

vDrive[®] Insecticide

**vDrive Insecticide Operator's Guide
For Gen 3 20|20 Displays**

 Precision Planting[®]

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vDrive Insecticide - System Setup, Calibration, and Operation



The calibration of vDrive Insecticide requires the handling of dangerous materials (insecticide). Always wear appropriate personal protective equipment when handling dangerous materials. Always wear protective gloves, mask, and eyewear.

There are six requirements for the vDrive Insecticide system to function:

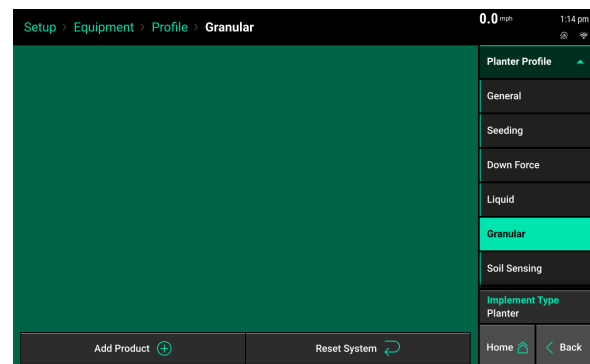
1. vDrive Insecticide must be configured on the 20/20 monitor.
2. There must be a Speed source.
3. The Master Plant Switch on the Cab Control Module must be in the up position.
4. The planter must be lowered.
5. vDrive Insecticide system must be enabled.
6. The Cal Mass Value must be greater than zero.

Configuring Monitor for vDrive Insecticide

Step 1:

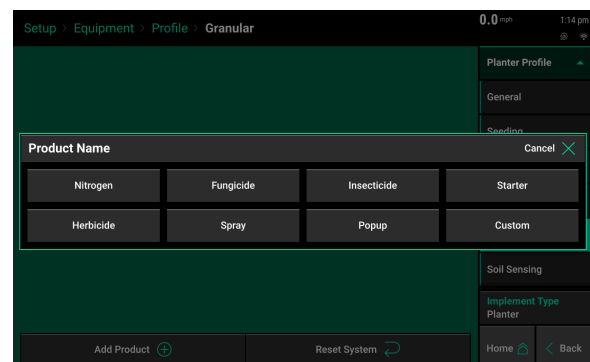
Set up a Granular System under the Equipment menu.

Navigate to the planter setup page by pressing Setup > Equipment and press Add Product.



Step 2:

Select Insecticide to add a vDrive Insecticide system.

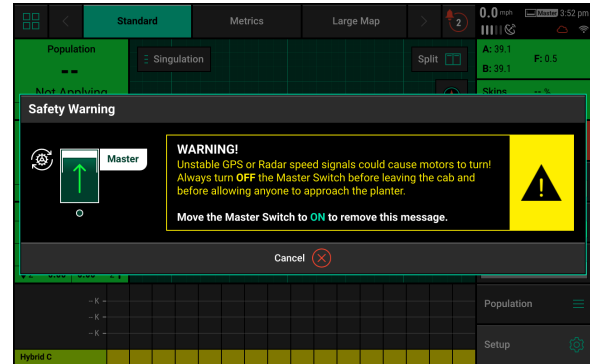


Safety Warning

Once any control product is configured on the 2020 display, the system will require a Cab Control Module (CCM) and will prompt the user to toggle the Master Plant switch on the CCM before any control products can be used. This warning is triggered any time the system is booted up, and when the system has traveled for more than half a mile.



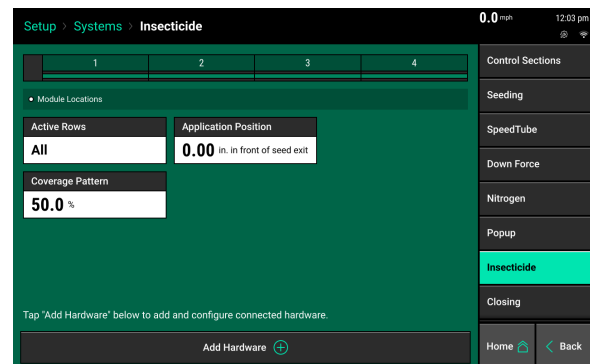
If a CCM is not installed, the cancel button can be used to bypass this warning. No control systems will operate until the Master Plant switch is toggled. This icon will be present in the status button in the top right if the Safety Warning was bypassed using the cancel button.



vDrive Insecticide Setup

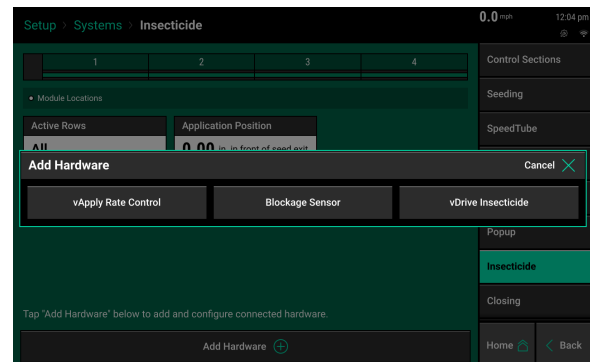
Step 1:

Navigate to Setup > Systems > Insecticide to set up the Insecticide system. Press the Add Hardware button to add the Insecticide system hardware.



Step 2:

Press vDrive insecticide.



Step 3:

Select which rows have vDrive Insecticide installed on them by pressing them so that they are highlighted in bright green. Once the appropriate rows are highlighted, press Continue.



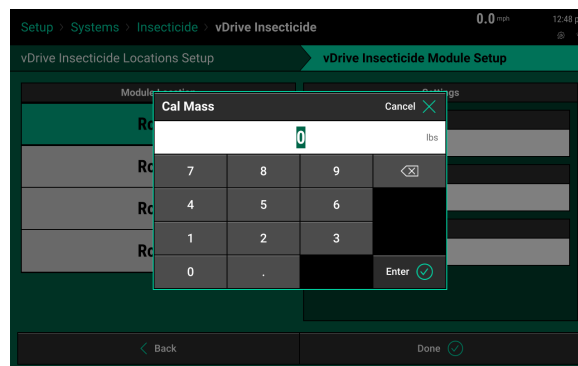
Step 4:

Select meter type. The options are PP Standard, PP Low Flow and PP High Flow. The color of the plastic Insecticide meter will indicate which meter type to select (unless customizations have been made). Black indicates Standard, Grey indicates Low Flow, and White indicates High Flow. Standard is the default selection, if High or Low Flow meters are installed, Meter Type **must** be changed manually on each row.

