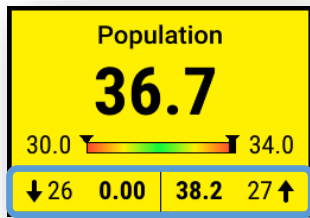


# 20|20 GEN 3—HOME SCREEN LAYOUT



There are 3 types of default dashboards: **Standard** - includes a large map with metrics on both sides (displayed below), **Metrics**—small map with various metrics, or **Large Map**—full screen map.

The **Notification Center** button on the home page will give a number indicating the number of **Event Codes** that have taken place since the last reset.

**CAUTION**—If **"Master"** appears next to speed or **"Safety Mode"** on the Control Buttons, the master switch must be toggled.

High and low rows and data for those rows.

Metrics buttons or widgets display a variety of data. Rows that exceed alarm values will turn red while rows that exceed alert values will turn yellow. Touching the button will open the **Row Detail** screen.



Some large metric buttons display a **Distribution Chart** showing each row represented by a triangle and the average of all rows by a vertical mark.

**Yellow** rows are swathed off.

Active hybrid displayed: **orange** represents hybrid 1. For multi-hybrid, hybrid 2 rows will be represented by **blue**.

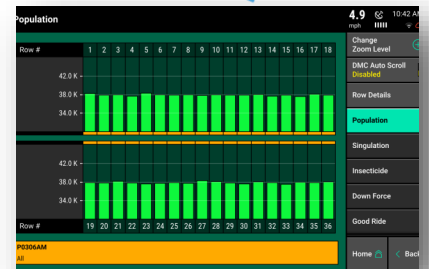
The **DashBoard Mini Chart** shows a bar chart for one of the metrics of the 20|20 for each row. Rows that exceed alert values will turn yellow while rows that exceed alarm values will turn red.

**Note: Alert and Alarm values can be set in the Crops menu—Setup>Crops then select Limit Adjustment, Liquid Alerts, SmartFirmer, or FurrowForce.**

This button selects the metric type displayed in the **Mini Chart**. Press this button to change the metric and to display **Row Detail Screen** of the current metric. See **Quick Reference Guide—Row Detail** for more information.

Area in upper right corner will open **GPS Communication** screen to access **GPS** and **WiFi** settings.

**Control** buttons or widgets display settings of the system. Touching the button will open the **Control Screen**.



# 20|20 GEN 3—HOME SCREEN MAP

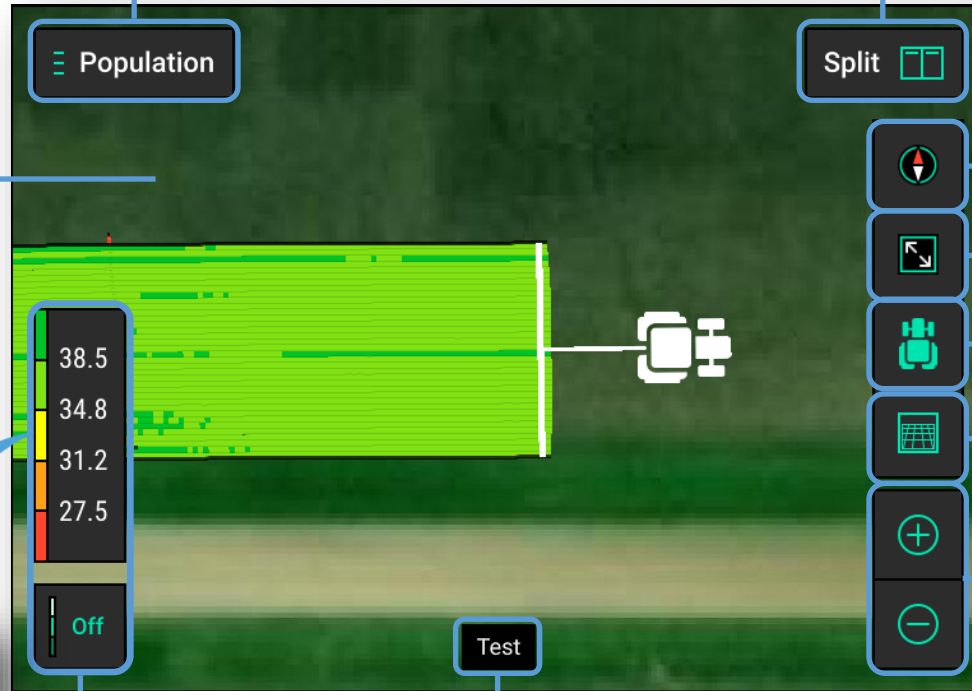
Selects map layer: tap to select different layer.  
To change what layers are available, navigate to **Setup>Systems>Display>Map Layers**.

Toggle between **Split** (two maps) and **Full** (one map) settings.

Switch between 2 orientation modes: **North Facing** (map always orients with North up) and **Implement Facing** (Tractor icon always faces up)

The map can be manipulated with finger gestures: move the map location with a single finger drag, zoom in and out with two finger pinch, rotate orientation by moving two fingers around each other.

Button Press



Toggles the map legend on and off. Most legends can be edited. There are two ways to edit legends:

1. Hold a finger on the legend and slide it up and down to adjust the high and low ends of the legend.
2. Tap on the legend to adjust the High & Low values, number of steps, and use the auto adjust feature.

Active field name, pressing this button opens the Field Setup Screen.

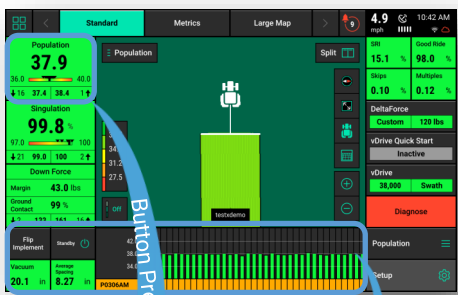
**Zooms** to a view where the entire field is displayed.

Pressing this button will cause the tractor/planter icon to stay centered in the screen. Additionally, the zoom level will be reset and zoomed in on the tractor icon

The **Perspective View** button will toggle the map view angle

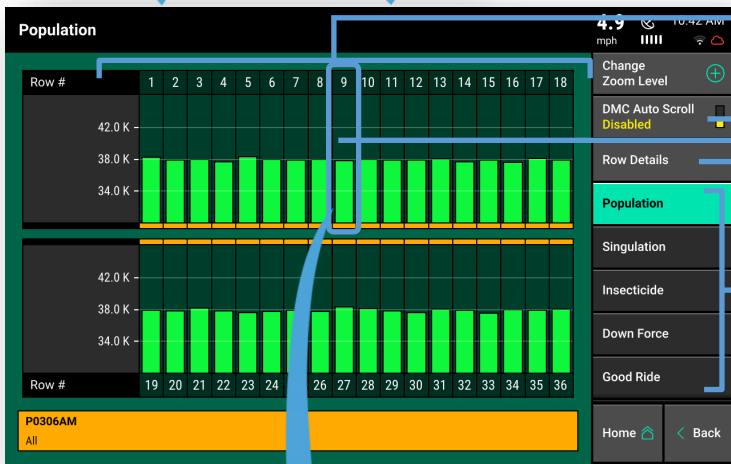
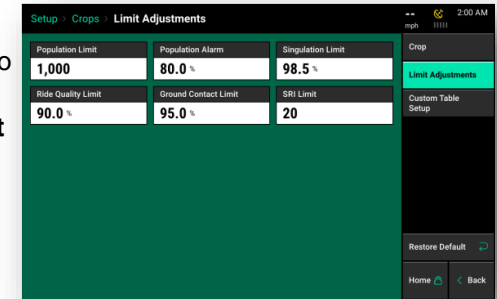
Adjusts **Zoom** level of map

# 20/20 GEN 3—ROW DETAIL SCREEN



**1** Row by row details showing a variety of metrics are available to help the operator better understand and respond to conditions. From the **Home Screen**, touch any metric button or the **MiniChart** at the bottom of the screen.

**Note:** Alarm and Alert values can be set in the **Crops** menu to change when metrics turn red and yellow (**Setup>Crops>Limit Adjustments**). See **20/20 Operators Guide for Planters** for more information.



**2** On the selection page a larger **Row by Row Chart** will be displayed. DMC Auto Scroll allows you to choose which metrics scroll through automatically on the Mini Chart located on the Home Screen.

Detailed information for each planter row can also be viewed on a **Row Details Page**. Access the Row Details screen by either selecting a row on the Row by Row chart or touching the Row **Details** button and then choosing the desired row to display the Row Detail page.

On the **Navigation Pane** on the right hand side of the screen, select a different metric type to be displayed. Additional metrics are available if you use a finger to scroll the **Navigation Pane** downward. Once a different metric has been selected, press "Home" to go back to the home page and the **Mini Chart** will now display the new metric (unless DMC Auto Scroll is selected).



**3** Rows that exceed **alert** values will turn **yellow** while rows that exceed **alarm** values will turn **red**. The **Row Details** screen displays all measurements available for that particular row including **Population, Singulation, Skips & Multiples, Speed,** and the **Live Seeds Display**. Other metrics such as down force or vacuum will only be displayed if the appropriate sensor is installed on that row.

Different color pins represent different singulation issues. The legend is displayed above the seed display. Pressing on the **Live Seed Display** will pause the screen so patterns can be evaluated. Press again to restart it.

The buttons showing row numbers at the bottom of the screen allow the operator to navigate to other rows.

# 20|20 GEN 3—HOME SCREEN CUSTOMIZATION

The Home Screen comes with 3 default layouts: **Standard**, **Metrics**, and **Large Map**. Each of these layouts can be edited. Additionally, new layouts can be added to fit the needs of different operators or situations.

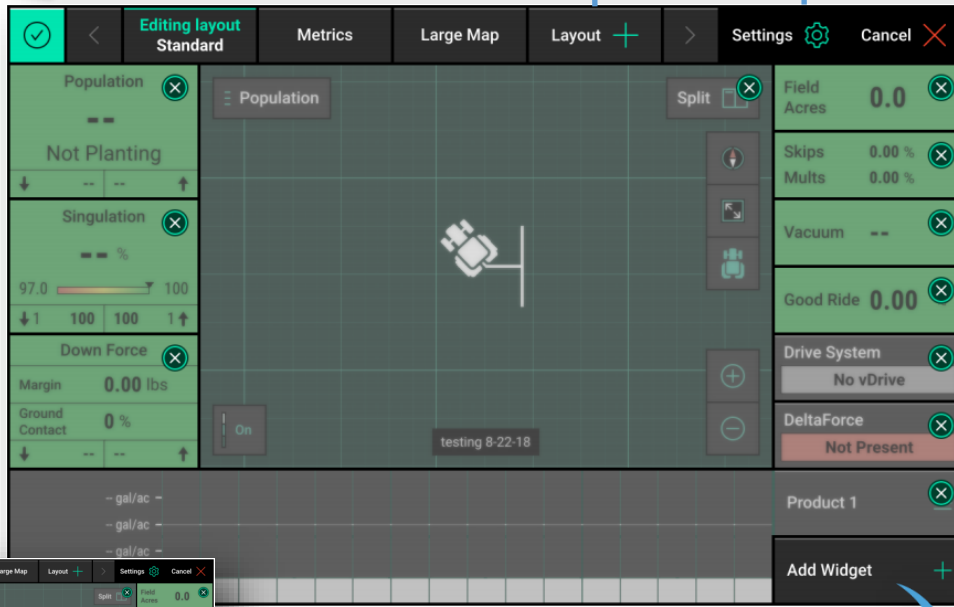
**START**  
HERE

**1** To begin the process of customizing the home screen, select the button in the top left hand corner of the **Home screen**.

“Editing Layout” indicates which layout is currently being edited, any other layout can be selected from the top bar.

New Layouts can be added by pressing the “Layout +” button at the top of the screen. Up to eight home screen layouts can be created for each implementation type. Layout options can be moved by pressing and dragging them to the desired position.

Settings button can be used to rename the layout and reset all screen layouts back to the factory default.



Four tabs give access to different types of widgets that can be added to the home screen:

- Metrics**—buttons that display planter information on the home screen.
- Controls**—used to control the different systems that can be installed on the planter.
- Dashboard Minichart**—Add either a Dashboard Minichart to the home screen or a Swath Control bar.
- Map**—Select the size of map to display on the home screen

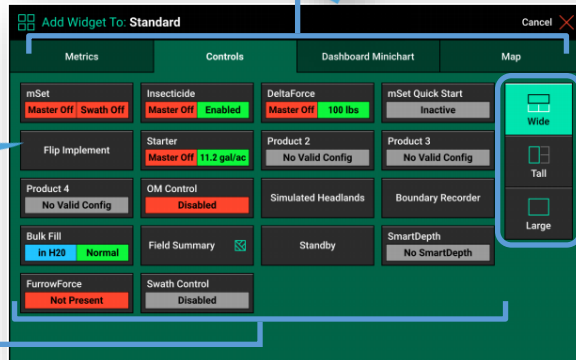
**Note:** Definitions for the Metric and Control buttons can be found in the 2020 Operators Guide for Planters Gen 3, Appendix A – Understanding the Home Screen Buttons.

