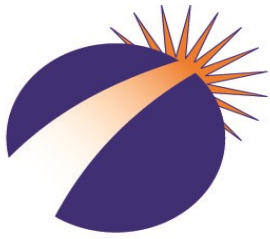


396-3053Y1



SureFire
Ag Systems



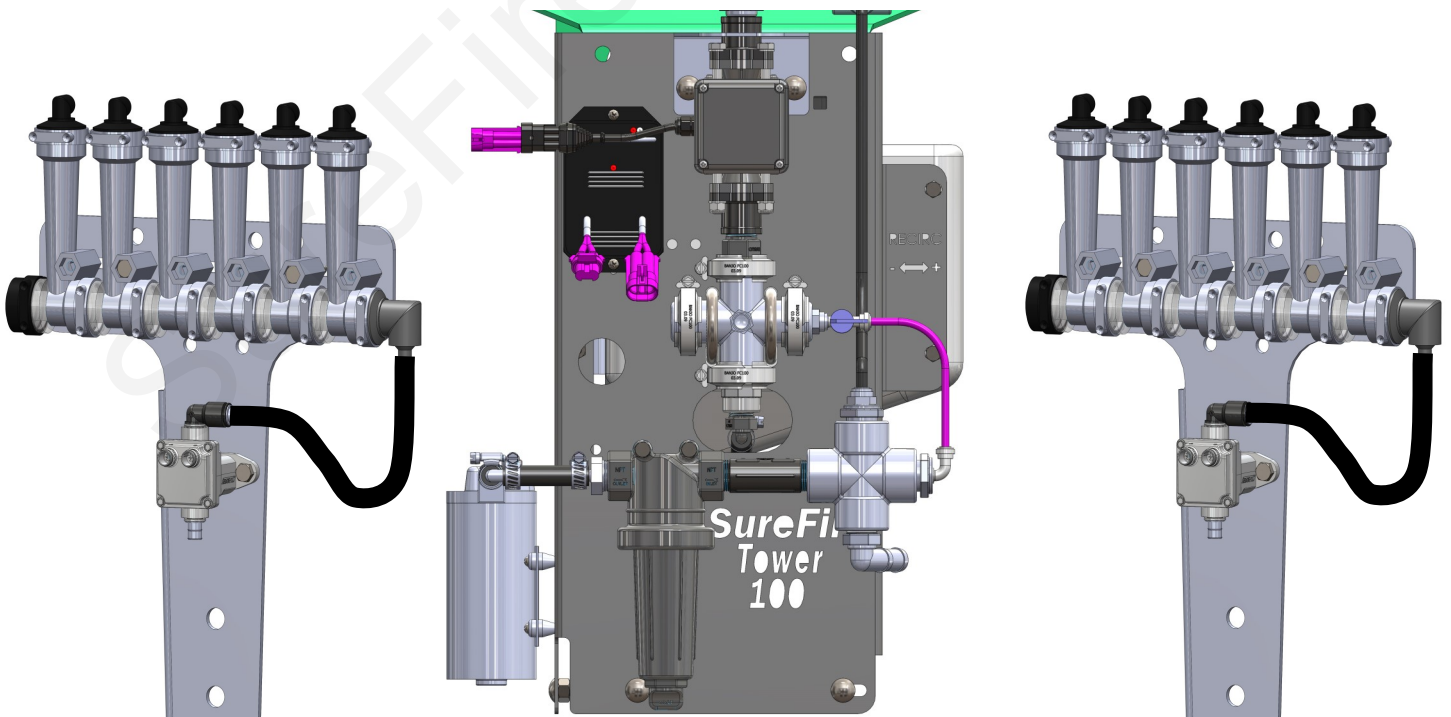
NUTRISPHERE-N[®]

Nitrogen Fertilizer Manager



Catalyst[™] Electric Pump System for NutriSphere-N[®] NH₃

AFS Pro 700 AccuControl



396-3053Y1

SureFire Catalyst for NutriSphere[®]-N NH₃ for Pro 700

Revised 09/30/2016

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396-3053Y1

SureFire Catalyst for NutriSphere®-N NH3 for Pro 700

Revised 09/30/2016

Read Me First

The SureFire *Catalyst*[™] system is designed to give accurate and even row-to-row distribution of NutriSphere-N NH₃ at a normal rate of 32 oz/acre. It has the capacity to deliver higher rates if desired.

Note: Ounces/acre, not gallons/acre.

Ounces per acre means a very small amount of liquid is being pumped and distributed. At 6 mph on 30" row spacing, a rate of 32 oz/acre means that each row has a flow of just under 1 oz/min. On a 12-row implement, the total amount being pumped, therefore, is less than 12 oz/min. The SureFire *Catalyst*[™] system is engineered to accurately and evenly distribute this flow.

Low Flow Electromagnetic Flowmeter

The SureFire *Catalyst*[™] system utilizes an electromagnetic flowmeter (with no moving parts) that is designed and built to accurately measure flows down to 10 oz/min. SureFire has proven the reliability and accuracy of the electromagnetic flowmeter by years of use in the field with thousands of flowmeters.

Dual Metering Tube Distribution

The low flow to each row will be evenly distributed through metering tubes that have an opening of 0.080" in diameter. An orifice that could distribute this flow would be 0.015" or less in diameter. An orifice of that size is easy to plug. The 4 to 5 times larger diameter of the tube greatly reduces the risks of plugging.

The use of two tubes to each row (dual tube system) means that this system has the ability to handle a wide variation of rates and speeds (from 5 to 10 mph) and to do this under a wide range of temperature changes where the viscosity of the product changes.

Flow Indicators

The flow for each row will pass through a flow indicator that has a ball that will float to indicate flow to that row. This will give an immediate visual indication of flow to each row. While the flow indicators give a good indication of the flow to each row, they are not always an indicator of the exact flow to each row. Only a catch test will verify the evenness of the row-to-row distribution.

Tool Box

Each *Catalyst*[™] system comes with a built-in tool box that contains mission-critical spare parts to reduce equipment downtime.

Product Tank

The *Catalyst*[™] comes with either a 55 gallon or a 110 gallon tank. The large tank would allow over 400 acres of application at the 32 oz/acre rate.

Rinse Tank

Each system comes with a 3-gallon rinse tank that can be filled with RV anti-freeze to allow the system to be flushed when it will not be used for a few days and to be protected from freezing after the rinse.

Electric Section Valves

Implements that are 60' wide or wider can be split into 2 sections to allow section control. Standard single section setups are equipped with electric row-shutoff valves on each flow indicator manifold set. Two-section systems will have the same manifold shutoff valves but can be configured so the valves on the left half of the implement will function as Section 1 and the valves on the right half as Section 2.

(Note: Due to the low flow rates with this product, on a 20' wide section flow control may be erratic under 6.5 mph at the 32 oz/acre rate.)



Getting Started

A

Introduction

This manual contains the information for the SureFire Tower 100 *Catalyst* system for NutriSphere-N NH₃.

Changes to components or configuration settings may be made to improve the operation of the system.

Go to the tab in Section F for the instructions on setting up your display.

General Information

You have purchased a SureFire NutriSphere NH₃ application system for your equipment. This system can be controlled by:

- John Deere Rate Controller
- Ag Leader Liquid Product Control Module
- Trimble Field-IQ Rate and Section Control Module
- Case IH Pro 700 with AccuControl
- SureFire Commander II controller

Note: SureFire Ag Systems also has the SureFire Torpedo system, a complete anhydrous ammonia application system. See www.surefireag.com for more information.

Basic Installation Steps

1. Have your control module and display in the cab connected and set up by the dealer for your display and controller. ***To apply anhydrous ammonia and NutriSphere-N NH₃ you will need 2 Field-IQ modules, one for each product.***
2. Open the packages and familiarize yourself with the components. See the System Overview Examples on the following pages to see the big picture of how SureFire Fertilizer Systems are installed. Refer to manual sections B & D for component information.
3. Mount the Tower and tank on your equipment.
4. Install the plumbing kit including flow indicator columns, electric ZIP valves, and metering tube plumbing to each row unit delivery point. See sections B & E for information on these components.
5. Attach harnesses as shown in Section D.
6. Setup Controller for SureFire fertilizer system as shown in Section F.
7. Fill system with water, conduct initial operation and tests per Section F.
8. Winterize system with RV Antifreeze if freezing temperatures are expected.

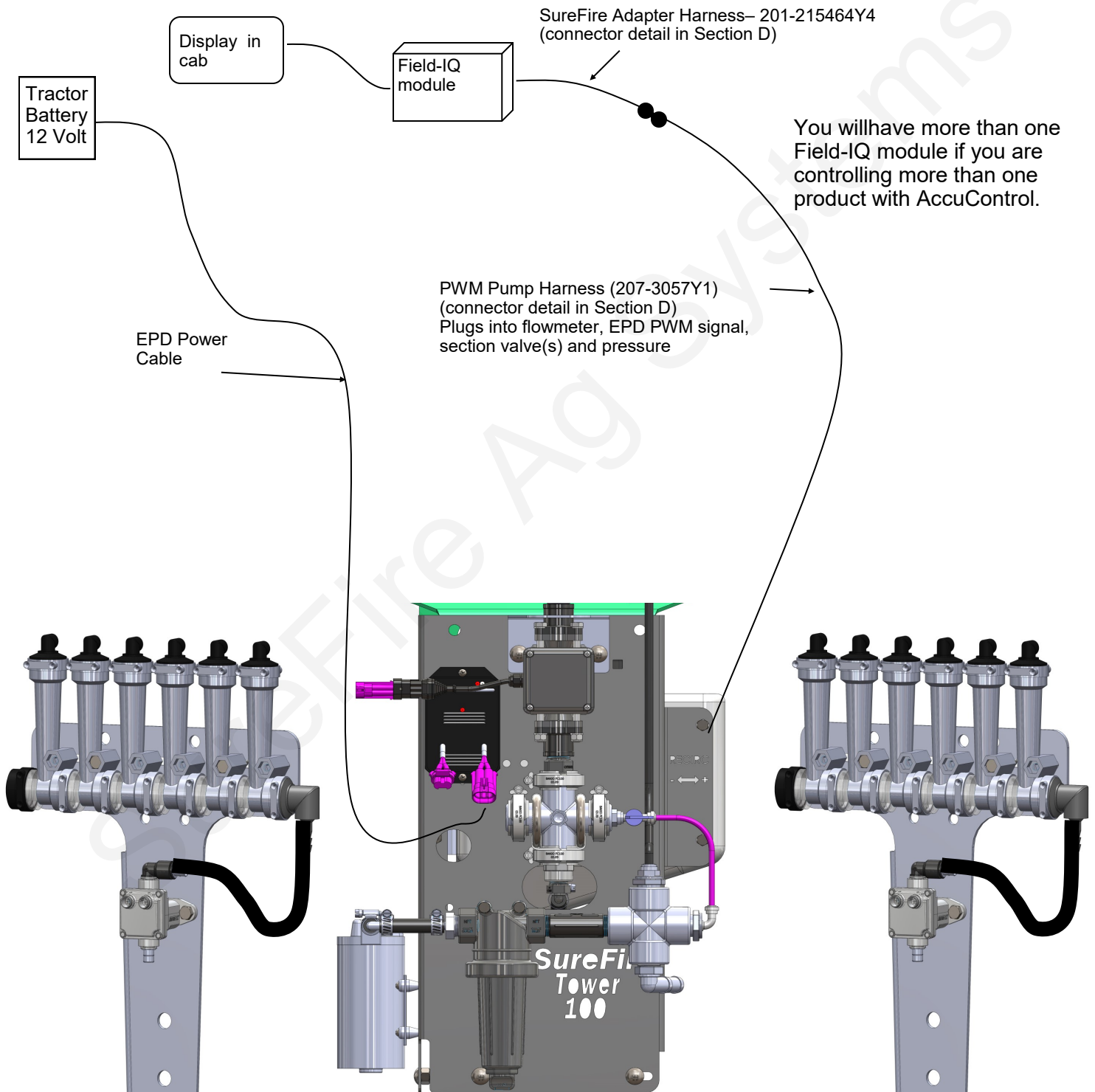
System Overview - Example 1

A

Introduction

The following gives a layout of the SureFire Tower 100 system with these components:

- Controller display in cab
- Field-IQ module
- Tower 100
- Flow Indicators with a ZIP valve on each manifold



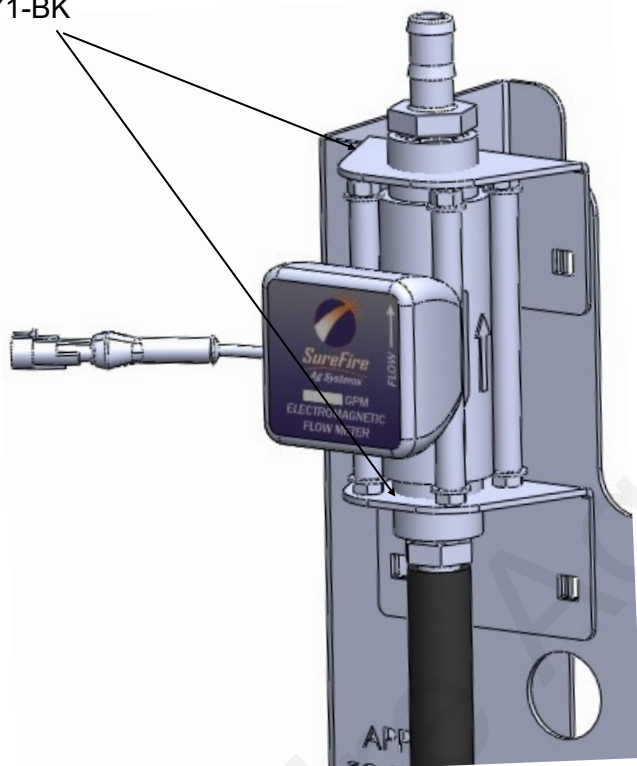
Electromagnetic Flowmeter

204-01-4621CUF05
0.08 to 1.6 GPM (10 oz/min to 205 oz/min)

B

Components
Liquid

Mounting Bracket,
Used in Tower 100
410-2106Y1-BK



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 independent of viscosity or density of the fluid measured. They are extremely accurate using the standard calibration number. SureFire still recommends you perform a catch test to verify the system is properly installed and configured.

Air causes erratic readings in flowmeters. Be sure all connections from the tank to the flowmeter are tight. Fittings may not show leaks, but still may be drawing in air that can cause system problems.

This flowmeter will accurately measure flows down to 8 oz/min. Below that rate, the flowmeter may not give a continuous pulse output.

Caution: Before welding on the implement, disconnect the flowmeter or damage to the flowmeter electronics may occur.

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.

Section Valves and Flow Indicator Manifold Shutoff Valves ZIP Valves

B

Components
Liquid



ZIP valve on right shown with both electrical connectors plugged (if daisy-chaining from one to the next). Outlets can be plumbed with a variety of fittings depending on the particular scenario.



Flow Indicator Manifold Shutoff Valves

Single-section systems will have electric shutoff valves (ZIP Valves) on each bank of flow indicators. These valves will be controlled by the Section 1 Connector. A 4' Y Adapter Cable (201-215604) will be plugged into the Section 1 connector on the Pump harness (200-03-18220). One end of the Y will connect to the valves on the left side of the machine, the other end of the Y will connect to the valves on the right side of the machine.

Section Control

Some systems (60 ft. and wider) may be set up as 2-section implements, so half of the applicator can be shut off in an overlap situation.

These systems will still have the flow indicator shutoff valves, but the valves on the left half of the machine will be plugged into the Section 1 connector on the harness and the valves on the right half of the machine will be plugged into the Section 2 connector.

Implements less than 60 feet wide need to be configured as one section for the NutriSphere N-NH3 product, since the output for narrower sections will drop below the range of the flowmeter at lower speeds.

3-Pin Wiring Connector:

Pin A—Red, 12 Volts +

Pin B—Black, Ground -

Pin C—White, Signal

12V=on ; 0V=off

Pressure Sensor

The Pro 700 with AccuControl currently does not support the use of a liquid pressure sensor.



The kit for the Pro 700 system includes a pressure gauge. A pressure reading is helpful troubleshooting information and helps in selecting which metering tube to use.

Pressure Sensor (3 wire type) with harness
521-05-050150

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.

Why use an air bleed valve:

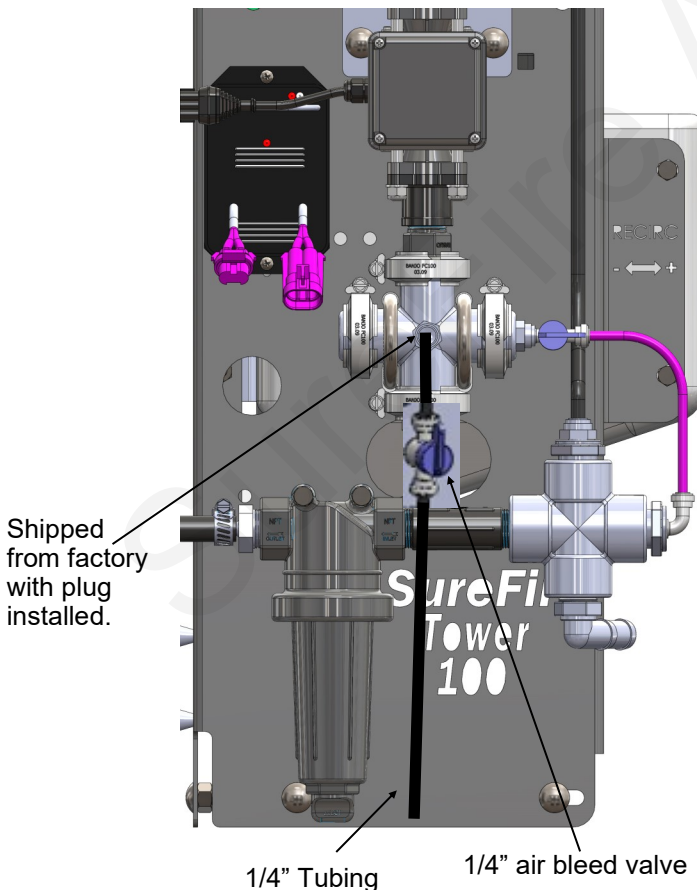
Your system is equipped with a 4 lb. check valve on each metering tube. These valves do not let air escape from the system unless it is pressurized. 12 volt liquid pumps are not good air compressors. Therefore, the pump can struggle to prime due to air trapped on the outlet side of the pump.

