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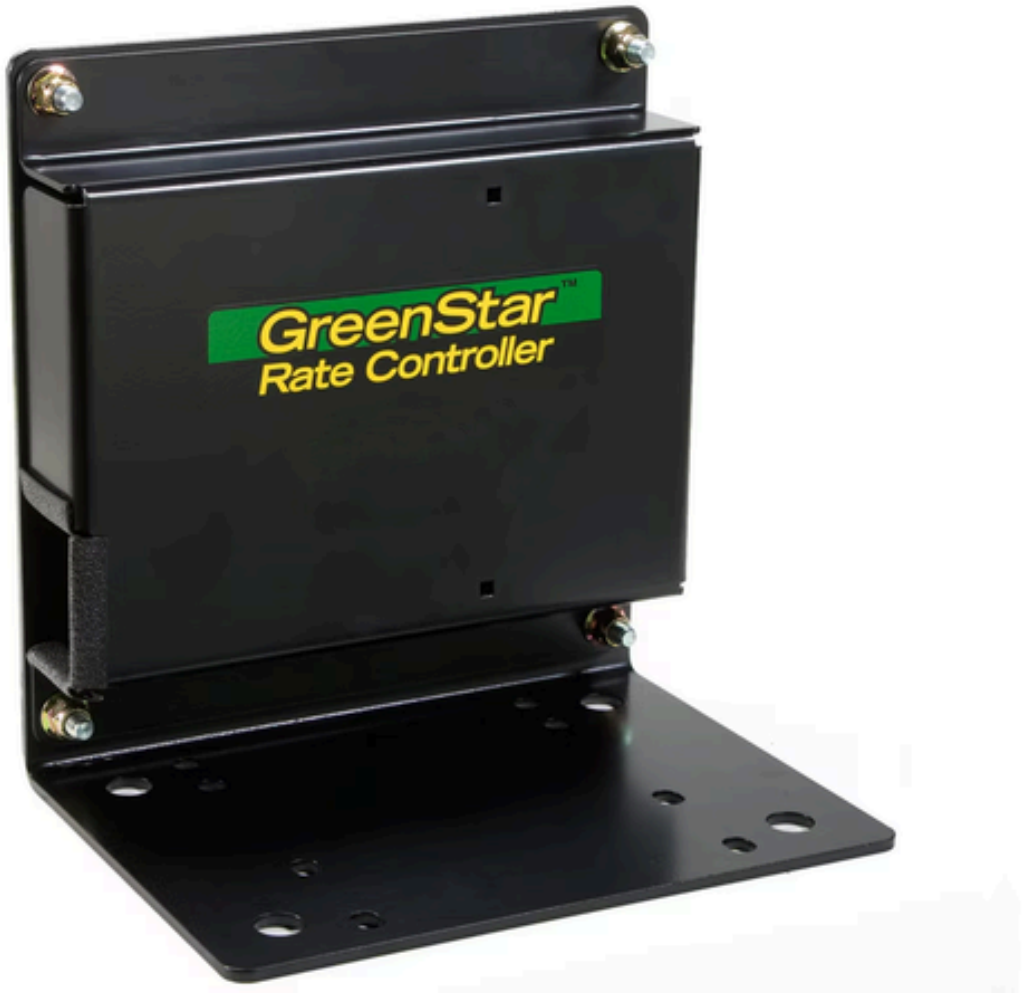
JOHN DEERE GS2 & GS3 RATE CONTROLLER

AgXcel Quick Start Setup



PLEASE NOTE: YOUR SETUP MAY VARY!

The screenshots in this guide represent a typical AgXcel Liquid Fertilizer System setup.
See your equipment operator's manual for safety information and additional setup and operating information.
Please ensure you have the latest firmware installed!

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Menu Structure for Liquid Rate Controller Set Up:
IMPLEMENT

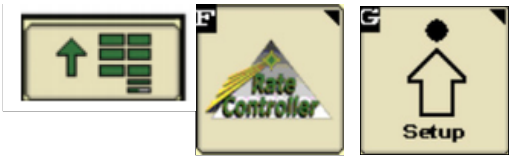
SETUP
- Implement
- System
- Alarms
- Rates

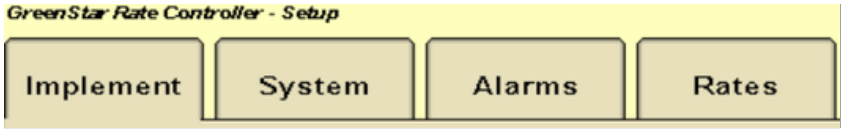
TOTALS
- Current
- Job Summaries
- Lifetime Totals

