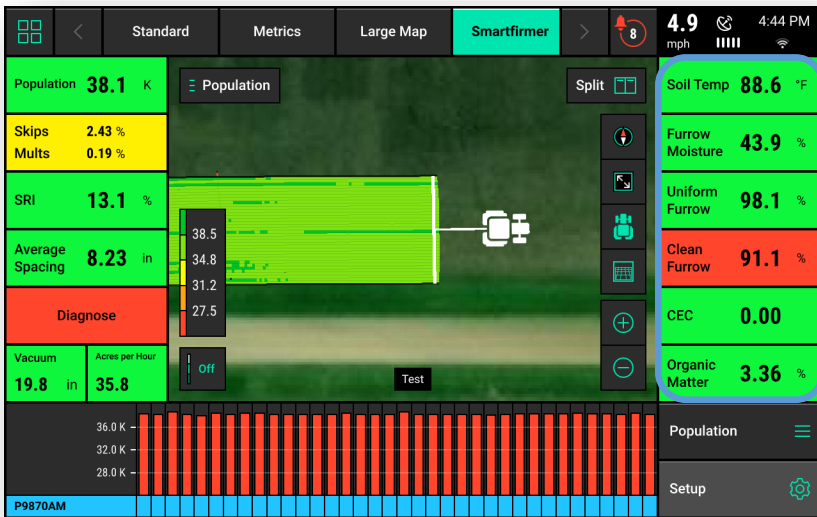


20/20 GEN 3—SMARTFIRMER CONTROL

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.

SmartFirm

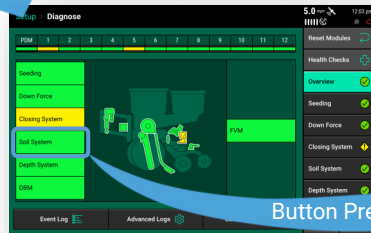
20|20 GEN 3—SMARTFIRMER DIAGNOSE

START HERE

Diagnose

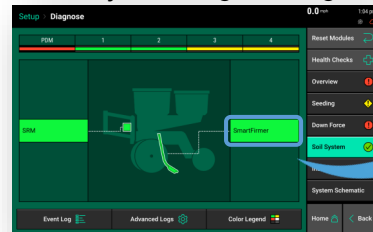
Press **Diagnose** button (or **Setup > Diagnose**) on **Home Screen**, select **Soil System** on the row unit schematic to access the **SmartFirmer Diagnose Screen**. Select SmartFirmer to navigate to the Detailed Diagnose Screen.

Main Diagnose Page



Button Press

Soil System Diagnose Page



Setup > Diagnose > SmartFirmer

5.8 mph 2:38 PM

Reset Modules

SRM

SmartFirmer

Row	Organic Matter	Uniform Furrow	Moisture	Clean Furrow	Temperature (°F)	CEC (meq/100g)
1	3.0%	98.0%	40.0%	89.0%	89.5	0.0
9	3.0%	99.0%	50.0%	93.5%	85.5	0.0
13	2.9%	94.5%	52.0%	96.5%	87.0	0.0
17	2.8%	99.5%	50.0%	90.5%	85.0	0.0
21	2.8%	94.0%	54.0%	94.5%	85.0	0.0
29	2.7%	99.5%	53.0%	93.5%	83.5	0.0
33	2.8%	96.5%	52.0%	97.0%	85.5	0.0

Lift State Lowered Radar Speed Wait Signal GPS Speed 5.8 mph FWD Accel 0.000 ft/s/s Master Plant On Turn Rate Missing

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Possible solutions for Event Log or Pop Up message errors:

Event Log Text	Pop Up Text	Action
SmartFirmer Not Detected	Lost Communication with SmartFirmers on row #____. Check connections:	Row # is showing an open input on the SmartFirmers input. This may indicate: damaged harness / connector; circuit failure of the SmartFirmers; or damaged SRM. Verify by plugging recognized SmartFirmers into row showing failure.
SmartFirmers Optics Damaged	SmartFirmers 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.
SmartFirmers Lens Blocked	SmartFirmers Lens Blockage detected on row #____.	Inspect SmartFirmers lens for build up, if lens is obstructed clean lens.
SmartFirmers Erratic Reading	Erratic SmartFirmers Readings on row #____	Inspect Row unit for potential ride issues and SmartFirmers for damage.

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

If **SmartFirmers** is healthy and communicating with the 20|20 and no pop up or error logs are present, anytime a single **SmartFirmers** shows unexplained deviation from the other **SmartFirmers** readings this could indicate an issue that should be investigated. First step is to visually inspect the **SmartFirmers** 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**.