

AirForce®

AirForce Operator's Guide

 Precision Planting®

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System Setup and Operation

There are four requirements for the AirForce system to function.

1. There must be a speed source.
2. The planter must be lowered.
3. AirForce must be enabled.
4. The system must be counting seed.

AirForce Setup

Step 1:

Press 'Setup' — 'Planter' to begin AirForce setup.

Verify that the general planter setup is correct on this page before proceeding.

Planter Setup				Home
Planter Make		Rows	Spacing	Enter
John Deere		16	30.0 in	
Active Rows	Meter Type	Drive Type	Down Force System	GPS Setup
All	Vac	Ground	Side Springs	
Fertility System	Insecticide System	Soil System	Down Force Sensor Type	
None	None	None	Smart Pin	
Effective Row Spacing	Effective Planter Width	SRM Row Assignment		Back
30.0 in	40.0 ft			

Step 2:

Select 'Down Force System' and choose the installed Down Force system.

- **Single Factory Airbags** — Choose this option if there is only one down airbag installed on each row from the OEM.
- **Dual Factory Airbags** — Choose this option if there are two down airbags installed on each row from the OEM.
- **Prec. Planting Airbags** — Choose this option if a Precision Planting AirForce down bag has been installed.
- **Side Springs** — Choose this option if there is no down airbag installed on the row, only springs attached to the parallel arms.
- **Adj Heavy Duty Springs** — Choose this option if there is no down airbag installed on the row, only heavy duty springs installed in the center of the row unit.

Planter Setup				Home
Planter Make		Rows	Spacing	Enter
John Deere		16	30.0 in	
Active Rows	Meter Type	Drive Type	Down Force System	GPS Setup
All	Vac	Ground	Side Springs	
Fertility System	Insecticide System	Soil System	Down Force Sensor Type	
None	None	None	Smart Pin	
Effective Row Spacing	Effective Planter Width	SRM Row Assignment		Back
30.0 in	40.0 ft			

Planter Setup			Home
Down Force System			Enter
Single Factory Airbags	Dual Factory Airbags	Prec. Planting Airbags	
Side Springs	Adj Heavy Duty Springs	DeltaForce	↑ ↓
Other			
			Back

Step 3:

Select the Lift Force System. 'Prec. Planting Airbags' must be selected if AirForce is controlling lift bags on each row.

Planter Setup		Home
Lift Force System		Enter
None	Prec. Planting Airbags	
		↑ ↓
		Back

Step 4:

Select 'DownForce Sensor Type' and ensure that the correct sensor is selected for the planter make and model.

Planter Setup				Home
Planter Make		Rows	Spacing	Enter
John Deere		16	30.0 in	
Active Rows	Meter Type	Drive Type	Down Force System	GPS Setup
All	Vac	Ground	Side Springs	
Fertility System	Insecticide System	Soil System	Down Force Sensor Type	
None	None	None	Smart Pin	
Effective Row Spacing	Effective Planter Width	SRM Row Assignment		Back
30.0 in	40.0 ft			

Step 5:

Once the planter setup is complete, go to 'Setup' — 'Systems' — 'AirForce'. Select 'Compressor Type' and enter the type of compressor that has been installed.

AirForce Setup				Home
Planter	Systems	Crops	Diagnose	Data
Row Unit Load Sensor Calibration			Automatic Hold	Enter
			Enabled	
Air Bag Type	Tank Pressure Target	Compressor Type	Compressor Duty Cycle	↑
Lift Only	150 psi	Hydraulic	100%	
Hold Time	Air Bag Units	Minimum Applied Force	Maximum Applied Force	↓
5 sec	lbs	-200 lbs	400 lbs	
				← Back

Step 6:

Validate the remaining settings on the AirForce Setup page. Each setting description is contained below.

