



EasyNAV eMG100

Installation and Commission Guide



Version: eMG V1.0.2

CONTENTS

1. Preface	2
1.1. Copyright	2
1.2. Safety Warning	2
2. Product Overview	3
2.1. Introduction	3
2.2. Main Components	4
2.3. Connection Diagram	4
3. Installation	5
3.1. Preparation Before Installation	5
3.2. GNSS Antenna Installation	7
3.3. Sensor Installation	9
3.4. Tablet Installation	14
3.5. Cable Installation	15
4. Calibration	16
4.1. Connection Configuration	16
4.2. Antenna Position Check	17
4.3. Machine Dimensions	18
4.4. Machine Calibration	21
4.5. Bucket Configuration	23

1. Preface

1.1. Copyright

1.1.1. 2024 – 2025 CHCNAV

Shanghai Huace Navigation Technology Ltd. All rights reserved.

CHCNAV and CHC Navigation are trademarks of Shanghai Huace Navigation Technology Limited. All other trademarks are the property of their respective owners.

1.1.2. Trademarks

All product and brand names mentioned in this publication are trademarks of their respective holders.

1.2. Safety Warning

Please follow these safety guidelines to minimize the risk of personal injury and/or property damage and ensure safe, stable operation of the equipment.

Before Installation or Operation:

- Only trained and qualified personnel should operate or maintain this device
- Carefully read and follow all operation instructions
- Ensure proper training has been completed before using the system

During Maintenance and Inspection:

- Only qualified maintenance personnel should service the equipment
- Before any inspection or repair:
 - Ensure the machine is completely stationary
 - Engage safety lock
 - Power down system as needed

During Operation:

- Maintain a safe distance from people and objects during system debugging
- Follow all operational procedures strictly

Equipment Care:

- For extended periods of none-use:
 - Cut off the power supply to prevent battery drain
 - Follow proper storage procedures

Warranty Notice:

- Damage caused by improper handling or human error is not covered under warranty

2. Product Overview

2.1. Introduction

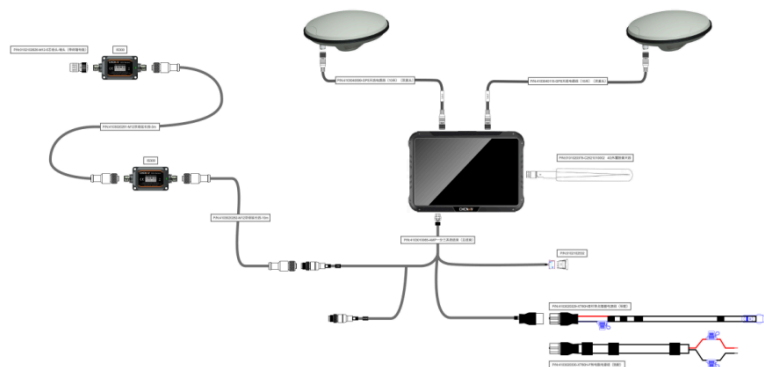
The EasyNav eMG100 3D System for Excavators is the world's simplest high-precision 3D excavator system, designed for seamless integration and ease of use. It features a 10.1-inch tablet with a built-in GNSS receiver, two IS300 IMU sensors, and two GNSS antennas. This system can be installed and calibrated quickly to provide centimeter-level precision guidance. With just one click, operators can set up the system for the operation. Important real-time data is shown clearly to help operators dig accurately in one go, ensuring high quality, efficiency, and less downtime on the job site.



2.2. Main Components

The EasyNav eMG100 3D system components are listed in Annex I.

2.3. Connection Diagram



3. Installation

3.1. Preparation Before Installation

3.1.1. Machine Inspection Before Installation

Before installation, verify the following:

- 1. Excavator Bucket Shaft
 - Check if the bucket can rotate slightly when the excavator turns left and right
 - If movement is excessive, add washers or replace the shaft/sleeve as needed
 - **Note: Loose bucket shaft can cause centimeter-level errors after calibration**
- 2. Hydraulic Cylinder Seal
 - Check seals by marking the hydraulic cylinder position
 - Observe for 10 minutes to detect any movement
 - Any sinking of the marker indicates seal issues
- 3. Machine Stability
 - Check for body rotation during arm extension
 - Excessive rotation will affect calibration accuracy
 - Do not install on machines with significant rotation
- 4. Bucket Tip Stability
 - Inspect welded or riveted steel plates on the bucket
 - Ensure all attachments are secure
 - Loose components will affect calibration accuracy

3.1.2. Required Tools

Tool	Image	Quantity	Purpose

Plumb bob		1	Vertical alignment
Tape measure		1	Dimension measurement
Level ruler		1	Horizontal alignment
Spanners (13-19mm)		1	Assembly
Set Square		1	Angle measurement
Pliers		1	General use / cutting
Welder		1	Weld

3.2. GNSS Antenna Installation

The EasyNav eMG100 3D system requires the installation of two GNSS antennas: main and auxiliary.

Note:

- The distance between the auxiliary antenna and the main antenna must be at least 1m
- Both antennas must be installed on the same side of the excavator boom

3.2.1. Main Antenna Installation

1. Base Bracket Welding

- Weld the base bracket on the excavator boom plane
- Position near the upper edge of the boom
- Complete welding on the inside of the base bracket



2. Antenna Bracket Installation

- Install the bracket to the base using hex screws



3. Antenna Installation

- Install the antenna to the bracket
- Ensure the antenna connector is protected
- Secure by rotating the bracket nut



3.2.2. Auxiliary Antenna Installation

Install the auxiliary antenna on the excavator boom following the same procedure as the main antenna.



3.3. Sensor Installation

The EasyNav eMG100 3D system typically requires two sensors: a stick sensor and a bucket sensor. For excavators with a tilt bucket, a third sensor (tilt sensor) is required.

3.3.1. Stick Sensor Installation

1. Sensor Bracket Welding
 - Weld the bracket on the excavator stick
 - Ensure the long side of the bracket is parallel to the axis pin line
 - Maximum allowable angle deviation: 20°



2. Sensor Installation

- Mount sensor on the bracket
- Align the arrow logo on the sensor toward the mark “1”



3.3.2. Bucket Sensor Installation

The bucket sensor can be installed in two ways:

1. Outside of the dog-bone
2. Inside quick coupler

1) Outside Dog-Bone Installation

1. Sensor Bracket Welding

- Weld bracket on the dog-bone
- Maintain horizontal alignment between the bracket's long side and a dog-bone
- Maximum angle deviation: 20°
- Weld bracket on the interior side



2. Sensor Installation

- Point the sensor arrow toward mark “1”
- Install sensor terminator near arrow end interface