**2** To begin editing the home screen, select “Add Widget”



**3**

Select a widget. That widget will be placed directly in the center of the screen. To move the widget press – hold – drag the widget to the area of the screen for it to be placed at.



Select a size button on the right hand side of the screen to view the widgets available in each size.

**Note:** some widgets are only available in specific sizes.

**4** Once finished press the check mark in the top left corner to save the current layout.

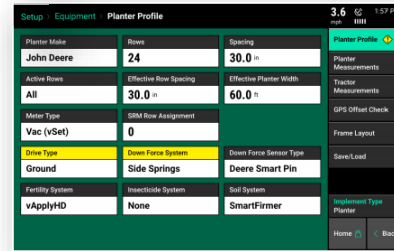
# 20|20 GEN 3—SETUP SCREEN

**START HERE**



Access from Home Screen

Implement setup information displays the **width, number of rows, implement make, frame type, active rows, and effective row spacing** that have been setup for the implement.



**Fields:** Change the active field name, assign prescription/boundary to a field, and create or edit Client, Farm, & Field names.

**Products:** Assign Seeding, Insecticide, and Liquid products being applied.

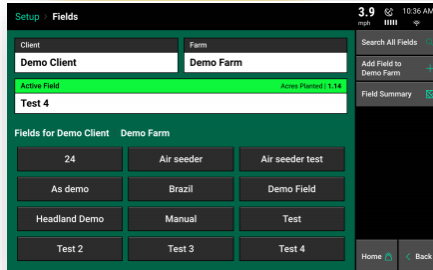
**Equipment:** Configure the implement profile, implement measurements, tractor measurements, and switch implements.

**Systems:** Setup and configure all products installed on the implement as well as the monitor.

**Crops:** Edit the active crop as well as adjusting settings that are saved for each crop type including alerts and alarms.

**Diagnose:** Troubleshooting data related to the operation of the display and products on the implement.

**Data:** Export, Import, and Delete data on the monitor and update software.



Displays the active field name information.

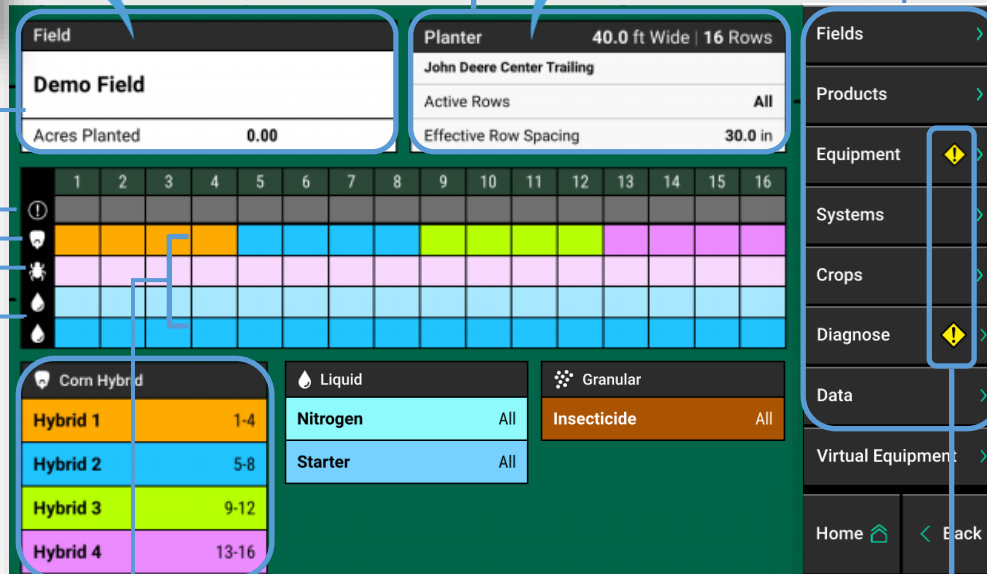
Displays each row's diagnostic color from the **diagnose** page.

Row by Row **Hybrid** Info.

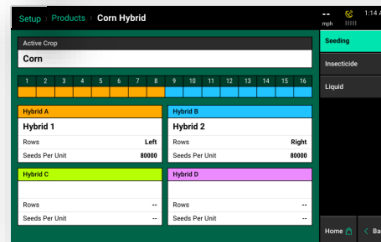
Row by Row **Insecticide** Info.

Row by Row **Liquid** Info.

Colors correspond to the product names listed in the columns underneath the row information.



Press on **Corn Hybrid** to select seeding products and assign to drive sections.



Indicates caution because something has not been set up correctly or an error has occurred. Open the page to investigate the cause.

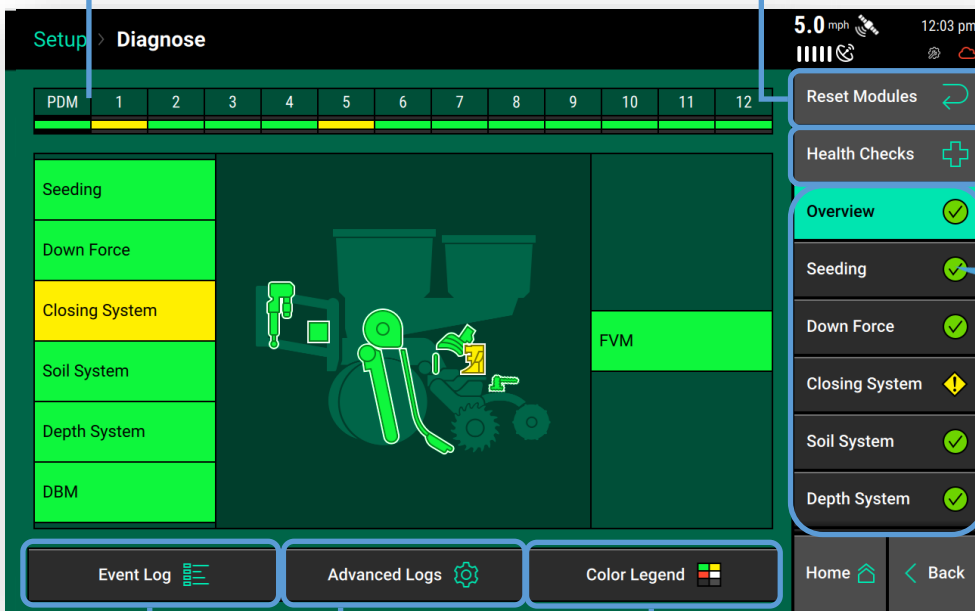
# 20|20 GEN 3—DIAGNOSE SCREEN

The **Diagnose Screen** is the primary location for troubleshooting 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 **Display 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 a planter bar at the top of the screen displaying the health of each row.

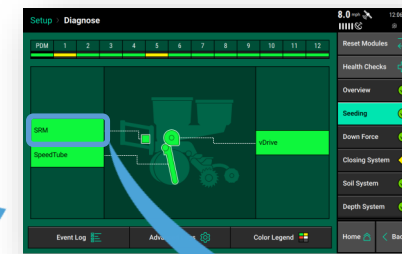
**Reset Modules** - Pressing this button breaks and reestablishes communication between the 20|20 components and is often used as a troubleshooting tool for communication issues. **Use this feature after any change to the system.**

**Daisy Chain** errors will appear on the planter bar diagram, as well as in the event log.

**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. **Health Checks** should be performed at the beginning of the season, and as needed throughout. For more information on specific health checks, see the operation guide for each specific product.



## Seeding Diagnose Page



Select system name to display a 2nd level diagnose screen containing a diagram of all the components installed within that system.

## Detailed Diagnose Page

Row	Supply Valves	CAN Errors	Row	Seed Sensor	Seed Count
1	13.75	0%	0%	Detected	131
2	13.80	0%	0%	Detected	132
3	13.50	0%	0%	Detected	133
4	13.80	0%	0%	Detected	134
5	13.80	0%	0%	Detected	135
6	13.90	0%	0%	Detected	136
7	13.90	0%	0%	Detected	137
8	12.50	0%	0%	Detected	138
9	12.80	0%	0%	Detected	139
10	13.80	0%	0%	Detected	140
11	13.50	0%	0%	Detected	141

**Detail Screen**—Touch on the component name to view a diagnose page with row by row details. Green boxes indicate metrics are within correct parameters. Any box that is other than green indicates an issue with the readings (see color legend).

Select the **Event Log** button to view a list of all event codes/error codes that have happened on the system. Select any event code to view additional details for that specific code.

Color legend is available for reference in identifying issues on **Diagnose Page**.

**Advanced Logs**—Only use when directed by **Product Support**.

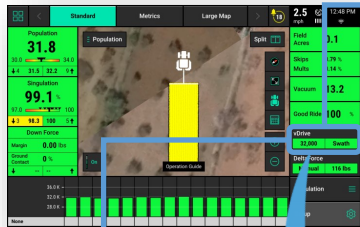


The red **LED on the SRM** (Single Row Module), as well as other modules (vDrive, Speedtube, vApplyHD, etc.), can also be important to diagnose communication and power issues. See chart above for reference.

Light Pattern	Meaning
No Light	Device is not powered
Solid Light	Device is being updated
Fast Blink (5/sec.)	Device is powered, but lost communication
Steady Blink (1/sec.)	Device is powered and is communicating
Erratic Blink	Device is powered, but never communicated



# 20|20 GEN 3—vDRIVE CONTROL SCREEN



The **vDrive Control Button** shows the status of the system.

## vDrive Control Button Population Legend

**Variable** – A seeding prescription is assigned and the vDrive system is in variable rate mode.

**Multiple**—the vDrive system is in manual mode and there are multiple rate sections configured

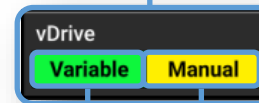
**Rate Off**—Unable to plant because the master plant switch is in the down position.

**A Number is Displayed** – the vDrive system is in manual mode with only a single rate section. The number that is displayed is the commanded manual population rate for that rate section.

**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.

**Red**—Unable to plant.



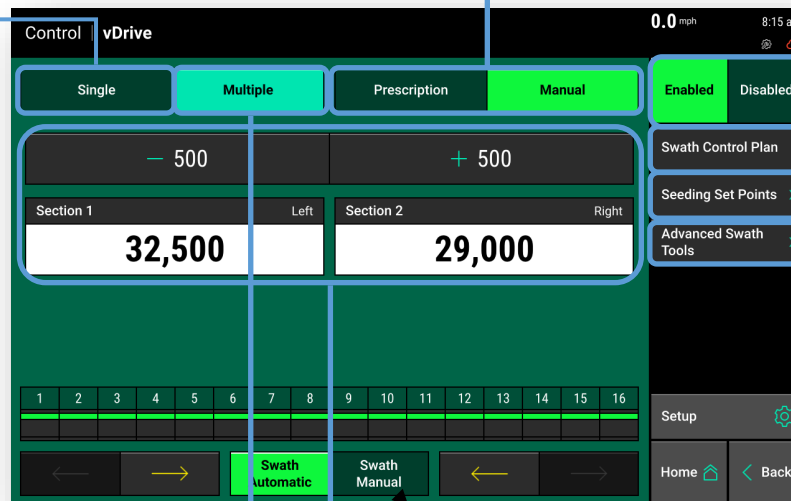
## vDrive Control Button Swath Legend

**Green**—Swath Control is enabled and set to automatic mode

**Yellow**—Swath Control is enabled and set to manual mode

**Red**—Swath Control is disabled due to the swath switch being in the off position on the Cab Control Module or due to coverage.

If a seeding prescription is assigned to the active field, **Prescription** mode will control to the seeding prescription. **Manual** mode ignores the assigned seeding prescription and continues to plant at the assigned manual rate.



**Single**—assigns the same population rate to all rows. Select a preset population from the list of population set points displayed on the screen (configure this list using the “**Seeding Set Points**” button on the right hand side of the screen) and use the + or - buttons to increase the rate.

**Multiple** - Allows assignment of different populations to multiple rate sections that were configured in **Control Sections** setup.

**Adjust Population**—Use the + and - buttons to adjust the populations up or down the same amount for each **Rate Section**, or tap on each population to manually enter a new population for each **Rate Section** (requires multiple rate sections to be set up) See **vDrive 2020 Operators Manual**.

Toggle this button to **Enable/Disable vDrive**. Must be Enabled for product to function.

Selects components the planter will swath off to, including **Field Boundary, Inner Boundary, Map Coverage, and Simulated Headlands**.

Allows editing of population set points.

**Advanced Swath Tools** includes creating **Boundary** and **Simulated Headlands**, as well as enabling **Draw Coverage Always**.

vDrive

# 20|20 GEN 3—vDRIVE DIAGNOSE SCREEN

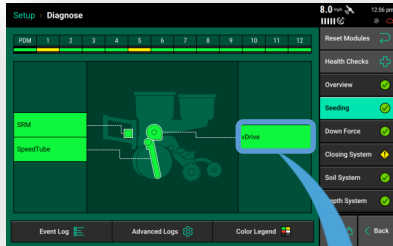
**START HERE**

Diagnose

1

Navigate to **Diagnose** from the **Home Screen (Setup > Diagnose)**, press **Seeding** on the right to access the **Seeding System** and then press **vDrive** to open the **vDrive Diagnose Page**.

