

DeltaForce®

DeltaForce Operator's Guide — 2024.1.x Software

 Precision Planting®

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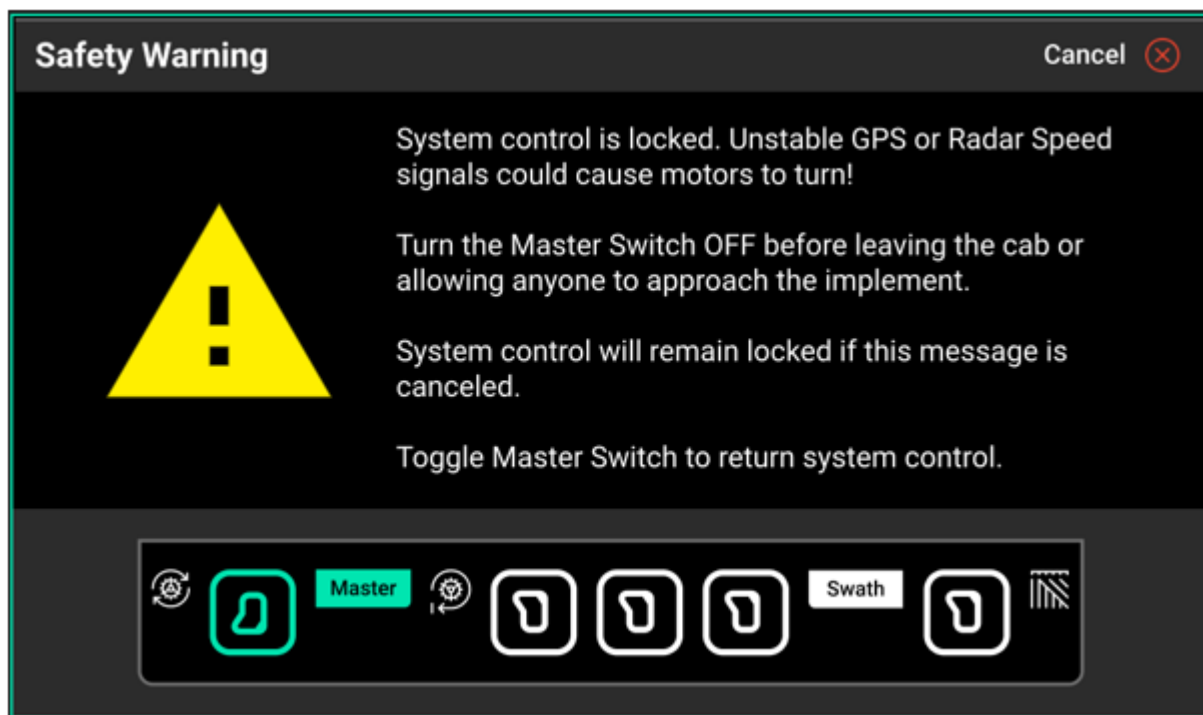
DeltaForce Requirments

DeltaForce operation requirements:

1. DeltaForce system configured on the 20|20 monitor.
2. Speed source active.
3. CCM master plant switch in the up position.
4. Implement must be lowered.
5. DeltaForce system enabled.

Safety Warning

If any control product is configured on the 20|20 display, the system will require a Cab Control Module (CCM) and will prompt the user to toggle the Master Plant switch on the CCM before any control products may be used. This warning is triggered any time the system is booted up, and when the system has traveled for more than half a mile.



If a CCM is not installed, press cancel to bypass this warning. No control systems will operate until the Master Plant switch is toggled. The Master Icon:

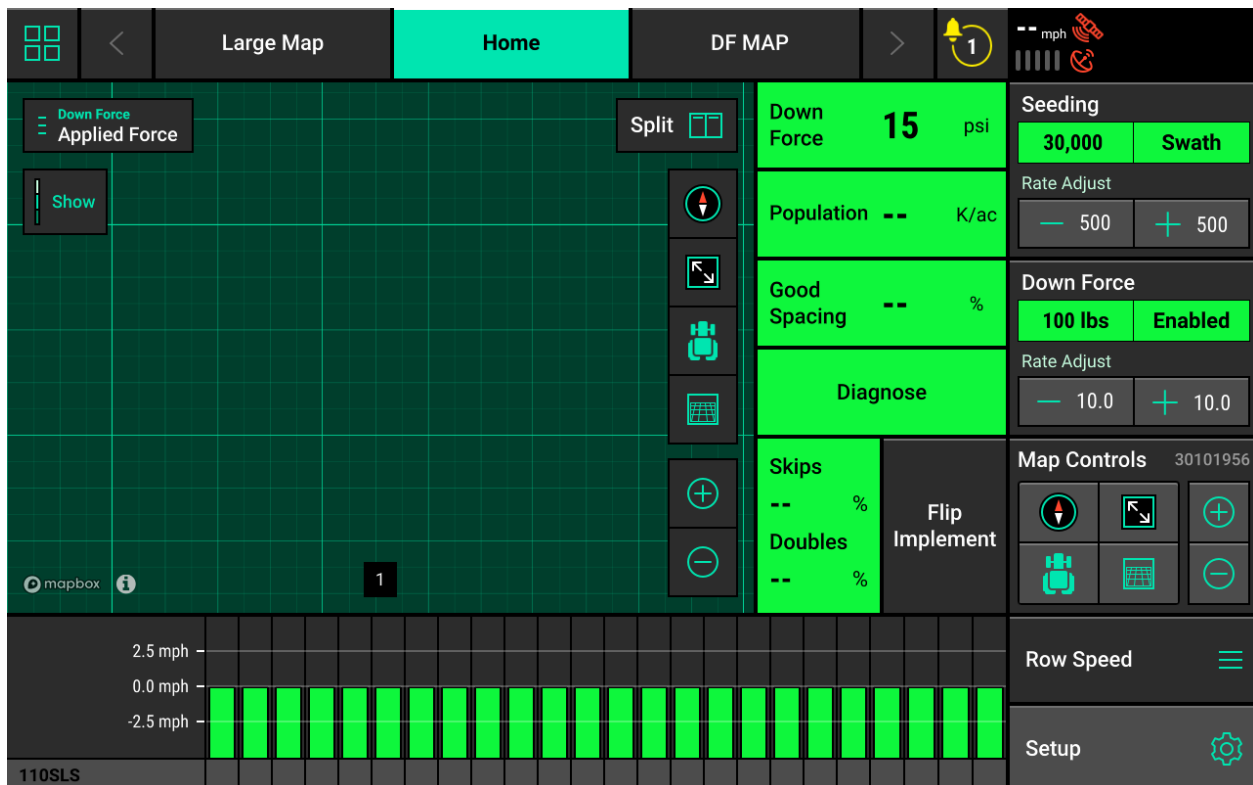


will be present in the top right if the Safety Warning was bypassed pressing cancel.

Home and Control Screens

Home Screen

The home screen displays information for controlling and mapping the DeltaForce System.



