AGRI-INJECT®
Because irrigation can deliver more than just water ®

Operating Manual

Insectigator® Fluid Injection System

Manual Part Number:	Man-887-001
Manual Description:	Operating Instructions - Insectigator®
Models in Manual:	887-34-312902-0, 887-34-212902-0, 887-34-112902-0
Revision Level:	M
Revision Date:	June 29, 2026

Please carefully read these operating instructions before use. Do NOT discard.
The operator shall be liable for any damage caused by installation or operating error(s).
The latest version of the operating instructions as well as any addendums and/or supplemental instructions are available at www.agri-inject.com.

1.0 TABLE OF CONTENTS

2.0 OPERATOR'S MANUAL ADVISORY

2.1 SUPPLEMENTARY INFORMATION

There may be additional instructions/information beyond this manual that are included with this manual AND/OR available on our website. Such instructions are very important and must be read prior to the installation or operation of this injection system.

2.2 TERMS & CONDITIONS

Agri-Inject reserves the right to alter, correct, and/or improve the technical documentation and the products described in the technical documentation at its own discretion and without giving prior notice, insofar as this is reasonable for the user. The same applies to any technical changes that serve the purpose of technical progress.

The receipt of technical documentation does not constitute any further duty on the part of Agri-Inject to furnish information concerning modifications to products and/or technical documentation. The user is responsible to verify the suitability and intended use of the products in your specific application, in particular with regard to observing applicable standards and regulations. All information made available in the technical data is supplied without any accompanying guarantee, whether expressly mentioned, implied, or tacitly assumed.

In general, the provisions of the current standard Terms and Conditions of Agri-Inject apply exclusively, in particular as concerns any warranty liability.

Questions or Comments?
Please call us at 1-800-446-5328 (USA) or 1-970-848-5336 (International) or visit us on the web at www.agri-inject.com.

3.0 GENERAL SYSTEM ADVISORY

3.1 ABOUT THIS SYSTEM

You are now the owner of one of the most advanced crop management tools available today.

The Insectigator® you have purchased is designed to deliver precise amounts of liquid concentrate into the water flowing through your irrigation system. The Insectigator® is unique in that it can inject most insecticides, fungicides, or crop/turf protection liquids into your irrigation to accomplish both irrigation and chemical application simultaneously.

When you invested in the Insectigator®, you acquired a complete injection system - everything you need to get started. Easy to install and simple to operate, your Insectigator® can be integrated into your center pivot, linear, greenhouse, or drip irrigation system with a minimum of work, tools, and effort.

The heart of your Insectigator® is the injection pump. This high quality pump is designed specifically to inject small, precise amounts of liquid, which is key in this application. The Insectigator®also features our patented Mister Mist'r® injection check valve. The Mister Mist'r® releases concentrate in four directions in the middle of the irrigation pipe for complete mixing. The injected liquid is atomized into tiny droplets for complete suspension and homogenous distribution through your irrigation system. As a regulatorally approved check valve, the Mister Mist'r® protects against backflow of concentrate into the water supply, or leakage of water into the Insectigator® supply tank. In combination, the precise, reliable injection pump and the exclusive Mister Mist'r® assure accurate, uniform, safe distribution of liquid concentrate to your crops.

Like all Agri-Inject products, your Insectigator® injection system is built with quality materials and designed to give you worry-free, low maintenance operation so you can fully benefit from the cost savings and production enhancements that fluid injection offers.

When properly installed and operated, your Insectigator® will give you many years of safe, dependable operation, providing greater management over your farm and putting dollars in your pocket along the way. This owner's manual is designed to help you get optimum performance and reliability from this quality fluid injection system.

If you have any questions about your Insectigator® or any other of our quality fluid injection systems, please contact your local Agri-Inject dealer, visit us on our website at www.agri-inject.com or give us a call at 1-800-4-INJECT (800-446-5328).

Above all, thank you for your business. We are dedicated to helping growers like you around the world increase efficiency, optimize plant health, and foster environmental stewardship through the use of fluid injection technology.