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.

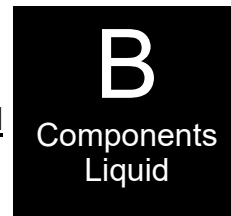
How to install the air bleed valve:

Remove the 1/4" plug from the quick connect fitting on the center cross on the Tower (see picture). 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.



Product Distribution



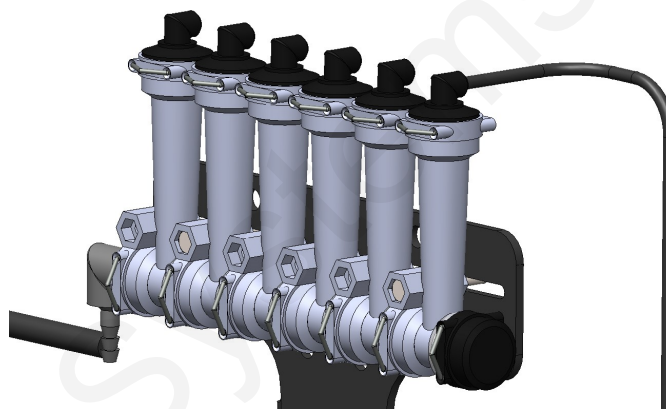
To assure proper and even distribution to each row, the product being applied must be metered to each individual row. This metering is done by using metering tubes which create back pressure so an equal amount of liquid is applied to each row.

Floating Ball Flow Indicator & Manifold System

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

The flow for each row will pass through a flow indicator that has one or two balls that will float to indicate flow to that row. This will give an immediate visual indication of flow to each row. While the flow indicators give a good indication of the flow to each row, they are not always an indicator of the exact flow to each row. Only a catch test will verify the evenness of the row-to-row distribution.

For most applications of NutriSphere-N NH3 at 32 oz/acre, the Green Plastic ball gives a good flow indication. If a heavier ball is needed, use the Red ball. On this low-flow system, the flow appears to be more stable if only one ball is used.



Parts List

Complete Columns

701-20460-920-GR-V Single Low Flow Column with 1/4" QC - 90 Degree Outlet

Fittings

701-20516-00 ORS x 1/4" QC - 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

701-20470-00 Low Flow Column

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

400-1036A2 7-12 Row Bracket

400-2011A1 White Backer Plate for 3-6 Row Bracket

400-2010A1 White Backer Plate for 7-12 Row Bracket

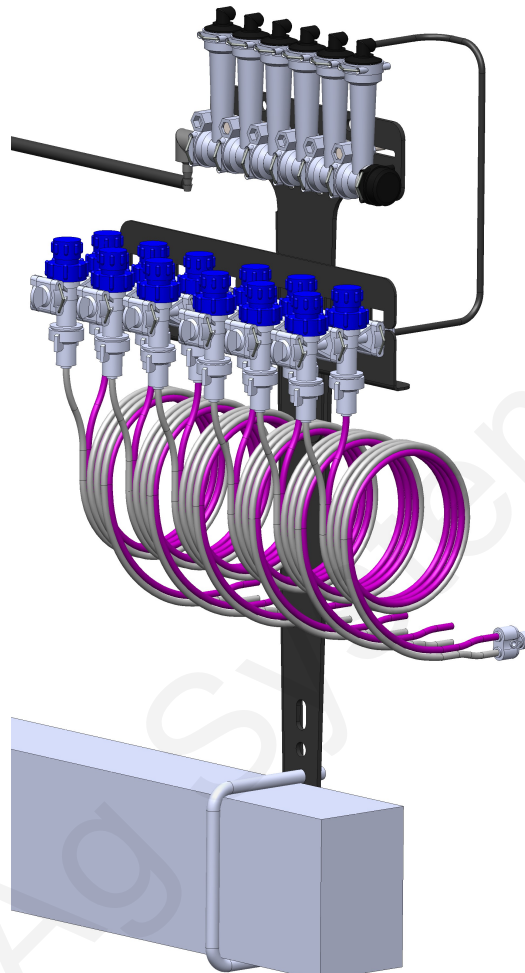
400-1315A2 Flow Indicator Bracket, 6-8 in wide hitch mount



Flow Indicators and Dual Check Valves

B
Components
Liquid

Some systems may have a dual check valve system with two metering tubes as shown at the right. On this system, flow can be directed to the small tube, or to the large tube, or to both tubes by opening or closing the valves by twisting the blue caps.



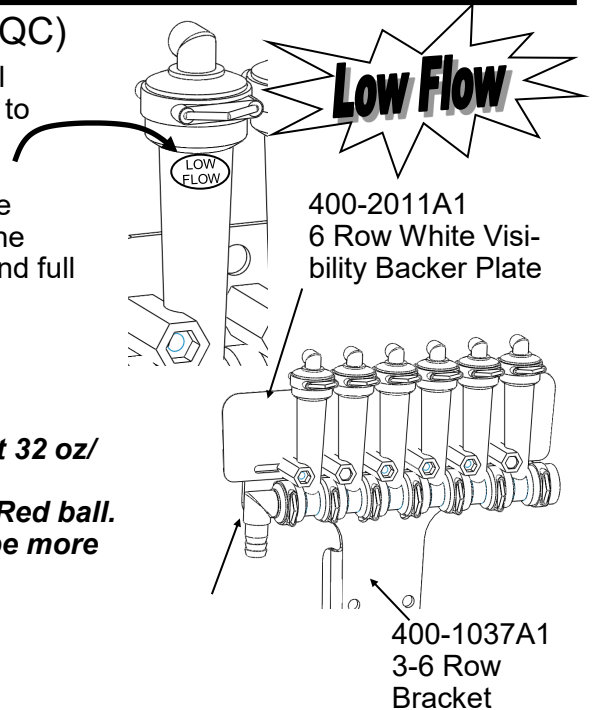
Ball retainer—If top is removed, be sure that the ball retainer is in place when top is reinstalled.

Assembly of top of flow indicator tube

Low Flow Column (mostly 1/4" QC)

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

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.



Floating Balls

For most applications of NutriSphere-N NH3 at 32 oz/acre, the Green Plastic ball gives a good flow indication. If a heavier ball is needed, use the Red ball. On this low-flow system, the flow appears to be more stable if only one ball is used.



Metering Tube Plumbing Kits

B

Components
Liquid

The SureFire *Catalyst* Tower 100 NutriSphere-N NH₃ system comes with a dual metering tube distribution system. These plumbing kits will contain everything you need to distribute product from the flowmeter outlet down to the ground application device.

For most applications of NutriSphere-N NH₃ at 32 oz/acre on 30" rows, the purple tube will be the tube that is used. When applying in cold weather and/or at high speeds, it may be necessary to use the blue tube. The system will work at pressures up to 50 PSI, but for prolonged use above 45 PSI, consider switching to a larger tube.

Dual Advantage of Dual Metering Tube

Metering tube provides a larger passage way diameter than a comparable orifice. Typical NutriSphere-N NH₃ applications apply around 1 to 1.5 oz/min/row. An orifice for this rate would have a 0.015" diameter opening. The SureFire system uses metering tubes with diameters of 0.080" (purple) and 0.096" (blue). This 12' tube with more than three times 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 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

The best tube to use may change, based on temperature, application speed, and product batch,

SureFire recommends you start with the Purple tube (for typical 32 oz/ac and 30" row spacing). Conduct a test using the Liq Cal procedure to determine your system pressure. Recommended pressure is between 10-40 PSI.

The system will operate up to 55 PSI. If prolonged application with pressures above 45 PSI is anticipated, consider changing to the blue tube. (Shortening the purple tube will also reduce pressure. All tubes must be the same length.)

If the pressure is below 10 PSI in the purple tube (this would probably be on low speed applications with warmer temperatures where the product is thinner), consider getting a set of gray tubes (0.060"). The system will operate in the 5 to 10 PSI range, but as the pressure decreases, row-to-row variation may increase. Only a catch test will verify row-to-row distribution.

Note: Flow tests with water will have very different pressure readings than what the system will have with NutriSphere-N. The pressure will be much less with water for a given flow than with NutriSphere-N.

Typical plumbing setup

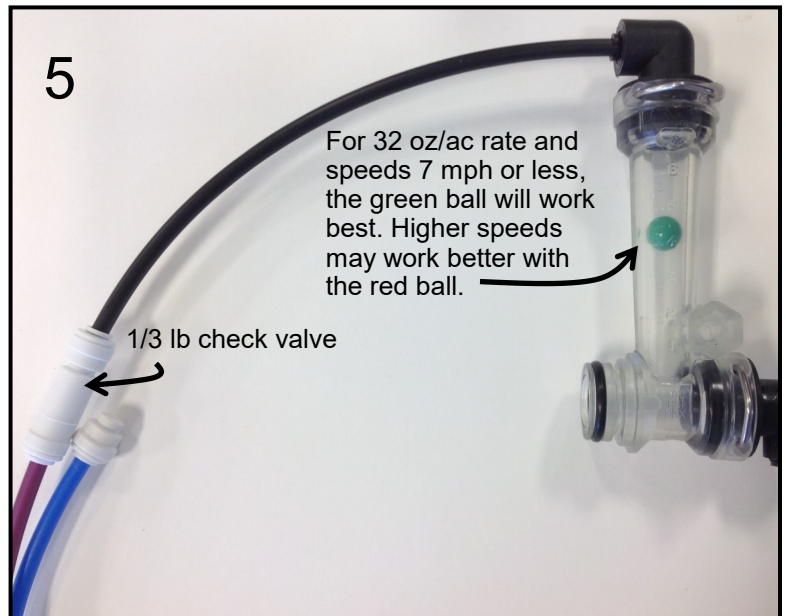
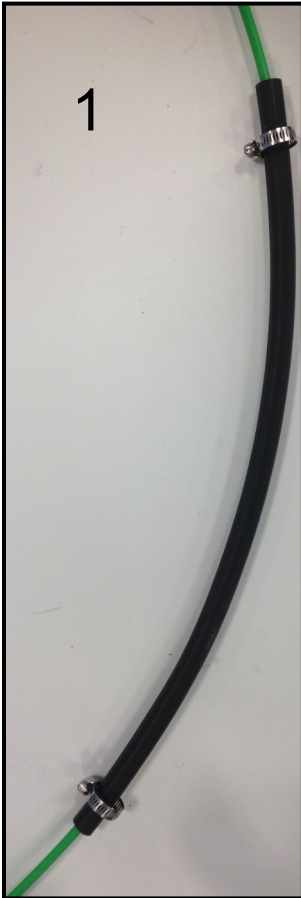
Your shanks and plumbing setup may vary from those shown here.

The 4' green tube delivers the product to the shank.

1. Slide a 2' piece of 3/8" hose over the green tube along with 2 clamps.
2. Slide the green hose in the tube on the shank as far as it will go.
3. Slide the 3/8" hose down over the tube. Clamp 3/8" hose at the top and at the bottom.
4. Connect purple tube to green tube with 1/4" QC x 1/4" QC. Cap both ends of the blue tube. Blue tube will be used when cold weather and/or high speeds create too high pressure in purple tube.
5. Connect purple tube to appropriate length of black tube with 1/3 lb 1/4" QC check valve. Connect this black tube to top of flow indicator.

B

Components
Liquid



Shanks and Knife Points available from SureFire Ag Systems

SureFire Ag Systems and Verdesian have worked closely with an established shank manufacturer to develop a shank and several knife points that will deliver the anhydrous ammonia and NutriSphere-N NH₃ where it needs to go. They will be able to advise users on the best setup for their application scenario.



The knife on the left is for no-till conditions. On the right is a less aggressive point for tilled soil.

Anhydrous tube

NutriSphere tube

Insert a piece of black 1/4" tube inside the NutriSphere tube and push it down so the end of the black tube is at the top of the outlet hole. (See instructions on previous page.)

To protect the black 1/4" tube, slide a 2-foot long piece of 3/8" hose over the black tube and clamp this hose to the top of the NutriSphere tube.

Your application setup may be different. Generally, insert the black 1/4" tube into the tube through which the NutriSphere-N NH₃ will be applied.

On NutriSphere placement tubes that are open on the bottom, a slightly higher velocity stream may be achieved by using a 30-36" piece of purple tube as the final discharge tube. Insert this purple tube inside the NutriSphere placement tube and push it to the bottom of the tube. If the purple tube is used, the length of this tube should be the same on all rows.



Sample of available knife profiles



Toolbox (no tools, just spare parts)

B

Components
Liquid

A toolbox containing critical items will be included with each system. The toolbox will contain:

QTY

- 1 12 volt electric pump
- 2 flow indicator columns
- 10 size 6 hose clamps
- 1 3/8" HB 90 degree electric pump fitting
- 1 3/8" HB straight electric pump fitting
- 2 40 Amp fuses
- 1 1" Tee Strainer gasket-FKM
- 2 Clips for electric pump
- 4 QC 1/4" End Stop White Poly Cap
- 6 QC to QC—1/4" QC x 1/4" QC
- 2 Check Valve—1/3 lb—1/4" QC x 1/4" QC



SureFire Ag Systems



Pro 700 AccuControl Field-IQ™ Rate and Section Control Module

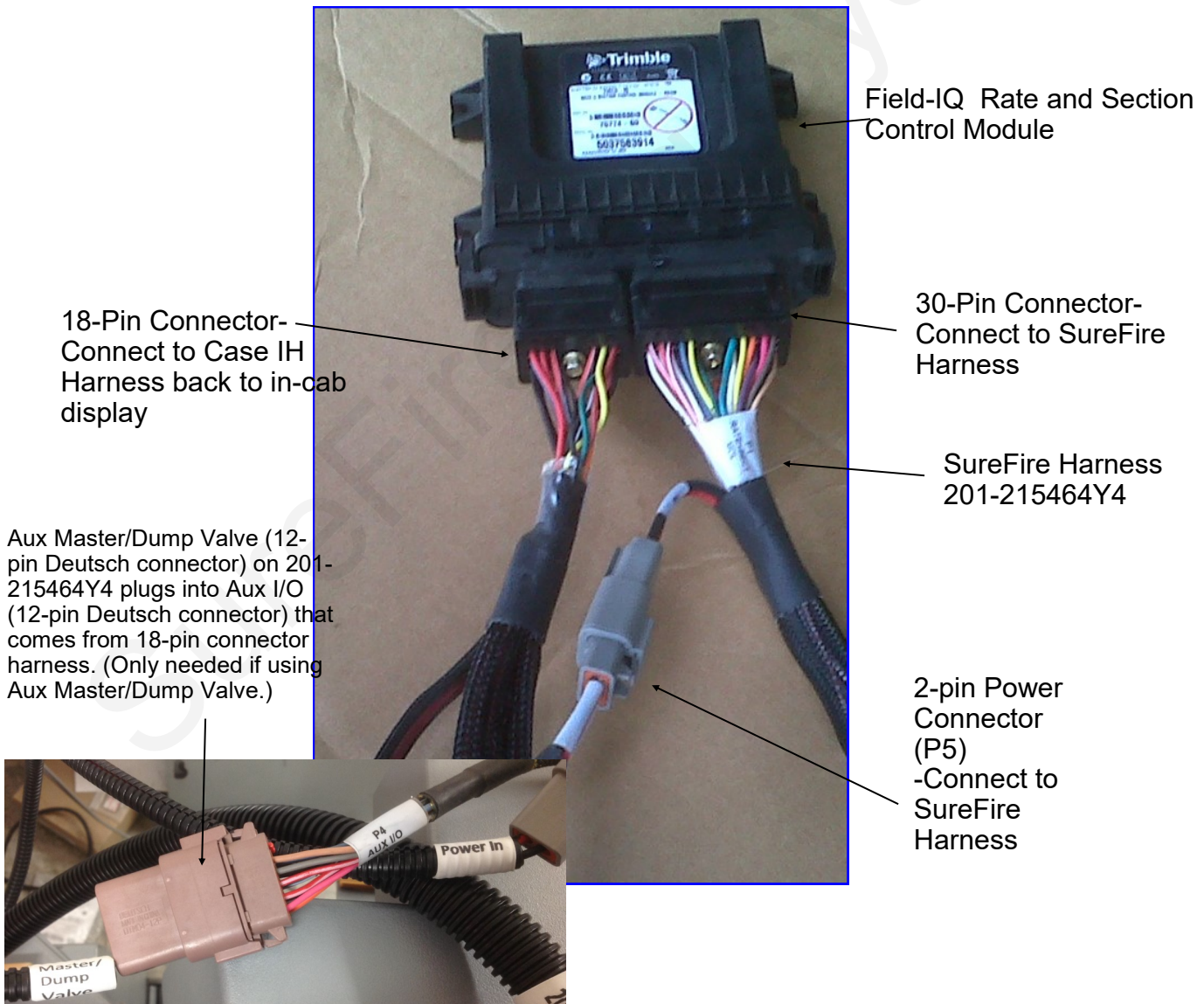


The SureFire system begins at the Field-IQ Rate and Section Control Module. The picture below shows this control module. You will need to purchase this module from your Case IH dealer. You will also need to purchase an unlock code for your Pro 700 display to enable AccuControl rate control functions.

