

SmartDepth™

SmartDepth Operators Manual

Precision Planting®

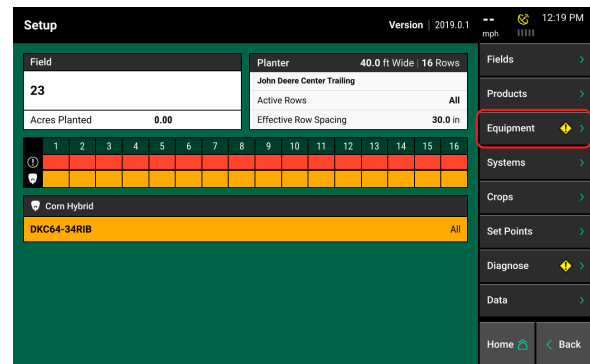
Contents

Configuring Monitor for SmartDepth	3
SmartDepth Setup.....	4
SmartDepth Calibration Process.....	6
SmartDepth Control.....	11

Configuring Monitor for SmartDepth

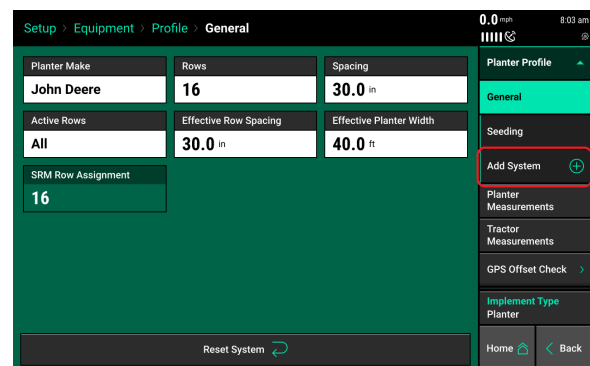
Step 1:

First, the planter configuration needs to be set up for the SmartDepth. From the home screen, navigate to the planter setup page by selecting, “Setup” – “Equipment”.



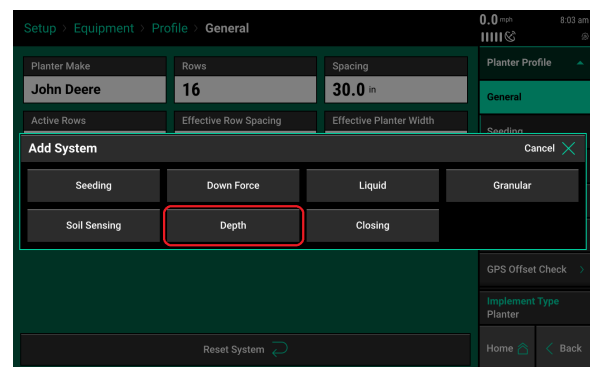
Step 2:

Ensure that Planter Make, Rows, Spacing, Active Rows, and Width are correct. Click on “Add System”.



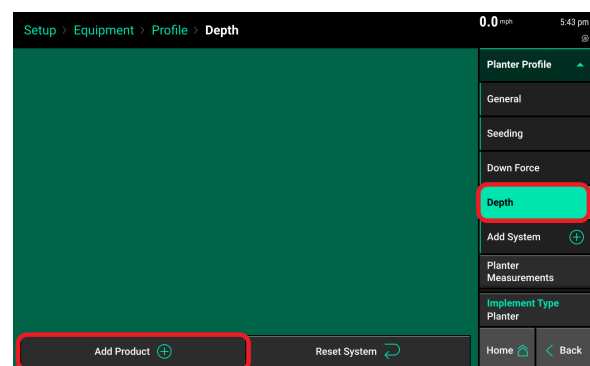
Step 3:

Press on the “Depth” button. The planter profile is now set for SmartDepth.



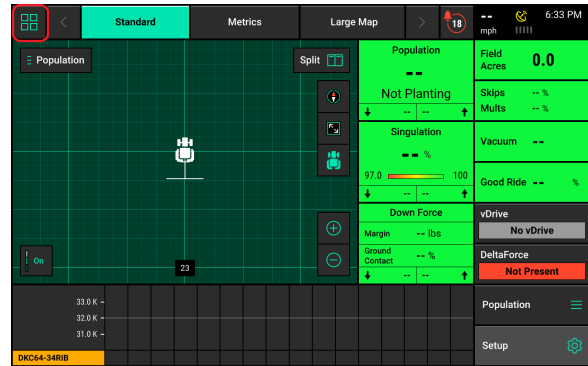
Step 4:

With “Depth” selected under the planter profile, click on “Add Product” and select “Depth” for the product name. SmartDepth is now setup under the equipment profile.



