

Granular Rate Control
Gen 3 Ops Guide



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Granular Rate Control Requirements

There are 6 requirements in the 20|20 for the Granular System to function:

1. The Granular product must be configured in the 20|20.
2. There must be a speed.
3. The Master Plant Switch on the Cab Control Module must be in the up position.
4. The implement lift switch must register “lowered” in the 20|20.
5. The product must be “Enabled” in the control page.
6. An application rate must be set

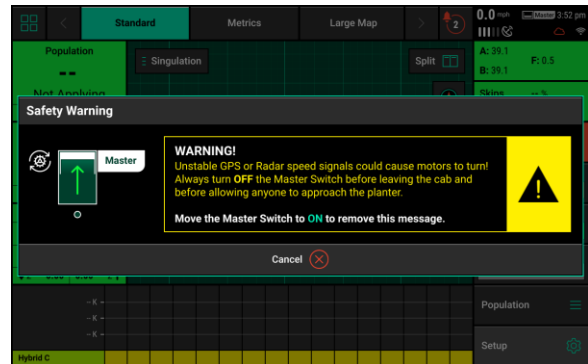
Safety Warning

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.

Note: This Safety Warning will only appear in 2020.1.x and newer software.

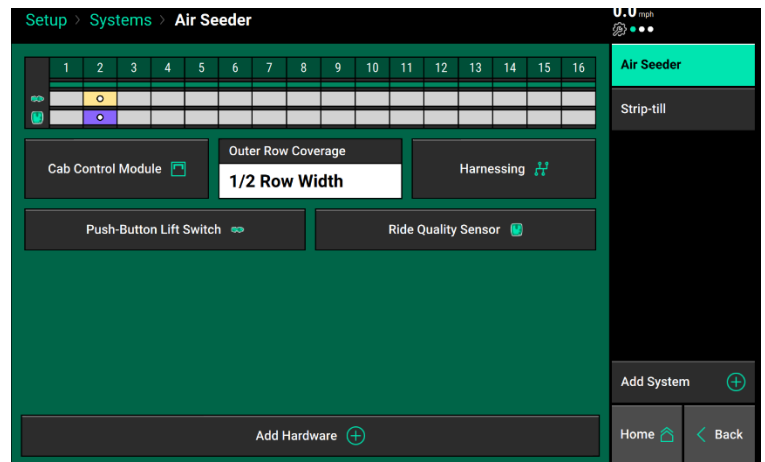


If a CCM is not installed, the cancel button can be used to bypass this warning. No control systems will operate until the Master Plant switch is toggled. This icon will be present in the status button in the top right if the Safety Warning was bypassed using the cancel button.

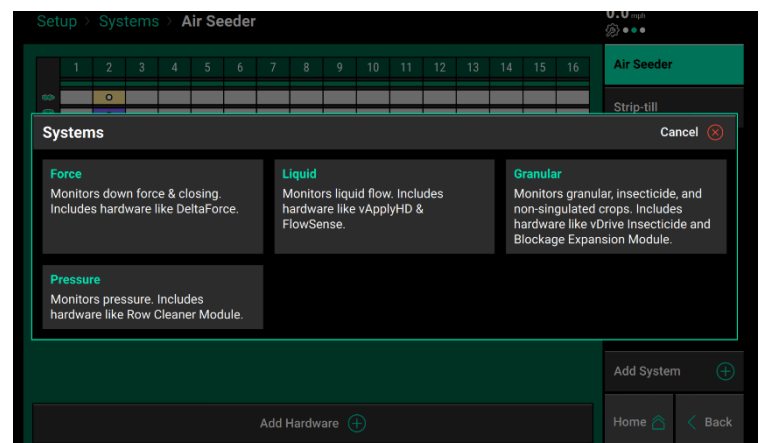


Configuring the 20|20 for Granular Rate Control

From the Home screen go to Setup — Systems. Press ‘Add System’ on the bottom right side of the screen to add a Granular system.



Select ‘Granular’ from the list of options to add a Granular system.



Once a Granular system has been configured, it will display at the top of the screen. The Remove button can be used to remove the system.

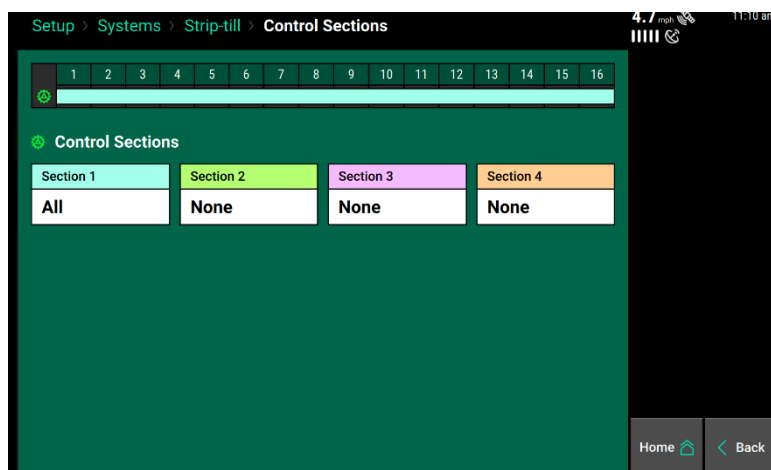
Control Sections Setup

Navigate to Setup → Systems → Granular System → Select “Control Sections” to configure the Control sections of this implement. The Control Sections will apply to all rate control products configured on this monitor. This includes seeding control, liquid fertilizer control, and granular fertilizer control.

Note: This section only applies to 2020.1.x and newer software, for 2020.0.x and older software, proceed to the next section of the manual.