- **Row Unit Load Sensor Calibration** — This will take the user to the Load Sensor Calibration page. The system will zero the load sensors upon lifting the system, but it is recommended to zero them manually while the planter is lifted periodically.
- **Automatic Hold** — If enabled, the system will stop increasing/decreasing the pressure in the airbags when the system is lifted or planting over previously planted coverage. (most applications — leave enabled)
- **Air Bag Type** — This setting shows if a down only, lift only, or down and lift airbag system has been configured.
- **Tank Pressure Target** — This is the tank pressure for the AirForce system.
- **Compressor Type** — There are two possible Compressor types — Electric and Hydraulic. This must be entered properly to enable system use.
- **Compressor Duty Cycle** — This setting will provide a limit to the maximum duty cycle the system will allow for the compressor.
- **Hold Time** — This setting will change the amount of time the hold will run for when the 'Hold' button is pressed from the Home Screen.
- **Air Bag Units** — This can be set to PSI or Lbs.
- **Minimum/Maximum Applied Force** — These are the limits of the AirForce system's control of the airbags.

Note: There is no lift switch calibration required with an AirForce only system.

Load Cells

Navigate to “Setup” – “Systems” – “Calibration”— “Row Unit Load Sensor Calibration”

This page displays Load Cell information as well as control for zeroing and disabling load cells.

Load Cell values can be zeroed by pressing the “Zero All” button on the right side of the page. Ensure the planter is raised when zeroing load cells

Down Force Calibration				Home
Row	Load Cell lbs	Cal Factor	State	
1	1	143.00	Active	Zero All
2	0	143.00	Active	
3	0	143.00	Active	
4	-1	143.00	Ignored	↑
5	1	143.00	Active	↓
6	1	143.00	Active	
7	1	143.00	Active	← Back
8	1	143.00	Active	
9	0	143.00	Active	

Load Cell Lbs

Displays the current weight that is being measured on each individual row

Calibration Factor

The calibration factor will auto-populate based on the planter make and model selected and the Downforce Sensor type.

displays the state of each load cell. Selecting a row in the state column will allow the operator to disable (ignore) the load cell on that row. To make a load cell active that has been ignored select that row in the state column. Please see the picture above to show ignoring a load cell.

Next, from the home screen, Select “Setup”— “Diagnose”— “Load Cells”

Load Cell Level 2 Diagnostic Diagram					Home
Display	Load Cell	System Log	show error rows only	display as table	Zero All
Row	Reading LBS	Sensor Source	Status	Ref Value	
1	124	RUM	Active	32.00	
3	160	RUM	Active	32.00	
15	177	RUM	Active	32.00	
Lift State: — Radar Speed: Uncalibrated GPS Speed: 5.1 mph Master Plant: No CCM Active Cells: 3					← Back

Sensor Source

Identifies the type of module the Load Cell is plugged into.

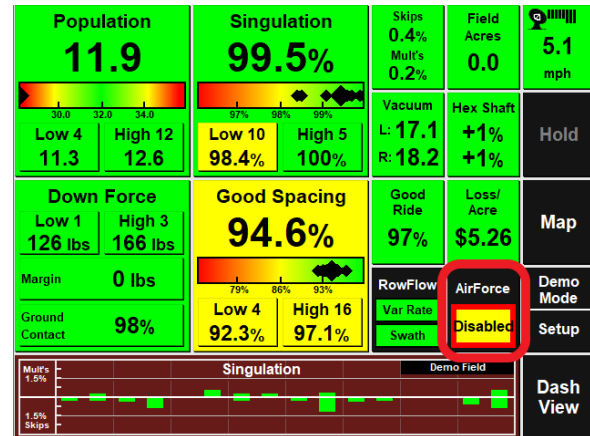
Reference Value

This is a value that is used to give a Load Cell a true zero. A healthy reference value is between 28 and 36. Reference values will vary across the planter but all should be within this range.

