

Hydraulic Down Force–Individual Row

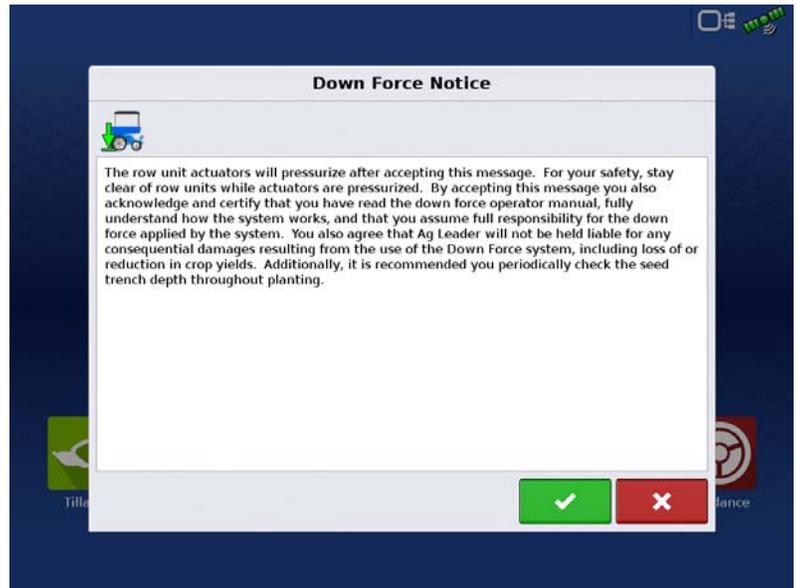
The gauge wheel sensors measure the weight carried by the gauge wheels. The system uses this information to adjust the down force so that the planter is firmly on the ground, to ensure correct planting depth, while trying to reduce any compaction risk. Individual Row Hydraulic Down Force control is only available with the InCommand 1200 display.

Upon starting the display, you will receive the Down Force Notice that will need to be accepted in order to operate the Hydraulic Down Force system.



Configuration

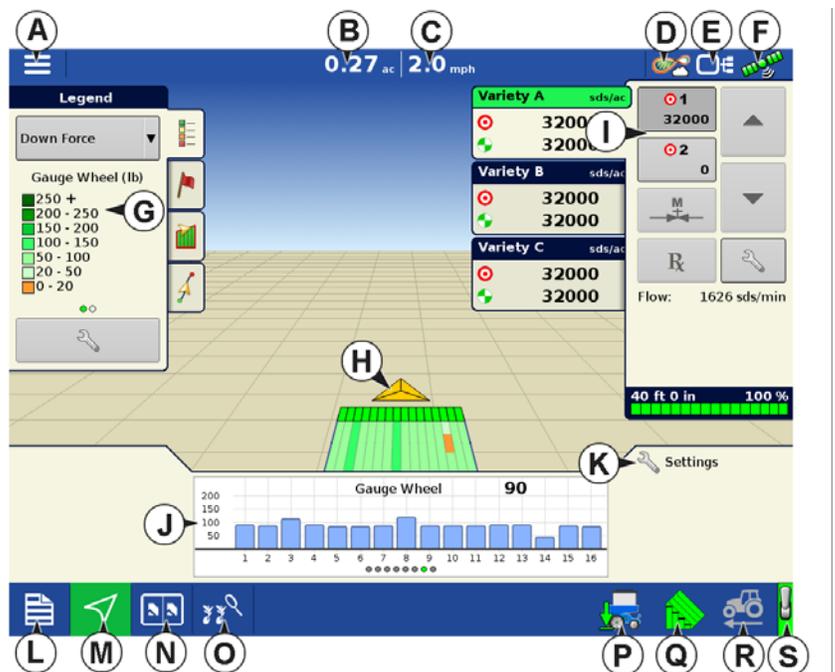
Press the Planting App from the home screen. This will take you through the steps needed to load a configuration.



