

Hydraulic Down Force–2 Channel

The gauge wheel sensors measure the weight carried by the gauge wheels. The system uses this information to adjust the down force so that the planter is firmly on the ground, to ensure correct planting depth, while trying to reduce any compaction risk.

Load Configuration

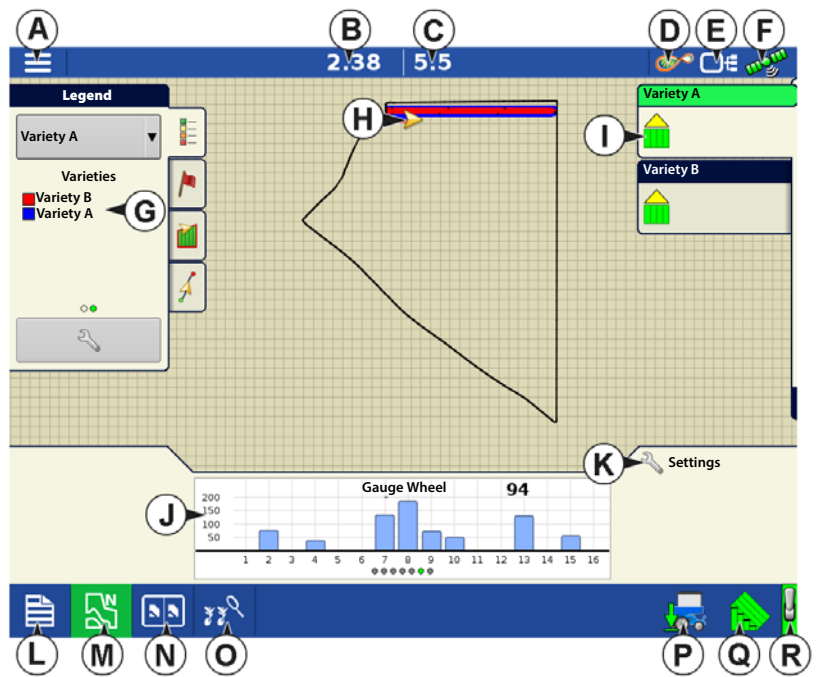


Press the Planting App from the home screen. This will take you through the steps needed to load a configuration.

Map View

Once a configuration has been completed, the Map View screen appears.

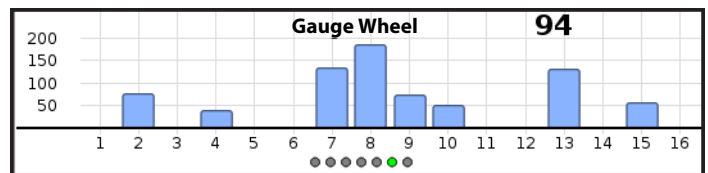
- A. Menu button
- B. Total Logged Field Area
- C. Ground Speed
- D. AgFiniti Status Indicator
- E. Diagnostics
- F. GPS Signal Indicator
- G. Display Legend
- H. Vehicle Icon
- I. Product Control toolbox
- J. Bar Graph
- K. Settings button
- L. Event Summary
- M. Map View
- N. Split screen
- O. Advance Seed Monitoring
- P. Down Force Icon
- Q. AutoSwath
- R. Master Switch Status



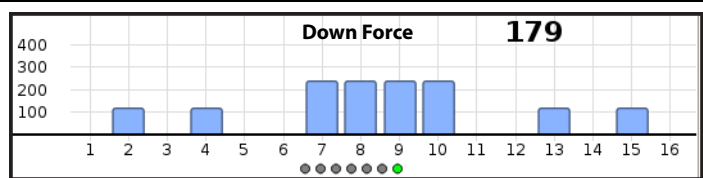
NOTE! Pressing the Map View button will cycle between the available Map Screen views, and the appearance of the Map View button changes.

Bar Graphs on Run Screen

Bar Graphs on Run Screen show **Gauge Wheel Load** and **Down Force** being applied to row unit. Swipe bar graph to advance to next graph. Bar graph may also contain graphs for Advanced Seed Monitoring.



Down Force is not shown when in Monitor Only mode.

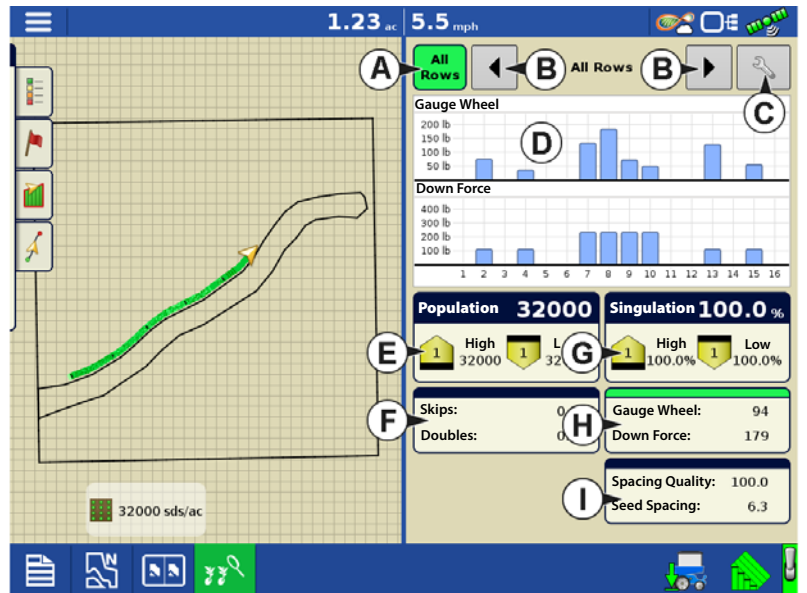


Planter Performance Screen



Press Advanced Seed Monitoring button

- A. All Rows
- B. Previous/Next Row Toggle
- C. Seed Monitor Options
- D. Bar Graph
- E. Population
- F. Skips/Doubles
- G. Singulation
- H. Down Force
- I. Spacing Quality