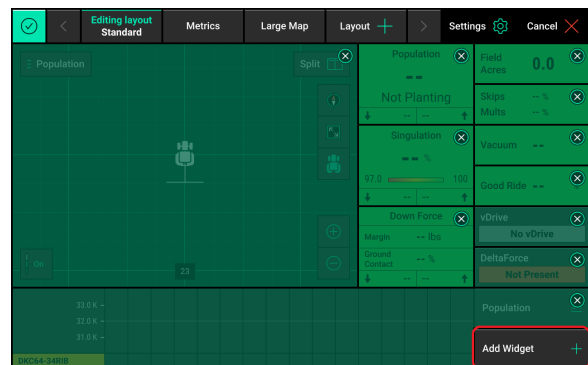
Step 5:

Next, the Depth Control button needs to be added to the home screen. Select the button in the top left hand corner of the home screen.



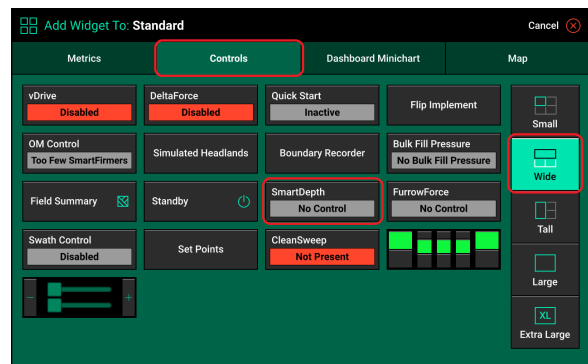
Step 6:

Select the “Add Widget” button on the lower right hand corner.



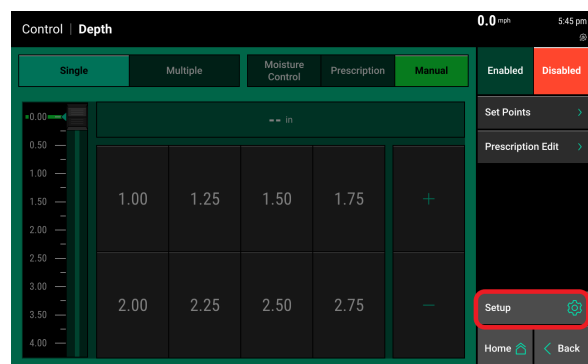
Step 7:

Then select the “Controls” tab and the “Depth” control button. Once you have added the widget to a run screen of your preference, press on the check mark in the top left corner to save the current layout.



Step 8:

Use the Depth Control button to access the SmartDepth control page. SmartDepth Control can not be “Enabled” until it has been configured under the systems setup. From the control page click on “Setup”. Or, from the home screen, “Setup” — “Systems” — “Depth”.



SmartDepth Setup

Begin by setting up the Control Sections.

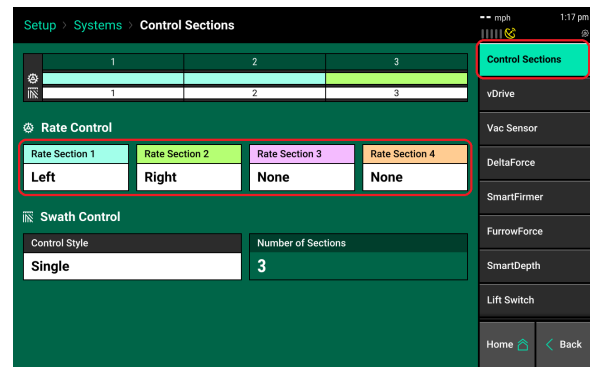
Step 1:

Navigate to “Setup” — “Systems” — “Control Sections” and setup the Rate Control Sections. Rate Control Sections allows the operator to configure which rows are assigned to each section. The monitor can control up to 4 different rate sections at once. Each rate section can be assigned a different depth setting if desired or configured to run specific sections in moisture control mode and other sections in manual mode.

Note: Any rows **not assigned** to a rate section **will not adjust depth or pass health checks**.

