

vApply™

vApply Operator's Guide

 Precision Planting®

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Gen 2 20/20

vApply Quick Reference

There are six requirements for the vApply System to function:

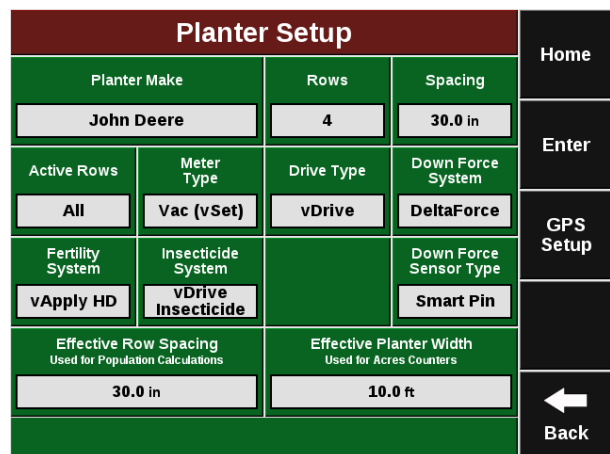
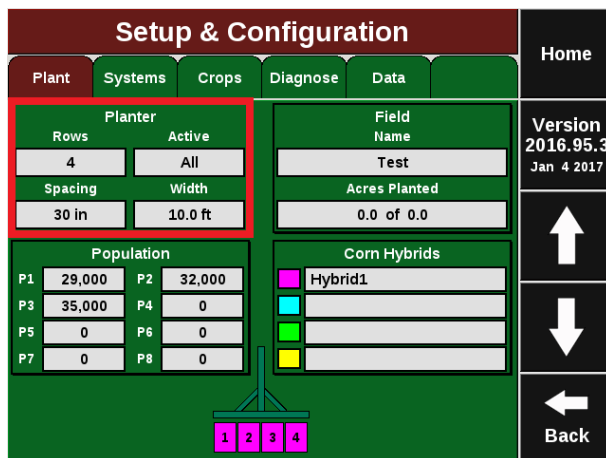
1. The vApply product must be configured on the 20/20 monitor.
2. There must be a speed source.
3. The Master Plant Switch on the Cab Control Module must be in the up position.
4. The implement lift switch must register lowered.
5. vApply system must be enabled in the control page.
6. An application rate must be set,

For initial event application setup, disconnect vApplyHD or FlowSense modules and run a “Pump Flush” health check to ensure debris does not contaminate the internal flow sensors. Details on this process can be found under the “Health Check Section.”

Configuring 20/20 for vApply

Step 1:

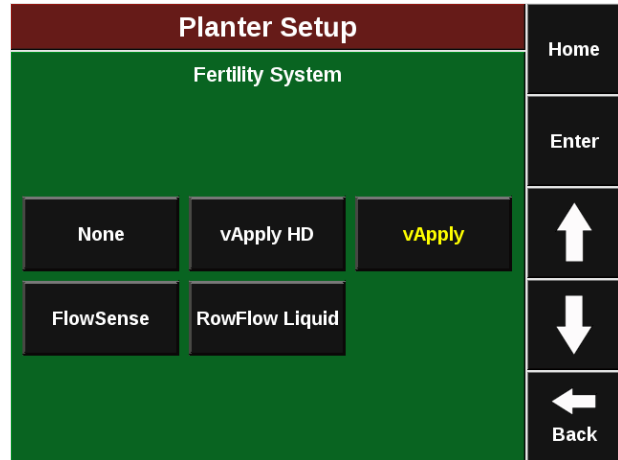
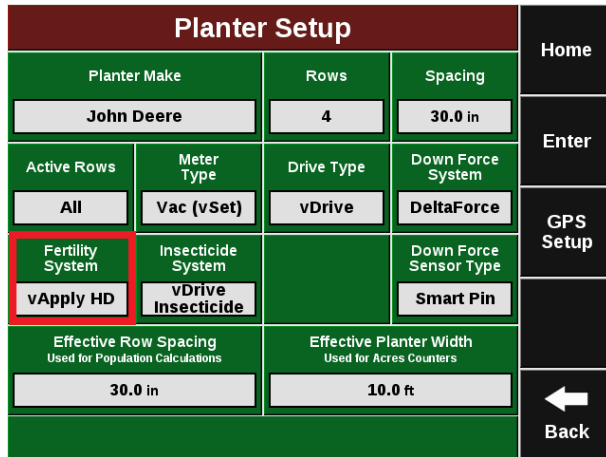
Navigate to the Planter Setup (Setup > Plant > Planter) in order to begin vApplyHD setup.



Step 2:

Press on the “Fertility System” section to choose the correct control type.

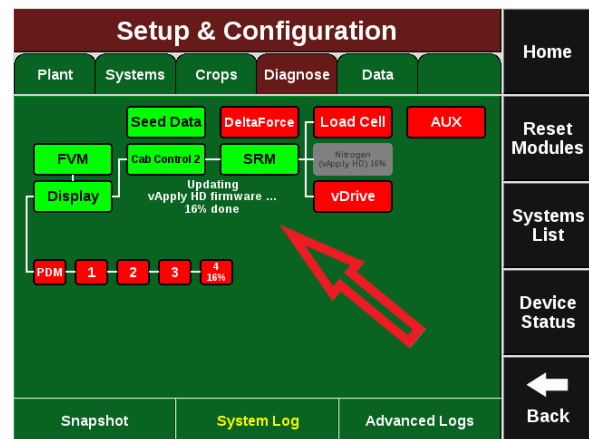
Note: If both vApplyHD modules and FlowSense are installed, select vApplyHD as the Fertility System.



Step 3:

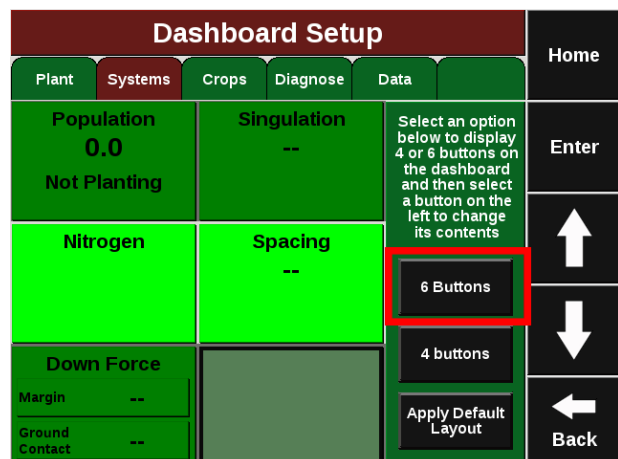
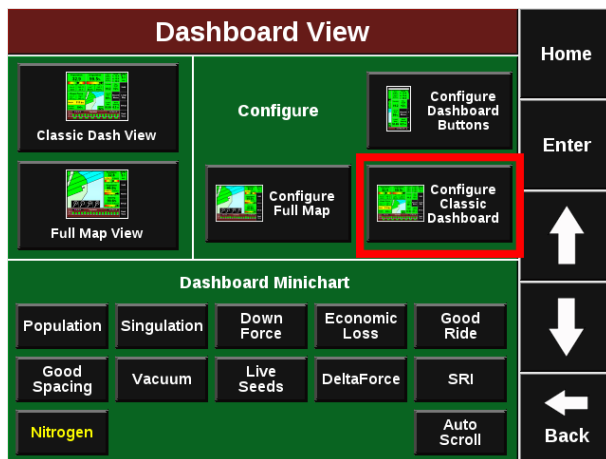
Navigate to the Diagnose tab and confirm that systems are communicating properly (all green).

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 any issues exist, refer to the Precision Planting Service Manual for troubleshooting procedures.



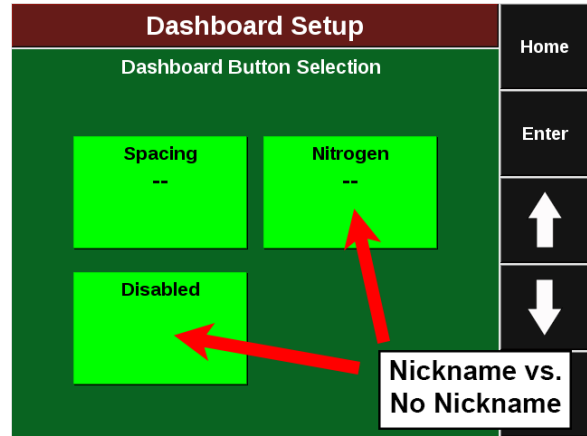
Step 4:

Set up the Home Screen for the best vApplyHD control. Change the default layout by navigating to the Dashboard Setup menu (Dash View>Configure Classic Dashboard) and selecting “6 Buttons”.



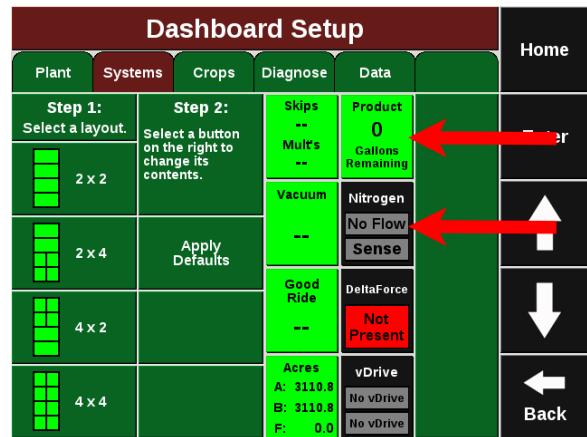
Step 5:

The two new middle display icons may be changed. Select your liquid product as one of the new icons. Unless a product nickname has already been selected, the icon will display “Disabled”.



Step 6:

Next add the vApplyHD control button to the right hand side of the home screen. (Dash View>Configure Dashboard Buttons). Tap on a dashboard icon and select from the list to change the desired function.



Configuring System

vApplyHD Row by Row

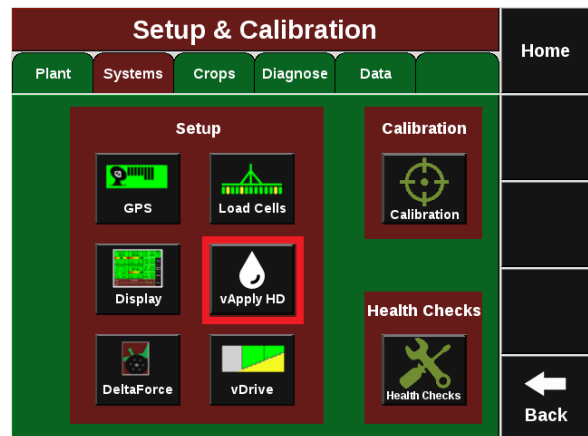
vApplyHD Section Control

vApply Base

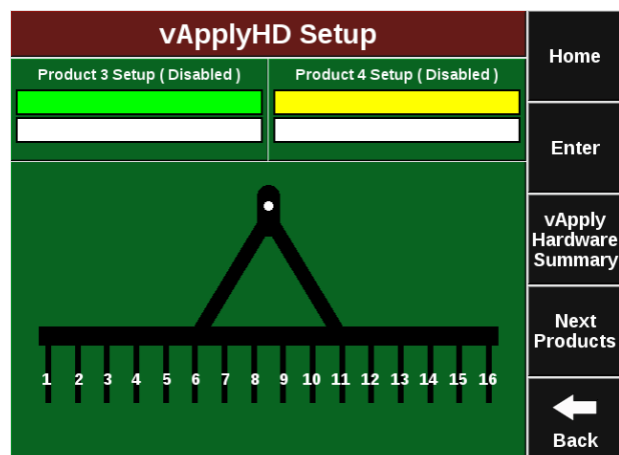
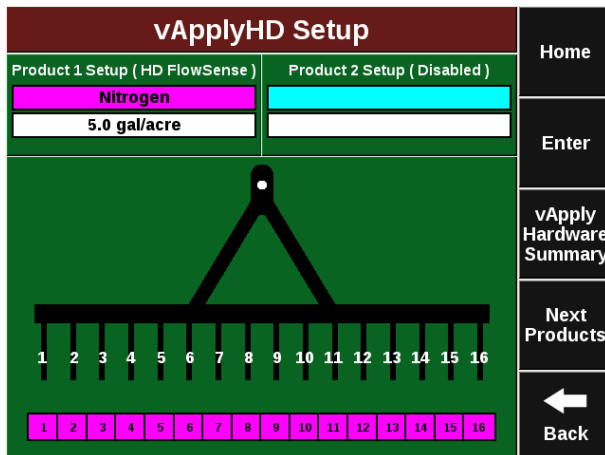
vApplyHD Row by Row

Product Setup

Navigate to the vApplyHD Setup menu (Setup > Systems>vApplyHD) in order to setup your first product.



For single vApplyHD systems only, the first product setup will need to be completed. Press on the Product 1 setup button on the top left side to begin the setup process. For multiple liquid systems (vApplyHD and/or FlowSense) each system will need to be setup individually. Up to four liquid systems can be configured.



To successfully configure a vApplyHD system all settings on this page must be set correctly. In order for the liquid product to be viewed on the home page and diagnose page the Control Style and Product Nickname must be set.

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				

Control Style

Change “Control Style” from Disabled to “vApplyHD” to allow the 2020 to begin using vApplyHD. To successfully configure a vApplyHD system all settings on this page must be set correctly. In order for the liquid product to be viewed on the home page and diagnose page the Control Style and Product Nickname must be set.

Note: Enable the Coverage Source on the right for the liquid system to define the coverage source for all liquid system swathing. If multiple liquid systems are configured, only one system can be set to the coverage source.

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				

Product 3 Setup (Disabled)			Home
Control Style			Enter
Select which flow system is associated with this product			
vApplyHD Row by Row Control	vApply Liquid Hydraulic Motor Contr	FlowSense Row by Row Monitor	Coverage Source
vApplyHD Section Control FlowSense Sensing	vApply Granular Hydraulic Motor Contr	Disabled	Back

Once you have selected “vApplyHD” for the control style you will need to select the vApplyHD’s control ID. This is determined by what jumper color is being used to connect the vApplyHD module to the system.

- First Control Module/Product.
- Second Control Module/Product.
- Third Control Module/Product.
- Fourth Control Module/Product.

Product 3 Setup (vApplyHD)		Home
Row Control Module		Enter
Select which vApplyHD is used for control		
First (Black Jumper)	Second (Brown Jumper)	Back
Third (White Jumper)	Fourth (Green Jumper)	

Application Nickname

Give your product a “Nickname” by selecting the empty box and selecting from the list. If necessary, a “Custom” name may be entered for your products “Nickname”. The nickname chosen will be displayed on the homepage, diagnose page, and control pages instead of vApplyHD.

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				

Active Rows

“Activate Rows” lets the 2020 know which rows should be actively controlled. When rows are not active, they will remain off and not apply any product.

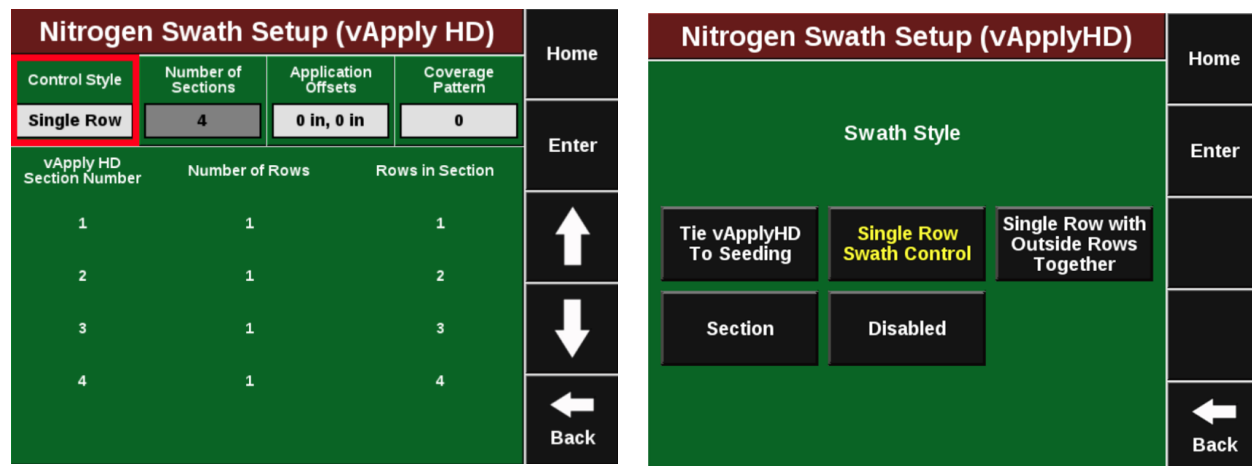
Application Position — Planters Only

Enter the position of the liquid exit point in order for swath control to work properly. Select “In front of Seed Exit” (marked A in the diagram) if you are applying your liquid prior to the seed tube exit. Measure how far in front of your Seed Tube Exit and enter in the number of inches. Select “Behind Seed Exit” (marked B in the diagram) if you are applying your liquid behind the seed tube exit. Measure how far behind your Seed Tube Exit and enter in the number of inches.

Nitrogen Position Setup (vApply HD)				Home
				Enter
Select the application position by selecting the box below, then enter the distance from the liquid exit point to center of the lowered seed exit point				
7	8	9	<input type="checkbox"/> In front of Seed Exit (A) <input type="checkbox"/> Behind Seed Exit (B)	Back
4	5	6		
1	2	3	<input type="text" value="10"/> inches	
0	.	C		

Swath Section Setup

Configure how the vApplyHD modules swath off and on.



Tied to seeding: Select “Tied to Seeding” in order to automatically control vApplyHD swath settings to the same vDrive swath settings.

Single Row Swath Control: Single Row Swath Control allows each row with vApplyHD to control individual rates and swath off as needed on a per row basis.

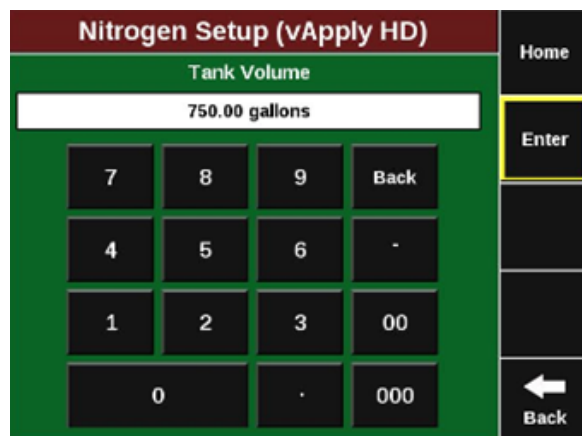
Single Row with Outside Rows Together: This option allows just the outside two rows on each wing to control together and swath off as a pair in order to safeguard a potential GPS signal drift discrepancy.

Section: This option allows the operator to customize the swath sections. Set the total number of swath sections at the top of the screen. Then use the arrows to assign rows to sections or press on the “Rows in Section” box to list rows in the section. Not recommend for individual row vApplyHD.

Disabled: Disabled swath will prevent the vApplyHD from turning off in a swath event. This will cause overlap in product at end rows and headlands.

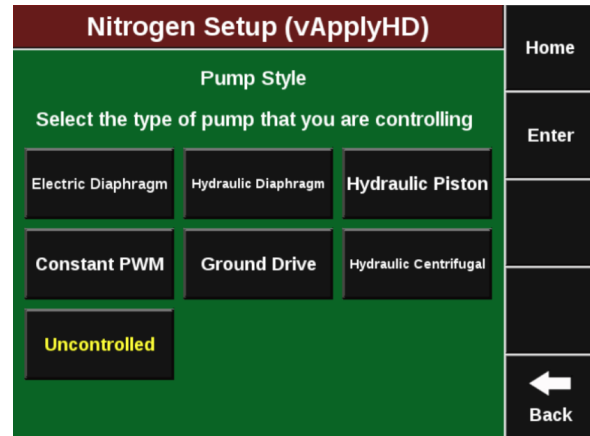
Tank Volume

Tank volume is designed to allow the user to track how many gallons of the active product are available to apply. Tank volume will be used to trigger the low product alarms that can be configured in the “Liquid Alerts” section of the “Crops” tab (see liquid alerts section). If there are multiple tanks feeding the liquid system add the volume of each tank together.



Pump Style

Select the pump style that you are controlling with a vApply module. NOTE: The vApply module will only control electric or hydraulic pumps that are also equipped with PWM control (PWM valve or electric PWM drivers). Additionally, a Pressure Maximum value must be entered - this is the maximum pressure that you want in the system. This should be no higher than what the pump and plumbing is rated for and should never exceed 100 psi.



Note: The vApply Module will only control electric or hydraulic pumps that are equipped with a PWM driver or valve.

Electric Diaphragm: Select this option when using an electric diaphragm pump WITH an electric pump driver (electric PWM control).

Hydraulic Diaphragm: Select this option when using a hydraulically driven diaphragm pump WITH a hydraulic PWM valve.

Hydraulic Piston: Select this option when using a hydraulically driven piston pump WITH a hydraulic PWM valve.

Hydraulic Centrifugal: Select this option when connected to a centrifugal pump that hydraulic driven and has a PWM valve.

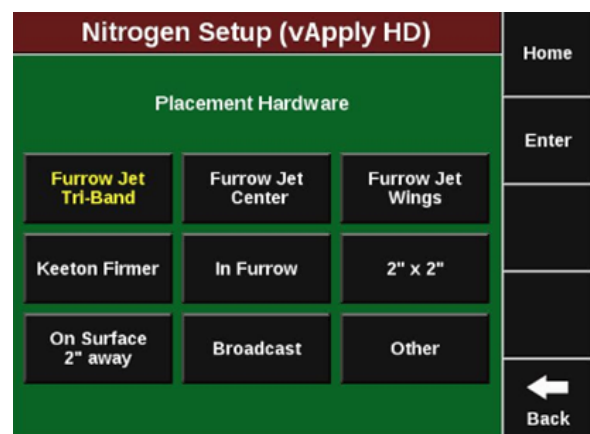
Constant PWM: Select this option when one of the previous three pump setups must be driven at a static rate.

Ground Drive: Select this option when using a ground drive pump.

Uncontrolled: Select uncontrolled for any pump setup that is not being controlled by the vApply module.

Placement Hardware

Select what Hardware device will be applying the liquid going through the vApplyHD modules. This is for record keeping only and will not affect any settings or controls.



Target Rate Minimum

Setting the minimum target rate will allow the 2020 to effectively alert the user in the event that the control of product drops below the minimum expected control. The rate entered here will also be used when calibrating the pump to ensure that the minimum rate can successfully be applied.

The screenshot shows the 'Nitrogen Setup (vApply HD)' screen. The title bar is dark red with white text. Below it, a green header contains 'Target Rate Minimum'. A white input field displays '10.00 gallons/acre'. To the right of the input field is a yellow 'Enter' button. Below the input field is a numeric keypad with buttons for digits 0-9, a decimal point, and a 'Back' button. On the far right, there is a vertical navigation bar with 'Home' at the top, a 'Back' button with a left arrow, and an 'Enter' button highlighted with a yellow border.

Default Rate

Setting the Default Rate that you want for this product. The rate entered here will also be used as a starting point when no RX is active.

The screenshot shows the 'Nitrogen Setup (vApply HD)' screen. The title bar is dark red with white text. Below it, a green header contains 'Default Rate'. A white input field displays '30.00 gallons/acre'. To the right of the input field is a yellow 'Enter' button. Below the input field is a numeric keypad with buttons for digits 0-9, a decimal point, and a 'Back' button. On the far right, there is a vertical navigation bar with 'Home' at the top, an 'Out of Rx' button, a 'Default' button, a 'Back' button with a left arrow, and an 'Enter' button highlighted with a yellow border.

Note: The default rate will be used when the “load vApply” button is used in the control screen.

Target Rate Maximum

The Target Rate Maximum entered here will also be used for calibration and Quick Test Health Check to ensure that the maximum rate can successfully be applied.

The screenshot shows the 'Nitrogen Setup (vApply HD)' screen. The title bar is dark red with white text. Below it, a green header contains 'Target Rate Maximum'. A white input field displays '30.00 gallons/acre'. To the right of the input field is a yellow 'Enter' button. Below the input field is a numeric keypad with buttons for digits 0-9, a decimal point, and a 'Back' button. On the far right, there is a vertical navigation bar with 'Home' at the top, a 'Back' button with a left arrow, and an 'Enter' button highlighted with a yellow border.

Tank Mix Setup

Use the Tank Mix Setup page to enter your Carrier and what Products are being added to the mixture. Future software updates will record and give field summaries of total used carriers and product separately.

Flow Rate Adjustment

Warning: This option provides the ability to implement minor rate adjustments. Our recommendation is to consult your dealer or Precision Planting Product Support prior to making any Flow Rate Adjustments. Proper rate measurements prior to adjustment are critical to ensure accurate control. Enter a percentage to adjust the vApplyHD control on the flow rate. Positive numbers increase vApplyHD output and negative numbers decrease the output. For example, if the current rate is 10 gpa and a bucket test shows it is actually doing 10.5 gpa (5% excess), enter -5% into the Flow Rate Adjustment to adjust the vApplyHD control to correctly display and apply the desired 10 gpa.

Advanced Setup

Note: Consult with Precision Planting dealer prior to changing any advanced settings.

(Setup > Systems > vApplyHD > Advanced Setup).

- **Pressure Sensor Type**

Select the type of pressure sensor that is plugged into the vApply Module. Currently, the only supported option is a Precision Planting Pressure Sensor.

- **Pressure Maximum**

The maximum pump pressure the grower is comfortable reaching in the system without exceeding the maximum pressure the pump is capable of. A diagnostic event will also be logged if this pressure is exceeded. This is the same Maximum Pressure that is set when a pump style is selected.

- **Minimum/Maximum Gallon Per Minute (Beta)**

If these configurations are set, they will enforce a minimum and maximum limit on the rate being commanded from the vApply control page. These options are put in place allow growers who are using a spray nozzle that require a minimum or maximum flow (in gpm) to create the desired spray pattern. In order for vApply to have the maximum range of operation, keep the default “No Limit” setting for both minimum and maximum options.

- **Pump PWM Frequency**

The default rate of 150hz PWM frequency will work for most types of electric and hydraulic controlled pumps. Changes to this value should reflect the pump manufacturer's recommendations.

- **Manual PWM**

Enter a PWM percentage to maintain as a constant for the pump. This constant PWM percentage only works if the pump style selected is ‘Constant PWM’ on the main vApplyHD setup. If any other pump style is chosen other than Constant PWM, then this field is not used by the control system.

- **Minimum/Maximum PWM**

Minimum PWM / Maximum PWM - these are the two extremes for how open the PWM valve can be. The control will not exceed the maximum or minimum PWM command. The default setting is 0% to 95%. These are not the Min/Max PWM values from the Pump Calibration.

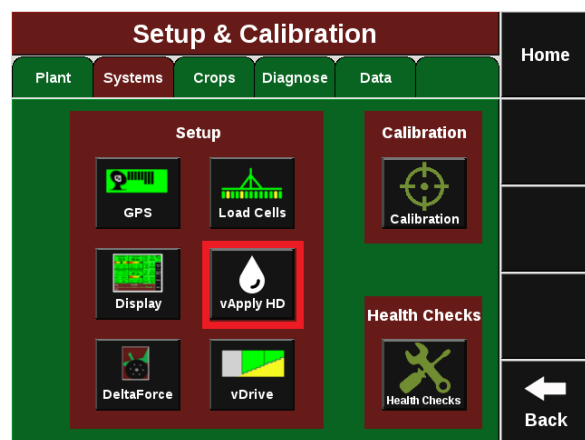
- **Rum Updates**

Rum Updates is only used when using FlowSense on planters with RUMs and NOT SRMs. Enabling the update will allow the 2020 to update the RUM Firmware so that the FlowSense can be read through the RUM.

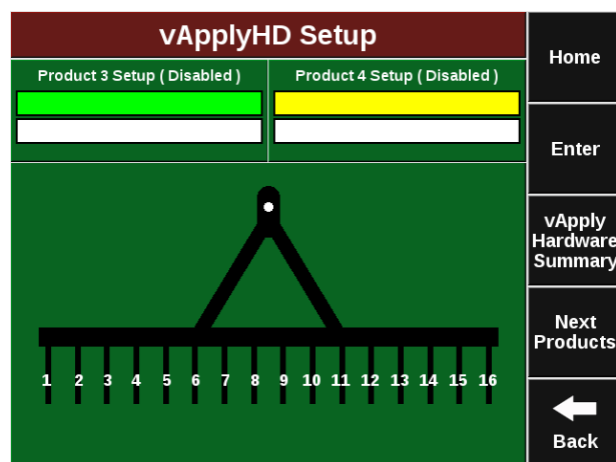
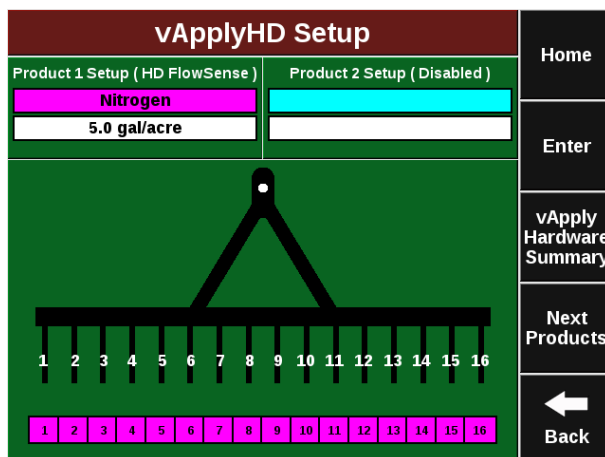
vApplyHD Section Control

Product Setup

Navigate to the vApplyHD Setup menu (Setup > Systems>vApplyHD) in order to setup your first product.



