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Troubleshooting / Service Guide for SurePoint PWM Liquid Application Systems

Raven Rate Control Module (RCM)

Always verify the controller settings. See the screenshots in Section F of the system manual.

See the Raven Rate Control Module Operation Manual P/N 016-0171-637

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Raven RCM

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The pump won't run.

Electric Pump System

EPD flashing 4 times

1. Find the EPD (electric pump driver). Should have a steady blinking light (one blink per second) in the middle when pumps should be off. In Run mode, the center light should be steady red, the upper right should be steady red. If Status LED is flashing 4 times, then pausing, EPD has tripped due to low voltage condition. Unplug the Power Supply to the EPD to reset. If condition persists, check Power Supply cables from battery to EPD to insure solid connections and good electrical path. Check connections at battery. Check connectors at the hitch and at the EPD. *(There should be at least 11-12 volts at the point where the EPD connects to the battery power harness, when tested under load. This voltage may show up when there is no load, but the harnessing may not be good enough to deliver 11-12 volts under load.)*

No Lights on EPD

1. There should be a steady blinking light in the middle of the EPD. If no light is ON, check the 40-amp fuse in the EPD harness near the battery. Use a voltmeter to verify that there is 12-13 volts at the Power Supply connector that plugs into the EPD. **Check this under load.** It may show adequate voltage with nothing on, but bad wiring or connectors or even a blown fuse may show voltage with no load, but will not support the current needed with a load.

Will pumps run?

1. Connect the two large connectors that are plugged into the bottom of the EPD to each other (bypass the module and supply 12 volts directly to pumps).
2. Do the pumps run? If not, check the 40 amp fuse in the EPD harness near the tractor battery. Inspect harnesses and connections. If 2-pump system, plug pumps in by themselves to check each individually.

Electric pumps only run with 12 volts direct from battery

Check to see if a PWM signal is getting to the EPD:

1. Connect pumps and power harness back to EPD.
2. Go to **Diagnostics > Calibrate PWM Limits** to investigate this issue.
3. In Calibrate PWM Limits, hold down "+" button for a 8-10 seconds. A single tap of this button produces a very small change in signal to the valve, so you must hold it. *(Look at PWM Duty Cycle –DC%)*
4. Remove PWM valve connector at EPD and check voltage. You will need 4-12 volts to turn pumps on. (PWM Duty Cycle at 100 should be 12+ volts on PWM signal)
5. If 4-12 volts is not present, check harnesses and review control valve type setup (should be PWM Close or PWM).
6. Go back to the 12-pin Deutsch pump connector, check PWM voltage between Pins 5 & 6 (check pins 5 & 2 if PWM wires are Yellow and BLACK).
7. If you have a 37-pin round connector, check the voltage between pins 15 & 16.

For more complete system information see the manual for your system. Manuals can be seen and downloaded at www.SurePointag.com/support. The manuals also contain wiring harness diagrams.

See the Raven Rate Control Module Operation Manual P/N 016-0171-637.

Hydraulic Pump Will Not Turn

Turn hydraulics off, go to the **SurePoint Hydraulic PWM valve** and use the manual override (red knob) on top of the electric coil to **manually open the valve** (Manual Override UP = valve fully open). There may be dirt in here that needs to be cleaned out before you can turn and raise the override. Start the **Calibrate PWM Limits Test** to open the section valves. Turn hydraulics on **at a low flow only** as the valve is 100% open. Gradually increase the hydraulic flow from the cab. If pump does not turn, try hydraulic lever in opposite direction. Try switching to a different remote. Does the pump turn? If it turns, your problem is electric / electronic. If the pump still does not turn, you have a hydraulic problem.

