HarvestMaster™

BY JUNIPER SYSTEMS

cache™

Weigh System

INSTALLATION AND USER MANUAL

Cache Weigh System Installation and Users Manual

Part Number: 32362-00

Trademarks

Disclaimer

Information is subject to change without notice.

Cautions

CAUTION: This symbol indicates that failure to follow directions could result in damage to equipment or loss of information.

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CHAPTER ONE

Introduction to the Cache Weigh System

1 Introduction to the Cache Weigh System

The Cache Weigh System is a total solution that can be installed on a belted chain piler or conveyor system. The load cells of the Cache system are built to withstand the rigorous process of loading and unloading tons of material year after year. Visual feedback is always available with the Cache system's display, and data is accessible via Wi-Fi connectivity. With the Cache Weigh System, growers can confidently know how much they have on hand as well as how much they are loading/unloading.

1.1 System Requirements

- **Tablet or handheld.** Any device that can connect to Wi-Fi and has a browser. Works best with a screen size of 10 in. with resolution of 1280 x 800.
- **Conveyor.** The Cache Weigh System will work on belted chain conveyor belts. Conveyor belts that fit the following seven characteristics will easily accommodate the Cache Weigh System.
  - Angle of the weighing belt does not exceed 24°.
  - No excessive mechanical vibration or bounce.
  - Crop flows smoothly across the belt where the weight measurements are made.
  - A straight section where the tops of three idler wheels on each side are aligned.
  - Belt must make continuous contact with idler wheels on both sides.
  - At least five sets of idler wheels on each side of the weighing belt.
  - The whole crop passes over the weighing belt.
  - At least 1/4 in. of room left on one end of the weighing belt drive shaft to install a tone wheel and speed sensor.

A conveyor belt that does not meet all of these characteristics may still support the Cache Weigh System. Please contact HarvestMaster with the specifics of your conveyor belt for additional directions or a custom solution for exceptional conveyor belts.

1.2 Crop Minimums

The Cache Weigh System will provide the most accurate results when all of the following conditions are met.

- The weighing belt is kept full. The crop should weigh at least 20 lbs per foot (10kg per 30 cm) of belt. Crops of potatoes, carrots, sugar beets, onions, horseradishes, carrots, or tomatoes will have sufficient weight passing over the weighing belt to ensure accuracy.
- The crop flows across the belt consistently. Continuous and even crop flow reduces the chance of crop roll back.
- The weighing belt moves at a consistent speed without stopping and restarting.
- Crop that has moved past the weighing belt is uploaded from the piler or conveyor belt.

1.3 Required Tools and Supplies

1.3.1 Tools Required for Installation

- Combination wrench set (1/4”–1”)
- SAE socket set (1/4”–1”)
- High-quality cutting fluid
- Cordless 1/2” drill
- Set of standard drill bits, including a 5/8” bit (1/2” shank) and 1.25” hole saw
- Allen key/hex wrench set, metric and Imperial
- High-quality sealed butt connectors and crimping tool for electrical connections
- Small butane torch for heat-shrink and butt connectors
- Center punch
- Hammer
- Diagonal wire cutting pliers
- Welder (for miscellaneous mounting brackets and attaching the tone wheel)
- Digital multimeter (DC and AC)
- Four-foot level
- Angle gauge

1.3.2 Other Installation Supplies

- UV resistant zip ties (black)
- Blue 243 Loctite or equivalent
- Weld hub (or lock collar) for the tone wheel, appropriately sized (See page 27)

1.3.3 Helpful Tools and Materials

- Standard set of screwdrivers (Phillips and flat)
- Magnetic drill press (small, portable), for side holes in the conveyor
- Ratchet straps
- Work lights or headlamp
- Cordless impact driver and socket set (1/2” drive)
- 12-foot step ladder (300–400lb capacity)
- Small cordless angle grinder

1.4 System Diagram

1.5 System Components

- The **Central Control Unit (CCU)** processes all of the information coming from the load cells and sensors. The CCU sends measurements to a web page available to your tablet from its own Wi-Fi network.
- The **Load Cells** weigh the crop as it passes over the conveyor belt. The load cells are mounted to two of the conveyor belt's idler wheels, one on each side.
- The **Remote Interface** provides a visual indication of the measurements received by the CCU. Through the tablet you can see and change settings and view previous measurements.
- The **Speed Sensor** and **Tone Wheel** track the speed of the weighing belt.

1.6 Terminology

A **weighing idler wheel** is created when an idler wheel is mounted on a load cell.

The **weighing belt** is the section of the belt that is being weighed by the load cells.

1.7 How the Cache Weigh System Works

1.7.1 Tablet or handheld

The Cache Weigh System will communicate with any internet-ready device, using a local wireless Wi-Fi network and browser. We recommend using a rugged tablet available from HarvestMaster.

A rugged tablet from HarvestMaster can use a solid mount or magnetic mount to easily affix to or remove from the conveyor.

1.7.2 Weighing Idle Wheel

With the load cells mounted, the idler wheels become weighing wheels. The crop is weighed (forty times per second) as it moves over the two weighing wheels.

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CHAPTER TWO

Plan for Component Placement

2 Plan for Component Placement

Most Cache Weigh System installations will be unique in some aspect. The following best practices for planning and installing the Cache Weigh System apply to conveyor belts that conform to the system requirements. (See **1.1 System Requirements** on page 6.) Following these best practices, regardless of your customizations, will create a secure, accessible, and durable Cache Weigh System.

CAUTION: Plan your Cache Weigh System layout before you begin installation. Lack of planning may result in a system failure or a system that is less accurate or serviceable than desired.

Before you install any part of the Cache System, inspect the conveyor belt and identify locations for each of the components listed below. As you identify those locations, consider the following.

- Is the location accessible for maintenance?
- What cables or wiring will need to access this part? Is there a clear, secure path for the wiring?
- Would replacing the part be convenient?

Considerations for Placement of Each Component

Component	Part Specific Placement Considerations
Central Control Unit	Must connect by wire to all other system components, except the tablet.
Power Cable	Connect to 12-16V DC power. If this is not available, a converter may be necessary.
Cables	Create a clear, secure path. Use existing wiring runs.
Load Cell (x2)	Mount on idler wheels to create idle weighing wheels. Replace worn wheels.
Tone Wheel	Install on the conveyor's weighing belt drive shaft.
Speed Sensor	Mount 1/4" from the teeth of the tone wheel.
Tablet	Position for convenience and desired portability.

Additional detailed guidelines for determining the optimal placement for each part in the Cache Weigh System installation follow.

2.1 Plan for Central Control Unit (CCU)

As the hub of the Cache Weigh System, the CCU must connect to all other components of the system.

Place the CCU according to the following directions.

- Place the CCU close to the midpoint between the load cells and speed sensor.
- Mount the CCU vertically so that it is horizontal with the ground. Cables plug in from the bottom.
- Mount the CCU to the conveyor belt's square tubing.
  Note: The CCU can also be mounted to a flat surface.
- Allow sufficient space beneath the CCU to accommodate the sensor wire bulkhead connectors to plug in.

2.2 Plan Wiring and Cable Runs

Placing the necessary wiring in existing wiring runs is the best way to create a clear, secure path.

To determine the best placement for wiring, ask:

- Are there existing wiring runs between the component and the CCU?

  If not,

  - Is there another route for this cable that is safe, secure, and serviceable?
  - Will this wiring route create a tripping or interference hazard?
- Are there any potential pinch points in this wiring route?
- Is this cable accessible if it needs to be changed?
- Is this cable long enough to reach the CCU via the chosen route? The Cache Weigh System includes a 20-foot load cell cable and a 32.8-foot speed sensor cable.
  - If the provided cable isn't long enough, is there a more efficient path?
- Is 12–16V DC power available for the CCU? If not, where is the best place to find 110V AC (i.e. to power the AC to DC converter)
- Will moving parts interfere with the cable?
  Note: Avoid placing any wire where it could be caught by moving parts.
- Is there a convenient, safe place to coil and tie up excess cable?
  Note: Cables that are too long should always be coiled and tied up out of the way. Never cut long cables.

