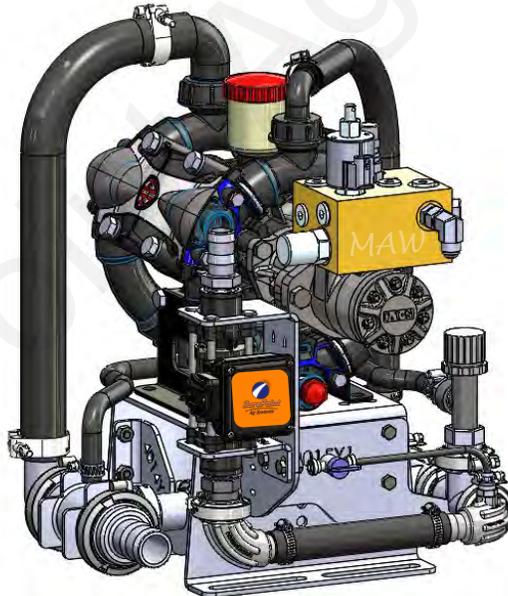


396-001070



**PumpRight
Fertilizer System for
John Deere
GreenStar Rate Controller
(GRC)
With PWM Control**



NOTICE

Operator should read this manual before operating the system.

Maximum Pump Flow and Application Rates

	Number of Diaphragms	Max Flow GPM	Max GPA on 40' at 6 MPH	Max GPA on 60' at 6 MPH
PR17	3	17	35	23.5
PR30	3	30	62	41
PR40	4	40	82	55
D250	6	55		75



SurePoint Ag Systems



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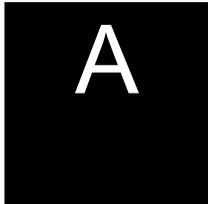
QuickStart Card 60-61

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Safety



TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.



**THIS SYMBOL MEANS
ATTENTION!**

BECOME ALERT!

YOUR SAFETY IS INVOLVED!

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines:



DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.



WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.



CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE is used to address safety practices not related to personal safety.





Hydraulic Fluid and Equipment Safety

This system uses hydraulic equipment with hydraulic fluid under extremely high pressure.

Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin causing serious injury. Keep all hoses and connections in good serviceable condition. Failure to heed may result in serious personal injury or death. Avoid the hazard by relieving the pressure before disconnecting lines or performing work on the system.

Make sure hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks. Wear protective gloves and safety glasses or goggles when working with hydraulic systems. DO NOT DELAY!

Check hydraulic hoses and fittings frequently. Loose, broken, and missing hardware can cause equipment to not perform properly and can result in serious injury or death. Hydraulic systems can be hot and cause burns. Before working on any system, wait until the fluid has cooled.

If an accident occurs, see a doctor familiar with this type of injury immediately. Any fluid injected into the skin or eyes must be treated within a few hours or gangrene may result.



A Word to the Operator

It is YOUR responsibility to read and understand the safety messages in this manual. YOU are the key to safety.
SAFETY IS YOUR RESPONSIBILITY.

Check out the SurePoint webstore.

<https://store.surepointag.com>

Anyone can look. Dealers with log-in credentials can see prices and place orders.



For support, go to:

<https://support.surepointag.com>

Read this Manual and keep it in the cab.

Other Resources

396-4608Y1 Gen3 LiquiShift Manual

396-4034Y1 PumpRight Pump Manual

[SurePoint support site](https://support.surepointag.com/products/32)

<https://support.surepointag.com/products/32>

- Manuals
- Videos on setup, operation, and troubleshooting
- QuickStart Guides
- Troubleshooting Documents
- Support Bulletins

System Summary (helpful for tech support)

System Purchased from: _____

Date Purchased: _____

S0 number from Sales Order: S0 _____

Rate Controller _____

Using Sentinel for: Row Monitoring Rate Control Gen3 LiquiShift

Pump: Electric PR17 PR30 PR40 D250

Implement: _____

Metering Tube colors _____ & _____ 8' 5' Other

Implement Width _____ Rows _____ Spacing _____ Sections _____



General Description

A

Introduction

You have purchased a SurePoint fertilizer system for your equipment. This system will be controlled by your John Deere display and John Deere GreenStar Rate Controller. The Rate Controller will adjust the speed of the PumpRight hydraulic pump based on feedback from the flowmeter and vehicle speed. The system is capable of using John Deere Section Control to minimize overlap areas with optional section valves.

Basic Installation Steps

1. Have John Deere Rate Controller mounted and wiring harnesses connected by your John Deere Dealer.
2. Open the packages and familiarize yourself with the components. See the System Overview Example on the following page to see the big picture of how SurePoint Fertilizer Systems are installed. Refer to manual sections B & D for component information.
3. Mount the PumpRight pump and make hydraulic connections. See section E for hydraulic plumbing information.
4. Plumb the tank to the PumpRight inlet. See section E for details.
5. Install the plumbing kit including section valves, flow indicator columns / manifolds, check valves, plumbing to each row unit delivery point. See section B for information on these components.
6. Attach the flowmeter outlet to section valve or manifold inlet. Attach section valve outlets to flow indicator inlets.
7. Attach harnesses as shown in Section D.
8. Set up Controller for SurePoint fertilizer system as shown in Section F.
9. Fill system with water, conduct initial operation and tests per Section F.
10. Winterize system with RV Antifreeze if freezing temperatures are expected.
11. Do pre-season service each year as described on page 54.

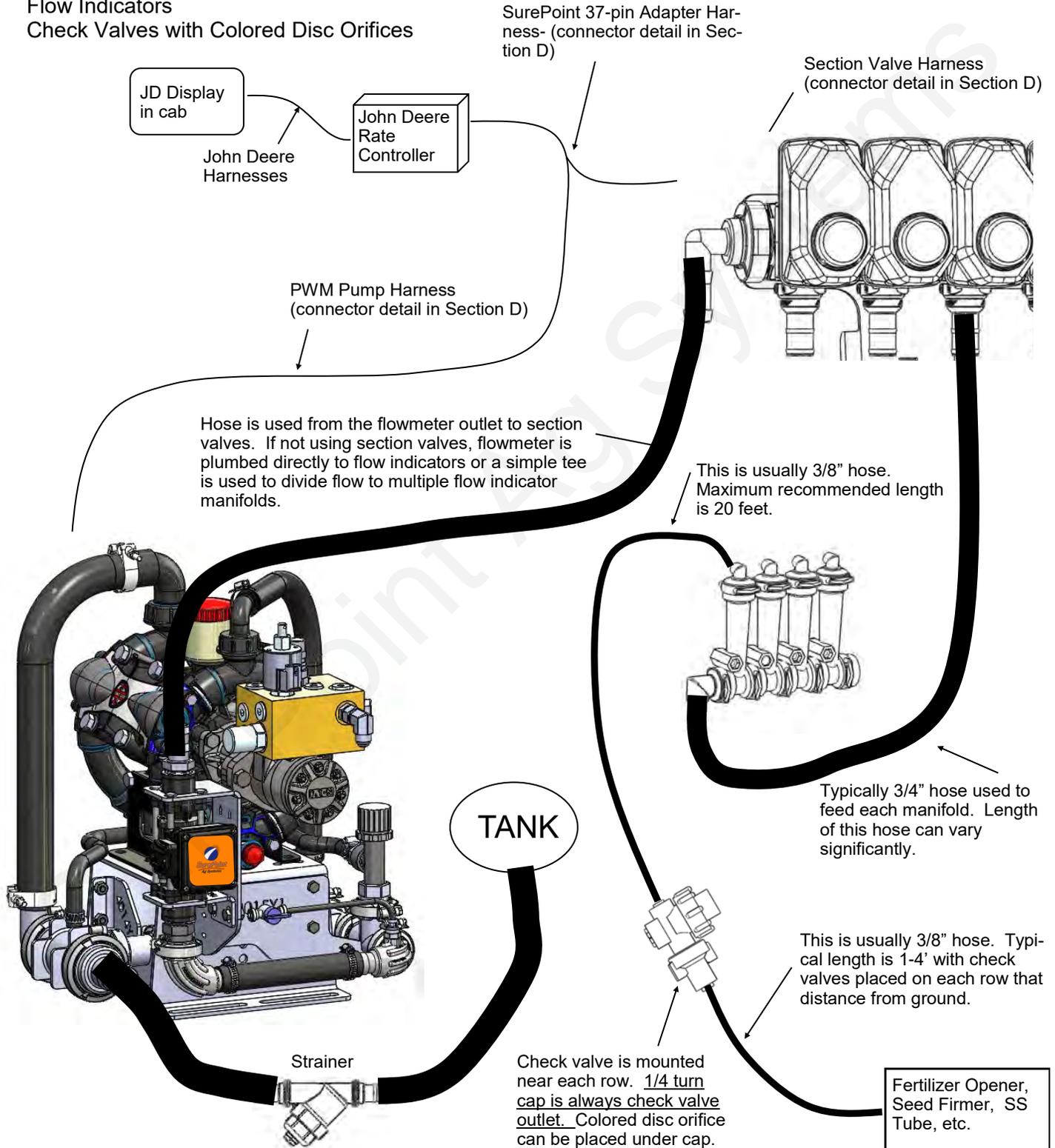
System Overview Example

A

Introduction

The following gives an example of a complete SurePoint Fertilizer system with these components:

- John Deere Display in cab
- John Deere GreenStar Rate Controller (GRC)
- PumpRight PR30
- Section Valves
- Flow Indicators
- Check Valves with Colored Disc Orifices

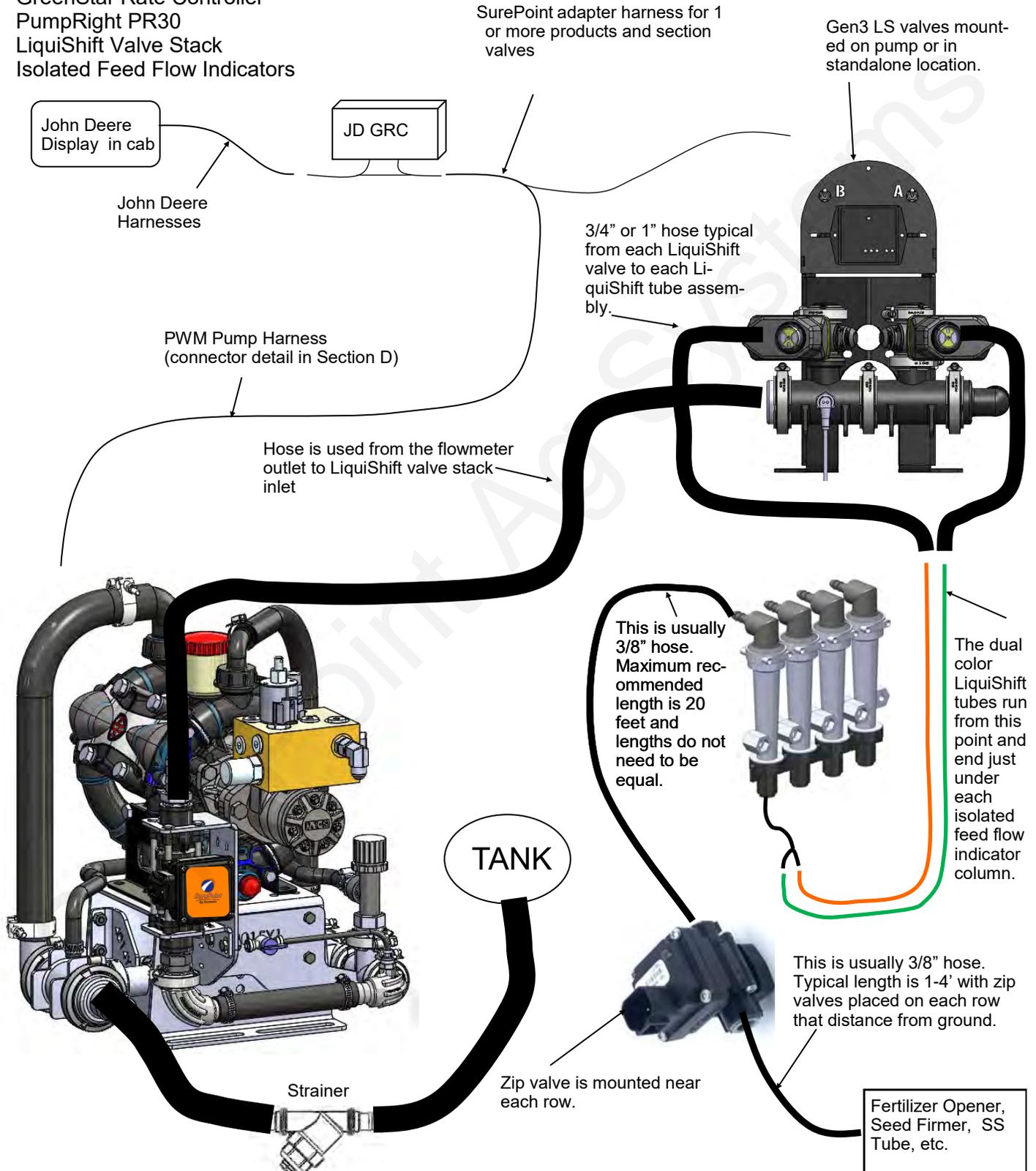


System Overview Example

The following gives an example of a complete SurePoint Fertilizer system with LiquiShift and these components:

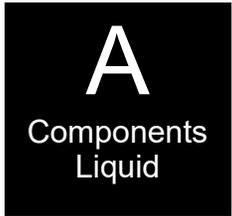
- John Deere Display
- GreenStar Rate Controller
- PumpRight PR30
- LiquiShift Valve Stack
- Isolated Feed Flow Indicators

For complete information on Gen3 LiquiShift, see the Gen3 LiquiShift manual, 396-4608Y1.



PR17 & PR30 Electromagnetic Flowmeter Kits *Flowmeter only*

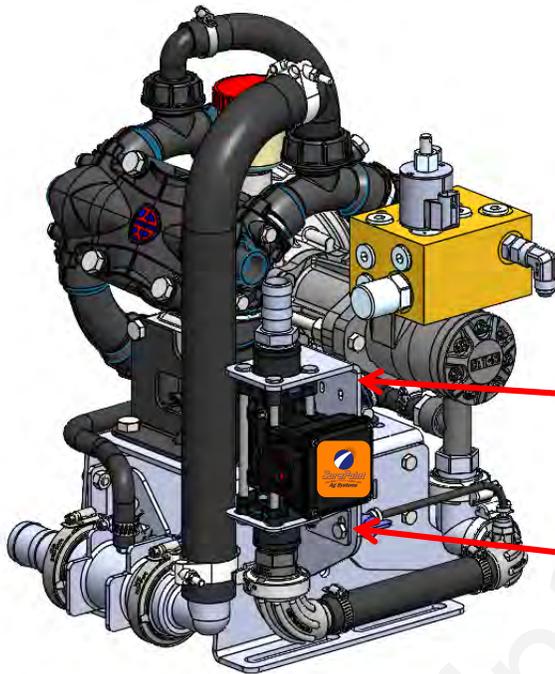
0.13 - 2.6 GPM	Item Number 500-02-2082 (PR17)	204-01-46211CUF00
0.3 - 5 GPM	Item Number 500-02-2085 (PR17)	204-01-46211CUF01
0.6 - 13 GPM	Item Number 500-02-2090 (PR17 & PR30)	204-01-46211CUF02
1.3 - 26 GPM	Item Number 500-02-2095 (PR30)	204-01-46211CUF03



Kits include flowmeter, adapter harness, mounting bracket, hose barb fittings & hose clamps.

-Before doing any arc welding on the implement, unplug the cable to the flowmeter, or damage to the flowmeter may result.

-Do not power wash the flowmeter. High pressure spray directed at the back edge of the face plate or at the wire connector may allow water into the flowmeter electronics.



Mounting Bracket,
410-4015Y1 (QTY 1)
(not used for PR40 and
D250 Pump)

Mounting Bracket,
400-3826Y1 (QTY 1)
(not used for PR40 and
D250 Pump)



Amp SuperSeal 3-pin connector
Use adapter 201-17842
to connect to 3-pin MP harness

Electromagnetic flowmeters are superior to traditional turbine flowmeters in two basic ways. First, they have no moving parts. This translates into no wear items or potential for contaminants to jam a spinning turbine.

Second, electromagnetic flowmeters detect the flow by electrically measuring the velocity of the liquid, which makes them less sensitive to viscosity or density of the fluid measured. They are generally extremely accurate using the standard calibration number, but the user must verify this.

SurePoint recommends you perform a catch test to verify the system is properly installed and configured. Adjust the flow cal as needed based on accurate catch tests with the actual product or observation of gallons applied and acres worked.

Flowmeter Model	Pulses per gallon	FPT Size	Hose Barb In kit
0.13 - 2.6 GPM	3000	3/4"	1"
0.3 - 5 GPM	3000	3/4"	1"
0.6 - 13 GPM	2000	3/4"	1"
1.3 - 26 GPM	2000	1"	1"

The flowmeters will accurately read higher than the rated range.

Earlier model flowmeters (gray meters with white labels with black text) have different calibration numbers. The flow cal number (pulses per gallon) is printed on the serial number sticker on the side of the flowmeter.



PR40 & D250 Electromagnetic Flowmeter Kit Flowmeter Only

2.6 - 53 GPM

Item Number 500-02-2080

204-01-46211CUF04

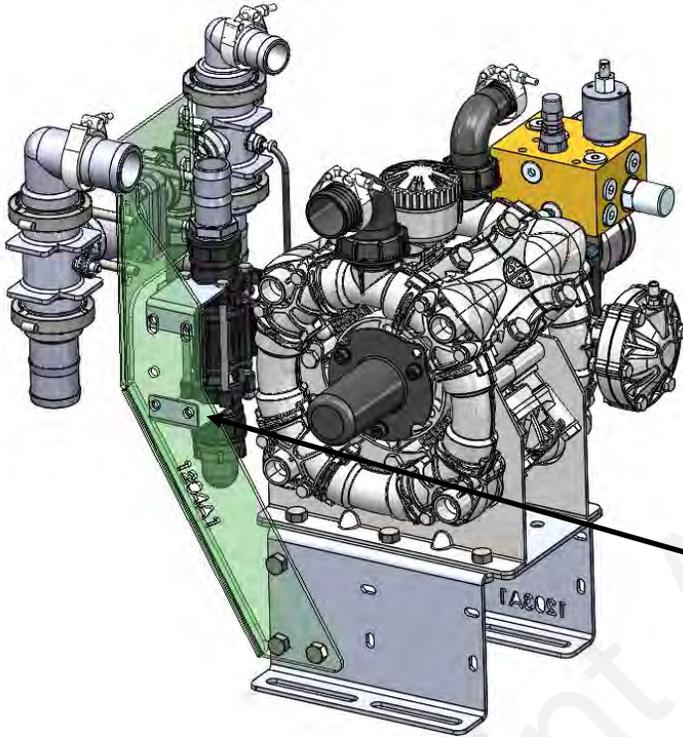
A

Components
Liquid

Kits include flowmeter, adapter harness, mounting bracket, hose barb fittings & hose clamps.

-Before doing any arc welding on the implement, unplug the cable to the flowmeter, or damage to the flowmeter may result.

-Do not power wash the flowmeter. High pressure spray directed at the back edge of the face plate or at the wire connector may allow water into the flowmeter electronics.



Mounting Bracket,
400-3335Y1 (QTY 2)
(used for PR40, D250 and
PR Pump)



Amp SuperSeal 3-pin connector

Use adapter 201-17842
to connect to 3-pin MP harness

Electromagnetic flowmeters are superior to traditional turbine flowmeters in two basic ways. First, they have no moving parts. This translates into no wear items or potential for contaminants to jam a spinning turbine.

Second, electromagnetic flowmeters detect the flow by electrically measuring the velocity of the liquid, which makes them less sensitive to viscosity or density of the fluid measured. They are generally extremely accurate using the standard calibration number, but the user must verify this.

SurePoint recommends you perform a catch test to verify the system is properly installed and configured. Adjust the flow cal as needed based on accurate catch tests with the actual product or observation of gallons applied and acres worked.

Flowmeter Model	Pulses per Gallon	FPT Size	Hose Barb In kit
2.6—53 GPM	2000	1-1/4"	1-1/2"
1.3—26 GPM	2000	1"	1"

The flowmeters will accurately read higher than the rated range.

Earlier model flowmeters (gray meters with white labels with black text) have different calibration numbers. The flow cal number (pulses per gallon) is printed on the serial number sticker on the side of the flowmeter.



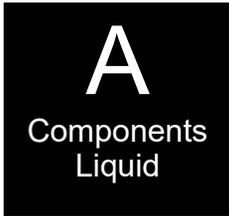
PR80 Electromagnetic Flowmeter Kit

5 - 106 GPM

Item Number 500-02-2100

Flowmeter Only

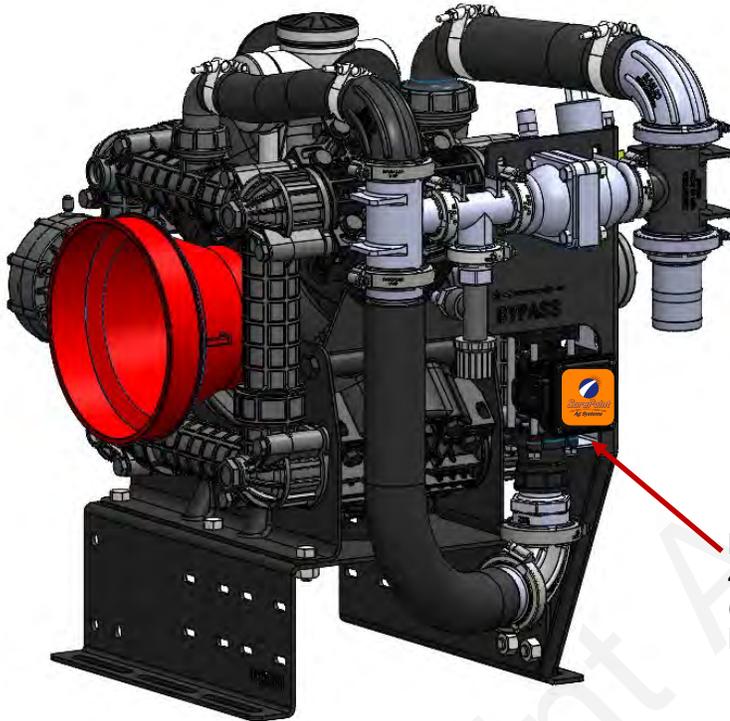
204-01-46221A58787



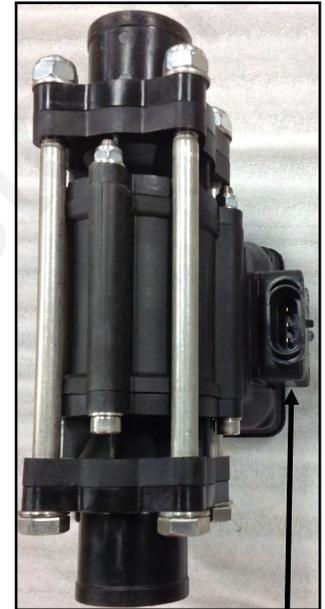
Kits include flowmeter, adapter harness, mounting bracket, hose barb fittings & hose clamps.

-Before doing any arc welding on the implement, unplug the cable to the flowmeter, or damage to the flowmeter may result.

-Do not power wash the flowmeter. High pressure spray directed at the back edge of the face plate or at the wire connector may allow water into the flowmeter electronics.



Mounting Bracket,
400-3335Y1 (QTY 2)
(used for PR40, D250 and
PR Pump)



Amp SuperSeal 3-pin connector

Use adapter 201-17842
to connect to 3-pin MP harness

Electromagnetic flowmeters are superior to traditional turbine flowmeters in two basic ways. First, they have no moving parts. This translates into no wear items or potential for contaminants to jam a spinning turbine.

Second, electromagnetic flowmeters detect the flow by electrically measuring the velocity of the liquid, which makes them less sensitive to viscosity or density of the fluid measured. They are generally extremely accurate using the standard calibration number, but the user must verify this.

SurePoint recommends you perform a catch test to verify the system is properly installed and configured. Adjust the flow cal as needed based on accurate catch tests with the actual product or observation of gallons applied and acres worked.

NOTICE: This flowmeter has a different flow cal number than the other SurePoint flowmeters.

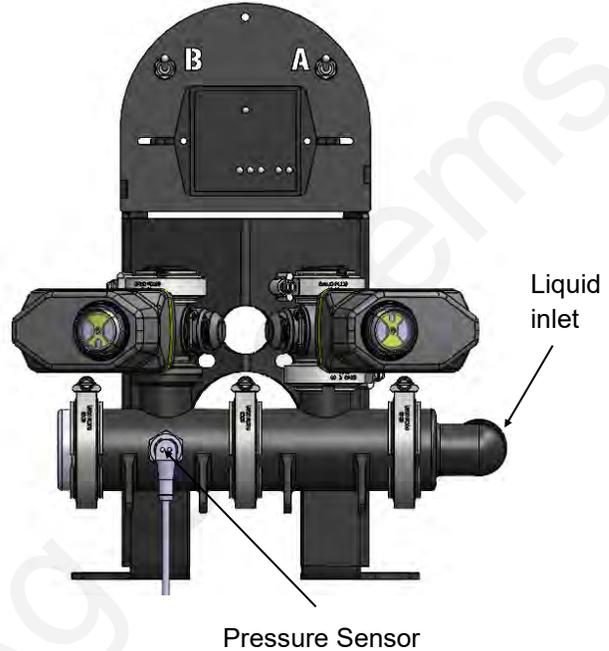
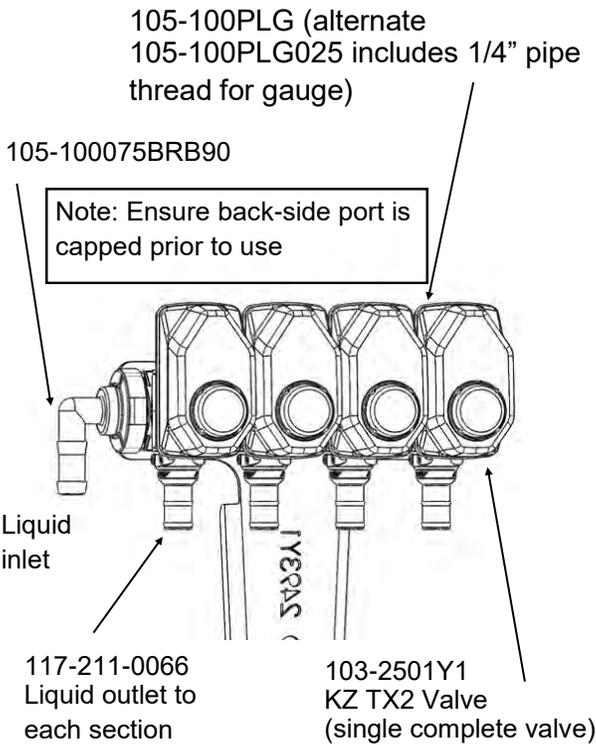
Flowmeter Model	Pulses per Gallon	Connection Size	Hose Barb In kit
5—106 GPM	568	2" F.P Flange	2"



Section Valves and LiquiShift Valves

B

Components
Liquid



Additional Parts:

- 1" Gasket 105-100G-H
- 1" Clamp 105-FC100

How section valves work

Section valves can be assembled into groups with a common inlet to control flow to each section. Common assemblies use up to 5-6 valves, however, more can be used where practical. Many alternate fittings can be used to accommodate different hose sizes and configurations.

The valves have a 3-pin weather pack electrical connector. This has a power, ground, and switched wire. The power measured to ground should have 12 volts when the controller is on. The switched wire will have 12 volts to turn the valve on, and 0 volts to turn the valve off. (Sentinel may show 7 v when off)

Wiring Connector:
 Pin A—Red, 12 Volts +
 Pin B—Black, Ground -
 Pin C—White, Signal
 12V=on ; 0V=off

Mounting Hardware:
 2 Valve Bolt Kit
 384-1100
 Mounting Bracket
 400-2493Y1

How LiquiShift Works

LiquiShift is a two-valve manifold specifically built and controlled to provide the operator a very wide flow range for variable rate application. It is valuable for variable rate prescription application or high-speed implements, or variable rate between different fields. LiquiShift has an A and B valve that are opened based on the system pressure.

The valves themselves are identical to a regular section valve (KZ TX2) and have a 3-pin weather pack electrical connector.

The A Valve is connected to a smaller metering tube. The B Valve is connected to a larger metering tube. The LiquiShift controller automatically turns on the A valve, or the B valve, or both valves depending on the flow required.

Gen3 LiquiShift systems on the GRC are available with up to 12 sections depending on the implement.

