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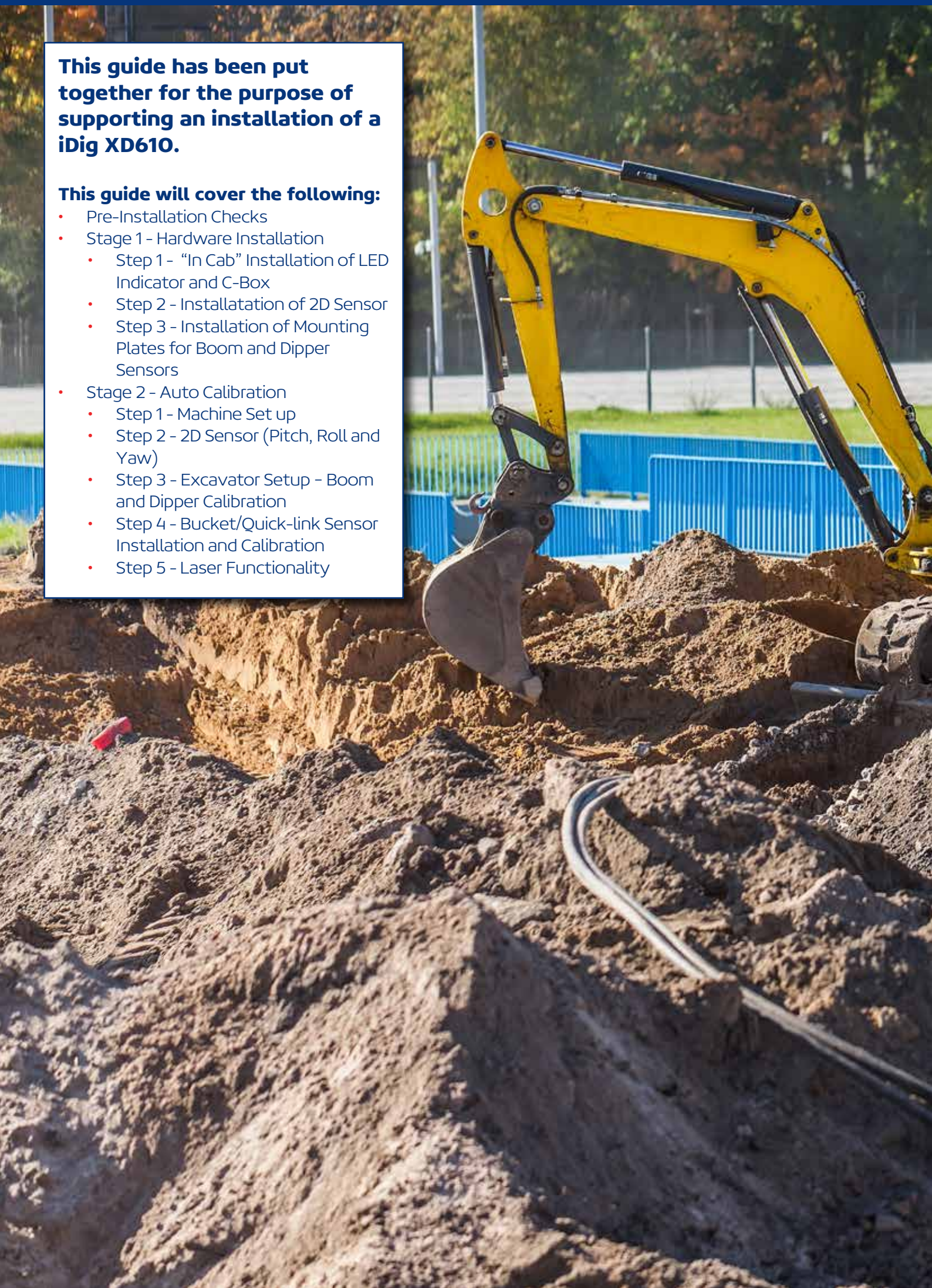


This guide has been put together for the purpose of supporting an installation of a iDig XD610.

This guide will cover the following:

- Pre-Installation Checks
- Stage 1 - Hardware Installation
  - Step 1 - "In Cab" Installation of LED Indicator and C-Box
  - Step 2 - Installatation of 2D Sensor
  - Step 3 - Installation of Mounting Plates for Boom and Dipper Sensors
- Stage 2 - Auto Calibration
  - Step 1 - Machine Set up
  - Step 2 - 2D Sensor (Pitch, Roll and Yaw)
  - Step 3 - Excavator Setup - Boom and Dipper Calibration
  - Step 4 - Bucket/Quick-link Sensor Installation and Calibration
  - Step 5 - Laser Functionality



Pre-Installation Checklists

Before you begin to install the iDig, make sure you've got everything you need to successfully complete the installation along with checking your equipment and your working area.

Prestart Checklist #1 - Items to have on hand to assist with installation

- Tape measure
- Magnetic plumb bob
- Clean rags
- Brake cleaner
- Window cleaner
- Flat Top Tripod
- An extra set of poles to raise the laser pointer higher for larger excavators
- Rotating laser
- Cable ties, conduit and sticky cable mounts for a tidy cab

Prestart Checklist #2 – Machine Checks

Have you got a Safe and Suitable location for the install?

This calibration process requires a bit of space to operate the machine in, you'll be rotating the cab 360 degrees and fully extending the boom and bucket. Find an area where you can do this safely. This area will need to provide stable and level footing for you and the machine. It is crucial that the machine is level left to right to aid in calibration of boom and dipper. An excavator tipping forward/backward at an angle is acceptable.

Machine checks before you start:

- Is the excavator in good working order?
  - Pins and bushes are well greased? A sloppy machine equals a potentially sloppy calibration and an inaccurate system.
  - No hydraulic problems? Does the boom stay raised and doesn't drop when left in a high position? If so, you'll not be able to calibrate the Boom and Dipper Sensors correctly and the system will not be accurate.

Check the power outlet

- Can the machine supply correct voltage?
- Is the power supply stable and not drop or turn off?
- If power is not available, check for blown fuse.



Stage 1 - Hardware Installation

Stage 1 – Hardware Installation

This process will consist of the following steps:

- Step 1 - Installation of LED Indicator and C-Box in cab
- Step 2 - Installation of 2D Sensor in cab
- Step 3 - Installation of Mounting Plates for Boom and Dipper Sensors

Step 1 - Installation of LED Indicator and C-Box

Machine is to be powered off.

- Before plugging in the cables, find suitable locations to mount the LED Indicator and Screen.
- The LED indicator should be put on the front window, in your field of vision of the working area outside.
- The C-Box is usually mounted onto the right hand side window and at a distance that is comfortably reached by hand.
- Allow clearance for the front window to be opened or slid up into the roof.
- Use window cleaner to clean both the glass and the suction cup mounts so as to achieve a good contact.
- Screw in cables and make tidy with conduit, cable ties etc.
- **DO NOT PLUG IN POWER** until **AFTER** 2D Sensor is Installed.
- Now you are ready to install the 2D Sensor.

LED indicator and C-Box installation

Examples of LED and C-Box locations below:







Step 2 - Installatation of 2D sensor

Locating a suitable spot to install the 2D sensor is worthwhile taking some time to get right.

You are looking for a place that:

Is accessible

- The sensor is able to be reached and removed from its mount with the removal key without undue interference.

Sensor will be level and facing forward

- Arrows on the top of the sensor indicate it is to be installed facing toward the front of the cab.
- The sensor ideally needs to be placed in a spot that is level to the floor of the cab.
  - Installing the 2D sensor on a tilt is acceptable if a level location is unable to be found.
  - A maximum angle of +/- 30° on both axes is ok.

Is free from vibration and strong magnetic Interference

- Avoid plastic moulding that is removable, as this can vibrate when the machine is running.
- Avoid being near storage of tools or devices that are strongly magnetic.

Has adequate space for cable and plug

- The communication cable is not under tension. Use an extra XD418 cable if more length is required.
- The cable and plug into the sensor sticks out approx. 2.5cm from edge of sensor. 5-7cm clearance is desirable to avoid complications with the cable bending too sharply.

Will not be subject to knocks or damage

- Avoid areas where tools are commonly stored
- On some machines, under the floormats to the side of the operators feet is the only location. Take care to make a safe place where the sensor and cable will not be affected.

Examples of 2D sensor installation below:









Once you've found a suitable location and BEFORE mounting anything permanently, click the 2D sensor into the correct 2D sensor bracket and attach the cable to the sensor and place into desired location.

Check for the following:

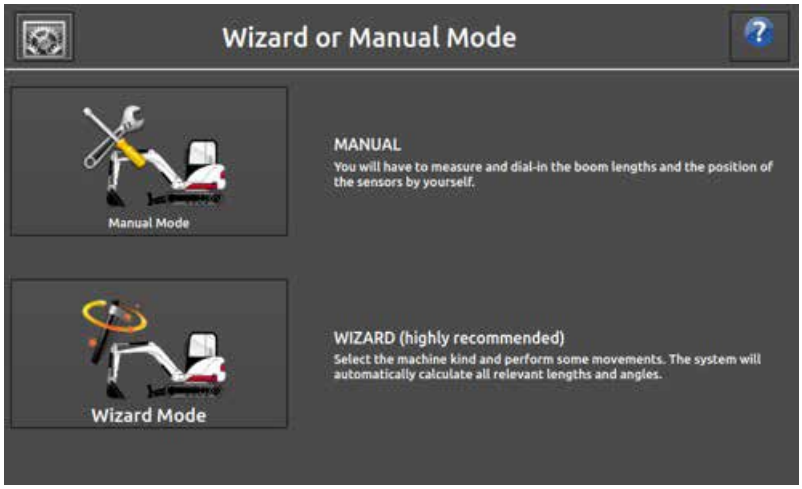
- The iDig power is UNPLUGGED.
- All cables have enough reach and aren't under any tension and the LED Indicator and C-Box can be moved around if necessary.
- Move the seat back and forward as well as raising and lowering it. Does the sensor cable move freely without stretching or pulling on the sensor?
- If mounting the sensor by the door under the left of the seat, open and close the left arm, as well as the door of the cab to check for clearances around the sensor and cables.

Once a suitable location is established:

- Suitably wipe clean the area with brake cleaner/grease remover.
- Wipe the area and the mounting plate with the 3M VHB wipes.
- Assemble the 2D Sensor mounting bracket onto the mounting plate, click in the sensor and plug in the cable.
- Stick the 3M VHB pad onto the bottom of plate and stick the whole assembly into position.

Put LED Indicator and C-Box into cradles, if not yet done so, plug in iDig Power and turn on machine.

If this is the first time the iDig has been installed you'll be greeted with this screen.



DO NOT progress any further! Leave this screen and exit the machine to proceed with the instructions on the next page to install the Boom and Dipper sensors first.

Step 3 - Installation of mounting plates for boom and dipper Sensors

Boom sensor

Find a suitable location on the boom that is near the cab to install the boom sensor. You are looking for spot that is easy to access when placing or removing the sensor day to day. On smaller machines this is commonly in the lower 1/3 of the boom of the left hand side. On larger machines where the boom is much higher, you can mount the sensor on the right hand side where access is much easier. Do not install on an inclined or angled section of the boom. The sensor must be parallel the movement arc of the boom and dipper arm.

You will want the bracket to be mounted so the BUMP on the sensor is facing forward and is parallel with the bottom section of the boom.

Suitably clean the area with Brake Cleaner and wipe dry. Clean the surface of the boom as well as the back of the mounting bracket with the 3M VHB wipes and then stick the bracket onto the boom. You can mount the bracket with the “bump” of sensor facing in either direction.

Examples boom sensor below:









Do not install boom sensor on an inclined section of the boom as above. It must be parallel with the arc of operation.

Dipper sensor

The dipper sensor will need to be located on the dipper arm as low as possible.The higher the sensor is located on the dipper stick, the more the boom and dipper has to be dropped to catch the beam. Be aware of the location of hoses and pipes that may inhibit a clear line of sight to the sensor when using the laser catch function.

Be aware of the crush zone of the dog bone coming onto the arm as the bucket crowds in and out. Note also where any auxiliary hoses are being plugged in and out that may spill oil onto the sensor. These locations are to be avoided avoided if possible.

For more accurate calibration and ease of setup regarding the laser catch function, you may want to consider installing the dipper sensor using the following directions. This will allow you to manually enter accurate measurements into the laser calibration setup stage and the system will be maximally accurate when using the laser catch function.

You will want to rotate the dipper sensor forward (counter clock-wise) slightly 10°-15° from when the Dipper arm is set at 90° to the ground. This again helps with catching the laser.

Suitably clean the chosen area with brake cleaner and wipe dry. Clean the surface of the boom as well as the back of the mounting bracket with the 3M VHB wipes and then stick the bracket onto the boom.

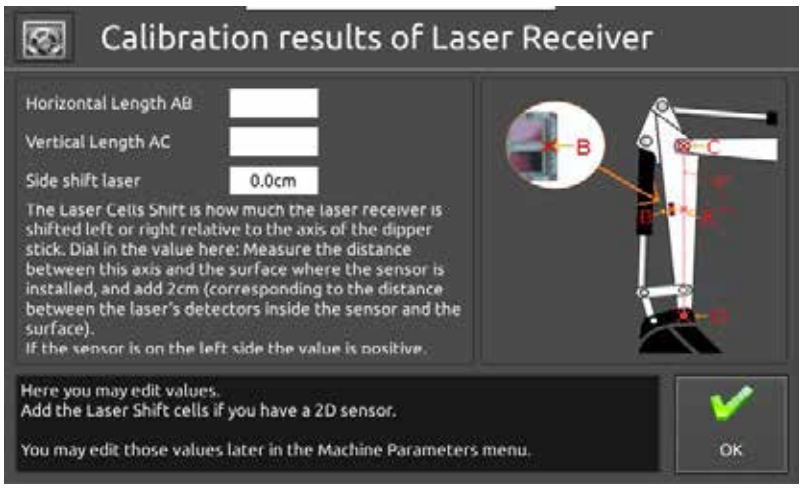
If you are using a secondary mounting plate between the sensor bracket and the machine, screw the bracket onto the plate and follow the same process as above.

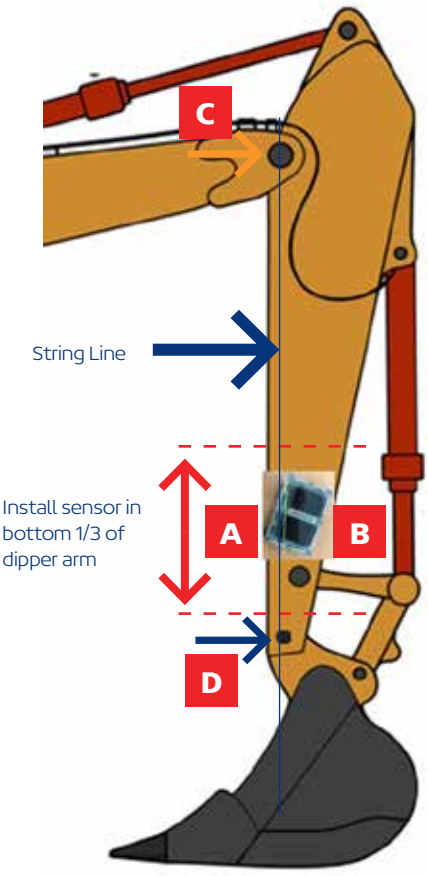
Recommended Installation method of dipper sensor in conjunction with Laser catch calibration.

Using a magnetic plumb bob or a string line and magnets, create a line that is between the centre points of the dipper stick pivot pin and the bucket pivot pin.

In the bottom 1/3 of the dipper arm, place the sensor on a point so that the very centre of the laser receiver is on this line, rotate the sensor forward (away from the cab) slightly by 10-15°.

Take a measurement from the centre of the top pin to the centre of the sensor, this will be the A-C measurement. The A-B Measurement will be 0. Enter these measurements via the System Settings menu once the main iDig calibration steps are complete.







Stage 2 - Auto Calibration

Stage 2 – Auto Calibration

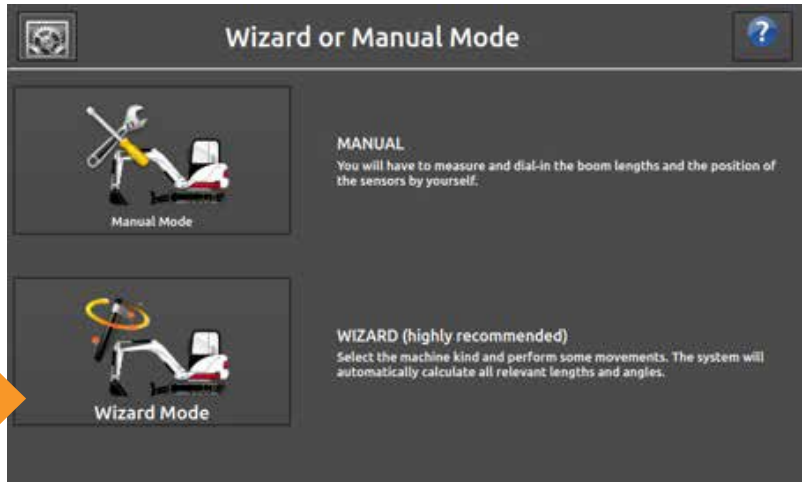
This process will consist of the following steps:

- Step 1 - Machine setup
- Step 2 - 2D Sensor calibration (pitch, roll and yaw)
- Step 3 - Excavator setup - boom and dipper calibration
- Step 4 - Bucket/quick-link sensor installation and calibration
- Step 5 - Laser functionality calibration

Step 1 - Machine Setup

Select:

"Wizard Mode"





Select:
Relevant Language

Select your units:

"Percent" is recommended for the Slope Units.