Rate Section Setup

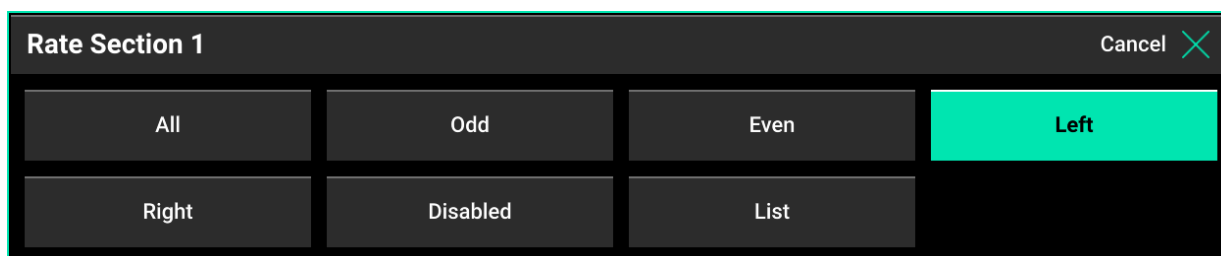
Setup the “Rate Control”. Rate Control Setup allows the operator to determine which rows to set to certain rates. The monitor can control up to 4 different rate sections at once. Each rate section can be assigned a different target rate or prescription attribute. A rate section can be any combination of rows.



If all rows will be controlled with the same rate or the same prescription attribute only one rate section needs to be configured. If only one rate section will be used select “Section 1” and then select “All”. Use multiple rate sections when controlling different rates between rows or sections.

To setup a rate section, select one of the four Rate Sections. Assign appropriate rows to the rate section. This may be Odd, Even, Left, Right or List. When selecting “List”, define which rows are to be used by touching those rows numbers so they turn green.

Note: Ensure that all rows are assigned to a rate section. Any row not assigned to a rate section will not operate.



Swath Setup

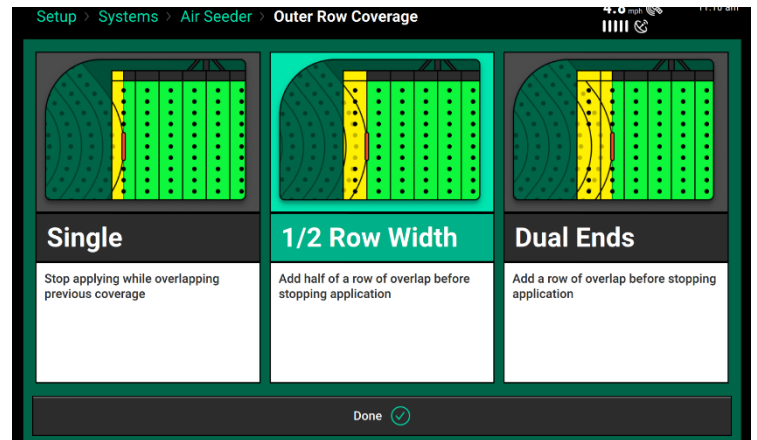
Set up the Swath Control. Setup → Systems → Select Implement → Outer Row Coverage. Swath Section Setup allows the operator to divide the planter into different swath sections. There are four different options for Swath Control.

Note: If setting up multiple Swath Sections, they **do not** have to be the same as Rate Sections.

½ Row Width — Add half of a row of overlap before stopping application.

Single — Stop applying while overlapping previous coverage.

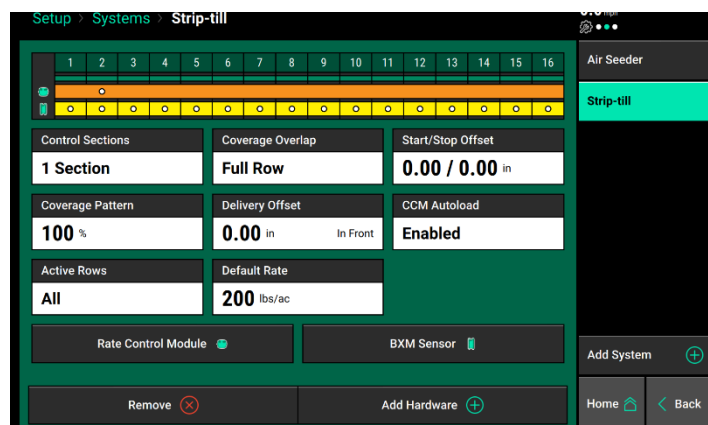
Dual Ends — Add a row of overlap before stopping application.



Setting up The Granular Rate Control Module

Once a granular system has been configured in the system setup, the granular product name will show up in the Systems tab on the right-hand side of the page. Navigate to Setup — Systems — System Name to configure the granular system.

Active Rows: Select what rows are active for this product.

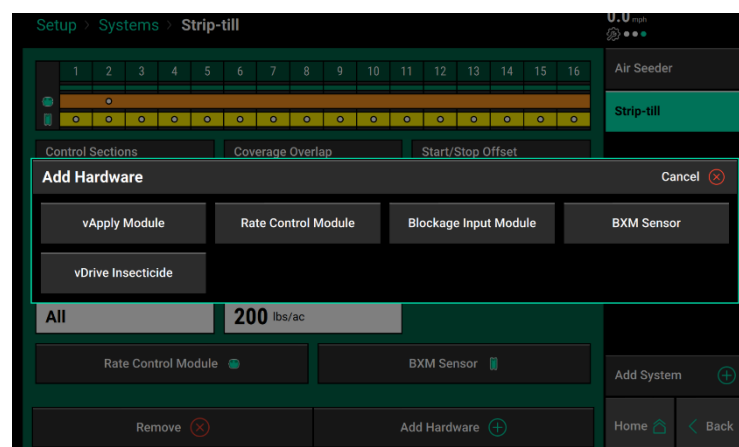


Delivery Offset: Input the distance — in front of or behind the seed exit — that the product application point is.

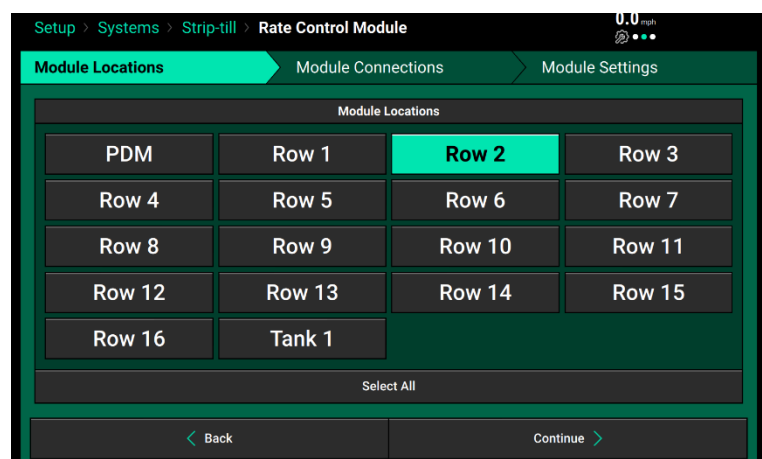
Coverage Pattern: Select what percent of a swath section is into coverage before control is stopped. Ex: If set at 50 percent on a system with motor/pump control only (one large planter wide swath section), 50 percent of the planter will be into a swathed area before the motor/control is stopped.