The rate controller has two harness connections. The first is the connection to the Case IH wiring harness that connects to the in-cab display. The second is where the SureFire harnesses begin. The following pages show system diagrams for single section and 2-section configurations. Detailed harness drawings follow for information and troubleshooting.

Instructions for setting up the AccuControl on the in cab display are in Section F. Detailed screen shots of the Pro 700 display are included showing exactly what settings are required and recommended for the SureFire system.

Check with your Case (NH) dealer at least annually to be sure that the Pro 700 display and the Field-IQ module have the latest software/firmware updates.



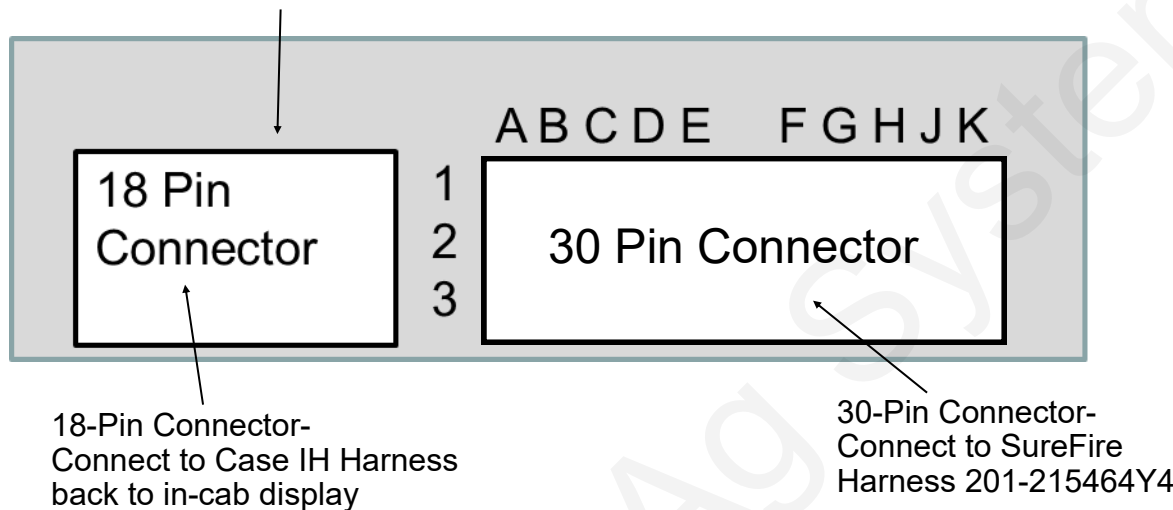
Case IH AFS AccuControl Rate and Section Control Module

D

Wiring & Elec

This chart shows you the output functions by pin location on the AccuControl Rate and Section Control Module. Use this information to verify if the AccuControl system is providing the correct output. If the module is not providing the correct output, contact your Case IH dealer to repair the problem. Also review any applicable settings on the display to verify the system is properly set up.

AccuControl Rate and
Section Control Module



Common Troubleshooting:

PWM Signal to Pump: Pins E1 to E2 should have 0-12 volts to energize the EPD module to run the pump. Use manual mode to increase signal. Should get up to 12 volts after holding increase button.

Flowmeter Tap Test: Pins C2 and C3 are Flow Ground and Signal. If no flow is registering on the display, you can tap between these two pins with a short wire. This produces a pulse. The display should indicate a flow when this is done rapidly. *(Note: To help register flow for the tap test, change the flowmeter calibration to 10, so it will show a flow with fewer taps. Be sure to reset the flow cal to the proper number after the test.)*

See the drawing of harness 201-215464Y4 on page 20 for all pin locations on the 30-pin connector.

Note: If applying 2 products (such as anhydrous ammonia and NutriSphere-N NH3) with the Pro 700 AccuControl you will need 2 Field-IQ Modules.

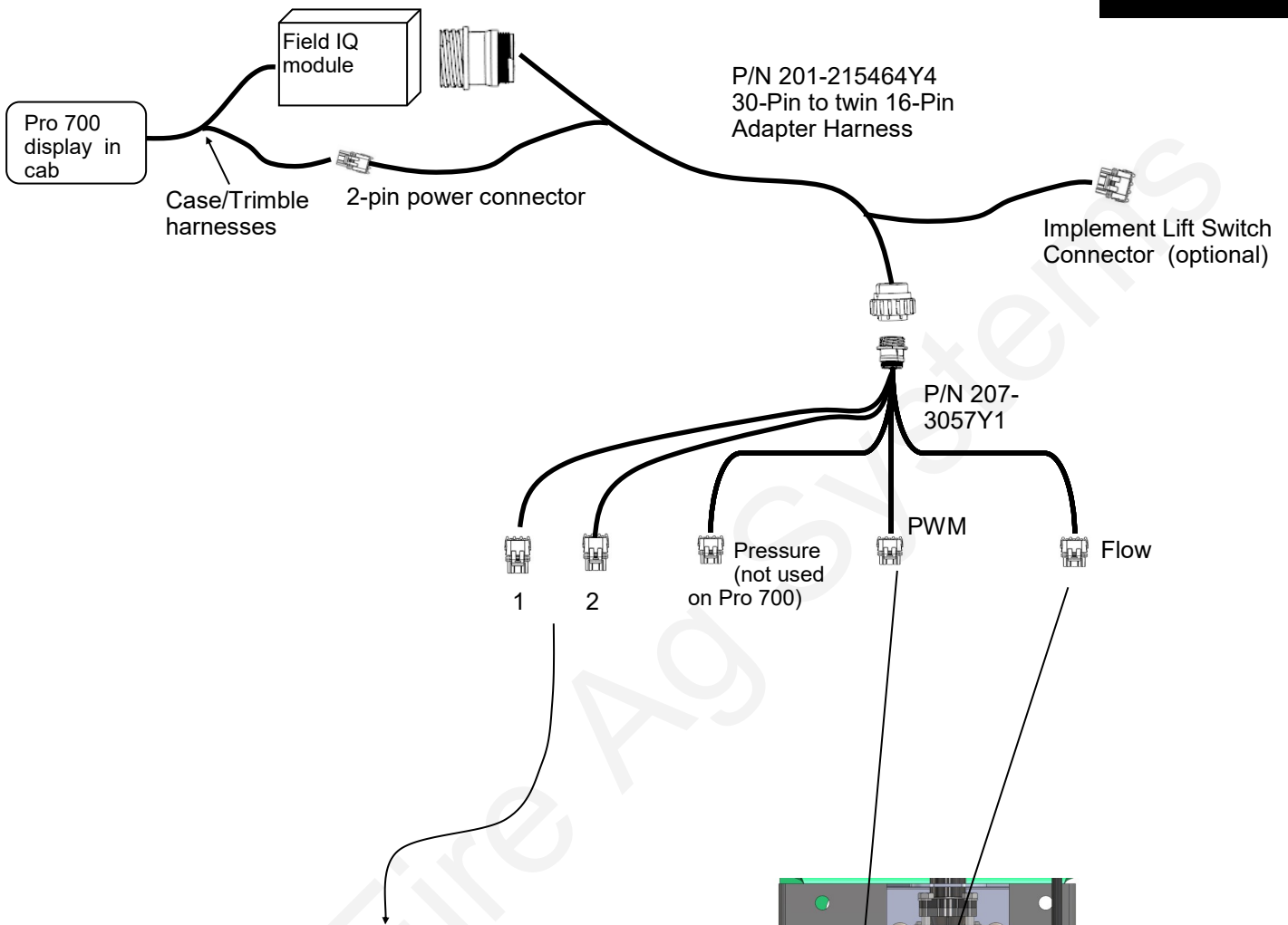
Tower & Pro 700 AccuControl Layout

Control: PWM EPD

Sections: 2

D

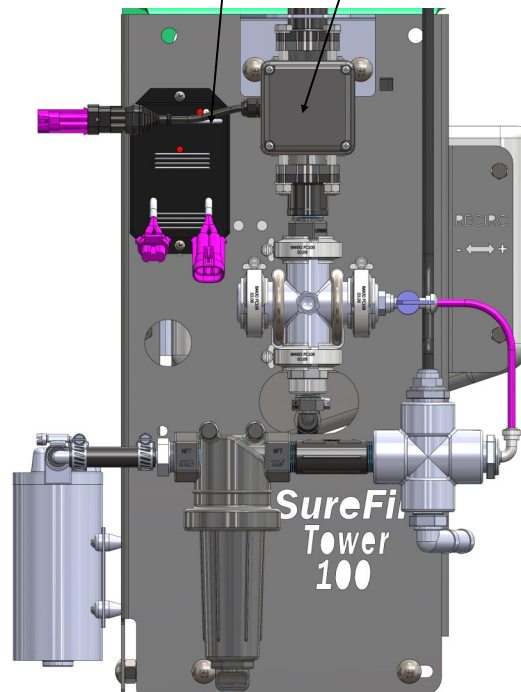
Wiring & Elec.



If the implement is set up as two sections, you will use the connector for Section 1 on the left side and Section 2 on the right side. (Implements less than 60' wide will be configured as 1 section.)

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

If implement is set up with just one section, you will use the Section 1 connector to connect to the Flow Indicator Manifold Shutoff valves. A 4' Y Adapter Cable (201-215604) will be connected to the Section 1 connector on 207-3057Y1. One Y connector will supply the valves on the left side. The other Y will supply the valves on the right side.

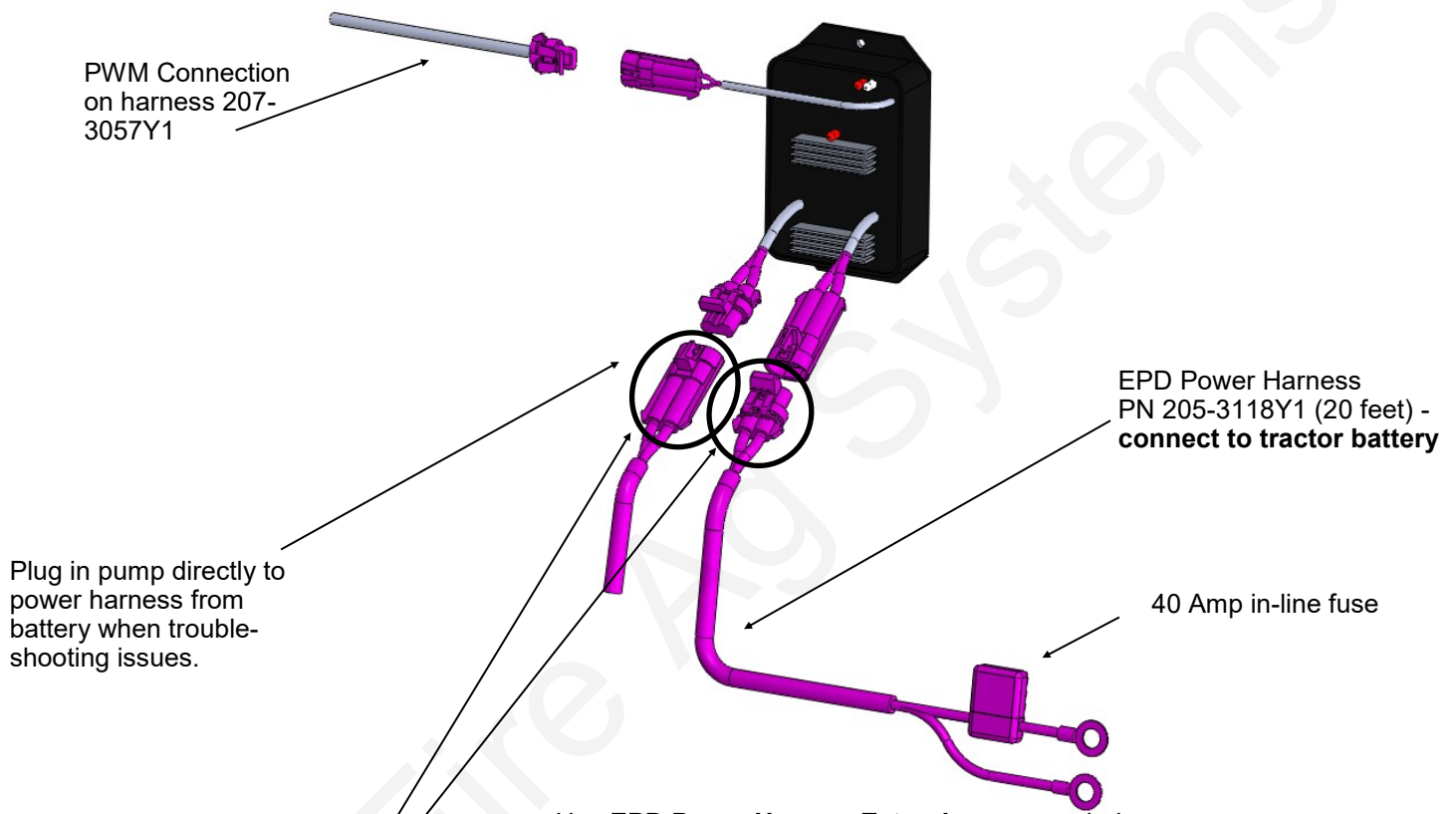


40 Amp PWM EPD (Pulse Width Modulated Electric Pump Driver)

Item Number: 205-19024 with Anderson connectors
Replaces 205-18385 with 480 connectors



The Electric Pump Driver powers the electric pump by providing a pulse width modulated signal to control pump speed. It needs to have a power connection and wiring capable of carrying up to 40 amps of current. **It must be connected directly to the tractor battery.** SureFire recommends 10 gauge (or heavier) wire if extending harnesses in the field.



Use EPD **Power Harness Extensions** as needed (These have Anderson Connedtors)

| Part Number | Extension Length | Wire Size |
|---------------|---------------------------------------|------------------------|
| 206-02-3120Y1 | 1' Extension | 10 gauge |
| 206-02-3121Y1 | 5' Extension | 10 gauge |
| 206-02-3122Y1 | 10' Extension | 8 gauge |
| 206-02-3123Y1 | 20' Extension | 8 gauge |
| 206-02-3124Y1 | 30' Extension | 30' and longer—6 gauge |
| 206-02-3125Y1 | 40' Extension | |
| 206-02-3126Y1 | 50' Extension | |
| 206-02-3127Y1 | 60' Extension | |
| 206-02-3128Y1 | 2' Anderson Ext w/ Power Switch-8 AWG | |

Troubleshooting Tip:

If the pump won't run, connect the power and pump connector directly together to give pump full 12 volts directly from battery. This will tell you if the pump is the problem or if something else is wrong. The pump will be running at full speed, so don't leave it connected this way for long.

SureFire recommends a single long extension harness as multiple connectors will reduce voltage, increase current and hurt performance of your electric pump system.

