



# 396-3391Y1

## Spartan Injection Pump Models 110, 120, 130, and 140

**ALL SYSTEMS:** These flowmeter settings are pulses per ounce, but for some controllers this number will be entered as pulses per gallon. Therefore the controller thinks it is measuring gallons when it is really measuring ounces. This will happen on controllers that only measure gal/acre, and only allow one decimal on the gal/acre rate. Set the Rate using the number of ounces per acre you want. For example, to apply 32 oz/acre, set the rate at 32 gal/acre. The display will read gpa, but it will actually be applying oz/acre.

*Operating Caution: Pump will produce up to 290 PSI. Limit operating pressure to 80 PSI. Pressure with water will be less than pressure with a thicker, heavier product.*

### Specifications

Voltage: 12 VDC

Pump Speed: 0-120 RPM

Current: 16.3 Amps

Spartan Injection Pump Model #	110	120	130	140
Flow Range (oz/min)	2-10	3-20	5-40	10-80
Flow Cal (pul/oz, but some controllers may use this as pul/gal)	1760	880	440	220
Commander II Flow Cal	3520	1760	880	440

### Original John Deere Rate Controller Calibration Settings

PWM Settings-Control Valve Calibration—211 PWM Low Limit—9 Use Flow Cal number above and Units—Gal  
For 32 oz/acre, enter Rate as 32 gal/acre.

### NEW John Deere Rate Controller 2000 and Raven RCM Calibration Settings

**Control Valve Setup:** See also 396-3639Y1 SureFire Spartan & JDRC 2000

**PWM CLOSE Valve Response—80 Control Deadband—2% Coil Frequency—100 High Limit—100**

**Low Limit—10 PWM Startup—10-20 Flowmeter Cal—See Flow Cal chart above: Flowmeter Units: fl.oz.**

**Rate Setup:** Check **Decimal Shift** box: for 32 oz/acre, set rate at 0.25 gpa

**From Run Screen: Setup > Settings (Push and hold Settings tab for 7 seconds until Advanced Tuning button appears.) Enter the following settings in the Advanced Tuning > PID Valve Tuning boxes:**

**Advanced Tuning: P = 90; D = 10; I = 10; S = 90 (These numbers or the Valve Response rate can be adjusted if needed for best operation. If Spartan will not lock on to rate, return these to Default Settings.)**

To test pump, go to **Diagnostics > Tests > select appropriate Product number > Calibrate PWM Limits.**

This test allows you to run the pump without the controller turning off the pump because it doesn't read flow yet.

Run this test. Observe DC(%) and flow (gal/min) as you speed up the pump. The flow may only be 0.1 or 0.2 gal/min. Be careful not to build more pressure than system will handle.

You can also run a **Nozzle Flow Check** with a Test Speed and Test Rate.

On the Run screen, SureFire recommends putting **DC% (PWM Duty Cycle)** as one of the Display Settings that you can monitor for this product.



# Settings for SureFire Spartan injection pump

*Typical settings. Adjust as needed for best performance on your system.*

## **SureFire Commander II**

Valve Control Speed (CAL-Control Speed)— (-3)      PWM Minimum (Special CAL 3--Area)—5      Flow Cal—above  
For 32 oz/acre, enter Rate as 32

## **Trimble Field-IQ Module for FmX Display**

Allowable Error 2%      Lower PWM Limit and Minimum Response      5%  
Drive Calibration      Integral--5 All other gains 0 (TMX 2050 will use Proportional instead of Integral)

## **Ag Leader Control**

Checkmark in Close Flow Control valve when rate off      PWM Gain      311  
Zero Flow Offset and PWM Standby      5      Allowable Error 2%

## **Pro 700 AccuControl**

AccuControl Valve Calibration > Advanced Calibration > Integral Gain—0.2      Breakout—2%  
Dead Zone—2%      Advanced PWM > PWM Minimum—5

