

# **TRIMBLE**

FM750, FM1000 OR FMX

## **REFERENCE MANUAL**

Low Volume System for  
Integration into the Trimble

**NOTE: This is only a guide! Please consult  
your Trimble dealer for detailed instructions  
or troubleshooting!**

Precision Liquid Fertilizer Solutions

*agXcel* **877-218-1981**  
[www.agxcel.com](http://www.agxcel.com)  
where precision meets the soil...



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## Important Information

The AgXcel Synergist® system is designed for low volume distribution of NutriSphere-N NH<sub>3</sub> at a rate of 32 oz/acre. Higher rates are possible.

### Note on ounces per acre

On the Trimble console display, the flow meter will be calibrated to measure this product in **ounces**, not gallons. The display is programmed to show measurements in gallons, so be aware the numbers shown for this product will actually be in **ounces**.

Ounces per acre means a very small amount of liquid is being distributed. At 6 mph on 30" spacing, 32 oz/acre means that each row is doing just under 1 oz/min. On a 12 row implement the total amount being distributed is less than 12 oz/min. AgXcel's Synergist system has been engineered to distribute this flow evenly and accurately.

### AgXcel's Low Flow Magnetic Flow Meter

AgXcel's Synergist system uses an electromagnetic flow meter that is designed to accurately measure flow on to 10 oz/min. With no moving parts this flowmeter proves to be reliable, accurate, durable, and long lasting.

### Dual Micro tube Solution

AgXcel's Synergist system uses our Dual Micro tube Solution. Micro tubing eliminates the need for an orifice. By using a micro tube with an opening 4 to 5 times larger than an orifice, the risks of plugging are greatly reduced.

By using a Dual Micro tube Solution (two micro tubes), the system will be able to handle a variety of rates and speeds. As well as handling a wide range of temperature changes that would affect the viscosity of the product.

### Floating Ball Manifold

Each row will be evenly distributed through a visual flow indicator with one or two floating balls. While providing a good indication of the flow to each row, they do not indicate the exact flow. AgXcel recommends doing a catch test on each row to verify it's distribution.

### Field Kit

The Synergist system has an optional field kit available (see pg. 29 for details) containing key replacement parts for your system to reduce equipment downtime.

### Product and Rinse Tank

The Synergist comes with a 55 or 110 gallon product tank and 3 gallon rinse tank. The rinse tank can be filled with RV anti-freeze to allow the system to be flushed when not in use for a period of time, thus protecting the system from freezing after rinsing.

### AgXcel's Micro Control Valves

Implements that are 60' or wider can be split into 2 sections to allow section control. Standard single section setups are equipped with AgXcel's Micro Control Valve on each floating ball manifold. This allows the system pump to continuously run when application stops at the end of the field to allow for a quicker return to the target rate when application resumes. A two section system will have the same Micro Control Valves but can be configured for two sections.



# **AgXcel Fertilizer Application System Overview**

(Read Instructions Completely Before Beginning Installation)

Thank you for purchasing an AgXcel Precision Liquid Fertilizer Application System (FAS) for your liquid placement requirements. The AgXcel FAS system can be integrated into the following OEM controllers:

- Ag Leader
- John Deere Green Star
- Trimble
- Raven
- Top Con
- Outback

This integration into these displays will require each of the OEM's Liquid Control Module which will need to be purchased from your local OEM dealer. The rate controller will provide the data required to manage the speed of the AgXcel electric pump(s) based on the flow response of the flow meter and the vehicle speed. The FAS system is also capable of managing section controls, also referred to as swath control, to minimize overlap areas with optional section control valves.

## **INITIAL INSTALLATION STEPS**

This guide contains information and settings for AgXcel's Synergist system for NutriSphere-N NH<sub>3</sub>. Changes to components or configuration settings can be made to improve operation of the system.

Below are some basic installation steps.

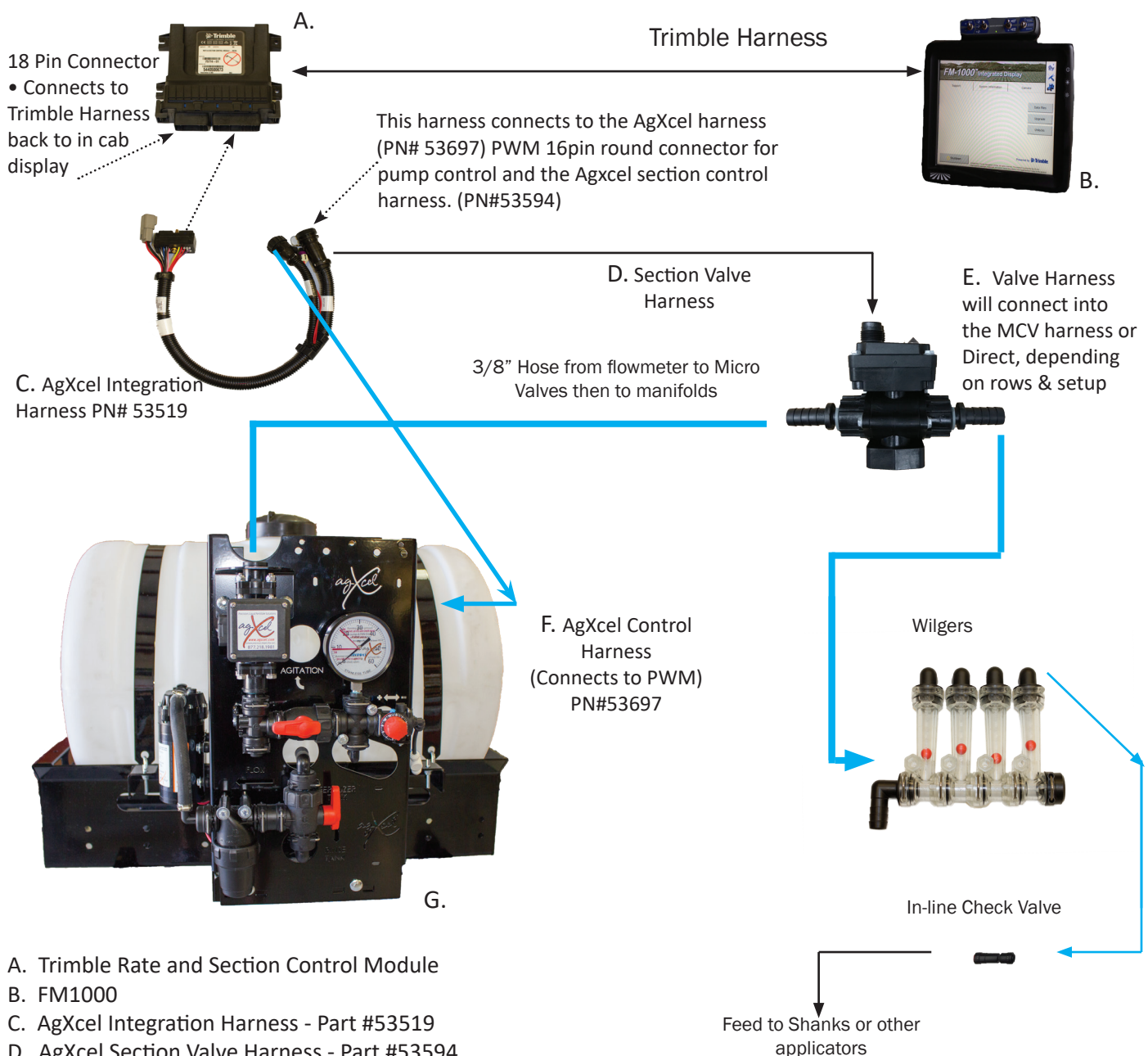
- Have your control module and display in the cab connected and set up by your display dealer. To apply anhydrous ammonia and NutriSphere-N NH<sub>3</sub> you will need 2 rate control modules. One for the anhydrous ammonia and one for NutriSphere-N NH<sub>3</sub>, when using an Agxcel Integration kit. However, when using with the AgXcel AutoX Compact Plus, you only need 1 rate controller to control the NH<sub>3</sub>.
- Open and layout AgXcel's Synergist and any components and familiarize yourself with system. See the overview example for installation ideas.
- Mount the AgXcel Synergist system on your equipment.
- Install and mount any floating ball manifolds, plumbing, and check valves to each row delivery unit.
- Attach any integration harnesses.
- Apply settings that you find in this guide to your controller.
- Fill system with water and conduct flow and operation tests.
- Winterize the system with RV anti-freeze if freezing temperatures are expected.

# AGXCEL INTEGRATION INTO THE TRIMBLE

System Overview - Example with GX40 Synergist

AgXcel Precision Fertilizer Application Systems (FAS) are designed to integrate into various OEM controllers. This installation guide will assist in the controller configuration settings for the in-cab monitor. The integration process begins with the users purchase and installation of the corresponding OEM's Liquid Rate Control Module.

The picture below displays the Trimble Rate Controller with the AgXcel integration harnesses. Each Trimble Rate Controller can control one product. Therefore, if you were applying two liquid fertilizers on you planter, you will need three rate controllers, one for seed and two for liquid fertilizer. The harness coming out of the Trimble rate controller is a 30 pin amp connector that will be connected to the AgXcel 30 pin cinch connector extending from the AgXcel GX system.



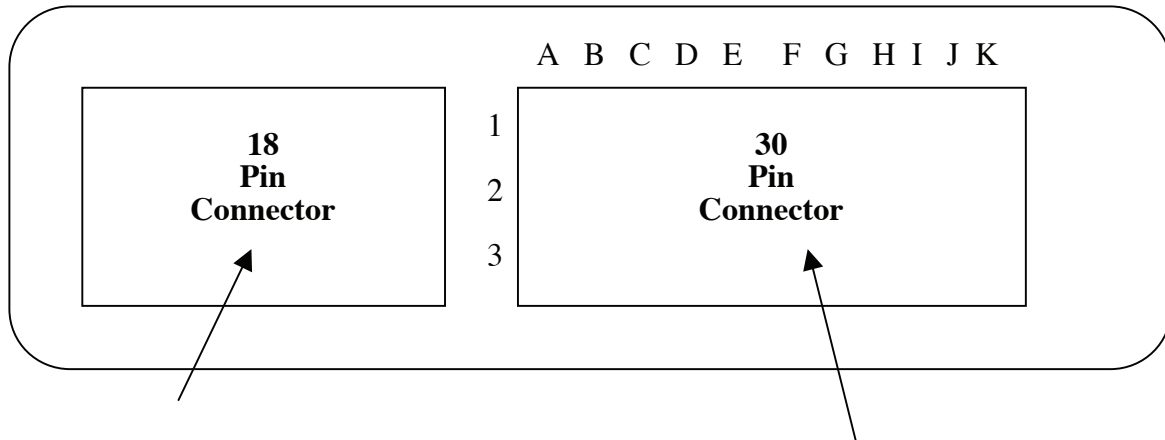
- A. Trimble Rate and Section Control Module
- B. FM1000
- C. AgXcel Integration Harness - Part #53519
- D. AgXcel Section Valve Harness - Part #53594
- E. MCV Harness PN# 54406
- F. AgXcel Control Harness - PN#53697
- G. AgXcel GX40 Synergist



## AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

### Trimble Rate and Section Control Module



#### 18 Pin Connector

- Connects to Trimble Harness back to in cab display

#### 30 Pin Connector

- This harness connects to the AgXcel integration harness P/N - 53519

### Common Troubleshooting Guidelines:

**PWM Signal to Pump:** Pins E1 to E2 should have 0-12 volts to turn pump on. Use manual mode to increase signal. Should get up to 12 volts after holding increase button.

**Flow meter 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.

# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

**PLEASE NOTE:** Your setup may vary. Not all screens are shown. See Trimble's Operator's Manual for safety information and additional setup/operating information. **Please ensure you have the latest firmware installed!**

## MENU STRUCTURE FOR LIQUID RATE CONTROLLER



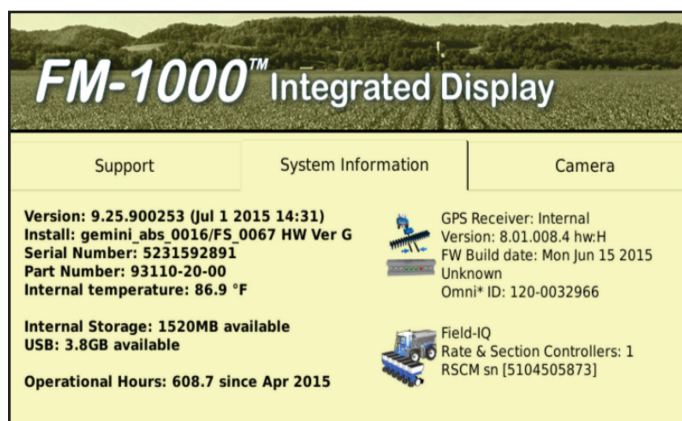
**Home**  
• Support  
• System Information  
• Camera



**Configuration**  
• Setup  
• Calibrate  
• Diagnostics



**Config Selection**  
• Display  
• Vehicle  
• Implement



### System Information

From the home screen, you can select 3 tabs; Support, System Information and Camera. The System Information tab is shown above. This will show what Trimble components are properly connected to your display. If your fertilizer system quits functioning, first check that the Control Module is still recognized on the display. If not, inspect the Trimble wiring harness connections or consult your Trimble dealer.