Add Hardware: Press the ‘Add Hardware’ button at the bottom of the screen to add granular hardware to the system. Select the Rate Control module you are using (vApply Module or Rate Control Module).

Note: For vDrive Insecticide setup, refer to the vDrive Insecticide Operators Guide.



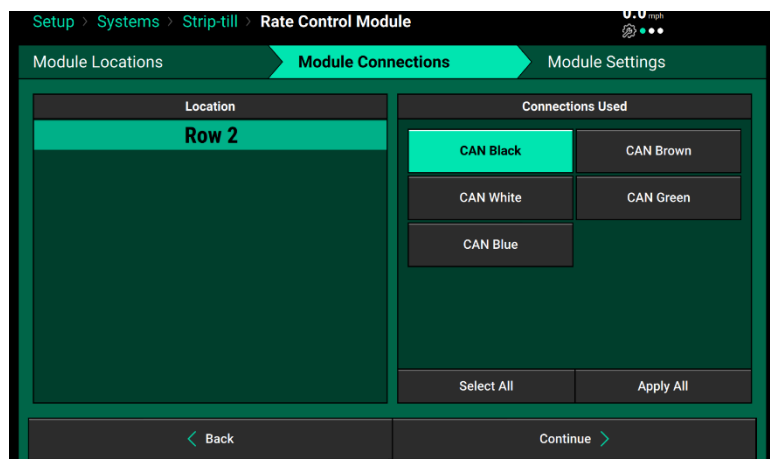
Next, select the location of each module(s) on the module locations page.



Next, assign the connections used (ie. Jumper color) to each rate control module location.

Note: If more than one of the same modules will be plugged into the same SRM (PDM or row), a different jumper color will need to be used for each module.

Please reference the installation guide for more information.

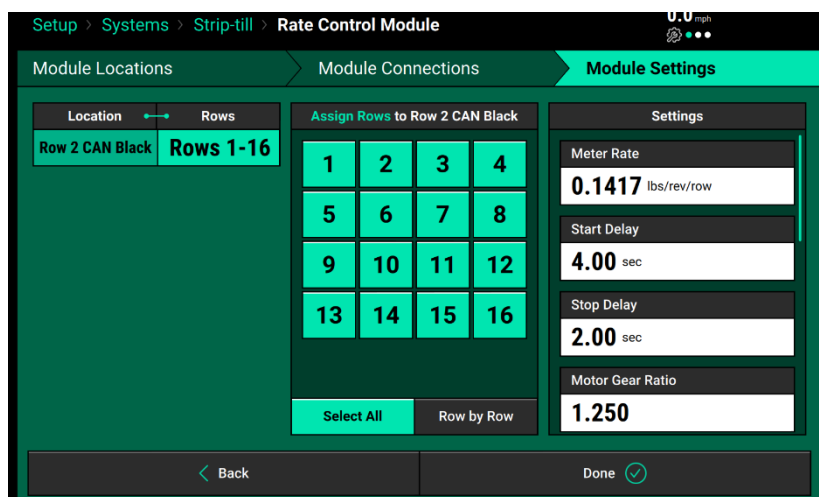


Next, assign the rows being controlled by each Rate Control Module.

Meter Rate - pounds (or kilograms) per shaft revolution per row. The proper ratio will be input after the Motor Calibration is complete. This could be changed based on the results of the calibration.

Start Delay-The time delay from when the motor starts to when the product reaches the application point.

Stop Delay- The time delay from when the motor stops to when the product reaches the application point.



Motor Gear Ratio - Calculated by dividing driven sprocket by drive sprocket. For information on more complex gear ratio set ups, visit the Motor Calibration Sheet on the Precision Planting Cloud (Doc No.955346).

Motor Encoder Pulses/rev - Precision Planting hydraulic motors should be set to 100, see manufacturers recommendations for all others. Must be set when running Granular Rate Control.

Motor PWM Frequency - Frequency needed to control the PWM solenoid. Default of 150hz will work for most systems. Changes should reflect the pump manufacturer's recommendations.

Minimum Duty Cycle -The Minimum PWM percentage the user would ever want to run. This setting may need to be changed depending on target application rate.

Maximum PWM -The Maximum PWM percentage the user would ever want to run. This setting may need to be changed depending on target application rate.

Motor Gain- DO NOT CHANGE this setting unless directed by product support. Default value of 1 is used. Increasing or decreasing by 0.1 increments increases or decreases the aggressiveness

of PWM control.

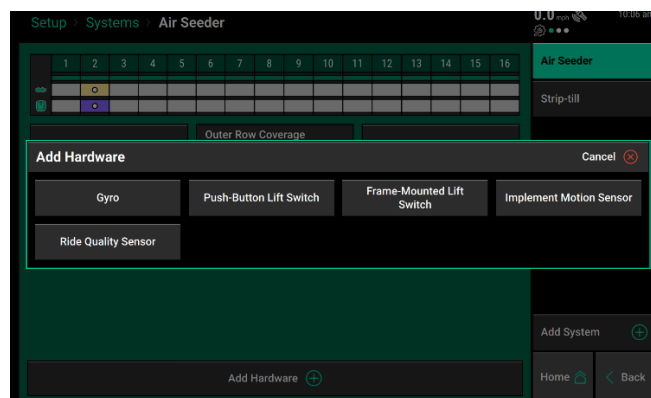
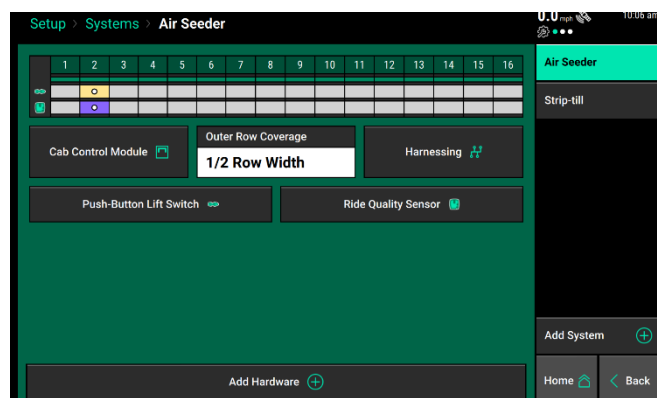
Lift Switch

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.