For single vApplyHD systems only, the first product setup will need to be completed. Press on the Product 1 setup button on the top left side to begin the setup process. For multiple liquid systems (vApplyHD and/or FlowSense) each system will need to be setup individually. Up to four liquid systems can be configured.



To successfully configure a vApplyHD system all settings on this page must be set correctly. In order for the liquid product to be viewed on the home page and diagnose page the Control Style and Product Nickname must be set.

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				

Control Style

Change “Control Style” from Disabled to “vApplyHD” to allow the 2020 to begin using vApplyHD. To successfully configure a vApplyHD system all settings on this page must be set correctly. In order for the liquid product to be viewed on the home page and diagnose page the Control Style and Product Nickname must be set.

Note: Enable the Coverage Source on the right for the liquid system to define the coverage source for all liquid system swathing. If multiple liquid systems are configured, only one system can be set to the coverage source.

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				

Product 3 Setup (Disabled)			Home
Control Style			Enter
Select which flow system is associated with this product			
vApplyHD Row by Row Control	vApply Liquid Hydraulic Motor Contr	FlowSense Row by Row Monitor	Coverage Source
vApplyHD Section Control FlowSense Sensing	vApply Granular Hydraulic Motor Contr	Disabled	Back

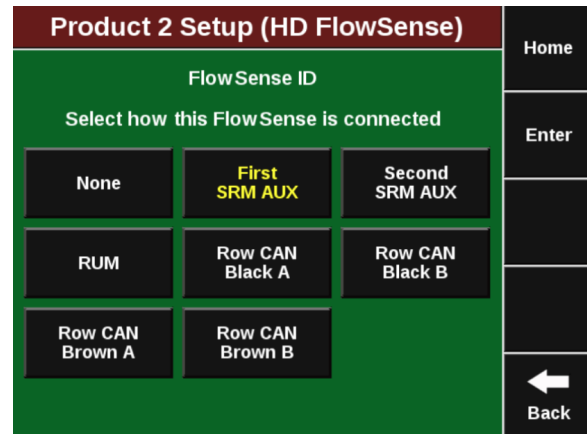
Once you have selected “vApplyHD” for the control style you will need to select the vApplyHD’s control ID. This is determined by what jumper color is being used to connect the vApplyHD module to the system.

- First Control Module/Product.
- Second Control Module/Product.
- Third Control Module/Product.
- Fourth Control Module/Product.

Product 3 Setup (vApplyHD)		Home
Row Control Module		Enter
Select which vApplyHD is used for control		
First (Black Jumper)	Second (Brown Jumper)	Back
Third (White Jumper)	Fourth (Green Jumper)	

FlowSense ID

After selecting the “Row Control Module” ID, a FlowSense ID window will appear. The correct FlowSense needs to be selected so that the 2020 understands which FlowSense module it expects to see flow on from the controlling vApplyHD you previously selected. See the list below for FlowSense options:



None: This option should not be selected if you are using vApplyHD Section control.

First SRM AUX: Select this option if you have a single AUX FlowSense plugged in to an SRM AUX plug.

Second SRM AUX: Select this option if you have two separate AUX FlowSense plugged in to an SRM AUX plug **AND** this product is using the second AUX FlowSense.

RUM: Use this option if you are using an AUX FlowSense plugged into the AUX plug on a RUM (non SRM planters).

Row CAN Black A: Select this option if you are using a CAN FlowSense with a **Black** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**A**” on the CAN FlowSense.

Row CAN Black B: Select this option if you are using a CAN FlowSense with a **Black** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**B**” on the CAN FlowSense.

Row CAN Brown A: Select this option if you are using a CAN FlowSense with a **Brown** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**A**” on the CAN FlowSense.

Row CAN Brown B: Select this option if you are using a CAN FlowSense with a **Brown** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**B**” on the CAN FlowSense.

Row Can Sequential: CAN Sequential allows for vApplyHD FLEX modules to do section control.

Application Nickname

Give your product a “Nickname” by selecting the empty box and selecting from the list. If necessary, a “Custom” name may be entered for your products Nickname. The nickname chosen will be displayed on the homepage, diagnose page, and control pages instead of vApplyHD.

Product 1 Setup (Disabled)				Home
Control Style	Application Nickname	Active Rows	Application Position	Enter
Disabled		All	Not Set	
HD Section Setup	Tank Volume	Pump Style	Placement Hardware	Calibrations
Tied Seed	300 gal	Uncontrolled	Other	
Target Rate Minimum	Default Rate	Target Rate Maximum	Tank Mix Setup	Advanced Setup
3.0 gal/acre	5.0 gal/acre	10.0 gal/acre		
Flow Rate Adjustment				Back
0 %				


Nitrogen Setup (vApply HD)			Home
Application Nickname			Enter
This is used for distinguishing multiple systems. It is also the name on the as applied map.			
Nitrogen	Insecticide	Fungicide	Back
Starter	Herbicide	Spray	
Popup	Custom	Disabled	
			Back

Active Rows

“Activate Rows” lets the 2020 know which rows should be actively controlled. When rows are not active, they will remain off and not apply any product.

Application Position

Enter the position of the liquid exit point in order for swath control to work properly. Select “In front of Seed Exit” (marked A in the diagram) if you are applying your liquid prior to the seed tube exit. Measure how far in front of your Seed Tube Exit and enter in the number of inches. Select “Behind Seed Exit” (marked B in the diagram) if you are applying your liquid behind the seed tube exit. Measure how far behind your Seed Tube Exit and enter in the number of inches.

Nitrogen Position Setup (vApply HD)			Home
			Enter
Select the application position by selecting the box below, then enter the distance from the liquid exit point to center of the lowered seed exit point			
7	8	9	Back
4	5	6	
1	2	3	
0	.	C	
In front of Seed Exit (A)		Behind Seed Exit (B)	
10		inches	

Swath Section Setup

Configure how the vApplyHD modules swath off and on.

Section: This option allows the operator to customize the swath sections. Set the total number of swath sections at the top of the screen. Then use the arrows to assign rows to sections or press on the “Rows in Section” box to list rows in the section.

Assigning Row To Sections: In the Swath Setup window, select the “Number of HD Sections” option and enter how many sections you have for this product. This number will be the total number of vApplyHDs controlling the sections of this product.

As displayed in the image above, you can then select the number of rows in a specific section and which rows in that section. The main vApplyHD Product Setup window will show the products and sections in the planter diagram (This example image has 16 individual row vApplyHD control on Product 1 and five vApplyHD sections on Product 2).

Disabled: Disabled swath will prevent the vApplyHD from turning off in a swath event. This will cause overlap in product at end rows and headlands.

Tank Volume

Tank volume is designed to allow the user to track how many gallons of the active product are available to apply. Tank volume will be used to trigger the low product alarms that can be configured in the “Liquid Alerts” section of the “Crops” tab (see liquid alerts section). If there are multiple tanks feeding the liquid system add the volume of each tank together.

The screenshot shows the 'Nitrogen Setup (vApply HD)' interface for 'Tank Volume'. The title bar is dark red with white text. Below it, the screen is green with white text. The title 'Nitrogen Setup (vApply HD)' is at the top. Below that, 'Tank Volume' is centered. A white box displays '750.00 gallons'. Below the display is a numeric keypad with buttons for digits 0-9, a decimal point, and a 'Back' button. The keypad is arranged in a grid: 7, 8, 9, Back; 4, 5, 6, .; 1, 2, 3, 00; 0, ., 000. On the right side, there are three buttons: 'Home' (top), 'Enter' (middle, highlighted with a yellow border), and 'Back' (bottom, with a left arrow icon).

Pump Style

Select the pump style that you are controlling with a vApply module. NOTE: The vApply module will only control electric or hydraulic pumps that are also equipped with a PWM control (PWM valve or electric PWM drivers). Additionally, a Pressure Maximum value must be entered - this is the maximum pressure that you want in the system. This should be no higher than what the pump and plumbing is rated for and should never exceed 100 psi.

The screenshot shows the 'Nitrogen Setup (vApplyHD)' interface for 'Pump Style'. The title bar is dark red with white text. Below it, the screen is green with white text. The title 'Nitrogen Setup (vApplyHD)' is at the top. Below that, 'Pump Style' is centered. Below the title, the text 'Select the type of pump that you are controlling' is displayed. Below this text are seven buttons: 'Electric Diaphragm', 'Hydraulic Diaphragm', 'Hydraulic Piston', 'Constant PWM', 'Ground Drive', 'Hydraulic Centrifugal', and 'Uncontrolled'. The 'Uncontrolled' button is highlighted in yellow. On the right side, there are three buttons: 'Home' (top), 'Enter' (middle), and 'Back' (bottom, with a left arrow icon).

Note: The vApply Module will only control electric or hydraulic pumps that are equipped with a PWM driver or valve.

Electric Diaphragm: Select this option when using an electric diaphragm pump WITH an electric pump driver (electric PWM control).

Hydraulic Diaphragm: Select this option when using a hydraulically driven diaphragm pump WITH a hydraulic PWM valve.

Hydraulic Piston: Select this option when using a hydraulically driven piston pump WITH a hydraulic PWM valve.

Hydraulic Centrifugal: Select this option when connected to a centrifugal pump that hydraulic driven and has a PWM valve.

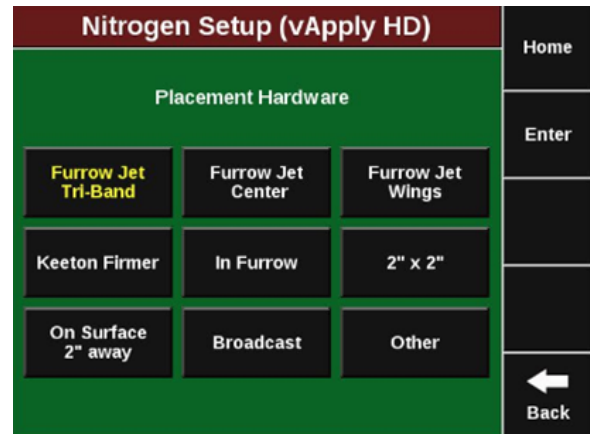
Constant PWM: Select this option when one of the previous three pump setups must be driven at a static rate.

Ground Drive: Select this option when using a ground drive pump.

Uncontrolled: Select uncontrolled for any pump setup that is not being controlled by the vApply module.

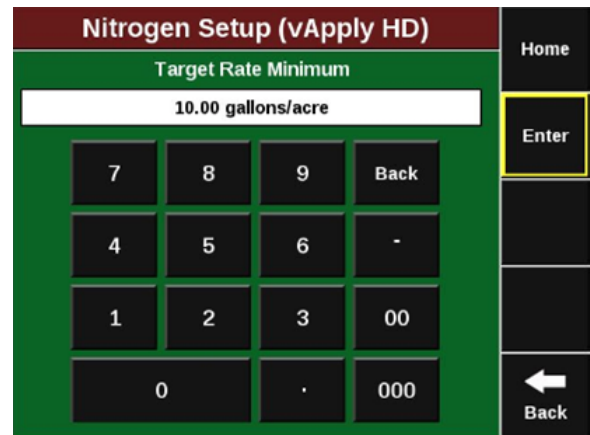
Placement Hardware

Select what Hardware that will be applying the liquid going through the vApplyHD modules. This is for record keeping only and will not affect any settings or controls.



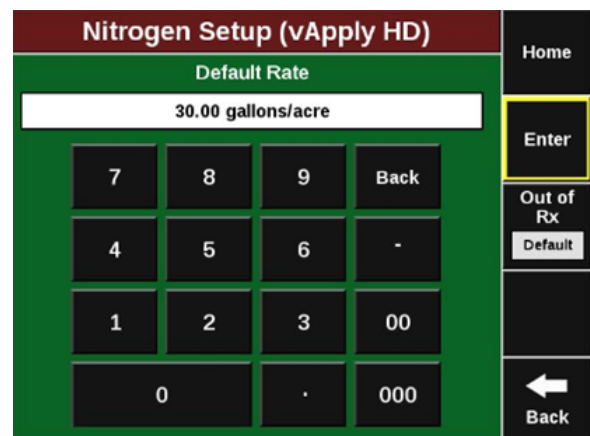
Target Rate Minimum

Setting the minimum target rate will allow the 2020 to effectively alert the user in the event that the control of product drops below the minimum expected control. The rate entered here will also be used when calibrating the pump to ensure that the minimum rate can successfully be applied.



Default Rate

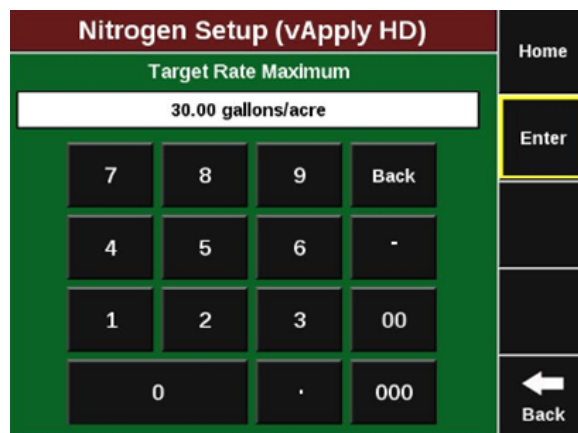
Setting the default rate that you want for this product. The rate entered here will also be used as a starting point when no Rx is active.



Note: The default rate will be used when the “load vApply” button is used in the control screen.

Target Rate Maximum

The Target Rate Maximum entered here will also be used for calibration and Quick Test Health Check to ensure that the maximum rate can successfully be applied.



The screenshot shows a control panel for 'Nitrogen Setup (vApply HD)'. At the top, the title 'Nitrogen Setup (vApply HD)' is displayed in white on a dark red background. Below this, the 'Target Rate Maximum' is shown in a white box with a green border, containing the value '30.00 gallons/acre'. To the right of the main display area is a vertical sidebar with a 'Home' button at the top, an 'Enter' button highlighted with a yellow border, and a 'Back' button at the bottom with a left-pointing arrow. The main display area contains a numeric keypad with buttons for digits 0-9, a decimal point, and a 'Back' button. The keypad is arranged in four rows: Row 1: 7, 8, 9, Back; Row 2: 4, 5, 6, .; Row 3: 1, 2, 3, 00; Row 4: 0, ., 000.

Tank Mix Setup

Use the Tank Mix Setup page to enter your Carrier and what Products are being added to the mixture. Future software updates will record and give field summaries of total used carriers and product separately.

Flow Rate Adjustment

This option provides the ability to implement minor rate adjustments. Our recommendation is to consult your dealer or Precision Planting Product Support prior to making any Flow Rate Adjustments. Proper rate measurements prior to adjustment are critical to ensure accurate control.

vApplyHD Control Adjustment: Enter a percentage to adjust the vApplyHD control on the flow rate. Positive numbers increase vApplyHD output and negative numbers decrease the output. For example, if the vApplyHD rate is 10 gpa and a bucket test shows it is actually doing 10.5 gpa (5% excess), enter -5% into the Flow Rate Adjustment to adjust the vApplyHD control to correctly apply the desired 10 gpa.

FlowSense Sensing Adjustment: Enter a percentage to adjust the FlowSense rate feedback on the 2020. Positive numbers increase the FlowSense GPA displayed and negative numbers decrease the GPA displayed. For example, if the vApplyHD rate is 10 gpa and a bucket test shows it is correct, but the FlowSense shows feedback of 10.5 gpa (5% excess), enter -5% into the FlowSense Sensing Adjustment to adjust the feedback to correctly display 10 gpa.

Advanced Setup

(Setup > Systems > vApplyHD > Advanced Setup).

Note: Consult with Precision Planting Dealer prior to changing any Advanced Settings.

- **Pressure Sensor Type**

Select the type of pressure sensor that is plugged into the vApply Module. Currently, the only supported option is a Precision Planting Pressure Sensor.

Pressure Maximum

The maximum pump pressure the grower is comfortable reaching in the system without exceeding the maximum pressure the pump is capable of. A diagnostic will also be logged if this pressure is exceeded. This is the same Maximum Pressure that is set when a pump style is selected.

- **Minimum/Maximum Gallon Per Minute**

If these configurations are set, they will enforce a minimum and maximum limit on the rate being commanded from the vApply control page. These options are put in place allow growers who are using a spray nozzle that require a minimum or maximum flow (in gpm) to create the desired spray pattern. In order for vApply to have the maximum range of operation, keep the default “No Limit” setting for both minimum and maximum options.

- **Pump PWM Frequency**

The default rate of 150hz PWM frequency will work for most types of electric and hydraulic controlled pumps. Changes to this value should reflect the pump manufacturer's recommendations.

- **Manual PWM**

Enter a PWM percentage to maintain as a constant for the pump. This constant PWM percentage only works if the pump style selected is “Constant PWM” on the main vApplyHD setup. If any other pump style is chosen other than Constant PWM, then this field is not used by the control system.

- **Minimum/Maximum PWM**

Minimum PWM / Maximum PWM - these are the two extremes for how open the PWM valve can be. The control will not exceed the maximum or minimum PWM command. The default setting is 0% to 95%. This is not the Min/Max PWM values from the pump cal.

- **Rum Updates**

Rum Updates is only used when using FlowSense on planters with RUMs and NOT SRMs. Enabling the update will allow the 2020 to update the RUM Firmware so that the FlowSense can be read through the RUM.

Liquid Alerts

Navigate to the Crops Tab in your 2020 setup. Select “Liquid Alerts” towards the bottom of the page (Planting) or “Setup” — “Liquid Alerts” (Sidedress) to adjust 2020 alerts related to your vApply system.

Nitrogen Alerts (vApplyHD)				Home
Planter	Systems	Crops	Diagnose	Data
Corn (Active)				Enter
Flow Alert	Flow Alarm	Tank Alert	Tank Alarm	
90% - 110%	70%	25%	10%	
Flow Alarm Action	Time to Flow Alert/Alarm		Coverage Minimum Rate	
Jump to Liquid Bar Chart	3 sec		0.0 gal/acre	
Pressure Alert	Pressure Alarm			
5 psi	20 psi			← Back

Flow Alert

- Select a flow percentage range. If flow is outside of the selected range, the vApply Control button on the home screen will turn yellow. The Flow Alert can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Flow Alert.

Flow Alarm

- If the flow drops below the selected percent the vApply Control button will turn red on the home screen. The Flow Alarm can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Flow Alert.

Tank Alert

- Select a tank level percentage so that if the level of liquid in the tanks falls below the percent, the Tank Volume metric on the home screen will turn yellow. The Tank Alert can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Tank Alert.

Tank Alarm Amount

- Select a tank level percentage so that if the level of liquid in the tanks falls below the percent, the Tank Volume metric on the home screen will turn red and sound an alarm. The Tank Alarm can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Tank Alert.

Flow Alarm Action

- Select the action the monitor should take if the Flow Alarm is triggered. Select between Jump to DMC (this is row by row details of flow rates), Jump to Homepage, or None.

Time to Flow Alert/Action

- Enter the amount of time a failure event needs prior to triggering the alert/alarm.

Coverage Minimum Rate

- Coverage minimum rate sets the minimum rate needed in order for the 20/20 to ‘paint’ coverage for vApply. Any rate below this minimum will NOT create a coverage layer and vApplyHD will not shut off if this area is passed over again.

Low Pressure Warning

- This warning will trigger if the system pressure is lower than the selected PSI level. Pressure reading taken by the vApply Module. To disable an Alert, press on the alert and then on the right hand side of the screen press on 'Flow Alert Enabled'. This will change it to say 'Flow Alert Disabled'. Press on the same button to switch it back to 'Flow Alert Enabled'.

Pressure Alert

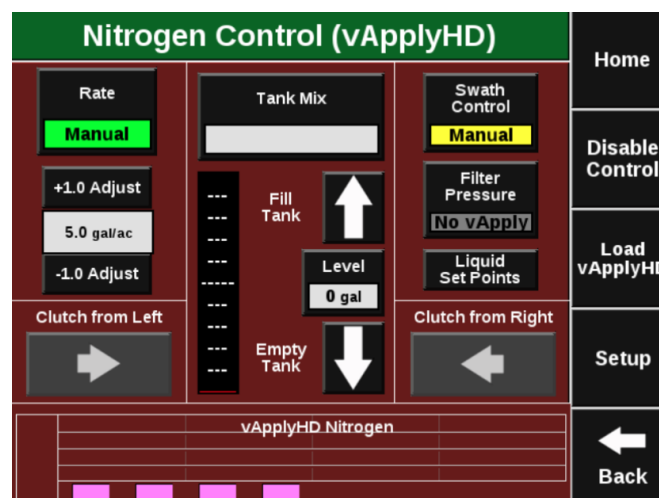
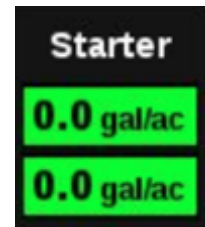
- Pressure alert sets a minimum PSI. If pressure drops below this value, an alert is triggered to warn the user of a potential issue.

Pressure Alarm

- Pressure alarm sets the maximum pressure for the system. If pressure at the pump raises above this value, an alarm is triggered to warn the user of a potential issue.

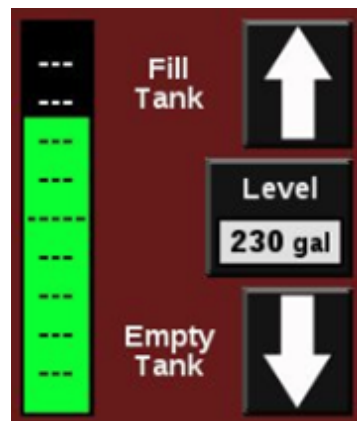
Control Page

The vApplyHD control screen is the central location for rate and swath control features in the 20/20 SeedSense display. To access the vApplyHD control page, the control button must first be added to the home screen. See Step 1 for information on how to add the control button to the home screen. The control button will have the product nickname listed as the name of the button. Press on this button to access the vApplyHD control screens.



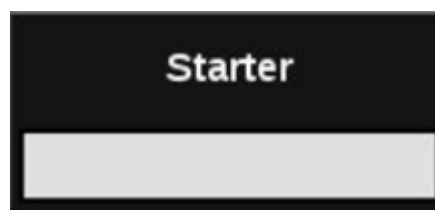
Tank Level

Tank level information is found in the center of vApplyHD control page. To reset the volume of liquid in the tank(s) either press on the up arrow to fill the tank with the total tank volume specified in the vApplyHD setup pages (section 2.8), press on the box specifying the gallons left to manually enter a volume, or press on the down arrow to specify zero gallons remaining. If the tank information is not displayed, press on the button titled “Liquid Tank” to display the tank information.



Tank Mix

The Tank Mix is optional information that can be added to help keep track of what mix is being applied to the field (similar to a hybrid/variety). By pressing on the Tank Mix button a customer mix can be created for what is being applied. Both a Carrier and Products (that are being mixed with the carrier) can be entered along with the volume of each. This way the exact mixture being applied to the field can be recorded.



On the right hand side of the screen a separate tank size measurement can be entered. This is the size of the tank that the mix is being carried in. It does not have to be equal to the tank volume size entered for the planter in the vApplyHD setup. As the carrier and products are being entered for the tank mix, the number of gallons for each can be entered. The system will keep deducting the remaining volume left for the mix from this new tank size measurement.

Mix 2 Example Tank Mix				Home
Carrier		Product 1		Enter
Example	800.00 gal	EX1	100.00 gal	
Product 2		Product 3		Load / Save / Rename
Ex2	50.00 gal	EX3	50.00 gal	
Click to add Product				Tank Size
				1,000 gal
				Back

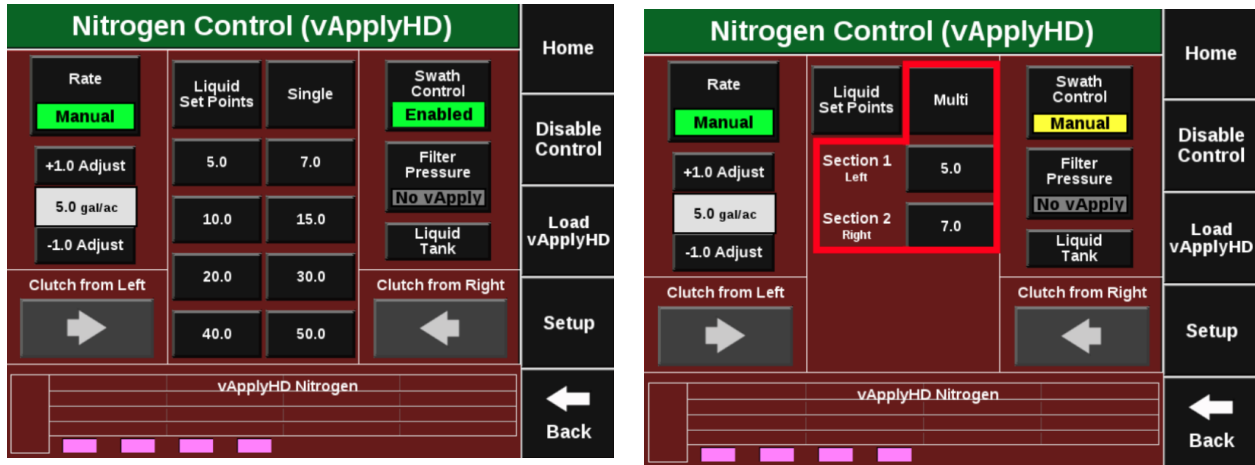
Once the mix has been created it can be given a name and saved by pressing on the Load/Save/Rename button on the right hand side of the screen. Once tank mixes have been saved, the same button can be pressed to load a previously used tank mix.

Rate Control

If a variable rate liquid prescription is being used the status button at the top left hand corner will say “Variable”. Below the status button the current rate is displayed along with the next rate in the prescription.

Pressing the “Variable Rate” button switches the system to Manual control. This ignores the prescription and continues to apply the rate being applied at the time the system was disabled. To control the rate again based on the prescription, press the “Manual Rate” again.

If no prescription is assigned, the status button will be set to Manual. When in Manual rate mode, the rate displayed in the white box is the rate being commanded. This rate can be adjusted manually by either pressing on the Liquid Setpoint button and selecting one of eight preset rates (set points can be set by pressing on Liquid Set points button found near the top of the page) or adjusted one gallon per acre at a time by pressing the +1.0 gal/ac or -1.0 gal/ac buttons.

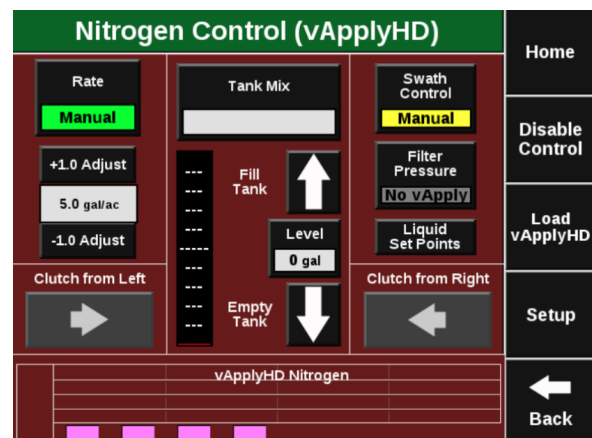


Within manual mode the operator can choose a single rate or multiple manual rates. To change between “Single” and “Multi”, select the button at the top center of the screen. If “Single” is showing, the planter will apply a single rate across all rows. If “Multi” is showing, a different rate can be assigned to each drive section. (Drive sections must be configured in the vDrive setup.) Change the rate for each drive section by pressing on the rate displayed next to each section number.

Note: This is only available in Planting mode.

Swath Control

The default Swath Control state (Swath Control button located near the top right corner) is set to “Enabled” meaning the system will swath on and off automatically. Pressing the Swath Control button will switch the system between “Enabled” and “Manual”. When in manual mode the left and right arrows can be pressed to swath off rows from either the left or right side. **Manually swathing off rows will shut off both seeding and liquid applications on the rows.**



Load vApply

The Load vApply button on the right hand side of the control page is used to pressurize the system (similar to autoloading meters, but for liquid). Pressing on the button will allow the auto load switches to function for the liquid system. Unless the operator is on this screen, the auto load switches will only spin the meters.



Calibration

Visit <https://cloud.precisionplanting.com/products/> for a short video of the pump calibration process.