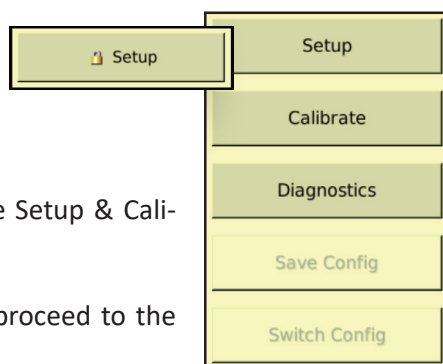
### CFX-750 and FM750 Users

Information in this manual is applicable to the 750 except for screen shots shown in the Setup & Operation. The calibration and setup values in this section DO apply to the 750. However, the 750 has a completely different screen layout and menu structure that is not shown in this manual. Use your Trimble manual to navigate, then enter the appropriate numbers from the AgXcel manual.

### Configuration – Setup & Calibrate

In the Setup & Calibrate menus, you will set the Trimble Field-IQ to work properly with the AgXcel Fertilizer System. Carefully follow these steps to first make sure you have the proper settings. Then, run the tests shown to verify your fertilizer system is ready to go to the field.

- From the home screen, choose **Setup & Diagnostics**.
- The Configuration screen below will appear. Choose **Field-IQ**. The Setup & Calibrate buttons will be locked, shown by a padlock next to them.
- Push **Setup**, then enter “2009”
- After entering the code, the locks will disappear. Push **Setup** to proceed to the next steps.



# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

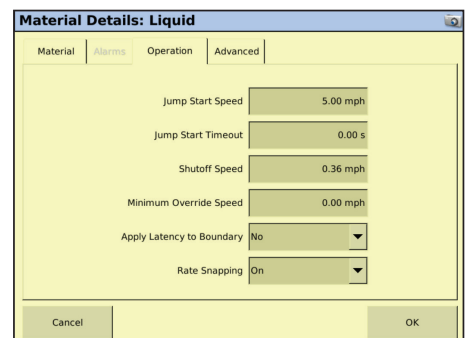
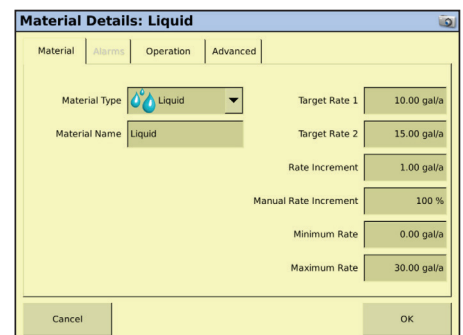
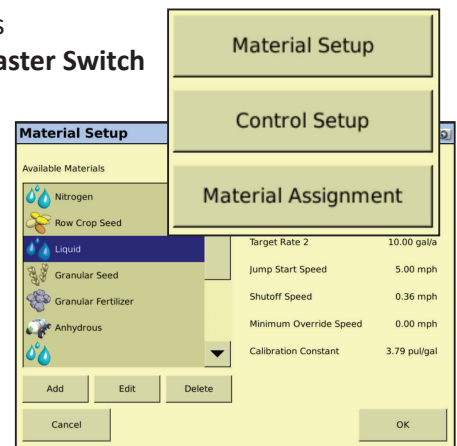
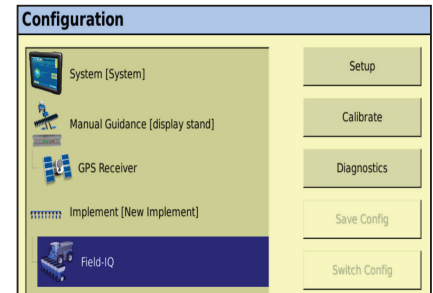
## Configuration – Setup cont.

- Select **Field-IQ** and press the **Setup** button.
- The next page will display 3 selections, press the “**Material Setup**” button.
- Select one of the available material profiles or press **Add** to add a new material. Press **Edit** to change any of the parameters of the material selected.
- **Material Type** will need to be set to **Liquid**.
- Give the material a name that makes sense.
- Set **Target Rate 1 & Target Rate 2** as desired.
- Rate Increment increases or decreases your **Target Rates** by this amount each time you press the rate **Adjustment Switch** on the **Master Switch Box**.
- **Manual Rate Increments** work when the **Rate Switch** is in the **Manual Position**. This number controls the speed at which the valve increases or decreases when you press the **Rate Adjustment Switch** on the **Master Switch Box**.
- **Minimum Rate** is typically set at **0**.
- **Maximum Rate** is set at something higher than the maximum rate that will be applied.

*These parameters may be adjusted as desired.*

- **Jump Start Speed** is the speed the system will ramp up to when the operator pushes the **Jump Start** button on the **Master Switch Box**. **3.0 – 5.0 mph** is a good setting for this.
- **Jump Start Timeout** allows the **Jump Start Speed** to run for a specific amount of time.
- **Apply Latency to Boundary**: set as needed so the system begins applying when needed.

AgXcel recommends setting the **Rate Snapping** to **On**. This will smooth out the rate fluctuation seen on the screen. If you are within the rate smoothing range, the applied rate will just show your target rate and not small deviations from target rate.



# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

## Setup - Control

If this is your first time setting up the **Trimble Control**, there will be **no Locations** entered. In that case, press **Add** and enter the information for a location. If there is a location and material that has been created already, you can select and/or edit.

The screenshot shows the 'Material' tab of the Trimble Control interface. On the left, under 'Available Materials', there is a list with icons for Nitrogen, Row Crop Seed, Liquid (selected), Granular Seed, Granular Fertilizer, and Anhydrous. On the right, the 'Material Type' is set to 'Liquid', and several parameters are listed: Target Rate 1 (10.00 gal/a), Target Rate 2 (15.00 gal/a), Jump Start Speed (5.00 mph), Shutoff Speed (0.36 mph), and Minimum Override Speed (0.00 mph). At the bottom, there are 'Cancel', 'Set Location Name', and 'Next >>' buttons.

The screenshot shows the 'Control Setup' window. It contains a table with the following data:

Location	Material	Module	SN	Status
NE	Liquid	RSCM	5104505873	Master is off

Below the table are 'Add', 'Edit', and 'Delete' buttons. At the bottom right are 'Cancel' and 'OK' buttons.

## Material

- Select your desired material from the **Available Materials**

## Layout

- From the Layout screen, you can enter a **Location Name** such as **Front Tank**, **Rear Tank**, etc. If desired, you can set up the **Bin/Tank Setup** to allow the system to track how much material is left in the tank.
- **(OPTIONAL)** If you would like to let your controller monitor how much material is left and set alarms when the material is getting low, set your values in the **Bin/Tank Setup**.

The screenshot shows the 'Layout' tab of the Trimble Control interface. It features a green field with a black outline of a tank. To the right of the field, there is a 'Location' dropdown menu set to 'Enabled', a 'Location Name' text box, and buttons for 'Bin / Tank Setup' and 'Row Offset Setup'. Below these, there is a 'Material Controlled By' dropdown menu set to 'Switch Boxes'. A small note at the bottom states: '\*Switch Boxes include both Master & Section boxes. If you do not select Switch Boxes you will be unable to calibrate your material.' At the bottom are 'Cancel', 'Set Location Name', and 'Next >>' buttons.

The screenshot shows the 'Virtual Bin/Tank Setup' window. It includes a tank icon and several settings: 'Status' (On), 'Capacity Units' (Default Units), 'Bin Capacity' (0.00 gal), 'Current Volume' (0.00 gal), 'Partial Refill' (0.00 gal), 'Warning Level' (0.00 gal), and 'Trip Area' (0.00 a). There are buttons for 'Refill Tank/Bin', 'Partial Refill Tank/Bin', and 'Reset Trip'. At the bottom are 'Cancel' and 'OK' buttons.

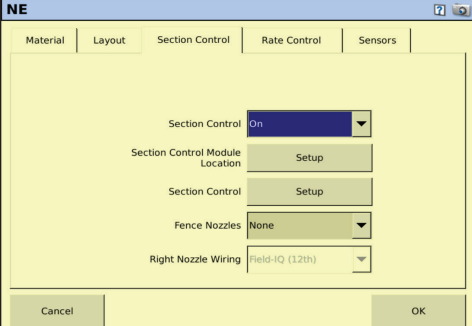


# AGXCEL INTEGRATION INTO THE TRIMBLE

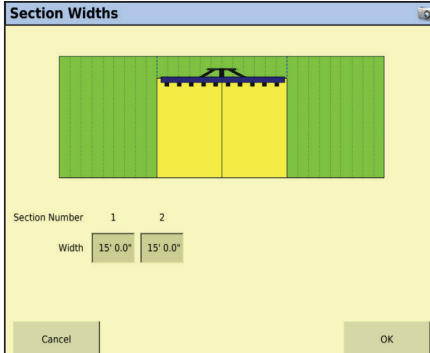
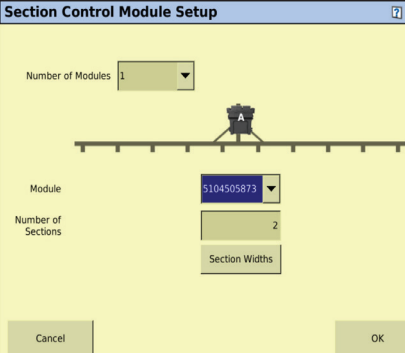
(Read Instructions Completely before Beginning Installation)

## Section Control

- If you have section control set up on your liquid fertilizer system, enable it by having the Section Control set to **On**
- Press **Setup** next to **Section Control Module Location**

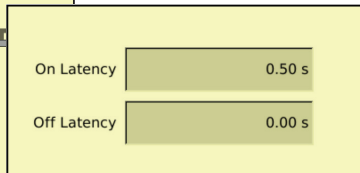
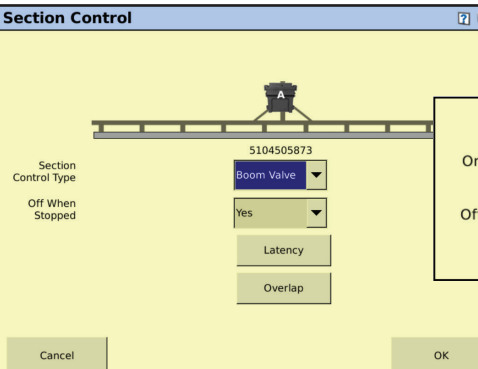
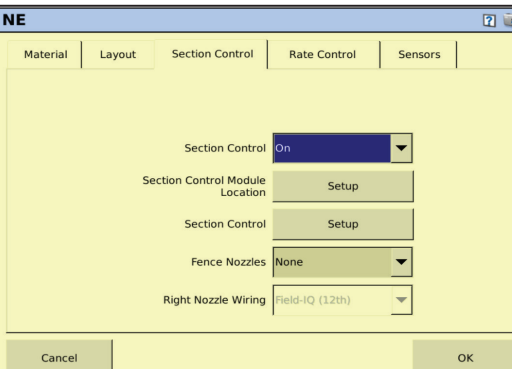


- On the **Section Control Module Setup Screen**, set the **Number of Modules** in your system.
- Select the **Module's Serial Number**.
- Set the number of **Sections** for your system.
- Press **Section Widths**.
- Set the **widths** of your sections



- Press the **Setup** button next to Section Control to take you to the Section Control Setup screen
- Set Section Control Type to: **“Boom Valve”**
- Set **Off When Stopped** to: **“Yes”**
- Press **“Latency”** button to setup latency.
- **On Latency: 0.50 s**
- **Off Latency: 0.00 s**

**\*Adjust these latency settings as necessary in the field.**





# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

## Rate Control

- Select the **Rate Control** tab at the top of the screen.
- Set **Rate Control** to **ON**
- Set **Number of Nozzles** (number of rows)
- Set **No/Low Flow Timeout** to 45 s for troubleshooting so the system does not shut off too quickly.
- Press **Setup** next to **Rate Control Module Location**.
- Set the correct information on the **Rate Control Module Setup** screen.
- Press **OK**

The left screenshot shows the 'Rate Control' tab with the following settings: Rate Control is set to 'On', Rate Control Module Location is 'Setup', Drive Setup is 'Setup', Number of Nozzles is '12', and No/Low Flow Timeout is '45 s'. The right screenshot shows the 'Rate Control Module Setup' screen with the following settings: Number of Drives is '1', Module is '5104505873', and Width is '30' 0.0"'. Both screens have 'Cancel' and 'OK' buttons at the bottom.

- Trimble will take you back to the screen you see above. On **Drive Setup**, press **Setup**.
- **Rate Control** (Continued)
- Set up the **Valve Setup** as shown:
- Valve Type: **PWM**
- Valve Behavior When Sections Closed: **Close**
- Auxiliary Valve: **Disabled**

(**OPTIONAL:** If using an **Aux/Dump** valve to keep the pump running when application stops so the system will resume applying at the **Target Rate** immediately upon restart, set **Auxiliary Valve to Dump**, then set **Valve Behavior** when **Sections Closed** to either **Lock in Last Position** or **Lock at Minimum**. This setup requires section valves with an additional dump valve plumbed to return flow to the tank when application stops.)

The left screenshot shows the 'Drive Setup' screen with the 'Valve Setup' tab selected. The settings are: Valve Type is 'PWM', Plumbing is 'Inline', Valve Behavior When Sections Closed is 'Close', Auxiliary Valve is 'Disabled', and Pump Disarming Switch is 'Disabled'. The right screenshot shows the 'Drive Setup' screen with the 'Feedback Setup' tab selected. The settings are: Flow Meter Type is 'Other', Flowmeter Calibration is '22710.00 pul/gal', and Min Flow is '0.0 gal/min'. Both screens have 'Cancel' and 'OK' buttons at the bottom.

Press **Feedback Setup** button on the **Drive Setup** page.

**Set the Feedback Setup as shown:**

- **Flow Meter Type:** Other
- **Flowmeter Calibration:** See AgXcel Flow Meter Guide
- **Minimum Flow:** 0.0 GPM (Can be set to the minimum specification for the flow meter.)



# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

## Flow Meter Guide

FLOW RANGE (GPM)	PULSES PER GALLON	TRIMBLE	
DIVIDE BY 8 CABLE REQUIRED (DB8)		DB8 CABLE	CAL #
0.08 - 1.6	22710	NO	22710
0.13 - 2.6	22710	NO	22710
0.3 - 5	11355	NO	11355
0.6 - 13	4542	NO	4542
1.3 - 26	2271	NO	2271
2.6 - 53	1135	NO	1135

## Pressure Sensor Setup

Select the Sensor tab

*Set up the Sensor setup as shown*

**Sensor Type:** Liquid Pressure

**Name:** Transducer (or other name)

**Alarm:** Enabled

**Suggested Alarms:**

**Warn if Below:**

GX40 Synergist .... 0

**Warn if Above:**

GX40 Synergist .... 35

**Add Sensor**

Sensor Type

Liquid Pressure

Name

New Sensor

Alarm

Enabled

Warn if below

0.00 psi

Warn if above

0.00 psi

Warn after

3.0 s

Sensor Setup

**Sensor Setup** will take you to a screen where you can select the Field-IQ Module that is controlling this sensor.

**REMINDER:** The pressure sensor is for informational purposes only and does not control the system in any way.

To finish the Pressure Sensor setup, it will be necessary to go to **Field-IQ Calibration** and select **Pressure Calibration** and the name of the pressure sensor you set up.

**Set the following as shown**

**Calibrate Type:** Point/Slope

**Slope:** 50 mv/PSI

**Field-IQ Calibration**

Rate and Section Control Module 5104505873

Drive Calibration

Flow Calibration

Pressure Calibration

New Sensor - Module 5104505873

# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

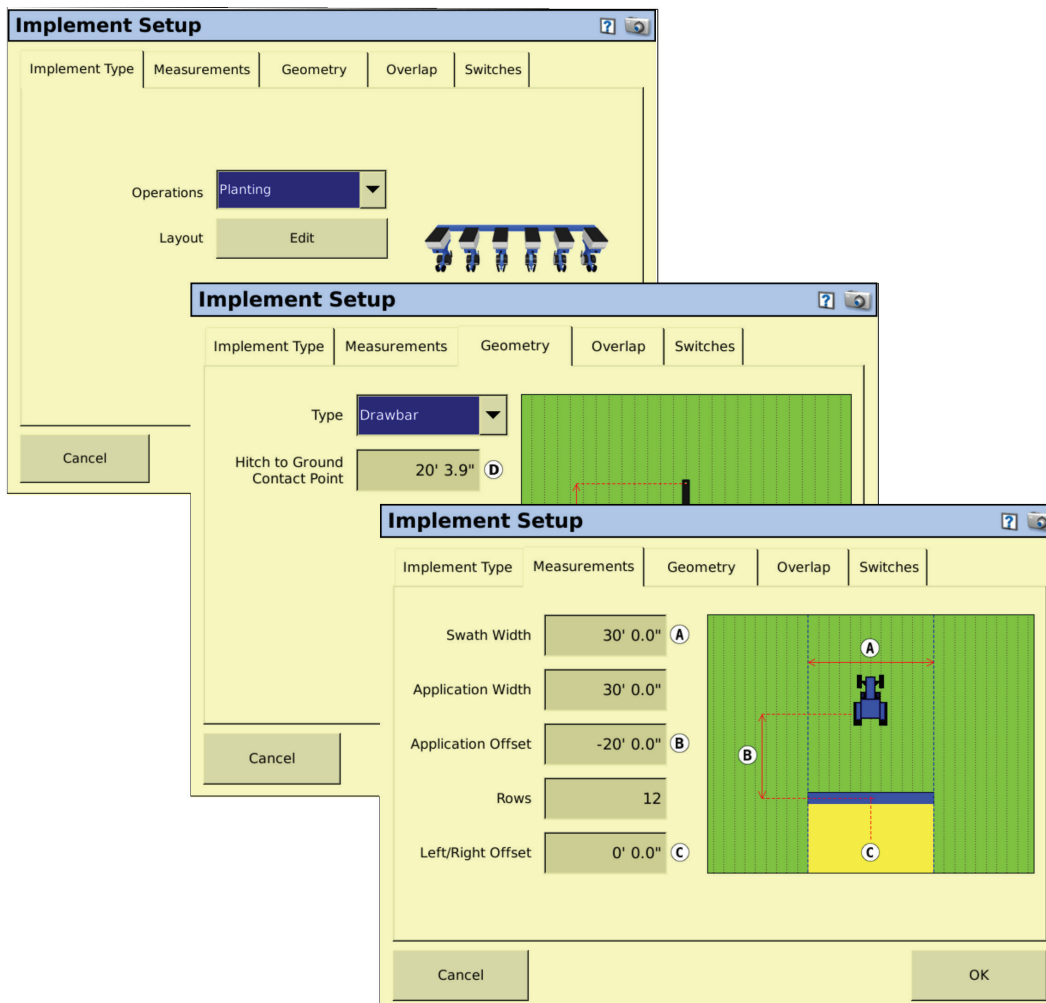
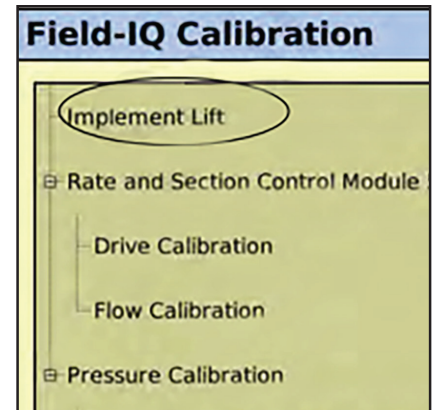
## Implement Lift Switch Calibration

- From the **Field-IQ Calibration** screen, select the **Implement Lift** option
- Raise the implement and then tap **Next**
- Lower the implement and then tap **Next**
- Tap OK to return to the **Field-IQ Calibration** screen

## Implement Setup

Implement Setup is where you set the information for the implement you are using. Mainly these settings affect the guidance control. However, if using auto section shutoff, these settings will determine when each section valve shuts off.

Measure your implement carefully and consult with your Trimble dealer for additional assistance with the Implement Setup section.



# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

## Field IQ Calibration

- On the Calibration page, select **Field-IQ** then press Calibrate button
- This will bring you to the Field-IQ Configuration screen
- Select **Drive Calibration**
- You can leave **Maximum Flow** set to 0 or enter the **Maximum Flow** rate of your pump in Gal/Min. Then press Next
- Follow the screen instructions to run **Auto Tuning** procedure.
- Press **Next** at the bottom of the screen to go to the **Drive Settings**.
- The settings on the **Drive Settings** screen are all duplicated on the **Advanced Parameters** screen. Press the **Advanced Parameters** button to go to the next screen.
- On the **Advance Tuning** page, set the settings as shown:
- Upper PWM Limit:** 100

**Lower PWM Limit:**  
GX40 Synergist .... 0

**Integral Gain: (Adjust as needed)**  
GX40 Synergist .... 100

**Minimum Response: (Adjust as needed)**  
GX40 Synergist .... 5%

**Allowable Error:**  
GX40 Synergist .... 5%

**Smoothing Factor:**  
GX40 Synergist .... 1%

**NOTE:** The TMX-2050 will use Proportional Gain instead of the Integral Gain. This is the opposite of the FmX. The Auto Tuning process should set this. If not, start with Proportional Gain at 20-30.

**Field-IQ Drive Calibration**

Drive Limits | Auto-Tuning | Drive Settings | Info

This step of the Auto-calibration allows you to set the maximum flow on your system so it doesn't operate outside its capability.

If the maximum limit of the system is unknown, please leave this setting set to zero to ensure accurate auto tune limits are calibrated.

Maximum Flow: 10.00 gal/min

Back Next

**Field-IQ Drive Calibration**

Drive Limits | Auto-Tuning | Drive Settings | Info

Turn the Master Switch on and vary between rates to ensure your system performs at the level you require.

Target Speed	5.00 mph	Integral Gain	15.00
Target Rate	10.00 gal/a R1	Minimum Response	0.0 %
Applied Rate	0.00 gal/a	Minimum Position	10.0 %
Master Switch	Off	Allowable Error	1.0 %
		Boost (Feed Forward)	Off

Advanced Parameters

Back Next

**Field-IQ Drive Calibration**

Advanced Tuning | Advanced PWM

Turn the Master Switch on and vary between rates to ensure your system performs at the level you require.

Target Speed	5.00 mph	Proportional Gain	0.0000
Target Rate	10.00 gal/a R1	Integral Gain	15.00
Applied Rate	0.00 gal/a	Differential Gain	0.0000
Master Switch	Off	Minimum Response	0.0 %
Upper PWM Limit	100.00 Hz	Allowable Error	3.0 %
Lower PWM Limit	0.00 Hz	Process Gain	0.180000
Comparator Limit	100.00 Hz	Smoothing Factor (Flow Filter Time Constant)	10.00 %
Ramp Limit	655.00 Hz	Pre Position Open	0.00
Boost (Feed Forward)	Off	Pre Position Stop	0.00

Cancel Accept

# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

## Advance PWM Tab

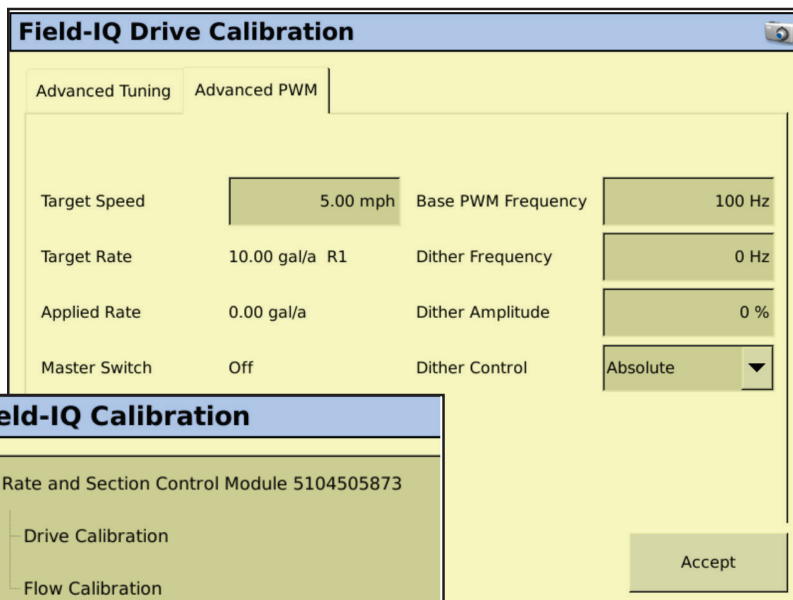
1. Press the Advance PWM tab On the Field-IQ Drive Calibration. Set the settings as shown:

Base PWM Frequency ..... 100  
Dither Frequency ..... 0  
Dither Amplitude..... 0  
Dither Control:..... Absolute

## Flow Calibration

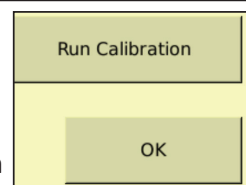
2. Select **Field-IQ – Calibrate** on the Calibration screen. This brings up the screen where you can select **Flow Calibration**.
3. The **Flow Calibration** numbers may have already been set in the **Drive Setup**. You can verify or update the settings here.
4. After pressing “**Run Calibration**”, a screen that will allow you to input your **Target Rate and Speed**. Enter your typical application rate and field speed. During calibration, the system will run at the correct flow for this rate speed.
5. You will need a **stop watch** to measure time. AgXcel recommends running the test for some duration in minutes for simple math. When your containers are in position under multiple fertilizer outlets, press the Start Flow, then turn on the Field IQ master switch and start your timer. The system will begin to run. When your containers are near full, push Stop Flow.
6. Now you will need to measure the amount of liquid caught. The number you enter must be in gallons per minute per row.
  - Find total amount caught in ounces.
  - Divide total ounces by number of rows caught.
  - Divide ounces / row by 128 to convert to gallons / row
7. After entering the amount caught, the Flow Calibration number will automatically change. If it has changed more than 5%, review your catch test and repeat.

**NOTE: AgXcel recommends running this procedure to verify set up is completed correctly. We recommend changing the flow calibration back to the standard ion flow meter calibration shown on the flow calibration on page 11.**

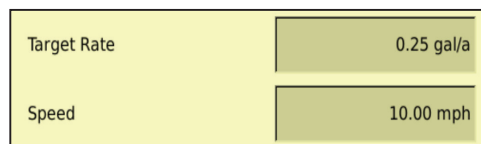


The 'Field-IQ Drive Calibration' screen has two tabs: 'Advanced Tuning' and 'Advanced PWM'. The 'Advanced PWM' tab is active, showing settings for Target Speed (5.00 mph), Target Rate (10.00 gal/a R1), Applied Rate (0.00 gal/a), Master Switch (Off), Base PWM Frequency (100 Hz), Dither Frequency (0 Hz), Dither Amplitude (0 %), and Dither Control (Absolute). An 'Accept' button is at the bottom right.

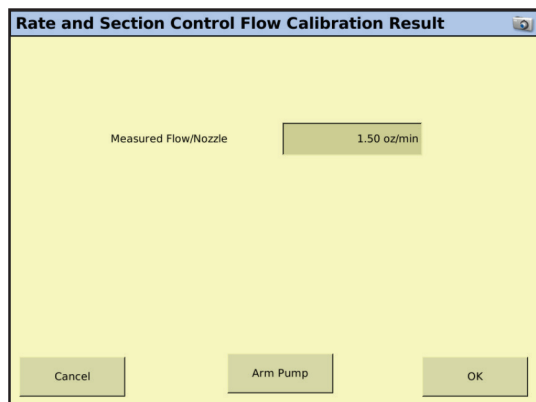
Below this screen is the 'Field-IQ Calibration' screen, which shows a tree view with 'Rate and Section Control Module 5104505873' expanded, containing 'Drive Calibration' and 'Flow Calibration' options.



