



Quick Start Setup Instructions for John Deere's GS2 & GS3 Rate Controller

PLEASE NOTE: Your setup may vary. Not all screens are shown. See JD JDRC Operator's Manual for safety information and additional setup/operating information.
Please ensure you have the latest firmware installed!

MENU STRUCTURE FOR LIQUID RATE CONTROLLER

SET UP: Implement



SETUP

- Implement
- System
- Alarms
- Rates



TOTALS

- Current
- Job Summaries
- Lifetime Totals

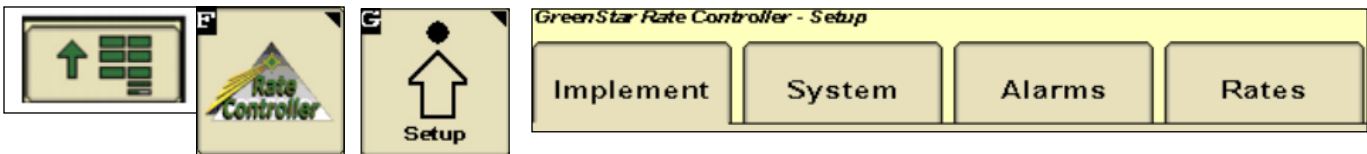


DIAGNOSTICS

- Readings
- Tests

Here you will enter the type, name, total width and section width for your implement you will be using for this operation. In this section of the setup you will be configuring the details of your implement to prepare it for liquid management.

1. Navigate to the Liquid Rate Controller Module



2. Select the Implement Tab to set up your Implement
3. Choose Implement type "Liquid Fertilizer Tool" **Note:** "Pull Behind Sprayer" may be selected on previous GS versions and does not require an implement switch.
4. Enter your preferred name for the implement where "AgXcel" is shown.
5. Enter your Implement Width in Feet
6. If you are going to setup your implement into multiple sections, press the Setup Sections button.
7. Setup the width of each section when the screen pops up after pressing the Setup Sections button.
8. **IF USING HEIGHT SWITCH:** Check the box at the bottom of this screen. You must then choose one of these choices:

Receive Status: On a planter, set it to this status to use the Seed Controller's height signal. (Some Seed Controller / Rate Controller combinations may not allow sharing of the height switch.)

Do Not Share: On a single product fertilizer applicator, set it to this setting.



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SET UP: System

System setup is where you will set the GS2/GS3 to be compatible with the AgXcel fertilizer system components. In this section of the setup, this is where you will configure the John Deere Liquid Rate Controller to manage the AgXcel fertilizer system.

1. Section Valve Type: 3-Wire
2. Control Valve type: PWM Close ("Close" means when the rate is zero or all sections are off, the controller will stop the pump)
3. Flow Return: NOT Checked
4. Flowmeter Calibration: See AgXcel Flow Meter Guide
5. Flowmeter Units: gal
6. Constant Flow: NOT Checked
7. Agitator Valve: Not Checked
8. Pressure Sensor: Check if using optional electronic pressure sensor.
9. PWM Setup (use the numbers indicated for your system)

OPTIONAL: 2nd pressure transducer. To have a 2nd pressure transducer, the customer must have the GreenStar Cable Main Harness. The part number for this adapter is 53992.

Control Valve Calibration (Adjust as needed) *

GX5 (hydraulic).....4012
GX2 (electric).....9911
Synergist.....533

Coil Frequency:

GX5 (hydraulic).....100
GX2 (electric).....100
Synergist.....150

High Limit: 255

Low limit (Adjust in the field as needed) **

GX5 (hydraulic) 60
GX2 (electric) 0
Synergist 16

*The GS2/GS3 Control Valve Calibration can be changed to optimize performance on your specific equipment. The 4-digit number is formatted XXYZ. Increase XX to make the system respond quicker. If set too high, the actual rate will oscillate around the target. Y is the output deadband and Z is the control deadband. Generally, leave these two digits low. Read your GS2 Operators Manual for more information. For example, to slow your response speed, move the number from 9911 to 8011, changing the valve response from 99 to 80. AgXcel has found the fastest setting has the best performance for each system.

**The Low Limit may be set higher if the system continues to present an error of "Solution Tank Dry." Slowly increment the Low Limit by 5,10,15 and 20 being the highest. If you set this number too high, you may not be able to achieve lower rates. Caution must be used when raising this number.

AGXCEL FLOW METER GUIDE		
MODEL / RATE	PULSES / GAL	Flow Cal #
0.08 - 1.6	22710 *	2838
0.13 - 2.6	22710 *	2838
0.3 - 5	11355 *	1419
0.6 - 13	4542	4542
1.3 - 26	2271	2271
2.6 - 53	1135	1135
NOTE: JDRC does not except more than 4 digits for a flow cal so a divide by 8 cable is required.		