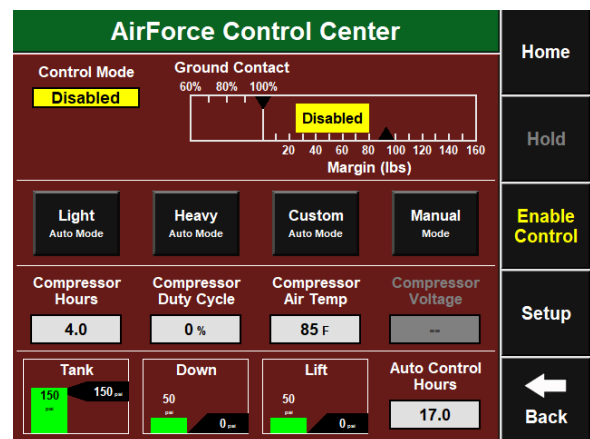
Calibration Factors for each type of load cell:		
Load Cell	Row Units	Calibration Factor
1/2" Load Pin	John Deere 7000 and Kinze 2000 row units	85
5/8" Load Pin	John Deere XP row units and newer	85
Kinze Link	Kinze 3000 & 4900 row units	65
White Smart Link	White 6000 & 8000 row units	65
White Smart Link	White 9000 row units	143
Case 1200 Sensor	Case IH 1200 row units	65
Case 2100 Sensor	Case IH 2100 row units	196

AirForce Control

Once the system has been configured for AirForce, an AirForce Control button will appear on the Home Screen. This is where all AirForce system controls are located.



The AirForce Control page can be used to adjust the automatic target or manually control the AirForce System. Use the button on the right hand side to Enable or Disable AirForce control.



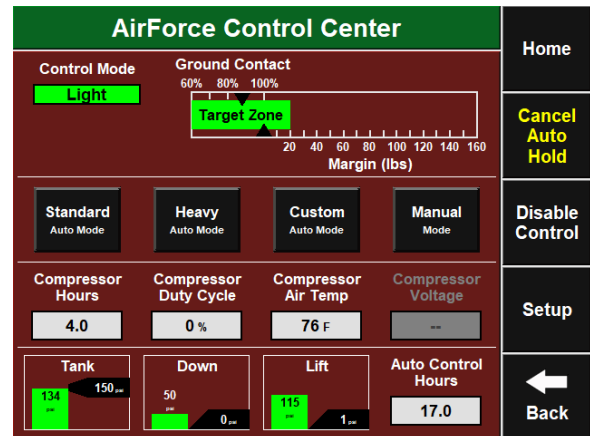
Automatic Target Control

Set a target range of weight that the operator wants to maintain between the ground and the gauge wheels on each row. The system will adjust the applied force and/or lift as needed planter wide to maintain the target range that was set. All AirForce adjustments will be based on the load cell readings measuring the weight on each gauge wheel. Select between: Light, Standard, Heavy, or Custom.

Note: For recommendations on how to set AirForce and what Automatic setting to use, refer to the section of this manual on how to set AirForce.

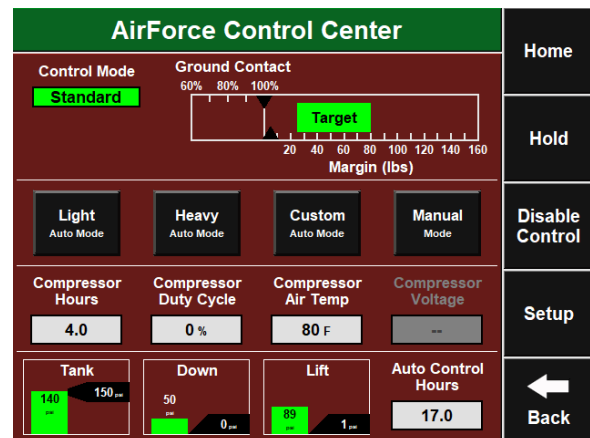
Light

The Light target range is less than 20 lbs of Margin, and greater than 60% Ground Contact.