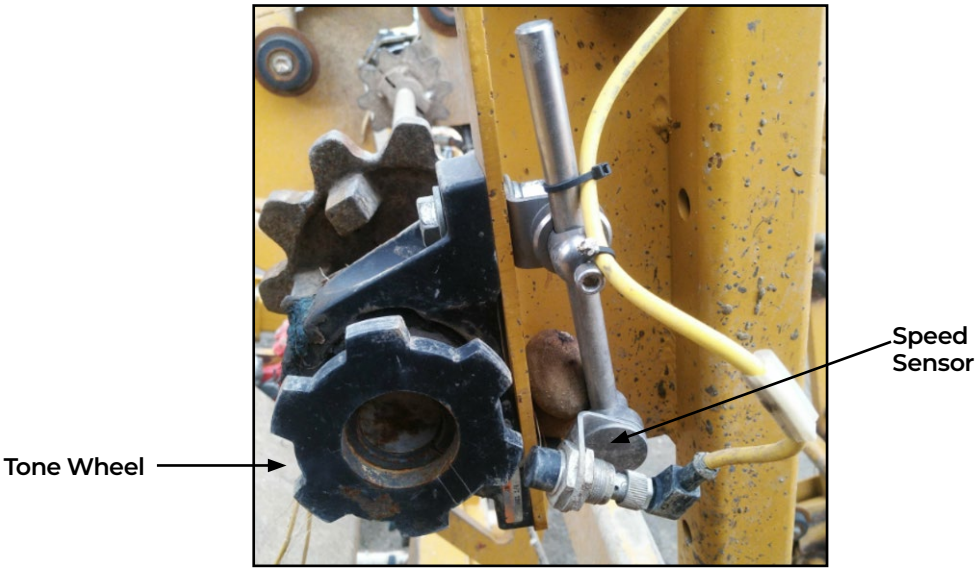
2.3 Plan for Load Cells (Weighing Idler Wheels)

Mounting a load cell onto an idler wheel creates a weighing idler wheel. Position the two weighing idler wheels

- Directly across from each other
- About 1/4 of the way up on the angled portion of the piler or 1/4 of the way from the start of a flat conveyor and at least two idler wheel positions from the bottom of the piler.
- At least two idler wheel positions from the crop entry point
- On a straight section of the conveyor belt. Each weighing idler wheels must sit between two other idler wheels. All three wheels must be in perfect linear alignment. The conveyor belt must have continuous contact with all three idler wheels.
- As far from the belt drive shaft as possible (still maintaining at least two positions away from the end of the belt and the crop entry point).

2.4 Plan for Tone Wheel and Speed Sensor

The tone wheel is installed on the conveyor's weighing belt drive shaft The speed sensor is mounted 1/4" from the teeth of the tone wheel as seen below.



Caution: The tone wheel spins when the belt moves. The wheel could catch on loose clothing, hair, etc. Install the tone wheel in a safe location or build a safety shield to prevent injury.

2.5 Plan for Tablet

To determine where you will place your tablet, consider

- Will you mount the tablet?
  A mount for your rugged tablet is convenient and allows the tablet to be easily removed. If you use a HarvestMaster tablet, HarvestMaster can provide mounting equipment that is ideal for the environment.
- How will you power the tablet?
  - **Option 1—Charge the tablet independently of the piler.**

    While some tablets are rugged enough to be connected to power at the piler, many do not have sufficient protection against dust to power the tablet safely and reliably at the piler. Charge these tablets in a dust free area at the end of your workday.

  - **Option 2—Connect a charge cable to the piler.**

    While most pilers have a 12-volt output that can be used for charging a tablet, we recommended caution in using this option. The warranty of many tablets may be void if using a method for charging that is not using a typical wall outlet. Also, the charging port on many tablets are not rated for the type of dust that would be introduced by charging in this environment.

    If you choose to charge your tablet from the piler, use a DC converter that converts 12V to 5V USB output. These can terminate with a female USB connection for easy connection to a tablet charging cable.

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CHAPTER THREE

Install Components

3 Install Components

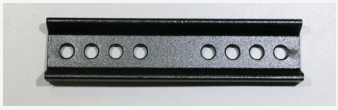
Most of the Cache Weigh System can be installed on your conveyor belt in the shop or field. You may prefer to weld the tone wheel to a wheel hub or bearing lock collar in a shop before beginning the rest of the installation. (See **Section 4.1.1 Change the Network Name on page 35**.)

3.1 Install the Central Control Unit (CCU)

3.1.1 CCU Parts List

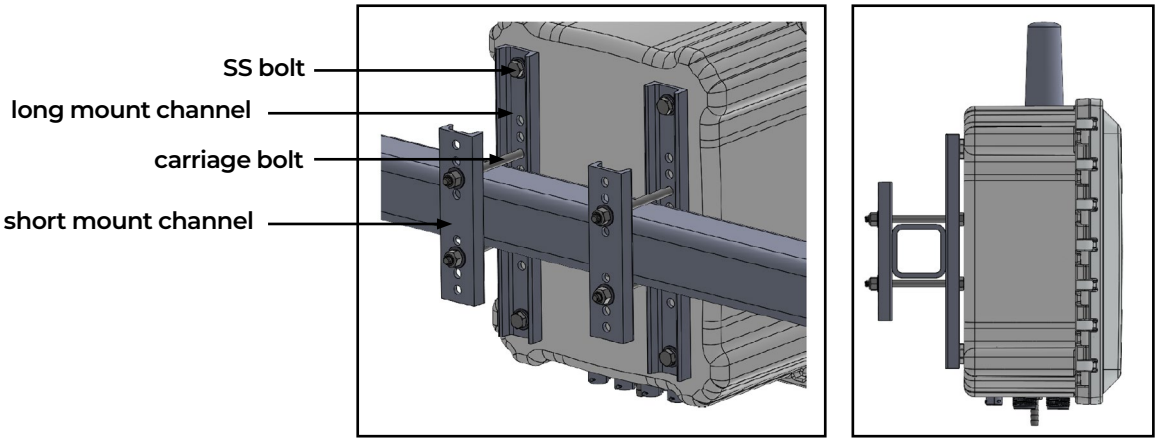
The following table lists the parts included with each CCU (Verizon PN 29358 or AT&T PN 28620) and CCU Mount Kit (PN 24854):

Central Control Unit and Mount Kit Parts

PN	Qty	Description	Photo
30123	1	Central Control Unit	
29176	2	Junction Box Long Mount Channel	
29177	2	Junction Box Short Mount Channel	
29546	4	1/4”–20-7, Grade 2 Zinc Carriage Bolt	
5428	4	HRD 1/4” Washer, flat	

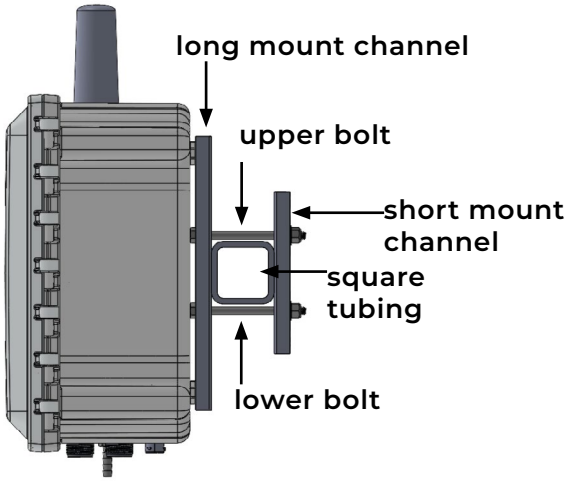
Central Control Unit and Mount Kit Parts			
PN	**Qty**	**Description**	**Photo**
23132	4	1/4”–20 x 5/8” SS Bolt (bars to CCU box)	
29147	4	1/4” Lock washer, split (bars to CCU box)	
795	4	1/4”–20 Nylock Nut	

3.1.2 CCU and Mount Kit Diagram



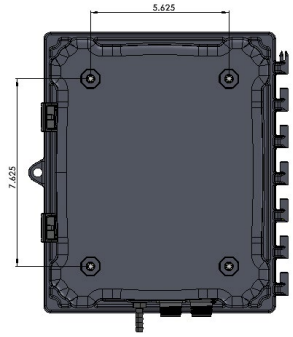
Back and side views of CCU with mounting kit

3.1.3 CCU Channel Mount Procedure



1. Determine which holes on the junction box long mount channels (PN 29176) will best suit the CCU location and the size of tubing to which you are attaching the CCU.
2. Insert the four carriage bolts through the appropriate holes in the long mount channels (two bolts per channel). The head of the bolt should be flush with the *flat* side of each mount channel.
3. Use the four SS bolts (PN 23132) and the split lock washer (PN 29417) to attach the long mount channels to the back of the CCU. The flat side of the channel faces the back of the CCU box. The holes in the CCU box are threaded.
4. Hold the box in place so that the carriage bolts are above and below the square tubing to which you are mounting the box.
5. Slide the short mount channels onto the carriage bolts to sandwich the tubing between the long mount channels and the short mount channels.
6. Add a nylon nut (PN 795) and HRD washer (PN 5428) to the end of each bolt.
7. Tighten into place.
8. Cut off any excess bolt length.