i NOTE: The Planter Performance Screen will only be available if a seed monitor module is connected and configured.

Screen will show Gauge Wheel readings and Down Force across the row sections of the planter.

Down Force will not be shown when using Monitor Only

Advanced Seed Monitoring provides planter performance monitoring of seed meter singulation, skips/doubles and spacing quality, along with population and spacing information for all rows when planting compatible crops.

Down Force Status

Icon on the lower right side of Map Screen shows the status of Down Force.



Active - Hydraulic Down Force is in an Active state - automatically controlling the down force per channel based on the gauge wheel load readings. To be Active, the implement switch needs to be in a planting state, speed needs to register on the display greater than 0.5 mph (0.8 km/h), and the tractor hydraulics engaged.



Inactive or Hold - Hydraulic Down Force is in an Inactive state or Hold state. Planter is either raised, the display is not registering speed, or Automatic Hold is active while planting in an AutoSwath area.



Manual Mode - Hydraulic Down Force is in Manual Mode. Manual Mode can be activated from the Planter Options screen.



Manual Hold - Hydraulic Down Force is in a Hold state - this Hold state is activated by the operator by toggling the Down Force icon. The Hydraulic Down Force can be set to an Active state by toggling the Down Force icon again, or raising and lowering the planter.

i NOTE: Manual Hold can be a useful tool for operators who wish to Hold down force in certain areas of their fields, instead of letting the Hydraulic Down Force system actively control in these said areas.

Planter Options Screen

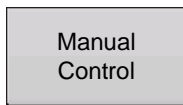


OR



Selecting Automatic Control

enables the system to control down force based on gauge wheel sensor readings.



Selecting Manual Control

enables the operator to set the downforce as they see fit.

Status—Displays current status of control system.

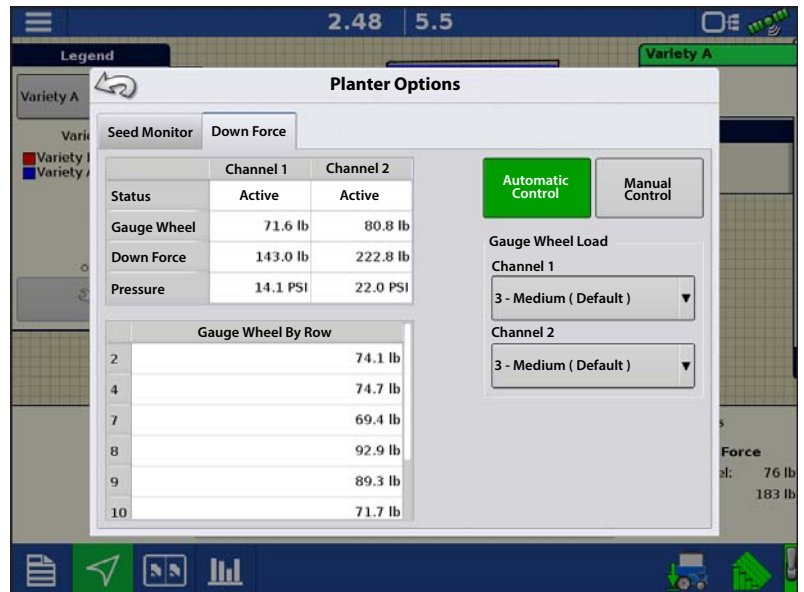
- **Active**—System is actively controlling down force
- **Inactive**—System is not actively controlling down force
- **Hold**—Pressure is being held constant due to manual hold or automatic hold

Gauge Wheel—Instantaneous channel average gauge wheel load

Down Force—Instantaneous supplemental down force

Pressure—Pressure reading from corresponding channel pressure transducer

Gauge Wheel By Row (table)—Instantaneous gauge wheel load for each monitored row



ATTENTION!: Gauge wheel sensors will “re-zero” when the planter is raised for 10 seconds, and will then continue to re-zero every second until the planter is in a down state. Re-zeroing provides more accurate gauge wheel data upon each planting pass. This is also a good troubleshooting measure to determine if a gauge wheel sensor is behaving appropriately.

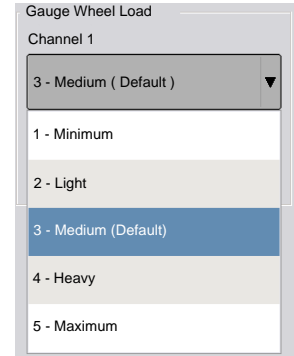
However, gauge wheel sensors will never re-zero to 0.0 lbs; once a sensor re-zeros the displayed load should be roughly anywhere from 0.1 to 5.0 lbs.