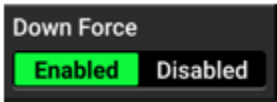
DeltaForce Mapping

DeltaForce Maps are available to view on the home screen for the DeltaForce system. To view the DeltaForce Maps, press the current layer name that is displayed in the top left corner of the map. A list of all available map layers will be displayed.

- **Applied Force** — displays cylinder commanded force on a row-by-row basis
- **Down Force** — displays load cell readings on a row-by-row basis
- **Force State** — displays any active alerts based on parameters set in Alerts > Down Force



Control Widget



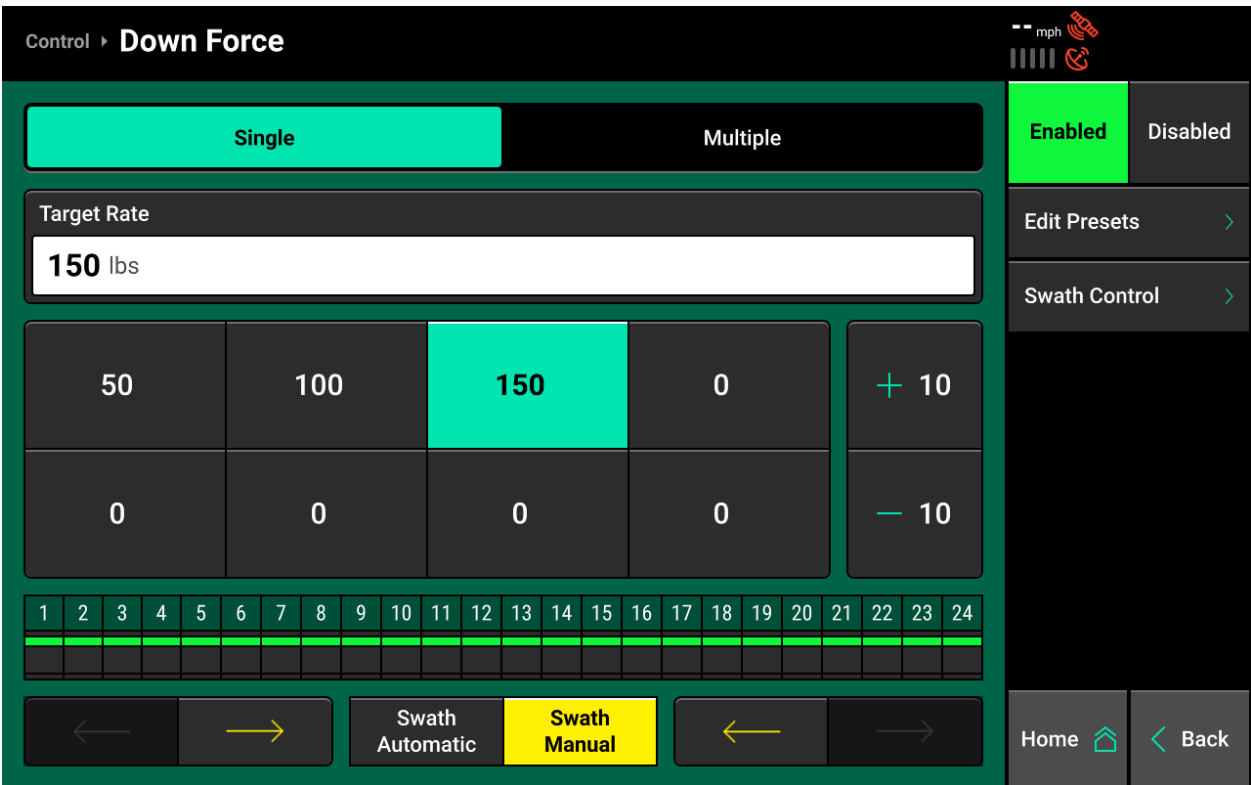
The DeltaForce control widget may be placed on the home screen. The control button displays the status of the DeltaForce system. If the DeltaForce control button is not on the home page, it must be added before system operation. See the *Gen 3 20|20 Operator’s Guide — 2024.1.x Software* for more information on editing the home screen layout.

Indicators for system status on the DeltaForce Control widget:

- Enabled* – system is ready and has been enabled.
- Disabled* – system will not function due to being disabled. To enable the system, press on the control button and select Enable.
- Lifted* — planter is lifted and system will not function. To enable the system, lower the planter
- Master off* — master plant switch is off and system will not function. To enable the system, toggle the master plant switch.
- Target Rate* — Needs to have a target rate set
- Green* — System is functional and has a commanded rate.

DeltaForce Control Screen

Press the control button on the Home Screen to open the DeltaForce Control Screen.





To enable or disable the DeltaForce system, press the DeltaForce control button and select either Enabled or Disabled in the top right corner of the screen.

Rate Control



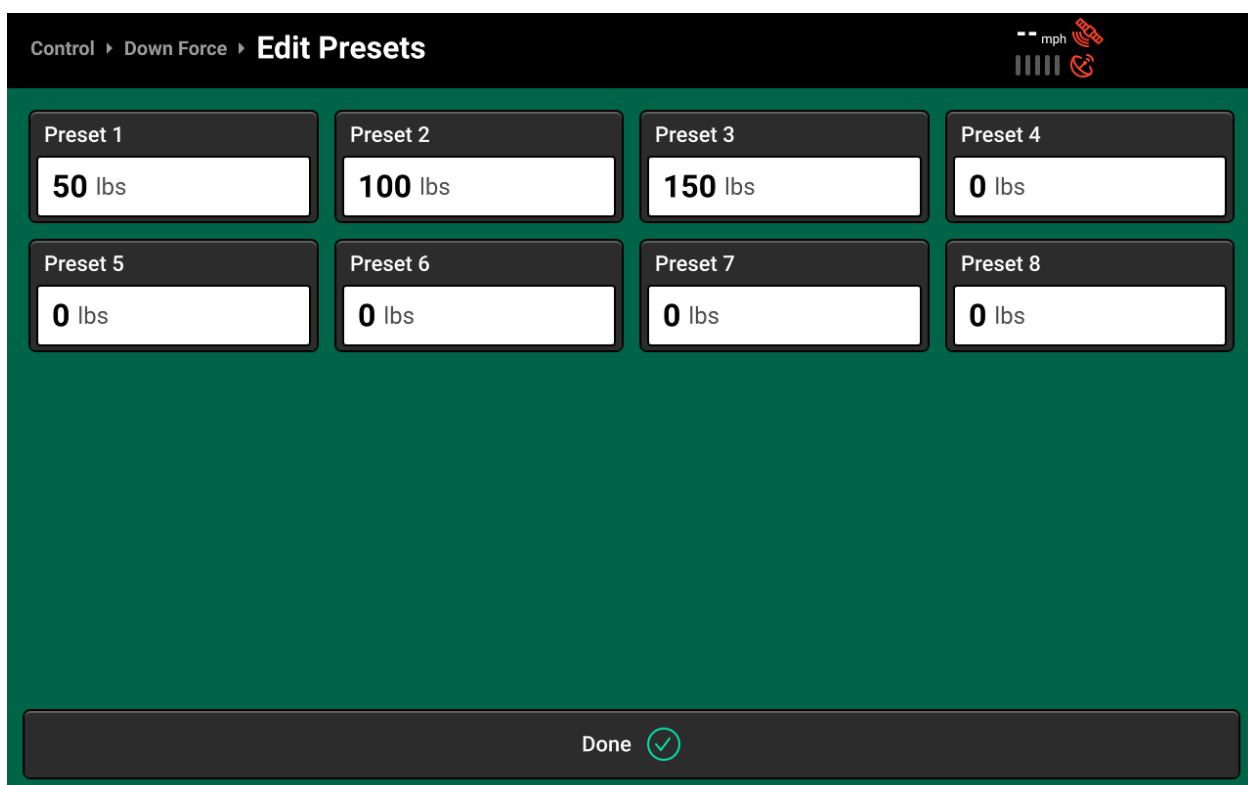
Single —Assigns the same target rate to all rows. Select a preset target rate from the list of set points displayed on the screen. Use the +/- buttons to increase or decrease the rate by 10lbs, or press the white box displaying the current target rate to manually enter a rate. Press Edit Presets in the navigation menu to open the Edit Presets screen, which allows the user to configure preset population points. Press Done to return to the Control screen.