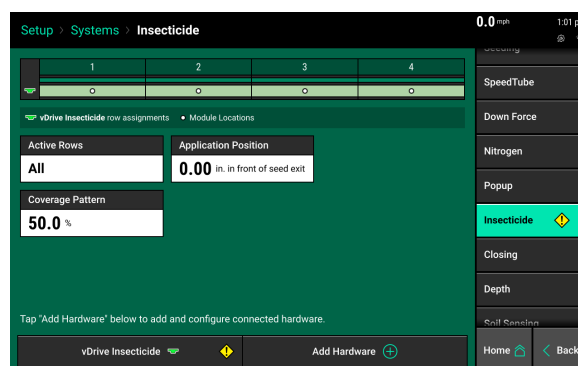


Step 5:

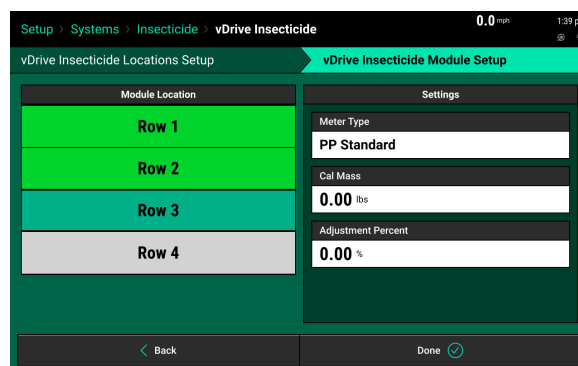
Select Cal Mass to enter the Calibration Mass for the product. See the Insecticide Calibration section of this document for instructions on how to determine Calibration Mass. This value may be left blank during initial setup, but **must** be entered before planting.



A yellow warning symbol with an exclamation point will be displayed next to the Insecticide system button and the vDrive Insecticide button if there is no value entered in Cal Mass.



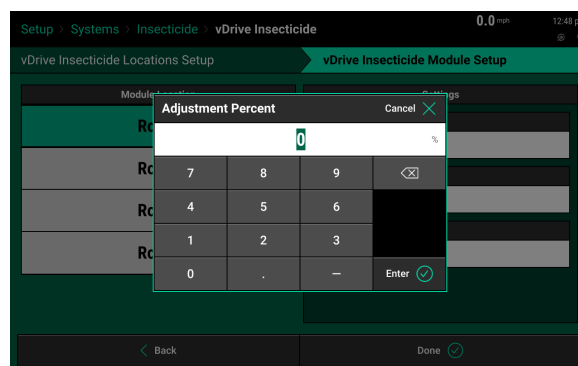
A Calibration Mass value **must** be entered for each row manually. Any row without a value entered will be displayed in white. Any row with a value entered will be displayed in bright green. The row that is currently selected will be displayed in blue-green.



Step 6:

Enter the Adjustment Percent (if necessary) for each row. This option is intended for use when the application rate for one or more rows deviates from the target rate.

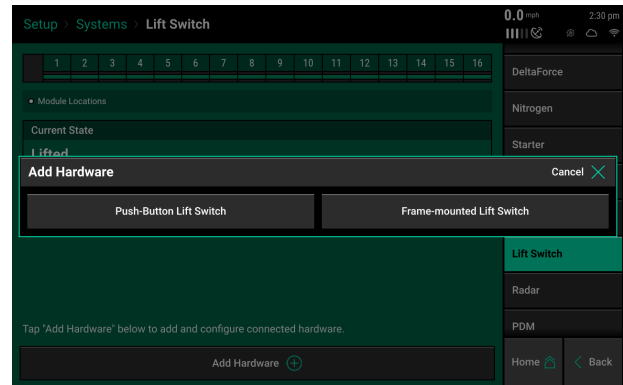
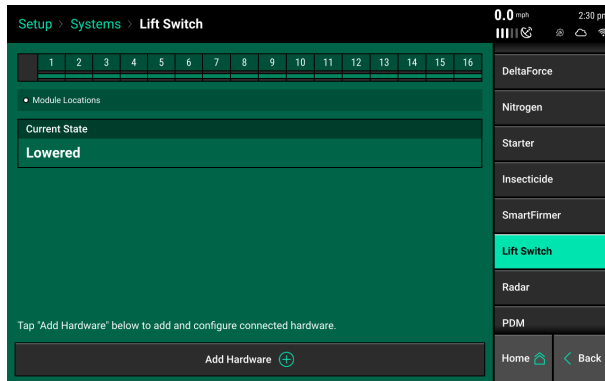
Example: Row 3 consistently has 2 lbs. remaining in the hopper when all other rows are empty. Rows are being filled with 50 lbs. of product. Divide 2 lbs. by the total fill weight of 50 lbs. for a result of 0.04 (4%). Press on Row 3 and then press on Adjustment Rate. Enter a value of 4 to increase the rate by 4%.