Pump Calibrations can be found in the “Calibration” page under the “Systems” tab (Setup>Systems>Calibration). Use the pump calibration to allow the SeedSense software to learn the controlling aspects of the connected pump. During this process the required PWM control will be learned to effectively control the pump during rate and or speed changes.

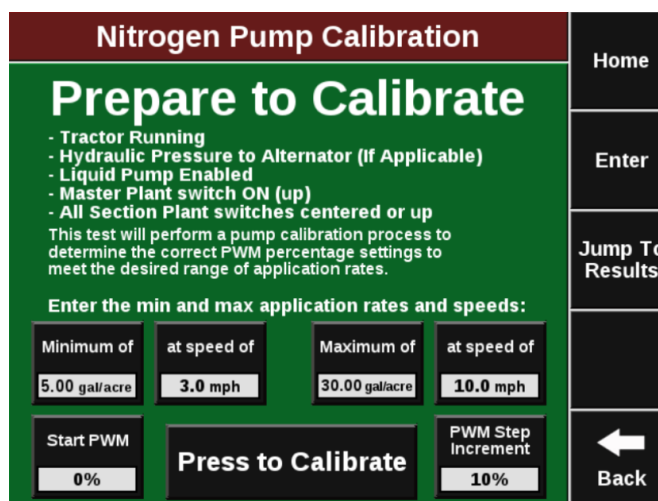
SeedSense can only control electric or hydraulically driven pumps that have a PWM controller. Ground driven or constant PWM pumps will not be able to take advantage of vApply pump control.

Calibration Checks				Home
Plant	Systems	Crops	Diagnose	Data
Lift Switch - Custom -	Swath Calibration 0 in, 0 in	Turn Compensation Missing	Radar State - Custom -	Enter
Row Unit Load Sensor Calibration		vApply HD Calibrations Uncalibrated		
				Back

Pump Calibration Quick Reference

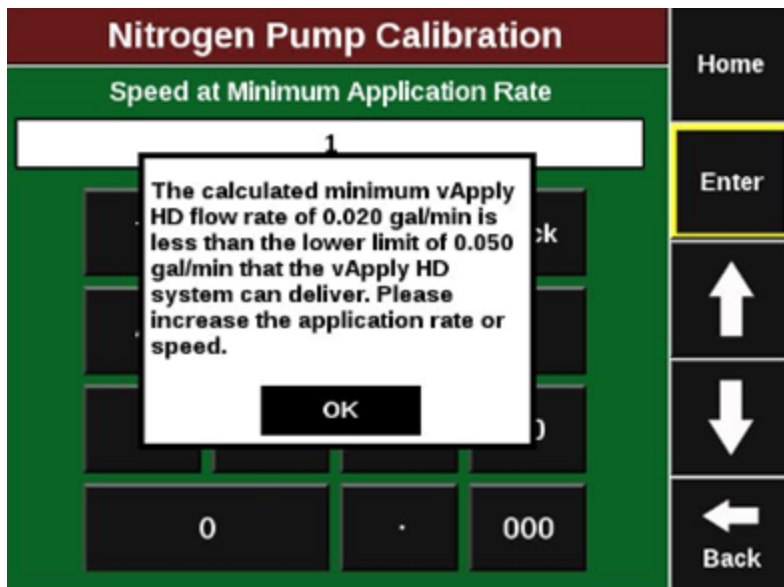
In order to run the calibration you will need:

- Must have liquid in the tanks and the tractor running.
- Hydraulic Pressure to Alternator (if applicable).
- Product control enabled.
- Master Plant switch on.
- All section plant switches centered or up.
- Run Pump Flush with vApplyHD/FlowSense hoses disconnected.
- Connect hoses to vApplyHD/FlowSense and use Pump Flush health check to set pressure relief valve at system operating pressure. This is the pressure that the system will run at or below.
- Run Pump Calibration Test and save results.



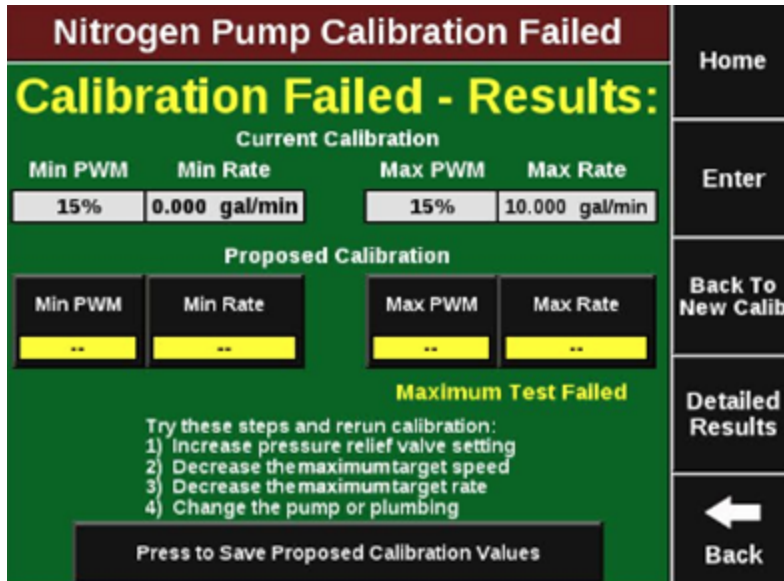
On the preparation screen, enter the lowest rate you may ask the vApplyHD to command as well as the lowest speed you plant at. Next, enter the highest rate and maximum speed you may encounter. The **Start PWM** and **PWM Step Increment** tell the 2020 where to start the motor speed at and how much to increase the PWM during each test increment. We recommend setting the **Start PWM** at 0% and using 10 as the **Step Increment**.

Note: vApplyHD is capable of .05-3.0GPM. If the entered rate and speed falls outside of these parameters, a popup will result indicating how to adjust the rate or speed to a functional range.



Run the Pump Calibration

Press “Run Calibration” to start the calibration process. This process will begin calibrating for the highest rate and speed entered on the previous screen. The SeedSense software will begin stepping the PWM percentage up until the rate is achieved or the test fails. In the event of failure, a list will be displayed with the most appropriate courses of action needed in to successfully pass the test.



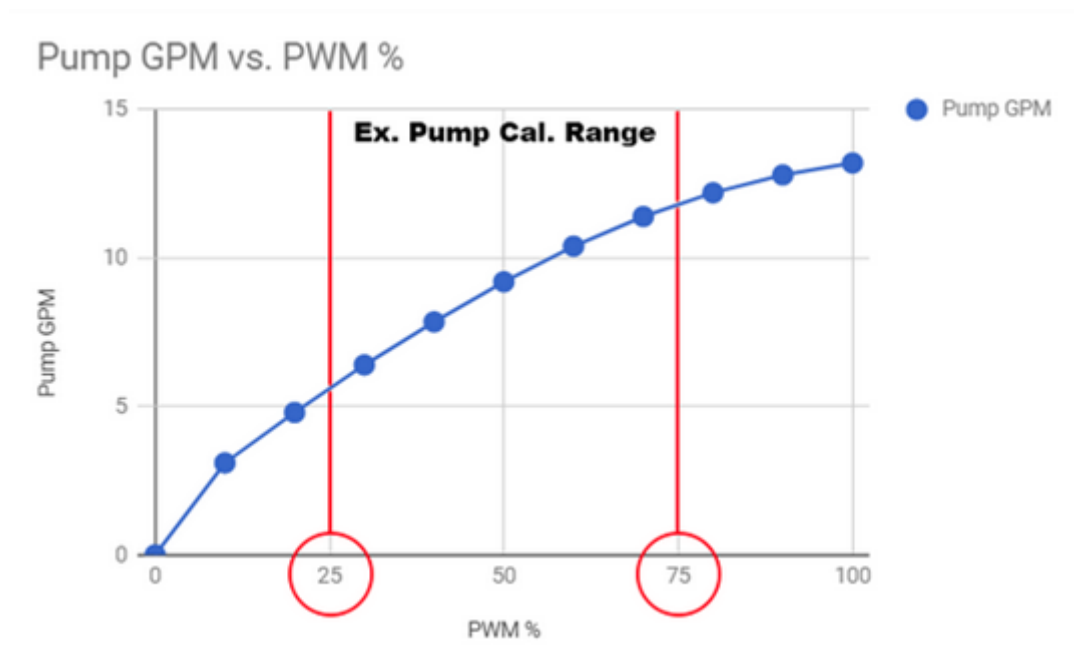
This Calibration process will typically fail the first time and requires adjustments to be made to the system prior to a successful calibration. Three or more attempts maybe be necessary to set up a vApplyHD system.

Understanding the Pump Calibration

The pump cal. is a process that the 2020 uses to learn about the rate capability of your system. The test starts in the “Off” position with a PWM command of 0%. This establishes a baseline for

the 2020 to understand (0% PWM = 0 gpm). The 2020 will then begin to run through a series of PWM commands and checks in order to understand how many gallons per minute the pump is capable of supplying at a given PWM command. After each 10% PWM increase there is a short period of 0% to reestablish the baseline.

The pump cal. process will run through the maximum rate and speed test first. This segment will create the full PWM curve of the pump and trains the 2020 to understand the maximum PWM command needed in order to hit the maximum rate and speed entered at the beginning of the test. The second part of the test checks for the lowest rate and speed and gives the 2020 an understanding of how low the PWM command may need to go.



A successful Pump Calibration will set a Min and Max PWM percentage based on the total pump GPM achievable at those commands. This is the operation window that vApply expects to run within but does NOT keep vApply from operating outside of this window. In the event that the current speed and rate combination is outside of this window, vApply will use the pump curve to command the needed PWM.

Note: The pump calibration WILL NOT pass successfully if ANY vApplyHD is not 100% healthy (i.e. Low or High sensor failed/jammed, Motor or valve issues, PSI sensor failed). Resolve vApplyHD issue prior to running a calibration.

Maximum Test Failed

Try these steps and rerun calibration:

1) Increase pressure relief valve setting.

a) Screw the relief valve in half a turn to reduce the amount of product returning back to the tank. This will allow more product from the pump to reach the vApplyHDs. Repeat this step at least three times if necessary but do not run with the relief valve all the way closed.

2) Decrease the maximum target speed

a) Reducing speed allows more time to apply product and increases the GPA rate achievable at the supplied GPM.

3) Decrease the maximum target rate

a) Reducing the rate will reduce the needed GPM and allow the desired speed to be achieved.

4) Change the pump or plumbing

a) Pump is too large

i) too much supplied product causes excess pressure and can be the result of a failed health check.

ii) Adjust pump stroke if available.

b) Pump is too small

i) Total pump supply is not enough to achieve the desired rate commanded at the vApplyHD

ii) See GPM requirement on the preparation screen and double check pumps GPM capabilities.

iii) Adjust pump stroke if available.

c) Plumbing restrictions

i) A pressure drop of more than 15PSI between the pump and the vApplyHD's indicates excessive restriction in the plumbing.

ii) Identify points of restriction or increase plumbing sizes to allow for more efficient delivery of product from the pump to the row.

Minimum Test Failed

Try these steps and rerun calibration:

1) Decrease pressure relief valve setting

a) Unscrew the relief valve half a turn to increase the amount of product returning back to the tank. This will allow less product from the pump to reach the vApplyHDs. Repeat this step at least three times if necessary.

b) If this step causes the Maximum Test to fail, return the relief valve to a position that passes the Maximum test and move to the next step.

2) Increase the minimum target rate

a) Increasing speed allows product to be applied over a greater area and will allow for the desired low GPA to be achieved.

3) Increase the minimum target rate

a) Increasing the rate will increase the needed GPM and allow the desired speed to be achieved and the requested GPA.

4) Change the pump or plumbing

a) Pump is too large

i) Too much supplied product causes excess pressure and can be the result of a failed health check.

Save the Pump Calibration

After a successful Calibration, a proposed calibration value for minimum and maximum will be displayed. Press the button at the bottom of the screen to save the calibration values. These values will be what SeedSense uses to quickly adjust product flow during swath, rate, or speed changes.

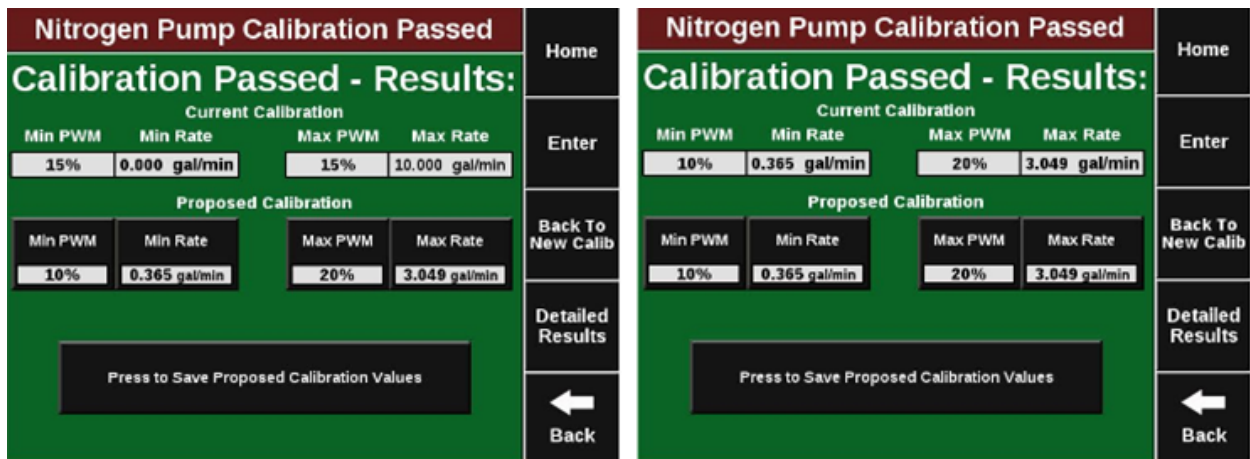


Image prior to saving calibration

Image after saving calibration

Proceed to the Quick Test to finalize vApply set up before heading to the field. Details on the Quick Test can be found in the Health Checks section of this manual.

Health Checks

Manual Test

The Manual Test is designed to allow the user an easy way to quickly look for vApply related issues, test product or plumbing changes, or to aid in cleaning/flushing the system. This “sandbox environment” gives the user the ability to enter any rate or speed combination desired without needing to actually drive the machine around. This is a great place to run pre-season water while still in the shop.

Note: A pump calibration is needed in order to run the Manual Test.

Setup > Systems > Health Checks

Setup > Diagnose > vApplyHD > HealthChecks

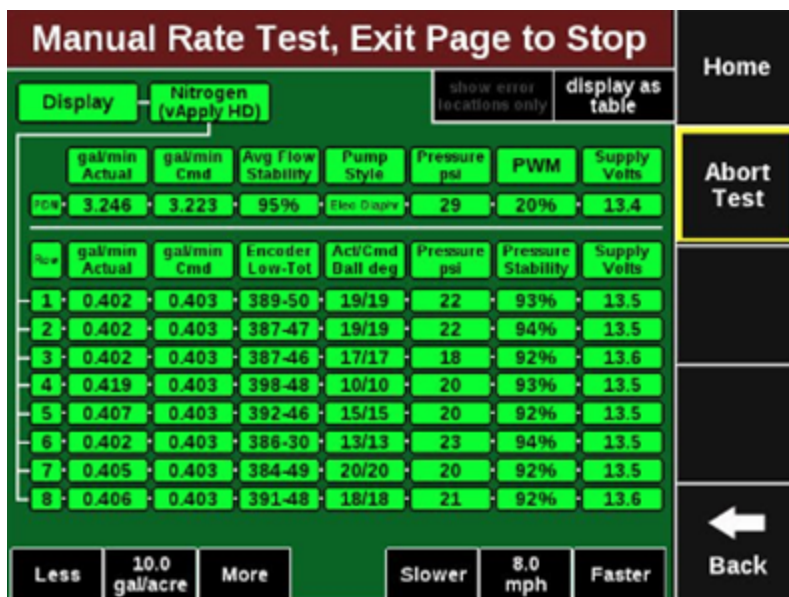
Calibration Checks				Home
Plant	Systems	Crops	Diagnose	Data
Lift Switch	Swath Calibration	Turn Compensation	Radar State	Enter
- Custom -	0 in, 0 in	Missing	- Custom -	
Row Unit Load Sensor Calibration		vApply HD Calibrations		
		Calibrated		
				← Back

In order to run the Manual Test, the following must be enabled:

- Tractor Running
- Hydraulic Pressure to Alternator
- Liquid Pump Enabled
- Master Plant Switch ON

Nitrogen Manual Test (vApply HD)	Home
<h2>Prepare to Test</h2> <ul style="list-style-type: none"> - Tractor Running - Hydraulic Pressure to Alternator (if Applicable) - Liquid Pump Enabled - Master Plant switch ON (up) <div style="text-align: center; border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Press to Test</p> </div> <p>During this test, you will be able to manually adjust vApply HD flows and simulated speed, while watching the vApply HD diagnostic page to monitor your system performance and to see the limits of your system.</p>	
	← Back

Select “Press to Test” to begin the test. This test will allow the user to enter simulated speed and product rates they may encounter when using vApplyHD. Use this mode to check for plumbing leaks after initial vApplyHD installation.

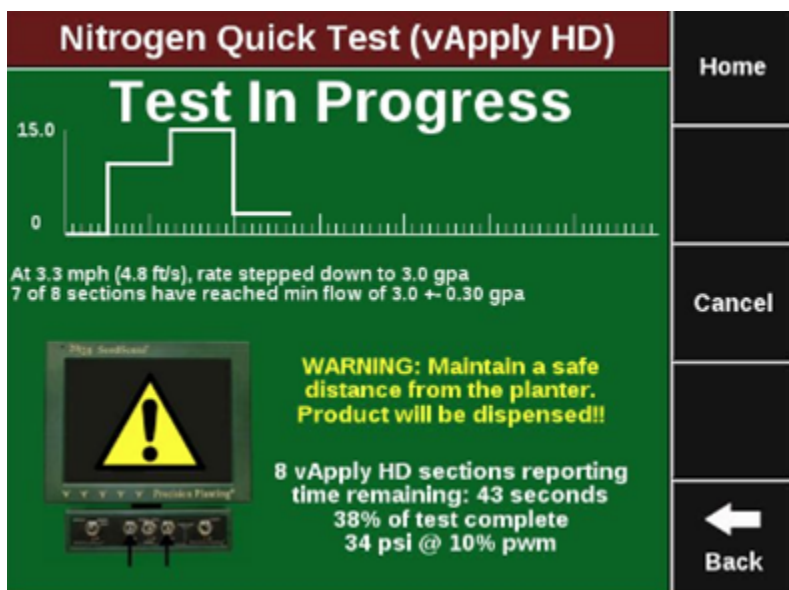


See the Diagnostics section below to help troubleshoot performance issues.

Quick Test

The Quick Test is designed to be performed as the last step prior to heading to the field with vApplyHD. Use this test after you have run the Calibration process.

The Quick Test will use the saved calibration values to quickly run through your application rates to validate that SeedSense can accurately execute all functions.



Once the test is complete, a 'scorecard' will be displayed. Any performance issues will be highlighted like the image below. Use the Manual Test to troubleshoot individual row issues.

Nitrogen Quick Test (vApply HD)									
Rows		Default Meas		Max Measured		Min Measured		Closed	
Row	Pass/Fail	gpa	psi	gpa	psi	gpa	psi	gpa	psi
1	Pass	9.9	36	15.0	31	2.9	32	0.0	36
2	Pass	9.9	36	15.0	31	2.8	34	0.0	36
3	Pass	10.1	35	15.0	31	2.9	33	0.0	36
4	Fail	9.6	33	14.7	30	3.5	0	0.0	36
5	Pass	9.7	33	15.1	31	2.9	34	0.0	36
6	Pass	9.6	35	14.9	30	0.0	33	0.0	34
7	Pass	9.9	35	15.0	31	3.0	32	0.0	36
8	Pass	9.8	35	15.1	31	2.9	33	0.0	36

Home

Enter

Page Up

Page Down

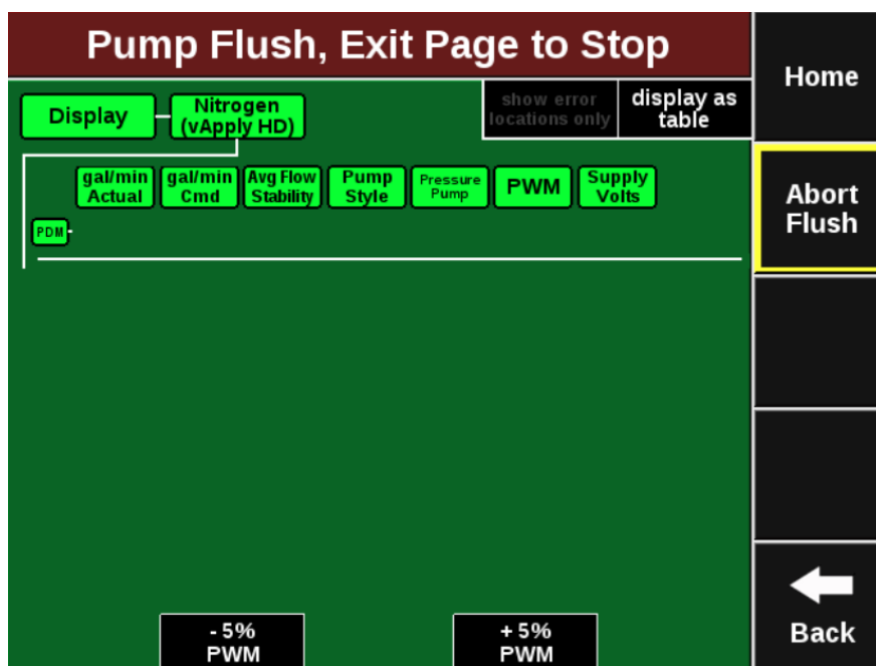
Back

Pump Flush Health Check

The Pump Flush health check allows users to manually run the pump in order to flush the system out. This can only be used on systems that have a pump controlled by the vApply module. This test allows manual PWM values to be commanded in order to spin the pump with commands from the 2020.

We recommend removing the tubing from the inlet of your vApplyHD modules so that this test can flush product through the system WITHOUT pushing product through the vApplyHD modules.

Note: Many hydraulic pumps will need a command of 60% or more before there is enough hydraulic force to spin the pump. After flushing your plumbing, connect your tubing back in to the vApplyHD and use the Pump Flush test again to run the pump at 60% and then set your system pressure with the Pressure Relief Valve. Refer to the Pump Calibration Test for more information



Loading a Liquid Prescription

Variable rate liquid prescriptions can be implemented by the vApplyHD system on a planter as long as the prescription is in the form of generic shapefile and written in terms of gallons per acre or liters per hectare. If BOTH the seeding and vApplyHD systems will be running variable rate prescriptions then there MUST be a single prescription assigned to the field that has both a seeding and liquid attribute. Separate liquid and seeding prescriptions will not be able to be ran simultaneously. Prescriptions can be loaded using FieldView or through a USB drive.

To import prescription files into the 20/20 SeedSense display unit, load the files (unzipped files only) onto the root drive of a USB drive and insert the drive into the display unit. From the dashboard screen select "Setup," "Data," "Import," and "Prescription/Boundary".

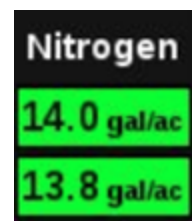
To assign a variable rate liquid prescription to a field vApplyHD must first be setup and configured on the display (See Setup Section). Prescriptions can be assigned to fields on the Field Setup screen (“Setup,” “Field,” and then select the appropriate field name). To assign a liquid prescription press on the button called “vApplyHD Prescription”. Next, select the prescription name and finally, the appropriate attribute. If a seeding prescription is being used, the same prescription name MUST be selected for both the seeding prescription and vApplyHD prescription.

Field Setup			Home
Client / Farm	Field Name	Entrance	Enter
Demo Client Demo Farm	17.4	0.00000 0.00000	
Field Number	Tillage	Field Acres	Delete Field
17		0.0	
	vApply HD Prescription	Seeding Prescription	Delete Coverage Map
	Training Rx 05	Training Rx 05	
	Attribute	Attribute	Back
	Nitrogen	1 H1_ALL	
	LiquidRate	2 H1_ALL	
	--	--	
	--	Boundary File	
	--		

Home Screen

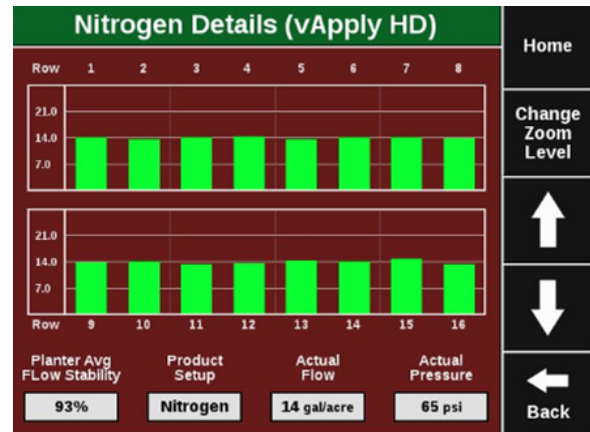
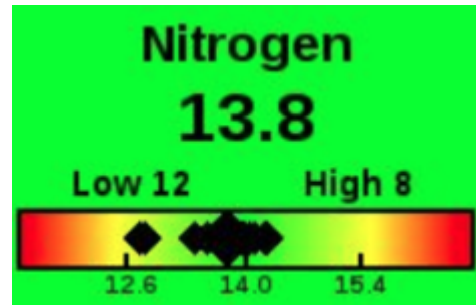
Control Button

The vApplyHD control button (named by the assigned product nickname) displays the status of vApplyHD. A green box indicates the system is detected and configured while a grey box indicates that the system is not detected. The top box indicates the commanded rate (this will be yellow if a prescription is assigned, but is in manual mode & will be red if the master plant switch is off). The bottom box is the planter wide average rate being applied.



Product Information

The product dashboard information box on the right hand side of the screen will be labeled with the product nickname selected during the vApplyHD setup. The number displayed is the planter wide average rate being applied. The large diamond on the chart represents the planter wide average, while each smaller diamond represents each individual row. Also the high and low rows are listed. Pressing on this button will display the rate being applied on each individual row.

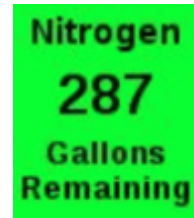


Definitions

Planter Wide Stability - Planter wide average of the stability of the liquid flowing out of the vApplyHD modules. The lower the percent, the lower the consistency of the flow of liquid out of the vApply HD modules
Actual Flow - Average flow of all vApplyHD modules.
Actual Pressure - Planter wide average of the pressure in the vApplyHD modules.

Gallons Remaining

The Gallons Remaining button displays the number of gallons that are remaining for the tank volume specified in the vApplyHD setup pages. The product nickname will be displayed on this button. Pressing on this button will take the user to the vApplyHD control page where a new tank volume can be set .



Diagnostics

SRM and vApplyHD Light Status

Erratic Blink (.. — —.. — — .. — —..)

Device has power but has never communicated to 20/20

Solid Light (_____)

Device is being updated.

Steady 1Hz Blink (— — — — —)

Device is powered and communicating to 20/20

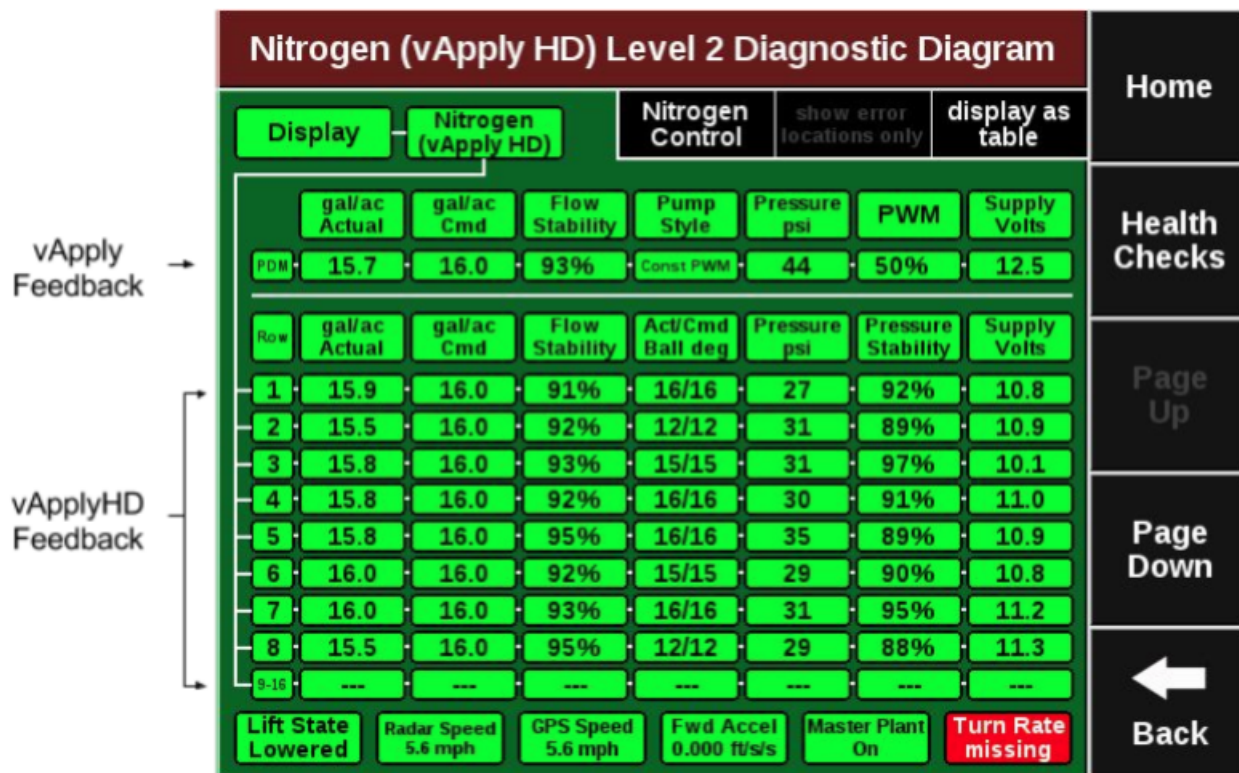
Fast 5Hz Blink (.)

