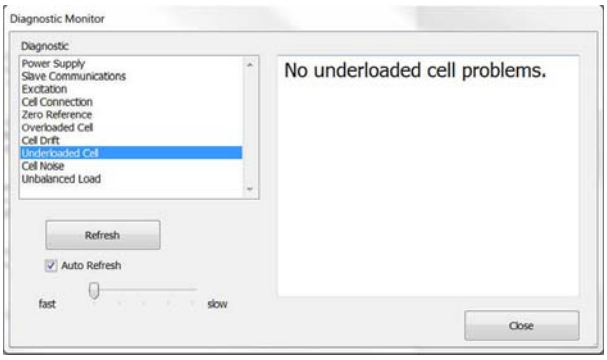
If an error occurs, it will display the mV level of the overloaded load cell.

At 5000 lb, the mV rating is 1.5



Cell Drift:

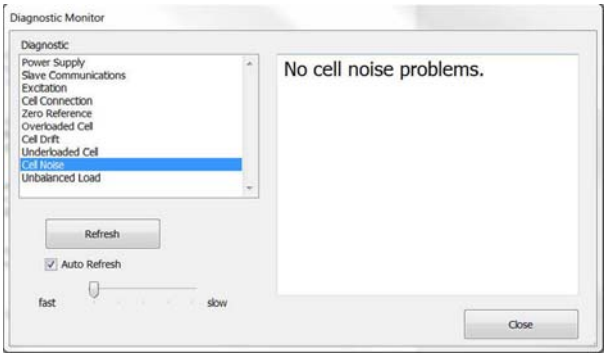
Not Applicable to CLS software



Under-load Load Cell:

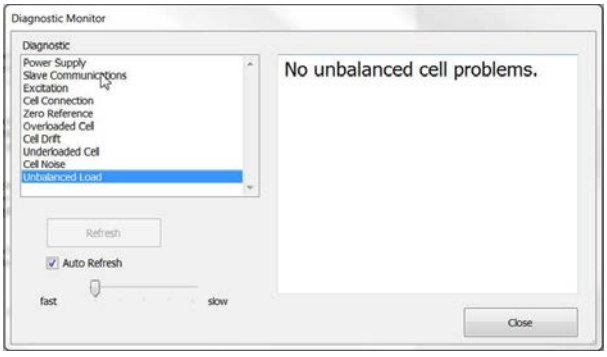
If an error occurs it will display the mV level of the underloaded load cell.

At 5000 lb the mV rating is 1.5



Cell Noise:

Not Applicable to CLS software



Unbalanced Cell:

Not Applicable to CLS software

5.0 Calibration

When hanging weights from the forks, make sure to note the weight of the hanging device and add to test weight value (Figure 5-5).
Make sure forks are level before beginning calibration (See Section 4.5 on page 35).
Suggested test weight is 500 lb minimum.
Always shut forklift off when calibrating. High vibration can cause inaccuracies.
When going through calibration steps, it is recommended that you do not use the back button; calibration may not complete.

5.1 Leveling Forklift Forks

1. Level the forks to 0° by placing a level on the forks and adjusting as required.

The carriage j-box will need to be in setup mode (See Section 5.2)
Turn off the forklift after leveling forks, high vibration from the running engine will cause inaccurate readings.

2. In the setup screen, press **Zero Angle** (Figure 5-1 A).
3. A pop-up appears as shown in (Figure 5-1 B). Press **OK** to close the pop-up box.

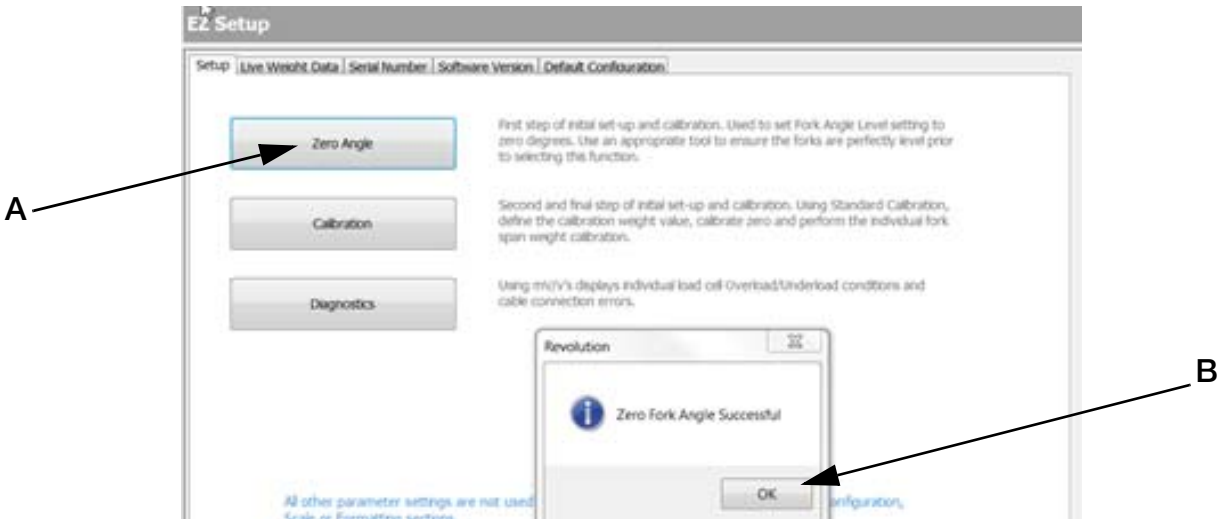


Figure 5-1. Zero Forks

Forks should be level when testing calibration. A degree of tilt in either direction can cause errors in the use of the scale.

5.2 Carriage J-Box Calibration Mode

The load cell j-box must be placed in the calibration mode:

1. Remove the scale cover.
2. Remove the one screw from the plate at the top of the j-box.
3. Swivel plate away from switch opening.
4. Place switch in the calibration position, away from coiled cable connection or toward the right-hand side of j-box when standing in front of the scale (load cell 2).

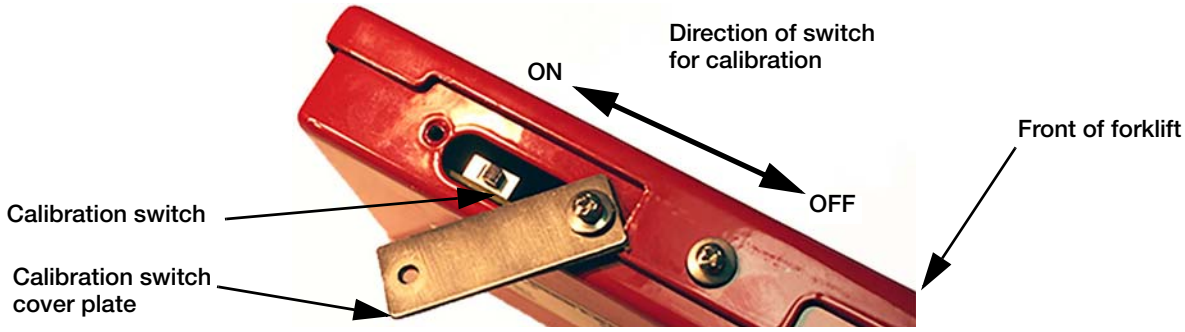


Figure 5-2. J-Box Calibration Switch Location

5.3 Standard Calibration

Note *The carriage j-box will need to be in setup mode (See Section 5.2 on page 46).*

1. Select ***Calibration*** from the ***EZ Setup*** screen.
2. Enter the six-digit serial number of the scale (Figure 4-21 on page 36 A). The serial number can be found on the top-right cleat of the scale back plate or the serial tag installed on the scale. If the serial number is incorrect or 0, enter the correct serial number and press **Next** to store that number.

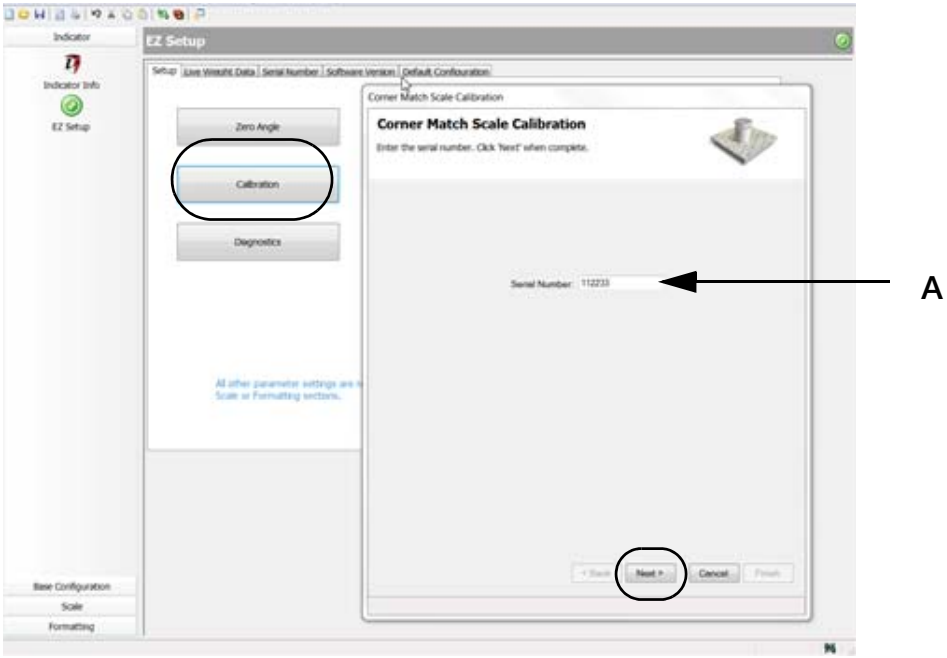


Figure 5-3. Enter Serial Number Information

3. Select ***Standard Calibration*** (Figure 5-4 B).
4. Press **Next** (Figure 5-4 C).

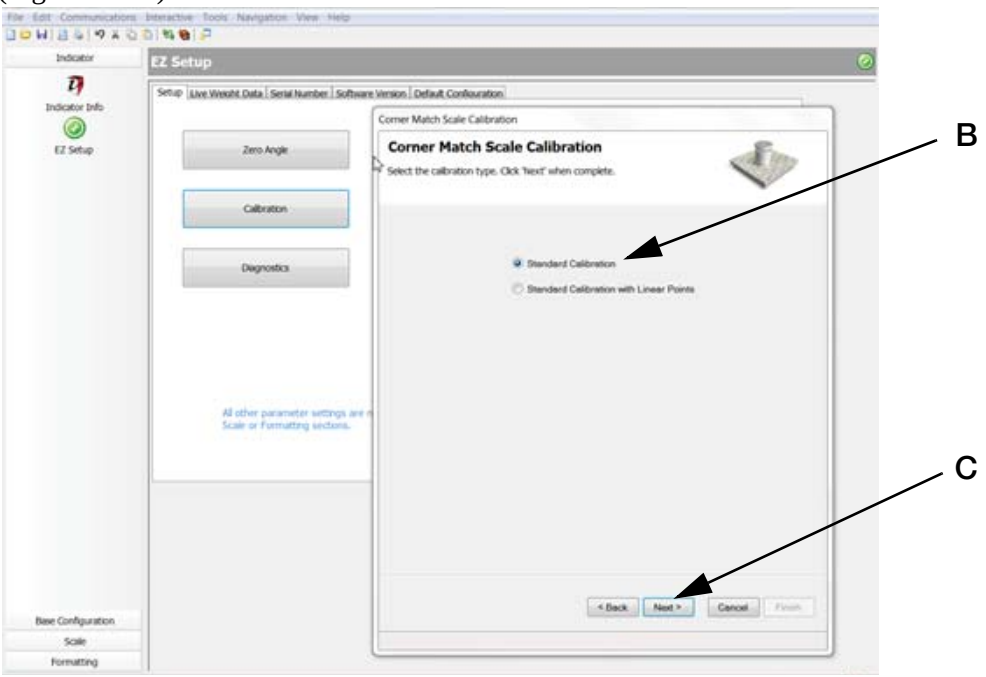


Figure 5-4. Enter Calibration

5. Enter the test weight value to be used and press **Next** (Figure 5-5 A).
   Certified Test Weight used during cell normalization must be checked.

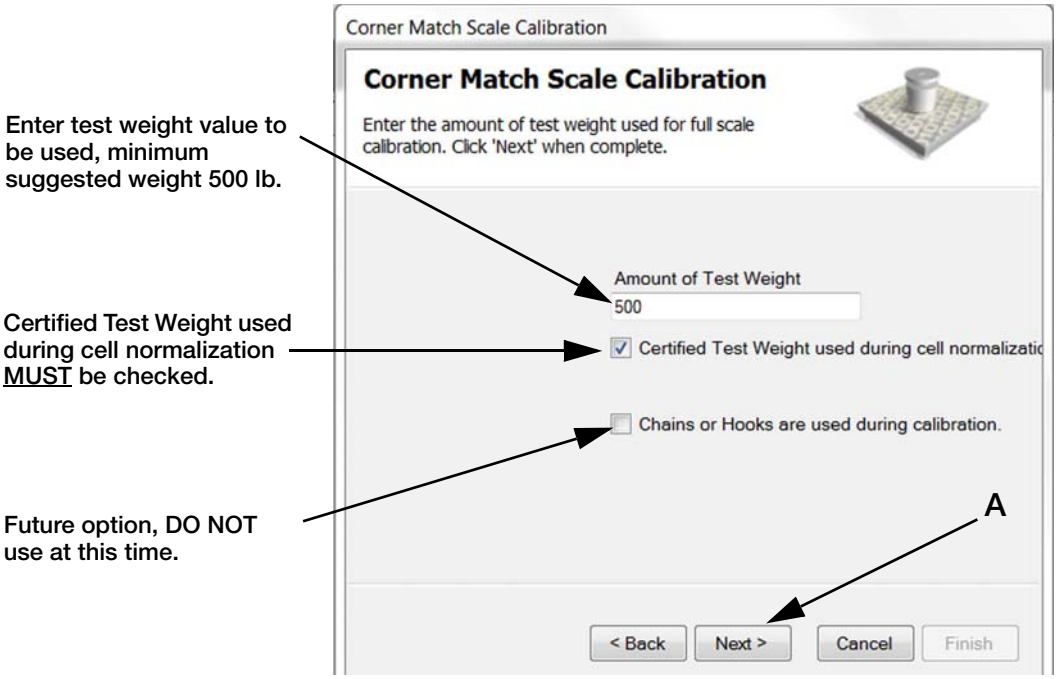


Figure 5-5. Enter Test Weight Value

6. The ***Corner Match Scale Calibration*** screen appears (Figure 5-6). Press **Calibrate Zero** (Figure 5-6 A).
7. Press **Next** (Figure 5-6 B).