Wire Size: 18 AWG unless otherwise specified

201-215464Y4

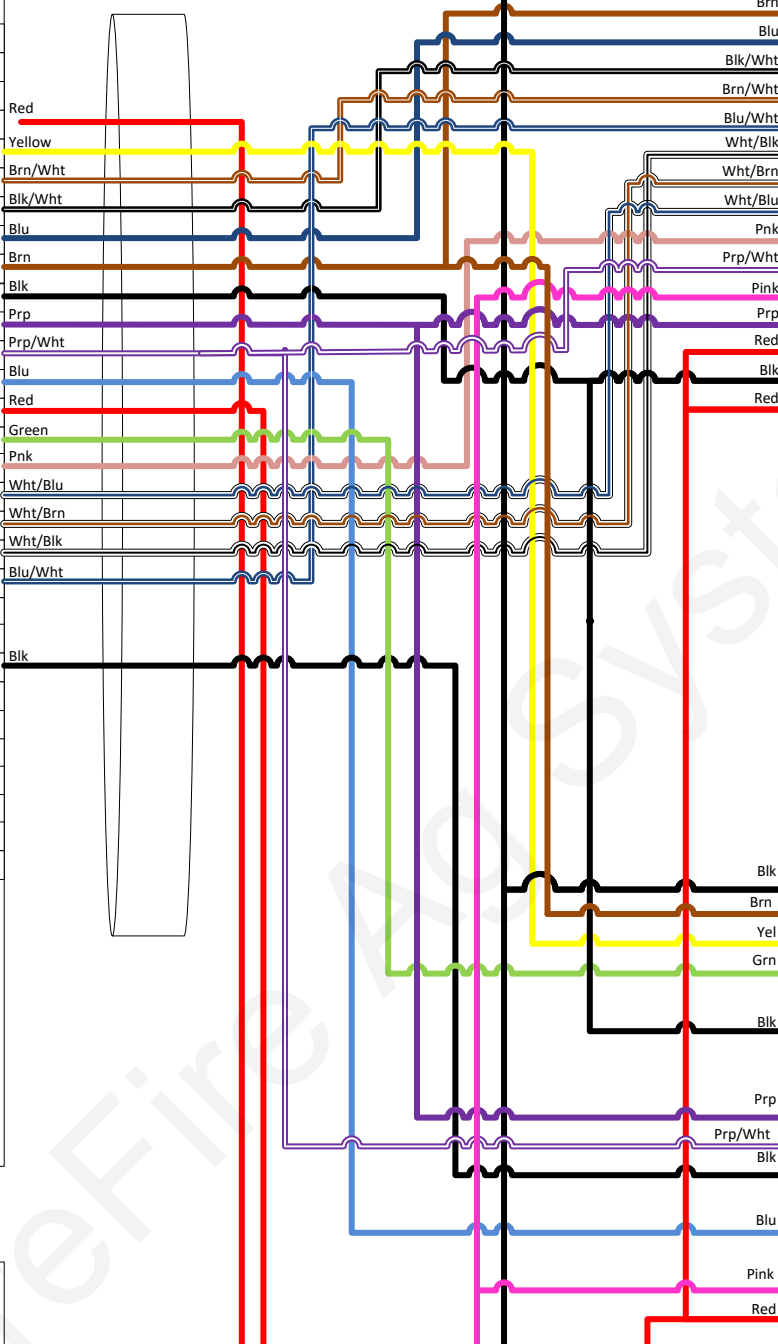
Length: 3ft Sections

Trimble Field IQ Adapter Cable – 30 pin to twin 16 pins- 2 pressure

Cinch Connector



| | |
|--------------------|----|
| +12V | A1 |
| +12V | B1 |
| + 5V | C1 |
| Impl Switch 5V | D1 |
| Servo +/-PWM | E1 |
| Section 5 | F1 |
| Section 4 | G1 |
| Section 3 | H1 |
| Section 2 | J1 |
| Section 1 | K1 |
| Pressure 1 Signal | A2 |
| Pressure 2 Signal | B2 |
| Flow Signal | C2 |
| Impl Switch Signal | D2 |
| Servo +/-PWM | E2 |
| Section 10 | F2 |
| Section 9 | G2 |
| Section 8 | H2 |
| Section 7 | J2 |
| Section 6 | K2 |
| GND | A3 |
| GND | B3 |
| Flow GND | C3 |
| GND | D3 |
| GND | E3 |
| GND | F3 |
| GND | G3 |
| POWER | H3 |
| Section 12 | J3 |
| Section 11 | K3 |



| | | |
|----|-------------------|---|
| 1 | Valve GND | 16 Pin Round – AMP Male pins in male body (with threads for swivel nut) |
| 2 | Section 2 | |
| 3 | Section 3 | |
| 4 | Section 4 | |
| 5 | Section 5 | |
| 6 | Section 6 | |
| 7 | Section 7 | |
| 8 | Section 8 | |
| 9 | Section 9 | |
| 10 | Section 10 | |
| 11 | Pressure 2 Signal | |
| 12 | Aux/Dump Valve | |
| 13 | Pressure 1 Signal | |
| 14 | Valve Power | |
| 15 | Section 1 | Mates with 215466 or 215467 |
| 16 | Valve Power | |



Pump

| | |
|---|-------------------|
| 16 Pin Round – AMP Female pins in female body (with swivel nut) Labeled "To Pump" | |
| 1 | GND |
| 2 | Section 2 |
| 3 | Servo +/- PWM |
| 4 | Servo -/ PWM |
| 5 | Section 1 |
| 6 | |
| 7 | |
| 8 | |
| 9 | Pressure 1 Signal |
| 10 | Pressure 2 Signal |
| 11 | Flow GND |
| 12 | |
| 13 | Flow Signal |
| 14 | |
| 15 | Master On/Off |
| 16 | Power |



Mates with 215223 or 215218

2 Pin Connector – Deutsch DTP04-2P Male (Power In)

| | |
|--------|---|
| GND | 1 |
| +12VDC | 2 |

12 Pin Connector Deutsch DTM04-12P

PIN 1 Pink Aux/Dump Valve Signal

Run/Hold

| | |
|---|---------------|
| A | Imp Sw Signal |
| B | |
| C | Imp Sw 5V |

Dust Cap

| | |
|---|------|
| A | Plug |
| B | Plug |
| C | Plug |



| | | | |
|---|--|---------------|---|
| Project: | 201-215464Y4 Trimble Field IQ Adapter Cable – 30 pin to twin 16 pin—2 pressure, 10 section, aux/dump valve | Drawn By: | Brady Gragg Rev. by Mark Wolters, Ricker |
| Filename: | Trimble Field IQ Adapter Cable – 30 pin to twin 16 pin | Date: | 10/23/12 Rev. 09/27/2013, 8/25/2014,3/3/2016 |
| Copyright 2012-2016 SureFire Ag Systems | | Page of Pages | 1 of 1 |

207-3057Y1 Tower Final harness w 2 sections

PWM Pump Cable – Flowmeter, PWM & Pressure

Length: 10ft

Wire Size: 18 AWG

Section 1
WP Tower
3-PIN

| | |
|---|--------|
| A | +12VDC |
| B | GND |
| C | Signal |

Section 2
WP Tower
3-PIN

| | |
|---|--------|
| A | +12VDC |
| B | GND |
| C | Signal |

PWM
150 MP
TOWER
2-PIN

| | |
|---|--------|
| A | +12VDC |
| B | -12VDC |



PRESSURE

150 MP
SHROUD
3-PIN

| | |
|---|--------|
| A | Signal |
| B | +12VDC |
| C | GND |



150 MP
Tower
3-PIN

| | |
|---|--------|
| A | Signal |
| B | +12VDC |
| C | GND |

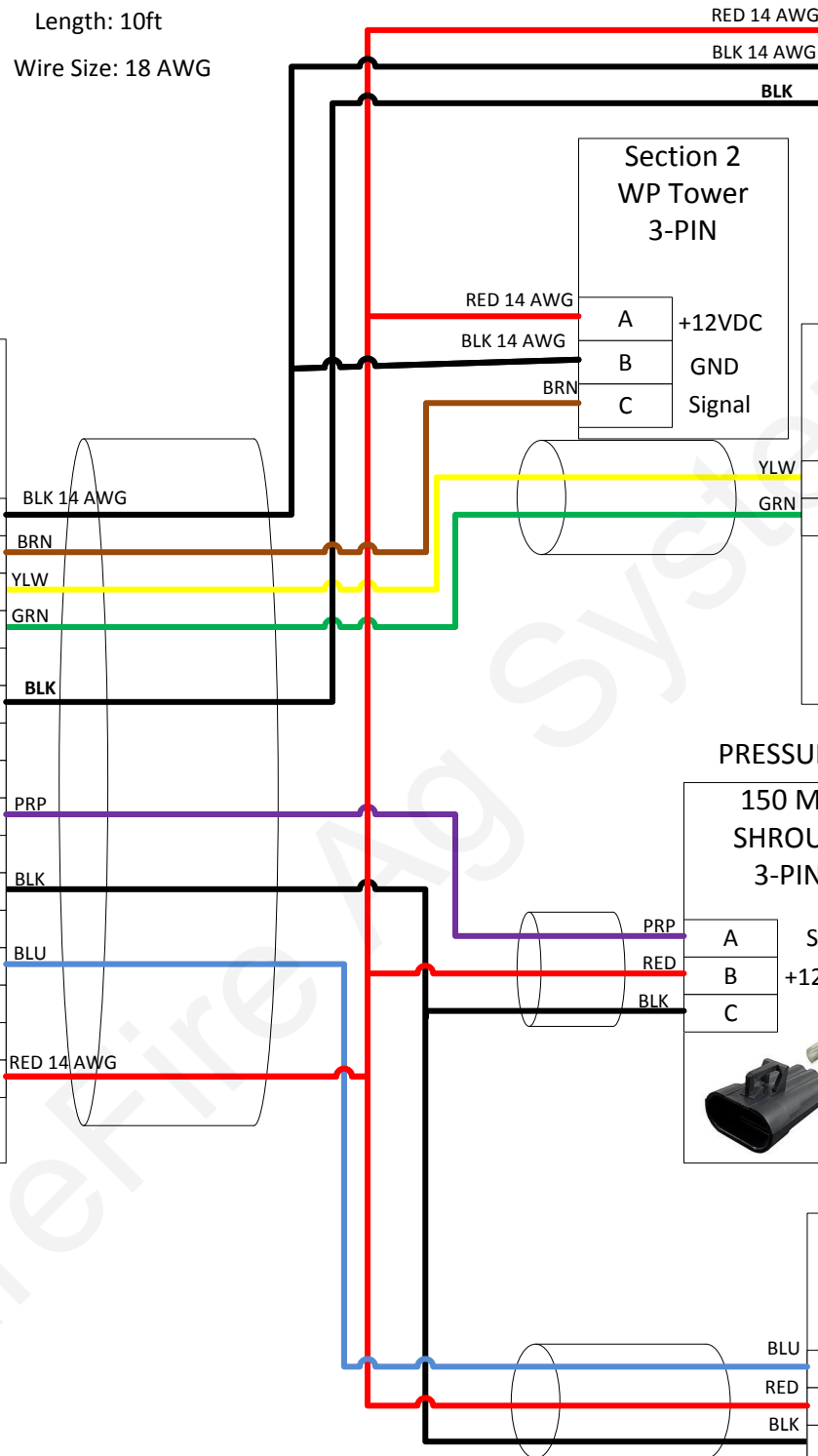


FLOW

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



| | | |
|--------------------|----|------------|
| Ground | 1 | BLK 14 AWG |
| Sect 2 | 2 | BRN |
| +12VDC | 3 | YLW |
| -12VDC | 4 | GRN |
| Sect 1 | 5 | |
| | 6 | BLK |
| | 7 | |
| Pressure Signal | 8 | |
| | 9 | PRP |
| | 10 | |
| Ground | 11 | BLK |
| Flow Signal | 12 | |
| | 13 | BLU |
| | 14 | |
| | 15 | |
| +12VDC | 16 | RED 14 AWG |



Project: 207-3057Y1 Tower Final harness w 2 sections

Drawn By:

Mark Wolters

Filename: PWM Pump Cable – Flowmeter, PWM & Pressure & 2 sections

Date:

07/30/2015

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Page of Pages

1 of 1

SureFire Catalyst Verdesian NS-N NH3 and Case Pro 700 AccuControl— Harness hookup

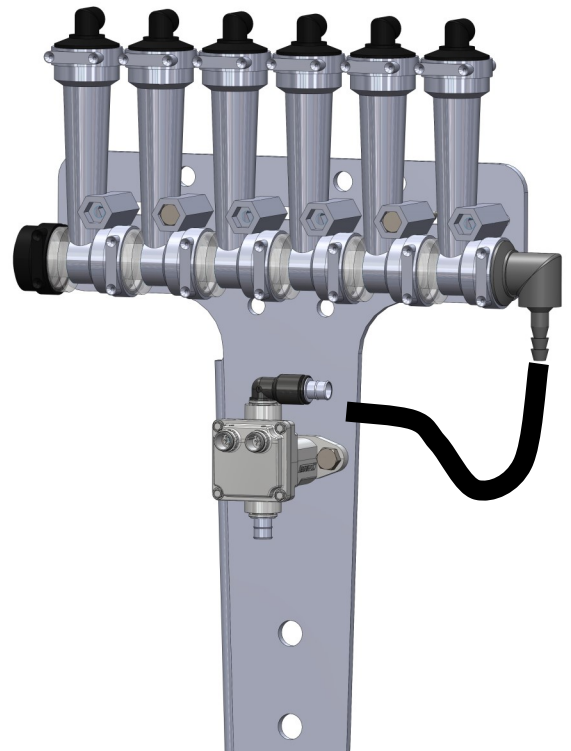


Harnesses for your particular system may vary from the list here. Not all of these harnesses will be used on all systems.

- 205-3118Y1 Anderson 40 Amp Fused Power Harness (connect to battery)
- 206-02-312_Y1 Anderson Extension Cable (to extend harness from battery to Tower)
- 206-03-1_ _ _ _ 3-pin Extension Cable (as needed)
- 206-16- _ _ _ _ 16-pin Extension Cable (as needed)
- 201-215464Y4 30-pin to 16-pin
Connects to 30-pin connector on Field-IQ module and 16-pin on 207-3057Y1.
- 207-3057Y1 Tower Final Harness to pump, flowmeter, EPD, etc...
- 201-3130Y1 480 MP Tower x Anderson Adapter Cable—Connect EPD to pump
- 201-215604 4' Y Adapter Cable—1 WP Shroud to 2 WP Tower
To connect Boom 1 connector to Left side and right side Zip valves
(On 1-section implement, all Zip Valves run from Boom 1 connector—this harness splits that harness to go the left side and to the right side of the implement)
- 201-3158Y1 Zip Valve WP Section Cable—Connect to Boom 1 or Y adapter from Boom 1 and then to Zip Valve (on 2-section implement could be Boom 2 to Zip Valve)
- 201-3161Y1 Zip Valve Termination Plug. Screw this onto open connectors on ZIP Valve.
- 201-3193Y1 Boom 1 WP connector to 2 Zip Valve MP12 connectors
- 201-3200Y1 to 3203Y1 Zip Valve to Zip Valve Connector cable (used if daisy-chaining Zip Valves)

Zip Valve Mounting

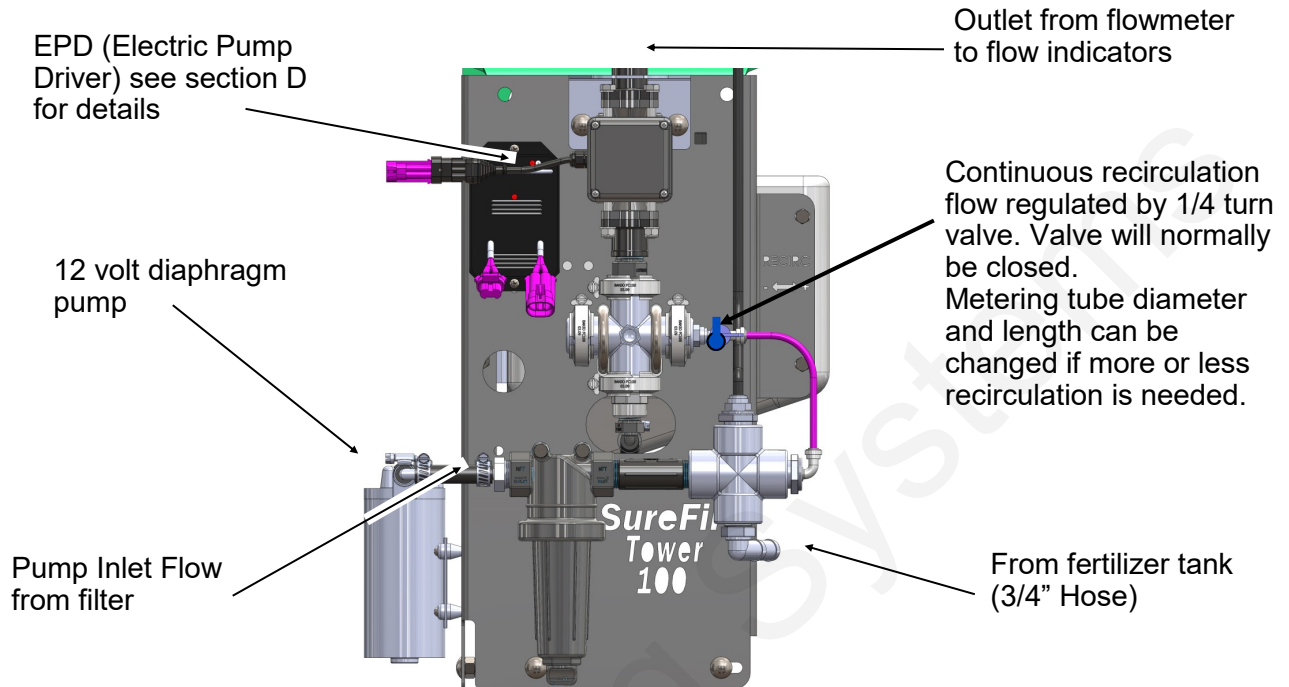
Picture at right shows ZIP Valve mounted on Flow Indicator Bracket.
Mount ZIP Valve to Flow Indicator Bracket with 1/4" bolts. Use washer and nylock nut.
Plumb flow from flowmeter into bottom of valve. From top of valve plumb to flow indicator with 3/8" hose.
Connect wiring harness to valve. Wiring harness connectors are keyed so they only fit on one of the connectors.