3.1.4 CCU Flat Mount Procedure



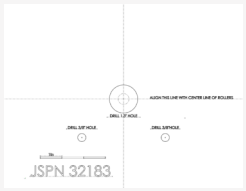
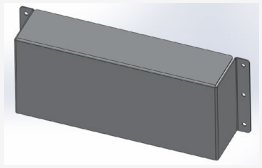
1. Create a paper drill template using the dimensions shown.
2. Find a flat surface that is solid and large enough to accommodate the CCU box.
   If a flat surface cannot be found, create a mounting plate out of 10 gauge or heavier sheet metal.
3. Drill the four holes using a 5/16” bit. (The bit is slightly oversized.)
4. Use the four SS bolts (PN 23132) and the split lock washer (PN 29417) to secure the CCU to the mounting plate so that it is level.

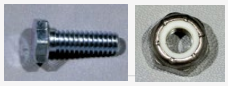
5. Check that the CCU is level. Adjust the CCU to be level, if needed.

3.2 Install the Load Cells and Idler Wheels

3.2.1 Load Cell Mount Kit Parts List

The following table lists the parts included for mounting both load cells to idler wheels:

Load Cell Mount Kit Parts			
PN	**Qty**	**Description**	**Photo**
32360 32356	2	Load Cell Mount Assembly Load Cell Mounting Kit	
24859		Idler Wheel Spacer	
32183	1	Drill Template	
		Loctite 243	
31359	1	Load Cell Cover	
29150	2	5/8”–11 x 3.5” Bolt through idler spacer	

Load Cell Mount Kit Parts			
PN	**Qty**	**Description**	**Photo**
2270		1/4”-20X 750 HX CAP G5 Bolt for load cell cover	
795		1/4”-20 Nylock Nut for load cell cover	

3.2.2 Install Load Cell and Idler Wheel

The following instructions describe how to mount a load cell and idler wheel. Repeat the process for the second load cell and idler wheel.

Use the load cell drill template (a paper that came with your Cache Weigh System) to mark the locations for drilling holes.

Once you have determined the idler wheels on which you will mount the load cells (see **2.3 Plan for Load Cells (Weighing Idler Wheels) on page 13**),

1. Create room to reach under the chain to position the idler wheel, using one of the following methods.
    - Remove the belted chain.
    - Lift the chain off the idler wheels from above with a ratchet strap.
2. Remove the idler wheel from the conveyor.

3. Mark a straight line between the two adjacent idler wheel bolts. (Use a marker or a long piece of masking tape.)
4. Position the template to align the printed center line with the marked line. Hold the template in place with masking tape.
5. Mark the center two 3/8” holes on the template using a center punch.

6. Expand the size of the original idler wheel axle hole to 1.25” or slightly larger to accommodate the weighing idler wheel axle and spacer. Center the new hole over the old hole.

CAUTION: The idler wheel shaft needs to be able to float in this hole.

8. Drill the two 3/8” holes using a 3/8” drill bit.

9. Remove the two nuts from the load cell assembly.

10. Align the assembly so that bolts go through the two 3/8” holes. Slide the bolts into the 3/8” holes you drilled in the conveyor belt frame.

11. From the inside of the piler, secure the nuts finger tight.

12. Slide the 5/8”–11 x 3.5” bolt through the idler wheel. *Note: One side of the wheel has a small collar that extends perpendicularly from the center hole. Position the bolt head on the flat hub side of the wheel.*

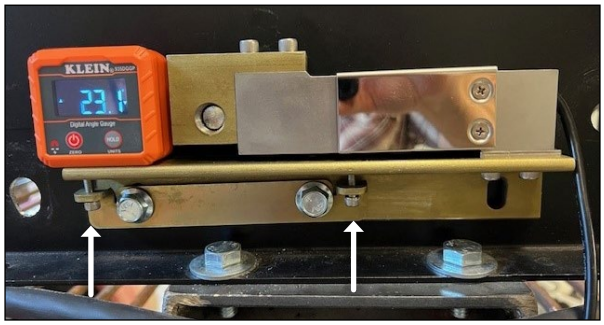
13. Slide the idler wheel spacer onto the bolt.

14. Apply Loctite 243 to the idler wheel axle hex bolt.

15. From the inside of the piler railing, position the bolt in the enlarged hole and thread the bolt into the load cell and tighten.

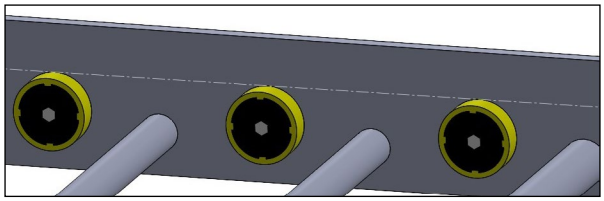
3.2.3 Fine Tune Alignment

1. Measure the angle of the piler frame.



2. Use the small screws to adjust the load cell to be the same angle as the piler frame.

3. Remove the piler belt (or come from underneath) and place a straight edge (a 4 ft level works well) on the piler rollers such that it rests on the load cell idler wheel and one idler wheel on each side.



4. Assess the relative height of the load cell idler wheel. All three idler wheels must be perfectly level. Use the two small screws on the load cell to move the wheel up or down into alignment.
Tip: Move the load cell idler wheel slightly above the above the needed height. It will settle into the correct height more easily than if you try to nudge it up to the correct height.

5. Verify that the angle of the piler frame and the angle of the load cell is the same. Adjust as necessary using the small screws.

3.2.4 Complete Load Cell Installation

1. Tighten the two load cell mounting bolts.

2. Using UV resistant wire ties, carefully tie the sensor wires from the weighing idler wheel load cells to an anchor position located within one to three inches of the load cell. Position the ties so that no force (up or down) is applied to the load cell.

3. Route the load cell wire to the CCU, tying it with UV resistant wire ties at appropriate intervals to protect the cable and keep it safely out of the way.

4. Install the Load Cell Cover with the open side down.

a. Position the shade so that it covers the sensor as much as possible without touching it.

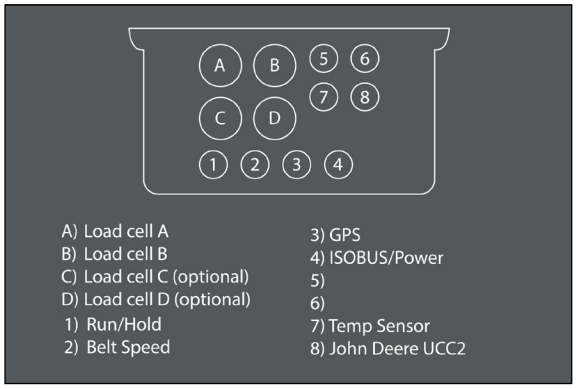
b. Determine which two holes in the cover to use to mount it to the convey belt frame. Select the two holes that will prevent the cover bolts from rubbing on the conveyor belt.

c. Drill mounting holes into the conveyor frame using the load cell cover itself as a drill template.

d. Thread the bolts through the frame and the cover from the conveyor side, so that the nut is installed on the outside of the conveyor system.

e. Secure tightly with the provided nuts.

5. Install the second idler wheel on the other side using the instructions outlined above.



6. Plug the load cell cables into the port A (Load cell A) and B (Load cell B) of the CCU. To determine right and left, look directly at the conveyor as the crop would flow away from you.
Note: If you have multiple systems, always identify the right and left the same way.

a. Plug the right-side load cell cable into Connector B of the CCU.

b. Plug the left-side load cell cable into Connector A of the CCU.