A 'Run Calibration' button is at the top, and an 'OK' button is below it.



This screen has two input fields: 'Target Rate' set to 0.25 gal/a and 'Speed' set to 10.00 mph.



The 'Rate and Section Control Flow Calibration Result' screen shows 'Measured Flow/Nozzle' as 1.50 oz/min. At the bottom are 'Cancel', 'Arm Pump', and 'OK' buttons.





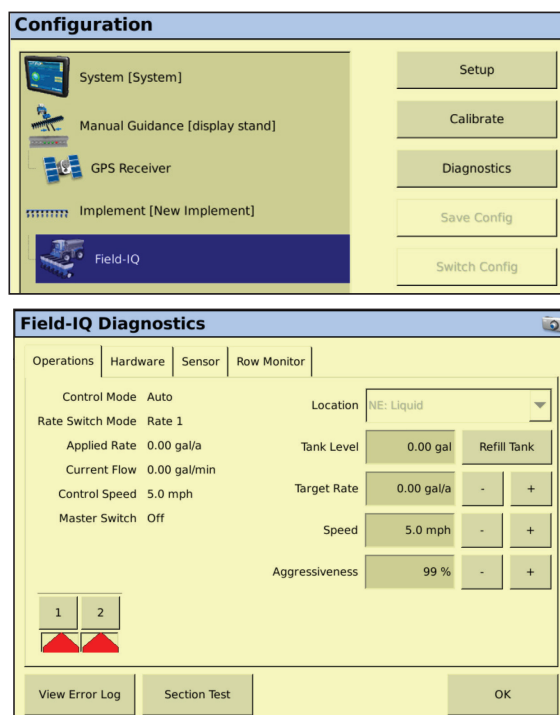
# AGXCEL INTEGRATION INTO THE TRIMBLE

(Read Instructions Completely before Beginning Installation)

## Initial Operation Instructions

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

- From the **Configuration Screen**, select **Field-IQ**, then **Diagnostics**. (If the Diagnostics tab is grayed out, you probably need to close a Field)
- Make sure that your pump is ready to be tested. Raise the implement and then tap **Next**
- Press the + next to **Speed** to simulate a **Speed** signal.
- Turn the **Field-IQ** master switch (#5) **On**.
- Push each section valve button and verify each valve is working.
- Turn **Switch #2** to **Manual** and open the section valves. Use **Switch #1** to increase flow. Does “**Current Flow**” display a flow rate? Is it stable after the system is primed? Do the increase & decrease buttons increase & decrease flow?
- Move **Switch #2** to **rate 1** and set speed to your typical field speed.
- The system should begin to pump liquid now in automatic control mode. ***Is the flow in GPM stable? Is it applying the correct rate? (applied rate = target rate?)***
- Change rate using screen buttons or switch #1 to increase/decrease rate or switch #2 to go to rate 2. ***Does applied rate change to equal target?***
- Close 1 section valve, does flow decrease? Does applied rate still equal target rate?***
- Change speed and target rate to minimum and maximum values. ***Does the system perform at these values? Does the system pressure seem reasonable (remember fertilizer will increase pressure over water)?*** Use “**Sensor**” tab at the top of the page to read pressure sensor value (If equipped).



Running the System with water will create much lower pressure than fertilizer.



## AgXcel's Micro Control Valve

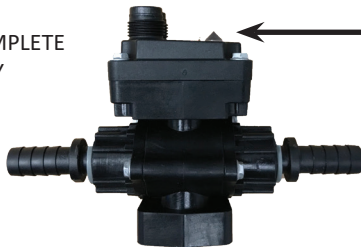


AgXcel's micro control valves are designed to eliminate the need for large sectional valves. The small compact design makes them ideal for controlling flow through the manifolds.

Implements that are 60 ft and wider may be set up with 2 control valves, therefore half of the applicator can be shut off. These systems are setup similar to a single section setup. However, Section 1 of the boom harness will connect to one valve and Section 2 will connect to the other valve.

Please note, implements that are less than 60 feet wide need to be setup as one section on order to prevent range dropping below flow meter capabilities at lower speeds.

GX40 PRO STOP COMPLETE  
REPLACEMENT BODY  
PN# 709



AgXcel's micro control valve (MCV) includes an indicator light. The red light shows voltage/power being supplied to the valve. It will turn Green when receiving a signal to open/close.

## Pump Priming and Bleeder Valve



A bleeder valve is included on every AgXcel system. Every row has a check valve. These valves do not let air escape from the system unless it is pressurized. 12 volt electric pump are not good air compressors, so pumps can struggle to prime due to air trapped on the outlet side of the pump.

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

Bleeder Valve



## AgXcel's Mag Flow Meter 0.08 - 1.6 GPM

AgXcel's Magnetic Flow Meters are superior to turbine flow meters in two ways. Magnetic flow meters have no moving parts. This eliminates any wear items or any potential for contaminants to jam a spinning turbine.

In addition, magnetic flow meters detect flow by electrically measuring the velocity of the liquid which make them independent of viscosity or density of the liquid measured. While extremely accurate when using the indicated calibration number, AgXcel strongly recommends performing a catch test to verify the system is properly installed and configured.

The flow meter included with your Synergist system is rated down to 10 oz/min, but will accurately measure flow down to 8 oz/min. Anything below 8 oz and the flow meter may not give a continuous pulse output.



tip

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

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

## Pressure Sensor

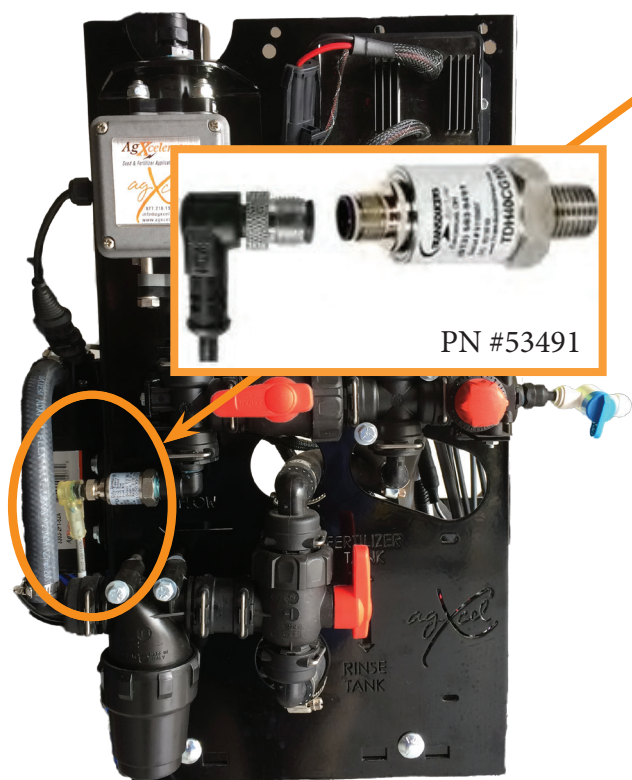
The GX40 Synergist comes equipped with a 100 psi pressure sensor to work with your controller. The sensor for the rate controller is a 3-wire type sensor. The Sensor has a 1/4" MPT fitting.

Your display will show the system pressure on the in cab screen. **The pressure reading is only for informational purposes and is not used in the flow control process.** Flow control uses the flowmeter feedback only.

The pressure sensor is very helpful to optimize system performance and troubleshoot any issues.

The pressure transducer is factory calibrated and will display a very accurate pressure reading on your display. No manual gauge is required. However, the Synergist will have a visual gauge for quick reference when standing near the system and not in cab to see controller display.

When attaching connector to pressure sensor, make sure pins are aligned so they are not bent.





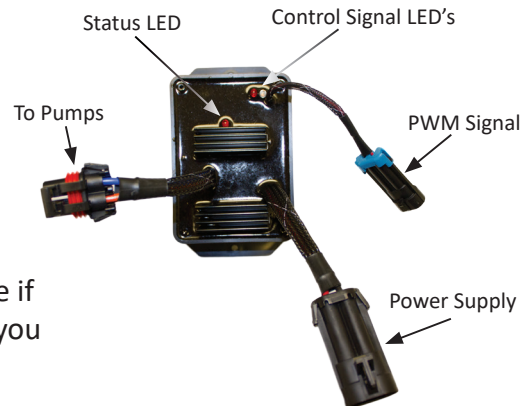
## TROUBLESHOOTING

(Read Instructions Completely before Beginning Installation)

### EPD LED Signals

AgXcel has 2 styles for EPD's. One of the models has three lights and the other model has five lights. Ensure that you are looking at the correct diagram to confirm the signals you are receiving.

The status LED on the PWM is a good indicator to determine if there's a problem with the system. It is especially helpful if you are calling in for tech support.



LED STATUS INDICATOR CODES		EDP Status Lights
Light on steady		Unit is turned on and operating normally
Steady Flashing		Unit in HOLD. Check Run/Hold jumper or remote switch for correct operation.
1 Flash/pause		Open circuit detected. Check motor connections for open.
2 Flashes/pause		Output short circuit detected. Check motor wiring.
3 Flashes/pause		Over-current condition. Check total load.
4 Flashes/pause		Input Power fault. Check input power wiring.
5 Flashes/pause		Input frequency out of range.
NOTE: Cycle power with the controller ON/OFF switch to clear a fault code		

### EDP Status Lights

	Color	Time Line	LED State	Condition
POWER	Power (12V) Green		Off	No power (or less then 6.8V)
	Power (12V) Green		1hz Flash	Under Voltage (less then 10.5V)
	Power (12V) Green		On Solid	12V supplied (power is acceptable)
PWM	PWM Blue		Off	No PWM Signal to the Module
	PWM Blue		1hz Flash	PWM signal present
	PWM Blue		On Solid	Maximum Duty Cycle
TEMP	High Temp Yellow		Off	Module within Temperature Range
	High Temp Yellow		1hz Flash	Module Temp is elevated
	High Temp Yellow		On Solid	Module Auto Shutdown from Temp
MOTOR CURRENT	Current Red		Off	Normal Operation (Under Max)
	Open Circuit Red		1hz Flash	Open Circuit Condition
	Over Current Red		On Solid	Over Current (Output Shorted)
MOTOR RUNNING	Motor Orange		Off	Motor is not running
	Motor Orange		On Solid	Motor is running



The PWM's take 12 volts for power and will send that voltage to the pumps to kick on and off. If the pumps are not turning on, then your PWM might not be getting 12 volts or your pumps might have gone bad.

## TROUBLESHOOTING

(Read Instructions Completely before Beginning Installation)

### Pumps run for a few seconds then turn off

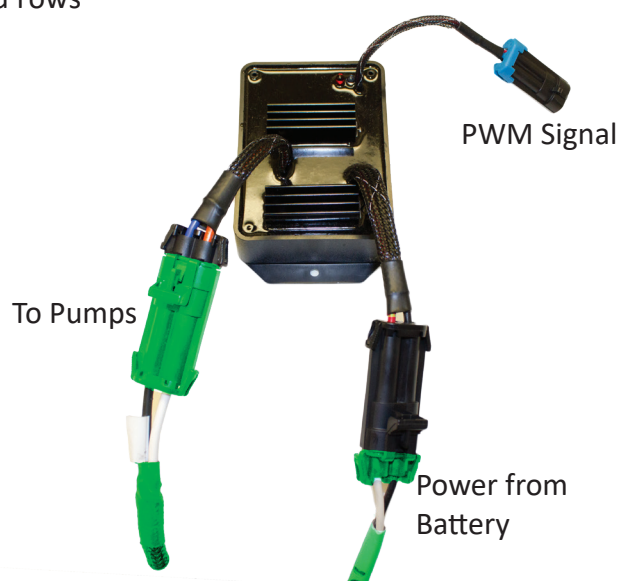
This symptom is due to the pumps drawing more current than the 40 amp limit of the EPD.

1. **Unplug the EPD connector** going to the battery for 2-3 seconds. Removing power from the EPD resets it.
2. **Go to Diagnostics**, Section Test to investigate this issue.
3. **In Section Test**, hold down “+” button for a few seconds. A single tap of this button produces a very small change in signal to the valve, so you must hold it.
4. Increase the flow slowly, checking the “1,2,3” screen to see you flow in GPM. Find the approximate flow where the EPD kicks out. If this is below the flow you need you will need to reduce system pressure by:
  - Looking for any unintended restrictions or plugged rows
  - Increase orifice size
  - Reduce ground speed
  - Reduce application rate

### Electric pumps will not turn on

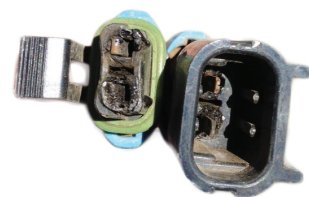
Connect pumps directly to battery

1. Find the EPD (electric pump driver) shown at right. Connect the two connectors (**highlighted green, shown on the right**) to each other. This will bypass the module and supply 12 volts directly to pumps.
2. Do the pumps run? If not, check the 40 amp fuse on the EPD harness that is connected to the tractor battery. Inspect harnesses and connections. Make sure wire colors match up. (white/white, black/black)
3. If using a dual pump system, test each pump by plugging one pump at a time directly to the battery.



### Inspect connections for burned out connectors.

Inspect all connections for bent or burned out leads. Constantly running the system at a high pressure or getting more than the required voltage (12v) can result in burned out connections causing the system to not work properly.





