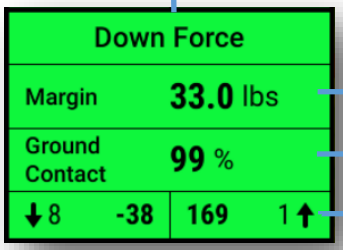
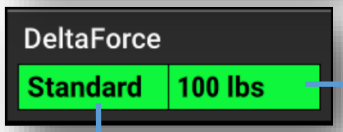
20|20 GEN 3—DELTAFORCE HOME SCREEN CONTROL

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





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

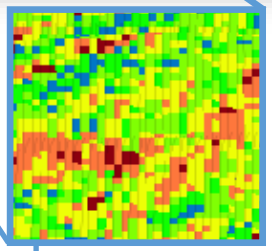
Margin—The lowest measured load cell reading in a given period of time on each row (varies with down force system installed). The Margin value displayed on the home screen Down Force button is an average of this value across all load cell equipped rows on the planter.

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.

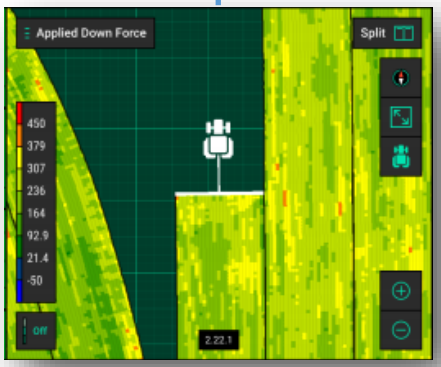
Low and High Row – Shows the average weigh pin readings for the lowest and highest rows.

Target pounds will be displayed.

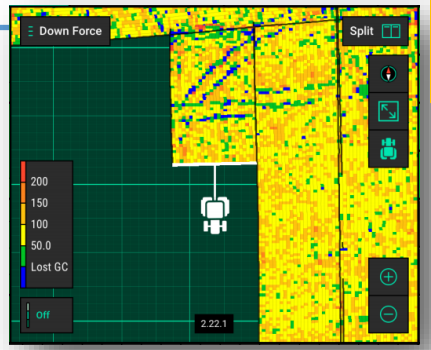
A **Blue** dot on the **Downforce** map indicates potential loss of ground contact. If blue dots are appearing regularly for multiple rows and the **Ground Contact** value in the **Down Force Metrics** widget is dropping below 100%, the **Target Control Setting** should be increased. See reverse for **"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 perfomance. 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.



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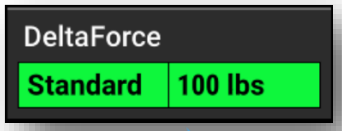
DeltaForce

20|20 GEN 3—DELTAFORCE CONTROL SCREEN



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

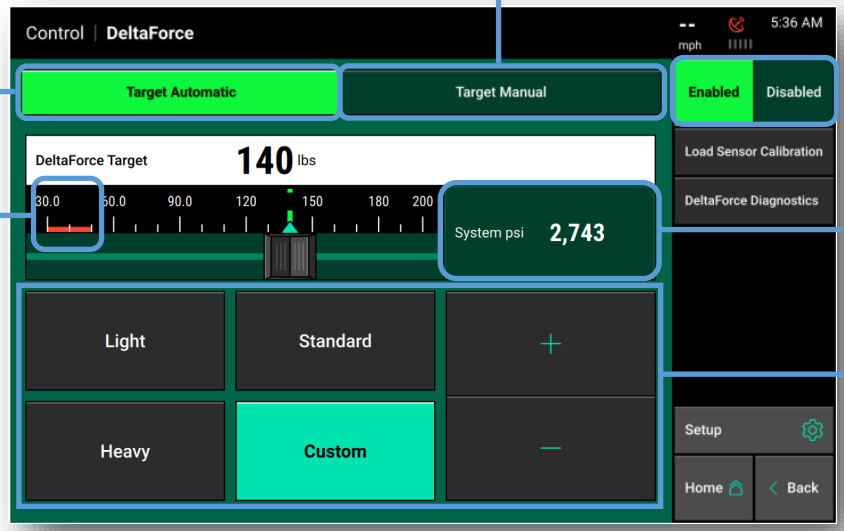
The DeltaForce system may also be operated in **Manual Mode**. **Warning**: this should only be used when planting plots as it only applies a set force to all rows and will make no adjustments based on weigh pin readings.