3.2 IDENTITY CODE

Product Category: Insectigator®								
887	Insectigator® product line designation							
	-	Dash separator						
		Input Power Option						
		11	Single Phase 110V AC					
		12	Single Phase 220V AC					
		21	12V DC					
		32	Three Phase 230V AC					
		34	Three Phase 480V AC					
			-	Dash separator				
				Tank Capacity				
				1	10 gallon			
				2	20 gallon			
				3	30 gallon			
					Mixer Attachment			
					1	Mixer included		
					0	No mixer		
						Control Option		
						2	Standard Control option	
							Pump Size	
							902	FIG Pump (v2017+)
887	-	**34**	-	**3**	**1**	**2**	**902**	**- 0**

Please provide the model code and serial number for your dealer to properly order spare parts or arrange for service on this system. This enables the unit definition and version to be clearly identified.

3.3 WARNING!

For your safety, the safety of others, and to prevent a risk of serious injury to yourself and others, before you install, use, or service an Agri-Inject system:

READ THIS MANUAL!

This manual (and its addendums, including supplementary information) provides you with warnings, instructions for installation, use, and servicing safety practices. Read such information thoroughly before you install, use or service an Agri-Inject system and follow all of the warnings and instructions it contains.
An Agri-Inject system should be installed, used, or serviced ONLY by those who are thoroughly familiar with the instructions and warnings contained in this document. Improper use or disregard for warnings, instructions, and basic safety practices can create a risk of serious bodily injury to you or a bystander and/or property damage.

3.4 TRAINING

Do not install, operate, or service an Agri-Inject system unless you have been properly trained to do so.

3.5 TUBING AND PLUMBING

Always use proper tubing or plumbing when connecting an Agri-Inject system. The working pressure rating, temperature rating, and chemical compatibility must be compatible with the pump output and the liquid being pumped. Agri-Inject provides tubing and plumbing with its systems. However, they may not necessarily be proper for the particular use to which you put the system. Our support staff will be happy to assist with discussing application and compatibility issues.

3.6 INSPECTION

Always check to see that the system's fittings are tight and free of leaks.

3.7 IMPORTANT

Do NOT install, operate or service this system unless you have thoroughly read all warnings and instructions in the manual. **Do NOT** install, operate or service this system until you have been properly trained. **Always** use fittings and tubing that is properly rated and compatible with pump output and the pumped liquid. **Always** follow the specimen label of any chemical being injected by this system. **The label is the law**. **Always** check to see that fittings and tubing connections are tight and free of leaks. **Always** disconnect the electrical power cord before you disassemble or otherwise service this system. **Never** transport this system with liquid present in the tank. **Always** relieve the pressure and drain the suction lines before you disassemble or otherwise service this system. **Never** disconnect the discharge or suction lines while the pump is operating and/or the lines are under pressure.

3.8 DISASSEMBLY AND SERVICE

Always disconnect the electrical power cord before you disassemble or otherwise service this system. **Never** open the electrical components of the system without first disconnecting the

electrical power cord and any other communication connections. **Never** disconnect discharge or suction lines from the system while the pump and/or lines are under pressure. **Never** disconnect discharge or suction lines from the system while the pump is operating. **Always** disconnect the electrical power cord, relieve the pressure in the discharge and/or suction lines, and drain the lines before disassembly or other service.