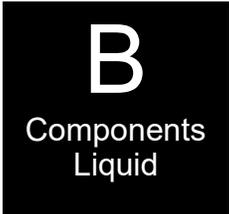
See also: [Gen3 LiquiShift Manual \(396-4608Y1\)](#)
[Gen2 LiquiShift Manual \(396-4063Y1\)](#)



Pressure Sensor

3 Wire Sensor with 2" Manifold x 1/4" MPT Fitting

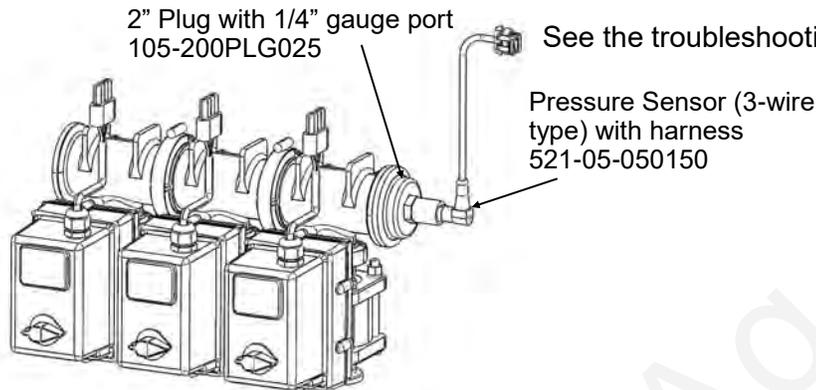
Item Number 520-00-055100



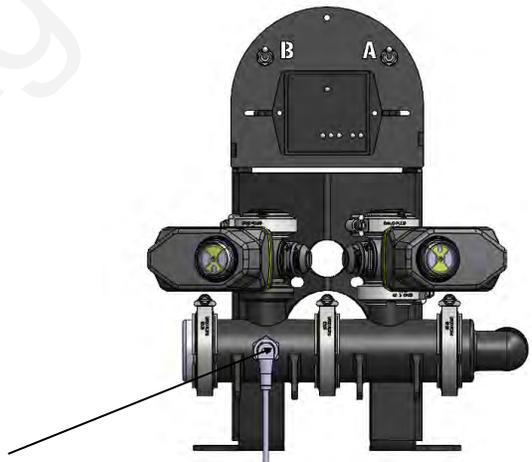
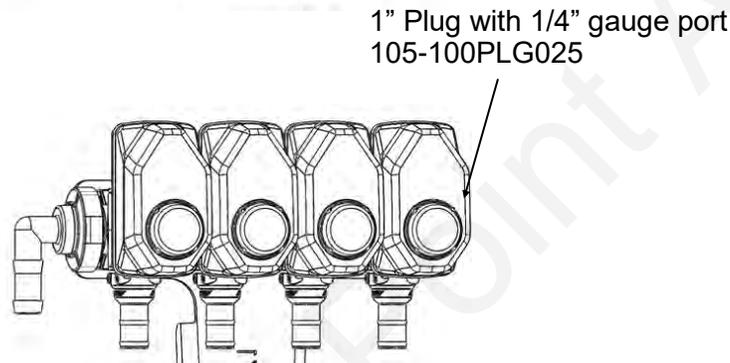
The JD GRC has the ability to show fertilizer system pressure on the display. The pressure sensor is most often mounted on electric section valves when used in PumpRight systems. The pressure sensor is a 100 psi, 0 to 5 volt, 3-wire type sensor for compatibility with the JD GRC. The sensor has a 1/4" MPT fitting.

The user can select to display the pressure on the John Deere display. ***If the pressure does not show up on the Pressure 1 display on the screen, try setting up Sensor 2, and putting PSI 2 in one of the two boxes on the bottom of the display.***

The pressure sensor is very helpful to optimize system performance and troubleshoot any issues. Pressure alarms or limits can be set on the Deere display in the cab.



JD GRC:
Pressure Calibration: 50 mv/psi



Pressure Sensor for LiquiShift is mounted at the base of the valve stack. The same sensor is used for LiquiShift and displayed on the John Deere display.

Pressure Sensor Hose Tap Kits

When electric section valves or LiquiShift is **not** used in the fertilizer system, the best location to install the pressure sensor is in the hose after it leaves the flowmeter. To use these kits, order the correct kit for your hose size. Then also order the kit above that includes the 2" Manifold x 1/4" MPT fitting.

- 3/4" Hose Pressure Tap 520-00-055800
- 1" Hose Pressure Tap 520-00-055850
- 1 1/2" Hose Pressure Tap 520-00-055900

Pump Priming and Air Bleed Valve

An air bleed valve is included with each pump to aid in system priming. It is shipped in the pump accessories bag and must be installed during system installation.

For best results, close the recirculation knob and open the air bleed valve when priming the pump.

Why use an air bleed valve:

Most fertilizer systems are equipped with a 4 lb or 10 lb check valve on the end of each hose delivering fertilizer to the ground. These valves do not let air escape from the system, unless it is pressurized. PumpRight liquid pumps are not good air compressors. Therefore, the pump can struggle to prime due to air trapped on the outlet side of the pump.

The air bleed valve is a small 1/4" valve that when opened lets air escape from the pump outlet at zero pressure. Open until liquid comes out and then close the valve.

Be sure the air bleed valve tube does not become plugged with dirt or it will not allow air to bleed.

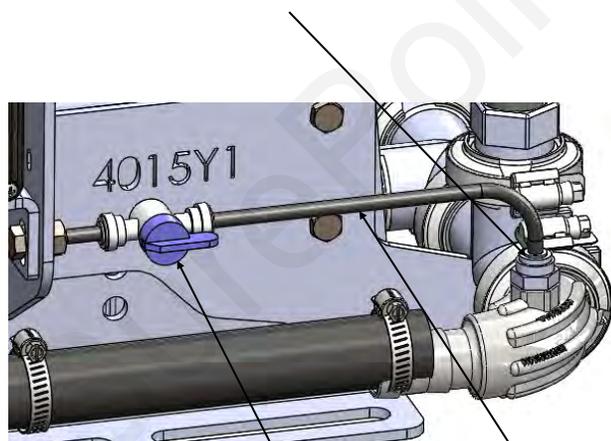
How to install the air bleed valve:

Remove the 1/4" plug from the quick connect fitting on the pump outlet side (see pictures below). Next, insert the 1/4" tubing in the quick connect fitting. Run the 1/4" tubing to an easily accessible spot on your equipment. Next, cut the tubing and push the 1/4" valve onto the tubing. Finally, run the tubing to a low location where any fertilizer that escapes will run on the ground.

Be sure the air bleed valve tube does not become plugged with dirt or it will not allow air to bleed.

PR17 & PR30

Attach 1/4" tubing to 1/4" QC on the 90 deg HB sweep gauge port

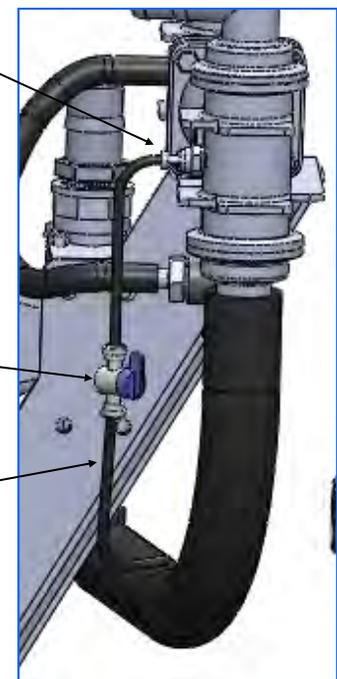


1/4" air
bleed
valve

1/4" Tubing

PR40 & D250

Attach 1/4" tubing to 1/4" QC on back side of 1" x 2" tee on outlet side of pump



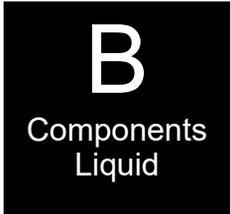
1/4" air
bleed
valve

Recirculation & Agitation

A recirculation valve is standard on all PumpRight models outlet plumbing assembly.

For best results, close the recirculation knob when priming the pump.

Opening the Recirculation valve will NOT lower the pressure required to push the product to the rows.



How Recirculation Works:

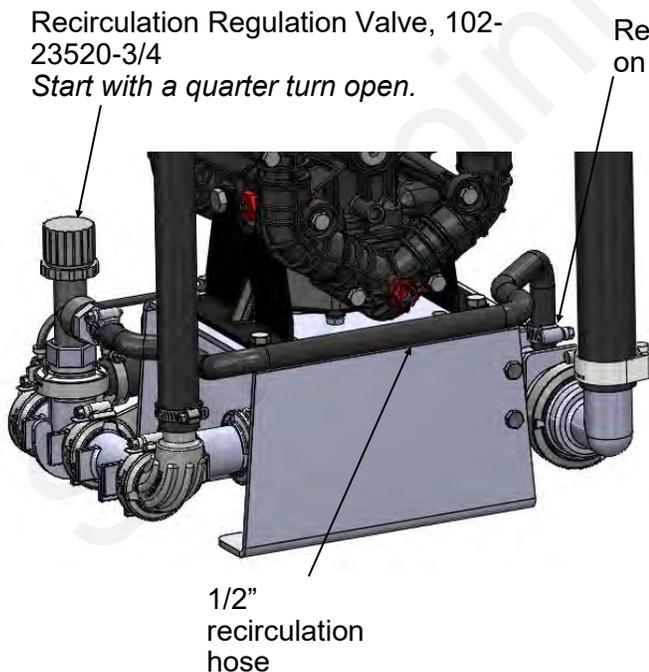
When running a PumpRight pump at less than 20% of its maximum flow, it sometimes improves system stability to allow the pump to run faster. Opening the recirculation valve diverts some pump flow before the flowmeter, causing the pump to run faster. The application rate is still measured by the flowmeter and everything that passes through the flowmeter is applied to the ground. If the pump is surging at a low flow rate, open the recirculation regulation valve slowly until the pump runs smoothly. Start with a quarter turn. If a lot of recirculation is needed, it may be best to plumb the recirculation back to the tank (see below). OPENING THE VALVE LOWERS THE MAXIMUM RATE THAT CAN BE APPLIED TO THE GROUND. Close the valve if a higher rate is required.

Generally, a quarter turn open is a good setting for the recirculation valve.

How to modify for tank agitation:

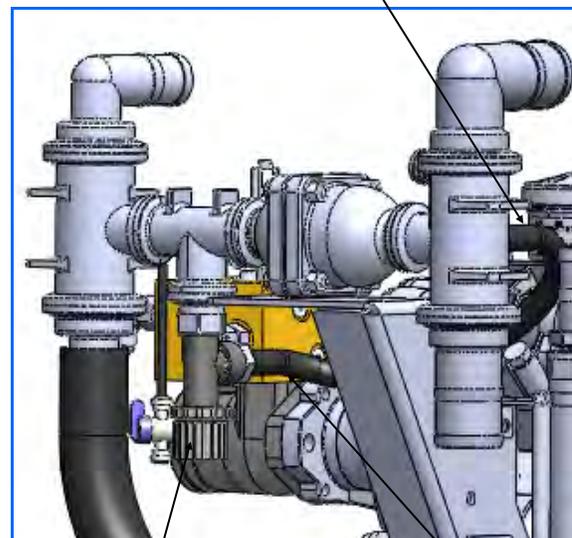
If tank agitation is required, the recirculation valve can be re-plumbed to divert flow to the tank. All that is required is to remove the 1/2" recirculation hose from the pump. Then replace the 3/8" MPT x 1/2" HB on the inlet side of the pump with a 3/8" plug which is included in your PumpRight accessories bag. Finally, install a longer 1/2" hose from the recirculation valve back to the tank.

PR17 & PR30



PR40 & D250

Recirculation hose attaches to back of 2" x 1" tee on pump inlet



Recirculation Regulation Valve
102-23520-3/4
Start with a quarter turn open.

Product Distribution

To assure proper and even distribution to each row, the product being applied must be metered to each individual row. This metering is done by one of the 3 following methods which create back pressure so an equal amount of liquid is applied to each row:

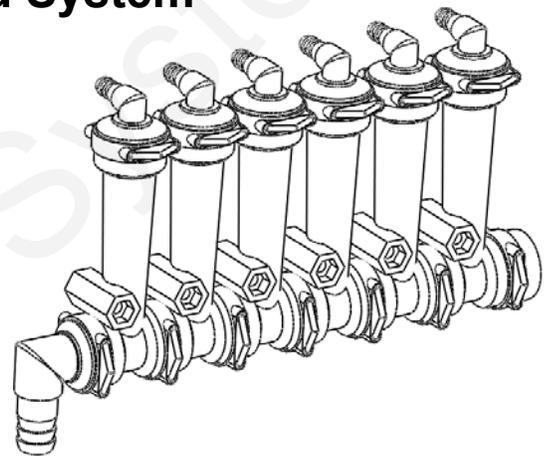
1. A metering orifice may be placed in the top cap of each floating ball flow indicator. (See photos on page 13. This is not used very often.)
2. A metering orifice may be placed in the check valve cap in the line that leads to each row. (See photo on page 15)
3. A dual metering tube kit with dual check valves may be used. (See pages 16-22)
4. A LiquiShift valve stack may be used that automatically selects which metering tube to use based on system pressure.

Floating Ball Flow Indicator & Manifold System

Flow indicators give a clear visual signal that a fertilizer system is working and all rows are flowing. These indicators use an o-ring and wire clip connection to snap together in any configuration necessary.

SurePoint has simple tee brackets and U-bolts that will mount these to a variety of bar sizes.

Two main types of flow indicators are used. On 30" row spacing, the low flow column with 1/4" push to connect outlet is recommended for rates under 10 GPA. For rates over 10 GPA the full flow column with 3/8" hose barb outlet is preferred.



Parts List

Complete Columns

701-20460-950	Single Full Flow Column with 3/8" HB - 90 Degree Outlet
701-20460-940	Single Full Flow Column with 3/8" QC - 90 Degree Outlet
701-20460-960	Single Full Flow Column with 1/2" HB - 90 Degree Outlet
701-20460-935	Single Low Flow Column with 3/8" QC - 90 Degree Outlet
701-20460-920	Single Low Flow Column with 1/4" QC - 90 Degree Outlet

Fittings

701-20503-00	ORS x 3/4" HB - Straight
701-20511-00	ORS x 3/8" HB - 90 Degree
701-20512-00	ORS x 1/2" HB - 90 Degree
701-20513-00	ORS x 3/4" HB - 90 Degree
701-20516-00	ORS x 1/4" QC - 90 Degree
701-20517-00	ORS x 3/8" QC - 90 Degree
701-20518-00	ORS x 1/4" FPT - 90 Degree
701-20519-00	ORS x 1/4" FPT - Straight
701-20520-00	ORS Male x ORS Female - 90 degree
701-20521-00	Wilger End Cap
701-20523-00	ORS Male x ORS Female x 3/8" FPT - Isolator
701-20525-00	ORS Male x ORS Male x 1" FPT - Tee

Service Parts Only

701-20460-02	Wilger Flow Indicator Ball Retainer
701-20460-03	FKM O-Ring for indicator body & fittings
701-20460-04	Wilger Lock U-clip
701-20460-05	Flow Indicator Ball - 1/2" SS Ball
701-20460-06	Flow Indicator Ball - Maroon Glass
701-20460-07	Flow Indicator Ball - Red Celcon
701-20460-08	Flow Indicator Ball - Green Poly
701-20460-09	Flow Indicator Ball - Black Poly
701-20460-15	Viton O-Ring for column & fittings
701-40225-05	Viton O-Ring for Orifice

Brackets & U-Bolts

400-1037A1	3-6 Row Bracket
400-3155Y1	7-12 Row Bracket
400-2011A1	White Backer Plate for 3-6 Row Bracket
400-2010A1	White Backer Plate for 7-12 Row Bracket
400-1315A2	Flow Indicator Bracket, 6-8 in wide hitch mount

Floating Ball Flow Indicators- Full Flow Column (mostly 3/8" HB)

The full flow column is typically used with rates over 10 GPA on 30" rows. For rates less than 10 GPA SurePoint recommends the low flow columns with 1/4" push to connect outlet fittings.

The full flow columns are most often assembled with 3/8" hose barb outlets. See the low flow info below for the difference between full and low flow columns.

Full Flow Indicators w/ 3/8" Hose Barb Outlet

Column Flow (GPM): .05-2.70 GPM
Equivalent Application Rate
On 30" Rows at 6 MPH: 2-70 GPA

Ball Selection for 30" Rows

GPM	GPA	Ball
.05-.18	2-6	Green Plastic*
.09-.30	3-10	Red Plastic*
.31-.72	10-20	Maroon Glass
.40-2.1	13-70	Stainless Steel (1/2")

*Plastic balls may float on heavier fertilizers, such as 10-34-0. Surepoint recommends using the low flow column for these flow rates.

400-2010A1
12 Row White
Visibility Backer
Plate

701-20460-95
Full Flow Col-
umn w/ 3/8"
HB Outlet

701-20521-00
End Cap

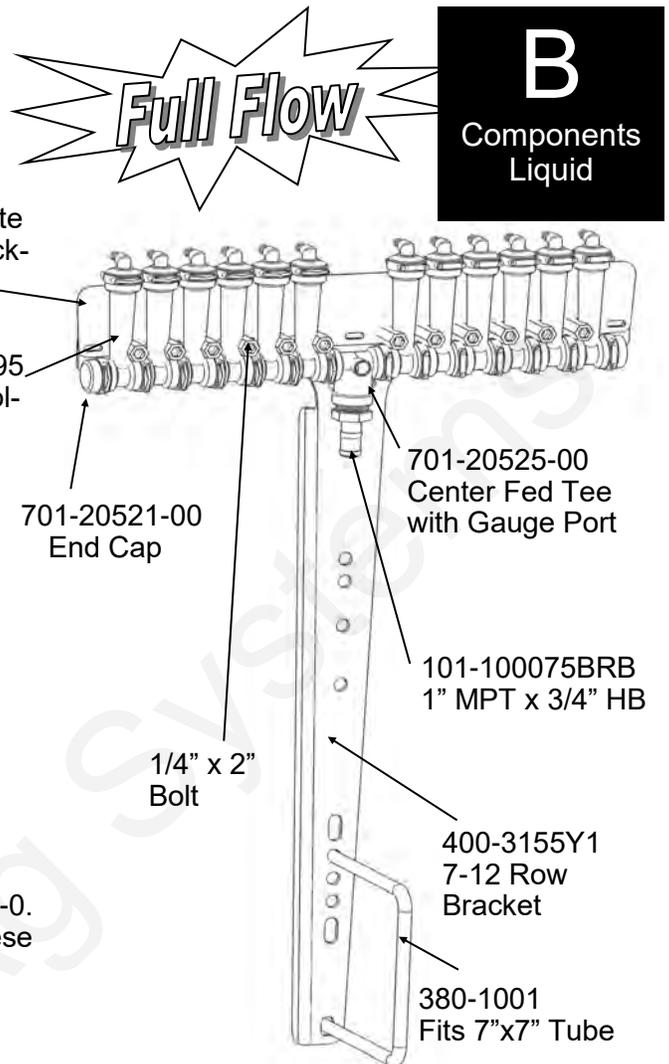
701-20525-00
Center Fed Tee
with Gauge Port

101-100075BRB
1" MPT x 3/4" HB

1/4" x 2"
Bolt

400-3155Y1
7-12 Row
Bracket

380-1001
Fits 7"x7" Tube



B
Components
Liquid

Low Flow Column (mostly 1/4" QC or 3/8" QC)

The low flow column has a smaller internal diameter. This means a heavier ball can be used to monitor a smaller flow.

SurePoint uses the low flow columns with 1/4" push to connect outlet fittings. The flow capability of 1/4" tubing and the low flow column are a great pair for rates on 30" rows under 10 GPA.

Externally, the low flow column can only be identified by "Low Flow" molded into one side of the column. All the same fittings work with low flow and full flow columns.

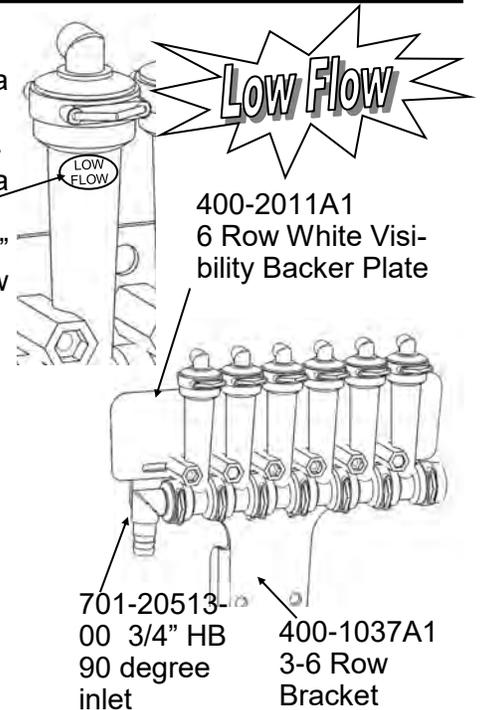
Low Flow Indicators w/ 1/4" Push to Connect Outlet

Column Flow (GPM): .03-.30 GPM
*** Low Flow Column with 3/8" hose barb .03 - .70 GPM
Equivalent Application Rate
On 30" Rows at 6 MPH (1/4" QC): 1-10 GPA

Ball Selection for 30" Rows

GPM	GPA	Ball
.03-.09	1-3	Green Plastic*
.05-.14	2-4	Red Plastic*
.10-.18	3-6	Maroon Glass
.15-.70	5-10	Stainless Steel (1/2")

*These balls may float on heavier fertilizers, such as 10-34-0. Use Maroon Glass in this case.



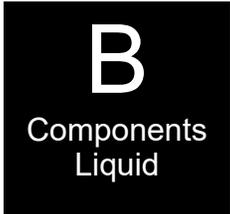
400-2011A1
6 Row White Visi-
bility Backer Plate

701-20513-
00 3/4" HB
90 degree
inlet

400-1037A1
3-6 Row
Bracket

Floating Ball Flow Indicators– Metering Orifice Selection for 30” Rows

See www.surepointag.com for other row spacings



30” Spacing

Orifice	PSI	Gal/Min 28-0-0	MPH						
			4.0	4.5	5.0	5.5	6.0	6.5	7.0
28	10	0.043	2.15	1.91	1.72	1.56	1.43	1.32	1.23
	20	0.061	3.02	2.69	2.42	2.20	2.02	1.86	1.73
	30	0.075	3.72	3.31	2.98	2.71	2.48	2.29	2.13
	40	0.087	4.29	3.82	3.43	3.12	2.86	2.64	2.45
	50	0.097	4.82	4.28	3.85	3.50	3.21	2.97	2.75
	60	0.106	5.26	4.67	4.21	3.82	3.50	3.23	3.00
35	10	0.070	3.46	3.08	2.77	2.52	2.31	2.13	1.98
	20	0.098	4.86	4.32	3.89	3.54	3.24	2.99	2.78
	30	0.120	5.96	5.30	4.77	4.33	3.97	3.67	3.40
	40	0.139	6.88	6.11	5.50	5.00	4.58	4.23	3.93
	50	0.156	7.71	6.85	6.17	5.61	5.14	4.74	4.41
	60	0.170	8.41	7.48	6.73	6.12	5.61	5.18	4.81
40	10	0.090	4.47	3.97	3.57	3.25	2.98	2.75	2.55
	20	0.127	6.31	5.61	5.05	4.59	4.21	3.88	3.60
	30	0.157	7.75	6.89	6.20	5.64	5.17	4.77	4.43
	40	0.181	8.94	7.94	7.15	6.50	5.96	5.50	5.11
	50	0.202	9.99	8.88	7.99	7.26	6.66	6.15	5.71
	60	0.221	10.95	9.73	8.76	7.96	7.30	6.74	6.26
46	10	0.119	5.91	5.26	4.73	4.30	3.94	3.64	3.38
	20	0.169	8.37	7.44	6.69	6.08	5.58	5.15	4.78
	30	0.207	10.25	9.11	8.20	7.45	6.83	6.31	5.86
	40	0.239	11.83	10.51	9.46	8.60	7.88	7.28	6.76
	50	0.267	13.23	11.76	10.58	9.62	8.82	8.14	7.56
	60	0.293	14.50	12.89	11.60	10.55	9.67	8.92	8.29
52	10	0.149	7.36	6.54	5.89	5.35	4.91	4.53	4.21
	20	0.210	10.38	9.23	8.31	7.55	6.92	6.39	5.93
	30	0.257	12.70	11.29	10.16	9.24	8.47	7.82	7.26
	40	0.296	14.67	13.04	11.74	10.67	9.78	9.03	8.39
	50	0.332	16.43	14.60	13.14	11.95	10.95	10.11	9.39
	60	0.363	17.96	15.96	14.37	13.06	11.97	11.05	10.26
63	10	0.218	10.78	9.58	8.62	7.84	7.18	6.63	6.16
	20	0.307	15.20	13.51	12.16	11.05	10.13	9.35	8.69
	30	0.376	18.62	16.55	14.89	13.54	12.41	11.46	10.64
	40	0.435	21.51	19.12	17.21	15.64	14.34	13.24	12.29
	50	0.486	24.05	21.38	19.24	17.49	16.03	14.80	13.74
	60	0.532	26.33	23.40	21.06	19.15	17.55	16.20	15.04
78	10	0.341	16.87	14.99	13.49	12.27	11.24	10.38	9.64
	20	0.481	23.83	21.18	19.06	17.33	15.89	14.66	13.62
	30	0.590	29.22	25.97	23.37	21.25	19.48	17.98	16.70
	40	0.681	33.73	29.98	26.98	24.53	22.49	20.76	19.27
	50	0.762	37.72	33.53	30.17	27.43	25.14	23.21	21.55
	60	0.835	41.31	36.72	33.05	30.04	27.54	25.42	23.60
98	10	0.553	27.38	24.34	21.90	19.91	18.25	16.85	15.64
	20	0.782	38.72	34.42	30.98	28.16	25.82	23.83	22.13
	30	0.956	47.31	42.05	37.85	34.41	31.54	29.11	27.03
	40	1.106	54.76	48.67	43.81	39.82	36.50	33.70	31.29
	50	1.239	61.33	54.51	49.06	44.60	40.88	37.74	35.04
	60	1.354	67.02	59.58	53.62	48.74	44.68	41.24	38.30
107	10	0.649	32.11	28.54	25.69	23.35	21.41	19.76	18.35
	20	0.920	45.56	40.50	36.45	33.13	30.37	28.04	26.03
	30	1.124	55.63	49.45	44.51	40.46	37.09	34.24	31.79
	40	1.301	64.39	57.24	51.52	46.83	42.93	39.63	36.80
	50	1.451	71.84	63.86	57.47	52.25	47.89	44.21	41.05
	60	1.584	78.41	69.70	62.73	57.03	52.27	48.25	44.81
130	10	0.938	46.43	41.27	37.15	33.77	30.96	28.57	26.53
	20	1.319	65.27	58.02	52.22	47.47	43.51	40.17	37.30
	30	1.619	80.16	71.26	64.13	58.30	53.44	49.33	45.81
	40	1.867	92.43	82.16	73.94	67.22	61.62	56.88	52.82
	50	2.088	103.38	91.89	82.70	75.19	68.92	63.62	59.07
	60	2.292	113.46	100.85	90.76	82.51	75.64	69.82	64.83

Pumpright Pressure Recommendations
(with 10 lb check valves):

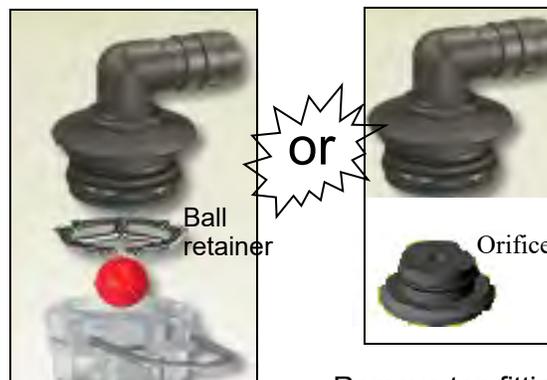
- Minimum 20 PSI
- Maximum 80 PSI

Tower Electric Pump Pressure Recommendations
(with 4 lb check valves):

- Minimum 10 PSI
- Maximum 30 PSI

Chart is for 28-0-0 Fertilizer @ 70°

- Heavier fertilizers (like 10-34-0) will have 5-15% less flow than chart indicates for a certain pressure
- Cold fertilizers will cause system pressure to increase at a given application rate.
- Tower Electric Pump Systems will have reduced flow and increased electrical current draw due to cold fertilizer increasing operating pressure. **Use the largest orifice possible for cold weather operation.**



If using a metering orifice in the flow indicator, the orifice replaces the ball retainer. If not using an orifice here, the ball retainer must be in place.

Remove top fitting of each column. Then push the metering orifice into bottom of each outlet fitting. (*This is not used very often.*)

All application rates (gallons/acres) are estimates based on 0-28-0 (10.65 lbs/gallon) at 70 degrees F.