## IMPLEMENT SWITCH

(Read Instructions Completely before Beginning Installation)

### GXIMPLEMENTS SWITCH KIT

PN# 53824

PN# 53982 (2 PIN/JD STYLE)

#### KIT INCLUDES:

- 1- 15FT Extension (John Deere or 3pin connector)
- 1- Implement Switch with 15FT Lead
- 1- Magnet Mount

#### IMPLEMENT SWITCH KIT:

1. Run/Hold optional connections (If not using be sure to use provided loop to close circuit)
  - For use with a N.O. (normally open) whisker switch, remove the dummy plug and connect to your run/hold switch wires. A smaller gauge wire (18 AWG minimum) may be used for this low current circuit.
  - For use with a hall-effect sensor, remove the dummy plug and attach the plug from your sensor.

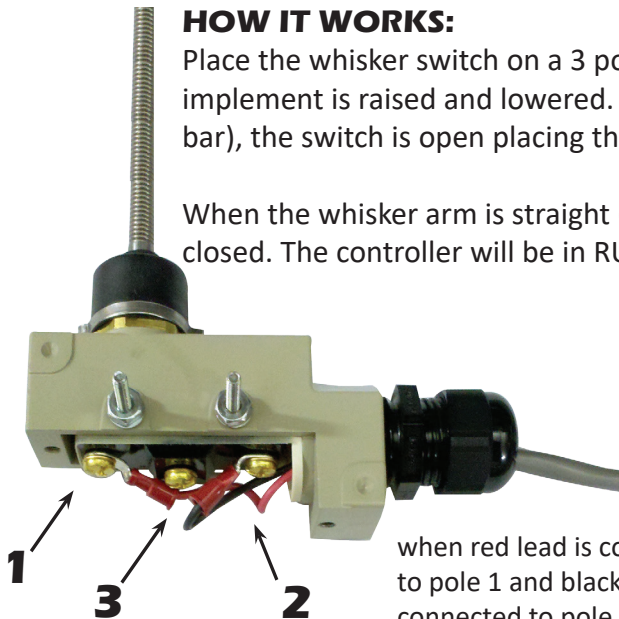


*Illustration shown has a 3pin connector.*

#### HOW IT WORKS:

Place the whisker switch on a 3 point arm or wheel frame that changes angle as the implement is raised and lowered. When the whisker arm is bent up (against the tool bar), the switch is open placing the controller in HOLD, not applying fertilizer.

When the whisker arm is straight (not touching the tool bar), the switch will be closed. The controller will be in RUN, applying fertilizer.



\* The Whisker switch will work with many other controllers. However, the polarity might be reversed from the positions described above.

when red lead is connected to pole 1 and black lead is connected to pole 3 pumps will run when whisker is bent

when red lead is connected to pole 1 and black lead is connected to pole 2 pumps will run when whisker is straight

EXTENSIONS AVAILABLE		
3PIN	2PIN	DESCRIPTION
17924	55917	GXH_EXT 15FT
54073	55415	GXH_EXT 30FT
*Custom extension lengths can be special ordered - contact SALES for a price quote*		



## FLOATING BALL MANIFOLDS

(Read Instructions Completely before Beginning Installation)

In order 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.

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 to each row will pass through a flow column that has one or two balls that will float to indicate flow to that row. This gives an immediate visual confirmation of flow to each row. While the floating balls are a good visual indication of flow they are **not always** an indicator of exact flow to each row. **Only a catch test will verify the evenness of the row-to-row distribution.**



### Low Flow Column (usually 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.

AgXcel 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 is 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.

*NOTE: Manifold Configuration is situational  
Photos are for general reference.*



**manifold examples**

### Floating Balls

For most applications of Nutri-Sphere-N NH<sub>3</sub> at 32 oz/acre, The Green plastic ball gives a good flow indication. If a heavier ball is needed, use the Red Plastic ball. See Fig.1

On the Gx40 Synergist low-volume system, the flow appears to be more stable if only one ball is used.

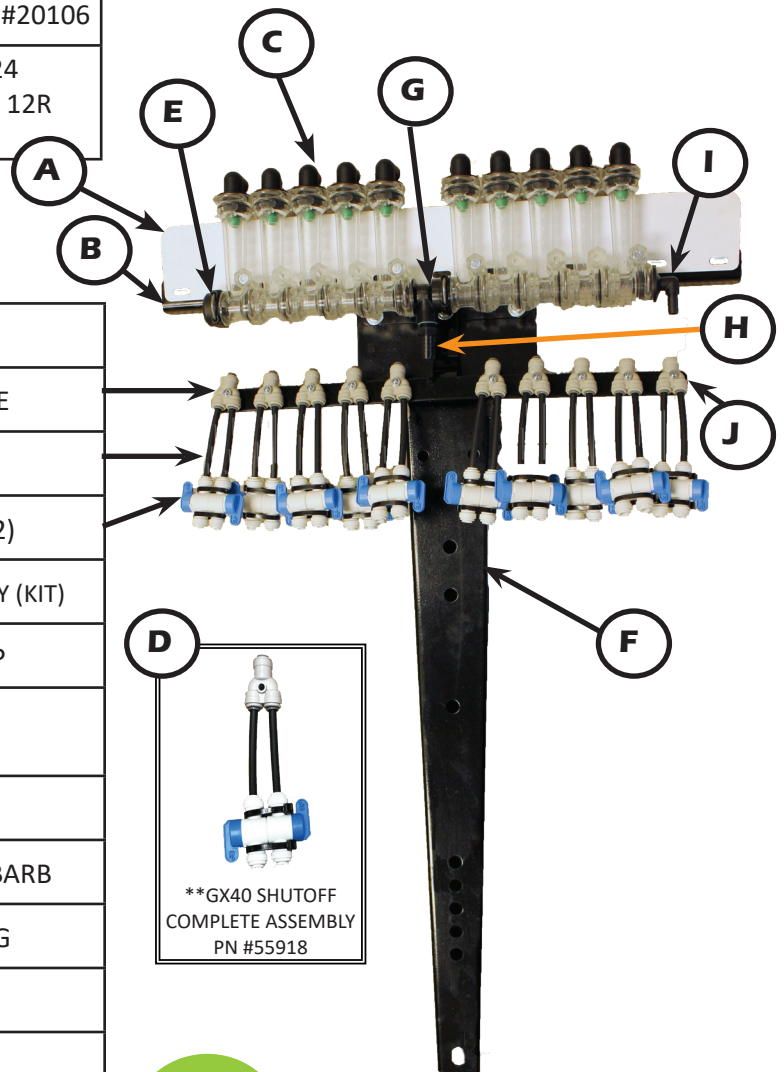


Fig. 1

GX40 SIGHT COLUMN BRACKETS		
PN#		DESCRIPTION
A	406	UP TO 6R WHT BACKDROP
	414	UP TO 8R WHT BACKDROP
	20106	UP TO 12R WHT BACKDROP
B	18082	MOUNTING BRACKET FOR PN#406
	18088	MOUNTING BRACKET FOR PN#414
	18083	MOUNTING BRACKET FOR PN#20106
SIGHT COLUMN HARDWARE KIT - PN#38324 HARDWARE KIT USED FOR MOUNTING UP TO 12R ONTO GX1 CHASSIS BRACKET		

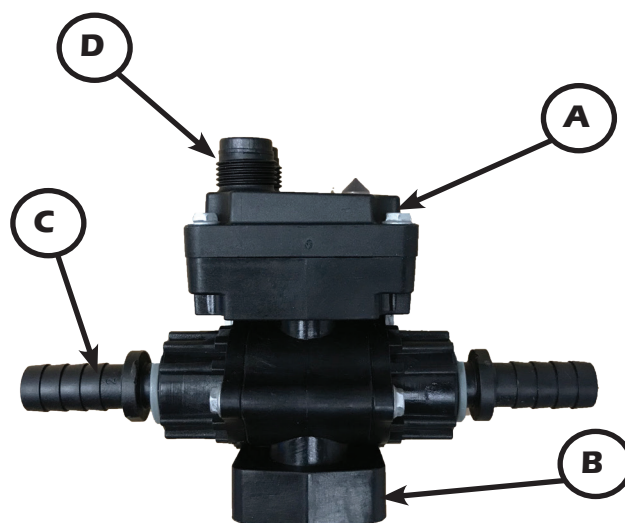
HARDWARE TO MOUNT SHUTOFF ASSEMBLY		
1 OF EACH REQUIRED PER ROW	PN#	DESCRIPTION
	715	6-32 NYLON LOCK NUT
	714	6-32X1" PHIL RH MS
	18182	#6 SAE FLAT WASHER

C	25709	1/4 PTC TOPS
D	37721	DIVIDER W/MOUNT HOLE
	19920	EVA14
	19848	1/4" PTC SHUTOFF (QTY 2)
	55918	**GX40 SHUTOFF ASSEMBLY (KIT)
E	18039	COLUMN END CAP & CLIP
F	38260	GX1 CHASSIS (TOMAHAWK ONLY)
G	18042	ISOLATED FEED
H	32264	3/8 MNPT TO 3/8 HOSE BARB
I	18033	3/8" HOSE SHANK-90 DEG
	25682	LOCK U-CLIP
J	17701	GX1SHUTOFFBRACKET
COMMON UBOLT(S)	17703	GXUBOLT 6 X 5 1/2" x 1/2"
	37726	GXUBOLT 4 X 7 X 5/8"
	55222	GXUBOLT 6 X 8 1/2" x 5/8"
	20554	GXUBOLT 6 X 8 X 5/8"



Implements that are less than 60 ft. wide need to be setup as one section in order to prevent range dropping below flow meter capabilities at lower speeds. Using more sections is not recommended.

GX40 PRO STOP HARNESSING		
PN#	SIZE	M12 TO 3 PIN CONNECTORS
54406	3FT	
54408	6.5FT	
55410	9.8FT	
54412	13FT	
54414	19FT	
54416	29FT	
54418	39FT	
**CUSTOM GX40 BOOM EXTENSIONS AVAILABLE AT EXTRA COST **		



GX40 VALVE BODY ASSEMBLY			
	PN#	DESCRIPTION	COMPLETE Gx40 BASE VALVE ASSEMBLY PN# 709
A	55716	GX30PROSTOP - E VALVE M12 (VALVE ONLY)	
B	17720	PRO STOP BODY BRACKET (NOT SHOWN)	
C	20808	3/8 TUBE TO 3/8 BARB (2 REQ'D)	
D	37665	GX40 M12CAP (NOT SHOWN)	

GX40 SIGHT COLUMNS		
PN#	DESCRIPTION	
LOW FLOW	25689	Wilger Low Flow Column Only
	25687	Wilger Low Flow Column W/balls, clip, retainer (No Top)
	37617	Wilger Low Flow Complete Column(s) - 4 pack w/ End cap, clips & 1/4QC Tops
BALL SELECTION FOR THE GX40		
1-3 GPA	18077	Green Plastic* Ball
2-4 GPA	18078	Red Plastic* Ball
*For 32 oz/acre at 7mph or less the Green ball works the best. Higher speeds may work better with the Red ball **		



PN#	DESCRIPTION
55634	GX40 DUAL TUBING - 12 FT SKY/NAVY
55938	GX40 DUAL TUBING - 12 FT GREY/NAVY
38251	GXMT GREEN (SOLD BY THE FT) NOTE: GX40 USES 4FT OF GREEN MT PER ROW.
20121	1/4 PTC DIVIDER
55212	.3 LB X 1/4" QC CHECK VALVE



## MICRO TUBE PLUMBING KITS

(Read Instructions Completely before Beginning Installation)

The GX40 Synergist system comes with a Dual micro 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 Gray micro tube will be what is used. When applying in cold weather and/or at high speeds, it may be necessary to use the Navy Blue micro tube. The system will work at pressures up to 50 psi, but for prolonged use above 45 psi, consider switching to a larger tube.

### FIELD OPERATION OF DUAL MICRO TUBE

The best micro tube to use may change based upon temperature, application speed and product batch.

AgXcel recommends you start with the Gray tube (for typical 32 oz/acre and 30" row spacing). Conduct a test using calibration mode to determine your system pressure. Recommended pressure is between 10-40 psi.

The system will operate up to 50 psi. However, if prolonged application with pressure above 45 is anticipated consider changing to the Navy Blue Metering tube.

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.

### ADVANTAGE OF DUAL MICRO TUBE

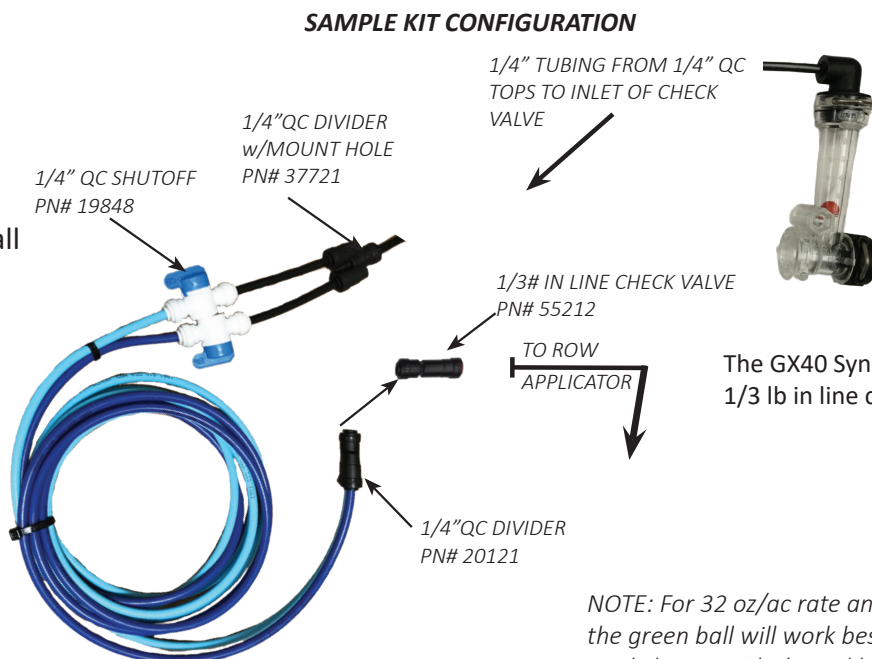
Micro tubes provides a larger passage way diameter than a comparable orifice. Typical NutriSphere-N NH3 applications apply around 1 to 1.5 oz/min/row. An orifice of this rate would have a 0.015" diameter opening. The GX40 Synergist uses micro tubes Navy Blue and Gray. This 12' tube with more than 3 times the diameter creates a system excellent in providing low volume row to row distribution.