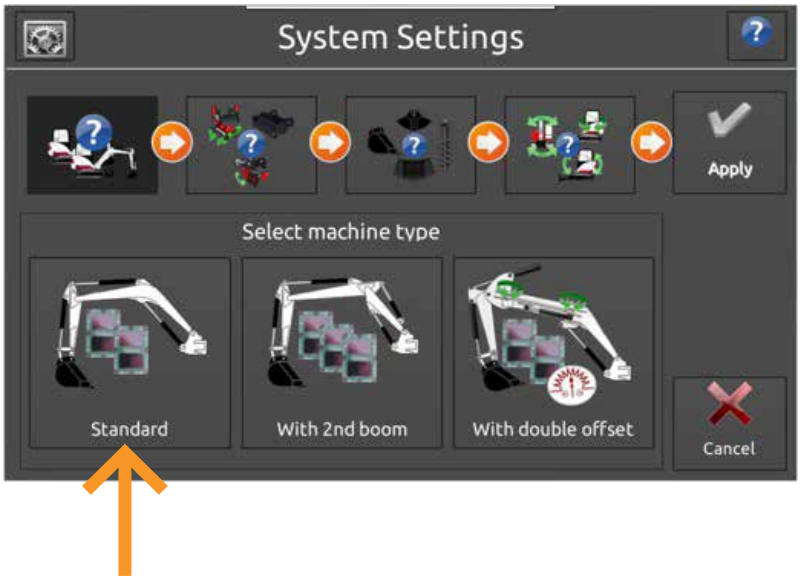
Note: The minimum unit of measurement for the iDig is 1cm and as such, no MM option is available.



1. Select Machine Type

This installation document covers the STANDARD machine type, that is an excavator with a normal boom and dipper arm.

Select “Standard”



2. Select Coupler Type

For ease of installation it is recommended that you select STANDARD for the coupler type for all installations, the tilting hitches or rotating couplers can be easily added at a later stage.

Select “Standard”



3. Tool Selection

For ease of installation it is recommended that you select CLASSIC BUCKET for the tool type for all installations, the extra attachments can be easily added at a later stage.

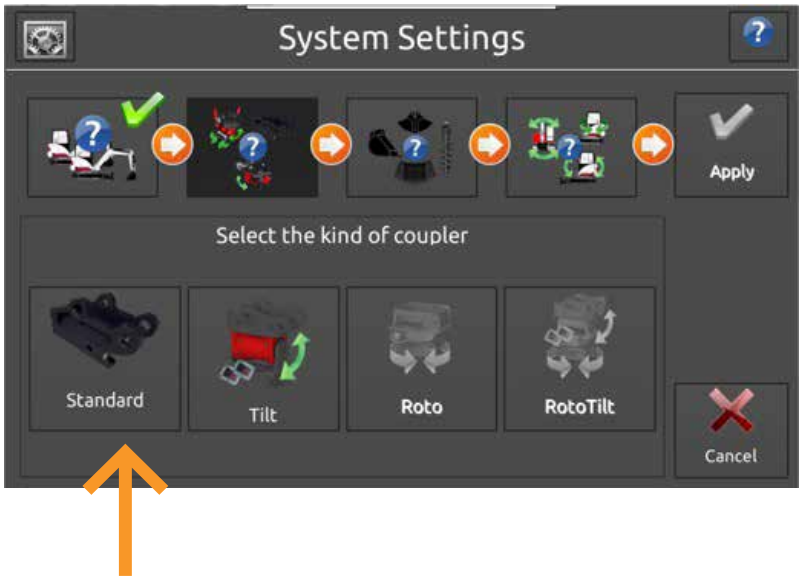
Select “Classic Bucket”



4. Select 2D option

Select “2D Sensor”

The other options are for 1D systems without the 2D sensor.



5. Confirm machine setup

Confirm that you choices are correct, make any changes if required.

Press “Apply”

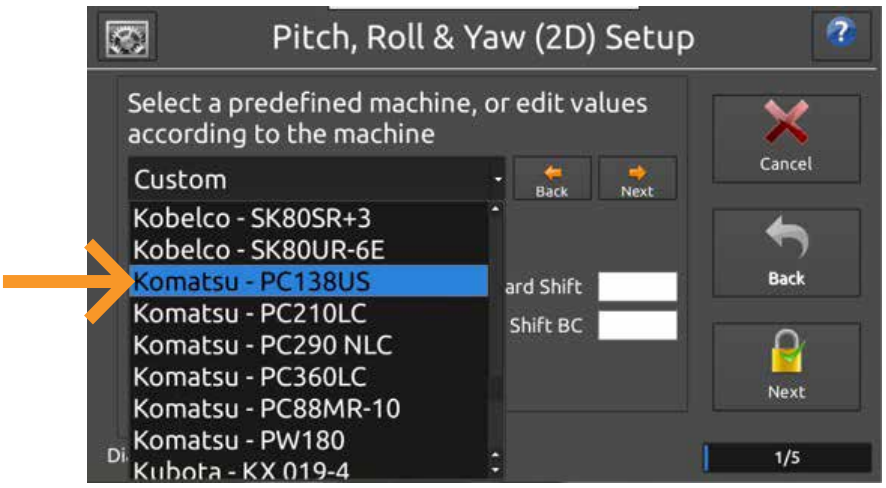


Step 2 - 2D sensor calibration (pitch, roll and yaw)

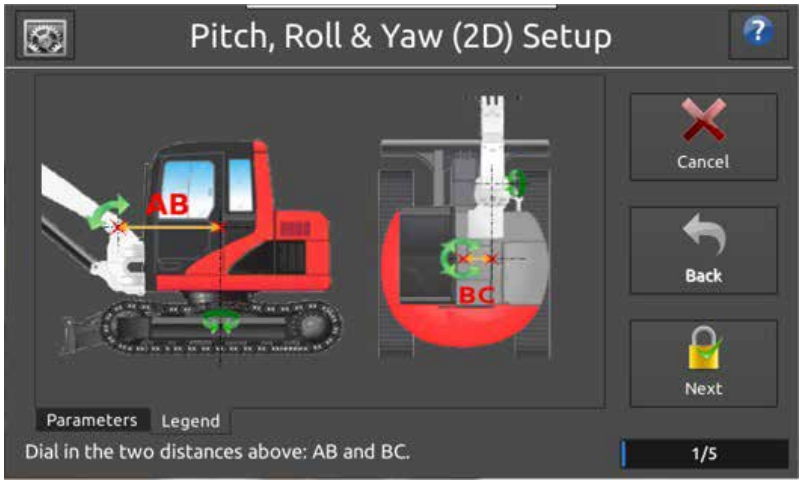
The calibration of the 2D Sensor requires some measurements to be input onscreen. These measurements can be automatically entered by selecting your machine from the dropdown list or determined manually and input in the sections indicated.

Select your machine from the dropdown list

It is recommended that you check these measurements, the same machines and models can vary depending on regional OEM distributor.

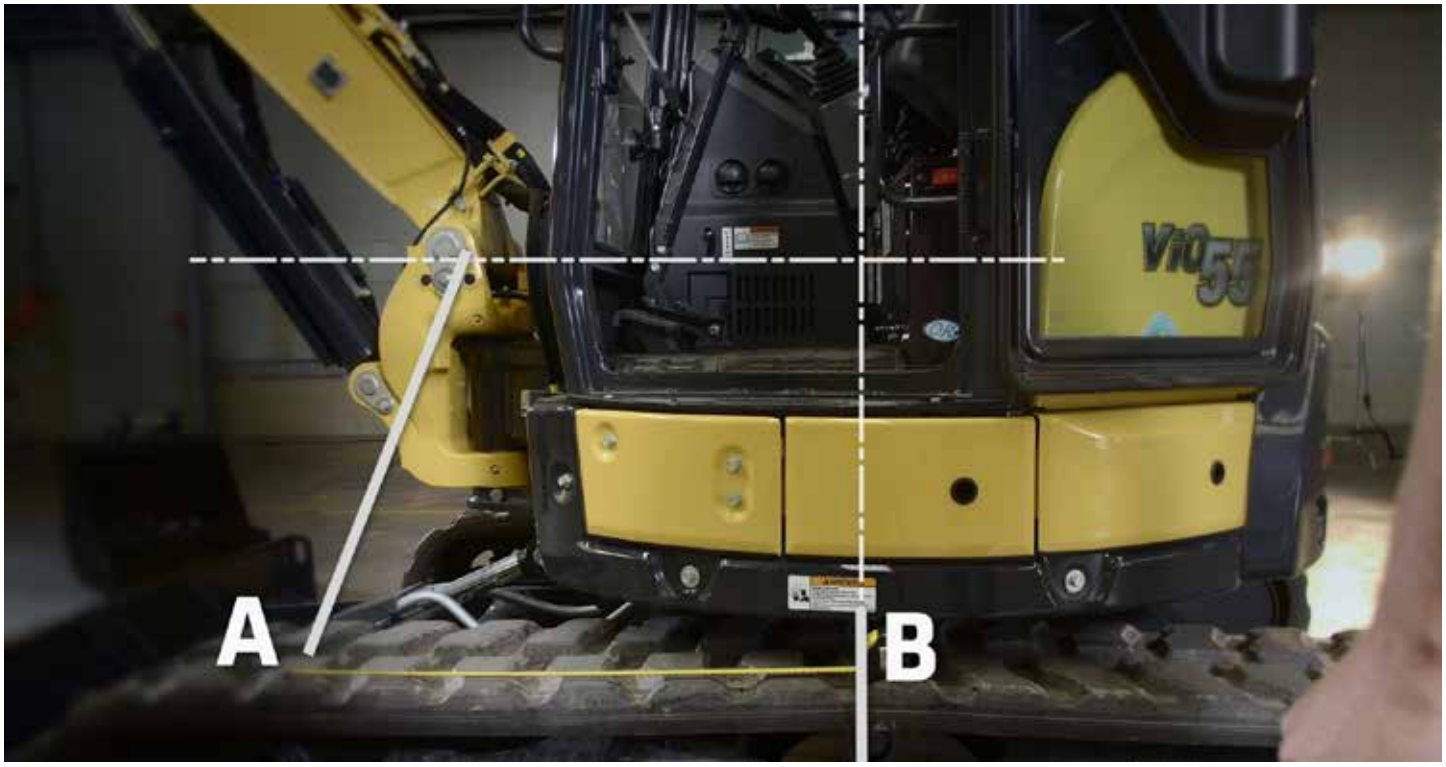


Manually determine the Forward and Side Shift Measurements.



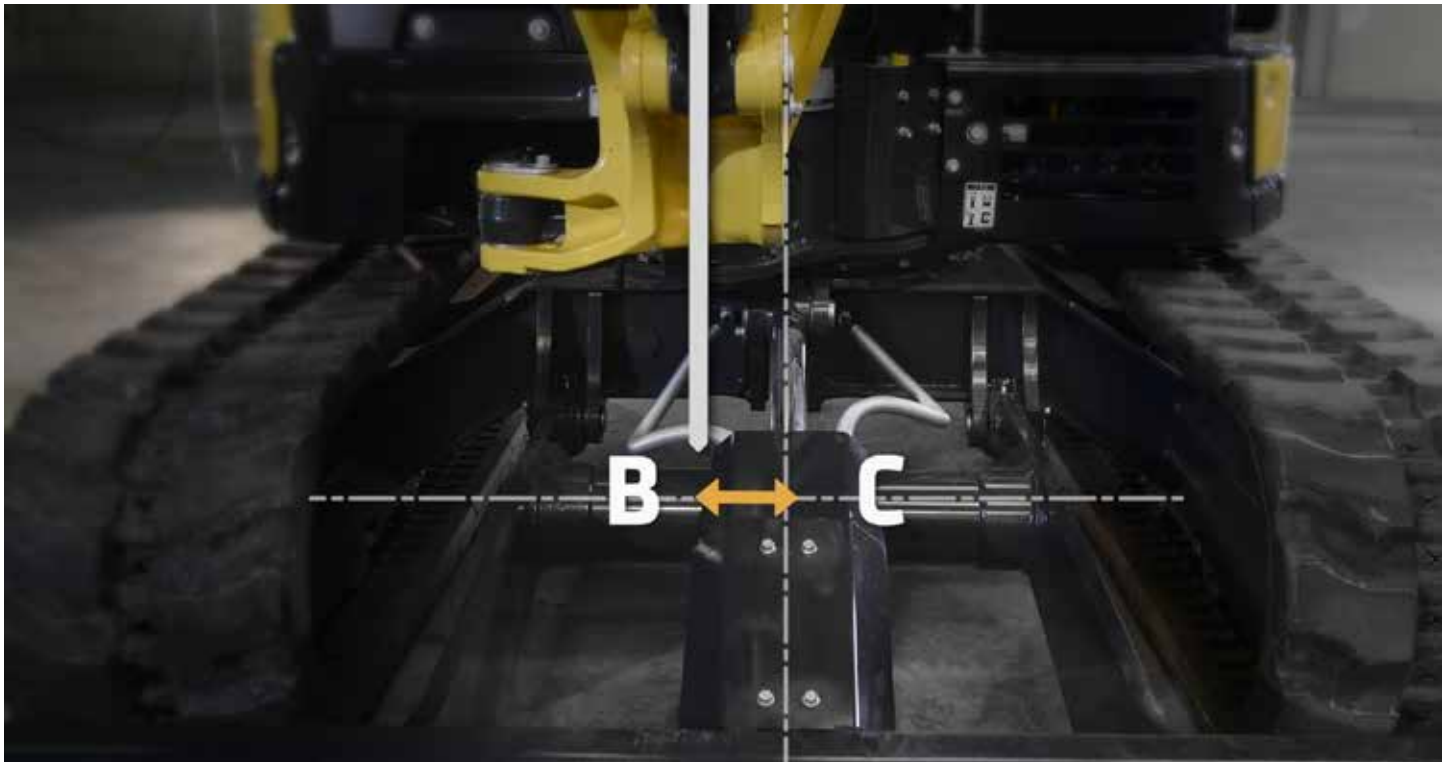
The A-B Forward Shift measurement is the horizontal distance between the machine's center of rotation to the main boom's pivot point.

Ensure that the boom is facing directly forward on machines with a swivel boom - exactly 90deg perpendicular to the cab. An incorrect measurement will result otherwise.



The B-C Side Shift measurement is the horizontal, perpendicular distance between the axis of the main boom and the machine's center of rotation.

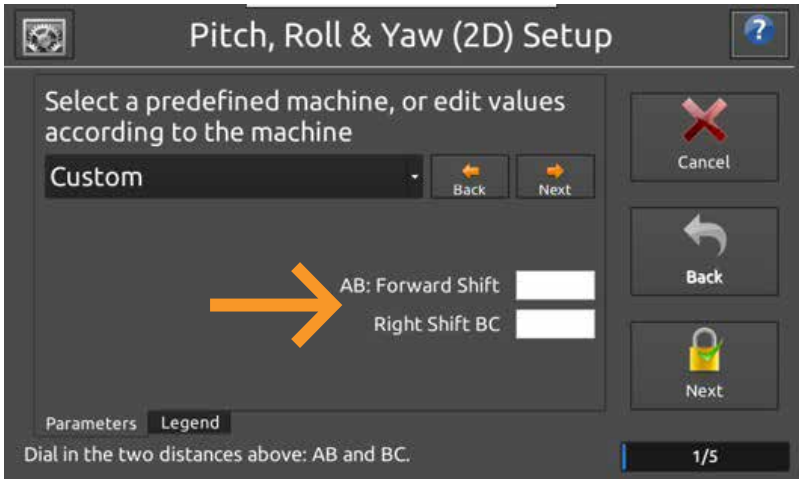
Ensure that the boom is facing directly forward on machines with a swivel boom - exactly 90deg perpendicular to the cab. An incorrect measurement will result otherwise.



Manually input the measurements onscreen

Note:

Negative values are possible. For example, if the main boom's pivot point is BEHIND the machine's centre of rotation, the AB distance is negative.



You will now calibrate the 2D sensor to the alignment of the machine.

This process will require you to rotate the cab of the machine through 360 degrees, so make sure you have a clear space around the work area to safely do this.