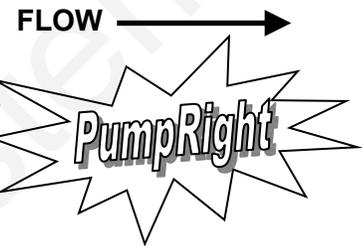
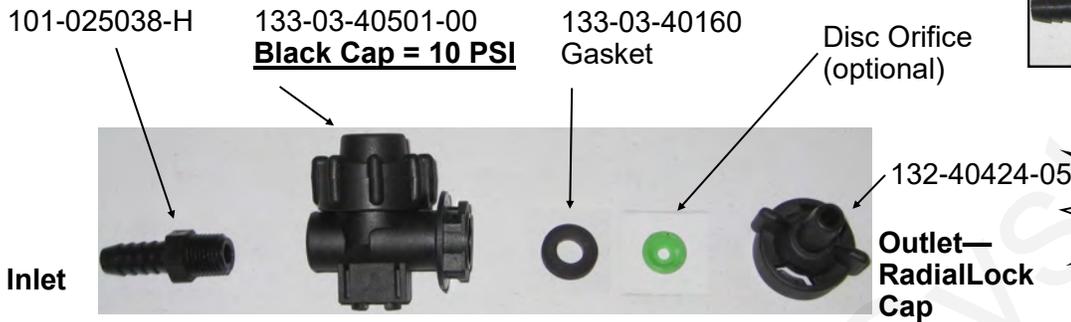


Check Valves

10 lb check valve with 3/8" hose barbs

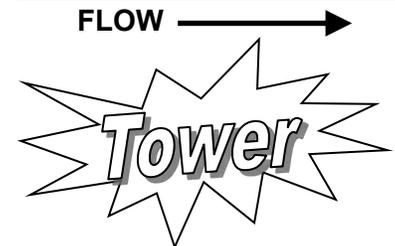


The recommended check valve for most **PumpRight** installations is the 10 lb check with 3/8" hose barbs. This works with 3/8" rubber hose which SurePoint recommends for most applications over 10 GPA on 30" rows. The recommended minimum system operating pressure for this check is 20 psi, to ensure all checks open fully.



4 lb check valve with 1/4" quick connect fittings

4 lb check valves are typically used with **electric pump systems**. SurePoint recommends this valve for use with 1/4" tubing applying up to 10 GPA on 30" rows. The recommended minimum system operating pressure for this check is 10 psi, to ensure all checks open fully.



Special Purpose Check Valve Assemblies

Assembly Part Number	Description	Suggested Uses (30" rows)
136-10-04QC04QC	1/4" QC x 1/4" QC 10 lb	< 10 GPA with PumpRight & 1/4" Tubing
136-10-06QC06QC	3/8" QC x 3/8" QC 10 lb	With 3/8" tubing plumbing
136-04-06HB06HB	3/8" HB x 3/8" HB 4 lb	> 10 GPA with Electric Pumps
136-04-08HB08HB	1/2" HB x 1/2" HB 4 lb	> 50 GPA with PumpRight
136-10-08HB08HB	1/2" HB x 1/2" HB 10 lb	> 50 GPA with PumpRight



Colored Disc Orifice Chart for 30" rows

Download the SurePoint Flow Calculator App for iPad

Scan for more Orifice Charts



B

Components
Liquid

30" Spacing

Orifice Color (Approx Size)	PSI	Gal/Min 28-0-0	MPH						
			4.0	4.5	5.0	5.5	6.0	6.5	7.0
Pink (24)	10	0.033	1.62	1.44	1.30	1.18	1.08	1.00	0.93
	20	0.046	2.28	2.02	1.82	1.66	1.52	1.40	1.30
	30	0.057	2.80	2.49	2.24	2.04	1.87	1.73	1.60
	40	0.065	3.24	2.88	2.59	2.36	2.16	1.99	1.85
	50	0.073	3.64	3.23	2.91	2.64	2.42	2.24	2.08
	60	0.081	3.99	3.54	3.19	2.90	2.66	2.45	2.28
Gray (30)	10	0.050	2.50	2.22	2.00	1.82	1.66	1.54	1.43
	20	0.072	3.55	3.15	2.84	2.58	2.37	2.18	2.03
	30	0.088	4.34	3.85	3.47	3.15	2.89	2.67	2.48
	40	0.101	4.99	4.44	4.00	3.63	3.33	3.07	2.85
	50	0.112	5.56	4.95	4.45	4.05	3.71	3.42	3.18
	60	0.124	6.13	5.45	4.91	4.46	4.09	3.77	3.50
Black (35)	10	0.070	3.46	3.08	2.77	2.52	2.31	2.13	1.98
	20	0.098	4.86	4.32	3.89	3.54	3.24	2.99	2.78
	30	0.120	5.96	5.30	4.77	4.33	3.97	3.67	3.40
	40	0.139	6.88	6.11	5.50	5.00	4.58	4.23	3.93
	50	0.156	7.71	6.85	6.17	5.61	5.14	4.74	4.41
	60	0.170	8.41	7.48	6.73	6.12	5.61	5.18	4.81
Brown (41)	10	0.094	4.64	4.13	3.71	3.38	3.10	2.86	2.65
	20	0.132	6.53	5.80	5.22	4.75	4.35	4.02	3.73
	30	0.162	8.02	7.13	6.41	5.83	5.34	4.93	4.58
	40	0.187	9.24	8.22	7.39	6.72	6.16	5.69	5.28
	50	0.209	10.34	9.19	8.27	7.52	6.89	6.36	5.91
	60	0.228	11.30	10.05	9.04	8.22	7.53	6.95	6.46
Orange (46)	10	0.119	5.91	5.26	4.73	4.30	3.94	3.64	3.38
	20	0.169	8.37	7.44	6.69	6.08	5.58	5.15	4.78
	30	0.207	10.25	9.11	8.20	7.45	6.83	6.31	5.86
	40	0.239	11.83	10.51	9.46	8.60	7.88	7.28	6.76
	50	0.267	13.23	11.76	10.58	9.62	8.82	8.14	7.56
	60	0.293	14.50	12.89	11.60	10.55	9.67	8.92	8.29
Maroon (52)	10	0.149	7.36	6.54	5.89	5.35	4.91	4.53	4.21
	20	0.210	10.38	9.23	8.31	7.55	6.92	6.39	5.93
	30	0.257	12.70	11.29	10.16	9.24	8.47	7.82	7.26
	40	0.296	14.67	13.04	11.74	10.67	9.78	9.03	8.39
	50	0.332	16.43	14.60	13.14	11.95	10.95	10.11	9.39
	60	0.363	17.96	15.96	14.37	13.06	11.97	11.05	10.26
Red (63)	10	0.218	10.78	9.58	8.62	7.84	7.18	6.63	6.16
	20	0.307	15.20	13.51	12.16	11.05	10.13	9.35	8.69
	30	0.376	18.62	16.55	14.89	13.54	12.41	11.46	10.64
	40	0.435	21.51	19.12	17.21	15.64	14.34	13.24	12.29
	50	0.486	24.05	21.38	19.24	17.49	16.03	14.80	13.74
	60	0.532	26.33	23.40	21.06	19.15	17.55	16.20	15.04
Blue (80)	10	0.351	17.39	15.46	13.91	12.65	11.59	10.70	9.94
	20	0.496	24.57	21.84	19.66	17.87	16.38	15.12	14.04
	30	0.608	30.09	26.75	24.08	21.89	20.06	18.52	17.20
	40	0.702	34.74	30.88	27.79	25.26	23.16	21.38	19.85
	50	0.785	38.86	34.54	31.08	28.26	25.90	23.91	22.20
	60	0.859	42.53	37.81	34.03	30.93	28.36	26.18	24.31
Yellow (95)	10	0.506	25.06	22.27	20.05	18.22	16.70	15.42	14.32
	20	0.715	35.39	31.46	28.32	25.74	23.60	21.78	20.23
	30	0.876	43.37	38.55	34.69	31.54	28.91	26.69	24.78
	40	1.009	49.94	44.39	39.95	36.32	33.29	30.73	28.54
	50	1.133	56.07	49.84	44.86	40.78	37.38	34.51	32.04
	60	1.239	61.33	54.51	49.06	44.60	40.88	37.74	35.04
Green (110)	10	0.686	33.95	30.18	27.16	24.69	22.63	20.89	19.40
	20	0.973	48.19	42.83	38.55	35.04	32.12	29.65	27.53
	30	1.186	58.70	52.18	46.96	42.69	39.13	36.12	33.54
	40	1.372	67.90	60.35	54.32	49.38	45.27	41.78	38.80
	50	1.531	75.78	67.36	60.63	55.12	50.52	46.64	43.30
	60	1.681	83.23	73.98	66.58	60.53	55.49	51.22	47.56

PumpRight Pressure Recommendations (with 10 lb check valves):

- Minimum 20 PSI
- Maximum 80 PSI

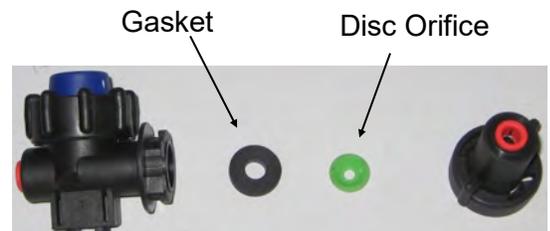
Tower Electric Pump Pressure Recommendations (with 4 lb check valves):

- Minimum 10 PSI
- Maximum 30 PSI

Chart is for 28-0-0 Fertilizer @ 70°

- Heavier fertilizers (like 10-34-0) will have 5-15% less flow than chart indicates for a certain pressure
- Cold fertilizers will cause system pressure to increase at a given application rate.
- Tower Electric Pump Systems will have reduced flow and increased electrical current draw due to cold fertilizer increasing operating pressure. **Use the largest orifice possible for cold weather operation.**

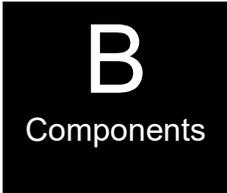
Colored Disc Orifice assemblies under the check valve cap in most cases. (Drop the orifice with the hole down into the cap, then put the gasket on top of it.) The orifice can also be installed in a manifold (common on grain drills).



FLOW → 1/4 Turn Cap is Outlet

Dual Metering Tube Plumbing Kits with Dual Check Valve

For more information, [watch this video](#) or see the [metering tube chart](#).



SCAN

for "What is Metering Tube?" video

SurePoint dual metering tube plumbing kits are a great way to apply fertilizer.

These plumbing kits will contain everything you need to distribute fertilizer from the flowmeter outlet down to the ground application device of your choice (not included).

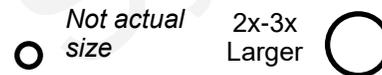
These instructions will show you where all the pieces go. It will provide guidance on how much metering tube to use. There are some optional fittings included in each plumbing kit. These instructions will show you where and why you'd want to use the optional pieces.

The dual check valve assembly is a key piece in the dual metering tube design. In addition to a check valve to stop fertilizer from draining when the system is shut off, **each check valve has an on/off valve on top of it. These on / off valves allow the operator to turn on only tube 1, only tube 2, or both tube 1 and 2.** This provides for three different application ranges, which is especially helpful when using a fertilizer which has a highly variable viscosity based on temperature changes or when changing rates from field to field.

Dual Advantage of Dual Metering Tube

Metering tube provides a larger passage way diameter than a comparable orifice. For a 5 GPA rate on 30" rows, a size 0.046" orifice would be used. For the same rate a 0.110" meter tube that is 8' long would be used. This 8' tube with more than twice the diameter creates a fertilizer system resistant to plugging while providing excellent row to row distribution.

By using two metering tubes, the fertilizer system can handle a wider range of rates and provide the proper system pressure as the fertilizer properties change due to temperature, mixtures and other factors.



Standard Orifice

Metering Tube

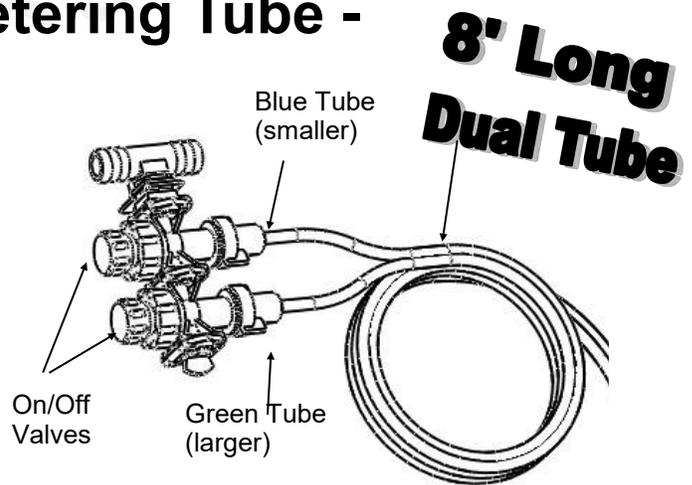
Field Operation of Dual Metering Tube - Dual Check Valve System

The dual metering tube allows for three application rate ranges. Some fertilizers have a widely variable viscosity. Therefore, based on temperature, tank mixing and fertilizer batch, the best tube to use will change.

SurePoint recommends you start with the larger tube ON only. This is the middle size and is a good starting point. Conduct a test using the Nozzle Flow Check with fertilizer to determine your system pressure. If pressure is below 15 psi, some check valves may not open and row to row distribution will be uneven.

Start with larger tube ON, smaller tube OFF:

- **Pressure below 15 PSI: Turn larger tube OFF and smaller tube ON.**
- **Pressure over 50 PSI: Turn BOTH tubes ON.**



	GPA on 30" rows (approx, will vary)
Blue Tube	1.5 - 3
Green Tube	3 - 6
Blue & Green Tube	6 - 10
Minimum Recommended flow for Blue Tube (8 ft)	4 - 5 oz/min

Other tubes are available if needed for different application rates.

** Ultra Low Rate Application –For rates from 2-5 oz/min/row use a 12 foot length of metering tube. To calculate oz/min/row: $Oz/min/row = (GPA \times MPH \times spacing \text{ (inches)}) \div 46.4$

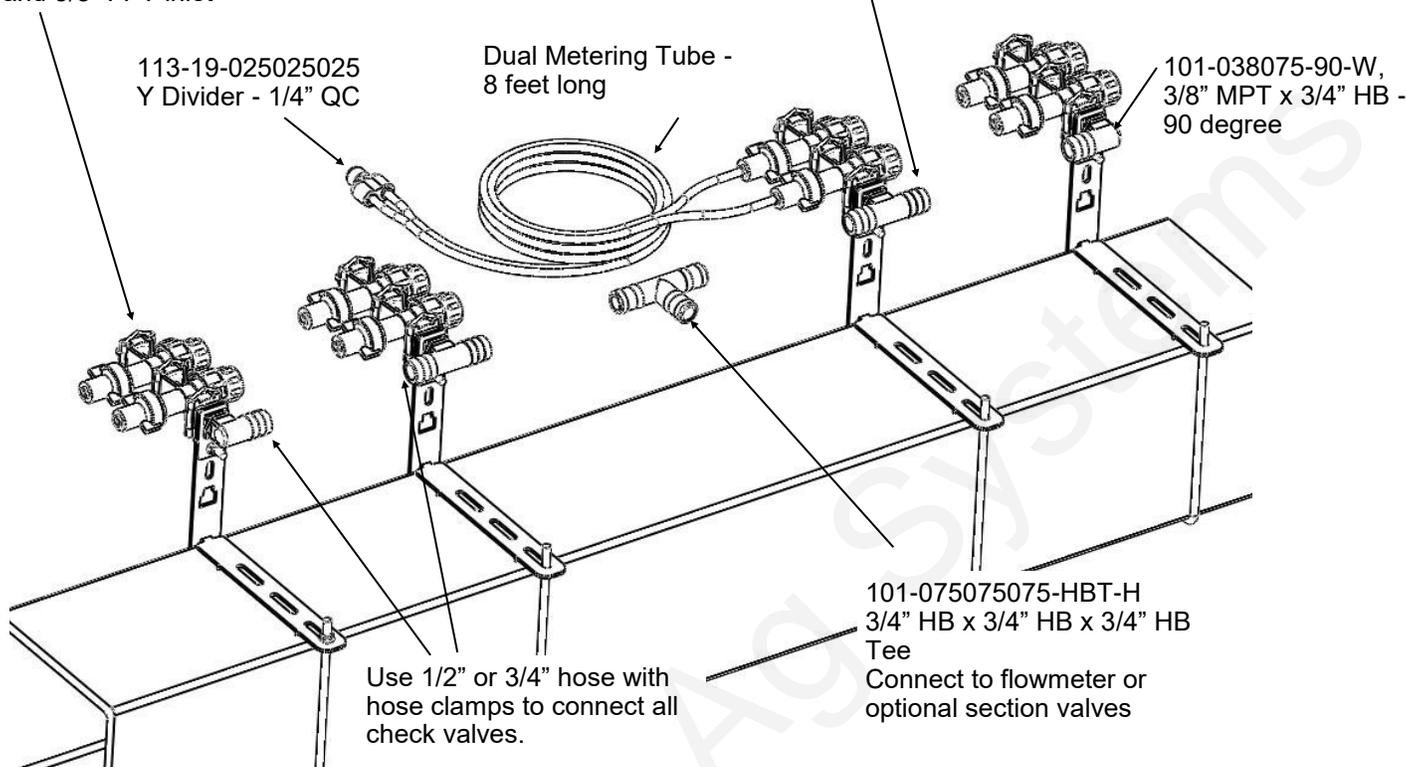


Dual Check Valve Plumbing Diagram

4 Row Planter Shown, add rows as necessary

136-04-200400, Dual 4 PSI check valve with 1/4" QC caps and 3/8" FPT inlet

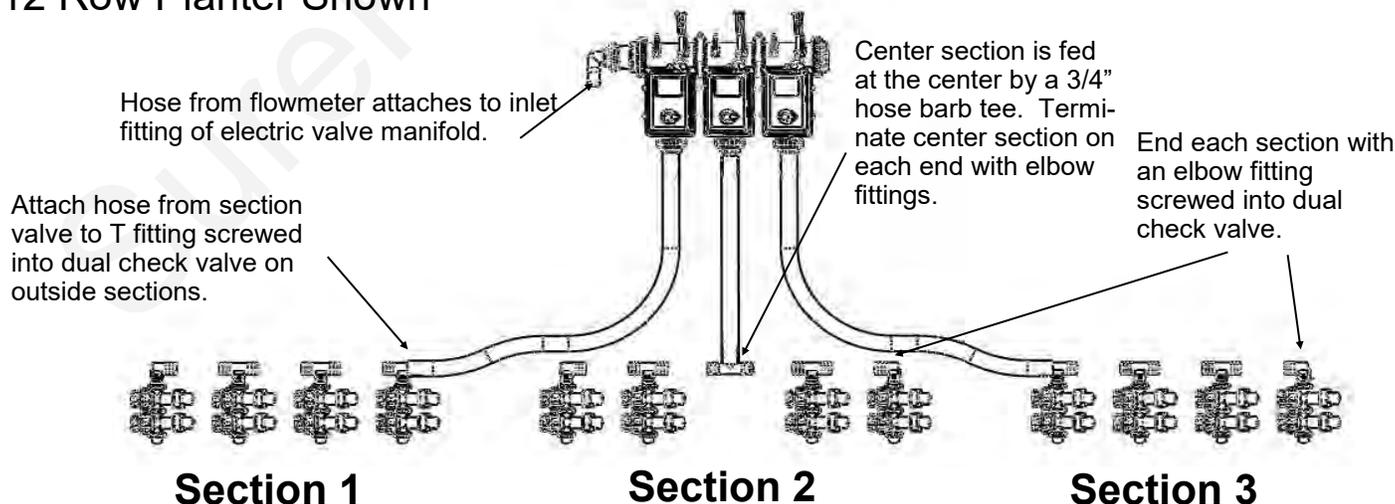
101-075075038-HBT-M-W 3/4" HB x 3/4" HB x 3/8" MPT Tee



This is a general diagram showing the dual check valve assembly mounted on a planter toolbar. The check valve and bracket are very flexible in their mounting. The check valve can mount behind, directly over, or in front of the toolbar. The check valve can be put in the bracket facing up & down or sideways (shown). In addition the steel bracket could be rotated 90 degrees and clamp around the bar. The multiple slots in the bracket are used to mount to any tube 7x7 inches or smaller.

Sectional Plumbing Diagram with Dual Check Valves

12 Row Planter Shown



For a **2 section plumbing system**, omit the center section and plumb similar to the outside 2 sections.

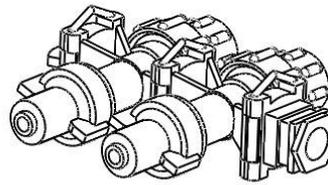
Dual Check Valve Assembly Steps

B

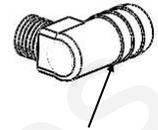
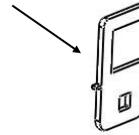
Components
Liquid

Follow these steps to mount each check valve to the steel bracket.

1. Screw the 3/8" MPT x 3/4" HB tee or elbow into the check valve using blue thread sealer. Orient the hose barb to run the 3/4" hose down the planter toolbar.
2. Insert the check valve into the "C" notch in the end of the bracket, according to how you want the check valve to be mounted on your planter. Orient the wire clips up or to the side for easiest access.
3. Slide the small "C" clamp bracket around the check valve to lock it in place.
4. Install the 1/4" carriage bolt and flange nut to secure the "C" clamp plate around the check valve.
5. Now, mount the check valve on the bar. Hold the check valve and long bracket assembly on the toolbar. Slide the tab on the front of the short bracket into the upper or lower notch on the long bracket.
6. Slide the L bolt into the appropriate slots on the brackets for your tube size. Tighten the 1/4" flange nuts to hold the bracket in place.

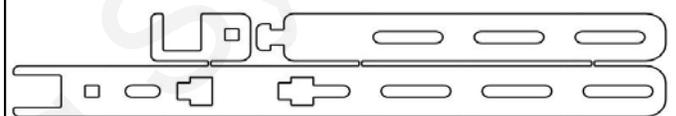


Clamp Bracket



Elbow at end of section, Tee in mid-locations.

400-1966A1 Dual Check Valve Mount Bracket

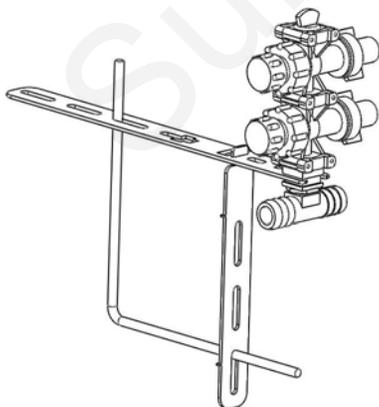


The long, short & clamp bracket come as one part connected by break-off tabs.

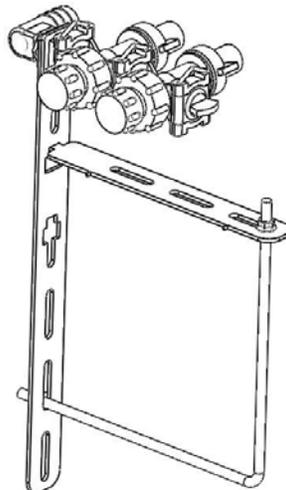
Check Valve Mounting Options

The dual check valve mounting bracket is very flexible to fit many different planter configurations. Three options are shown here to illustrate some of the possibilities.

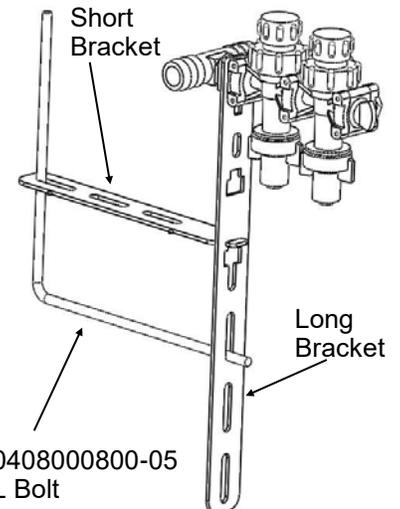
Example 1. Use the long bracket on the top of a bar. The check valve is mounted vertically. The liquid supply hose is ran directly on the front side of the bar. The U-bolt is placed in slots to clamp on a 4x6 inch tube.



Example 2. Use the long bracket on the rear of a bar. The check valve is mounted over the top of the bar. The supply line would run above and behind the bar. The short bracket is placed in the notch to mount the check valve closer to the bar.



Example 3. Use the long bracket on the front of a 3x7 bar (vacuum tube on some planters). Mount the check valve hanging forward of the bar. The supply line will run directly over the bar. The excess bolt and bracket length can be cut off.

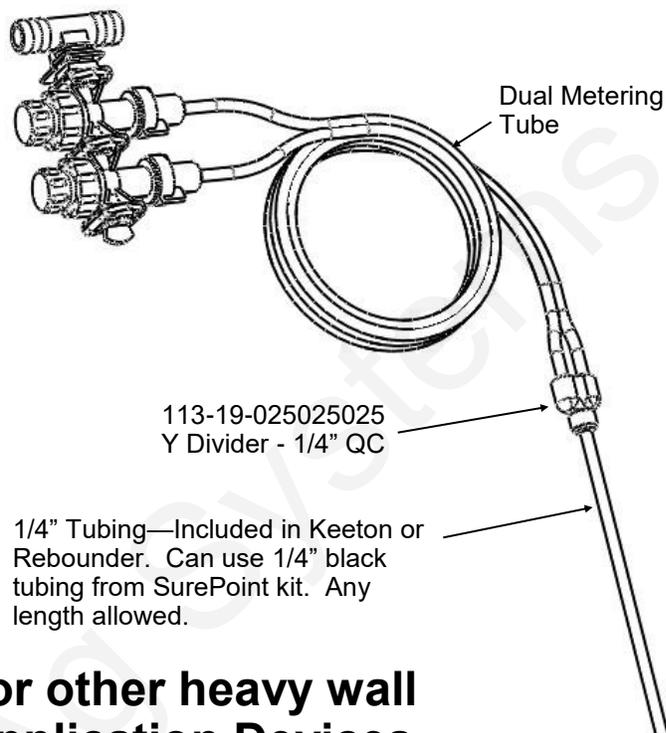


311-0408000800-05
1/4" L Bolt

Connection to Keeton Seed Firmer, Rebounder Seed Covers or through thin wall stainless steel tubes

1. Mount the Keeton Seed Firmer or Rebounder Seed Cover.
2. Route the tube included in the above kit as instructed.
3. Attach the 1/4" tube to the 1/4" QC Y divider fitting.
4. Zip all tubing to the planter and row unit in as many locations as possible.

For thin wall stainless steel tubes, you can push the 1/4" black tubing all the way through the stainless steel tube so fertilizer will run directly from the tubing onto the ground.



113-19-025025025
Y Divider - 1/4" QC

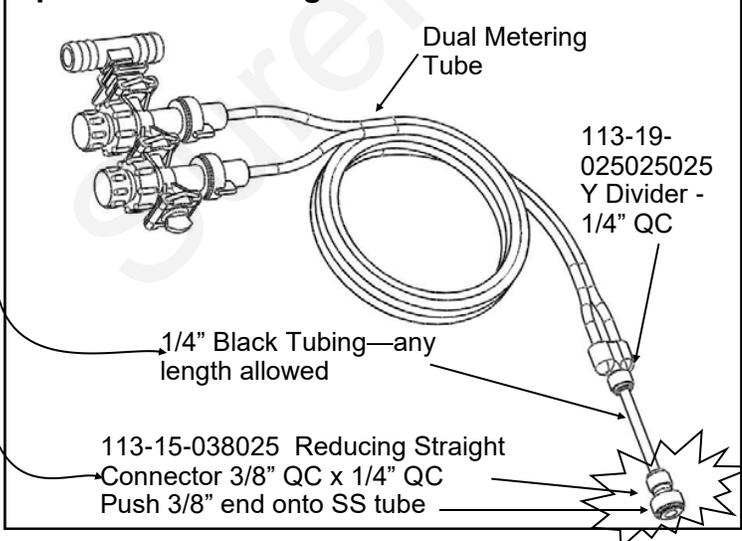
1/4" Tubing—Included in Keeton or Rebounder. Can use 1/4" black tubing from SurePoint kit. Any length allowed.

Connection to Totally Tubular or other heavy wall Stainless Steel Tube Ground Application Devices

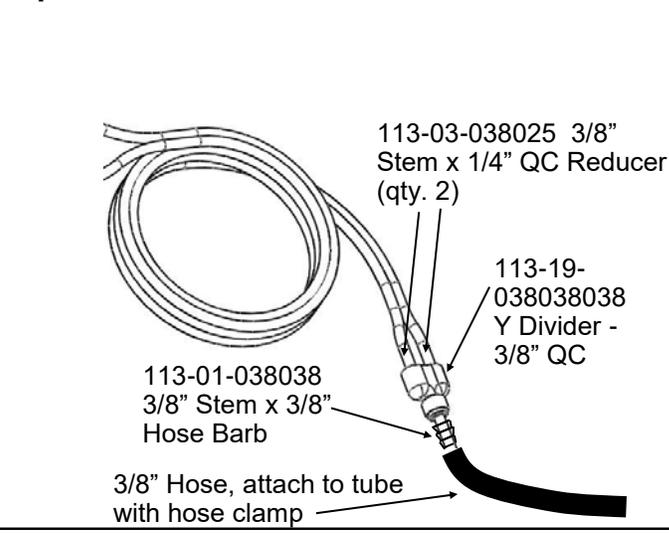
When using a 3/8" OD stainless steel tube to apply fertilizer to the ground, there are two options for the delivery tube plumbing. If the tube ID is less than 1/4" (tubing will not fit inside tube) this attachment method must be used. The description following is for Option 1. See bottom right picture for Option 2.