By using two micro tubes, the system can provide proper application as the product properties change due to temperature, mixtures and other factors.

## CHECK VALVES

(Read Instructions Completely before Beginning Installation)

A standard dual check valve system with two micro tubes as shown on the left. This allows the flow to be directed to the small tube, large tube or to both tubes by opening or closing the valves by twisting the blue caps.



Dual Navy Blue/Grey - PN# 55938 \* - Standard kit

Dual Navy/Sky - PN# 55634 - Situational and dependent on speed of implement

\*12' lengths per row are standard for the GX40 Synergist and included in all kits.\*

[www.agxcel.com](http://www.agxcel.com)

[info@agxcel.com](mailto:info@agxcel.com)



## TYPICAL PLUMBING SETUP

(Read Instructions Completely before Beginning Installation)

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 Gray tube 1/4" QC x 1/4" QC. \*Navy Blue tube will be used when cold weather and/or high speeds create too high pressure in the Gray tube.
5. Connect Navy blue tube to outlet side check valve provided.
6. Connect the black 1/4" tubing from top of flow indicator to inlet of check valve.

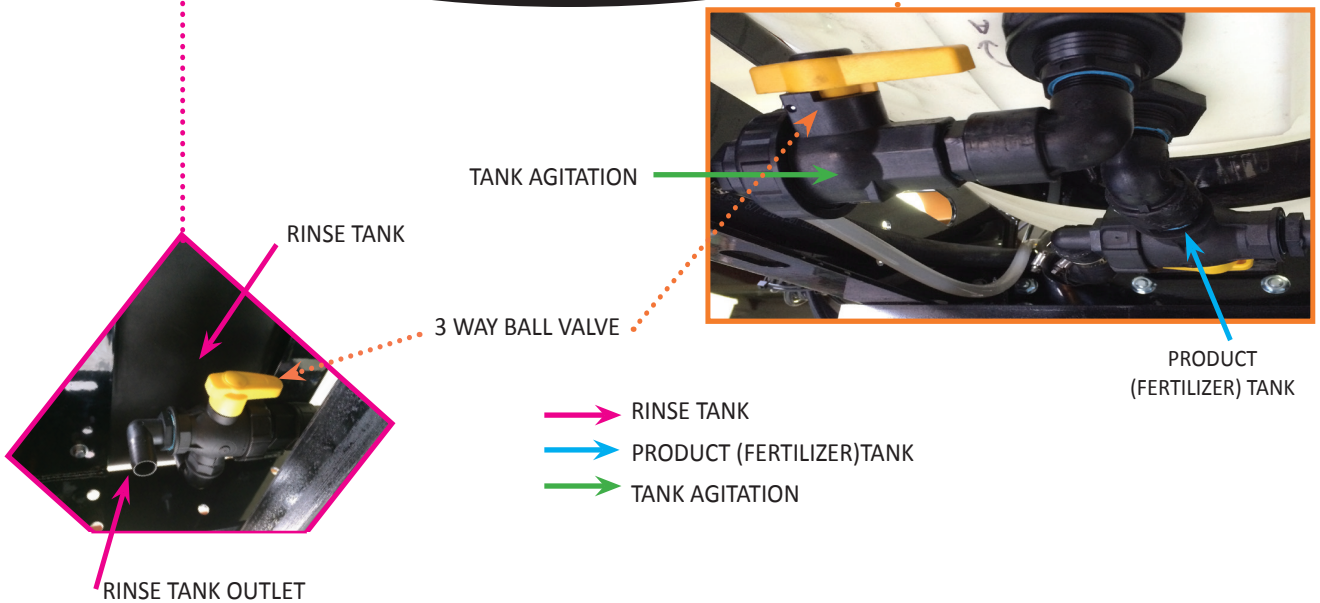
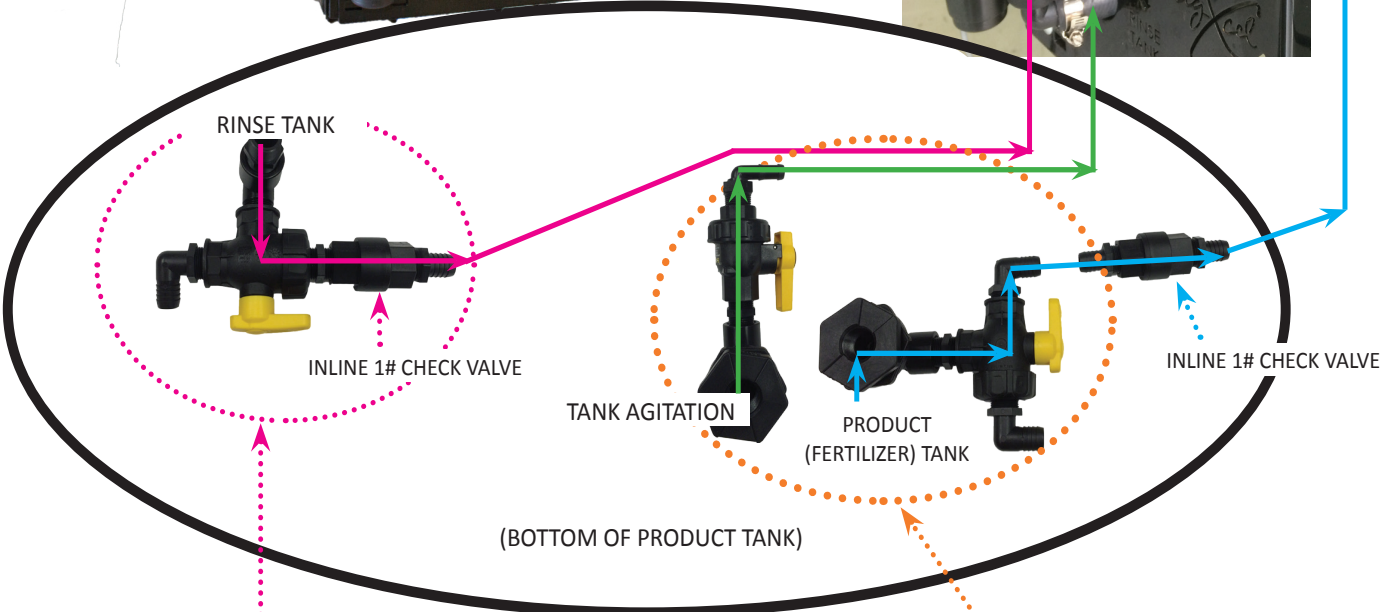
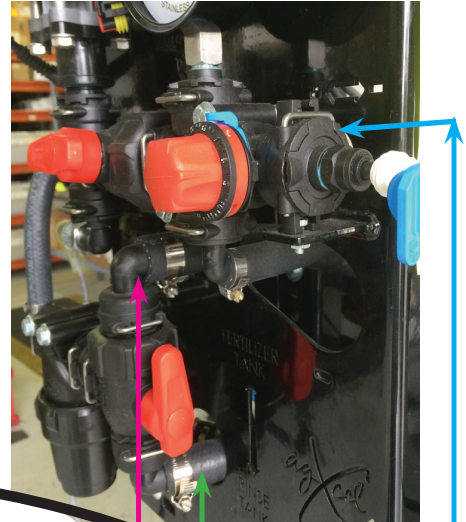


NOTE: For 32 oz/ac rate and speeds 7 mph or less, the green ball will work best. Higher speeds may work better with the red ball



## GX40 TANK PLUMBING DETAIL

(Read Instructions Completely before Beginning Installation)

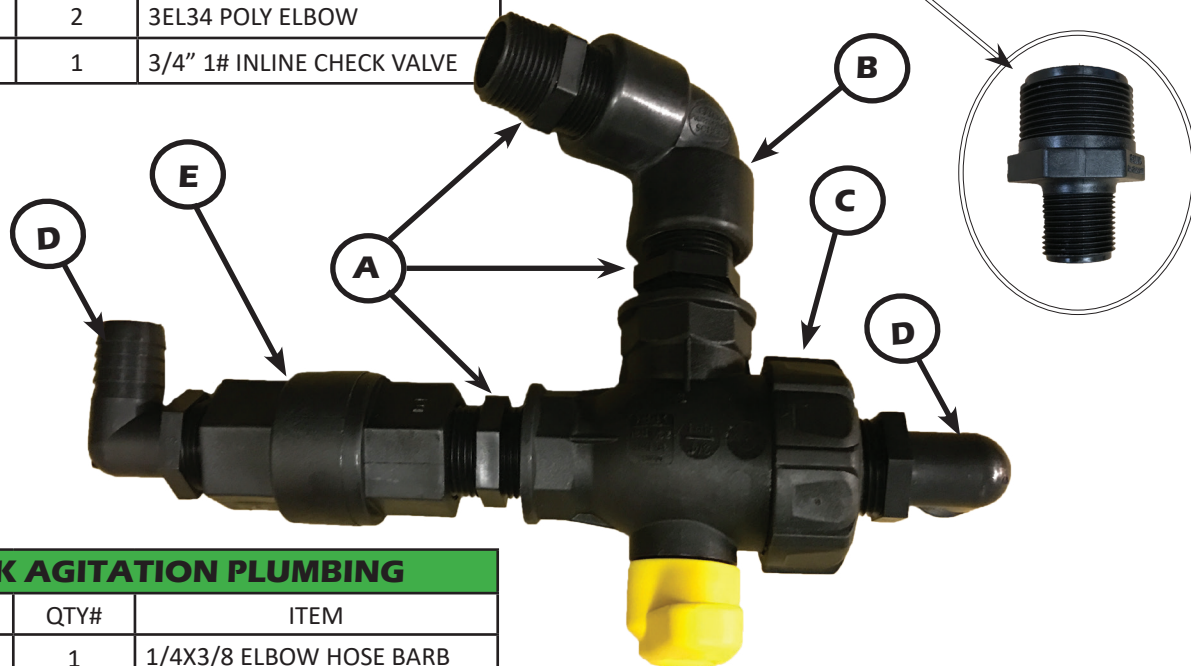


## PRODUCT TANK PLUMBING

	PN#	QTY#	ITEM
<b>A</b>	<b>32399</b>	3	3/4 THREADED NIPPLE
<b>B</b>	<b>50577</b>	1	3/4 PIPE ELBOW
<b>C</b>	<b>37667</b>	1	3-WAY BALL VALVE
<b>D</b>	<b>32331</b>	2	3EL34 POLY ELBOW
<b>E</b>	<b>54022</b>	1	3/4" 1# INLINE CHECK VALVE

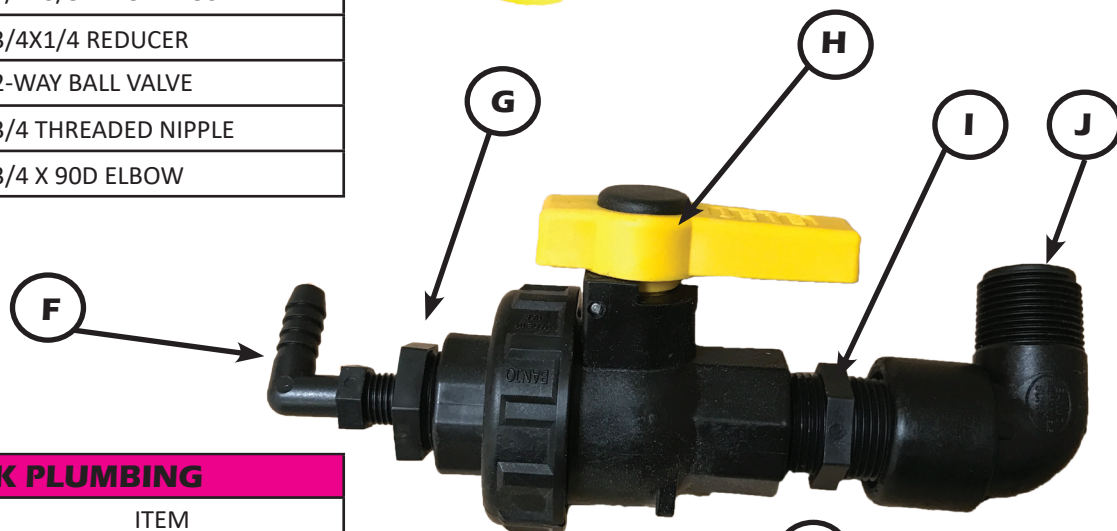
A & B are used with  
a 55 gal tank.