DIAGNOSTICS
- Readings
- Tests

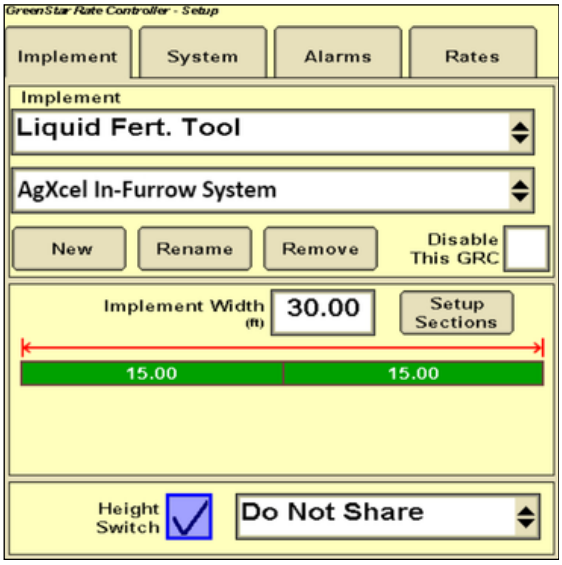
Here you will enter the type, name, total width and section width for your implement you will be using for this operation. In this section of the setup you will be configuring the details of your implement to prepare it for liquid management.

- **Navigate to the Liquid Rate Controller Module**





- **Select the Implement Tab to set up your Implement**
- **Choose Implement type "Liquid Fertilizer Tool" Note: "Pull Behind Sprayer" may be selected on previous GS versions and does not require an implement switch.**
- **Enter your preferred name for the implement where "AgXcel" is shown.**
- **Enter your Implement Width in Feet**
- **If you are going to setup your implement into multiple sections, press the Setup Section button.**
- **Setup the width of each section when the screen pops up after pressing the Setup Sections button.**
- **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.**



Note: On previous versions of GS2/GS3 software, a height switch was required for a Liquid Fertilizer Tool. However, on this version you can leave the Height Switch box unchecked and no height switch is required.

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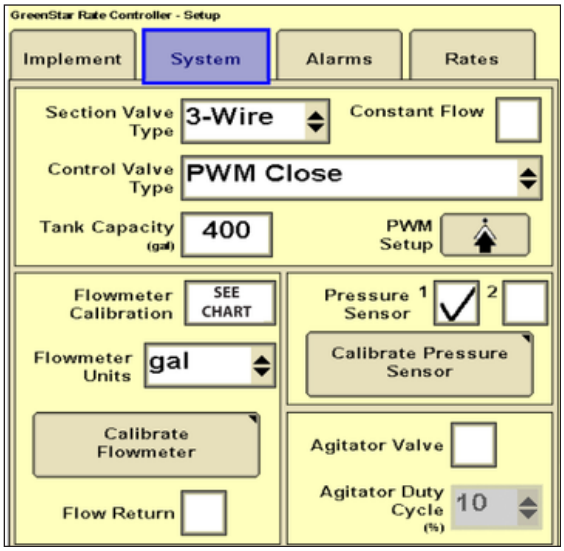
SETUP SYSTEM

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.



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

Control Valve Calibration (Adjust as needed) *

- **GX5 (hydraulic diaphragm).....4012**
- **GX5 (hydraulic centrifugal)....0522**
- **GX2 (electric) 9911**

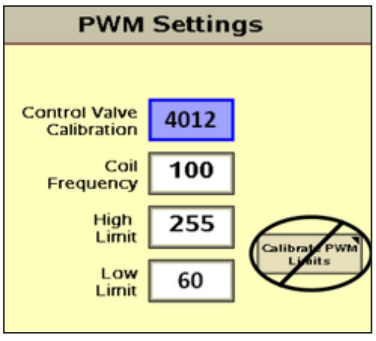
Coil Frequency:

- **GX5 (hydraulic diaphragm).....100**
- **GX5 (hydraulic centrifugal).....122**
- **GX2 (electric) 100**

High Limit: 255

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

- **GX5 (hydraulic diaphragm) 60**
- **GX5 (hydraulic centrifugal) 60**
- **GX2 (electric) 0**



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.

*The GS2/GS3 Control Valve Calibration can be changed to opti- mize performance on your specific equipment. The 4-digit number is formatted XXYZ. Increase XX to make the system respond quick- er. If set too high, the actual rate will oscillate around the target. Y is the output deadband and Z is the control deadband. Gener- ally, 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 pres- ent 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.

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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ORION 2+ MAGNETIC FLOWMETER MODELS

Orion 2+ Magnetic Flowmeters:

- 0.053 - 5.3 GPM.....11355
- 0.53 - 53 GPM.....1135
- 2.11 - 211 GPM.....284

ORION 3 MAGNETIC FLOWMETER MODELS

Orion 3 Magnetic Flowmeters:

- 0.04 - 1.6 GPM (DN3).....75712
- 0.08 - 3.17 GPM (DN4).....37854
- 0.26 - 10.5 GPM (DN7).....11356
- 0.52 - 21 GPM (DN10).....4245
- 1.45 - 58 GPM (DN17).....2063