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. Jump Start
- S. Master Switch Status



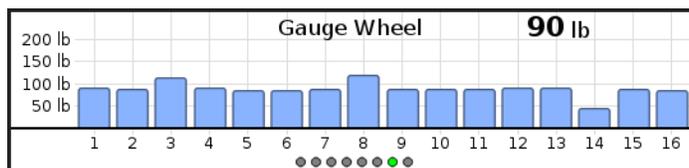
Real time individual row down force data is available on the Map View screen; both Gauge Wheel load and Supplemental Force data is mapped. To display either the Gauge Wheel load or Supplemental Force, select Down Force from the Legend tab. Then swipe the Display Legend (G) left/right to change between Gauge Wheel load and Supplemental Force.



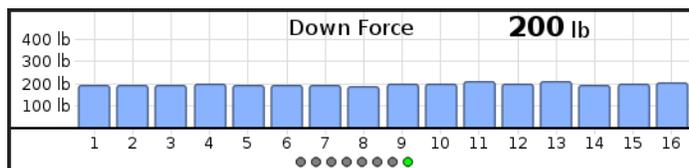
NOTE! Pressing the Map View button will cycle between the available Map Screen views, and the appearance of the Map View button changes.

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.

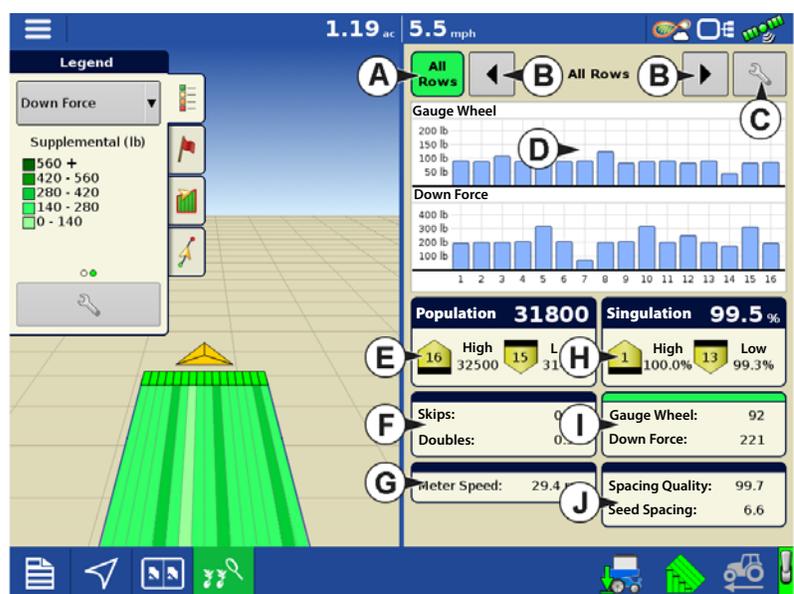


Planter Performance Screen



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. Meter Speed
- H. Singulation
- I. Down Force
- J. Spacing Quality



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 the implement is in an AutoSwath area.

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NOTE!: With AutoSwath active, the entire planter bar will need to be in a previously applied area or boundary area in order for all rows to Hold the Supplemental Force.



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

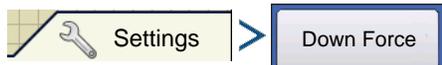


Manual Hold - Hydraulic Down Force is in a Hold state - this Hold state is activated by the operator by toggling the Down Force icon. **The Hydraulic Down Force can only be set back to an Active state by toggling the Down Force icon again.**



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.

Gauge Wheel—Instantaneous gauge wheel load for each row. This is a raw sensor reading; it can be used for diagnostic purposes.

Planter Drives	Gauge Wheel	Down Force
1	80.2 lb	206.5 lb
2	75.0 lb	207.1 lb
3	80.2 lb	195.3 lb
4	81.7 lb	210.5 lb

Gauge Wheel Load: Standard, 3 - Medium (Default)



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.