Tower 100 Plumbing Overview & Valve Operation

E

Installation
Overview

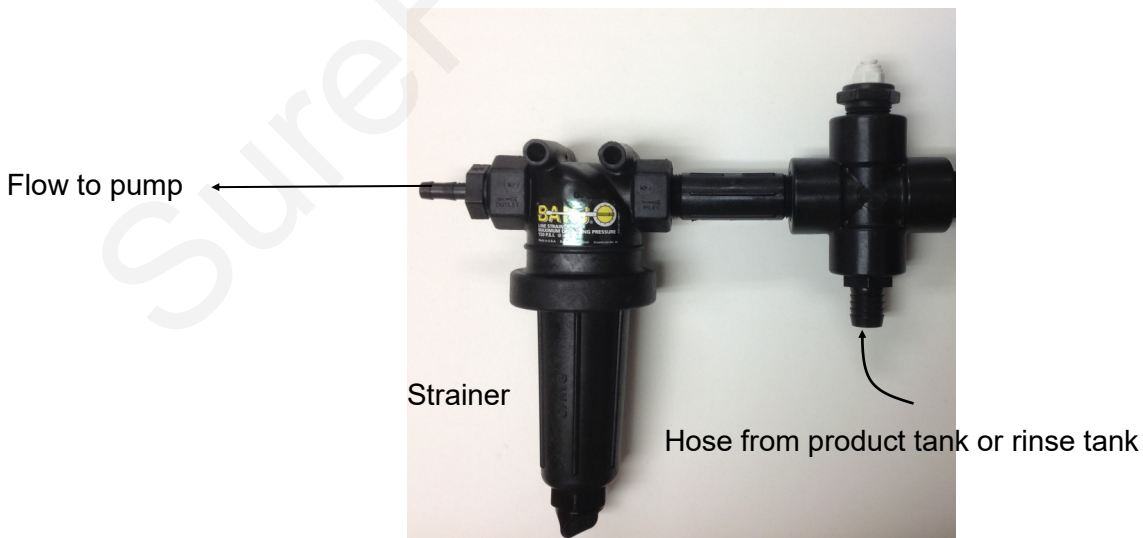
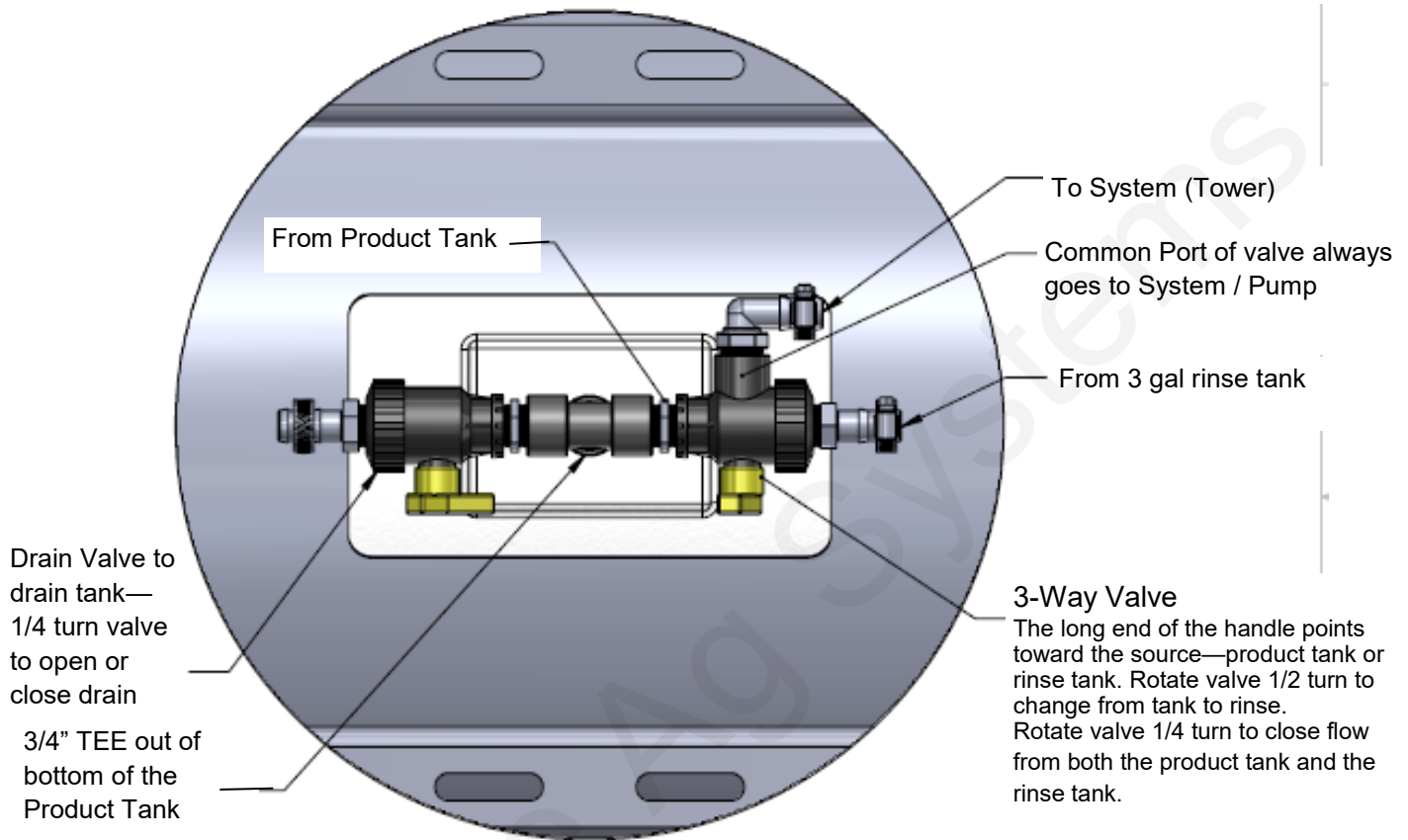


Do I need recirculation flow?

Recirculation flow allows the pump to run faster than if the total pump flow was applied to the ground. This may be helpful when operating at very low flow rates. This system will typically operate with the recirculation valve closed. The metering tube on the recirculation loop can be changed to allow for more or less recirculation. Too much recirculation can result in unstable flow reading on the display.

Tower 100 *Catalyst* Plumbing Detail

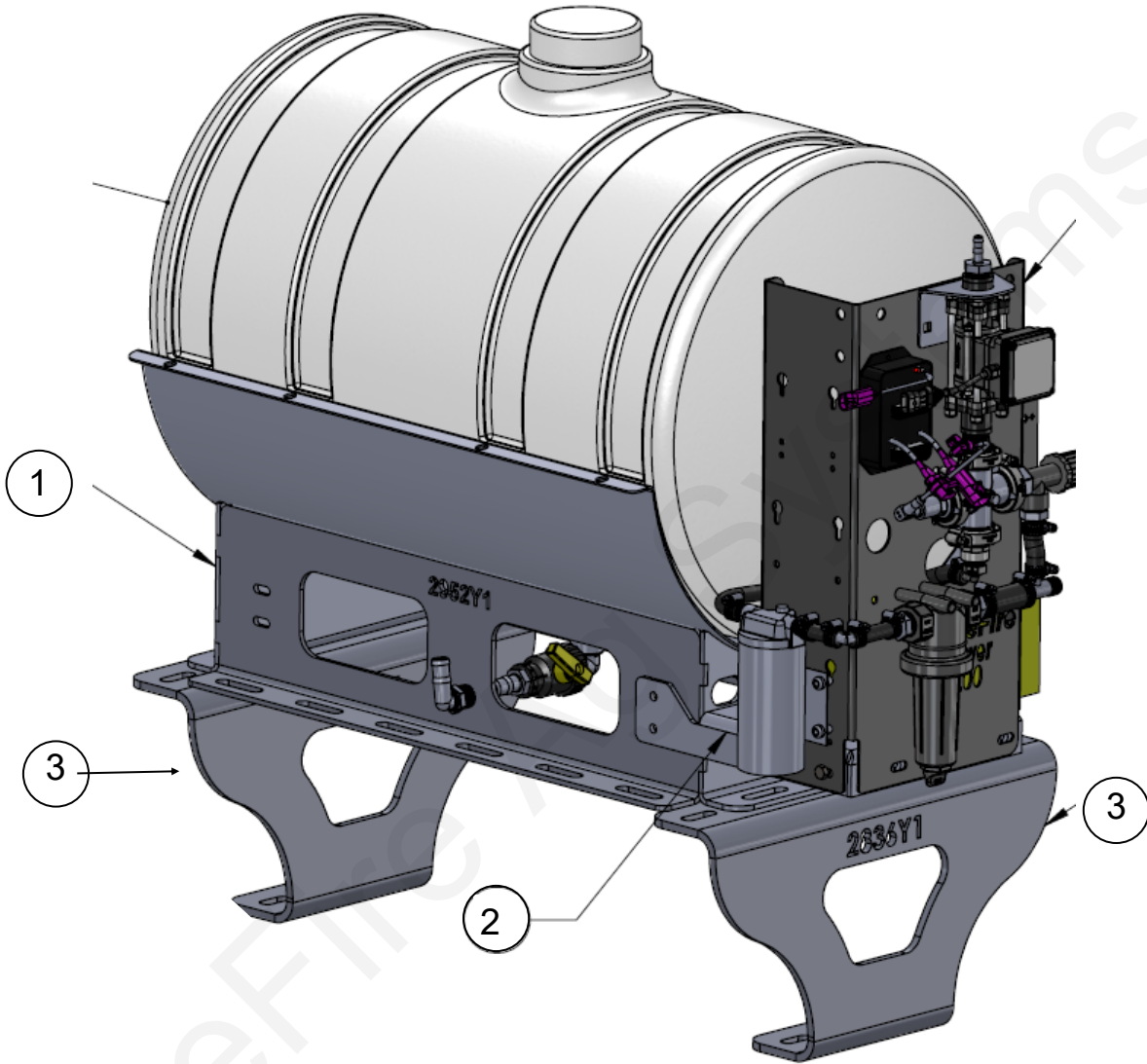
(Bottom of Product Tank)



Tower 100 Mounting Options



Various brackets and u-bolts are available to provide a way to mount the Tower 100 to almost any implement.
 Your SureFire configuration specialist will get your implement information at ordering time and make sure that all of the hardware needed for your system is included.

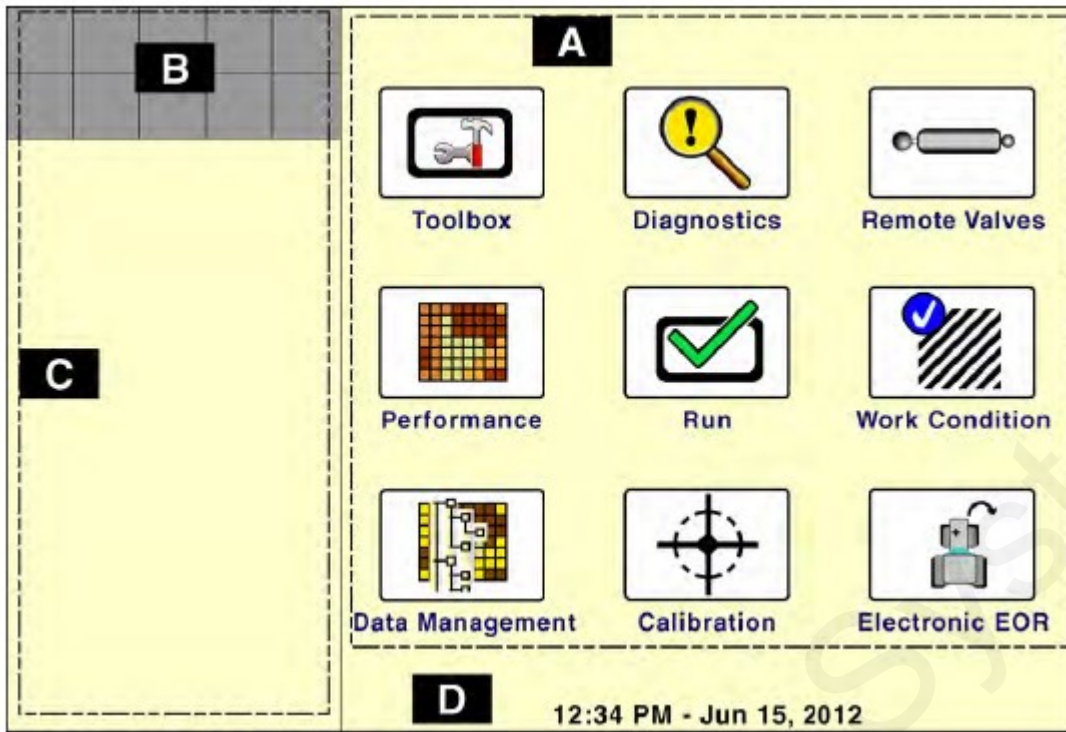


| ITEM NO. | Part Number | Description | QTY |
|----------|-------------|----------------------------|-----|
| 1 | 421-2952Y1 | 55 gal/24" DIA tank cradle | 1 |
| Or | 421-2956Y1 | 110 gal tank cradle | 1 |
| 2 | 420-2957Y1 | Tower 100 Mount Bracket | 1 |
| 3 | 420-2836Y1 | Tank Stand (12" tall) | 2 |
| Or | 420-2986Y1 | Tank Stand (6" tall) | 2 |

A variety of U-bolts are available to fit various sized bars.

Pro 700 Display Setup for AccuControl and SureFire Systems

General Pro 700 Operation



- A** Home Screen
- B** Status and Warning
- C** Left-hand Area—
 - Created by the vehicle
 - Is always displayed
 - Some parts may be configurable on the Layout screen
 - A window placed here has priority over the same window placed on a “Run” Screen
- D** Current time and date



Items in **Toolbox** will vary according to the products that are installed and activated. They could include:

| | | | | |
|----------|----------|-------------------|---------|---------|
| AccuCtrl | Activate | Contr | Display | GPS |
| Impl | Layout | Manual | Marks | NAV |
| Operator | Overlap | Precision Farming | Print | Product |
| TC | Vehicle | VT | | |



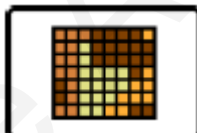
Items in **Work Condition** include:

| | | | | |
|------------------|-------------------|-----------------|------------------|---------------------|
| Layer Assignment | Valve Calibration | Operation Setup | Controller Setup | Product Calibration |
| Layer | Valve Cal | Operate | Control | Liquid Cal |

You must create or select a Work Condition to complete the setup for product application.



Items in **Run** include Run1 through Run6.



Items under the **Performance** icon could include:

| | | | |
|---------|------|------|----------|
| Profile | Sum1 | Sum2 | Rx Setup |
|---------|------|------|----------|



Items under the **Diagnostics** icon could include:

| | | | | | |
|---------|-----|-------|----------|-----|------|
| Version | CAN | Fault | Resource | GPS | GPS2 |
|---------|-----|-------|----------|-----|------|

Pro 700 AccuControl Setup for NH3 plus Liquid PWM Control



Your system may vary from the screens shown here. See the *AFS AccuControl Rate Controller Software Operating Guide* for additional information about configuring your system. The setup may not always happen in the order shown here. (There should be green checkmarks when things are set up correctly. Red X's indicate a problem.)

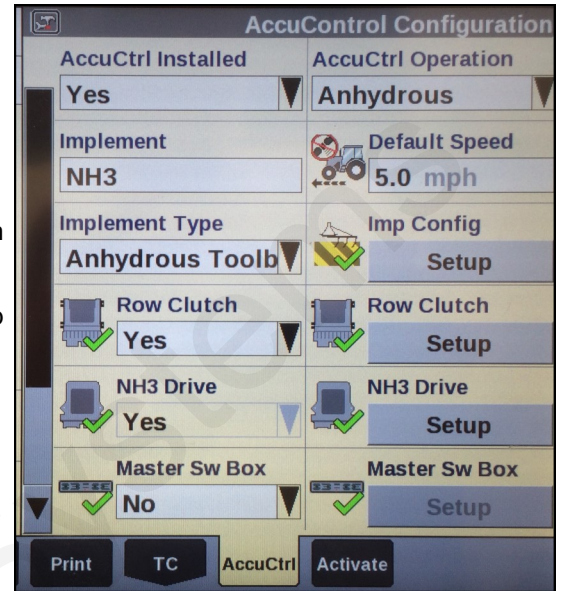
Running NH3 with AccuControl on this setup also?

If you are running NH3 with AccuControl on this setup, your **AccuControl Configuration** will probably be set up as an **Anhydrous** operation with an **Anhydrous Toolbar**.

In that case, the Catalyst system for the NutriSphere N- NH3 will be set up as the second product in the **AccuControl Configuration**.

Scroll down for 2nd product

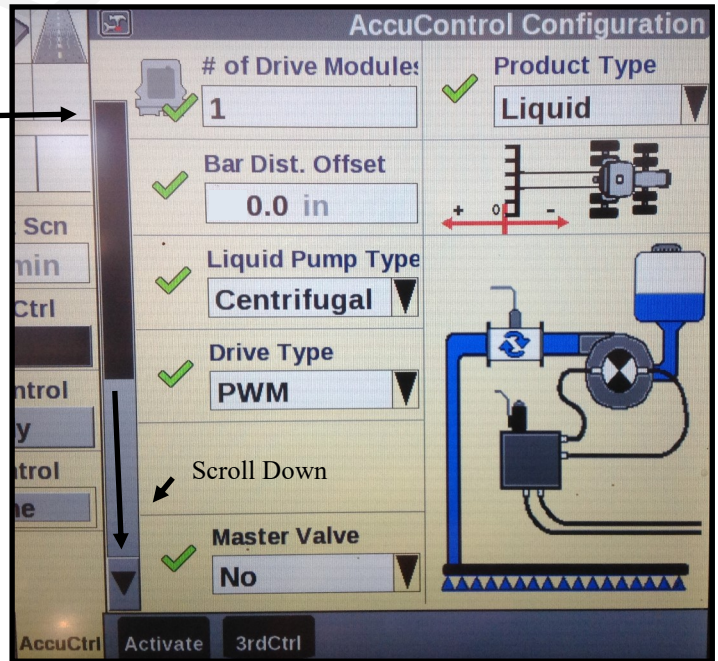
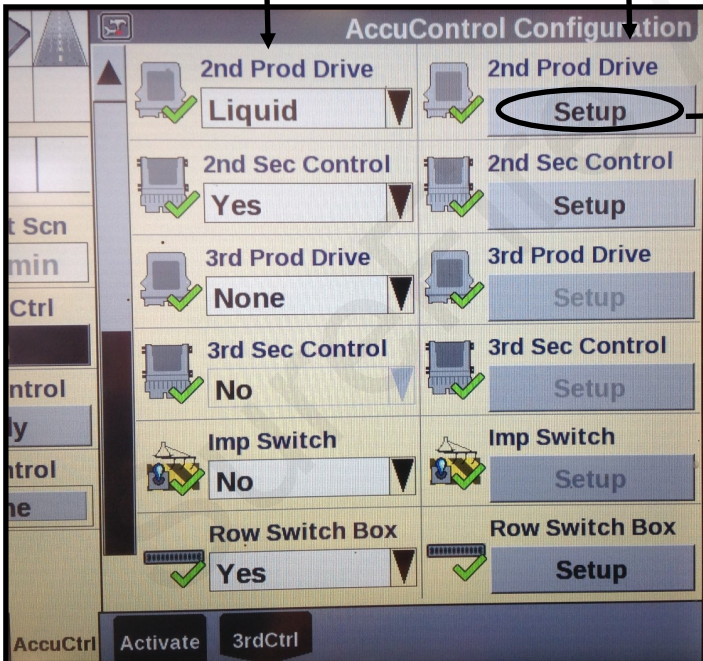
Be sure you have the serial numbers of the Field-IQ modules so that you select the correct module for the NH3 and for the NutriSphere.