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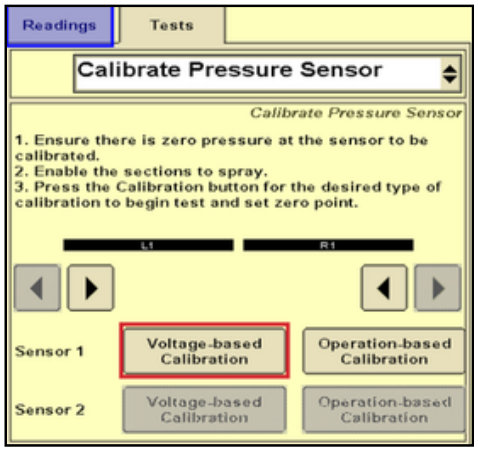
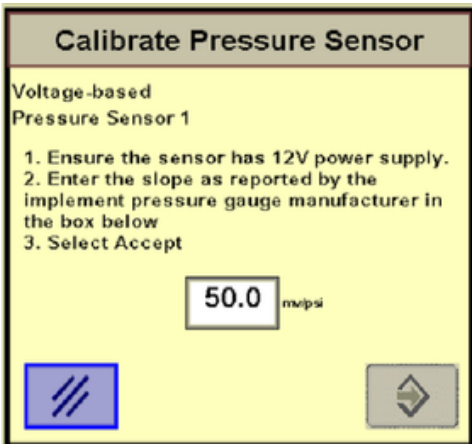
SET UP: System Cont. – Pressure Sensor Calibration*

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

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

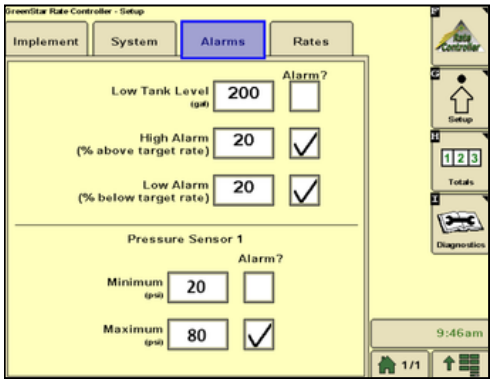
Tip: If the system has been running, there may be pressure in the system due to the check valves. In that case, simply unplug the sensor while this setup is being done so it will calibrate the zero point correctly.





SET UP: Alarms

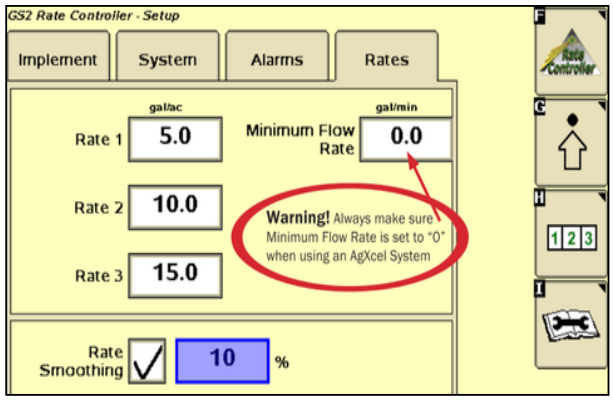
Customize your alarms and settings on this page.



SET UP: Rates

Enter your desired rates:

- Enter up to 3 rates.
- AgXcel recommends checking the rate Smoothing box and entering 10%
- 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 flowmeter.



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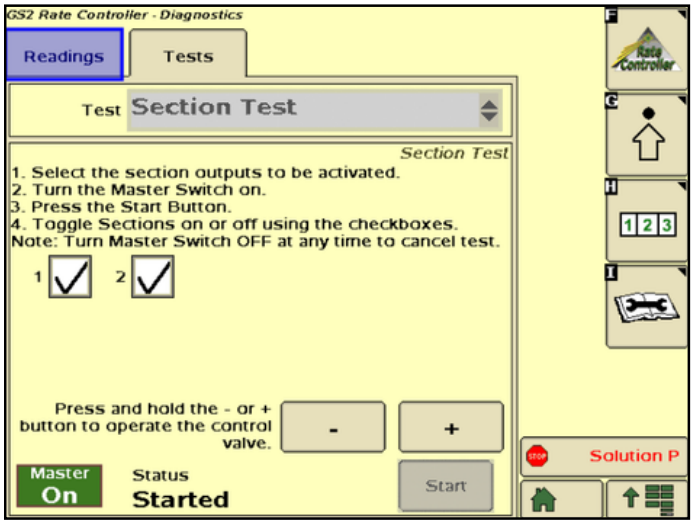
INITIAL OPERATIONS INSTRUCTIONS

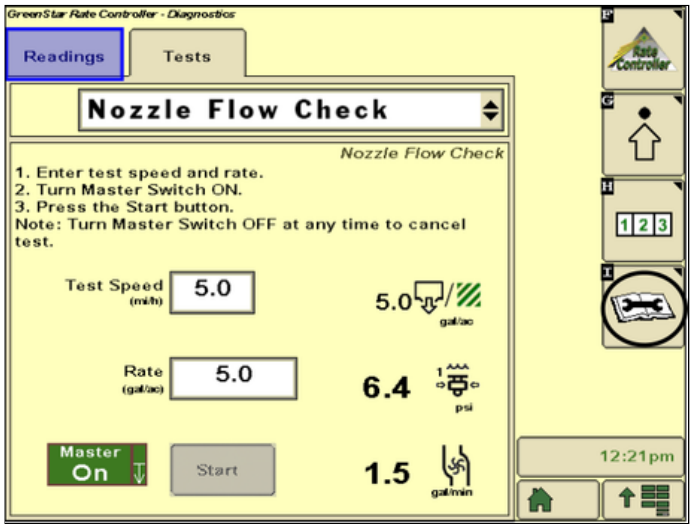
The following diagnostic tests are critical to ensuring that your AgXcel solution functions properly and is ready for field use. AgXcel recommends that you perform these steps with WATER.