WARNING: When receiving the "Solution Tank Dry" warning, it does not always warrant changing the "Low Limit" number. Other causes could be, fertilizer tank is low, flow meter is bad, pumps are not turning on, or bad harness connection. First ensure that liquid is NOT flowing when changing this number.

For AgXcel GX40 Synergist, divide pulses/gal by 128 and use fl. oz. as flowmeter units!



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SET UP: System Cont. – Pressure Sensor Calibration*

*(When using optional Pressure Transducer Kit P/N 53491)

1. On the System Setup screen, press "Calibrate Pressure Sensor" to open this screen.
2. Select Voltage-based Calibration
3. On the Screen that opens, enter 50.0 mv/psi
4. Press the button on the lower right to return to the System Setup screen.

Tip: If the system has been running, there may be pressure in the system due to the check valves. In that case, simply unplug the sensor while this setup is being done so it will calibrate the zero point correctly.

SET UP: Alarms

5. Customize your alarms and settings on this page.

SET UP: Rates

Enter your desired application rates here.

6. Enter up to 3 rates.
7. AgXcel recommends checking the rate Smoothing box and entering 10%
8. AgXcel recommends leaving minimum flow rate at 0.0. If greater than zero, this is the minimum flow in gallons per minute that the system will **NEVER** go lower than. Optionally, it could be set to the minimum flow limit of your flow meter



Quick Start Setup Instructions for John Deere's GS2 & GS3 Rate Controller

INITIAL OPERATIONS INSTRUCTIONS

The following diagnostic tests are critical to ensuring that your AgXcel solution functions properly and is ready for field use. AgXcel recommends that you perform these steps with **WATER**.

1a. Diagnostic – Tests – Section Test

1b. Diagnostic – Tests – Nozzle Flow Check

- Go to the Section test** (Diagnostics > Tests > Section Test.) Section test essentially functions like a MANUAL mode where you have direct control pump and valves.
 - Turn the Master switch on.**
 - Test section valves** by checking and unchecking boxes. Check boxes to open valves.
 - Press the “+” button and hold it.** The pump(s) should begin running (it takes lots of individual taps of this button to cause a visible effect.)
 - Is the water being pumped?** If system is not primed, remove the end cap from a flow indicator manifold or otherwise open the system. This will allow air to be expelled and the pump to prime and fill system.
 - With pump running and water flowing,** push “1,2,3” buttons. Look at the flow in GPM. Is there a reading there? If not, is the system primed with water flowing to each row? If water is flowing but no reading, check the flowmeter calibration and wiring harness connections.
 - Press the wrench icon,** now push the “-” button. Go back to the “1,2,3” screen. Did the flow in GPM decrease?
 - Make sure the GS2/GS3 flow readout** in GPM can be increased and decreased with the “+” and “-”.
- Go to the Nozzle Flow Check** (Diagnostics, Tests, Nozzle Flow Check.) This test will operate the system as if it were running in the field as a speed and application rate you enter.
 - Test Speed:** Enter your typical field operating speed.
 - Rate:** Enter your typical application rate.
 - Turn the Master switch on.**
 - Pump** will turn on and begin applying the entered rate.
 - Observe the system.** Are the flow and pressure on the screen stable and reasonable? Is the flow reasonable and equal from each application point?
 - Repeat this test** at minimum and maximum values for both Test Speed and rate. Remember heavier fertilizers, such as 10-34-0, will have higher pressures at a given flow than water.



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INITIAL OPERATIONS INSTRUCTIONS Cont.

1c. Diagnostic – Tests – Calibrate Flowmeter

1. **This test is required** before the John Deere Rate Controller will work properly and quit warning the operator to calibrate flowmeter.
2. **Go to Calibrate Flow Meter** (Diagnostics, Test, Calibrate Flow Meter.) The Calibrate Flowmeter screen will pop up.
3. **Nozzle that will spray:** Enter total rows on equipment.
4. **Test Speed:** Enter typical operating speed.
5. **Rate:** Enter typical application rate.
6. **Volume to dispense:** Enter volume that you are capable of catching and measuring from a single nozzle (in ounces.)
7. **Press the continue button** in the lower right hand corner
8. **Turn master switch on** and begin test.
9. **The “Calibration Test” screen will pop up** after test is complete. Enter the sample size collected from 1 row. You need to enter only 1 sample measurement. The GS2/GS3 just uses the various samples to calculate the average and total dispensed. The GS2/GS3 then calculates the new flowmeter calibration value.
10. **With AgXcel Mag Flowmeters**, in most cases the sample volume is correct. In that case, just enter the same sample size you did in #5 above to leave the calibration value unchanged. If the sample volume is different from what is expected, then recheck the calibration settings. Do not change the calibration values if there is only a small difference. AgXcel recommends that you do not change the flowmeter calibration number unless field use shows that the amount indicated by the flowmeter is not correct.