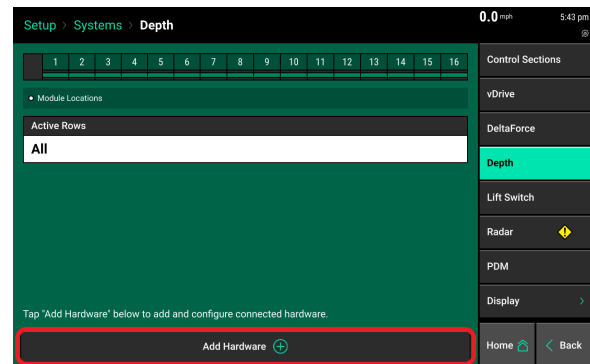
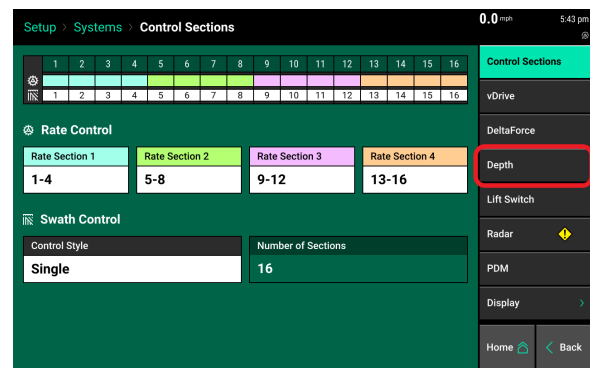
Step 2:

Next, click on “Depth” to configure the SmartDepth hardware on the planter.



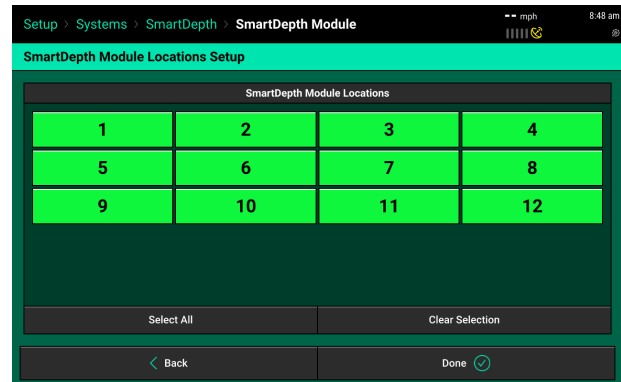
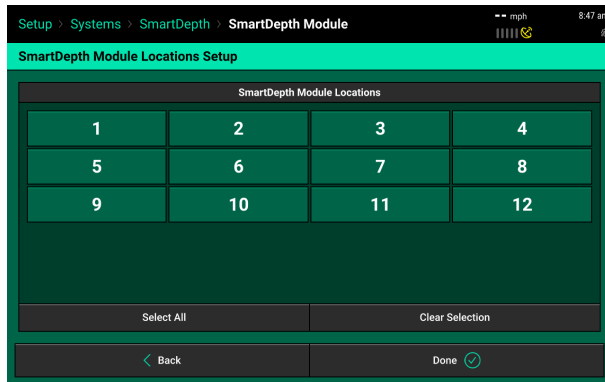
Step 3:

Click on “Add Hardware” and then Select “SmartDepth”.



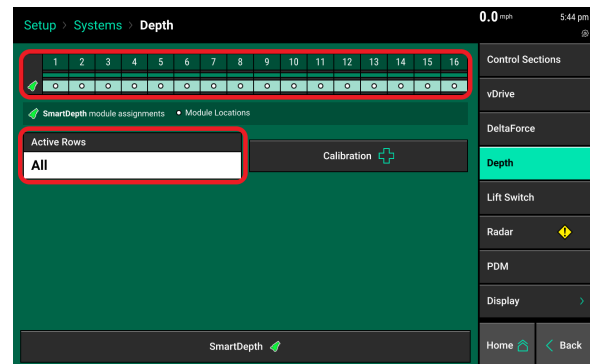
Step 4:

Select the rows that have a SmartDepth module installed. If SmartDepth is installed on all rows then click on “Select All”. If SmartDepth is only installed on some rows then use the list feature and only click on the rows with a SmartDepth Module.



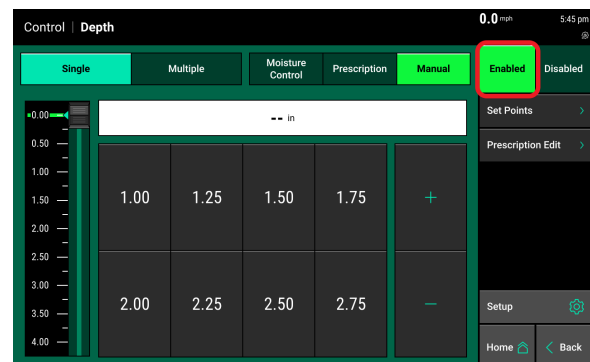
Step 5:

Confirm the SmartDepth module location is assigned to the correct rows. Finally, click on “Active Rows” and select “All” rows. Select all rows even if there isn’t a SmartDepth module installed on all rows.



Step 6:

Now that SmartDepth is setup, you can “Enable” control on the SmartDepth control page.