1a. Diagnostic – Tests – Section Test



- **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 oth- erwise 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 "-".

1b. Diagnostic – Tests – Nozzle Flow Check



- **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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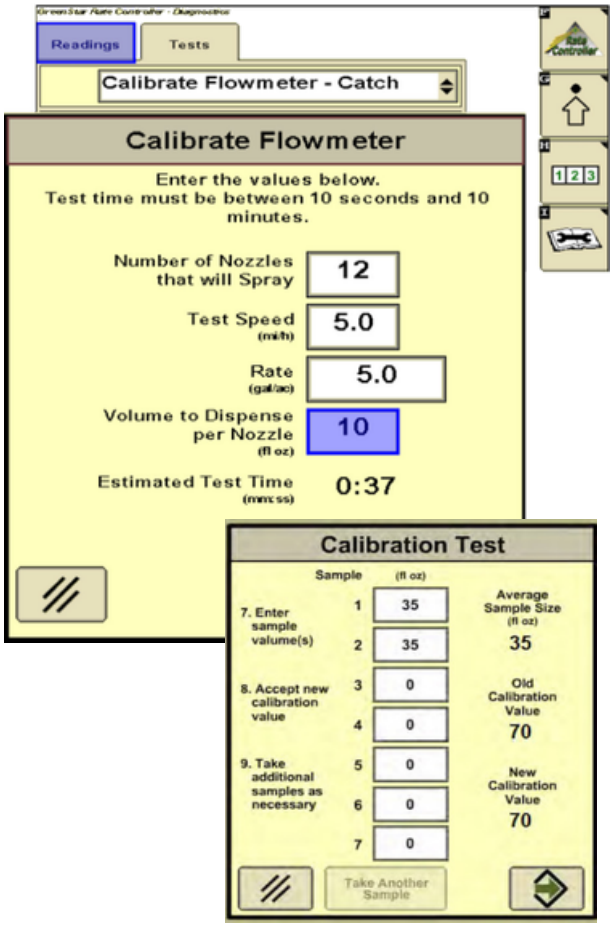
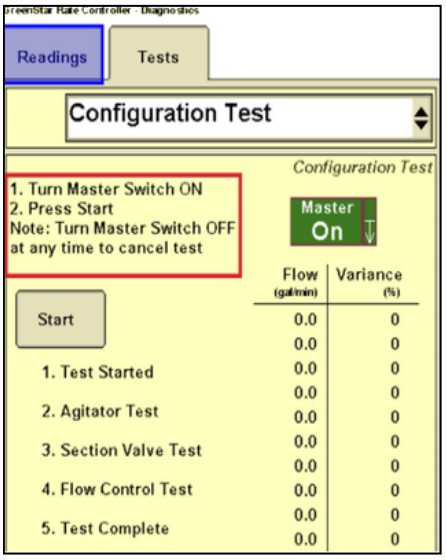
INITIAL OPERATIONS INSTRUCTIONS CONT.

1c. Diagnostic – Tests – Calibrate Flowmeter



- **This test is required** before the John Deere Rate Controller will work properly and quit warning the operator to calibrate flowmeter.
- **Go to Calibrate Flow Meter** (Diagnostics, Test, Calibrate Flow Meter.) The Calibrate Flowmeter screen will pop up.
- **Nozzle that will spray:** Enter total rows on equipment.
- **Test Speed:** Enter typical operating speed.
- **Rate**: Enter typical application rate.
- **Volume to dispense**: Enter volume that you are capable of catching and measuring from a single nozzle (in ounces.)
- **Press the continue button** in the lower right hand corner
- **Turn master switch** on and begin test.
- **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.
- **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 cali- bration value unchanged. If the sample volume is different from what is expect- ed, 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.

1d. Diagnostic – Tests – Configuration Test



- **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.

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TROUBLESHOOTING

Why am I Over-Applying?

- Ensure that your Low Limit setting is lower than the current Duty Cycle. This setting can be found in Setup > Setup > PWM Setup. If your Low Limit is set too high, then the liquid controller will not allow the pump to apply at a lower Duty Cycle than the set low limit.
- Ensure that your Minimum Flow Rate is set to 0. This setting can be found Under Setup > Rates.
- If you are using the GX5 Hydraulic Pump, ensure that the manual override valve is set in the close position. If the manual override is opened, then the GX5 pump will ignore the commands from your liquid controller and will only apply fluid based off of your hydraulic flow.