Device is powered but lost communication to 20/20

No Light ()

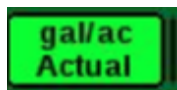
Device is not powered.

Level 2 Diagnostic Diagram will show the necessary values needed to pinpoint an issue on your fertility system. Review the image below to become familiar with what each metric represents.



PDM (vApply Module)

These values are reported by the vApply module and reported through the PDM.



System wide average measured GPA



System wide average commanded GPA



Calculated by finding the planter wide average and then measuring the deviation of max and min actual GPA.

Anything below 80% is considered poor (visual pulses in product output).

Above 85% is the goal.

Encoder Low-Tot

Low and Total flow sensor reading will be displayed.

Low flow encoder: Hz Values between 1 and 900.

Total FLOW encoder: Hz values between 10 and 200.

Pump Style

Displays the selected Pump Style from the product setup page

Pressure psi

Pressure measured by the vApply module at the plumbing essentials kit.

PWM

Current PWM percentage commanded by the 2020.

Supply Volts

Voltage supplied to the vApply module.

Normal values are reported by each vApplyHD module on a row by row basis.

vApplyHD

These values are reported by each vApplyHD module on a row by row basis.

gal/ac Actual

Measured GPA for row.

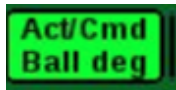
gal/ac Cmd

Commanded GPA for row.

Flow Stability

How much individual row flow variation is measured.

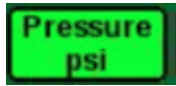
Acceptable performance is above 85%



Actual/Commanded ball position of the vApplyHD

Should always match

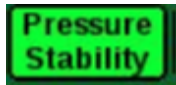
A stuck valve popup is triggered in the event that these fail to match



Pressure reading at the vApplyHD module

Should not be less than 15 PSI less than vApply Module pressure reading

Tapping on this icon also displays temperature. This is for future diagnostics.



Derived by calculating an average PSI and then measuring the percentage of deviation of the max or min PSI readings.

Above 85% is healthy



Voltage reading of each vApplyHD

Normal is 12–15v. HD will shutdown below 9.5V.

Refer to Dealer Service Manual to Troubleshoot System Issues.

*******vApply Base (WOULD LIVE HERE)*******

Advanced Setup

Gen 3 20|20

Quick Reference

There are six requirements for the vApply System to function:

1. The vApply product must be configured on the 20|20 monitor.
2. There must be a speed source.
3. The Master Plant Switch on the Cab Control Module must be in the up position.
4. The implement lift switch must register lowered.
5. vApply system must be enabled.
6. An application rate must be set.

For initial event application setup, disconnect vApplyHD or FlowSense modules and run a “Pump Flush” health check to ensure debris does not contaminate the internal flow sensors. Details on this process can be found under the “Health Check Section.”

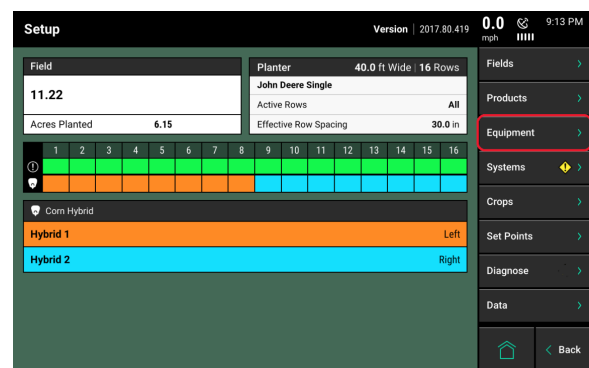
Configuring the Monitor for vApply

Step 1:

Set vApplyHD as the Fertility System.

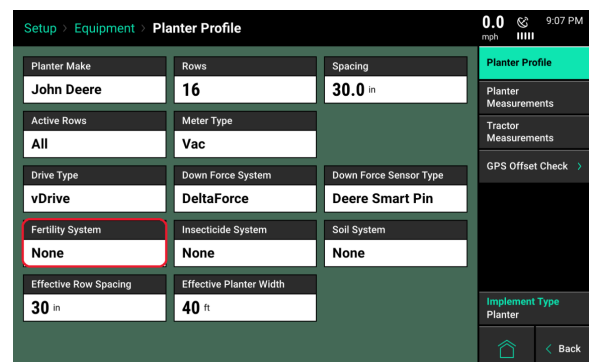
Step 2:

Navigate to the planter setup page by selecting, “setup” then “equipment”.



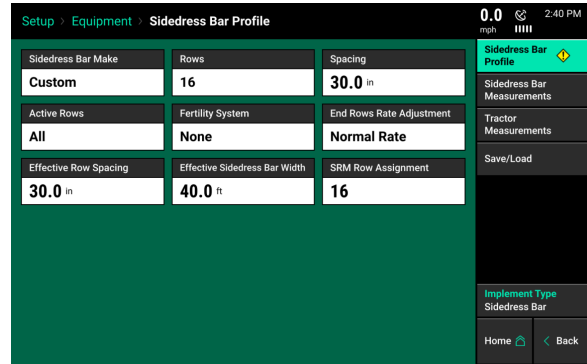
Step 3:

For Planters — Ensure that “Planter Make”, “Rows”, “Spacing”, “Active Rows”, and “Meter Type” are correct.



Step 4:

For Sidedress — Ensure that “Rows”, “Spacing”, “Active Rows”, and “End Rows Rate Adjustment” are correct.



Step 5:

Press on the “Fertility System” button and then select “vApplyHD”.



Note: vApplyHD will not be displayed on the diagnose page until it has been setup in the systems menu.

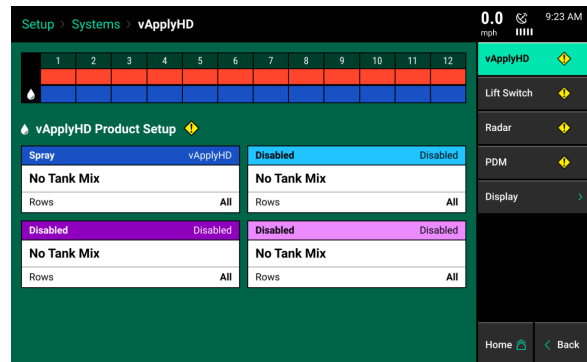
Note: If both vApplyHD modules and FlowSense are installed, select vApplyHD as the Fertility System.

vApplyHD Section Control Setup

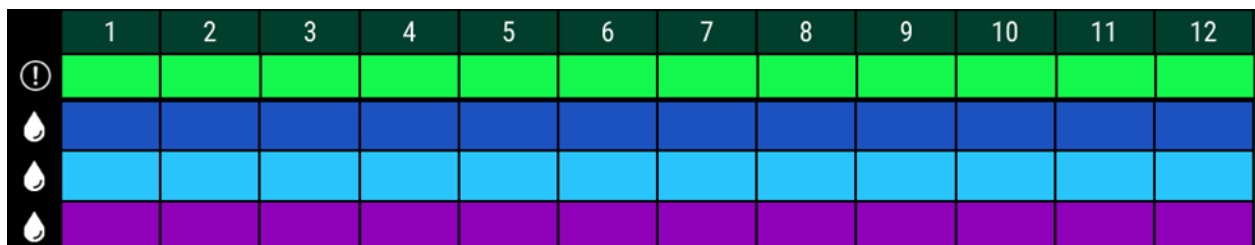
Navigate to “Setup” “Systems” “vApplyHD”.

For single vApplyHD systems only, the first product setup will need to be completed. Press on the Product 1 setup button on the top left side to begin the setup process.

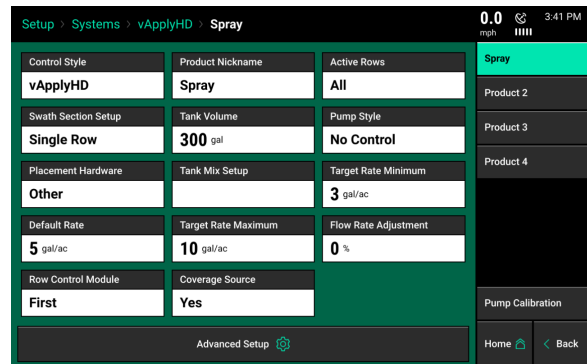
For multiple liquid systems (vApplyHD and/or FlowSense) each system will need to be setup individually. Up to four liquid systems can be configured.



Once the setup is complete, the information box towards the top of the screen indicates the rows that have been configured for each product. If a row or product is not configured it will stay gray.



To successfully configure a vApplyHD system all settings on this page must be set correctly. In order for the liquid product to be viewed on the home page and diagnose page the Control Style and Product Nickname must be set.



Control Style

Change “Control Style” from Disabled to “vApplyHD Control FlowSense Sensing” to allow the 2020 to control rate sections with vApplyHD while using FlowSense to report, monitor, and record row by row rate applied.

Once you have selected “vApplyHD Control Flowsense Sensing” for the control style you will need to select the vApplyHD’s control ID. If this product is using a vApplyHD that has a BLACK CAN Jumper harness, select “First”. If you are using a BROWN CAN Jumper harness for this vApplyHD, select “Second”.

After the Control Style is selected, a Popup about coverage source is displayed. Enable the coverage source on the liquid product that all liquid products will swath off to for coverage.

Then select which vApply row control module is being configured. This is determined by what jumper color is being used to connect the vApplyHD module to the system.

- **Black** — First Control Module/Product.
- **Brown** — Second Control Module/Product.
- **Green** — Third Control Module/Product.
- **White** — Fourth Control Module/Product.

After selecting the “Row Control Module” ID, a FlowSense ID window will appear. The correct FlowSense needs to be selected so that the 2020 understands which FlowSense module it expects to see flow on from the controlling vApplyHD you previously selected. See the list below for FlowSense options:

First SRM AUX: Select this option if you have a single AUX FlowSense plugged in to an SRM AUX plug.

Second SRM AUX: Select this option if you have two separate AUX FlowSense plugged in to an SRM AUX plug **AND** this product is using the second AUX FlowSense. (Y-Harness plugged into the first AUX Flowsense).

RUM: Use this option if you are using an AUX FlowSense plugged into the AUX plug on a RUM (non SRM planters).

Row CAN Black A: Select this option if you are using a CAN FlowSense with a **Black** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**A**” on the CAN FlowSense.

Row CAN Black B: Select this option if you are using a CAN FlowSense with a **Black** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**B**” on the CAN FlowSense.

Row CAN Brown A: Select this option if you are using a CAN FlowSense with a **Brown** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**A**” on the CAN FlowSense.

Row CAN Brown B: Select this option if you are using a CAN FlowSense with a **Brown** CAN Jumper harness **and** have physically plumbed the product from the controlling vApplyHD into the port labeled “**B**” on the CAN FlowSense.

Row Can Sequential: CAN Sequential allows for vApplyHD FLEX modules to do section control in “side dress” mode.

Product Nickname

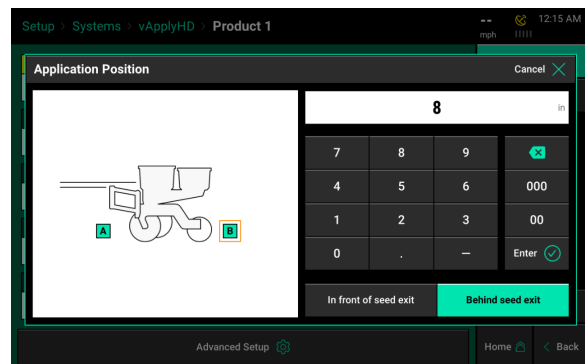
Give the product being applied a “Nickname” by selecting the empty box and selecting from the list. If necessary, a Custom name may be entered. The “Nickname” chosen will be displayed on the homepage, diagnose page, and control pages instead of vApplyHD. The “Nickname” is used to distinguish product being applied on the monitor.

Active Rows

Active Rows lets the 20|20 know which rows should be actively controlled. When rows are not active, they will remain off and not apply any product. Active rows will be displayed on the vApplyHD setup page.

Application Position — Planters Only

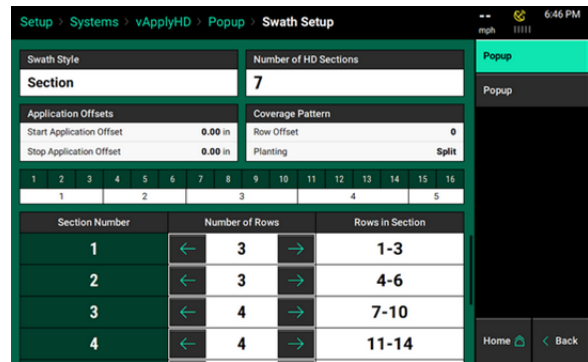
Enter the position of the exit point for the liquid in order for the swath control to work properly. Select “In Front of Seed Exit” if the liquid will be applied before the seed tube exit. Measure the distance from the front of the seed tube exit to the application point for the liquid product, and enter the distance in inches.



Select “Behind Seed Exit” if the liquid will be applied after the seed tube exit. Measure the distance from the distance between the seed tube exit and the application point of the liquid product and enter the distance in inches.

Swath Section Setup

Configure how the vApplyHD modules swath on and off.



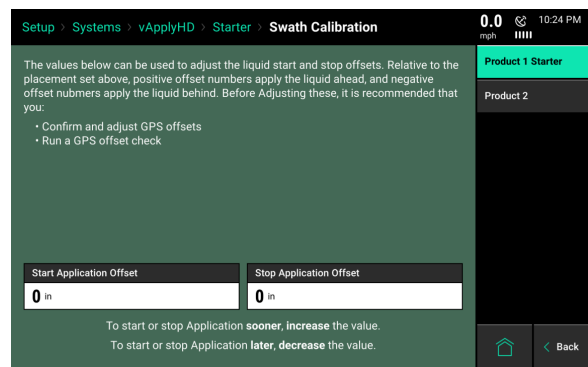
Control Style

Section: This option allows the operator to customize the swath sections. Set the total number of swath sections at the top of the screen. Then use the arrows to assign rows to sections or press on the “Rows in Section” box to list rows in section.

Disabled: Disabled swath will prevent the vApplyHD from turning off in a swath event. This will cause overlap in product at end rows and headlands.

Application Offsets

Use the Application Offsets if the start and/or stop delays for vApplyHD swath control need to be adjusted slightly. To start or stop the liquid SOONER, increase the value in inches. To start or stop the liquid Later, decrease the value in inches. (Run a GPS offset check to ensure proper GPS setup and measurements prior to adjusting the Application Offsets).

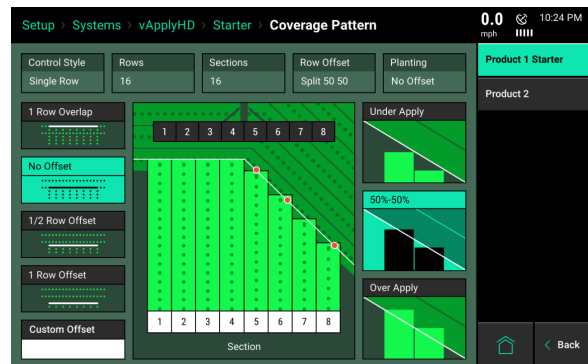


Coverage Pattern

Coverage Pattern defines how the vApplyHD modules are to operate when entering and leaving already-planted areas.

First, define the offset on the left side of the screen. This is the position from the headlands where to stop applying liquid at.

On the right hand side of the screen a coverage pattern can be selected. This is used when vApplyHD is setup in sections instead of individual rows. Determine how the liquid sections control when entering/leaving prior coverage that is on an angle.



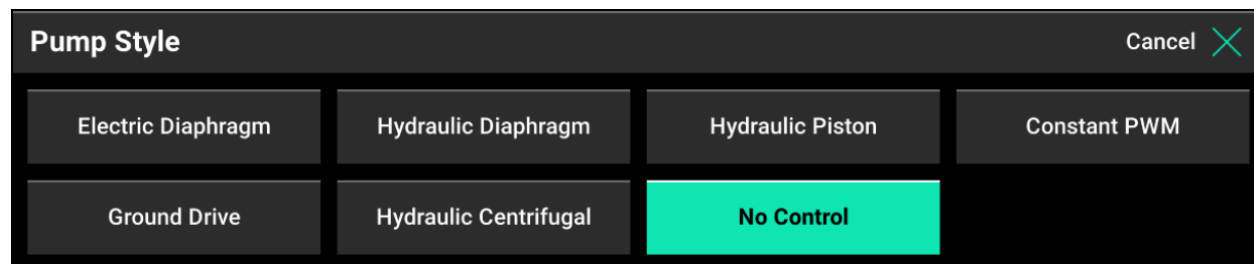
Note: The eight row planter in the picture is used as an example only on this setup screen and is not indicative of the planter configured on the monitor.

Tank Volume

Tank volume is designed to allow the operator to track how many gallons of the active product are available to apply. Tank Volume will be used to calculate the Product Remaining metric that can be added to the home screen as well as used to trigger the low product alarms that can be configured in the “Liquid Alerts” section of the “Crops” menu options. If there are multiple tanks feeding the liquid system, add the maximum volume of each tank together.

Pump Style

Select the pump style that will be controlling with the vApplyHD system. A Pressure Maximum value must be entered – this is the maximum pressure that the operator wants in the system. This should be no higher than what the pump and plumbing is rated for and should never exceed 100 psi.



Note: The vApply module will only control electric or hydraulic pumps that are equipped with a PWM driver or valve.

Electric Diaphragm: Select this option when using an electric diaphragm pump WITH an electric pump driver (electric PWM control).

Hydraulic Diaphragm: Select this option when using a hydraulically driven diaphragm pump WITH a hydraulic PWM valve.

Hydraulic Piston: Select this option when using a hydraulically driven piston pump WITH a hydraulic PWM valve.

Hydraulic Centrifugal: Select this option when connected to a centrifugal pump that is hydraulic driven and has a PWM valve.

Constant PWM: Select this option when one of the previous three pump setups (Electric Diaphragm, Hydraulic Diaphragm, or Hydraulic Piston) must be driven at a static rate.

Ground Drive: Select this option when using a ground drive pump.

No Control: Select uncontrolled for any pump setup that is not being controlled by the vApply module.

Note: If a ground drive pump is being used either Ground Drive or Uncontrolled can be selected.

Placement Hardware

Select the hardware that will be applying the liquid going through the vApplyHD modules. This is for record keeping only and will not affect any settings or controls.

Tank Mix Setup

The Tank Mix is optional information that can be added to help keep track of what mix is being applied to a field (similar to a hybrid/variety). For more information on creating tank mixes see the Tank Mix section in the vApplyHD Control.

Target Rate Minimum

The target Rate Minimum entered here will be used for calibrations and the Quick Test Health Check to ensure that the minimum rate can be successfully applied.

Default Rate

Setting a default application rate will allow the 20|20 to control to the desired default rate when a prescription is not active or available. If a prescription is being used, the default rate will also be applied to any rows that go outside of the prescription.

Target Rate Maximum

The Target Rate Maximum entered here will also be used for calibration and the Quick Test Health Check to ensure that the maximum rate can successfully be applied.

Flow Rate Adjustment

This option provides the ability to implement minor rate adjustments. Our recommendation is to consult your dealer or Precision Planting Product Support prior to making any Flow Rate Adjustments. Proper rate measurements prior to adjustment are critical to ensure accurate control.

vApplyHD Control Adjustment

Enter a percentage to adjust the vApplyHD control on the flow rate. Positive numbers increase vApplyHD output and negative numbers decrease the output. For example, if the vApplyHD rate is 10 gpa and a bucket test shows it is actually doing 10.5 gpa (5% excess), enter —5% into the Flow Rate Adjustment to adjust the vApplyHD control to correctly apply the desired 10 gpa.

FlowSense Sensing Adjustment:

Enter a percentage to adjust the FlowSense rate feedback on the 2020. Positive numbers increase the FlowSense GPA displayed and negative numbers decrease the GPA displayed. For example, if the vApplyHD rate is 10 gpa and a bucket test shows it is correct, but the FlowSense shows feedback of 10.5 gpa (5% excess), enter -5% into the FlowSense Sensing Adjustment to adjust the feedback to correctly display 10 gpa.

Row Control Module

A Row Control Module number must be entered for the system to function properly. This is determined by the color of the CAN jumper harness coming from the CAN expansion Hub to the vApplyHD module. If the vApplyHD module is using a black CAN jumper, select “First”. If the vApplyHD module is using a brown CAN jumper, select “Second”, If the vApplyHD module is using a green CAN jumper, select “Third”. If the vApplyHD module is using a white CAN jumper, select “Fourth”.

Coverage Source

This setting determines if this liquid system will define the coverage source for all liquid system swathing. If multiple liquid systems are configured, only one system can be set to the coverage source.

Advanced Setup

Note: Consult with Precision Planting dealer prior to changing any advanced settings.

(Setup > Systems > vApplyHD > Advanced Setup).

Pressure Sensor Type

Select the type of pressure sensor that is plugged into the vApply Module. Currently, the only supported option is a Precision Planting Pressure Sensor.

Pressure Maximum

The maximum pump pressure the grower is comfortable reaching in the system without exceeding the maximum pressure the pump is capable of. A diagnostic event will also be logged if this pressure is exceeded. This is the same Maximum Pressure that is set when a pump style is selected.

Minimum/Maximum Gallon Per Minute

If these configurations are set, they will enforce a minimum and maximum limit on the rate being commanded from the vApply control page. These options are put in place allow growers who are using a spray nozzle that require a minimum or maximum flow (in gpm) to create the desired spray pattern. In order for vApply to have the maximum range of operation, keep the default “No Limit” setting for both minimum and maximum options.

Pump PWM Frequency

The default rate of 150hz PWM frequency will work for most types of electric and hydraulic controlled pumps. Changes to this value should reflect the pump manufacturer's recommendations.

Manual PWM

Enter a PWM percentage to maintain as a constant for the pump. This constant PWM percentage only works if the pump style selected is ‘Constant PWM’ on the main vApplyHD setup. If any

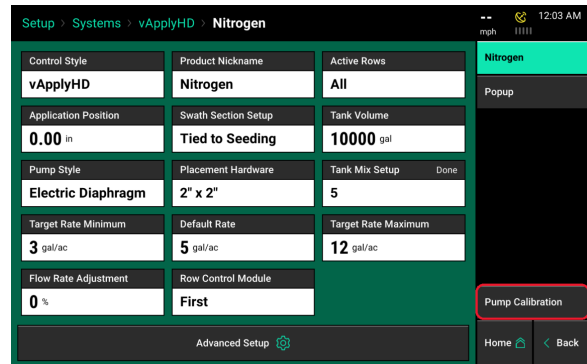
other pump style is chosen other than Constant PWM, then this field is not used by the control system.

Pump Calibration

Visit <https://cloud.precisionplanting.com/products/> for a short video of the pump calibration process.

Note: We recommend running a Pump Flush Health Check to flush the plumbing out prior to connecting the vApplyHDs to the system.

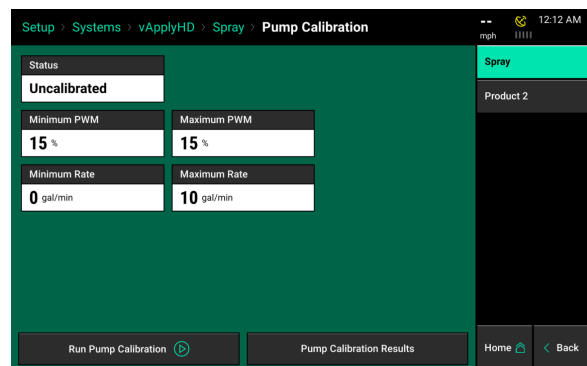
It is necessary to run a Pump calibration before the 20|20 can automatically control the pump. The Pump calibration allows the 20|20 to learn the controlling aspects of the connected pump. During this process the required PWM control will be learned to effectively control the pump during rate and/or speed changes. To run a Pump Calibration, navigate to “Setup” - “Systems” - “vApplyHD” – “vApplyHD Product Setup” – “Pump Calibration”.



The 20|20 can only control electric or hydraulically driven pumps that have a PWM controller. Ground driven or constant PWM pumps will not be able to take advantage of vApply pump control.

The “Pump Calibration” button will be located above the Home and Back button.

The pump calibration begins by showing the current values that the vApplyHD system has been calibrated at for the PWM percentages and Rates. If the system is uncalibrated the values will be defaults to a low PWM percent and 0 for the rates, displayed in Gallons per Minute (gpm). Tapping on these values allows the user to manually adjust them. However, it is better to let the pump calibration process determine the values in gallons per min.



Note: vApplyHD is capable of .05-3.0GPM. If the entered rate and speed falls outside of these parameters, a popup will result indicating how to adjust the rate or speed to a functional range.

Select the “Run Pump Calibration” button to begin the calibration process.

If a pump calibration has been run in the past, select “Pump Calibration Results” to see either the Brief or Detailed Results from the previously run test.

Prepare to Calibrate

In order to run the calibration you will need:

- Water in the tanks.
- Tractor running.
- Hydraulic pressure to alternator (if applicable).
- Liquid pump enabled.
- Master plant switch on (up).
- All section plant switches centered or up.
- vApplyHD Control Enabled

On the preparation screen, the values will be preset to match with values that were configured during the vApplyHD setup process. The Min and Max application rates will be equal to the Min and Max target rates there were configured. Both the PWM value and Application Rates can be adjusted for the pump calibration by tapping on the buttons and entering a new value

The low and high speeds can also be adjusted to match the speeds that the planter will be moving at, in order to make sure the pump is calibrated for the actual speeds it needs to be.

Setup > Systems > vApplyHD > Nitrogen > Pump Calibration

Step 1 | Step 2 | Summary

Prepare to test

Calibration Description
This test will perform a pump calibration process to determine the correct PWM percentage settings to meet the desired range of application rates.

Pre-test Checklist

- ✓ Tractor Running
- ✓ Hydraulic Pressure to Alternator (If Applicable)
- ✓ Liquid Pump Enabled
- ✓ Master Plant Switch ON (up)
- ✓ All Section Plant switches centered or up

Start PWM	Minimum Application Rate	at speed of	Maximum Application Rate	at speed of	PWM Step Increment
50 %	3 gal/ac	3 mph	12 gal/ac	7.5 mph	10 %

Cancel | Continue

Finally, the PWM Step Increment can be adjusted if need be. The pump calibration process tests the pump at each PWM percentage starting at the “Start PWM” value and then increasing in incremental steps as set by this value. The default value is 10%.

Press Continue to begin the pump calibration process.

Once the Pump Calibration process is completed a Summary will be displayed. If the system passes the calibration process, two sets of values will be displayed on this page. The current calibrations will be displayed at the top and the new proposed calibration values that were determined by the test will be displayed at the bottom. Press “Save Proposed Values” to set these as the min/max PWM and Rates. These values is what the system uses to quickly adjust product flow during swath, rate, or speed changes.