Edit Presets —Allows for custom presets. Select a preset to change the preset target

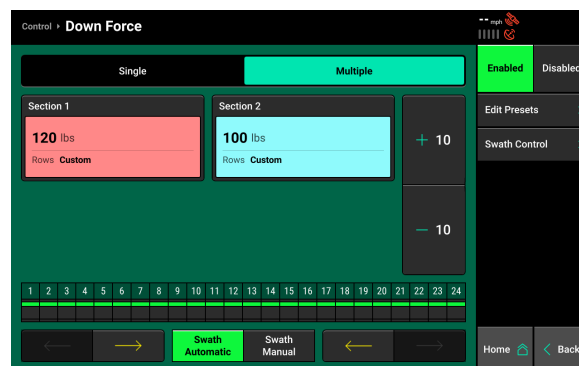
Suggested presets: These are **starting points** and need to be confirmed by digging to verify furrow integrity, adjust as needed. Standard gauge wheels will start at 100 lbs, RID gauge wheels will start at 150 lbs.

Previous Software auto-presets:

- **Light** (50 lbs)/ **Standard** (100 lbs)/ **Heavy** (150 lbs)

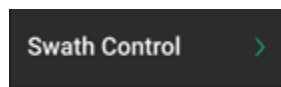


Multiple —Assigns different target rates to each DeltaForce control section that was configured during DeltaForce Setup. Use the + and – buttons to adjust the down force up or down the same amount for each section, or press either section to manually enter a new target rate for that section.

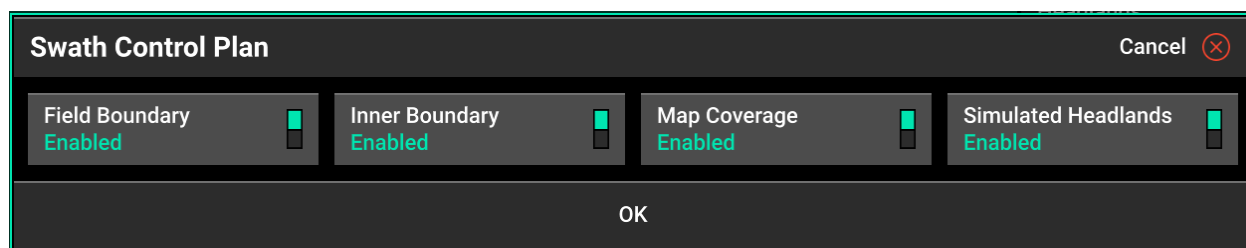


Swath Automatic — Allows for **automatic** row by row DeltaForce Control.

Swath manual — Allows for **manual** row by row shutoff utilizing the arrows on either side.



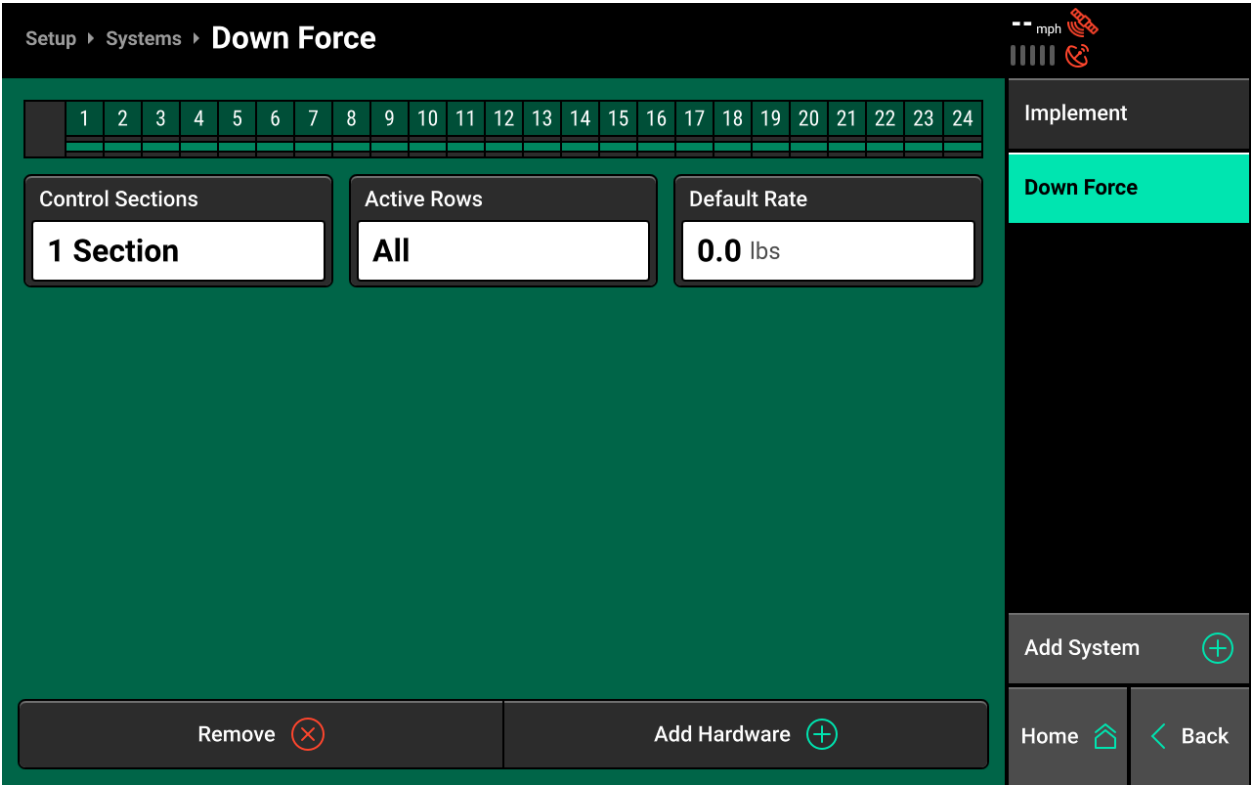
Swath Control —Allows for you to manually shut off individual rows.