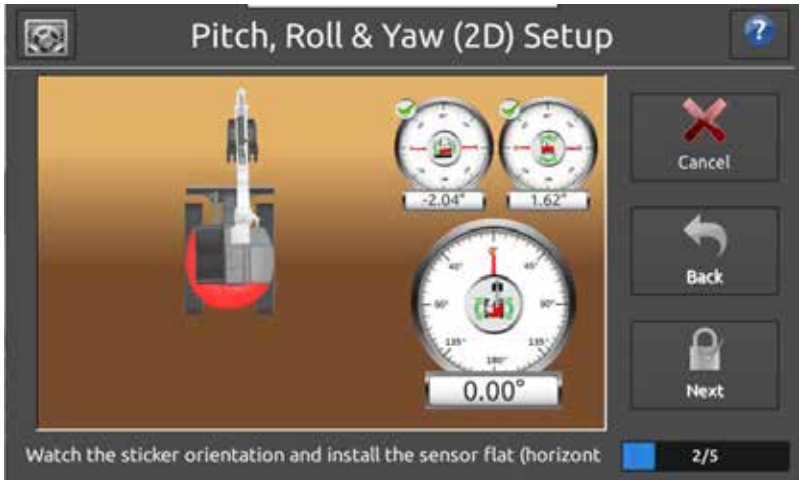
Begin by aligning the machine facing forward and parallel to the tracks.

When in the correct position press "Next" to begin.

Note:

The 2D sensor is sensitive to vibration and it is recommended that you have the machine operating at medium to high RPM during this alignment process.

Higher RPM reduces the wavelength of the vibration and allows an accurate calibration.

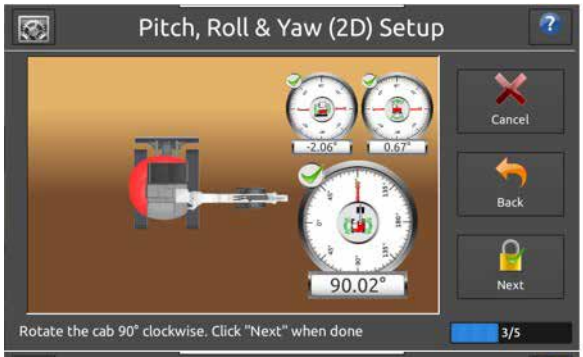


You will now be required to align the cab through three further positions, +90, 180 and -90°. You are aligning the cab to these physical points of the tracks, not to the exact number numbers shown on the screen.

When you reach each point, press “Next”.

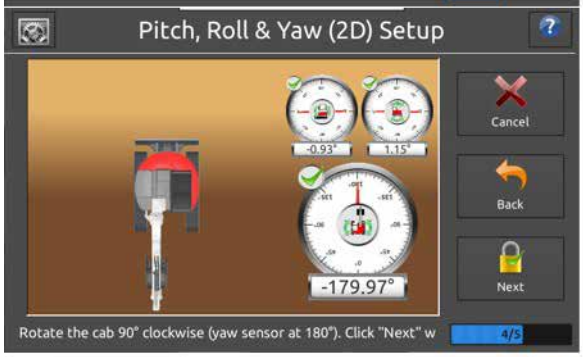
A pop-up will appear during alignment setting. Move to next position when this pop-up is gone.

+90°



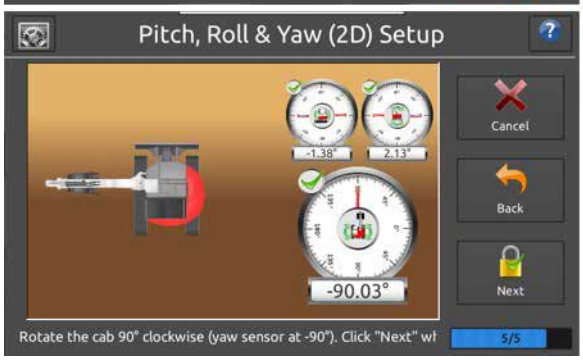


-180°





-90°





Once calibration is complete,
press “Done”



Step 3 - Excavator setup – boom and dipper calibration

If you've not already done so, click on the sensors to the boom and dipper.

This process requires you to fully extend the boom and dipper out in front of the machine so make sure your work area has enough space to do so safely.

You will also need a tripod, the laser pointer, laser tripod mount, threaded tubes and the magnetic target tube from your iDig kit.

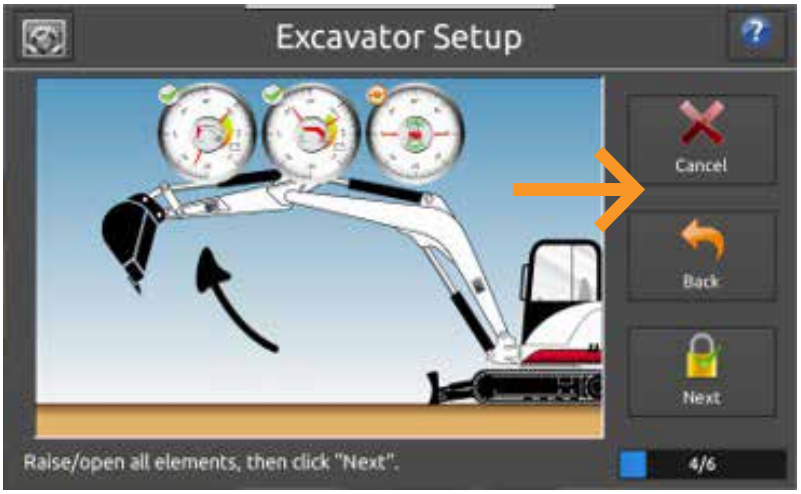
It is recommended that you remove the bucket to allow for ease of calibration.



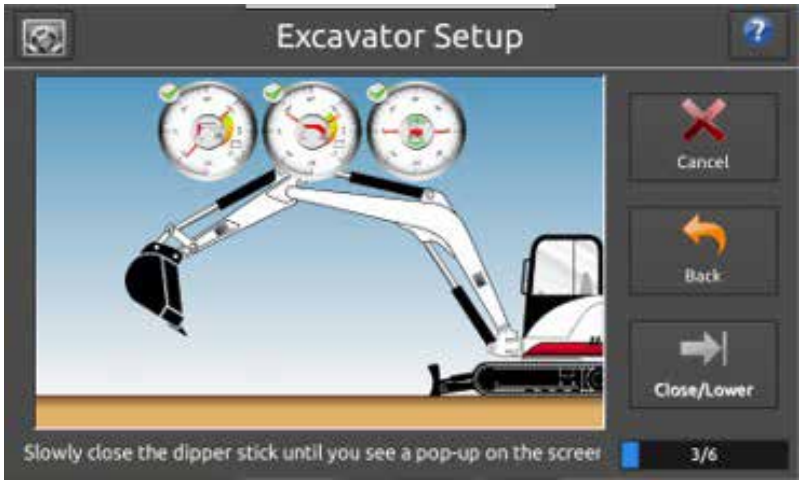
The system now will automatically detect which side the sensors have been installed on:

Dipper Sensor

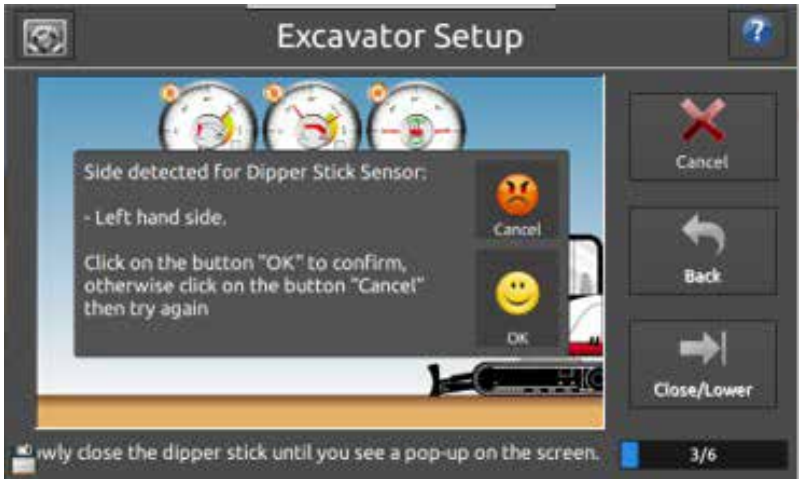
Raise the boom and dipper, **press "Next"**



Lower the dipper only until the pop-up appears on screen.



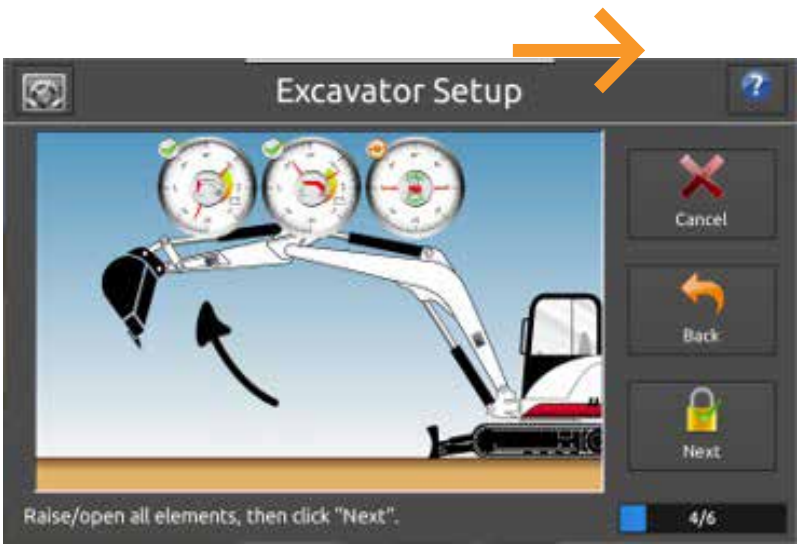
Press “OK” to continue



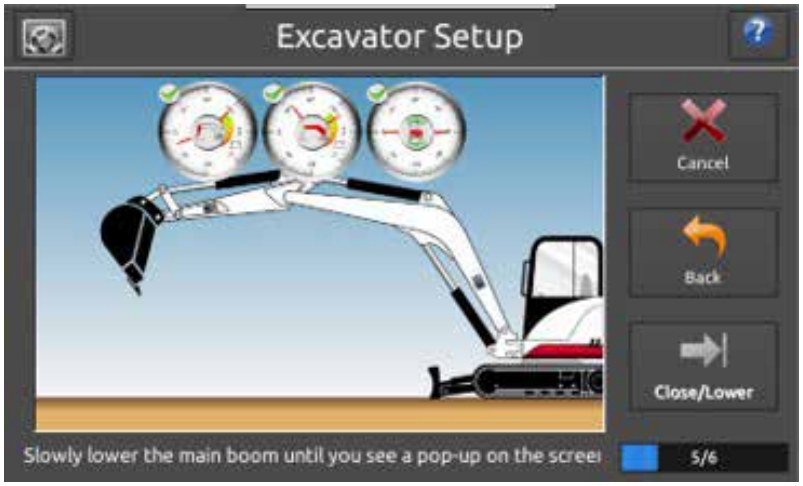
The system now will automatically detect which side the sensors have been installed on:

Boom Sensor

Raise the boom and dipper again, **press “Next”**

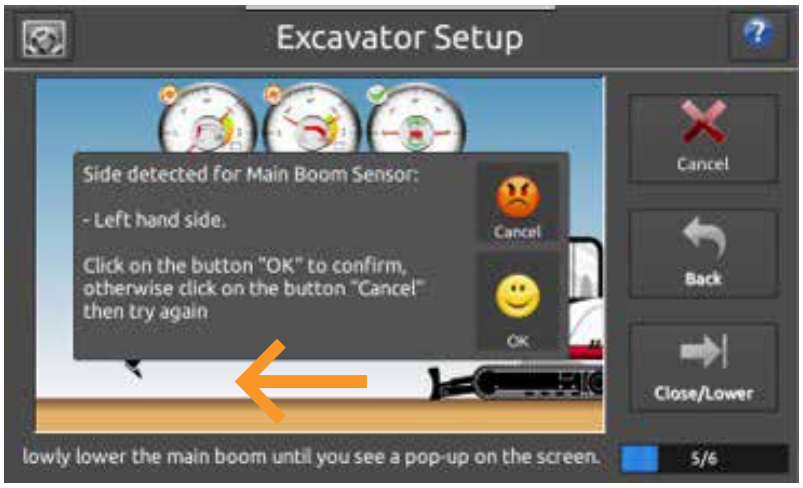


Lower the boom only until the pop-up appears on screen.



Confirm the sensor is located as detected.

Press “OK” to continue



Once sensor sides have been detected, you will now begin the boom and dipper calibration. This will be done by placing the magnetic target tube in the direct centre of the bucket pivot pin and directing the laser pointer onto this target. Then you will incrementally move the boom and dipper through a series of movements placing the tube onto the laser beam each time. This process is repeated again by increasing the height of the laser pointer using the two threaded tubes provided. Removing the bucket is recommended.

Assemble the laser pointer onto the tripod and place in front of the machine and turn on the laser. Ensure that the tripod is level and the laser pointer is clear of the boom when being raised and lowered, both when the laser pointer is in a low and high position. Also keep the legs of the tripod clear of the machine to avoid vibration.

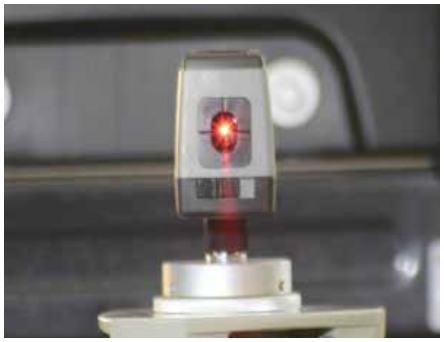
For smaller excavators you may find that you cannot lower the tripod enough to allow for the boom and dipper to be raised to the required level, if this is the case, placing the laser pointer on a flat surface on the ground will suffice.

To achieve maximum accuracy with your final calibration, it is recommended that the machine is calibrated on level ground.

Be aware of any machine that has hydraulic problems, any gradual loss in pressure will cause the boom to drop between setting the points and pressing the button. This will lead to an inaccurate calibration.





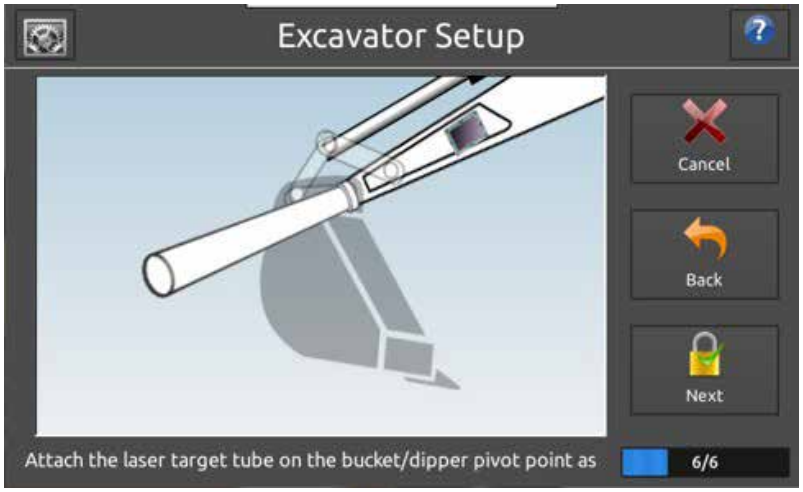


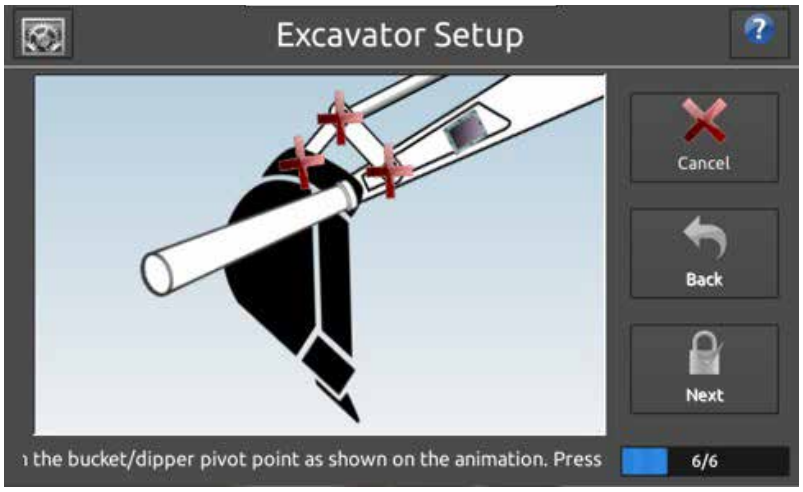
Attach target tube:

Tube must be in the very centre of the main pivot pin of the bucket or quick hitch

The tube can be mounted on either the left or right side of pin.