Down Force—Instantaneous supplemental down force for each row.

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.)

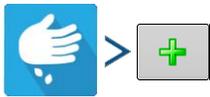


WARNING!: When operating on light or minimum, shallow planting can occur.

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.

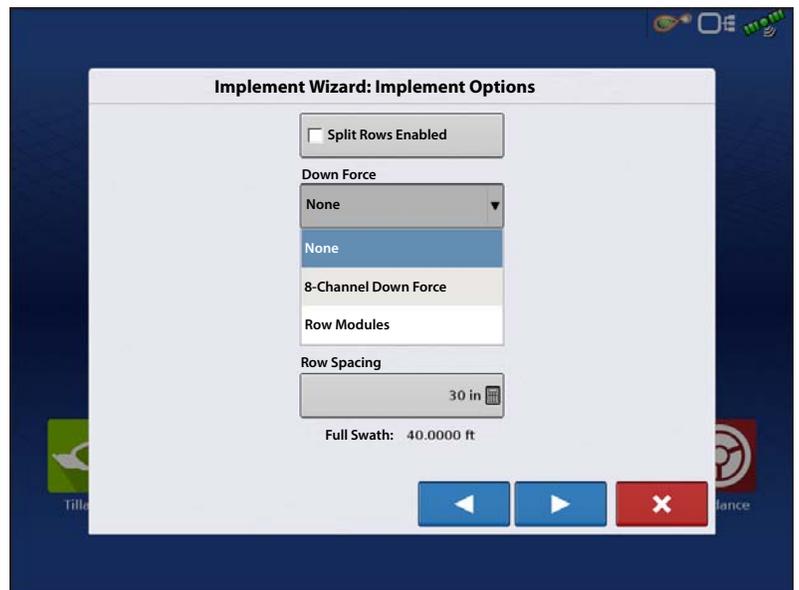


You can also use the **Manage Equipment** button to create or edit specific vehicles and implements.

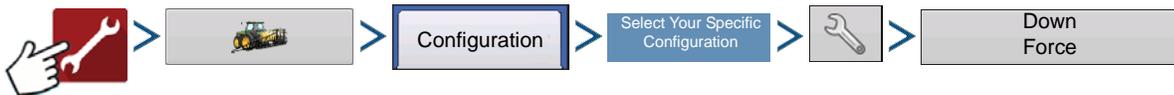
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At the **Implement Options** screen, the operator can choose a Row Module from the Down Force drop down menu:

i NOTE!: This Implement Options screen will only be available if Electric Drive was previously chosen in the wizard as the Seed Rate Controller.



Setup Down Force Configuration

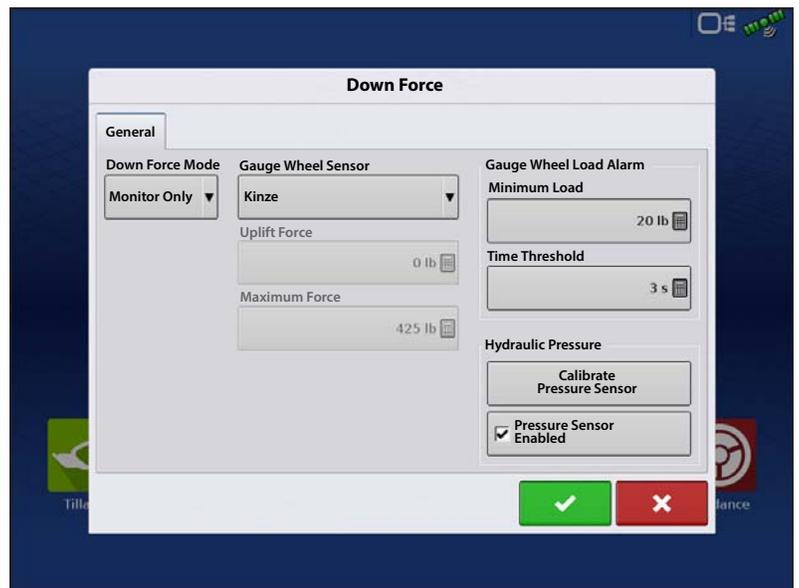


General tab

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.