Swath Control Plan —Allows for enabling or disabling of boundaries, coverage, and simulated headlands. If these are disabled DeltaForce will continue to operate through them.

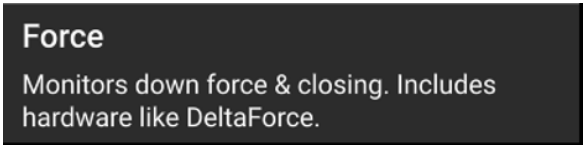
System Setup

DeltaForce must be configured in a Force system. To add a Force system to an implement, navigate to Setup > Systems. This guide assumes that all Equipment, harnessing, and implement-wide modules have already been configured and calibrated. See the *Gen 3 20|20 Operator's Guide — 2024.1.x Software* for more details on setting up/calibrating harnessing and implement modules.



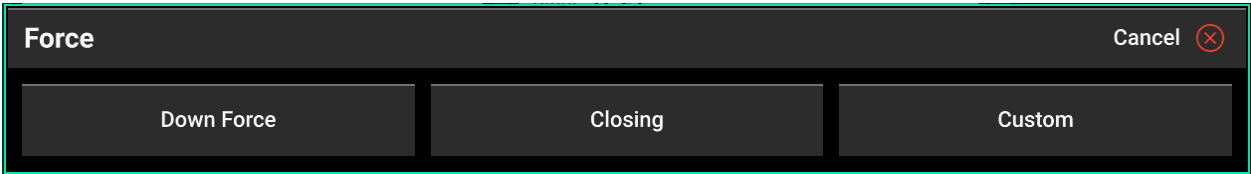
Step 1:

Press Add System and select Force.



Step 2:

Select Down Force or press Custom and use the pop-up keyboard to enter a custom name.



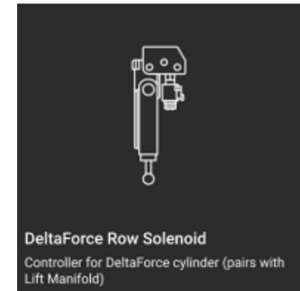
Hardware Setup

To configure DeltaForce system hardware, select the Down Force system in the navigation menu, then press Add Hardware in the bottom of the screen.

DeltaForce Row Solenoid

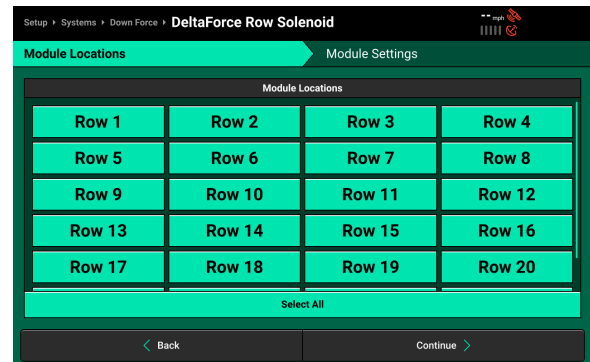
Step 1:

Scroll up/down on the list of available modules and press DeltaForce Row Solenoid



Step 2:

Press on each row that a DeltaForce Row Solenoid is installed on, or press Select All to highlight all rows, then press Continue to advance to Module Settings.



Step 3:

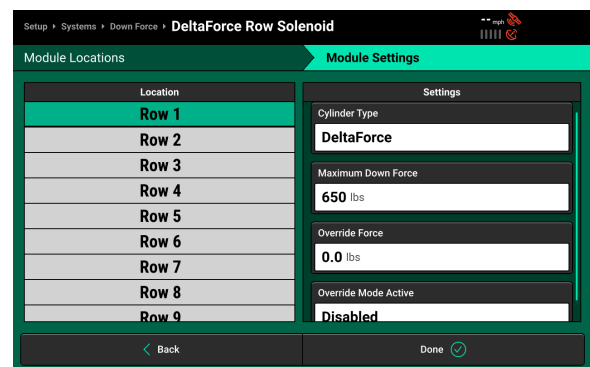
In this section you can change your DeltaForce Row Solenoid Settings

Cylinder Type- Allows for selection of down force cylinder type

Maximum Down Force- Allows for Maximum Down Force weight to be changed.

Override Force- Allows for setting a manual Down Force weight.

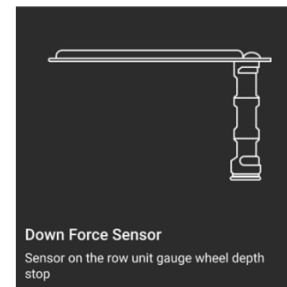
Override Mode Active- Allows for enabling or disabling of Override Mode. If this is enabled automatic down force control will be disabled for the cylinder selected.



Down Force Sensor

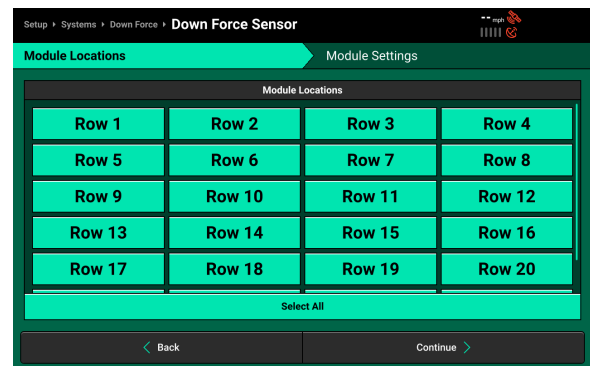
Step 1:

Scroll up/down on the list of available modules and press Down Force Sensor



Step 2:

Press on each row that Down Force Sensor is installed on, or press Select All to highlight all rows, then press Continue to advance to Module Settings.



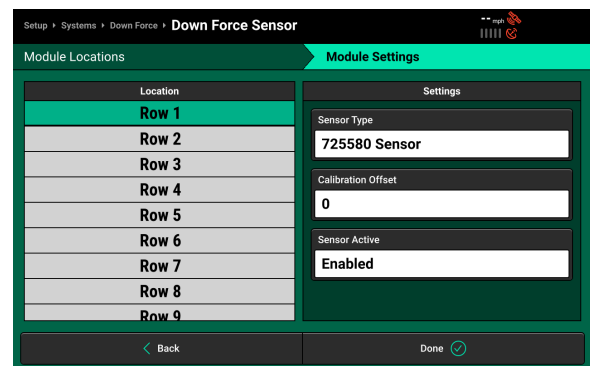
Step 3:

In this section you can change your Down Force Sensor Settings.

Sensor Type- Select the Down Force Sensor that is installed on each row unit.

Calibration Offset- This number will populate after completion of Zero Load Sensors Calibration

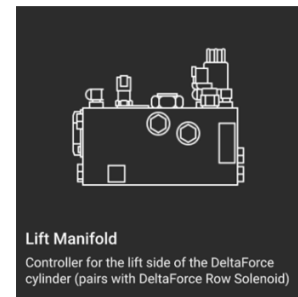
Sensor Active- Allows for manually disabling of individual Down Force Sensor.



