

# agXcel 40 Synergist

Nano-Technology Application System



## AUTOXCOMPACT

## REFERENCE MANUAL

*Plus*

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 NH3 at a rate of 32 oz/acre. Higher rates are possible.

### Note on ounces per acre

On the AutoX Compact Plus 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.27 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's Micro Control Valve

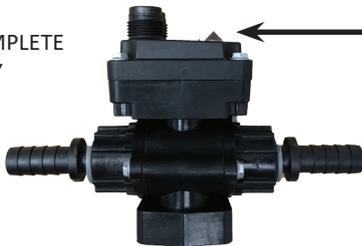


AgXcel's micro control valves are designed to eliminate the need for large sectional valves. The small compact design makes them ideal for controlling flow through the manifolds.

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.

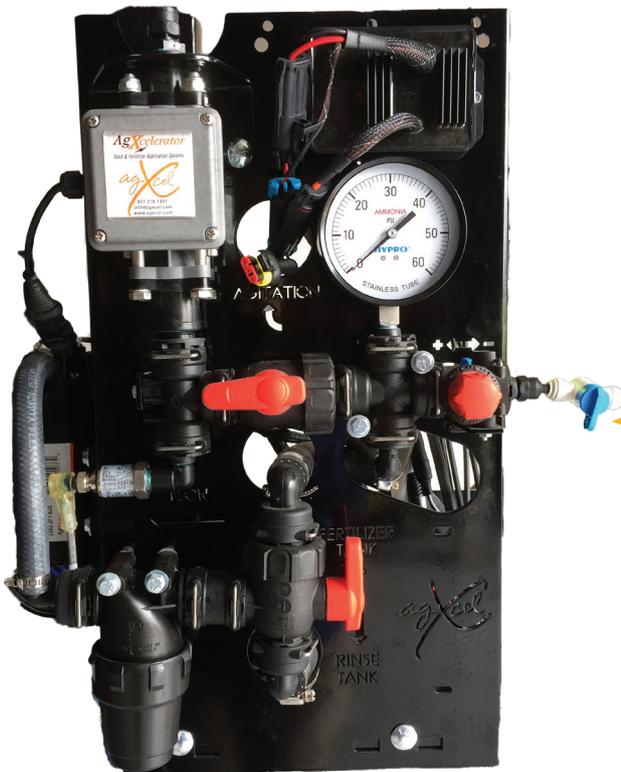
Please note, implements that are less than 60 feet wide need to be setup as one section in order to prevent range dropping below flow meter capabilities at lower speeds.

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 pumps 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.



Make sure your system is properly calibrated before beginning to apply product.



## Manual Operation

This mode sets and maintains a steady flow rate (GPM) not affected by changes in vehicle speed. The overall application rate (GPA) will vary depending on speed (slow vehicle speed = increased application rate, fast speed = lower application rate.)

Manual mode is most useful for system set up, spot applications, etc.

1. Press the AUTO/MAN button to select Manual mode ("MAN" icon will be displayed).
2. Adjust the flow rate by using the Increase/Decrease buttons to adjust the servo valve. The longer the buttons are held, the faster the valve will move to allow both rapid movement and fine adjustments.

Note: Manual control can be disabled by changing the MANUAL ENABLE setting in Special Calibrate.

### IN RUN:

Manual rate adjust can be done while the rotary knob is in either the RATE or VOLUME/MINUTE position.

### IN HOLD:

If the console is in HOLD, or if all section valves are OFF, the rotary knob must be in the VOLUME/MINUTE position to adjust the servo valve using the Increase/Decrease buttons. In that position only, the servo valve can be adjusted without any section valves on, and the flow rate (GPM or LPM) can be monitored. This can be useful for system pressure tests, etc. The above applies only when using a Standard (Std) control valve. A PWM (PULSE) control valve is always Off when in HOLD.

## Automatic Operation

This mode sets and maintains a steady application rate (GPA) - unaffected by changes in speed or section switching.

1. Press the AUTO/MAN button to select Automatic mode ("AUTO" icon will be displayed).
2. Switch on the desired number of boom sections.
3. Switch the RUN/HOLD switch to RUN.
4. Drive vehicle. (Speed signal will activate system.)

Use the Section switches, the RUN/HOLD switch or remote RUN/HOLD sensor to Start or Stop application at any time.

### ON-THE-GO RATE ADJUSTMENTS

To adjust the application rate, turn rotary knob to the RATE position and press the Increase/Decrease buttons. The increment of this change is set in the ADJUST RATE position in Calibration. For example, if the calibrated TARGET RATE = 20.0 GPA and ADJUST RATE = 1.0 GPA, pressing the Increase key once will increase the target rate from 20.0 to 21.0. The display will momentarily show the new TARGET (21.0) for two seconds before it resumes showing the ACTUAL application rate. The "adjusted" target rate is maintained until console power is turned off. NOTE: The target rate may also be adjusted while in HOLD.

## Care and Maintenance of your AutoX Compact Plus

- Store the console in a cool dry location during the off-season.
- Do NOT allow water or other liquids to enter the case.



**BE SURE ALL POWER HARNESSSES ARE CONNECTED DIRECTLY TO THE BATTERY. FAILURE TO DO SO CAN CAUSE POWER ISSUES AND POTENTIALLY VOID WARRANTY.**



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# AUTOX COMPACT PLUS CONSOLE FUNCTIONS



The AutoX Compact Plus provides automatic rate control using PWM control. This controller is compact in size, yet packed with powerful rate control and calculating features. Built to fit your changing needs with flexible system options and added special features to ensure quick valve response to changes in vehicle motion, helping minimize disappointing under-applications.

**VOLUME (1) (2) (3):** Displays the total volume of product applied in gallons (liters) or lbs (kg) of NH<sub>3</sub>. May be reset. SEE NOTE

**VOLUME/MINUTE:** Displays total gallons (liters) of liquid applied per minute, or lbs. (kg) NH<sub>3</sub> per minute.

**TANK:** Displays gallons (liters) of liquid remaining or lbs. (kg) of NH<sub>3</sub> remaining

**RATE:** Displays application rate in the following units of measurement based on the UNITS and MATERIAL settings.

**RUN/HOLD:** Turns liquid application on (RUN) or off (HOLD)

**AUTO/MAN:** Changes operation from automatic control to manual. (If Manual Control is enabled).

**CAL:**

- Used to enter & exit the calibration mode.
- Used to select the Section # in 'Width Cal' position.
- Used to select the page # in "Special" Calibration.
- Toggles between SPEED CAL and Distance traveled while fine tuning the SPEED CAL factor or between FLOW CAL and Volume when fine tuning the Flow Cal factor

**NOTE:** VOLUME and AREA counters function in pairs. If the VOLUME counter 1 is reset, it also resets AREA counter 1. There are 3 independent data sets. The number icon indicates which counter set is shown. If console is in Supervisor Lockout then only Data Set 1 can be cleared. Counters do not accumulate data when console is in HOLD or sections are turned off.

**3 SECTION SWITCHES:**  
Turns application on/off for each section. If not dividing implement into sections, use Section 1 switch only

**AREA (1) (2) (3):** Keeps a running count of the total area worked in acres (hectares) or 1000 Ft<sup>2</sup> in Turf Units May be reset. SEE NOTE

**DISTANCE:** Displays Distance traveled in either Feet or Meters. May be reset.

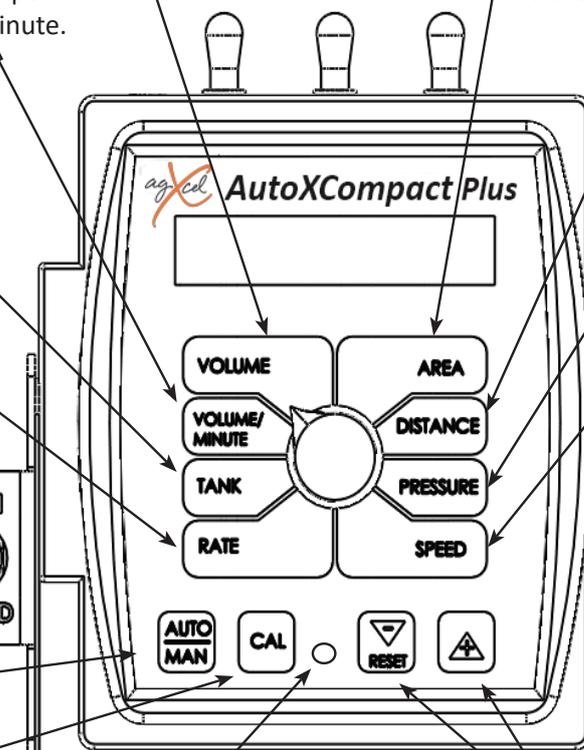
**PRESSURE:** Displays system pressure (if pressure sensor is connected to system).

**SPEED:** Displays ground speed in miles per hour (kilometers per hour).

**ON/OFF:** power switch. When the SprayMate Plus console is turned on (except when starting SPECIAL CALIBRATE) the display shows the following information for approximately 1 sec each:

- # of hours it has operated.
- Software PN#
- Software Revision Letter
- Drive type for control valve ("PULSE" or "Std")

**NOTE:** If FTW option is enabled (using Three Way valves) then "3WAY" is also shown.



Red LED indicates Calibration Mode.

**INCREASE/DECREASE:**

- In normal operating modes, used to increase/decrease application rate.
- In Volume, Area, or Distance, the "+" button selects the counter set.
- RESET: When in Hold and not in CAL, clears the selected counter set when held for one second.
- When in CAL, the "+" button increases and the "-" button decreases the calibration value displayed.