Button Press



2

Button Press



3

Setup > Diagnose > vDrive 0.0 mph 2:43 pm

Row	RPM		Stability	Supply Volts	Drive Amps	Duty Cycle
	Actual	Cmd				
1	0.0	0.0	0%	11.8	0.00	0%
2	0.0	0.0	0%	11.8	0.00	0%
3	0.0	0.0	0%	11.8	0.00	0%
4	0.0	0.0	0%	11.9	0.00	0%
5	0.0	0.0	0%	11.8	0.00	0%
6	0.0	0.0	0%	11.8	0.00	0%
7	0.0	0.0	0%	11.8	0.00	0%
8	0.0	0.0	0%	11.8	0.00	0%
9	0.0	0.0	0%	11.7	0.00	0%
10	0.0	0.0	0%	11.8	0.00	0%
11	0.0	0.0	0%	11.8	0.00	0%

Reset Modules

SRM

vDrive

Lift State: Lifted | Radar Speed: Wait Signal | GPS Speed: Waiting Comm | FWD Accel: 0.000 ft/s/s | Master Plant: Off | Turn Rate: 0.00 deg/s

Home < Back

Shortcuts to components required for the function of vDrive. Click on any button to access settings screen for each component.

## HEALTH CHECK

Select **Seeding Manual Test** on the **Health Checks** page. This test will allow you to select a simulated **Rate** and **Speed** to verify the integrity of the vDrive system.

Seeding Manual Test 0.0 mph 2:56 pm

vDrive SpeedTube

Rate Adjust: 30,000 | Speed Adjust: 5.0 mph

Row	RPM		Stability	Supply Volts	Drive Amps	Duty Cycle
	Actual	Cmd				
1	28.1	28.0	99%	11.5	0.21	23%
2	28.1	28.0	99%	11.4	0.27	23%
3	27.9	28.0	99%	11.6	0.22	23%
4	28.0	28.0	99%	11.6	0.21	23%
5	28.0	28.0	99%	11.5	0.22	23%
6	28.2	28.0	99%	11.6	0.19	22%
7	28.0	28.0	99%	11.6	0.21	22%

Done

**RPM Actual** - The actual RPM of the vSet meter.

**RPM Commanded** - The RPM being commanded of the meter, as required by the target population.

**Stability** - Measures the variance of the drag on the motor. The higher the stability percentage the smoother the vDrive motor will be turning.

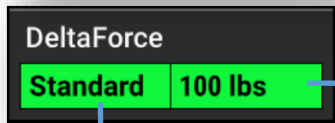
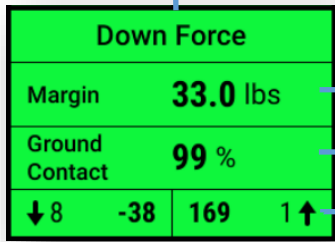
**Supply Volts** - The amount of volts at the vDrive motor. Average range of supply volts - 12-15 volts

**Drive Amps** - The amperage the vDrive is using while in operation.

**Duty Cycle** - The percent of time that power is commanded on where the on/off cycles are occurring at 35 kHz.

# 20|20 GEN 3—DELTA FORCE HOME SCREEN CONTROL

On the **Home Screen**, the **Down Force Metrics** widget will display **Margin**, **Ground Contact**, and the lowest and the highest weigh pin readings.

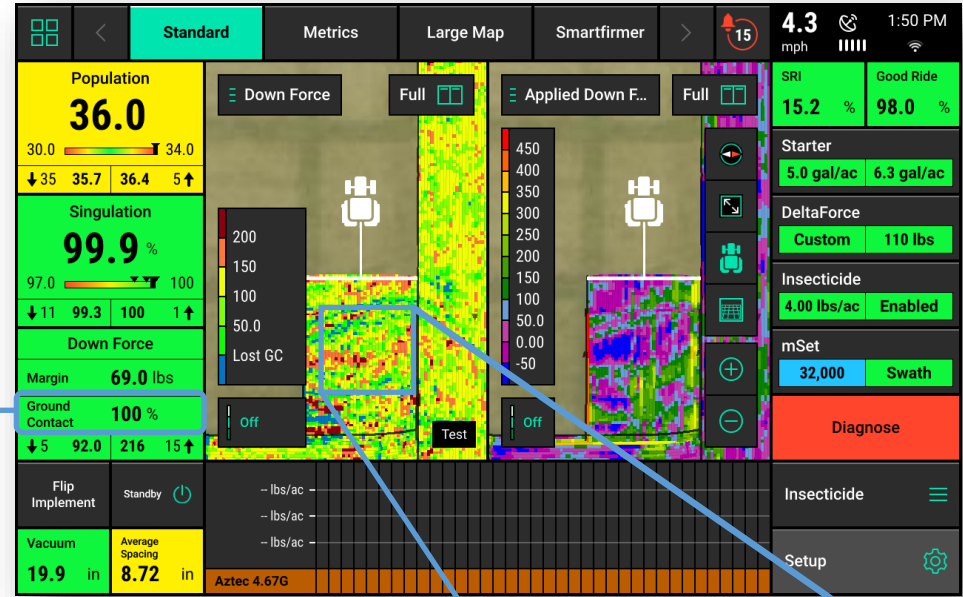


**Margin**—The lowest measured load cell reading in a given period of time on each row (varies with down force system installed). The Margin value displayed on the home screen Down Force button is an average of this value across all load cell equipped rows on the planter.

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

**Low and High Row** – Shows the average weigh pin readings for the lowest and highest rows.

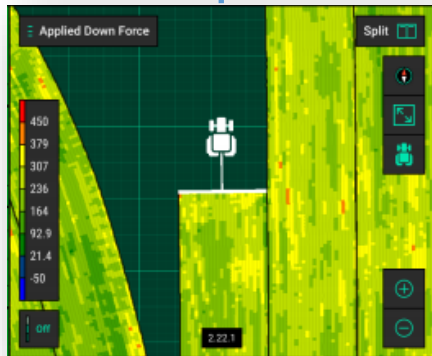
**Target** pounds will be displayed.



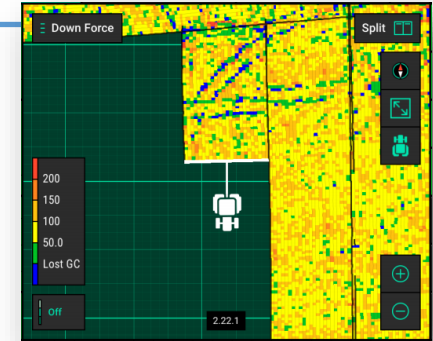
**Target Setting:** If set to **Automatic**, the **Target Setting** will be displayed: **Light**, **Standard**, **Heavy** or **Custom**. Manual setting will display “**Manual**”.

A **Blue** dot on the **Downforce** map indicates potential loss of ground contact. If blue dots are appearing regularly for multiple rows and the **Ground Contact** value in the **Down Force Metrics** widget is dropping below 100%, the **Target Control Setting** should be increased. See reverse for “**Quick Reference Guide—DeltaForce Control Screen**” for more information on setting target.

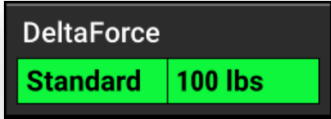
The **Applied Force Map** is mapping what the cylinder is being commanded to do on a row by row basis. This map will show the applied force in pounds. This map can be very helpful for diagnosing potential issues. For example, if a row unit is constantly applying the maximum amount of applied force to achieve ground contact and surrounding rows are not, there may be a mechanical problem causing the row unit to have ground engagement issues.



**Down Force** map plots load cell readings on a row by row basis and should be used to set system and monitor performance. A blue dot on the **Down Force** map signifies a loss of **ground contact** which can lead to shallow planted seeds. Blue dots should be avoided and may indicate a higher **Target** is needed, although care should be taken to not over apply downforce. See reverse for more information on **Down Force** settings.



# 20/20 GEN 3—DELTA FORCE CONTROL SCREEN



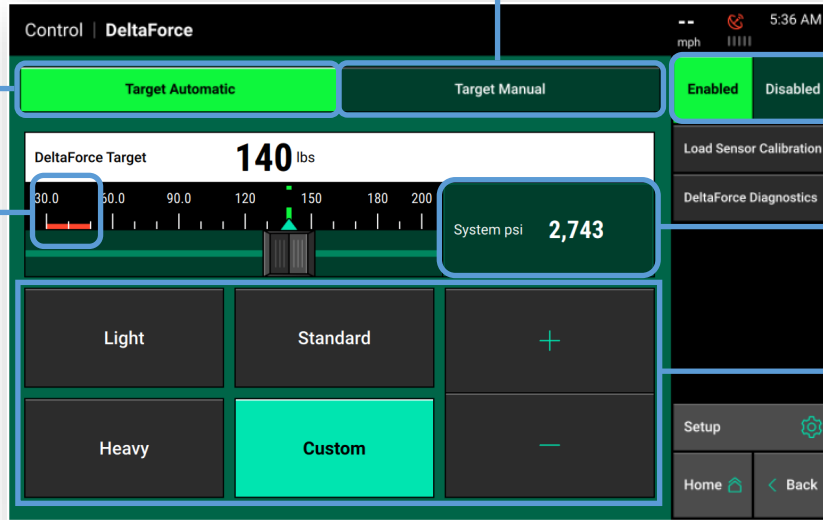
On the Home Screen, the DeltaForce Control button will open the Deltaforce Control Screen.

The DeltaForce system may also be operated in **Manual Mode**. **Warning:** this should only be used when planting plots as it only applies a set force to all rows and will make no adjustments based on weigh pin readings.

**Automatic Target Control** – Set a target value of weight that the operator wants to maintain between the ground and the gauge wheels on each row. The system will adjust the applied force and/or lift as needed on each row independent of each other to maintain the target value that was set. All **DeltaForce** adjustments will be based on the load cell readings measuring the weight on each gauge wheel.

The **red line** indicates a setting range which is not recommended for most conditions. See **Product Support** for more information.

The most important consideration when setting **Target** is loss of ground contact. Once loss of ground contact has been eliminated, the correct **Target Setting** is determined primarily by the formation of a good furrow. Pinning up the closing system or digging the furrow will be necessary to verify if the correct **Target Setting** has been achieved for the current conditions. A good furrow is evidenced by a sidewall that is firm enough to hold soil from falling into the furrow, but not too firm that the sidewalls don't easily crumble.



**System must be enabled to function.**

**System PSI** displays the current supply PSI reading from the pressure sensor located on the **DeltaForce Lift Manifold**. System requires 2250 PSI or greater.

### Automatic Target Settings:

**Light** – The light target is 50 pounds. Meaning the system will target 50 lbs of force between the gauge wheel and the ground. Mostly used for wet conditions.

**Standard** – The standard target is 100 pounds. This is the default setting. Recommended starting point for standard profile gauge wheels.

**Heavy** – The heavy target is 150 pounds. Recommended starting point for RID gauge wheels.

**Custom** – This control mode allows the operator to set any target value (50–195 lbs.) while still maintaining automatic control. Use the plus and minus arrows to adjust the target value.

### NOT ENOUGH DOWNFORCE:



A furrow with a too light downforce setting can have dry or cloddy soil from the surface that falls into the furrow, negatively affecting germination due to inconsistent moisture or poor seed to soil contact, leading to inconsistent emergence.

### TOO MUCH DOWNFORCE:



A furrow with too heavy downforce setting is evidenced by compaction and slick sidewalls that do not easily crumble when disturbed. Slick sidewalls create a barrier to roots resulting in hatchet roots. Compaction restricts soil pore size which limits water, oxygen, and nutrients available to the plant.

# 20|20 GEN 3—DELTA FORCE DIAGNOSE

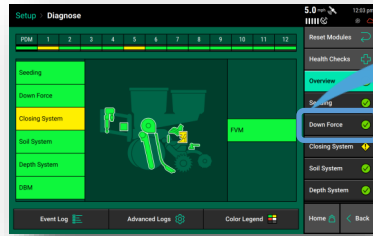
## START HERE



Button Press

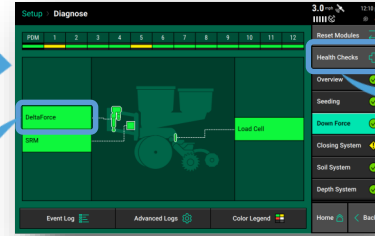
Press **Diagnose** button (or **Setup > Diagnose**) on **Home Screen**, Press the **Down Force** button on the row unit schematic to access the **DeltaForce Diagnose Page**, then select **DeltaForce, Load Cell** or **SRM** to view **Detail Screen**.

## Main Diagnose Page



Button Press

## System Diagnose Page



## HEALTH CHECK

Select **Advanced Applied Force Test** on the **Health Checks** page. This test will help verify the integrity of the DeltaForce system.

**PDM** row displays the **Lift Pressure** circuit. **Lift Pressure** is controlled planter wide at the **Lift Manifold**. The system only raises this pressure when conditions require lifting on rows.

**Health Checks** should be performed at the beginning of the season, and as needed throughout. For more information on DeltaForce health checks, see the operation guide.