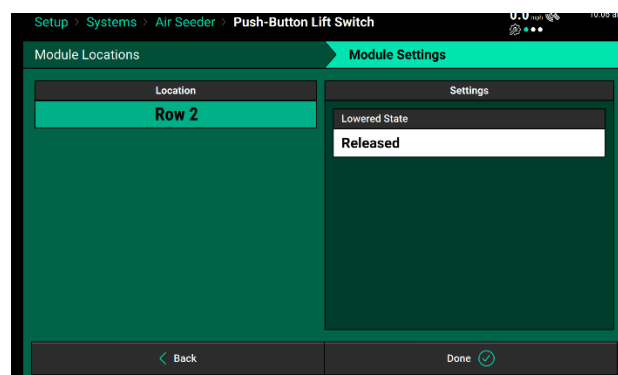
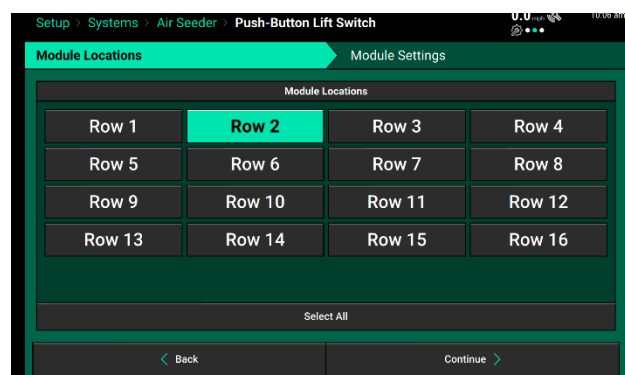
Note: Configuration of lift switch row locations is only required on 2020.1.x and newer software.

IMPORTANT: 2020.1.x and newer software will require ALL LIFT SWITCHES to be configured as a "PUSH BUTTON LIFT SWITCH" when not using a PDM.



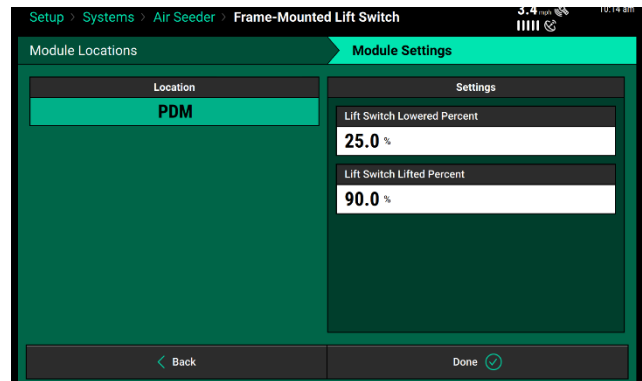
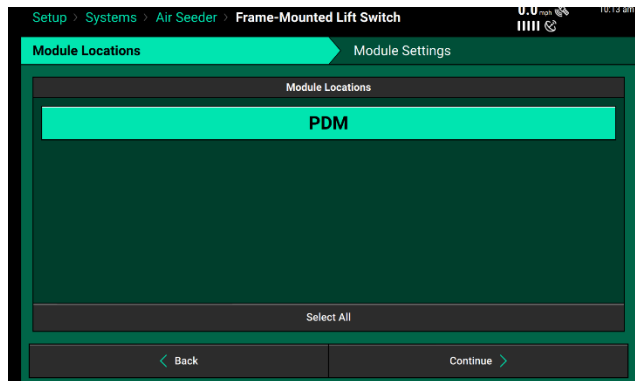
Push Button Lift Switches

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

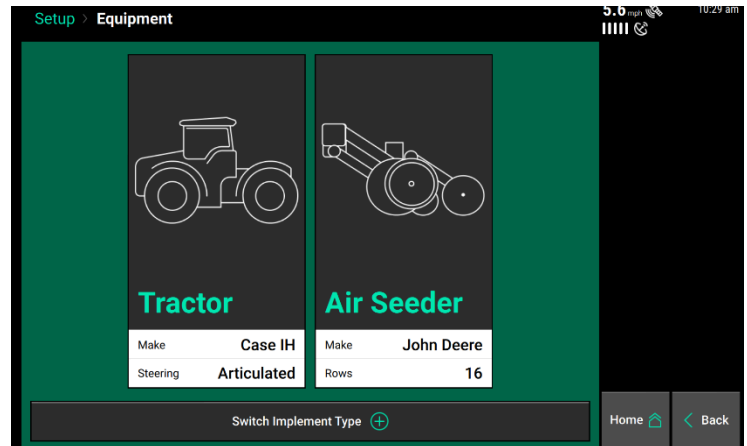
For issues with the lift switch not calibrating or functioning correctly, see the Troubleshooting Guides for Lift Switches in the Dealer Service Manual. After a calibration has been completed, verify the system is reading the lift switch correctly by watching the “Current State” information on the Lift Switch page. Ensure the “Current State” is correct when lowering and lifting the planter.

Radar

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.

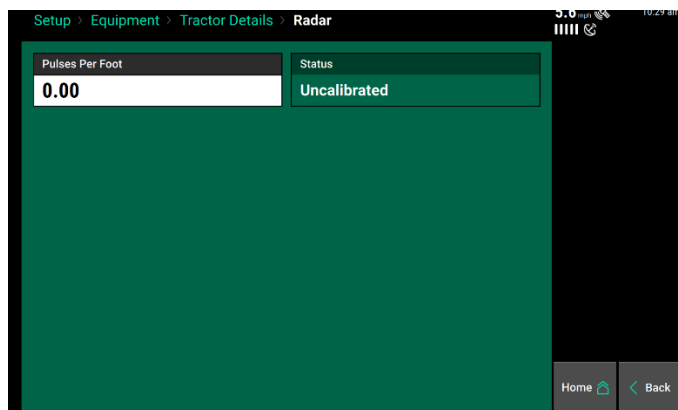
To add a radar, navigate to Equipment → Tractor → Add Hardware → Radar

Select the “Radar” button under the “Vehicle Speed” section 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.