Press “Next” to continue





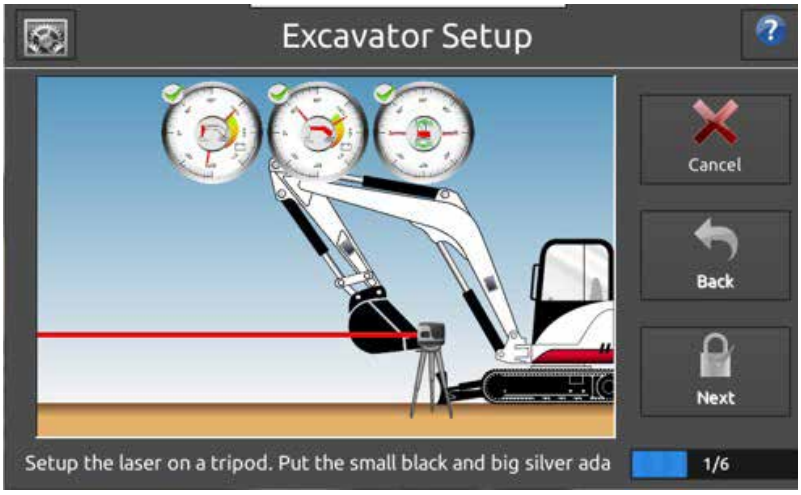


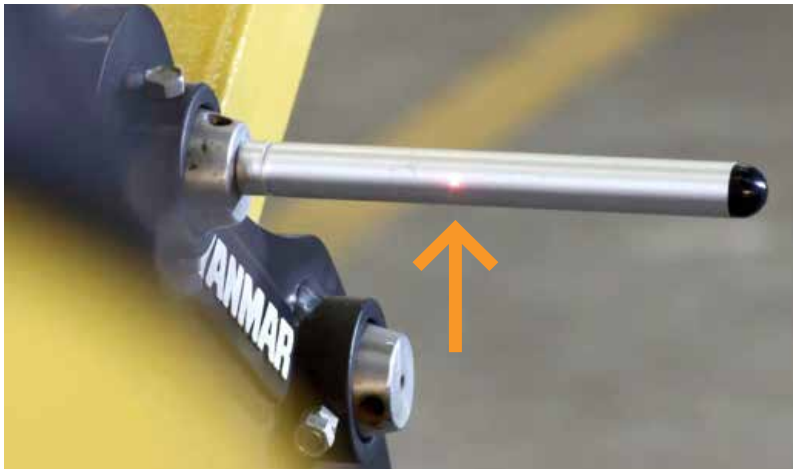
Step 1 of 6

Close the dipper and boom completely and bring laser point onto the target tube.

For maximum accuracy ensure that the laser point is kept on the same spot of the tube at each step.

Press “Next”



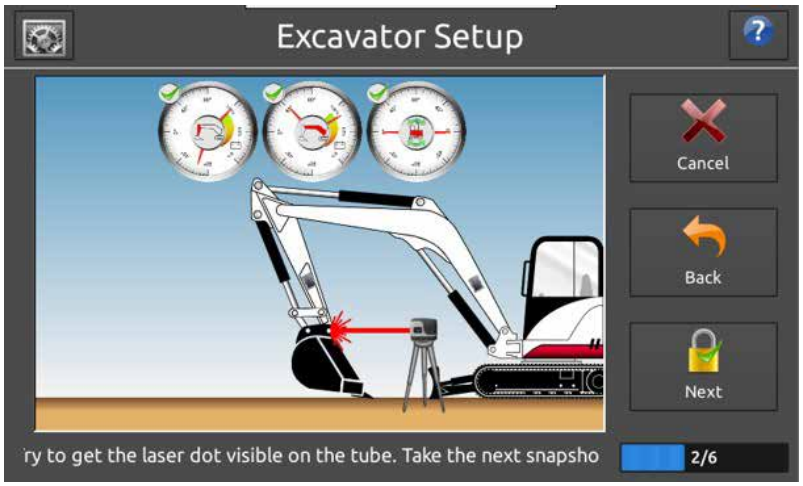


Step 2 of 6.

Open/extend the dipper and boom completely and bring laser point onto the target tube.

For maximum accuracy ensure that the laser point is kept on the same spot of the tube at each step.

Press “Next” to continue



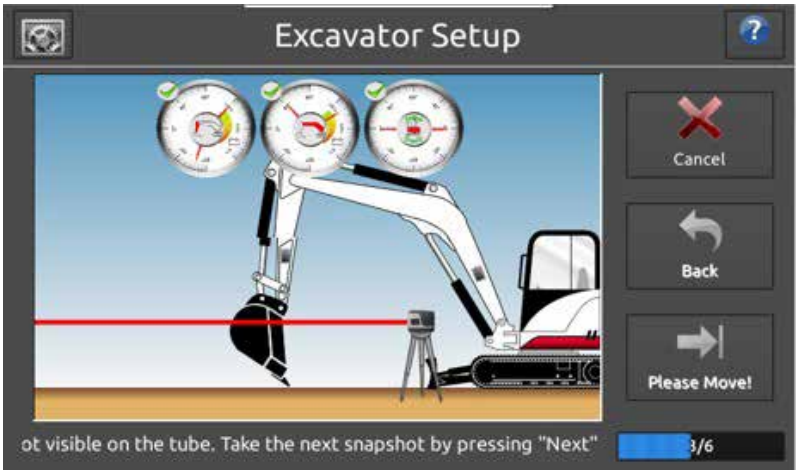


Step 3 to 6.

The four remaining steps consist of incrementally closing the machine and bringing the laser point onto the target tube, pressing “Next” each time to continue to the next step.

For maximum accuracy ensure that the laser point is kept on the same spot of the tube at each step.

Press “Next” to continue

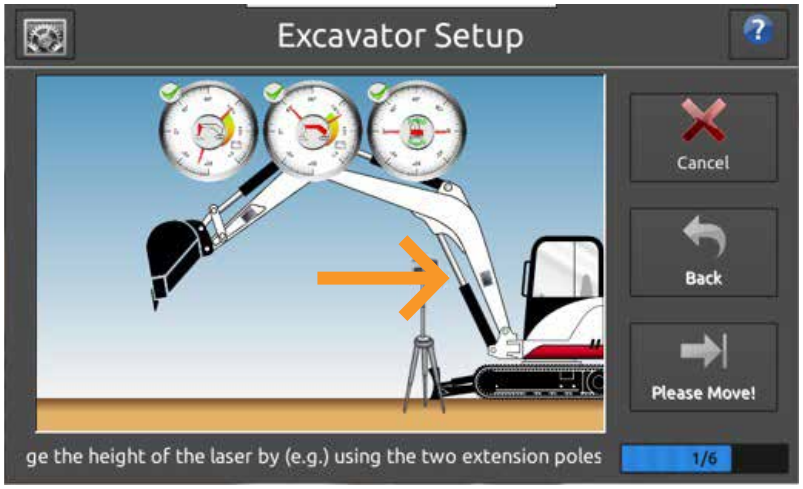




Increase the laser pointer height using the threaded tubes.

These next six steps are a repeat of the previous, except now the laser pointer is raised to the new height.

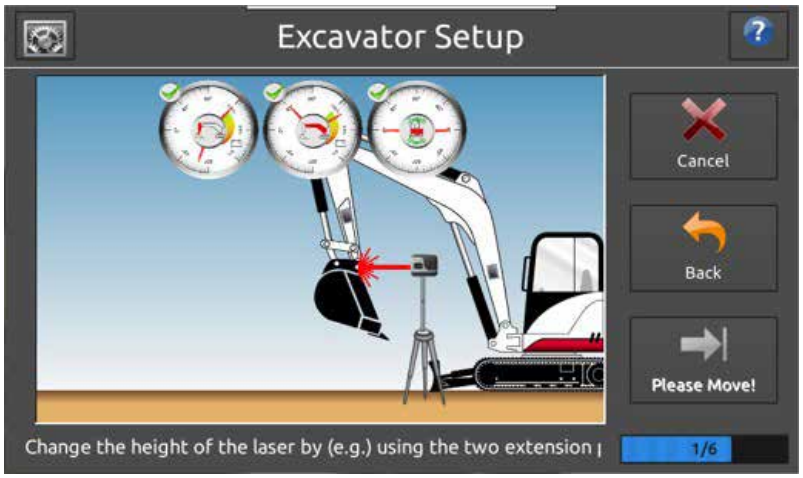
Step 1 of 6.



Close the dipper and boom completely and bring laser point onto the target tube.

For maximum accuracy ensure that the laser point is kept on the same spot of the tube at each step.

Press “Next”

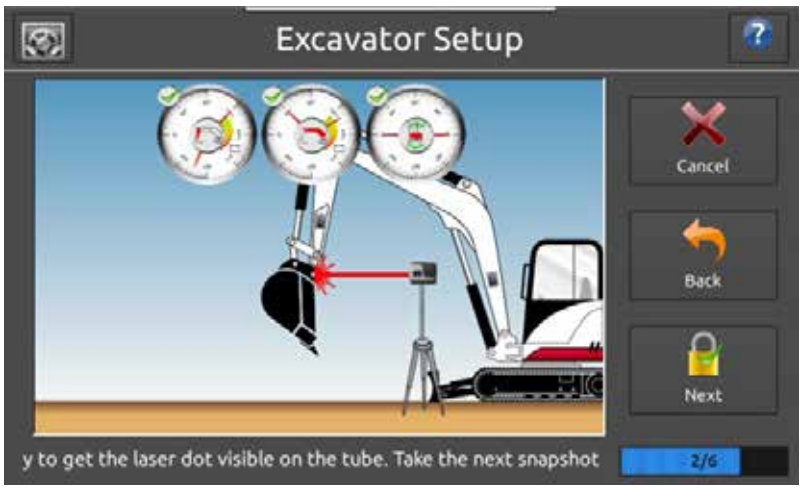


Step 2 of 6.

Open/extend the dipper and boom completely and bring laser point onto the target tube.

For maximum accuracy ensure that the laser point is kept on the same spot of the tube at each step.

Press “Next” to continue



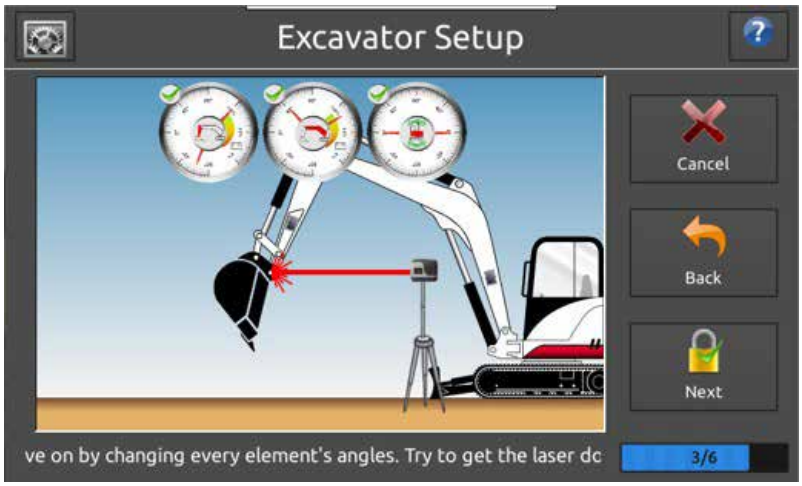


Step 3 to 6.

The four remaining steps consist of incrementally closing the machine and bringing the laser point onto the target tube, pressing “Next” each time to continue to the next step.

For maximum accuracy ensure that the laser point is kept on the same spot of the tube at each step.

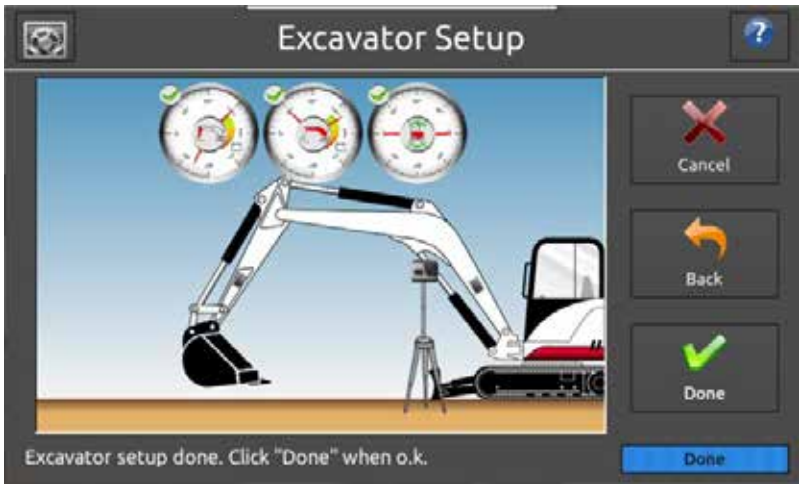
Press “Next” to continue



Final step of excavator setup

Once boom and dipper movement calibration has been completed.

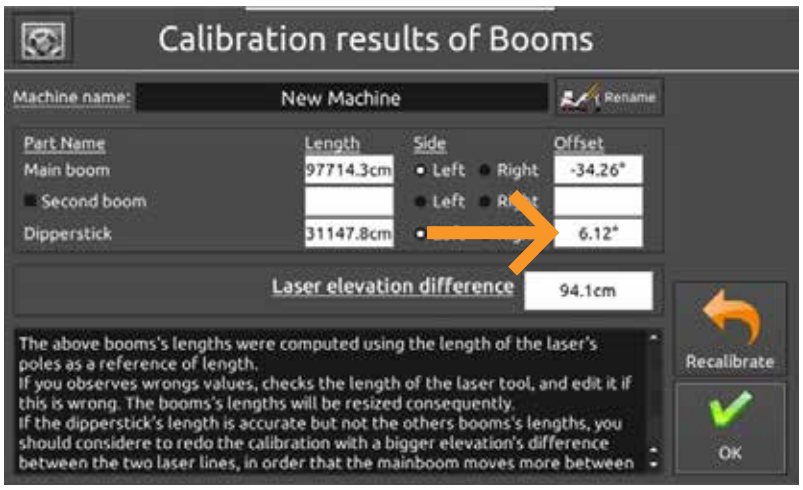
Press “Done” to continue



The calibration results will now be shown.

Give your machine a unique name by pressing **“Rename”**

Press **“OK”** to confirm and move to bucket calibration.



Step 4 - Bucket setup

Reattach Bucket if you've not already done so and click on the sensor to the plate. If you've not yet installed the sensor plate see below.

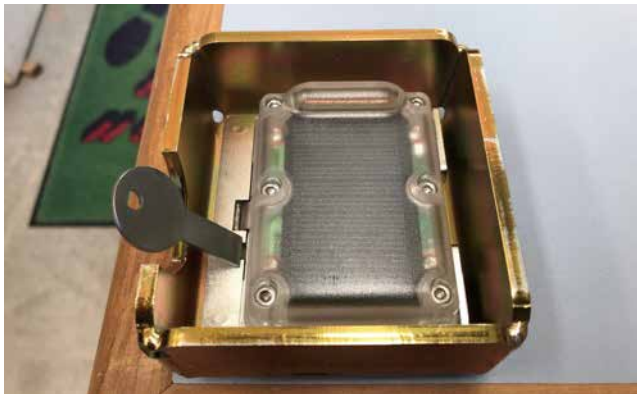
Installing bucket sensor

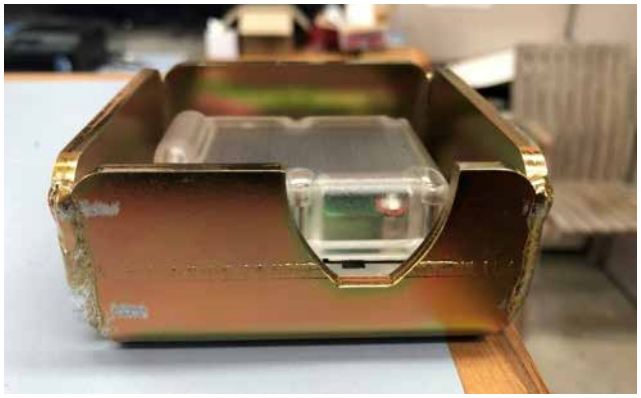
The bucket sensor can be installed on either side of the machine and on either the dog-bone or the hitch.

For maximum accuracy it is recommended the you always install on the hitch.

Find a suitable location on the hitch and clean thoroughly with brake cleaner then wipe clean with 3M wipes. Stick your sensor plate on firmly and press for 30 seconds. The adhesive bond will strengthen over time.

If your machine works in an environment where the sensor could be prone to accidental damage, now is the time to consider additional protection. Custom brackets can be made and welded to your hitch for additional security.Contact your iDig dealer for custom brackets.









Click on the sensor to the plate and begin the calibration process.