For a 110 gal tank  
substitute A & B for  
PN# 52108 (shown)  
1-1/4 X 3/4 REDUCER



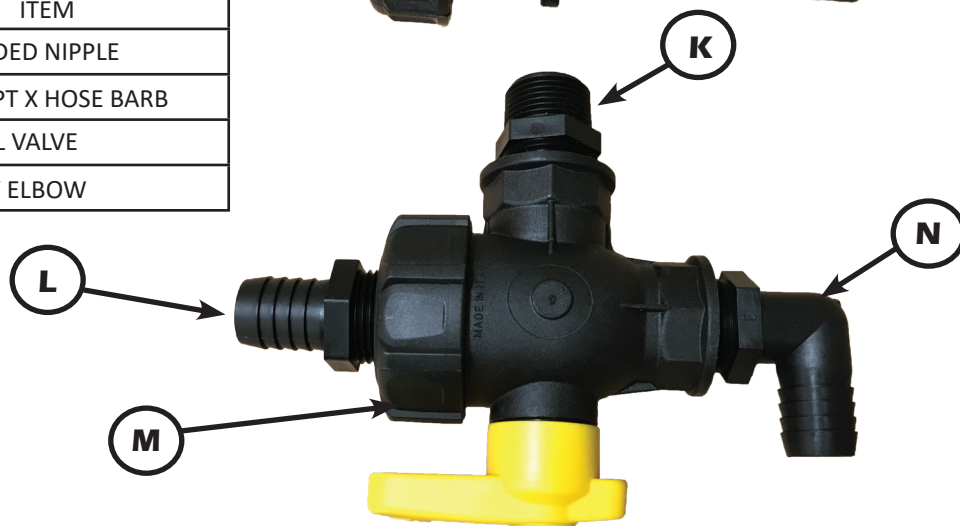
## TANK AGITATION PLUMBING

	PN#	QTY#	ITEM
<b>F</b>	<b>32324</b>	1	1/4X3/8 ELBOW HOSE BARB
<b>G</b>	<b>32433</b>	1	3/4X1/4 REDUCER
<b>H</b>	<b>52169</b>	1	2-WAY BALL VALVE
<b>I</b>	<b>32399</b>	1	3/4 THREADED NIPPLE
<b>J</b>	<b>52146</b>	1	3/4 X 90D ELBOW



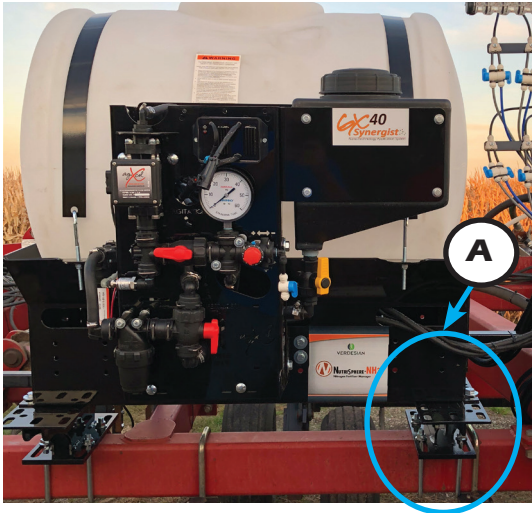
## RINSE TANK PLUMBING

	PN#	QTY#	ITEM
<b>K</b>	<b>32399</b>	1	3/4 THREADED NIPPLE
<b>L</b>	<b>18005</b>	1	3/4x3/4 MPT X HOSE BARB
<b>M</b>	<b>37667</b>	1	3-WAY BALL VALVE
<b>N</b>	<b>32331</b>	1	3EL34 POLY ELBOW





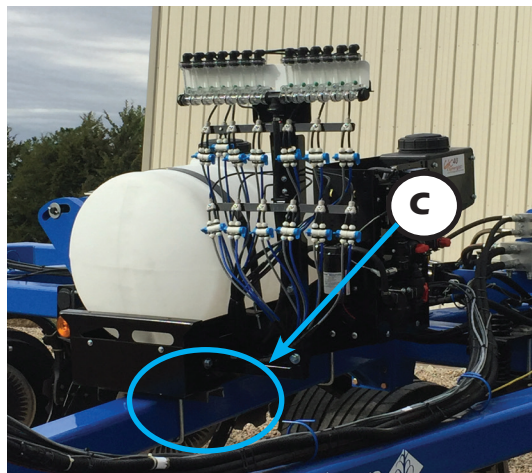
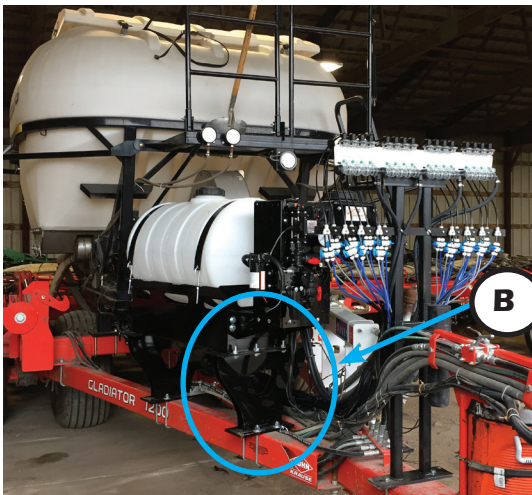
## AGXCEL SYNERGIST MOUNTING OPTIONS



Various brackets and u-bolts are available to provide a way to mount the GX40 Synergist to almost any implement. Your AgXcel configuration specialist will get your implement information at ordering time to make sure that all of the hardware needed for your system is included.

ITEM#	PN#	DESCRIPTION
<b>A</b>	<b>55598</b>	GX40_UNIVERSALTANKMOUNT 6"
<b>B</b>	<b>55597</b>	GX40_UNIVERSALTANKMOUNT 16"
	<b>55596</b>	GX40_UNIVERSALTANKMOUNT 24" (NOT SHOWN)
	<b>38327</b>	GXUNIVERSALTANKMOUNTBOLT KIT

**PN#38327** = BRACKET HARDWARE PACKAGE  
(USED TO MOUNT GX40 SYNERGIST TANK CRADLE  
TO UNIVERSAL MOUNT BRACKET 6", 16", 24" OR  
LOW PROFILE BRACKET)



The most common mounting options are shown here. Also GX40 systems can be mounted directly to the tool bar as shown above. Agxcel carries a variety of sizes to fit majority of tool bar sizes.

ITEM#	PN#	DESCRIPTION
<b>C</b>	<b>55625</b>	GX40_LOWPROFILEBARMOUNT
	<b>53719</b>	9" BOLTS 5/8"
	<b>38402</b>	5/8" WASHER
	<b>37601</b>	5/8" SPIN NUT
	<b>38327</b>	GXUNIVERSALTANKMOUNTBOLT KIT



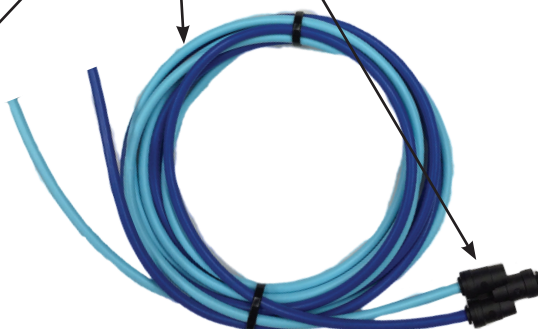
## SYNERGIST FIELD KIT - PN#55558



COMPLETE AGXCEL GX40 SYNERGIST FIELD KIT  
CONTAINING CRITICAL COMPONENTS TO KEEP YOU  
RUNNING IN THE FIELD.

KIT INCLUDES:

SYNERGIST FIELD KIT PN#55558		
PN#	ITEM	QTY
25709	WILGER 1/4" CAP QC	1
37614	WILGER LOW FLOW COLUMN	1
262	QC3 (1/4" TO 1/4" QC)	4
55212	1/3# IN LINE CHECK VALVE	2
38412	SST #6 CLAMPS	2
55938	GX6MT DUAL NAVY/GREY 12FT	2R
37721	1/4" DIVIDER WITH MOUNT HOLE	2
20121	1/4" DIVIDER	2
32324	QA PUMP FITTINGS 3/8" BARB	2
709	MICRO-VALVE W/BODY	1
20064	2.0 QA PUMP	1



**\*\*OPTIONAL FIELD KIT AVAILABLE BEYOND BASIC  
FIELD KIT PROVIDED WITH EVERY SYSTEM\*\***

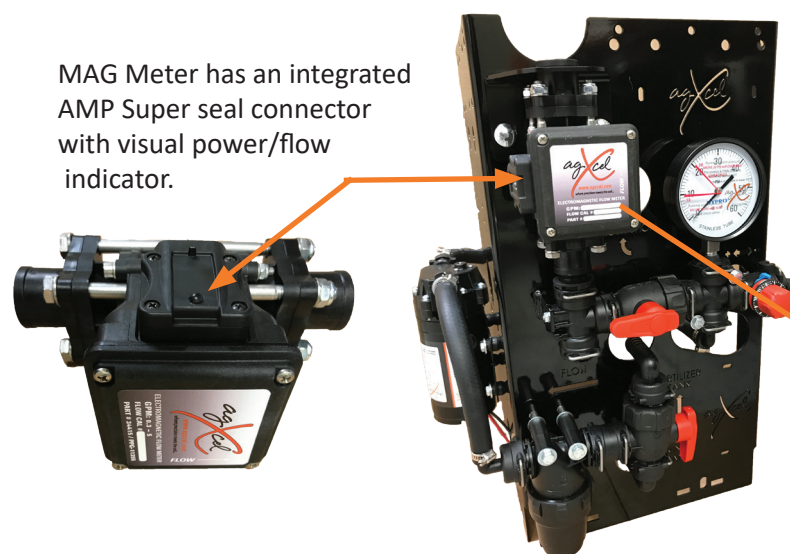


## FLOWMETER OVERVIEW

(Read Instructions Completely before Beginning Installation)

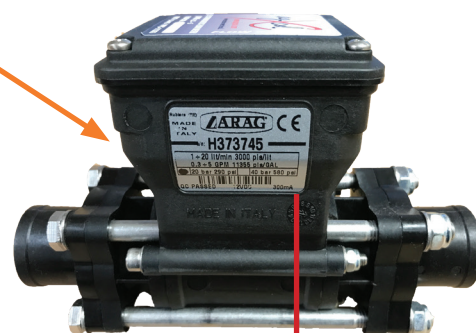
### AGXCEL MAG FLOWMETER

The AgXcel Mag Flow meter is a magnetic flow meter, also technically known as an electromagnetic flow meter. A magnetic field is applied to the metering tube, which results in a potential difference proportional to the flow velocity perpendicular to the flux lines. The physical principle at work is electromagnetic induction. The Mag meter is superior to other flow meter since there are no moving parts to replace or maintain just as when dirt or fertilizer with particles is present. Also given that the Mag meter detects the flow of ions in the liquid, it can therefore accommodate for viscosity or liquid density changes. Given the superior features of the Mag flow meter, a quick catch test is always recommended to ensure precision application.



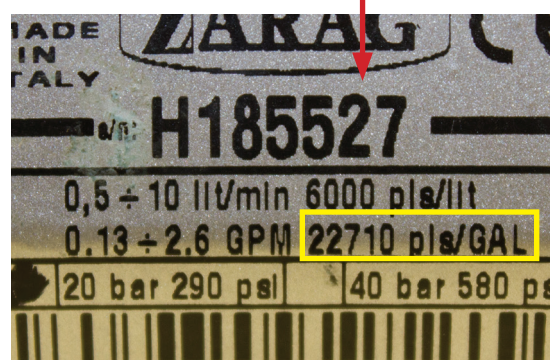
MAG Meter has an integrated AMP Super seal connector with visual power/flow indicator.

The Synergist uses special quick attach fittings that lock n clip into place making easy part replacement.

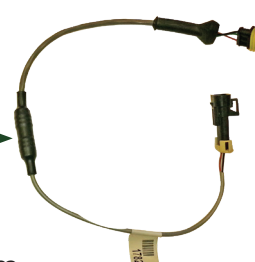


On the magnetic flowmeter there will be a sticker located on one of the sides. Find the pulses per gallon and use the chart in your OEM manual to determine your flowmeter calibration number.

FLOW RANGE (GPM)	PULSES PER GALLON
0.08 - 1.6*	22710
0.13 - 2.6	22710
0.3 - 5	11355
0.6 - 13	4542
1.3 - 26	2271
2.6 - 53	1135



When calling for tech support our technicians may ask if you have a "Divide by 8" cable connected to the flowmeter. The image to the right is what the cable looks like. This only applies to the magnetic flowmeter. This cable is easily identified by the small "pill box" in the middle of the harness.



\*GX40 Synergist exclusively uses the .08-1.6 flowmeter. Special settings to read in oz/acre. See OEM manual for details.



[www.agxcel.com](http://www.agxcel.com)

[info@agxcel.com](mailto:info@agxcel.com)

## GX ACCESSORY - RECIRCULATION KIT

(Read Instructions Completely before Beginning Installation)

### APPLICATIONS

1. Recirculation flow is required for product agitation.
2. IF a low flow rate is required, that would require pump to run less than 10-20% of maximum capacity. This kit will allow the pump to turn faster, while only applying a low rate of product. This makes the pump performance more stable under these circumstances. Make sure the flowmeter minimum flow is capable of metering the flow rate you wish to apply to the ground.

### HOW IT WORKS

The recirculation valve diverts some pump flow before the flowmeter. The application rate is still measured by the flowmeter and everything that passes through the flowmeter is applied to the ground. Adjust the regulation valve to set the required recirculation.

### USE OF THIS KIT LOWERS THE MAXIMUM RATE THAT CAN BE APPLIED

#### *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 rates. The Synergist 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.

## RECOMMENDED CARE AND MAINTENANCE

(Read Instructions Completely before Beginning Installation)

### WINTERIZATION

AgXcel 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.

### RECOMMENDED PRESSURE (GX ELECTRIC SYSTEMS ONLY)

Agxcel recommends to maintain a pressure between 10 and 20 psi. Doing so, and with proper winterization, will ensure the durability of the system, and reduce problems when preparing for the next season.

### TESTING THE SYSTEM

Agxcel recommends testing your system with water first. Water testing will help determine if the plumbing and hardware is secure.