2nd Prod Drive > Liquid

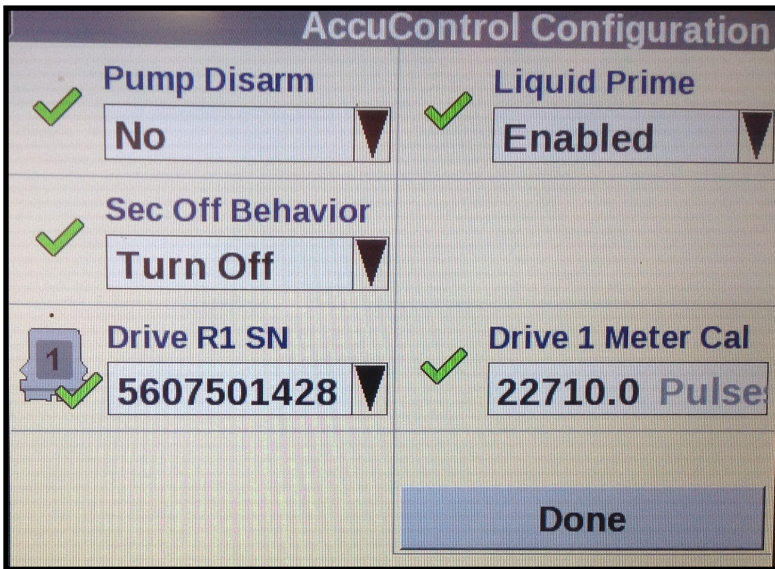
2nd Prod Drive > Setup

Fill in as shown below, then scroll down for page 2



Pro 700 AccuControl Setup for NH3 plus Liquid PWM Control

Page 2 of 2nd Prod Drive Setup

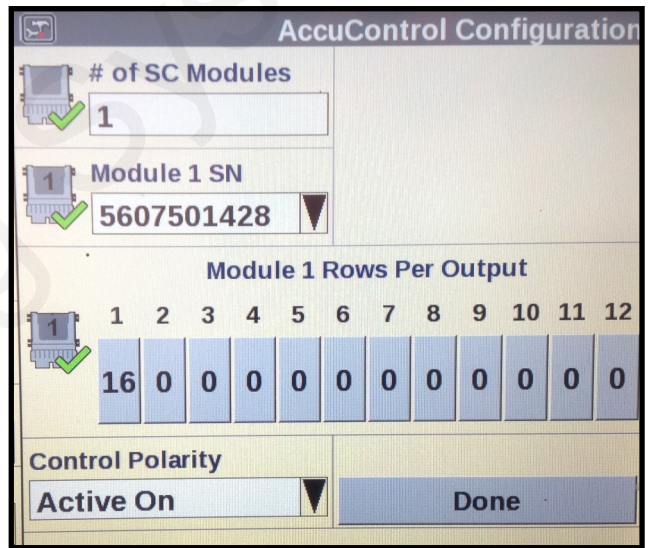
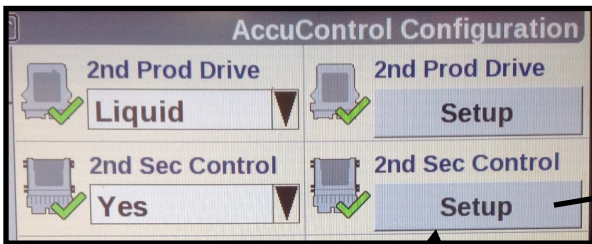


Set up page as shown.

Be sure the Drive R1 SN is for the module that is connected to the NutriSphere NH3 liquid.

Flowmeter cal for SureFire 0.8 to 1.6 GPM flowmeter is 22710 pul/gal.

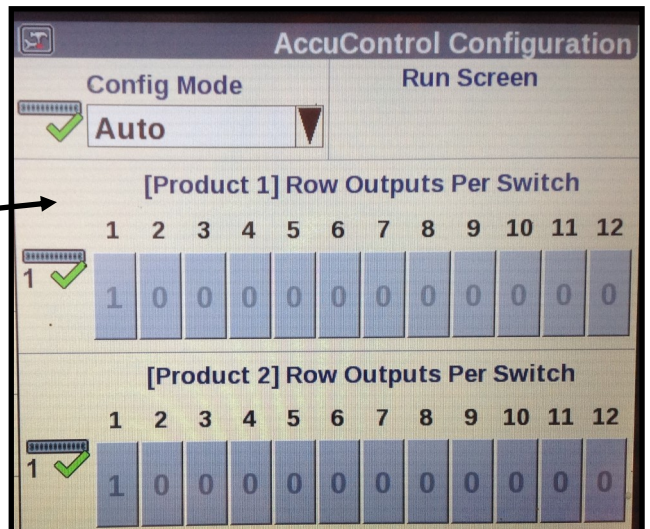
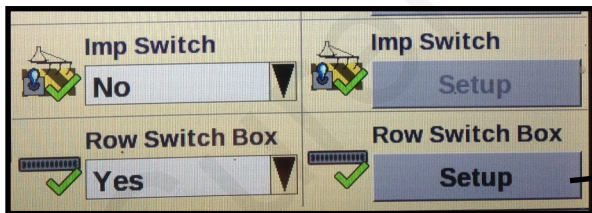
Press Done



Press **2nd Sec Control > Setup**

Select the **Module 1 SN** for the module that is connected to the NutriSphere NH3 liquid. If the liquid is being applied so that the entire bar is either ON or OFF, put the full number of rows in Box 1. If the liquid is being applied in 2 sections (a 24-row bar split into 2 sections) put half of the rows in Box 1 and half in Box 2.

Control Polarity > Active On > Done



Imp Switch > Optional > Set up if using an Implement Switch

Row Switch Box > Yes (this puts a switch on your Run Screen)

Config Mode > Auto (if implement is single section, there will be a "1" in Box 1.)

Valve Calibration setup information continues on page 32.



Pro 700 AccuControl Setup for Liquid PWM Control

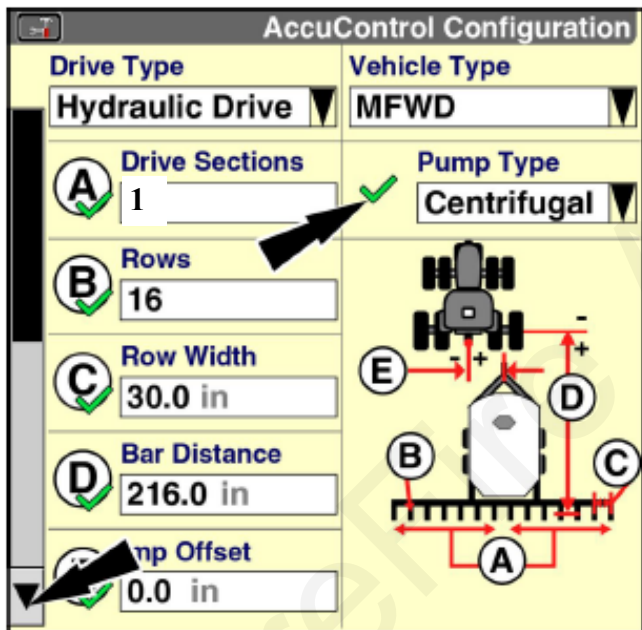
(Use these screens if the liquid is the only product controlled by AccuControl)

Your system may vary from the screens shown here. See the *AFS AccuControl Rate Controller Software Operating Guide* for additional information about configuring your system. The setup may not always happen in the order shown here. (There should be green checkmarks when things are set up correctly. Red X's indicate a problem.)



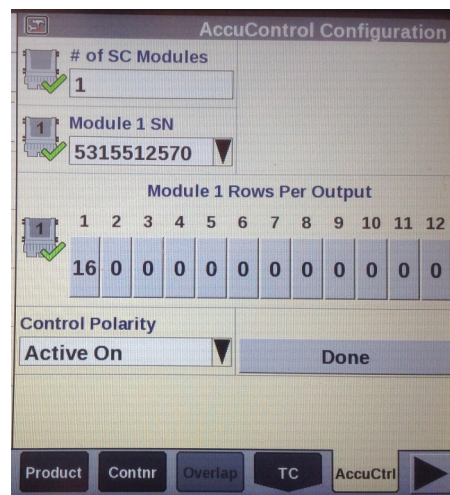
correctly. Red X's indicate a problem.)

1. Create an Operator (**Toolbox > Oper**)
2. Check GPS Status (**Toolbox > GPS**)
3. Create Implement (**Toolbox > Impl**)
4. Set up Product (**Toolbox > Product**)
5. Set up Container (Optional) (**Toolbox > Container**)
6. Basic Setup (**Toolbox > AccuCtrl**) (If NutriSphere is first product to be set up)
 - A. Select AccuCtrl Operation (Liquid)
 - B. Select AccuCtrl Installed (Yes)
 - C. Select Implement Type (Liquid Toolbar)



7. Implement Configuration (**Toolbox > AccuCtrl > Imp Config**)
 - A. Press 'Setup'
 - B. Select Drive Type (will be Hydraulic Drive)
 - C. Select Vehicle Type
 - D. Set Number of Drive Sections (A) **Always = 1**
 - E. Pump Type will be set at Centrifugal
 - F. Set Total Number of Rows (B)
 - G. Enter Row Width (C)
 - H. Enter Bar Distance in Inches (axle to knife) (D)
 - I. Measure Implement Right/Left Offset
 - J. Scroll down to Enter Rows per Drive Section (same as Total Number of Rows)
 - K. Press 'Done'

8. Section Control Setup **Toolbox > AccuControl > Section Control**
 - A. Select Section Control (Yes)
 - B. Press 'Setup'
 - C. Assign Module Serial Numbers
 - D. Assign Rows per Output (number of rows per Section)
 - E. Select Control Polarity (Active On)
 - F. Select 'Done'
9. Overlap/ Boundary Control (**Toolbox > Overlap**)
 - A. Turn Overlap Control and Boundary Control ON.
 - B. Adjust values as desired.



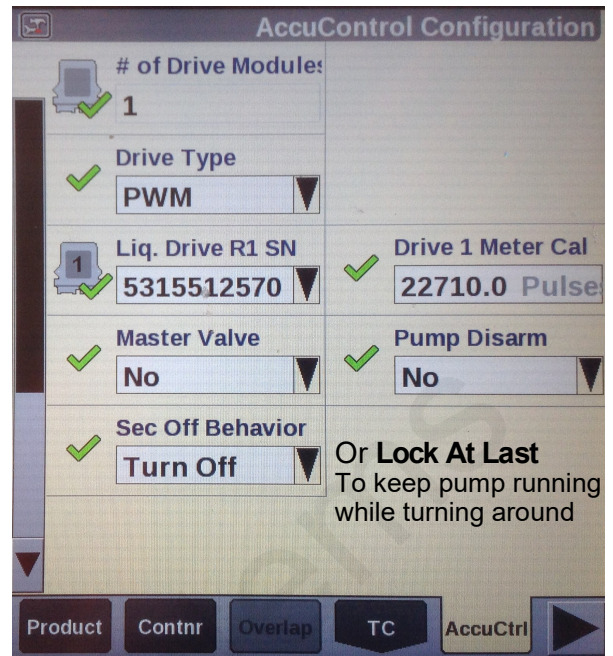
AccuControl Setup for Liquid

10. Liquid Drive Setup *Toolbox > AccuControl > Liquid Drive*

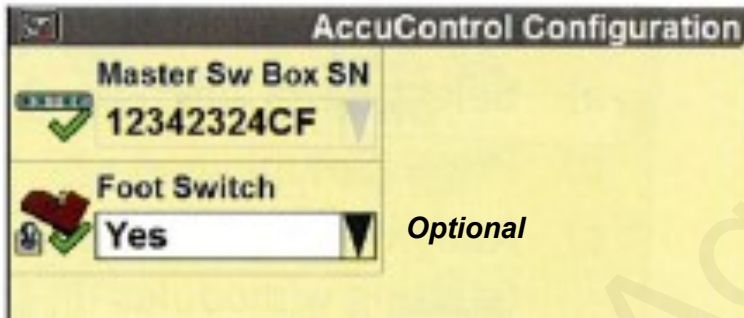
- A. Select Liquid Drive (Yes)
- B. Press 'Setup'
- C. Assign Liquid Drive Serial Numbers
- D. Select Drive Type (**PWM**)
- E. Select Master Valve Type (**NO**)
- F. Select Pump Disarm (**No**)
- G. Select Sec Off Behavior (**Turn Off or Lock at Last**)

(Turn off the pump at the end of the field or keep it running at the same speed for a quicker return to Target Rate.)

- H. Enter Drive Meter Cal Number (**22710** pulses/gal)
- I. Press 'Done'



Optional Master Switch Box and Foot Switch

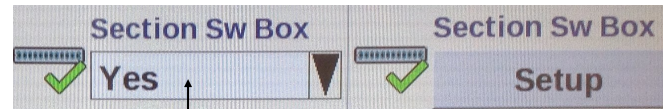
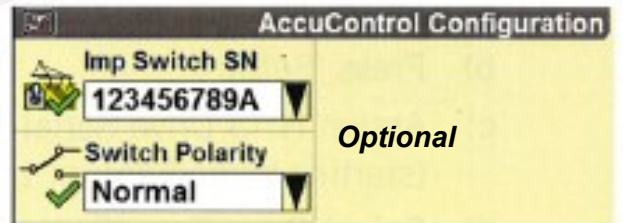


11. Master Switch Box (If equipped with External Switch Box)

- A. Select Master Sw Box (Yes or No)
- B. Press 'Setup'
- C. Verify Serial Number
- D. Select Foot Switch (if installed)
- E. Press 'Done'

12. Implement Switch (if installed)

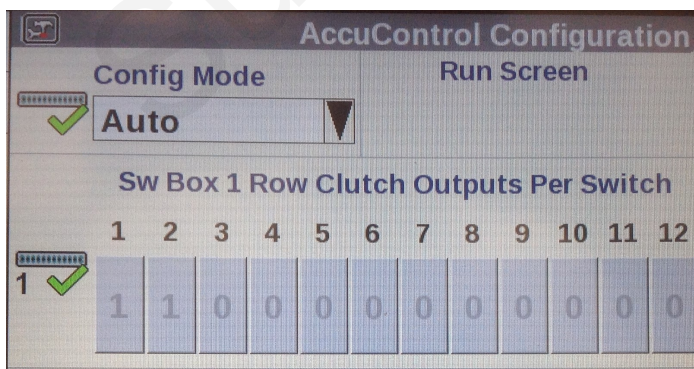
- A. Select Imp Switch (Yes)
- B. Press 'Setup'
- C. Select Imp Switch Serial Number
- D. Select Switch Polarity (Determine this by raising and lowering the implement and watch the Implement Status Arrow in Status/Warning Area for proper operation.)
- E. Press 'Done'



13. Section Switch Box (If system is equipped with External Section Switch Box or desire Manual Valve Section Control through Run Screens).

- A. Select Section Switch Box (Yes)
- B. Press 'Setup'
- C. Select Config Mode (Auto) *(picture shows setup for 2 sections)*
- D. Verify Sw Box Serial Number (if equipped)

If no external switchbox is installed, User Defined Windows can be assigned to a Run Screen (Toolbox>Layout).