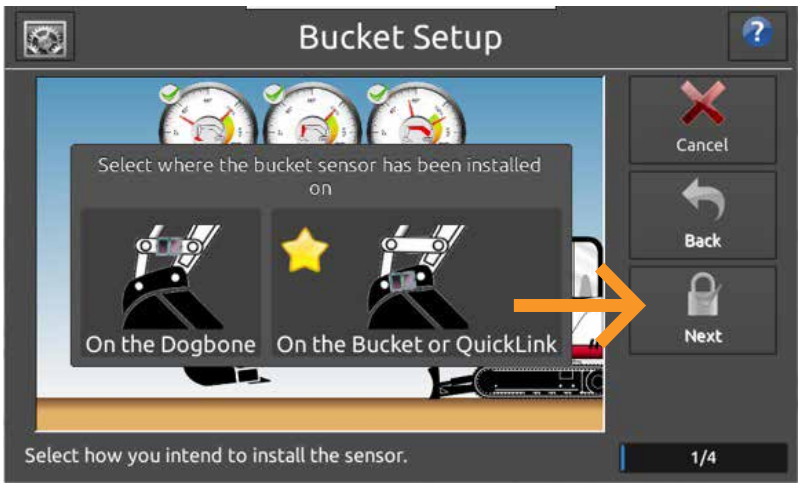
There are two methods of calibrating the bucket sensor: Manual and Automatic. The manual process is much quicker, although you will need some additional items. The automatic process is similar in concept to the Excavator setup, whereby you will move the bucket through a series of incremental changes while keeping the bucket blade on a fixed point.

If the bucket sensor is located on the dog-bone an automatic calibration is your only option.

For a manual calibration you will need a magnetic plumb-bob and a tape measure. For an automatic calibration a tape measure and something to use as the set-point is required. A traffic/road cone is an ideal item.

Begin by selecting the location in which the sensor has been installed.

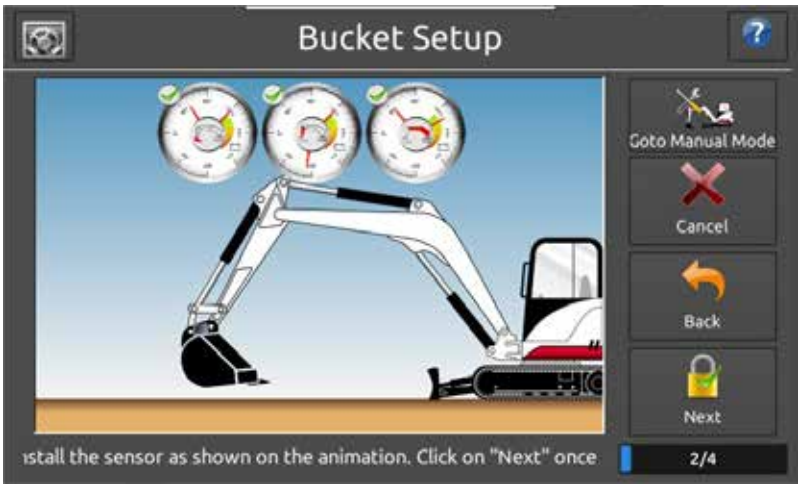
Press “Next” to continue



Manual Bucket Calibration -Quicklink

As previously mentioned the manual bucket calibration is a much quicker process than the automatic calibration.

It is imperative that you are ABSOLUTLEY accurate with your measurements and vertical angle position of the bucket when proceeding with the following steps.



Manual bucket calibration

Place a plumb-bob or weighted string line on the bottom of the dipper arm so the string passes directly through the center of the bucket pivot pin.

Drop the string down below the edge of the bucket teeth/edge. Make sure the string is hanging still.

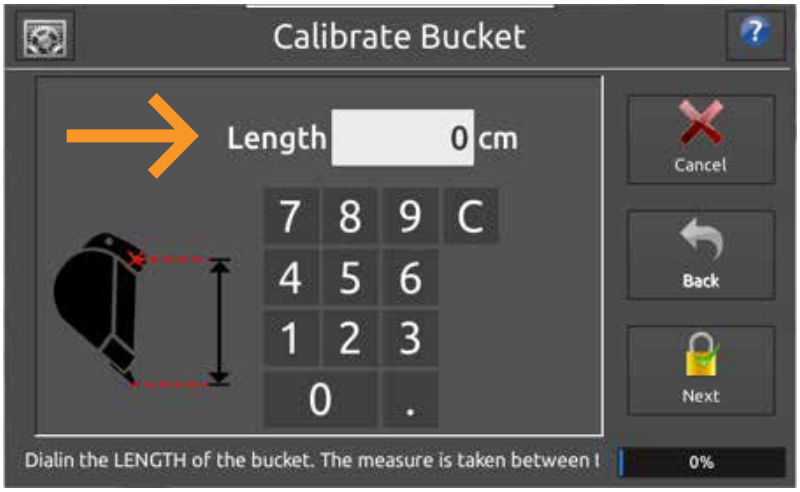
Slowly close the bucket (do not move the dipper or boom) until the edge or teeth of the bucket is just touching the string. This will set the Vertical position for the bucket sensor.

If the machine is older and/or has pressure loss resulting in a dropping boom, perform the above vertical alignment procedure last.

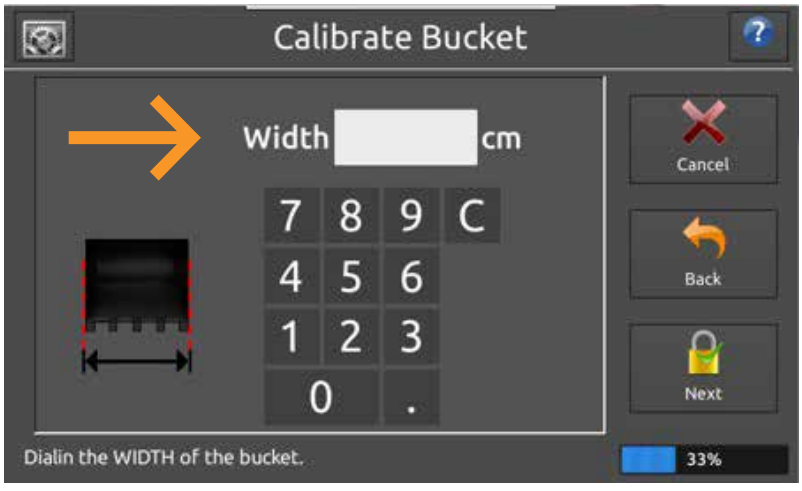
With your tape measure, take a measurement from the bottom of the edge/teeth to the centre of the bucket pin.

Measure the width of the bucket.

Input the bucket **"length"**



Input the bucket **"width"**



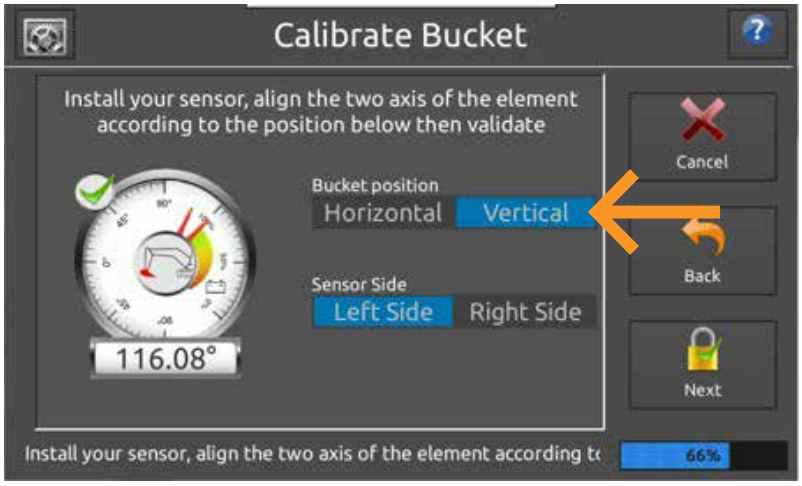


Press **“vertical”** so that it is highlighted in blue

Select which side the sensor has been installed on. Selection will be highlighted in blue.

Press Next to ok and confirm.

This bucket will be named in your system as new bucket. Be sure to go to the system menu and give it a proper name.

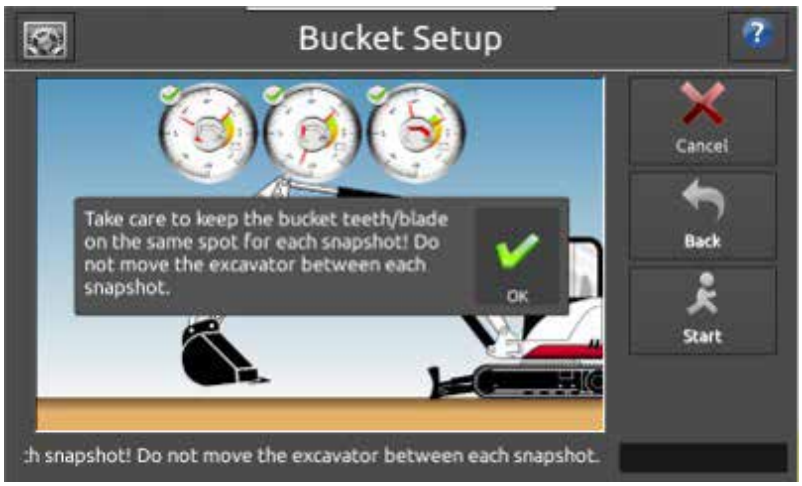


Automatic bucket calibration – Quicklink Location

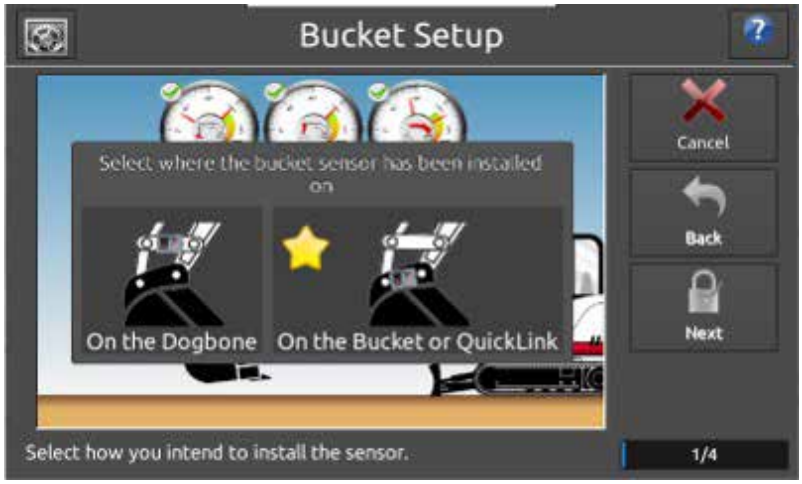
Automatic Calibration of the bucket sensor.

You will require a stable point on which to place the bucket edge. This point needs to not move, deflect or change when the bucket is placed on it. An ideal item to use is a traffic cone.

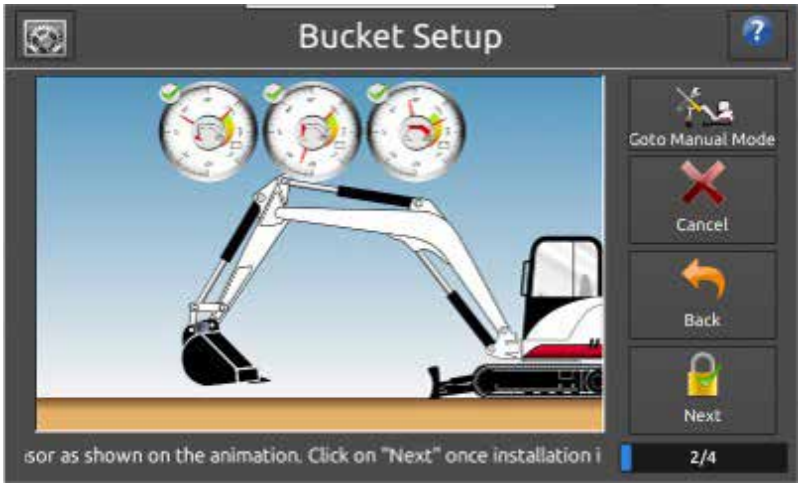
As the pop-up will remind you, take care when placing the bucket edge on the point to keep on the EXACT same point.



Once the location of the sensor has been confirmed you will be presented with a quick animation reminding you to click the sensor into the plate, do this now if you’ve not yet done so.



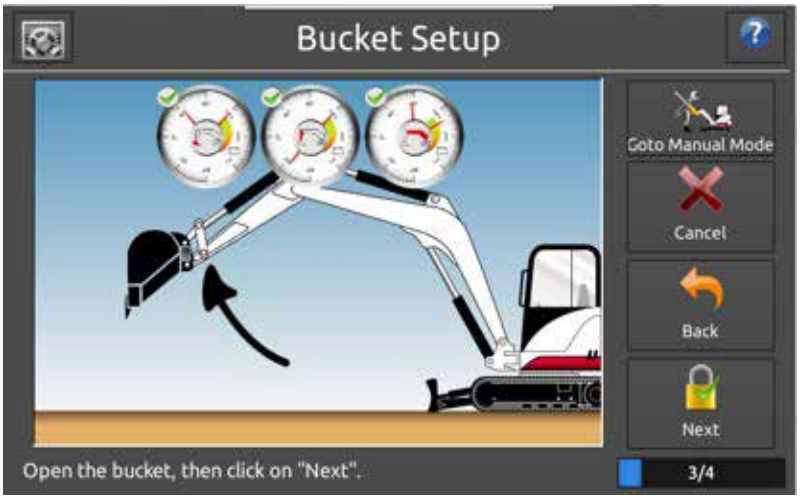
Once the sensor is in position,
press “Next” to continue.



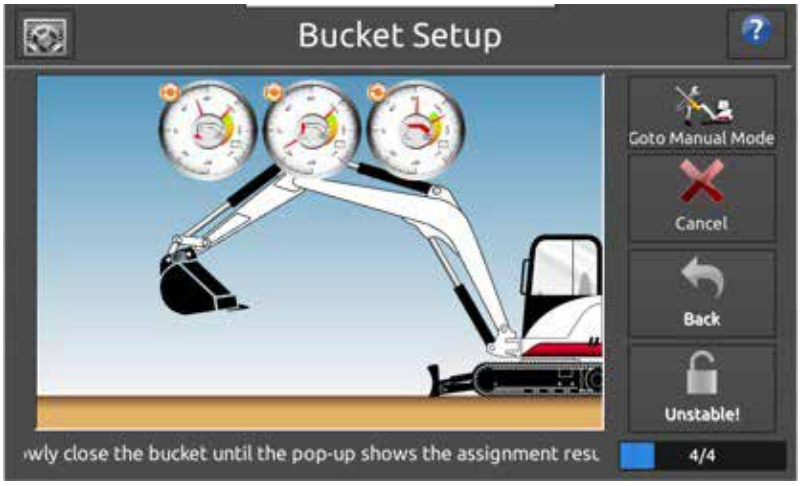
The system needs to detect which side of the machine the sensor is installed.

Raise the dipper far enough of the ground so the you can open the bucket.

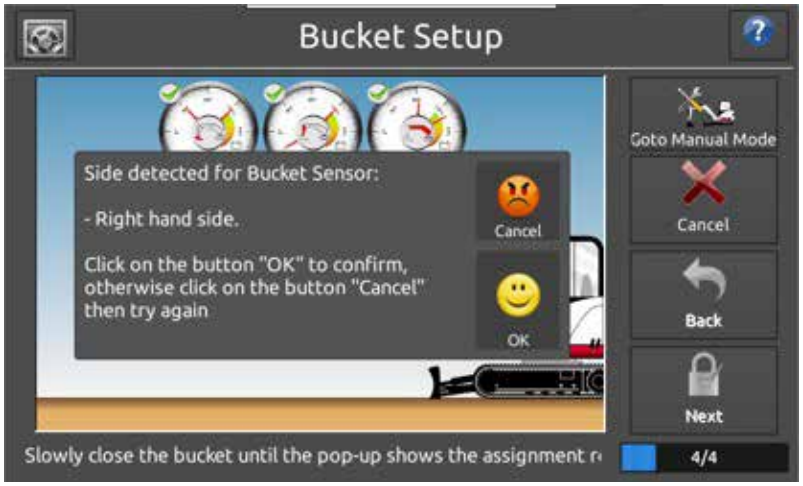
Open the bucket and press Next.