3. Protective Shell Installation

- Mount protective shell on bucket sensor bracket



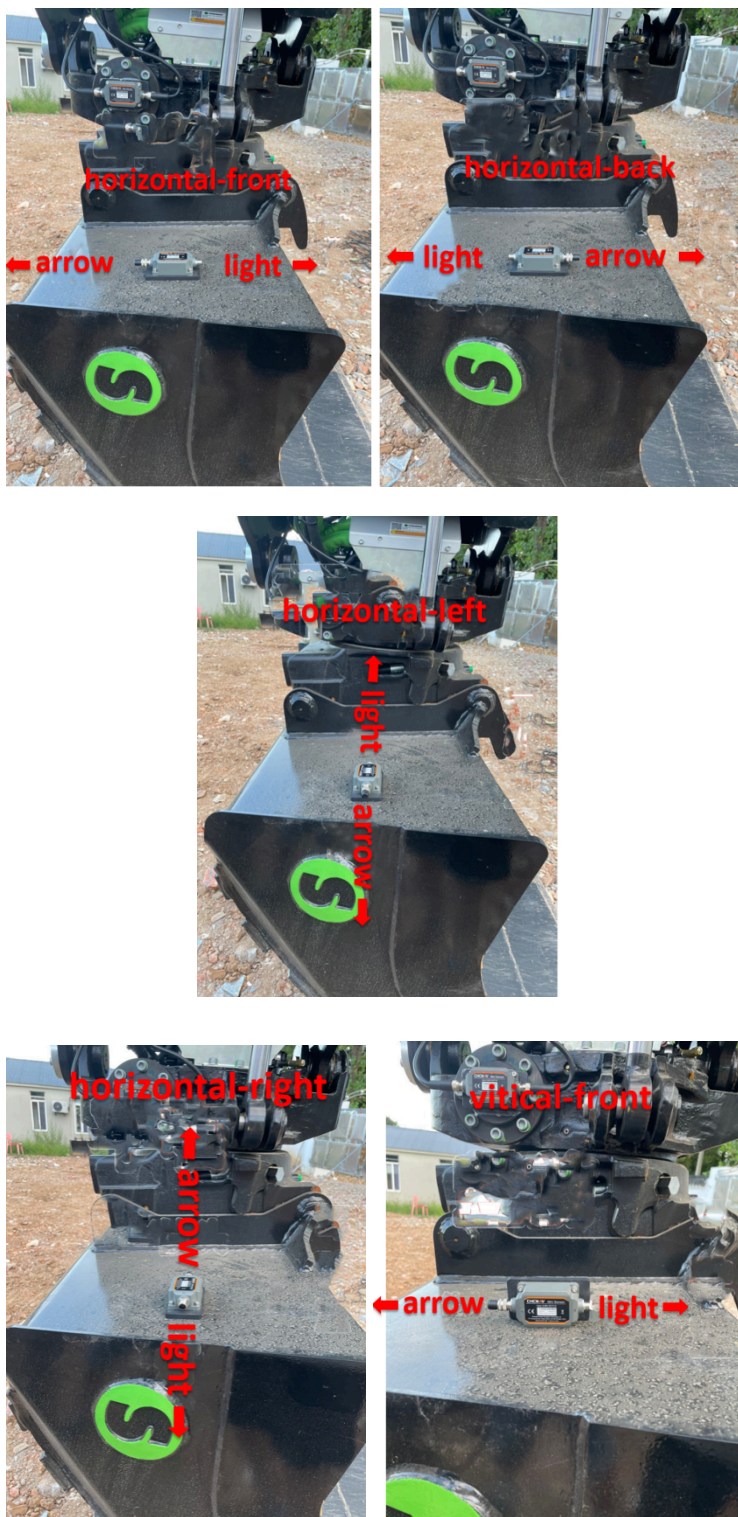
2) Inside Quick Coupler Installation

- Install bucket sensor inside the quick coupler
- Ensure the long side of the bracket is parallel to the dog-bone (maximum 20° deviation)
- Point sensor arrow toward excavator forward direction
- Install sensor terminator or protective case at the end marked with an arrow



3.3.3. Tilt Sensor Installation (Optional)

Currently, the tilt bucket sensor supports the following installation methods:





Install the sensor bracket with its long side parallel to the corresponding surface (maximum 10° deviation allowed) as shown in the images above.

Note:

- A sensor protective case is included by default. Use the bracket corresponding to this protective case when installing the tilt bucket sensor
- After installing the tilt bucket sensor, install the terminator at the end marked with an arrow

3.4. Tablet Installation

1. Select an appropriate position on the glass
2. Glue the flat plate to the glass
3. Attach the tablet base bracket
4. Adjust to the appropriate angle

Note: Ensure the installation position does not interfere with opening or closing the front windshield.

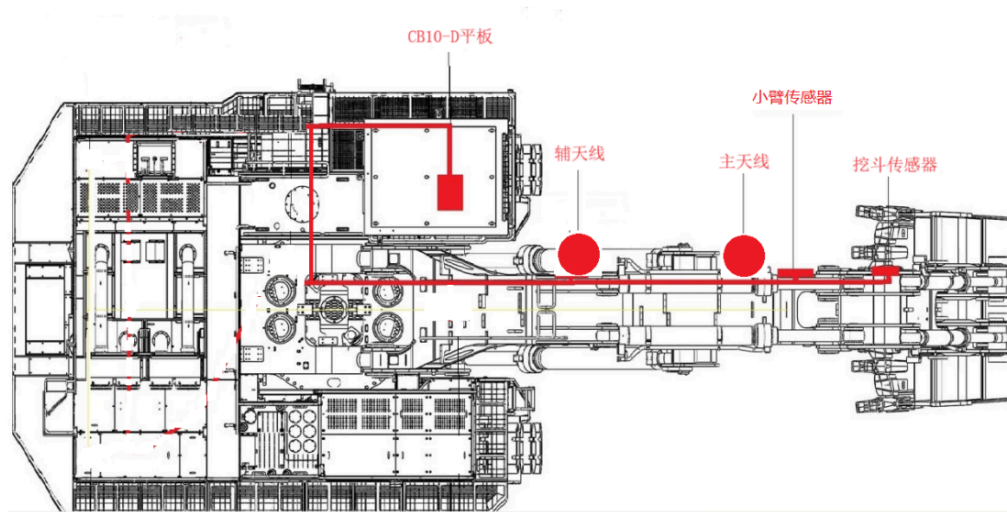


3.5. Cable Installation

Follow these guidelines when installing cables:

1. Route cables along the machinery's hydraulic lines
2. Keep cables away from heat sources (engine, exhaust pipe)
3. Prevent cable damage during mechanical movement
4. Protect cable contact points with the vehicle body using insulation tape or a cable shield