Lift Switch

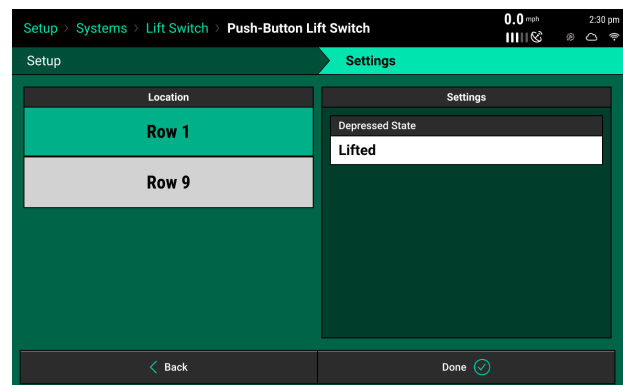
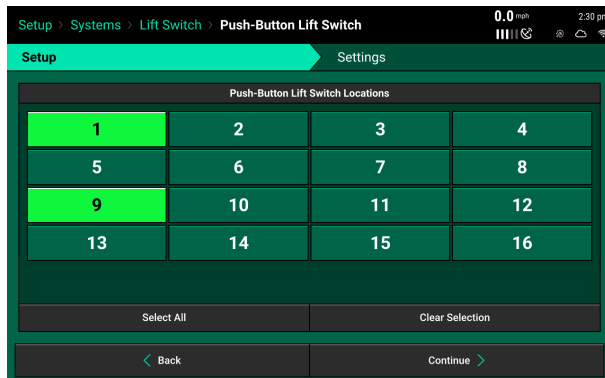
One of the requirements for all control products to function is for a lift switch to be installed, and reading lowered.

Configure the connected lift switches by selecting ‘Add Hardware’. Select the type of lift switch (es) plugged in. A summary of lift switch locations will be displayed at the top of the screen.



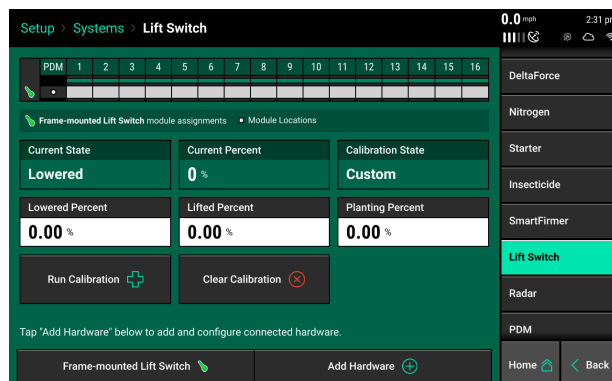
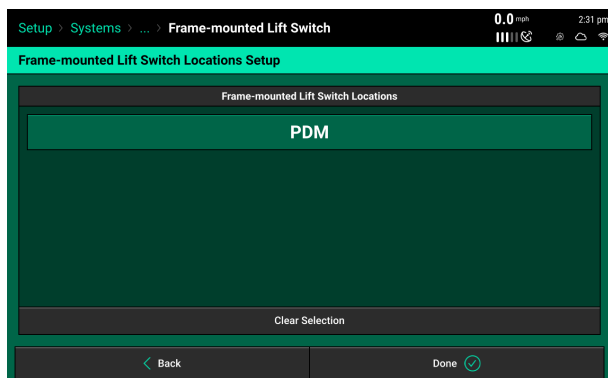
Push Button Lift Switches

Select what rows have push button lift switches installed, then press ‘Continue’. In the settings page, select if the push button is depressed (pushed in) when lifted or lowered. A calibration will not need to be performed for push button lift switches.



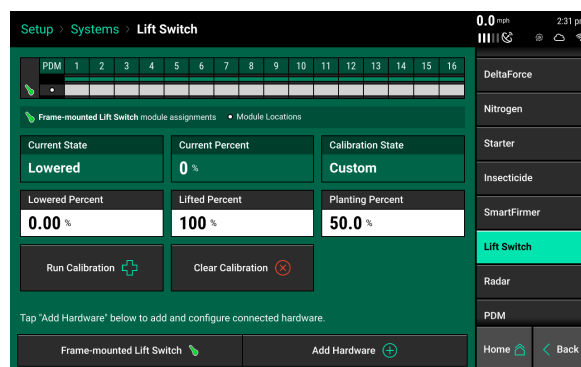
Frame Mounted Lift Switches

For a frame mounted switch, configure the plug in location as the PDM. Once the PDM is selected as the location, the system will then need to be calibrated for lifted and lowered position.



Calibrate Lift Switch

To complete the Lift Switch calibration, press the “Run Calibration” button at the bottom of the screen. Follow the on-screen 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.

Insecticide Calibration

Warning: The calibration of vDrive Insecticide requires the handling of dangerous materials (insecticide). Always wear appropriate personal protective equipment when handling dangerous materials. Always wear protective gloves, mask, and eyewear.

Tools Required for Calibration

Item	Picture
Insecticide Scoop (Included in Base Kit: 732060)	
Measuring Cup -2 Cups Dry- (Included in Base Kit: 732060)	
Scale—REQUIRED A recommended scale is Ozeri: Pronto Digital Kitchen Not included in vDrive Insecticide. This scale may be purchased at Amazon, Home Depot, Walmart, Kmart, and other locations.	
SMARTBOX SYSTEMS ONLY	
Calibration Collection Bottle SmartBox (AMVAC) Included in Amvac SmartBox Kit-SB022299. Required for SMARTBOX Calibration	

Open Container Calibration

For sealed container calibration instructions, skip to the sealed container calibration section. The calibration process in this section will consist of calculating a bulk density. Included with the hardware is a measuring cup (2 Cup Dry). Any 2 cup dry measuring cup will work. If you switch products during the season (for example switching from Force to Aztec), a new density needs to be calculated. Not recalibrating can cause errors of 10-20% due to the differences in density from one product to another. In addition, failure to follow these steps precisely can result in a variation of up to 5%. For the most accurate results, weigh multiple samples and enter the average of the

samples. Also, because different lots of the same product vary in density, calibration should be done for each lot to ensure accuracy.

Step 1:

Place the provided measuring cup on the purchased scale and press TARE to zero the scale.



Step 2:

Fill the measuring cup to the brim with the provided scoop/spoon. Do not use a larger scoop and do not use the measuring cup as a scoop. This will affect the density and create errors of up to 5%.



Step 3:

Use a flat edge to remove excess product from the cup. Do not press down or shake to compact. This will affect density and application rates.