SmartDepth Calibration Process

SmartDepth must be calibrated which consists of finding both end points of the depth range and a depth calibration.

The calibration should be preformed after:

- Initial Installation
- Any Row Unit Hardware Replacement
- Any SmartDepth Hardware Replacement

- Diagnose Page Displays “Needs Offset Calibration”
- Diagnose Page Displays “Needs Range Calibration”
- The Yellow light on the Depth Module is On solid, or On 1.5 seconds; off 0.5 seconds

The Yellow light on the SmartDepth module is used to indicate the calibration and health state of the module.

Yellow Light State	Condition
ON Solid	Waiting to calibrate first time; no valid saved offset
ON 1.5s; off .5s	Waiting to calibrate first time; valid saved offset
OFF	Waiting to re-calibrate (2nd or more iteration)
Fast flash	Normal operation; bad motor or invalid sensor
Flash w/ red LED	Normal operation; movement in progress
OFF	Normal operation; no movement in progress

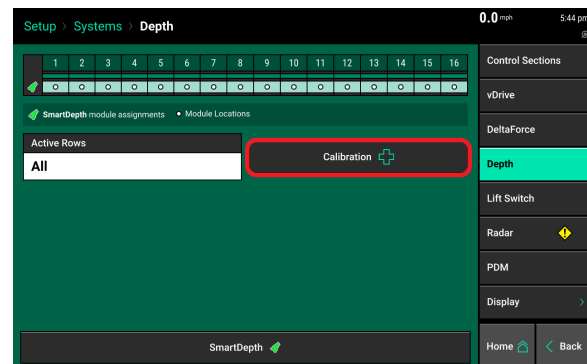
Range Finding and Depth Calibration

Step 1:

Park the planter over a concrete pad with the planter unfolded.

Step 2:

To start the calibration select “Setup” — “Systems” — “Depth” — “Calibration”.



Step 3:

To begin the calibration, ensure the planter is in the raised position, the Pre-test Checklist has been met and then press “Continue” on the calibration page. During Step 2 the actuators will travel to the shallowest setting (top of the depth handle range) in order to find the minimum setting. Once the shallowest setting has been found/calibrated the actuator will then travel to the deepest setting (bottom of the depth handle range) to find the maximum setting.

Note: The “Calibration Summary” button will let you skip a certain portion of calibration process. For example, if you have already completed the range finding calibration and you just want to preform the depth calibration, you can skip step 2 and jump straight to the depth calibration on step 3.

Step 4:

On Step 3, enter the thickness of the board that will be used for row by row calibrations. Use a 2”x6” or 2”x4” board to create a block of known thickness, i.e. 1.5” thick boards. The default setting is 1.5” assuming you are using a standard 2x4 piece of lumber. If you are using a block that is not 1.5”, you can type in the thickness of the block in the box shown.

Step 5:

Press “Continue” to advance to Step 4. The Depth actuators will move to the Deepest setting to prepare for the row by row calibration.

Setup > Systems > Depth > Calibration 0.0 mph 5:44 pm

Step 1 Step 2 Step 3 Step 4 Summary

Prepare to test

Test Description
During this step, each module will run to the top and bottom of the row unit to determine the minimum and maximum achievable depth.

Pre-test Checklist

- ✓ Planter parked on concrete pad
- ✓ No obstacles are in the way of the actuator
- ✓ Planter raised
- ✓ Master plant or section switch enabled

Cancel ✕ Calibration Summary ✓ Continue >

Setup > Systems > Depth > Calibration 0.0 mph 5:44 pm

Step 1 Step 2 Step 3 Step 4 Summary

Prepare to test

Test Description
This will move all actuators to the deepest setting to prepare for row by row calibration. Enter the width of the board that will be used for row by row calibrations below.

Pre-test Checklist

- ✓ Planter parked on concrete pad
- ✓ No obstacles are in the way of the actuator
- ✓ Planter lowered
- ✓ Master plant or section switch enabled
- ✓ Board width entered below

Calibration Position
1.50 in

Cancel ✕ Continue >

Setup > Systems > Depth > Calibration 0.0 mph 5:44 pm

Step 1 Step 2 Step 3 Step 4 Summary

Calibration in progress

Calibrate each SmartDepth module by placing the 1.50in boards under each gauge wheel and pressing the top button on the SmartDepth Module.