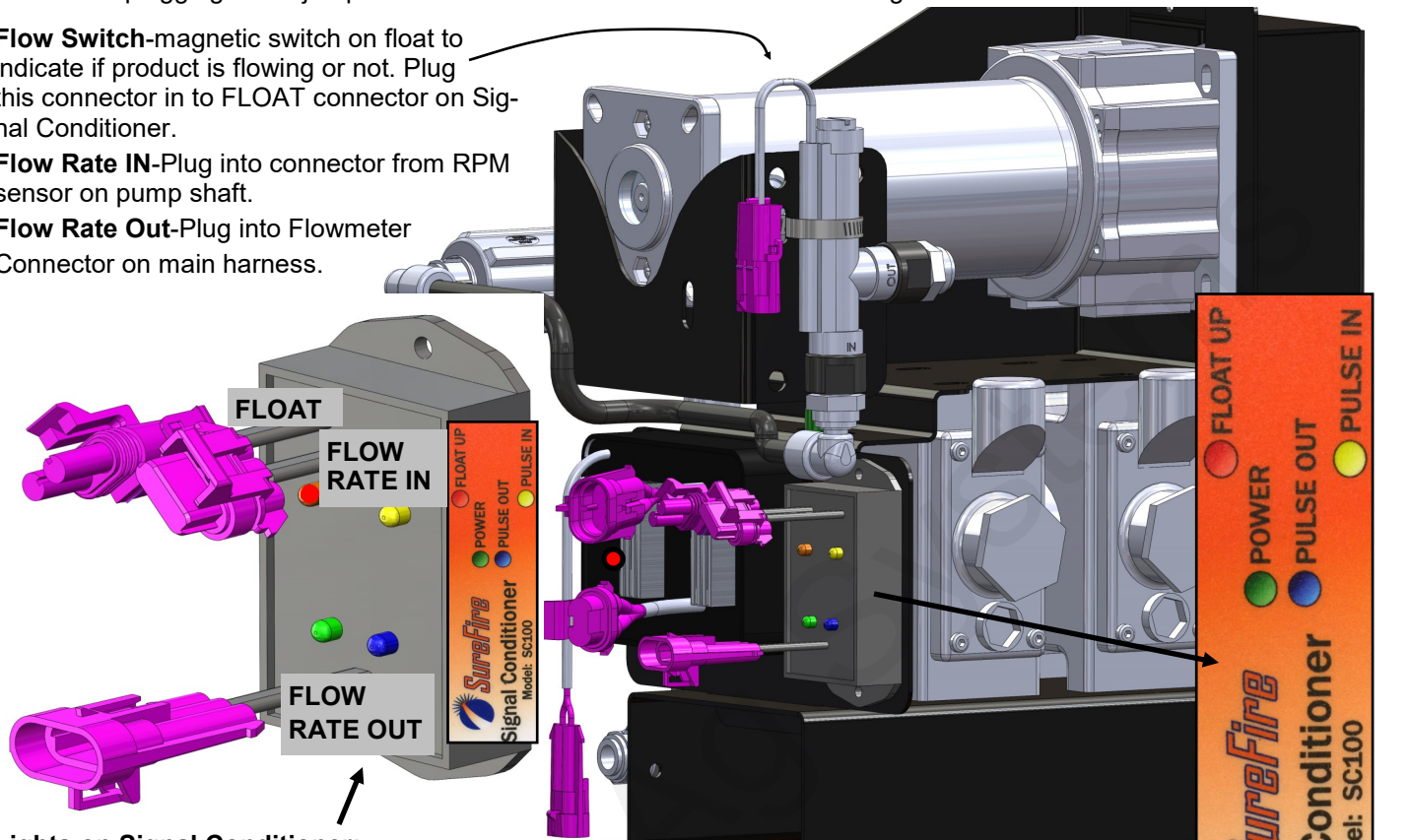
*If using a suspension liquid, use constant agitation and FLUSH when you will be stopped for an hour or more. If it is a product that might set up, it can ruin the pump. Install a rinse tank if needed.*

The flowmeter on the Spartan is a pump RPM sensor that is calibrated to convert the pump RPM to flow measured in oz/ min. To be certain that liquid is actually flowing, a flow switch with a floating magnetic switch is in the flow line. If the tank is empty, the float will go down, telling the controller that there is no flow. If the flow switch malfunctions and tells the controller there is no flow when there is flow, you can run the system without the flow switch by unplugging the flow switch and plugging in the jumper connector to the Float connection on the Signal Conditioner.

**Flow Switch**-magnetic switch on float to indicate if product is flowing or not. Plug this connector in to FLOAT connector on Signal Conditioner.

**Flow Rate IN**-Plug into connector from RPM sensor on pump shaft.

**Flow Rate Out**-Plug into Flowmeter Connector on main harness.



**Lights on Signal Conditioner:**

**Normal operating mode:** Green and Blue steady on. Yellow pulsing quickly.

Green-Steady ON-is receiving power from flowmeter connector on harness.