**WARNING LIGHT:** Flashes 3X to indicate over or under application of +/-\*10% from the Target Rate, a low tank level, too high or too low Pressure reading, or that Minimum Flow feature is active. Also lit when in CAL and Unlocked.

\*NOTE: % adjustable via 'Rate Alarm Threshold'.

**NOTE:** If console is locked (by using Supervisor Lockout), the calibration factors can be viewed but not changed.

# AUTOXCOMPACT PLUS QUICK SETUP

## \* IMPORTANT SETUP ITEMS\*



The GX40 Synergist system will need to have several Calibration entries set by the end user. The AutoX Compact Plus will be shipped with the defaults for PWM Electric Pumps, but the changes shown below and explained on the next pages must be made prior to using the GX40 Synergist for NutriSphere-N NH3 at a 32 oz/acre rate.

### Make these Cal and Special Cal adjustments prior to using the system:

<i>Summary of Calibration entries and Special Cal changes for GX40 Synergist</i>				
Parameter	CAL or SPEC CAL	Default	Setting for Synergist	More Info Page #
FLOW CAL	CAL VOLUME	145.0	355	10
WIDTH CAL	CAL AREA (TURN ON BOOM 1 TO SET BOOM1)		WIDTH IN INCHES FOR EACH SECTION	10
CONTROL SPEED	CAL PRESSURE	-1	-3 (VARY FROM -4 TO 3)	10
TARGET RATE	CAL RATE	20	32	10
ADJUST RATE	CAL TANK	1	ANY INCREMENT	10
MINIMUM FLOW	CAL VOL/MIN	0	8	10
TANK FILL LEVEL (OPT)	SPEC CAL 1 - VOLUME	OFF	TANK SIZE (GAL X 128)	11
TANK ALARM LEVEL	SPEC CAL 1 - VOL/MIN	OFF	#GAL X 128	11
MINIMUM PULSE	SPEC CAL 4 - TANK	10	12	14
PWM FREQUENCY	SPEC CAL 4 - AREA	200	150	14
RATE ALARM (SMOOTHING)	SPEC CAL 5 - AREA	10	10 - 30%	15

#### CALIBRATION STEPS:

1. Stop the vehicle, if moving.
2. Switch console to HOLD, or turn all section switches OFF.
3. Press and hold the CAL button about 1 second until the 'CAL' icon appears on screen and Red LED light is on.
4. Select calibration position on rotary selector (see explanations of each position starting on page 10).
5. Adjust values using Increase/Decrease buttons.
6. To exit Calibration without saving changes - turn console OFF.
7. To save changes and exit Calibration - press and hold the CAL button for 1 second - 'CAL' icon on screen will turn off and red LED light will turn off.

NOTE: If console is locked, Calibration values can be viewed but not adjusted. Test Speed position is always active.

#### SPECIAL CALIBRATION STEPS:

1. Turn ON console while pressing the CAL button - screen will display "SPEC", then "CAL" and number (Page 1).
2. Select a Special Calibration position using rotary knob. (See explanations of settings on next pages)
3. Adjust Page 1 value or press the CAL button to access Pages 2-5.
4. Adjust value using Increase/Decrease buttons.
5. To exit Special Calibration without saving changes - turn console OFF.
6. To save changes and exit Special Calibration - press and hold the CAL button for 1 second - 'CAL' icon on screen will turn off and red LED light will turn off.



# STANDARD CALIBRATION:



## STEP 1

### FLOW CAL:

Enter the calibration number for your flowmeter here. On electromagnetic flowmeters the calibration number is from the chart below.

In order to measure the product in ounces take the pulses/gallon divided by 128 then multiply by 2. **\*\*chart below\*\***

FLOW RANGE (GPM)	PULSES/GALLON	AUTOXCOMPACT FLOW CAL
0.08 - 1.6	22710	355

### MIN FLOW:

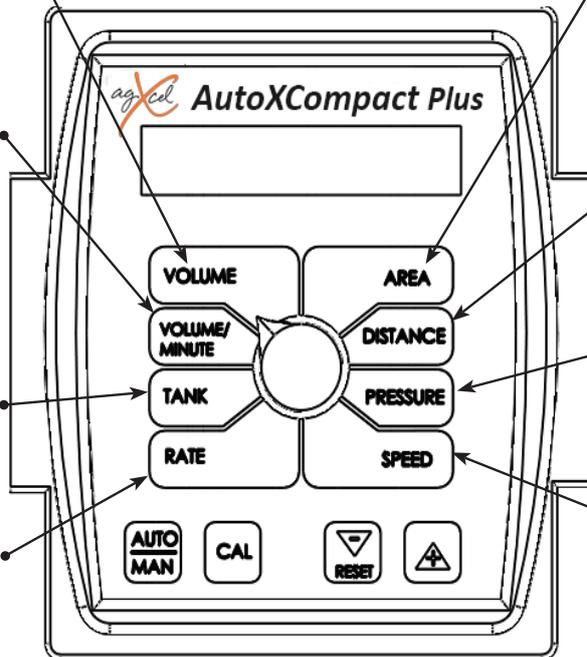
The purpose of this calibration value is to prevent the system from dropping below the amount that the flowmeter can measure. Set this to 8.0 oz/min when using the GX40 SYNERGIST system with the 0.08 to 1.6 GPM flowmeter.

### ADJUST RATE:

Sets amount of rate change by pressing "+" or "-" button once. Usually set to 2.0. This allows you to change from 32 oz/ac to 34 oz/ac, etc.

### TARGET RATE:

Set to your intended target rate in Ounces per Acre.



### WIDTH CAL:

Enter the width of each fertilizer or chemical section of your implement. For a single section system, set Section One to the full implement width in inches. For example, for an 8 row 30" implement, set Section One to 240 inches. To set the section widths the Run/Hold Switch has to be in Run and the Section Switch must be ON. If using a single section implement, set Section 2 and 3 to ZERO.

### SPEED CAL:

Used in calibration mode to enter the speed calibration number in inches per pulse. Default is 0.189 for Astro GPS speed sensor.

### CONTROL SPEED: START WITH -3

Allows adjustment of response to "tune" the system for use with fast or slow valves. For example, if response is too slow, use the "+" button to adjust the valve response number to 1, 2 or 3. The range of adjustment is -4 to +3.

### TEST SPEED:

Use this mode to verify controller automatic operation only AFTER initial operation in MANUAL mode.

### CALIBRATION STEPS:

1. Stop the vehicle, if moving.
2. Switch console to HOLD, or turn all section switches OFF.
3. Press and hold the CAL button about 1 second until the 'CAL' icon appears on screen and Red LED light is on.
4. Select calibration position on rotary selector (see explanations of each position on next few pages).
5. Adjust values using Increase/Decrease buttons.
6. To exit Calibration without saving changes - turn console OFF.
7. To save changes and exit Calibration - press and hold the CAL button for 1 second - 'CAL' icon on screen will turn off and red LED light will turn off.

NOTE: If console is locked, Calibration values can be viewed but not adjusted. Test Speed position is always active.

### Make these Cal and Special Cal adjustments prior to using the system:

355  
(to measure in ounces)

FLOW CAL

VOLUME

AREA

WIDTH CAL

SET BOOM 1 AND BOOM 2 AS NEEDED:  
BOOM 1: 360 INCHES  
BOOM 2: 0 INCHES  
BOOM 3: 0 INCHES

8

MIN FLOW

VOLUME/MINUTE

DISTANCE

SPEED CAL

0.189

2.0  
(ANY INCREMENT)

ADJUST RATE

TANK

PRESSURE

CONTROL SPEED

PWM ELECTRIC: -3  
(VARIES FROM -4 TO 3)

32 OZ/ACRE

TARGET RATE

RATE

SPEED

TEST SPEED

OFF ( WILL SET SPEED WHEN DOING AUTO TEST)

**STEP 2**

**TANK FILL LEVEL:**

If using the Tank feature, this setting can be used to enter the volume of the tank. Use the “+” and “-” buttons to choose OFF or any value from 1-65,535. Then when the tank is filled, the tank counter can be reset to full by simply turning the rotary switch to the TANK position and pressing the “+” button

**UNITS:**

Adjusts system to calculate pressure readings when using an “Absolute” style pressure sensor. Input Absolute Atmospheric Pressure in PSI (bar) for your location. Set to ZERO.

**MATERIAL:**

Chooses material for application- H2O or NH3.

**OUTPUT TYPE:**

Choose PULSE (PWM) OR STD (reversing polarity DC) electronic drive signal for the control valve. The display will show PULSE or Std (also shown when console is powered up.)

**APPLICATION ID:**

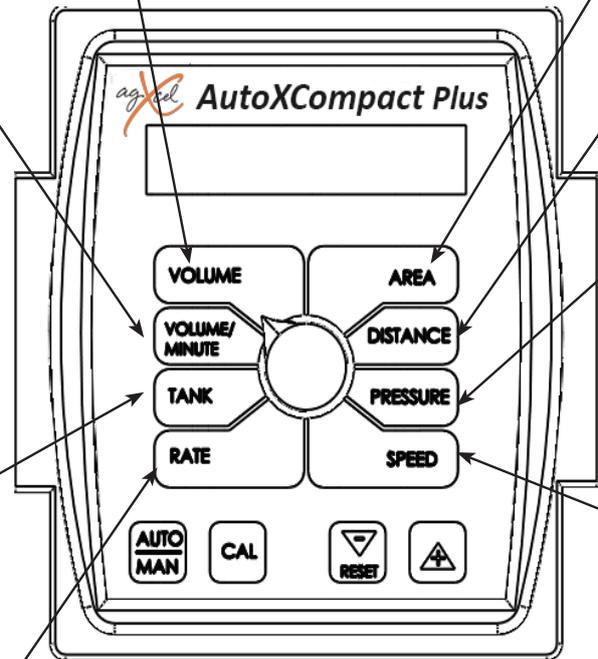
Enter an ID number to identify the console. (This number could also represent an application or a vehicle.) If you connect the console to another device via serial port, the APPLICATION ID is included with the Totals Data List and Equipment List information.