Setup > Systems > vApplyHD > Nitrogen > Pump Calibration

12:14 AM

Calibration Results:

Current Calibration Values

Minimum PWM	Minimum Rate	Maximum PWM	Maximum Rate
50 %	0.35 gal/min	70 %	3.67 gal/min

Proposed Calibration Values

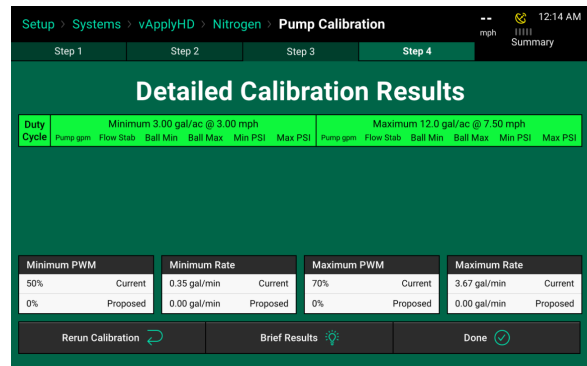
Minimum PWM	Minimum Rate	Maximum PWM	Maximum Rate
45 %	3.00 gal/min	70 %	12.0 gal/min

Save Proposed Values

Rerun Calibration | Detailed Results | Done

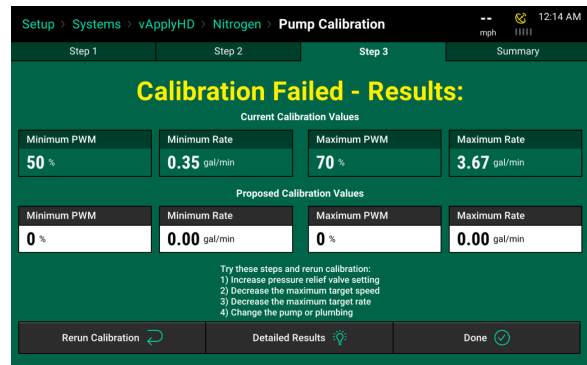
If necessary, press “Rerun Calibration” to check the system again.

Select “Detailed Results” for a more in depth look at the values proposed by the system. The detailed view includes information on the ball positions in the vApplyHD modules and PSI values.



Note: Once the Pump Calibration passes and values have been saved, it is highly recommended to run a Quick Test (Health Check) to finalize the vApply setup before planting in the field. Details on the Quick Test can be found in the Health Checks section of this manual.

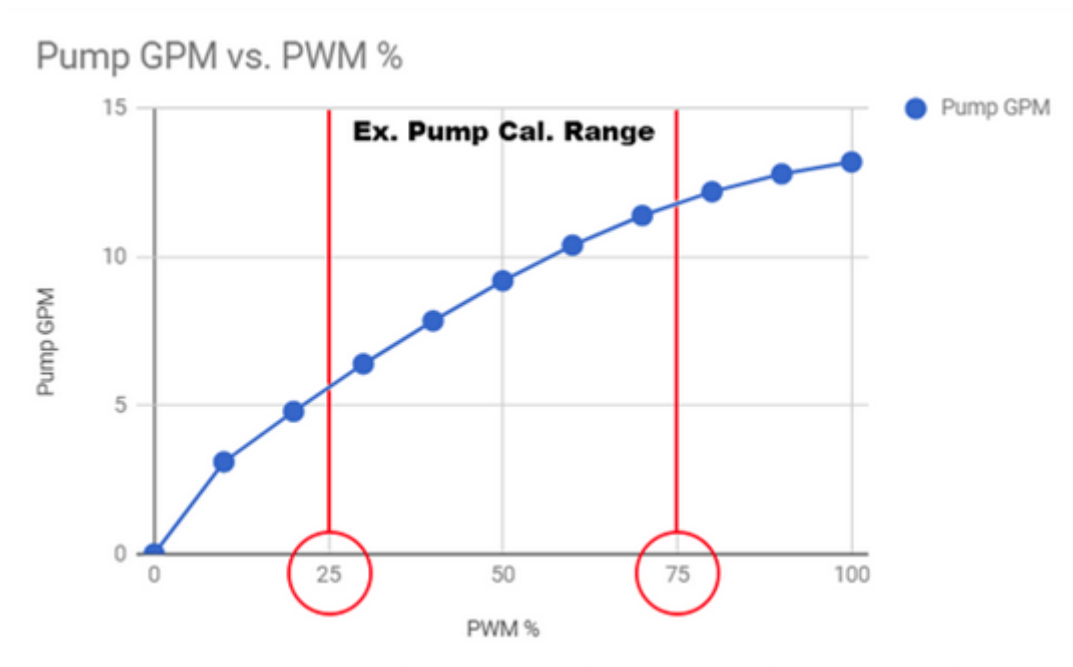
This Calibration process will typically fail the first time and requires adjustments to be made to the system prior to a successful calibration. Three or more attempts are typical to set up a vApplyHD system.



Understanding the Pump Calibration

The pump cal. is a process that the 20|20 uses to learn about the rate capability of your system. The test starts in the “Off” position with a PWM command of 0%. This establishes a baseline for the 20|20 to understand (0% PWM = 0 gpm). The 20|20 will then begin to run through a series of PWM commands and checks in order to understand how many gallons per minute the pump is capable of supplying at a given PWM command. After each 10% PWM increase there is a short period of 0% to reestablish the baseline.

The pump cal. process will run through the maximum rate and speed test first. This segment will create the full PWM curve of the pump and trains the 20|20 to understand the maximum PWM command needed in order to hit the maximum rate and speed entered at the beginning of the test. The second part of the test checks for the lowest rate and speed and gives the 20|20 an understanding of how low the PWM command may need to go.



A successful Pump Calibration will set a Min and Max PWM percentage based on the total pump GPM achievable at those commands. This is the operation window that vApply expects to run within but does NOT keep vApply from operating outside of this window. In the event that the current speed and rate combination is outside of this window, vApply will use the pump curve to command the needed PWM.

Note: The pump calibration WILL NOT pass successfully if ANY vApplyHD is not 100% healthy (i.e. Low or High sensor failed/jammed, Motor or valve issues, PSI sensor failed). Resolve vApplyHD issue prior to running a calibration.

Maximum Test Failed

If the Pump Calibration fails with “Maximum Test Failed” as the reason, try the below steps and re-run the calibration.

1) Increase pressure relief valve setting

a) Screw the relief valve in half a turn to reduce the amount of product returning back to the tank. This will allow more product from the pump to reach the vApplyHDs. Repeat this step at least three times if necessary but do not run with the relief valve all the way closed.

2) Decrease the maximum target speed

a) Reducing speed allows more time to apply product and increases the GPA rate achievable at the supplied GPM.

3) Decrease the maximum target rate

a) Reducing the rate will reduce the needed GPM and allow the desired speed to be achieved.

4) Change the pump or plumbing

a) Pump is too large

i) Too much supplied product causes excess pressure and can be the result of a failed health check ii) Adjust pump stroke if available.

b) Pump is too small

i) Total pump supply is not enough to achieve the desired rate commanded at the vApplyHD.

ii) See GPM requirement on the preparation screen and double check pumps GPM capabilities.

iii) Adjust pump stroke if available.

c) Plumbing restrictions

i) A pressure drop of more than 15PSI between the pump and the vApplyHD's indicates excessive restriction in the plumbing.

ii) Identify points of restriction or increase plumbing sizes to allow for more efficient delivery of product from the pump to the row.

Minimum Test Failed

If the Pump Calibration fails with “Minimum Test Failed” as the reason, try the below steps and re-run the calibration.

1) Decrease pressure relief valve setting

a) Unscrew the relief valve half a turn to increase the amount of product returning back to the tank. This will allow less product from the pump to reach the vApplyHDs. Repeat this step at least three times if necessary.

b) If this step causes the Maximum Test to fail, return the relief valve to a position that passes the Maximum test and move to the next step.

2) Increase the minimum target speed

a) Increasing speed allows product to be applied over a greater area and will allow for the desired low GPA to be achieved.

3) Increase the minimum target rate

a) Increasing the rate will increase the needed GPM and allow the desired speed to be achieved and the requested GPA.

4) Change the pump or plumbing

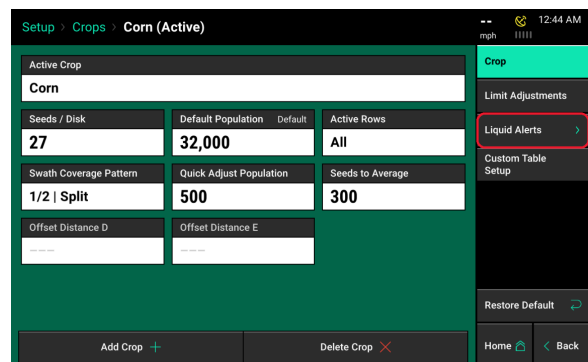
a) Pump is too large

i) Too much supplied product causes excess pressure and can be the result of a failed health check

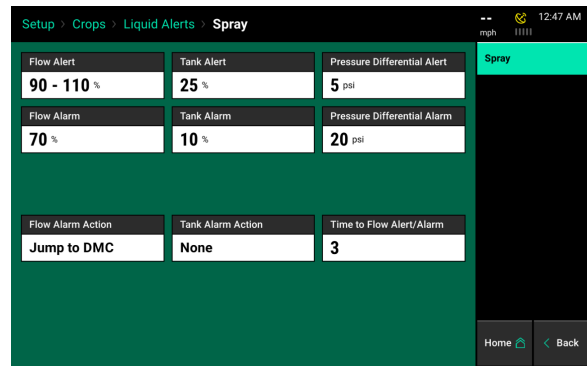
Liquid Alerts

Configure the Liquid Alerts in order to correctly give the operator, the warning and alarms when needed.

Navigate to “Setup” “Crops” “Liquid Alerts” (Planting) or “Setup” “Liquid Alerts” (Sidedress) to configure the alerts.



Flow Alert: Select a flow percentage range. If flow is outside of the selected range, the vApply Control button on the home screen will turn yellow. The Flow Alert can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Flow Alert.



Flow Alarm: If the flow drops below the selected percent the vApply Control button will turn red on the home screen. The Flow Alarm can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Flow Alert.

Tank Alert: Select a tank level percentage so that if the level of liquid in the tanks falls below the percent, the Tank Volume metric on the home screen will turn yellow. The Tank Alert can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Tank Alert.

Tank Alarm: Select a tank level percentage so that if the level of liquid in the tanks falls below the percent, the Tank Volume metric on the home screen will turn red and sound an alarm. The Tank Alarm can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Tank Alert.

Pressure Differential Alert: If the pressure differential from the input side of the filter to the output side of the filter drops more than the set Alert value then an audible warning will sound and a warning message will be placed in the vApplyHD control screen in the Pressure Differential message center.

Pressure Differential Alarm: If the pressure differential from the input side of the filter to the output side of the filter drops more than the set Alarm value then a warning message will pop up on the display, and event code will be registered in the Notification Center, and an alarm message will be placed in the vApplyHD control screen in the Pressure Differential message center.

Note: When setting the Pressure Differential Alert/Alarm take into consideration the type of pump and how high the PSI is from these pumps. Low PSI systems should set lower values while high PSI systems can set higher values

Flow Alarm Action: Select the action the monitor should take if the Flow Alarm is triggered. Select between Jump to DMC (this is row by row details of flow rates), Jump to Homepage, or None.

Tank Alarm Action: Select the action the monitor should take if the Tank Alarm is triggered. Select between Jump to DMC (this is row by row details of flow rates), Jump to Homepage, or None.

Time to Flow Alert/Alarm: Enter the amount of time a failure event needs prior to triggering the alert/alarm.

Home Page

The home page offers information for monitoring, controlling, and mapping the vApplyHD system.

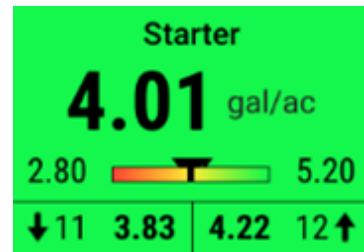
Monitoring vApplyHD

There are different options for the operator to view for monitoring the feedback from the vApplyHD system. The home screen will need to be configured to view the different options.

Note: For more details in configuring the home screen see the 20|20 operator's guide.

Three different widgets can be added to the home screen for each liquid product that has been configured on the monitor. The name of the widgets will be the same as the nickname assigned to the product during the vApplyHD setup. (If no nickname was selected or vApplyHD has not been setup, the widget names will be Product 1 & Product 2).

The large & extra-large vApplyHD metric displays the planter average in gallons per acre at the top. At the bottom of the metric the low row and the high row will be displayed along with their output in gal/ac.

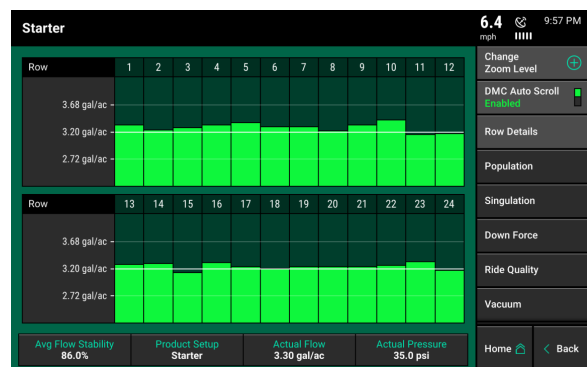


In the middle of the metric a rainbow chart that displays the planter average as a rectangle and each row as triangles. This chart is designed to give the operator a quick look at where all rows are at compared to the planter average. The low and high values on either end of the chart are determined by the Flow Alarm that is set in the Liquid Alerts.

A smaller metric can be added that only displays the planter wide average in gallons per acre.



Pressing on either the large or small liquid metric will redirect the operator to the level 2 liquid details page. On this page row by row liquid information will be displayed in bar chart form, displaying the current gallons per acre on each row.



At the bottom of this page Planter Average Flow Stability, Product Setup, Actual Flow, and Actual Pressure is displayed.

Planter Average Flow Stability: Defines the percentage of time that the planter is achieving the desired rate, the goal is to be above 85%.

Product Setup: The product nickname that is configured for the current product.

Actual Flow: The planter average flow in gallons per acre.

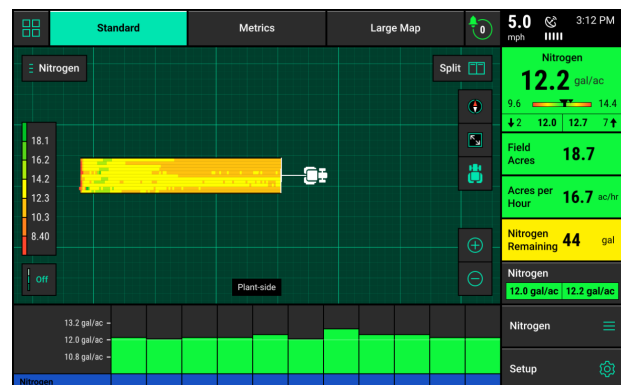
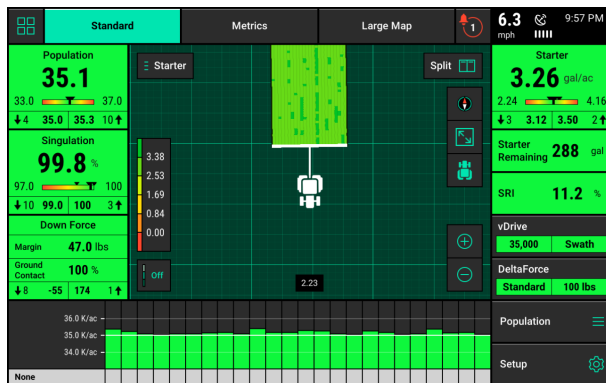
Actual Pressure: The pressure reading measured at the pump.

A tank level indicator displaying the number of gallons remaining can be added to the home screen. Pressing on this button will redirect the operator to the vApplyHD control page where the tank level can be reset after refilling.



Controlling vApplyHD

The vApplyHD control screen is the central location for rate and swath control. To access the vApplyHD control page, the control button must first be added. Use the home screen editor to add the control button. It will be called either “Product 1” (if a nickname has not been assigned in the vApplyHD setup page) or it will be called the same name that was entered as the product’s nickname (e.g. Starter, Popup, etc...). See the monitor’s operator’s guide for more information on editing the home screen and adding buttons.

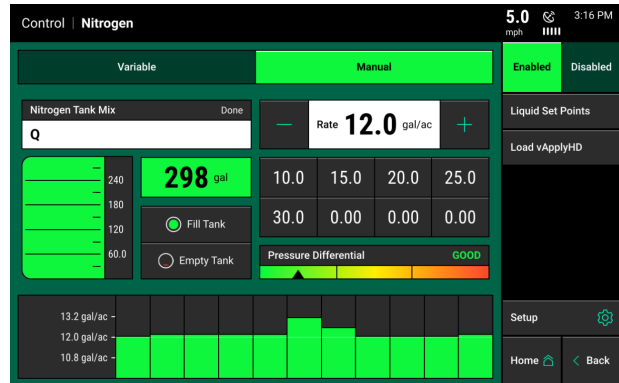
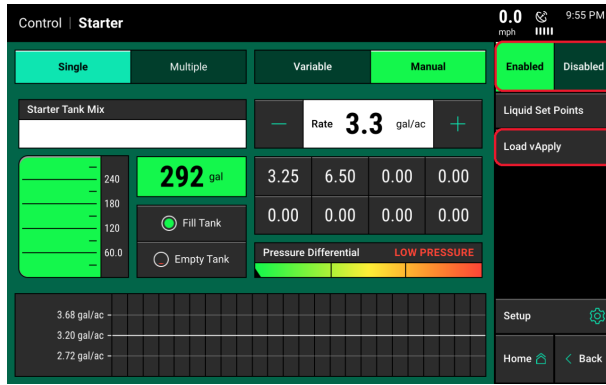


The control button (indicated by the product nickname that was selected during the setup process) will display the rate being commanded as well as the average rate being applied per acre. Pressing on this button will access the vApplyHD control page.

Before the vApplyHD system can be used, the system must be enabled by selecting the “Enabled” button in the top right hand corner.

The “Load vApply” button on the right hand side of the control page is used to pressurize the system (similar to auto loading meters, but for liquid). Pressing on the button will allow the auto load switches to function for the liquid system. Unless the operator is on this screen, the auto load switches will only spin the meters.

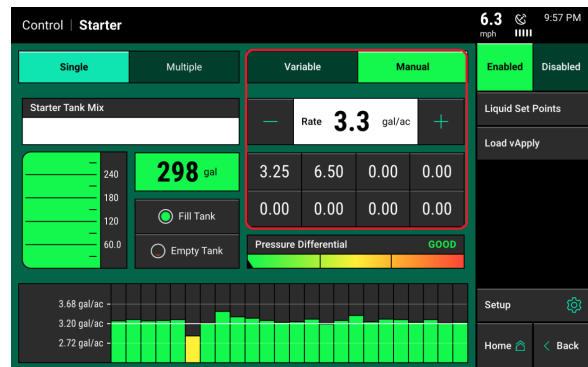
Note: Multiple manual target rates is not an available function in Sidedress mode.



Rate Control

If a variable rate liquid prescription is being used the status button will say “Variable”. The current rate being applied will be displayed in the white box.

Select “Manual” to switch to manual control. This ignores any prescription that may be assigned and applies a constant rate. If no prescription is assigned to the active field, manual mode will automatically be selected. When in Manual rate mode, the rate displayed in the white box is the rate being commanded. This rate can be adjusted manually by pressing on a Liquid Set point button and selecting one of eight preset rates (set points can be set by pressing on Liquid Set points button found near the top of the page), adjusting one gallon per acre at a time by pressing the plus or minus buttons to either increase or decrease the rate by 1 Gal/Ac, or by pressing on the white box and typing the rate.



Manual Mode

When in Manual mode the operator can choose a single rate or multiple manual rates. Use the “Single” and “Multiple” buttons to change between a single rate or multiple rates being applied. If “Single” is selected, the planter will apply a single rate across all rows. If “Multiple” is selected, a different rate can be assigned to each drive section. (Drive sections must be configured in the vDrive or vSet Select setup screens.) Select each rate sections rate being applied by selecting each individual box and either typing in a rate or select a rate from the liquid set points. If the plus and minus buttons are used all rate sections will increase or decrease by 1 gal/ac.

Note: Multiple manual target rates is not an available function in Sidedress mode.

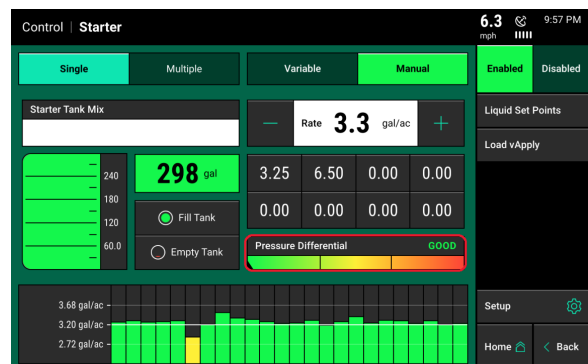
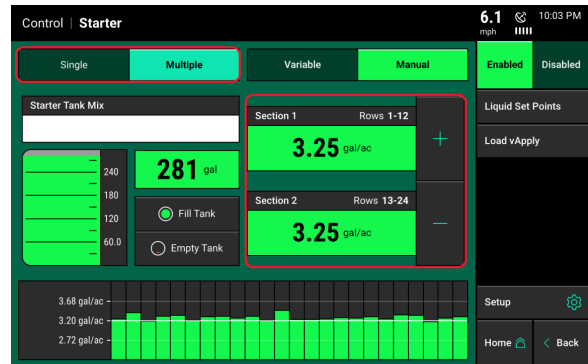
Pressure Differential

The Pressure Differential is measured as the difference between the input side of the filter to the output side of the filter. A rainbow chart is provided in the vApplyHD control page to display the status of the filter. As the pressure difference increases at the filter, the filter is becoming increasingly dirty and in need of being cleaned. A triangle will be placed on the rainbow chart to give a visual representation of the Differential. The values for the rainbow are determined by the Alert/Alarm values set in the Liquid Alerts menu.

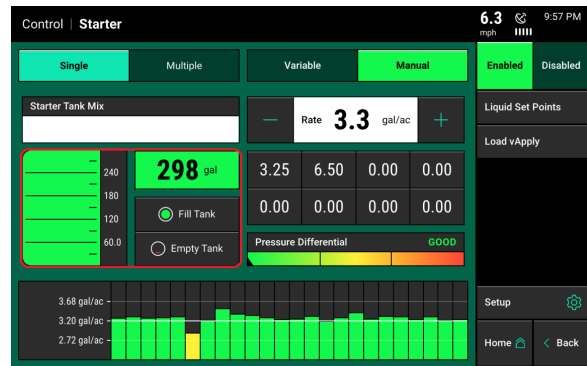
A message will be display along with the chart describing the pressure in the system.

Tank Level

The liquid tank level can be managed from the vApplyHD control page. The chart on the right indicates the current amount liquid remaining in the tanks (assuming that the tank level was initially set correctly). The total volume of the tank will be equal to the tank volume set in the vApplyHD setup.



Select “Fill Tank” to tell the system the tanks are full, “Empty Tank” to indicate an empty tank, or select the volume remaining (indicated by 0.00 gal in the illustration) to manually enter the number of gallons in the tank.

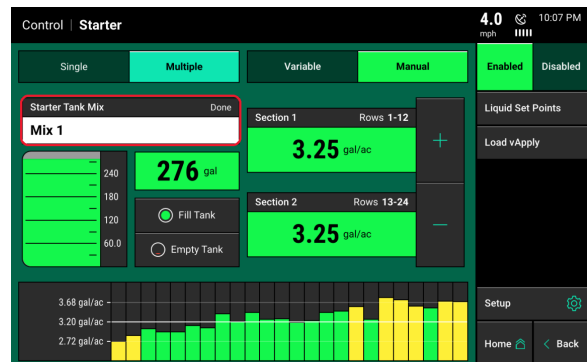


As liquid is applied the volume of the tank will decrease. A tank level metric can be added to the home screen so the operator can view the current volume of liquid remaining in the tank. For the “Tank Level” metric to maintain accuracy, a tank volume must be specified (selecting “Fill Tank” or manually entering a tank volume) when liquid is added to the tanks.

Note: Alert and Alarm settings for tank level can be configured by going to Setup – Crops – Liquid Alerts.

Tank Mix

The Tank Mix is optional information that can be added to help keep track of what mix is being applied to a field (similar to a hybrid/variety). Tank mixes are made up of a carrier and ingredients along with the volume of each. This way the exact mixture being applied to a field can be recorded. Once tank mixes have been created, they are save and can be selected at any time.

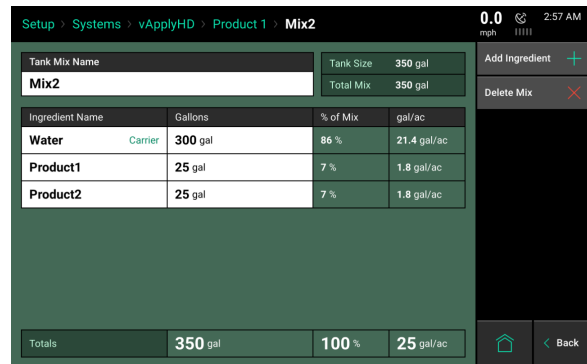


Select the “Tank Mix” button to create a mix of what is being applied. The tank mix button will be indicated by the product nickname. Tank mixes can also be entered in the vApplyHD setup screen.

If tank mixes have been previously created, the tank mix names will be displayed along with the carrier and added products. The active tank mix will be highlighted and say “Active” next to the mix name. To select a previously created mix, select the name of the mix and then press, “Make Active”. A new tank mix can be created by pressing “New Tank Mix” on the navigation pane.



If no tank mix has been created before or the “New Tank Mix” button was pressed, the system will begin automatically starting the creation process by asking for a name for a mix. After creating a name for the mix, enter the Carrier type (e.g. Water).



After the carrier is added the Tank Mix page is displayed. On the tank mix page, specify the number of gallons for the carrier by pressing on the box in the “Gallons” column.

Add Ingredients to the mix by pressing “Add Ingredient” and entering an ingredient name. Once the ingredient is added, the number of gallons must be added by pressing on the box in the “Gallons” column.

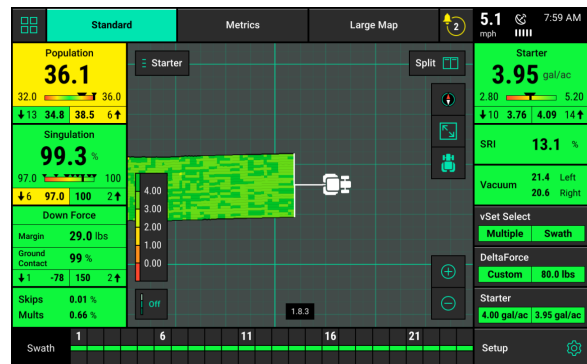
The Tank Size and the Tank Mix (upper right corner) do not have to be the same size. The Tank Size is referring to the size of the tank on the planter/tractor while Mix Size is referring to the volume of the mix in the tank that will then be transferred to the planter/tractor tank (e.g. nurse tank).

Select “Delete Mix” to delete the current mix from the list of saved mixes.

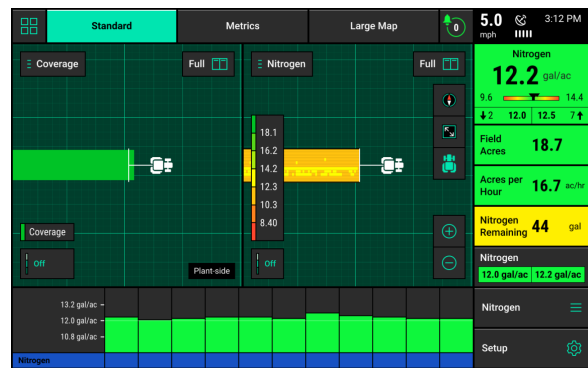
Existing Tank Mixes can be edited by a tank mix from the list of already saved tank mixes and then selecting “Edit” on the navigation pane.

Mapping vApplyHD

A liquid map is available to view on the home screen for vApplyHD. To view the liquid map select the current map type name that is displayed at the top of the map. A list of all different map types available to be viewed will be displayed. Select the map type that matches the product nickname that was selected during the vApplyHD setup process. This map will show row by row liquid information in gallons per acre.



If two different liquid systems are configured with the 20|20 two different liquid maps will be available. Each map will be named by the product nickname that was set during the setup process.



Liquid Prescriptions

Variable rate liquid prescriptions can be implemented by the vApplyHD system on a planter as long as the prescription is in the form of generic shapefile and written in terms of gallons per acre or liters per hectare.

When importing Prescriptions onto the display, prescriptions must be in the form of a shapefile and include at minimum the .shp, .shx, & .dbf file extensions. Load all of the files on the root drive of the UBS drive or in a folder titled “Sendto2020”. Insert the USB drive into the side of the display. Then select “Setup” – “Data” – “Import” – “Prescription/Boundary”.

Once Prescriptions have been imported into the display, they must then be assigned to the appropriate field names. To assign to a field select “Setup” – “Fields” – Select either the Active Field or another Field name (selecting a different Client or Farm name may be required to locate the appropriate Field name). The Field Setup page has options to assign both a Boundary and Prescription.