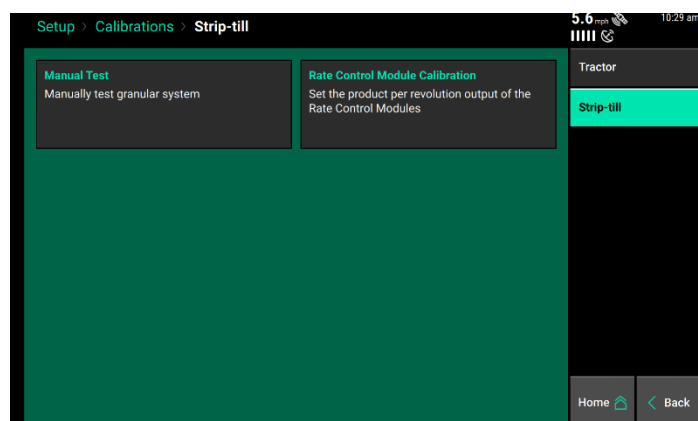
Granular Rate Control Calibration

To calibrate your rate control module, navigate to Setup → Calibrations → Granular System → Rate Control Module Calibration. Follow the on-screen instructions.

Note: The calibration will require the user to “catch” and measure total output. Be prepared to do so before starting the calibration.

Begin by entering:

- Catch Amount Per Row (The goal is to achieve 10 meter revolutions)
- Speed (average operating speed)
- Target Rate (average application rate)



Once this is complete make sure all the items on the “Pre-test Checklist” are complete and select “Continue”.

The test will run until the total catch amount that was entered in the calibration page is achieved per row based on the granular ratio that was initially input. Catch the output from this motor.

When the test is complete, the 20|20 will take the user to the results page. To input the amount that was caught, click on the white box under “Measured”.

A “Catch Test Amount” box will then appear. Input the number of rows product was caught from. Then input the total amount caught from those rows. When complete, hit “Enter”.

Note: Be sure to subtract the weight of the container from the total amount caught

If not all rows are caught, the 2020 will do the math to calculate the Granular Ratio (lbs/rev/row) and display that in the box labeled “Calculated Ratio”.

If the user would like for the “Calculated Ratio” to become the “Granular Ratio” select the button marked “Accept” and the ratio will be saved. If the user does not want to save the proposed value, select “Cancel” to continue with the current Granular Ratio, or “Recalibrate” to rerun the calibration.

Once an acceptable Granular Ratio has been reached, select “Accept” to complete the calibration.

The Granular Ratio will now be displayed in the Granular Calibrations screen.

Note: It is not possible to go back and access old calibration screens once the user has left. The only way to re-access the calibrations results screen is to run the calibration again.

***NOTE:**

What should my catch amount per row be?

After the calibration has completed, the final page on the 20/20 will display your total meter revolutions. This number should be around 10. You can increase or decrease the number of meter revolutions during the calibration by adjusting your catch amount per row.

How many rows should I catch?

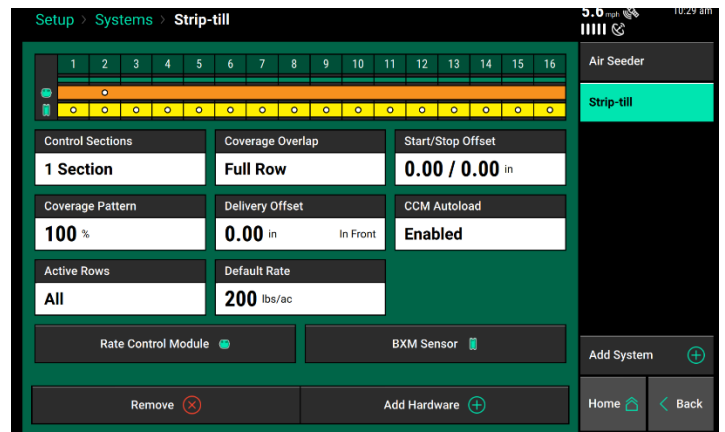
Best practice is to catch as many rows as feasible. If not catching product from all rows, try to catch product from various rows spaced out along the implement. Uniformity will vary, and the goal is to try to capture these variations during the calibration.

How many times should I do the calibration?

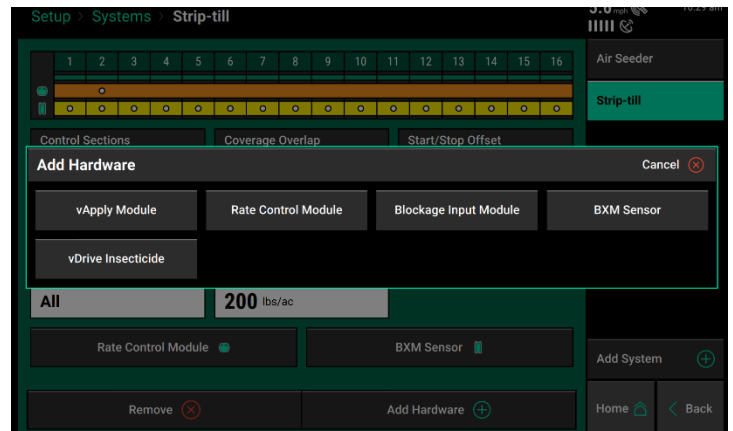
This calibration should be run at a minimum 2-3 times.