**TANK ALARM LEVEL:**

Use the “+” and “-” buttons to set the level where the Warning LED starts flashing and the word “FILL” flashes on the display. Range is OFF or 1-65,535. When the tank value drops below the set point, the alarms will notify the user that the tank level is low.

**START SPEED TIME:**

Enables “Quick Start - Speed” function and defines the duration of the simulated speed - up to 6 seconds. Setting to 0 (Off) will disable the function.



**START SPEED:**

Enables “Quick Start - Speed” function and defines the intended simulated speed in MPH (km/H). Setting to 0 (Off) will disable the function.

**SPECIAL CALIBRATION STEPS:**

1. Turn ON console while pressing the CAL button - screen will display “SPEC”, then ‘CAL’ and number (Page 1).
2. Select a Special Calibration position using rotary knob. (See explanations of settings on next pages)
3. Adjust Page 1 value or press the CAL button to access Pages 2-5.
4. Adjust value using Increase/Decrease buttons.
5. To exit Special Calibration without saving changes - turn console OFF.
6. To save changes and exit Special Calibration - press and hold the CAL button for 1 second - ‘CAL’ icon on screen will turn off and red LED light will turn off.

OFF	TANK FILL LEVEL	VOLUME	AREA	UNITS	ENG
OFF	TANK ALARM LEVEL	VOLUME/MINUTE	DISTANCE	MAT	H2O
0	START SP. TIME	TANK	PRESSURE	TYPE	PULSE
0	SPEED TIME	RATE	SPEED	ID	1



**SPECIAL CALIBRATION:  
PAGE 2**



**STEP 3**

**HOLD INPUT POLARITY:**

On Remote Run/Hold connection - allows user to reverse the circuit function. The default setting is CLOSED - meaning that AGXCEL AUTOX will be in HOLD when the circuit is closed.

**START TIME:**

Enables "Quick Start - Valve" function and defines the duration of the "Quick Start". Setting to 0 (Off) will disable the function.

**VALVE START % OR AUTO SHUTOFF:**

**VALVE START % - PWM ONLY**  
Enables "Quick Start - Valve" function and defines the percentage of the PWM duty cycle during the "Quick Start - Valve" feature.

**AUTO SHUTOFF - STD ONLY**

Enables Auto Shutoff feature - it runs the control valve towards minimum flow each time HOLD is selected, or when all (non-zero width) sections are turned off, or when in AUTO and ground speed goes to zero. Duration of Auto Shutoff feature is 18 seconds.

**PRESSURE OFFSET:**

Adjusts system to calculate pressure readings when using an "Absolute" style pressure sensor. Input Absolute Atmospheric Pressure in PSI (bar) for your location. Set to ZERO.

**PRESSURE ALARM LOW:**

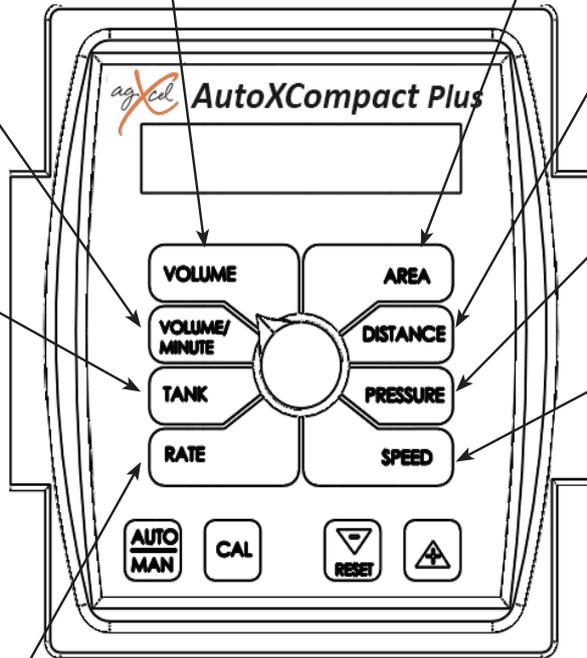
Enables and adjusts value for Pressure Alarm set value to notify operator when low level is reached. This can be set to OFF (0) or up to 50% of FULL SCALE setting.

**PRESSURE ALARM HIGH:**

Enables and adjusts value for Pressure Alarm set value to notify operator when high level is reached. This can be set to OFF (0) or up to 100% of FULL SCALE setting.

**PRESSURE FULL SCALE:**

Displays and adjusts FULL SCALE (maximum) value for Pressure Sensor. Default setting is 150 PSI. For AgXcel Pressure Sensor P/N #53491.  
NOTE: This measurement is always rated in PSI.



**AUTO DELAY TIME:**

Enables and adjusts value for Auto Delay feature. When transitioning from HOLD to RUN, it provides time for motorized valves to operate and allows the flow to stabilize before AUTO control begins. This can be set to OFF (0) or between 1 - 4 seconds.

OPEN	HOLD INPUT	VOLUME	AREA	PRESS OFFSET	0
0	START TIME	VOLUME/MINUTE	DISTANCE	PRESS LOW	OFF
---	VALVE START %	TANK	PRESSURE	PRESS HIGH	OFF
0	AUTO DELAY	RATE	SPEED	PRESS FULL	150

# STEP 4

**MANUAL ENABLE:**  
Enables (ON) or disables (OFF) Manual Control mode. Disabling this function means the console will only run in AUTO mode and the AUTO/MAN switch will be inactive.

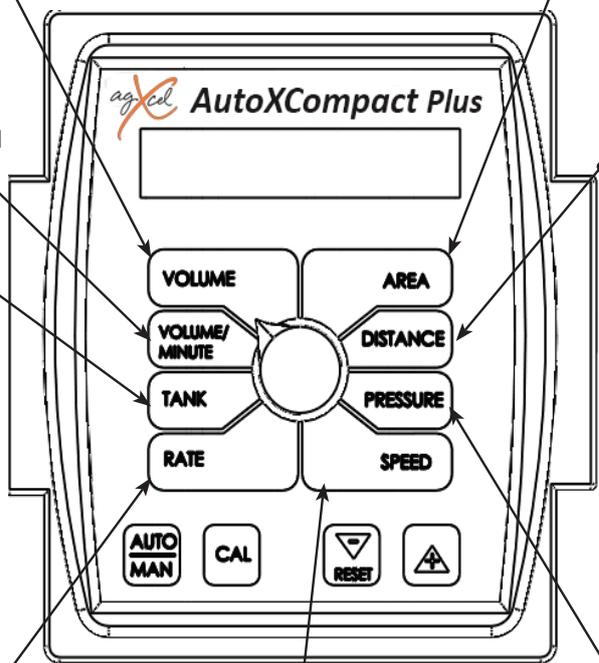
**SERIAL PROTOCOL TYPE:**  
Chooses serial protocol used for communicating VRA information through the serial port. Choices are Micro-Trak or Raven (model 660) Default is Micro-Trak protocol

**MINI ALARM SPEED:**  
Enables and adjusts a minimum speed threshold for the audible alarm - this prevents unneeded warnings while stopping and starting. This can be set to OFF (0) or from 0.1 to 99.9 mph (km/h). Affected alarms are Application Rate Error and Minimum Flow.

**AUDIBLE ALARM ENABLE:**  
Enables (ON) or disables (OFF) Audible Alarm function - allows user to operate system without hearing any system warnings. Flush cycle completion alert is not affected by this setting.

**F-FLO:** Threshold value turns on power to Multifunction output based on the fixed total flow rate, regardless of active width.

**P-FLO:** Threshold value turns on power to Multifunction output based on flow rate, proportional to active width. Example: If the threshold is set to 10gpm while running only 2 out of 5 sections, the trigger would start output at 4gpm - (2/5 X 10).



**MULTIFUNCTION FLOW TRIG. THRESHOLD:**  
When Multifunction output is set to Fixed Flow Trigger (F-FLO) or Proportional Flow Trigger (P-FLO), this adjusts the threshold value in Volume/Minute for activating the voltage output. The output will turn off if Volume/Minute is reduced to 95% of the threshold value. This fixed margin is maintained to reduce on/off cycling if system is operating at or near threshold setting. **\*\*SEE BOX\*\***

**MULTIFUNCTION OUTPUT:**  
Selects mode of 12VDC power sent to Multifunction Output connection on branch harness. Default setting this function is Master.

1. OFF = Always off
2. ON = Always on
3. ON CAL HOLD = On in Hold
4. OFF CAL HOLD = On in Run and at least 1 section on
5. FLUSH = Enables Flush cycle to purge chemicals from lines when switching from Run to Hold - see below
6. F-FLO = Fixed Flow Trigger - see above
7. P-FLO = Proportional Flow Trigger- see above

**FLUSH TIME:**  
When Multifunction output is set to FLUSH, this enables and adjusts the duration of the Flush cycle. This can be set to OFF (0) or from 1-12 seconds.