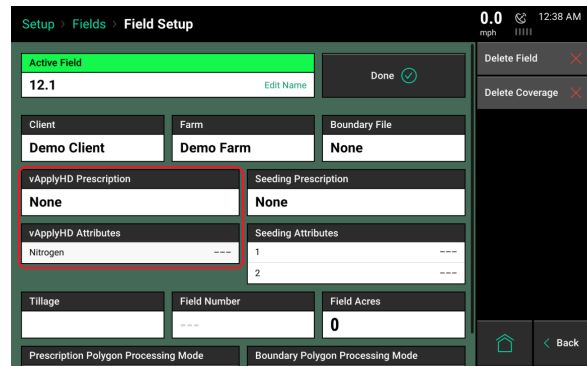
Note: Only ONE prescription can be assigned to each individual field. Prescriptions can be for seeding, liquid, and/or insecticide. To combine multiple types into one prescription, create separate attributes within the same prescription shapefile for seeding, liquid, and insecticide. Only

If no liquid prescription/attribute is assigned, a manual rate must be selected in the vApplyHD Control Page.

Assigning a Prescription to a Field Name

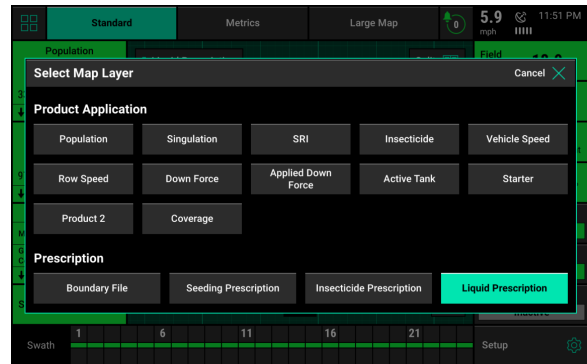
Note: A field can have either a Boundary or a Prescription, both a Boundary and Prescription, or neither assigned to it. A boundary file is only used for swathing off rows on the planter if they go outside of the boundary. A boundary file can have both an exterior and interior zones.

To assign a liquid Prescription/attribute to the selected field, press the “vApplyHD Prescription” button. (If there is not an option for a Liquid Prescription then the vApplyHD system has not been configured on the display.) This will display ALL shapefiles that have been imported into the display. Choose the appropriate prescription for the field name. After selecting the prescription name, an attribute MUST be selected (if dual vApplyHD systems are configured an attribute for both systems must be selected).



Note: An attribute is based on a defined product and contains a single defined rate for each management zone and is defined/named during the creation of the prescription. (Liquid attributes should be written in gallons per acre).

Liquid Prescription files that have been assigned to a field can be viewed on the home screen for the active field. Select the current Map Type displayed at the top of the page to see a list of all available map types.



Scroll to the bottom of the list and locate the map type called Liquid Prescription.

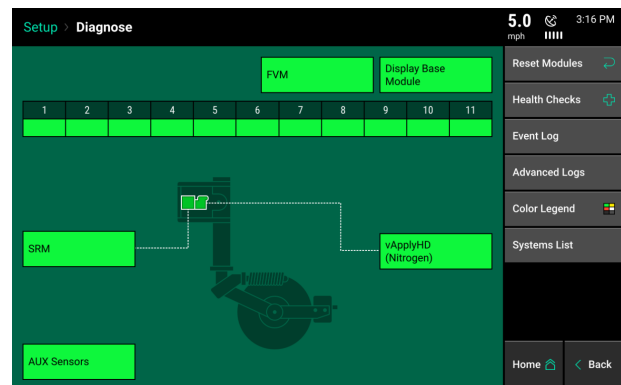
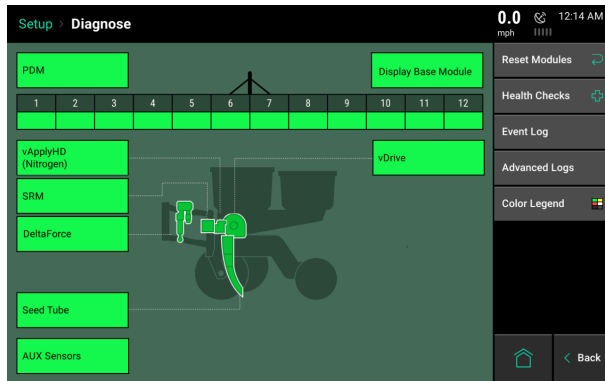
Select this map type to view the shapefile that has been assigned to the active field as an vApplyHD Prescription.

vApplyHD Diagnostic Information

vApplyHD Diagnostic Information

Prior to planting, ensure that all planter diagnostic information is ok. 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.

Color Legend



Green: The system is working correctly and communications are good. Select “Color Legend” to view an explanation of what each color indicates.

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.

The vApplyHD button (Indicated by the Product Nickname selected during the setup process) will display as green if the system is working correctly and communications are good. If it is not green, press on it to view the vApplyHD level 2 row-by-row diagnostics. The level two diagnostic page gives row by row information on the vApplyHD modules as well as information on the vApply module that is connected to the PDM.

vApply Module Feedback →

vApplyHD Modules Feedback

Setup > Diagnose > vApplyHD
0.0 mph 12:47 AM

Row	gal/ac		Avg. Flow Stability	Pump Style	Pressure (psi)	PWM	Supply Volts
	Actual	Cmd					
PDM	21.0	21.0	100%	No Control	81	0%	13.0

Row	gal/ac		Flow Stability	Act/Cmd Ball Pos. (deg)	Pressure (psi)	Pressure Stability	Supply Volts
	Actual	Cmd					
1	21.5	21.0	100%	-3/-3	40	85%	13.0
2	21.1	21.0	100%	-3/-3	41	83%	13.2
3	21.3	21.0	100%	-10/-5	44	77%	13.1
4	21.0	21.0	100%	-3/-3	41	83%	13.1
5	21.0	21.0	100%	-3/-3	40	85%	13.1
6	21.3	21.0	100%	-3/-3	41	86%	13.1

Lift State Lowered
Radar Speed Wait Signal
GPS Speed Waiting Comm
FWD Accel 0.000 ft/s/s
Master Plant On
Turn Rate 0.00 deg/s

Reset Modules
Show Error Rows Only
vApplyHD Health Checks
DeltaForce
SRM
Seed Tube
vApplyHD (Nitrogen)
vDrive

PDM (vApply Module)

These values are reported by the vApply Module through the PDM.

Gal/Ac Actual: System wide average being measure in Gallons per Acre. Tap on this column heading to switch from gallons per acre to gallons per minute.

Gal/Ac CMD: System wide average that is being commanded, measured in Gallons per Acre.

AVG. Flow Stability

Above 85% is the goal.

Anything below 80% is considered poor (visual pulses in product output).

Calculated by finding the planter wide average and then measuring the deviation of max and min actual GPA.

Pump Style: Displays the selected Pump Style from the product setup page.

vApplyHD

These values are reported by each vApplyHD module on a row by row basis.

Gal/ac Actual: Measured gallons per acres measured on each row.

Gal/ac Cmd: The gallons per acres being commanded on each row.

Flow Stability: The individual row flow variation. Acceptable performance is above 85%.

Act/Cmd Ball Pos (deg): The actual and the commanded ball position of the vApplyHD valve. These numbers should always match. A stuck valve popup is triggered in the event that these fail to match.

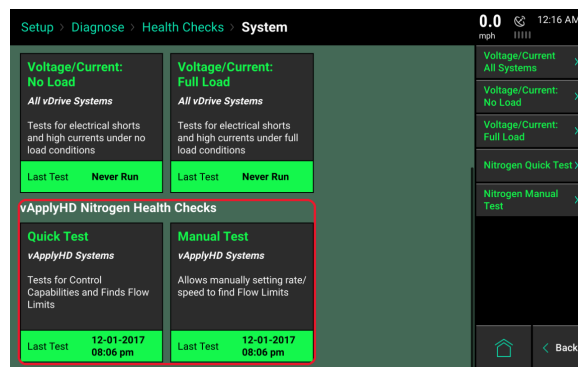
Pressure (psi): Pressure reading at the vApplyHD module. This value should not be less than 15 psi less than the vApply module pressure reading. Touching on the Pressure column, will change it to a temperature reading (for future diagnostics).

Pressure Stability: Derived by calculating an average psi and then measuring the percentage of deviation of the max or min psi readings. Acceptable performance is above 85%.

Supply Volts: Voltage reading of each vApplyHD module. A normal voltage range is from 12-15v. If the voltage drops below 9.5v, the vApplyHD module will shut down.

Health Checks

Always perform a health check on the vApplyHD system after installation or sitting for long periods of time. Access the vApplyHD health check page by selecting “Setup” – “Diagnose” – “Health Checks” or by pressing the vApplyHD Health Checks button on the vApplyHD level 2 diagnose page. There are two vApplyHD Health Checks that can be run: Quick Test and Manual Test.



To run both the Quick and Manual Tests the following conditions must be met:

- Tractor Running.
- Hydraulic Pressure to Alternator (when applicable).
- Liquid Pump Enable.
- Pump Calibration Complete.
- Master Plant Switch on (up).
- vApplyHD Control Enabled

Pump Flush Health Check

The Pump Flush health check allows users to manually run the pump in order to flush the system out. This can only be used on systems that have a pump controlled by the vApply module. This test allows manual PWM values to be commanded in order to spin the pump with commands from the 20|20.

We recommend removing the tubing from the inlet of your vApplyHD modules so that this test can flush product through the system WITHOUT pushing product through the vApplyHD modules.

Note: Many hydraulic pumps will need a command of 60% or more before there is enough hydraulic force to spin the pump. After flushing your plumbing, connect your tubing back in to the vApplyHD and use the Pump Flush test again to run the pump at 60% and then set your system pressure with the Pressure Relief Valve. Refer to the Pump Calibration Test for more information

Quick Test

The Quick Test is designed to be performed as the last step prior to heading to the field with vApplyHD. Run this test after completing the pump calibration as it is used to validate the calibration.

The Quick Test will use the saved pump calibration to quickly run through the application rates to validate that the 20|20 can accurately execute all functions. Once the test is complete a

‘scorecard’ will be displayed. Performance issues will be highlighted. Use the vApplyHD troubleshooting trees to help diagnose issues highlighted by the health checks.

Manual Test

The Manual Test is designed to be the first step in testing out a new vApplyHD install. This sandbox environment gives users the ability to test pump calibrations, plumbing health, and speed and rate ranges. Use this test to check for plumbing leaks after the initial vApplyHD installation.

During the Manual Test, the application rate can be increased or decreased as well as the simulated tractor/planter speed can be increased and decreased. Do this to simulate the requirements needed from the vApplyHD system prior to heading to the field.

The screenshot shows the vApplyHD Manual Test interface. At the top, it displays the navigation path: Setup > Diagnose > Health Checks > vApplyHD. The current speed is 5.0 mph and the time is 12:01 AM. Below this is a summary table for the PDM (Pump Diagnostic Module) and a main data table for rows 1 through 6. At the bottom, there are control buttons for adjusting the application rate (Less, 5.0 gal/ac, More) and speed (Slower, 5.0 mph, Faster), along with 'Test Again' and 'Done' buttons.

Row	Actual gal/ac	Cmd	Avg. Flow Stability	Pump Style	Pressure (psi)	PWM	Supply Volts
PDM	4.5	5.0	74%	Elec. Diaphr.	17	53%	13.0

Row	Actual gal/ac	Cmd	Flow Stability	Act/Cmd Ball Pos. (deg)	Pressure (psi)	Pressure Stability	Supply Volts
1	4.8	5.0	96%	9°/9°	10	94%	13.1
2	4.6	5.0	59%	11°/11°	14	95%	13.0
3	4.9	5.0	65%	10°/10°	16	96%	13.1
4	8.9	5.0	20%	13°/12°	15	92%	13.0
5	5.1	5.0	93%	8°/8°	11	94%	13.1
6	4.7	5.0	93%	7°/7°	11	95%	13.1

vApply Sidedress Mode—Gen 2 20/20

Sidedress Quick Reference Guide

Consult your Precision Planting Dealer or the Online Order Guide for more information on the hardware and plumbing components required to run in Sidedress Mode.

Follow the below steps to set up the 20/20 SeedSense for Sidedress mode. Details for each step can be found in the sections of this manual or in the vApplyHD Operator's Guide.

Step 1:

Save Current Implement and Vehicle.

Step 2:

Change Implement Type to 'Sidedress'.

Step 3:

Configure Sidedress bar setup.

Step 4:

See product family setup options at the beginning of the document.

Step 5:

Configure Liquid Alerts.

Step 6:

Enter in GPS measurements for the Tractor and Sidedress bar.

Step 7:

Verify Diagnose page is green with 100% communication.

Step 8:

Run vApplyHD Pump Flush Healthcheck.

Step 9:

Run vApplyHD Pump Calibration.

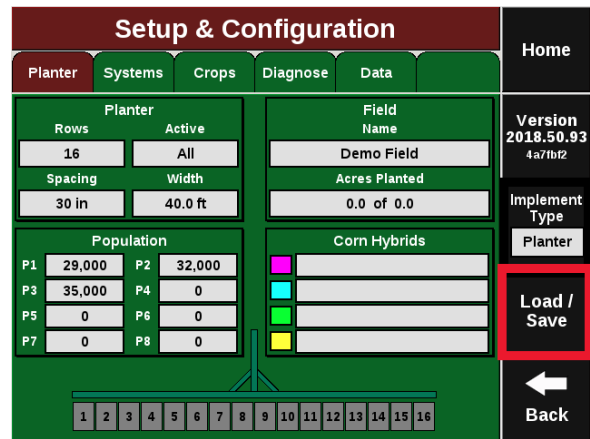
Once the above steps have been completed, the system will be ready for operation. For a detailed explanation on how to operate vApplyHD on a sidedress bar, refer to the section of the vApplyHD Operator's Guide on the vApplyHD control screen.

Load/Save Configuration

Before switching between Implement types, save the current vehicle and implement configuration.

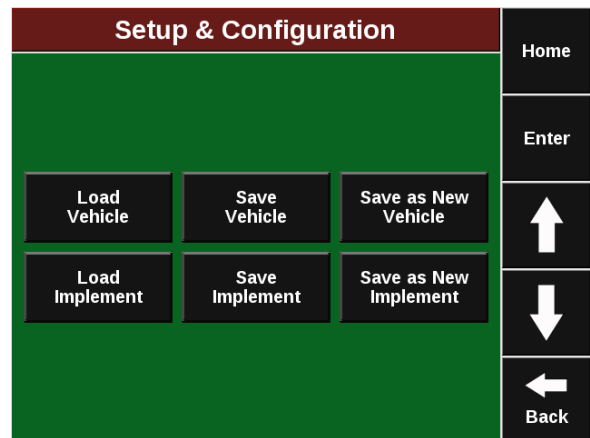
Note: If you do not save the current tractor and planter configuration, the current configuration will be erased when switching implement type.

The Load/Save feature can be used to save multiple configurations on the 20/20 SeedSense monitor. This setting can be found by pressing ‘Setup’, then either the ‘Planter’ or ‘Sidedress’ tab.



Within the Load/Save feature, a vehicle and implement can be saved.

- **Vehicle** — Contains all GPS measurements for the Tractor.
- **Implement**— Contains all settings from the implement including all components installed, GPS measurements, and general planter or sidedress bar setup.

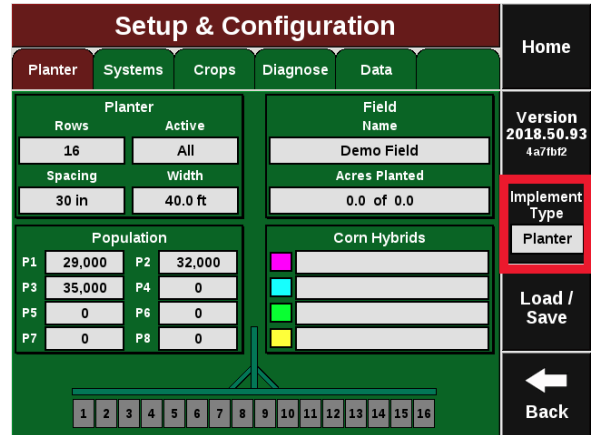


There are three options available under Load/Save for implement and vehicle.

- **Load** — This will allow you to load a previously saved configuration.
 - Note** If the current configuration has not been saved, loading a new vehicle or implement will overwrite the current settings.
- **Save** — This will save the current settings into the vehicle or implement name selected.
- **Save as New** — This option will save the current configuration as a new configuration name. A new name will need to be assigned for this vehicle or implement.

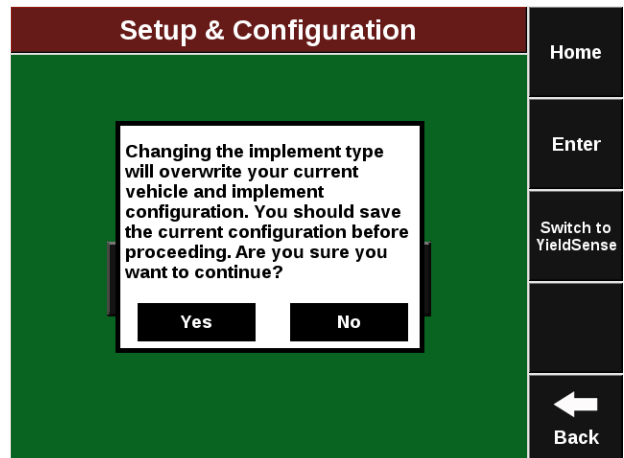
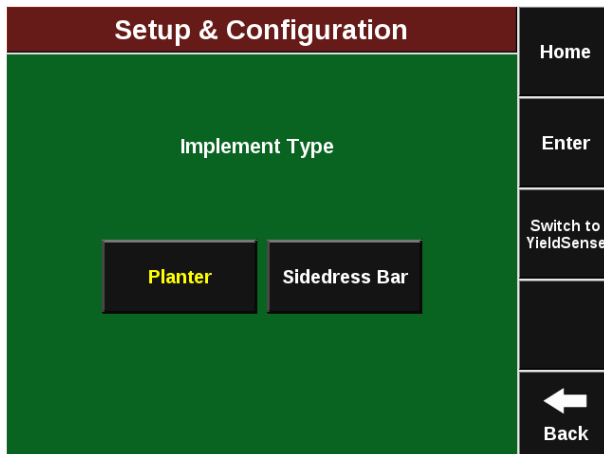
Changing Implement Type

Changing Implement can be done by pressing ‘Setup’ then ‘Implement Type’



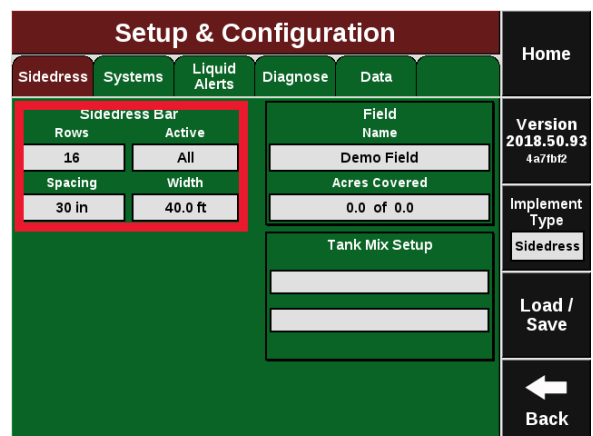
Change the implement type from ‘Planter’ to ‘Sidedress Bar’. Before proceeding, verify that the current implement and vehicle configurations are saved, or the current active configuration will be erased.

Note: This Implement type does not support RowFlow Liquid.



Sidedress Tab

Navigate to the “Sidedress Bar” Setup (Setup — Sidedress — Sidedress Bar) in order to begin setup.



Enter the below settings to properly set up the Sidedress Bar.

Sidedress Bar Setup				Home
Sidedress Make		Rows	Spacing	Enter
Custom		6	30.0 in	
Active Rows	Fertility System	End Rows Rate Adjust	SRM Row Assignment	GPS Setup
All	vApplyHD	Normal Rate	All Rows	
Effective Row Spacing		Effective Sidedress Width <small>Used for Acres Counters</small>		Back
30.0 in		15.0 ft		
				← Back

Sidedress Make: This option gives users the ability to enter the toolbar make.

Rows: Enter the number of physical rows, knives, or application tools on the toolbar that will be applying product.

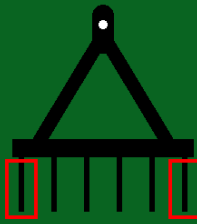
Spacing: Enter the row spacing for this toolbar. This spacing will be used for calculations when applying.

Active Rows: “Activate Rows” lets the 2020 know which rows should be actively controlled. When rows are not active, they will remain off and not apply any product.

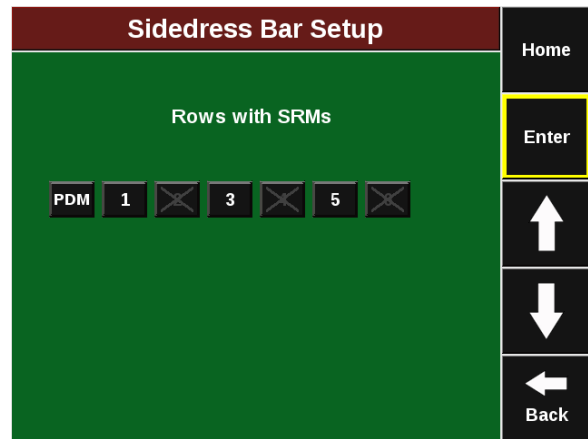
Fertility System: Select the “Fertility System” on this sidedress bar. Currently ONLY vApplyHD systems are supported.

Sidedress Make: This option gives users the ability to enter the toolbar make.

End Row Rate Adjust: “End Row Rate Adjust” allows odd numbered bars to run half rate or rate and a half as needed.

Sidedress Bar Setup			Home
			Enter
End Rows Rate Adjust			
Normal Rate	Half Rate	1.5x Rate	↑
			↓
			← Back

SRM Row Assignment: Use the “SRM Row Assignment” to tell the system which rows have an SRM installed. Toolbars that have individual row control with vApplyHD Flex will have all rows assigned (including the PDM). If the toolbar is configured with vApplyHD Flex FlowSensing (Section control with FlowSense feedback), select the PDM and just the rows that have a vApplyHD Flex plugged in to the backbone harness.



Note: The Effective Row Spacing and Effective Sidedress Bar width are both automatically displayed from the Sidedress Bar number of Rows, Spacing and Active Rows.

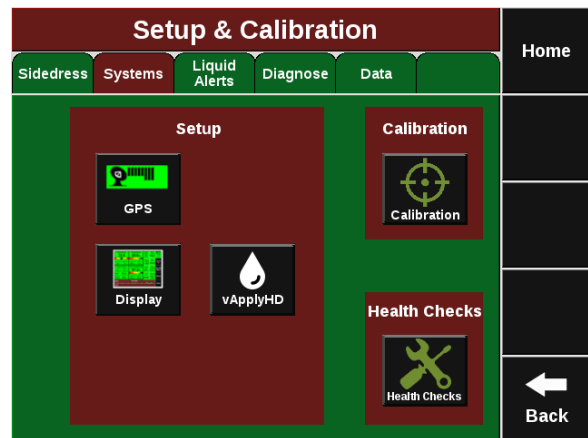
Systems Tab

Systems Tab Overview

The Systems Tab contains Setup for GPS, Display, and any Control Products that are installed. The Calibrations and Health Checks for all products installed can be accessed from this tab as well.

Note: The available buttons on this page will change depending upon what control products are configured and installed.

Note: Refer to each individual product manual for how to utilize the Calibration and Health Checks buttons.



SRM System Calibrations

For vApplyHD to function are the Sidedress Bar must be lowered and there must be speed.

Note: If the Lift Switches, Radar, and PDM have already been configured and calibrated during the setup of a different product (e.g. vDrive) this process needs repeated in Sidedress Mode.

Step 1:

Ensure that the Lift Switches have been calibrated and are functioning correctly. The Lift Switch systems page can be found by navigating to “Setup”—”Systems”—”Calibrations”—”Lift Switch”..

Step 2:

Both GPS and Radar should be used as speed sources. If Radar is installed, verify that the Radar calibrations has been completed. The Radar Status systems page can be found by navigating to “Setup”—“Systems”—“Calibrations”—“Radar”..

Step 3:

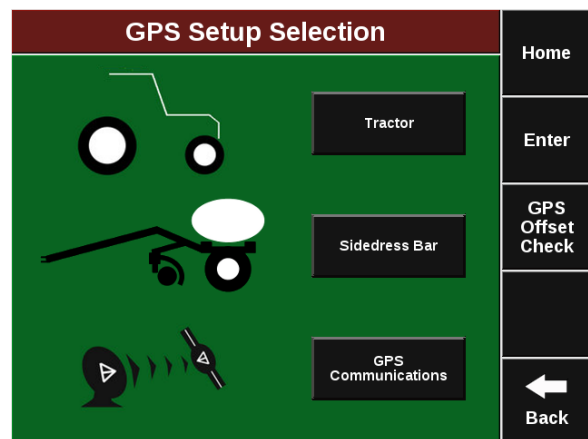
The PDM must also be setup correctly for vApplyHD to have optimal performance. Ensure the PDM Mounting Location and Orientation are set correctly and zero the gyro. These settings can be found under “Setup”—“Systems”—“Calibrations”—“Turn Compensation”.

For more information on setting up and calibrating the SRM system, see the 20/20 Operator’s Guide and the vApplyHD Operator’s Guide.

GPS Setup

GPS Setup Overview

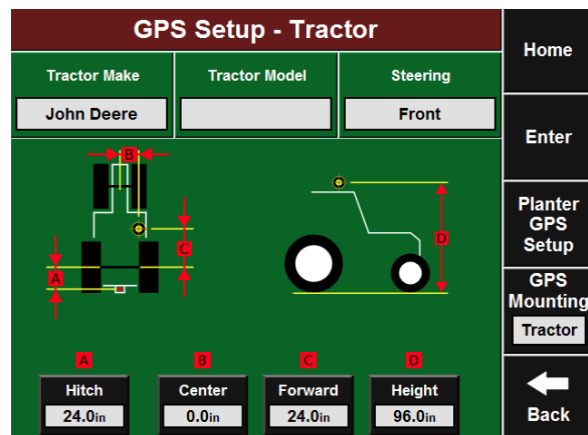
Press ‘GPS Setup’ under the Systems tab to access GPS setup. The Tractor measurements, Sidedress Bar measurements, and GPS communication status can be accessed on this page. A GPS offset check can also be accessed on the right side of the screen. This offset check will verify the measurements entered against actual distances.



Tractor GPS Measurements Overview

Selecting the Tractor button under GPS setup will open the Tractor measurements page. Enter in the Tractor Make, Tractor Model and Steering type. There is also an option for GPS mounting on the Tractor or on the Sidedress Bar on the right side of the Screen. The yellow target references the GPS output location from the GPS globe.

Note: Some GPS systems do not output the location of the actual GPS globe. Verify the GPS output location with the GPS manufacturer.



Front Steering Tractor GPS Measurements

If Front Steering is selected as the steering type, a similar tractor diagram will appear.

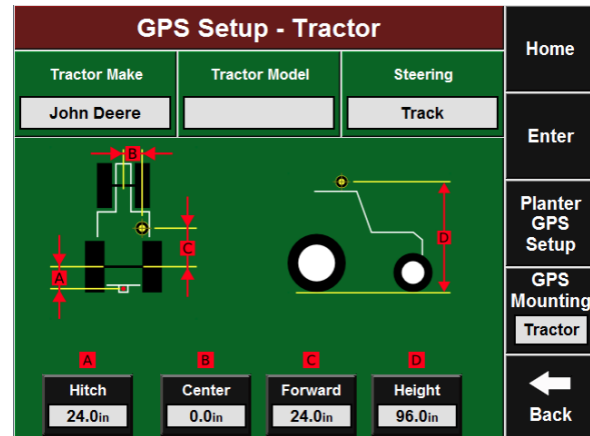
Hitch — A: Measure from the pivot location at the hitch to the rear fixed axle.

Note: If this is a 3 pt hitch, enter 0. If this is a 2 pt hitch, measure to the pivot location on the Sidedress Bar tongue.

Center — B: Measure the Left/Right offset of the GPS output location from the center of tractor. Switching sides can be accomplished by pressing ‘Flip’.

Forward — C: Measure from rear fixed axle to GPS output location. Switching front/back can be accomplished by pressing ‘Flip’.

Height — D: Measure from the ground to the height of the GPS output location.



Track Steering Tractor GPS Measurements

If Track Steering is selected as the steering type, a similar tractor diagram will appear.

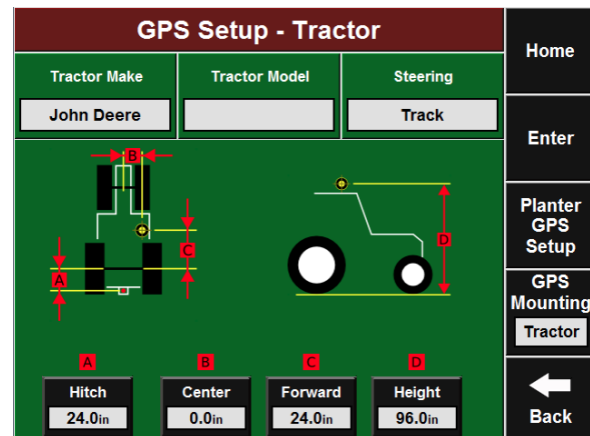
Hitch — A: Measure from the pivot location at the hitch to the track pivot (normally right in front of the tractor seat)

Note: If this is a 3 pt hitch, enter 0. If this is a 2 pt hitch, measure to the pivot location on the Sidedress Bar tongue.