### Row by Row reporting of DeltaForce Cylinders

**Load Cell (lbs)** – Displays the current weight being measured on each individual row by the load cell.

**Solenoid Volts – Voltage** commanded to the solenoid controlling the valve for the **DeltaForce** cylinder.

**Commanded Pressure** – The downward pressure that the **DeltaForce** system is commanding each cylinder to apply.

**Commanded Force (lbs)** – The amount of weight in pounds which the **DeltaForce** system is commanding each cylinder to apply downward.

**Net Applied Downforce (lbs)** – Amount of weight that the **DeltaForce** system is adding or subtracting to the weight of the row unit. Negative values represent lift while positive values represent applied force. Net Applied Downforce is calculated by subtracting Lift Force (Commanded Force at PDM) from Downforce (Commanded Force on each row).

Row	Load Cell (lbs)	Solenoid Volts	Commanded Pressure (psi)	Commanded Force (lbs)	Net Applied Downforce (lbs)
PDM		2.46	0	0	
1	168	3.72	1,400	344	250
2	163	3.54	1,380	339	250
3	170	3.54	1,340	329	240
4	164	4.32	1,880	461	370
5	165	3.90	1,600	393	300
6	165	4.50	1,940	476	380
7	158	3.66	1,380	339	250
8	156	4.02	1,620	398	310
9	166	3.96	1,580	388	300
10	160	3.78	1,420	349	260
11	151	3.54	1,260	309	220

**Supply Pressure** of **DeltaForce** system measured at the **Lift Manifold**. Must be a minimum of 2250 PSI.

Shortcuts to components required for the function of **DeltaForce**. Click on any button to access settings screen for each component.

### Normal operating ranges

- "P" port on lift manifold or cylinder – 2250 to 3000 psi
  - "R" port on lift manifold or cylinder – Less than 100 psi
  - "L" port on lift manifold or cylinder – 200-2200 psi \*
- \* This pressure will only read when the system is activated.

DeltaForce

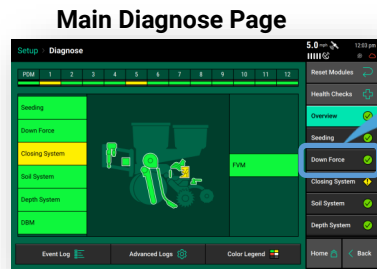
# 20|20 GEN 3—DELTA FORCE DIAGNOSE—LOAD CELL PAGE

## START HERE

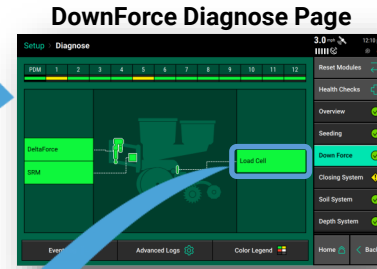


Button Press

Press **Diagnose** button (or **Setup > Diagnose**) on **Home Screen**, Press the **Down Force** button on the row unit schematic to access the **DeltaForce Diagnose Page**, then select **DeltaForce, Load Cell** or **SRM** to view **Detail Screen**.



Button Press



Button Press

Setup > Diagnose > Load Cell

Row	Reading (lbs)	Status	Reference Value	Calibration Factor
1	0.00	Active	31.43	85.00
2	0.00	Active	35.80	85.00
3	0.00	Active	35.32	85.00
4	0.00	Active	36.30	85.00
5	0.00	Active	36.87	85.00
6	0.00	Active	35.49	85.00
7	0.00	Active	36.28	85.00
8	0.00	Ignored	36.35	85.00
9	0.00	Active	36.64	85.00
10	118	Faulted	50.00	85.00
11	0.00	Active	36.34	85.00
12		Missing	36.22	85.00

0.0 mph 2:57 pm

Reset Modules  
Zero All Sensors  
SRM  
DeltaForce  
Load Cell

Lift State Lifted Radar Speed Wait Signal GPS Speed Waiting Comm Master Plant Off Active Cells 13 Home Back

## Row by Row reporting of Load Cells

**Reading (lbs)** – displays the current weight that is being measured on each individual row.

**Status** – displays the status of each load cell. Selecting a row in the status column will allow the operator to disable (ignore) the load cell on that row. To make a load cell active that has been ignored select that row in the status column.

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

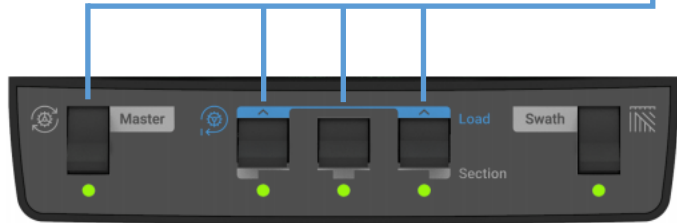
**Calibration Factor** – The calibration factor will auto-populate based on the planter make and model selected and the Downforce Sensor type

**Zero All Sensors—Load Cell** values are zeroed by pressing this button. This is important to get an accurate reading on each row. Ensure the planter is raised when zeroing load cells. It is recommended the **Load Cells** are zeroed at least at the beginning of the day and may need to be zeroed when starting a new field if there is an extended or rough transport time between fields.

**Note about ignored load cells:** If a load cell is ignored (see “**Status**” description), that row will control **DeltaForce** to the 80th percentile of all other properly operating rows. If the system suspects an issue with a load sensor, it will automatically ignore that load sensor and it will be display “**Faulted**”. “**Missing**” will be displayed when a load cell is not present.

# 20/20 GEN 3—SPEEDTUBE CONTROL SCREEN

**SpeedTubes** will operate anytime the **Master Plant** or a single **Section Plant** switch is active on the **Cab Control Module**. If the planter is not moving (either lifted or lowered, unless **SpeedTube Stop When Lifted** is **Enabled** in **SpeedTube** settings ), **SpeedTubes** will operate at a minimum belt speed. To deactivate **SpeedTube** operation, the **Master Plant** and all three **Section Plant** switches must be off.



**Ride Quality** is of limited significance when **SpeedTube** is installed across the whole planter. As long as other planting metrics (**SRI**, **Ground Contact**, etc.) are acceptable, "poor" **Ride Quality** will not impact performance. Operators should not limit speed based solely on **Ride Quality**. The "**Smooth Ride Limit**" can be adjusted as needed by going to **Setup>Crops >Limit> Adjustments**.

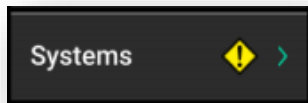


Increased **Vacuum** is sometimes necessary when operating **SpeedTube** at higher speeds. This will help limit seeds from dropping off the disk (due to increased rough ride) before reaching the feeder wheels.

## Start Here

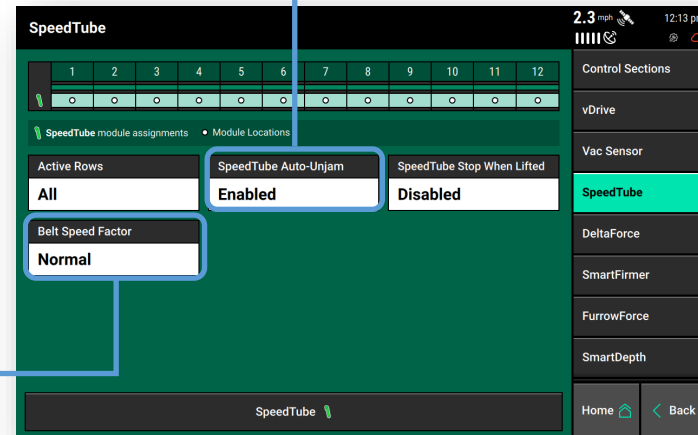


The available settings for **SpeedTube** are found on the **System>Speedtube** setup screen.



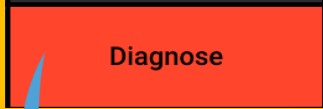
The default setting for **Auto-Unjam** is "**Enabled**". When enabled, **SpeedTubes** will automatically reverse belt direction to clear a detected jam/obstruction.

The default setting for "**Belt Speed Factor**" is "**Normal**". This value should not be changed unless directed by Product Support.



# 20|20 GEN 3—SPEEDTUBE DIAGNOSE

**START HERE**



Button Press

Press **Diagnose** button on **Home Screen** to access **Diagnose Page** Or navigate to **Setup> Diagnose**.

## Main Diagnose Page



Button Press

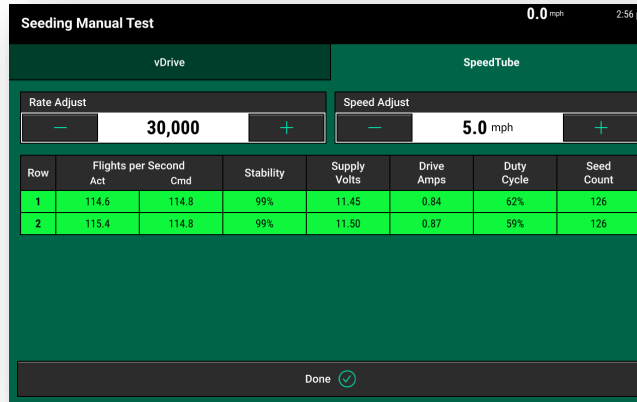
## Seeding Diagnose Page



Button Press

## HEALTH CHECK

The **Seeding Manual Test**, accessed through the **Health Checks** button on the main or seeding diagnose page, select the **Speedtube** tab to perform a test at user defined **Rate** and **Speed**.



The following are the failure thresholds for the health check:

<b>Voltage</b> —	<b>Duty Cycle</b> —
<10 Volts	30 FPS: >30%
<b>Amperage</b> —	80 FPS: >95%
30 FPS: >0.5 A	<b>Stability</b> —
80 FPS: >4.0 A	30 FPS: +/-6%
	80 FPS: +/-3.5%

In the event of a failed **Seeding Manual Test** reference the instructions listed below:

- **Voltage Failure:** There is low supply voltage. Check harnessing for damage and ensure alternator is operating.
- **Amperage Failure:** Ensure voltage is within range. Check for obstructions or misaligned parts in **SpeedTube**.
- **Duty Cycle Failure:** Check for obstructions or misaligned parts in **SpeedTube**.

**FPS Actual** – Measure of SpeedTube belt speed and is the number of belt flights per second as detected by seed sensors.

**FPS Commanded** – SpeedTube belt speed or flights per second as commanded.

**Stability** – Displays stability of SpeedTube mo-

**Supply Volts** – Voltage at SpeedTube Module

**Drive Amps** – SpeedTube current draw in

**Duty Cycle** – Displays SpeedTube motor output over the operating range.

**Seed Count**– Seeds detected on each row.

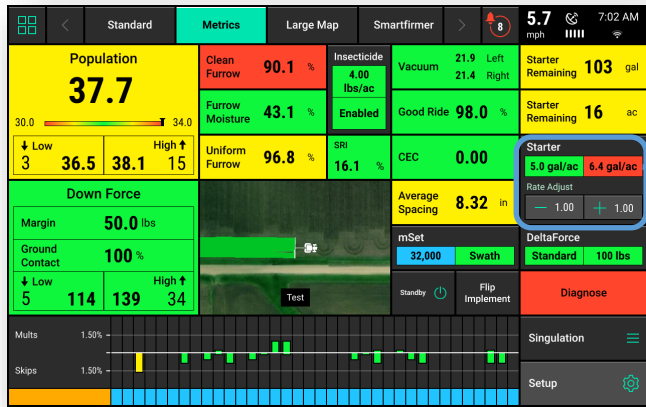


# 20|20 GEN 3—vAPPLYHD CONTROL

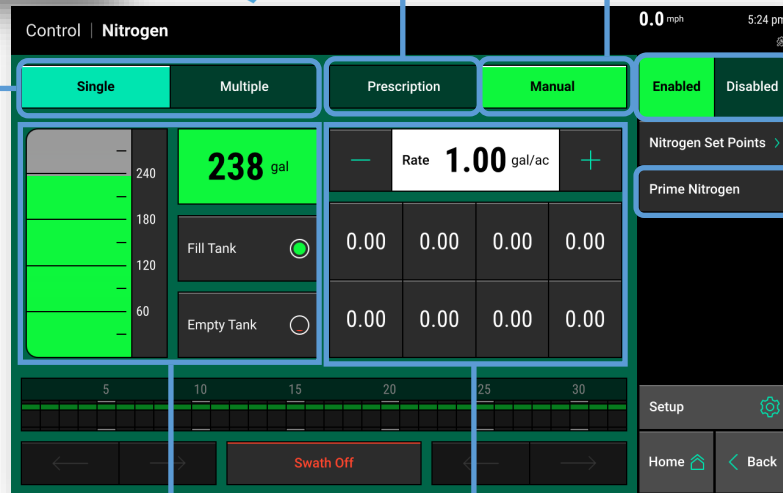
To access the **vApplyHD Control Page**, the control button must first be added to the Home Page (see **Quick Reference Guide—20|20—Home Page Customization**). It will be called either "Product 1" (if a nickname has not been assigned in the vApplyHD setup page) or it will be called the same name that was entered as the product's nickname.

If a variable rate liquid prescription is being used the status button will say **"Variable"**. The current rate being applied is 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.



Button Press



**Single** rate control indicates a single rate section. **Multiple** will allow multiple rate sections to be assigned if rate sections have been created in **Control Sections Setup**.