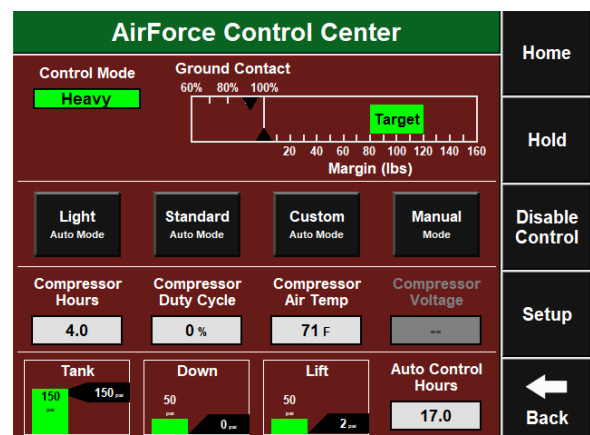
Standard

The Standard target range is 25–80 lbs of Margin. This is the default setting.



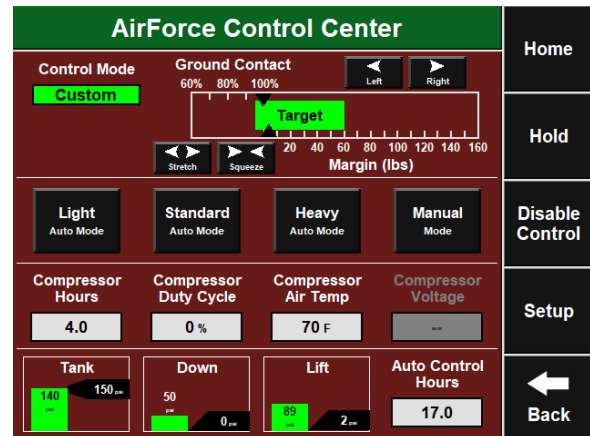
Heavy

The Heavy target range is 80–120 lbs of Margin



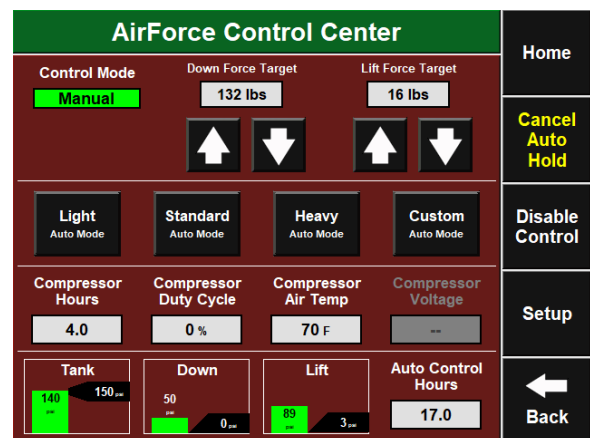
Custom

This control mode allows the operator to set the target range. The Left/Right arrows can be used to move the target higher or lower, and the Stretch/Squeeze can be used to make the target range narrower or wider.



Manual Mode

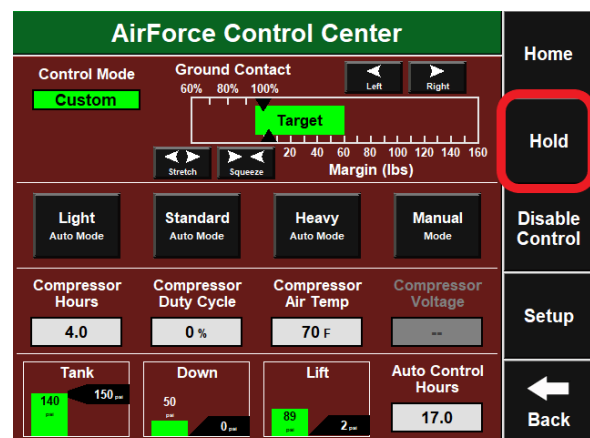
The AirForce system may also be operated in Manual Mode. This control mode allows the operator to designate a desired force for the system to maintain. Both a Lift Force and a Down Force value can be entered. When using Manual Mode, weigh pin readings are not taken into account and all cylinders will apply a single force to all rows until manually changed by the operator.