Gauge Wheel Load

Set offset to target gauge wheel load as calculated by the down force system.



ATTENTION! User can select 1 of 5 available gauge wheel load settings. Each available setting is an offset to the continuously calculated target gauge wheel load. Target Gauge Wheel Load is defined as: The amount of gauge wheel load necessary to achieve proper depth 100% of the time, while minimizing compaction as much as possible (without risking loss of proper planting depth).



Setting	Offset to Target
Minimum	-100 lbs
Light	-50 lbs
Medium (default)	0
Heavy	+50 lbs
Maximum	+ 100 lbs

Example: Based on the ground conditions in a specific area of a field, the down force system applies 150 lbs of supplemental force in order to achieve a target gauge wheel load of 100 lbs. However, if the Gauge Wheel Load setting is set to **Heavy**, the target gauge wheel load is now 150 lbs. The supplemental force will adjust accordingly in order to achieve the new target gauge wheel load. (Keep in mind, the target gauge wheel load is a continuously calculated value.)



WARNING! When operating on light or minimum, shallow planting can occur.

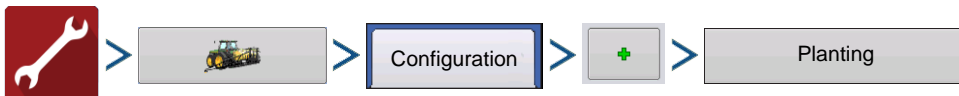
Create Configuration

A wizard will guide you through the process of selecting or creating a configuration with application settings.

The configuration can be started in two places:



OR



Your Operating Configuration will then be viewable when you start a new Field Operation with the Application Wizard.



You can also use the **Manage Equipment** button to create or edit specific vehicles and implements.

Hydraulic Down Force–2 Channel

At the **Down Force Options** screen, the operator can choose a Down Force configuration from the drop down menu:

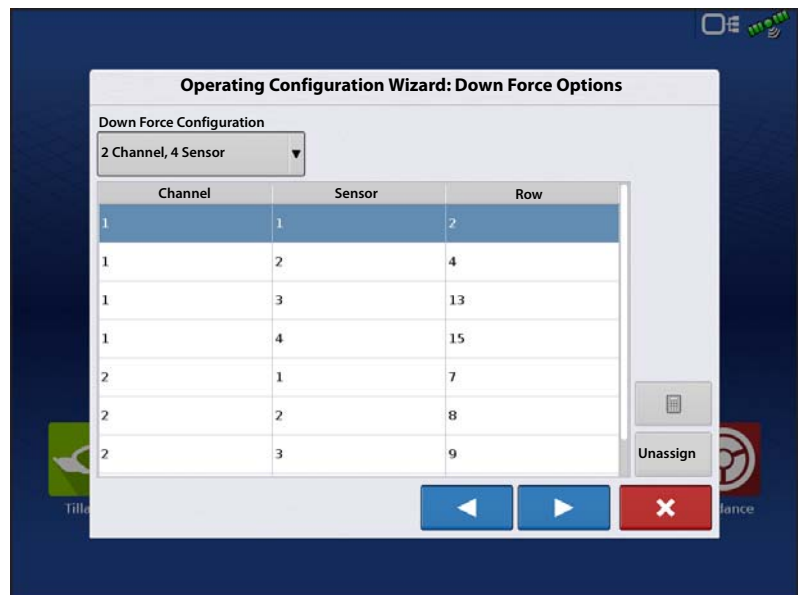
The rows listed are the recommended rows where the sensors should be installed.



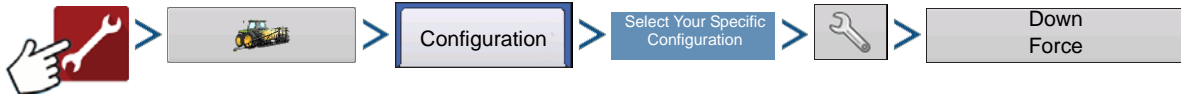
The operator can assign rows if custom installed. (Select **Custom** from the drop-down menu.)

User can also unassign sensors from rows if a sensor is not installed there.

Row 1 is the on the left side of the planter (when standing behind the planter facing forward).