**FLUSH DELAY TIME:**  
When Multifunction output is set to FLUSH, this enables and adjusts a time delay from the RUN/HOLD transition to the start of the Flush cycle. This can be set to OFF (0) or from 1-6 seconds.

OFF	MANUAL ENABLE	VOLUME	AREA	FLOW TRIG	---
DEFAULT	SERIAL PROTO TYPE	VOLUME/MINUTE	DISTANCE	MULTI OUTPUT	MASTER
0	MIN ALARM	TANK	PRESSURE	FLUSH DELAY	0
OFF	AUDIBLE ALARM	RATE	SPEED	FLUSH TIME	0



**STEP 5**

**THREE-WAY VALVE ENABLE:**

Enables the use of Three-way Valves with the AutoX Plus system. This setting changes the internal calculations for section totals so that flow in return lines to the tank (or to hydraulic system) is not included when sections are turned off.

**FLOW @ MIN PULSE WIDTH - PWM ONLY:**

Enables and adjusts value for Volume/Minute flow when the PWM valve is operating at minimum duty cycle. This can be set from 0.00 to 655.35 (This value must be smaller than the Flow At Maximum Pulse Width.)

**MINIMUM PULSE WIDTH - PWM ONLY:**

In PWM Output, this adjusts value for Minimum Pulse Width. This setting can be useful to maintain hydraulic motor min. rpms or to ensure nozzle min. flows are maintained. This can be set from 0 to 100% (This value must be smaller than the Flow At Maximum Pulse Width.)

**PWM FREQUENCY - PWM ONLY:**

In PWM Output, this adjusts value for PWM Frequency. This can be set from 50 to 500Hz. Consult your PWM device information for optimal frequency. Default frequency is 200Hz.

**FLOW @ MAX PULSE WIDTH - PWM ONLY:**

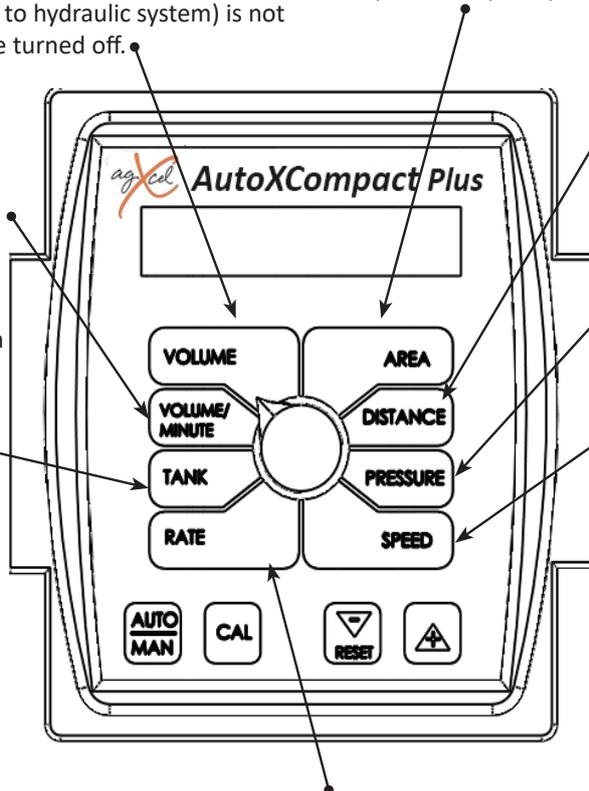
Enables and adjusts value for Pressure Alarm set value to notify operator when low level is reached. This can be set to OFF (0) or up to 50% of FULL SCALE setting.

**MAXIMUM PULSE WIDTH - PWM ONLY:**

In PWM Output, this adjusts value for Maximum Pulse Width. This can be set from 0 to 100% (This value must be larger than the Flow At Minimum Pulse Width.)

**CLOSED/OPEN LOOP - PWM ONLY:**

In PWM Output, this selects Open or Closed Loop configuration. Closed Loop operation means using a flowmeter (or other sensing device) to calculate flow. Open Loop operation uses PWM parameters to calculate flow - useful when a flowmeter is not practical or flow rate is extremely low. Flow at Max. Pulse Width parameter must be set >0 before choosing Open Loop.



**AGITATION % OR VALVE POLARITY:**

**AGITATION % - PWM ONLY**

In PWM Output, this enables Tank Agitation when system is in Hold, and adjusts the desired duty cycle for the agitation. This can be set to OFF (0) or from 1 to 100%. Agitation is disabled during any calibration mode.

**VALVE POLARITY - STD ONLY**

In STD Output, this defines operation of the flow control valve - choose Bypass or Inline plumbing configuration. Default setting is Bypass

OFF

3-WAY  
ENABLE

VOLUME

AREA

PWM  
FREQ

200

0

FLOW  
@MIN  
PULSE

VOLUME/  
MINUTE

DISTANCE

PRESS  
LOW

OFF

12

MIN  
PULSE

TANK

PRESSURE

PRESS  
HIGH

100

OFF

AGI %

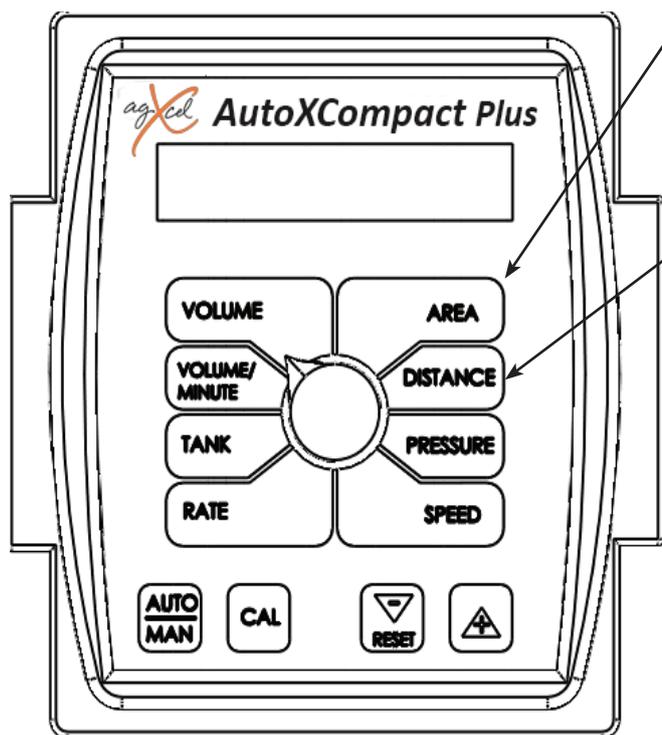
RATE

SPEED

LOOP

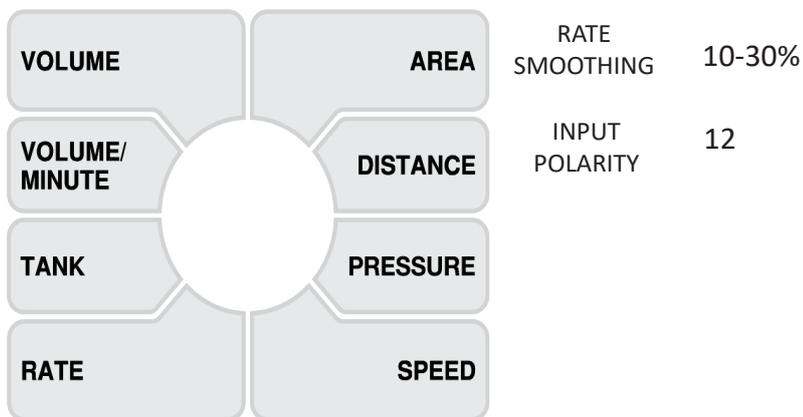
CLOSED

# STEP 6



**RATE ALARM THRESHOLD (SMOOTHING):**  
Adjusts threshold value for the Rate Alarm - can be set from 10-30%. This value is the percentage of difference between the actual rate of application and the intended (target) rate. Default setting is 10%.

**SECTION INPUT POLARITY:**  
This setting allows the user to reverse the polarity of section inputs. This may be useful when connecting a separate device to the AgXcel system for automatic section control. Default is 12v.



## “QUICK START” FUNCTION

There are two different Quick Start methods, “Quick Start - SPEED” and “Quick Start – VALVE”, which can be enabled for use in Automatic operating mode. Each method uses a separate set of Special Calibrate parameters, and only one method can be enabled at a time (the other must be disabled). See Special Calibration section to enable/adjust the parameters.

### QUICK START - SPEED

Provides an instant Speed (simulated) whenever the system goes from HOLD to RUN.

#### USAGE:

This is useful for applications where the delay associated with acquiring enough Speed signal pulses to provide the console with a valid operating speed is unacceptable. This is intended for situations where the application equipment is quickly going from a stopped condition (Speed=0) to an operating speed.

#### SETUP:

Two Special Cal factors, START SPEED and START SPEED TIME, must be set (values > 0) to enable this feature.

\* Important: Verify that “Quick Start –VALVE” is disabled: (START TIME = ‘OFF’).

\* Important: Make sure AUTO DELAY TIME = 0, so it does not add any delay to the Quick Start feature.

#### HOW IT WORKS:

When switching from HOLD to RUN, the console will use the START SPEED value as the simulated Speed (example: 5 mph) for START SPEED TIME (example: 2 seconds).