Electric / Electronic Problem

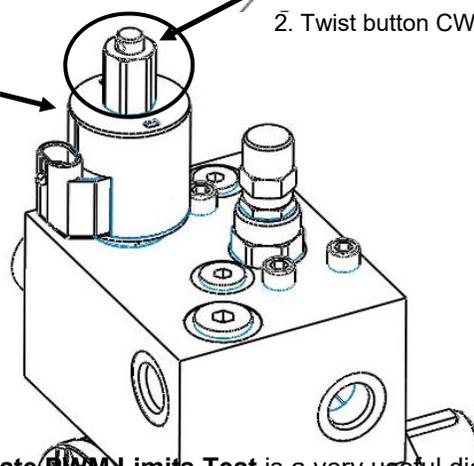
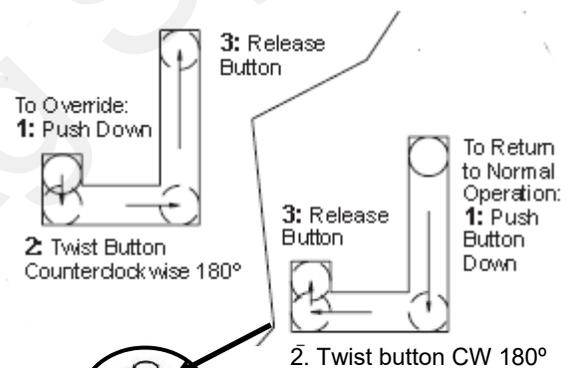
1. Close manual override (lock down)
2. Go to **Diagnostics > Calibrate PWM Limits** to investigate this issue.
3. Verify hydraulics are on.
4. In Calibrate PWM Limits, hold down "+" button for 8-10 seconds. A single tap of this button produces a very small change in signal to the valve, so you must hold it.
5. Take a metal object and hold it next to the coil. If the coil is working, you will feel the magnetic pull.
6. If no magnetic force is felt, disconnect the PWM valve connector and check voltage. You will need 6-12 volts to get hydraulic valve to open.
7. If 6-12 volts is not present, check harnesses and review control valve type setup.
8. Go back to the 12-pin Deutsch pump connector. Check voltage between pins 5 & 6. (Check 5 & 2 if PWM connector has Yellow and BLACK wires.)
9. If you have a 37-pin connector, check voltage between pins 15 & 16, should be between 6-12 volts while in Calibrate PWM Limits after holding "+" button.
10. You can remove the electromagnetic solenoid with proportional valve to see if the valve moves when a PWM signal is sent to it. Look closely, it's a small movement.

Hydraulics Problem

1. Leave the manual override open on the SurePoint valve.
2. Check the hose routings. The "P" port on the SurePoint valve should hook to pressure. The "T" port is the return that should flow back to the tractor.
3. Try hoses in a different hydraulic remote. Inspect hydraulic connectors for damage or restrictions.

Hydraulic Manual Override

Down - Normal Operation



Set PWM Limits

Tests > Calibrate PWM Limits

1. Turn Master Switch ON.
2. Press the Start button.
3. Adjust setting until minimum acceptable flow/pressure is achieved, and press Set Low Limit.
4. Adjust setting until maximum acceptable flow/pressure is achieved, and press Set High Limit.

Note: Turn the Master Switch off to stop product application.

-

+

Set High Limit

1.2

(gal/min)

Master ON

21

(PSI)

31.0

DC

Set Low Limit

The **Calibrate PWM Limits Test** is a very useful diagnostic tool in servicing the John Deere system. It is a good way to prime the pump initially. It can be helpful to go the **Readings > Delivery System** to see information on the flowmeter operation and the **PWM Duty Cycle**.

Tests > Nozzle Flow Check is a good screen to try a Speed and Target Rate to see if it will lock on to a rate. *When testing with water, the pressure will be a lot less than it will be when using a fertilizer product.*

Application Rate Fluctuates

First, you need to determine if the fluctuation is caused by the controller sending fluctuating signals to the valve or because of something else.

1. **Inspect & clean pump inlet strainer.** Strange flow rate fluctuations are very often due to an obstruction to the pump inlet. Inspect plumbing from tank to pump. With a SurePoint electromagnetic flowmeter and metering tube, you usually need just a 20- or 30-mesh strainer.

OR

1. Run the system in Manual Mode with a Test Speed or Diagnostics > Tests > Calibrate PWM Limits.
2. Turn the system on. Watch the flow in GPM. **Does the system run steady in Manual Mode?**
3. Is the flow steady within a very small range? For example, a fluctuation from 12.3 to 12.6 GPM would be considered normal. A fluctuation from 10-14 GPM is a problem. If only a small normal fluctuation is seen in section test, skip steps 4-8 and proceed to "Application Rate Fluctuates in Field " below.
4. If there is a large fluctuation, observe the system flow. Is the discharge a steady stream; are the flow indicator balls floating steady?
5. If visually the flow is steady, but the display reports a fluctuation in GPM, inspect the flowmeter. See section B of manual for flowmeter information. Check connections between tank and pump. A loose connection may not show up as a leak, but it can be a place where air can be sucked in. Air in the system will cause erratic flowmeter operation.
6. If visually the flow is unsteady, the flowmeter is working correctly reporting a flow problem. Is the pump turning steady or surging?