Slowly close the bucket until the pop-up appears onscreen



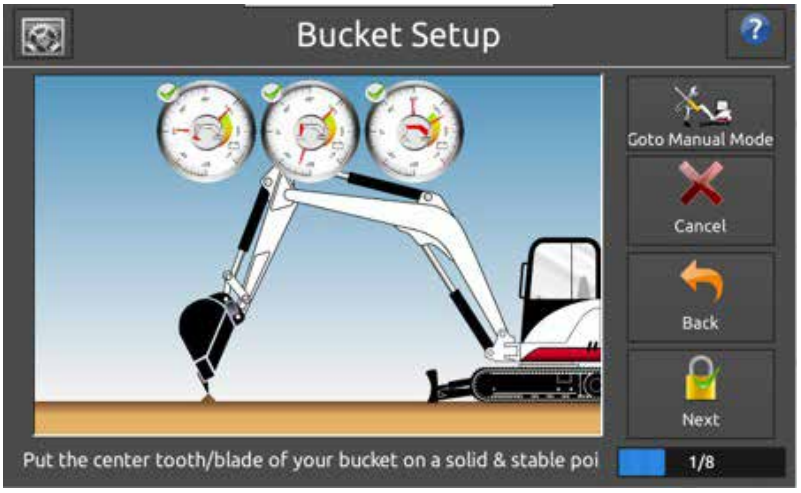
Press “Ok” to confirm and continue.



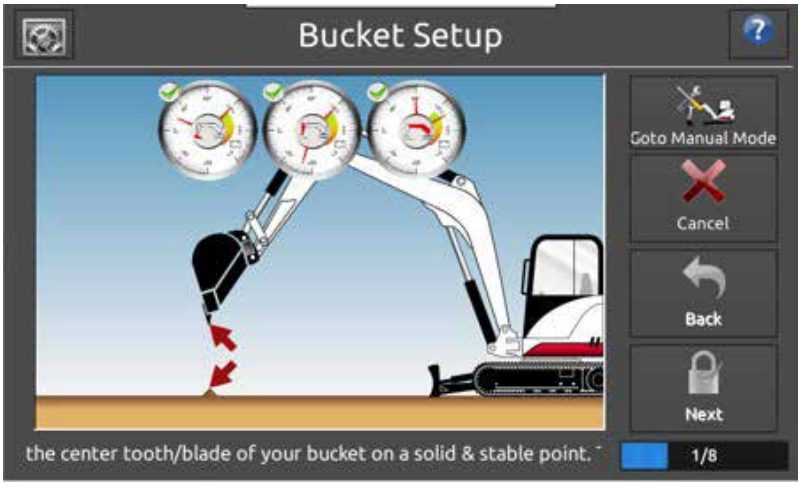
The automatic calibration of the bucket sensor requires the bucket to be placed on the EXACT same point and then incrementally change the angle and then place it back on the same point. There are eight steps to this process.

Step 1 - Fully open the bucket and place the edge onto a point.

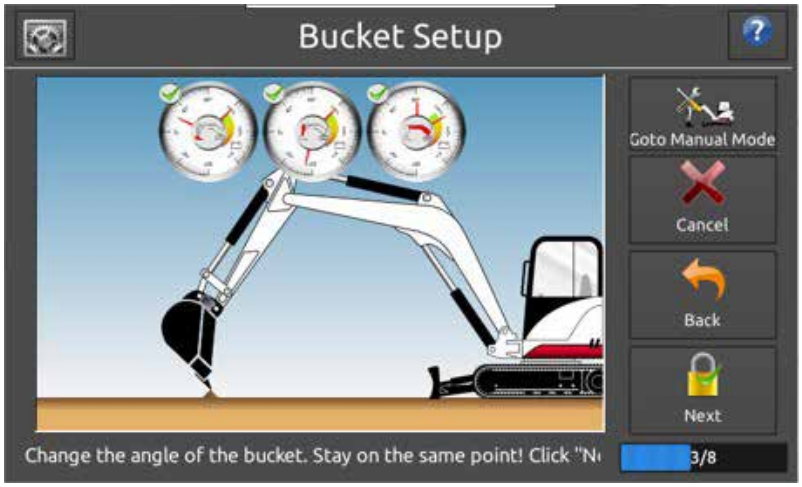
Press “Next” to continue.



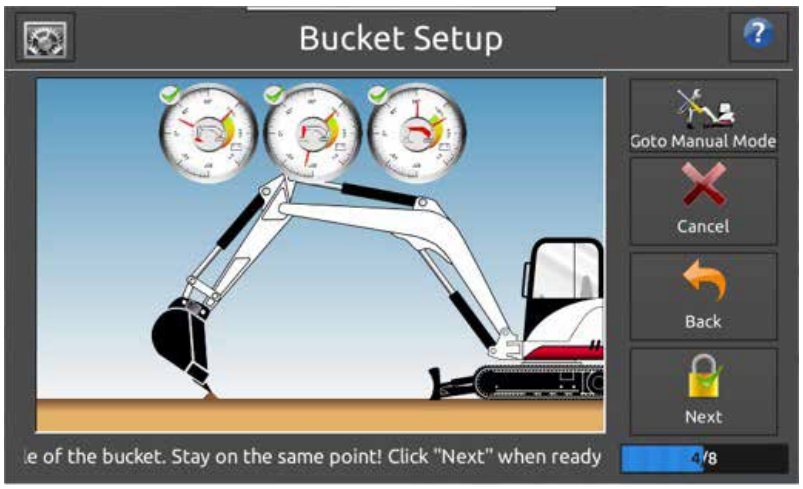
Step 2 - Fully close the bucket (or close as much as your point allows) and place the edge back onto the same point.



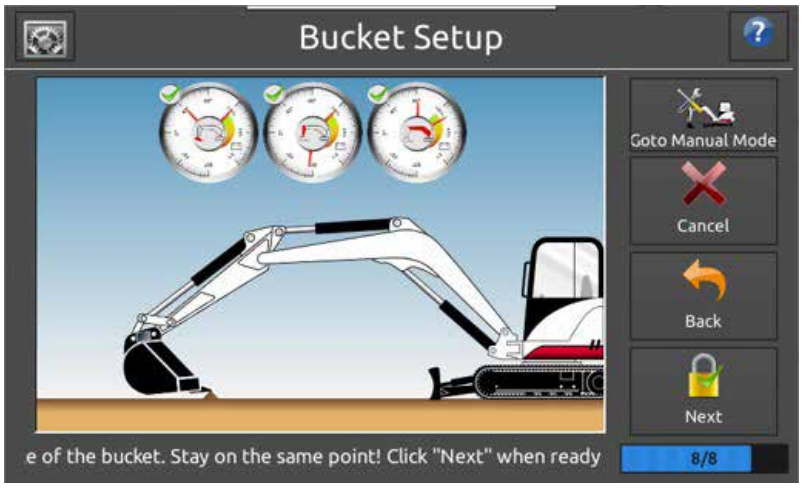


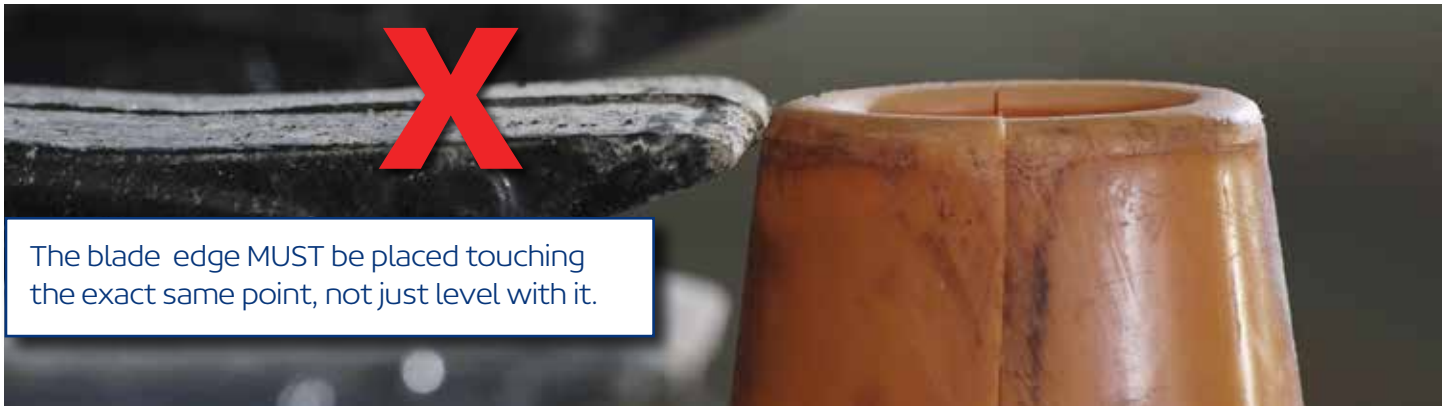


Press “Next” to continue

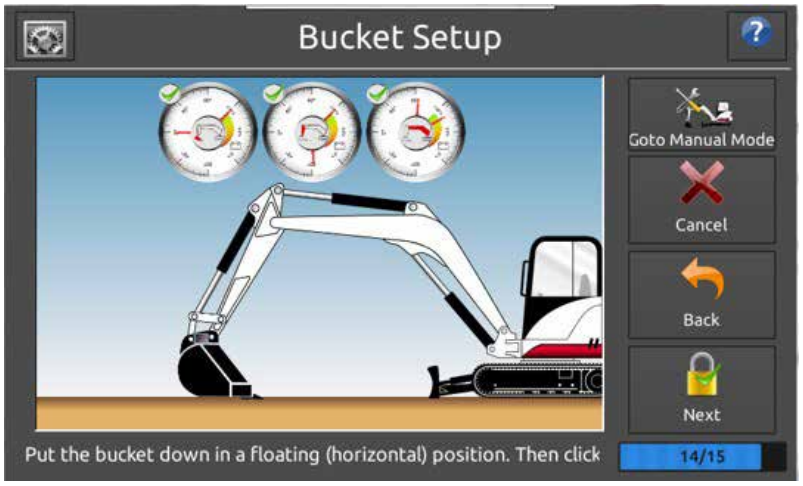


Steps 3 – 8 - Incrementally change the angle of the bucket and place it back onto the same point. Pressing Next until you have gone through each steps.





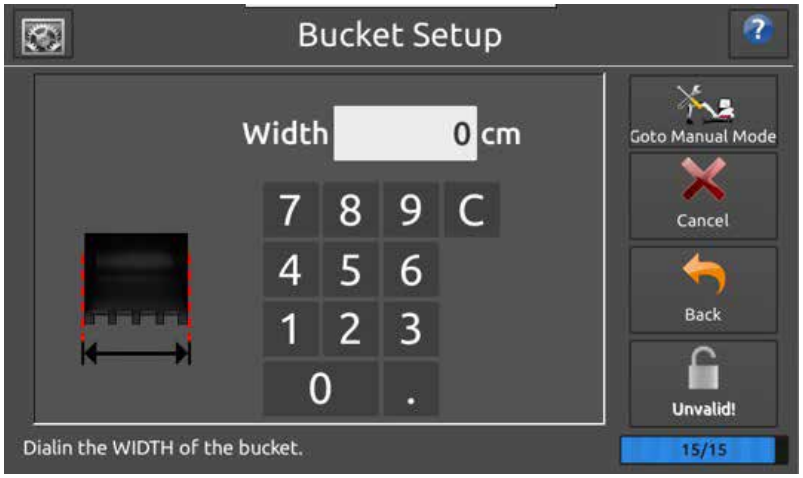




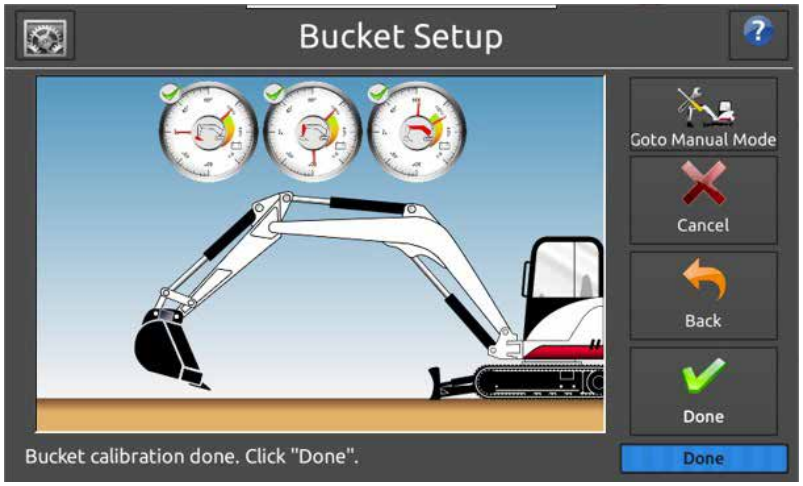
Put the bucket down into a flat/level floating position.

Press Next.

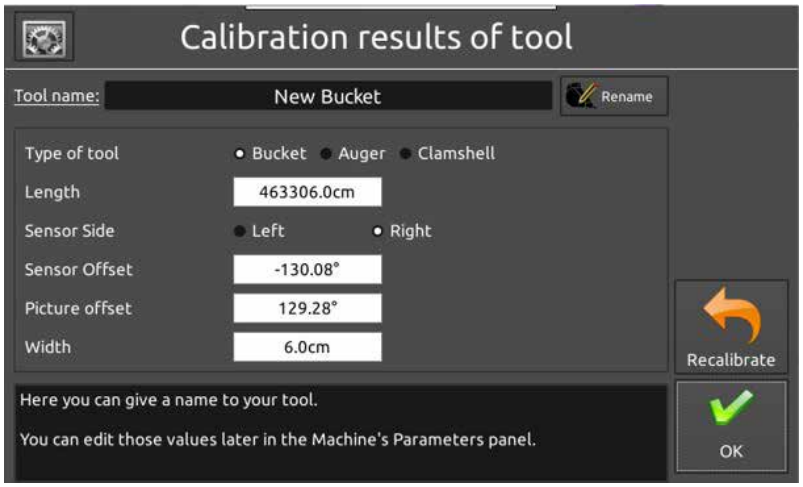
Enter the width.



Once the width has been entered, the bucket calibration has been completed



Rename your bucket and press ok to complete

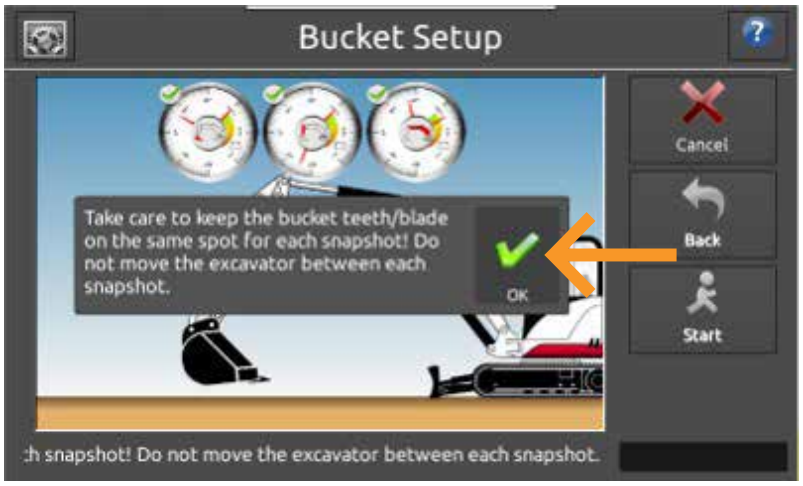


Automatic bucket calibration – Dogbone location

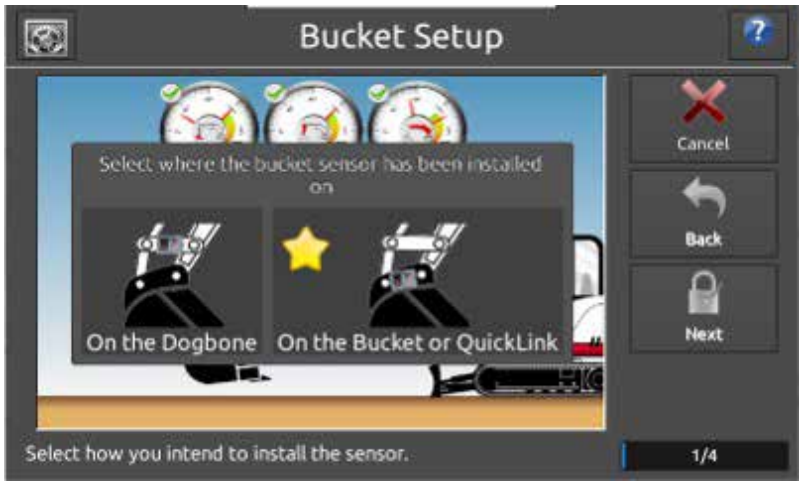
Automatic Calibration of the bucket sensor

You will require a stable point on which to place the bucket edge. This point needs to be high enough to enable fully opening and closing the bucket. This point needs to not move, deflect or change when the bucket is placed on it. An ideal item to use is a traffic cone.