1. Use the 1/4" x 3/8" QC fitting shown. Push the 3/8" end onto the stainless steel tube. (Hint: if the fitting slips off the stainless steel tube, use sandpaper or a file to roughen the end of the tube slightly)
2. Use a short piece of 1/4" black tubing to connect the Y fitting to the reducer fitting on the stainless steel tube.
3. Zip all tubing to the planter and row unit in as many locations as possible.

Option 1: QC Fitting attaches to SS Tube



Option 2: 3/8" Hose attaches to SS Tube



396-4116Y1 Metering Tube (8'), LiquiShift, and Split Flow Tube Charts

Low Viscosity (28-0-0 approx 10.7 lb/gal)				Medium-Low Viscosity (32-0-0 approx 11.0 lb/gal)			
	oz/min	mL/min	gal/min		oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range	Tube Color	Flow Range	Flow Range	Flow Range
Gray	3.5-10	105-295	0.03 - 0.08	Gray	2.5-7.5	74-222	0.02-0.06
Purple	6-20	180-590	0.05 - 0.16	Purple	4.1-15.7	121-464	0.03-0.12
Brown	8-25	235-750	0.06 - 0.20	Brown	5.7-20	170-590	0.04-0.16
Blue	10-31	295-915	0.08 - 0.24	Blue	7.5-25	220-740	0.06-0.20
Green	18-55	530-1600	0.14 - 0.43	Green	14-46	415-1360	0.11-0.36
Tan	25-75	740-2220	0.19 - 0.59	Tan	20-64	590-1890	0.16-0.50
Orange	44-126	1300-3725	0.34 - 0.98	Orange	36-114	1065-3370	0.28-0.89
Yellow	55-154	1625-4555	0.43 - 1.20	Yellow	44-137	1300-4050	0.34-1.07
Black	72-205	2130-6060	0.56 - 1.60	Black	60-175	1775-5175	0.47-1.37
5' Tan	33-100	975-2960	0.26 - 0.78	5' Tan	27-85	800-2515	0.21-0.66
5' Orange	57-165	1685-4880	0.45 - 1.29	5' Orange	49-155	1450-4585	0.38-1.21
5' Yellow	70-200	2070-5915	0.55 - 1.56	5' Yellow	59-185	1745-5470	0.46-1.45
5' Black	95-260	2810-7690	0.74 - 2.03	5' Black	80-235	2365-6950	0.63-1.84

10-60 PSI 60°F

Medium Viscosity (Starter, N-P Blend, approx 11.2 lb/gal)				High Viscosity (10-34-0 approx 11.6 lb/gal) For 11-37-0, find the flow range here, and use next larger tube.			
	oz/min	mL/min	gal/min		oz/min	mL/min	gal/min
Tube Color	Flow Range	Flow Range	Flow Range	Tube Color	Flow Range	Flow Range	Flow Range
Gray	1.5-5.0	45-150	0.01-0.04	Gray			
Purple	2.2-11.5	65-340	0.02-0.09	Purple	1-4	30-118	0.008-0.03
Brown	3.5-15	105-445	0.03-0.12	Brown	1.4-6	41-177	0.011-0.05
Blue	5-19.5	150-575	0.04-0.15	Blue	1.8-8	53-237	0.014-0.06
Green	9.5-37	280-1095	0.07-0.29	Green	2.6-14	77-414	0.02-0.11
Tan	14-53	415-1565	0.11-0.41	Tan	4-22	120-650	0.03-0.17
Orange	27-102	800-3015	0.21-0.80	Orange	9-44	265-1300	0.07-0.34
Yellow	33-120	975-3550	0.26-0.94	Yellow	13-61	385-1805	0.10-0.48
Black	48-145	1420-4290	0.38-1.13	Black	18-80	530-2365	0.14-0.63
5' Tan	20-75	590-2220	0.16-0.59	5' Tan	6-31	165-910	0.04-0.24
5' Orange	38-140	1125-4140	0.30-1.09	5' Orange	13-62	375-1820	0.10-0.48
5' Yellow	46-170	1360-5030	0.36-1.33	5' Yellow	18-85	540-2525	0.14-0.67
5' Black	67-200	1980-5915	0.52-1.56	5' Black	25-112	745-3310	0.20-0.88

10-60 PSI 60°F--For 10-34-0 select a tube with additional capacity for cold weather.

Water (8.34 lb/gal)				<p>These charts are typical flow rates from 10 to 60 PSI.</p> <p>Electric pumps typically won't operate at 60 psi. See charts on next page for 10 to 40 PSI for typical electric pump operating range.</p> <p>These charts are designed for typical N-P fertilizers. Suspension, granular, and/or clay-based products may not follow these charts.</p> <p style="text-align: center;">These charts are for product at 60° F.</p> <p>Products will be thicker and pressure will be higher at lower temperatures (esp 10-34-0). <small>MAW</small></p>
	oz/min	mL/min	gal/min	
Tube Color	Flow Range	Flow Range	Flow Range	
White	2.5-7.5	75-220	0.02-0.06	
Gray	5.8-15.5	170-460	0.045-0.12	
Purple	10-26	295-770	0.08-0.20	
Brown	12.5-34	370-1005	0.10-0.27	
Blue	17.5-45	520-1330	0.14-0.35	
Green	26-70	770-2070	0.20-0.55	
Tan	34-93	1005-2750	0.27-0.73	
Orange	60-159	1775-4700	0.47-1.24	
Yellow	75-196	2220-5800	0.59-1.53	



LiquiShift Dual Tube Combinations

Low Viscosity Product (28-0-0) (10.6 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
180-1475	6-50	Purple/Blue
240-2365	8-80	Brown/Green
295-2510	10-85	Blue/Green
295-3105	10-105	Blue/Tan
535-5025	18-170	Green/Orange
535-5765	18-195	Green/Yellow
740-6210	25-210	Tan/Yellow
740-7390	25-250	Tan/Black
1035-8870	35-300	5' Tan/Yellow
1300-9165	44-310	Orange/Black
1035-9610	35-325	5' Tan/Black
1625-10350	55-350	Yellow/Black
1685-11830	57-400	5' Orange/Black
2070-13600	70-460	5' Yellow/Black

Medium-Low Viscosity (32-0-0) (11.0 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
135-1180	4.5-40	Purple/Blue
165-1920	5.7-65	Brown/Green
220-2070	7.5-70	Blue/Green
220-2570	7.5-87	Blue/Tan
415-4495	14-152	Green/Orange
415-5175	14-175	Green/Yellow
590-5620	20-190	Tan/Yellow
590-6210	20-210	Tan/Black
830-7985	28-270	5' Tan/Yellow
1035-8030	35-275	Orange/Black
830-9020	28-305	5' Tan/Black
1300-9020	44-305	Yellow/Black
1420-10795	48-365	5' Orange/Black
1775-12125	60-410	5' Yellow/Black

To calculate Flow (oz/min/row): **Speed (mph) X Rate (gpa) X Row Spacing (in) divided by 46.4**

Calculate Minimum flow using Minimum Speed and Minimum Rate.

Calculate Maximum flow using Maximum Speed and Maximum Rate.

Find the Tube Combination that best covers the Flow Range needed.

10-34-0 gets thicker and harder to push when cold. **Use a larger tube combination when possible for 10-34-0** so it will flow OK when it is cold.

Medium Viscosity (N-P-K Blend, ProGerm-11.2 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
75-885	2.5-30	Purple/Blue
105-1475	3.5-50	Brown/Green
150-1625	5-55	Blue/Green
150-2070	5-70	Blue/Tan
295-3990	10-135	Green/Orange
295-4435	10-150	Green/Yellow
415-5025	14-170	Tan/Yellow
415-5765	14-195	Tan/Black
590-7245	20-245	5' Tan/Yellow
800-7100	27-240	Orange/Black
590-7985	20-270	5' Tan/Black
975-7690	33-260	Yellow/Black
1125-9760	38-330	5' Orange/Black
1360-10795	46-365	5' Yellow/Black

High Viscosity (10-34-0 at 60 deg) (11.65 lb/gal)		
ML	OZ	20-70 PSI
Flow Range	Flow Range	Tubes
30-325	1-11	Purple/Blue
44-530	1.5-18	Brown/Green
53-590	1.8-20	Blue/Green
53-830	1.8-28	Blue/Tan
75-1480	2.6-50	Green/Orange
75-1920	2.6-65	Green/Yellow
118-2220	4-75	Tan/Yellow
118-2960	4-100	Tan/Black
180-3400	6-115	5' Tan/Yellow
265-3400	9-115	Orange/Black
180-4230	6-143	5' Tan/Black
385-3850	13-130	Yellow/Black
415-4730	14-160	5' Orange/Black
530-5765	18-195	5' Yellow/Black

Tubes may need to be adjusted for best operation with a particular product.

If necessary, system can be operated at 70-90 PSI to achieve high flow rates.

Green/Yellow combination should only be used when maximum range is needed.

LiquiShift Mode Selection should be set at 20-80 PSI for Green/Yellow tubes.

7/14/2020

Metering Tubes to use to split the flow to both sides of the row:

(Numbers indicate the **flow range through each tube** in oz/min with a pressure drop from 4 to 15 psi)

LOW VISC	2'	32"	4'
Purple	7-20	6-15	5-11
Blue	12-32	11-25	9-20
Green	24-55	20-47	18-36
Tan	31-73	27-64	24-48
Orange	56-125	47-110	41-83
Yellow	71-153	60-135	53-104
Black	91-205	76-175	68-133
MID VISC	2'	32"	4'
Purple	4-11	3-9	2-6
Blue	7-20	5-15	4-11
Green	14-36	10-30	8-23
Tan	20-55	15-44	12-31
Orange	37-100	30-84	26-62
Yellow	46-120	36-102	30-75
Black	65-145	52-130	45-100
HIGH VISC	2'	32'	4'
Purple	1-4	0.9-3	0.6-2
Blue	2-8	1.8-6	1.6-4
Green	4-14	3-11	2.5-9
Tan	6-22	4.5-17	3.8-11.5
Orange	14-44	10.5-36	8-25
Yellow	19-61	15-49	12-34
Black	27-80	21-65	16-49
WATER	2'	32'	4'
White	3.5-7.5	3-5.8	2.5-5
Gray	7-15	6-13	5-11
Purple	13-26	11-23	9-18
Blue	22-40	19-39	16-31
Green	33-70	28-60	25-48
Tan	43-93	37-80	32-64

(32" tube is an 8' tube cut into 3 pieces)

VISC	EX	LB/ GAL	SP GR
LOW	28-0-0	10.7	1.29
MID	9-24-3	11.2	1.34
HIGH	10-34-0	11.6	1.39

As with all metering tube recommendations, these charts should provide a starting point, but adjustments may need to be made in the field.

When doing a split at the row, we are trying to provide paths of equal resistance (and equal flow) to each side of the row, while keeping the pressure drop in this step as small as possible.

In general, use as large a tube (and / or as short a tube) as possible to minimize the pressure drop caused by splitting the flow. In other words, if possible, use the tube that matches up best at the low end of the range on the chart, rather than at the high end.

A compromise may need to be made in LiquiShift systems that have a wide flow range that extends beyond a selection on the chart.



John Deere Rate Controller for GS2 & GS3

D

Wiring & Elec.

SurePoint Fertilizer Systems begin at the John Deere Rate Controller. The picture below shows the John Deere Rate Controller. A John Deere Rate Controller can control one product. Therefore, if you were applying two liquid fertilizers on your planter, you will need three rate controllers, one for seed and two for liquid fertilizer. The John Deere Rate Controller communicates with the John Deere display in the cab.

The harness coming from the rate controller is a 37-pin Amp connector. SurePoint Fertilizer System harnesses begin at this 37-pin connector. The following page shows a system layout to illustrate how the harnessing is connected to all components. Detailed harness drawings follow for information and troubleshooting.

Instructions for setting up the JD display are in Section F. Detailed screen shots of the display are included showing exactly what settings are required and recommended for SurePoint Fertilizer Systems.

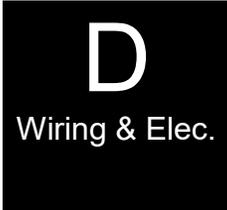
See your John Deere GreenStar Rate Controller Operator's Manual for more setup and operating instructions.



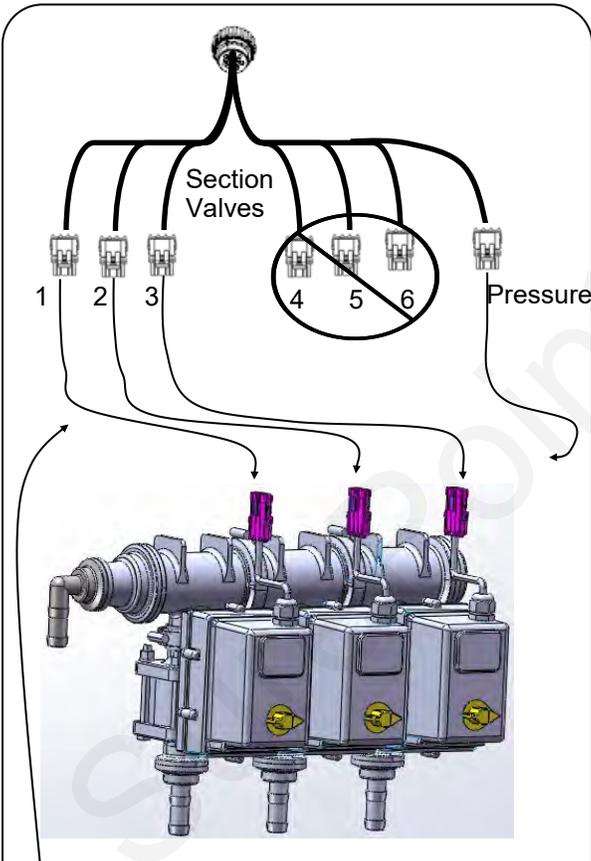
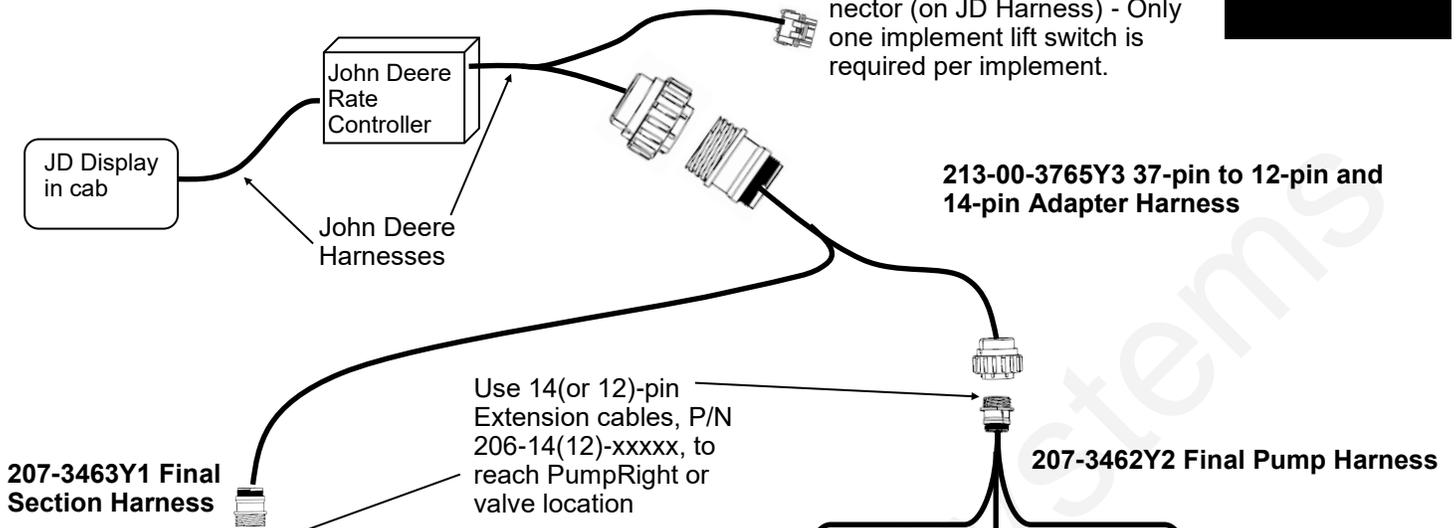
PumpRight & John Deere Rate Controller Layout

Control: PWM Hydraulic Valve

Sections: 3



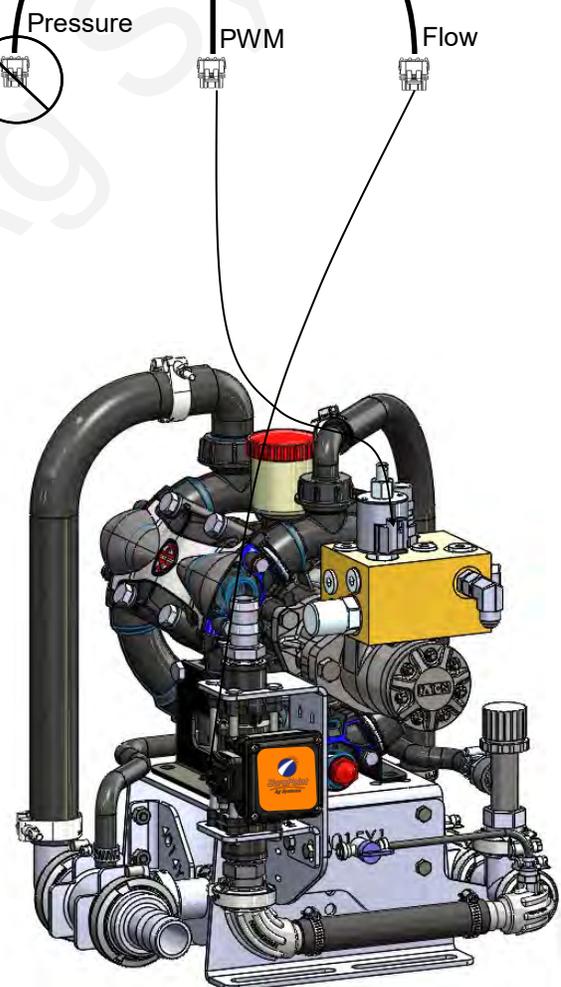
Implement Lift Switch Connector (on JD Harness) - Only one implement lift switch is required per implement.



Can use 3-Pin Weatherpack Extension cables to reach section valves

Section Valves are optional.

 Means connector not used in this configuration.



John Deere GreenStar Rate Controller Wiring Schematics



Your John Deere system may have one of the following two sets of harnesses. The first set was introduced during the 2018 season. The second set is the legacy set that has been used for several years.

New JD GreenStar Rate Controller (GRC) harnesses for the 2018 season:

Adapter Harness

213-01-3765Y3 JD Rate Controller Adapter harness with 12-pin Product and 14-pin Section connectors

Pump Harness

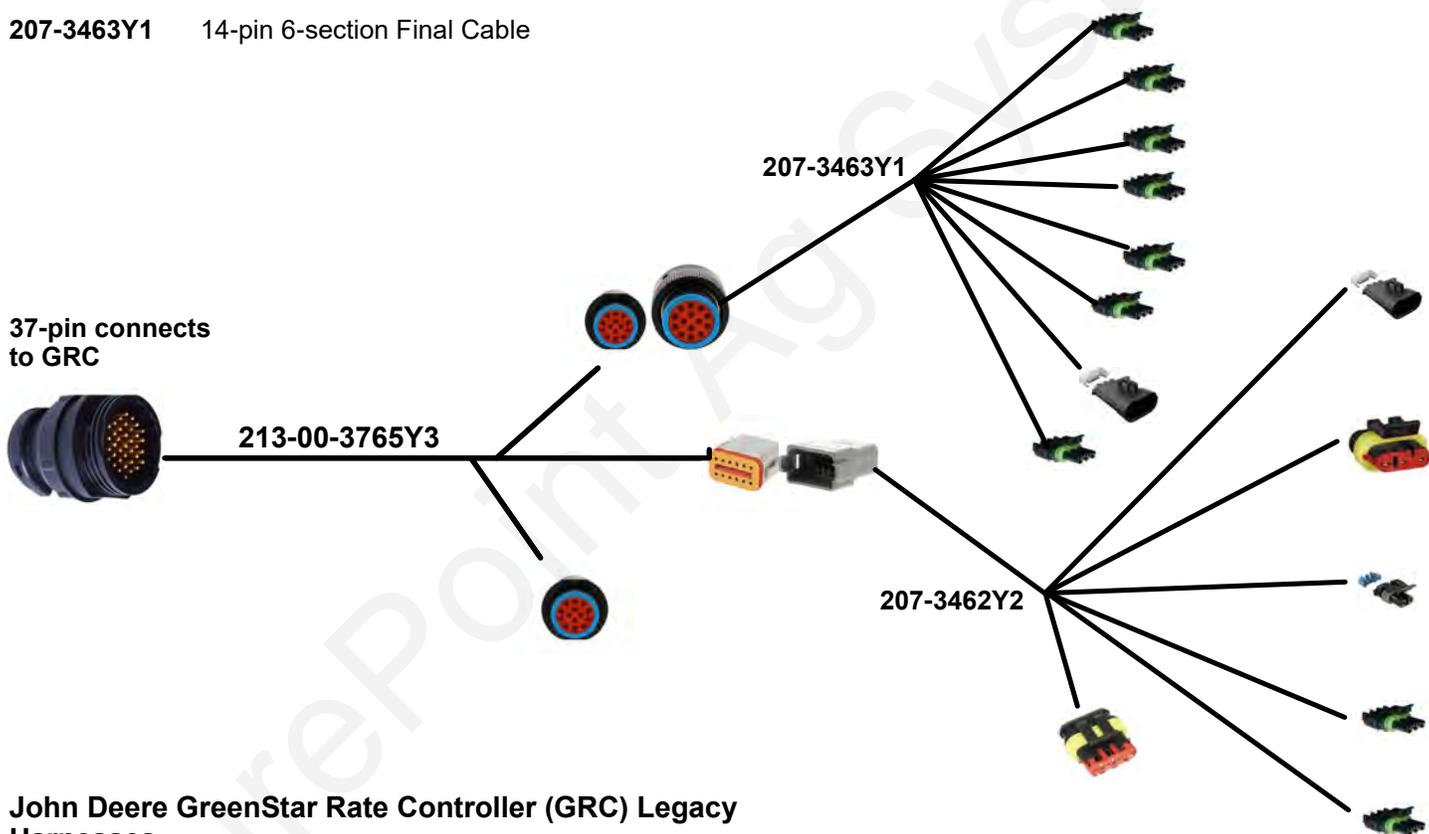
207-3462Y2 12-pin Final Cable for SurePoint Liquid System (PWM, Flow, Pressure, Pump RPM)

Or

207-3461Y2 12-pin Final Cable for Tower with 1 or 2 Section Valves (PWM, Flow, Pressure, Sections 1 and 2)

Section Harness (if needed)

207-3463Y1 14-pin 6-section Final Cable



John Deere GreenStar Rate Controller (GRC) Legacy Harnesses

Adapter Harness

201-215465Y2 JD Rate Controller to twin 16-pin AMP connectors

Pump Harness

207-215223Y2 PWM Pump Cable (alternate 207-3057Y1)

Section Harness

207-215466Y2 16-pin 6-Section Harness

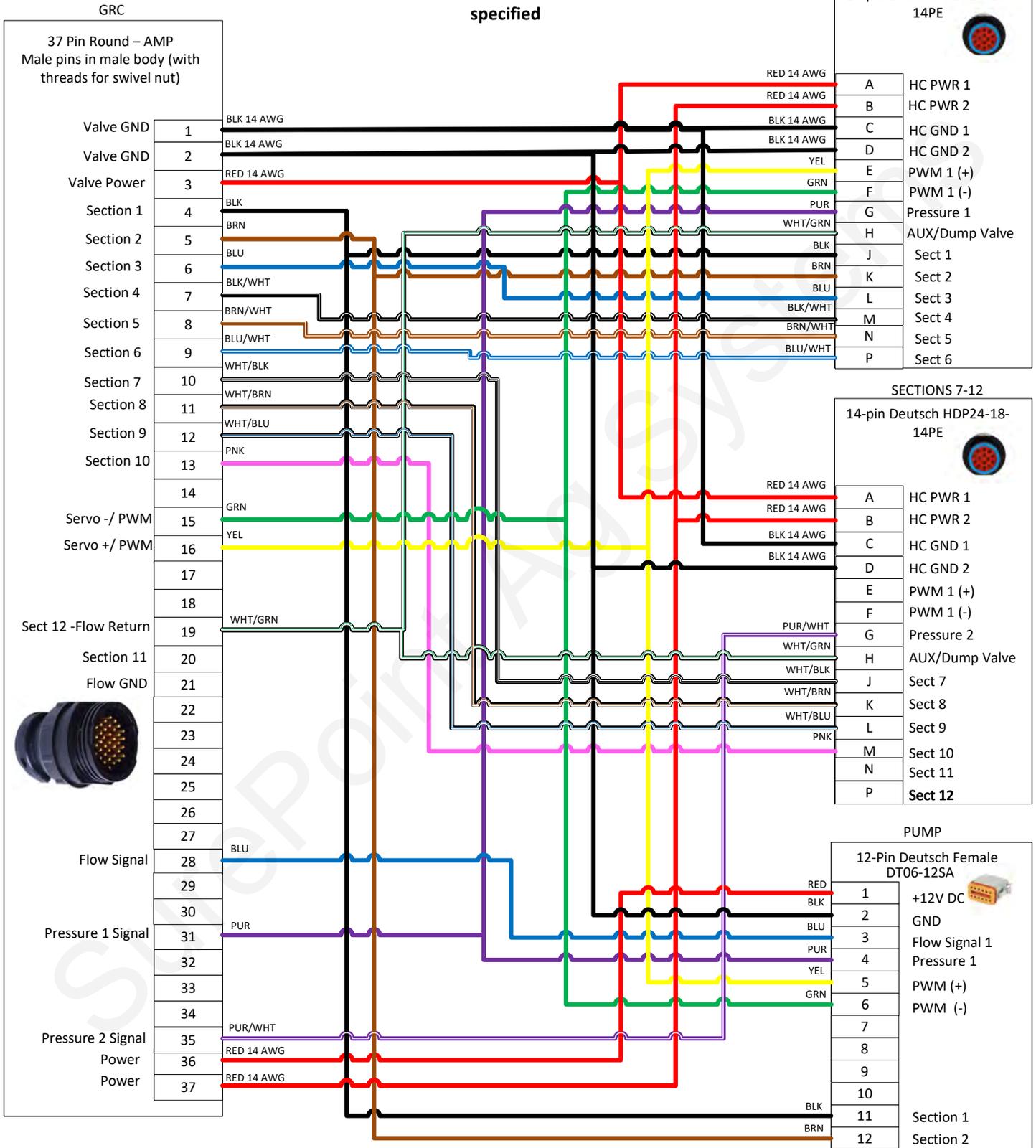
The 16-pin AMP connectors on these legacy harnesses are susceptible, over time, to corrosion on the pins and on the wires that connect to the pins. Check these connectors very carefully. If there is corrosion on the pins or on the wires where they connect to the pins, you may get a good voltage reading or a tap test may work, but the corrosion may prevent it from working with a live load.