Why am I Under-Applying?

- Ensure that the pump system pressure is not too high, such as over 40 PSI. If your pump system pressure is too high, then you may have an obstruction in your pump or in your plumbing after the pump.
- Ensure that your disk orifice or microtube size is not too small. When the weather is colder, fertilizer can become more viscous, meaning that the pump is creating more pressure so the thicker liquid can be pushed through the same smaller size disk orifice or microtube.
- Ensure that your filter is not fully plugged or partially plugged.
- Ensure all ball valves from the tank to the pump are fully opened.
- Ensure you are not pulling in air from anywhere on the pump or before the pump. Ensure that all poly fittings have plumbers tape, all clamps are tight, all gaskets are in place, no poly fittings are cracked or damaged, all filter cups are screwed on tight and the oring is present and not damaged on the cup.
- If you are using a GX5 Hydraulic Pump, ensure you are providing enough hydraulic flow to the GX5 pump.
- Ensure that your High Limit is set at 255. This setting can be found under Setup > System > PWM Setup. If your High Limit is set too low, then the liquid controller will not allow the pump to apply at a higher Duty Cycle than the set high limit.
- If you are using the GX5 Hydraulic Pump, ensure that the manual override valve is set in the close position. If the manual override is opened, then the GX5 pump will ignore the commands from your liquid controller and will only apply fluid based off of your hydraulic flow.
- Ensure that your pressure is higher than at least 10 PSI (check valve size dependent). If you are using a 4LB check valve (blue top), then you will need a minimum of 10 PSI to open all of the check valve. If you are using a 10 PSI check valve (black top), then you will need a minimum of 20 PSI to open all of the check valves. Not creating enough pressure can cause uneven flow to each row and also potentially cause your pump system under apply.

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TROUBLESHOOTING

Why is my flow rate surging?

- Ensure that the Rate Smoothing box is checked and set at 10%. This can be found under Setup > Rates.
- Lower the first two digits of your Control Valve Calibration Setting. This setting can be found in Under Setup > System > PWM Setup. The higher the value of the first two digits is, the more aggressive the pump system will be. The more aggressive the pump system is, the more the pump can surge, but having a higher valve response rate also means that the pump is able to respond faster to changes in your flow rate. But if the control valve calibration is too low, then the pump can become too slow and take too long to reach your target rate.
- Ensure that your pressure is higher than at least 10 PSI (check valve size dependent). If you are using a 4LB check valve (blue top), then you will need a minimum of 10 PSI to open all of the check valve. If you are using a 10 PSI check valve (black top), then you will need a minimum of 20 PSI to open all of the check valves. Not creating enough pressure can cause uneven flow to each row and also potentially cause your pump system under apply.

What should my system pressure be?

- AgXcel Pump Systems are not pressure based, especially when they are controlled with a Liquid Rate Controller. However, pressure can affect the performance of the pump system if the pressure is too low or too high. It is recommended to not apply under 10 PSI if you are applying fertilizer infurrow and not above 40 PSI. For a Nitrogen application, it is recommended not to apply below 20 PSI but no need to apply over 60 PSI.

Why is my controller tells me I am applying the correct amount, but I am actually applying more/ less at the rows?

- If your flowmeter calibration number is incorrect, your liquid controller can still tell you that you are applying the correct amount of fertilizer, even though you are actually applying an incorrect amount of fertilizer. Ensure that your flowmeter calibration number is the same as what was provided on your pump system manual. This number will be located on a sticker on the manual. •
- If you have the correct flowmeter calibration number entered that was provided by AgXcel, then you will need to manually change the flow calibration number. You can either preform a Catch Test Calibration which can be found under Diagnostics > Tests > Calibrate Flowmeter - Catch, or you can manually adjust the flow calibration number yourself. If you raise the flowmeter calibration number, then you will apply more fertilizer. If you lower the flowmeter calibration number, then you will apply less fertilizer.
    - To quickly find what your flowmeter calibration number should be, take the amount of fluid you caught at the row and divide that by the amount of fluid that you should have caught at the row. So if you over applied by 20%, then you can reduce your flowmeter calibration number by 20%. Then do another catch test to ensure you are applying at the correct rate. Or if you under applied by 20%, then you can raise your flowmeter calibration number by 20% and do a catch test to ensure you are applying at the correct rate.