Setting Up Blockage Sensors

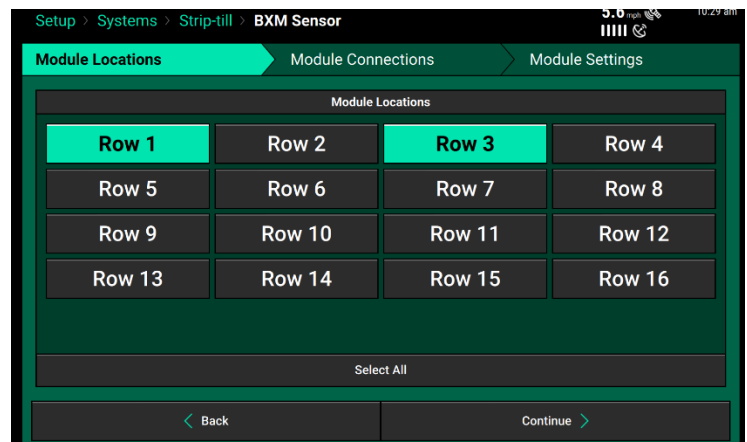
From the Home screen, navigate to Setup → Systems, and select the product the blockage sensors are monitoring.



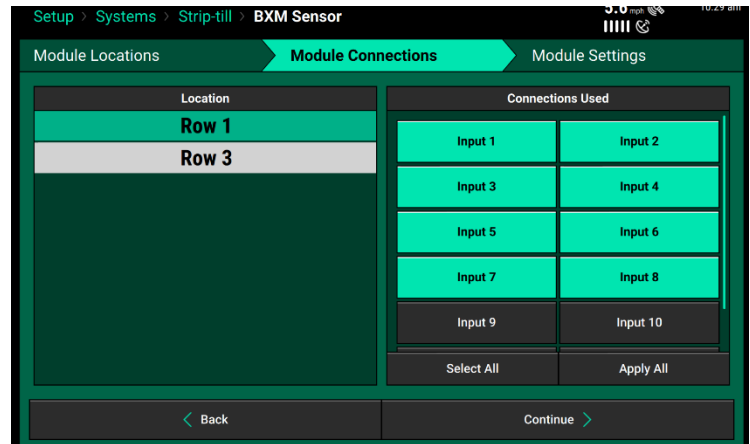
At the bottom of the page, select 'Add Hardware' to add the Blockage Sensors.



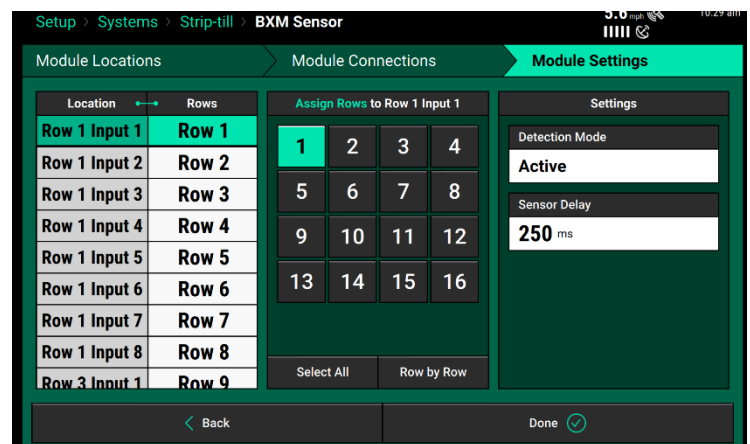
Next, select the module location(s) on the menu.



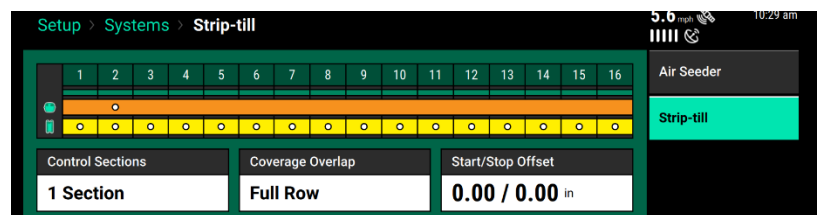
Next, Select the inputs being used for each blockage expansion module (BXM). Each BXM has up to 12 inputs that can be used.



Assign the Row number(s) each blockage sensor is monitoring to each corresponding blockage sensor. No more than one blockage sensor can be installed per row.



When setup is complete, the product page will display a summary of the configured module location(s) and section(s) at the top of the screen.

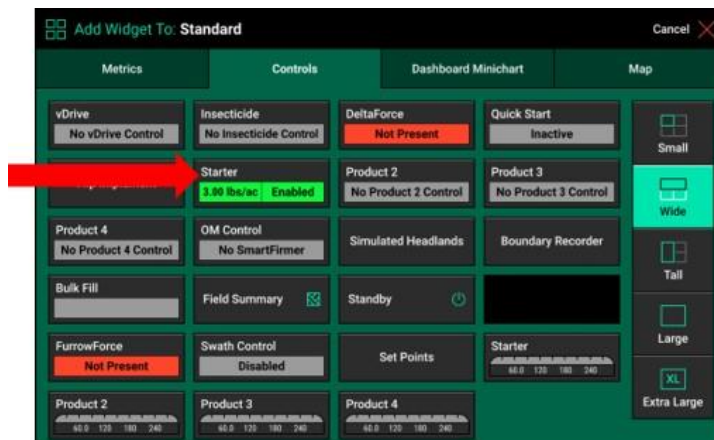


Granular Control Page

The product control page is the central location for rate control, and it is where the product is enabled. To put the control button on the home screen, tap the button with four boxes in the top left corner of the 20|20.



The control button can be found under the “Controls” tab and will be indicated by the product nickname that was assigned during set up. The control button is available in various sizes. Select the size that is appropriate for the desired area on the 20|20.



Drag the control button into the desired spot and click the check mark in the upper left corner to complete the button assignment process.



Tap on the control button and select “Enabled” on the product control page to enable the product.