213-00-3765Y2

Rate Controller Adapter Cable 37-pin to 12-pin Product and 14-pin Sections

Wire 18AWG
unless otherwise
specified

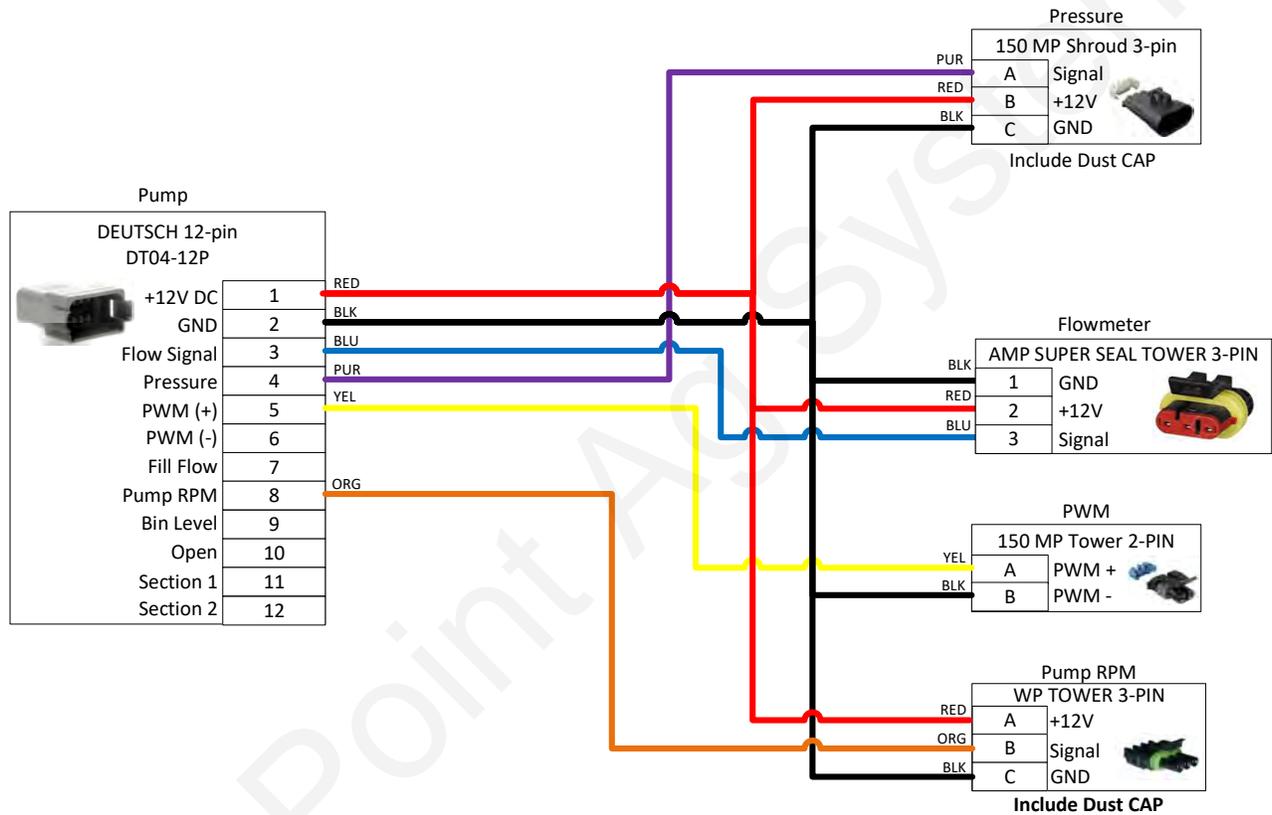


Part No:	213-00-3765Y2	Drawn By:	Mark Wolters		
Description:	Rate Controller Adapter Cable 37-pin to 12-pin Product and 14-pin Sections	Last Edit Date:	10/12/2018	Revision	A-01
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207-3462Y2

Final Cable for SureFire Liquid Pump System (pwm, flow, pres., pump rpm)

**Wire 18AWG
unless otherwise
specified**

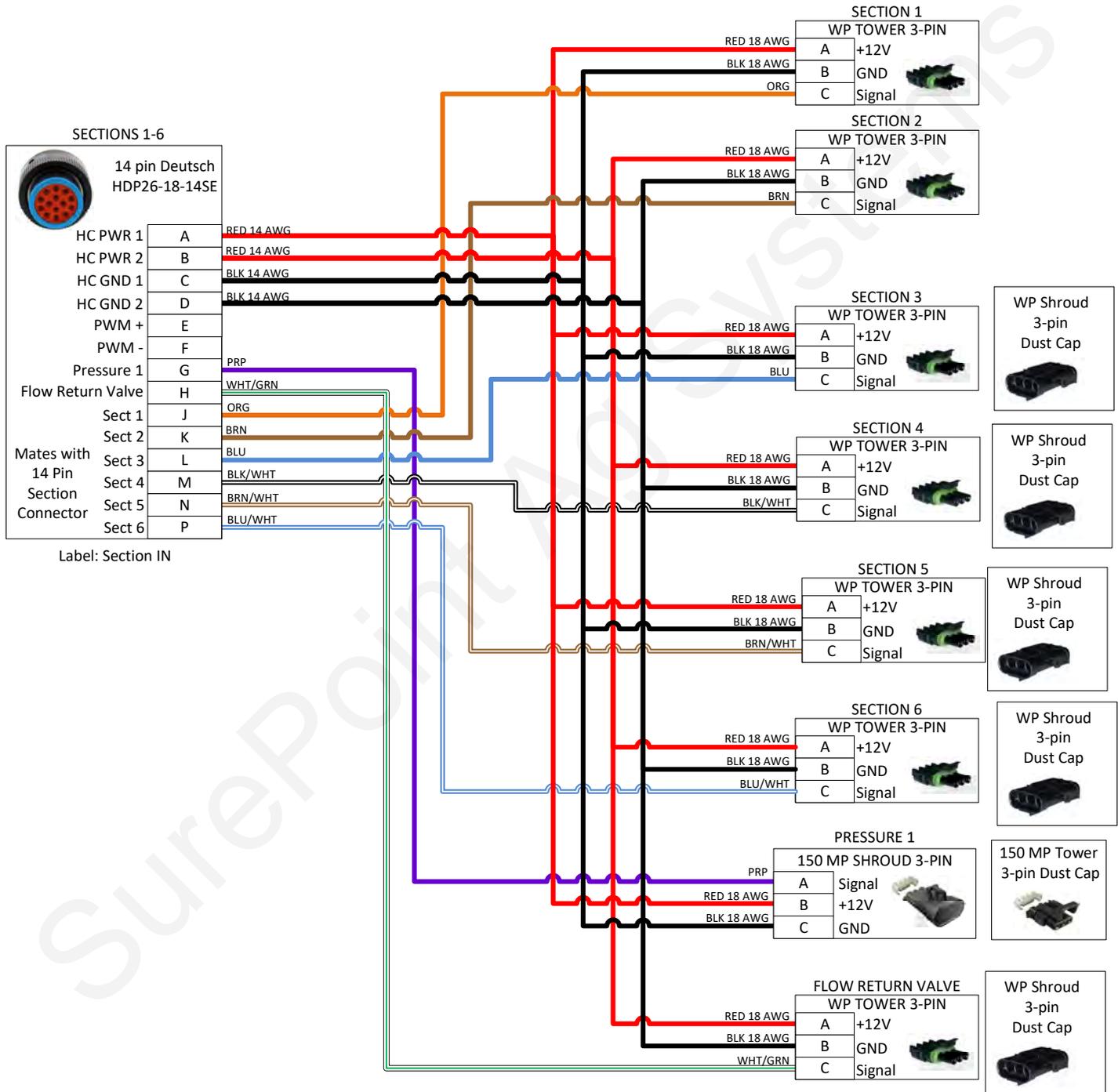


Part No:	207-3462Y2	Drawn By:	Brandon Cavenee		
Description:	Final Cable for SureFire Liquid Pump System (pwm, flow, pres., pump rpm)	Last Edit Date:	6/4/2021	Revision	A-03
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207-3463Y1

14-Pin 6 Section Final Cable (6 sections, flow return, pressure)

**Wire 18AWG
unless otherwise
specified**



	Part No:	207-3463Y1	Drawn By:	Brandon Cavenee		
	Description:	14-Pin 6 Section Final Cable (6 sections, flow return, pressure)	Last Edit Date:	6/4/2021	Revision	A-02
	Copyright 2016 SureFire Ag Systems, Reproduction or other use of drawing without express written permission from SureFire Ag Systems is forbidden			28	1	of 2

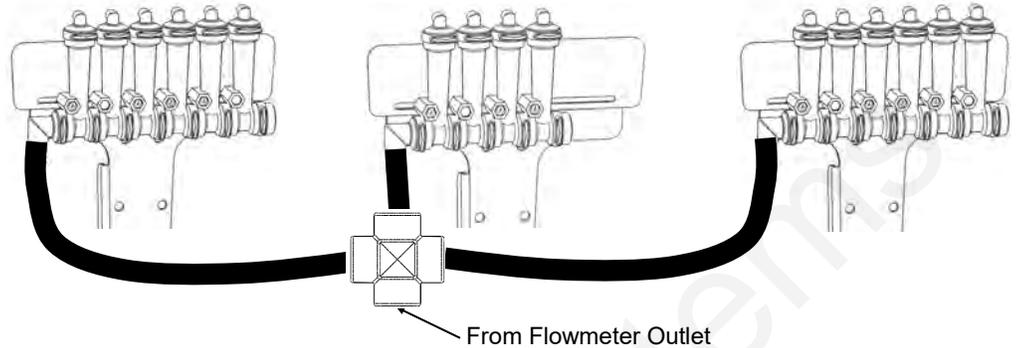
Floating Ball Flow Indicators

E Installation Overview

Flow Indicators are extremely flexible and can be mounted in hundreds of different configurations on various types of liquid application equipment. This page is to give you some ideas and let you customize the installation for what works best on your equipment.

16 Row Split 6 - 4 - 6

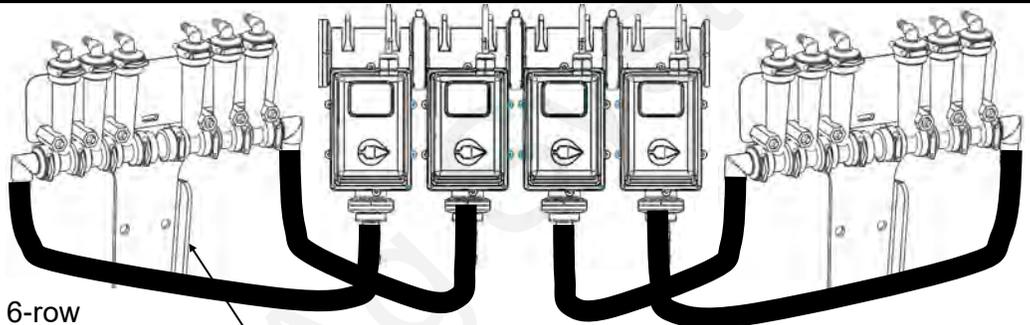
This configuration works well on a 16-row front fold planter. Each flow indicator manifold is shown fed by a cross in a single section installation. Each manifold could be fed by a section valve if desired.



12 Row Split 3 - 3 - 3 - 3

Shown here is a 12 row with four 3-row sections controlled by four section valves. Note each 6-row T-Bracket can hold two separate 3-row manifolds.

A 4-section 24-row could be similar with four 6-row manifolds on two large T-Brackets.

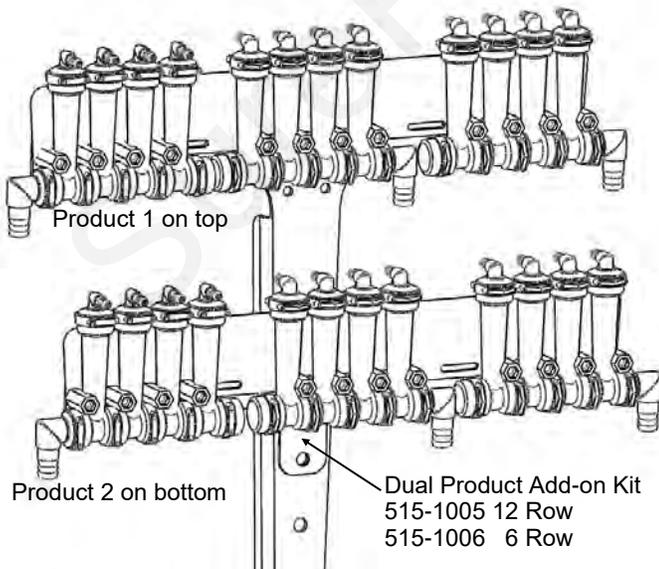


NOTE: Another option is the flange can face forward so the T-Bracket could be mounted on the front side of a bar.

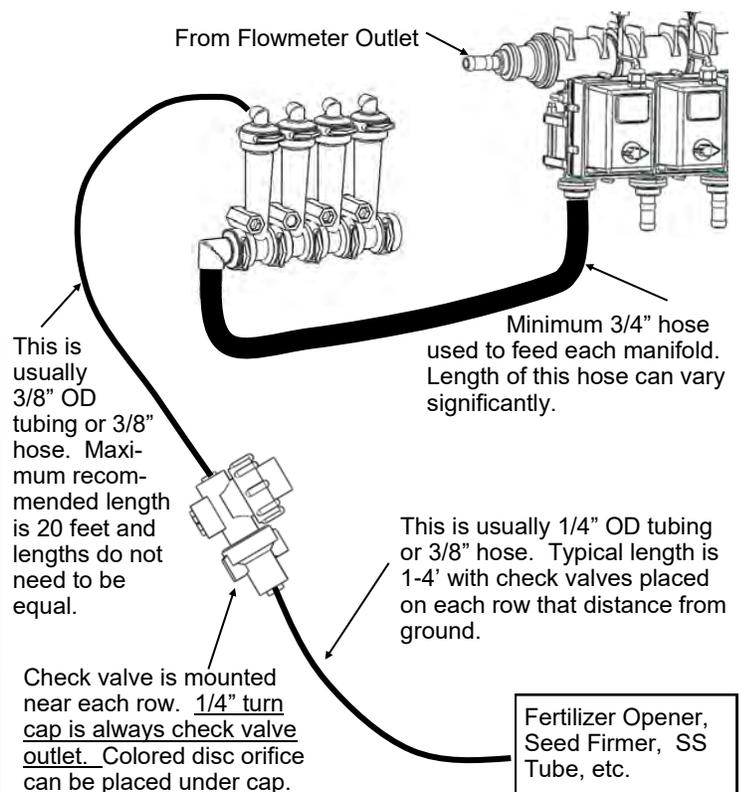
12 Row Dual Product

Product 1 Split 4 - 4 - 4 / Product 2 Split 4 - 4 - 4

In this case each manifold would be fed by a section valve. There would be 6 total section valves (3 sections X 2 products). Most often one set (top) of flow indicators would be Full Flow for high rate fertilizer and 2nd set (bottom) would be Low Flow for starter.



General Plumbing Guidelines



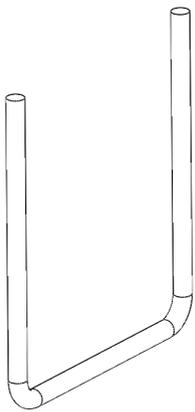
PumpRight Pump Installation

E

Installation
Overview

Mounting

1. Mount pump in your preferred location. The PumpRight pump has excellent suction and priming ability, so it can be mounted away from or above fertilizer tanks.
2. SurePoint has U-Bolts available to mount the pump directly to multiple bar sizes shown below. Each U-bolt kit includes 1 bolt and 2 flange nuts.
3. If the U-Bolts will not work, order the universal backer plate kit, number 515-203000 which will clamp to any size tube from 4" - 8" wide.



Mounting Bar
Size

Mounting Bar Size	Item Number	Item Description
3" x 3"	380-1022	1/2" U-bolt Kit - 1/2", fits 3" x 3" tube - (3" opening)
4" x 4"	380-1023	1/2" U-bolt Kit - 1/2", fits 4" x 4" tube - (4" opening)
4" x 6"	380-1015	1/2" U-bolt Kit - 1/2", fits 4" x 6" tube - (4" opening)
	380-1017	1/2" U-bolt Kit - 1/2", fits 6" x 4" tube - (6" opening)
5" x 7"	380-1014	1/2" U-bolt Kit - 1/2", fits 5" x 7" tube - (5" opening)
	380-1016	1/2" U-bolt Kit - 1/2", fits 7" x 5" tube - (7" opening)
6" x 7"	380-1018	1/2" U-bolt Kit - 1/2", fits 7" x 6" tube - (7" opening)
7" x 7"	380-1001	1/2" U-bolt Kit - 1/2", fits 7" x 7" tube - (7" opening)
6" x 10"	380-1021	1/2" U-bolt Kit - 1/2", fits 6" x 10" tube - (6" opening)
8" x 12"	380-1019	1/2" U-bolt Kit - 1/2", fits 8" x 12" tube - (8" opening)
8" x 16"	380-1020	1/2" U-bolt Kit - 1/2", fits 8" x 16" tube - (8" opening)



PumpRight Hydraulic Connections

PWM Valve



Manual Override - Push down and turn 1/2 turn CCW to lift the valve for manual override to check for proper hydraulic operation. **Override will completely open valve, so limit tractor hydraulic flow to valve.**

(May need to clean packed dirt to allow movement of override knob.)

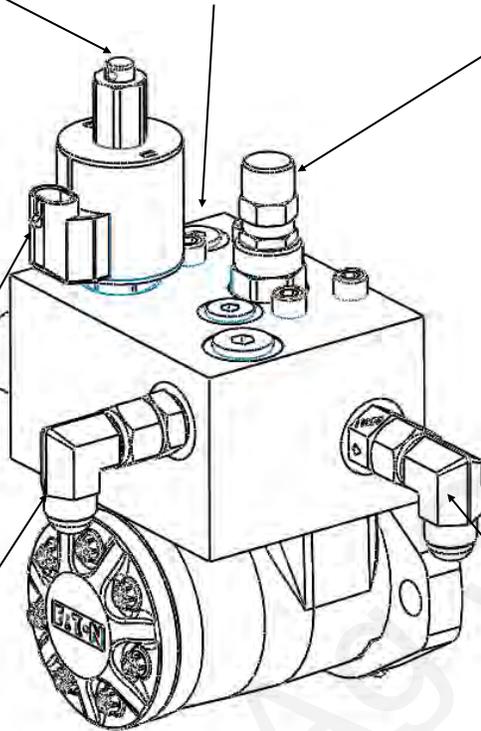
Push down and turn 1/2 turn CW to return to operating position.

PWM Valve Connector -2 Pin MP Shroud

Troubleshooting Tip: To check coil, an ohmmeter placed on the two pins should show 7-9 ohms.

Pressure line from Tractor

Load Sense Port—For power beyond hydraulic use only.



Bypass Valve—Remove the cap to access a bypass needle valve. This valve is shipped from the factory closed. **The only case when valve should be open is when running in series with other hydraulic motors.**

Depending on your tractor and exact hydraulic plumbing scenario your pump may turn very slowly when it should stop. To stop the pump completely, open the bypass valve slightly.

To adjust the Bypass Needle Valve, first loosen the lock nut. Do not overtighten the needle valve.

Return oil to Tank - Check valve included on return port

⚠ **DANGER**

Hydraulic oil under extremely high pressure. Do not use hand or any other skin to check for or to stop hydraulic leaks. Be sure pressure is relieved before loosening hydraulic fittings. Replace worn hoses immediately. Seek medical care immediately if hydraulic oil is shot into the eye or the skin.

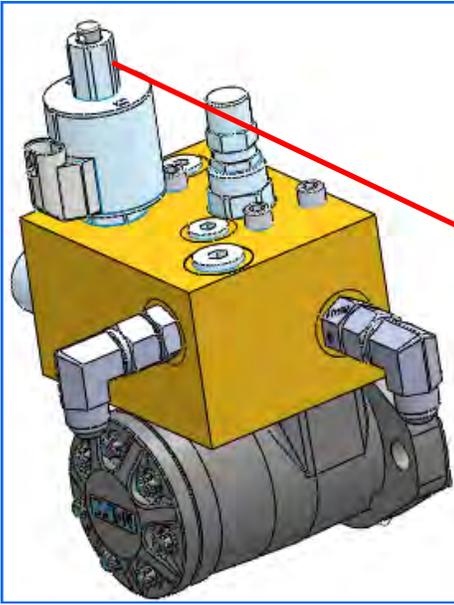
Pump Rotation Check Valve

A check valve is included on the outlet port of the hydraulic valve. This prevents the pump from running in the wrong direction. If ran in the wrong direction, liquid will be pumped, however the hydraulic valve will not be able to control the flow. The check valve can be identified by the Part Number 1108R stamped on it and a flow direction arrow.

How it Works with Power Beyond Hydraulics

This valve is designed to work with power beyond hydraulics. This configuration will not require a standard tractor remote hydraulic valve. The load sense port and hose described next will typically not be needed if other hydraulic ports are in use. If the load sense is needed, do this: First, remove the load sense plug and install a #6 male boss x #6 JIC adapter fitting, SurePoint PN 161-01-6MB-6MJ. Then run a 3/8" or 1/4" hydraulic hose back to the tractor. This hose will connect to the load sense port on the tractor. The load sense line will signal the tractor hydraulic system to supply the flow needed by the pump to meet your application rate. The SurePoint valve has an internal load sense check valve, which is required for power beyond hydraulics.. The bypass valve (see above) must be closed to use power beyond hydraulics or else an unlimited amount of oil will be continuously circulated.

Hydraulic Manual Override

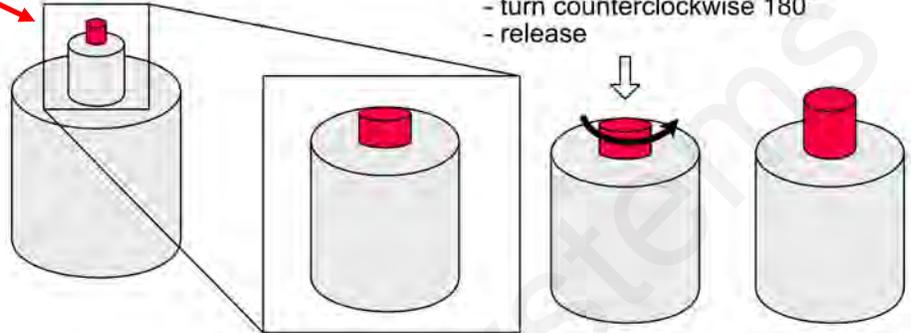


Hydraulic Manual Override

Down - Normal Operation

Up - Override, valve 100% open

To Override:
- push down
- turn counterclockwise 180°
- release



Manual Override - Override will completely open valve, so turn down the hydraulic flow in the cab.

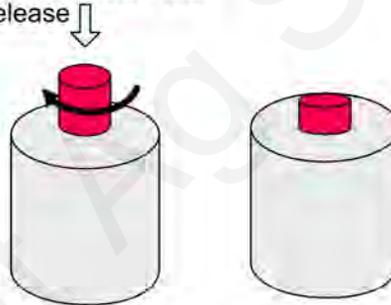
Push down and turn CCW and let the button pop up to open the manual override to check for proper hydraulic connections. (Spring-loaded, should pop up 1/4")

(May need to clean packed dirt to allow movement of override knob. If it is packed with dirt, you can break the stem if you force it with a wrench.)

Push down and turn 1/2 turn CW to return to operating position.

To Return to Normal Operation

- push down
- turn clockwise 180°
- release



Preseason - Clean the dirt out of the stem for the red knob so the red knob can be moved by hand. Be sure to lock it in the down position before operating the pump.

PumpRight Hydraulic Connections

B

Installation
Overview

Hydraulic Hose

SurePoint recommends 1/2" hydraulic hose for both pump inlet and outlet. The hoses will need #8 JIC female swivel fittings.

Where do I get hydraulic flow for my PumpRight?

This question is often asked as many implements use up all the hydraulic connections on a tractor. SurePoint has some recommendations as to what works best.

Best Option - Dedicated PumpRight Circuit

If you have a tractor remote available, attach the tractor remote valve directly to the PumpRight pressure and return ports. DO NOT try to avoid this method simply to save another set of hydraulic hoses running to the tractor. Operating the PumpRight on it's own circuit is the simplest for installation and operation. It guarantees the PumpRight won't negatively affect any other hydraulic components on your equipment.

Preferred

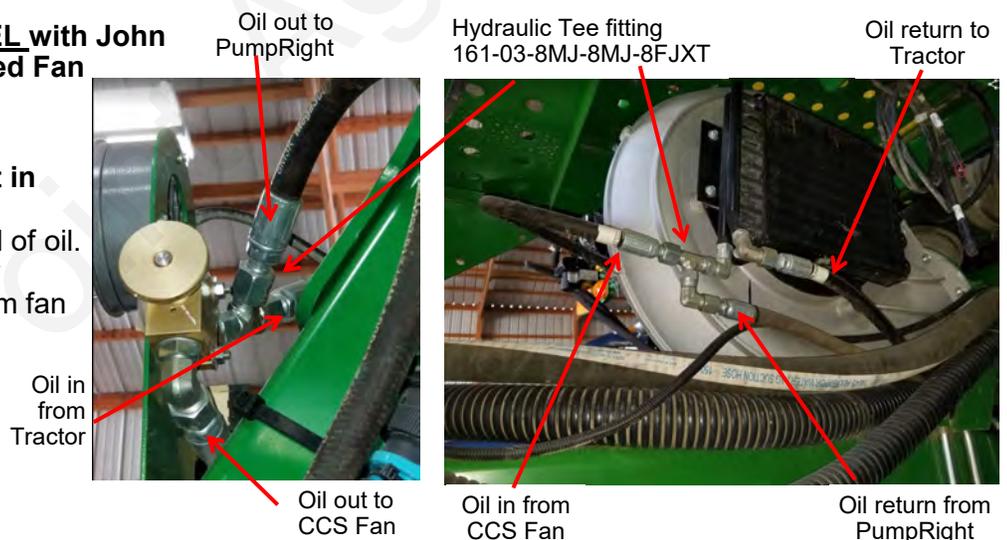
Alternate Option - In SERIES with John Deere CCS Fan or Bulk Fill Seed Fan

If you do not have a tractor remote valve available, this may be your best method. You can plumb the PumpRight after the seed distribution fan. **If using this method, the SurePoint PWM bypass valve must be open** (see previous page for instruction & picture). If bypass is left closed, the SurePoint valve will limit the speed of the seed distribution fan.

For example, the John Deere CCS fan uses around 7 GPM of oil. This will limit the PumpRight maximum flow (8-9 GPM oil necessary for maximum flow). See the charts on the next page for adjusted maximum pump flow. See section G for flow charts to determine your necessary flow rate. If you absolutely need the maximum flow in this case, SurePoint has an alternate motor (smaller displacement) to increase pump speed at 7 GPM oil flow.

Alternate Option - In PARALLEL with John Deere CCS Fan or Bulk Fill Seed Fan (Shown Right)

DO NOT plumb the PumpRight in series with a vacuum fan. The vacuum fan uses just a few GPM of oil. Also, problems will be caused by excessive pressure at the vacuum fan motor



Two PumpRights

The preferred method is to plumb the two pumps in series. **DO NOT plumb two pumps after the CCS fan.** Excessive pressures may damage the CCS fan motor. Run the pressure line from tractor to first pump inlet. Plumb from the outlet of Pump 1 to the Inlet of Pump 2, then from Pump 2 outlet back to the tractor. Open the bypass needle valve on both pumps so each valve controls motor speed independently. Run the flow setting procedure on the next page to minimize the hydraulic flow based on the pump that requires more hydraulic motor flow.

⚠ DANGER

Hydraulic oil under extremely high pressure. Do not use hand or any other skin to check for or to stop hydraulic leaks. Be sure pressure is relieved before loosening hydraulic fittings. Replace worn hoses immediately. Seek medical care immediately if hydraulic oil is shot into the eye or the skin.



PumpRight Hydraulic Oil Flow Requirements

(Requirements for 4.0 CID Motor—standard SurePoint motor beginning in 2016—
Earlier motor was 4.9 CID which uses 20% more oil)



Setting Tractor Hydraulic Remote Speed

PumpRight pumps require a constant hydraulic oil flow from the tractor. The amount of oil needed varies with pump size and speed. The chart at right shows the necessary oil flow for each pump model at varying fertilizer flows.

Use this procedure to determine the correct setting on your tractor hydraulic flow.

1. Run the fertilizer system in the field at the maximum rate and ground speed.
2. Turn down the hydraulic flow slowly while watching the pump flow (Volume / Minute).
3. Observe when the Volume / Minute begins to drop.
4. Turn the hydraulic flow back up slightly.

This setting will provide the Pump Right pump just enough oil for your application rate.

If running with the bypass open (only recommended when 2 motors are operated in series) this process will minimize the oil circulated in the bypass loop, leaving more oil flow for other hydraulic functions.



The pump is rated at a maximum of 550 RPM. Spinning the pump over 550 RPM may cause pump failure.

The system will spin the pump faster than that if precautions are not taken to limit the speed. This could happen if the strainer becomes plugged or blocked and the controller attempts to speed the pump up to achieve the desired Rate. It could also happen if a high pressure situation occurs that opens the Pressure Relief Valve (PRV) and the pump speeds up to try to achieve the Rate.

A way to limit the maximum pump speed is to set the High PWM Limit just above what is needed for regular operation. If the pump tries to speed up above that, check for blocked strainer or other issue.