The image shows two screenshots from the John Deere Rate Controller interface. The top screenshot is the 'Calibrate Flowmeter' screen, which has a title bar 'GreenStar Rate Controller - Diagnostics' and tabs for 'Readings' and 'Tests'. The 'Tests' tab is selected, and a dropdown menu shows 'Calibrate Flowmeter - Catch'. The screen contains input fields for 'Number of Nozzles that will Spray' (12), 'Test Speed (mi/h)' (5.0), 'Rate (gal/ac)' (5.0), and 'Volume to Dispense per Nozzle (fl oz)' (10). An 'Estimated Test Time (mm:ss)' is shown as 0:37. A 'Continue' button is in the bottom right. The bottom screenshot is the 'Calibration Test' screen, also with the 'GreenStar Rate Controller - Diagnostics' title bar and 'Readings'/'Tests' tabs. It shows a table for sample measurements:

Sample	(fl oz)
7. Enter sample volume(s)	1 35
	2 35
8. Accept new calibration value	3 0
	4 0
9. Take additional samples as necessary	5 0
	6 0
	7 0

Summary statistics on the right: Average Sample Size (fl oz) is 35, Old Calibration Value is 70, and New Calibration Value is 70. A 'Take Another Sample' button and a 'Continue' button are at the bottom.

1d. Diagnostic – Tests – Configuration Test

1. Another way to verify that your system is working properly is by running the “Configuration Test”. This test will confirm that the section valves are operating while also checking the GreenStar’s ability to control the flow at various rates.

The image shows the 'Configuration Test' screen from the John Deere Rate Controller interface. It has a title bar 'GreenStar Rate Controller - Diagnostics' and tabs for 'Readings' and 'Tests'. The 'Tests' tab is selected, and a dropdown menu shows 'Configuration Test'. The screen contains instructions: '1. Turn Master Switch ON', '2. Press Start', and 'Note: Turn Master Switch OFF at any time to cancel test'. A 'Master On' button is shown. Below is a table with columns 'Flow (gal/min)' and 'Variance (%)':

	Flow (gal/min)	Variance (%)
Start	0.0	0
	0.0	0
1. Test Started	0.0	0
	0.0	0
2. Agitator Test	0.0	0
	0.0	0
3. Section Valve Test	0.0	0
	0.0	0
4. Flow Control Test	0.0	0
	0.0	0
5. Test Complete	0.0	0



AgXcel Liquid System Frequency Asked Questions (FAQ)

I am trying to achieve 5 GPA but my system will not go lower than 9 GPA.

- Make sure your PWM Low Limit is set to a number that is lower than your required lowest rate. This can be found in your Valve Control PWM settings on your console. If the PWM Low Limit is set too high you will not be able to achieve the lowest rate possible if set other than 10. Many times setting the Low Limit to 0 will work just fine especially when running lower rates.
- With an AgXcel System always make sure your Minimum Flow rate is set to 0.0 GPM or your system will not drop below this rate. For example if the Minimum flow rate is set to 3 GPM your system will not drop below this setting so if your required GPA requires 2.1 GPM then your system will not achieve this rate given that you have set the Minimum Flow rate to 3 GPM.
- When using an AgXcel GX5 Hydraulic system, make sure the AgXcel silver hyd valve is NOT in manual override. Check to ensure that the RED knob on top of the valve is pressed down by turning the knob clockwise while pressing the RED knob down. This will lock the PWM valve down so that the electronic solenoid can control the hyd flow.

I am trying to achieve 12 GPA but my system will only go up to 8 GPA on my GX5 Hyd system or I am trying to achieve 8GPA and can only achieve 5 GPA on my GX2 electric system

AgXcel GX2 Electric System

- What is your system pressure? If system pressure is too high (50PSI or above) this will prevent you from achieving your highest rate possible. High system pressure with an electric system can put the electric pump head into bypass mode and will not allow for full flow.
- **Check the following areas to lower your pressure**
 1. Select a larger orifice or Micro Tube with a larger hole, this will allow for easier flow of liquid through the system and can increase over all flow and GPA
 2. Check your system filters and make sure they are clean. This should be a practice each morning before using the system
- AgXcel GX2 Electric Systems can achieve up to about 5.9 GPM with dual electric pumps. Check your total GPM requirements and ensure that you are within range
- When using a Dual Pump System – unplug 1 pump and ensure that the other pump is working. Perform this test with both pumps and if one pump sounds weak replace it immediately
- Ensure that your PWM High Limit is set to 100. Many times an Auto Tune will set this to a lower number so make sure this is set to 100
- If you controller has this option, make sure the PWM Duty Cycle is within range
- Check all your boom widths and make sure that all are set correctly