Note: Enter the number on the end of the cables into the Cache Weigh System. (See **4.1 Connect Tablet to Cache Weigh System** *on page 33.)*

3.3 Install the Belt Speed/RPM Sensor

The belt speed sensor consists of a proximity sensor mounted with two 360° mounting systems, a 200 mm rod, and a tone wheel. The belt speed sensor can be installed in many different ways. Find the best fit for your conveyor belt.

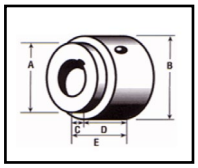
3.3.1 Belt Speed Sensor Mount Kit and Parts List

The following table lists the parts included for mounting the belt speed sensor:

Belt Speed Sensor Mount Kit Parts			
PN	**Qty**	**Description**	**Photo**
24871	2	Proximity Sensor 360° Mount	
24872	1	Proximity Sensor Rod, 12 mm x 200 mm	
24855	1	Tone Wheel	
24881	1	Inductive Proximity Sensor	
24825		Proximity Sensor Cable (10m)	
NA	1	Weld Hub or Lock Collar*	

Belt Speed Sensor Mount Kit Parts			
PN	**Qty**	**Description**	**Photo**
29148	1	5/8” Split Lock Washer for nut side	
29152	1	5/8”–11 x 1” Hex Bolt	
29153	1	5/8” Washer for conveyor belt side	
29154	1	5/8”–11 Nut	

* The weld hub or lock collar must fit your drive shaft. Purchase a standard W-Series weld hub or lock collar with a bore hole that fits the diameter of your conveyor belt’s drive shaft. An industry-standard W-series weld hub with the following dimensions can be purchased at most parts stores.



a. 1 5/8” (the tone wheel ID drops over this shoulder to be welded)

b. 1 13/16”

c. 7/16”

d. 1”

e. 1 7/16”

Note: If the belt drive shaft is larger than 1 5/8”, the hole in the tone may need to be cut larger to fit over the shaft.

3.3.2 Belt Speed Sensor Installation Instructions

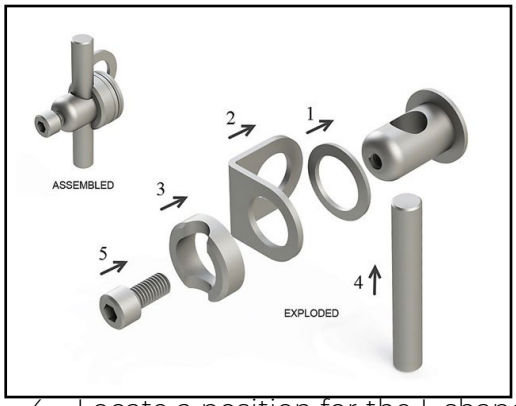
Once you have determined the placement for the tone wheel and proximity sensor (see **2.4 Plan for Tone Wheel and Speed Sensor** on page 14),

Caution: The tone wheel spins anytime the belt is moving. It could catch on loose clothing, hair, etc. Install the tone wheel in a safe location or build a safety shield to prevent injury.

1. Spot weld the tone wheel and the weld hub in at least three spots.

2. Slide the tone wheel/weld hub onto the weighing belt drive shaft. Turn the set screw on the hub to secure it in place.

Tone wheel attached to the weighing belt drive shaft.



3. Lay out the parts of the speed sensor mounting systems (PN 24853) according to the illustration.

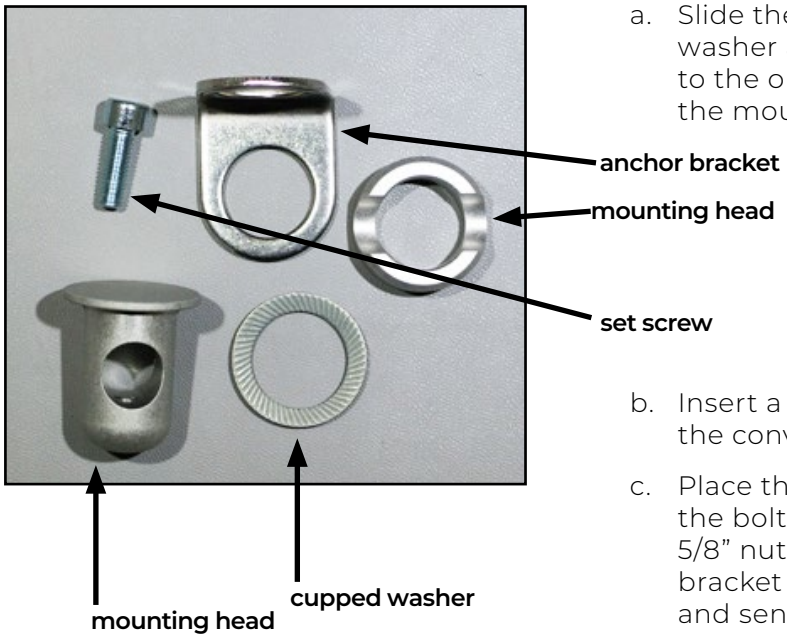
4. Locate a position for the L-shaped bracket of the mounting system where the proximity sensor will be within 1/4" of the tone wheel teeth. You can attach the anchor bracket to an existing bolt on the conveyor belt.

Anchor bracket placement

Anchor bracket

5. If needed mark and drill a 5/8” hole in the side of the conveyor belt for the anchor bracket.

6. Assemble one mounting system. (See illustration in step 3.)



a. Slide the mounting head through the cupped washer and the anchor bracket, from the inside to the outside. The cupped washer rests between the mounting head and the anchor bracket.

b. Insert a 5/8” bolt through the hole you drilled in the conveyor frame.

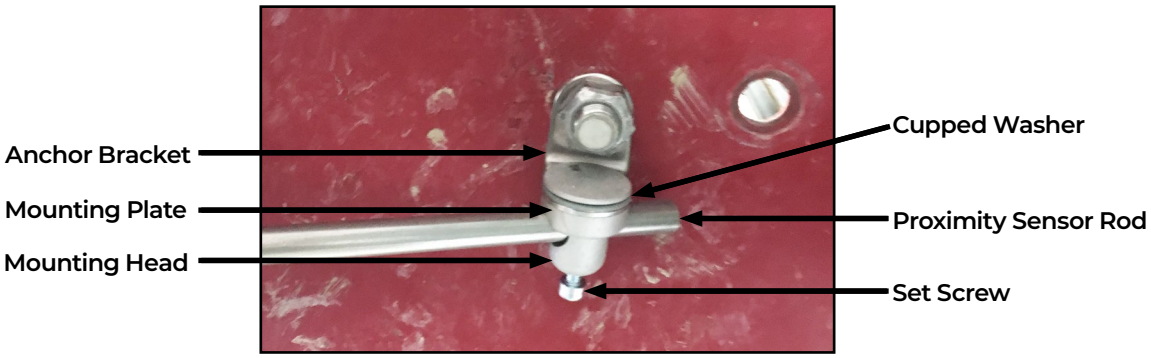
c. Place the empty hole of the anchor bracket on the bolt. Secure loosely with 5/8” washer and 5/8” nut. Leave enough give to allow the anchor bracket to rotate for final positioning of the rod and sensor.

d. Slide the mounting plate onto the mounting head, rotating them so that the plate grooves line up with the holes in the head.

e. Insert the proximity sensor rod through the mounting head. Leave one end near the tone wheel.

f. Insert the set screw into the mounting head. Tighten the screw to hold the rod in place.

An assembled mounting system is pictured below:



7. Assemble the second mounting system.

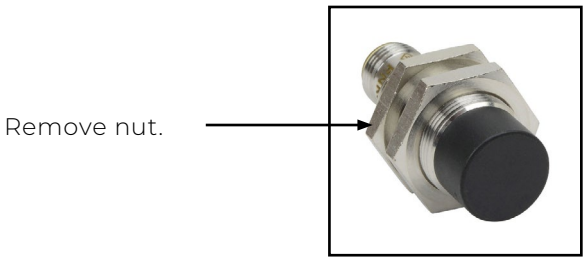
a. Slide the mounting head through the cupped washer and the anchor bracket, from the inside to the outside.
Note: This must be done before the sensor is mounted to the bracket.

b. Slide the mounting plate onto the mounting head, rotating them so that the plate grooves line up with the holes in the head.

c. Slide the assembled mounting system parts onto the empty end of the proximity sensor rod.

d. Insert the set screw. Tighten the set screw.