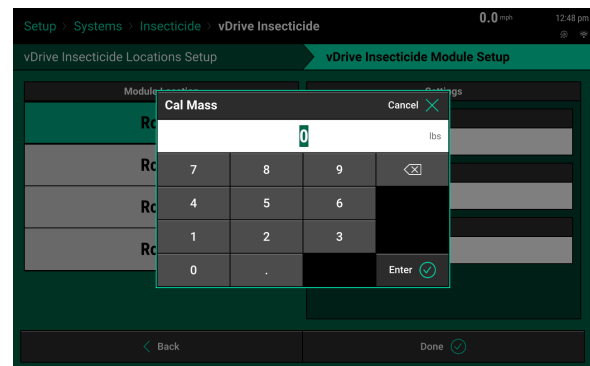
Step 4:

Place the full cup on the scale and record the weight in pounds (or ounces in metric mode). For best results, weigh multiple samples and calculate the average for entry into the 20/20 Display.



Step 5:

Navigate to Setup > Systems > Insecticide and press vDrive Insecticide. Press vDrive Insecticide and select which rows have vDrive Insecticide installed. Press continue to move to the Module Setup screen and press Cal Mass to enter the Calibration Mass for **each** row. See the vDrive Insecticide Setup section of this document for more details.



Repeat Steps 1-5 for each product, or when switching to a new product.

Sealed Container Calibration

Warning: The calibration of vDrive Insecticide requires the handling of dangerous materials (insecticide). Always wear appropriate personal protective equipment when handling dangerous materials. Always wear protective gloves, mask, and eyewear.

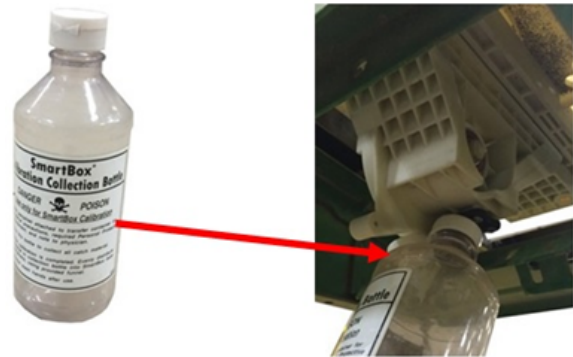
Note: Sealed container calibration is only used for SmartBox systems. It may be convenient to have a second operator on site to assist with step 6.

Step 1:

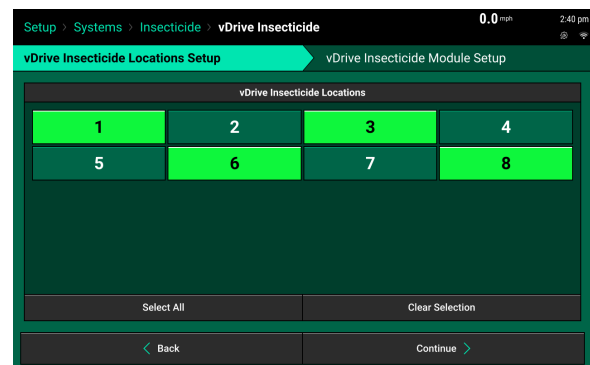
Place the provided measuring cup on the purchased scale and press TARE to zero the scale.

**Step 2:**

Secure the sealed container calibration bottles to the drop funnels on four rows.

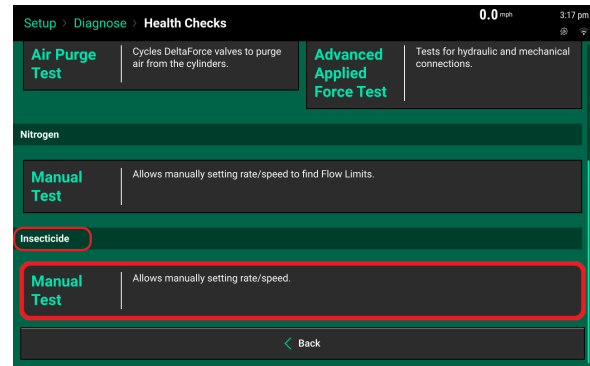
**Step 3:**

Navigate to Setup > Systems > vDrive Insecticide. Press vDrive Insecticide and set all rows with bottles secured to them to active by pressing on them until they are highlighted in bright green. If any rows that do not have bottles secured to them are active, deactivate those rows by pressing on them until they are dark green.



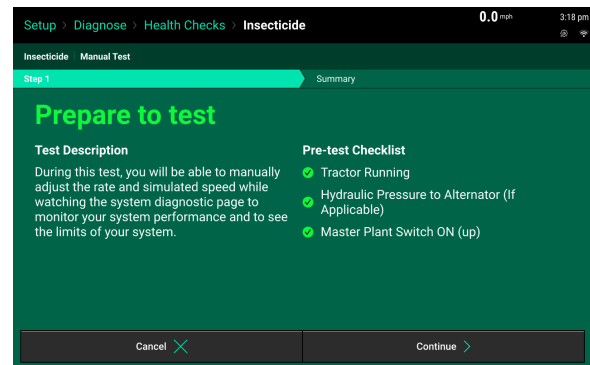
Step 4:

Navigate to Setup > Diagnose > Health Checks and select the Manual Test under the Insecticide heading.



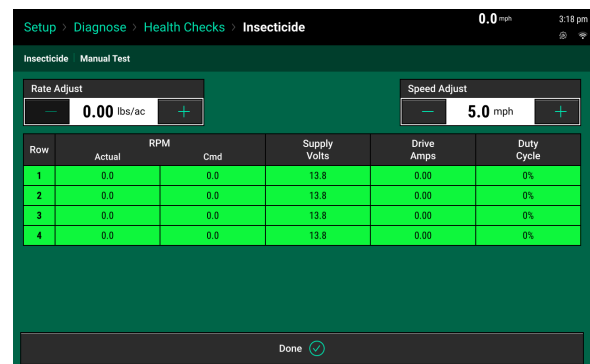
Step 5:

Press Continue when prepared to test.



Step 6:

Adjust rate and speed settings to dispense product. Stop dispensing when the bottles are filled with at least 2 cups of product.