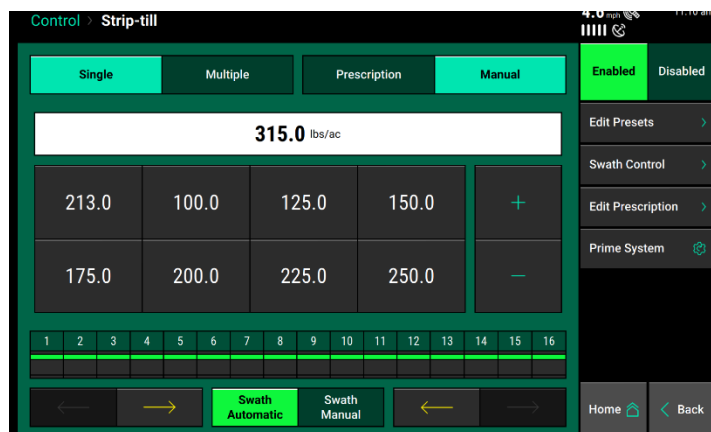


Rate Control

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

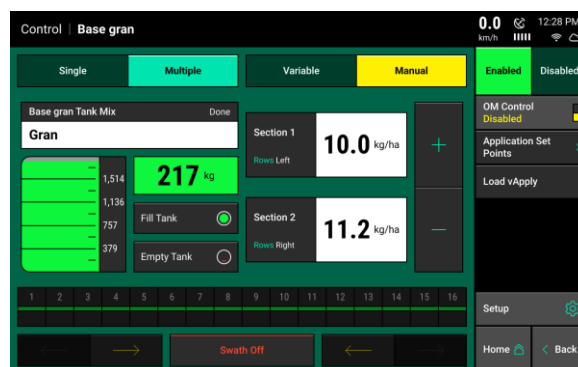
Select “Manual” to switch to manual control.

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 mode, the rate displayed in the white box is the rate being commanded. This rate can be adjusted manually by pressing on an Application Set Point button and selecting one of eight preset rates (set points can be set by pressing on an Application Set button found near the top of the page), adjusting one lb/ac at a time by pressing the plus or minus buttons to either increase or decrease the rate by 1 lb/ac, or by pressing on the white box and typing the rate.



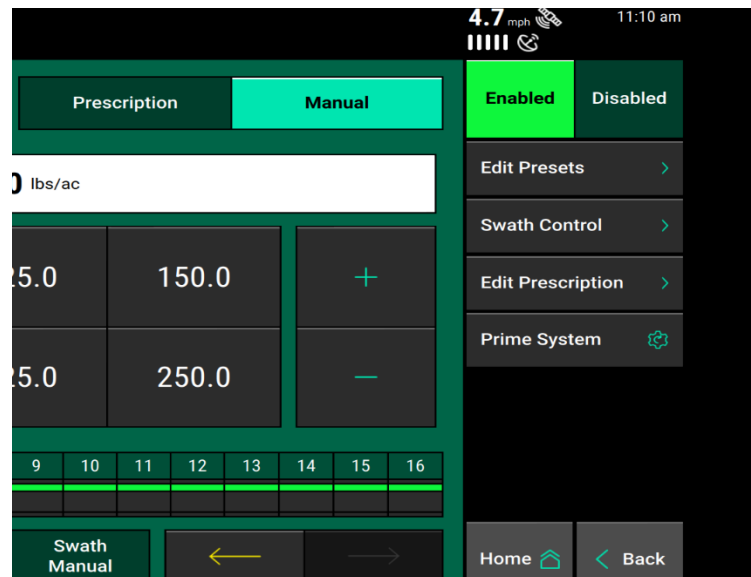
Manual Mode

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 “motor/module”. Multiple mode or multiple rate sections will follow the vDrive rate section setup. Meaning the rate sections setup for Granular must match the vDrive rate sections setup for the manual function to work properly. Select each rate sections rate being applied by selecting each individual box and either typing in a rate or select a rate from the granular set points. If the plus and minus buttons are used all rate sections will increase or decrease by 1 gal/ac.



There is also a button to “Prime System” on the navigation pane of the product control screen. This button allows the user to spin the granular motor to load the meter. To perform this test, click the “Prime System” button and hold up the “autoload” switches (first and third switches on the CCM). There is no signal to show the meters are loaded, as long as the autoload switches are held up the motors will turn.

Note: The user must select “Prime System” to load the granular meter.



Tank Mix

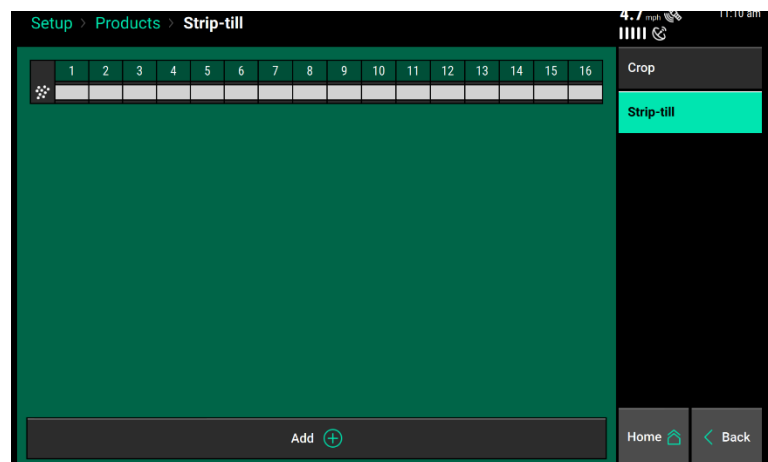
To add a tank mix, navigate to Setup → Products

→ Granular System. From here, you can “Add

Tank”. Once a tank is added, you can click on the tank and “Edit 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).

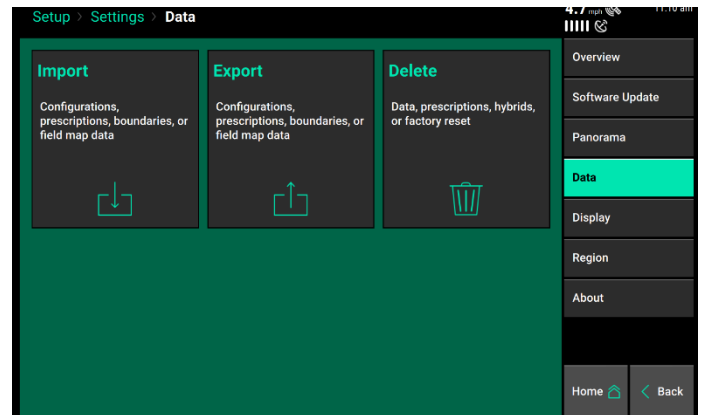
Tank mixes are made up of a carrier and ingredients along with the volume of each. This way the exact mixture being applied to a field can be recorded. Once tank mixes have been created, they are saved and can be selected at any time.