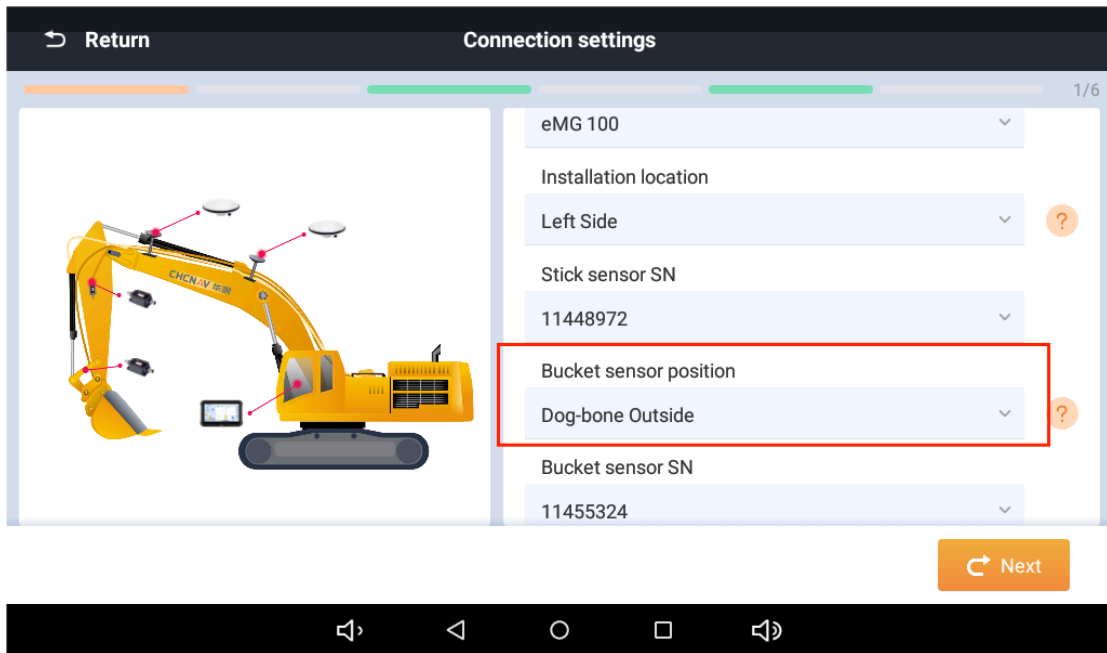
系统主线束走线示意图



4. Calibration

4.1. Connection Configuration

1. Navigate to [Settings] > [Mechanical] > [Connection Settings]
2. Enter the following information:
 - Product configuration
 - Installation position
 - Stick sensor SN
 - Bucket sensor position
 - Bucket sensor SN



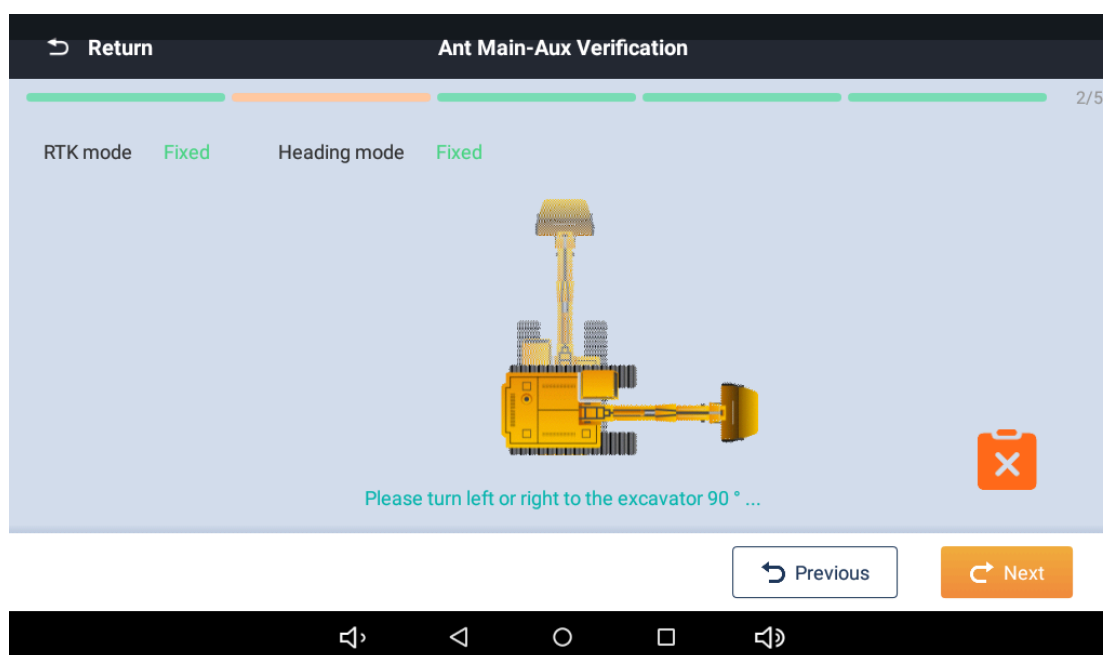
The screenshot displays the 'Connection settings' screen in the CHCNAV application. On the left, there is a 3D model of a yellow excavator with red lines indicating sensor locations. On the right, a list of settings is shown: 'eMG 100' (dropdown), 'Installation location' (dropdown), 'Left Side' (dropdown), 'Stick sensor SN' (11448972), 'Bucket sensor position' (Dog-bone Outside, highlighted with a red box), and 'Bucket sensor SN' (11455324). There are question mark icons next to the 'Installation location' and 'Bucket sensor position' dropdowns. A 'Next' button is located at the bottom right of the settings list.

Note: Select the bucket sensor installation position according to the actual installation

4.2. Antenna Position Check

1. Click [Next] to enter the Ant Main-Aux Verification interface

2. Turn the excavator 90 degrees left or right
3. If check fails:
 - Exchange ANT 1 and ANT 2 interfaces at the back of the tablet
 - Perform check again
4. If check passes:
 - Click [Next] to proceed to the mechanical dimension interface



4.3. Machine Dimensions

Use the squares and tape measure to measure the following lengths accurately to the millimeter (mm):

- OM
- OP

- N1
- N2
- PD

Return
Machine Dimension



3/5

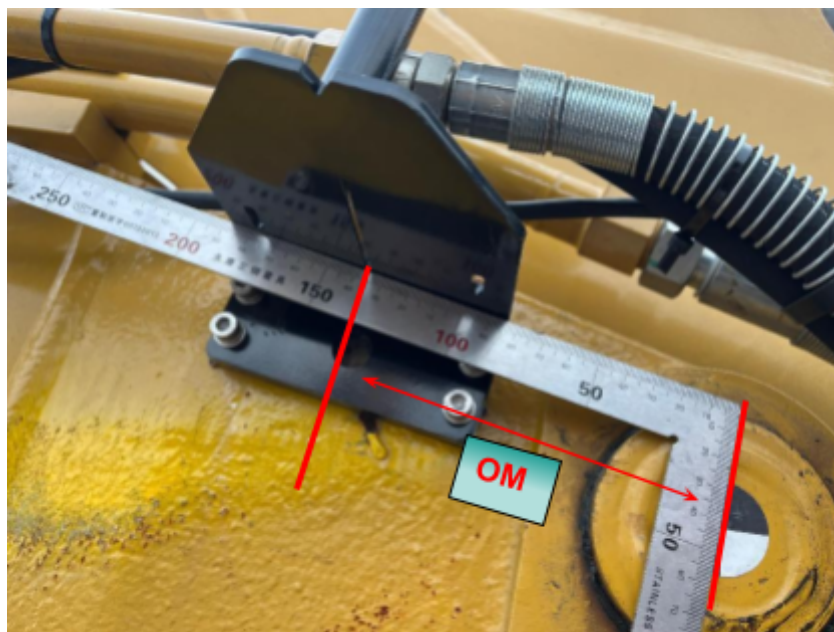
Length O-M	
0.035	m ?
Length O-P	
0.017	m ?
N1	
0.049	m ?
N2	
0.049	m ?
Length P-D	

Previous
Next

⏮ ⏪ ⏩ ⏭ 🔊

4.3.1. Length OM

Measure the level distance from the main antenna bracket base to the connecting axis pin of the boom and stick using squares.