Step 7:

Empty one bottle into the measuring cup. Use a straight edge to strike off the top of the cup. Weigh the cup and repeat for the other 3 bottles. Determine the average weight of the 4 samples and enter that value in the Cal Mass box for **each** row the vDrive Insecticide setup screen.

**Step 8:**

Ensure to set all rows to active again after the test.

SRM System Calibrations

For vDrive Insecticide to function, the planter must be lowered and there must be speed.

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” – “Lift Switch”. See the 20|20 Operator’s Guide for more information on calibrating Lift Switches.
2. Both GPS and Radar should be used as speed sources. If Radar is installed, verify that the Radar calibration has been completed. The Radar Status systems page can be found by navigating to “Setup” – “Systems” – “Radar Status”.
3. The PDM must be setup correctly for vDrive Insecticide to have optimal performance. Ensure the PDM Mounting Location & Orientation are set correctly, and zero the gyro.

Note: In addition, for vDrive Insecticide to function, it must be configured on the display and the master plant switch on the Cab Control Module must be in the up position.

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 does not have to be repeated.

Home Screen

The home screen offers information for controlling and mapping the vDrive Insecticide system.

vDrive Insecticide Control

The vDrive Insecticide control button is located on the home screen. The control button also shows the status of the vDrive Insecticide system. If the vDrive Insecticide control button is not on the home page it will need to be added. See the 20/20 operator's guide for assistance in editing the home screen layout.

Indicators for the system status of the vDrive Insecticide Control button:

Enabled – system is ready and has been enabled.

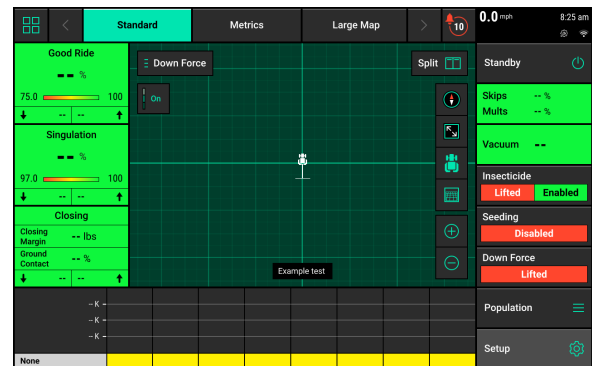
Disabled – system will not function due to being disabled. To enable the system, press on the control button and select Enable.

Lifted — planter is lifted and system will not function. To enable the system, lower the planter

Master off — master plant switch is off and system will not function. To enable the system, toggle the master plant switch.

Green — System is functional and has a commanded rate.

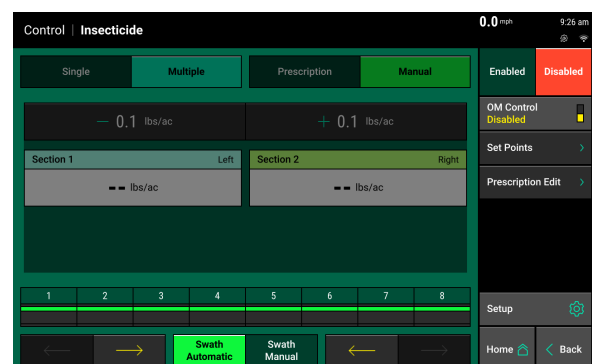
Yellow — There is a prescription assigned to the active field, but the system is set to plant a manual rate.



vDrive Insecticide Control Screen

Press on the control button on the Home Screen to bring up the vDrive Insecticide Control Screen.

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



Rate Control

To manually assign or adjust the application rate, select Manual at the top of the screen. If multiple insecticides were configured in the vDrive Insecticide setup, select between Single or Multiple. If only one insecticide was configured, only Single can be used.

Manual – Set an application rate for the vDrive Insecticide system to apply. This ignores any assigned insecticide application prescriptions and continues to plant at the assigned manual rate. When in Manual select either Single or Multiple when setting rates. Manual will turn yellow on both the vDrive Insecticide Control page and the Home Screen if a manual rate is selected when there is also an insecticide application prescription assigned to the active field.

Single – Assigns the same application rate to all rows. Select a preset population from the list of population set points displayed on the screen. Use the +/- buttons to increase the rate by one tenth of a pound per acre, or tap on the white box displaying the current application to manually enter a rate. Press the Set Points button to change/configure preset population points.

The screenshot shows the 'Control | Insecticide' screen with the 'Single' tab selected. At the top, there are buttons for 'Single', 'Multiple', 'Prescription', and 'Manual'. Below these, a large white box displays '2.0 lbs/ac'. Underneath this box is a grid of four smaller white boxes, each containing '0.0', and a '+' button on the right. Below the grid is a row of eight small boxes numbered 1 through 8. At the bottom, there are navigation buttons: 'Swath Automatic' (highlighted in green), 'Swath Manual', and arrows. On the right side, there are status indicators for 'Enabled' and 'Disabled', and buttons for 'Set Points' and 'Prescription Edit'.

Adjusting Set Points — To configure this list, press on each white box and enter the desired value(s).

The screenshot shows the 'Control | Insecticide > Set Points' screen. It displays a grid of eight white boxes, each representing a set point. The first four boxes are labeled 'Set Point 1' through 'Set Point 4', and the next four are 'Set Point 5' through 'Set Point 8'. Each box contains a value of '0.0 lbs/ac'. On the right side, there are status indicators for 'Enabled' and 'Disabled', and buttons for 'Set Points' and 'Prescription Edit'.

Multiple – Assign a different application rate to each insecticide section that was configured during vDrive Insecticide Setup. Use the + and – buttons to adjust the populations up or down the same amount for each section, or tap on each application rate to manually enter a new rate for each section.