Lift Manifold

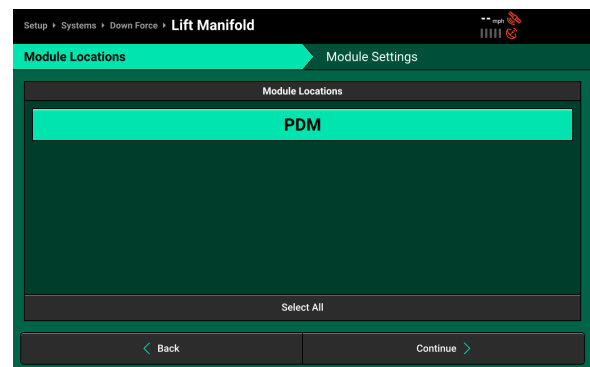
Step 1:

Scroll up/down on the list of available modules and press Lift Manifold



Step 2:

Press on PDM then press Continue to advance to Module Settings.



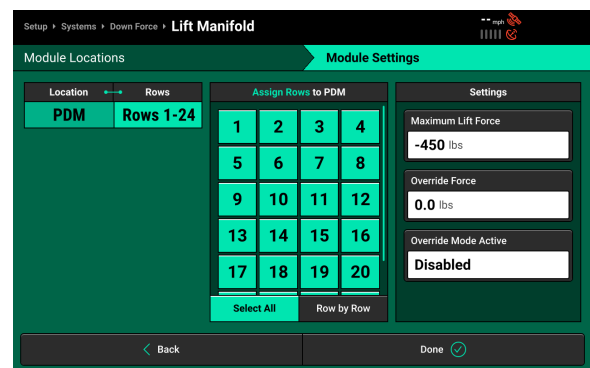
Step 3:

Select all rows that will be controlled by the lift manifold. If the DeltaForce System is installed on all rows press Select All.

Maximum Lift Force- Allows for Maximum Lift Force weight to be changed.

Override Force- Allows for setting a manual Lift Force weight.

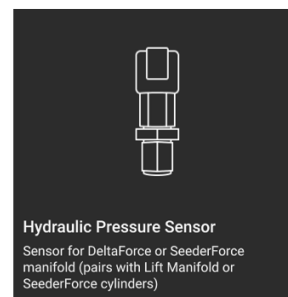
Override Mode Active- Allows for enabling or disabling of Override Mode. If this is enabled automatic DeltaForce control will be disabled



Hydraulic Pressure Sensor

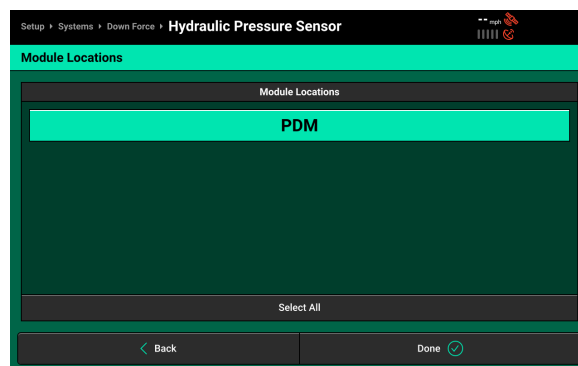
Step 1:

Scroll up/down on the list of available modules and press Hydraulic Pressure Sensor



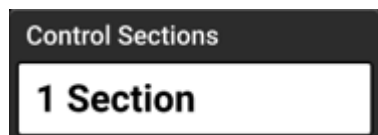
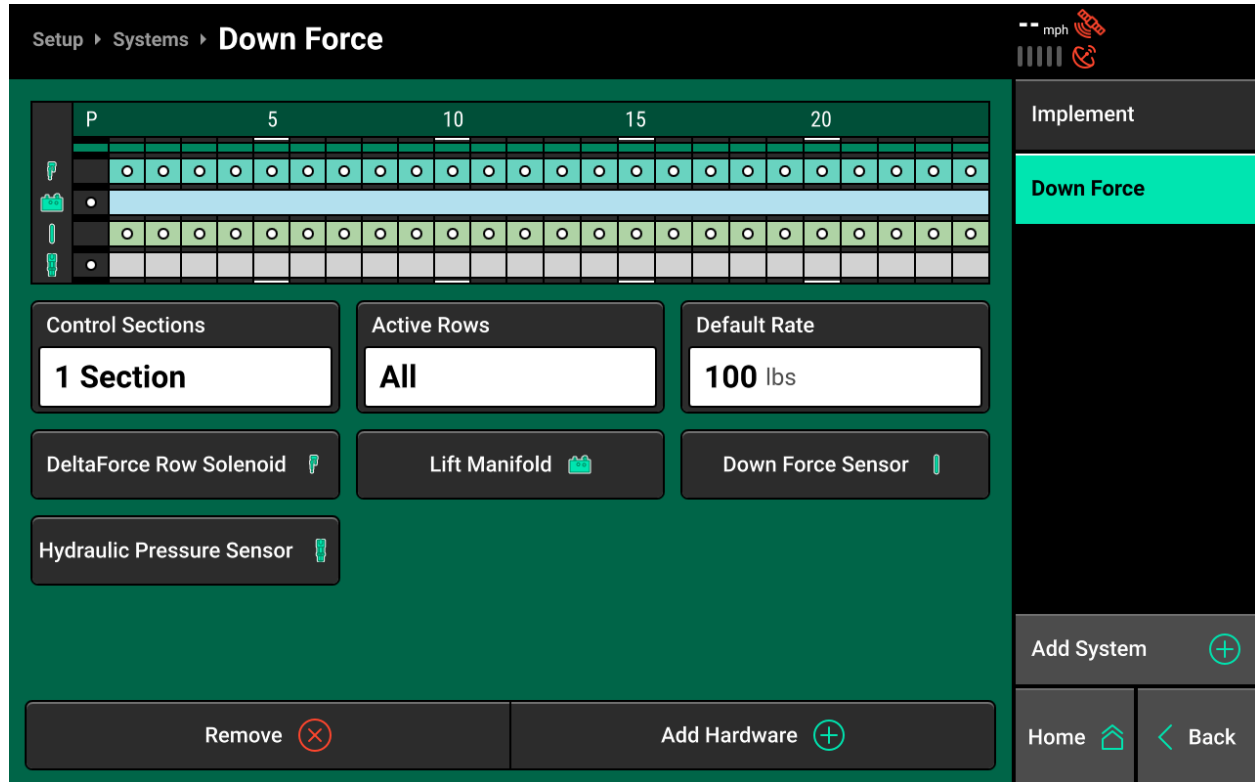
Step 2:

Press on PDM then press Done.