8. Remove one of the nuts from the proximity sensor.



9. Insert the proximity sensor through the second hole of the anchor bracket with the sensor's face pointing out and away from the bracket. Replace the nut to secure the proximity sensor to the anchor bracket.

10. Rotate the rod until the face of the proximity sensor is perpendicular to and 1/4" from the teeth of the tone wheel.
Note: To adjust the proximity sensor's distance from the tone wheel, move the rod or adjust the lock nuts on the proximity sensor.

11. Tighten the set screws at either end of the rod and the nut anchoring the mount.

12. Connect the proximity sensor cable to the proximity sensor, using the right-angle connector on the cable.

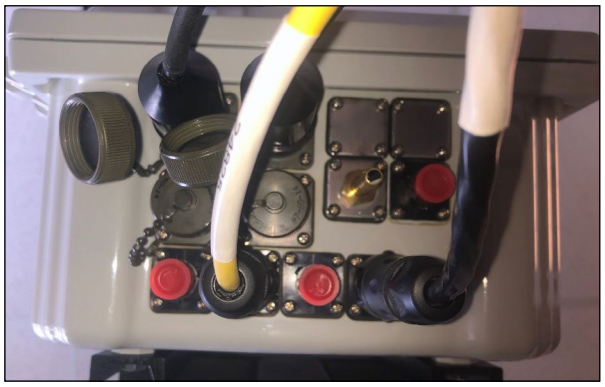
13. Tighten the threaded collar of connector for the proximity sensor cable right-angle.

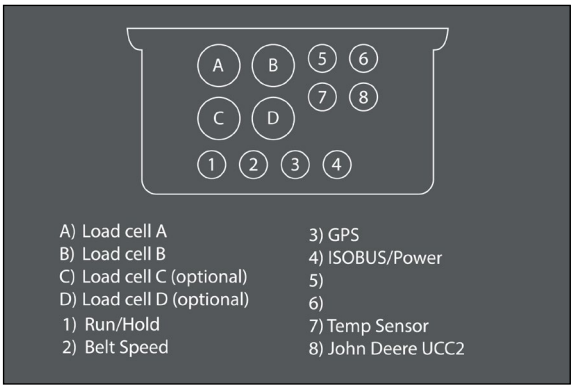
14. Route the proximity sensor cable toward the CCU so that it will be safe from harm. Secure the cable with UV resistant zip ties to relieve stress on the cable coming from the right-angle connector.

A completed installation of the belt speed sensor is pictured below:

15. In an out-of-the-way place between the belt speed sensor and the CCU, neatly coil and zip tie any extra cable.

16. Plug the bulkhead end of the cable into Position 2 (Belt Speed) of the CCU.





17. Inspect the sensor cable run to ensure that it is secure and protected.

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Weigh System

CHAPTER FOUR

Setup

4 Set Up

Your Cache Weigh System will connect to your tablet, using a local Wi-Fi network.
Note: The local connection does not connect to the internet.

4.1 Connect Tablet to Cache Weigh System

To connect your tablet and Cache Weigh System,

1. Power on your Cache Weigh System.
2. From your device's Wi-Fi settings, connect to Cache Weigh System.
3. Open a web browser.
4. In a new tab, type the IP address **192.168.67.1** in the address field.

   If the screen is not displayed comfortably,

   - Adjust the zoom of your browser.
   - Use the full screen mode.

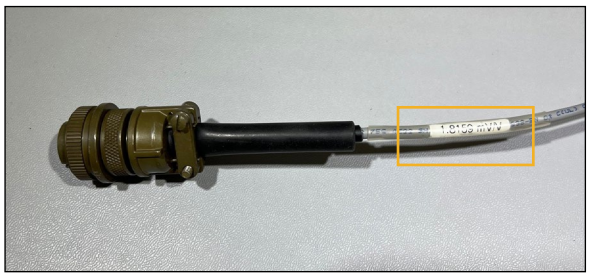
   If you will be using multiple Cache Weigh Systems, see **4.1.1 Change the Network Name** on page 35. When your Cache Weigh Systems have distinct Wi-Fi network names, use those names rather than the IP address in step 4.

The Setup screen shows the default readings for all the required settings. (Access the Setup screen by tapping .) Most settings will need to be adjusted once after installation to account for the individual measurements of each piler

To adjust these settings,

1. Tap **Unlock**.
2. Enter 8306.

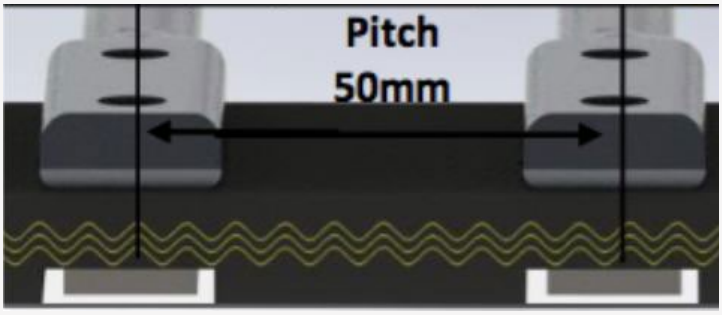
   The screen will remain editable for 5 minutes.



Each load cell comes with a specific load cell coefficient that will need to be entered when you set up your Cache Weigh System. Find the load cell coefficient on the load cell cable near the connector.

Setup

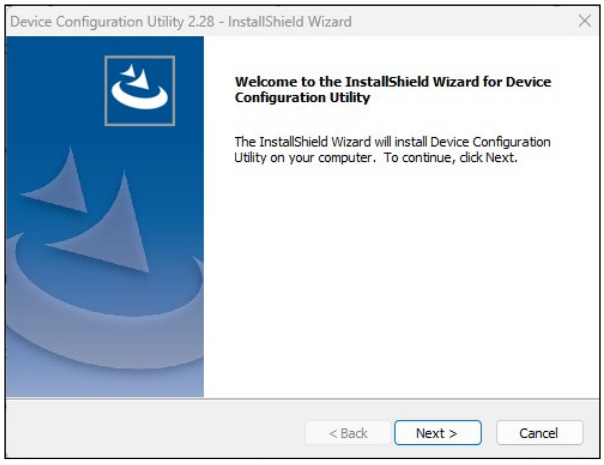
Setting	Default Value	Description
Display: Weight Units	pounds	The units of measure displayed on the home page. Choose from kilograms, pounds, tons, and hundred weight.
Load Cells: Coefficient A:	2.000 mV/V	First load calibration multiplier used to calibrate weights. Set to match the coefficient on your cable.
Load Cells: Coefficient B	2.000 mV/V	Second load cell calibration multiplier used to calibrate weights. Set to match the coefficient on your cable.
Load Cells: Max Rating	272.16 kg	The maximum weight that can be applied before damaging the load cell. Set to 75 kg.
Belt: Angle	0.0°	The angle of the weighing belt. Determine the angle while the conveyor is parked on a level surface. The Cache Weigh System uses this value when it corrects for the slope and motion.
Belt: Roller Spacing	0.370 m	The space between the two non-weighing rollers of the weighing belt
Pulses Per Rev	6	The number of teeth on the tone wheel speed sensor. The tone wheel that comes as part of the Cache Weigh System has six teeth. If your conveyor belt already has a tone wheel, enter the number of teeth on your tone wheel.
Belt: Sprocket Teeth	10	The number of teeth on the weighing belt drive shaft.

Setup		
Setting	**Default Value**	**Description**
Pitch	45.00 mm	The distance between the links in a chain (center to center). To get an accurate measurement, measure the distance of 10 links and then divide by 10. 