Model PR17 - 3 Diaphragms 0.036 gal/rev		
Fertilizer Flow (GPM)	Pump Speed (RPM)	Hydraulic Oil Flow (GPM)
5	137	2.4
10	275	4.8
15	412	7.1
17	467	8.1

Model PR30 - 3 Diaphragms 0.059 gal/rev		
Fertilizer Flow (GPM)	Pump Speed (RPM)	Hydraulic Oil Flow (GPM)
5	85	1.5
10	170	2.9
15	255	4.4
20	340	5.9
25	425	7.4
30	510	8.8

Model PR40 - 4 Diaphragms 0.087 gal/rev		
Fertilizer Flow (GPM)	Pump Speed (RPM)	Hydraulic Oil Flow (GPM)
10	115	2.0
20	229	4.0
30	344	6.0
40	458	7.9

Model D250 - 6 Diaphragms 0.117 gal/rev		
Fertilizer Flow (GPM)	Pump Speed (RPM)	Hydraulic Oil Flow (GPM)
10	86	1.6
20	172	3.2
30	258	4.8
40	343	6.4
50	429	8.0
55	472	8.6

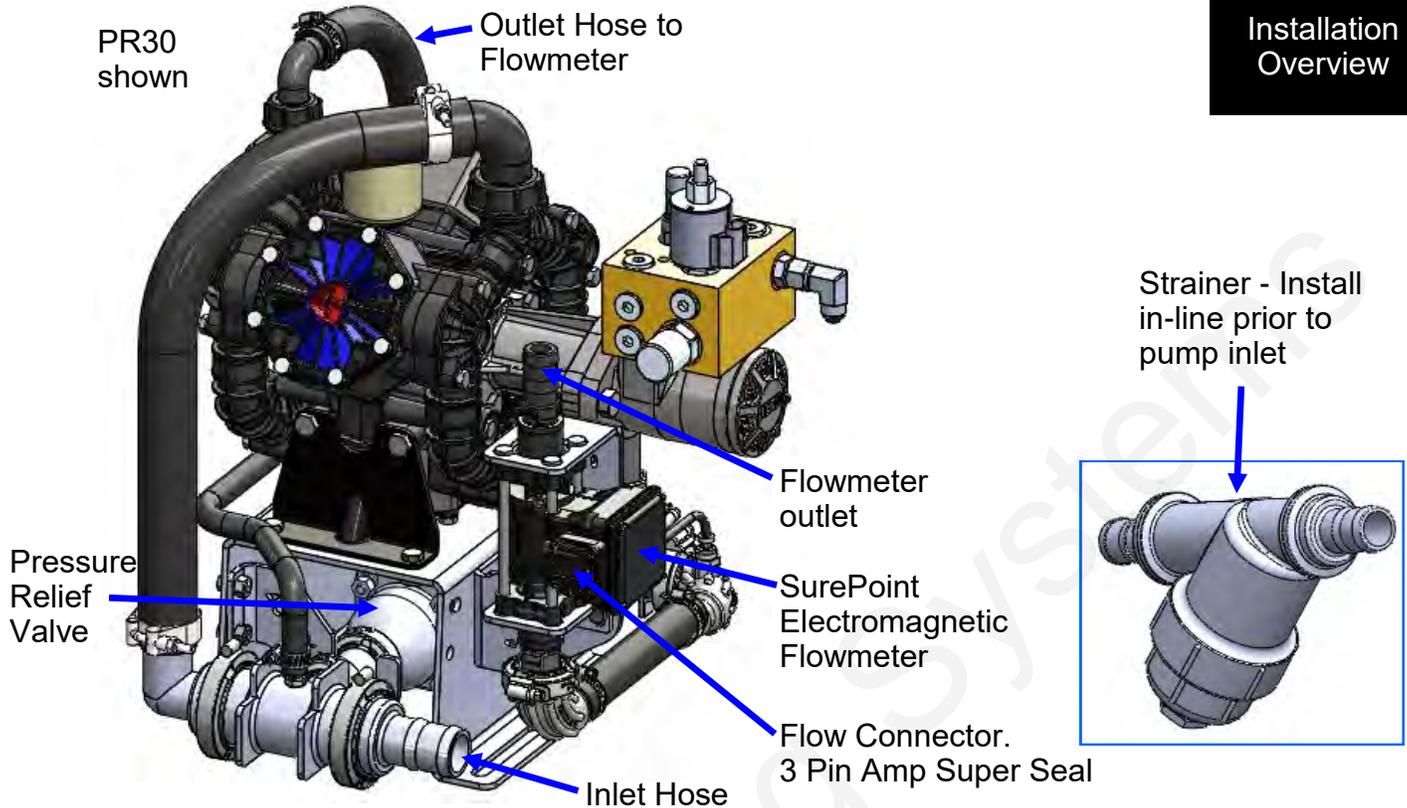
Model PR80 - 4 Diaphragms 0.176 gal/rev		
Fertilizer Flow (GPM)	Pump Speed (RPM)	Hydraulic Oil Flow (GPM)
10	57	1.0
20	114	2.0
30	170	2.9
40	227	3.9
50	284	4.9
60	340	5.9
70	397	6.9
80	454	7.9



PR17 & PR30 Liquid Plumbing Connections

E

Installation
Overview

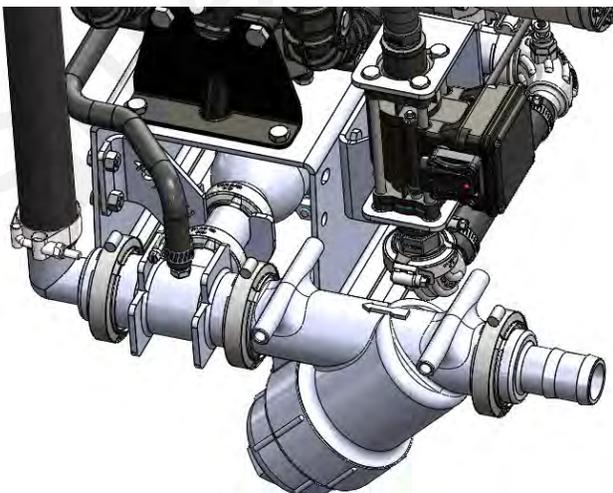


Inlet: The PR17 and PR30 PumpRight are shipped with a 1 1/2" inlet hose barb. Attach this to the hose from your supply tank and strainer. A 1 1/2" 90 degree hose barb is included and can be substituted.

Inlet Strainer: A 20 mesh strainer is included in the pump kit. The manifold strainer includes two hose barbs so it can be mounted anywhere in the inlet line. If space allows, the strainer can be mounted directly to the inlet plumbing assembly as shown below.

Outlet: The outlet is plumbed directly to the flowmeter with 1" hose. As shown above, the flowmeter may be mounted directly to the PumpRight pump. The flowmeter outlet is a 1" hose barb. The outlet hose should be a minimum of 24" long with a gentle curve prior to any fittings for optimum flowmeter performance. The flowmeter outlet will attach to your manifold(s) or section valves. A 3/4" hose barb is included in the bag of parts and can be substituted on the flowmeter outlet.

Pressure Relief Valve (PRV): The PRV is a 100 psi relief. If there is a restriction that creates over 100 psi in the system, the PRV will open allowing the excess flow to pass back to the inlet side of the pump. This protects the pump and fertilizer system from damage.





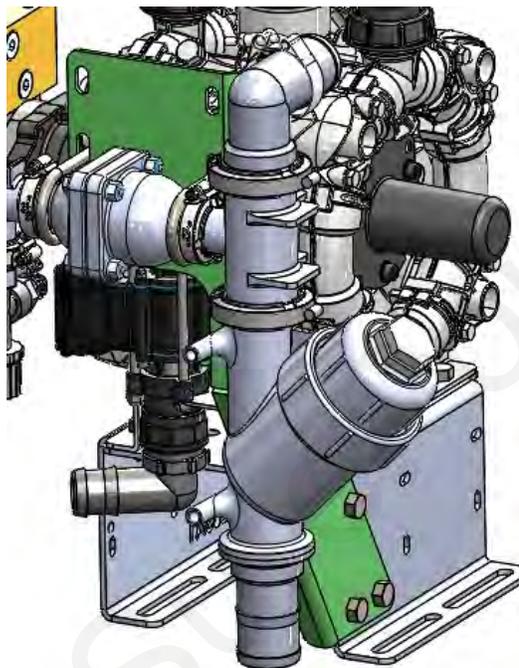
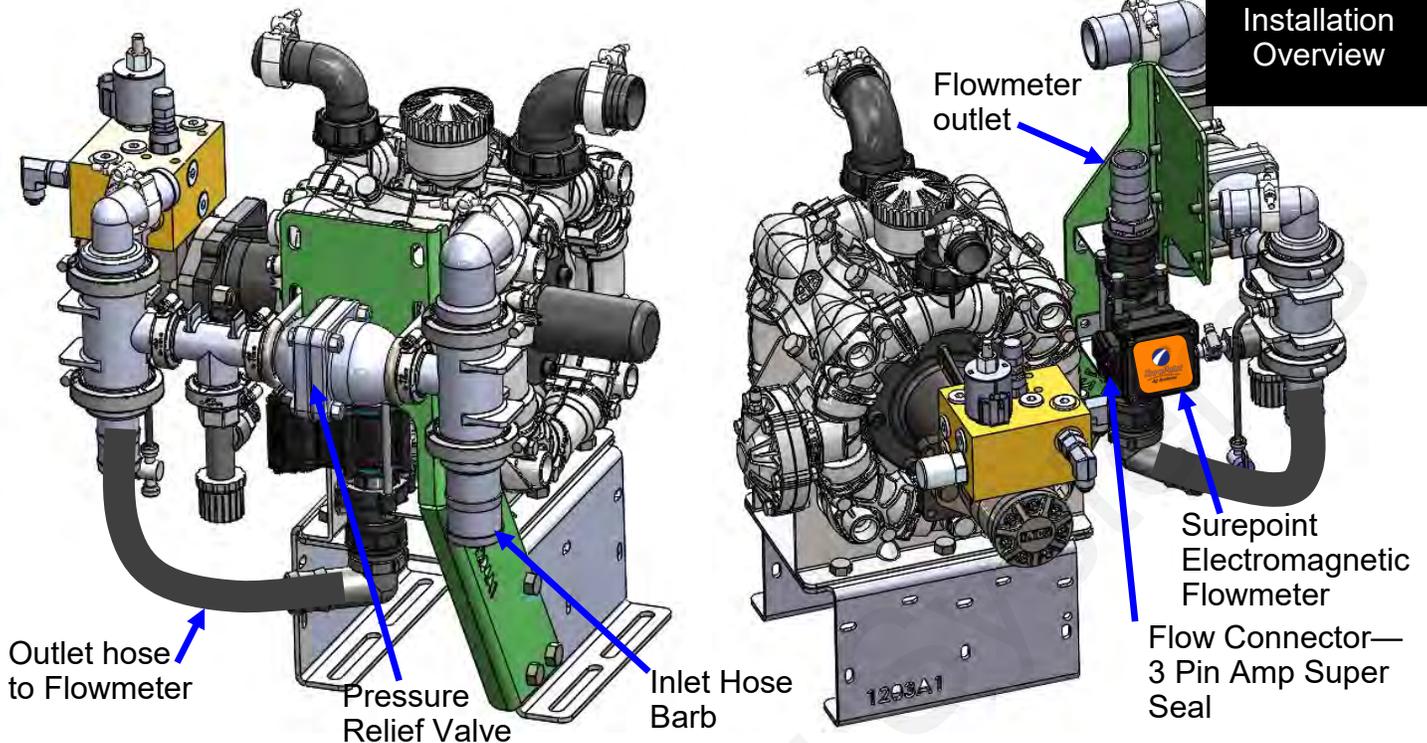

CAUTION

These pumps can deliver liquid at high pressure (290 PSI). Be sure the 100 PSI Pressure Relief Valve (PRV) is installed and functioning so system pressure will be kept under 100 PSI. Check hoses, hose clamps, and liquid fittings regularly and repair or replace loose connections.

PR40 & D250 Liquid Plumbing Connections

E

Installation Overview



Inlet: The PR40 and D250 PumpRight are shipped with a 2" inlet hose barb. Attach this to the hose from your supply tank and strainer. A 2" 90 degree hose barb is included and can be substituted.

Inlet Strainer: A 20 mesh strainer is included in the pump kit. The manifold strainer includes two hose barbs so it can be mounted anywhere in the inlet line. If space allows, the strainer can be mounted directly to the inlet plumbing assembly as shown in image to the left.

Outlet: The outlet is plumbed directly to the flowmeter with 1 1/2" hose. As shown above, the flowmeter may be mounted directly to the PumpRight pump. The flowmeter outlet is a 1 1/2" hose barb. The outlet hose should be a minimum of 24" long with a gentle curve prior to any fittings for optimum flowmeter performance. The flowmeter outlet will attach to your manifold(s) or section valves.

Pressure Relief Valve (PRV): The PRV is a 100 psi relief. If there is a restriction that creates over 100 psi in the system, the PRV will open allowing the excess flow to pass back to the inlet side of the pump. This protects the pump and fertilizer system from damage.



CAUTION

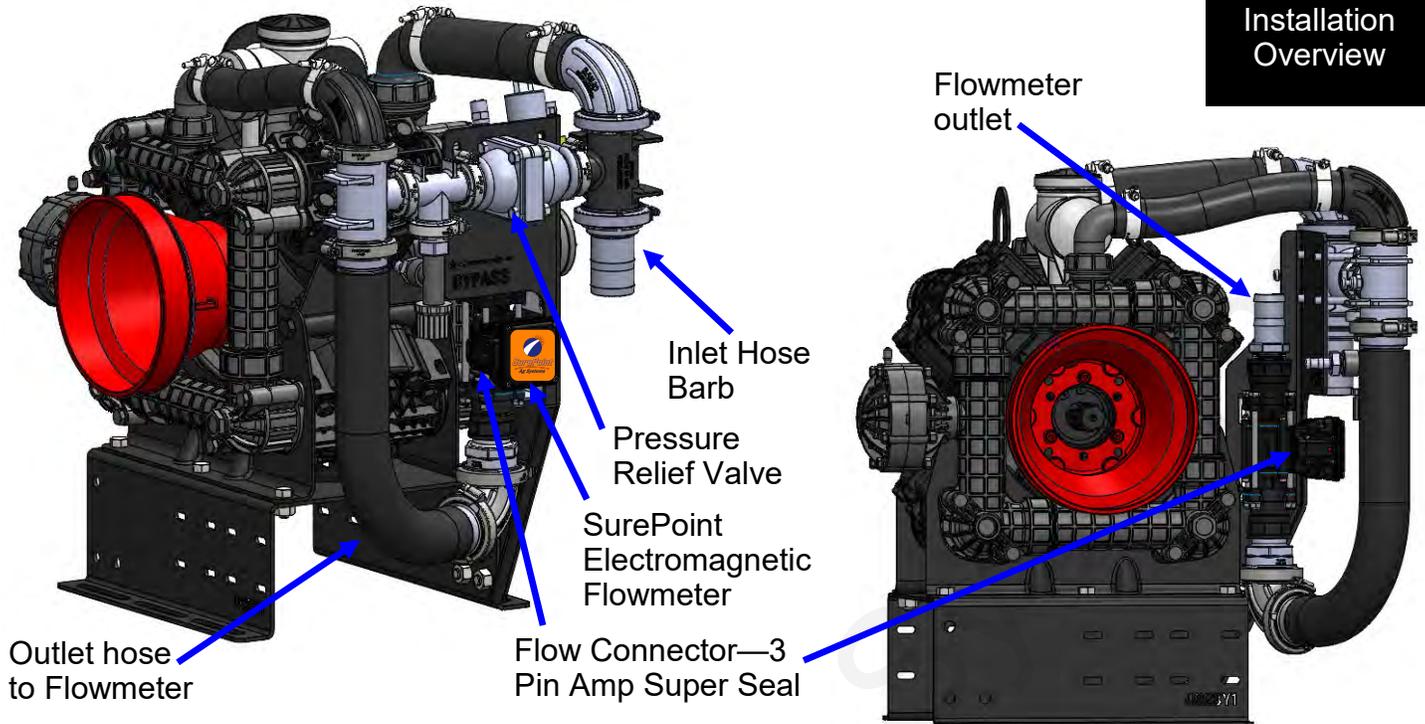
These pumps can deliver liquid at high pressure (290 PSI). Be sure the 100 PSI Pressure Relief Valve (PRV) is installed and functioning so system pressure will be kept under 100 PSI. Check hoses, hose clamps, and liquid fittings regularly and repair or replace loose connections.



PR80 Liquid Plumbing Connections

B

Installation
Overview



Inlet: The PR80 PumpRight is shipped with a 2" inlet hose barb. Attach this to the hose from your supply tank and strainer. A 2" 90 degree hose barb is included and can be substituted. In high flow scenarios, use a 3" inlet hose and replace the 2" hose barb with a 3" reducer coupling.

Inlet Strainer: A 16 or 20 mesh strainer is included in the pump kit. The manifold strainer includes two hose barbs so it can be mounted anywhere in the inlet line. If space allows, the strainer can be mounted directly to the inlet plumbing assembly as shown in image to the left.

Outlet: The outlet is plumbed directly to the flowmeter with 2" hose. As shown above, the flowmeter may be mounted directly to the PumpRight pump. The flowmeter outlet is a 2" hose barb. The outlet hose should be a minimum of 24" long with a gentle curve prior to any fittings for optimum flowmeter performance. The flowmeter outlet will attach to your manifold(s) or section valves.

Pressure Relief Valve (PRV): The PRV is a 100 psi relief. If there is a restriction that creates over 100 psi in the system, the PRV will open allowing the excess flow to pass back to the inlet side of the pump. This protects the pump and fertilizer system from damage.



CAUTION

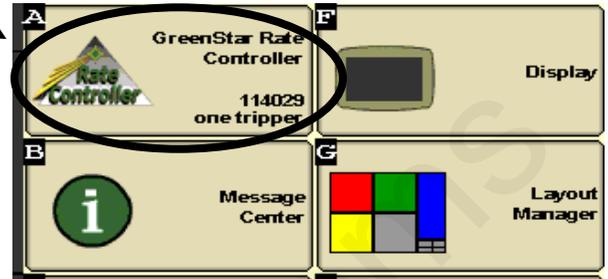
These pumps can deliver liquid at high pressure (290 PSI). Be sure the 100 PSI Pressure Relief Valve (PRV) is installed and functioning so system pressure will be kept under 100 PSI. Check hoses, hose clamps, and liquid fittings regularly and repair or replace loose connections.

Rate Controller Setup



To access the Greenstar Rate Controller (GRC) Functions, push this button. If this button is not present the Rate Controller is not communicating with the display. See your John Deere operators manual or your John Deere dealer for assistance.

If more than one GreenStar Rate Controller is installed, check the Serial number to be certain they are configured for the correct system.



Main Rate Controller Screen

Pressure (if Pressure Sensor 1 is installed) OR **Flow in GPM** (without pressure sensor) (If pressure does not show up on Pressure 1, try setting up Sensor 2, and adding it to a box on the bottom of the screen.)

Tractor Speed

Actual Rate → 5.0 gal/ac

Target Rate → 5.0 gal/ac

Implement Height Switch Indicator, Arrow will point up or down to indicate implement position if height switch is used.

Estimated Volume Remaining / Tank Refill Button (press to refill tank) → 956 (gal)

Optional Display Items → 0.0 gal/min, 0.0 psi

Navigation Buttons

- Main Rate Controller Screen
- Setup
- Totals
- Diagnostics

Menu Structure



- Setup**
- Implement
 - System
 - Alarms
 - Rates



- Totals**
- Current
 - Job Summaries
 - Lifetime Totals



- Diagnostics**
- Readings
 - Tests



SCAN for video on **Diagnostics > Readings**

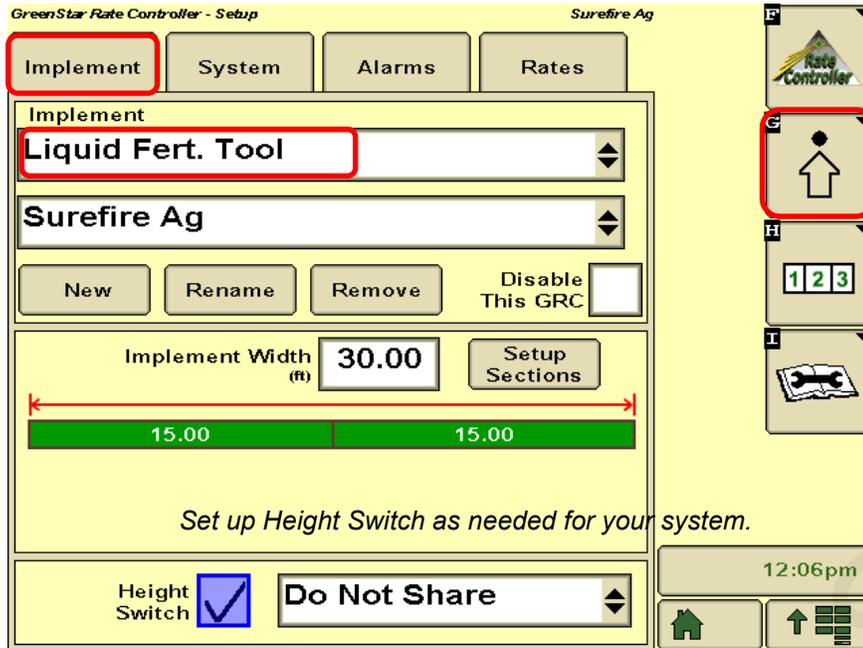


SCAN for video on **Diagnostics > Tests**

Setup - Implement



Here you will enter the **type, name, total width and section width** for the implement you will be using for this operation.



**Rate Controller Setup:
Use the QuickStart Setup
card for your system.**

396-3101 PumpRight Hydraulic

396-4760 Gen3 LiquiShift

[https://
support.surepointag.com/
products/32](https://support.surepointag.com/products/32)

Implement Type, Name & Width

1. Choose implement type “**Liquid Fert Tool**”
2. Enter a **Name** for the Implement where “SurePoint Ag” is shown above.
3. Enter your **Implement Width** in feet.
4. Push **Setup Sections** button if dividing the implement into sections.
5. Setup the width of each section on the new screen that pops up.

Height Switch

A height switch is optional for a Liquid Fert Tool setup.

If using a height switch on your implement, check the box at the bottom of this screen. You must then choose one of the choices at right.

On a single product fertilizer applicator you would set to “Do Not Share”.

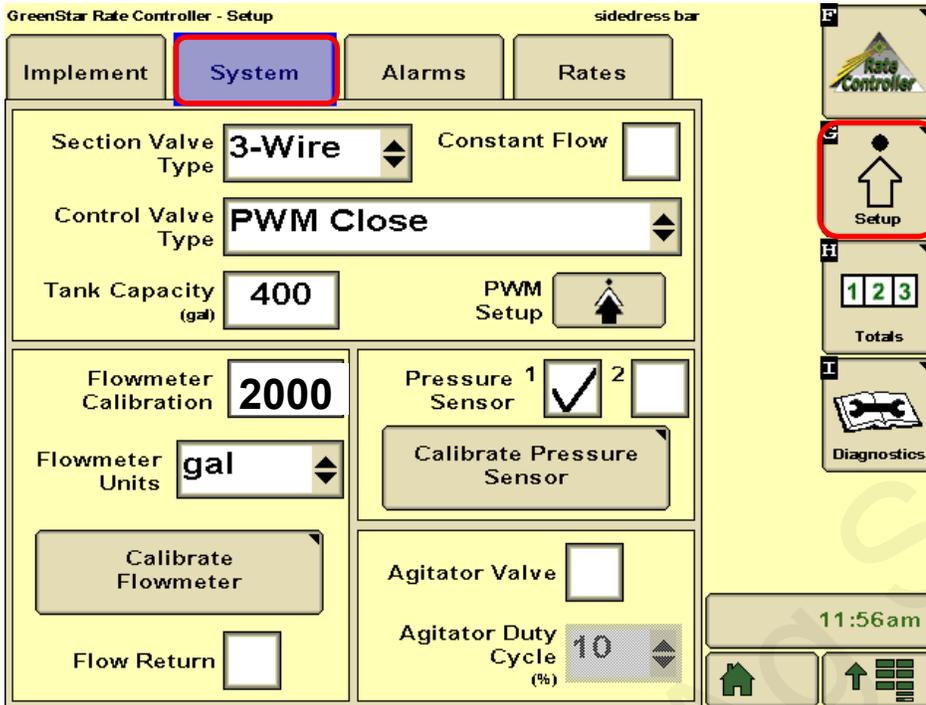
If you are sharing a height switch between 2 liquid systems, plug the Height Switch into one system, set that system to “Send Status” and set the other one to “Receive Status”.

This is a sample setup. Set your height switch as needed for your system.



Setup - System

System Setup is where you will set the John Deere Rate Controller to be compatible with the SurePoint fertilizer system components.



Rate Controller Setup:
Use the QuickStart Setup card for your system.

396-3101 PumpRight Hydraulic

396-4760 Gen3 LiquiShift

<https://support.surepointag.com/products/32>

1. **Section Valve Type:** 3-Wire **Constant Flow:** Do NOT check this box.

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. **Flowmeter Calibration:**

- Electromagnetic Flowmeter: see chart

4. **Flowmeter Units:** gal

5. **Flow Return:** Optional Flow Return Valve connector is on Section Harness. Normally, this box is not checked.

6. **Pressure Sensor:** Check #1 if using optional electronic Pressure Sensor 1. Check #2 if using Pressure Sensor 2. See next page for instructions to calibrate pressure sensor. (If Sensor 1 does not read pressure, try setting up Sensor 2. If you have harness 213-00-3765Y1, Pressure 2 is on the Section 1-6 connector. On harness 213-00-3765Y2 and Y3, Pressure 1 is on the Section 1-6 connector.)

7. **Agitator Valve:** NOT Checked

8. See next page for instructions on “PWM Setup” & “Calibrate Pressure Sensor”

- Earlier model flowmeters (meters with white labels with black text) have different calibration numbers. See the documentation with that flowmeter or find calibration number on Serial Number sticker on the side of the flowmeter.

Always verify flowmeter calibration by running a catch test and/or closely monitoring acres and gallons.

Flowmeter Model (GPM)	GS2 & GS3 Flowmeter Calibration
0.3—5.0	3000
0.6—13	2000
1.3—26	2000
2.6—53	2000



Setup - System (continued)

F

Setup & Operation

PWM Setup

From System Setup screen, push “PWM Setup” to open this screen.

1. Control Valve Calibration: 2532, 2032, 1532

The John Deere Rate Controller 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 JD Rate Controller Operators Manual for more information. For example, to slow your response speed, move the number from 2532 to 2032 or 1532. To speed up the valve go to 3032 or 3532.

2. Coil Frequency: 100

3. High Limit: 255 (maximum value allowed) This can be set lower to limit the speed of the pump.

4. Low Limit: 60 (setting where SurePoint hydraulic valve cracks open). This can be set higher to get the system to Target Rate faster on startup. If set too high, the system may not be able to go slow enough when needed.

The “Calibrate PWM Limits” button is not necessary after you enter the numbers above. However, the Calibrate PWM Limits Test can be used to test the system in a manual mode.

5. Push the lower right button to return to the System Setup screen.

Calibrate Pressure Sensor

From System Setup screen, push “Calibrate Pressure Sensor” to open this screen.

1. Select Voltage-based Calibration

2. On the screen that opens up, enter 50.0 mv/psi.

3. Push the lower right button to return to the System Setup screen.

The Rate Controller will accommodate 2 pressure sensors. This requires a SurePoint harness with Pressure 1 and Pressure 2 connectors. **If the pressure does not read on Sensor 1, try Sensor 2.**

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.

Setup - Alarms



Customize your alarms and settings on this page.

- Low Tank Level** can be used by the customer if they desire, but is not required.
- High and Low Alarm:** 20% is the John Deere default and SurePoint recommended setting. SurePoint recommends these alarms be enabled (checkmark in the box).
- Minimum pressure:** 20 psi is a safe minimum pressure to ensure all check valves (10 psi setting) are fully opening and equal flow will go to every row. SurePoint recommends turning this alarm off as each time the system turns on & off it will activate, being a nuisance.
- Maximum Pressure:** 80 psi is the recommended setting. SurePoint pumps have a 100 psi pressure relief valve. Continually activating that relief valve causes vibrations that will damage components. SurePoint recommends turning this alarm on to provide an early warning before high pressure causes other problems. (The system can run at 80-90 PSI without hurting anything if needed.)

Setup - Rates

Enter your desired application rate(s) here.

- Enter up to 3 rates. Rates entered here will be available on the home page.
- SurePoint recommends checking the **Rate Smoothing** box and entering 10%.
- SurePoint 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 as shown above.
- If system is overapplying and will not come down to rate, check the **Minimum Flow Rate (and the PWM Low Limit and be sure the manual override button is down and locked)**.

Initial Operation Instructions - Step 1

F

Setup & Operation

SurePoint highly recommends you perform these exact steps with water to verify the system is correctly installed and ready for field use.