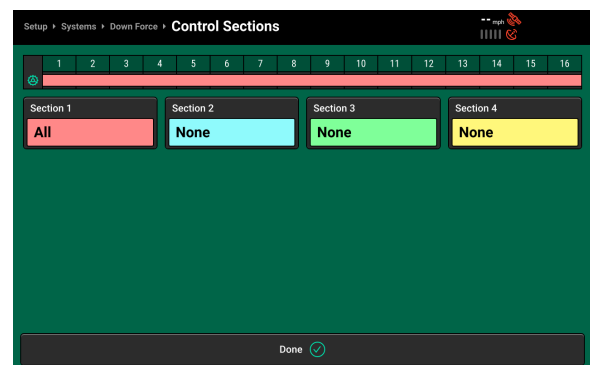


System Settings

To configure DeltaForce system settings, select Down Force [or custom system name] system in the navigation menu. Press the desired setting to modify it.



Press Control Sections to open the control sections screen. Use this screen to set up multiple control sections, and to assign different rows to those sections. The default number of control sections is 1. A target rate may be set for each control section using the control widget on the home screen. See the *Home Screen* section of this guide for more details.



Press any section to open a pop-up which allows the user to assign a preset group of rows to that section, or to assign a custom row selection to that section. Press List to assign custom rows.

Section 1 Cancel

All	Odd	Even	Left
Right	Disabled	List	

Section 1 Cancel

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16								

Select All Enter

Active Rows

All

Press Active Rows to open a pop-up which allows the user to select the active rows for the system. Select a preset section, or press List to select a custom section. Use this setting to disable any rows if desired.

Active Rows Cancel

All	Odd	Even	Left
Right	None	Custom	

Active Rows Cancel

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16								

Select All Enter

Press Default Rate to open a pop-up which allows the user to input a system-wide default rate in lbs.

Default Rate

100 lbs

Default Rate Cancel

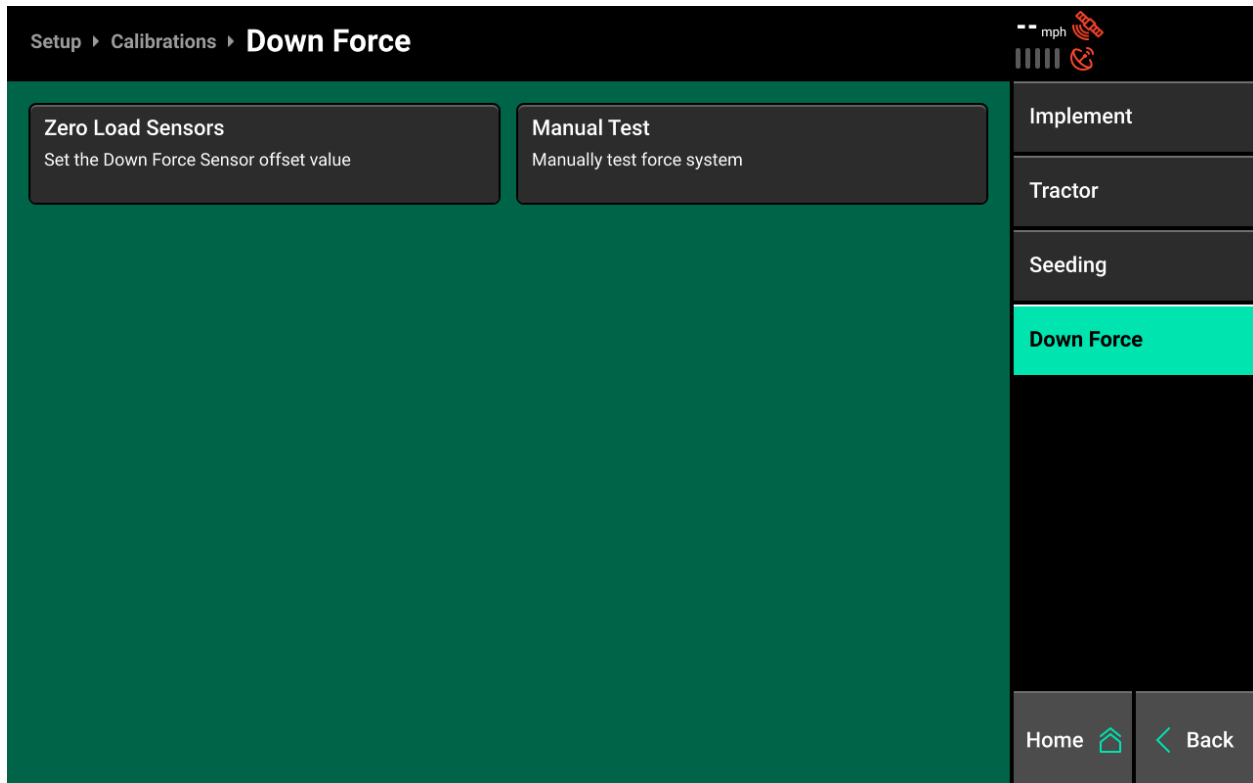
0 lbs

7	8	9	⌫
4	5	6	000
1	2	3	00
0	.		Enter

Calibrations

Navigate to Setup > Calibrations > Down Force. From here you can Zero Load Sensors or run a Manual Test.

Note: In commercial release software versions 2024.0.0 and prior, Calibrations were designated as Health Checks. Many procedures have been consolidated into calibrations. (Zero Load Sensors, Advanced Applied Force Test, and Air Purge Test)



Calibration Descriptions:

- **Zero Load Cells:** This calibration allows for zeroing of all Load Sensors.
- **New Install:** This Calibration was previously know as an Air Purge Health Check, this calibration will purge the air from the DeltaForce system.
- **Manual Test:** This Calibration was previously know as the Advanced Applied Force Health Check, this calibration verifies the health of the DeltaForce hydraulic and electrical components.

Zero Load Sensors

Select Zero Load Sensors to access the Zero Load Sensors Calibration. This Calibration will Zero all Load Sensors, and should be performed on all new installations and at the start of each season. The Implement must be lifted to commence this test.

Press Continue when all Pre-test Checklist requisites are met

The screenshot shows the 'Zero Load Sensors' calibration screen. At the top, a breadcrumb trail reads 'Setup > Calibrations > Down Force > Zero Load Sensors'. Below this is a progress bar with three steps: 'Preview' (highlighted in green), 'Step 1', and 'Summary'. The main content area is titled 'Prepare to Calibrate' and is split into two columns. The left column, 'Calibration Description', states: 'This test will perform a Down Force Sensor calibration process to zero the Sensors'. The right column, 'Pre-test Checklist', contains a single item: 'Implement Lifted' with a green checkmark icon. At the bottom, there are two buttons: 'Cancel' with a red 'X' icon and 'Continue' with a green right-pointing arrow icon.

When the implement is completely raised press continue to Zero all Load Sensors.

The screenshot shows the 'Zero Load Sensors' calibration screen at 'Step 1: Raise Implement'. The progress bar now highlights 'Step 1'. The main content area is titled 'Raise Implement' and features an icon of a plow being lifted. Below the icon, the text reads: 'Completely raise the implement. Press continue to save.' To the right of this text is a table titled 'Down Force (lbs)' with 10 rows, numbered 1 through 10. Each row has a green bar representing the down force, and all values are currently '0'. At the bottom, there are two buttons: 'Cancel' with a red 'X' icon and 'Continue' with a green right-pointing arrow icon.