**QUICK START - VALVE** Provides a “jump start” to open the control valve by running it immediately after some movement is detected.

#### USAGE:

On some Standard DC servo and all PWM systems, the control valve is used to completely stop the hydraulic flow when in HOLD (see \*Note below). In those systems there may be an undesirable delay for the Servo or PWM valve (which may “stick” off) to return to normal operating flow again. “Quick Start –VALVE” can be used to reduce this delay by “jump starting” the hydraulic flow to allow AUTO control to reach the Target Application Rate faster, resulting in a smaller area of under application. The optimal settings for START TIME and START PERCENTAGE will require experimentation. If the values are too small there will be little improvement in startup time, and if too large it will overshoot the desired application rate.

\*Note: A HOLD condition can be generated by: Run/Hold switch (or sensor) in HOLD position, or when all non-zero width sections are switched OFF, or if ground speed is 0 in AUTO (automatic All-Sections-Off feature).

#### SETUP:

Depending on the type valve used, certain Special Calibrate factors must be set up as indicated below.

- Standard servo valve:

Only one Special Calibrate factor, START TIME, must be set (value > 0) to enable this feature.

- PWM valve:

Two Special Calibrate factors, START TIME and START PERCENTAGE, must be set (values > 0) to enable this feature.

\* Important: Verify that “Quick Start –SPEED” is disabled: (START SPEED = ‘OFF’ and START SPEED TIME = ‘OFF’).

\* Important: Make sure AUTO DELAY TIME = 0, so it does not add any delay to the Quick Start feature.

#### HOW IT WORKS:

After a change from HOLD to RUN and after the vehicle has traveled about 10 inches:

- Standard servo valve:

The servo control valve (previously closed) is run towards open for START TIME (example: 1 second).

- PWM valve:

The PWM valve is “cracked” open by running it at specific duty cycle above MIN PWM determined using START PERCENTAGE, for a short time interval specified by START TIME.



## TROUBLESHOOTING

(Read Instructions Completely before Beginning Installation)

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

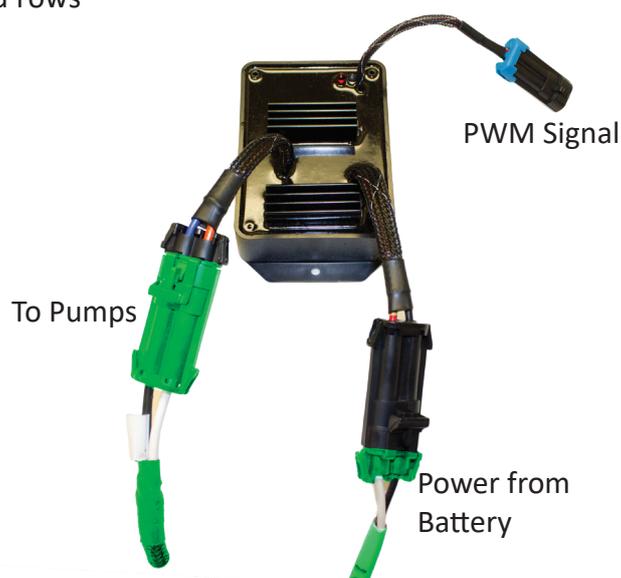
This symptom is due to the pumps drawing more current than the 40 amp limit of the EPD.

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

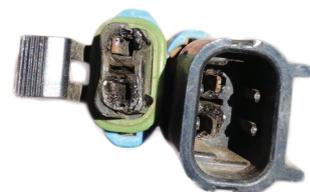
Connect pumps directly to battery

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.

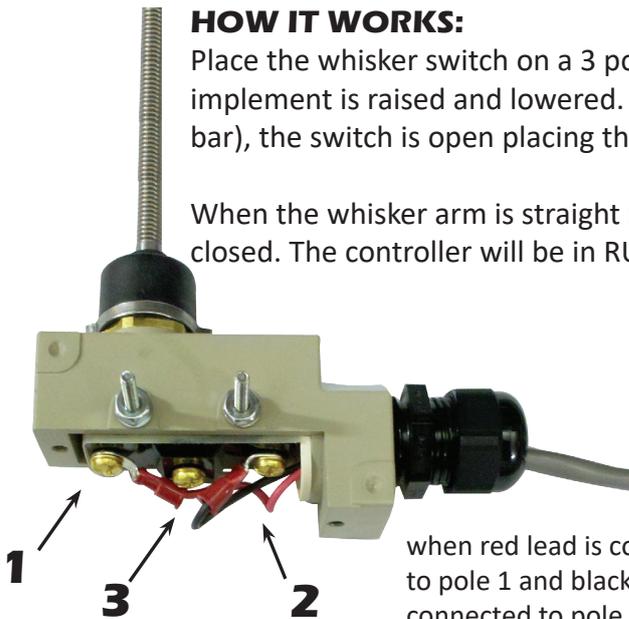


*Illustration shown has a 3pin connector.*

#### 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 NH3 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.

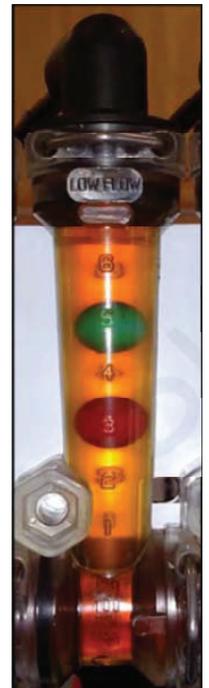


Fig. 1

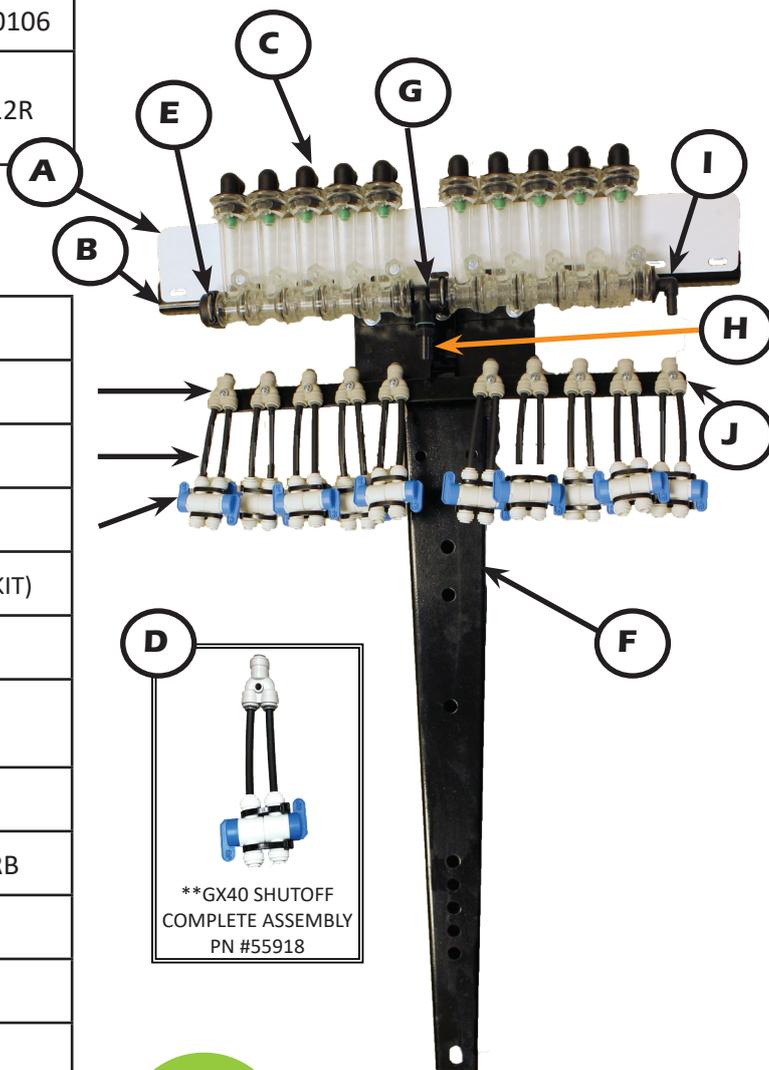


Ball retainer - If top is removed, be sure that the ball retainer is in place when top is reinstalled.