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

The **"Prime Nitrogen"** 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.

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 238 gal in the illustration) to manually enter the number of gallons in the tank.

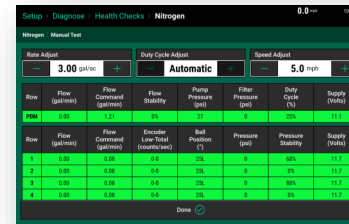
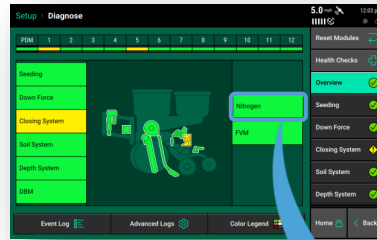
When in **Manual** rate mode, the rate displayed in the white box is the rate being commanded. This rate can be adjusted manually by pressing on the white box and typing the rate, touching the **+ or -** buttons, or using a preset button (add presets by pressing the **Liquid Set Points** button).

# 20/20 GEN 3—vAPPLYHD DIAGNOSE

START HERE

Diagnose

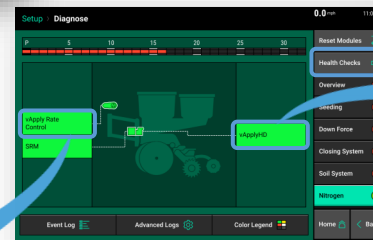
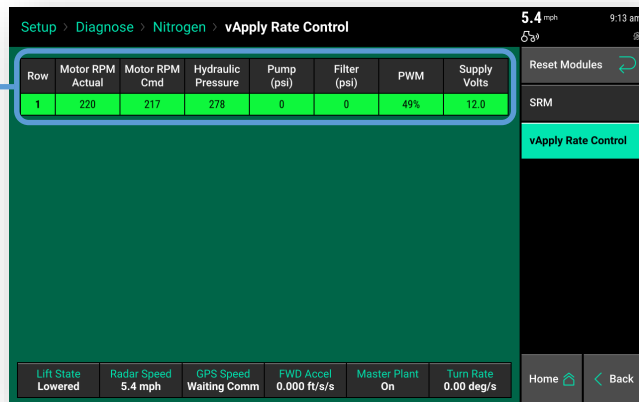
Button Press



## HEALTH CHECK

Select liquid **Manual Test** on the **Health Checks** page. This test will allow you to select a **Rate** and **Speed** to help in calibrating the pump. See the **vApply Operator's Guide** (955656).

## vApply Rate Control Module—System Wide



## vApplyHD Modules—Row by Row

Row	Flow (gal/min)	Flow Command (gal/min)	Encoder Low-Total (counts/sec)	Ball Position (°)	Pressure (psi)	Pressure Stability	Supply (Volts)
1	0.00	0.00	0-0	-6L	0	0%	11.9
2	0.00	0.00	0-0	-5L	0	0%	11.9
3	0.00	0.00	0-0	-6L	0	84%	11.9
4	0.00	0.00	0-0	-5L	0	0%	11.9
5	0.00	0.00	0-0	-6L	0	0%	11.9
6	0.00	0.00	0-0	-6L	0	0%	11.9
7	0.00	0.00	0-0	-6L	0	0%	11.8
8	0.00	0.00	0-0	-5L	0	0%	11.8
9	0.00	0.00	0-0	-6L	0	0%	11.8
10	0.00	0.00	0-0	-6L	0	76%	11.8
11	0.00	0.00	0-0	-5L	1	89%	12.0
12	0.00	0.00	0-0	-6L	0	0%	11.9

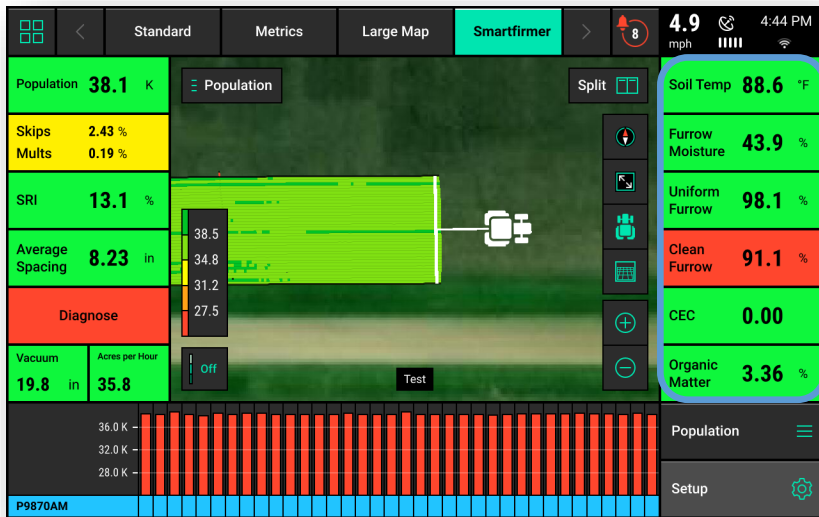
The liquid diagnostic page opens either the **vApply Rate Control** page, which shows planter-wide metrics, or the **vApplyHD** page which shows row by row details.

- Motor RPM Actual:** Actual revolutions per minute of the hydraulic motor.
- Motor RPM Cmd:** The RPM being commanded of the hydraulic motor by the vApply system.
- Hydraulic Pressure:** The hydraulic pressure as measured at the hydraulic motor.
- Pump Pressure :** Pressure reading of the system taken at the by-pass valve.
- Filter Pressure:** Displays differential pressure between the inlet and the outlet of the filter. Tap to toggle between the following readings: **Filter In (PSI), Filter Out (PSI), Filter Status.**
- PWM:** Current **PWM%** being commanded to the pump.
- Supply Volts:** Voltage reading at the **vApply Module.**

- Flow:** Measured flow in gallons per min.
- Flow Cmd:** The gallons per min. being commanded by the system.
- Encoder Low-Total:** Actual flow rate feedback of each flow sensor located in the vApplyHD module. Low flow range is 1-900 Htz., total flow is 10-200 Htz. When total flow is open the low flow is also being used.
- Ball Pos (degree):** The commanded ball position of the **vApplyHD** valve.
- Pressure (psi):** Pressure reading at the **vApplyHD Module.** This value should not be less than 15 psi less than the vApply module pressure reading, if it is that indicates an obstruction between the pump and the vApplyHD module. Tap to toggle to **Temperature.**
- 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%. Tap to toggle to **Flow Stability.**
- 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.

# 20/20 GEN 3—SMARTFIRMER CONTROL

**SmartFirm** metric buttons can be assigned to the **Home Screen** for real time monitoring. For more information on assigning metrics to **Home Screen** see **Quick Reference Guide—20/20 Gen 3—Home Screen Customization**.



CEC 0.00

**Cation Exchange Capacity (CEC)** is the soil's capacity to hold and exchange **Cations**. This represents the ability for soil to hold onto fertilizers and liming agents, the higher the number indicates a higher holding capacity.

Organic Matter 3.36 %

**Organic Matter (OM)** is the portion of the soil that consists of plant material in various stages of decomposition. The **SmartFirm** organic matter measurement includes all of this except the visible crop residue. For most fields, reported organic matter will be greater than 0.5% and less than 6%. The value should be fairly stable each second and only change over hundreds of feet.

**Real Time Control:** Primary contributors to soil productivity are soil **Organic Matter** and **CEC**. **SmartFirm** can control seeding, hybrid selection, insecticide rates, fertilizer application rates (liquid) and planting depth based on real-time organic matter or moisture measurements and the corresponding population/hybrid/rate/depth selected by the user. See **SmartFirm Operators Guide** and the associated control products' operator guides for more information.

Soil Temp 88.6 °F

**Soil Temperature (Temp) Definition:** Real time temperature at seeding depth. **Goal: Above 50 degrees.**

Furrow Moisture 43.9 %

**Furrow Moisture** is the percent of water weight that a corn seed is projected to absorb in a 3 day time period. A corn seed needs to take up 30% of its weight in moisture to start germination. It is recommended to keep this value above 30% for adequate moisture conditions. Conditions that may result in values lower than 30% could be cloddy conditions, sandy soils, and light knobs. If the **SmartFirm** is highlighting dry areas, stop & dig to ensure seeds are in an environment with moisture. **Goal: Above 30%** for corn and beans.

**In Field Adjustments for Furrow Moisture:** If furrow moisture drops below 30% the furrow should be inspected to see if dry soil is falling into the furrow and verify the seed is being planted into adequate moisture. Dry soil could be caused by poor gauge wheel shimming, too light of downforce, worn opening discs, etc. A mechanical issue may also be revealed by a corresponding drop in **Uniform Furrow** percentage below acceptable levels. If adequate moisture is the cause of low moisture readings, consider adjusting planting depth after considering weather forecasts for the coming day.

Uniform Furrow 98.1 %

**Uniform Furrow** is any variation in the furrow (light, cloddiness, moisture changes). Can indicate row unit mechanical problems, tillage patterns, opportunity to use row cleaners, windrowed residue, etc. **Goal: Above 95%**

**In Field Adjustments for Uniform Furrow:** If Uniform Furrow drops below 95% inspect furrow to ensure sidewalls are stable not collapsing, DownForce setting too light, dry soil "rooster tailing" into furrow, opening disc/gauge wheel maintenance and settings.

Clean Furrow 91.1 %

**Clean Furrow** is a measure of the crop residue in the furrow. A value of 100% represents a perfectly clean furrow, but any value above 90% is considered to be acceptable. Either surface residue dropping into the furrow or incorporated residue will be sensed by **SmartFirm** if it passes by the sensor window. **Goal: Above 95%.**

**In Field Adjustments for Clean Furrow:** Visually inspect furrow for pinning of residue (any foreign object in furrow will be read as residue, ie. rocks). Is surface residue falling in seed trench? If surface residue is falling in furrow, adjust aggressiveness of row cleaners to remove debris from falling in furrow. If incorporated residue is present, consider shifting planting pass so planter is not planting "on top of" stalks, or possibly change tillage practice.

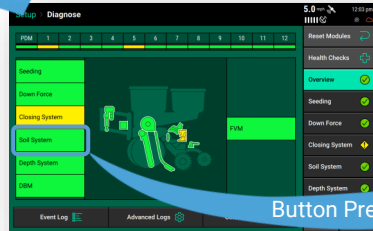
# 20|20 GEN 3—SMARTFIRMER DIAGNOSE

## START HERE



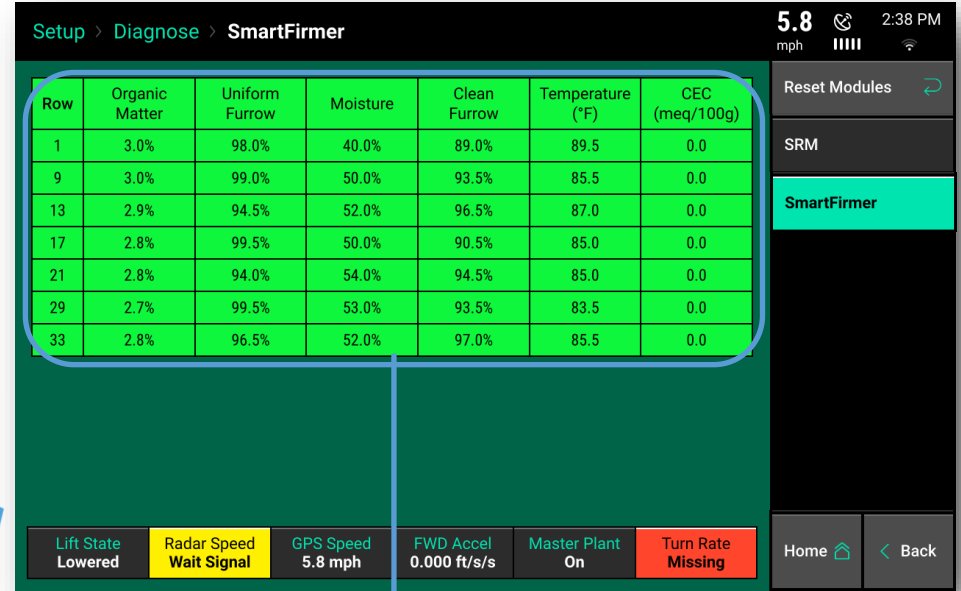
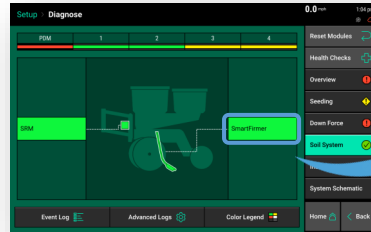
Press **Diagnose** button (or **Setup > Diagnose**) on **Home Screen**, select **Soil System** on the row unit schematic to access the **SmartFirmer Diagnose Screen**. Select SmartFirmer to navigate to the Detailed Diagnose Screen.