Use the Plus and Minus arrows to adjust the Lift and Down Force targets.

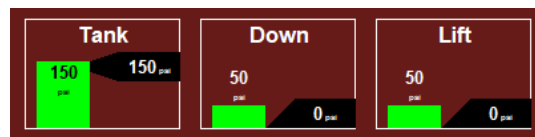
Hold

AirForce Hold can be enabled by pressing on the 'Hold' button on the Home screen and the AirForce Control page. This will stop any transfer of air pressure to or from the airbags. The amount of time that it runs can be changed in the AirForce Setup.



System Pressure

The AirForce compressor tank, down circuit, and lift circuit pressure can be viewed on the control page. The black arrow indicates the target pressure and the green bar indicates actual pressure.



Compressor Hours, Compressor Duty Cycle, Compressor Air Temperature, Compressor Voltage, and Auto Control Hours can also be viewed on the Control page.

How to Set AirForce

When AirForce is enabled for the first time it is in Standard Mode at 100lbs. If AirForce is installed on a John Deere, Kinze, or White planter, Standard Mode is a reasonable starting point when planting at 5 miles per hour. When planting faster, a higher target may be needed. If AirForce is installed on a CaseIH planter, Heavy Mode (150 lbs.) is the recommended starter setting. This is because the Reduced Inner Diameter (RID) gauge wheel style allows for increased flowability of soil between the opening disks and gauge wheels. An increased AirForce target will ensure that soil along the RID is properly firmed, and will not allow dry soil from a crumbling sidewall to fall into the furrow. This principle also applies to RID gauge wheels on a different equipment manufacturer's planter.

From an agronomic perspective, if this is the first time running AirForce; err on the side of heavy — too much downforce. While both compaction (excessive downforce) and shallow planted seeds are yield robbing events, the consequences of shallow planting seeds are greater than losing a row(s) around an ear from soil compaction. Once the first pass is complete, look to the first two tools listed below (20/20 metrics and High Definition Mapping) to help maintain near 100% ground contact. Once this is either achieved or closely achieved, start to evaluate the furrow and dig seed. Below is an in depth look at each tool.

Ground Contact Percentage (20/20) - On the home page of the 20/20 there is a box that displays a percentage of ground contact. This is the percentage of time that the gauge wheels are pushing against the depth stop. This number is updated every second based on a three second rolling average per row and then averaged across the planter. The goal is to maintain 100% ground contact. If the ground contact is not near 100%, the AirForce target should be increased until near 100% is achieved. Depending on the conditions of the field, 100% ground contact may not be unobtainable. On the other hand, just because 100% ground contact is achieved does not mean this is the proper setting. A lighter setting may be needed if excessive force is being used and the furrow reveals compaction. A heavier setting may be needed if additional soil firming is needed

Using High Definition Mapping - The Down Force high definition map displays weigh pin readings through the field. This can be used to look for any row units that are consistently

showing a loss of ground contact, as represented by a blue dot. If these dots are showing up frequently through the field, consider increasing the AirForce target

Looking in Ground - Investigating the furrow is vital for properly setting downforce. After selecting a downforce setting, drive a few hundred feet with the closing system held up on a few rows

The ideal furrow should have formed sidewalls that do not crumble without being touched. If the side wall was manipulated or pressure was applied, the side wall should start to collapse or cave from the bottom up.

If digging reveals slick sidewalls or sheen development, these are good indicators of moisture present in the furrow that could cause compaction. This is something to take into consideration when finding the proper setting. The seed should also be placed at a depth where there is a consistent moisture layer on either side.