AgXcel GX5 Hyd System

- What is your system pressure? If system pressure is too high (90PSI or above) this will prevent you from achieving your highest rate possible. High system pressure with a hydraulic system set 100 PSI bypass spike valve to open and you could begin to lose volume
- **Check the following areas to lower your pressure**
 1. Select a larger orifice or Micro Tube with a larger hole, this will allow for easier flow of liquid through the system and can increase over all flow and GPA
 2. Check your system filters and make sure they are clean. This should be a practice each morning before using the system
- Check your total GPM requirements and ensure that you are within range of the GX5 hyd pumps recommended GPM
- Ensure that your PWM High Limit is set to 100. Many times an Auto Tune will set this to a lower number so make sure this is set to 100
- If you controller has this option, make sure the PWM Duty Cycle is within range
- Check all your boom widths and make sure that all are set correctly



AgXcel Liquid System Frequency Asked Questions (FAQ)

AgXcel Liquid System Frequency Asked Questions (FAQ) cont....

My rate is fluctuating and is almost locking in but is jumping around

- Make sure that your Rate Smoothing is checked and set to 10. You can typically find this setting under your System Controller settings. Rate Smoothing allows the system to lock into the rate if the rate is within 10% of the required rate. Many times liquid temperature can affect the performance of the system.
- Make sure your pressure is enough to fully OPEN every check valve on the implement. A good rule of thumb is to ensure that pressure is higher than 15 PSI when using 4lb, 5lb and especially 10lb check valves

How do I know where my pressure should be?

- AgXcel systems are not pressure based especially when they are controlled with a Liquid Rate Control Module. HOWEVER, pressure can affect the performance of the system if the pressure is too low or too high. Many users feel that the higher the pressure then the less chance they have to plug an orifice. Although this statement holds value it can also have a major effect on system performance
- **Low pressure – RECOMMENDED 15PSI is the lowest**
 1. Can affect the performance of the pump and may cause it to surge which affect the accuracy of your flow
 2. Can affect the performance of your system check valves, not enough pressure and all your check valves may not OPEN and this may affect the accuracy of your system
- **High Pressure – RECOMMENDED – GX2 Electric = 25PSI GX5 Hyd = 70PSI**
 1. Too high of pressure can also affect the performance of your system as this can cause too much restriction in the manifold tubes and too much resistance will slow the rate down
- **RULE OF THUMB FOR PRESSURE**
 - AgXcel GX2 systems = 15PSI – 25 PSI
 - AgXcel GX5 Hyd systems
 - Low Range = 15PSI – 40 PSI
 - Medium Range = 20PSI – 50PSI
 - High Range = 40PSI – 80PSI
 - All these ranges are OK for the AgXcel GX5 system
 - For High Speed Planters check out the AgXcel GX30i VRT Solution

How do I raise and lower my pressure when required

- If your pressure is too HIGH then increase the size of your orifice and or Micro Tube to a larger hole size
- If your pressure is too LOW then change the size of your orifice or Micro Tube to a smaller hole

TIP - Many times the system may have difficulty priming, or if a flow meter has not detected flow and you want the system to continue running so as to prime. Go to Diagnostics > Tests > Calibrate PWM Limits

1. Time for Auto Mode Testing -
2. Once again, enter a Test Speed
3. Press the AUTO button
4. Ensure that the height switch is down or unchecked
5. Turn the Master ON
6. You can now monitor system flow vitals and ensure that all outlets of liquid are flowing
7. Once again, check sections if sections are being used
8. System testing is complete - Turn OFF the Master Switch

AgXcel System Performance Settings - To ensure the best performance of your AgXcel system especially at Start Up, setting the PWM Start Up % can be fine tuned. PWM Start Up % sends voltage to the pumps at the % that has been set. This can assist in the priming cycle to get the pumps running quicker. Once the pumps jump up to the % set, then it will begin its cycle to lock into the required target rate setting.



AgXcel John Deere Green Star GS2/3 Integration

Harness 37 round pin to Twin-16 round pin Y connector

WIRE SIZE –
18 AWG

LENGTH –
3 FT

AgXcel #53593
309-524

37 Pin Round
AMP Male pins
in male body
(with threads
for swivel nut)



Valve Ground

Valve Ground

Valve Power

Section 1

Section 2

Section 3

Section 4

Section 5

Section 6

Section 7

Section 8

Section 9

Section 10

Section 11

Section 12

Section 13

Section 14

Section 15

Section 16

Section 17

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AgXcel PWM Integration Harness, PWM, Flow Meter, Pressure