### Main Diagnose Page



Button Press

### Soil System Diagnose Page



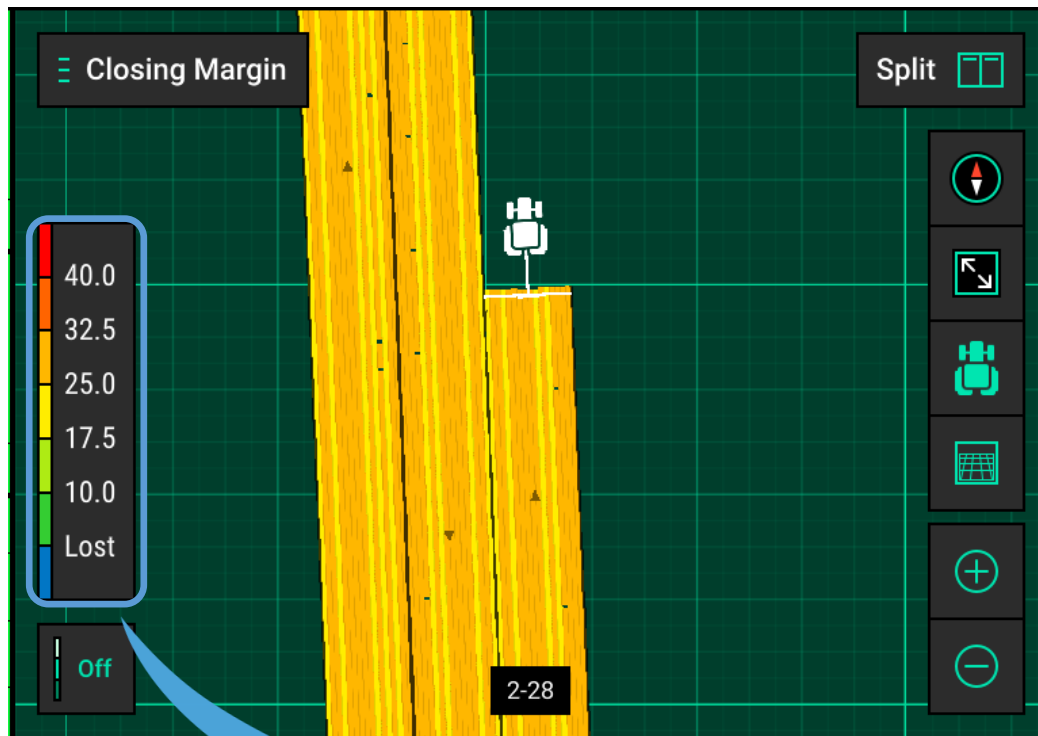
## Possible solutions for Event Log or Pop Up message errors:

Event Log Text	Pop Up Text	Action
SmartFirmer Not Detected	Lost Communication with SmartFirmer on row #____. Check connections:	Row # is showing an open input on the SmartFirmer input. This may indicate: damaged harness / connector; circuit failure of the SmartFirmer; or damaged SRM. Verify by plugging recognized SmartFirmer into row showing failure.
SmartFirmer Optics Damaged	SmartFirmer Signal Error Detected on row #____. Inspect for damage on lens and electronics housing:	Row # is showing an abnormal reflectance reading (relative to neighboring rows) for extended time period. Can indicate physical issue on row unit or a problem with one or more LED's, contamination inside of optics assembly, broken lens.
SmartFirmer Lens Blocked	SmartFirmer Lens Blockage detected on row #____.	Inspect SmartFirmer lens for build up, if lens is obstructed clean lens.
SmartFirmer Erratic Reading	Erratic SmartFirmer Readings on row #____	Inspect Row unit for potential ride issues and SmartFirmer for damage.

The metrics displayed on the **SmartFirmer Level 2 Diagnose Page** are used for advanced diagnostic only.

If **SmartFirmer** is healthy and communicating with the 20|20 and no pop up or error logs are present, anytime a single **SmartFirmer** shows unexplained deviation from the other **SmartFirmer** readings this could indicate an issue that should be investigated. First step is to visually inspect the **SmartFirmer** for damage, build up, blocked lens, harness damage...etc. If no obvious damage or physical explanation is present, contact your **Precision Planting Dealer** or **Product Support**.

# QUICK REFERENCE GUIDE—20|20 GEN 3—FURROWFORCE HOME SCREEN



## FurrowForce Maps and Operation

The following maps are available on the 20|20 for FurrowForce:

**Closing Margin** – Displays the weight (lbs) on the second stage wheels for each row.

**Closing Act. Pressure** – Displays the pressure (psi) in the airbag for each row.

## Reading the Closing Margin Map

A blue dot on the **Closing Margin** map indicates potential loss of closing. If blue dots are appearing regularly for multiple rows and the **Good Closing** value in the **Closing** widget is dropping below 100%, the **Closing Target** should be increased.

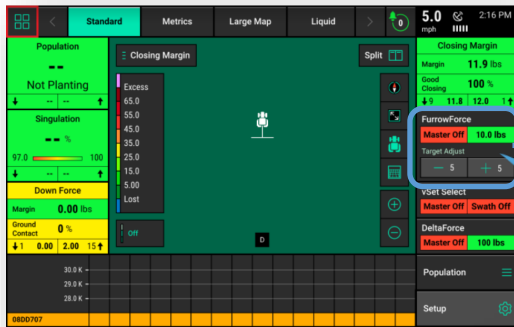
A red or dark orange dot on the **Closing Margin** map indicates excess closing weight. If the majority of the **Closing Margin** map is reading heavy with possible compaction from **FurrowForce**, the **Closing Target** should be decreased.

## **Note:**

**30-40 lbs.** of **Closing Margin** is generally ideal for most conditions. Adjust the **Closing Target** or manual regulator pressure as needed, based off **FurrowForce** maps/metrics and closing performance investigation in-field.

Ensure the legend is displaying a representative operating range before making adjustments. Press legend to open dialog window allowing you to set the low and high limits, as well as the number of steps in the legend.

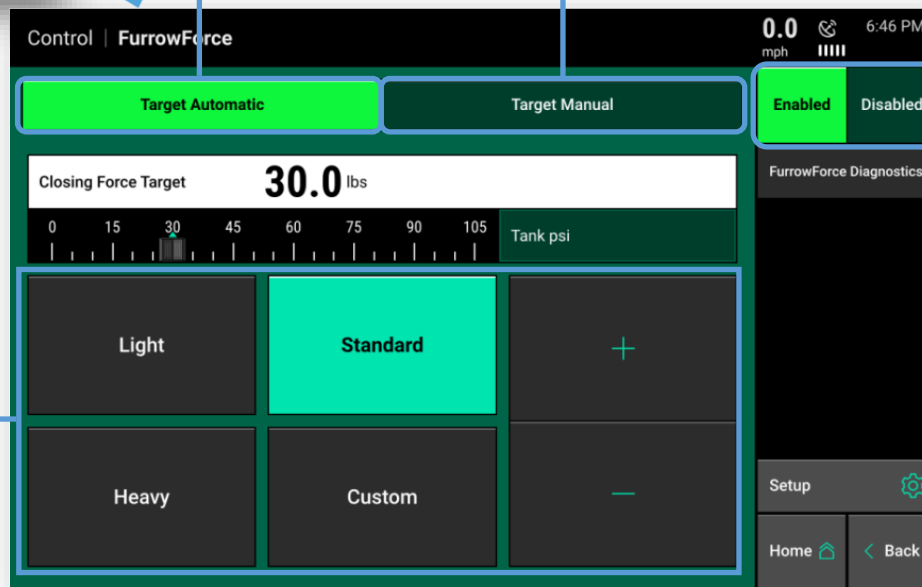
# QUICK REFERENCE GUIDE—20|20 GEN 3—FURROWFORCE CONTROL



**FurrowForce** control button will open the **FurrowForce Control Page**. If button is not present on **Homescreen** it will need to be added.

**Target Automatic** should be selected as default. The system will automatically adjust airbag pressure to maintain the **Closing Target** setting.

If **Target Manual** is selected, the system will maintain a static airbag pressure set by the operator. **Warning:** this should only be used in unique situations, such as planting plots, as it only applies a single force to all rows and will make no adjustments based on sensor readings.



**System** must be enabled to function.

**Note:** When **FurrowForce** is disabled, bag pressure will release and go to 0 psi. If **FurrowForce** remains enabled and the **Master Plant** switch is shut off, the current pressure will remain in the airbags.

When **Target Automatic** is selected, there are four **Closing Target** settings:

**Light** – Closing Target is set to **15 lbs.**

**Standard** – Closing Target is set to **35 lbs.**

**Heavy** – Closing Target is set to **55 lbs.**

**Custom** – This setting is user defined and allows for target adjustments of 5 lbs. using the “+” and “-” buttons. The slider under the Closing Target value can also be used for even finer adjustments if needed.

**Note:** start with **Standard** set as the **Closing Target**. Generally 30-40 lbs. of closing margin is ideal, but always check closing performance in-field and on available maps. Adjust the **Closing Target** as needed.

# QUICK REFERENCE GUIDE—20|20 GEN 3—FURROWFORCE DIAGNOSE

**START HERE**

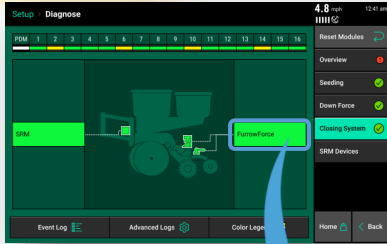
Diagnose

1

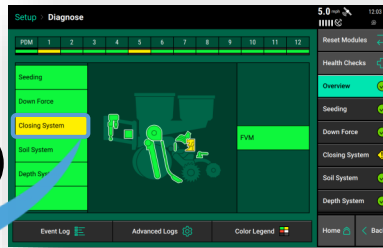
Button Press

2

Button Press



3



Press **Diagnose** button or **Setup > Diagnose** on **Home Screen**, Press the **Closing System** button on the row unit schematic and then select **FurrowForce** to open the **FurrowForce Diagnose Page**.

**Zero Furrowforce** button is used to zero the load cells. This should be done with the planter raised and is recommended to do at the start of the day.

**Supply Volts Sensor** – Displays the supply voltage for the FurrowForce Load Sensor

**Supply Volts Control** – Displays the supply voltage for the FurrowForce Control Module

**Reading (lbs.)** – Weight being carried on second stage wheels as measured by the FurrowForce Load Sensor.

**Status** – Sensor status (Active, Faulted, Ignored)

**Reference Value** – Baseline for each sensor

**Pressure Cmd (psi)** - Commanded pressure to achieve closing force target based on sensor reading.

**Pressure Actual (psi)** – Individual airbag pressure as measured by the FurrowForce Control Module

Row	Supply Volts Sensor	Supply Volts Control	Reading (lbs)	Status	Reference Value	Pressure Cmd (psi)	Pressure Actual (psi)
1	11.4	11.7	24.6	Active	90.0	5.0	7.0
2	11.4	11.6	27.1	Active	96.0	5.0	8.0
3	11.4	11.6	30.5	Active	80.0	5.0	8.0
4	11.4	11.6	22.3	Active	74.0	7.0	9.0
5	11.4	11.7	31.7	Active	80.0	5.0	6.0
6	11.4	11.6	28.9	Active	78.0	5.0	10.0
7	11.4	11.6	32.2	Active	74.0	5.0	6.0
8	11.4	11.7	29.0	Active	68.0	5.0	9.0
9	11.4	11.6	26.8	Active	88.0	5.0	6.0
10	11.4	11.6	22.9	Active	84.0	5.0	6.0
11	11.3	11.6	26.7	Active	86.0	5.0	6.0
12	11.3	11.6	24.0	Active	104.0	5.0	8.0

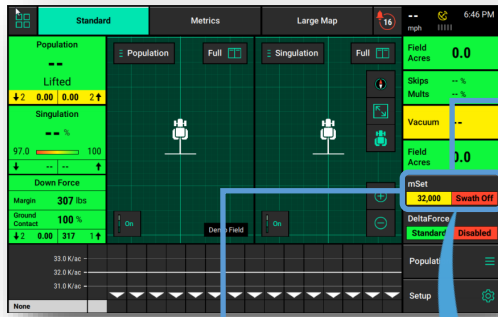
**Note:** If a **FurrowForce Load Sensor** is ignored, that row will control **FurrowForce** to the average of all other properly operating rows.

FurrowForce



# 20|20 GEN 3—mSet/vSet SELECT CONTROL

**Note:** mSet and vSet Select are controlled through the same process. mSet will be used throughout this guide, but all processes for vSet Select are virtually the same.



The **mSet/vSet Select Control Button** shows the status of the system. See indicator explanations to the right.

## mSet/vSet Select Control Button Population Indicators

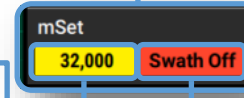
**Variable** – multi-hybrid seeding prescription is assigned and the system is in variable rate mode.

**Multiple** – the system is in manual mode and there are multiple rate sections configured

**A Number is Displayed** – the system is in manual mode with only a single rate section. The number that is displayed is the commanded manual population rate for that rate section.