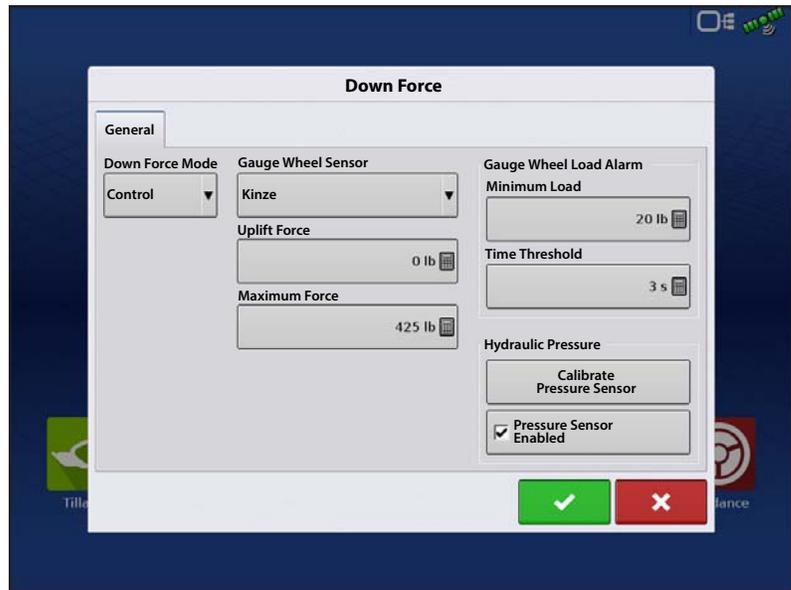
- Allows user to monitor the weight on the gauge wheels but does not adjust down pressure.
- Control related settings are grayed out when using Monitor Only mode.



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 gauge wheel load and the operator's settings, to maintain the correct seed placement in the soil.

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.



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

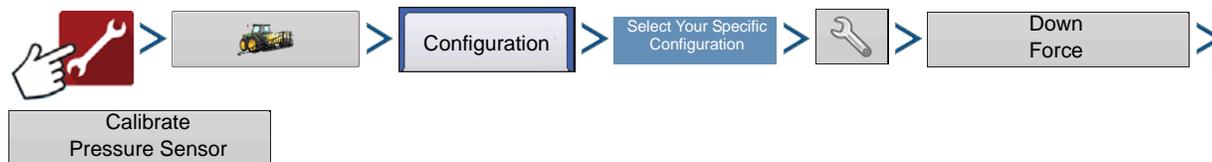
Maximum Force—used to limit the down force created by the actuator. The default is 425 lbs same as the factory airbag.

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).

Calibrate Pressure Sensor

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



If the Hydraulic Pressure (PSI) reading in the Planter Control Master Module diagnostic screen is not accurately reflecting the pressure sent to the control valve, the operator can proceed to calibrate the pressure sensor in attempt and correct the PSI reading.

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Calibrate Pressure Sensor:

1. Verify hydraulic pressure to the control valve is at 0 PSI. This can be achieved by turning the vehicle off, or disengaging SCV remote.

2. Press



NOTE!: No dialog or messages will appear when Calibrate Pressure Sensor is pressed.

3. Pressure sensor is now calibrated.



ATTENTION!: If the Pressure Sensor Enabled box is unchecked, a warning message will appear. With the pressure sensor disabled, automatic down force control will still work as intended. However, there will be no Supplemental Force value, graphs, or pressure sensor alarms.