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 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.



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.

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.

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 retricts soil pore size which limits water, oxygen, and nutrients available to the plant.

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20|20 GEN 3—DELTAFORCE DIAGNOSE

START HERE

Diagnose

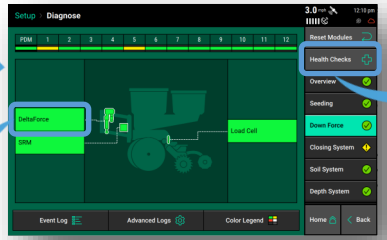
Button Press

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 **DeltafForce, 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.

Button Press

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.

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.

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.

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 Down-Force (Commanded Force on each row).

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

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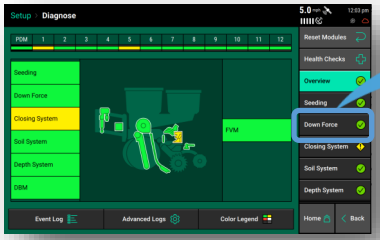
20|20 GEN 3—DELTAFORCE DIAGNOSE—LOAD CELL PAGE

START HERE

Diagnose

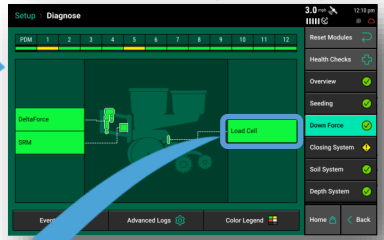
Button Press

Main Diagnose Page



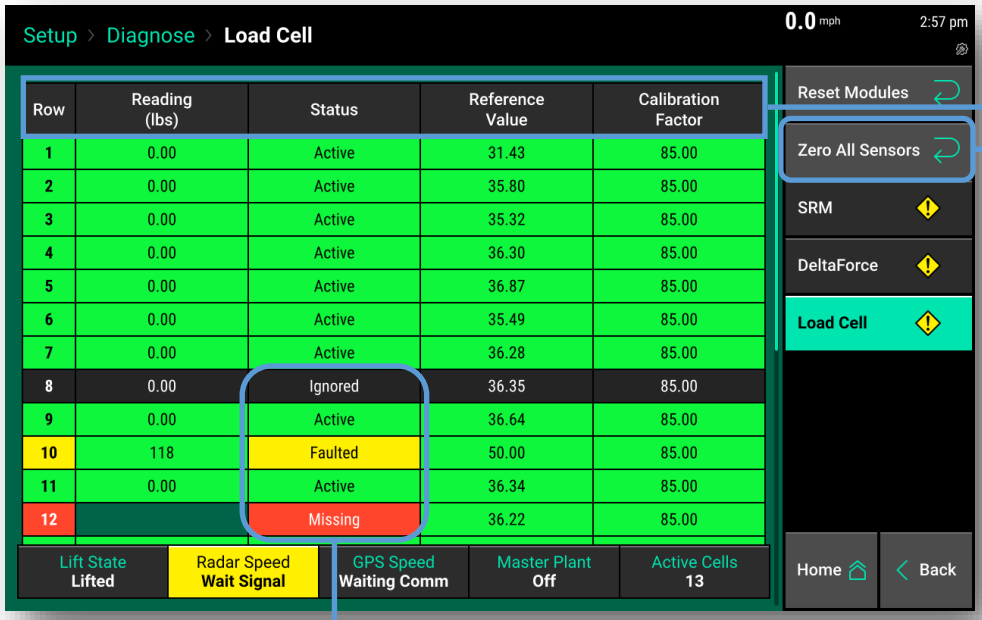
Button Press

DownForce Diagnose Page



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 **DeltafForce, Load Cell or SRM** to view **Detail Screen**.



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.

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.

Precision Planting