Application Rate fluctuates in field, but flow in manual (Calibrate PWM Limits) mode is stable.

This problem indicates the valve calibration needs changed. The system is surging because the Rate Controller is moving the hydraulic valve too much.

1. Go to **Setup > Settings > Control Valve Setup**.
2. Lower the Valve Response Rate by 5 or 10. **Keep lowering** until system settles down. If you get too low, system will be very slow to respond to rate changes. You can do this on the go and see how the change affects the rate.
3. In extreme cases, it may be necessary to go to Advanced Tuning and adjust some other parameters.

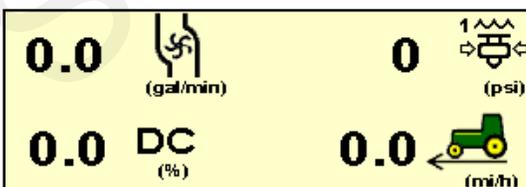
Application Rate is slow to get to the Target Rate

1. To get system to Target Rate faster on startup, go to **Setup - Settings - Control Valve Setup > PWM Setup > PWM Startup**. Set PWM Startup (%) so that pump starts up at or slightly above the normal PWM Duty Cycle.
2. If system is slow responding to rate or speed changes, you may need to increase the Valve Response Rate. Go to **Setup - Settings - Control Valve Setup**. Increase Valve Response Rate. You can do this while going across the field and observe the effects of each change. If Valve Response Rate is at 100 and system is still slow getting to Target, go to Advanced Tuning and increase P and S (usually only on electric pump systems).

Helpful Operating and Troubleshooting Information on the RCM

1. **Flow (gal/min), Pressure (PSI), PWM Duty Cycle (DC%), and Pump RPM** (if equipped on your hydraulic pump) are important indicators of system performance. It is good to know what these values are in normal field operation.

They provide good troubleshooting information if there is a problem.



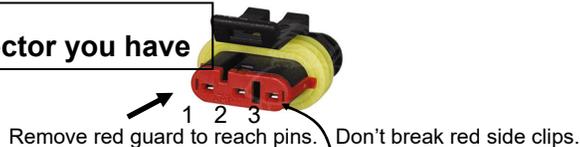
2. These items can be placed on the Run Screen with Display Settings or can be placed in the bottom two windows on the Run Screen.



No Flow shown on display, but liquid is being pumped

Flowmeter Tap Test

See which flowmeter connector you have



Flowmeter pinout:

3-pin MP Tower **A- Signal** **B- 12V Power** **C- Ground**

3-pin AMP SuperSeal **1- Ground** **2- 12V Power** **3- Signal**

1. Unplug the flowmeter. With voltmeter, check for **12 volts between Power & Ground** of flowmeter connector. Should have **4-5 volts between signal and ground**. If voltage is not present, inspect wiring harness and check for voltage at harness connection(s) nearer the Rate Controller (at 12-pin Deutsch connector, Power is 1, Ground is 2, Signal is 3).
2. If 12 volts is present, then conduct a **tap test**. Go to **Setup > Settings > Flow/Rate Sensor Setup** and change the flow cal to 10. Have a second person watch GPM on the 1,2,3 screen while other person taps repeatedly (use a short piece of wire or a paper clip) between signal and ground pins of flowmeter connector. A flow value (gpm) should show up indicating the wiring is not damaged. (If alone, note or reset a volume counter to 0, enter a Test Speed, and turn system ON in Manual mode. Check for increased volume after tapping.)
3. If the flow showed on the display during the tap test, your wiring to that point is good. If tap test did not work, go back to the next harness connection and do a tap test there between signal and ground.
4. If the tap test registers flow on the display, replace flowmeter.
5. Change Flow Cal back to appropriate Flow Cal when finished with Tap Test.
6. SurePoint has a Speed/Flow Simulator (PN 219-01462) or a Tap Tester (212-03-3912Y1) that can be used to confirm if the wiring is good between the flowmeter and controller.

Field Verification of Flowmeter Calibration

Always verify the flow cal setting by comparing the amount actually applied in the field (from weigh tickets) with the amount shown on the display. Adjust the flow cal as needed to get less than 1% difference between the actual amount applied and the amount shown on the display.

In general:

Increase the Flow Cal number if not enough product is actually being applied. (If you want more, increase the number)

Decrease the Flow Cal number if too much product is being applied. (If you want less, decrease the number)

Formula to Adjust Flow Cal Number

(Volume shown on display) / (Volume actually applied) X flow cal number in display = new flow cal

Example: Display shows 727 gallons was applied. Weigh ticket shows 750 gallons was actually applied. Flow cal number in display was 3000. (We applied too much, so we will decrease the flow cal.)