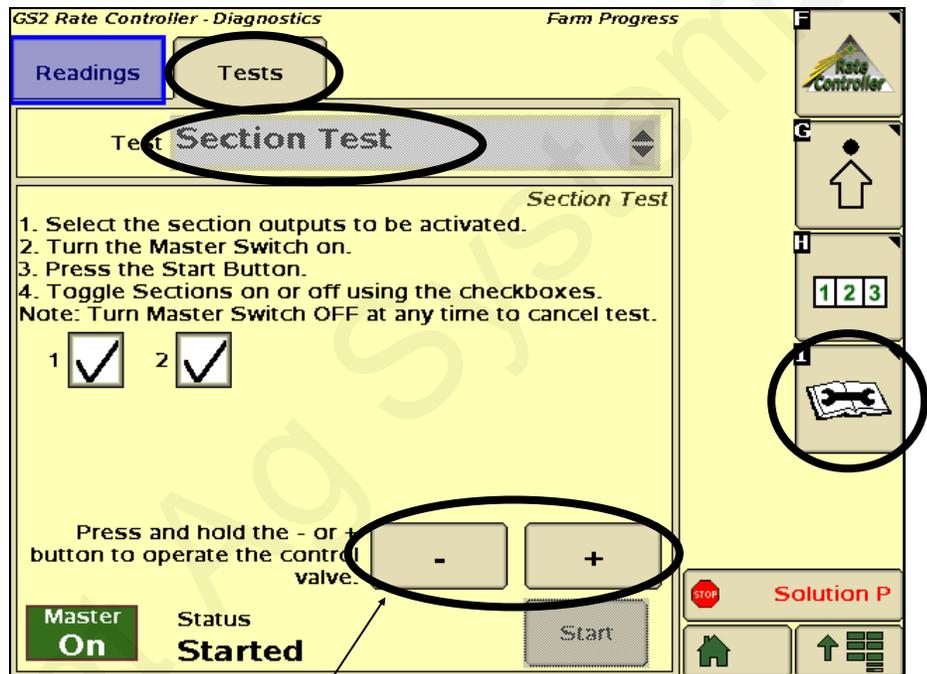
DO NOT begin testing with a Nozzle Flow Check. Do the Section Test or Calibrate PWM Limits first to verify all the valves are opening and the flowmeter is working.

1. Go to the **Section Test or Calibrate PWM Limits Test** (Diagnostics > Tests > Section Test). **Section Test** essentially functions like a MANUAL mode where you have direct control of pump and valves.
2. Turn the Master switch ON.
3. Test section valves by checking and unchecking boxes. Check boxes to open all valves.

4. Activate tractor hydraulic remote.
5. Push the "+" button and **hold it**. This should open PWM hydraulic valve. Pump should begin running. (It takes lots of individual taps of this button to cause a visible effect).

6. Is water being pumped? If system is not primed, open the priming air bleed valve and close the recirculation knob. This will allow air to be expelled and the pump to prime.

7. With pump running and water flowing, push "1,2,3" button. Look at flow in GPM. Is there a reading there? If not, is the system primed with water flowing to every row? If water is flowing, but no reading, check flowmeter calibration and wiring harness connections.



8. Push wrench button, now push the "-" button. Go back to the "1,2,3" screen. Did the flow in GPM decrease?

9. **Make sure the flow readout in GPM can be increased and decreased with the plus & minus buttons.** Go to Step 2 on the next page when you can increase and decrease the GPM reading using the + and - buttons.

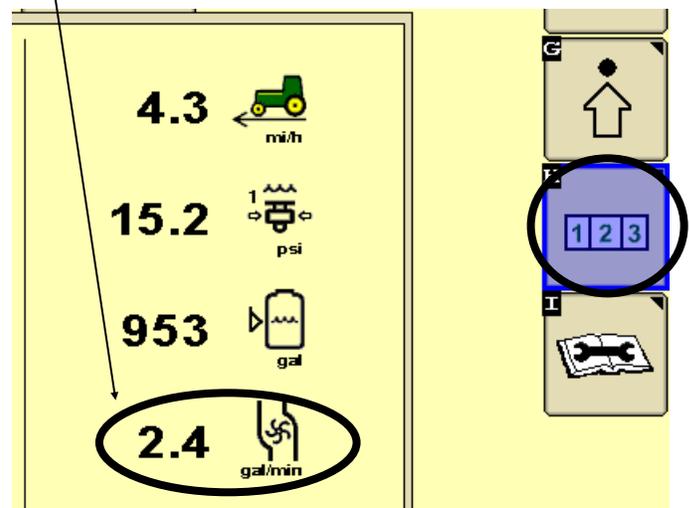
NOTICE

Running these tests will dispense liquid. Be sure it is safe to dispense the liquid in your tank in this location.

You can also observe system performance at **Diagnostics > Readings > Delivery System**.

This is a good screen to see flowmeter operation and PWM Duty Cycle.

The system can also be operated manually by running the Calibrate PWM Limits Test.



Initial Operation Instructions - Step 2

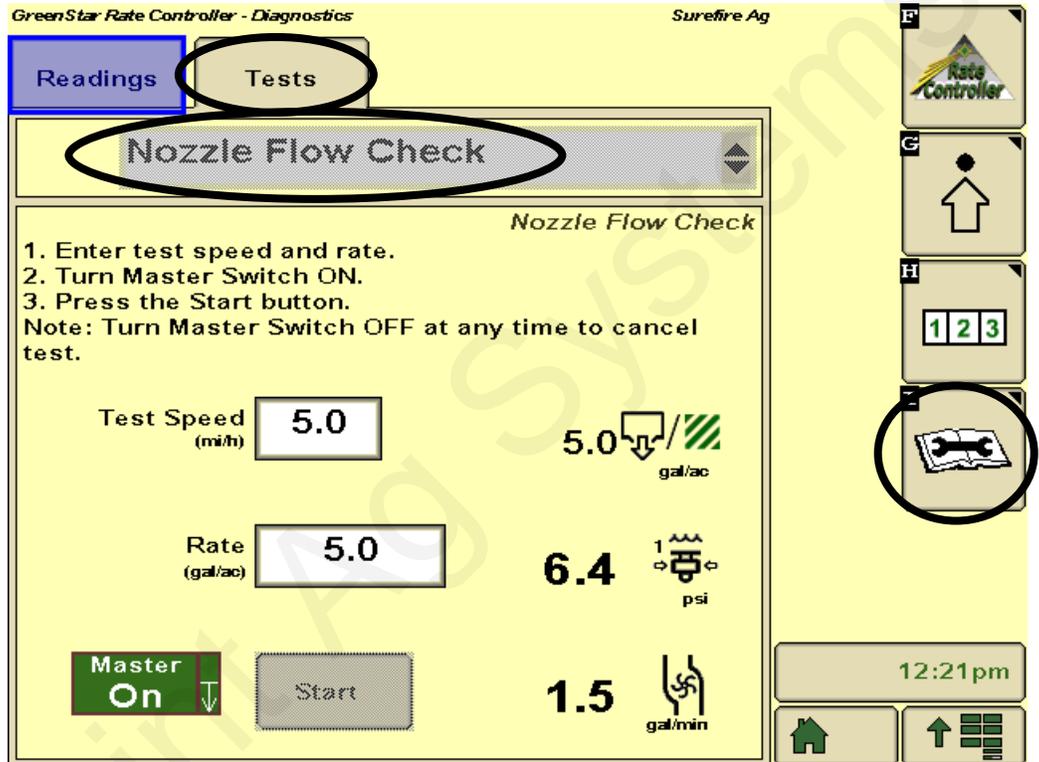
F

Setup & Operation

NOTICE

Running these tests will dispense liquid. Be sure it is safe to dispense the liquid in your tank in this location. Always start with Section Test or Calibrate PWM Limits Test before running the Nozzle Flow Check.

1. 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 at a speed and application rate you enter.
2. **Test Speed:** Enter your typical field operating speed.
3. **Rate:** Enter your typical application rate.
4. Turn the Master switch ON.
5. Pump will turn on and begin applying the entered rate.
6. Observe the system. Are the flow and pressure on the screen stable and reasonable? Is the flow reasonable and equal from each application point?
7. 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.



8. You can use this procedure with fertilizer (instead of water) to verify your minimum pressure is at least 15 psi (to ensure all check valves open). Also, check the maximum speed and rate to make sure the pressure is under 80 psi. **When testing with water, the pressure will be much less than it will be when using fertilizer and not all of the check valves may open, so there may not be flow from every row.**

Helpful Tip

The **Calibrate PWM Limits Test** is the first and most basic test to make sure that the system is set up and hooked up correctly. This test verifies that you can run the pump and control the speed of the pump.

If there is a problem with the operation of the system, start with the Calibrate PWM Limits Test or Section Test to run the system manually.

Helpful Tip

Diagnostics > Readings > **Delivery System**

Check this screen while system is running a test or while it is running in the field.

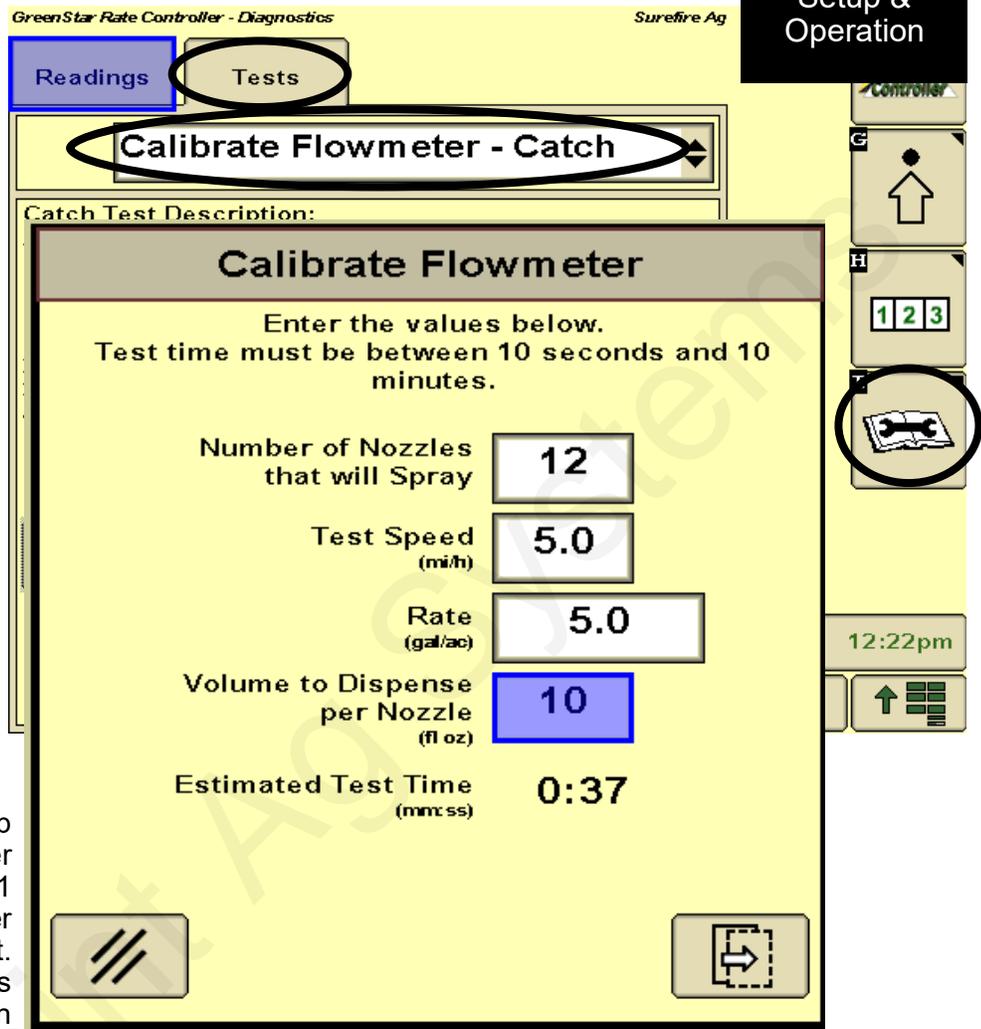
This shows the flowmeter operation and PWM Duty Cycle (a very important system parameter).

Initial Operation Instructions - Step 3-Optional



This test can be used to check the flowmeter calibration or a manual catch test can be done.

1. Go to **Calibrate Flowmeter - Catch** (Diagnostics, Tests, Calibrate Flowmeter - Catch). The Calibrate Flowmeter screen will pop up.
2. **Number of Nozzles** that will spray: Enter total rows on equipment.
3. **Test Speed:** Enter typical operating speed.
4. **Rate:** Enter typical application rate.
5. **Volume to dispense:** Enter volume that you are capable of catching and measuring from a single nozzle (in ounces).
6. Push continue button in lower right corner. Turn master switch and hydraulic remote on and begin test.
7. The screen to the right will pop up after test is complete. Enter the sample size collected from 1 or more rows. You need enter only 1 sample measurement. The controller then calculates the new flowmeter calibration value based on the average sample size.

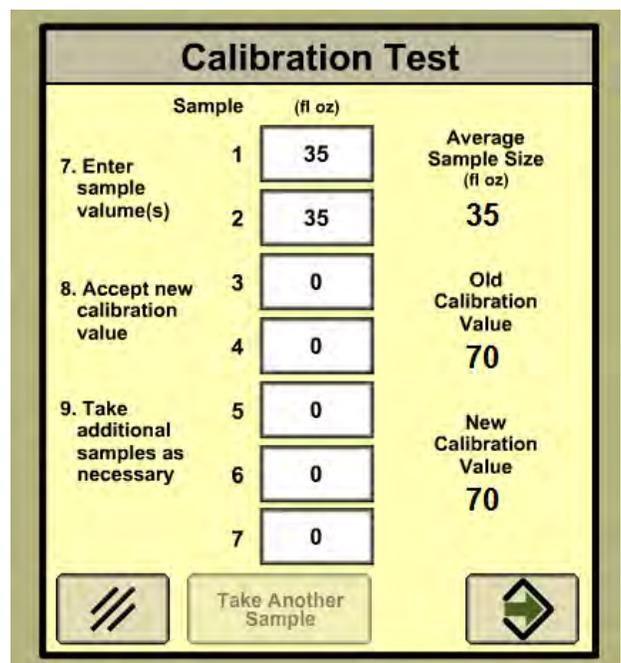


With SurePoint Electromagnetic flowmeters, most times the sample volume is correct. In that case, just enter the same sample size you did in #5 above to leave the calibration value unchanged. If the sample volume differs from what is expected, recheck the calibration settings. **If you change the flow cal, verify the new cal number with another test or with acres worked and gallons applied.**

SurePoint recommends that you do not change the Flowmeter Calibration value unless repeated catch tests or field use shows that the amount indicated by the flowmeter is not correct. The flowmeter is very accurate and the flow cal should not be changed without a very accurate test.

Always verify the flow cal by comparing acres worked and gallons applied in the field.

NOTE: DO NOT ADJUST THE FLOWMETER CALIBRATION VALUE BASED ON A CATCH OF 1 ROW ON AN IMPLEMENT. AT A MINIMUM CATCH 3-4 ROWS.



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) (see pg.31-32)
2. Go to **Diagnostics > Tests > 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. There should be 12 v if the PWM Duty Cycle is at 255.
7. If 12 volts is not present, check harnesses and review control valve type setup.
8. Go back to the 12-pin connector that plugs into the Pump harness. Check voltage between pins 5 & 6 and pins 5 & 2. If yours is a 16-pin connector, check between pins 3 & 4.
9. Go back to the 37-pin connector at the John Deere Rate Controller. Check voltage between pins 15 & 16 (and 16 & 2), should be between 12 volts while in Calibrate PWM Limits after holding "+" button to take the PWM Duty Cycle to 255.
10. If you cannot get voltage at pins 15 & 16, contact your John Deere dealer for further assistance.
11. 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.

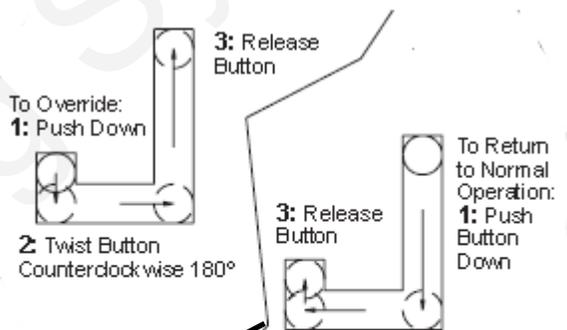
Hydraulics Problem

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

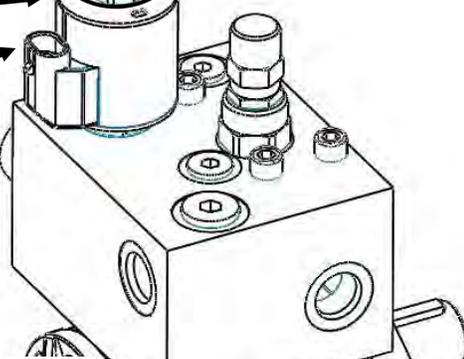
Down - Normal Operation

Up - Override, valve 100% open



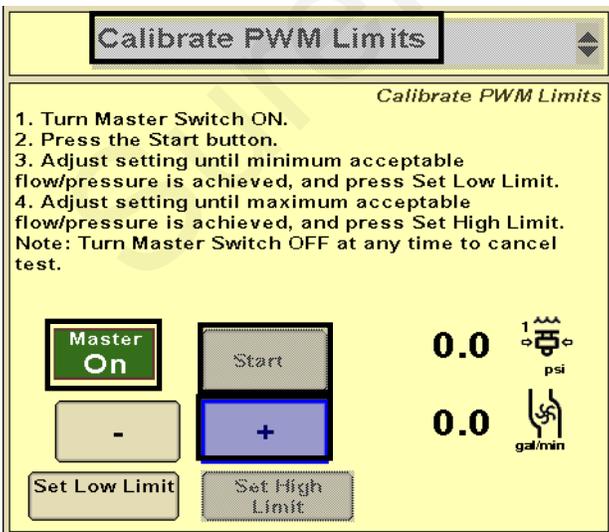
2. Twist button CW 180° (May need to clean out dirt)

Coil Check: Should be 7-9 ohms between the two pins on the PWM connector on the coil.



Hydraulic Fluid and Equipment Safety

This system uses hydraulic equipment with hydraulic fluid under extremely high pressure. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin causing serious injury. Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks. Wear protective gloves and safety glasses or goggles.



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.

OR

1. Go to **Diagnostics > Tests > Calibrate PWM Limits Test**, to run the system in **Manual Mode**.
2. Turn the system on. Watch the flow in GPM and PSI. **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 11-14 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. Sometimes, the inside of the flowmeter may need to be cleaned with a soft brush and soapy water.
6. If visually the flow is unsteady, the flowmeter is working correctly reporting a flow problem. Is the pump turning steady or surging?
7. If the pump is turning steady, the hydraulic circuit is functioning correctly. Look for any type of obstruction in the pump inlet. Clean the strainer. If continually plugging the strainer investigate fertilizer quality and necessary strainer size.
8. If the pump speed is surging when running in Manual mode, there is a hydraulic problem.

G

Trouble-
shooting

Application Rate fluctuates in field, but flow in Calibrate PWM Limits Test 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 - System - PWM Setup**.
2. If Valve Cal is 2532, try 2032. If system is still surging, go to 1532, and lower if needed. If the first two digits get too low, the system will be slow to respond to speed or rate changes. If the system is stable, but slow to adjust and slow to get to rate, increase the first 2 digits (from 2532 to 3032, etc.).

Application Rate is slow to get to the Target Rate

1. You may need to increase the valve calibration. Go to **Setup - System - PWM Setup**.
2. Change the **Valve Calibration** by increasing the valve speed (first two digits of the valve calibration number). For example, increase the number from 2522 to 3022, which changes valve speed from 25 to 30. If this number is set too high, the rate will oscillate as you are going across the field.
3. If system is too slow to get to the Target Rate when starting, go to **Setup—System - PWM Setup**. Raise the **Low Limit (from 60 to 80, possibly higher)**. This will start the pump at a faster speed when it initially turns on. (*This number sets the low limit of your pump, so if it is set too high your pump may not be able to slow down enough at low speed/low rate settings or with some sections turned off.*)
4. **Optional Method 1** to get to Target Rate faster: (*Caution: You can only use this method if you have Electric Section Valves.*) Go to **Setup - System**. Set **Control Valve Type** to **PWM**. This leaves the pump running at the last speed when product application is stopped. Under **PWM Settings** check the **Pump Enable Checkbox**. With the section valves closed and the pump running, this can build up too much pressure in the system at times. To reduce this pressure, open the Recirculation Regulation Valve slightly. Since this will cause continuous recirculation, it will reduce the maximum output to the rows that is attainable and the pump will run at a higher speed all the time.
5. **Optional Method 2** to get to Target Rate faster: Use the John Deere Rate Controller **Flow Return** feature. This will involve adding an additional electric valve and plumbing to return flow to the tank when product application is stopped. It also requires a SurePoint harness with Flow Return connection. On the **Setup - System** screen, check the **Flow Return** box. In **Setup - System**, the **Control Valve Type** is set to **PWM**. Under **PWM Settings** check the **Pump Enable Checkbox**. With the Control Valve Type set to PWM, the pump continues to run at the last speed it was running when product application was stopped. Flow at this time is returned to the tank. When product application is resumed, flow is diverted from the tank back to the rows.

No Flow shown on display, but liquid is being pumped

Flowmeter Tap Test

G

Trouble-shooting



See which flowmeter connector you have

3-pin AMP SuperSeal

Flowmeter pinout:

Remove red guard to reach pins. Don't break red side clips.

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.
2. If 12 volts is present, then conduct a **tap test**. Have a second person watch Flow on the Diagnostics > Readings > Delivery System 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) of Flowmeter (Hz) should show up indicating the wiring is not damaged. It's possible to have voltage and tap test OK, but still have corroded wires/pins that won't work. Visually check all connectors and the wires attached to them.
3. If the display responded to 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. (*Sometimes, cleaning the inside tube of the flowmeter with soapy water and a soft brush will remove a film covering the electrodes.*)
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 749 gallons was actually applied. Flow cal number in display was 3000. (*We applied too much, so we will decrease the flow cal.*)

$$727 / 749 \times 3000 = 2912 \text{ (new flow cal number to set in display)}$$

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

Do not power wash the flowmeter.

Unplug the flowmeter before doing any welding on the implement.

Section Valve(s) will not move

G

Troubleshooting

1. Go to **Diagnostics > Tests > Section Test** to investigate this issue. If system shuts off with Solution Pump Dry warning, use the Calibrate PWM Limits Test.
2. Start Section Test. Check and uncheck the boxes. With the box checked the valve should turn on. The valve should be off with the box not checked.
3. If none of the valves are working, or if half of the valves are working, it may be a Power (or Ground) issue. On some harnesses, the odd-numbered sections have one power source, the even-numbered sections have another power source. (See harness diagrams) On Gen 3 LiquiShift, the left sections have one power source, the right another.

Pin	Function
A	+ 12 V Constant
B	Ground
C	+ 12 V Signal

4. If a valve does not open, switch the connector that is plugged into that valve with a connector that is plugged into a working valve. Also, plug in the connector to the non-working valve to a valve that is working.

5. Check the harness connection to the non-working valve. It is a 3-Pin Weather Pack connector. Check voltage pin A to Pin B. Must be 12 volts, if not, go back to the next harness connection and check the voltage there. (See harness diagrams for pins)

6. If voltage is present on pins A&B of 3-pin connection to valve, then check Pin C to Pin B. This should be 12 volts when the valve is commanded on or open; this should be zero volts when valve is off or closed.
7. If signal voltage is not present to open valve, use diagrams to check at the 14- (or 16-) pin connector, then the 37-pin for voltage on the proper pin for that section.
8. If harnesses and voltages are good, but valve still will not open, remove the actuator from the valve and see if the actuator will work when it is not connected to the valve. Use a wrench to turn the valve to be sure it is moving freely. Be sure actuator and valve are oriented correctly when you put them back together.
9. If constant voltage (Pins A&B) and switched voltage (Pins C&B) are present, inspect, repair or replace the valve.

<p>If valve indicator stays GREEN all the time or if valve indicator is not in full ON or full OFF position, replace actuator. Pull gray pin to remove actuator from valve.</p>			<p>This is a 3-way valve. If product will not flow when valve is ON, either move the outlet hose to the other port, or remove actuator and rotate valve ball 180°, and replace actuator.</p>
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Pressure Sensor is not reading

1. Monitor pressure sensor at *Diagnostics > Readings > Sensors/Status*. Calibration points should be 0 PSI—0.0v; 90 PSI—4.5v).
2. Be sure Pressure Sensor is plugged into Pressure Sensor 1 connector. If the SurePoint adapter harness connected to the GreenStar Rate Controller is 213-00-3765Y1, *the pressure connector on the Section harness is for **Sensor 2**. In that case, on the display do the Calibration for Sensor 2, and put PSI 2 in one of the two bottom boxes on the Run Screen.*
3. Make sure the pins where the harness screws on to the end of the sensor have not been bent.
4. Be sure Pressure Sensor is set up and calibrated in the display. Unplug the pressure harness before doing this.

Setup > System > Check the box for Pressure Sensor 1 > Calibrate Pressure Sensor > Voltage-based Calibration > 50 mv/PSI.

4. There should be a green LED light on the end of the pressure sensor. This may be difficult to see in daylight. The sensor needs 12 v. Check between pins B&C on the Pressure 1 connector on the harness. If there is no voltage here, check the voltage between pins 1 (power) and 2 (ground) if you have a 12-pin pump connector. (Check pins 11 (ground) & 16 (power) on the 16-pin connector labeled PUMP on the legacy harnessing.)
5. **Testing Pressure Sensor Harnessing:** If the pressure sensor is not reading, you can use a AA or AAA battery to test the harnessing. Connect the (-) end of the battery to pin C and the (+) end to pin A of the pressure connector. The 1.5 v should show up as 30 psi on the screen. You can check this at *Diagnostics > Readings > Sensors/Status*.

Other issues

G

Trouble-shooting

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

A. Check **Setup > Rates > 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**.

B. Check **Setup > System > PWM Setup > PWM Settings > Low Limit**. Default setting for JD is 15 for electric pumps and 60 for hydraulic pumps. These may be set higher to get the pump to start faster to get to Target Rate sooner, but if set too high, the pump cannot slow down enough when your speed drops or when sections close.

C. On a hydraulic pump, be sure the red manual override knob is down and locked on the hydraulic valve.

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

A. How many GPM are required to hit your rate? Is this within the pump’s specifications? **Is a recirculation valve open**, allowing too much liquid to recirculate?

B. **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. Most SurePoint systems with metering tube and electromagnetic flowmeter can use a 20– or 30-mesh strainer.

C. 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. Run pump in Manual Override to see output.

D. Check **Setup > System > PWM Setup > PWM Settings > High Limit**. This should be 255.

E. Go to **Diagnostics > Readings > Delivery System**. What is PWM Duty Cycle while the pump is running (in the field or on a Section Test or Nozzle Flow Check)? 255 means the pump is being told to run at full speed.

F. Run the **Calibrate PWM Limits Test** and hold the (+) button to speed up the pump. Check GPM and PSI at different levels. Check the PWM Duty Cycle at **Diagnostics > Readings > Delivery System**.

G. Run a Nozzle Flow Check. See gal/ac, PSI, gal/min, and PWM Duty Cycle.

H. Is the flow cal correct? Is the width of the implement set correctly? Is speed reading 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. Also, considering lowering the first 2 digits of the Valve Cal.

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. This message may be stopped by going to **Setup > System > PWM Setup > PWM Settings > Low Limit**. **Increase the Low Limit so the pump will start faster.**

Be sure the recirculation knob is closed, so the flow goes to the row and not to recirculation. If you must recirculate, start with a quarter turn of the knob.

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.

Here is a summary of the typical settings: Not everything is shown in this table. Some systems may need to be adjusted for better operation.

Setup Arrow	Tower Electric	PumpRight Hydraulic
Implement	Liq Fert Tool—Set up width, sections, and height switch as needed	
System—Section Valve—Control Valve	3-Wire—PWM Close	
Flowmeter Calibration	3000—gal	2000—gal
PWM Setup	9911—100—255—20	2532—100—255--60
Alarms—Pressure Sensor	10—40	15—80
Rates—Minimum Flow	0.0 or low end of flowmeter (Note: This is Gal/min NOT Gal/acre.)	
Rates—Rate Smoothing	Check the box—10	

6. “My pressure is too high / too low.”

The pressure will be what it is depending on how hard it has to push to get the amount of liquid you are moving from the pressure sensor to where it leaves the system. This pressure will depend on the product itself, the volume (gal/min) you are moving and how much restriction there is to that flow. The orifice or metering tube will be the primary restriction, but it is possible that other parts of the system may add to the total pressure. 1/4” tubing can build a lot of pressure with 10-34-0. The pressure a system develops will be less (probably much less) with water than it will be with a fertilizer product.

What pressure is “too low”?

You need enough pressure to open the check valves. If the pressure is too low, some check valves will open before others, so that some rows may be flowing while others are not. **With 4 lb check valves, we like at least 8 PSI. With 10 lb check valves, we like 15-20 PSI.**

What pressure is “too high”?

A pressure is too high if it keeps the system from being able to hit the rate you want or if it opens the PRV (Pressure Relief Valve) on a hydraulic pump.

The plumbing components of a SurePoint system are rated at 100 PSI or above.

The SurePoint PumpRight hydraulic pump has the ability to pump up to 290 PSI. SurePoint plumbs these with a 100 PSI pressure relief valve (PRV) so that plumbing components will not be damaged if high pressure develops. **Typical operating pressures with hydraulic pumps will be 20-60 PSI**, but the pump will work fine at 80-90 PSI if that is needed. If continually running in that high range, consider a larger orifice or metering tube.