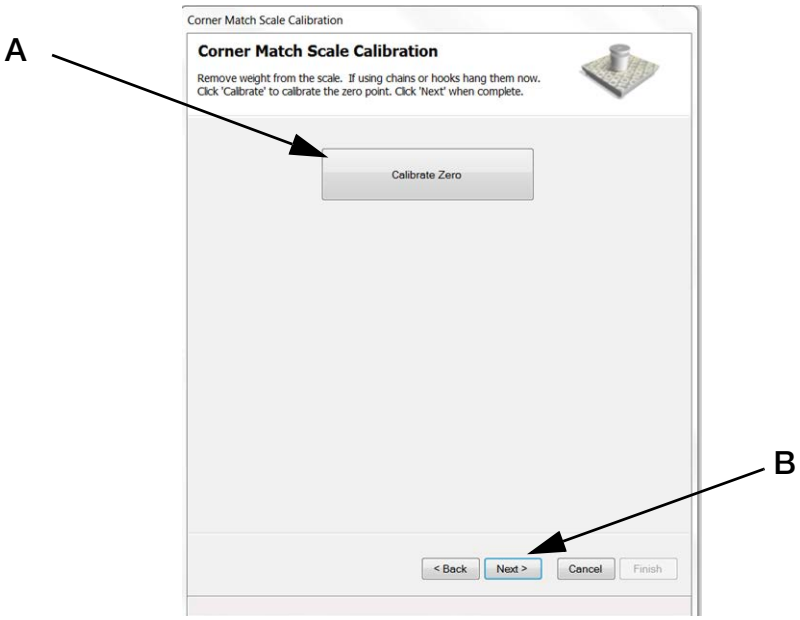
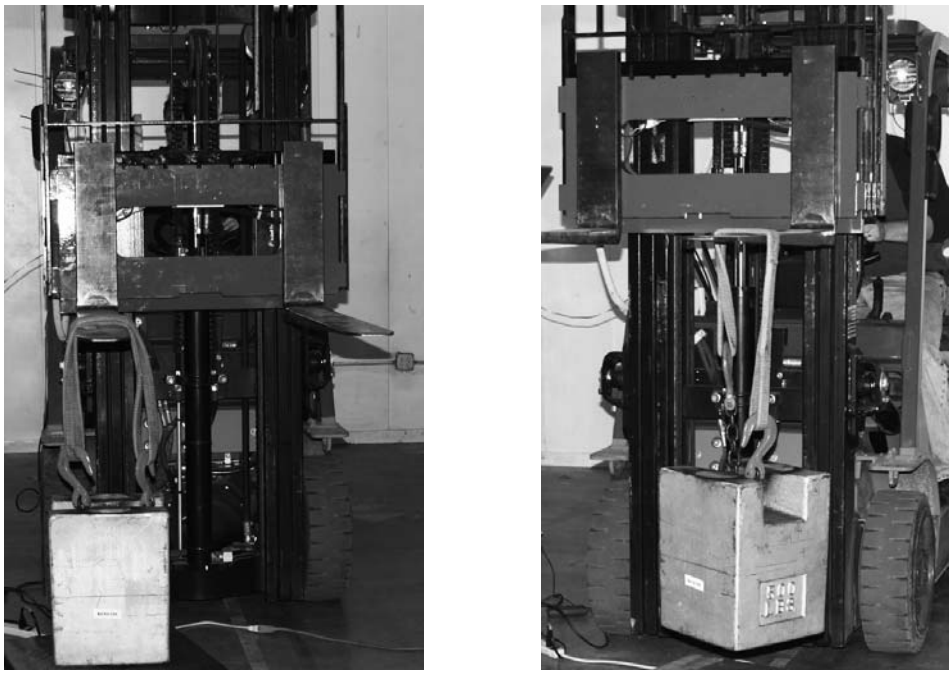


Figure 5-6. Calibrate Zero

8. Add a known weight to Load Cell 1 (Left-hand Load Cell, see Figure 5-7).
9. Lift weight (allow it to stabilize if using hanging weight).

Note

Always shut the forklift off when calibrating, high vibration can cause inaccuracies.
Make sure to calibrate the forks in the correct order, or the calibration will not be successful.
Watch the pitch value to ensure it is close to zero. Adjust forks if necessary.



Load Cell #1
(Left Hand)

Load Cell #2
(Right Hand)

Figure 5-7. Load Cell #1 & #2

10. Press ***Measure*** (Figure 5-8 A).

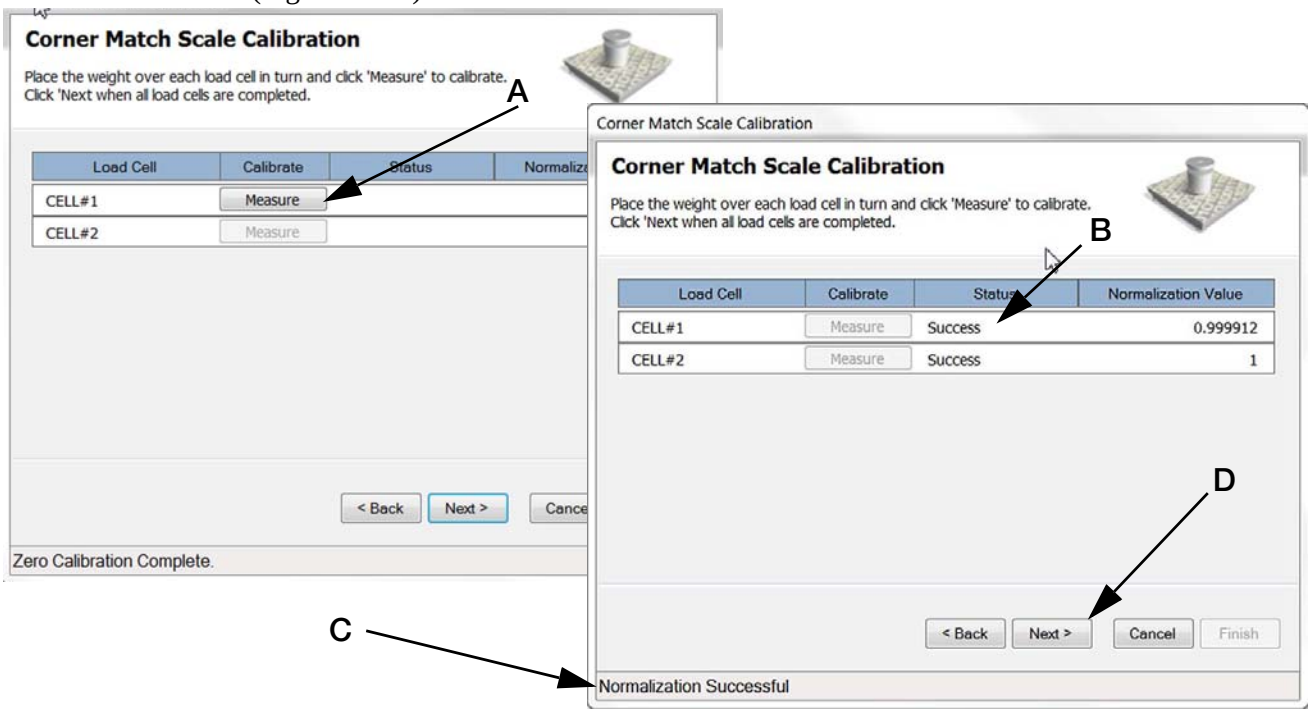


Figure 5-8. Load Cell Calibration

11. Load Cell #1 Status will read ***Success*** (Figure 5-8 B) and Load Cell #2 *Measure* will become available. Repeat steps 9-11 for Load Cell #2.
12. When both load cells have been calibrated (status reads Success for both Cell #1 & #2, Figure 5-8 B) and the ***Normalization Successful*** message appears (Figure 5-8 C) press **Next** (Figure 5-8 D).

13. A message that you have successfully calibrated the scale will appear (Figure 5-9 A), then press **Finish** (Figure 5-9 B).
    A message appears in the bottom of the frame ***Getting New Calibration*** (Figure 5-9 C). When done the pop up box will disappear and calibration is complete.

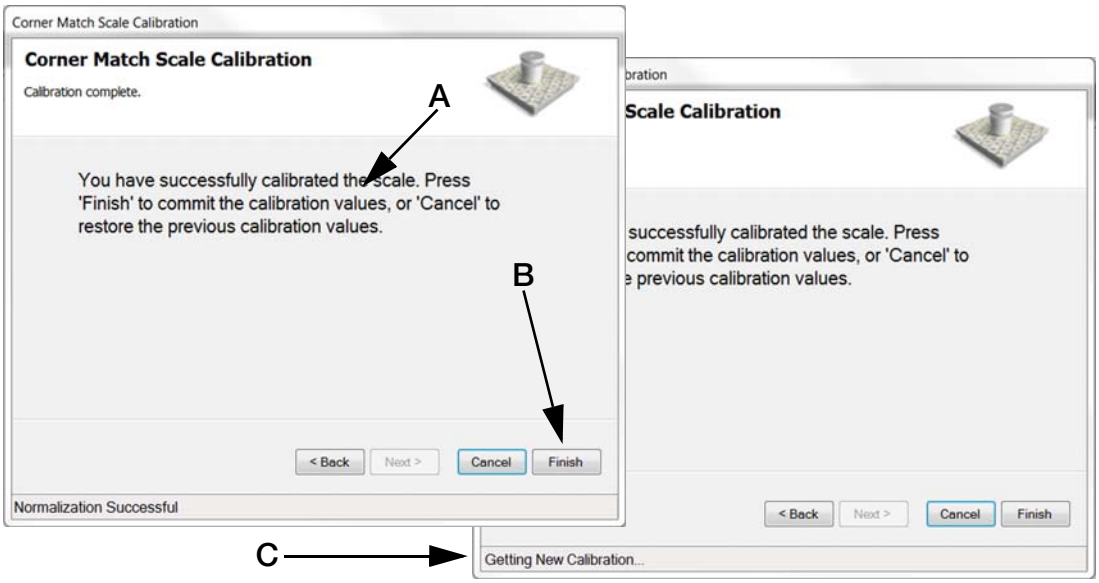


Figure 5-9. Finish Calibration

14. Place the calibration switch into the closed position (Figure 5-2 on page 46), toward the left hand side of j-box when standing in front of the scale (toward load cell #1).

5.3.1 Standard Calibration with Linear Points

This calibration method is used in combination with a pallet. Use the following steps to do a standard calibration with linear points.

1. Enter the six-digit serial number of the scale (Figure 5-10 A). The serial number can be found on the top-right cleat of the scale back plate or the serial tag installed on the scale. If the serial number is incorrect or 0, enter the correct serial number and press **Next** to store that number (Figure 5-11 B).

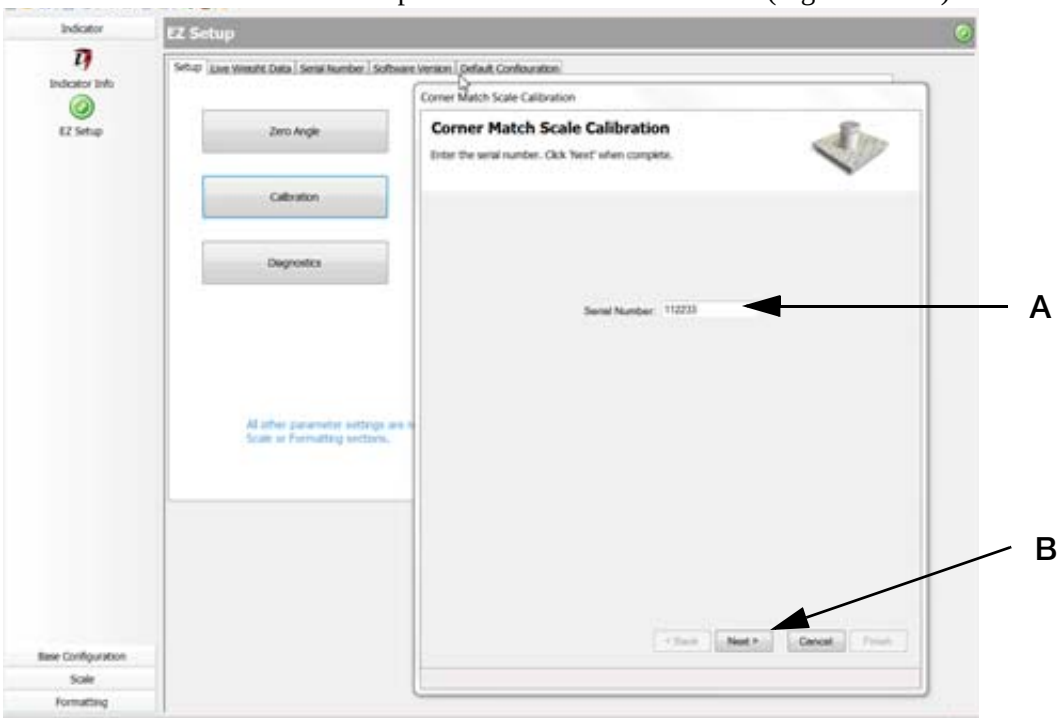


Figure 5-10. Enter Serial Number

2. Select ***Standard Calibration with Linear Points*** (Figure 5-11 A) and press **Next** (Figure 5-11B).

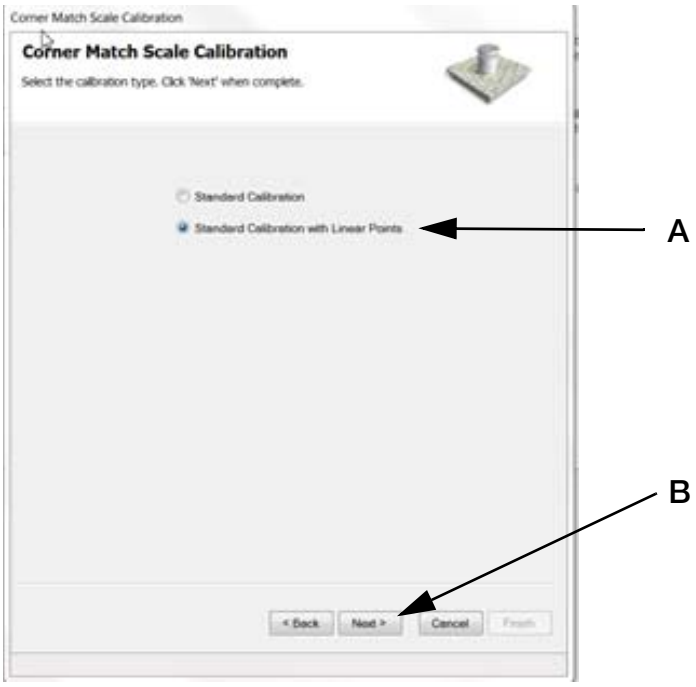


Figure 5-11. Standard Calibration with Linear Points

3. Enter a test weight value (Figure 5-12 A) to be used for normalization and ensure the ***Certified Test Weight Used During Cell Normalization*** box is checked (Figure 5-12 B). Also select ***Chains or Hooks are used during Calibration (***Figure 5-12 C).
4. Press **Next** (Figure 5-12 D).