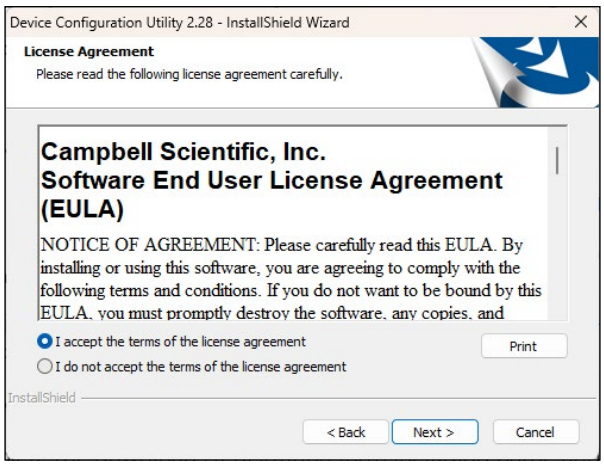
4.1.1 Change the Network Name

If you have multiple Cache Weigh Systems nearby, change their default Wi-Fi network names to distinguish each system.

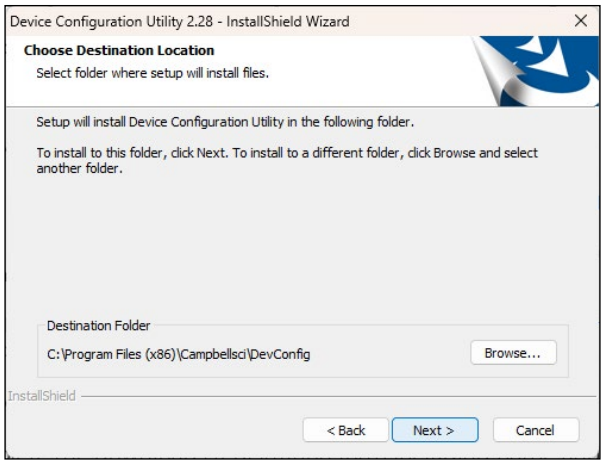
1. Install Campbell Scientific's Device Configuration Utility from *https://www.campbellsci.com/downloads/device-configuration-utility*.
2. Tap **Add to List**.
3. Complete the downloads registration form, including name and email. Tap **Submit**.
4. Follow the link sent in an email with the subject "Requested Campbell Scientific Downloads." The installation file, DevConfig_2.28.exe, will download to your device.
5. Run the installation file.



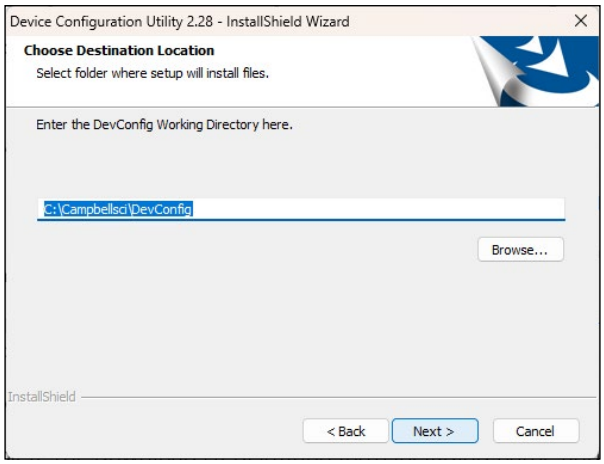
6. From the welcome screen, tap **Next**.



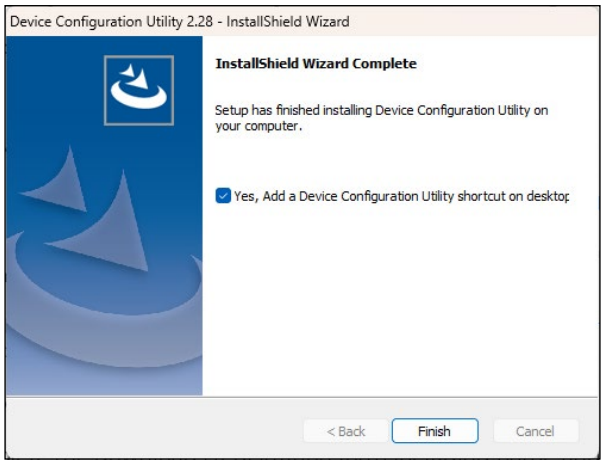
7. Tap **Next** to accept the license agreement.



8. Tap **Next**. Adjust the destination folder, if desired.

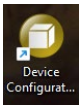


9. Tap **Next**. Adjust the destination folder, if desired.



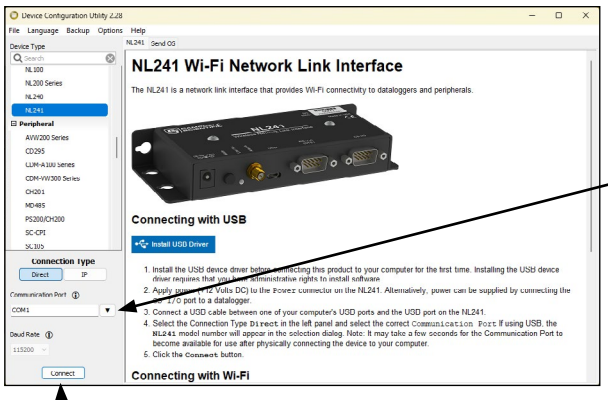
10. Tap **Finish**.

11. Connect a USB-A-to-micro-B cable between a USB port on your tablet and the USB port on the Cache Weigh System NL241 Wi-Fi module.

12. Tap the 

icon on the desktop.

From the Device Configuration window,



13. Tap **Network Peripheral**.

14. From the Network Peripheral sections, select **NL241**.

15. Tap the down triangle next to the Communication Port.

16. Select **NL241**.

17. Tap **OK**.

18. Tap **Connect**.

19. From the Deployment tab, select **Wi-Fi**. If necessary, enter the password.

20. Type a new name in the Network Name (SSID) field. This is the new Wi-Fi network name for the Cache Weigh System to which your tablet is attached.

21. Tap **Apply** to save your new network name.

Use the new network name to connect your tablet to the Cache Weigh System. (See **4.1 Connect Tablet to Cache Weigh System** on page 33.)

4.2 Check the Sensors

1. Place a weight on the belt over the load cell idler wheels.

2. From the Diagnostics screen, check that the on-screen load cell gauges show when weight is applied.

3. Remove the weight.

4. Start the weighing belt.

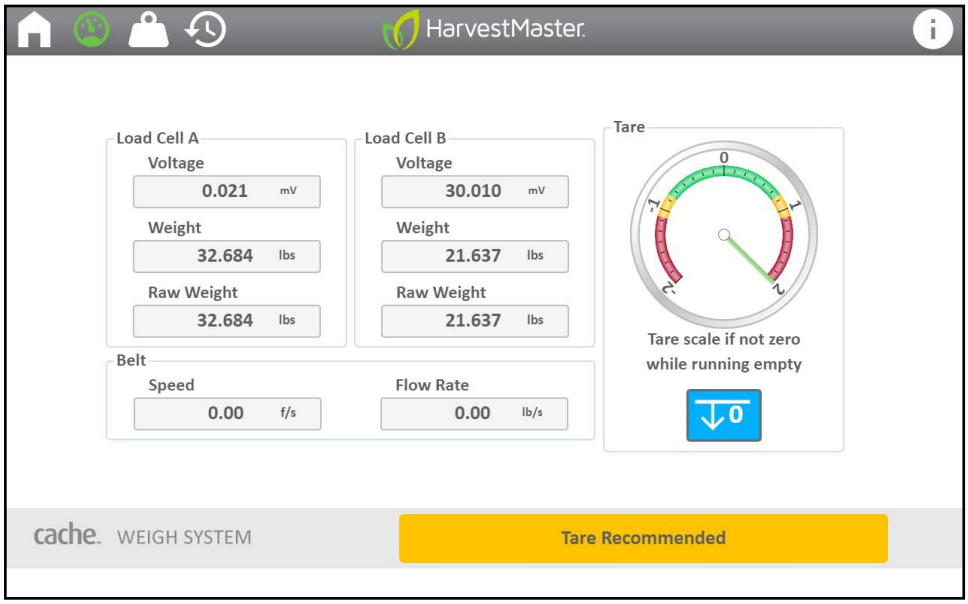
5. Check that the belt speed dial shows movement.

6. Tare the scale.

7. Check that

   - The weight returns to 0.000.
   - The Raw Weight does not fluctuate more than + or - .1 lbs.