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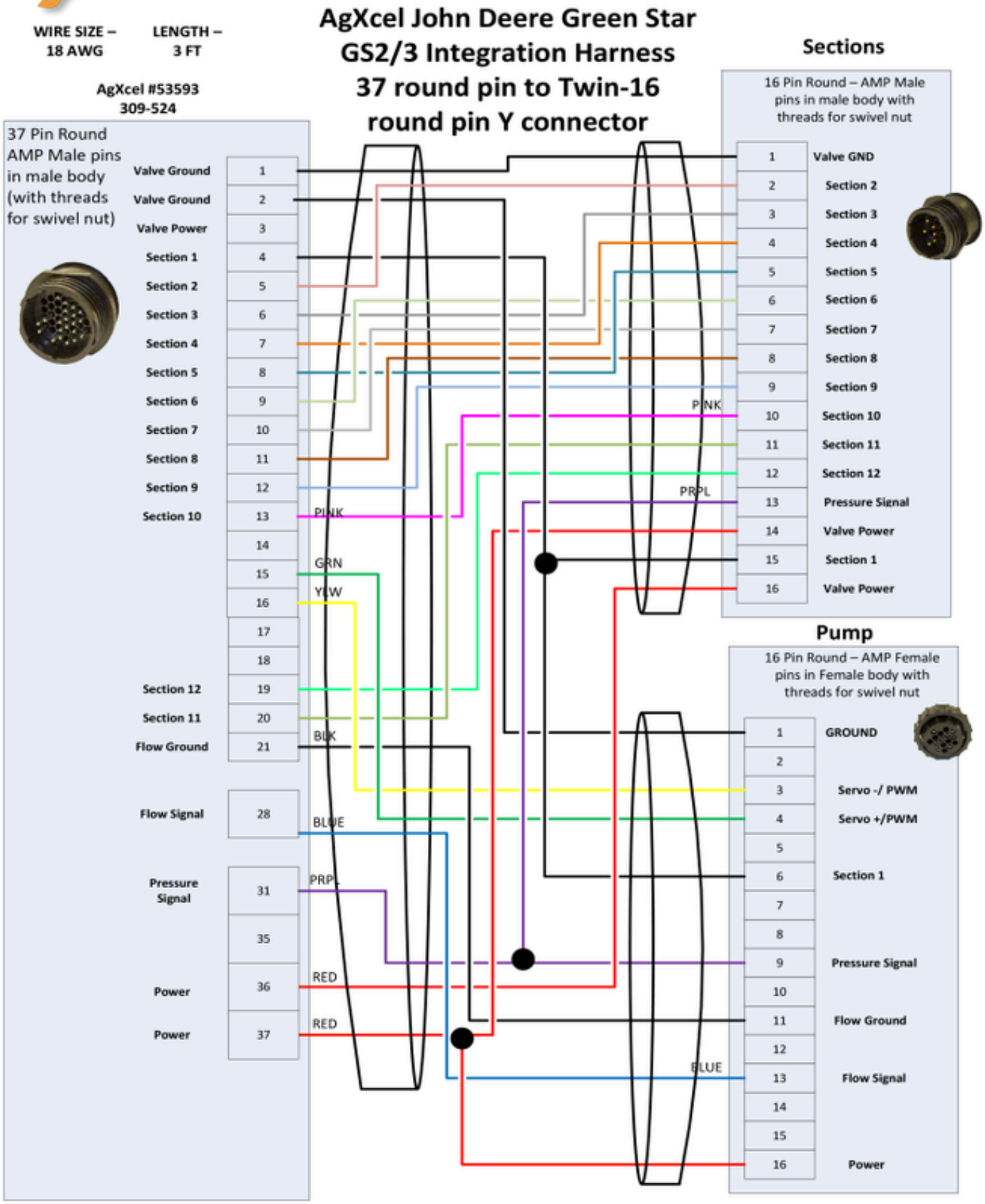