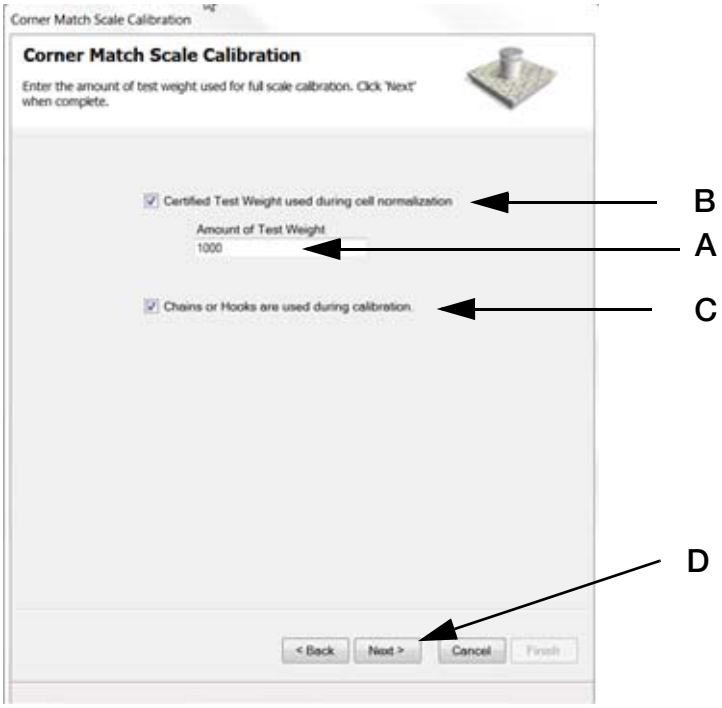


Figure 5-12. Enter Test Weight Value

5. Place a pallet on the forks and lift the tines off the ground.
6. Press **Calibrate Zero** (Figure 5-13 A), then press **Next** (Figure 5-13 B).
7. Press **Next** (Figure 5-6 B).

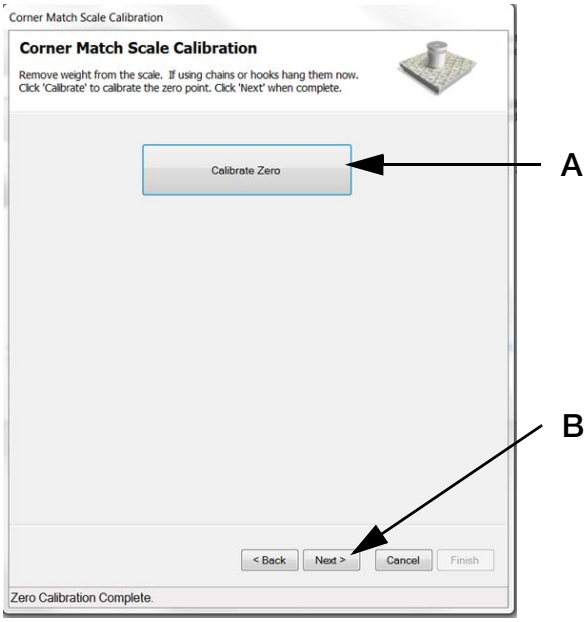


Figure 5-13. Calibrate Zero

8. Add known weight over the load cell 1 (left-hand load cell).
9. Lift weight (allow it to stabilize if using hanging weight).

Note ***Always shut forklift off when calibrating; high vibration can cause inaccuracies. Make sure to calibrate forks in the correct order, or the calibration will not be successful. Watch the pitch value to ensure it is close to zero. Adjust forks if necessary.***

10. Press **Measure** (Figure 5-14 A).

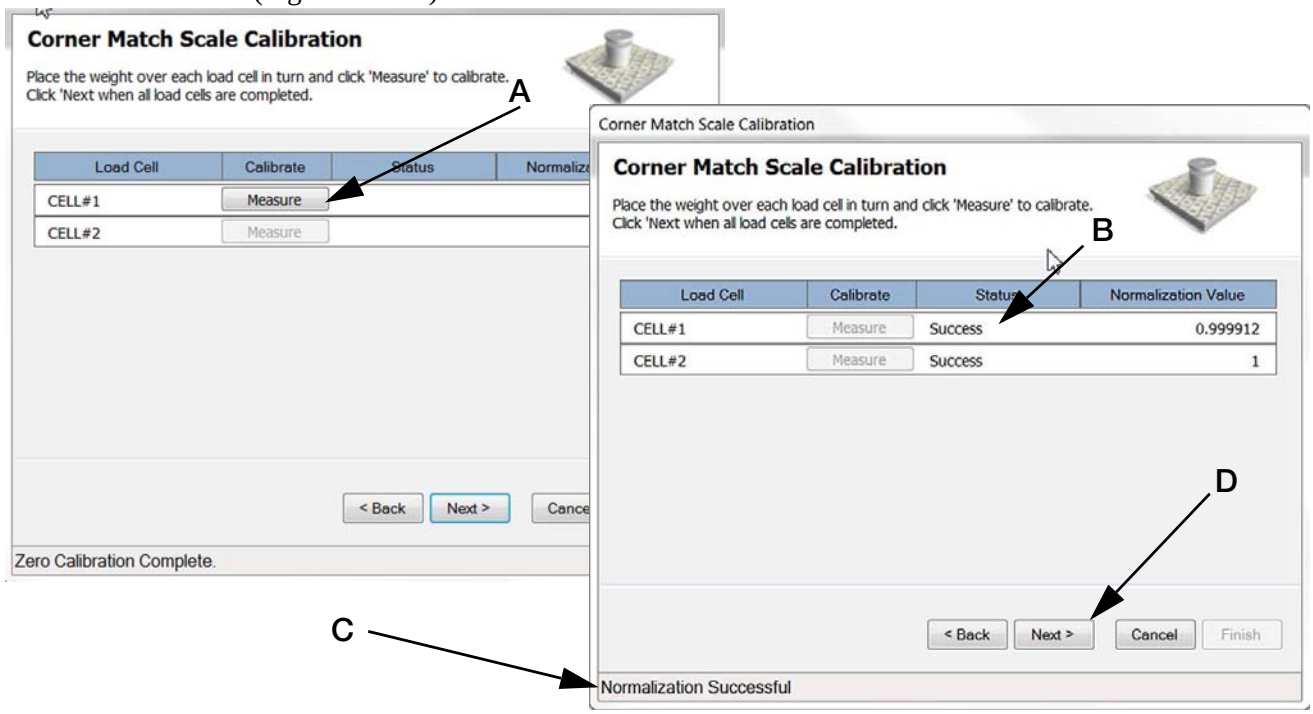


Figure 5-14. Load Cell Calibration

11. Load Cell #1 Status will read ***Success*** (Figure 5-14 B) and Load Cell #2 *Measure* will become available.

Repeat steps 9-11 for Load Cell #2.

12. Place a certified weight on the pallet and enter the value in the first weight field box then press **Measure.**

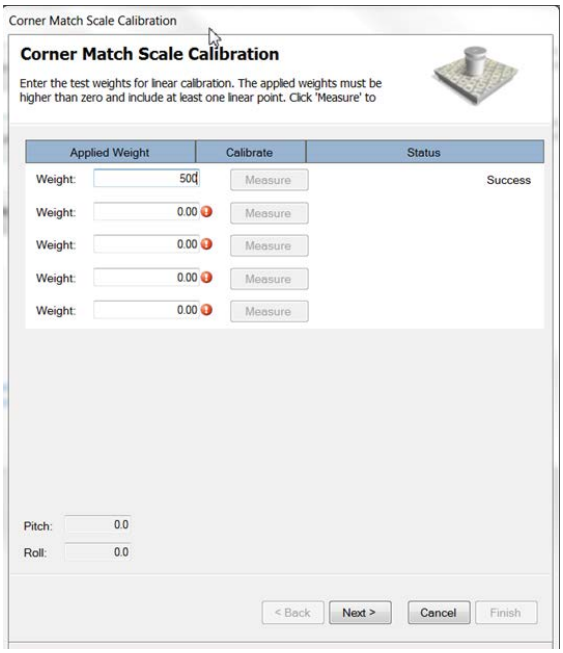


Figure 5-15. Enter Weight Values

Continue to place certified weights on the pallet and press **Measure** as each button become activated (up to five total linear points), making sure each weight value is an incremental weight.

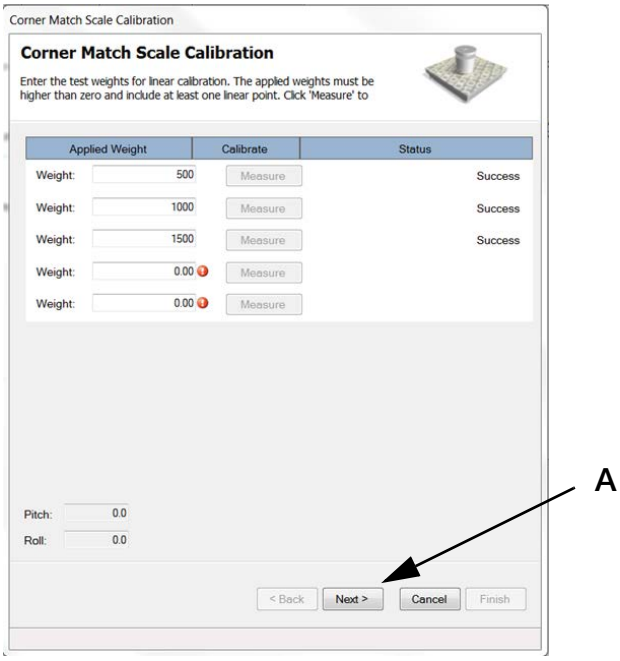


Figure 5-16. Continue to Enter Weight Values

13. Press **Next** (Figure 5-16 A).

14. Remove the weights and pallet. Select **Rezero Calibrate** (Figure 5-17 A) and wait for the prompt ***Rezero Calibration Complete*** (Figure 5-17 B).

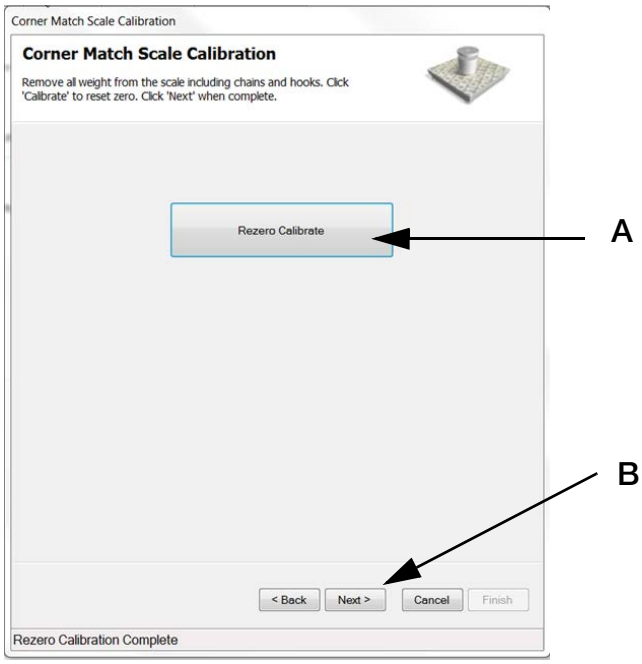


Figure 5-17. Rezero Calibrate

15. Press **Finish** to complete the calibration (Figure 5-18 A).

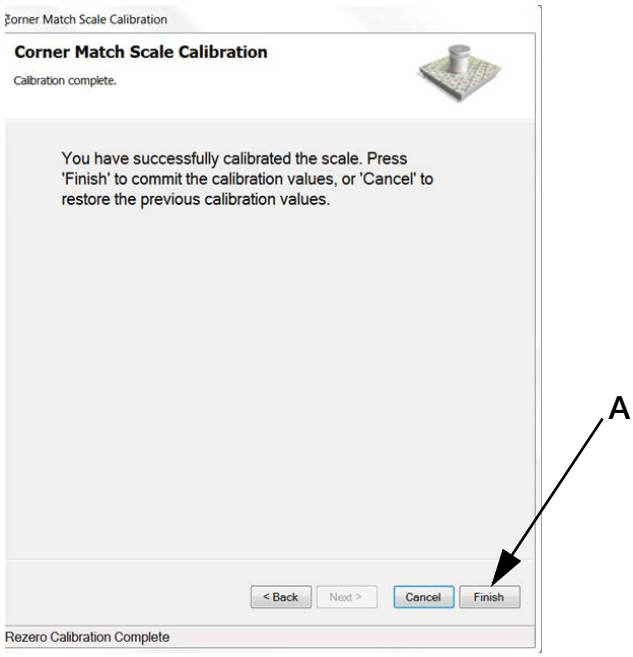


Figure 5-18. Finish Calibration

5.3.2 Reading Data in Live Weight Screen

Once calibration is complete, select the ***Live Weight Data*** tab.

Figure 5-19. Revolution Live Weight Data Screen.

Important ***When moving the calibration switch in and out of calibration mode, it may take a few seconds for the Weight Data Packet and Weight window fields to update with accurate information.***

The mV, Pitch and Roll Angle functions are active whether the scale is in calibration or normal weighing mode. If the sealing switch is in calibration mode, the ***Weight*** may have held the last displayed weight value in memory. Move the sealing switch in normal weighing mode to continue to use the ***Live Weight Data*** feature correctly.

1. Place the calibration switch into the closed position (Figure 5-2 on page 46), toward the left-hand side of the j-box when standing in front of the scale (toward load cell #1).
2. Test a known weight amount as specified in Section 4.3.3 on page 31. When the weight is on the fork, the value will appear in the ***Weight*** box and the ***Weight Data Packet*** values will update.
3. If scale is weighing correctly, carefully disconnect USB and replace the clear cover.
4. Swivel the cover plate back to the correct position and secure with the screw.
5. Upon successful installation and calibration verification, seal the carriage j-box and load cell quick disconnects for Weights and Measurements approval.
6. Re-install the scale cover plate. The scale is now ready for use.