Lower pressure will not necessarily reduce the **velocity of the output stream** at the row. Conversely, higher pressure will not necessarily increase the velocity of the output stream at the row. The velocity of the output stream is determined by the volume of the flow and the size of the opening at the output. Changing the pressure by changing an orifice or metering tube upstream from the outlet will not affect the velocity of the output stream if the flow volume remains the same.

Options if pressure is too high with orifices: Use a bigger orifice. Slow down. If pressure is too low, use a smaller orifice.

With metering tube: Options if pressure is too high: Use a larger diameter tube. Shorten the tubes that are on now. Slow down. (*The pressure in a metering tube is related to the viscosity of the product. Many products change viscosity as the temperature changes. A product will have a higher viscosity (and therefore higher pressure) on a cold morning than it will on a hot afternoon.*)

With metering tube: Options if pressure is too low: Switch to a smaller diameter tube. Use a longer tube.

7. How do I set the Recirculation knob? Generally, the recirculation knob is closed on electric pump systems. On hydraulic pump systems, start with the knob open a quarter turn. If tank agitation is necessary while applying, the recirculation hose can be plumbed back to the tank. A small amount of recirculation may be desired if the pump needs to run slowly and the output is not smooth. Start with a quarter turn of the knob. A half turn of the knob will recirculate a lot. If too much is recirculated, the pump may not be able to hit the rate to the rows. **Opening recirculation will not lower the pressure required to push the desired product to the rows.**

See SurePoint video “[What is Metering Tube...?](#)” or “[396-4116Y1 Metering Tube Charts](#)” for more information on how metering tube works.

See SurePoint publication “[396-3249Y1: Troubleshooting Service Guide](#)” for a description of all the system components and additional troubleshooting/service information.

See the system manual for your system for more complete information. Manuals and publications are available for download at <https://support.surepointag.com>.

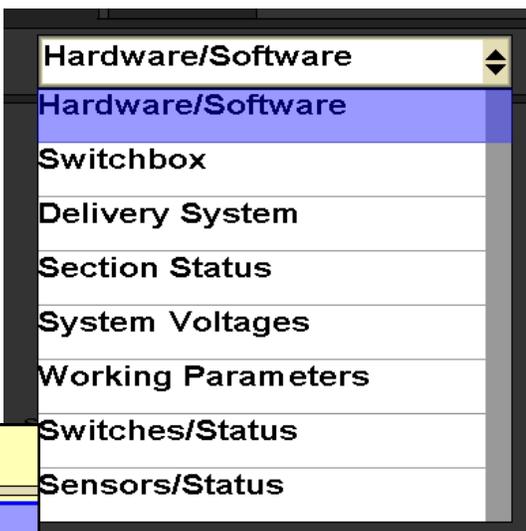
Also see the John Deere manuals for the JD Display and the John Deere Rate Controller for more information on the setup and operation of those components.

Troubleshooting Tip

1. Useful information is available at **Diagnostics—Readings**.
2. Below are examples of some of the screens available:



SCAN for video on **Diagnostics > Readings**



SCAN for video on **Diagnostics > Tests**

If Valve Power is low, check 2-pin Molex connector (big red and black power/ground wires), ISO connector at back of tractor (2 big pins), and fuse between battery and ISO connector. This is the path of the High Current Power.

<p>Readings Tests</p> <p>Delivery System</p> <p>Flow Meter (Hz) 0</p> <p>Flow Rate (gal/min) 0.0</p> <p>Spray Rate (gal/ac) 0.0</p> <p>Control Valve (A) 0.010</p> <p>PWM Duty Cycle 0</p>		<p>System Voltages</p> <p>ECU Power (V) 13.9 Valve Power (V) 13.8</p> <p>Sensor Power 1 (V) 5.0 Valve Power 1 OK</p> <p>Sensor Power 2 (V) 5.1 Valve Power 2 OK</p> <p>Sensor power 3 (V) 5.0 Valve Power 3 OK</p> <p>Sensor Power 4 (V) 0.0 Valve Power 4 OK</p>		<p>Readings Tests</p> <p>Sensors/Status</p> <p>Pressure Sensor (V) 0.0</p> <p>Calibration Points</p> <p>0.0 psi 0.00 v</p> <p>90.0 psi 4.50 v</p> <p>Pressure 1 (psi) 0.0</p> <p>Slope (mv/psi) 50.0</p>	
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Delivery System

Check the operation of the **flowmeter** here.

The **PWM Duty Cycle** tells how fast the pump is being told to run. The range is from 0 to 255.

NOTICE

Most systems generally should not need to run much more than 150 on the PWM Duty Cycle. If the Duty Cycle is running 200 to 255, it may be over speeding the pump. The pump is rated at 550 RPM. Continuous overspeeding may cause premature pump failure. If the system needs to run high Duty Cycles all the time, check to see that the expected pump output is within the pump capacity. Be sure the recirculation knob is closed. Be sure that high pressure is not opening the PRV. Be sure that the strainer is not plugged or that there are no other inlet restrictions. Be sure the pump has adequate hydraulic oil flow. If the pump will not reach it's rated capacity, check for a torn diaphragm or a malfunctioning valve.

System Voltages should be similar to those shown here.

Sensors/Status—Check the operation of the **pressure sensor** here. The top number (V) will be between 0 and 5.0 when the system is under pressure.

The **Calibration Points** should indicate that 0.0 psi is 0.00 volts and that 90 PSI is 4.5 volts.

The **Slope** should be 50.0 mv/psi. *If pressure does not show on Pressure 1, try setting up Sensor 2.*

You can test the harnessing for the pressure sensor by using a AA or AAA battery. Connect the (+) end of the battery to pin A of the pressure sensor connector. Connect the (-) end of the battery to pin C. The Pressure Sensor (V) should be approximately 1.5 volts. The Pressure should read about 30 PSI.

Recommended Care and Maintenance

H

Maintenance
& Parts

Air Bladder

Legacy D-series PumpRight pumps and the PR40 have an air bladder to smooth the pump output flow. It is recommended to run this bladder at 20% -25% of working pressure. So, if your system operates at 50 psi, charge the air bladder to 10- 12 PSI. Due to the small size of the air bladder, **very little air is needed**. SurePoint recommends charging a portable air tank to the correct pressure, then attach to the bladder valve to charge the air bladder to the same pressure as your air tank.

The PR17 and PR30 pumps do not have an air bladder.

Winterization

SurePoint recommends flushing your fertilizer pump and complete system with adequate amounts of water first. Next, use RV antifreeze to winterize your system by pumping an adequate amount through all components. At the beginning of the next season, begin with water to verify the system is in working order with no leaks.

Change Pump Oil Annually

PumpRight pumps use an internal oil lubricated crankshaft and connecting rod design. The oil is held in an external reservoir with level indicators. Hypro oil is recommended for the pump. This is a non-detergent SAE30 weight oil. If not available, hydraulic jack oils are a similar non-detergent formulation. Annual oil changes are recommended.

To fill or drain the pump completely, the pump shaft must be turned slowly by hand. The hydraulic motor will have to be removed to do this.

On some pump models, the pump will have to be removed from the mounting bracket and lifted slightly to allow access to the oil plug.

When refilling the pump with oil, the shaft will again have to be rotated to fill the pump to its required oil volume.

CRANKCASE OIL CAPACITIES				
Model	Capacity		Model	Capacity
PR17	13 oz		PR40	56 oz
PR30	28 0z		D250	98 oz
			PR80	148 oz

Diaphragm & Valve Replacement

PumpRight pumps are designed to allow very simple replacement of the two main pumping components; the diaphragms and the inlet & outlet valves. It is a good practice to replace these every 3 or 4 years (or every 1000 hours). It is a small job that helps ensure reliable operation during the busy season.



Pre-season Service



(A little time spent here may prevent some downtime when you want to be rolling.)

1. Visually check entire system (hoses, fittings, harnesses, etc.) for any signs of wear or trouble. Undo harness connections, clean out, visually inspect pins and wires for corrosion.
2. On the display, recheck all setup screens (see Section F) to verify correct setup.
3. Fill system with water and run in Manual mode (Section Test or Calibrate PWM Limits) to verify components and system are in working order. (May need to open air bleed valve to prime pump the first time. Be sure air bleed tube is not plugged.)
4. **Clean out the dirt that may be packed in to the manual override knob on the hydraulic valve block.**
5. If necessary run pump in manual override mode to check hydraulic setup (see pages 31,32, and 46).
6. Tighten all clamps. Loose clamps may be evident by leaks on the output side of the system. *Loose clamps from the tank to the pump are not always apparent, but can be sources of air getting into the system which can create issues. A loose clamp on the suction side can cause erratic flowmeter readings.*
7. Push in tubes at all Quick-Connect fittings so they are seated tightly. Tubes that are not fully seated are not always obvious, but may allow air in, which can cause check valves to leak.
8. Remove the black cap from the top of each check valve. Check the diaphragm to be sure it is intact and not gummed up with residue. Look under the diaphragm for debris. Compress the spring in the cap to be sure it moves freely. Carefully replace diaphragm and tighten cap.
9. Remove and clean the strainer. Be sure strainer is tightened securely so it will not suck air.
10. Be sure all rows are flowing and that all metering tubes/orifices are open. (Note: It will take a higher flow rate with water to create enough pressure to open all the check valves.)
11. First, run the system with Section Test or Calibrate PWM Limits test to verify that all valves are opening and that the flowmeter is reading.
12. Run the Nozzle Flow Check to verify that system will lock on to a Target Rate.
13. Check, and if necessary, tighten the tank straps.



⚠ DANGER

Hydraulic oil under extremely high pressure. Do not use hand or any other skin to check for or to stop hydraulic leaks. Be sure pressure is relieved before loosening hydraulic fittings. Replace worn hoses immediately. Seek medical care immediately if hydraulic oil is shot into the eye or the skin.



⚠ CAUTION

These pumps can deliver liquid at high pressure (290 PSI). Be sure the 100 PSI Pressure Relief Valve (PRV) is installed and functioning so system pressure will be kept under 100 PSI. Check hoses, hose clamps, and liquid fittings regularly and repair or replace loose connections.

PumpRight Valves & Diaphragms for D pumps



All PumpRight models use the same diaphragm and valve parts.

Diaphragm Pump Service Kit

Item Number 291-02-100500

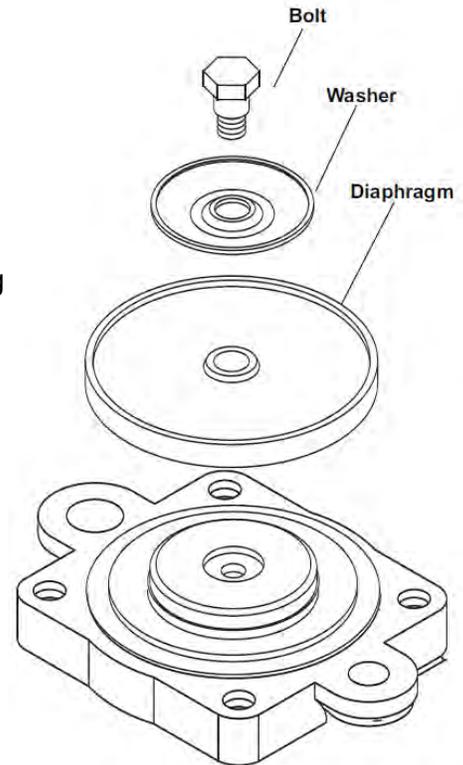
1 Kit contains 1 diaphragm and 2 valves to service a single pumping diaphragm. Order multiple kits to service all the diaphragms in your pump per chart at right.

	Number of Diaphragms
D70	2
D115	3
D160	4
D250	6

Qty in Kit	Part Number (all begin 291-02-9910-xxxxxx)	Description
1	550081	Diaphragm (BlueFlex)
2	320030	O-Ring
2	759054	Valve Assembly

Diaphragm & Valve Service Steps:

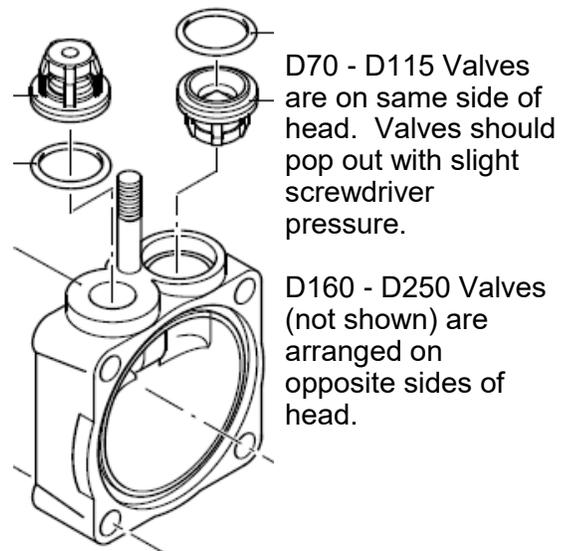
1. Remove inlet and outlet plumbing connections by unscrewing ring nut on inlet and outlet fitting.
2. Use extreme caution when removing and replacing drain plug, so that threads are not stripped and o-ring is not damaged. Remove drain plug from bottom of pump to drain oil from pump. Rotate pump shaft to remove all oil. Replace drain plug making sure o-ring is in place. Tighten plug to 171.4 In.Lbs.
3. Remove pump manifold(s) using a 17mm or 13 mm wrench.
 - D70 1 manifold 2 x 17 mm nuts (on top)
 - D115 1 manifold 3 x 17 mm nuts (on side)
 - D160 2 manifolds Each manifold has 4 sets of 2 x 13 mm nuts
 - D 250 2 manifolds Each manifold has 6 sets of 2 x 13 mm nuts
4. Remove and replace complete valve assembly.
5. Remove the pump head.
6. Remove the diaphragm bolt, support washer and diaphragm. Turn the pump shaft to up stroke to replace diaphragm.
7. Install new diaphragm (LIQUID side up), then replace washer and bolt.
8. Turn pump to downstroke to seat new diaphragm into the sleeve groove.
9. Replace pump head and manifold(s).
10. Refill crankcase with SAE30 non detergent oil (PumpRight Oil or hydraulic jack oil). Turn pump shaft and top off sight glass with oil.



Other Service Parts

D70, D115, D160, D250

Part Number (all begin 291-02-9910-xxxxxx)	Description
550080	Diaphragm (Buna, Optional)
550190	Accumulator Diaphragm



PumpRight Valves & Diaphragms



Diaphragm Pump Service Kits

1 Kit contains 1 diaphragm and 2 valves to service a single pumping diaphragm.

Order multiple kits to service all the diaphragms in your specific pump per chart below...

Visit <https://support.surepointag.com> or [PumpRight Diaphragm Pump Repair and Maintenance Video](#)

QTY in Kit	Part Number	Description
PR17 Pump Service Kit - 3 Diaphragm		
KIT #: 291-13-100100 (pump requires 3 kits)		
1	291-13-1040083	BlueFlex Diaphragm (PR17)
2	291-13-2429051	Valve
2	291-13-3460380	Gasket/O-ring

PR30 Pump Service Kit - 3 Diaphragm		
KIT #: 291-13-100150 (pump requires 3 kits)		
1	291-13-550081	BlueFlex Diaphragm
2	291-13-2429051	Valve
2	291-13-3460380	Gasket/O-ring

PR40 Pump Service Kit - 4 Diaphragm		
KIT #: 291-13-100150 (pump requires 4 kits)		
1	291-13-550081	BlueFlex Diaphragm
2	291-13-2429051	Valve
2	291-13-3460380	Gasket/O-ring

D250 Pump Service Kit - 6 Diaphragm		
KIT #: 291-13-100200 (pump requires 6 kits)		
1	291-13-550081	BlueFlex Diaphragm
2	291-02-9910-759054	Valve
2	291-02-680070	Gasket/O-ring

For other service parts, see individual Pump Part Breakout Diagrams in [396-4034Y1](#), the PumpRight manual that came with your pump.

Also see the manual and individual pump parts breakouts online here. (store.surepointag.com)



PumpRight Valves & Diaphragms

Diaphragm Pump Service Kit Replacement Instructions for PR Pumps

Visit <https://support.surepointag.com> or [PumpRight Diaphragm Pump Repair and Maintenance Video](#)

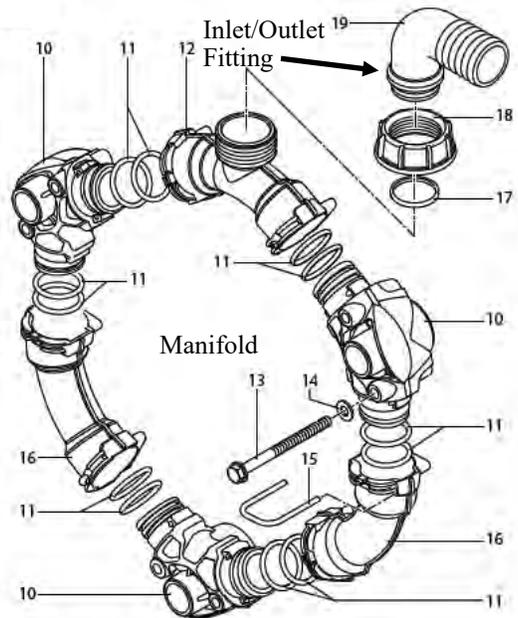


	Number of Diaphragms
PR17	3
PR30	3
PR40	4
D250	6

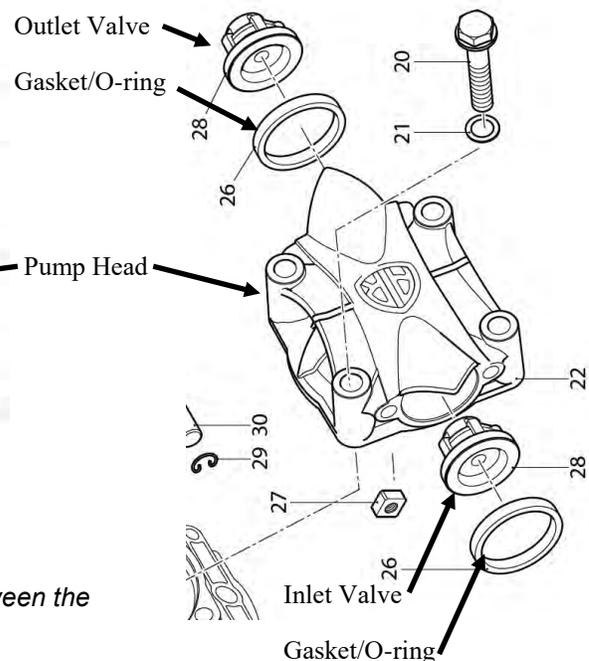
Diaphragm & Valve Service Steps:

1. Remove inlet and outlet plumbing connections by unscrewing ring nut on inlet and outlet fitting.
2. Use extreme caution when removing and replacing drain plug, so that threads are not stripped and o-ring is not damaged. Remove drain plug from bottom of pump to drain oil from pump. Rotate pump shaft to remove all oil. Replace drain plug making sure o-ring is in place. Tighten plug to 180 In.Lbs.
3. Remove pump manifold(s) using a 13 mm wrench.
4. Remove and replace complete valve assembly.
5. Remove the pump head.
6. Remove the diaphragm bolt, support washer and diaphragm. Turn the pump shaft to up stroke to replace diaphragm.
7. Install new diaphragm (LIQUID side up), then replace washer and bolt.
8. Turn pump to downstroke to seat new diaphragm into the sleeve groove.
9. Replace pump head and manifold(s).
10. Refill crankcase with SAE30 non detergent oil (PumpRight Oil or hydraulic jack oil). Turn the pump shaft and top off sight glass.

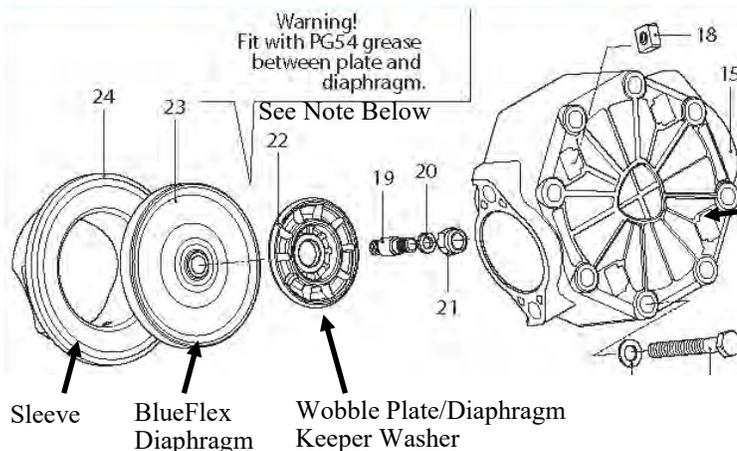
Typical Manifold—2 per pump—
inlet and outlet



Typical Valve Assembly



Typical Diaphragm Assembly



NOTE: A multipurpose grease is fine to use for applying in between the Diaphragm and Wobble Plate/Washer

For other pump service parts, see individual Pump Part Breakout Diagrams in [396-4034Y1](#), the PumpRight manual that came with your pump.

[Also see the manual and individual pump parts breakouts online here. \(store.surepointag.com\)](#)

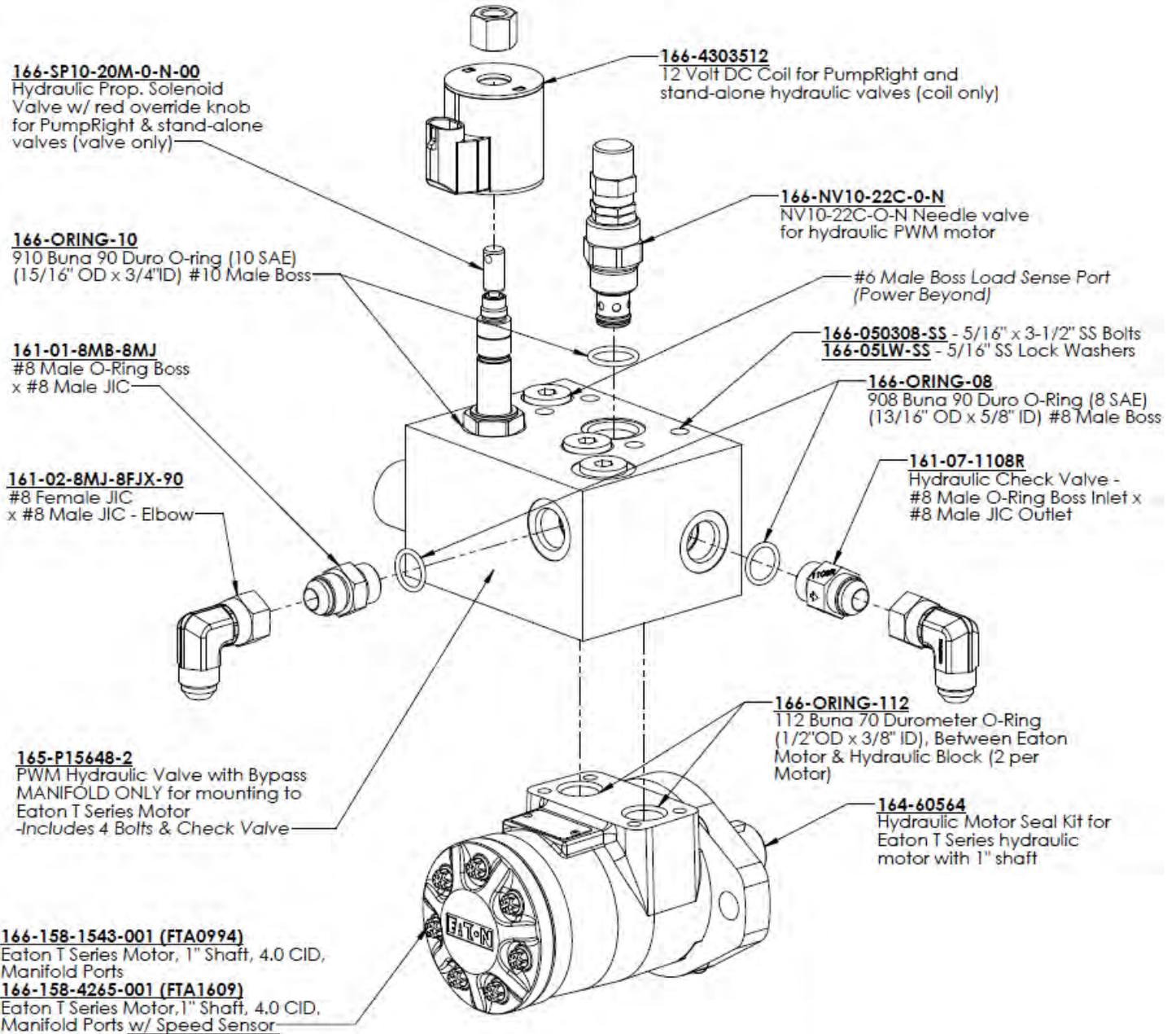
[Go to support.surepointag.com for pump information and parts breakdowns.](#)

PWM Valve and Motor Parts

H

Maintenance
& Parts

- 164-FTA0994 4.0 CID motor (this is the standard motor beginning in 2016)
- 164-FTA1609 Same as 164-FTA0994, but with RPM Speed Sensor--
GRC does not support a Pump RPM sensor.



396-3101Y1 QuickStart Card



SurePoint *PumpRight* Hydraulic Pump System
with PWM control for **JD GreenStar Rate Controller (GRC)**
Supplement to 396-001070

The following screenshots show the setup settings that are typically good initial settings. Actual settings on your system may vary from those shown here. Adjust settings as necessary in the field to get the best operation from your system. For more complete system information see the full manual for this system (396-001070) available at www.surepointag.com.

WARNING Operator is responsible for the safe operation of this system. Follow all safety precautions for safety with hydraulic equipment. Read the manual.

Setup-Implement

Setup-System

Set up Height Switch as appropriate for this system. Some systems may not use a height switch.

Flowmeter Cal—2000 Flowmeter Units—gal
For SurePoint Electromagnetic Flowmeter - Verify calibration. Adjust as

PWM Setup

Calibrate Pressure Sensor

Pre-season Service —See the manual for important pre-season service tips.
Troubleshooting Tips-See the manual (Section G) for more troubleshooting tips.

- To check for proper hydraulic connections and operation:** (See pages 31-32 and 46 in manual) Turn hydraulics off. Go to the SurePoint hydraulic valve and open the manual override (red knob) on top of the electric coil. Turn the hydraulic on at a low flow rate (since the valve is 100% open in manual override.) Gradually increase hydraulic flow. Pump should turn if hydraulic flow is present and connected correctly.
- To get pump to Target Rate quicker on startup:** (1) Increase the LOW LIMIT on PWM Settings (to 70 or 80). (Caution: Pump will not slow down below LOW LIMIT. (2) Increase the first 2 digits of Control Valve Calibration (from 20 to 25 or 30). This may cause the pump to overshoot and oscillate on speed or rate changes across the field.



Setup - Alarms

Setup - Rates

Diagnostics-Tests-Section Test

Diagnostics-Tests-Nozzle Flow Check

Section Test or Calibrate PWM Limits can be used for manual operation of the system. **Calibrate PWM Limits** is good to prime the pump on startup, to rinse the system, and for troubleshooting.

Use **Nozzle Flow Check** to see if system will lock on to a rate at a test speed. Pressure with water will be a lot lower than it will be with a heavier product. Some check valves may not open with low pressure.

Diagnostics—Readings—Delivery System will show details on flowmeter operation and pump speed (PWM Duty Cycle). This can be useful information for troubleshooting. Look at this screen.



Flowmeter Troubleshooting and Tap Test

1. Unplug flowmeter. With voltmeter, check for 12 volts between Power and Ground (pins 1 & 2 or pins B & C) of flowmeter connector. If no voltage, check at each connection back to Rate Controller. Should have 4-5 volts between Signal and Ground (pins 1 & 3 or pins A & C).
2. If 12 volts is present, then conduct a **tap test**. Have a second person watch **Flow Meter (Hz)** on the **Diagnostics > Readings > Delivery System** screen while other person taps repeatedly (use a short piece of wire or a paper clip) between Signal and Ground (pins 1 & 3 or A & C) of flowmeter connector. Taps should register on display.
3. If GS2/GS3 responded to the tap test, your wiring to that point is good. If still not fixed, inspect adapter harness and test continuity at each connection per schematic (see Section D of system manual).
4. Consider cleaning inside tube of flowmeter with warm soapy water. Replace flowmeter if it is still not working.

Electric Section Valve Problems

1. If one valve is not working, switch connections from that valve with a valve that is working to see if the problem is with the valve or with getting power/signal to the valve. If valve indicator light is always green or if position indicator appears out of sync, replace actuator. If valve won't turn, remove actuator and turn valve manually to loosen it.
2. All valves should have constant 12V power between pins A & B. When valve is commanded to turn on, there should be 12V between pins B & C. Start checking at the connection closest to the valve and work back to the Rate Controller. (See wiring pinouts in main manual.)
3. If using Auto Section Control, be sure the controller doesn't think you are in an area already covered or out of bounds. Use the Section Test to open and close valves.