Create A Layout (sample)

Go to **Toolbox>Layout**

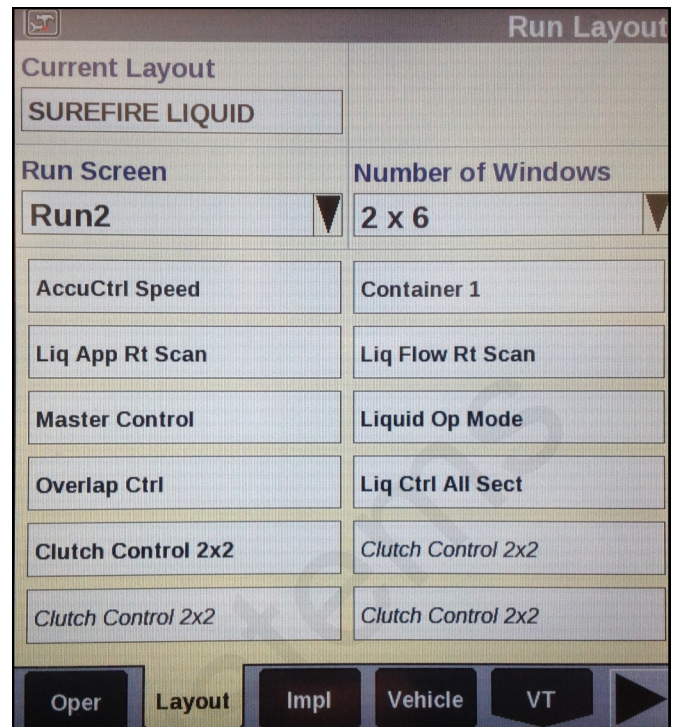
Select Current Layout and then select New.

Name the Layout. Under Run Screen select a screen.

In the white boxes consider adding the following items

to a **Run Screen**:

- AccuControl Speed
- Master Control
- Liquid Op Mode
- Liquid Control
- Liq App Rate Scan Container
- Liq Flow Rt Scan
- Section Control
- Overlap Ctrl Overlap Control
- Clutch Control



The Run Screen Layout is largely a matter of operator preference. Some of these items may be added to the Left Hand Area if space is available there, or more than one Run Screen can be set up.

Valve Calibration

Work Condition > Valve Cal > Advanced Valve Calibration

The electric pump systems typically run well with the following default settings. Try the following default values as a starting point and make adjustments as needed for your system.

See the pictures on the following pages for other values.

| | Integral Gain | Breakout | DeadZone | Integrator Upper Limit | Integrator Lower Limit | Comparator Limit |
|----------|---------------|----------|----------|------------------------|------------------------|------------------|
| Electric | 0.2 | 3 | 2-3 | 100 | -100 | 100 |

If the system appears to adjust too slowly to rate or speed changes, increase the Integral Gain in increments of 0.1. If necessary, go in increments of 0.05. If the Integral Gain is too high, the system will be unstable and will go back and forth below and above the Target Rate.

Additional Tips for Getting Started

1. Set the **Flow Error Timeout at 30—45 seconds** until you get the system adjusted and operating correctly. The default is 5 seconds. This may result in the application being shut down before you have a chance to see how it is operating. After the system is operating correctly, this can be set lower to give you a quicker warning if something is wrong. (**Work Condition > Valve Cal > Advanced Calibration > Scroll down to 2nd page and Flow Error Timeout**)

2. Set the **Fault Speed to Slow or Off** until you get the system adjusted and operating correctly. The default is Normal. (**Work Condition > Operate > Fault Speed**) After the system is operating correctly, this can be set back to Normal. You can run this at Slow if the system gives too many Fault Warnings at Normal.

Pro 700 & AccuControl Operation for Liquid Application

To start applying product (these are not necessarily all the setup you will need)

Go to **Toolbox>AccuCtrl>Default Speed**

Enter a default speed. The applicator will default to this speed if all ground speed sources are lost.

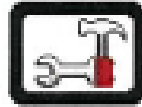
The **Master Apply** button may need to be cycled twice to start the application.

1. Preparation

- A. Insert a data card in the display.
- B. Create or Select a Grower/Farm/Field/Task & Crop Type (Performance > Profile)

2. Product Setup: **Toolbox > Product**

- A. Name the product (NutriSphere N NH3)
- B. Select the form for the product (Liquid)
- C. Select Usage (Fertilizer)
- D. Enter Default Application Rate
- E. Enter Minimum and Maximum Application Rate.



| Product Setup | |
|-----------------------------------|-----------------------------|
| Product Name NutriSphere N NH3 | Form Liquid |
| Usage Fertilizer | |
| Default App Rate 32.0 oz/ac | Delta App Rate 4.0 oz/ac |
| Min App Rate 0.0 oz/ac | Max App Rate 64.0 oz/ac |

3. Product Layer Assignment: **Work Condition > Layer** to assign a product to a control section of the applicator

- A. Select or Create a Work Condition.
- B. Select Layer 1 Control Type (AccuControl Liquid)
- C. Select Product for Layer 1 Control
- D. Select Container if using the Container
- E. Assign additional layers as needed.



| Layer Assignment | |
|--------------------------------|-----------------------|
| Work Condition Verdesian | |
| Layer 1 AccuControl Liquid | |
| Product 1 NutriSphere N NH3 | Container 1 55 GAL |

4. Controller Setup—Liquid: **Work Condition > Control**

- A. Verify Implement
- B. Verify Work Condition
- C. Select Controller—Liquid
- D. Default Rate set as 32 oz/acre in Product Setup will show up as 0.25 gal/ac here
- E. Product Delay—set at 2.0 sec. Adjust as needed in the field.
- F. Enter the Minimum Speed (if the speed drops below this, the applicator will keep applying at this speed)
- G. Enter a value for Off-target Alarm Limit (probably 15-20%)

| AccuControl Controller Setup | |
|-------------------------------|-----------------------------|
| Implement NutriSphere | Work Condition Verdesian |
| Controller Liquid | |
| ✓ Default Rate 0.25 gal/ac | ✓ Alarm Limit 10 % |
| ✓ Delta Rate 0.03 gal/ac | |
| ✓ Product Delay 2.0 sec | |
| ✓ Minimum Speed 0.0 mph | |

5. Enable Application: Run Screens

- A. Liquid Op Mode—Select Liquid
- B. Read the safety message and press Accept.
- C. Master Control—Press Apply on display or switch on Master Switch on switchbox (if equipped)

Liquid Op Mode

Liquid

Master Control

Apply

6. Liquid Rate Control

- A. Liquid Control defaulted to ON
- B. Increase or decrease rate if needed
- C. Automatic rate control (prescription) is assigned in **Performance > Rx Setup**.

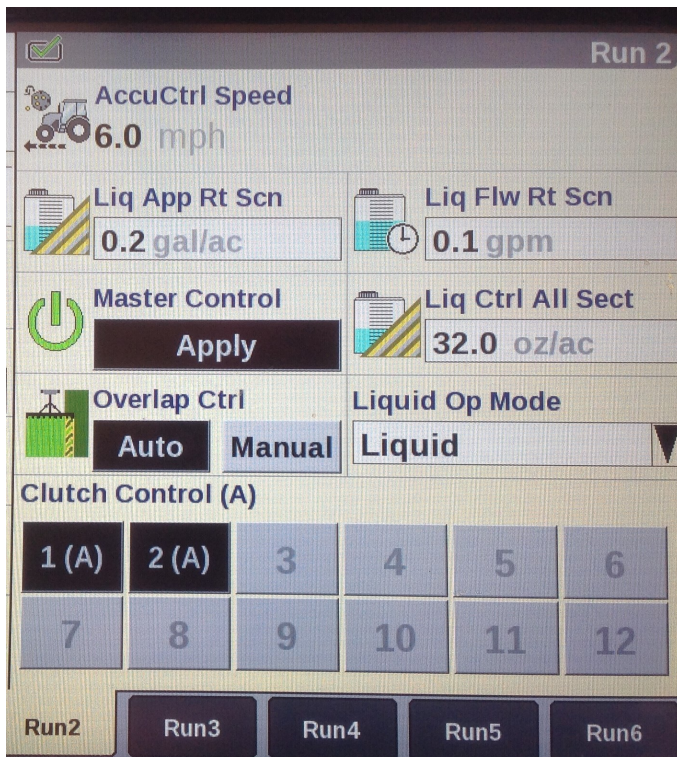
Liq Ctrl

32.0

Reset

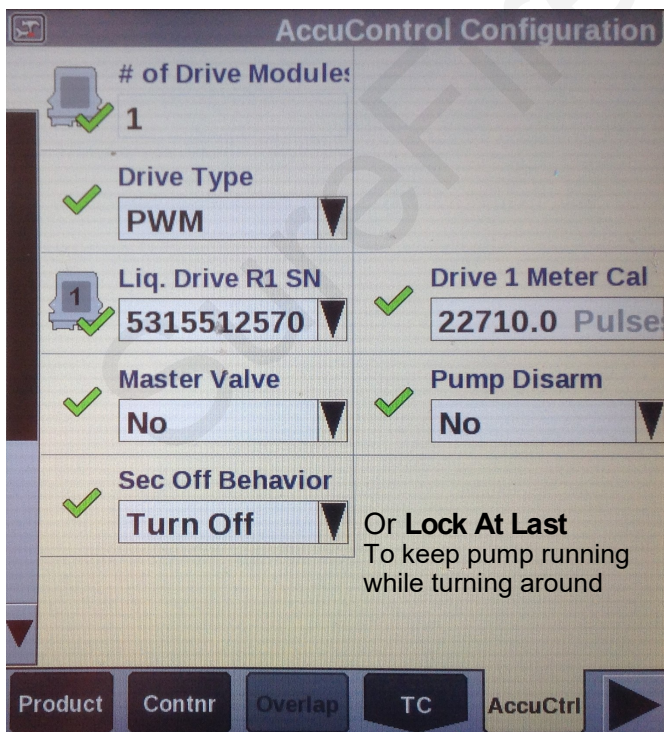
On

Possible Run Screen Layout for system with 2 sections

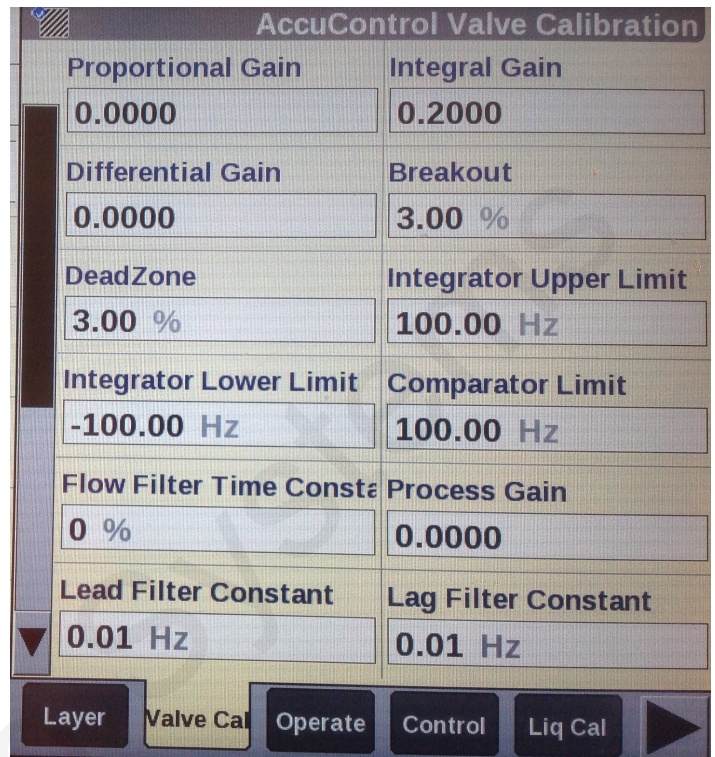


To use default AccuCtrl speed, turn Radar off.
Toolbox > Vehicle > Radar Installed > NO

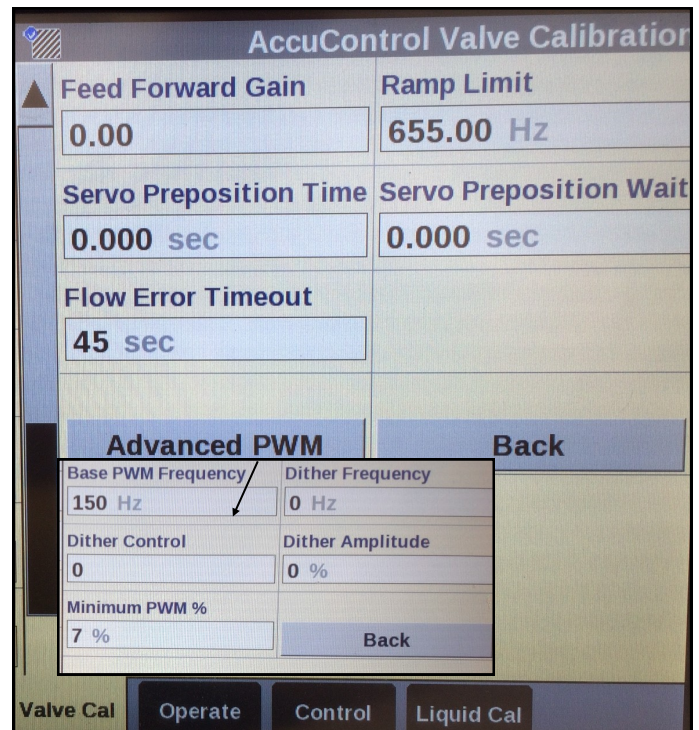
Screen showing AccuControl Liquid Drive Setup
Toolbox > AccuCtrl > Liquid Drive Setup



Start with these Valve Cal settings Work Condition > Valve Cal > Advanced Calibration



Screen showing Flow Error Timeout set to 45 sec
Work Condition > Valve Cal > Advanced Calibration > Scroll down to 2nd page and (Flow Error Timeout)



Frequently Asked Questions (FAQ), Operating Tips, and Troubleshooting Tips for SureFire Catalyst System with Pro 700 AccuControl

1. Which metering tube should I use?

For most application scenarios using NutriSphere N NH₃ with a rate of 32 oz/acre on 30" rows, the purple tube will be used. The normal pressure operating range is from 10 to 40 PSI. The system will operate up to 55 PSI with no problems on this low-volume application. As long as the target rate is met, the pressure does not matter much. If the pressure continually runs high (such as in cold weather or at high speeds) consider switching to a larger diameter tube. If the system is being used on narrower rows or at lower rates, it may be necessary to use a smaller diameter tube.

2. I'm trying to apply 32 oz/acre. My Target Rate is set at 32 oz/acre. On my Run Screen the Liq App Rate Scan only shows gal/ac and the Liq Flow Rt Scan shows gpm. How do I know if I'm hitting my rate?

The Pro 700 only shows gallons on the Liq App Rt Scan and the Liq Flow Rt Scan, and it only shows these to 1 decimal place.

32 oz/acre is 0.25 gal/ac. The Liq App Rt Scan should move back and forth between 0.2 and 0.3 gal/ac if it is applying 0.25 gal/ac.

At 32 oz/acre on a 40' implement, the pump output will be 0.1 gpm at 5 mph and 0.2 gpm at 10 mph.

The ultimate verification of proper application is if the actual output in a field matches what should have been applied for the number of acres covered. At 32 oz/acre (0.25 gal/ac), 100 acres would take 25 gallons.

A catch test can be conducted to verify proper setup and operation. The Pro 700 has a Liquid Calibration sequence (Work Condition > Liq Cal). If doing the AccuControl Liquid Calibration be sure to catch enough output to get a good measurement. At 32 oz/acre, each row is only putting out about 1 oz/min. It would be best to catch the total pump output for several minutes to get a large enough sample volume. The SureFire electromagnetic flowmeter typically measures very accurately. Small adjustments, if any, to the Meter Cal Value are usually sufficient.

(Optional workaround to have the Pro 700 show Liq App Rate Scan and Liq Flow Rt Scan in ounces instead of gallons:

Set the Flowmeter Cal Value at 177.4 (22710 / 128). It will say 177.4 pulses/gal, but it is actually 177.4 pulses/ounce. The flowmeter will think it is counting gallons, but it is actually counting ounces. Set the Rate at 32 gal/ac. The Liq App Rate Scan and Liq Flow Rate Scan will now show the number of ounces per acre and ounces per minute (but the controller will say and will think it is measuring gallons per acre and gallons per minute). With this setting, the Liq App Rate Scan will jump around some. It should be close to 32, but this will move because of the instantaneous nature of the calculations and the unavoidable momentary variations as the implement goes across the field.

3. Can I use the Pro 700 Valve Calibration procedure to set up my system?

Yes (maybe). Work Condition > Valve Cal has a Valve Calibration procedure. On the Pro 700, this may or not may not give values for the various valve calibration parameters that will work. This manual has values that have worked on a number of systems. There is no harm in trying the Valve Cal procedure but it may not always provide a workable setup. Make sure the system is primed and ready for operation before running the Valve Calibration.

Frequently Asked Questions (FAQ), Operating Tips, and Troubleshooting Tips for SureFire Catalyst System with Pro 700 AccuControl

4. I keep getting an Error Message and my system stops.

For initial setup and during troubleshooting, set the Flow Error Timeout (Work Condition > Valve Cal > scroll to 2nd page) to 45 seconds. This should let the system run long enough to troubleshoot the problem. Also, set the Fault Speed (Work Condition > Operate) to Slow or Off.

Some of the Pro 700 error messages are not specific enough to be very helpful. Consider each item listed in the message to try to pinpoint the problem.

5. Which ball should I use in the flow indicator?

The green ball will give a good indication for most application scenarios below 8 mph. In cold weather when the product is thicker, the heavier red ball may do better. Basically, if the green ball works, use it. If you want a heavier ball, use the red one. At the low flow rates of this system, using a heavier ball or using both balls has, at times, created some instability in the flow.

6. The balls in my flow indicators are not at the same level.

While giving a good indication of the flow to each row, the balls are not an absolute indicator of exact flow. Repeated catch tests have shown very little row-to-row variation with this system. Uneven balls may be an indication of variation in flow, but only a careful catch test can verify this. Check the plumbing on rows that appear out of line. Switch the tube that is coming out of one flow indicator with another tube and see if the other flow indicator shows the same thing.