6.0 Load Cell Replacement and Flexure Troubleshooting

This section describes procedures for replacing a load cell. The *CLS-M Cargo Lift Scale* uses Rice Lake's load cell, PN 125543.

The following instructions must be followed exactly to allow for seamless and easy load cell replacement.

WARNING ***Take all necessary safety precautions when installing or replacing the scale parts including wearing safety shoes, protective eyewear, and using the proper tools.***

6.1 Required Tools for Replacing a Load Cell

The following list of tools is necessary for replacing a load cell on the *CLS-M* scale. Ensure that you have these tools handy.

Rice Lake Part #	Item Description
96196	Modified box wrench
	Crescent wrench
	3/4" socket wrench, with extensions
	ball-peen hammer
	1-1/8" wrench for overload stop
	Chisel
	Allen wrench for overload stops
	Torque wrench
	Pry bar

Table 6-1. Required Tools for Replacing a Load Cell

Note ***Adequate light is necessary to change the load cell. Try to position the forklift close to a good source of natural light or if not possible, have a good source of lighting available.***

6.2 Load Cell Replacement

A replacement parts kit is available (PN 97883), which contains all of the component parts shown in Figure 6-1.

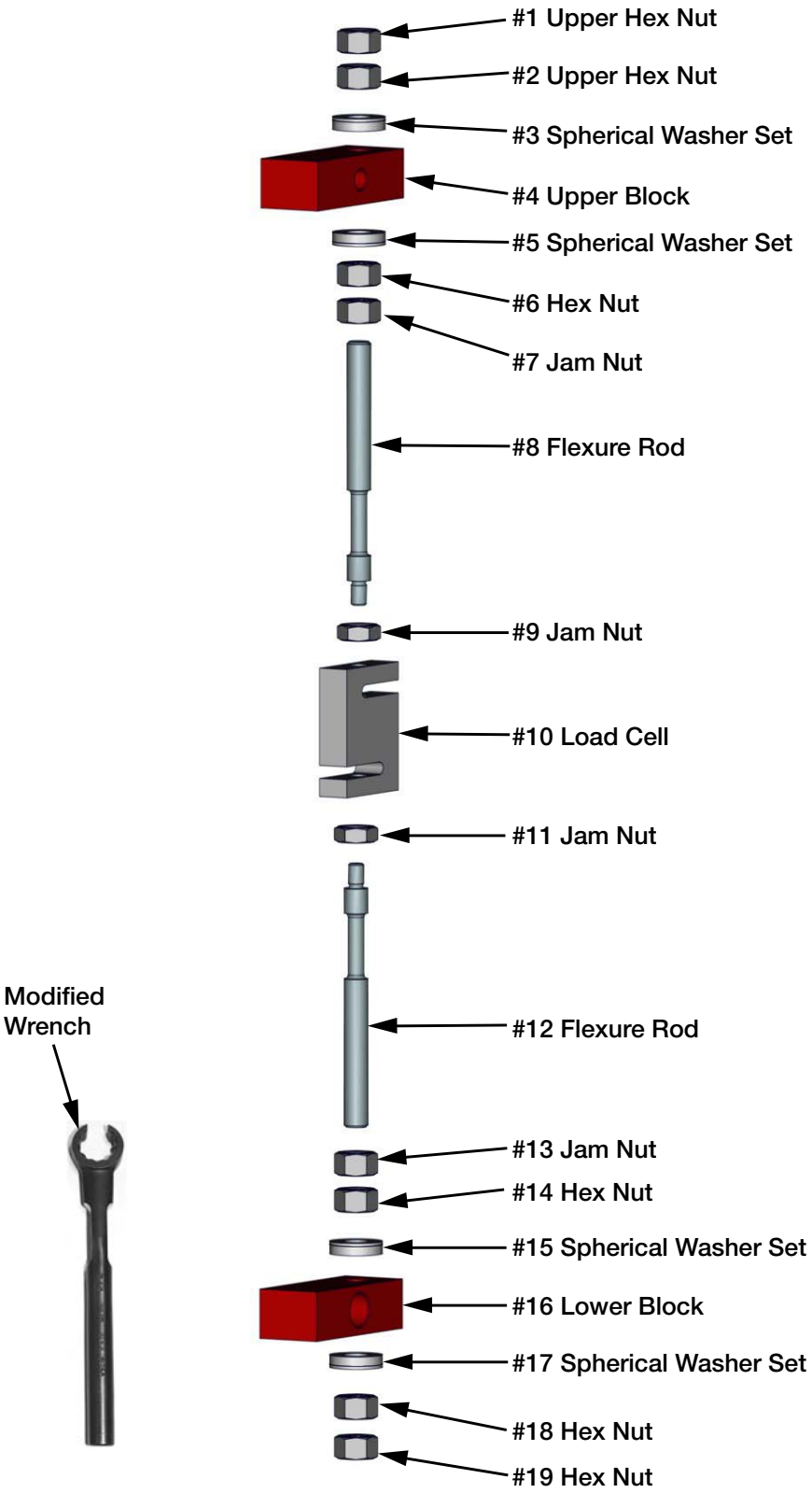


Figure 6-1. CLS-M Load Cell Assembly Parts Breakout

Use the following steps to replace a load cell.

1. Raise the forklift carriage just slightly for fork removal.
2. Slide the forks to the center of the carriage to allow for removal. Set forks aside.

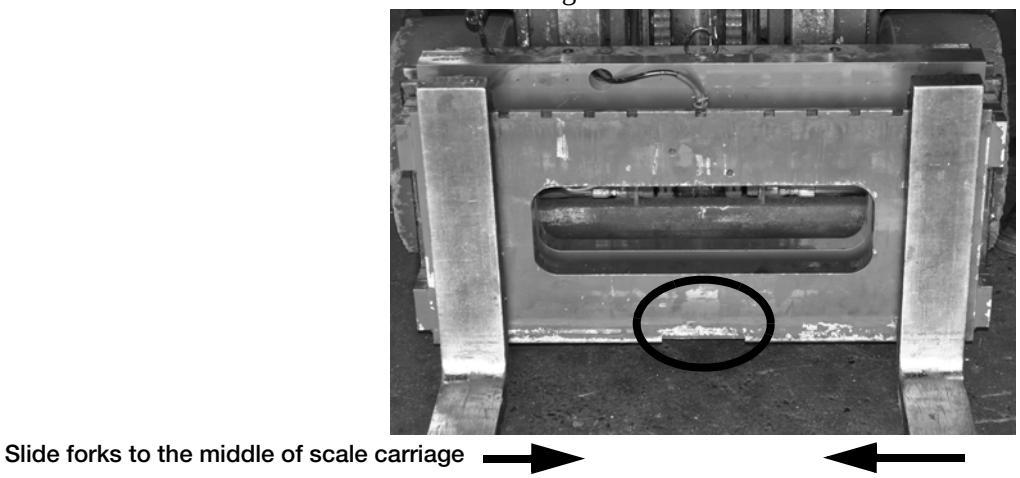


Figure 6-2. Fork Removal

3. Raise the forklift carriage to a comfortable working height for the load cell replacement.
4. Remove the top hex nut (#1) with a socket wrench.

Note ***It's okay if the load cell slightly rotates up against the front or back plate of the scale.***

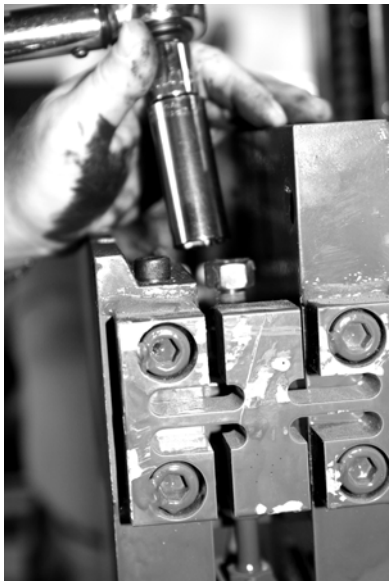


Figure 6-3. Removal of Hex Nut (#1 of Parts Breakdown)

5. Loosen jam nut (#7) from the upper block using the special modified box wrench (PN 96196 - supplied with load cell replacement kit) and shown in Figure 6-1.
6. Loosen jam nut (#13) from the lower block.
7. Remove the top hex nut (#2) and the top spherical washer set (#3).

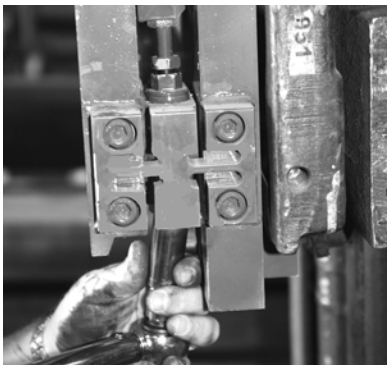


Figure 6-4. Loosen and Remove Bottom Hex Nut (#18 and #19 on Parts Breakdown)

Note ***It's okay if the load cell slightly rotates up against the front or back plate of the scale.***

8. Remove the bottom hex nuts (#18 and #19) and the bottom spherical washer set (#17).
9. Loosen the hex nut located under the upper block (#6).
10. Loosen the jam nut located on top of the load cell (#9).
11. Loosen the hex nut (#14) located on top of the lower block.
12. Loosen the hex nut (#11) on the lower side of the load cell.
13. Remove the bottom flexure rod (#12) and the top flexure rod (#8) sliding the remaining washer sets (#5 and #15) with it.

.

Ensure flexure rod threads are free of debris and paint by running a nut the full distance of the rod.

Figure 6-5. Remove Flexure Rod with Nuts and Washers

14. Check the flexure rod threads for smooth operation by running a nut the full distance of the rod, making sure it does not get stuck anywhere along the way. If so, clean off any paint using a wire brush and oil.
15. Oil the spherical washers using a standard machine shop oil.
16. Disconnect the load cell cable from the junction box.
17. Loosen cable clips and remove the load cell.

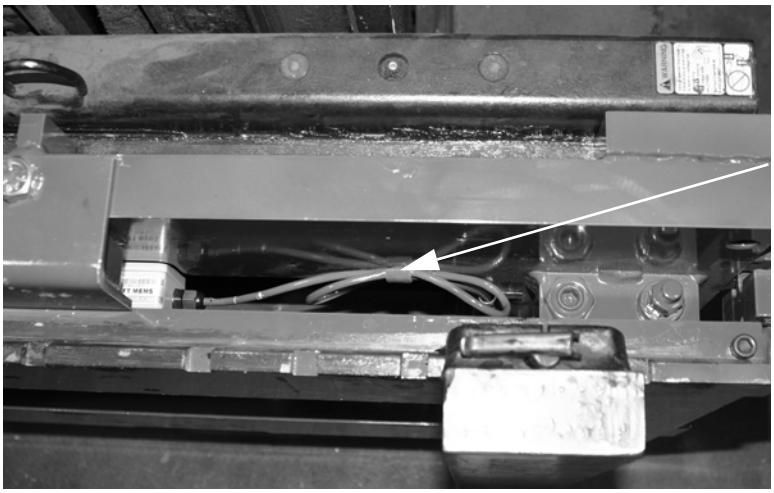


Figure 6-6. Load Cell Cable Clips

18. Position a new load cell with its cable facing towards the center and opening of the S-beam facing the flexure's.

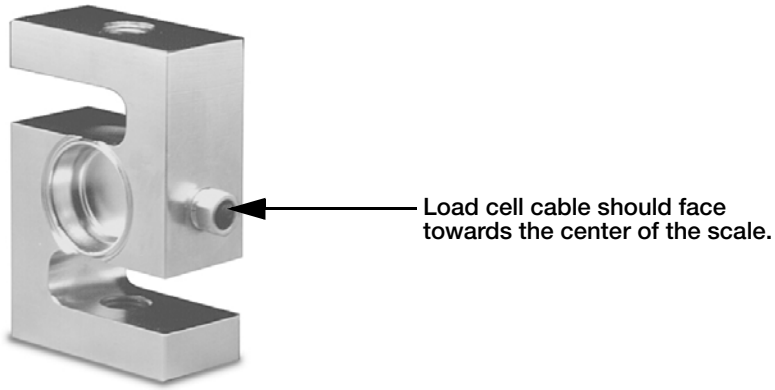


Figure 6-7. Load Cell

19. Install the top and bottom flexure rod with hardware, ensuring that the flexure rod be oriented with the short thread of the rod facing nearest the load cell.

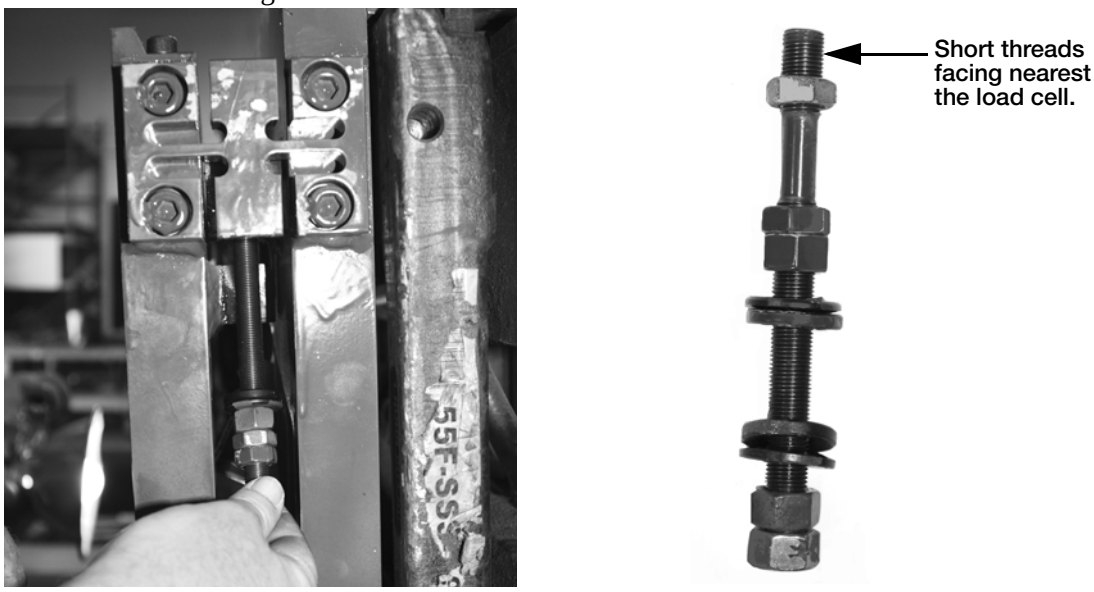


Figure 6-8. Installing Flexure into Scale

20. Insert the load cell and thread flexure rods into top and bottom of the load cell making sure the appropriate hex nuts, jam nuts, and spherical washers are in the correct order per Figure 6-1 on page 57.
21. Screw in the rod and tighten jam nut but, leave approximately two threads exposed outside of the jam nut. Do both the top and bottom of the load cell.
22. Use hex nuts to position the load cell in the center of the mounting blocks with an equal amount of flexure rod on the top and bottom of the load cell.
23. Tighten the jam nuts on the top and bottom of the load cell, making sure they are tight, and load cell is completely vertical with the scale. To accomplish this, you can use a pry bar or chisel to hold the cell straight as illustrated in Figure 6-9.