Lastly, if the closing system was set, it should be difficult to try and go back and dig to find the furrow. If an in-ground evaluation shows the setting should be lighter the operator will need to re-evaluate if they are as close as they can be to 100% ground contact

Bear in mind that 100% ground contact is simply the point where the downforce system has engaged the mechanical depth stop on a row unit. More firming force may be needed to firm the sidewall and hold the furrow open for the whole row unit pass. Finding the right AirForce target requires finding the setting that forms the furrow for optimal seed placement, soil structure, and plant development.

In-Season Adjustments - To optimize the downforce management system, it may be necessary to change AirForce target settings as environment and soil conditions change. One example that may help illustrate this point is a significant rain event. It would be reasonable to think a lighter setting may be needed to still form the proper furrow after the event occurs. Even though factors in the field may change, the ways to evaluate the proper setting will remain the same.

The HD maps and monitor metrics will show a grower information that would be difficult to see in the field. Digging and evaluating the furrow will show conditions that would not be viewable on a map. Thus, for best results a grower should balance using these tools. Although the 20/20 and HD Maps are useful tools, no number on a map can replace checking in ground to make sure a good furrow is being formed. It is conceivable that a map shows minimal/no loss of ground contact or excess downforce and still not be the appropriate target. For example, a field report may show 100% ground contact but digging in ground reveals (sidewall compaction or) crumbling furrow walls.

Home Screen

In the Down Force Metrics box the monitor will display Margin, Ground Contact, and the lowest and the highest weigh pin readings.

Margin

The lowest measured load cell reading in a given period of time on each row (varies with down force system installed). The Margin value displayed on the home screen Down Force button is an average of this value across all load cellequipped rows on the planter.

Down Force	
Low 1	High 3
97 lbs	132 lbs
Margin	55 lbs
Ground Contact	100%

Ground Contact

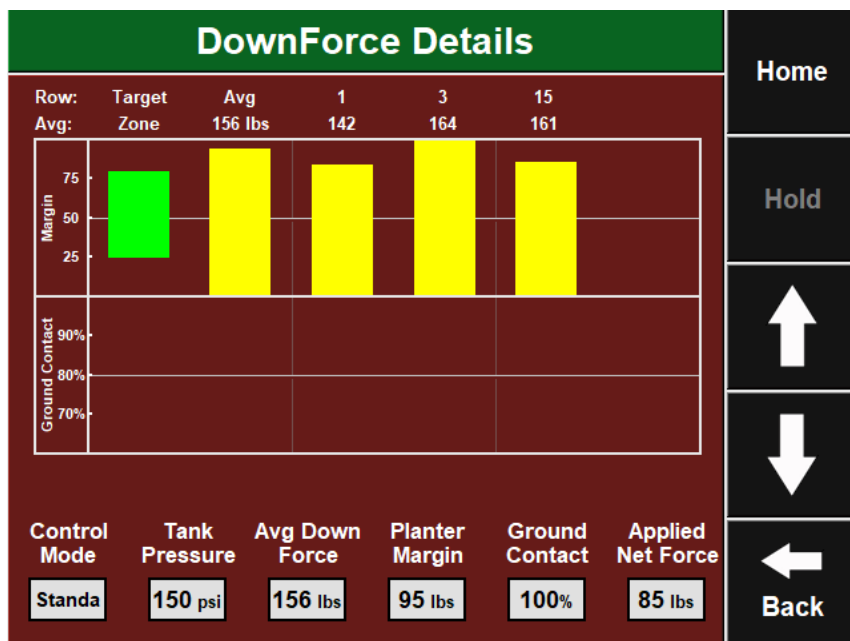
The percentage of time the system can confirm that the gauge wheels have met the depth stop, which generally indicates that the row unit is planting at the depth to which it has been set. This is calculated by the percentage of time that the load cell is measuring 20 pounds or more.

Low and High Row

Shows the average weigh pin readings for the lowest and highest rows.

Select the Down Force metric by clicking “Down Force” from the home screen to view row by row load cell information.

This setting can display down force average in place of the Low/High row by going to ‘Setup’ — ‘Systems’ — ‘Display’ — ‘Down Force Mode’.