Setup Down Force Configuration

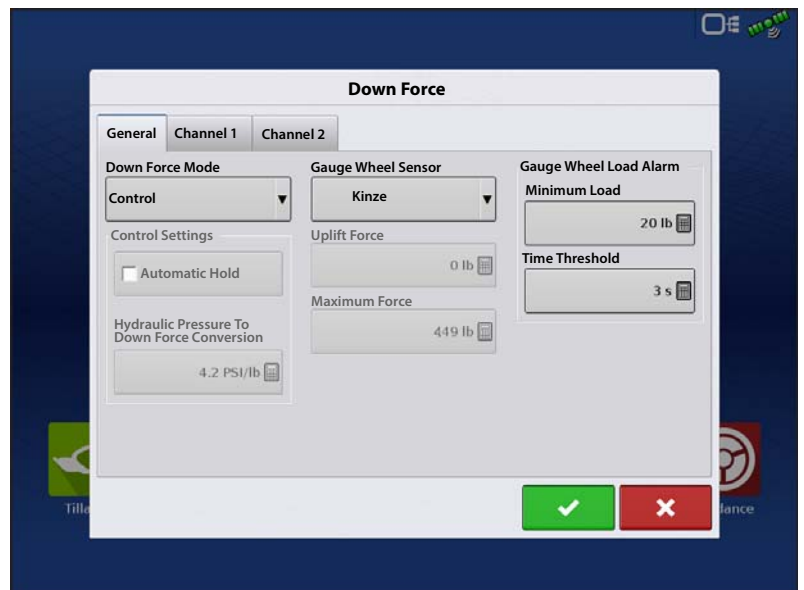


Down Force screen General tab

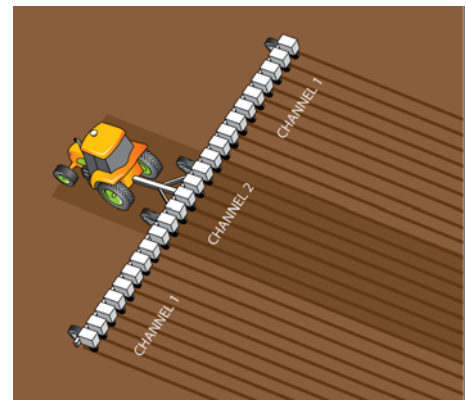
Down Force Mode

Monitor Only mode—provides the operator with information to determine if the row units are properly engaging the soil. If they are not, the operator needs to adjust the planter to correct the situation.

- Allows user to monitor the weight on the gauge wheels but does not adjust down pressure.
- Control Settings (Automatic Hold and Hydraulic Pressure to Down Force Conversion) are grayed out when using Monitor Only mode.



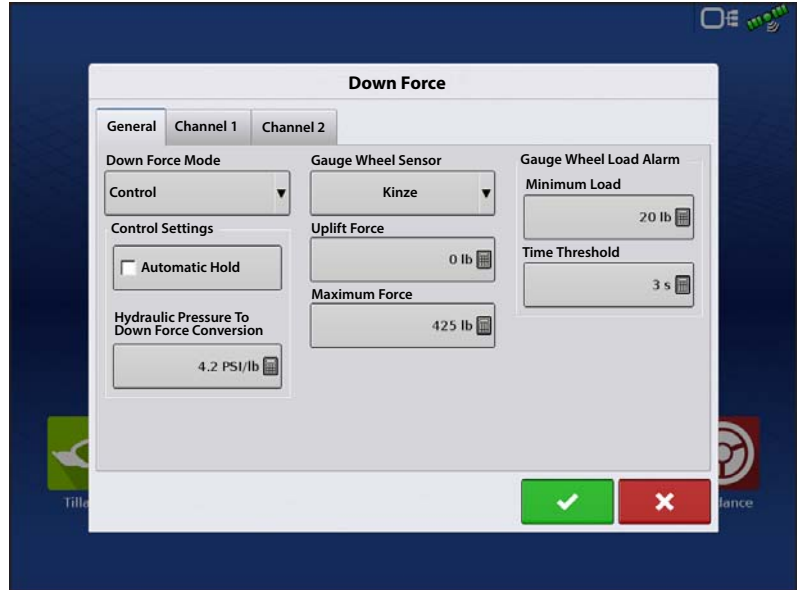
Control mode—as the planter travels across the field and encounters varying soil conditions (soil types, compaction zones, levels of debris) the display makes adjustments to the down force actuators on the row units, according to the operator’s settings, to maintain the correct seed placement in the soil.



The system can be split between two channels to allow the down force to be adjusted separately on the planter wings and center section, where soil compaction is more likely to occur.

- Allows user to monitor the weight on the gauge wheels and have system automatically adjust down force.

Automatic Hold—Enabling this option will disengage active control (system will Hold), when any portion of the planter enters a no plant zone, such as boundaries, or previously planted areas. Use **caution** with this option if planting long point rows. Alarms will be disabled when system is in Hold.



Hydraulic Pressure to Down Force

Conversion—adjusts system to accurately display changes to hydraulic down force. This setting is row unit specific.

Force Conversions	
Parallel Linkage	Pressure Conversion
Deere Short Arm	4.5 psi/lb
Deere Long Arm	3.8 psi/lb
Kinze 3000	4.2 psi/lb
Kinze 4000	5.1 psi/lb
White 8000/9000	4.8 psi/lb

Gauge Wheel Load Sensor—type of gauge wheel load sensor used. This is specific to the make of your planter.

i NOTE!: There are two selections for John Deere gauge wheel sensors. Select the appropriate one based on the part number installed on the planter. Only ONE John Deere sensor type can be installed; the two John Deere types are not compatible together on the same planter.

Hydraulic Down Force–2 Channel

Uplift Force—usually 0 unless planter is equipped with uplift springs to provide an upward force on row units.