8. Stop the weighing belt.

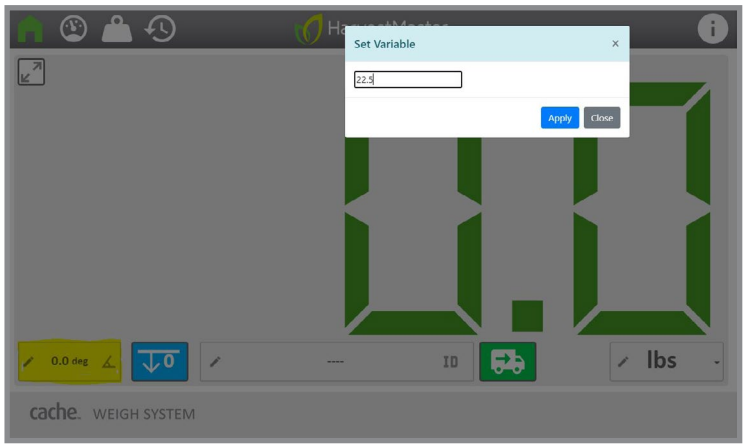


4.2.1 Calculate and Enter Weighing Belt Angle

The Cache Weigh System needs to know the angle of the weighing belt in relation to the ground.

1. Use an angle finder to measure the angle of the weighing belt. The Klein Tools 935DAG or 935DGGP digital angle gauge is included with the Cache Weigh System.

2. On the Home screen, enter the angle into the angle field in the lower left corner (highlighted in yellow). Tap **Apply** to save the angle.



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Weigh System

CHAPTER FIVE

Calibration

5 Calibrate

By calibrating all your conveyor belts to a single reference, you standardize your data. Standardized data can be compared with confidence, even if the data was collected by different Cache Weigh Systems on different conveyor belts.

Each Cache Weigh System includes a calibration wizard. There are two steps to calibrate your Cache System using the wizard:

- Tare the Weigh System. (See **5.1 Tare the Weigh System** on page 41.)
- Compare the scale weight with the weight of the Cache Weigh System. (See **5.2 Calibrate to a Truck Scale** on page 41.)

5.1 Tare the Weigh System

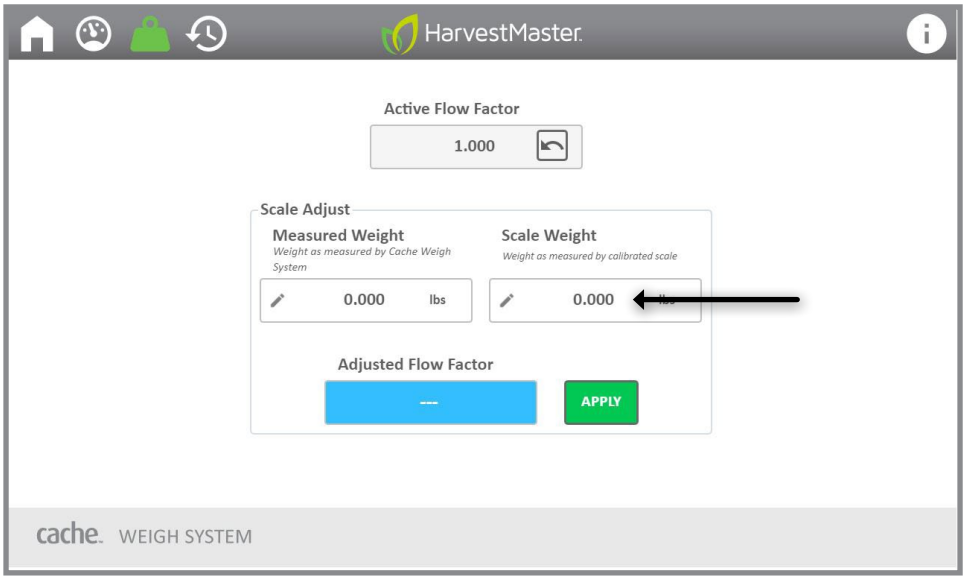
From the Diagnostics screen,

1. Run the empty belt at a typical RPM. Tap the blue button to tare the scale. A green bar will move slowly across the screen while the taring is in progress..
2. Allow the process to complete.

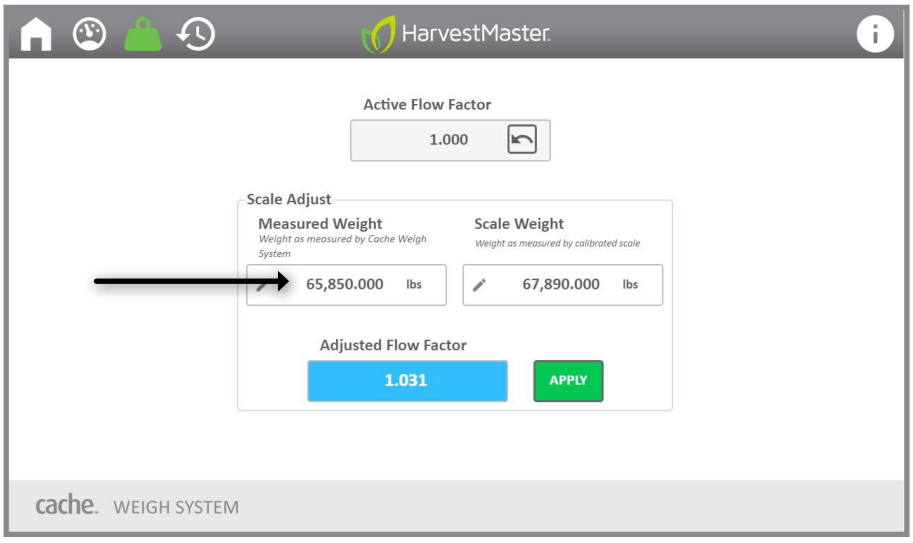
5.2 Calibrate to a Truck Scale

1. Load a truck with the piler.
2. Note the weight that the Cache Weigh System reports.
3. Weigh the crop on a truck scale.

4. From the Calibration screen, enter the crop weight as obtained from the truck scale in the Scale Weight field.

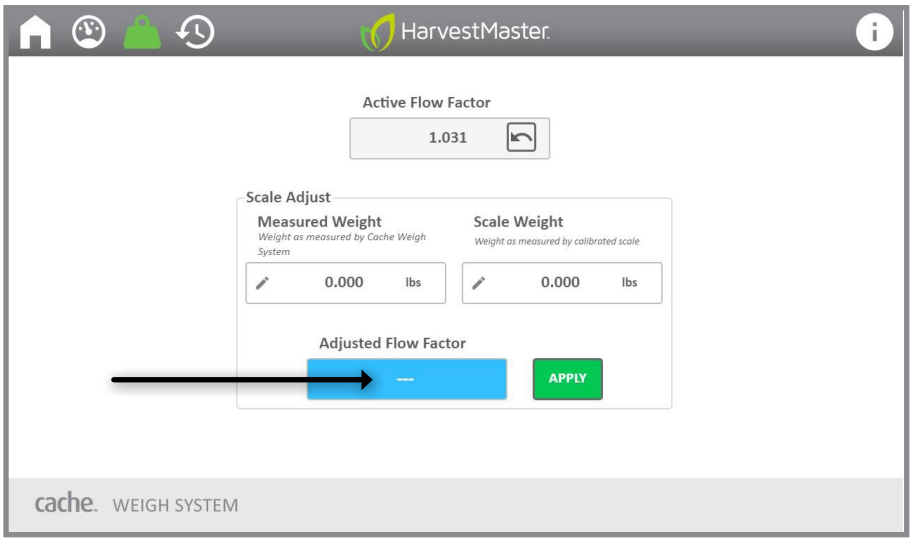


5. Enter the weight as measured by the Cache Weigh System into the Measured Weight field. The new calibration (coefficient) is displayed.