Once 'DownForce' is selected from the Home screen, the page will display Margin, and Ground Contact for each row that has a load cell. The planter average Net Applied Force, Margin, Ground Contact, Average Down Force, Tank Pressure, and Control Mode are displayed at the bottom of the page.

Note: Net Applied Force is the commanded amount of force being applied to the row unit

AirForce Diagnostic Information

Prior to planting, ensure that all planter diagnostic information is healthy. Select “Setup” – “Diagnose”. Everything should be green on the diagnose page. If there is an issue on a row or rows, it will be indicated on the level 1 diagnose page by displaying the system that is having an issue in a color other than green.

Select any blank area on this screen to view an explanation of what each color indicates.

Color Legend

Green - the system is working correctly and communications are good.

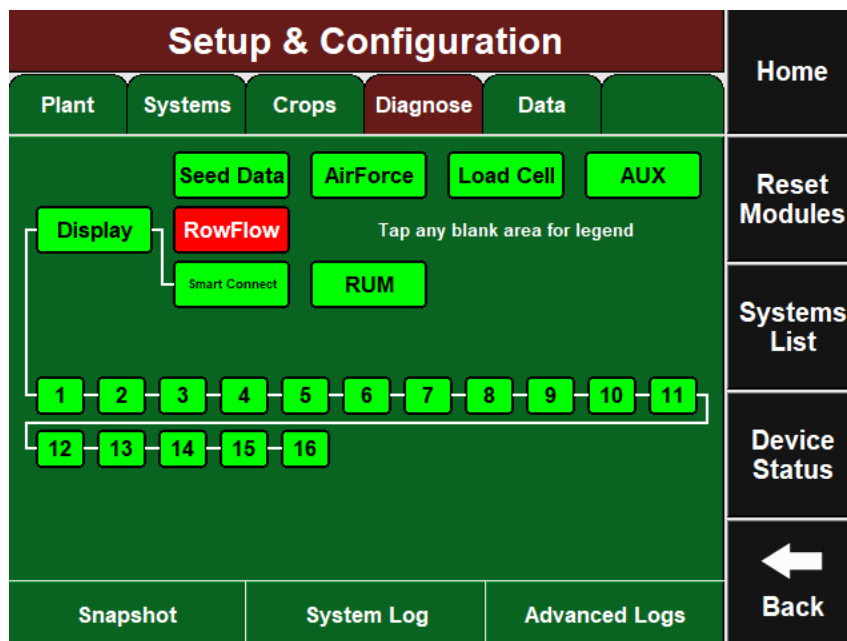
Yellow – a Device or sub-component is not 100%.

Red – Device has failed, or is expected, but not detected.

White – Device is detected, but is not expected.

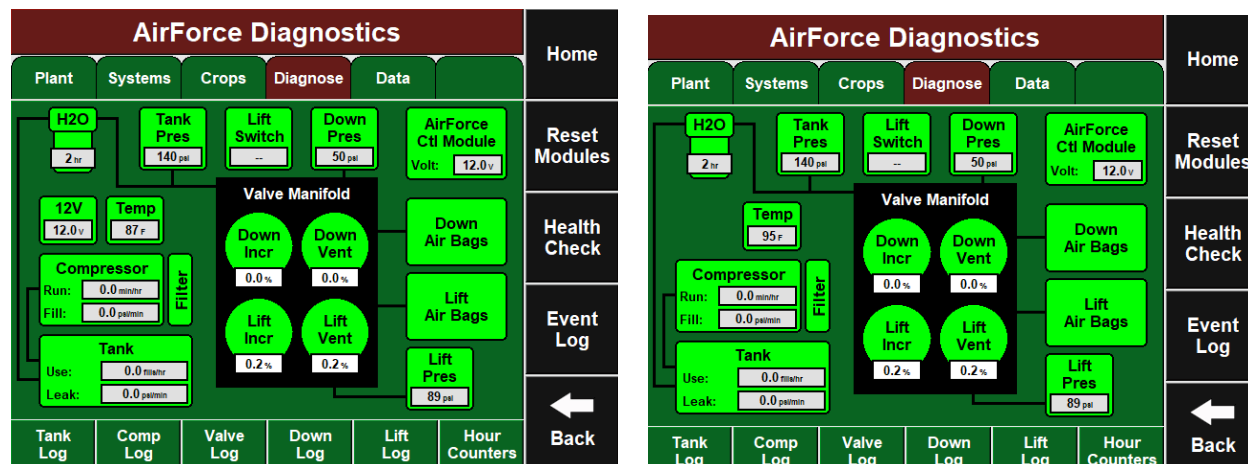
Black – Row has been disabled in the planter configuration.