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

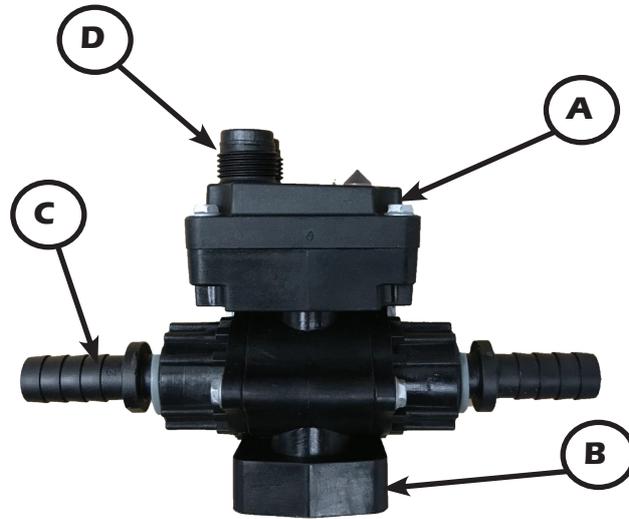
C	25709	1/4 PTC TOPS
D	37721	DIVIDER W/MOUNT HOLE
	19920	EVA14
	19848	1/4" PTC SHUTOFF (QTY 2)
	55918	**GX40 SHUTOFF ASSEMBLY (KIT)
E	18039	COLUMN END CAP & CLIP
F	38260	GX1 CHASSIS (TOMAHAWK ONLY)
G	18042	ISOLATED FEED
H	32264	3/8 MNPT TO 3/8 HOSE BARB
I	18033	3/8" HOSE SHANK-90 DEG
	25682	LOCK U-CLIP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



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



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

<b>GX40 SIGHT COLUMNS</b>		
	PN#	DESCRIPTION
<b>LOW FLOW</b>	<b>25689</b>	Wilger Low Flow Column Only
	<b>25687</b>	Wilger Low Flow Column W/balls, clip, retainer (No Top)
	<b>37617</b>	Wilger Low Flow Complete Column(s) - 4 pack w/ End cap, clips & 1/4QC Tops
<b>BALL SELECTION FOR THE GX40</b>		
<b>1-3 GPA</b>	<b>18077</b>	Green Plastic* Ball
<b>2-4 GPA</b>	<b>18078</b>	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

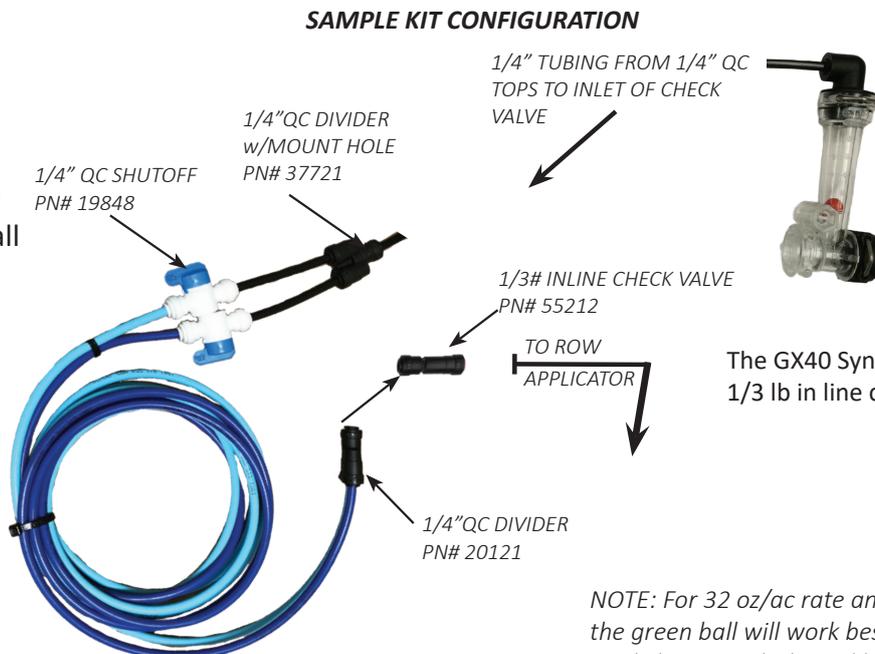
Micro tubes provides a larger passage way diameter than a comparable orifice. Typical NutriSphere-N NH3 applications apply around 1 to 1.5 oz/min/row. An orifice of this rate would have a 0.015" diameter opening. The GX40 Synergist uses micro tubes Navy Blue and Gray. This 12' tube with more than 3 times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

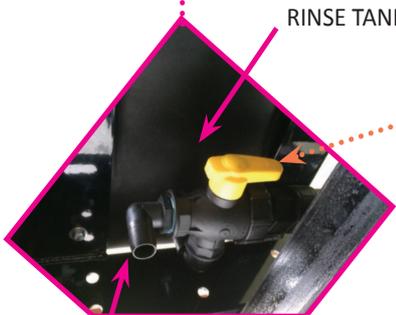
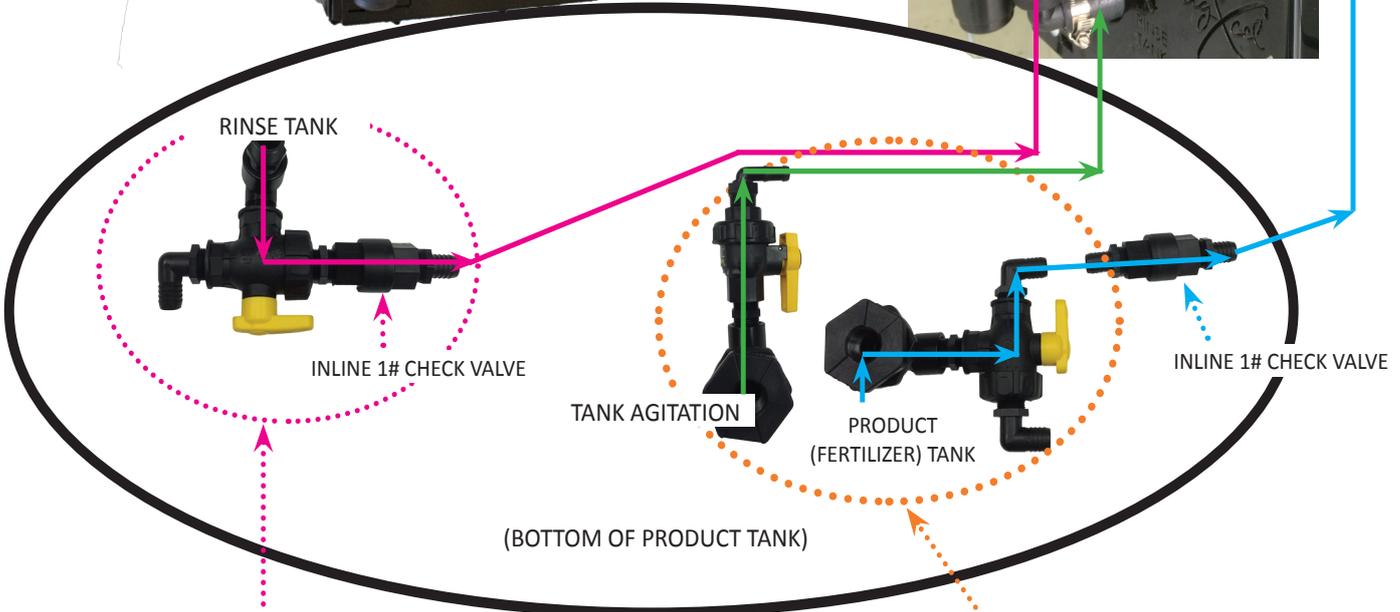
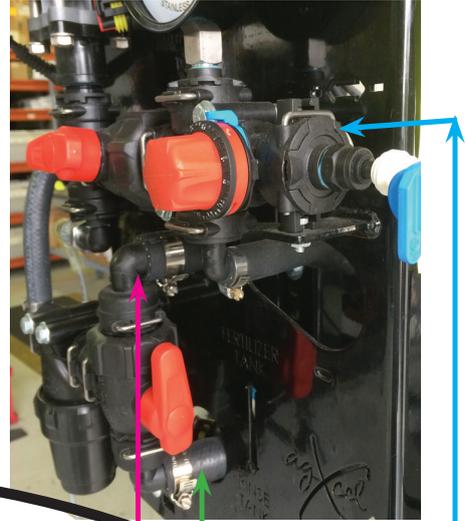
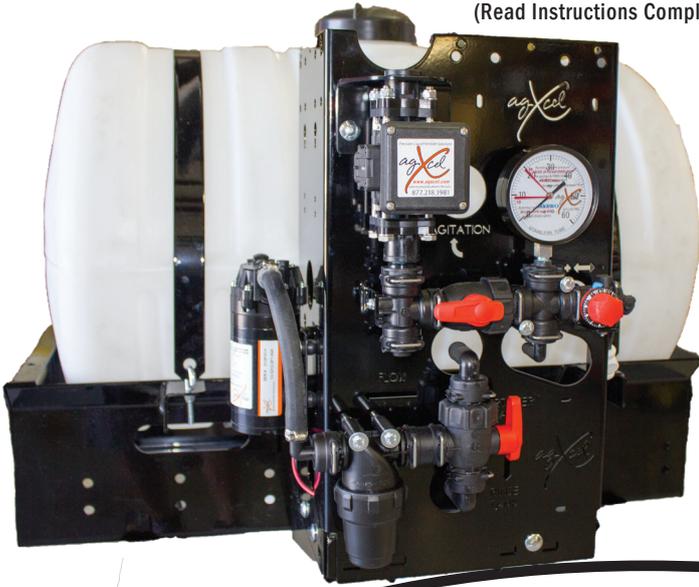
The 4' green tube delivers the product to the shank.

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 Navy blue tube 1/4" QC x 1/4" QC. Cap both ends of the Sky Blue tube. \*Sky Blue tube will be used when cold weather and/or high speeds create too high pressure in the Navy Blue tube.
5. Connect Navy blue tube to outlet side check valve provided (see p.12 for kit options)
6. Connect the black 1/4" tubing from top of flow indicator to inlet of check valve.