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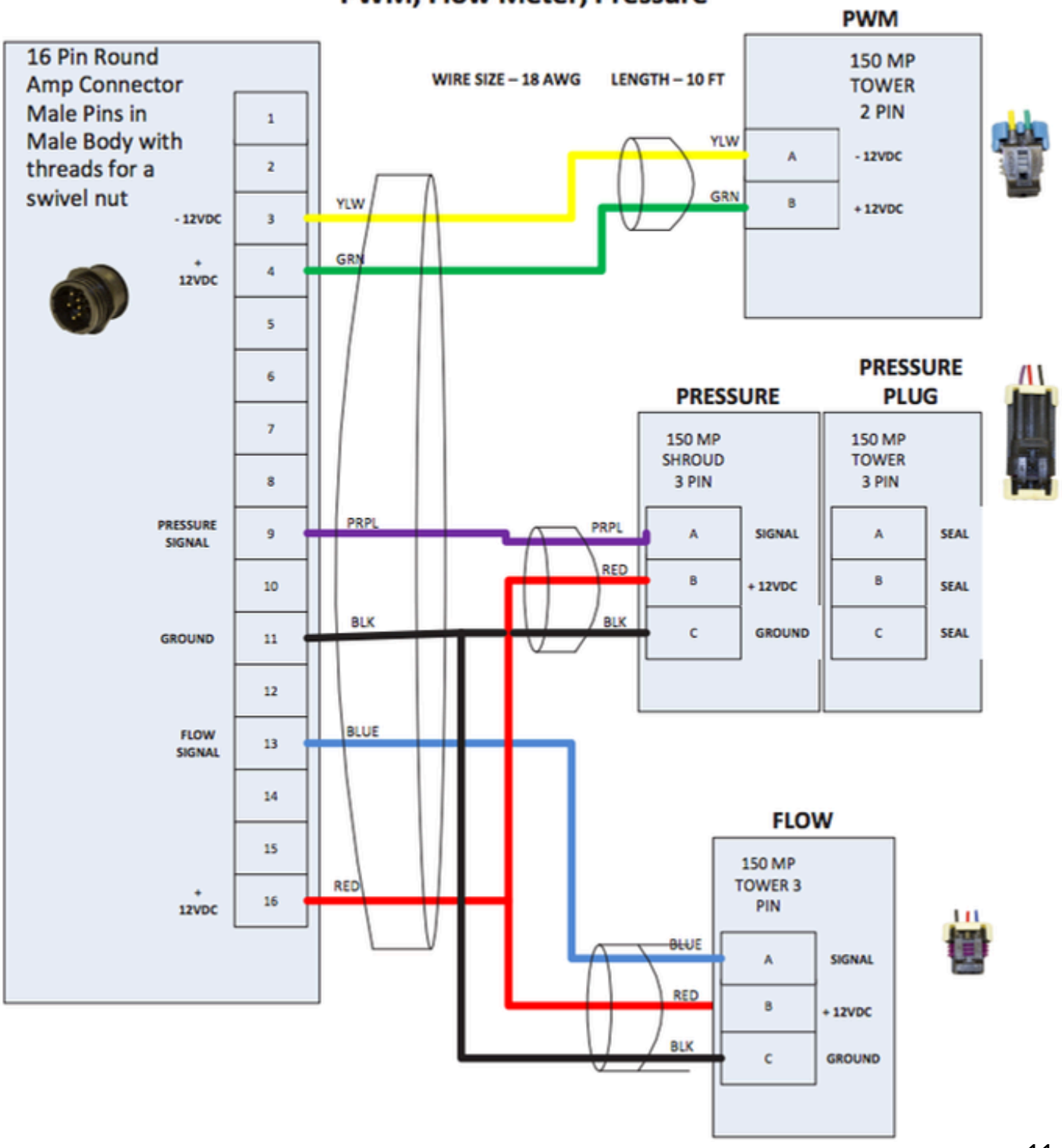
AgXcel PWM Integration Harness
PWM, Flow Meter, Pressure



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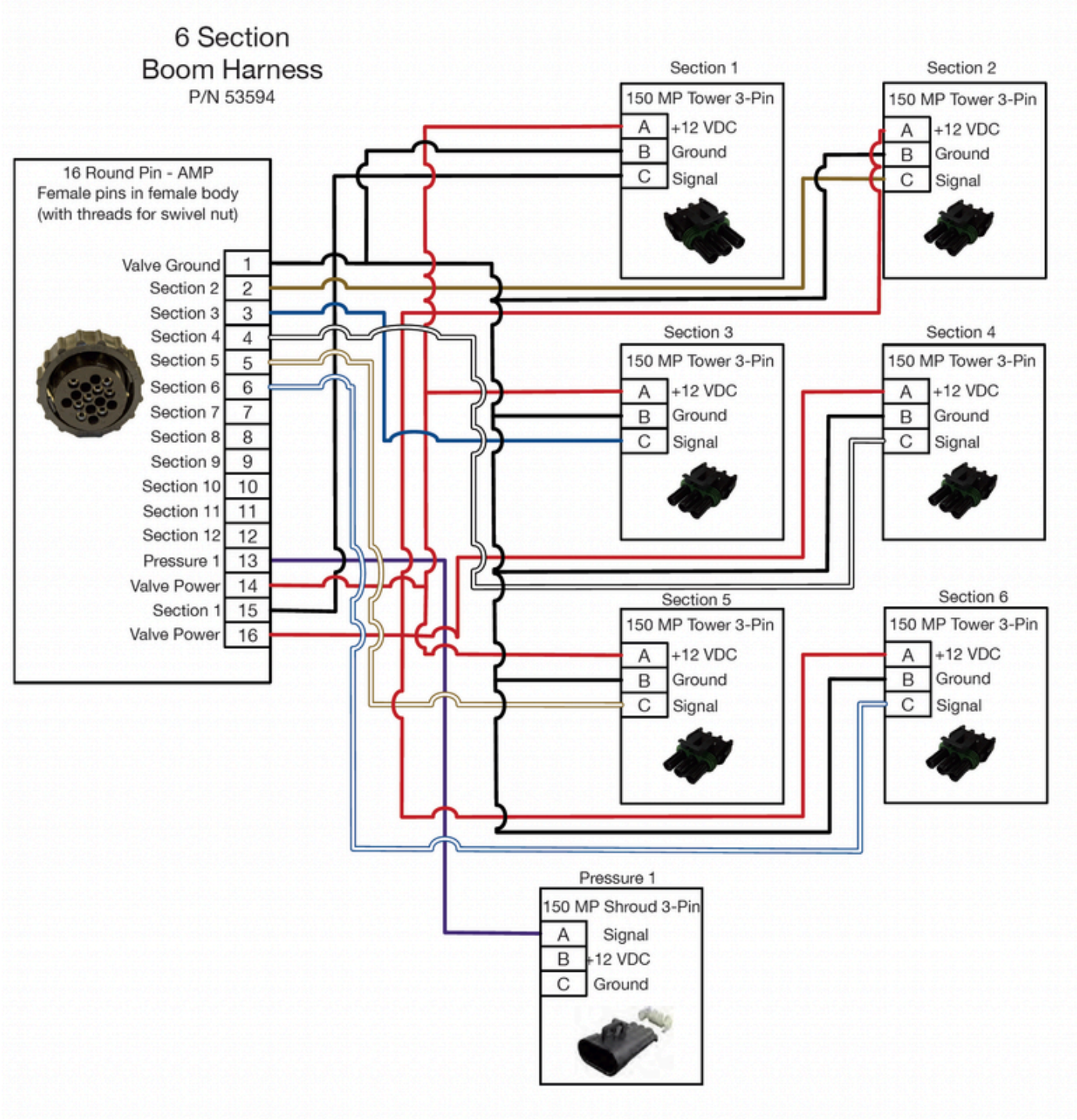