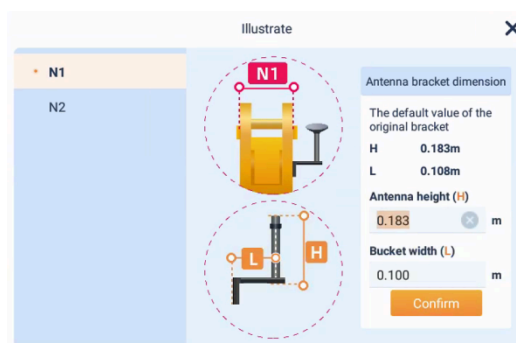
4.3.2. Length OP

Measure the vertical distance from the bottom of the main antenna bracket to the connecting axis pin of the boom and stick using squares.



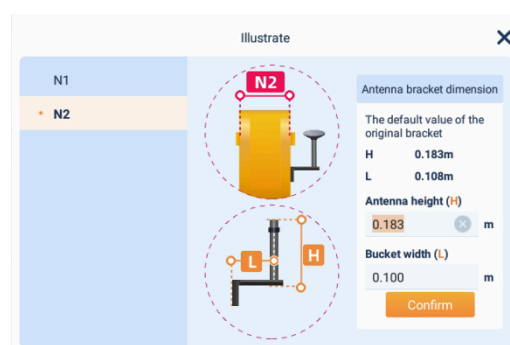
4.3.3. Length N1

Measure the length N1 using a tape measure as show in the diagram.



4.3.4. Length N2

Measure length N2 using a tape measure as shown in the diagram.



4.3.5. Length PD

Measure the distance from the connecting axis pin of the boom and stick to the connection axis pin of the stick and bucket.



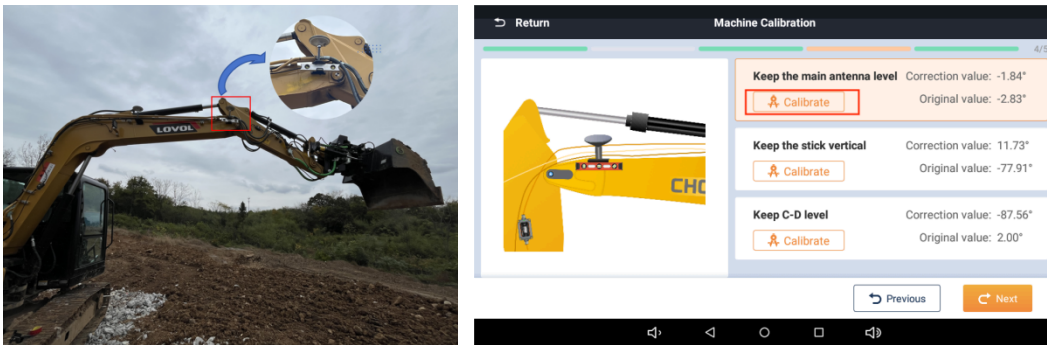
Click [Next] to enter the mechanical calibration interface.

4.4. Machine Calibration

Machine calibration includes the main antenna, stick sensor, and bucket sensor.

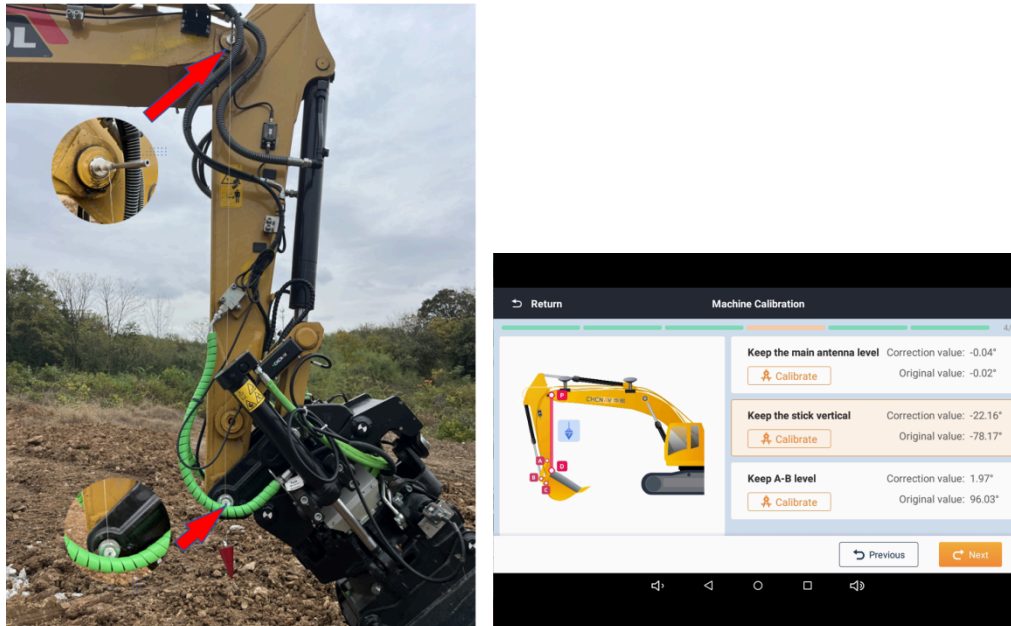
4.4.1. Main Antenna Calibration

1. Use the level ruler to adjust the main antenna to be horizontal
2. Click [Calibration]



4.4.2. Stick Sensor Calibration

1. Use the plumb to adjust the stick to be vertical
2. Ensure both axes are on the same vertical line
3. Click [Calibration]



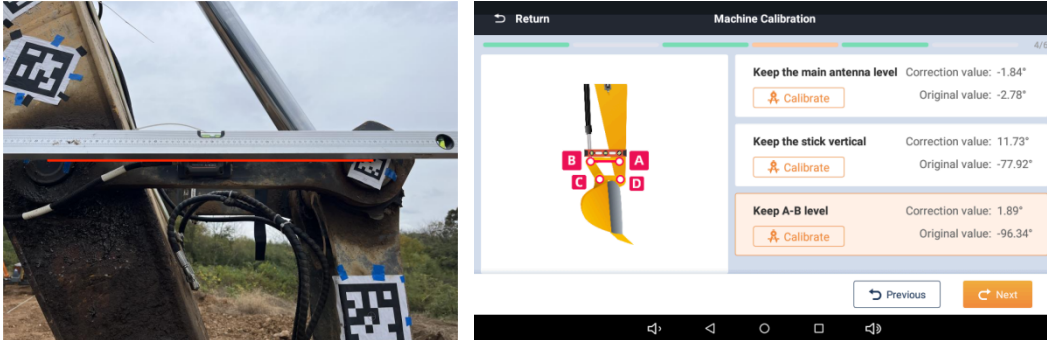
4.4.3. Bucket Sensor Calibration

The bucket sensor can be installed in two ways:

1. Outside the dog-bone
2. Inside the coupler

1) Installation on Dog-Bone

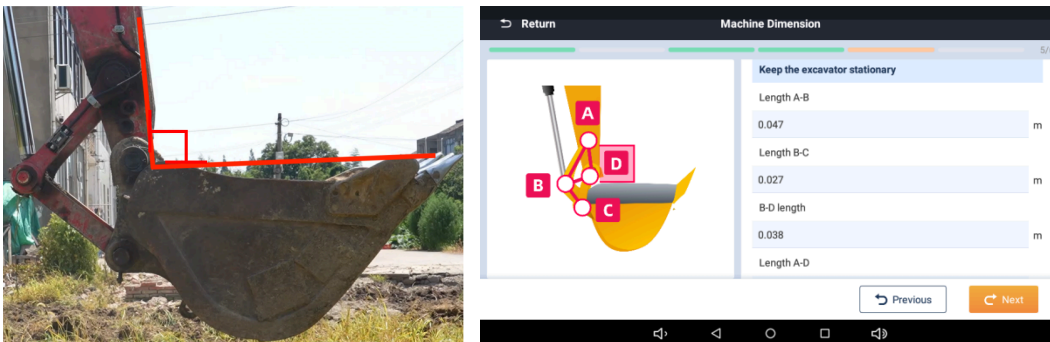
1. Use the level ruler to adjust the dog-bone (AB) to be horizontal
2. Ensure both axes are on the same horizontal line
3. Click [Calibration] to complete machine calibration



Click [Next] to enter the machine dimension interface

Note:

1. Curl up the bucket so the stick is roughly perpendicular to the bucket



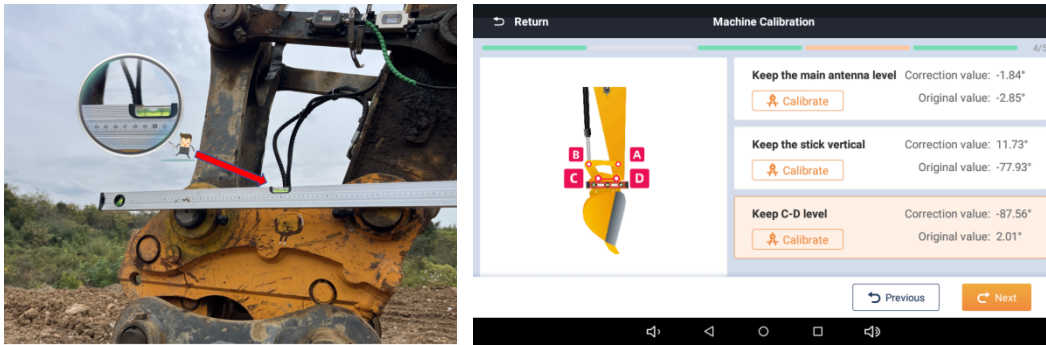
Measure and input the following lengths (in mm):

- AB
- BC
- BD
- AD

Click [Next] to enter bucket configuration.

2) Installation on Quick Coupler

1. Use the level ruler to adjust the quick coupler (CD) to be horizontal
2. Ensure both axes are on the same horizontal line
3. Click [Calibration]

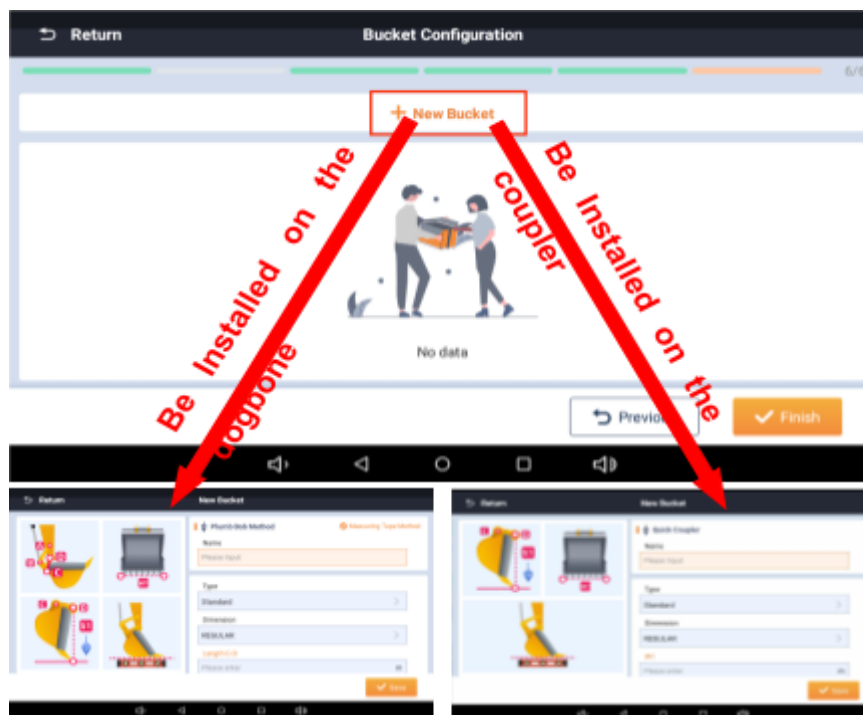


Click [Next] to enter bucket configuration.

4.5. Bucket Configuration

This chapter explains the regular bucket configuration. For tilt bucket configuration, please refer to tilt bucket calibration instructions.

Click [New Bucket] to enter the new bucket interface. Configure parameters according to the bucket sensor installation position



4.5.1. Installation on Dog-Bone

The sensor installation outside the dog-bone supports two calibration methods: a plumb method and a tape measure method.

Method 1: Plumb Bob Method

1. Enter bucket details:

- Input bucket name
- Select “Standard” type
- Choose “Regular” dimension (custom bucket options available)

New Bucket

Plumb Bob Method **Measuring Tape Method**

Name
Please Input

Type
Standard

Dimension
REGULAR

Length C-D
Please enter m

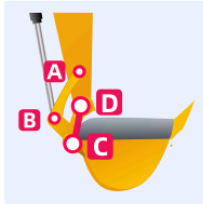
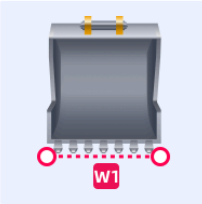
Save

2. Measure and input the following lengths:

- C-D
- W1
- S1

Return

New Bucket



REGULAR

Length C-D

Please enter

m

W1

Please enter

m

S1

Please enter

m

Correction value

Calculate Only

Calibrate

?