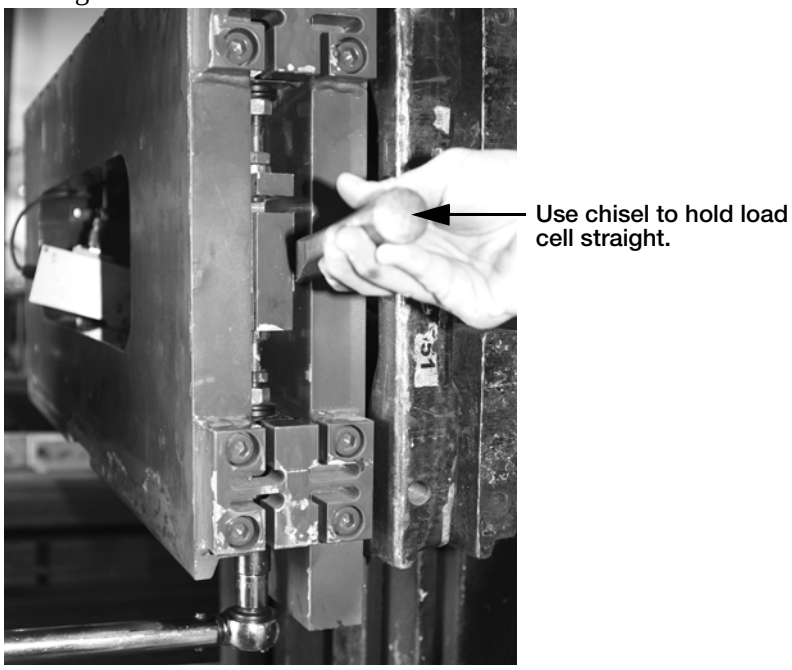


Figure 6-9. Use Chisel to Hold the Load Cell in Straight

24. Install the spherical washer set and hex nut on the bottom flexure rod, ensuring that the fat washer is mounted towards the mounting block.

Figure 6-10. Install Spherical Washer Set

25. Install a flat-bladed screwdriver in the upper mounting block between the hole and the flexure rod, forcing the flexure rod in the same direction of the flexures.

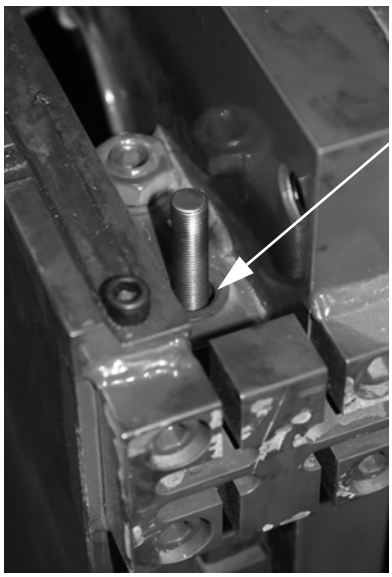


Figure 6-11. Centering the Flexure Rod

26. Use a pry bar or chisel to hold the load cell (bottom half of the cell), straight while using a torque wrench to tighten the bottom hex nut on the lower mounting block to 110 ft-lb. Install the other hex nut on the bottom of the flexure rod and torque it to 110 ft-lb.

Figure 6-12. Centering the Load Cell Using a Chisel

Figure 6-13. Tightening the Lower Hex Nut

27. Use the special modified box wrench to tighten the jam nut (#13) on the lower block.
28. Remove the flat-bladed screwdriver as used in Step 25 and inspect the flexure rod. The flexure rod needs to be in the center of the hole. If it is not, use a hammer and an angled diamond chisel to hit the bottom mounting plate and spherical washer set to adjust it to center.
29. Install the spherical washer set (#3) and hex nut (#2) on the top of the upper block.
30. Connect the load cell cable to the junction box at this time.
31. Torque the hex nut (#2) on the upper mounting block until you see 100 lb on the weight display. Tighten the lower hex nut (#6) below the upper mounting block using the modified box wrench and try to get the display as close to zero as possible.
32. Torque the top hex nut (#1) with a torque wrench to 110 ft-lb. Use a pry bar or chisel to ensure the load cell stays centered while tightening and doesn't touch the sides of front or back plate
33. Install the final hex nut on the top mounting plate and torque to 110 ft-lb. Use a pry bar or chisel to keep the load cell centered.
34. Tighten the jam nut on the lower mounting block assembly.
35. Exercise the scale, heel to toe, by placing a weight (1000 lb) on the heel, then the toe to check if the assembly was installed correctly. Do this for both sides. If the weight is off, check assemblies.
36. Place a weight in the center of the fork and check side to side values. If they are equal, you are done.
37. Calibrate the load cells (See Section 5.0 on page 46).

6.3 Forklift Flexure Troubleshooting - 28" and 34" Models

For Part Number 92828

The forklift flexure is designed to protect the load cell from damage in the forklift environment.

Use the following steps if the forklift scale is out of tolerance or unable to return to zero on a consistent basis.

1. Check for debris within the scale or between the scale carriage.
2. Check for proper spacing of the jam nuts at 0.02".
3. Check the dimensions of the flexure for damage. There should be a +/-0.03" tolerance to the drawing shown below for height and width.

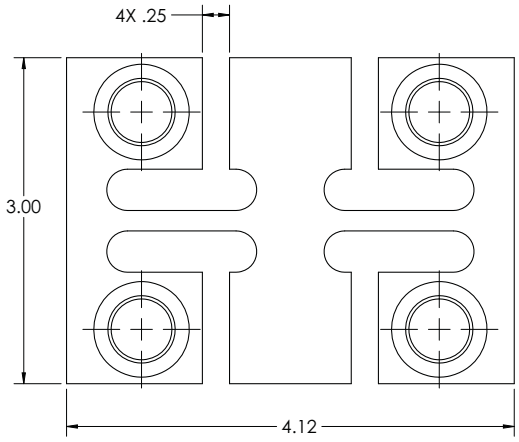


Figure 6-14. Flexure Chassis

7.0 iQube2® J-Box

The iQube2 j-box designed for use with the Rice Lake CLS-M series forklift scales and is a replacement for the j-box used on early models of the scale. Load cell connectors have been updated to improve serviceability.

7.1 iQube2 J-Box Replacement

The j-box is located between the front and back panel of the scale and is covered by a metal cover plate on the top of the scale.

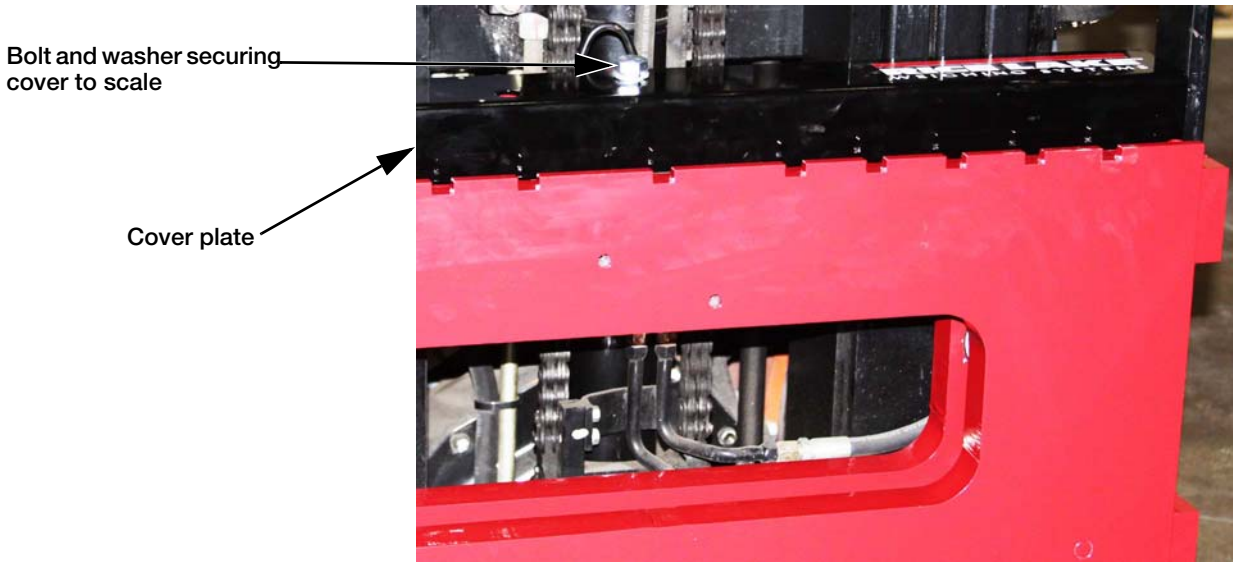


Figure 7-1. Remove Cover Plate

1. Turn scale power off on the Communication/Power box.
2. Remove the bolt that holds the cover plate in place, which conceals the junction box.
3. Remove the cover plate and set aside.
4. Unplug power cable.
5. Lift the forklift to a comfortable working height.
6. Remove the two screws securing the j-box to the scale, using a #4 metric Allen wrench, to remove existing j-box from scale carriage.
7. Remove the coiled interface cable from the junction box.
8. Disconnect the load cell cables.

Note ***Steps 9-14 are only required when upgrading the original j-box to an iQube2. If replacing an iQube2 with another iQube2 skip to step 15.***

9. Remove automotive quick connects from load cell cables.
10. Strip wires for connection to the new load cell connectors. See Figure 7-3.
11. Follow the instructions on the packaging for Turk connector, PN BS-8157-0/P69, for inserting wires.
12. Wire the load cell 5-pin male connector to the following color codes Table 7-1 and Figure 7-3. Note the orientation of the raised diamond in Figure 7-3. Use the supplied tool in the rectangular tool slot to lock wires down.

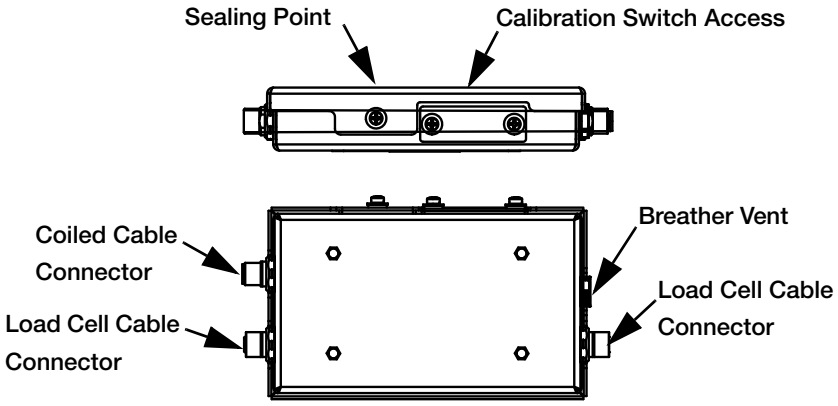


Figure 7-2. iQube2 J-Box

Load Cell 5 Pin Male Connector Wiring

Pin #	Wire Color	Function
1	Green	+SIG
2	White	-SIG
3	Red	+EXC
4	Black	-EXC
5	Yellow	Ground

Table 7-1. Load Cell Wiring

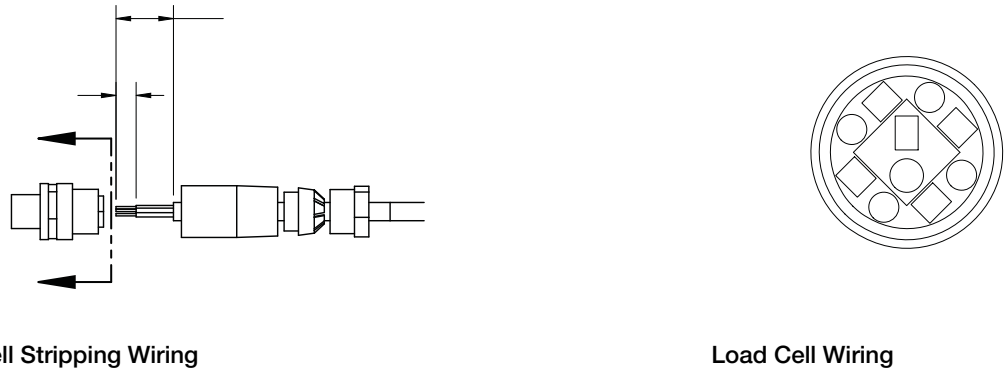


Figure 7-3. Load Cell Wiring

13. Add blue Loctite®[1] 425 to the two contact points as indicated in Figure 7-3.
14. Attach the load cell cables to the bottom two connectors on the junction box.
    - Apply Loctite.

- Hand tighten until the connection is snug, plus another 1/4 turn. Only two threads should be visible.

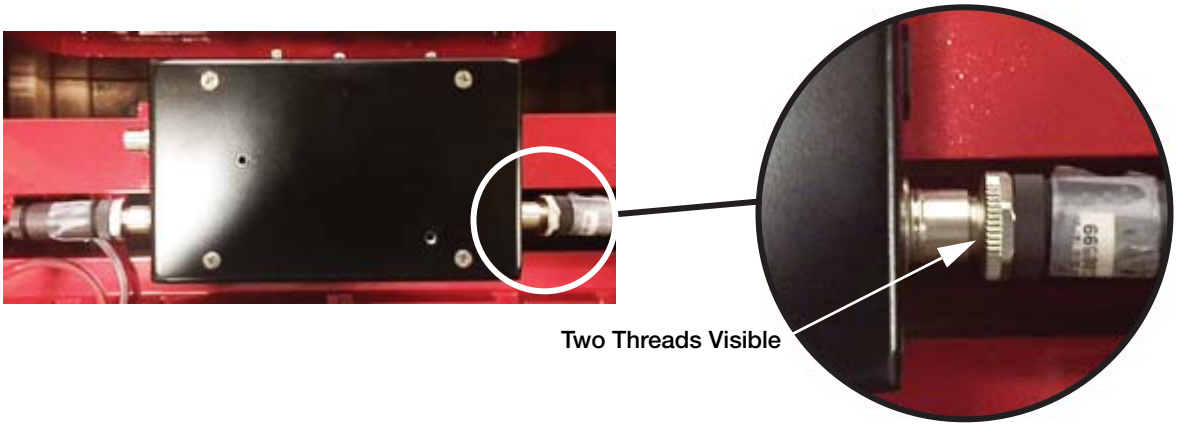


Figure 7-4. Connect Load Cell Cable to J-Box

15. Attach the home run cable to the top side connector.
16. Install the iQube2 j-box into the forklift scale, using Loctite on the mounting screws.
17. Open the calibration access switch cover on the j-box, set switch to the ***On*** position.
18. Plug in the power cable, and turn on the communication power box.
19. Calibrate the unit using Revolution software.
20. Connect the load cell cables to each side.
21. Connect the coiled interface cable to the top of the j-box.
22. Align the iQube2 j-box with the bolt holes in the scale and use an Allen wrench to tighten.
23. Place the cover plate in place and secure with a bolt and washer, and seal the unit.