Uplift Force	
Parallel Linkage	Uplift Force
Deere Short Arm	140 lbs
Deere Long Arm	
4 spring design	160 lbs
2 spring design	100 lbs
Kinze 3000	140 lbs
Kinze 4000	130 lbs
White 8000/9000	100 lbs

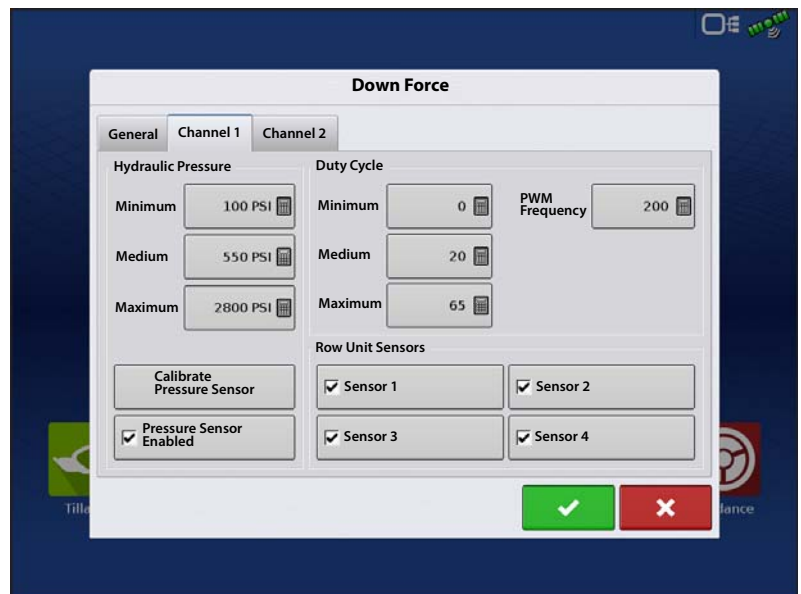
Maximum Force—used to limit the down force created by the actuator. The default is 425 lbs same as the factory airbag.

i NOTE!: When an uplift force amount is entered the actual Maximum Allowable Force that can be applied is now increased by that amount, in order to accommodate for the uplift. This takes place internally in the control module and is not displayed to the operator. Operators should enter Force Settings as they normally would.

Gauge Wheel Load Alarm—sets alarm to notify operator when system goes below Minimum Gauge Wheel Load for a set amount of time (Time Threshold).

Down Force Channel 1 and Channel 2 tabs

The pressure and duty cycle settings are to help the display control the hydraulics. The defaults should be correct.



Hydraulic Pressure (Unavailable for Monitor Only)		
AgLeader Valve Block Calibration		
Operating Limits	Pressure	Duty Cycle
Minimum	100	0
Medium	550	20
Maximum	2800	65

PWM Frequency—The frequency that the PWM control valve is pulsed at should be set to 200.

Calibrate Pressure Sensor—Unavailable for Monitor Only

Pressure Sensor Enable—Unavailable for Monitor Only

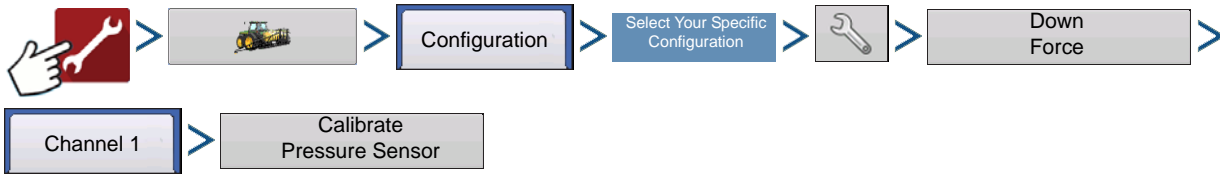
Row Unit Sensors—Sensors 1-4 check boxes. These check boxes allow the operator to disable gauge wheel sensors. If a sensor fails in-field, the failed sensor can be disabled from this screen.



ATTENTION!: Automatic Down Force can continue to operate as long as there is 1 active sensor on a channel.

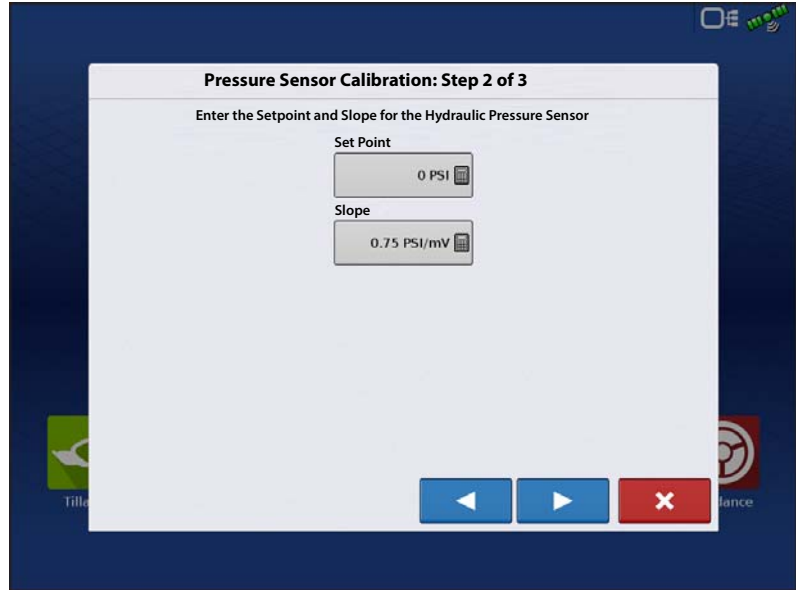
Calibrate Pressure Sensor


(Only able to calibrate when Control Mode has been selected)