Save

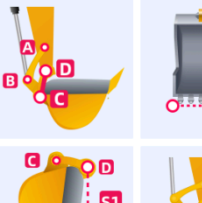
3. Vertical calibration:

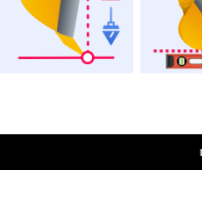
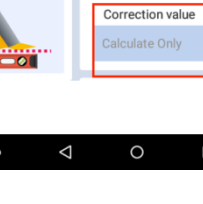
- Use plumb bob to adjust bucket tip (S1) to be vertical
- Click [Calibration]



Return

New Bucket



REGULAR

Length C-D

Please enter

m

W1

Please enter

m

S1

Please enter

m

Correction value

Calculate Only

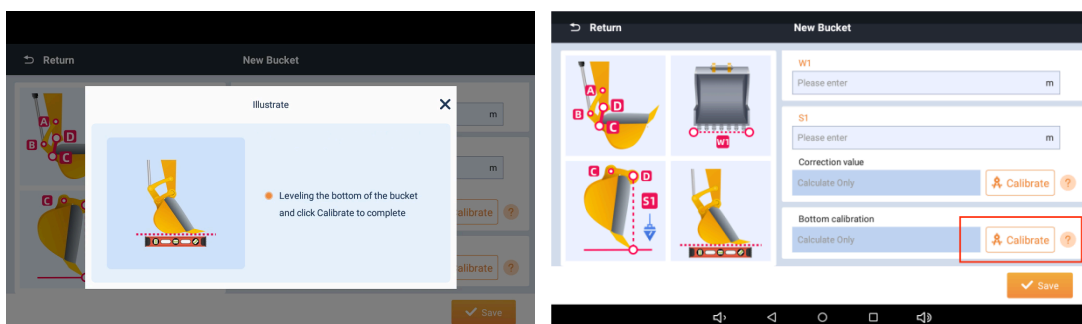
Calibrate

?

Save

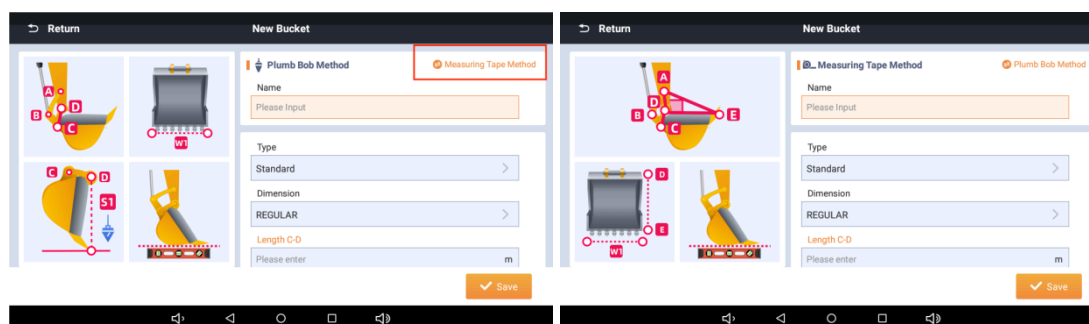
4. Bottom calibration:

- Use level ruler to adjust bucket bottom to be horizontal
- Click [Calibration]
- Click [Save] to complete calibration and apply bucket



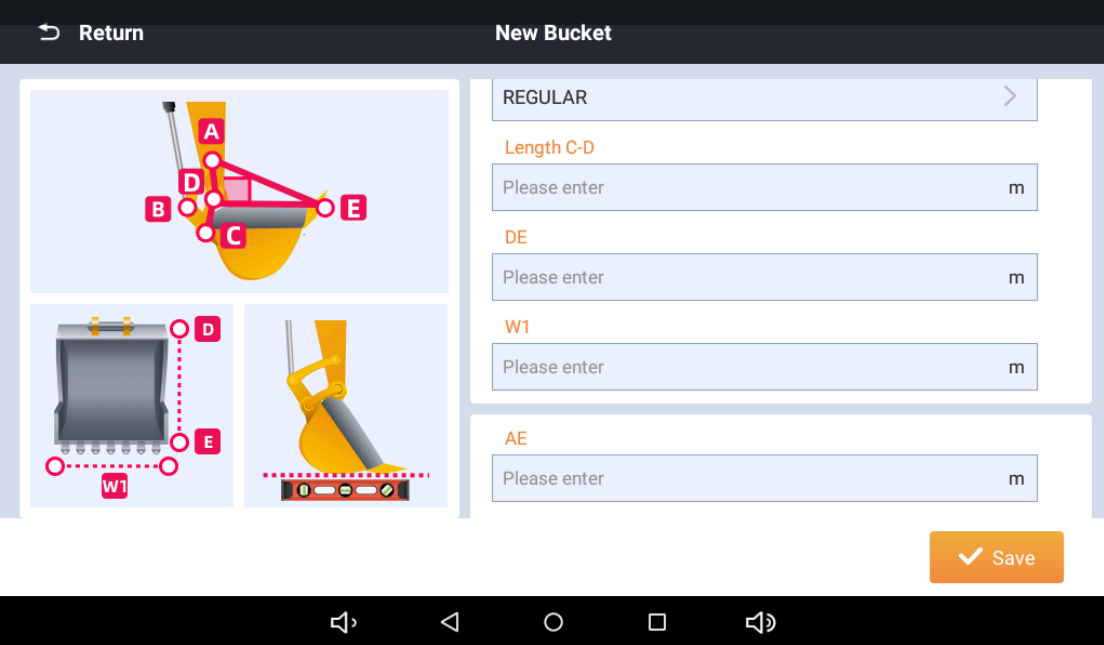
Method 2: Tape Measure Method

1. Click [Tape Measure Method] in the upper right corner to change the calibration method.
2. Enter bucket details:
 - Input bucket name
 - Select “Standard” type
 - Choose “Regular” dimension