Prescriptions and Boundaries

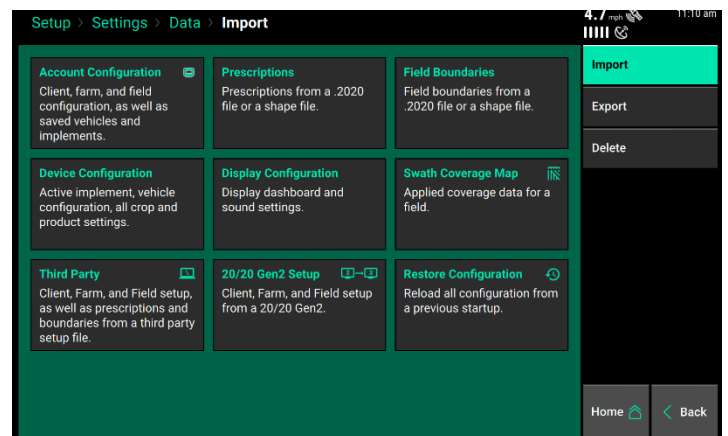
Importing Files onto the Display

When importing Prescriptions and Boundaries onto the display, both the Prescriptions and Boundary files must be in the form of a shape 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 → Settings → Data → Import → “Prescription/Boundary”



Assigning Prescriptions and Boundaries to a Field Name

Once Prescriptions/Boundaries 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.

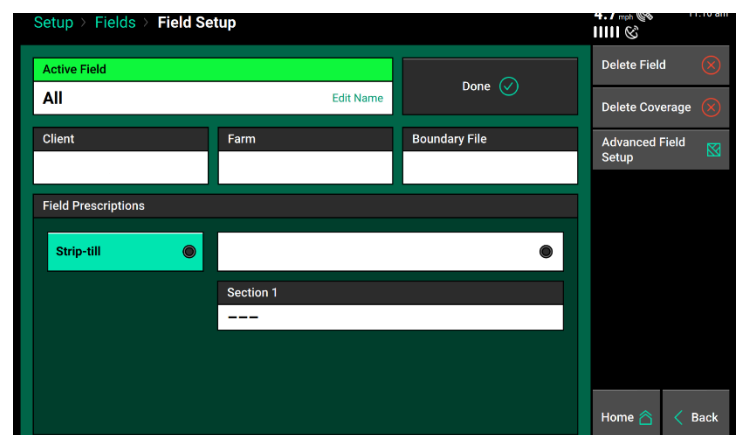


Note: 2020.0.x and Older Software Only: Only one prescription can be assigned to each individual field. Prescriptions can be for seeding, liquid, and/or insecticide. To combine multiple types into one prescription, create separate attributes for seeding, liquid, and insecticide. If no seeding prescription is assigned, a manual rate must be selected in the vDrive Control Page.

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

Boundary:

To assign a Boundary File to the selected field, press the “Boundary File” button. This will display ALL shapefiles that have been imported into the display. Ensure that the appropriate boundary file is selected. After selecting the boundary file name, an attribute can be selected. It is not necessary to select an attribute for a boundary file.



Note: Boundary files that have been recorded by the display can also be assigned to the field using the same process.

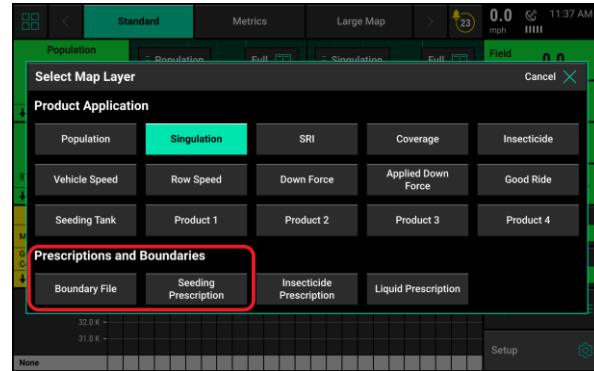
Seeding Prescription:

To assign a Seeding Prescription to the selected field, press the “Seeding Prescription” button. 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 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. A different attribute can be selected for each rate section (allowing each rate section to be controlled by a different attribute/seeding rate), or the same attribute can be selected for each rate section.

The name of the prescription assigned to the field will be displayed in the Seeding Prescription box while the Attribute names assigned to rate sections will be displayed in the Attribute box.

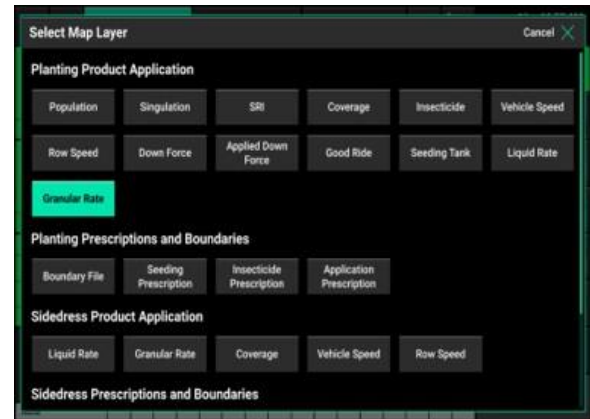
Viewing the Boundary and Prescription

Boundary and 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 two map types called Boundary File and Seeding Prescription. Select these map types to display the Seeding Prescription map or Boundary map assigned to the active field on the home screen.



Mapping

A map will be built on the 20/20 of the commanded Granular rate. Enable the “Granular Rate” map as shows in the picture on the right to view this map.



Diagnose Page

To diagnose issues with Granular Rate Control Systems go to “Setup” and “Diagnose”. The “Rate Control Module” box will indicate the health of the system. If the box is green the components are healthy and communicating. A yellow or red box would indicate an issue with the product that should be further investigated.

Select your Granular System to view each Granular CAN product. The tabs at the top allow the user to toggle between multiple Granular or Liquid products and multiple CAN products for each product. Notice under the Rate Control Module tab in this page the 20|20 will display Rate (lbs/min), Commanded Rate, Meter Speed (rev/min), Commanded Speed, Duty Cycle, and Voltage.