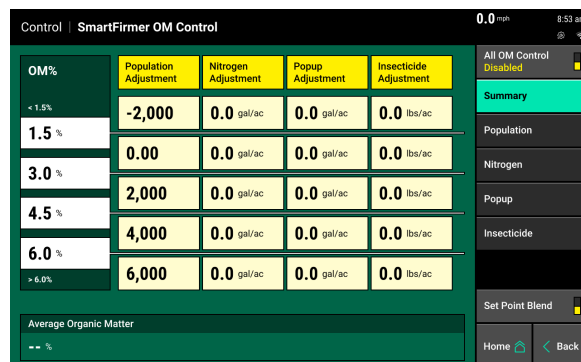
The screenshot shows the 'Control | Insecticide' screen with the 'Multiple' tab selected. At the top, there are buttons for 'Single', 'Multiple', 'Prescription', and 'Manual'. Below these, there are two large white boxes. The left box is labeled 'Section 1' and contains '-- lbs/ac'. The right box is labeled 'Section 2' and contains '-- lbs/ac'. Below these boxes is a grid of four smaller white boxes, each containing '0.0', and a '+' button on the right. Below the grid is a row of eight small boxes numbered 1 through 8. At the bottom, there are navigation buttons: 'Swath Automatic' (highlighted in green), 'Swath Manual', and arrows. On the right side, there are status indicators for 'Enabled' and 'Disabled', and buttons for 'Set Points' and 'Prescription Edit'.

Prescription– If an Insecticide Application prescription is assigned to the active field, Prescription mode will be selected as the default setting. When in Prescription mode, the system will control to the application prescription assigned to the active field.

Shortcut Buttons

In addition to the Set Points button described above, shortcut buttons to OM Control and the vDrive Insecticide Setup are included on the right hand side of the screen.

OM Control — If SmartFirmers are being used, Organic Matter control can be set by pressing on the OM Control button. Insecticide rate set points based on Organic Matter content can be entered under the Insecticide Adjustment column. OM control is enabled or disabled using the All OM Control button in the upper right corner of the screen.



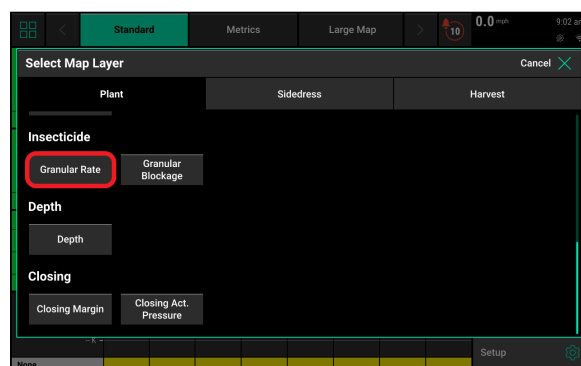
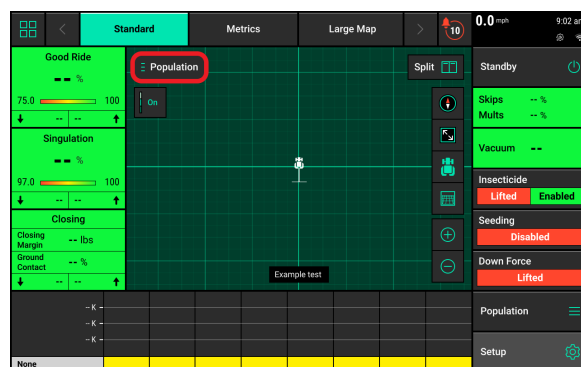
The screenshot shows the 'SmartFirmers OM Control' interface. It features a table for setting insecticide adjustments based on Organic Matter (OM) percentages. The table has columns for Population Adjustment, Nitrogen Adjustment, Pop-up Adjustment, and Insecticide Adjustment. The Insecticide Adjustment column shows values in lbs/ac. To the right of the table are buttons for 'All OM Control Disabled', 'Summary', 'Population', 'Nitrogen', 'Pop-up', 'Insecticide', 'Set Point Blend', 'Home', and 'Back'.

OM%	Population Adjustment	Nitrogen Adjustment	Pop-up Adjustment	Insecticide Adjustment
< 1.5%	-2,000	0.0 gal/ac	0.0 gal/ac	0.0 lbs/ac
1.5 %	0.00	0.0 gal/ac	0.0 gal/ac	0.0 lbs/ac
3.0 %	0.00	0.0 gal/ac	0.0 gal/ac	0.0 lbs/ac
4.5 %	2,000	0.0 gal/ac	0.0 gal/ac	0.0 lbs/ac
6.0 %	4,000	0.0 gal/ac	0.0 gal/ac	0.0 lbs/ac
> 6.0%	6,000	0.0 gal/ac	0.0 gal/ac	0.0 lbs/ac

Refer to the *Real Time Control* section of the *SmartFirmers Operators Guide* for additional information on setting up and planting/applying with OM Control.

vDrive Insecticide Mapping

An Insecticide map is available to view on the home screen for vDrive Insecticide systems. The map will display the commanded vDrive Insecticide rates for each row. To view the Insecticide map, press the current map type name that is displayed in the top left corner of the map. A list of all available map types available to be viewed will be displayed. Select Granular Rate under the Insecticide heading.



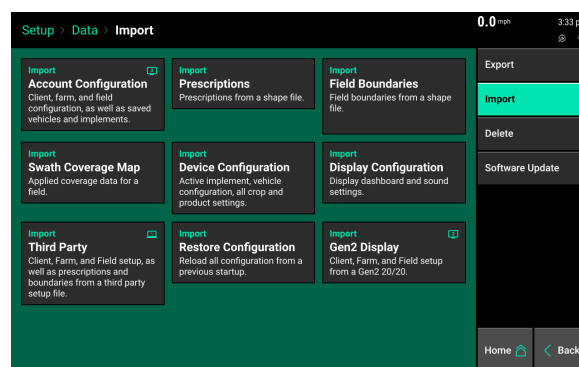
The screenshot shows the 'Select Map Layer' screen. It has tabs for 'Plant', 'Sidedress', and 'Harvest'. Under the 'Insecticide' heading, there are two options: 'Granular Rate' (highlighted in red) and 'Granular Blockage'. Below this, there are sections for 'Depth' and 'Closing'. The 'Depth' section has a 'Depth' button. The 'Closing' section has 'Closing Margin' and 'Closing Act. Pressure' buttons.