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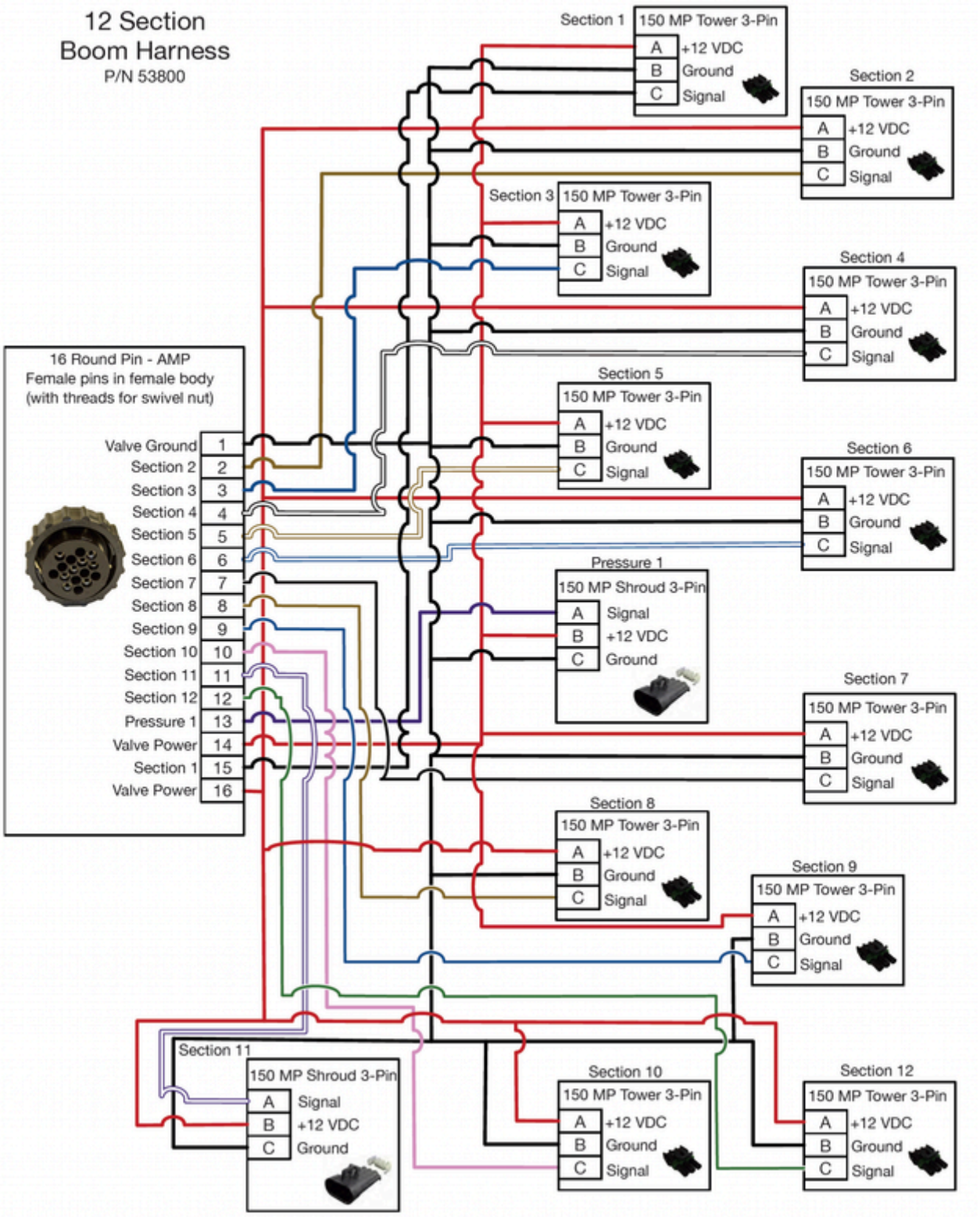

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