Gray – Device is being detected, updating firmware, or unreachable.



Note: Modules may be updating during initial connection. Once updates are complete, all modules should be green. If the modules are not green, confirm that the number of rows and planter setup is correct. If still experiencing issues, refer to the Dealer Service Manual.

The AirForce button will be green if the system is configured and communication is established. If it is not green, press it to view the level 2 diagnostics. Across the bottom of this page, there are logs of each component to assist with diagnostics.



H2O — This indicates the number of hours since the last time the water filter was emptied (reset this under the Hour Counters)

Tank Pres — Shows current Tank Pressure.

Lift Switch — Shows current Lift Switch status (Lifted/Lowered)

Down Pres — Shows current down circuit air pressure (only if a down air bag system is set to the Down Force type)

AirForce Ctl Module — Shows current communication and Voltage to the AirForce Control Module.

12V — Shows voltage at the compressor (Electric Compressor only).

Temp — Shows current temperature at the compressor.

Compressor — Shows the run and fill time of the compressor.

Tank — Shows a calculation of the current fills per hour and psi per minute of leaking.

Down Incr — Shows the percentage of time the system is opening the Down Increase solenoid.

Down Vent — Shows the percentage of time the system is opening the Down Vent solenoid.

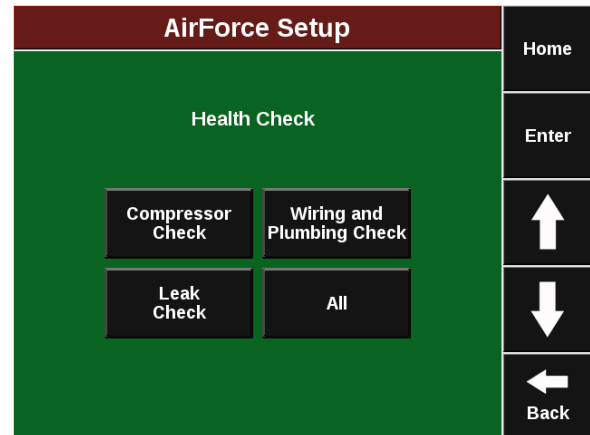
Lift Incr — Shows the percentage of time the system is opening the Lift Increase solenoid.

Lift Vent — Shows the percentage of time the system is opening the Lift Vent solenoid.

Lift Pres — Shows current Lift Pressure (only if a lift airbag system is configured)

AirForce Health Checks

Always perform a health check on the AirForce system after installation and at the start of every season. The health checks will show yellow if they have never been ran. Access the AirForce health check page by selecting “Setup” — “Systems” — “Health Checks” or by pressing the “AirForce Health Checks” button on the AirForce level 2 diagnose page. There are three AirForce Health Checks that can be run.



Compressor Check

This health check will validate that all electronic components on the AirForce system are functional and that the compressor is operating and increasing pressure to the tank.

Wiring and Plumbing Check

This health check will validate that all solenoids are responding by increasing and decreasing pressure in the lift and lower circuits.

Leak Check

This health check will hold pressure in the lift and lower circuits and validate that there is no leaking from the system.