Advanced tab

In order to access the Down Force Advanced tab, a configuration must be loaded. In the Advanced tab operator can disable a Load Pin or Down Force control, edit the row unit Linkage Type, and set a Target Force for Disabled Rows.

Control Toggle – This allows the operator to indicate if a row has hydraulic down force control. Pressing this button will change the Control status to "Yes" or "No". Multiple rows can be selected together when toggling the control.

Load Pin Toggle — This allows an operator to disable a gauge wheel sensor if one fails in field or enable a sensor to just monitor a row. Pressing this button will change the "Enabled" status for that specific Load Pin to "Disabled". Multiple rows can be selected together when disabling/enabling gauge wheel sensors.

Linkage Type — This allows the operator to change the row unit Linkage Type. Planters may have a combination of short and long parallel arms. Linkage type can be selected independently for each row. Multiple rows can be selected together when changing the Linkage Type.

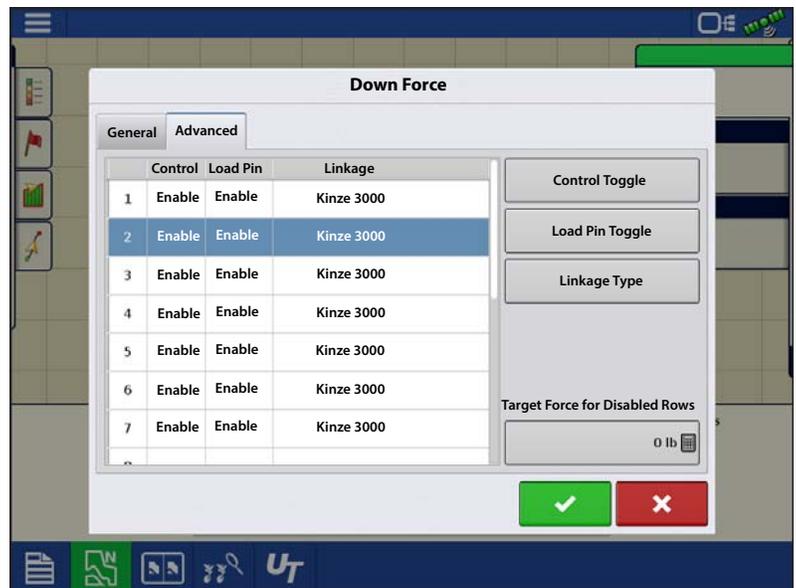


NOTE!: John Deere Short parallel arms have an overall length of 15-3/4". John Deere Long parallel arms have an overall length of 23".

Target Force for Disabled Rows — This allows the operator to set a target Supplemental Force for a row with a Disabled Load Pin. For example, if row 1 is Disabled and 250lbs is entered in this box as the Target Force, row 1 will apply a constant 250lbs of Supplemental Force. The remaining Enabled Rows will continue to function in automatic control mode.



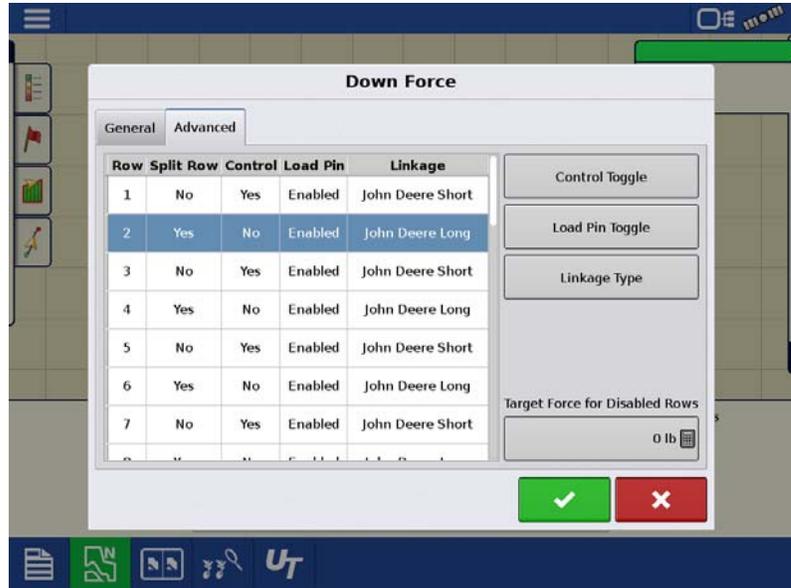
WARNING!: It is recommended to enter a Target Force for Disabled Row when a row(s) are Disabled. If this value is left at 0lbs, the Disabled row(s) will apply 0lbs of Supplemental Force.