7.2 Download the Serial Number to the J-Box

1. To download the serial number of the scale using Revolution while in the ***EZ Setup*** mode, select the Serial Number tab.
2. Enter the new six-digit serial number from the forklift scale (A) and press the **Download Serial Number** button (B) to save the new serial number.

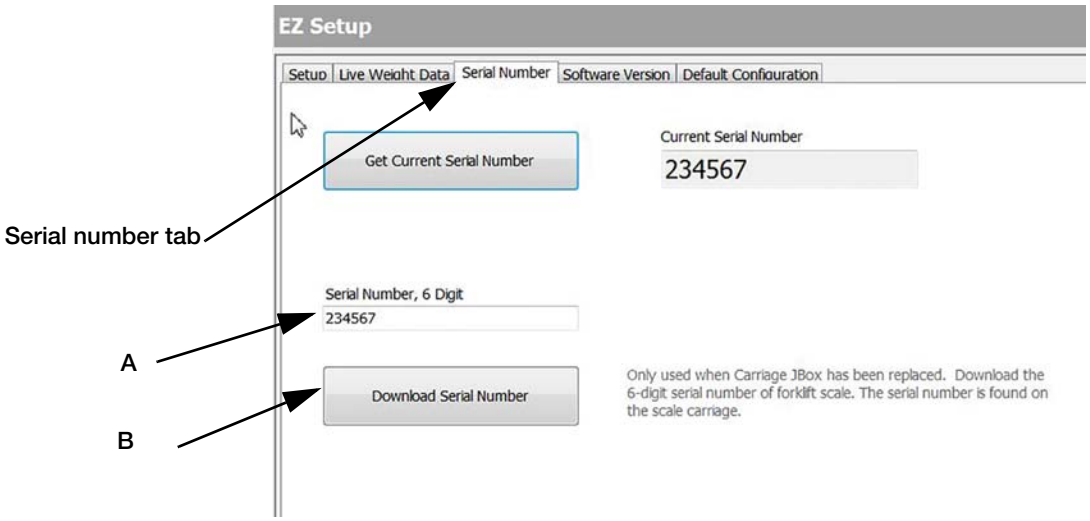


Figure 7-5. Serial Number Setup Screen

3. Once the serial number is download, a message ***Serial Number sent to device*** is displayed on the screen. Press **OK** to accept that number.

Note ***The serial number of the scale is located on the right side of the carriage and also under the black cover plate on the scale assembly.***

The serial number (a six-digit entry) screen typically displays 0 or the last serial number downloaded.

The upload and download of each configuration file is no longer required. The iQube2 junction box has default factory settings to communicate with the CLS forklift scale.

7.3 iQube2 PCB Board Assembly Replacement

1. Remove j-box from the scale carriage. See Section 7.0 on page 65.
2. Disconnect load cell and coiled cable connectors
3. Loosen four screws to remove front cover of j-box.
4. Disconnect JST connectors for load cells and coiled cable.
5. Remove PCB board assembly.
6. Install new PCB board assembly and install screws using blue Loctite®.
7. Connect coiled cable JST connector to J1.
8. Connect left load cell cable JST connector to J2.
9. Connect right load cell cable JST connector to J3.
10. Replace cover and secure with four screws, Locktite not required.

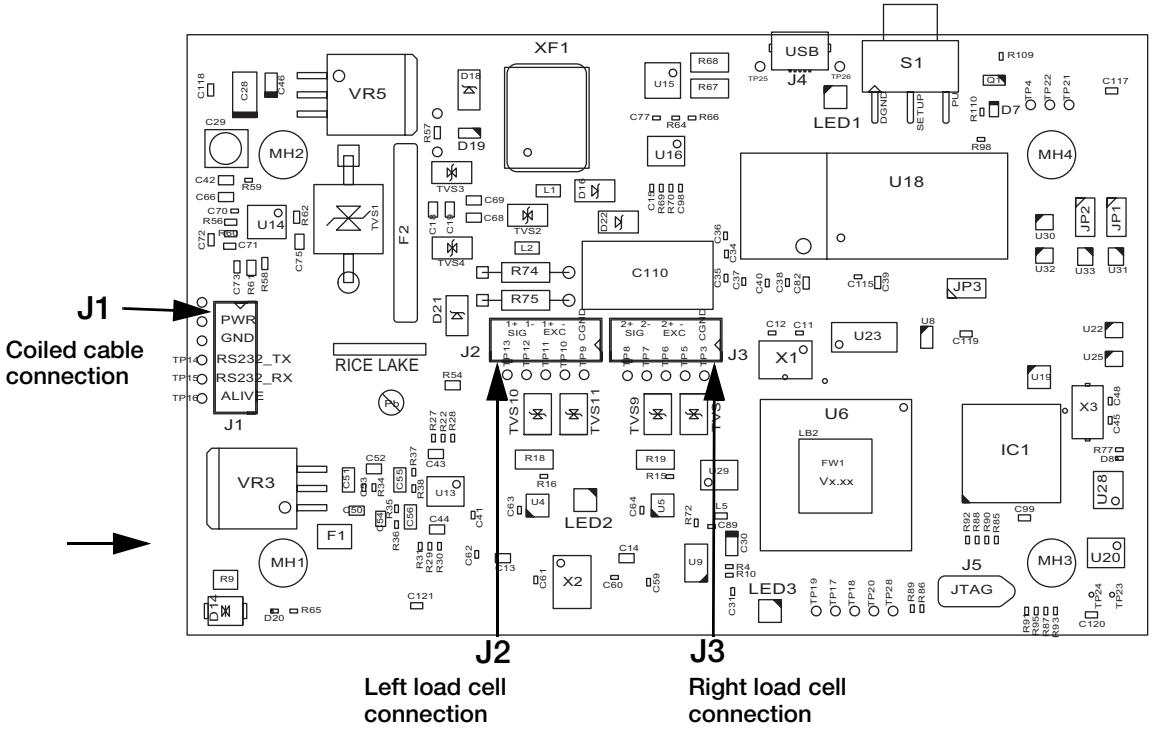


Figure 7-6. PCB Board Assembly

7.4 iQube 2.3 Cross References

When identifying the correct j-box cross referenced part number, please provide the serial number of the scale so that the Rice Lake Weighing Systems sales and service departments can track it to the correct top level part number sold.

To verify the correct j-box has been received, use Table 7-2, the iQube 2.3 j-box part number reference table.

The kit part number includes the appropriate load cell and cable adapters required to upgrade your unit.

Note *This manual references the part numbers 125277 and 153539 only.*

28" Forklift Carriage			
Top Level Fork Lift PN	Indicator	iQube 2.3 Kit PN	iQube 2.3 J-Box PN
111033	420 Wired	167345	167344
111034	420 Wireless		167416, 167344
111035	920i Wired	Upgrade not available	121014
111036	920i Wireless		121014
34" Forklift Carriage			
Top Level Fork Lift PN	Indicator	iQube 2.3 Kit PN	iQube 2.3 J-Box PN
96339	420 Wired	167345	167344
96340	420 Wireless		167344
96341	920i Wired	Upgrade not availabl	121014
96342	920i Wireless		121014
130822	420 Wired	167356	167261
130823	420 Wireless		167261
130824	920i Wired	Upgrade not available	130826
130825	920i Wireless		130826
SPX or SO WO	420 ABF	167345	167344
120911	420 ABF	167356	167261
161964	420 ABF	167341	167261
125277	CLS-M	167340	164071
153539	CLS-M	167340	164071
151803	CLS-420	167356	167261
132414	CLS-M2	167340	164071
156294	CLS-M3	167340	164071
164649	CLS-420	167341	167261
162279	CLS-420	167341	167261
38" Forklift Carriage			
Top Level Fork Lift PN	Indicator	iQube 2.3 Kit PN	iQube 2.3 J-Box PN
111038	420 Wired		167407
111039	420 Wireless		167407
111040	920i Wired	Upgrade not available	121366
111041	920i Wireless	Upgrade not available	121366
151506	420 Wireless		167407
151490	920i Wireless	Upgrade not available	121366

Table 7-2. iQube 2.3 Cross References

8.0 Appendix

8.1 Parts Breakout

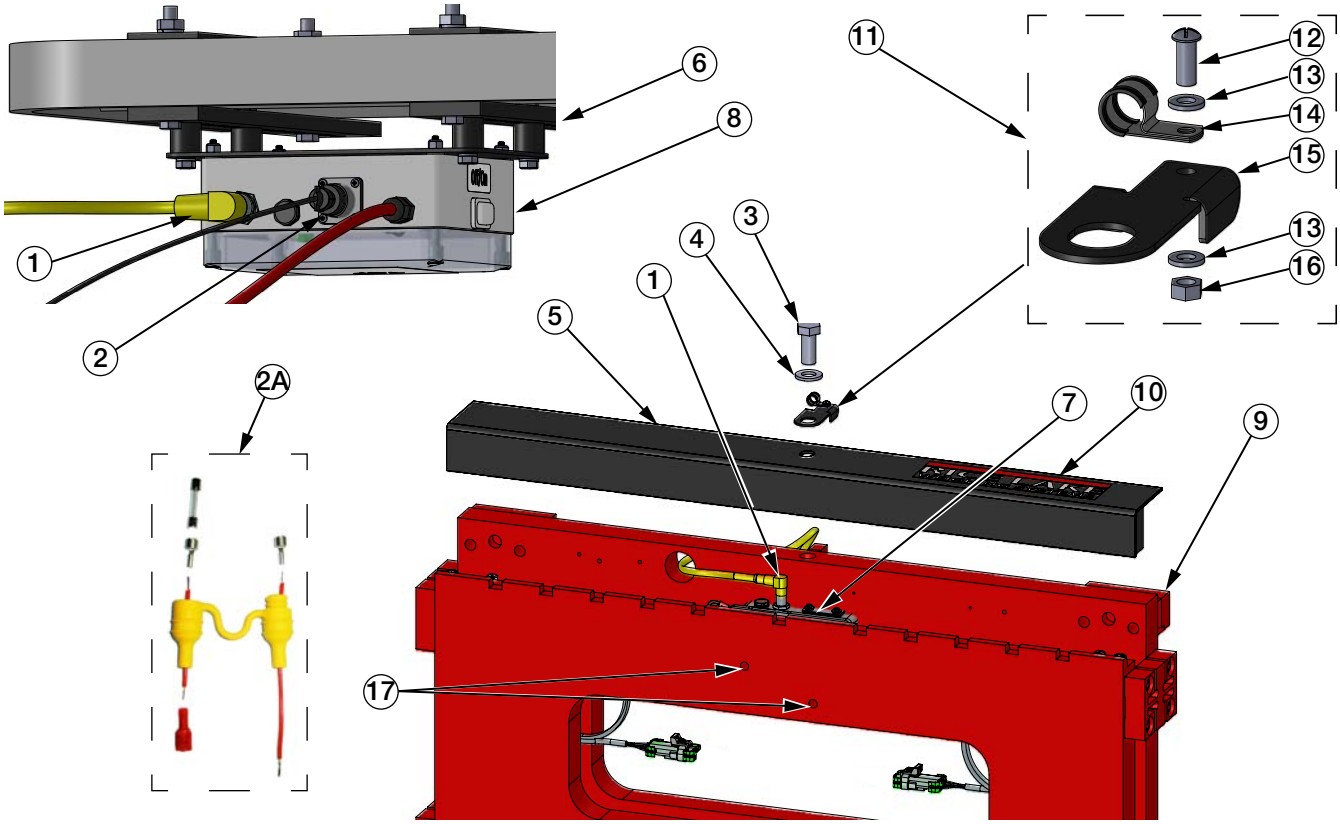
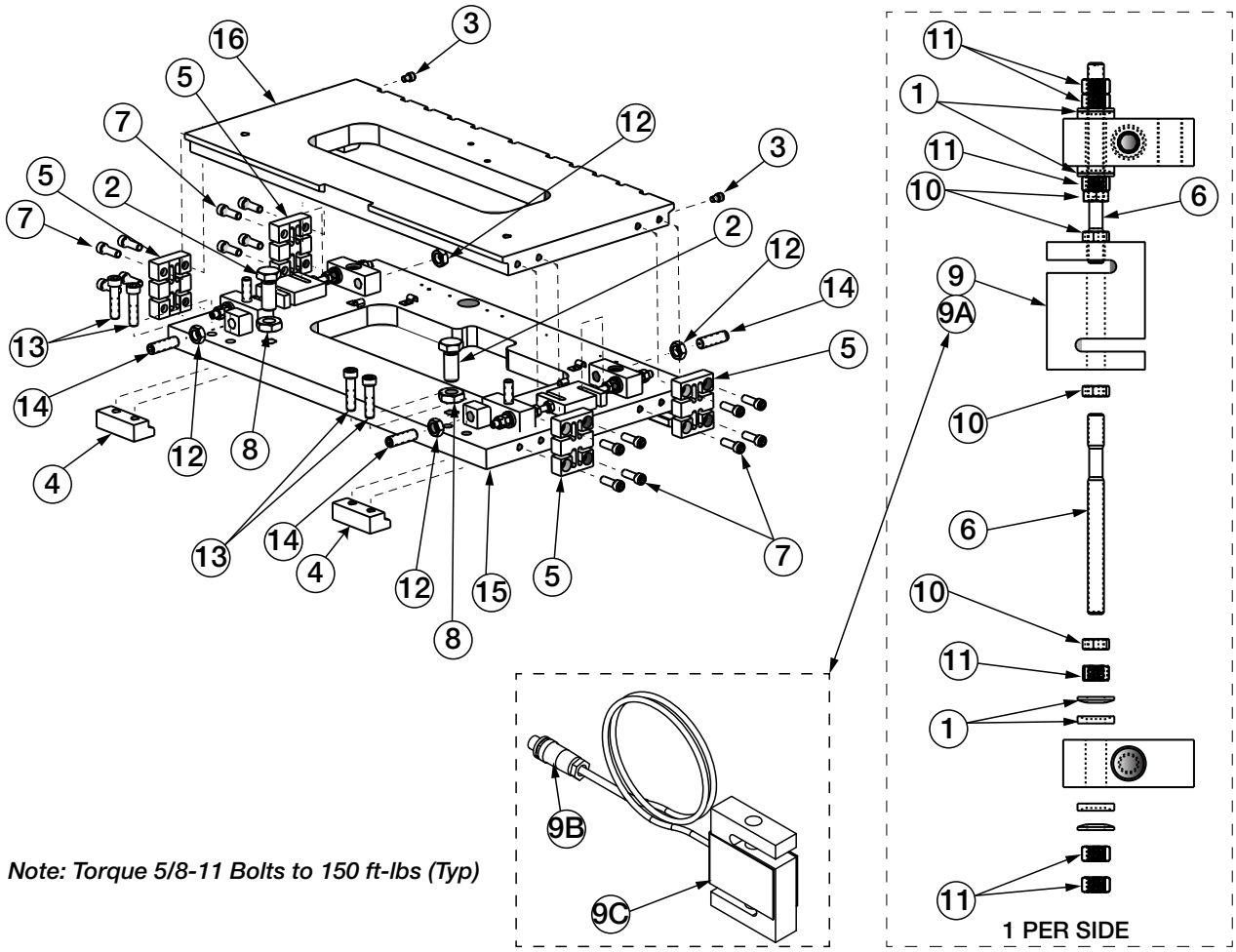