### CALLING FOR TECH SUPPORT

Before calling for tech support, please check our troubleshooting section. If your problem cannot not be resolved please have your serial number handy so our technicians can easily look up your order. Serial numbers can be located on the chassis of the pump systems, or on the front page on the installation guide.

Recirculation Regulation Valve



## 3300 Industrial Series Pumps

# Installation, Operation, Repair and Parts Manual

## Description

AgXcel offers various pump models for different applications. The information outlined in this manual is general and not specific to all 3300 series pumps. Be certain the pump materials are compatible with the fluid being pumped. Product data sheets, outlining detailed specifications such as thermal limits, load capacities, and performance curves are available for individual models, along with further technical data. If unsure about chemical compatibility or intended applications of a motor, please call AgXcel for assistance.



## General Safety Information

**⚠ California Proposition 65 Warning** -- This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

### NOTE

Notes are used to notify of installation, operation, or maintenance information that is important but not safety related.

### ⚠ CAUTION

Caution is used to indicate the presence of a hazard, which will or may cause minor injury or property damage if the notice is ignored.

### ⚠ WARNING

Warning denotes that a potential hazard exists and indicates procedures that must be followed exactly to either eliminate or reduce the hazard, and to avoid serious personal injury, or prevent future safety problems with the product.

### ⚠ DANGER

Danger is used to indicate the presence of a hazard that will result in severe personal injury, death, or property damage if the notice is ignored.

### ⚠ CAUTION

“Intermittent Duty” is defined as: operated and/or frequently started within a period of time that would cause the motor to reach its maximum thermal limits. Once the maximum thermal limit is obtained, the motor must be allowed to return to ambient temperature before resuming operation.

### ⚠ CAUTION

DO NOT use to pump flammable liquids. Never operate the pump in an explosive environment. Arcing from the motor brushes, switch or excessive heat from an improperly cycled motor may cause an explosion.

### ⚠ CAUTION

DO NOT assume fluid compatibility. If the fluid is improperly matched to the pump’s elastomers, a leak may occur. Pumps used to transfer hazardous or hot (max. tempera-

ture 120°F [49°C] viton only) chemicals must be in a vented area to guard against the possibility of injury due to harmful or explosive liquid/vapors.

### ⚠ CAUTION

DO NOT operate the pump at pressures which cause the motor to exceed the amperes rating indicated on the name plate. Various pump models are equipped with thermal breakers to interrupt operation due to excessive heat. Once the temperature of the motor is within proper limits, it will automatically reset, and the pump will start operation without warning.

### ⚠ CAUTION

To prevent electrical shock, disconnect power before initiating any work. In the case of pump failure, the motor housing and/or the pumped fluid may carry high voltage to components normally considered safe.

## Hazardous Substance Alert

1. Always drain and flush pump before servicing or disassembling for any reason (see instructions).
2. Never store pumps containing hazardous chemicals.
3. Before returning pump for service/repair, drain out all liquids and flush unit with neutralizing liquid. Then, drain the pump. Attach tag or include written notice certifying that this has been done.

### NOTE

It is illegal to ship or transport any hazardous chemicals without United States Environmental Protection Agency Licensing.



## Pressure Switch Operation

The pressure switch reacts to outlet pressure and interrupts power at the preset shut-off pressure indicated on the pump label. When outlet pressure drops below a predetermined limit (typically 15-20 psi [1-1.4 bar] less than the shut-off pressure), the switch will close and the pump will operate until the shut-off (high) pressure is achieved. The shut-off pressure is set to factory calibrated standards. See the motor label for specific pump specifications.

### ⚠ CAUTION

Improper adjustment of the pressure switch may cause severe overload or premature failure. Failures due to improper adjustment of the pressure switch will not be covered under the limited warranty.

If the plumbing is restrictive or the flow rate is very low, the pump may re-pressurize the outlet faster than the fluid is being released, causing rapid cycling (ON/OFF within 2 seconds). If the pump is subjected to rapid cycling during normal operation, damage may occur. Applications which exhibit rapid cycling should have restrictions in the outlet minimized.

## Bypass Operation

A bypass pump may be used for applications that normally induce frequent start/stop of the motor, and thereby create a potential for overheating. Models equipped with an internal bypass are designed to pump at high pressure while at low flow rates.

Bypass models equipped with a switch may operate for several seconds even though the outlet side has been closed off. Contact AgXcel for information regarding bypass pumps.

## Mounting

The 3300 series pumps are self priming. Horizontal and vertical prime vary depending on the fluid viscosity and pump configuration.

The pump should be located in an area that is dry and provides adequate ventilation. If mounted within an enclosure, provisions to cool the motor may be necessary. If increased heat dissipation is necessary, motor mountable heat sinks are available from AgXcel.

### ⚠ CAUTION

DO NOT locate the motor near low temperature plastics or combustible materials. The surface temperature of the motor may exceed 250°F [120°C].

The pump may be mounted in any position. However, if mounting the pump vertically, the pump head should be in the down position so that in the event of a leak, fluid will not enter the motor.

Secure the rubber feet with #8 hardware. DO NOT compress the feet: doing so will reduce their ability to isolate vibration/noise.

## Plumbing

Flexible high pressure tubing compatible with the fluid should be used to connect the inlet/outlet ports. Tubing should be 1/2" [13 mm] I.D. and at least an 18 in. [46 cm] length is suggested to minimize stress on the fitting/ports and reduce noise. Allow for the shortest possible tubing route and avoid sharp bends that may kink over time.

### NOTE

Restrictions on the inlet may cause vacuum levels to reach the fluid vapor pressure, causing cavitation, degassing, vapor lock, noise, and a loss in performance. Inlet pressure must not exceed 30 psi [2.1 bar] maximum.

### NOTE

AgXcel does not recommend the use of metal fittings or rigid pipe to plumb the inlet/outlet ports. Standard plastic male and female-threaded fittings can be acquired at commercial plumbing supply stores. AgXcel also distributes swivel barb fittings and special fittings through its dealers.

**1/2" Female NPT models:** In some cases, the ports may require a suitable thread sealer applied sparingly. DO NOT over-tighten, max. torque 3.7 ft. lbs. [45 in. lbs. (5 Nm)].

**1/2" Male-threaded models** are intended to be used with SHURflo swivel barb fittings which seal with an internal taper when hand-tightened. Standard 1/2" NPT fittings may be used when tightened to a maximum torque of 3.7 ft.lbs [45 in.lbs (5 Nm)].

### ⚠ CAUTION

Sealers and Teflon tape may act as a lubricant, causing cracked housings or stripped threads due to over-tightening. Care should be used when applying sealers. Sealers may enter the pump, inhibiting valve action, causing no prime or no shut-off. Failures due to foreign debris are not covered under warranty.

Installation of a 50-mesh strainer is recommended to prevent foreign debris from entering the pump.

If a check valve is installed in the plumbing, it must have a cracking pressure of no more than 2 psi (.14 bar).



## Electrical

### ⚠ CAUTION

Electrical wiring should be performed by a qualified electrician, in accordance with all local electrical codes.

The pump should be on a dedicated (individual) circuit, controlled with a double pole switch (VAC U.L./C-UL certified) rated at or above the fuse ampere indicated by the pump motor label. Depending on distance of the power source from the pump and ampere load on the circuit, wire may need to be heavier than indicated by the chart.

### ⚠ CAUTION

All 115 VAC and 230 VAC pump motors and systems MUST be grounded per local and state electrical codes.

Improper duty cycle and/or rapid start & stop conditions may cause the internal thermal breaker (if equipped) to

trip, or can result in premature motor or switch failure due to excessive heat.

For the pump to meet U.L./C-UL requirements, the circuit MUST be protected with a slow-blow fuse (U.L./C-UL certified) or equivalent circuit breaker as indicated on the motor label. Use an approved wire of the size specified or heavier.

### ⚠ CAUTION

Circuit protection is dependent on the individual application requirements. Failure to provide proper overload/thermal devices may result in a motor failure, which will not be covered under warranty.

Voltage	Wire Leads	Wire Size	Fuse Rating
12 DC			SEE PUMP MOTOR LABEL
24 DC	Red (positive +)	#14 AWG [2.5 Mm <sup>2</sup> ] (or heavier)	
36 DC	Black (negative -)		
115 AC	Black (common)	#16 AWG [1 Mm <sup>2</sup> ] C-UL - TEW / UL 1015 (or heavier depending on distance)	
	White (neutral)		
	Green (ground)		
230 AC	Brown (common)		
	Blue (neutral)		
	Green/Yellow (ground)		

## Troubleshooting

### Symptom

### Corrective Action(s)

Pump will not start:

Check fuse or breaker.  
Check for correct voltage ( $\pm 10\%$ ) and electrical connections.  
Check pressure switch operation and correct voltage at switch or motor wires (as equipped).  
Check rectifier or motor for open or grounded circuit.  
Check for locked drive assembly.

Pump will not prime:  
(no discharge/motor runs)

Check to see if out of product.  
Check strainer for debris.  
Check inlet tubing/plumbing for severe vacuum leak.  
Check to see if inlet/outlet tubing is severely restricted (kinked).  
Check for debris in pump inlet/outlet valves.  
Check for proper voltage with the pump operating ( $\pm 10\%$ ).  
Inspect pump housing for cracks.

Leaks from pump head or switch:

Check for loose screws at switch or pump head.  
Check to see if switch diaphragm is ruptured or pinched.  
Check for punctured diaphragm if fluid is present at bottom drain.

Pump will not shut off:  
(pressure switch equipped)

Check to see if output line is closed and not leaking.  
Check for air trapped in outlet line or pump head.  
Check for correct voltage to pump ( $\pm 10\%$ )  
Check inlet/outlet valves for debris or swelling.  
Check for loose drive assembly or pump head screws.  
Check pressure switch operation and/or if adjustment incorrect.

Noisy / rough operation:

Check mounting feet to see if they are compressed too tight.  
Does the mounting surface multiply noise (flexible)?  
Check for loose pump head or drive screws.  
Is the pump plumbed with rigid pipe, causing noise to transmit?





## WARRANTY:

AgXcel manufactured systems come with a 1 year limited warranty. Electronic components from our OEM vendors come with a 1 year limited warranty and some components only have a 90 day warranty. (e.g. the Garmin GPS devices)

AgXcel warrants that the products or services sold here shall be free from defects in material and workmanship under normal use and services when correctly installed, used, and maintained. This warranty of quality shall terminate 1 year after delivery of the product, and shall not apply to products which have been subject to misuse, abuse, neglect, improper storage, handling, or maintenance. If the product proves to be defective within the warranty period the purchaser must contact AgXcel technical support team to troubleshoot the product to verify the defect. If technical support feels there is an issue, at AgXcel's discretion a new or factory refurbished part will be shipped to replace the part in question. All product(s) replaced or repaired under warranty shall carry the remainder of the warranty left on the original purchase. Under no circumstances shall AgXcel be liable for special, indirect, or consequential damages. In particular AgXcel shall not be liable for damage to crops as the result of misuse or negligence in the application of chemicals or operation of AgXcel products.

Our warranty process is as follows:

- When a warranty claim is made; at AgXcel's discretion a new or factory refurbished part will be shipped and invoiced. It is very important to note that the invoice is due in full within 30 days from the invoice date. Finance charges will be applied if not paid in full. Credit to your account will be processed when OEM validates and approves your warranty claim.
- It is the Authorized Dealers'/Customers' responsibility to return the warranty part to AgXcel for review within 15 days. (Note return procedure below)
- Once the part is received AgXcel will test the part to justify the claim.
- Part is then shipped to the original manufacturer to validate for warranty.
- If the original manufacturer determines that the part qualifies; your account will be credited for the new part sent.
- If the manufacture denies warranty and the part is in working order it will be returned to the authorized dealer.
- If the part is not in working order it will be discarded unless you request that it be returned to you.

## RETURNS:

AgXcel will gladly accept returns for new items purchased directly from us if returned within 30 days of receipt. However returned items must be accompanied by the original product packaging, any associated components and informational tags (such as flow meter calibration tag). Metal brackets are not returnable unless they are in new condition and are not scratched. Authorized Dealers/Customers wishing to return items must contact AgXcel at 877-218-1981 or [info@agxcel.com](mailto:info@agxcel.com) prior to returning any items to request a RMA number. **Packages sent with no RMA number are UNAUTHORIZED and will be refused by our receiving department and returned to sender at sender's expense.**

Once the return has been approved and a RMA number is obtained, AgXcel will contact the Authorized Dealer/Customer with RMA number and instructions on how to return the items.

Ensure that items are properly packaged; taking special care with items that can be scratched, damaged or broken during

shipping. Clearly write the RMA number on the outside of the package and return to AgXcel. {Return shipping and handling fees are the customer's responsibility and will not be reimbursed by AgXcel.} AgXcel highly recommends that a traceable method of shipping is used for your protection. AgXcel is not responsible for damaged or lost items due to shipping. Upon receipt of returned items AgXcel will inspect all the items and give the Authorized Dealer/Customer credit for the approved return within 30 days. Credit will not be given on items that are damaged, broken or used. This does not apply to warranty returns.

Credit for the RMA will be placed on the Authorized Dealers' account. To receive credit in the form of a check the Authorized Dealer must request this through AgXcel accounting. Customers' credit for the RMA will be issued when approved.

### Returns will not be accepted for credit on items that are:

- Opened or used
- Special orders - Items that are specially ordered from an outside vendor not normally held in AgXcel stock
- Returned more than 30 days after delivery
- Returned without an RMA
- Returned in a package not well suited for the item
- Partial return of items sold as a kit

Products returned to AgXcel must be thoroughly cleaned and free of all chemical contamination. Items not properly cleaned will be returned to the owner at their expense.

A 20% re-stocking fee will be applied on all returned parts.

agXcel