7. When I tested the system with water, I couldn't build any pressure.

The metering tubes are designed to work with the NutriSphere N-NH₃ product, which has a much higher viscosity than water. When testing the system with water it will be necessary to run a much higher rate to build more pressure. At low rates and low pressure, the check valves may not all open or there may be uneven row-to-row flow.

8. What software/firmware versions should I be running?

The latest. Check with your Case dealer to see what the current versions are. It is necessary to update the display software, the AccuControl software, and the Field-IQ firmware, along with any other features you are using. Out of date or mismatched software/firmware versions can cause system operating problems.

9. My system surges above rate and then below rate.

Check the Integral Gain in the Advanced Valve Calibration page (Work Condition > Valve Cal > Advanced Calibration). Too high of an Integral Gain will cause the system to surge above and below the rate (like oversteering). Too low of a DeadZone setting can cause some of this also. If the DeadZone is set at 3%, the controller will not make any adjustments to the pump speed if the Applied Rate is within 3% of the Target Rate. On a 32 oz/acre, this would be ± 1 oz. If this is set too low, the controller attempts to adjust to every slight deviation from the Target Rate. This can actually lead to oscillating back and forth across the Target Rate.

Frequently Asked Questions (FAQ), Operating Tips, and Troubleshooting Tips for SureFire Catalyst System with Pro 700 AccuControl

10. Where can I get more information on operating the Pro 700 with AccuControl?

See the Case IH AFS AFS Pro 700 AccuControl Rate Controller Software Guide and the AFS Pro 700 Display Software Operating Guide or the Quick Reference Cards for these (available on the web or from your Case IH dealer).

11. What can cause problems for my system?

Air. Check and double check all connections and fittings from the tank to the row. A loose connection between the tank and the pump may not always leak, but it can allow air to be sucked into the system. Air in the system can make the flowmeter read erratically which can start a cycle of increasing instability. Check all QuickConnect fittings to be sure all tubes are pushed all the way to the stop. Tubes that are not seated all the way in QuickConnect fittings may not always leak, but they can be a place where air can enter the system. Air in the system is bad. Be sure the strainer is airtight.

To help purge air from the system, set the pump to a higher rate. Open and close the air bleed valve. Open and close the recirculation valve. Tap on the flow indicators and manual check valves while the system is running.

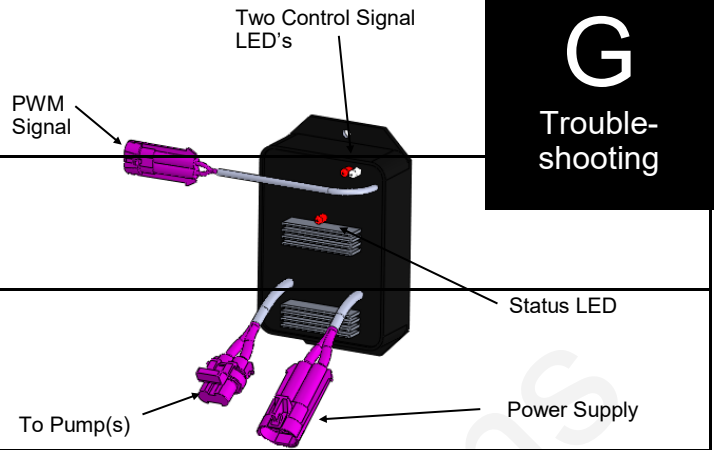
12. How much product am I pumping and how much am I applying to each row at any given time?

| Flow Information at 32 oz/acre rate and 30" row spacing | | | | | | | | | |
|---|----------------|--------------------------------|------------|------------|------------|------------|------------|------------|------------|
| Pump Output (gal/min and oz/min) | | | | | | | | | |
| MPH | Oz/min/ row | 20' GPM | 20' OPM | 30' GPM | 30' OPM | 40' GPM | 40' OPM | 60' GPM | 60' OPM |
| 4 | .65 | .04 | 5.2 | .06 | 7.8 | .08 | 10.4 | .12 | 15.6 |
| 5 | .81 | .05 | 6.5 | .08 | 9.7 | .10 | 13 | .15 | 19.4 |
| 6 | .97 | .06 | 7.8 | .09 | 11.6 | .12 | 15.5 | .18 | 23.2 |
| 7 | 1.13 | .07 | 9.0 | .11 | 13.6 | .14 | 18.1 | .21 | 27.2 |
| 8 | 1.29 | .08 | 10.3 | .12 | 15.5 | .16 | 20.6 | .24 | 31.0 |
| 9 | 1.45 | .09 | 11.6 | .14 | 17.4 | .18 | 23.2 | .27 | 34.8 |
| 10 | 1.62 | .10 | 13.0 | .15 | 19.4 | .20 | 25.9 | .30 | 38.8 |
| | | Below flowmeter rated range | | | | | | | |

Note: 20' width at less than 7 mph is below flowmeter rated range. 30' width below 5 mph is below flowmeter range.

Electric Pump Won't Run

EPD Status Lights



G

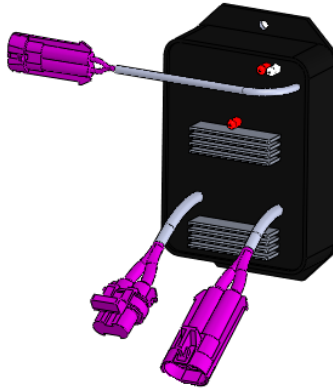
Troubleshooting

| Status LED | Status Description | Troubleshooting Steps |
|--|---|---|
| On Steady | Power input is good and PWM input Signal is detected | No Problem, Typical operating condition. |
| Steady Blink | Power input is good and PWM signal is not detected | Typical 'Off' Condition. If pumps should be on: <ol style="list-style-type: none"> 1. Inspect wiring and connectors 2. Check voltage at PWM connector to EPD, should be 1-12 volts to turn on. 3. Check voltage at Field-IQ module, between pins E1 and E2 of the 30-pin connector. |
| Blink once, pause, blink once, pause | Open circuit between motor output and motor. | Check harness and connectors to motor. If using two motors, plug each in separately directly to EPD (bypassing Y-harness) |
| Blink twice, pause, blink twice, pause | Output short circuit detected. | <ul style="list-style-type: none"> • Check motor wiring |
| Three blinks, pause, three blinks, pause | Overcurrent condition | <ul style="list-style-type: none"> • Check total load • Clean cooling fins on EPD |
| Four blinks, pause, four blinks, pause | Input power fault. Low voltage condition in power to EPD. | <ul style="list-style-type: none"> • Unplug battery power from EPD to reset. Check power cables and connections for quality. Be certain that the power cable to the EPD connects directly to the battery and has a solid clean connection. |
| Five blinks, pause | Input frequency out of range. | Check PWM Settings on Rate Controller. |
| Control Signal LEDs | | |
| Light intensity varies | Off - No PWM Signal 100% brightness - Maximum PWM input signal | |

Electric pump will not turn on

G

Trouble-
shooting



EPD flashing 4 times

1. Find the EPD (electric pump driver) shown above. Should have a steady blinking light in the middle when pump should be off. If Status LED is flashing 4 times, then pausing, EPD has tripped due to low voltage condition. Unplug the Power Supply to the EPD to reset. If condition persists, check Power Supply cables to EPD to insure solid connections and good electrical path.

No Lights on EPD

1. There should be a steady blinking light in the middle of the EPD. If no light is ON, check the 40-amp fuse in the EPD harness near the battery. Use a voltmeter to verify that there is 12-13 volts at the Power Supply connector that plugs into the EPD.

Will pump run?

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

See the next 2 pages on additional ways to troubleshoot and diagnose pump issues.

No Flow shown on display but liquid is being pumped

1. Unplug flowmeter. With voltmeter, check for 12 volts between pins B&C of flowmeter connector (on main harness PN 3057Y1). If 12 volts not present, inspect wiring harness and troubleshoot all connections per schematic (see Section D).
2. If 12 volts is present, then conduct a **tap test**. Go to setup and change the flow cal to 10. Have a second person watch GPM on the run screen while other person taps (use a short piece of wire or a paper clip) between pins A&C of flowmeter connector (on 3057Y1 harness). A flow value should show up indicating the wiring is not damaged.
3. If the display responded to the tap test, your wiring to that point is good. If still not fixed, inspect adapter harness and test continuity per schematic (see Section D).
4. Replace flowmeter.

Setup and Troubleshooting the Pro 700 AccuControl Liquid PWM System (aka Intellivew IV Intellirate)

Note to SureFire people: The Default speed setting that works on our test stand does not work when the tractor is not moving when the Pro 700 is plugged into a tractor that has Radar, Wheel, or GPS speed capability. This makes testing the system in a Run mode impossible without driving the tractor. Use the method below, instead. On our test stand, set the Default Speed to 0 (Toolbox > AccuCtrl > Default Speed > 0) before doing this.

To test the Pro 700 AccuControl on initial startup and in a troubleshooting situation, use the **Liquid Cal** mode. (Work Condition > Liquid Cal)

1. Set up the **Toolbox > AccuControl** configuration page so all AccuControl items are set.
2. Set up the **Work Condition > Valve Cal > Advanced Calibration** screen to match the settings shown in the manual for Tower (3/3/2016 manual or later) or PumpRight systems. The Valve Calibration procedure is likely to give results that will not work. It may be fairly good except for an Upper Integrator Limit that is too low, or it may have totally unworkable numbers in Dead Zone and other fields.
3. Set the **Flow Error Timeout** (on page 2 of the Valve Calibration setup) to 45 sec. This will let the system run for a while before it shuts down if it is not detecting flow.

4. Go to **Work Condition > Liquid Cal**

5. If the **Prime** button does not show up here:

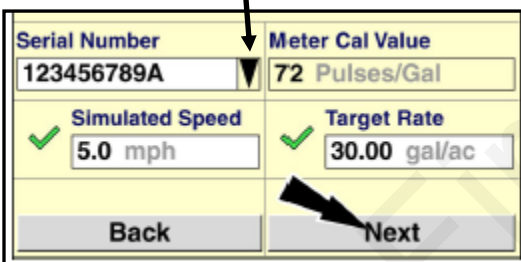
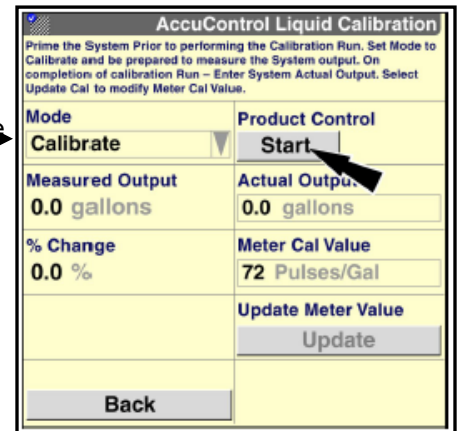
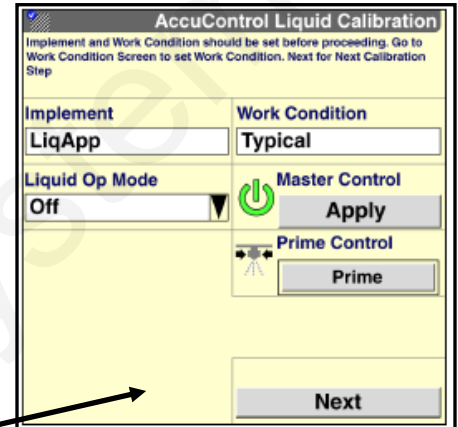
Home > Toolbox > AccuControl > Imp Config > Setup > Scroll down > Liquid Prime > Enabled. (Pressing the Prime button will run the pump for 10 seconds. To keep the pump running, press and hold the Prime button.)

6. To run the system from here with a simulated speed and target rate:

Liquid Op Mode > On Master Control > Apply > Next

7. Enter a **Simulated Speed** and **Target Rate** (these can be changed while running in this mode to test other speeds or rates). Press **Next**.

8. Press **Start** to start the pump. System should run at Simulated Speed and Target Rate. **Measured Output** should count up as product is pumped. To see actual flow in gpm, you need to set up a Layout for the Left Area with **Liq Flw Rt Scn**. This is very useful when diagnosing pump or system issues. It needs to be in the Left Area so you can see it while running in this mode. (Remember, when testing with water, the pressure will be much less than it will be with a fertilizer product. If the pressure is too low, all the rows may not flow because there may not be enough pressure to open all the check valves. Increase the rate until all rows are flowing.)



9. If the pump does not run here, perform the other troubleshooting tests for hydraulic or electric pumps. You can start the system here and use a voltmeter to verify that there is PWM voltage at the EPD or hydraulic valve. (If it is not reading flow, it will quickly ramp up to maximum pump speed and shut off, giving a "Motor Stalled" error message. To make this happen more slowly, set the Integral Gain to 0.1 to allow time for diagnostic observation.)
10. If the pump runs and liquid is flowing but no flow is showing in the Liq Flw Rt Scn box, check for 12 v at the flowmeter connection (pins B & C) and do a tap test (pins A & C) to see if flow will register on the display (see note in #9 about setting Integral Gain).
11. If the pump runs, but is surging, lower the Integral Gain. If it is pumping, but getting to rate very slowly, raise this.
12. If the system has section valves, they should open when this test is started. If they don't open, check the AccuControl Configuration setup (Toolbox > AccuControl > Section Control > Setup {should have green checkmarks, Control Polarity is Active On}). Check Section Sw Box Setup > Config Mode > Auto (should say Run Screen in upper right corner). Set up a Run Screen layout with Clutch Control 2X2 to have section switches on the display. Be sure Boundary Control and Overlap Control are ON (Toolbox > Overlap). If they still don't open, check for constant voltage (pins A&B) and signal voltage (pins B&C) at valve.

Application Rate & Flow Troubleshooting

G

Trouble-
shooting

Application Rate Fluctuates

Due to the very low application rate used on this system, pump speed changes must be made very slowly since even small changes in pump speed will result in a relatively large change in flow. The controller needs to be set with a very low Valve Calibration number (Integral Gain) so that it can lock onto the rate without continually overshooting and undershooting. This means that the controller will react slower on startup and on larger speed changes.

Any system will have minor rate fluctuations going across the field. This is normal and may show up more when applying at very low rates as this system does.

First, you need to determine if the fluctuation is caused by the controller sending fluctuating signals to the valve.

1. Set the DeadZone at 3%. (Work Condition > Valve Cal > Advanced Calibration) If the DeadZone is too low, the controller attempts to adjust every time the rate deviates even a small amount. This can cause the system to start oscillating and actually create more error.
2. Decrease the Integral Gain. (Work Condition > Valve Cal > Advanced Calibration)
3. Are the floating balls slowly going up and down? This low rate system works better when just one ball is in the flow indicator. Use the green ball unless conditions dictate a heavier ball (red). Also, sometimes the flowmeter sensitivity indicates output changes that don't translate into actual fluctuation in output at the row. Is the output at the row fluctuating?
4. **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.
5. Consider if there is air getting into the system. Air going through the flowmeter will cause erratic flowmeter readings, which in turn will cause the controller to start surging as it tries to chase the fluctuating flowmeter readings.
6. What is the pressure? Pressure that is under 5 PSI may cause fluctuations in flow. If the pressure is over 60 PSI, the internal bypass in the pump may be opening.
7. If recirculation valve is open, try running it with this valve closed (or vice versa).
8. Try operating the system at a lower rate or speed and building up to the desired rate and speed. See chart on page XX to see if desired output is below the range of the flowmeter. Outputs near or below the range of the flowmeter may cause fluctuation as the output goes in and out of flowmeter range.

Application Rate is slow to get to the Target Rate

(Due to the very low application rate used on this system, the controller needs to be set with a very low Valve Calibration number (Integral Gain) so that it can lock onto the rate without continually overshooting and undershooting. This means that the controller will react slower on startup and on larger speed changes.)

1. You may need to increase the **Integral Gain**. Go to **Work Condition > Valve Cal > Advanced Calibration**. **(Note: Increasing the Integral Gain to speed up control changes may result in the system being unstable at normal operating speed.)**
2. Increase the Minimum PWM setting (Work Condition > Valve Cal > Advanced Calibration > scroll down to 2nd page > Advanced PWM > Minimum PWM %). The system will get to Target Rate faster on startup if the Minimum PWM is close to the operating rate. However, the Minimum PWM setting sets the lowest speed that the pump will run, so if the Minimum PWM is too high, the pump will not be able to slow down enough to reach the lowest rate and speed output.

Recommended Care and Maintenance

H

Maintenance
& Parts

Winterization

SureFire recommends flushing your product 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.

Inspect Electric Pumps

The electric pump and motor is a completely sealed component. Over time the electric motor will lose efficiency. The entire pump and motor will need replaced when it won't efficiently produce the flow required.

Pre-season Service

1. Fill system with water and run in Manual mode to verify components and system are in working order.
2. 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.
3. Be sure that check valves are clean and operating freely.
4. Be sure all rows are flowing and that all metering tubes are open. (Note: It will take a higher flow rate with water to create enough pressure to open all the check valves.)
5. Run the system in Liquid Cal mode to verify that system will lock on to a Target Rate.



Torpedo™ NH3 Precision Anhydrous Ammonia Application

SureFire's Torpedo™ NH3 Systems are a "one-stop-shop" for all components needed to get Anhydrous Ammonia from the tank to the soil. SureFire will work with you to ensure all necessary components are supplied as part of the complete kit.

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SureFire Catalyst for NutriSphere®-N NH3 for Pro 700

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