Figure 8-1. CLS-M2 Scale Assembly

Item No.	Part No.	Item Description	Qty
	167248	Scale, CLS-M	Ref
1	125395	Cable Assy, Coiled 5x18AWG	1
2	96915	Cable Assy, Fused Power	1
2A	130129	Fuse Assy, Power Cable	1
3	127009	Screw, Cap 5/8-11NC	1
4	111731	Washer, Lock 5/8 Regular	1
5	162340	Angle, Protective	1
6	125738	Plate Assy, Compow Box (See Fig 8-6)	1
7	167071	J-Box Assy, Carriage CLS-M (See Fig 8-5)	1
8	132416	J-Box Assy,COMPOW CLS-M2 (See Fig 8-3)	1
9	125368	Scale, Cargo Lift (See Fig 8-2)	1
10	99191	Decal, Rice Lake	1
11	167250	Kit, Loop Clamp, Coiled Cable Assy (Inc 12-16)	1
12	126980	Screw Machine 10-32 x 1/2	1
13	15141	Washer, Plain STD No 10	2
14	150719	Clamp, Loop One Hole 1/4”	1
15	130928	Bracket, CLS	1
16	14633	Nut, Lock 10-32NF Hex	1
17	125649	Hex Socket Cap Screw 10-32 x 1 SST	2
NS	125943	Parts Kit, Forklift CLS-M	1
NS	53308	Label,1.25x1.25 8000T	2



Note: Torque 5/8-11 Bolts to 150 ft-lbs (Typ)

Figure 8-2. CLS-M Scale Parts

Item No.	Part No.	Item Description	Qty
	125368	Scale Section Assy 34	
1	15198	Washer, Spherical.53x1.12	8
2	92822	Bolt, 1-8NCx2-3/8 Gr 5	2
3	92812	Screw, Cap 3/8-16NCx1/2	2
4	92826	Cleat, Bottom 1.25x1.9x4	2
	126770	Cleat, Bottom, Thick for use on worn carraiges	2
5	92828	Flexure, 1x3x4.12 17-4PH	4
6	92827	Flexure Rod, 1/2-20x6.13	4
7	15061	Screw, Cap 1/2-13NCx1-1/2	16
8	14701	Nut, Jam 1-8NC HEX Steel	2
9	125543	Load Cell, With Quick	2
10	14665	Nut, Jam 1/2-20NF HEX SST	8
11	109958	Nut, Full 1/2-20NF HEX SST	12
12	14688	Nut, Jam 3/4-16NF HEX SST	4
13	92810	Screw, Cap 5/8-11NCx2-1/2	4
14	92814	Screw, Set 3/4-16NFx2.406	4
15	125367	WLDT, Assy Back Plate 34in	1
16	125547	WLDT, Front Plate 34in	1

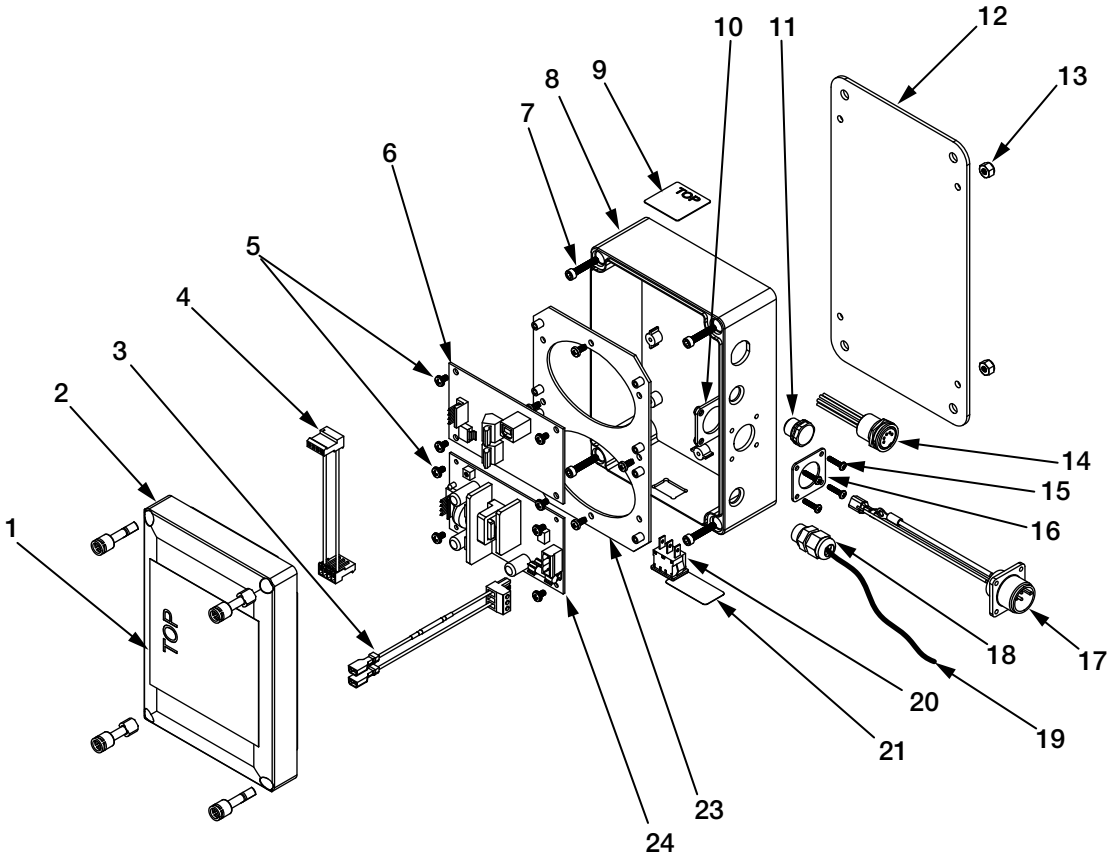


Figure 8-3. Power/Communication Box

Item No.	Part No.	Item Description	Qty
	132416	J-Box Assy Compow CLS-M2	Ref
1	132420	Label Instruction	1
2	125680	Enclosure, Polycarbonate	1
3	125947	Cable Assy, 3 Position	1
4	125967	Cable Assy, 4 Pin .156 MTA	1
5	14839	Screw, Mach 6-32NC x 1/4''	8
6	132419	Board Assy, RS232-USB	1
7	125960	Screw, Cap 8-32NC x 7/8''	4
8	132417	Enclosure, Machined COMPOW	1
9	53308	Label, 1.25 x 1.25	1
10	125868	Nut Plate Assy,	1
11	120022	Vent, Integrated Screw	1
12	125760	Plate, Compow Box	1
13	14628	Nut, Lock 8-32NC Hex Thin	4
14	125862	Receptacle Assy, M16 5	1
15	115500	Screw, 4-40 x 1/2 Phillips	4
16	57241	Gasket, MS CONN Shell Size	1
17	125864	Cable Assy, DC Power Input	1
18	150959	Cord Grip, Metric Thread	1
19	132418	Cable, CLS-M2 Compow, 6.5' RS-232	1
20	156613	Switch, Rocker Illuminated	1
21	126343	Label, On/Off	1
23	125677	Plate Assy, PCB Mount	1
24	132750	Power Supply, DC/DC +7.5V	1
	107439	Fuse, 5 Amp 250V, 5 x 20 mm (power supply)	1

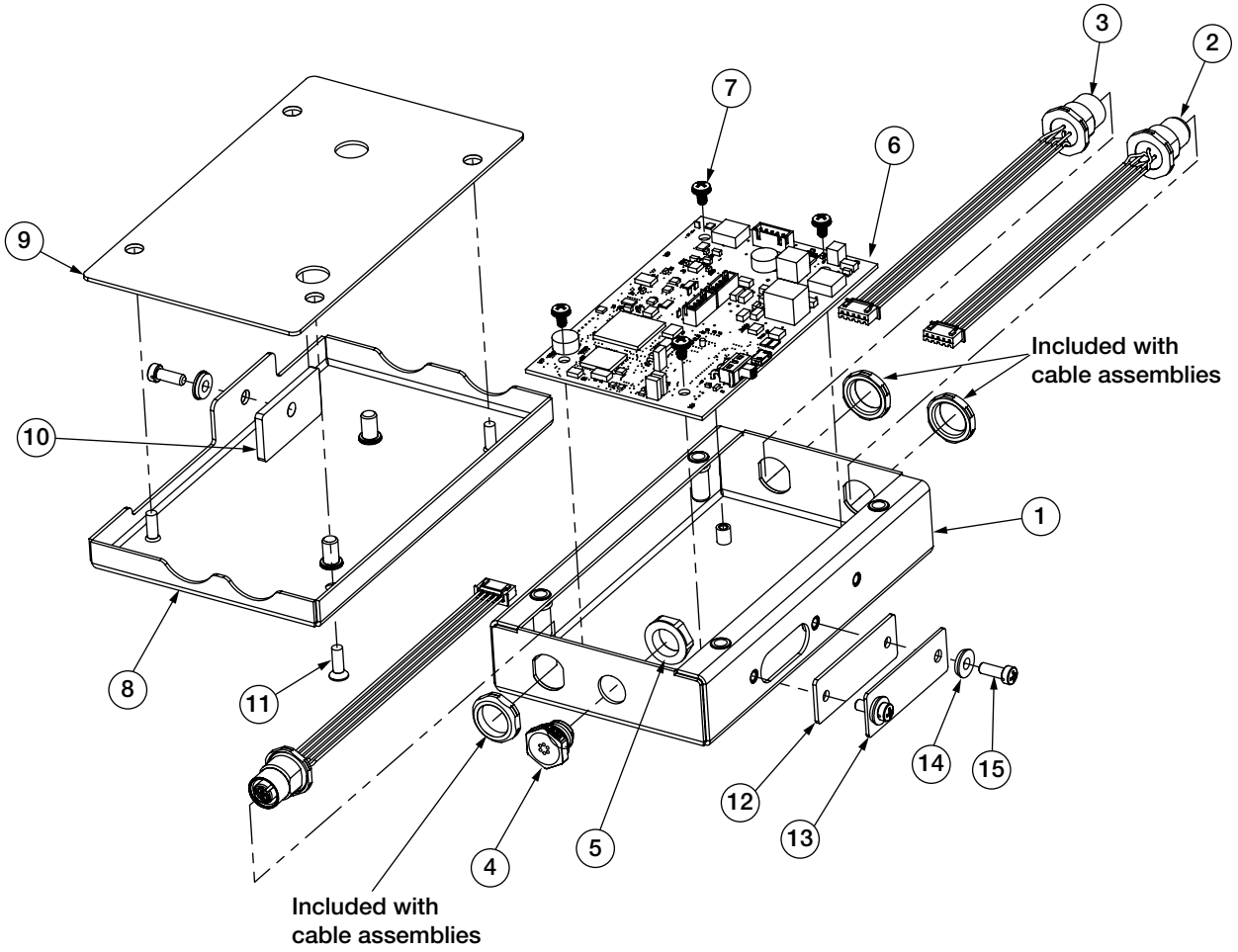


Figure 8-4. iQube2 J-Box Assembly, PN 164071

Item No.	Part No.	Item Description	Qty.
1	162378	Enclosure Assembly	1
2	163767	Data Receptacle Cable Assembly	1
3	163766	Load Cell Cable Receptacle Assembly	2
4	164598	Breather Vent	1
5	88734	Nut, Breather Vent Thread	1
6	169248	J-Box PCB Assembly	1
7	14839	Screw, 6-32NC x 1/4	4
8	162383	Cover Assembly	1
9	163764	Gasket, Assembly Cover	1
10	164070	Gasket, Access Cover	1
11	100968	CR-FHMS 0.164-32 x 0.5 x 0.5-N-SST	4
12	163765	Gasket, Access Cover	1
13	162384	Cover Plate, Access Hole	1
14	75062	Sealing Washer, #8	3
15	30623	Screw, 8-32NC x 7/16	3
16	52342	Label	1