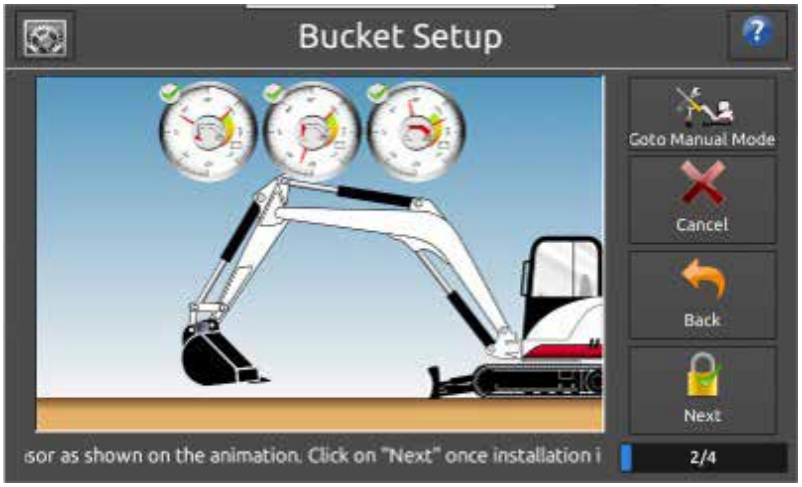
As the pop-up will remind you, take care when placing the bucket edge on the point to keep on the EXACT same point.



Once the location of the sensor has been confirmed you will be presented with a quick animation reminding you to click the sensor into the plate, do this now if you've not yet done so.



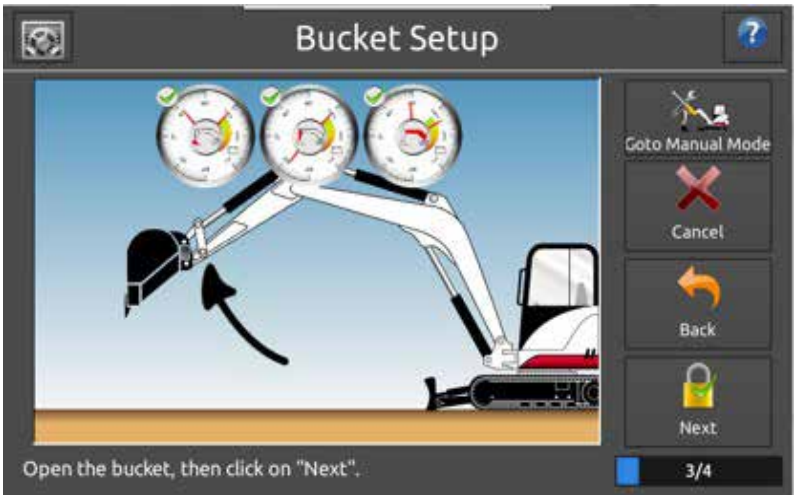
Once the sensor is in position,
Press “Next” to continue.



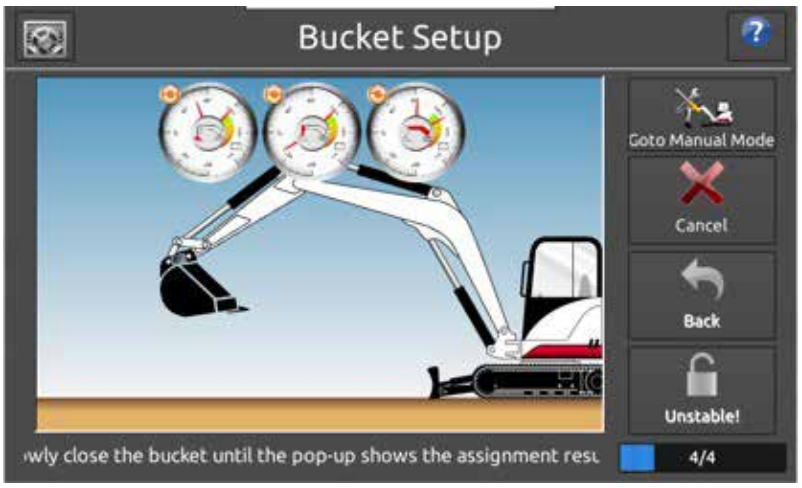
The system needs to detect which side of the machine the sensor is installed.

Raise the dipper far enough of the ground so the you can open the bucket.

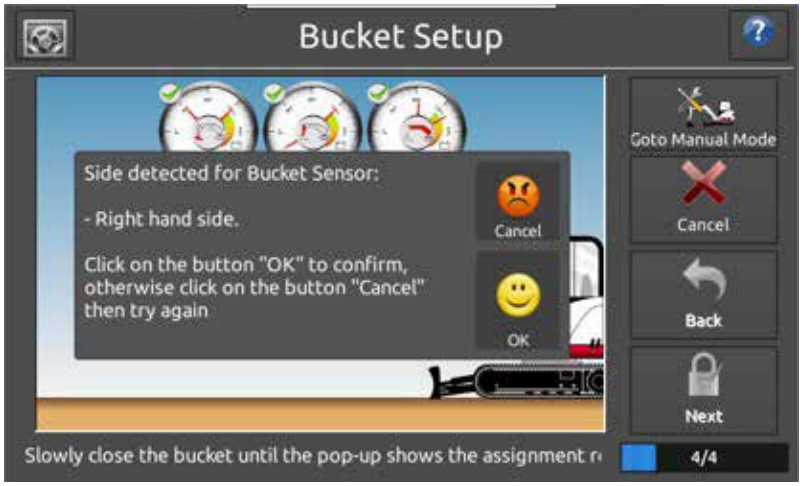
Open the bucket and press “Next”.



Slowly close the bucket until the pop-up appears on-screen.



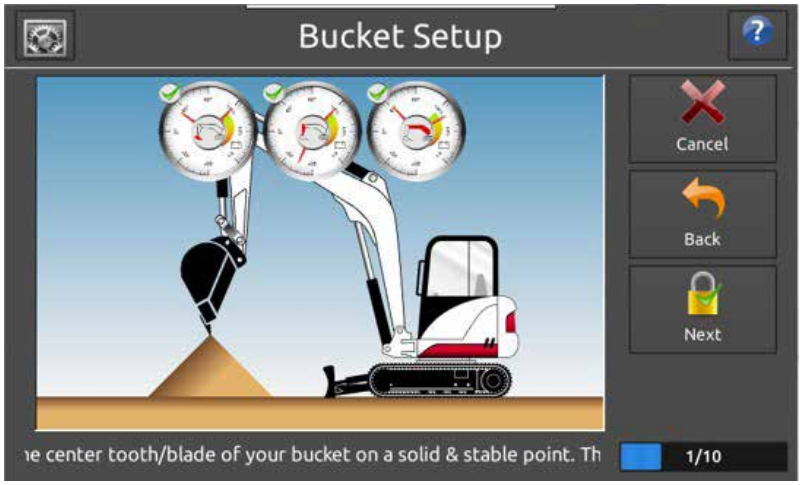
Press “Ok” to confirm and continue.



The automatic calibration of the bucket sensor requires the bucket to be placed on the EXACT same point and then incrementally change the angle and then place it back on the same point. There are eight steps to this process.

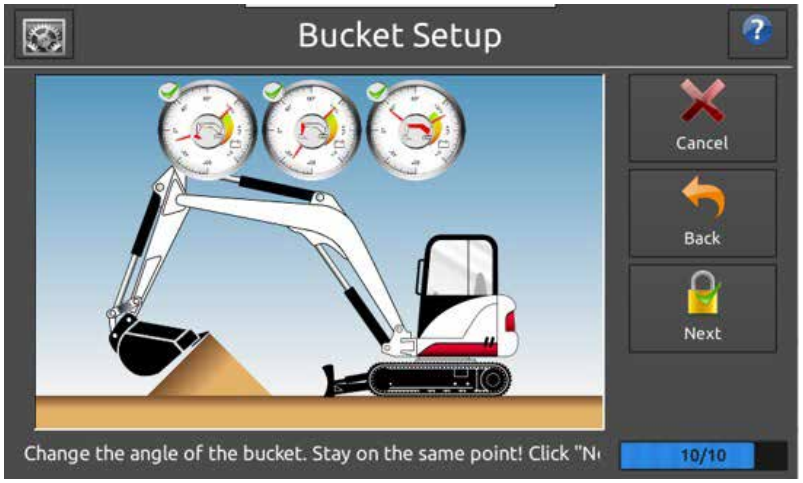
Step 1 – Fully open the bucket and place the edge onto a point.

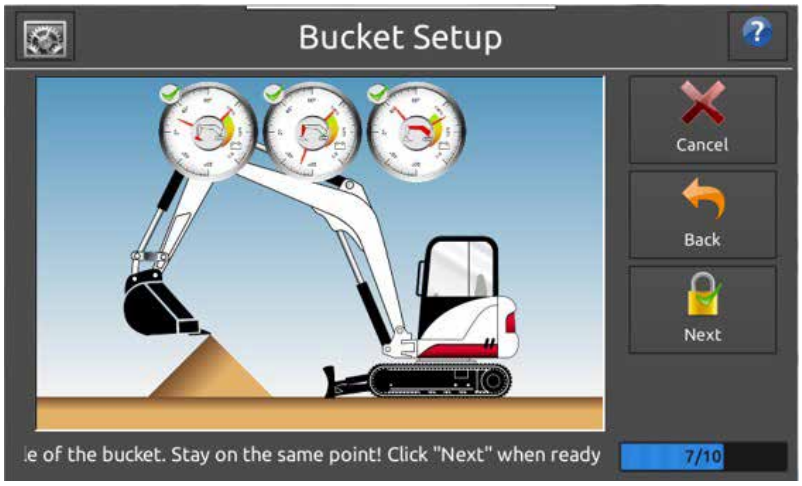
Press “Next” to continue.



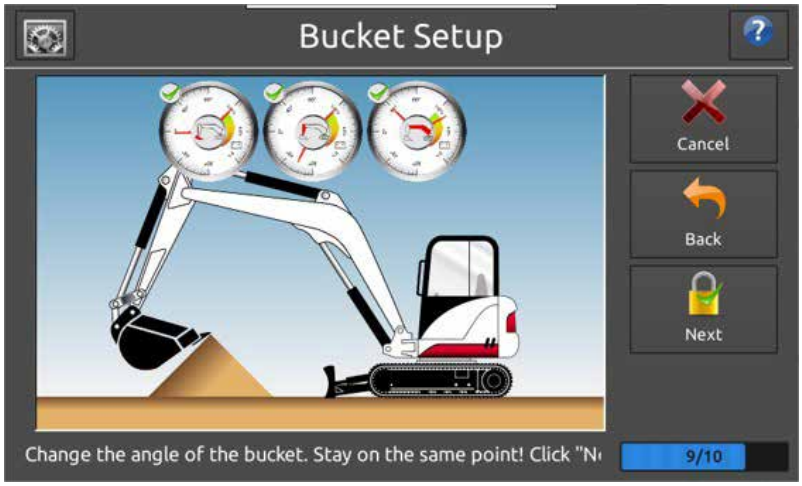
Step 2 – Fully close the bucket (or close as much as your point allows) and place the edge back onto the same point.

Press “Next” to continue



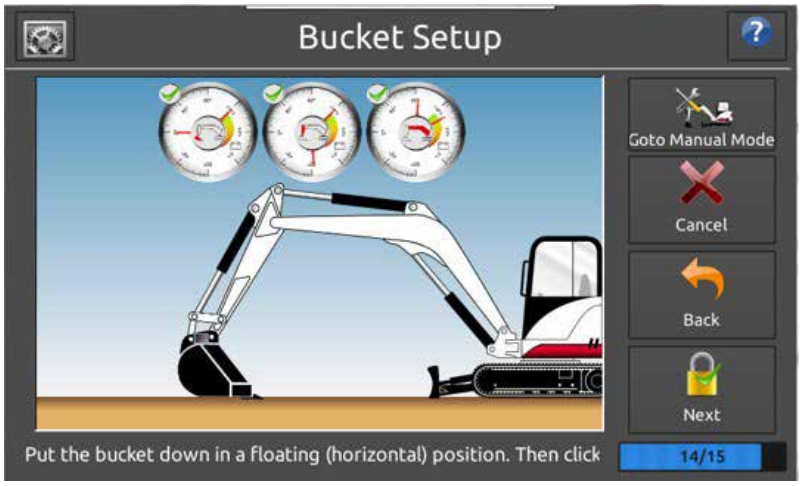


Steps 3 – 10 - Incrementally change the angle of the bucket and place it back onto the same point. Pressing Next until you have gone through each steps.

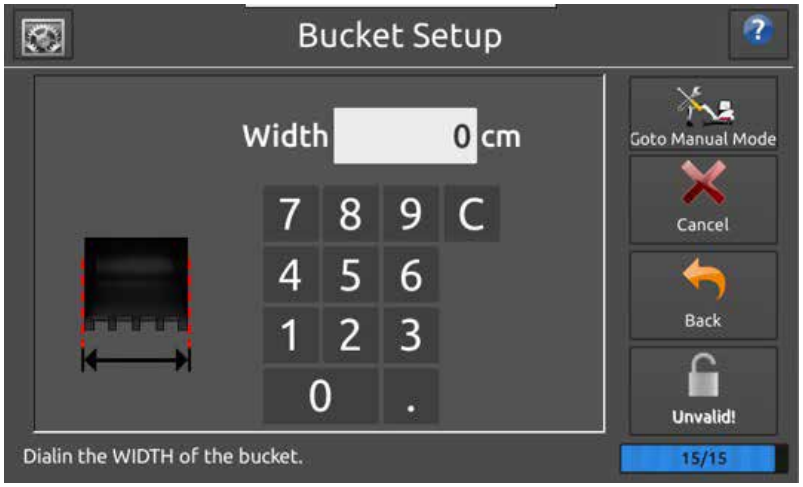


Put the bucket down into a flat/level floating position.

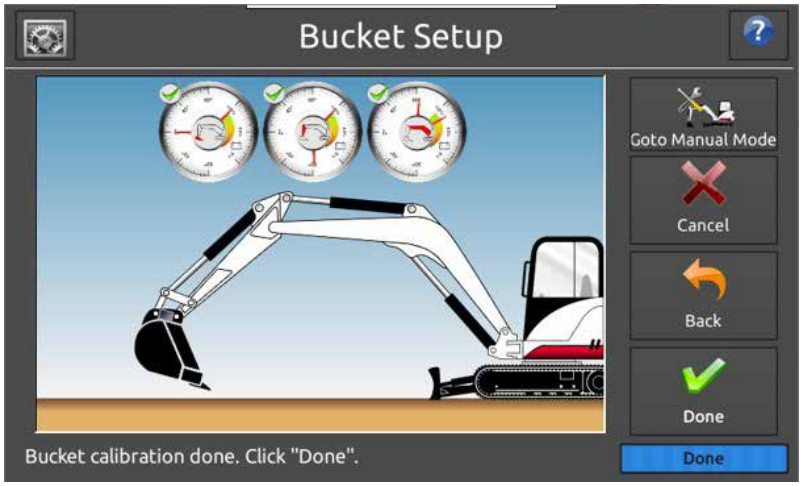
Press “Next”.



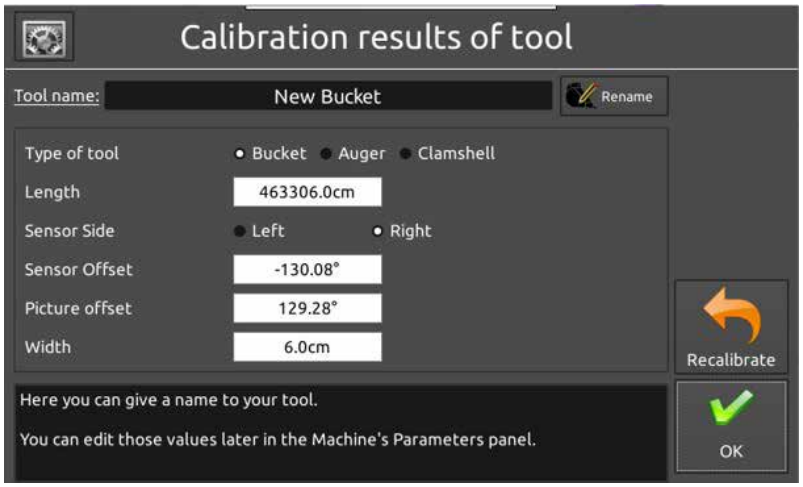
Enter the width.



Once the width has been entered, the bucket calibration has been completed



Rename your bucket and press ok to complete.