Monitoring Planter Rows in Conjunction with Controlled Rows

Individual Row Down Force allows the ability to monitor just gauge wheel load on some planter rows while continuing to hydraulically control the rest of the rows.

Example: A split row planter is setup to control down force on the standard rows, but also setup to just monitor gauge wheel load on the split rows. Split rows that have gauge wheel sensors will need to be set to No for Control, and Enabled for Load Pin. (Split rows that don't have a gauge wheel sensor will need to be set to No for Control, and Disabled for Load Pin.) All standard rows will need to be set to Yes for Control, and Enabled for Load Pin.

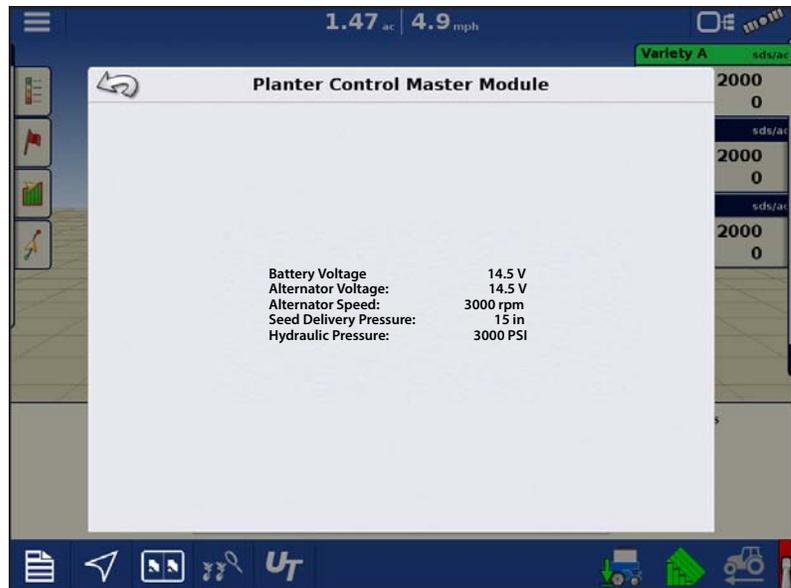


Diagnostics Screen



Pressing on the CAN button, located in the upper right corner of the display, opens the **Devices** screen. Highlight the **Planter Control Master Module** in the CAN B 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 **Hydraulic Pressure**. This is the input pressure to the valve block.



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.

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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.

Gauge wheel sensor types do not match. Please reconfigure.

- The Gauge Wheel Sensor selection in the Down Force settings General tab, does not match the sensor type installed on the planter.
- One or more Row Control Modules are not detecting the gauge wheel sensor.
- One or more Row Control Modules have an incorrectly set gauge wheel sensor type.

Recommendations:

- Verify type or part number of the gauge wheel sensor installed matches the Gauge Wheel Sensor setting
- Verify all sensors are plugged in.
- Inspect cabling and connections on Row Control Module I/O cable.
- Set Gauge Wheel Sensor to a different type, accept this type by pressing the green check mark and returning to the map screen. Re-enter Down Force settings and change the Gauge Wheel Sensor back to the correct type.