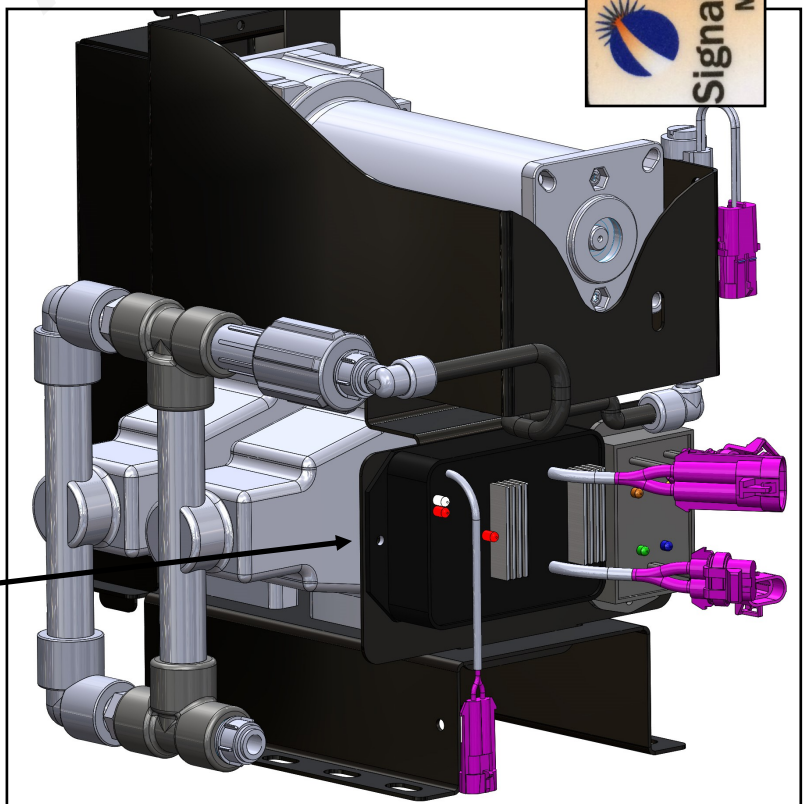
Blue- should be ON when system is running. Indicates Signal Conditioner is sending out pulses to controller.

Yellow—Quick pulses while system is running indicates it is receiving pulses from the RPM sensor on the pump shaft.

Red-should be OFF. Red light ON indicates that float is down or is malfunctioning if fluid is flowing. Red light ON means no pulses are being sent to the controller. (When Red light first comes ON, pulses will be sent for about 10 seconds). To bypass the float (Flow Switch) unplug Flow Switch connector from Float connector on Signal Conditioner, and plug jumper into Float connector. Red light should go out.

**Lights on EPD module:**

Red light by fins-steady blink (once per second) indicates power from battery. When system is running, this light goes steady red, and red light in corner turns on (maybe not as bright) indicating PWM signal.



# SureFire Ag Systems

Fertilizer Application and Control Experts

John Deere Rate Controller  
and  
SureFire Spartan Injection Pump

PWM Settings	
Control Valve Calibration	211
Coil Frequency	100
High Limit	255
Low Limit	9

~~Calibrate PWM Limits~~

## Control Valve Calibration 211

If the system is slow getting to the Target Rate, increase the first digit of the Control Valve Calibration. If the system overshoots above and below the Target Rate, decrease the first digit.

## Low Limit 9

This must be set here to “jump-start” the pump. If the pump stalls and won’t get to rate on start-up, increase this setting 1 digit at a time.

*PWM High Limit could be set lower to prevent the pump from running at a high speed.*

*Also on System screen, enter the **flow cal** for the pump you are using.*

**See the first page of this document for flow cal numbers.** Use the number in the chart, set flowmeter units as Gal. This will cause the controller to measure the output in ounces, even though the screen will say gallons.

Implement	System	Alarms	Rates
		Low Tank Level (gal)	20 <input type="checkbox"/>
		High Alarm (% above target rate)	20 <input checked="" type="checkbox"/>
		Low Alarm (% below target rate)	20 <input checked="" type="checkbox"/>
		Pressure Sensor 1	Alarm?
		Minimum (psi)	10 <input type="checkbox"/>
		Maximum (psi)	80 <input checked="" type="checkbox"/>

Flowmeter Calibration	440
Flowmeter Units	gal

These are suggested settings for **Alarms**.

If using a Pressure Sensor, set the Alarms as shown.

**The SureFire Injector Pump is capable of achieving 290 PSI. Operating pressure should be kept at 80 PSI or less.**

Operating pressure with water will typically be less than the pressure that will be experienced with thicker, heavier products.

Implement	System	Alarms	Rates
Rate 1	gal/ac	32.0	Minimum Flow Rate
Rate 2		0.0	0.0
Rate 3		0.0	
		Rate Smoothing	<input checked="" type="checkbox"/> 10 %

Enter minimum flow rate required to maintain spray pattern. This is also the flowrate used when manual button is pressed.

## Rates

Set the desired Rate in **oz/acre** (ignore the gal/ac label on the screen).

With the settings shown on this sheet, the flow will be measured and reported in **ounces** (oz/acre, oz/min, etc.).

After the system is plumbed, and the settings shown above have been entered, SureFire recommends:

1. Run a **Section Test. Diagnostics—Tests—Section Test**. This will verify that you can start the pump and speed it up and slow it down. **Keep the pressure at 80 PSI or less during the Section Test.**
2. Run a **Nozzle Flow Check** with typical operating Rate and Speed to verify that the controller will lock on to the Target Rate. (Enter the Rate in **oz/acre**) You can change the speed to check out various possible operating speeds.
3. Do a **Catch Test** to verify the Flowmeter Calibration. Catch the output from several (or all) of the rows and compare that to what the flowmeter calculated. Adjust the Flowmeter Calibration number as needed.