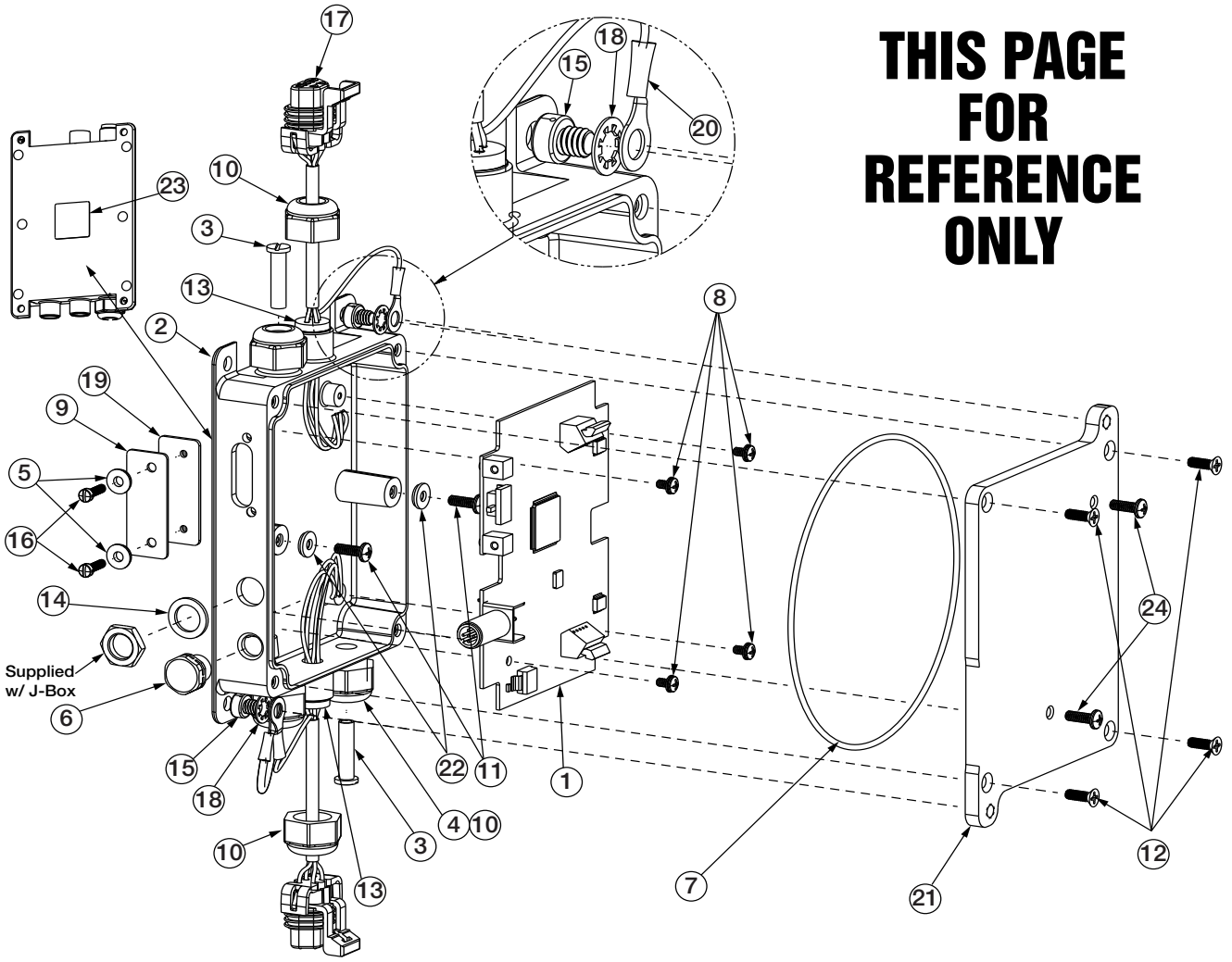


Figure 8-5. J-Box Assembly

Item No.	Part No.	Item Description	Qty
	159589	J-Box Assy,Carriage CLS-M	1
1	132726	Board,CLS-M J-Box Rev C	1
2	125640	Enclosure,Machined CLS-M	1
3	19528	Post Only,Slotted Black	2
4		Seal, Cable Gland	Ref
5	75062	Washer, Bonded Sealing SST	2
6	128022	Vent,Breather Sealed	1
7	125650	O-Ring,Buna N 70 160	1
8	14839	Screw	Ref
9	125564	Cover, J-Box Set-Up Switch	1
10		Cable Gland	Ref
11		Screw	Ref
12	100968	Screw, Mach 8-32NC x ½	4

Item No.	Part No.	Item Description	Qty
13	125376	Seal, Cable Gland	2
14	125942	Gasket,Rubber CLS-M	2
15	42640	Screw,Mach 1/4-28NF X ¼	2
16	81220	Screw, Mach 6-32NCx1/2	2
17	125559	Cable Assy,CLS-M Carriage	2
18	31546	Washer,Lock 1/4 Internal	2
19	125565	Gasket, Access Port Cover	1
20	126167	Wire,Ground 4 Inch	1
21	125494	Plate,Adapter CLS-M	1
22		Washer	Ref
23	52342	Label	1
24	125649	Screw, Cap 10-32 x 1 SST	2

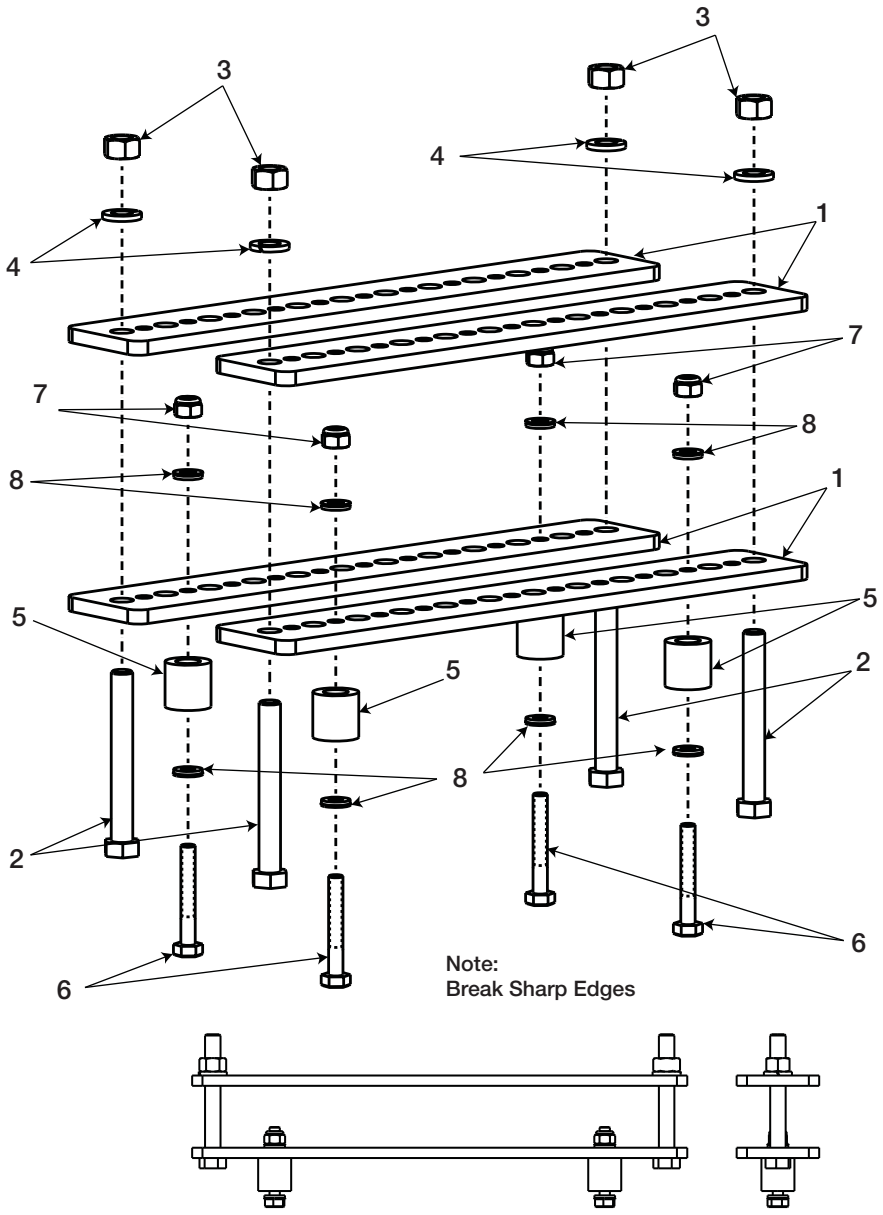


Figure 8-6. Plate Assembly, Power/Communication Box Cage Mount

Item No.	Part No.	Item Description	Qty
	125759	Plate Assembly, Compow Box Cage Mount	1
1	125761	Plate, Cage Clamp	4
2	69987	Bolt, 3/8-16NC x 3 Hex	4
	39528	Bolt, 3/8-16NC x 2 1/4 Hex (For use with Toyota Model #7FGCU25)	4
3	14656	Nut, 3/8-16NC	4
4	15159	Washer, Lock 3/8 Regular	4
5	98537	Bumper, Recessed Flat Top	4
6	14984	Screw,Cap 1/4-20NC x 1 3/4	4
7	14634	Nut, Lock 1/4-20NC Hex	4
8	44676	Washer, Bonding Sealing	8

8.2 Troubleshooting Table

Symptom	Possible Cause	Action
Scale displaying negative weight	Forks are resting (even slightly) on the floor.	Lift forks up off floor.
Scale reading high against test weight.	Material, like wood debris, between the scale and the forklift carriage.	Remove debris.
	Material, like wood debris, between the front and back scale plates.	Remove debris.
	Centering pin touching the forklift carriage, causing it to teeter back and forth.	Adjust scale carriage, centering pin should not touch on sides and bottom.
	Bottom cleats not adjusted properly or loose.	Adjust to proper gap using jam nuts, 0.02”
	If all these steps do not resolve your issue, check the following,	
	J-box error	Open j-box and look for obvious damage
	Load cell errors	Test mV/v levels, at 1.5 mV per 1,000 lb, test at 350 ohms
	Calibration is required	Calibrate the scale using Revolution™
Scale reading low against test weight.	Zero key has been pressed with a negative weight reading, while forks are on the floor.	Lift forks off ground, press the Zero key
	Material, like wood debris, between the scale and the forklift carriage.	Remove debris
	Material, like wood debris, between the front and back scale plates.	Remove debris
	Centering pin touching the forklift carriage, causing it to teeter back and forth.	Adjust scale carriage, centering pin should not touch on sides and bottom.
	Bottom cleats not adjusted properly or loose.	Adjust to proper gap using jam nuts, 0.02"
	If all these steps do not resolve your issue, check the following	
	J-box error	Open j-box and look for obvious damage.
	Load cell errors	Test mV/v levels, at 1.5 mV per 1,000 lb, test at 350 ohms
	Calibration is required	Calibrate the scale using Revolution.
Scale not returning to zero (0)	Forks are touching the ground.	Lift forks off ground, press the Zero key.
	Material, like wood debris, between the scale and the forklift carriage.	Remove debris
	Material, like wood debris, between the front and back scale plates.	Remove debris
	Centering pin touching the forklift carriage, causing it to teeter back and forth.	Adjust scale carriage, centering pin should not touch on sides and bottom.
	Bottom cleats not adjusted properly or loose.	Adjust to proper gap using jam nuts, 0.02"
	Scale is in motion, it won’t zero if the forklift is moving: • Forks moving up and down • Forklift is being driven	Bring forklift to a complete stop and ensure forks are still.
	If all these steps do not resolve your issue, check the following,	
	J-box error	Open j-box and look for obvious damage.
	Load cell errors	Test mV/v levels, at 1.5 mV per 1,000 lb, test at 350 ohms.
Will not display small weight values	Digital filter sensitivity is too high.	Using Revolution: **scales menu/scales #1/filtering** change the digital filitering sensitivity to light and change digital filter threshold to 10°.
Unstable weight	Power connections faulty, low battery	Check battery power cable. Check for low battery voltage.
Scale reading incorrect weight value	Tare is enabled	At stable zero weight, press the **TARE** key to return to normal weighing mode.

Symptom	Possible Cause	Action
Intermittent weight readings, weight reading high and low.	Material, like wood debris, between the scale and the forklift carriage.	Remove debris
	Material, like wood debris, between the front and back scale plates.	Remove debris
	Centering pin touching the forklift carriage, causing it to teeter back and forth.	Adjust scale carriage, centering pin should not touch on sides and bottom.
	Bottom cleats not adjusted properly.	Adjust to proper gap using jam nuts, 0.02"
	Check alignment of load cells.	Adjust load cells.
	Low forklift battery	Charge forklift battery, disconnect power prior to charging.
	Check coiled cable for loose connections & wear.	Fasten coiled cable connections. Replace coiled cable, if damaged.
	If all these steps do not resolve your issue, check the following,	
	Load cell connections on j-box	Securely fasten connections.
	J-box error	Open j-box and look for obvious damage.
	Load cell errors	Test mV/v levels, at 1.5 mV per 1,000 lb, test ohms using Revolution/Live Weight Data/Cell 1 & 2 MV
	Calibration is required.	Calibrate the scale using Revolution.
Weight on forks, no displayed weight.	Material, like wood debris, between the scale and the forklift carriage.	Remove debris
	Material, like wood debris, between the front and back scale plates.	Remove debris
	Centering pin touching the forklift carriage, causing it to teeter back and forth.	Adjust scale carriage, centering pin should not touch on sides and bottom.
	Bottom cleats not adjusted properly.	Adjust to proper gap using jam nuts, 0.02"
	Low forklift battery.	Charge forklift battery.
	Coiled cable error	Check coiled cable connections wand wear and tear.
	If all these steps do not resolve your issue, check the following,	
	J-box sealing switch is in calibration mode.	Move switch to weighing mode.
	Load cell connections on j-box loose.	Securely fasten connections.
	J-box error	Open j-box and look for obvious damage.
	Load cell errors	Test mV/v levels, at 1.5 mV per 1,000 lb, test ohms.
	Calibration is required.	Calibrate the scale using Revolution.

Symptom	Possible Cause	Action
COMPOW Box LEDs	**Power Supply PCB**	
	Green LED “PWR LED1”	
	On	COMPOW box turned on, power from battery cable is good.
	On, blinking	Check power cable for short. Check for low battery voltage.
	Off	Turn COMPOW box power switch ON. Check fuses on battery connection and power supply PCB.
		Low forklift battery
		Replace power supply PCB
	USB/Bluetooth PCB	
	Green LED “HB LED4”	
	On	J-box is transmitting valid data. Coiled cable and j-box are working.
	On, solid	Change j-box
	Off	Check coiled cable and tighten connections.
		Check power switch.
		Check PWR LED1
		Check load cell connections.
		Check j-box.
	Red/Green LED “RS-232 LED5”	
	On, blinking	Responding to commands from VIRTUi2. VIRTUi2 interface configuration.
	Off	Not responding to commands from VIRTUi2 software. Restart VIRTUi2 configurator.

Symptom	Possible Cause	Action
VIRTUi2 displays INVALID.	Calibration switch in open position J-box error check wiring connections Check load cell wires Check excitation on j-box at 4.1.	Move calibrationswitch to closed position. Press reset in VIRTUi2. Correct wiring. Change j-box.
VIRTUi2 weight display is blank.	No power.	Turn on COMPOW Check
Scale carriage is not fitting securely on forklift during installation.	May have to use electric grinder to grind down the centering pin on the forklift scale or center slot on forklift.	Discuss with local terminal manager to determine if scale dealer is to perform this chargeable service.
	May have to grind or torch down the area where the top cleats of the forklift scale are mounted.	
	May have to grind or torch side of forklift carriage due to previously installed side shift protection method.	
Loose screws on j-box		Apply loctite 242 or 243 for greasy enviroments, to screws and tighten.

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July12, 2016 PN 151718 Rev E