Center — B: Measure the Left/Right offset of the GPS output location from the center of tractor. Switching sides can be accomplished by pressing ‘Flip’.

Forward — C: Measure from track pivot to GPS output location. Switching front/back can be accomplished by pressing ‘Flip’.

Height — D: Measure from the ground to the height of the GPS output location.

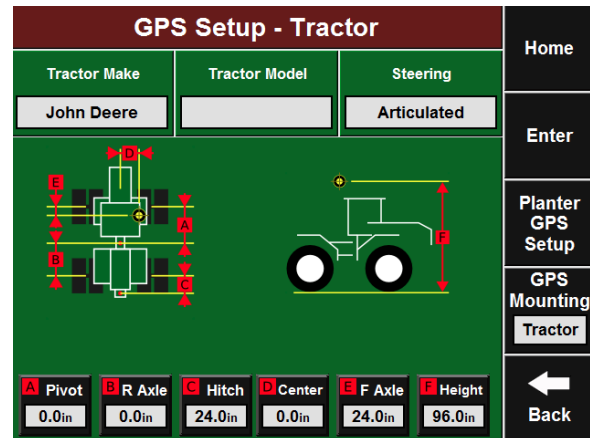


Articulated Steering Tractor GPS Measurements

If Articulated Steering is selected as the steering type, a similar tractor diagram will appear.

Pivot — A: Measure from front fixed axle to articulation point.

Rear Axle — B: Measure from articulation point to rear fixed axle.



Hitch — C: Measure from the pivot location at the hitch to the rear fixed axle

Note: If this is a 3 pt hitch, enter 0. If this is a 2 pt hitch, measure to the pivot location on the Sidedress Bar tongue.

Center — D: Measure the Left/Right offset of the GPS output location from the center of tractor. Switching sides can be accomplished by pressing ‘Flip’.

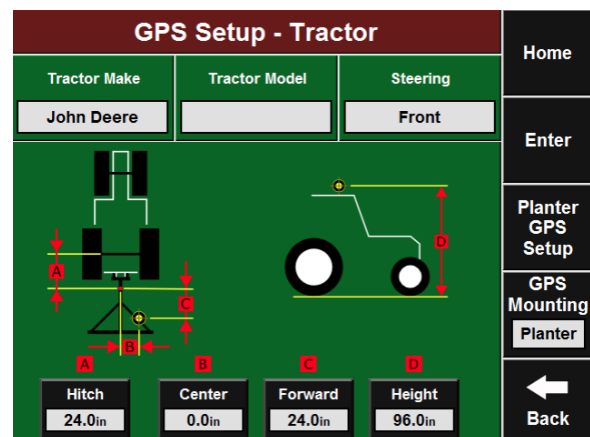
Front Axle — E: Measure from front fixed axle to GPS output location. Switching front/back can be accomplished by pressing ‘Flip’.

Height — F: Measure from the ground to the height of the GPS output location.

Sidedress Bar Mounted GPS Tractor Measurements

Selecting the GPS Mounting button and changing it to ‘Sidedress Bar’ will change the GPS measurements to allow for a Sidedress Bar mounted receiver.

Note: Verify GPS output location from GPS manufacturer. The output location is not always the actual GPS receiver mounted on the Sidedress Bar.



Hitch — A: Measure from the pivot location at the hitch to the rear fixed axle

Note: If this is a 3 pt hitch, enter 0. If this is a 2 pt hitch, measure to the pivot location on the Sidedress Bar tongue.

Center — B: Measure the Left/Right offset of the GPS output location from the center of tractor. Switching sides can be accomplished by pressing ‘Flip’.

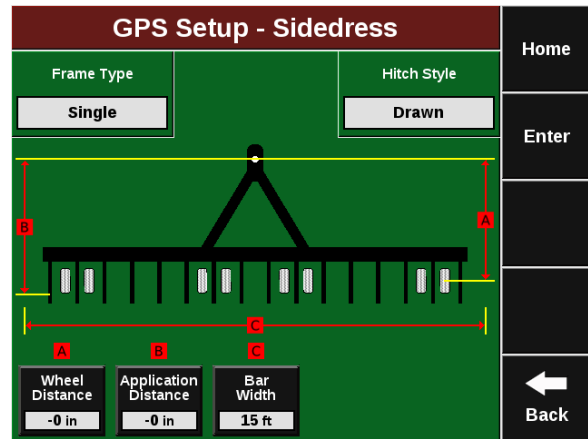
Forward — C: Measure from the pivot location at the hitch to the GPS output location.

Height — D: Measure from the ground to the height of the GPS output location.

Sidedress Bar GPS Measurements Overview

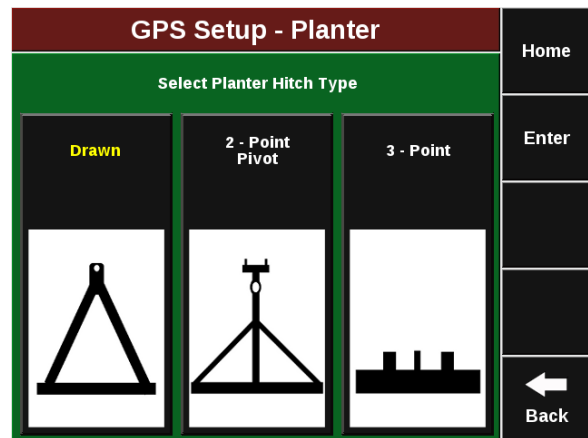
Selecting the Sidedress Bar Setup under GPS brings up the Sidedress Bar GPS measurements page. Select the 'Frame Type' and 'Hitch Style' for the Sidedress Bar.

Note: Custom Table setup is available on the right side of the Screen. This allows for custom offset measurements to be entered for every row.



Sidedress Bar GPS Measurements Hitch Style

Selecting the hitch style is crucial for mapping. Each option will change the reference point for each seed tube exit measurement. If 3-Point is selected, all measurements will be from the rear axle of the tractor.

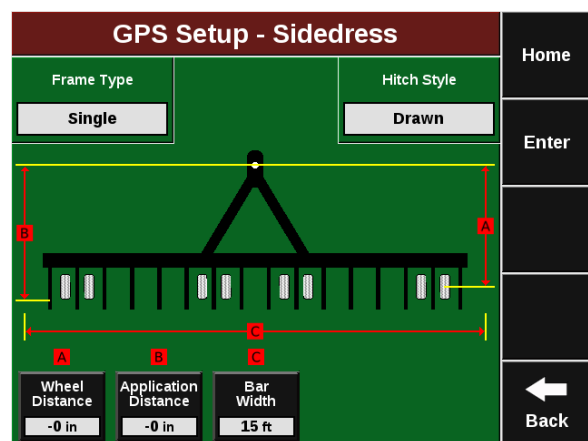


Sidedress Bar GPS Measurements Single Frame

Wheel Distance — A: Measure from the pivot location at the hitch to the transport tires.

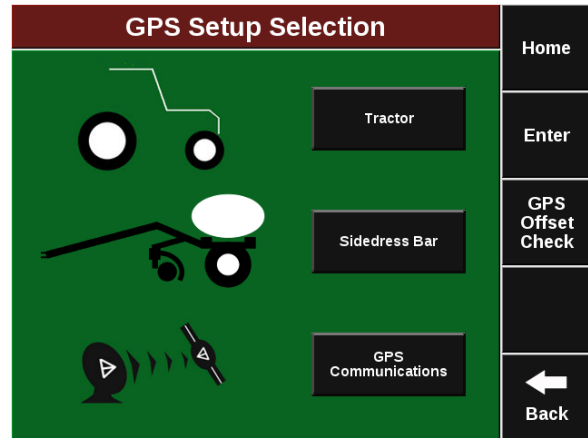
Application Distance — B: Measure from the pivot location at the hitch to the product exit location.

Bar Width — C: This is the calculated bar width from the Sidedress Bar setup.



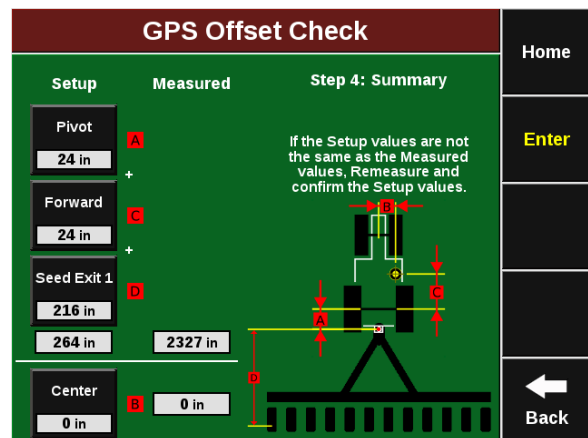
GPS Offset Check Summary

Once the GPS measurements are entered, a GPS offset check is required to verify measurements. Select 'GPS Offset Check' on the GPS page under Systems Tab. The GPS Offset Check will require good GPS signal on flat ground.



GPS Offset Check Results

Once the GPS Offset is complete, a summary page will appear. The Setup column shows the addition of the entered measurements with a total at the bottom. The Measured column shows the actual distance as displayed by the GPS Offset Check. If the difference between the Setup and the Measured values are greater than what would be expected with the GPS accuracy, verify all entered measurements and the GPS output location and run the GPS Offset Check again.

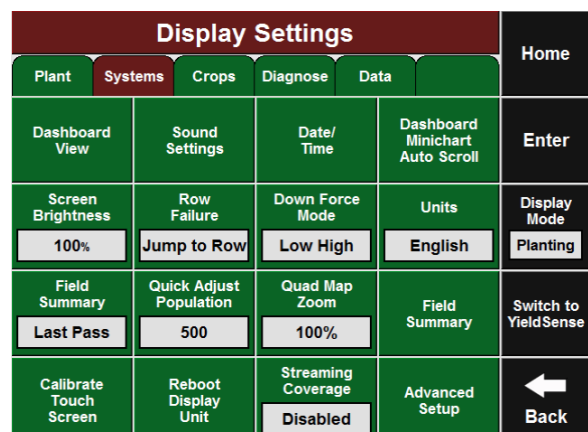


Note: The GPS Offset Check is not available for Articulated tractors.

Display Settings

Display Settings Overview

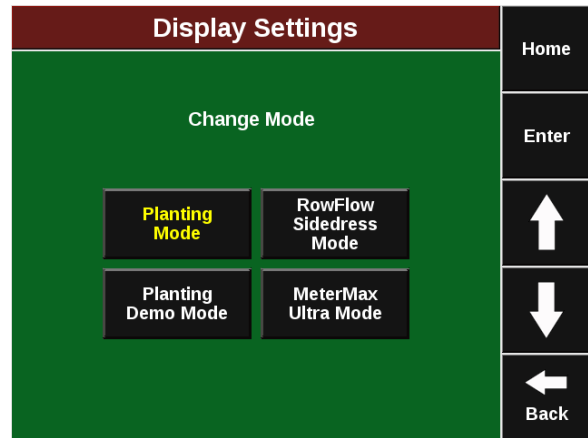
Select the 'Display' button on the Systems Tab to configure Display Settings.



Display Mode

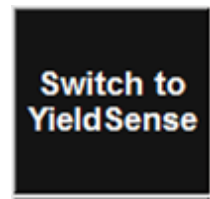
Select 'Display Mode' on the right side of Display Settings to view Display Mode. This allows switching between Planting Mode, RowFlow Sidedress Mode and MeterMax Ultra Mode

Note: Planting Demo Mode requires downloading and importing Demo Files from cloud.precisionplanting.com



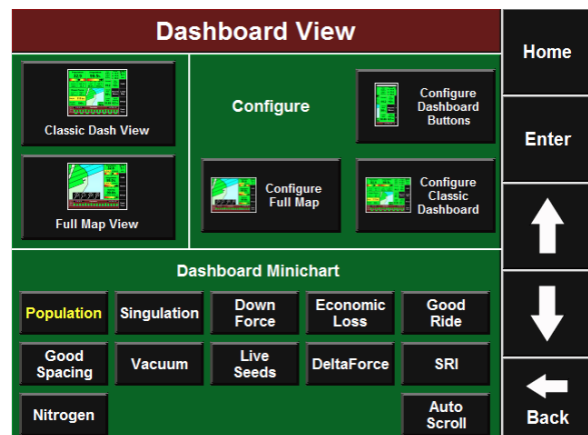
Switching to YieldSense

Select the 'Switch to YieldSense' on the right side of the screen. This will change the software to harvest mode for YieldSense.



Dashboard View

Select Dashboard View on Display settings and the Dashboard (Home Screen) settings can be configured.



Sound Settings

Select 'Sound Settings' to configure the Sound of the display. The volume can be controlled using the volume slider below each sound type.

Selecting each sound type allows the selection of difference sound options. If a sound option is selected, a demo will play.

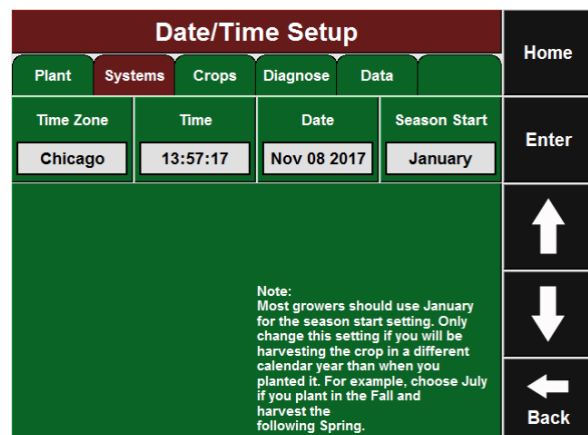
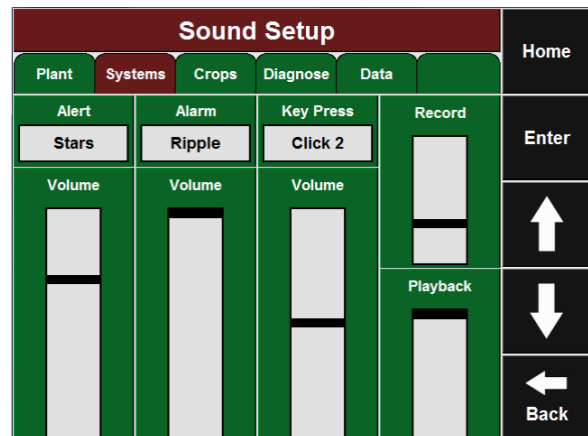
Alert This sound will play when an item is yellow on the Dashboard

Alarm This sound will play when an item is red on the Dashboard.

Key Press This sound will play when the touch screen is pressed

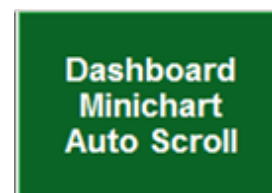
Date/Time Setup

Select 'Date/Time' to setup the Time Zone and Season Start month. UTC time will automatically update from GPS.



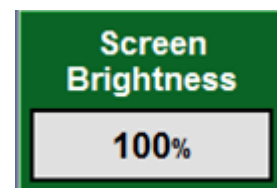
Dashboard Minichart Auto Scroll

Select this button to configure what is displayed in the Dashboard mini chart at the Refer To bottom of the home screen. An auto scroll can also be configured to scroll through multiple metrics.



Screen Brightness

Select this button to configure the Screen Brightness. Manual mode used the user selected brightness, Auto mode uses an ambient light sensor to change the brightness for day/night.



Row Failure

Select this button to change the display action when a row failure occurs.

Jump to Row This option will go to Row Details when a row failure occurs.

Jump to Dashboard This option will go to the Population Dashboard when a row failure occurs.

No Action This option will cause no action to occur with a row failure.

Down Force Mode

Select this option to configure the DownForce button on the Home Screen.

Low High This will show the Low and High rows of Downforce Average.

Average This will show the planter Average Downforce.

Units

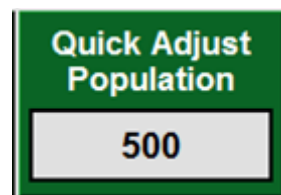
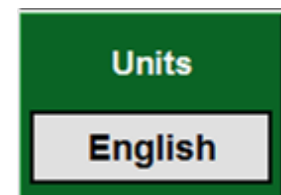
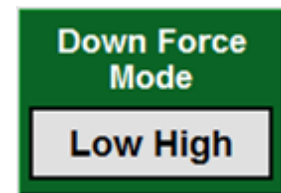
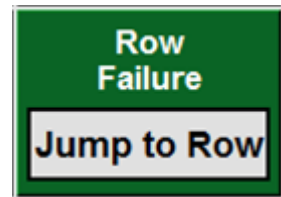
Select this option to change the units from English to Metric

Field Summary

Configure this option to show a summary of the last pass or entire field after planter is lifted. The summary will appear on the Dashboard.

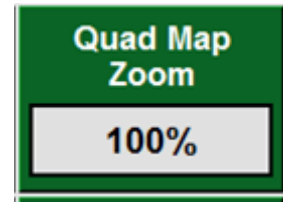
Quick Adjust Population

Select this option to change the Quick Adjust population on any Population control product.



Quad Map Zoom

Select this option to change the default zoom level of the Dashboard map.



Field Summary

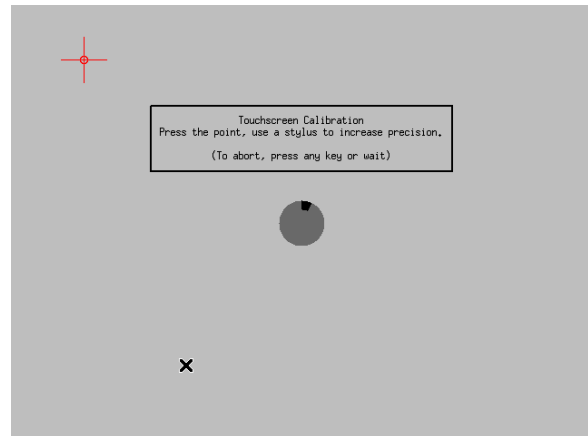
Select this to view a summary of the active field.



Calibrate Touch Screen

Select this option under display settings to start the touchscreen calibration.

Note: The touchscreen calibration can also be started by pressing the touchscreen on any page for 15 seconds.



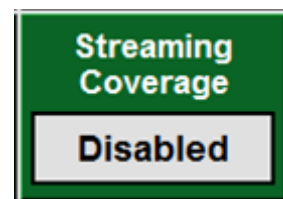
Reboot Display Unit

Select this to reboot the monitor.



Streaming Coverage

Select this option to Enable or Disable the coverage streaming through Climate FieldView.



Advanced Display Setup

Select 'Advanced Display Setup' under Display Setup to see additional settings. Many of these options should not be changed without consulting with Precision Planting Product Support.

Advanced Setup					Home
Plant	Systems	Crops	Diagnose	Data	
	Bad GPS Correction Use GPS Speed	Simulated Speed Off	Simulated GPS Data Disabled		Enter
	Aux Sensors	Language English (USA)	Enable Remote Support		↑
Pass Closure Mode Normal	Show Pass Lines Enabled		Unpair FieldView Account		↓
Reboot Display Unit	Restart Application	Restart Comm	Repair Data Storage		← Back

Simulated Speed

Select this option to enable a simulated speed. Simulated Speed will not start until seed drop is detected.

Note: This option will not start any motors.



Display Language

Select this option to change the Language displayed on the 2020 SeedSense.



vApply Sidedress Mode—Gen 3 20|20

Sidedress Quick Reference Guide

Step 1:

vApplyHD must be configured on the 20|20 monitor.

Step 2:

There must be a speed source.

Step 3:

The Master Plant Switch on the Cab Control Module must be in the up position.

Step 4:

The planter must be lowered.

Step 5:

vApplyHD System must be enabled.

Step 6:

A rate (GPA) must be set.

Before connecting vApplyHD modules to the liquid plumbing, run a Pump Flush Health Check to ensure debris does not contaminate the vApplyHD modules. Details on this Health Check can be found under the Health Check section.

Overview

Beginning with the release of 2018.2.0 software, growers can use the 20|20 to control vApplyHD Flex modules on a fertilizer toolbar or sprayer.

Consult your Precision Planting Dealer or the Online Order Guide for more information on the hardware and plumbing components required to run in Sidedress Mode.

Follow the below steps to set up the 20|20 for Sidedress mode. Details for each step can be found in the sections of this manual or in the vApplyHD Operator's Guide.

Note: All vApplyHD setup steps can be found in the vApplyHD Gen3 Operator's Guide, document number 955706 and can be found in the Technical Documents section of support. precisionplanting.com

Step 1:

Save Current Implement and Vehicle.

Step 2:

Change Implement Type to 'Sidedress'.

Step 3:

Configure Sidedress bar setup.

Step 4:

Configure vApplyHD setup.

Step 5:

Configure Liquid Alerts.

Step 6:

Enter in GPS measurements for the Tractor and Sidedress bar.

Step 7:

Verify Diagnose page is green with 100% communication.

Step 8:

Run vApplyHD Flush Healthcheck.

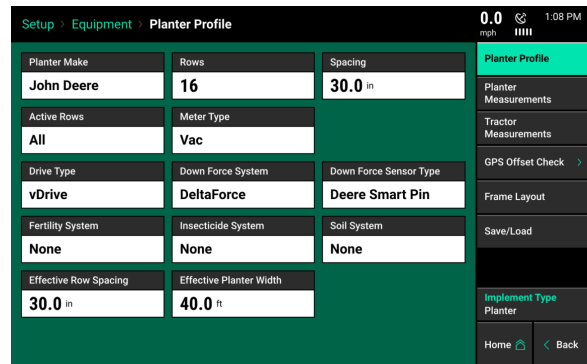
Step 9:

Run vApplyHD Pump Calibration.

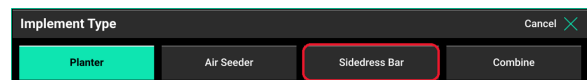
Once the above steps have been completed, the system will be ready for operation. For a detailed explanation on how to operate vApplyHD on a sidedress bar, refer to the section of the vApplyHD Gen3 Operator’s Guide on the vApplyHD control screen.

Switching into Sidedress Mode

The Gen3 20|20 has different modes that it can be put into. These modes include Planters, Combines, Air Seeders, and Sidedress Bars. To switch modes, select Setup – Equipment – Implement Type



From the displayed list, select “Sidedress Bar”.



At the time of publishing this document, when the Implement Type is changed the configuration from all other Implement Types (for example: planting) will be reset to factory defaults. There are two ways to save configurations before switching Implement Types.

1. Save all configs to a USB drive.
2. Use the Save/Load option in the equipment menu to save both the Tractor and Planter configurations. Any Tractor configurations that have been saved can be loaded in Sidedress mode and used so the tractor does not have to be set up again.

Equipment Menu

The Equipment menu is where the Sidedress bar and tractor are configured. It is important to ensure that all information is entered correctly in the Equipment menu.

Equipment — Profile

The “Sidedress Bar Make” is locked to Custom and cannot be changed.

Press the “Rows” button to enter the correct number of physical rows on the Sidedress bar that will have vApplyHD Flex modules and/or FlowSense installed on.

Setup > Systems > vApplyHD > Spray			0.0 mph	3:41 PM
Control Style	Product Nickname	Active Rows	Spray	
vApplyHD	Spray	All	Product 2	
Swath Section Setup	Tank Volume	Pump Style	Product 3	
Single Row	300 gal	No Control	Product 4	
Placement Hardware	Tank Mix Setup	Target Rate Minimum	Pump Calibration	
Other		3 gal/ac	Home < Back	
Default Rate	Target Rate Maximum	Flow Rate Adjustment		
5 gal/ac	10 gal/ac	0 %		
Row Control Module	Coverage Source			
First	Yes			
Advanced Setup				

Press the “Spacing” button to select the spacing for the rows on the planter. If the correct spacing is not available, select “Other” to manually enter the row spacing.

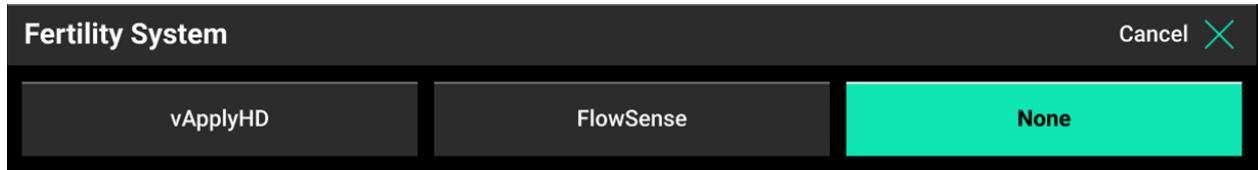
Spacing				Cancel X
15.0 in	20.0 in	22.0 in	30.0 in	
36.0 in	38.0 in	40.0 in	Other	

Press the “Active Rows” button to define the rows that will actively be applying liquid. The system defaults to all rows active. Preset row options for Odd, Even, Left, or Right rows can be selected. To define specific rows, select “List”. When listing out the active rows, rows marked by a green box are active rows.

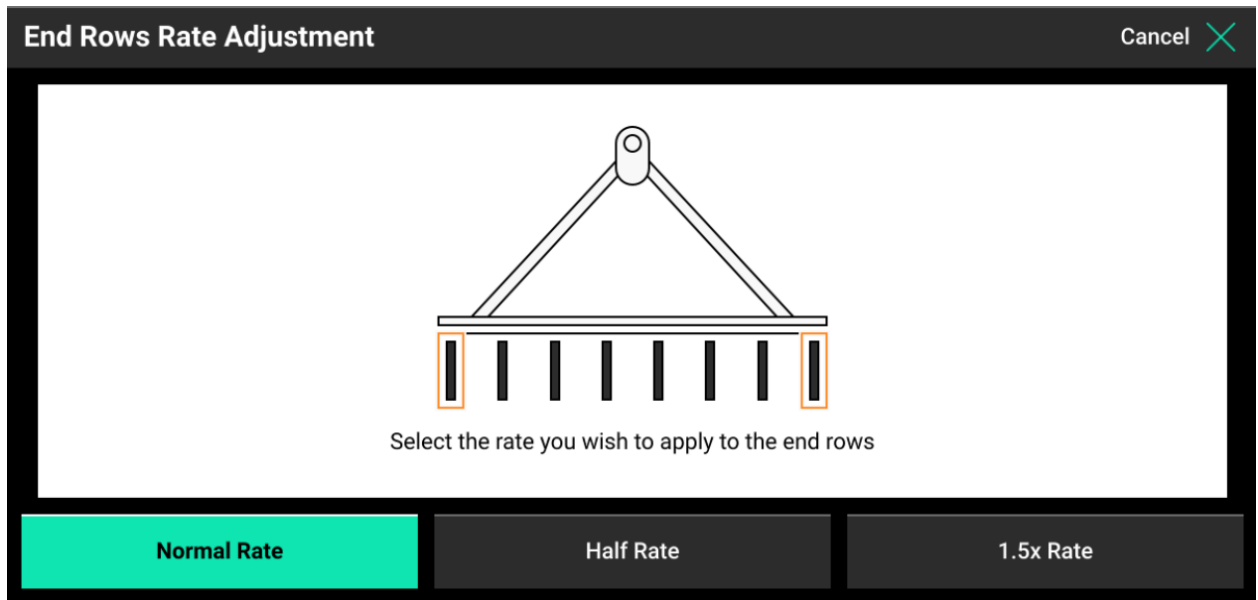
Active Rows				Cancel X
All	Odd	Even	Left	
Right	None	Custom		

Press the “Fertility System” button to select a fertility system installed on the planter and being ran through the 20|20. In a case where both vApplyHD Flex modules and FlowSense modules are installed select vApplyHD for Fertility System.

Note: Selecting a Fertility system will enable control products to be setup in the Systems menu.

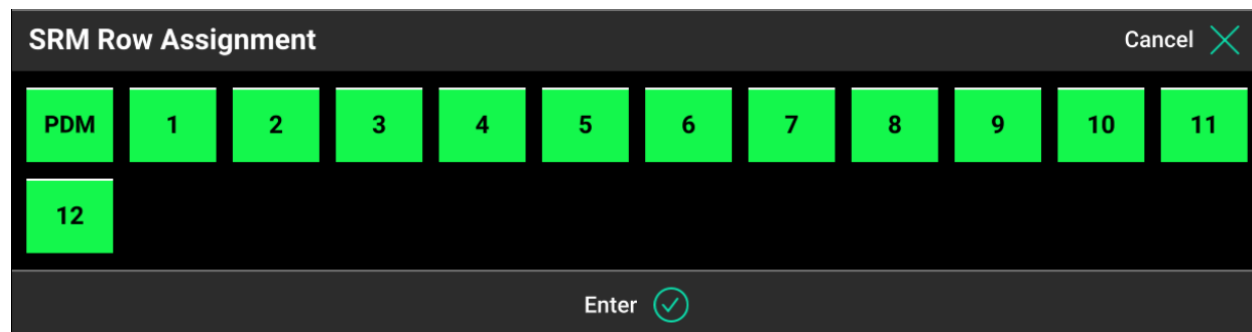


Select the “End Rows Rate Adjustment” button to set different rates for the outside row on each side of the bar. This setting allows for half rate or rate and a half as needed. Typically used for bars with an odd numbered amount of rows.