Zero Load Sensors Calibration is complete. Press Done to finish the Calibration.

The screenshot shows the 'Zero Load Sensors' calibration screen at 'Step 1: Calibration Successful'. The progress bar now highlights 'Summary'. The main content area is titled 'Calibration Successful' and contains the text: 'Press Done to exit.' To the right of this text is the same 'Down Force (lbs)' table as in the previous screenshot, with 10 rows, numbered 1 through 10, and all values are '0'. At the bottom, there are two buttons: 'Recalibrate' with a green circular arrow icon and 'Done' with a green checkmark icon.

New Install (Air Purge Test)

This is necessary for new install's and upon replacement of DeltaForce hydraulic components, to verify hydraulic system health and capabilities. The Implement must be lifted to commence this test.

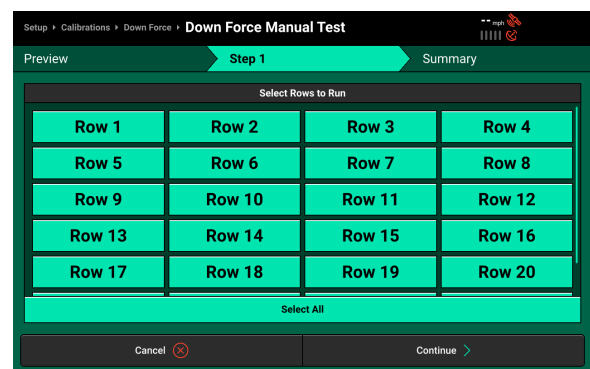
Successful Test: Visually verify that all cylinders fully extended and retracted a minimum of 3 times. In certain cases you will have to cycle the cylinders up to 9 times depending on the amount of air in the hydraulic system.

Step 1:

The bottom pin on the DeltaForce Cylinders must be unpinning. This test will extend and retract the cylinders, make sure the cylinders will not hit on any row unit obstructions when fully extended.

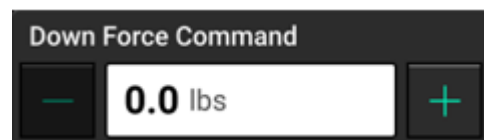
Step 2:

Open the Manual Test by going to Setup > Calibration > Down Force > Manual Test > Continue (When all pretest requisites are met). Then Select all rows.



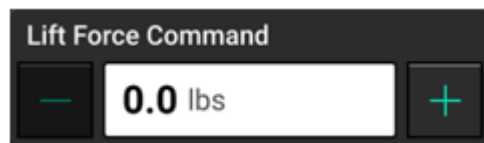
Step 3:

- Start by pressing the Down Force Command + button until you get to 240lbs, let the system hold that for 10 seconds.
- Then press the — button until the weight reading is back at 0 Lbs



Step 4:

- Then press the Lift Force Command + button until you get to 180 lbs, let the system hold that for 10 seconds. Cylinders should retract at this point.
- Then press the — button until the weight reading is back at 0 Lbs.



Repeat Steps 3 and 4, three times, or until Air Purge is satisfied.

Manual Test (Advanced Applied Force Test)

Select Manual Test to access the Manual Test Calibration. This Calibration will allow you to verify the health of DeltaForce hydraulic and electrical components. This should be performed on all new installations and at the start of each season. The Implement must be lifted to commence this test.

Successful test: All row units lifted and lowered.

Press Continue when all Pre-test Checklist requisites are met.

Setup > Calibrations > Down Force > Down Force Manual Test

Preview Step 1 Summary

Prepare to Test

Test Description
This manual test will try to lift the row unit. If your row units weigh more than the amount of force, then the row units will not move, and you will not be able to see the results. If needed, please remove some weight from your row units before proceeding.

Safety Warning
Maintain a safe distance from the implement!

Pre-test Checklist

- ✓ Tractor Running
- ✓ Hydraulic pressure to alternator (if applicable)
- ✓ No seed required
- ✓ No vacuum required

Cancel Continue

Select all rows that need to extend or retract, or if all rows need to be extended or retracted press Select All, then press Continue.

Setup > Calibrations > Down Force > Down Force Manual Test

Preview Step 1 Summary

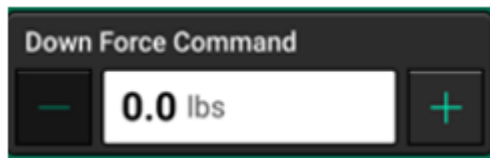
Select Rows to Run

Row 1	Row 2	Row 3	Row 4
Row 5	Row 6	Row 7	Row 8
Row 9	Row 10	Row 11	Row 12
Row 13	Row 14	Row 15	Row 16
Row 17	Row 18	Row 19	Row 20

Select All

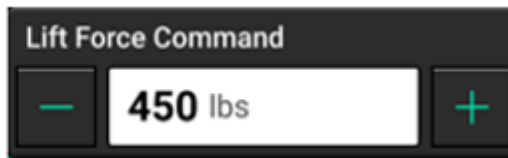
Cancel Continue

Manual Test (Continued)



Down Force Command

— 0.0 lbs +



Lift Force Command

— 450 lbs +

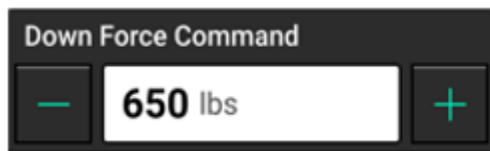
Step 1:

Testing the Lift Circuit

- Start by pressing the + button on Lift Force Command until you get to **450 lbs**.
- Row Units should lift on there own at this point or with slight assistance.

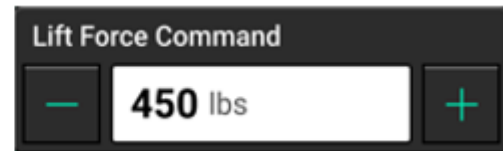
Note: If row units don't lift at this point, there may be an issue with the Lift Circuit.

Note: Switch to the Lift Tab to view Command (PSI) and Duty Cycle.



Down Force Command

— 650 lbs +



Lift Force Command

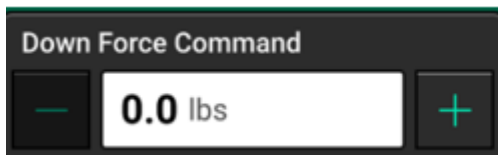
— 450 lbs +

Step 2:

Testing the Down Circuit

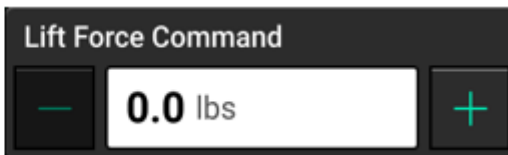
- Leave the Lift Force Command at **450 lbs**.
- Press the Down Force Command + button until you get to **650 lbs**.

Note: Row Units should now return to the down position, if any row units stay lifted at this point there may be an issue with the Down Circuit.