Row	State	Calibrated Offset (in)	Min Depth (in)	Max Depth (in)
1				
2				
3				
4				
5				
6				
7				
8				

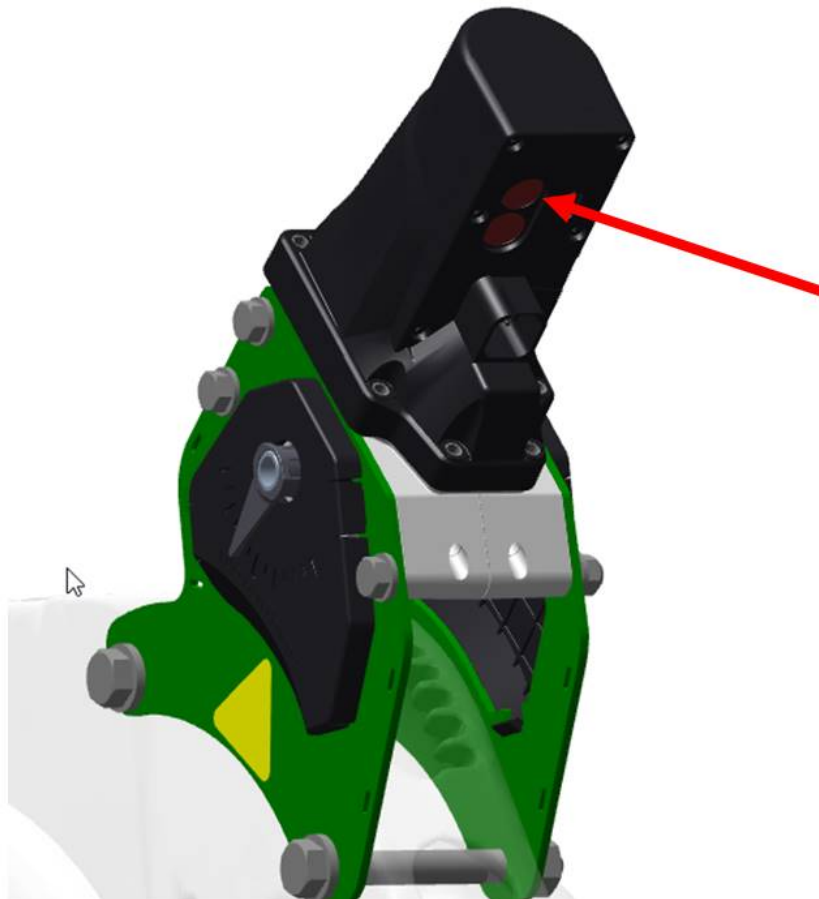
Cancel ✕ Continue >

Step 6:

With the planter lowered, push a 3 ft long section of 2x4 lumber under each gauge wheel of the row you want to calibrate. Since the actuator is in the deepest position, the blocks can be slid under each gauge wheel easily by hand. Make sure the gauge wheel is centered and fully resting on the block and not hanging off the edge of the block to avoid having the gauge wheels roll off during calibration. Verify that the gauge wheels are resting directly on the boards and the opening disks are fully resting on the concrete and not the board.

**Step 7:**

With the boards in place, start the calibration by pushing the top button on the depth control module. The actuator will move toward the shallow end of the depth settings until the gauge wheels begin to carry a load on the boards. At this point we know that the gauge wheels have reached the 1.5" depth of the block they sit on. The actuator will move past this point and begin to lift the row unit. In some instances it may even lift the row units until the actuator reaches the shallowest setting. This is determined by the row unit weight. In both instances, this is normal operation. Once the modules moves back to the deepest setting you can remove the boards.

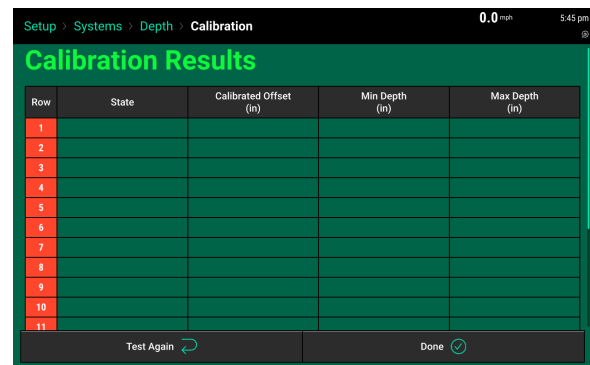


Step 8:

Remove the two boards under that row unit and move them to the next adjacent row unit and repeat the process until all rows have been calibrated.

Step 9:

After all of the rows or desired rows have been calibrated press “Continue”. The Calibration Results page will display the calibration state of all the rows.