Insecticide Prescriptions

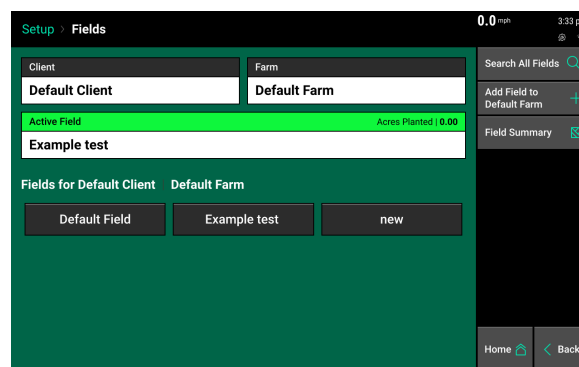
Importing Files into the Display

Variable rate Insecticide prescriptions can be implemented by the vDrive Insecticide system on a planter as long as the prescription is in the form of a shapefile and written in terms of pounds per acre (kilograms per hectare).

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 of the USB drive. Insert the USB drive into the side of the display. Then navigate to Setup > Data > Import > Prescriptions.



Once prescriptions have been imported into the display, they must then be assigned to the appropriate fields. Navigate to Setup > Fields and select either the Active Field or another Field name. It may be necessary to change Client or Farm to display the desired Field.

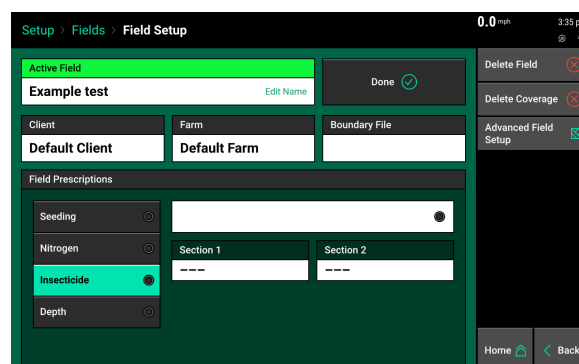


Note: Only ONE prescription can be assigned to each individual field. Prescriptions can be for seeding, liquid, and/or insecticide. To combine multiple types into one prescription, create separate attributes within the same prescription shapefile for seeding, liquid, and insecticide. If no insecticide prescription or attribute is assigned, a manual rate must be selected in the vDrive Insecticide Control Page.

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 exterior and interior zones.

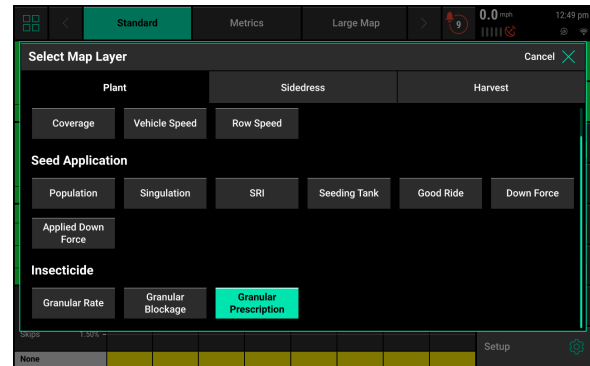
Assigning a Prescription to a Field Name

To assign an Insecticide Prescription/Attribute to the selected field, press the “Insecticide Prescription” button. This will display ALL shapefiles that have been imported into the display. If there is not an option for an Insecticide Prescription then the vDrive Insecticide system has not been configured on the display. Choose the appropriate prescription for the field name.



After selecting the prescription name, an attribute **MUST** be selected for each rate section that has been setup for the planter. 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. Insecticide attributes should be written in pounds per acre (kilograms per hectare). A different attribute can be selected for each rate section that has been assigned to a row, allowing each rate section to be controlled by a different attribute/seeding rate, or the same attribute can be selected for each rate section.

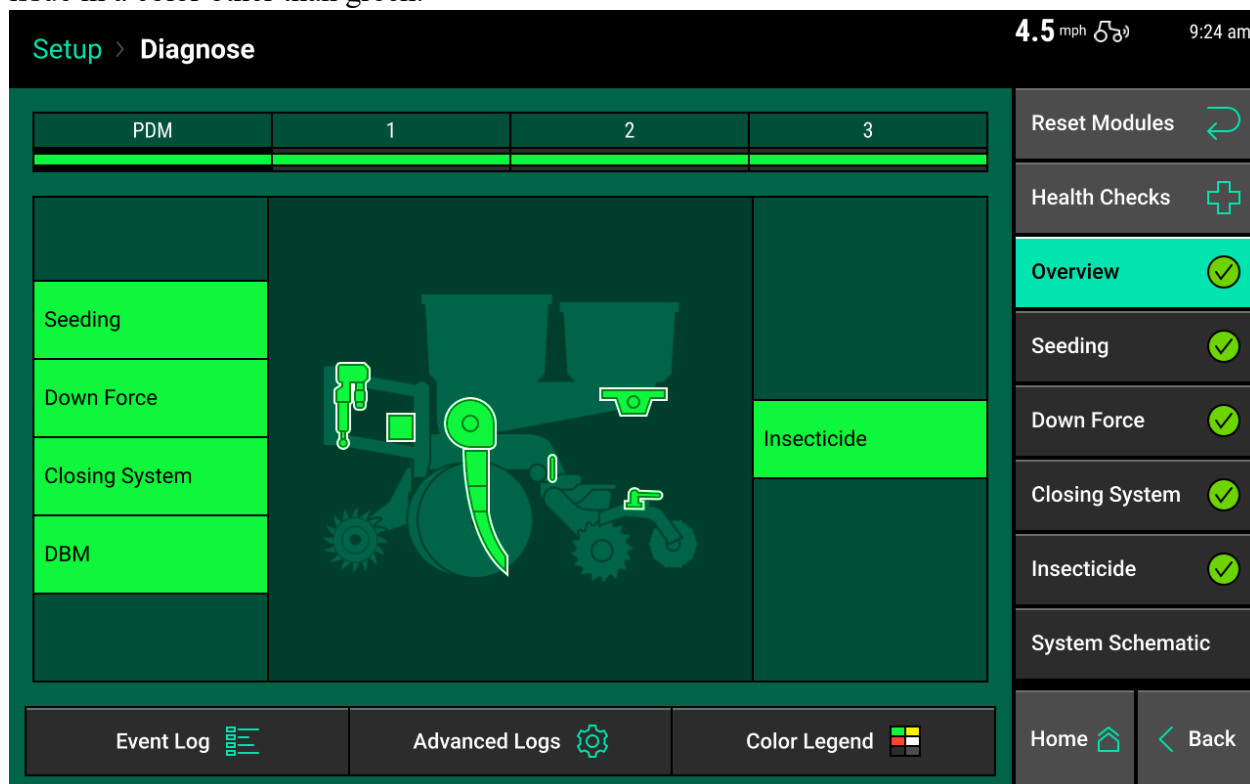
Insecticide Prescription files that have been assigned to a field can be viewed on the home screen for the active field. Select the current Map Layer displayed at the top left corner of the map to see a list of available map layers. Scroll to the bottom of the list and locate the map layer called Granular Prescription under the Insecticide heading.