Setpoint—enter the current pressure of the system found on the mechanical pressure gauge on the valve block

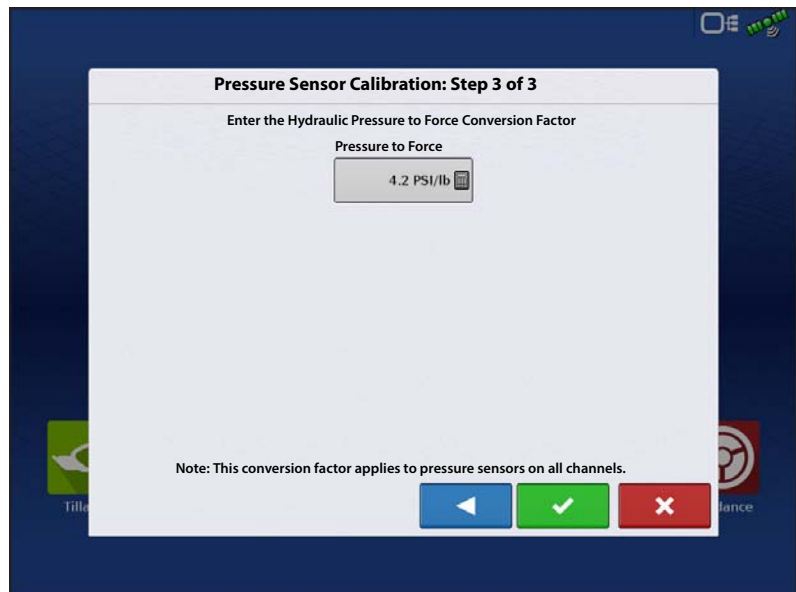
Slope—pressure sensor calibration, do not adjust this value



Pressure to Force—Enter the specific pressure to force conversion ratio for the planters parallel linkage arm. Press the . Pressure Sensor Calibration is complete.



NOTE!: Pressure Sensor must be enabled in order to display "Down Force" on the run screen for that specific channel of control.



Down Force Diagnostics screen

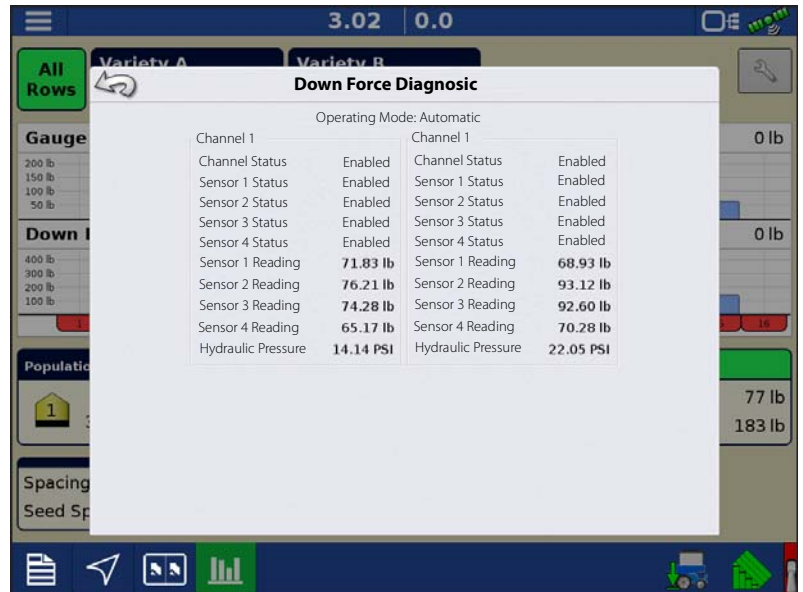


Pressing on the CAN button, located in the upper right corner of the display, opens the **Devices** screen. Highlight the **Down Force Module** in the CAN A tab and press the **Diagnostics** button in the lower right-hand corner. Technical support may request that you look at these screens for help in diagnosing a problem.

In this screen you can view the current **Operating Mode**, **Channel Status**, individual **Sensor Status**, individual **Sensor Readings**, and **Hydraulic Pressure**.



NOTE! Sensor Readings are the raw pound value being received by the Control Module. The value seen on Diagnostic screen is not dependent on the planter operational state, therefore making this a valuable tool to diagnosis sensor issues or inaccuracies.



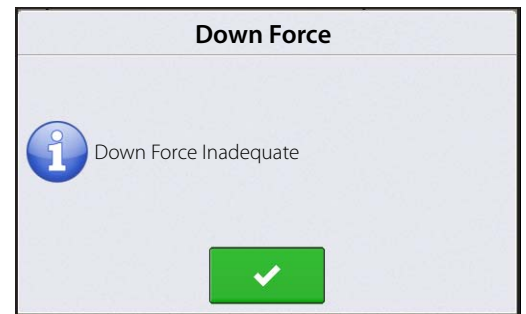
Down Force Alarms

Down Force Inadequate

System hydraulic pressure is at maximum pressure, but the Down Force system is not achieving acceptable gauge wheel load.

Recommendation—If supplemental force is at maximum, increase Maximum Force on the Down Force setup screen.