Down Force Command

— 0.0 lbs +



Lift Force Command

— 0.0 lbs +

Step 3:

Test is complete.

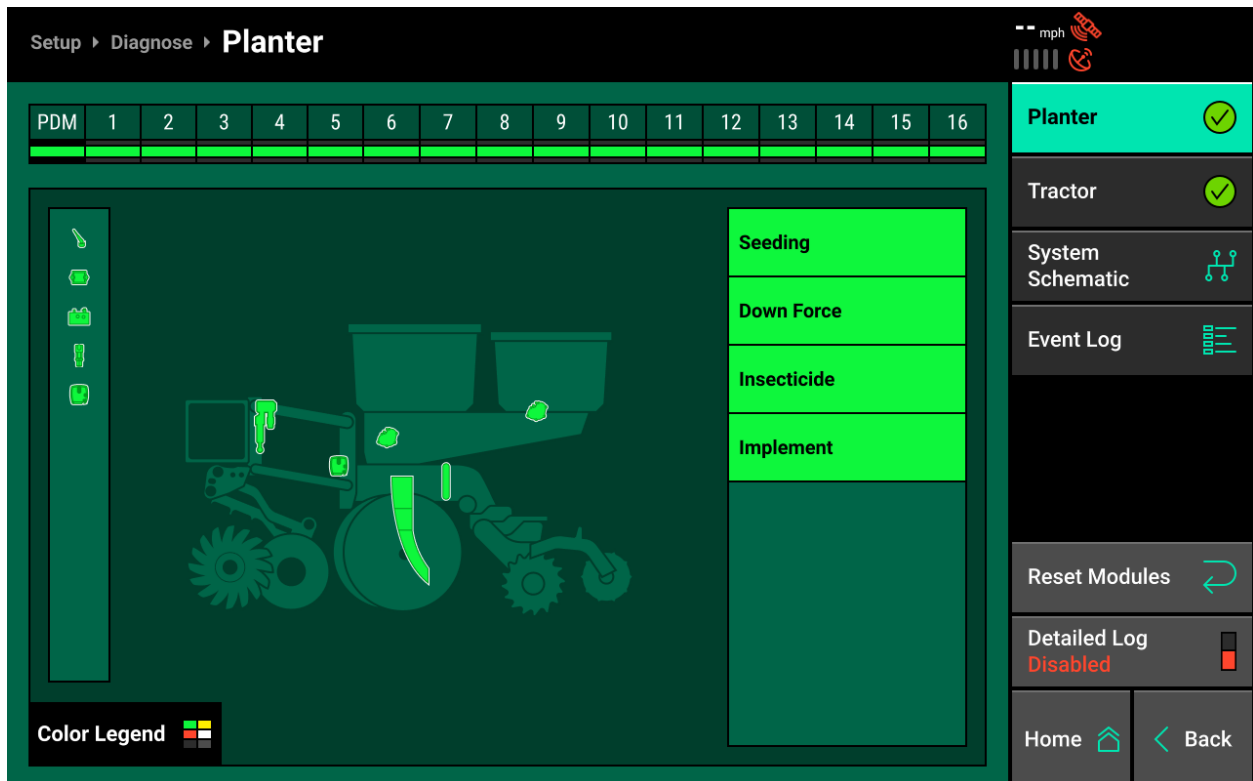
- Press the Lift Force Command — button until you get to **0.0 lbs**.
- Press the Down Force Command — button until you get to **0.0 lbs**.

Click Done to complete test.

Diagnostics

Diagnose Screen

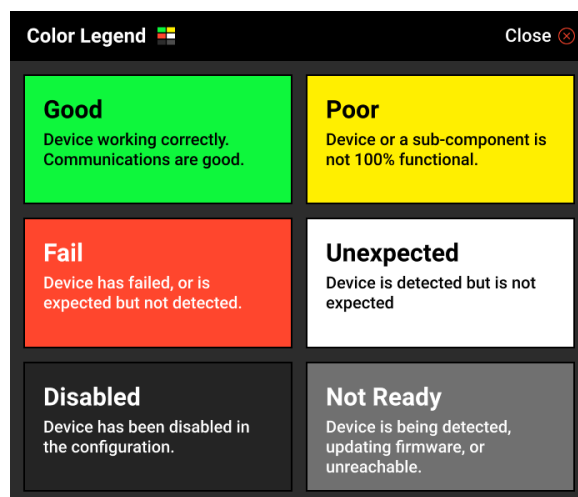
Navigate to Setup > Diagnose to view the Diagnose screen. The Diagnose screen is the primary location for troubleshooting issues related to the operation of the 20|20 system and all products configured on the monitor. An icon for each configured system is superimposed over a graphic of the appropriate implement. Additionally, there is an implement bar at the top of the screen displaying the health of each row.



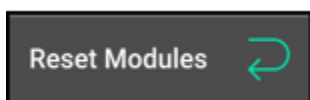
Color Legend



The modules and system names displayed on the implement graphic and bar will appear in different colors depending on module health. Press Color Legend in the lower left corner of the screen to view a description of what each color indicates.



Reset Modules

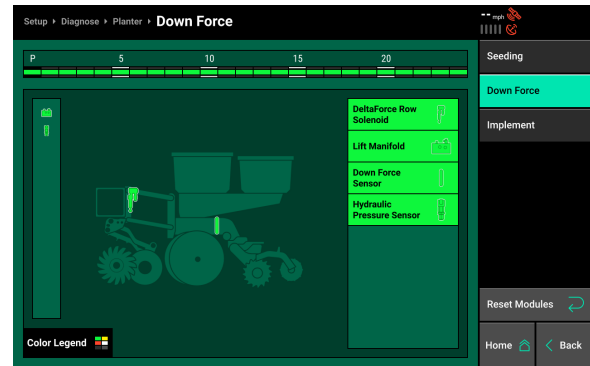


Press the Reset Modules button to break and reestablish all CAN communication and daisy chain identification. This function is often used as a troubleshooting tool for communication issues. It may be necessary to press reset modules after setting up a new system(s) to cause the 20|20 to recognize system modules.

Note: Due to software changes for sprayer and seeder compatibility, after performing a Reset Modules or power cycle in limited release software versions 2023.1 and onward, if a daisy chain break is present in the physical harnessing, all components after the daisy chain break will display red on the diagnose screen. The break must be addressed before functionality is restored.

DeltaForce Diagnostics

Press Down Force to view all configured modules for that system. Press each component to view detailed diagnostics for those modules.



DeltaForce Row Solenoid

Command (psi) – Commanded Down Force PSI of each DeltaForce Cylinder.

Duty Cycle – Displays the DeltaForce Row Solenoid output over the operating range, 0 – 100%.

Lift Manifold

Command (psi)– Commanded Lift Force PSI of the Lift Manifold.

Duty Cycle– Displays the Lift Manifold output over the operating range, 0 – 100%.

Down Force Sensor

Down Force (lbs)– Displays Load Sensor weight reading in lbs.

Hydraulic Pressure Sensor

Lift Manifold (psi)– Displays Lift Manifold PSI.