# GX40 SYNERGIST TANK PLUMBING DETAIL

(Read Instructions Completely before Beginning Installation)



TANK AGITATION

3 WAY BALL VALVE

RINSE TANK

PRODUCT (FERTILIZER) TANK

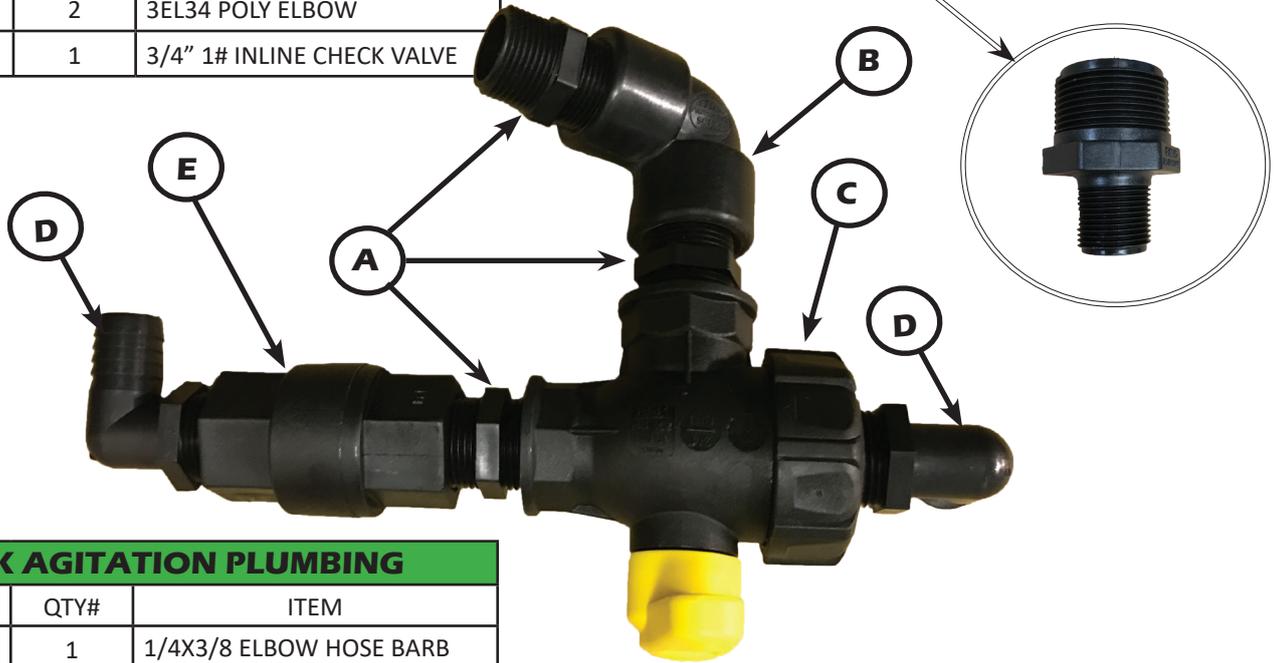
- ➔ RINSE TANK
- ➔ PRODUCT (FERTILIZER)TANK
- ➔ TANK AGITATION

RINSE TANK OUTLET

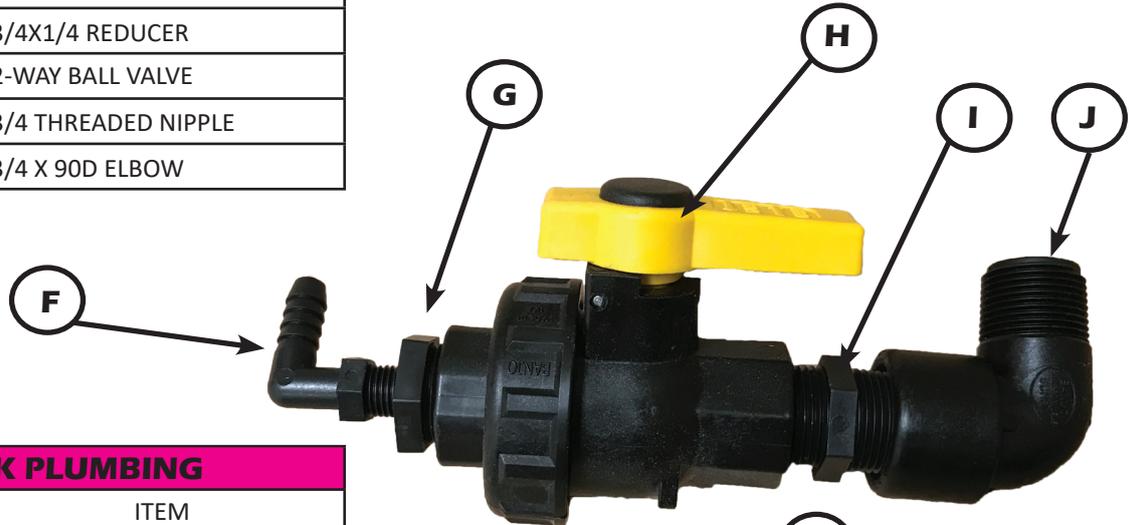


PRODUCT TANK PLUMBING			
	PN#	QTY#	ITEM
A	32399	3	3/4 THREADED NIPPLE
B	50577	1	3/4 PIPE ELBOW
C	37667	1	3-WAY BALL VALVE
D	32331	2	3EL34 POLY ELBOW
E	54022	1	3/4" 1# INLINE CHECK VALVE

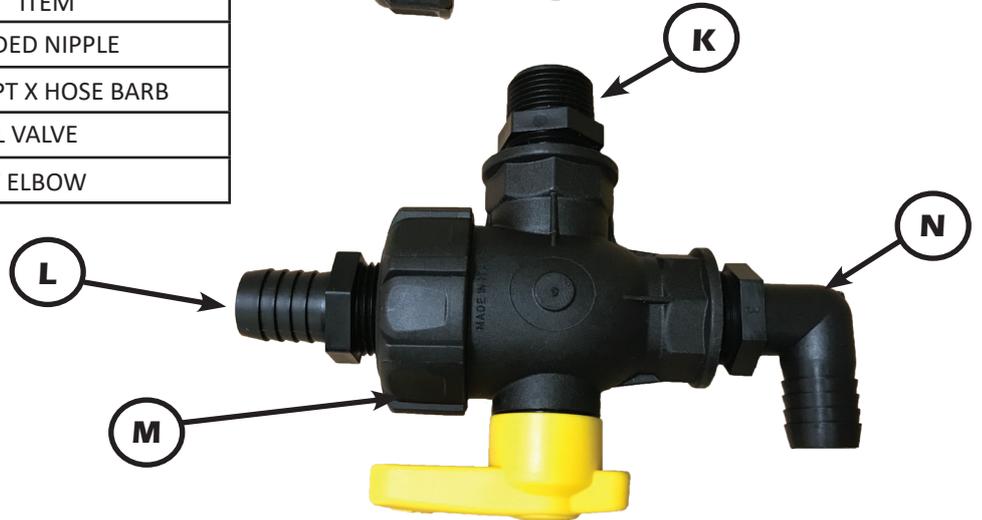
A & B are used with a 55 gal tank.  
For a 110 gal tank substitute A & B for PN# 52108 (shown) 1-1/4 X 3/4 REDUCER



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

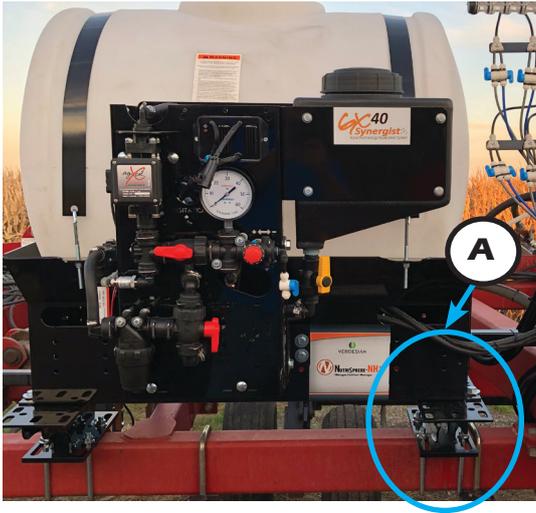


RINSE TANK PLUMBING			
	PN#	QTY#	ITEM
K	32399	1	3/4 THREADED NIPPLE
L	18005	1	3/4x3/4 MPT X HOSE BARB
M	37667	1	3-WAY BALL VALVE
N	32331	1	3EL34 POLY ELBOW



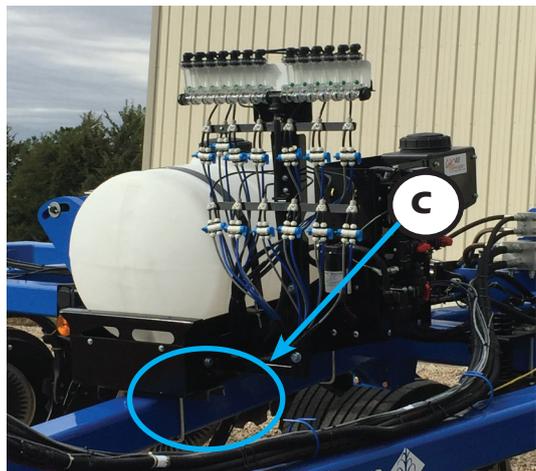
## AGXCEL SYNERGIST MOUNTING OPTIONS

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
A	55598	GX40_UNIVERSALTANKMOUNT 6"
B	55597	GX40_UNIVERSALTANKMOUNT 16"
	55596	GX40_UNIVERSALTANKMOUNT 24" (NOT SHOWN)
	38327	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
C	55625	GX40_LOWPROFILEBARMOUNT
	53719	9" BOLTS 5/8"
	38402	5/8" WASHER
	37601	5/8" SPIN NUT
	38327	GXUNIVERSALTANKMOUNTBOLT KIT