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

**Red**—Master plant switch is off.



## mSet/vSet Select Control Button Swath Indicators

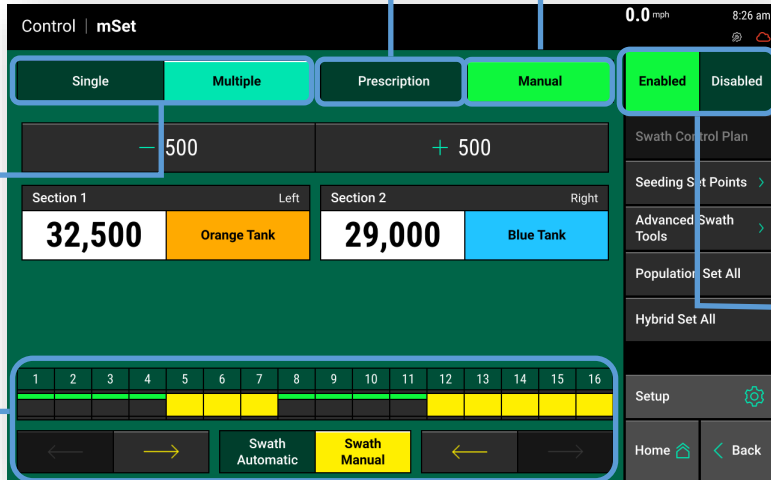
**Green**—Swath Control is enabled and set to automatic mode

**Yellow:** Swath Control is enabled and set to manual mode

**Red:** Swath Control is disabled because the swath switch is in the off position on the **Cab Control Module**.

For a seeding prescription to be used select **“Prescription”**, a prescription must be assigned to the field (**Setup>Fields>Active Field**).

**Single** rate control indicates a single rate section. **Multiple** will allow multiple rate sections to be assigned if rate sections have been created in **Control Sections Setup**.



Select between **Automatic** and **Manual** swath control. Rows can be manually swathed off from either side of the planter by pressing the arrows. Additionally, the box representing rows on the planter can be manually swathed off/on by pressing-holding-swiping any of the boxes. Boxes that are yellow are swathed off.

**Single Hybrid Mode** (only with mini hoppers) allows you to plant one hybrid with the whole planter.

**Normal Hybrid Mode** gives you the option to plant two different hybrids.

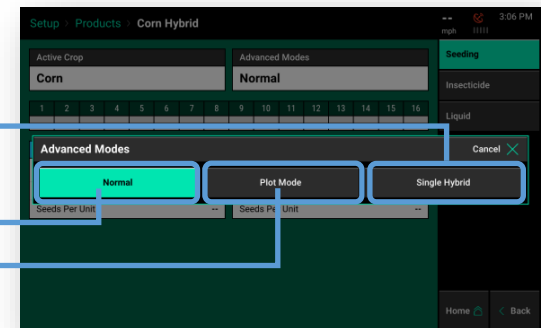
**Plot Mode** gives you the option to plant and map up to four different hybrids.

**Manual** mode will display all configured **Rate Sections**. For each rate section the **Population** and **Tank** can be adjusted. To adjust all rate sections at the same time press the + or – buttons to change by 500 seeds. To change the **Tank** that seed is being planted from select the tank color button. To adjust a single rate section’s population, press on the population rate that is displayed, then either select a population from the **Population Set Points** or press the white box at the top and enter a rate.

Before the **mSet** system can be used, the system must be enabled by selecting the **“Enabled”** button.

## 3 Hybrid Modes Available—

Navigate to **Setup>Products>Advanced Modes**



Precision Planting

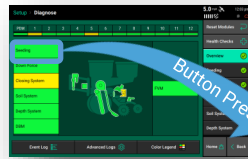
# 20|20 GEN 3—mSET/vSET SELECT DIAGNOSE

**START HERE**



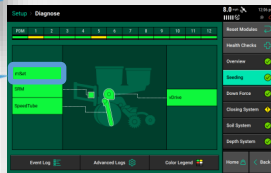
Button Press

**Main Diagnose Page**



Button Press

**Seeding Diagnose**



Button Press

**mSET DIAGNOSE:**

Setup > Diagnose > mSet

Row	Actual	Tank	Cmd	Pool Sensor	Supply Volts
1	None	None	None	Calibrating	14.7
2	None	None	None	Calibrating	14.7
3	None	None	None	Faulted	14.8
4	None	None	None	Faulted	14.6

0.0 mph 1:00 pm

Reset Modules

SRM

vDrive

mSet

Lift State: Lifted | Radar Speed: Wait Signal | GPS Speed: Waiting Comm | FWD Accel: 0.000 ft/s/s | Master Plant: Off | Turn Rate: 0.00 deg/s

Home < Back

**vSET SELECT DIAGNOSE:**

Setup > Diagnose > vSet Select

Row	Tank	Actual	RPM	Cmd	Stability	Supply Volts	Drive Amps	Duty Cycle
1	None	0.0	0.0	0.0	0%	11.9	0.00	0%
	None	0.0	0.0	0.0	0%	11.7	0.00	0%
2	None	0.0	0.0	0.0	0%	11.8	0.00	0%
	None	0.0	0.0	0.0	0%	11.9	0.00	0%
3	None	0.0	0.0	0.0	0%	11.8	0.00	0%
	None	0.0	0.0	0.0	0%	11.7	0.00	0%
4	None	0.0	0.0	0.0	0%	11.8	0.00	0%
	None	0.0	0.0	0.0	0%	11.7	0.00	0%
5	None	0.0	0.0	0.0	0%	11.8	0.00	0%
	None	0.0	0.0	0.0	0%	11.9	0.00	0%
6	None	0.0	0.0	0.0	0%	11.7	0.00	0%
	None	0.0	0.0	0.0	0%	11.7	0.00	0%

0.0 mph 2:16 pm

Reset Modules

SRM

vSet Select

Blower Control

Flow Reducer

Lift State: Lifted | Radar Speed: Wait Signal | GPS Speed: Lost Comm | FWD Accel: 0.000 ft/s/s | Master Plant: Off | Turn Rate: 0.00 deg/s

Home < Back

Navigate to **Diagnose Screen** from the Home Screen (**Setup > Diagnose**), select Seeding on the row unit schematic to access the **mSet/vSet Select Detailed Diagnose Screen**.

**Actual Tank:** The active hybrid that is being planted at the time.

**CMD Tank:** The commanded hybrid to be planted once the seed pool is exhausted of the previous hybrid.

**Pool Sensor:** Shows the health of the seed pool sensor.

1. **Red** – Missing or not detected.
2. **Yellow** – Faulted
3. **Green** – Healthy sensor range. Will display **Calibrating** for initial sensor learning. If a sensor is recalibrating it will show **Recal**.

**Supply Volts:** Supply voltage at the mSet module housed in the Seed Selector.

**Tank** – displays which tank's seeds are currently being planted from.

**RPM Actual**—The current RPM of the meter

**RPM Command** - The RPM being commanded of the meter, required to reach the target population.

**Stability** - Measures the variance of the drag on the motor. The higher the stability percentage the smoother the vDrive motor will be turning.

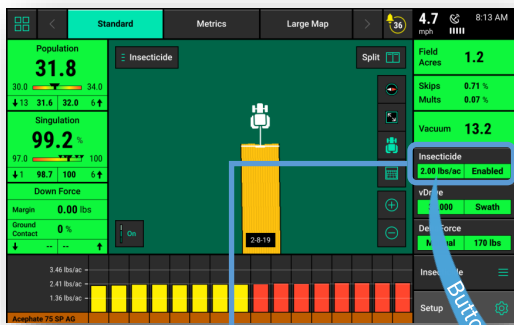
**Supply Volts** - The amount of volts being sent to the vDrive motor. Average range of supply volts - 12-15 volts

**Drive Amps** - The amperage the vDrive is pulling while in operation. Standard operating range of current draw at 5mph • Corn - .4-.6 amps • Beans - .7-.9 amps

**Duty Cycle** - The percent of time that power is commanded on where the on/off cycles are occurring at 35 kHz.

**vSet Select Systems** with mini-hoppers will have a **Flow Reducer** button on the main diagnose page. Systems with 1.6 bu hoppers connected to bulk tanks there will be a **Blower Control** button on the main diagnose page. Select this button to see the status of the **Blower Control** or **Flow Reducer Modules**.

# 20|20 GEN 3—vDRIVE INSECTICIDE CONTROL



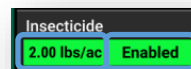
**Color indicators for the commanded rate portion of the vDrive Insecticide Control button:**

**Green**—a Calibration Mass has been entered for the assigned Insecticide.

**Red**—a Calibration Mass has not been entered. Set a calibration mass for the assigned insecticide in the vDrive Insecticide setup.

**A rate** will be displayed if a single rate is being commanded across all rows.

**“Multiple Rate”** will be displayed if more than one rate is being commanded for different groups of rows.



**vDrive Insecticide System Status Indicators:**

**Enabled**—system is ready and has been enabled.  
**Disabled**—(surrounded by red) system will not function due to being disabled. To enable the system, press on the control button and select Enable.

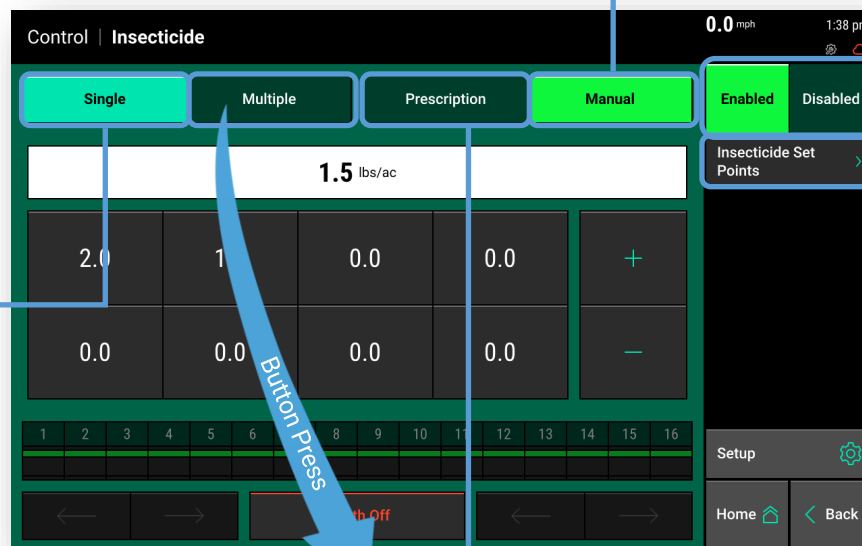
**Green**—System is functional and has a commanded rate.

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

**Red**: Master plant switch is off.

The **vDrive Insecticide Control Button** shows the status of the system. If the **vDrive Insecticide Control Button** is not on the Home Page it will need to be added.

**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.

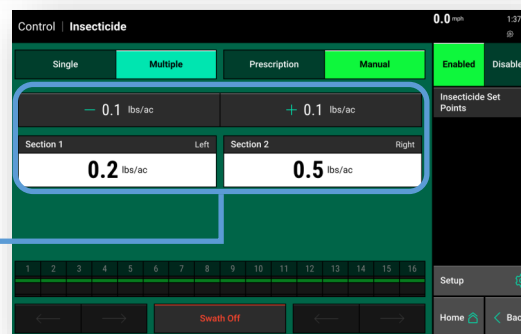


**Manual** – Set an application rate for the **vDrive Insecticide** system to apply. This ignores any assigned insecticide application prescriptions.

Toggle this button to **Enable/Disable vDrive Insecticide**. Must be Enabled for product to function.

The values displayed in the eight boxes below the active rate are quick adjust rates. Set these rates by selecting the **“Insecticide Set Points”** button on the right hand side.

**Multiple** – Assign a different application to each insecticide section that was configured in **Control Sections** set-up. 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.



**Prescription** – If an Insecticide application prescription is assigned to the active field, **“Prescription”** mode will be selected as the default setting. A prescription must be assigned to the field (**Setup>Fields>Active Field**).

# 20|20 GEN 3—vDRIVE INSECTICIDE DIAGNOSE

**START HERE**

Diagnose

1

Press **Diagnose** button or **Setup > Diagnose** on **Home Screen**, press **Insecticide** to access the **Insecticide System** and then press **vDrive Insecticide** to open the **vDrive Insecticide Diagnose Page**.

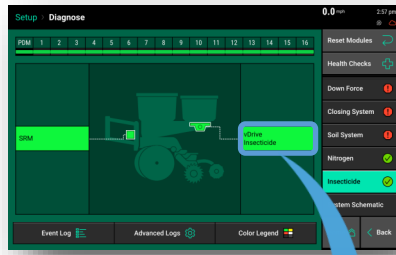
Button Press

2

Button Press

## HEALTH CHECK

Select **Insecticide Manual Test** on the **Health Checks** page. This test will allow you to select a simulated **Rate** and **Speed** to verify the integrity of the **vDrive Insecticide system**.



3



**RPM Actual** – Actual RPM of the meter.

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

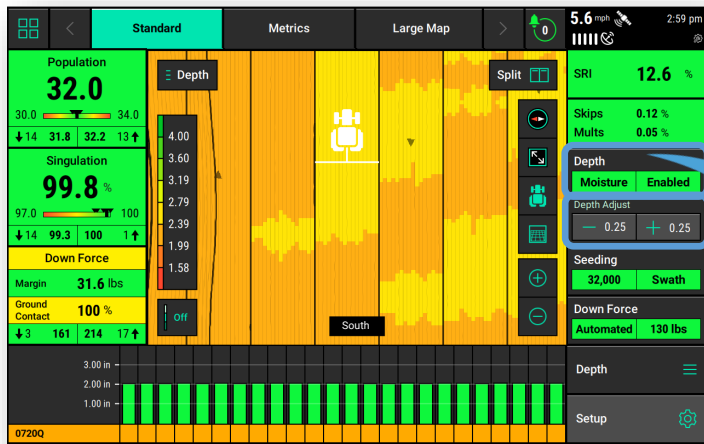
**Supply Volts** – Voltage at **vDrive Insecticide Module**.