6. Tap **Apply** to update the Active Flow Factor.

7. Verify that the Adjusted Flow Factor has updated.



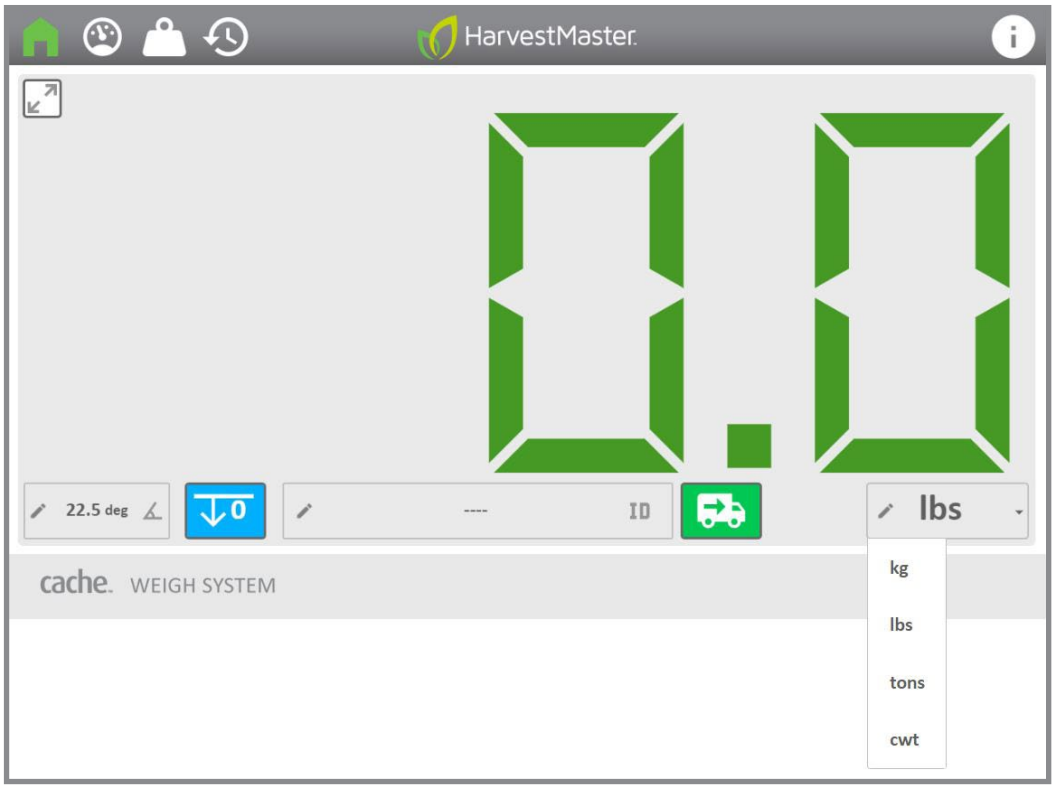
You should not have to recalibrate again. If the system starts drifting in accuracy, it most likely is caused by

- Crop roll back and/or not keeping enough weight moving consistently over the weigh belt.
  Fix: keep a consistent flow of crop moving across weigh belt.
- Malfunctioning or misadjusted speed sensor causing an inaccurate and/or inconsistent belt speed.
  Fix: Replace and/or readjust belt speed sensor.
- Dirt or mud collecting on the chain links.
  Fix: Re-zero/re-tare the belt.
- Angle changed from moving the piler to a new location.
  Fix: Enter new angle and re-zero/re-tare the belt.

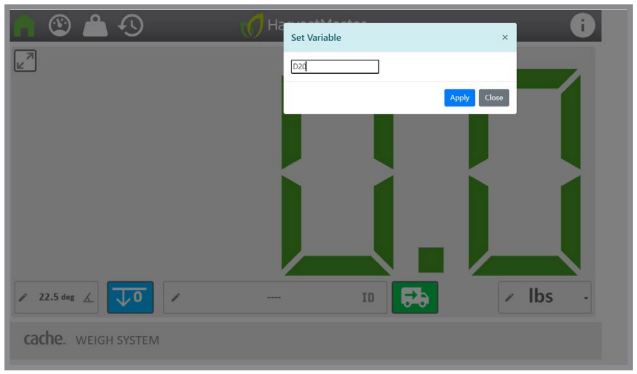
It is always best to identify the cause of error before recalibrating. You can, however, run the calibration again anytime you have concerns about accuracy.

5.3 Use the Weight Screens

The Home screen is used in real-time to see the weight of your load. The weight can be displayed in Kg, lbs, tons, or CWT.

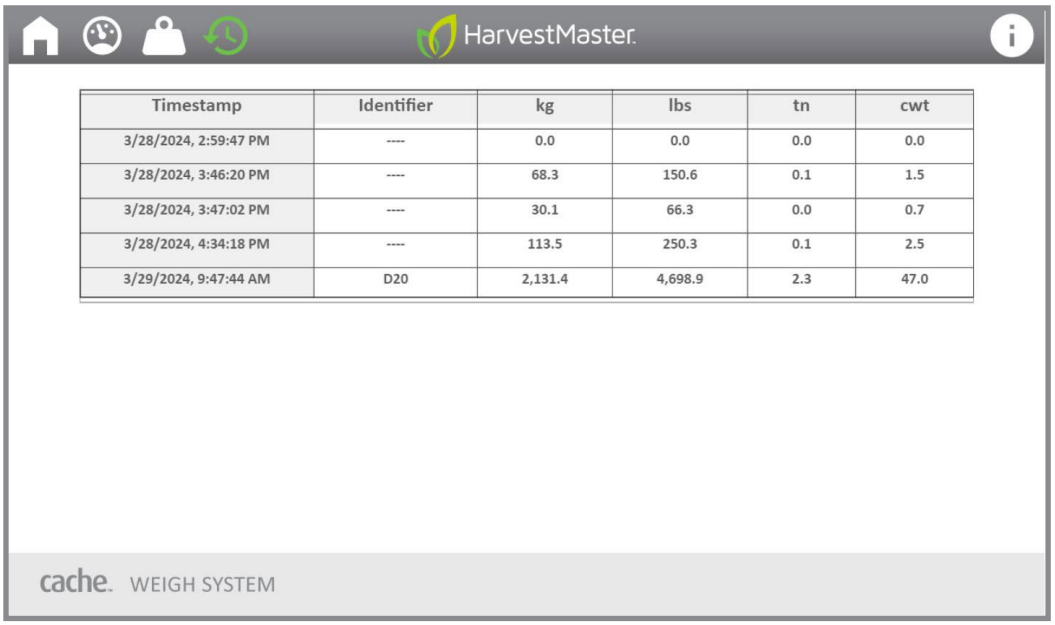


The ID field is a description field. It can be used to record a custom note associated with the measurement. Use it to record the crop storage unit or to capture the truck ID of the truck being loaded.



Tap to log the weight, the time of the measurement, and any description that has been entered. Once the data has been recorded, the weight reading on the Home screen resets.

View the logged measurements on the History screen. Each history column contains the same information, but displays the weight with a different unit of measure.



Timestamp	Identifier	kg	lbs	tn	cwt
3/28/2024, 2:59:47 PM	----	0.0	0.0	0.0	0.0
3/28/2024, 3:46:20 PM	----	68.3	150.6	0.1	1.5
3/28/2024, 3:47:02 PM	----	30.1	66.3	0.0	0.7
3/28/2024, 4:34:18 PM	----	113.5	250.3	0.1	2.5
3/29/2024, 9:47:44 AM	D20	2,131.4	4,698.9	2.3	47.0

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Weigh System

CHAPTER SIX

Additional Reference

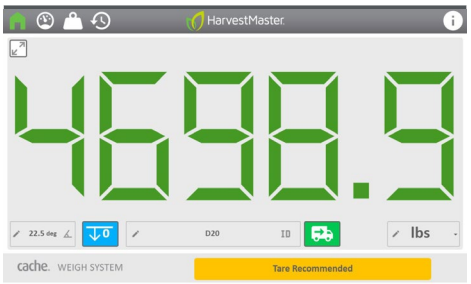
6 Additional Reference

Each Cache Weigh System includes a laminated *Field Reference* mounted on the inside of the CCU door. Check the following parts listed under the Annual Checklist at the beginning of each season of use and/or after transport.

If there have been significant changes to the Cache Weigh system, review all of the settings. See **4 Set Up** on page 33 and **5 Calibrate on page 41**

CAUTION: Do not pressure wash the CCU or spray directly on the load cells.

You may occasionally see a warning displayed. Two warnings are detailed below.

Warning	Explanation	
Tare Recommended	The system needs re-zeroed or re-tared.	
Load Cell Fault	The system has detected a bad load cell that needs to be repaired or replaced.