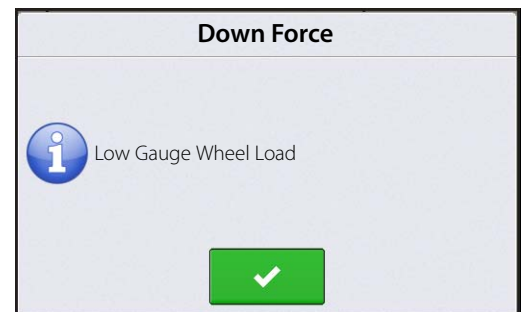
-Planter may not weigh enough to handle field conditions - toolbar may be lifting. Verify if the toolbar is lifting by checking parallel arms while planting. If weight needs to be added to the toolbar, contact planter manufacturer.



Low Gauge Wheel Load

Down force system does not achieve acceptable gauge wheel load

User defined alarm to signal operator if planter is losing planting depth.

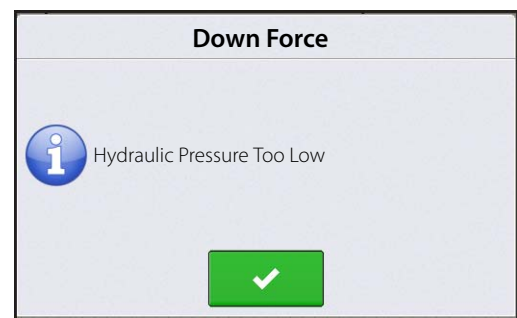


Hydraulic Pressure too low

Down force system commanding more down force but hydraulics are not reacting

Recommendations:

- Check tractor remote is on
- Check that enough hydraulic fluid is directed to down force system



Pressure Sensor Failure

Problem—Pressure sensor is outside voltage range.

Resolution—swap cables with other channel (if applicable), re-zero pressure sensors. If problem persists on same channel, replace pressure sensor. If problem is now on other channel, inspect/replace cable.

Row Module Communication Lost

Problem—Row module communication lost.

Resolution—Inspect cabling of row module. Replace row module.

Row Module Failure

Problem—Row module is not sensing inputs. Row module is power cycling at intervals of less than 2 seconds

Resolution—Swap module with different row. If problem follows, replace module. If problem exists on same row, inspect or replace load sensor.

Row Modules does not match the display configuration

Problem—Configuration was set to a number of sensors that was not detected by the system.

Resolution—Create a configuration that matches the number of sensors used. Check that all row modules are communicating. Flashing green LED on the row module indicates proper communication.

How to use Manual Override

Manual Override of the control valve may be needed if all electronic control of the Down Force System is lost, or the display becomes unusable. Manual Override allows the Down Force system to apply a constant force in order to achieve planting depth (similar to down force springs). If the need arises to put the control valve into Manual Override, follow these steps.

Steps:

1. Engage hydraulics for the Down Force system.
2. Locate the Down Force control valve. Push the red knobs down and twist. The knobs will "pop out" to their outer position. (The inner position is used for Auto Control).
3. Locate the allen head adjustments just above electronic PWM valve. Loosen the lock nuts on the allen head adjustments.
4. Screw the allen head adjustment IN to increase pressure sent to actuators; screw OUT to decrease pressure.
Pressure (PSI) sent to actuators is shown on analog gauges on the valve block.
5. Refer to the Down Force setup screen and note the Hydraulic Pressure to Down Force Conversion ratio. Multiply this value by the desired down force; this will give you the appropriate pressure to adjust the valve to.

Example: Kinze 3000 planter = 4.2 PSI/lb. The desired down force is 250 lbs.

$4.2 \text{ PSI/lb} \times 250 \text{ lbs} = \mathbf{1050 \text{ PSI}}$.

FAQ

What do I set the input hydraulic source to?

The vehicle hydraulic source (SCV) will need to be set at max flow.

Where do I plug in an implement switch?

Generation 1 modules will broadcast the implement switch status over the CAN bus. No additional implement switch is needed.

What if I don't have any other generation 1 modules?

You will use the Ag Leader CAN implement switch module P/N 4002911 and cable P/N 4002658 in conjunction with the standard implement switch.

What if my cables don't reach the rows for which I have installed gauge wheel sensors?

It may be acceptable to choose rows the cables will reach, as long as channel 2 sensors are on the center 6 rows, and channel 1 sensors are outside that.

What if I don't have any free SCV connections for the down force valve?

Teeing into existing lines is acceptable. Do not tee into the vacuum fan line if adjusting fan RPM on the tractor with a knob or dial. Teeing into the line before a flow limiter on the planter would be acceptable. Teeing into the hydraulic drive supply line would be the best option. Do not tee into Rawson Drive supply line.

What if my hydraulic oil gets too hot?

Ag Leader sells a Load Sense kit (P/N 4101225) to help manage oil temperatures. Note: This system will not help if using SCV to control hydraulic drives. In this case, an auxiliary oil cooler may need to be installed.

What if my hydraulic actuator does not extend far enough to reach the lower bracket with row unit at bottom travel?

Purchase one spacer kit (P/N 4101201) per row. This will install at the bottom of the ram. (Commonly used on John Deere long parallel arms)

My Kinze 3000 planter has rows that are offset 4" back, causing the upper actuator bracket to not line up with the lower actuator bracket.