3. Measure and input the following lengths:

- CD
- DE
- W1
- AE



Return New Bucket

REGULAR

Length C-D

Please enter m

DE

Please enter m

W1

Please enter m

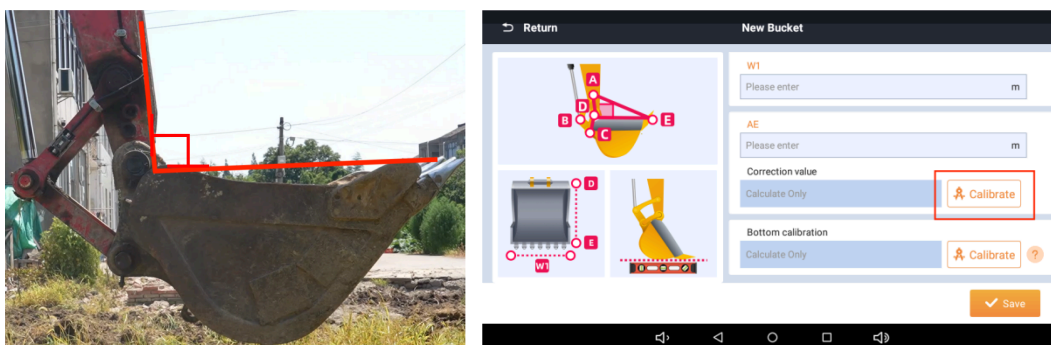
AE

Please enter m

Save

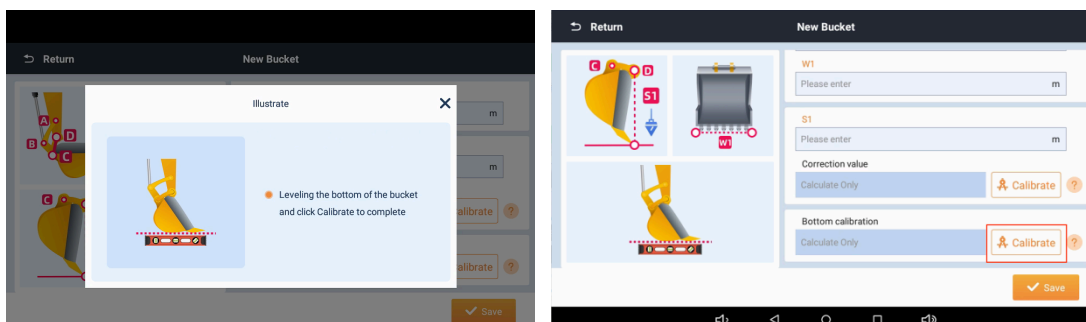
4. Position calibration:

- Curl up bucket until stick is roughly perpendicular to bucket
- Click [Calibration]



5. Bottom calibration:

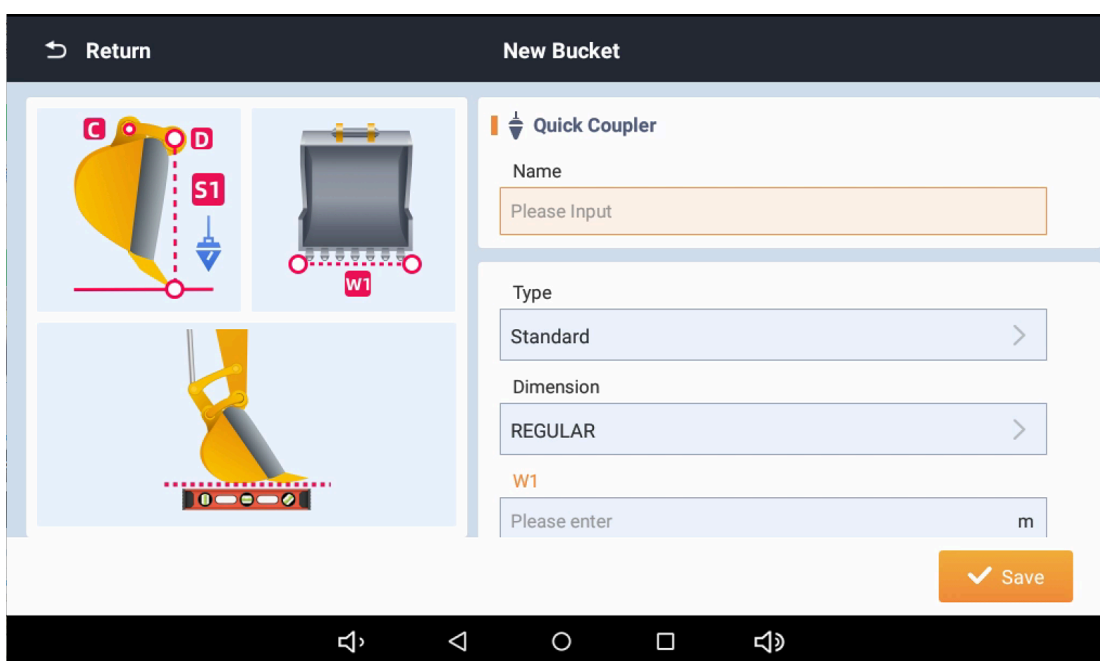
- Use level ruler to adjust bucket bottom to be horizontal
- Click [Calibration]
- Click [Save] to complete calibration and apply bucket



4.5.2. Installation on Quick Coupler

1. Enter bucket details:

- Input bucket name
- Select “Standard” type
- Choose “Regular” dimension



2. Measure and input the following lengths:

- W1
- S1

Return New Bucket

W1
Please enter m

S1
Please enter m

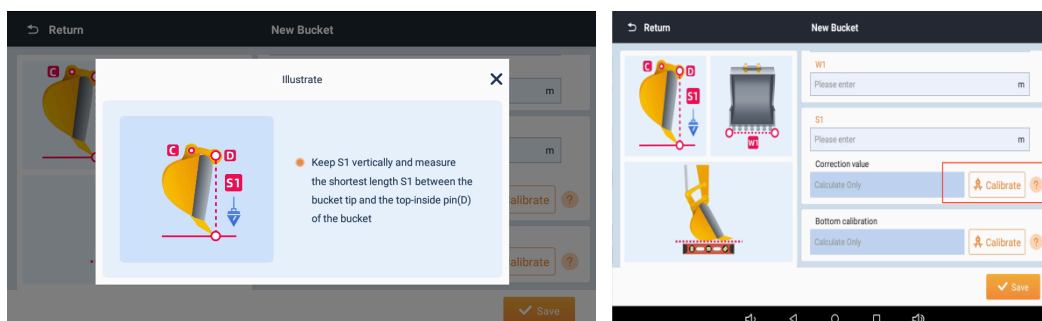
Correction value
Calculate Only Calibrate ?

Bottom calibration
Calculate Only Calibrate ?

Save

3. Vertical calibration:

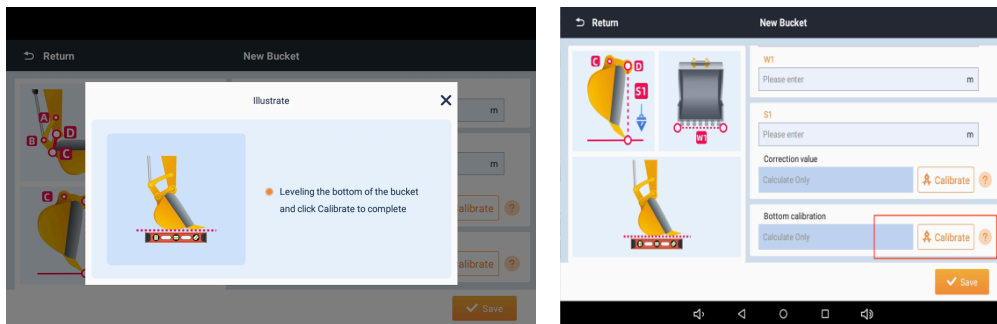
- Use plumb bob to adjust bucket tip (S1) to be vertical
- Click [Calibration]