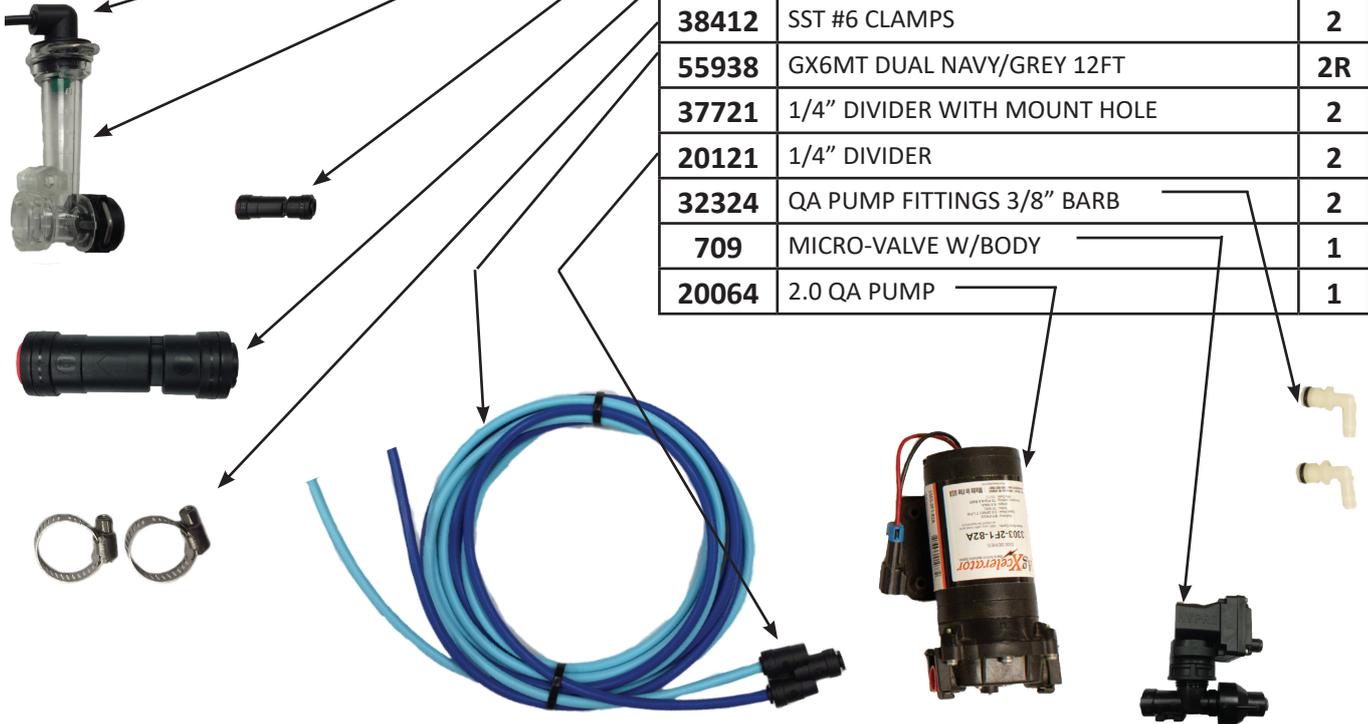
## SYNERGIST FIELD KIT - PN#55558



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

KIT INCLUDES:

<b>SYNERGIST FIELD KIT PN#55558</b>		
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

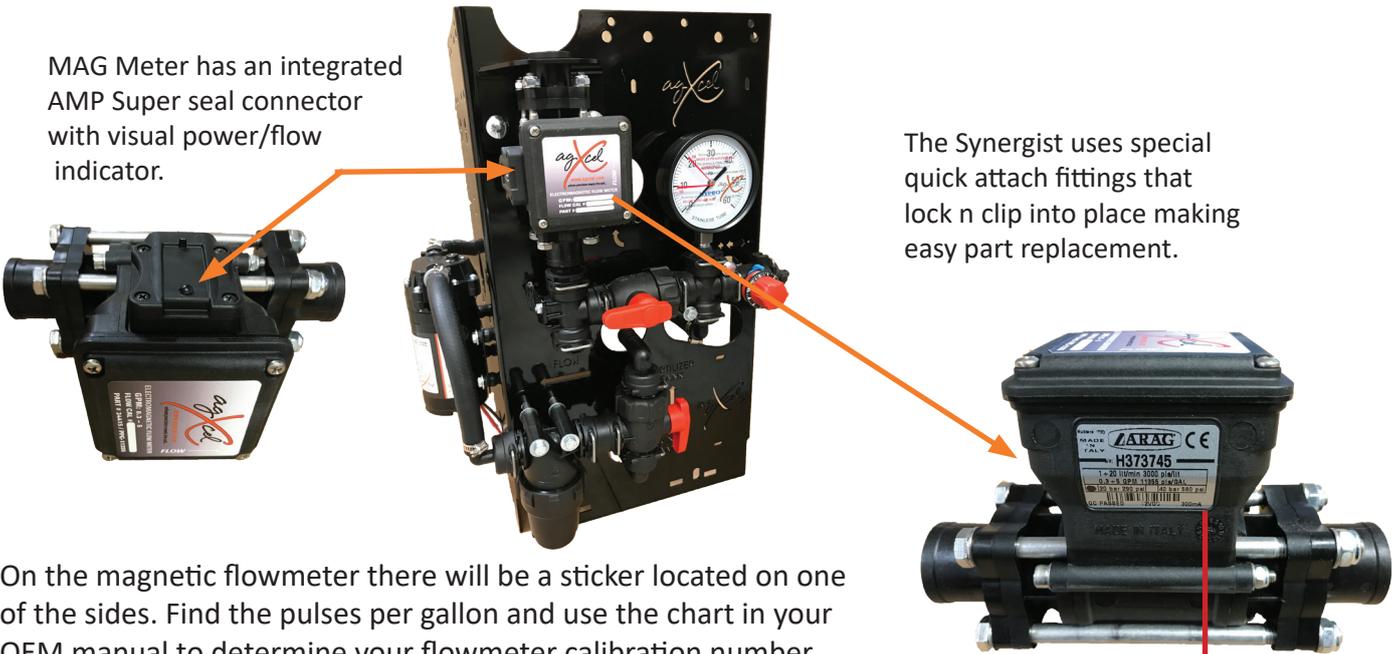
(Read Instructions Completely before Beginning Installation)

## 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.

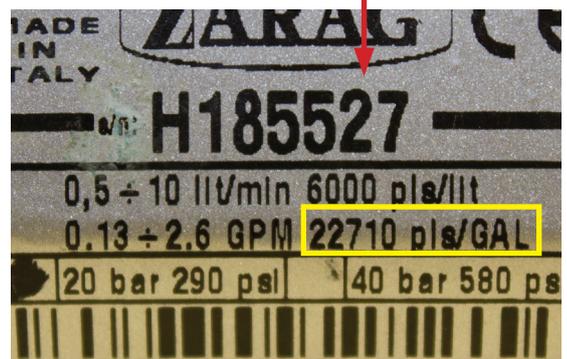
MAG Meter has an integrated AMP Super seal connector with visual power/flow indicator.

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.*



## 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.

### Recirculation Regulation Valve



### 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.

## 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			
24 DC	Red (positive +)	#14 AWG [2.5 Mm <sup>2</sup> ] (or heavier)	SEE PUMP MOTOR LABEL
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)		
230 AC	Green (ground)		
	Brown (common)		
	Blue (neutral)		
	Green/Yellow (ground)		

## Troubleshooting

Symptom	Corrective Action(s)
Pump will not start:	<ul style="list-style-type: none"> <li>Check fuse or breaker.</li> <li>Check for correct voltage (<math>\pm 10\%</math>) and electrical connections.</li> <li>Check pressure switch operation and correct voltage at switch or motor wires (as equipped).</li> <li>Check rectifier or motor for open or grounded circuit.</li> <li>Check for locked drive assembly.</li> </ul>
Pump will not prime: (no discharge/motor runs)	<ul style="list-style-type: none"> <li>Check to see if out of product.</li> <li>Check strainer for debris.</li> <li>Check inlet tubing/plumbing for severe vacuum leak.</li> <li>Check to see if inlet/outlet tubing is severely restricted (kinked).</li> <li>Check for debris in pump inlet/outlet valves.</li> <li>Check for proper voltage with the pump operating (<math>\pm 10\%</math>).</li> <li>Inspect pump housing for cracks.</li> </ul>
Leaks from pump head or switch:	<ul style="list-style-type: none"> <li>Check for loose screws at switch or pump head.</li> <li>Check to see if switch diaphragm is ruptured or pinched.</li> <li>Check for punctured diaphragm if fluid is present at bottom drain.</li> </ul>
Pump will not shut off: (pressure switch equipped)	<ul style="list-style-type: none"> <li>Check to see if output line is closed and not leaking.</li> <li>Check for air trapped in outlet line or pump head.</li> <li>Check for correct voltage to pump (<math>\pm 10\%</math>)</li> <li>Check inlet/outlet valves for debris or swelling.</li> <li>Check for loose drive assembly or pump head screws.</li> <li>Check pressure switch operation and/or if adjustment incorrect.</li> </ul>
Noisy / rough operation:	<ul style="list-style-type: none"> <li>Check mounting feet to see if they are compressed too tight.</li> <li>Does the mounting surface multiply noise (flexible)?</li> <li>Check for loose pump head or drive screws.</li> <li>Is the pump plumbed with rigid pipe, causing noise to transmit?</li> </ul>



## **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 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.

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