**Drive Amps** – **vDrive Insecticide** motor current draw in amps.

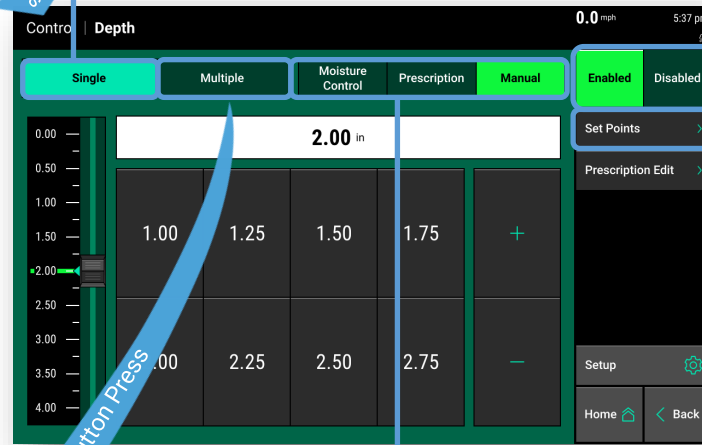
**Duty Cycle** – Displays the **vDrive Insecticide** motor output over the operating range, 0 – 100%.

Shortcuts to components required for the function of vDrive Insecticide. Click on any button to access settings screen for each component.

# QUICK REFERENCE GUIDE—20|20 GEN 3—SMARTDEPTH CONTROL SCREEN



**Single Mode** controls to a single depth planter wide. Select a preset depth from the list of depth set points displayed on the screen (configure this list using the “Set Points” button on the right hand side of the screen) and use the + or - buttons to increase or decrease the depth by a 1/4” inch at a time, or tap on the white box displaying the current depth to manually enter a depth.



System must be **Enabled** to function.

Press **Set Points** to edit the preset buttons found in the middle of the page.

- and + buttons decrease or increase depth in .25” increments when in manual mode only.

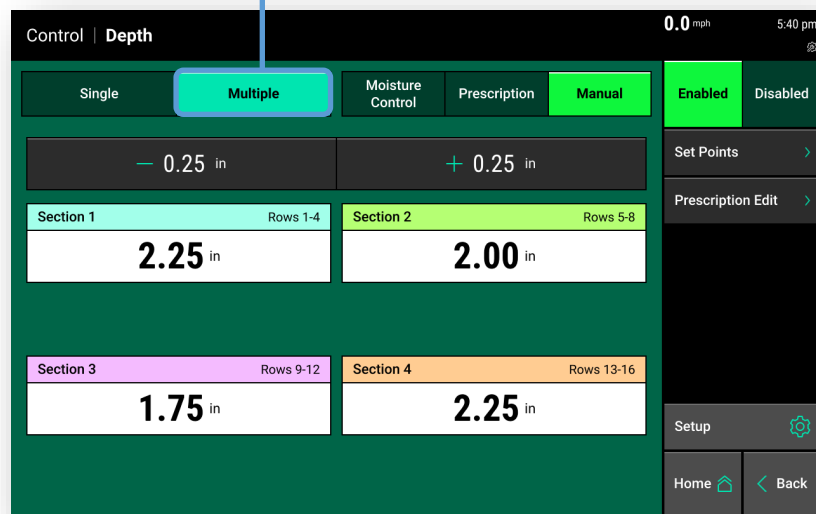
**Multiple Mode** controls the **Depth** system in individual sections if there are multiple rate sections configured. Up to 4 rate sections can be configured (**Setup>Systems>Control Sections>Rate Section 1-4**).

**Depth** can be controlled in three modes—**Moisture Control**, **Prescription**, and **Manual**:

**Moisture Control** uses the **Furrow Moisture** metric from **SmartFirmers** to control the depth. A minimum of 4 **SmartFirmers** per rate section are recommended for controlling depth to **Furrow Moisture**. *See following page for more information.*

**Prescriptions** can control Depth by assigning it to the field (**Setup>Fields>Active Field**) and assigning an attribute for each section.

**Manual** mode allows for depth to be set by one of the following methods: pressing white box and entering a depth, pressing a set point button, or moving slider on left of screen.

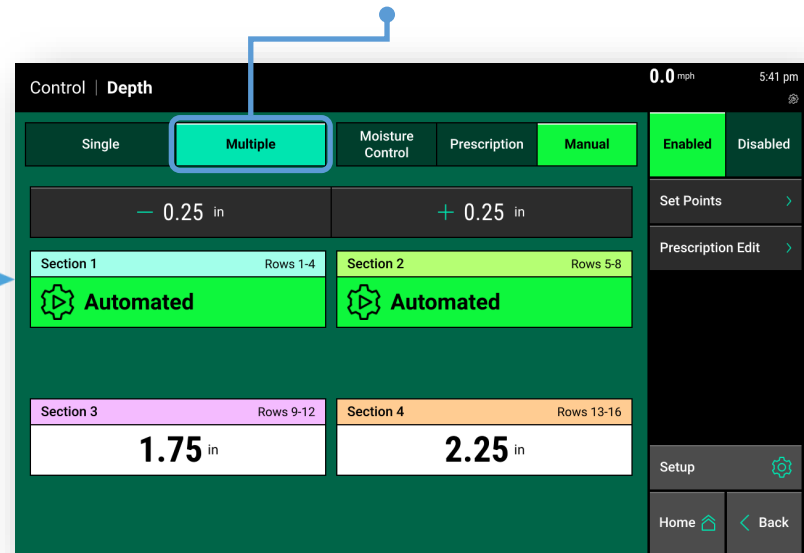
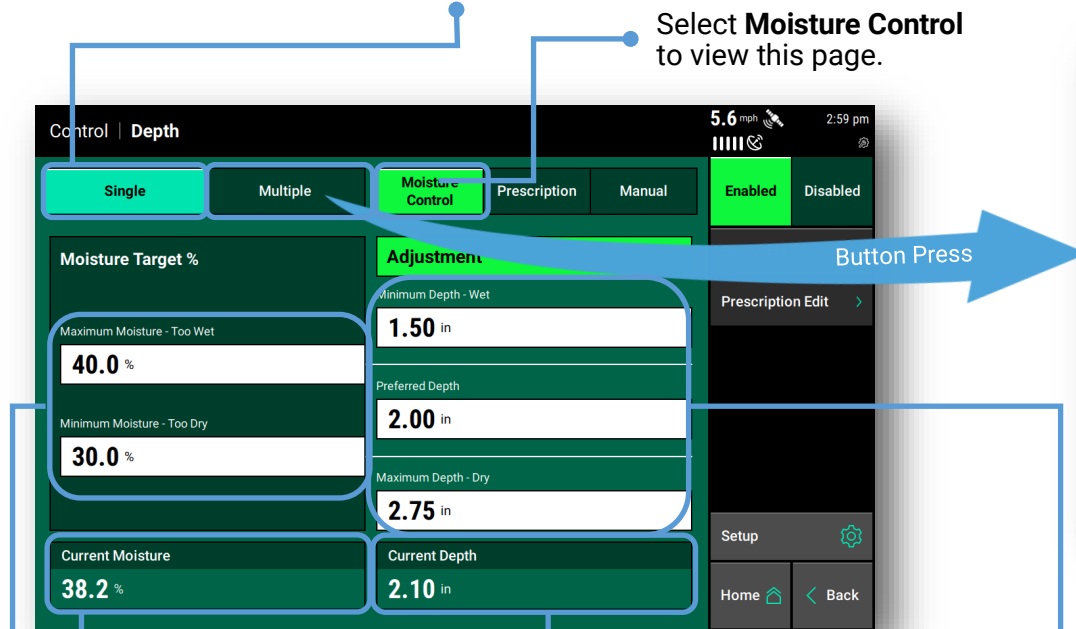


SmartDepth

# QUICK REFERENCE GUIDE—20|20 GEN 3—SMARTDEPTH MOISTURE CONTROL MODE

**Single Mode: Moisture Control** mode allows the operator to use **SmartFirmer** furrow moisture percentage to automatically adjust the planting depth based on user defined settings. Moisture Control mode is section controlled defined by the number of rate sections. Up to 4 rate sections can be configured. In this example, Moisture Control is enabled as a single section where the depth control will be planter wide. Select "Multiple" if you want to utilize up to 4 sections.

**Multiple Mode:** Select "Multiple" if you want to utilize up to 4 sections. In this example, Moisture Control is enabled on Section 1 and Section 2 while Sections 3 and 4 are left in a manual depth mode. The "Automated" sections can be configured with different moisture control parameters if desired or all four sections can control to the same moisture control parameters.



**Current Moisture:** planter wide average moisture when in "Single Mode" or the section average moisture when in "Multiple Mode".

**Current Depth:** is the planter wide average depth when in "Single Mode" or the section average depth when in "Multiple Mode".

**Moisture Target Parameters:** The Maximum Moisture target determines at what furrow moisture percentage do we command depth to go shallower. In other words, if we have too much moisture plant shallower. The Minimum Moisture target determines at what furrow moisture percentage do we command depth to go deeper. In other words, if we are too dry plant deeper to find moisture.

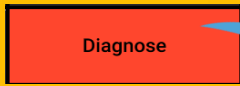
**Minimum Depth – Wet:** sets the shallowest depth SmartDepth will command"

**Preferred Depth** should be set to a depth between the minimum and maximum settings. If the furrow moisture falls between our moisture target then the depth will move towards our preferred depth set point assuming there is ample moisture at that depth.

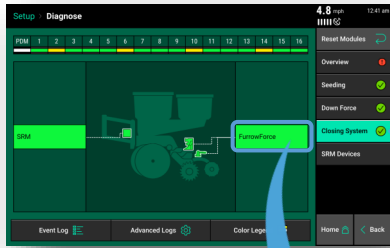
**Maximum Depth – Dry:** sets the deepest depth SmartDepth will command"

# QUICK REFERENCE GUIDE—20|20 GEN 3—SMARTDEPTH DIAGNOSE SCREEN

**START HERE**

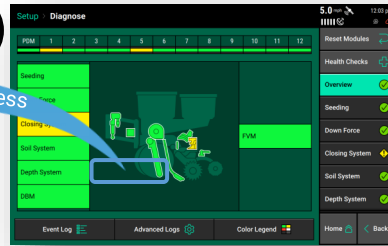


**1** Press **Diagnose** button on **Home Screen** or **Setup > Diagnose**, press the **Depth System** button on the row unit schematic and then select **SmartDepth** to open the **SmartDepth Diagnose Page**.



**2**

Button Press



**3**

Setup > Diagnose > SmartDepth

Row	Supply Volts	Current (mA)	Duty Cycle (%)	Depth (in)	Manual Override
1	12.3	20	0.0	2.00	
2	12.4	20	0.0	1.89	Clear
3	12.4	20	0.0	2.00	
4	12.3	20	0.0	2.00	
5	12.4	20	0.0	2.00	
6	12.4	20	0.0	2.00	
7	11.9	20	0.0	2.00	
8	12.1	20	0.0	2.00	
9	12.1	20	0.0	2.00	
10	12.2	20	0.0	2.00	
11	12.3	20	0.0	2.00	
12	12.2	20	0.0	2.00	

0.0 mph 8:59 am

Reset Modules

SRM

SmartDepth

Lift State: Lifted | Radar Speed: Wait Signal | GPS Speed: 0.0 mph | FWD Accel: 0.000 ft/s/s | Master Plant: On | Turn Rate: 0.00 deg/s | Clear Manual Overrides

Home < Back

**Clear** manual override; can be cleared by the individual row or you can select "**Clear Manual Overrides**" at the bottom."

## Light status on SmartDepth Module:

Yellow Light State	Condition
ON Solid	Calibration procedure; module does not have a saved offset
ON 1.5s; OFF 0.5s	Calibration procedure; module has an offset saved from a previous calibration procedure
OFF	Calibration procedure; module has saved an offset during the current calibration procedure
Fast Flash	Module has detected a hardware error
Flash with red LED	Normal Operation; movement in progress
OFF	Normal Operation; No movement in progress

- Supply Volts** – Displays the supply voltage for **SmartDepth**.
- Current** – Displays the amperage for **SmartDepth**.
- Duty Cycle** – Displays the **SmartDepth** motor output over the operating range, 0-100%.
- Depth** – planting depth including any calibration offset



Push button and led location.

## Manual Operation of the Depth Actuators:

The actuators can be moved manually via the push buttons on each respective row. The top button moves the actuator to a shallower setting and the bottom button moves the actuator to a deeper setting. This functionality is most commonly used to move the actuator out of the way while working on the row unit.

**Note:** Any actuator that is moved with the buttons will not move again with any **20|20** commands until that manual movement is cleared on the **SmartDepth Diagnostics** page (see notes on **Clear** button to the left).