4. Bottom calibration:

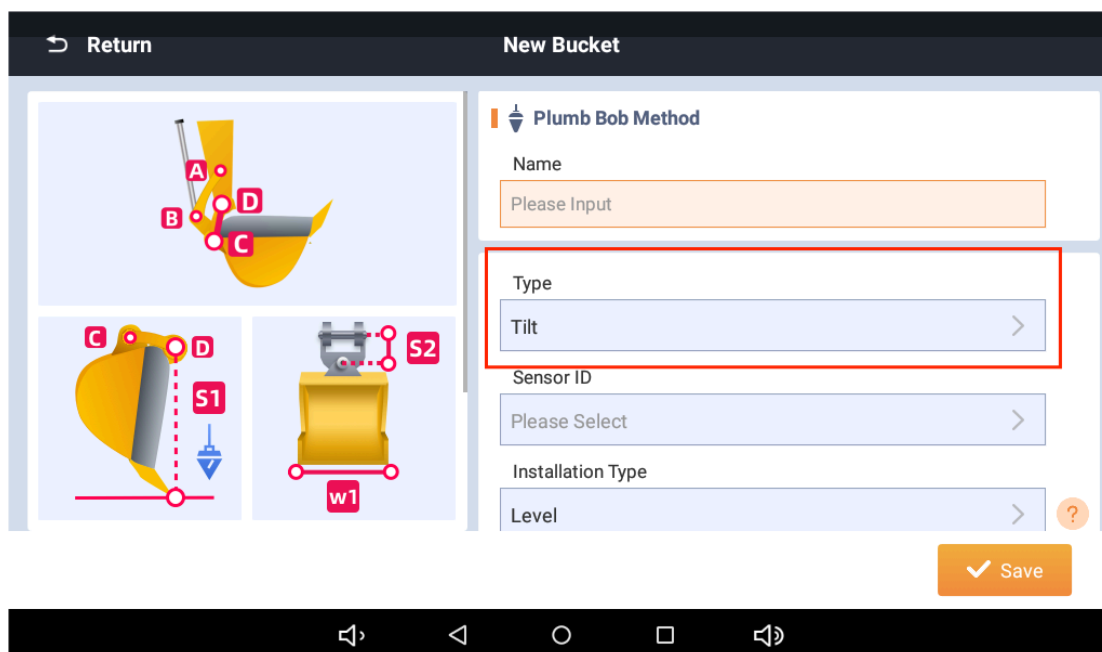
- Use level ruler to adjust bucket bottom to be horizontal
- Click [Calibration]

- Click [Save] to complete calibration and apply bucket



4.5.3. Tilt Sensor Calibration

1. Select "Tilt" as bucket type on the New Bucket interface



2. Configure sensor settings:

- Input sensor ID
- Select installation type (Level or Vertical)
- Select connector direction (Left, Right, Front side, Rear side)

Return

New Bucket

Installation Type

Level

Connector direction

Left

S2

Please enter

m

CD

Please enter

m

W1

Please enter

m

Save

3. Measure and input the following lengths:

- S1
- CD
- W1

Return

New Bucket

W1

Please enter

m

S1

Please enter

m

Correction value

Calculate Only

Calibrate

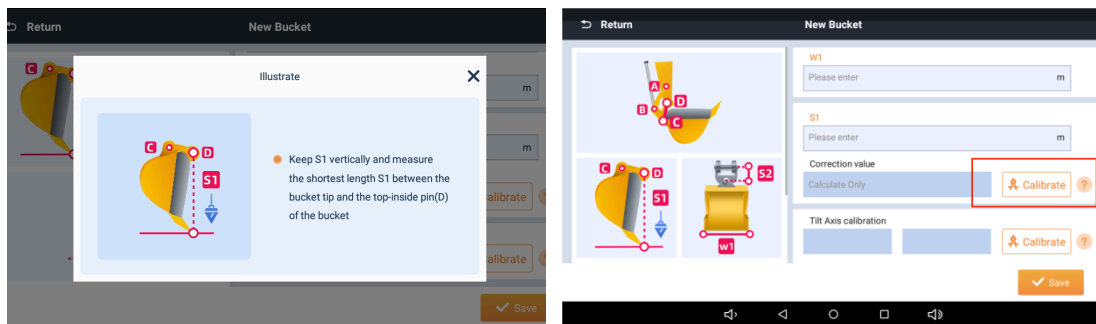
Tilt Axis calibration

Calibrate

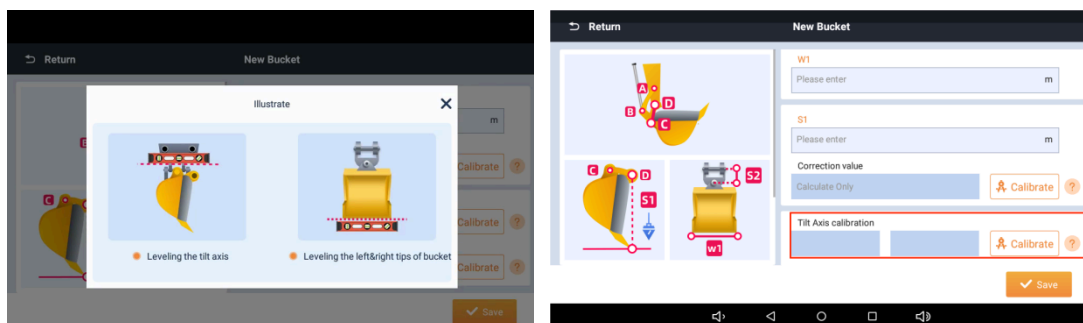
Save

4. Complete the calibration sequence:

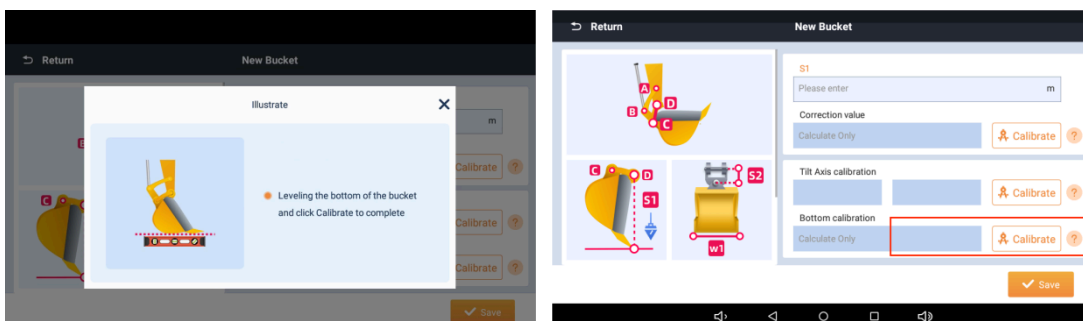
- Use plumb bob to adjust bucket tip to be vertical
- Click [Calibrate]



- Use level ruler to adjust bucket front and back to be level
- Click [Calibrate]



- Use level ruler to adjust bucket bottom to be horizontal
- Click [Calibrate]
- Click [Save] to complete calibration and apply bucket



4.5.4. Precision Check

After completing dimensional measurements and calibration, verify precision:

1. Select a fixed point on the ground

2. Measure the elevation of this point from different excavator positions
3. Check elevation differences:
 - Acceptable range: within 5 cm
 - Differences less than 5 cm indicate successful calibration