Setup / Systems / Depth / Calibration 0.0 mph 5:45 pm

Calibration Results

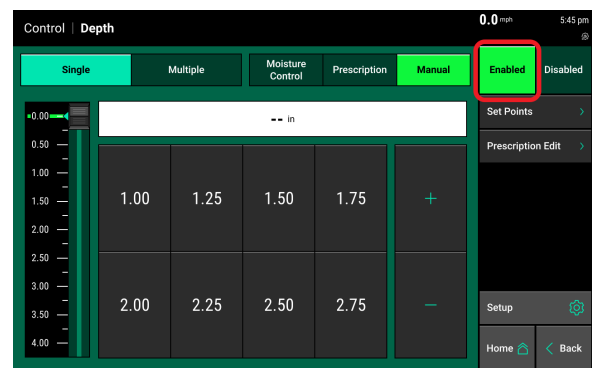
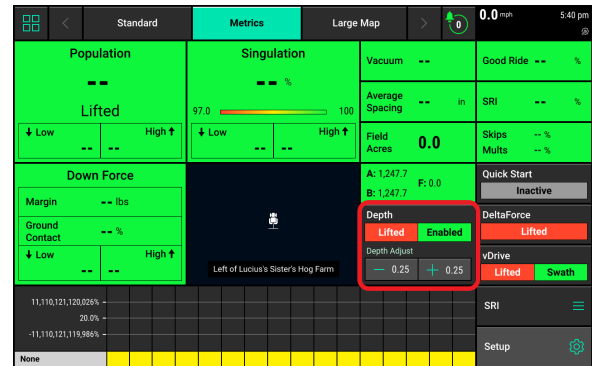
Row	State	Calibrated Offset (in)	Min Depth (in)	Max Depth (in)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				

Test Again Done

SmartDepth Control

The Depth Control button is located on the home screen. When in “Manual Mode” this button displays the actual depth and the commanded depth. With “Moisture Control Mode” enabled the control button will display the percent of furrow moisture and the actual depth. If multiple rate sections are setup and running in multiple mode, the depth displayed will be an average of all the sections. Click on the control button to access the Depth Control page.

Click Enable in the top right hand corner to turn on SmartDepth control.



Depth Control Button Legend

Single – Single Mode controls to a single depth planter wide.

Multiple – Multiple Mode controls the Depth system in individual sections if there are multiple rate sections configured.

Prescription— Enables Depth to control to a Depth prescription.

Prescription Editor— Allow the operator to make adjustments to the prescription file.

Manual— Select “Manual” mode to set the depth manually from the display.

Set Points — Allows the operator to set predetermined depth set points to be used in Manual Mode.

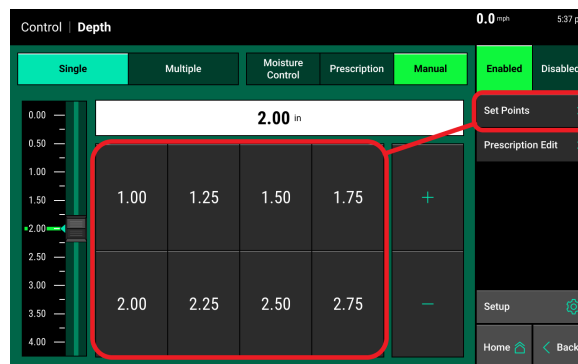
Slider Bar — Allows the operator to adjust depth by sliding the bar up and down.

Moisture Control — Enables/Disables SmartDepth to control to SmartFirmer moisture readings. Four SmartFirmers per control section is recommended before enabling moisture control mode. Refer to the SmartFirmer Recommendations Table in order to determine the minimum number of SmartFirmers. The number of rate sections can be found by going to “Setup” — “Systems” — “Control Sections”. Up to four rate sections can be configured.

SmartFirmer Recommendations		
Number of Rate Sections	Minimum Number of SmartFirmers	16 Row Planter Example
1	4 SmartFirmers	Minimum 4 SmartFirmers
2	4 SmartFirmers per section	Minimum 8 SmartFirmers
3	4 SmartFirmer per section	Minimum 12 SmartFirmers
4	4 SmartFirmers per section	Minimum 16 SmartFirmers

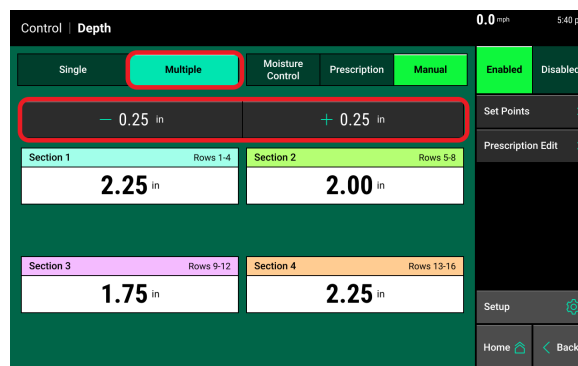
Single Mode Example:

Select a preset depth from the list of depth set points displayed on the screen (configure this list using the “Depth Set Points” button on the right hand side of the screen) and use the + or - buttons to increase or decrease the depth by a 1/4” inch at a time, or tap on the white box displaying the current depth to manually enter a rate.