ATTENTION! If Gauge Wheel Sensor are not installed on every row, be sure to enter the Down Force settings Advanced tab and Disable the Load Pin on all rows that do not have a sensor.

Planter Row Control Modules: Found # of

Problem—When attempting to load an Event, the Configuration Selection screen displays a  next to the

configuration name. There is a  next to Planter Row Control Modules (RCM). Not all RCM's have been detected.

Resolution:

- Verify that the second number matches the number of planter rows.
- Next inspect the installation of the RCM's and the cabling Local CAN BUS.
- Verify all 3 lights on each RCM are green. LED #2 will be OFF if SureDrives are not configured.
- Inspect Local CAN terminators.

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. Unplug the 2-pin connection that's plugged into the problematic channel(s). (Connections are plugged into each channel's PWM valve.)
3. Locate the allen head adjustments (3/16 inch) above electronic PWM valve.



ATTENTION! For the next step you will need a quick connect pressure gauge to measure the pressure being sent to each channel. (Ag Leader Hydraulic Test Gauge Kit PN 4100164).

4. Connect pressure gauge to the quick connect port on the back of the valve block. Port will be located under each control channel's hose.



5. 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 the pressure gauge.
6. Refer to the table below 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.



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
Case 1200	4.5 psi/lb

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

4.2 PSI/lb x 250 lbs = **1050 PSI.**

FAQ

-What should be input hydraulic pressure (PSI) be set at?

2500 to 3000 PSI (with the vehicle hydraulic source set to max flow)

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-Where do I plug in an implement switch(s)?

Into the Implement Switch Module(s).

-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 actuator does not extend far enough to reach the lower bracket with row unit at bottom travel?

Purchase one Actuator Spacer Kit 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.

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

This can happen if control channel lines are routed incorrectly. Ensure channel components (hydraulic hoses, control valve cable, gauge wheel sensor wiring) are installed per the instructions.

-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.

-What is a CAN Repeater Module; and when is it required?

A CAN Repeater Module is a component that is used on Ag Leaders Individual Row Hydraulic Down Force and SureDrive systems. It is only installed on systems with a Local CANBUS that exceeds a certain length. The modules purpose is to "repeat" CAN messages on these longer BUS lines to ensure communication between all of the modules connected. Ag Leader will supply the CAN Repeater Module in appropriate kits as needed.

-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. On the implement switch module, verify the indicator light turns blue on the module when the switch is tripped to the planting position.
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 Row 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.

Module Diagnostic Lights

Planter Control Module (PCM)

ⓘ **High Power** – Indicates ECU power (12V) to the module.

Status	Definition
OFF	No Power
Blinking Yellow	Firmware Upgrading
Solid Green	High Power OK

1. Local CAN – Indicates if the PCM is communicating with the RCM's.
2. Display CAN – Indicates if the PCM is communicating with the controlling display.

Status	Definition
OFF	No CAN Communication
Solid Red	CAN BUS Off
Solid/Blinking Yellow	CAN BUS Error
Blinking Green	CAN BUS Communicating

Row Control Module (RCM)

ⓘ **High Power** – Indicates high power (12V) to the module.

Status	Definition
OFF	No Power
Solid Red	Low Voltage
Solid Green	High Power OK

1. Local CAN – Indicates if the RCM is communicating with the PCM.
2. Display CAN – Indicates if the RCM is communicating with the Motor Driver.



NOTE!: LED #2 will be OFF if SureDrives are not configured.

Status	Definition
OFF	No CAN Communication
Solid Red	CAN BUS Off
Solid/Blinking Yellow	CAN BUS Error
Blinking Green	CAN BUS Communicating



Implement Switch Module

Left LED

Status	Definition
OFF	No CAN Communication
Solid Red	CAN BUS Off
Solid/Blinking Yellow	CAN BUS Error
Blinking Green	CAN BUS Communicating

Right LED

Status	Definition
OFF	Planter Raised
Solid Blue	Planter Lowered