$727 / 750 \times 3000 = 2908$ (new flow cal number to set in display)

(Any adjustments to the flow cal number will only be as accurate as the measurements used in figuring it.)

Other issues

1. “My rate won’t go low enough. I want 8 gpa, but it won’t put down less than 11 gpa.”

- Check **Setup > Settings > Flow/Rate Sensor Setup > Minimum Flow Rate**. This can be set at 0.0 or at the low range of your flowmeter. This is **gal / min** not **gal / acre**.
- Check **Setup > Settings > PWM Setup > PWM Settings > Low Limit**. Default setting for JD is 10 for electric pumps and 25-30 for hydraulic pumps. You may need to lower those. If set too high, the pump cannot slow down enough when your speed drops or when sections close.
- On a hydraulic pump, be sure the red manual override knob is down and locked on the hydraulic valve.
- Check to see if a **Pressure Sensor is assigned** to this product, and if a **Minimum Alarm is set**. If the **box is checked** for a Minimum Pressure, the system will not go below that pressure.

2. “I can’t get up to my rate. I want 12 gpa, and I can’t get more than 10 gpa.”

- How many GPM are required to hit your rate? Is this within the pump’s specifications? On an electric pump, **the output of the pump decreases as the pressure increases**. Keep the pressure under 40 PSI (or lower) on an electric system. Is a **recirculation valve** open, allowing too much liquid to recirculate?
- On a dual electric pump system, **check each pump individually** to see that each one is working at capacity.
- Is the **strainer** plugged? If too small of a mesh strainer is being used, the fluid can gel up around the screen as the fluid is pulled through, even if the strainer appears clean. Most SurePoint systems with metering tube and electromagnetic flowmeter can use a 20– or 30-mesh strainer.
- Does the pump have **enough hydraulic oil** to hit the desired rate? If the pump is in series behind another pump or motor, the hydraulic oil to this pump may be limited. Is the hydraulic flow set high enough?
- Compare the **PWM Duty Cycle DC%** and **Pump RPM**. At 100% DC the pump should have over 500 RPM. Run the pump with the **manual override UP**. Start at low hydraulic flow. Gradually increase hydraulic flow and watch GPM and Pump RPM. The solenoid or proportional valve on the hydraulic valve block may need to be replaced if they are not opening all the way to allow full hydraulic flow.
- If a **Maximum Pressure Alarm** is set and the box is checked for a Pressure Sensor assigned to this product, the system will not go above that pressure.
- Check **Setup > System > PWM Setup > PWM Settings > High Limit**. This should be 100.
- Check the **PWM DC % (Duty Cycle)**. This can be placed on the Run Screen.
- Run the pump with a Test Speed in Manual Mode. Press the + button to increase flow. Observe flow (GPM), PWM DC%, PSI, and Pump RPM (if equipped).
- Run a Nozzle Flow Check. See gal/ac, PSI, gal/min, and PWM Duty Cycle.
- Is the flow cal correct? Is the width of the implement set correctly?

3. “It’s pretty close to the rate, but it won’t ever lock in to the rate.”

- Go to **Setup > Rates > Rate Smoothing**. Check the box for Rate Smoothing. Put **10** in the box.
- Without Rate Smoothing it is normal for the system to show the rate constantly changing small amounts as you go across the field. With Rate Smoothing, if the Applied Rate is close to the Target Rate, the display does not show all the small changes.
- If the **Control Deadband** is too small, this may cause the system to oscillate as it tries to correct for every small variation from target. Try increasing the Control Deadband to see if this helps.
- If the **Valve Response Rate** is too high, the system may overshoot back and forth across the Target Rate.

4. “When I start up, I get a screen that says “Solution Pump Dry”.

This is not unusual on the Deere display. If the flowmeter does not show flow immediately when you start, this screen pops up. It is made to protect centrifugal pumps that can be harmed quickly if they are dry. This is not a problem for SurePoint diaphragm pumps. To get to Target Rate quicker on startup, **set the PWM Startup %** so the pump starts at or slightly above where it will be running.

Also, to help eliminate the Solution Pump Dry screen, **assign a pressure sensor to this product**. If the system reads pressure, it will assume there is flow and will not give this warning.

5. “What settings do I use for the SurePoint system on the original JD Rate Controller?”

- The full screenshots of these are in Section F of the manual that came with the system.
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