Effective Row Spacing and Effective Sidedress Bar Width are both automatically calculated from the number of Rows, Spacing, and Active Rows. If these are incorrect, they can be selected and a new value manually entered.

Use the “SRM Row Assignment” to tell the 2020 which rows have an SRM installed. Toolbars that have individual row control with vApplyHD Flex will have all rows assigned (including the PDM). If the toolbar is configured with vApplyHD Flex section control (Section control with FlowSense feedback), select the PDM and the rows that have a vApplyHD Flex plugged into the backbone harness.

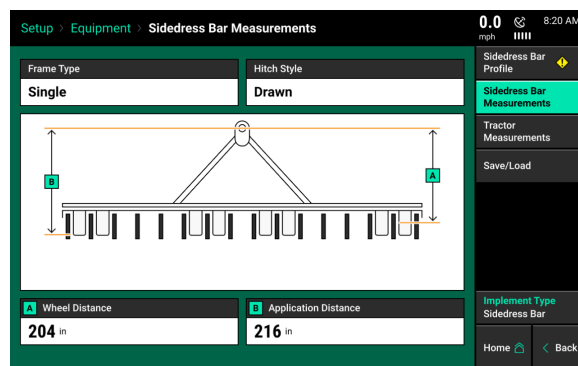


Equipment — Sidedress Bar Measurements

GPS offset measurements must be setup prior to planting in order for the monitor to correctly control and model the Sidedress bar. From the home screen select Setup – Equipment – Planter Measurements.

At this time, the Frame Type can only be set to Single frame type.

A “Hitch Style” must also be defined. Select the hitch style that best fits the sidedress bar.



Measurement A - Wheel Distance: With the Sidedress bar lowered, measure the distance from the center of the drive wheels to the Pivot point. Enter this measurement in box A. Press the check mark button after entering the measurement.

Measurement B – Application Distance: Measure the distance from the pivot point to the point where liquid is being applied.

Note: For a 3-Point hitch style, measure both A and B distances to the center of the tractor’s rear axle.

Equipment — Tractor Measurements

Tractor GPS measurements must also be setup prior to planting in order for accurate modeling and control of the planter. From the home screen select Systems – Equipment – Tractor Measurements to enter measurements for the tractor.

Note: Some GPS systems do not output the location of the actual GPS globe. Verify the GPS output location with the GPS manufacturer.

The options for Tractor Make and Tractor Model provide useful troubleshooting information, but are not necessary information to enter.

A “Steering” type must be selected. There are three steering options: Front, Track, and Articulated. Each steering has different GPS measurements that must be entered.

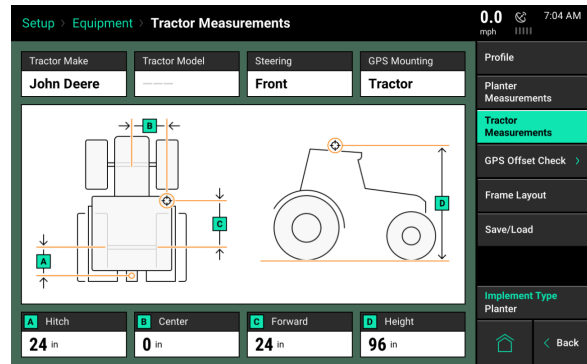
Steering Type: Front

A - Hitch: Measure the distance from the center of the rear axle the hitch (or pivot point on a two point pivot planter hitch).

Note: If a 3 pt planter hitch is connected, enter 0.

B - Center: Measure the distance from the center line of the tractor to the GPS output location.

Then select if the GPS output location is to the left or right side of the tractor's center line.



C - Forward: Measure the distance from the center of the rear axle to the center of the GPS antenna.

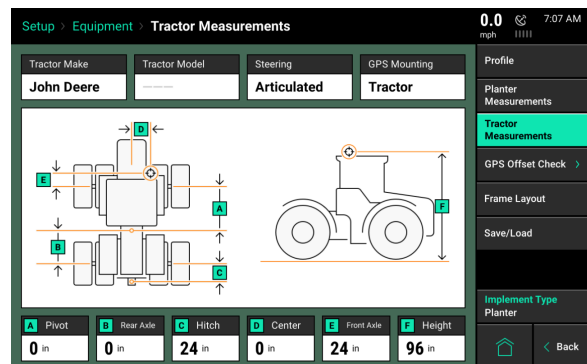
D - Height: Measure the distance from the ground to the base of the GPS output location.

Steering Type: Articulated

A - Pivot: Measure the distance from the center of the front fixed axle to the articulation point.

B - Rear Axle: Measure from the articulation point to the center of the rear fixed axle.

C - Hitch: Measure the distance from the pivot location at the hitch to the center of the rear fixed axle.



D - Center: Measure the distance from the center line of the tractor to the center of the GPS antenna. Then select if the GPS receiver is to the left or right side of the tractor's center line.

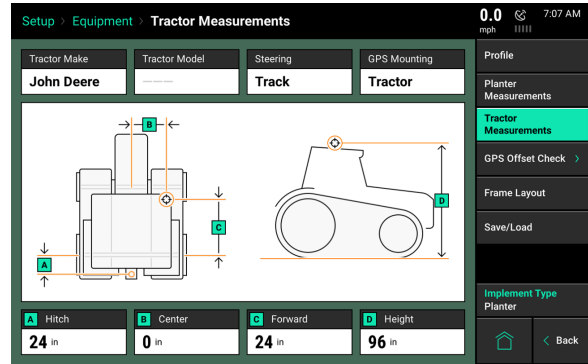
E - Front Axle: Measure the distance from the center of the front fixed axle to the GPS output location. Indicated if the GPS output location is in Front or Back of the front axle.

F - Height: Measure the distance from the ground to the GPS output location.

Steering Type: Tracked

A - Hitch: Measure the distance from the pivot location to the hitch (or pivot point on a two point pivot planter hitch).

B - Center: Measure the distance from the center line of the tractor to the GPS output location. Then select if the GPS output location is to the left or right side of the tractor's center line.



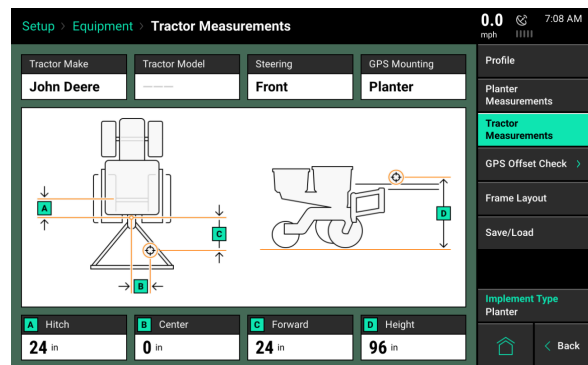
C - Forward: Measure from the track pivot to the GPS output location. Indicate if the GPS output location is in Front or Back of the pivot location.

D - Height: Measure the distance from the ground to the base of the GPS output location.

Planter Mounted GPS

The “GPS Mounting” location can be changed from the “Tractor” to the “Planter Bar”. Select the “GPS Mounting” button to change the GPS measurements to allow for a planter mounted receiver.

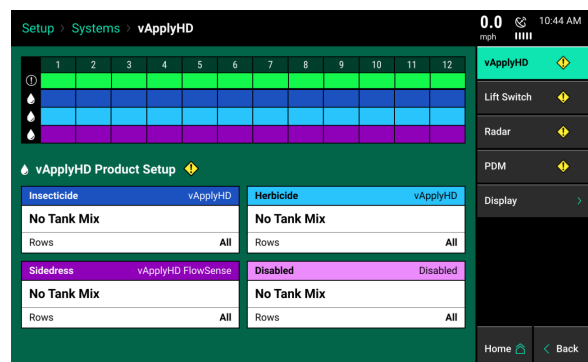
Note: Verify GPS output location from GPS manufacturer. The output location is not always the actual GPS receiver mounted on the planter. Always take measurements from the GPS output location.



Measurements for planter mounted GPS systems are very similar to tractor mount GPS systems, except that measurements will be taken from the GPS output location on the planter instead of an output location on the tractor.

System Menu

The Systems Menu is where control products are configured as well as the Lift Switch, Radar, PDM, and Display. For setting up the liquid systems, the Systems Menu will either show vApplyHD or FlowSense on the navigation pane (right hand side of the screen) depending on which one was selected in the Equipment Menu.



Up to four liquid systems can be configured and controlled/monitored by the Gen3 20|20.

If setting up multiple systems, each one must be setup individually.

Once a liquid system is configured, the vApplyHD page will display each row with a corresponding liquid system that has been configured and assigned to the rows on the Sidedress bar.

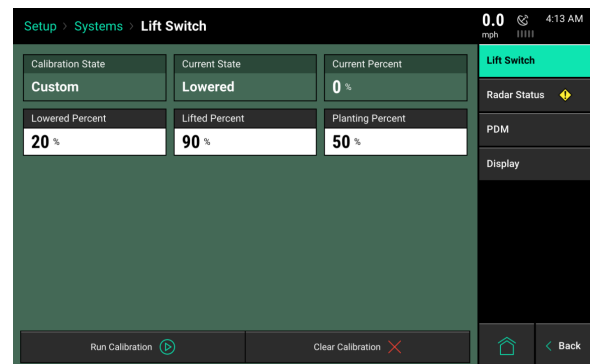
There are three different possible setups for each liquid system being setup: vApplyHD Flex modules on every row, vApplyHD section control (only two rows per section) with FlowSense monitoring flow on every row, and monitoring liquid flow with FlowSense.

Note: Product monitoring only through FlowSense is only supported on Sidedress if there is an additional product with vApplyHD control installed.

For instructions on configuring and running each of these setups, refer to the vApplyHD and/or FlowSense Operator’s Guide. The configuration and operator of these systems are the same regardless if the 20|20 is in Planting mode or Sidedress mode.

Lift Switch

One of the requirements for all control products to function is for a lift switch to be installed, and reading lowered. The lift switch menu allows for a lift switch to be calibrated. To complete the Lift Switch calibration, press the “Run Calibration” button at the bottom of the screen. Follow the onscreen instructions for the different positions the planter must be in. The results will then be displayed on the main Lift Switch Page. For issues with the lift switch not calibrating or functioning correctly, see the Troubleshooting Guides for Lift Switches in the Dealer Service Manual. After a calibration has been completed, verify the system is reading the lift switch correctly by watching the “Current State” information on the Lift Switch page. Ensure the “Current State” is correct when lowering and lifting the planter.

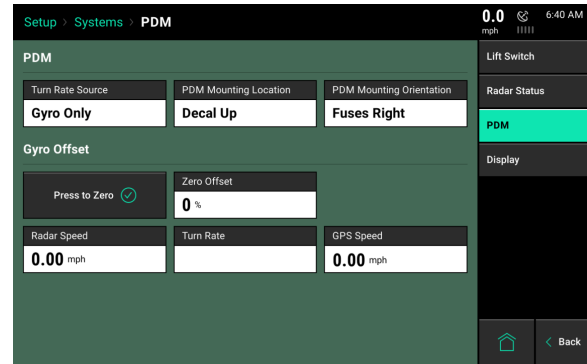


Manual entry of values can be done by selecting the “Lowered Percent”, “Lifted Percent”, or “Planting Percent” buttons and entering a value.

To clear out the current calibration press the “Clear Calibration” button located at the bottom of the screen.

PDM

The Power Distribution Module [PDM] must be configured in order for control products that connect through the SRM infrastructure to operator properly.



Turn Rate Source - Select the input source for calculating turn compensation when planting through curves. Select between “Gyro then GPS”, “Gyro Only”, and “GPS Only”. “Gyro Only” is the recommended setup.

Note: For the system to be able to recognize forward acceleration quickly and start seeding correctly, the position of the Gyro inside of the PDM must be known. Ensure that the PDM Mounting Location and PDM Mounting Orientation are set correctly. Otherwise performance will be degraded.

PDM Mounting Location - Determine if the PDM is mounted with the decal on the PDM facing up or if the decal on the PDM is facing down.

PDM Mounting Orientation - Determine the orientation of the fuses. The orientation is based on the operator sitting in the cab. Fuses can be orientated either: Forward, Right, Backwards, or Left.

“Press to Zero” - use this button to zero the gyro. The gyro should always be zeroed when setting up a new system. There will be a Zero Offset percentage recorded after the gyro has been zeroed. Make sure the planter is straight behind the tractor when zeroing the gyro. If the turn compensation seems to be off or if getting warnings about the gyro, re-zero the gyro.

Radar Speed - displays the speed being read from the Radar. Press on this button to be directed to the Radar Status page.

Turn Rate - Displays the radius of a turn in degrees per second, of the turn that is being read from the gyro while turning. This is the degree that will be used for turn compensation. Press on the “Turn Rate” button to adjust the turn compensation.

On - This is the RECOMMENDED and default setting for all SRM systems. In this setting, both control and monitoring will be based on the speed of each individual row. For example; all rows will keep a consistent seed spacing around curves.

Control Only - Each row will control to its own calculated speed and will keep consistent seed spacing. However, the reporting will only show a population based on the center of the planter. There will be a higher population on the outside rows and lower population on the inside rows of the curve.

Monitor Only - Control for all rows will be based on the center of the planter. However, reporting will show a population based on the distance each individual row traveled. Resulting in a higher population for the inside rows and lower populations for the outside rows.

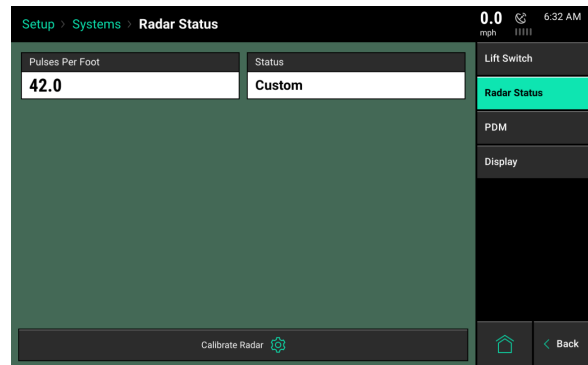
Off - both control and monitoring will be based on the speed of the tractor. Seed Spacing will be closer on the inside of the curve and further apart on the outside of the curve.

GPS Speed - displays the speed being read from GPS. Press on this button to be directed to the GPS Communication page.

Radar Status

Receiving a speed reading from a tractor mounted radar is recommended when running a control product. The Radar Status page allows the operator to calibrate the radar.

Select the “Calibrate Radar” button at the bottom of the screen and then follow the onscreen instructions.



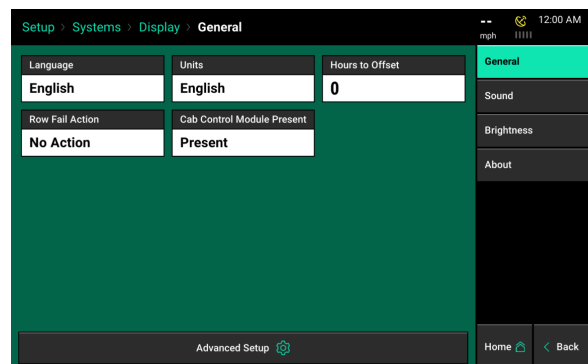
The calibration process will require a good GPS signal as well as having the operator drive straight for at least 300 feet at a constant speed of 4 mph or greater.

If the Pulses Per Foot is already known, enter this value manually by selecting the “Pulses Per Foot” box.

Display General

Select the “Display” option in the Systems menu to configure the Display Settings.

If two displays are being used, each display has its own display settings that can be adjusted.



Language - Change the language of the display.

Units - Select this option to change between English and Metric units.

Row Fail Action - Select this option to change the display action when a row failure occurs.

Jump to Row - This option will redirect the screen to the Row Details page when a row failure occurs.

Jump to Dashboard - This option will redirect the screen to the Population Dashboard to display Row-by-Row population information.

None - This option will cause no redirection of the screen when there is a row failure.

Note: Row Fail Action is not available when in Harvest mode.

Cab Control Module Present - If a Cab Control Module is **NOT** connected to the display, change this to “Not Present”. If using two displays, the display that does not have a CCM must also change this to “Not Present”.

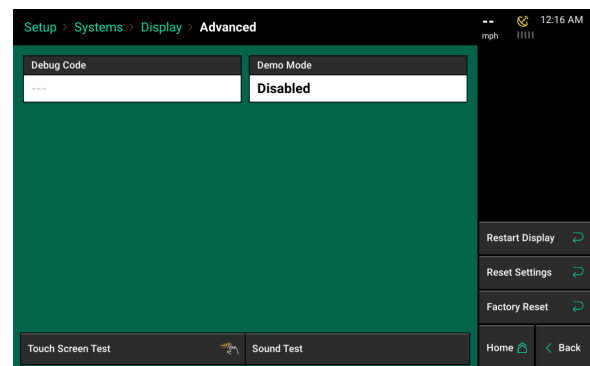
Multiple Display Mode - Select this option to disable certain notifications on the active monitor. Options include: “Alerts and Alarms”, “Screen Jump”, and “Event Popups”.

Background Map Style - Once the system has been connected to WiFi, use this option to change the Home Screen map background between the standard grid to a background map.

Display — Advanced Setup

Debug Code - if a code has been provided from a Precision Planting representative for a specific support issue, it must be entered in this location.

Demo Mode - Enables the demo mode which will display planting or harvest data on the display. A demo file is required for this mode to function. Press on this button to Enable demo mode.



Touch Screen Test - Tests to see if all areas of the touch screen work correctly. When in the test, touch to the screen to paint the screen a different color of where it was touched to see if that area of the screen is responding to touch correctly. Hold a finger in a stationary spot for five seconds to exit the test.

Reset EULA - Resets the User License Agreement. This will reset the EULA so that it will need to be agreed to when the display boots up next.

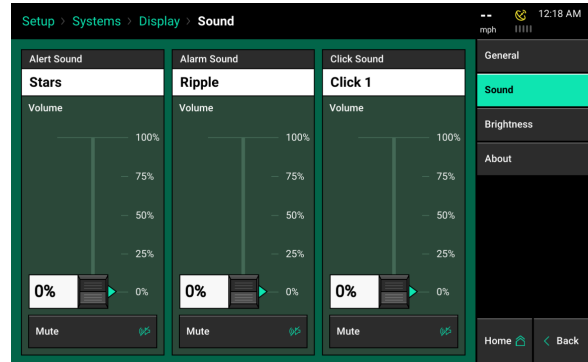
Restart Display - Restarts the display screen only. The connected modules will not restart.

Reset Settings - Resets ALL display settings and ALL configurations for tractor, planter, and control products back to the default.

Factory Reset - Wipes all data from the Display Base Module and resets all settings back to default.

Display — Sound

Select the Sound option in the navigation pane when in the Display menu to configure the sound settings. The volume can be controlled using the volume sliders below each sound type. Selecting each sound type allows the selection of different sound options. If a sound option is selected, a demo will play. If no sound is desired for a certain sound type, select the “Mute” button under the slider bar.



Alert - This sound will play when an item is yellow on the home screen.

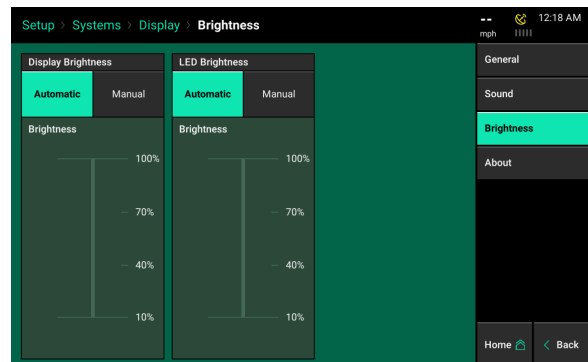
Alarm - This sound will play when an item is red on the home screen.

Key Press - This sound will play when the touch screen is pressed.

Display — Brightness

Select the Brightness option in the navigation pane when in the Display menu to configure the brightness of the display and the LED lights on the Cab Control Module (switch box connected to the display).

The default setting is “Automatic” for both the Display Brightness and LED Brightness. Automatic mode uses an ambient light sensor to change the brightness for day/night. Select “Manual” to display a slider bar to manually adjust the brightness.

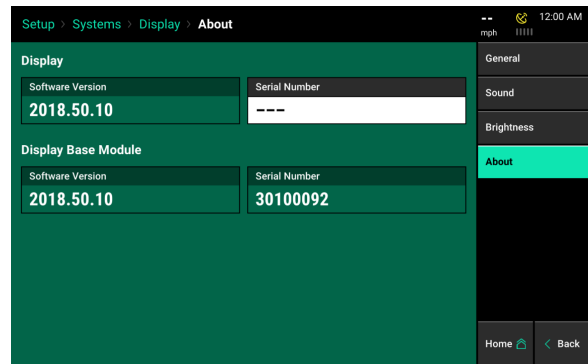


Display — About

View software versions and serial numbers for both the Display and the Display Base Module. Press on the software versions to be directed to the Software Update Screen. Serial Numbers cannot be manually entered, but will automatically update when plugged into a Display and Display Base Module.

The Disk Usage shows the percent of the total memory that is being used.

The License Agreement can also be viewed by pressing the License Agreement button at the bottom of the screen.

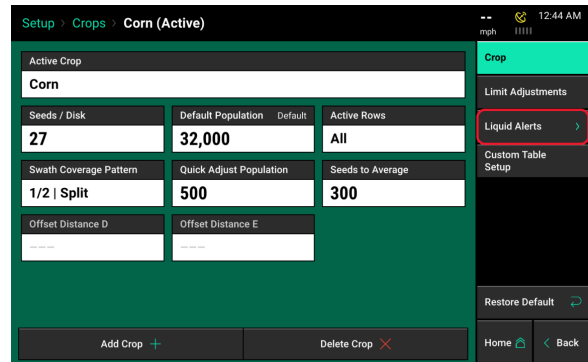


Liquid Alerts

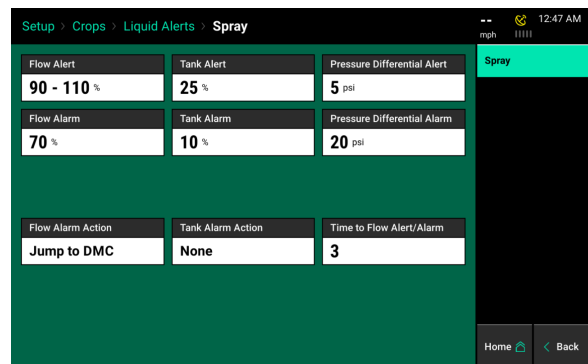
Liquid Alerts

Configure the Liquid Alerts in order to correctly give the operator, the warning and alarms when needed.

Navigate to “Setup” “Crops” “Liquid Alerts” (Planting) or “Setup” “Liquid Alerts” (Sidedress) to configure the alerts.



Flow Alert: Select a flow percentage range. If flow is outside of the selected range, the vApply Control button on the home screen will turn yellow. The Flow Alert can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Flow Alert.



Flow Alarm: If the flow drops below the selected percent the vApply Control button will turn red on the home screen. The Flow Alarm can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Flow Alert.

Tank Alert: Select a tank level percentage so that if the level of liquid in the tanks falls below the percent, the Tank Volume metric on the home screen will turn yellow. The Tank Alert can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Tank Alert.

Tank Alarm: Select a tank level percentage so that if the level of liquid in the tanks falls below the percent, the Tank Volume metric on the home screen will turn red and sound an alarm. The Tank Alarm can be disabled by pressing the green “Enabled” button which will then turn it yellow and “Disabled”. Select it again to re-enable the Tank Alert.

Pressure Differential Alert: If the pressure differential from the input side of the filter to the output side of the filter drops more than the set Alert value then an audible warning will sound and a warning message will be placed in the vApplyHD control screen in the Pressure Differential message center.

Pressure Differential Alarm: If the pressure differential from the input side of the filter to the output side of the filter drops more than the set Alarm value then a warning message will pop up on the display, and event code will be registered in the Notification Center, and an alarm message will be placed in the vApplyHD control screen in the Pressure Differential message center.

Note: When setting the Pressure Differential Alert/Alarm take into consideration the type of pump and how high the PSI is from these pumps. Low PSI systems should set lower values while high PSI systems can set higher values

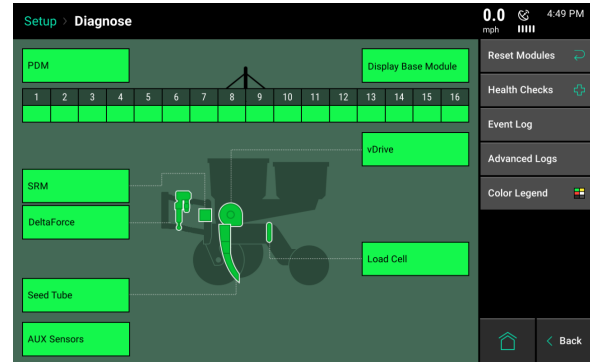
Flow Alarm Action: Select the action the monitor should take if the Flow Alarm is triggered. Select between Jump to DMC (this is row by row details of flow rates), Jump to Homepage, or None.

Tank Alarm Action: Select the action the monitor should take if the Tank Alarm is triggered. Select between Jump to DMC (this is row by row details of flow rates), Jump to Homepage, or None.

Time to Flow Alert/Alarm: Enter the amount of time a failure event needs prior to triggering the alert/alarm.

Diagnose

The Diagnose Menu is the primary location for trouble shooting issues related to the operation of the 20|20 system itself and all products configured on the monitor. The schematic on this page shows each component including the Base Module that the display screen connects to. Each product that is configured is displayed along with a row unit showing a drawing of the product(s). Additionally, there is planter bar at the top of the screen displaying the health of each row.



Color Legend

Green - the system is working correctly and communications are good. Select “Color Legend” to view an explanation of what each color indicates.

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.

All systems should be Green before using the system in the field. The color of each system on the top level diagnose page will be reflected by any issues within the system. For example if there is an issue on one row, that row number will be a color other than green at the top of the page and the system (e.g. vDrive, DeltaForce, etc....) will also be red. Touch on the system name to view the row by row level two details page. Anything on the level two detail pages that is working correctly (indicated by a green color) will be marked by a different color that fits the color legend. If a system is green on the top level page, then everything will also be green on the level two diagnose page for that system. For more information on product specific diagnose page information page, see the operation guide for that specific product.

Note: For assistance with diagnosing issues that are indicated on the diagnose page, see the troubleshooting guides in the Dealer Service Manual.

The Navigation Menu on the right hand side of the screen offers additional options within the Diagnose Menu.

Row #	Population Actual	Cmd	RPM Actual	RPM Cmd	Stability	Supply Volts	Drive Amps	Duty Cycle
1	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
2	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
3	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
4	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
5	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
6	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
7	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
8	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
9	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
10	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
11	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%
12	Not Apply	32,000	0.0	0.0	0%	13.3	0.00	0%

Additional metrics shown at the bottom: Lift State: Raised; Radar Speed: Wait Signal; GPS Speed: 0.0 mph; FWD Accel: 0.000 ft/s/s; Master Plant: Off; Turn Rate: 0.00 deg/s.

Display Base Module - Displays information about the DBM including the CAN bus usage, Temperatures, voltages, Ethernet ports, and software versions.

Reset Modules - Pressing this button breaks and reestablishes communication between the 20|20 components and is often used as a troubleshooting tool for communication issues.

Health Checks - Perform health checks on the different systems configured on the monitor. Health checks will give a report card for the system after completion. Follow the on screen instructions for each health check. For more information on specific health checks, see the operation guide for each specific product.

Event Log

Select the Event Log button to view a list of all event codes/error codes that have happened on the system. The Event Log is in order from the most recent event to the oldest event with the newest event codes at the top of the list. All events will have a number and a date/time when the event happened along with a description of the event. Select any event code to view additional details for that specific code

Additionally, event codes can be sorted by a system type. Select the system type on the right hand of the screen (e.g. SRM). System types will only be available for selection if there are event codes for specific systems. Otherwise, select “Entire System” to view all event logs.

Event #	Start	End	Description	Product
901	January 26, 10:30:11 PM	--	Loss of SRM on row 16	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 15	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 14	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 13	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 12	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 11	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 10	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 9	SRM
901	January 26, 10:30:11 PM	--	Loss of SRM on row 8	SRM

Advanced Logs - Allows for a detailed log to be Enabled, Exported, and Deleted. To begin a detailed log, press the “Enable Detailed Log” so that it turns Green. Detailed Logs are taken when requested by the Precision Planting Support Team. A detailed log will run for one minute and then automatically be disabled. Once a log is captured, select the “Export – System Data Log” button to export the log to a USB drive plugged into display. Once exported logs can be deleted by pressing the “Delete – Log File” button.