Select this map type to view the shapefile that has been assigned to the active field as an Insecticide Prescription. If different attributes are assigned to each rate section, only one attribute can be viewed at a time.

vDrive Insecticide 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.



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

Color Legend:

Select “Color Legend” to view an explanation of what each color indicates

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

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

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

White – Device is detected but is not expected.

Black – Row has been disabled in the planter configuration

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

The vDrive Insecticide button will be green if the system is working correctly and communications are good. If it is not green, press it to view vDrive Insecticide level 2 row-by-row diagnostics.

RPM Actual – Actual RPM of the meter.

RMP Command (Cmd) – The RPM the meter is being commanded to turn at to meet application rates.

Supply Volts – Voltage at vDrive Insecticide Module.

Drive Amps – vDrive Insecticide motor current draw in amps.

Duty Cycle – Displays the vDrive Insecticide motor output over the operating range, 0 – 100%.

At the bottom of the vDrive Insecticide diagnostic page there are indicators of the state for the Lift Switch, Radar Speed, GPS Speed, Forward Acceleration Reading, Master Plant Switch, and the Turn Rate (degree the planter is turning based off the gyro in the PDM).

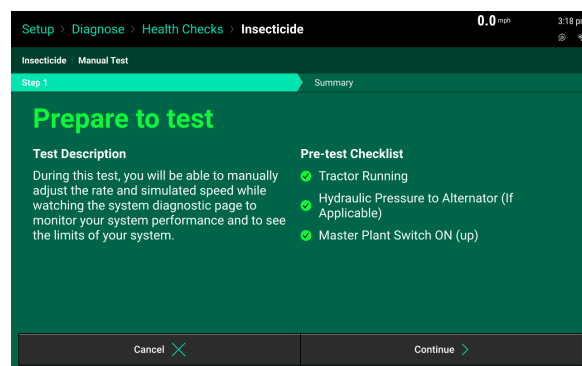
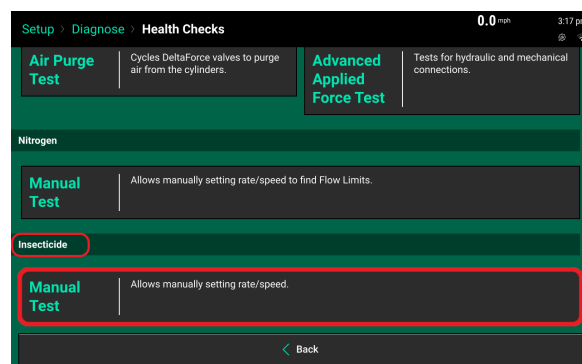
Row	Actual	RPM Cmd	Supply Volts	Drive Amps	Duty Cycle
1	37.2	37.2	13.8	0.16	14%
2	37.2	37.2	13.8	0.17	14%
3	37.2	37.2	13.9	0.18	14%
4	37.2	37.2	13.8	0.17	14%
5	37.2	37.2	13.8	0.17	14%
6	37.3	37.2	13.8	0.18	14%
7	37.1	37.2	13.8	0.19	15%
8	37.2	37.2	13.8	0.20	15%

At the bottom of the screen, there are status indicators: Lift State (Lowered), Radar Speed (Uncalibrated), GPS Speed (5.9 mph), FWD Accel (0.000 ft/s/s), Master Plant (On), and Turn Rate (0.00 deg/s).

vDrive Insecticide Health Checks

Always perform a health check after installation and before the start of planting season. Access the vDrive Insecticide health check page by navigating to Setup > Diagnose > Health Checks and selecting the Manual Test under the Insecticide heading. This health check will test the vDrive Insecticide system for correct operation. The meters will spin, dispensing any insecticide that is in the boxes. Insecticide is not required for this health check.

Press Continue when prepared for the test



Monitor the different informational columns while adjusting rate and speed. Verify that Commanded (CMD) and Actual RPMs match. Verify that supply volts are at least 12.5 for all rows. Verify that Drive Amps are not more than 0.5 for all rows. Verify that Duty Cycle readings are close to equal across all rows. Press the Done button after monitoring the above items at multiple speeds and rates.

Setup > Diagnose > Health Checks > Insecticide

6.0 mph 11:34 am

Insecticide Manual Test

Rate Adjust: 0.00 lbs/ac

Speed Adjust: 5.0 mph

Row	Actual RPM	Cmd RPM	Supply Volts	Drive Amps	Duty Cycle
1	0.0	0.0	13.8	0.00	0%
2	0.0	0.0	13.8	0.00	0%
3	0.0	0.0	13.8	0.00	0%
4	0.0	0.0	13.8	0.00	0%
5	0.0	0.0	13.8	0.00	0%
6	0.0	0.0	13.8	0.00	0%
7	0.0	0.0	13.8	0.00	0%
8	0.0	0.0	13.8	0.00	0%

Done