Multiple Mode Example:

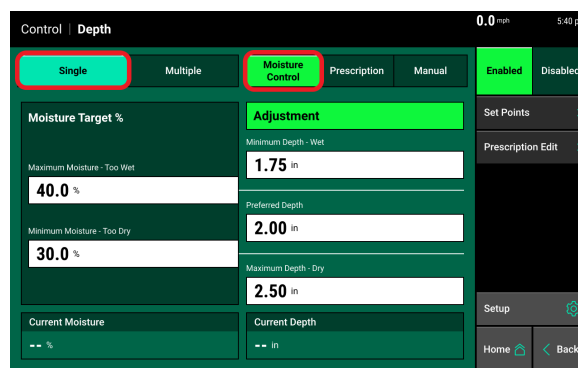
Multiple Control mode allows the operator to command a different depth for each section that has been setup. Select the + or - buttons to increase or decrease the depth by a 1/4" inch at a time. The 1/4" adjustment will apply to all sections. Or, tap on the white box displaying the current depth to manually enter a rate for an individual section.



The depth actuators are controlled through the section control switches on your monitor. The actuator will not move if the section control switch is in the off position. If you have setup multiple sections then each section is controlled by its respective switch. Even "Single" mode may require the use of multiple section switches if you have created multiple sections.

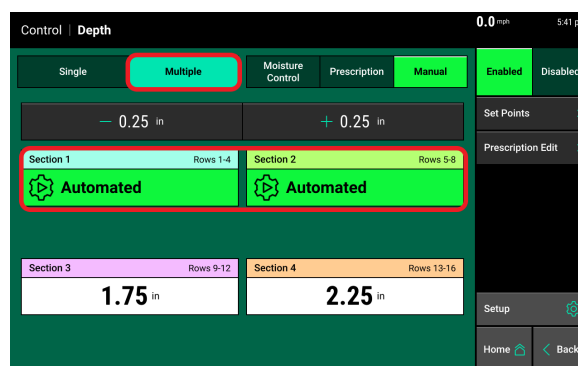
Moisture Control Mode (Single Section):

Moisture control mode allows the operator to use SmartFirmer furrow moisture percentage to automatically adjust the planting depth based on user defined settings. Moisture control mode is section controlled defined by the number of rate sections. Up to 4 rate sections can be configured. In this example, Moisture Control is enabled as a single section where the depth control will be planter wide. Select "Multiple" if you want to utilize up to 4 sections.



Moisture Control Mode (Multiple Section):

Select "Multiple" if you want to utilize up to 4 sections. In this example, Moisture Control is enabled on Section 1 and Section 2 while Sections 3 and 4 are left in a manual depth mode. The "Automated" sections can be configured with different moisture control parameters if desired or all four sections can control to the same moisture control parameters.



Moisture Target Parameters:

With Moisture control mode selected, begin by selecting a “Maximum Moisture — Too Wet” target and a “Minimum Moisture — Too Dry” target. The Maximum Moisture target determines at what furrow moisture percentage do we command depth to the minimum depth set point. In other words, if we have too much moisture plant shallow. The Minimum Moisture target determines at what furrow moisture percentage do we command depth to go deeper. In other words, if we are too dry plant deeper to find moisture.

The screenshot displays the 'Control' screen for 'Depth' in 'Section 2'. The 'Automated' mode is selected. The 'Moisture Target %' section is highlighted with a red box, showing a 'Maximum Moisture - Too Wet' target of 40.0% and a 'Minimum Moisture - Too Dry' target of 30.0%. The 'Adjustment' section shows three depth targets: 'Minimum Depth - Wet' at 1.50 in, 'Preferred Depth' at 2.00 in, and 'Maximum Depth - Dry' at 2.50 in. The 'Current Moisture' and 'Current Depth' are both shown as '--'. The interface includes a 'Setup' button and 'Home' and 'Back' navigation options at the bottom right.

Moisture Target %	Adjustment
Maximum Moisture - Too Wet: 40.0 %	Minimum Depth - Wet: 1.50 in
Minimum Moisture - Too Dry: 30.0 %	Preferred Depth: 2.00 in
	Maximum Depth - Dry: 2.50 in
Current Moisture: -- %	Current Depth: -- in

Moisture Control Depth Parameters:

SmartDepth allows you to set upper and lower depth limits as well as a preferred depth which may be different for different crops. For example, we would not recommend planting corn shallower than 1.5 inches so in order to prevent SmartDepth from commanding a depth shallower than that we set the minimum depth to 1.5". In this example, when our moisture target goes above 40% furrow moisture, depth will adjust to its "Minimum Depth — Wet" setting of 1.5 inches.