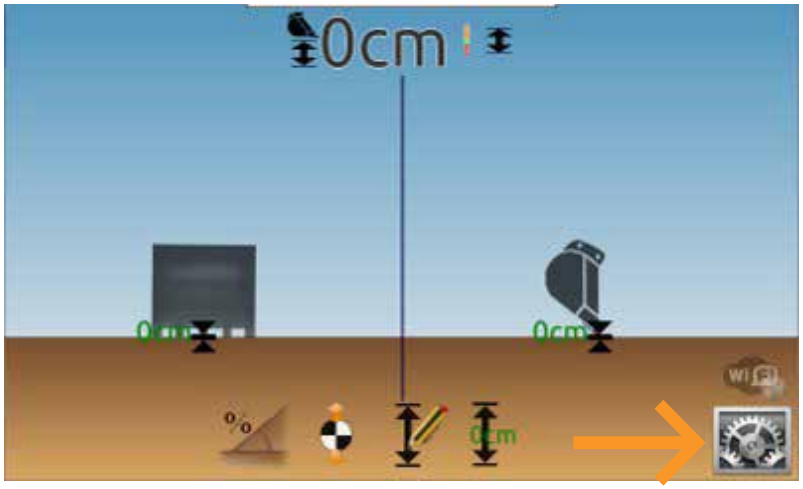
Step 5 - Laser functionality

To be able to use the iDig with a rotating laser, you must first calibrate the system.

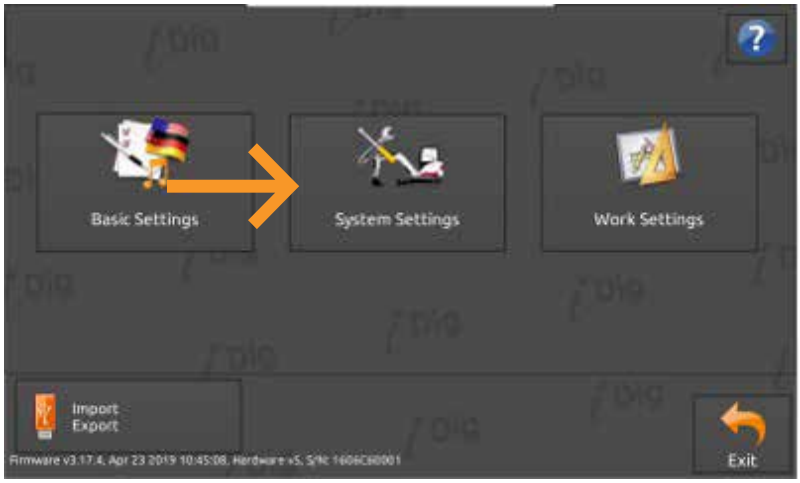
You will need a rotating laser, tripod and laser receiver and if available, an extra person to assist.

Remove the bucket from the machine and set up the tripod and laser to the side of the machine. Turn on the laser.

The iDig dipper sensor needs to pick up the laser beam while moving through an arc from in close to open, so make sure the laser is set high enough to enable the dipper to move in and out without having to lift the boom.

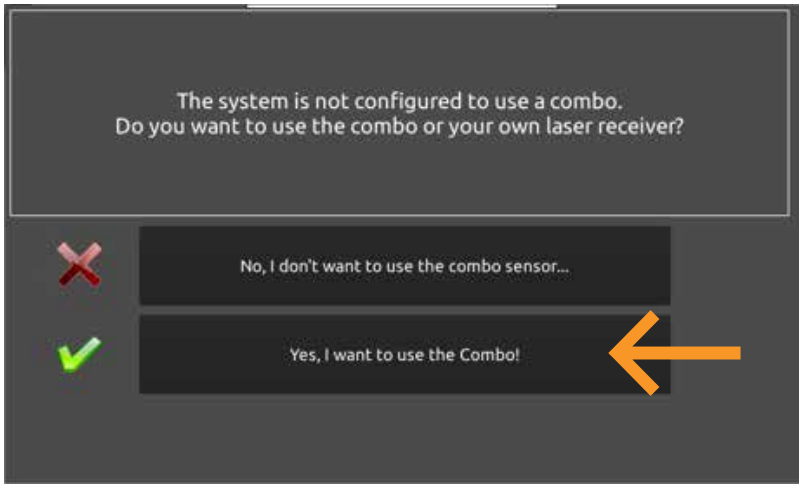


To start, go to the “System Settings” and press “Laser Functionality and the select “Calibrate”

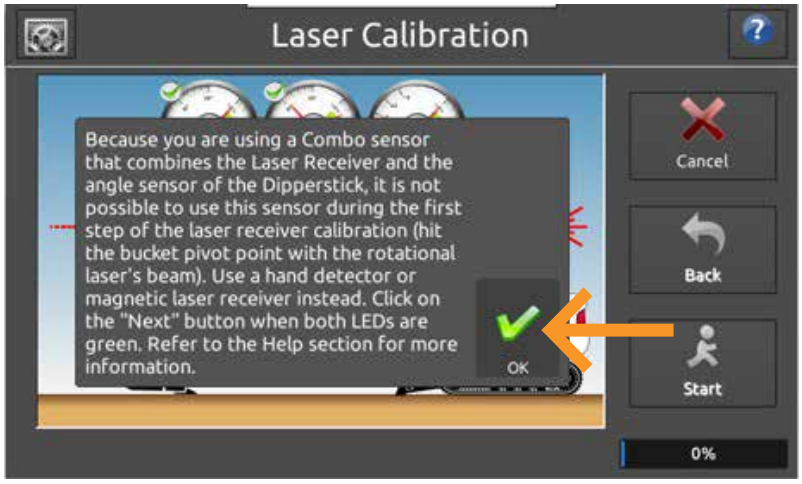




Select **“Yes, I want to use the Combo”**

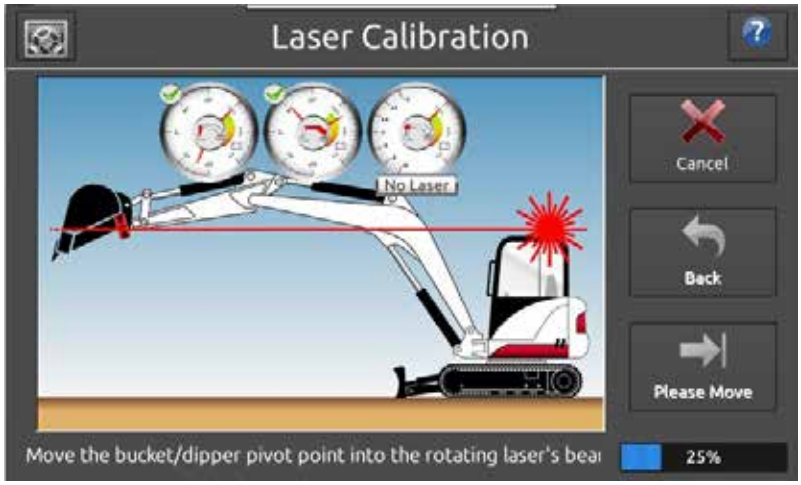


Read the brief reminder and press **“OK”**.



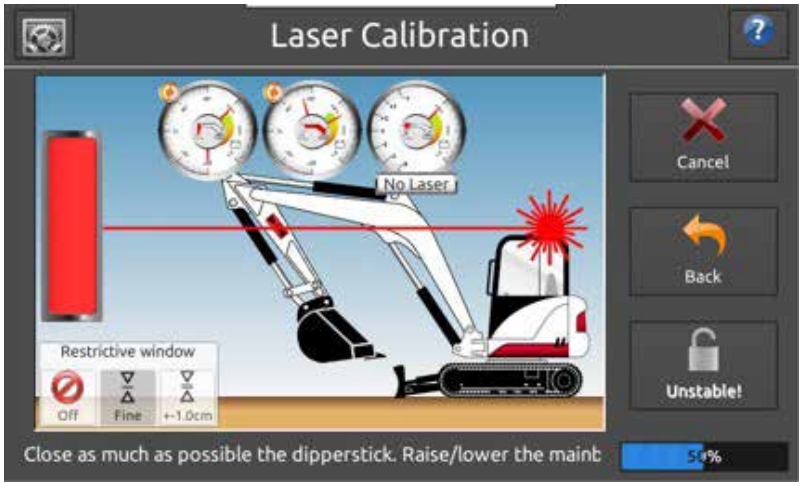
Place the laser receiver at the very centre of the bucket pivot pin, raise the boom and dipper until the laser beam is detected at the centre point. Now is a good time to get that extra pair of hands to help.

Press “Next” to continue.





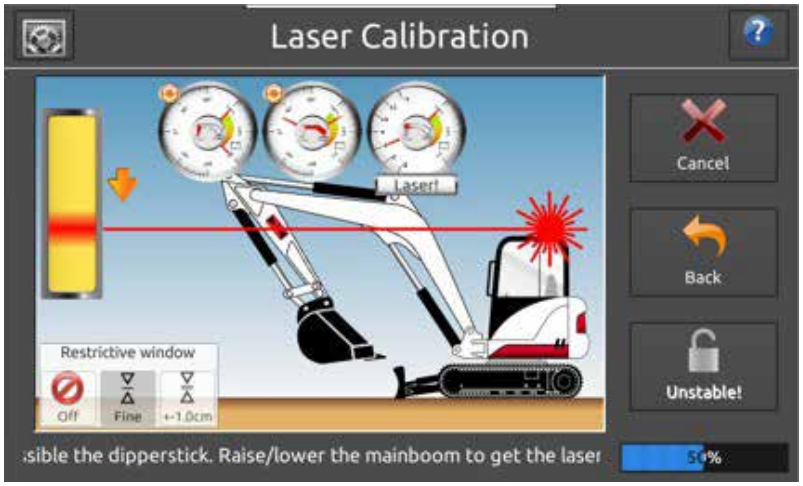


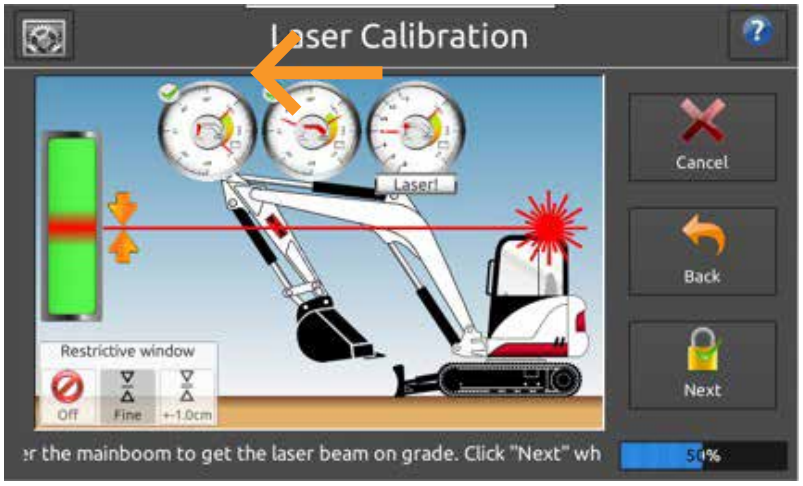


Completely close the dipper and slowly raise the boom until the dipper sensor picks up the laser beam.

The iDig will guide you onscreen.

For this calibration make sure “FINE” is selected for the laser options.

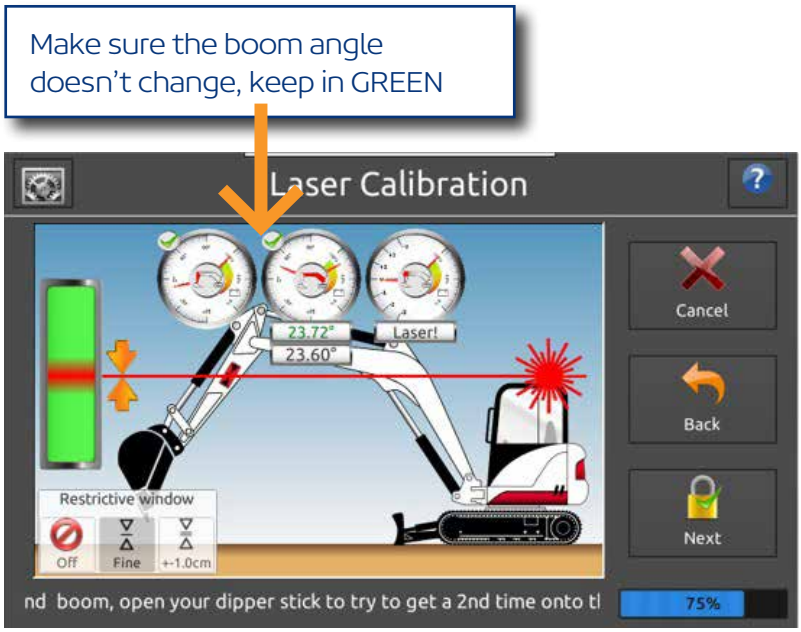




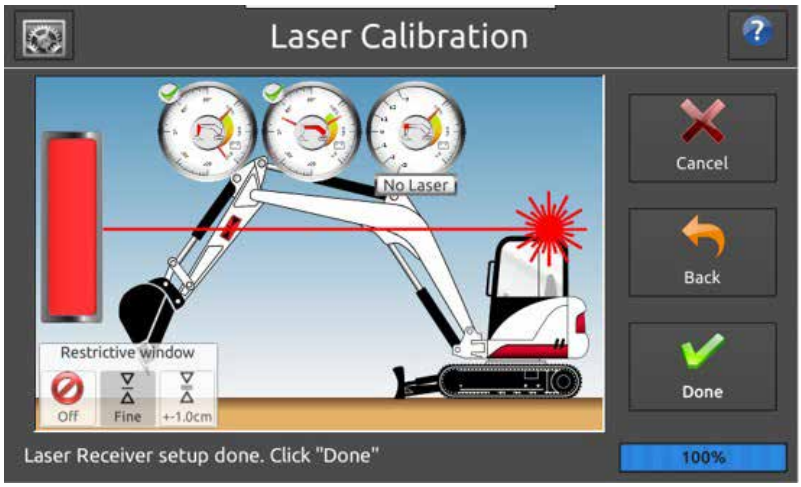
Slowly open the DIPPER ONLY, do not move the boom, and pick up the laser beam, again using the onscreen directions.

If the boom angle does change, you will need to move the boom back into the right angle parameter, the middle dial on screen will tell you how far to move.

Press “Next” to continue







With a tape measure, you now need to measure the amount of “Sideshift” to input into the iDig to complete the Laser Calibration. A detailed explanation is on screen.

Measure the width of the dipper arm, taking into account the removal of the overlap of the backplate.

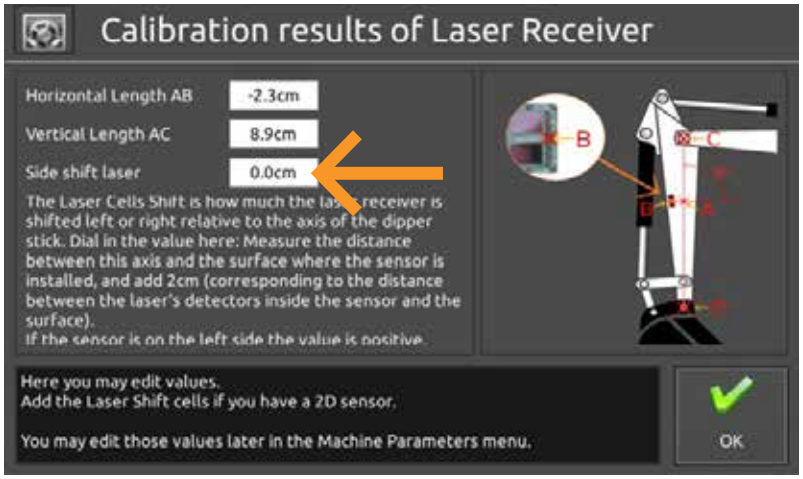
Halve this number and add 2cm for the thickness of the dipper sensor, plus the thickness of any extra mounting plates if used.

For Example:

Dipper is 14cm wide, Minus 2cm overlap = 12cm.
Half this = 6cm. Add 2cm for Sensor.

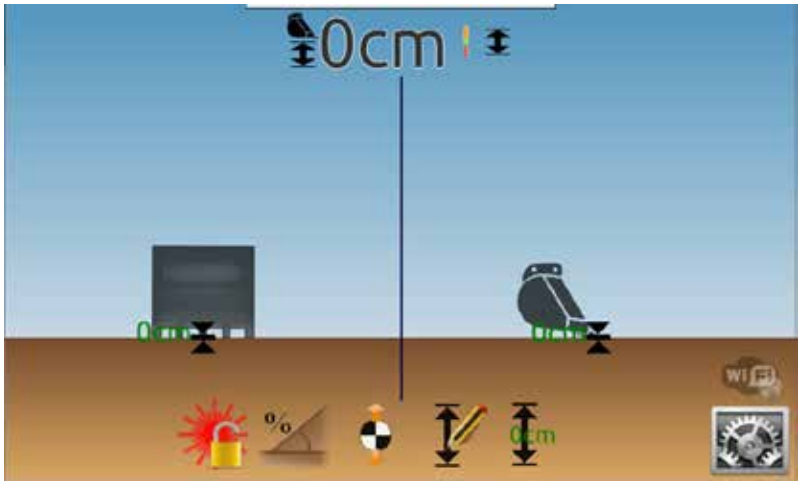
= Final Side shift of 8cm.





The laser catch function can be accessed by pressing the Laser Lock icon on the home screen.

See the onscreen help for more detail on using the laser catch functions.



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