Purchase one spacer kit (P/N 4101204) per row. This will move the upper bracket 4" rearward.

How does the system know the difference between the row modules on channel 1 and those on channel 2?

The Channel 1 row modules will connect to the cable labeled "Type 1" while channel 2 row modules will connect to "Type 2" cables.

Am I missing something to plug into the 3 pin connector on the master hydraulic down force module?

This connector is not used.

Why is the gauge wheel load bar graph constantly spiking and then going to 0?

This can happen if the Channel 1 pressure lines are routed to channel 2 sensors. Ensure channel 1 components (Down force pressure, and gauge wheel load sensor wiring) are on the wings, and channel 2 components are on the center 6 rows. Ensure channel hoses are going to correct channel of down force valve. Ensure PWM/pressure sensor cables are going to correct channel of Down Force Module and Down Force Valve.

What are the red knobs on the down force valve?

This allows for manual adjustment of down force in the event of electronics failure. Push and twist the knob to move between automatic adjustment (inner position) and manual adjustment (outer position).

Why does the system need 3 hydraulic lines (Pressure, Return and Tank)

Under normal operation, pressure in the down force system is increased through the Pressure line and relieved through the Return line. When the planter runs over a terrace or a water way, the excess pressure is released through the Tank line. All three lines **MUST** be connected.

What happens if my Pressure and Return hoses are connected backwards on my Hydraulic Down Force valve block?

If the Pressure and Return hoses are connected backwards on the Hydraulic Down Force valve block, the hydraulic flow will be sent directly to the channels connected to the valve block. Once this happens, the actuators on all of the channels will be applying max supplemental force. On the screen of the controlling display, this may likely result in very high gauge wheel load. This will occur on all variations of valve blocks that Ag Leader supports.

Can an open-center tractor be used for Ag Leaders Hydraulic Down Force?

Open center tractors are not recommended for use with Ag Leaders Hydraulic Down Force.

Troubleshooting

Problem—Down Force will not adjust in Auto Control while planting (Down Force Holds)

- Down Force indicator arrow stays Yellow while planting.

Solution:

- Verify implement switch(s) polarity is correct.

- Verify implement switch(s) are tripping when planter is lowered.

1. With planter lowered, verify implement switch(s) have tripped.
2. Check the polarity of the implement switch is correct. Implement switches can be swapped from Normally Open to Normally Closed by switching 3-pin weatherpack connections.
3. If Generation 1 SeedCommand modules are installed, verify the implement switch(s) is hooked to the correct module according to the hierarchy.

If an Implement Switch module is installed, verify the indicator light turns blue on the module when the switch is tripped.

4. Check mounting of implement switch(s).
5. While operating Down Force, verify the toolbar is not lifting causing the implement switch to trip.



ATTENTION! Gauge wheel sensors will "re-zero" when the planter is raised for 10 seconds and will then continue to re-zero **every second** until the planter is in a down state. Re-zeroing provides more accurate gauge wheel data upon each planting pass. This is also a good troubleshooting measure to determine if a gauge wheel sensor is behaving appropriately.

However, gauge wheel sensors will never re-zero to 0.0 lbs; once a sensor re-zeros the displayed load should be roughly anywhere from 0.1 to 5.0 lbs.

Problem—Supplemental Force and Gauge Wheel Load do not appear to reflect each others responses. (Ex: High Gauge Wheel Load on Channel 1, with very little Supplemental Force being applied, or vice versa)

Solution—Verify installation of the Local CAN terminators.

1. The Local CAN is the communication wiring bus that transfers the gauge wheel load readings to the main control module. There needs to be a terminator on each end of this bus.
2. Terminator PN 4002870 will need to be installed on the wiring harness closest to row 1. Terminator 4002871 will need to be installed on the wiring harness closest to the end of the planter (right-hand side when looking at planter from the rear)

Implement Switch Adjustment Problems

Problem A—Down Force is too high at the beginning of a pass after the planter has been raised.

This problem can be caused by the implement switch tripping too late when the planter is being raised. If a row with a gauge wheel sensor comes off the ground before the implement switch trips, there is the chance the sensor will register no gauge wheel load and the system will react to it and apply down force. Once the switch trips, this higher down force is now held. When the planter resumes, down force may be initially excessive until it can relieve pressure.?

Solution—Adjust the implement switch mounting so that it trips sooner when raising the planter. This will allow the system to hold the appropriate amount of down force.

Problem B—Low gauge wheel load is witnessed on a row causing the system to apply Max down force; but after inspection of the seed trench, the problem row appears to be receiving adequate gauge wheel load.

This problem can be caused by the implement switch tripping too late when the planter is being lowered. If a row with a gauge wheel sensor makes contact with the ground before the implement switch trips, there is the chance the sensor will register a load. Since the implement switch has not tripped yet, the gauge wheel sensors are still continuously re-zeroing every second, after the initial 10 seconds. (Ex: 50 lbs of actual load may be displayed as 0 lbs). The down force system will detect the “lower gauge wheel load” and react to it by applying more down force until the sensor reaches an acceptable load.

Solution—Raise the planter to allow the sensors to re-zero with no load on the gauge wheels. Adjust the implement switch so that it trips sooner when lowering the planter. This will prevent the false gauge wheel load readings.