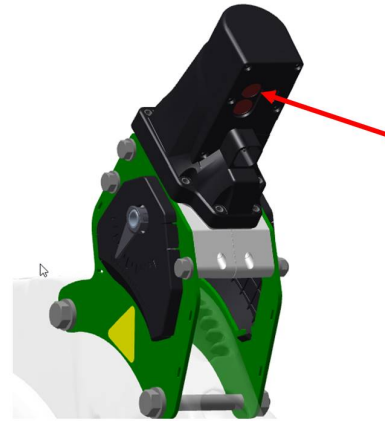
Preferred Depth should be set to a depth between the minimum and maximum settings. If the furrow moisture falls in between our moisture target then the depth will move towards our preferred depth set point assuming there is ample moisture at that depth.

"Maximum Depth — Dry" sets the limit on the deep side so we do not plant deeper than that set point. In this example, if furrow moisture drops below 30% the depth will move deeper to find more moisture. If it does not find 30% furrow moisture or higher at 2.5 inches then the depth command will stay at 2.5 inches.

The screenshot displays the 'Control | Depth > Section 2' interface. At the top, there are three tabs: 'Automated' (highlighted in green), 'Prescription', and 'Manual'. Below the tabs, the 'Moisture Target %' section shows 'Maximum Moisture - Too Wet' at 40.0% and 'Minimum Moisture - Too Dry' at 30.0%. To the right, the 'Adjustment' section is highlighted with a red box and contains three input fields: 'Minimum Depth - Wet' set to 1.50 in, 'Preferred Depth' set to 2.00 in, and 'Maximum Depth - Dry' set to 2.50 in. At the bottom, there are fields for 'Current Moisture' (displaying -- %) and 'Current Depth' (displaying -- in). On the far right, there are buttons for 'Setup', 'Home', and 'Back'.

Manual Operation of the Depth Actuators

The actuators can also be moved manually via the push buttons on each respective row. The top button moves the actuator to a shallower setting and the bottom button moves the actuator to a deeper setting. These movements will be displayed on the 20|20 so you can see current depth of each individual row. This functionality is most commonly used to move the actuator out of the way while working on the row unit.



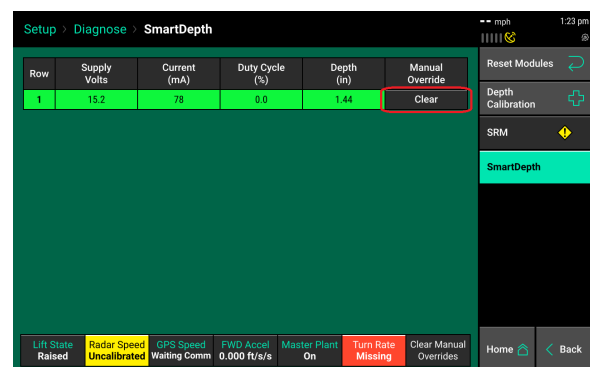
Additional button control functions:

Pushing the top button only — Calibrates the Depth control module while in the depth calibration mode.

Note: Any actuator that is moved with the buttons will not move again with any 20|20 commands until that manual movement is cleared on the SmartDepth Diagnostics page.

Clearing Manual Override

To clear the manual override from the button push on the actuator go to the SmartDepth diagnostics page and press “Clear” on the rows that you want to clear. Then press yes on the popup to confirm clearing the manual override. The actuator will then travel to the commanded depth from the 20|20. To clear all rows with a manual override, press “Clear Manual Overrides” and select “Yes” on the confirmation prompt. All rows will now travel to the commanded depth from the 20|20. A manual override will also clear after a power cycle of the 20|20, a reset modules on the diagnose page, or simply unplugging the module and plugging it back in.



Getting Started in the Field

Generally, when starting a field your commanded depth setting is based on your knowledge of digging in the field to find the moisture line, type of tillage, and predicted weather forecast. It is suggested that you start with this predetermined depth setting and plant 100 ft or so and then dig to confirm you are in your desired depth range. Varying tillage, downforce setting, and residue management may alter your true depth compared to your commanded depth. For example if you set your commanded depth to 2" and you are planting in a field with heavy residue, you might not actually achieve 2" of depth, but rather only 1.75" of depth. In this case you will want to change your commanded depth setting to account for the heavy residue which might be 2.25" in this example. Digging for seed depth and moisture should still be performed with this product.