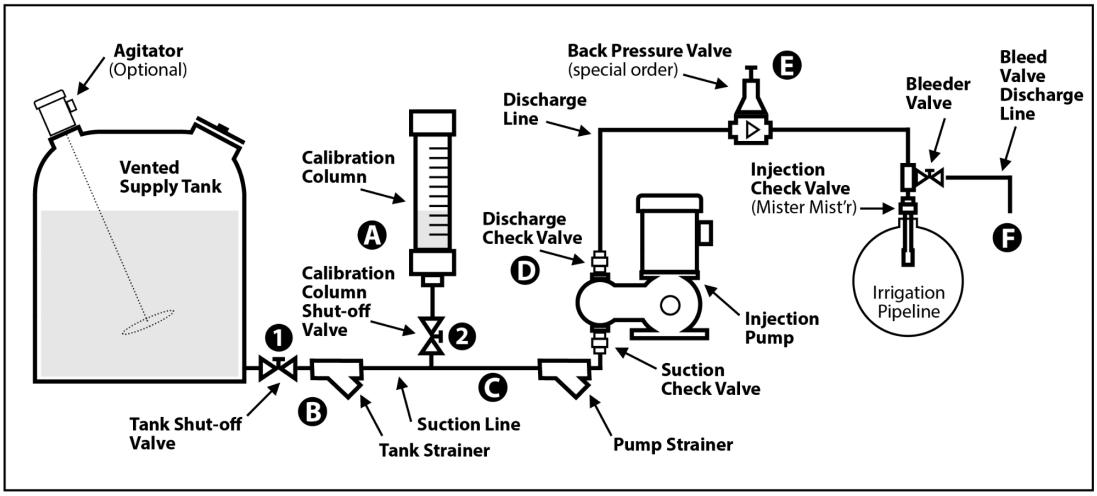
3.9 PUMPING DANGEROUS LIQUIDS

When the system is used to inject dangerous liquids, you face risks of harm to yourself and others from the dangerous liquids and/or the impact of those dangerous liquids. Personal injury and/or property damage can result from contact with the dangerous liquids from spray, splash, fumes, or vapors. Damage can also result from the impact of the misapplication of such dangerous liquids.

If the system is used to pump dangerous liquids, in addition to heeding the warnings already set forth, you must also:

- Always avoid bodily contact with dangerous liquids. Use the Personal Protective Equipment (PPE) recommended in the SDS, Specimen Label, or other data provided by the dangerous liquid supplier/manufacturer.
- Take great caution to ensure dangerous liquids do not cause damage to local property or equipment.
- Always heed the warnings, follow the instructions, and take whatever precautions the supplier of the dangerous liquid has provided you.
- Never operate the pump if the fittings or tubing connections are not tight and/or free from leaks.
- Always drain the discharge line before disassembly.
- Always fully drain and flush the tank with water before adding another chemical.
- Always flush the pump with water after injecting a dangerous liquid and before adding another to avoid a potentially hazardous chemical reaction.
- Consider installing a supplementary back pressure valve in the discharge line between the discharge check valve and the injection check valve. See diagram below and **Section 15.0 INSTALLATION AND PIPING APPENDIX**.

Typical Piping Diagram - Chemigation/Fertigation



3.10 DEFINITIONS

The following terms are used in this manual and in the context of this scope of work, the following definitions should be applied.

Term	Meaning
Bleeder Valve	The valve assembly commonly provided with Mister Mist'r® Injection Check Valves that allows for the bleeding of air from the discharge plumbing on startup and for relieving line pressure after shut down.
Calibration	The process of ensuring an injection pump discharges the proper amount of liquid per unit of time, e.g., gallons per hour.
Calibration Tube	The calibrated tube provided with the Insectigator® used to measure injection volume over time.
Carrier	A liquid in which feed chemicals are mixed. Examples include water and crop oil.
Chemigation	The application of chemicals to a crop through injection into the irrigation system
Feed Chemical	The chemical (or chemicals) being injected.
Injection Quill	A device at the end of the discharge line from the pump that connects to the irrigation pipe and distributes feed chemicals into the irrigation water. Nearly all regulations call for the injection quill to have a spring-loaded check valve integrated into the quill. In this case, it can also be called an injection check valve. The Agri-Inject provided injection quill is the Mister Mist'r®.
Jar Test	A method of testing the compatibility and suitability of a mixture of chemicals and carrier prior to mixing them in the tank.
Liquid End	The head, diaphragm, and check valves of a pump, i.e., the part of the pump that 'pumps the liquid'.
Frequency Knob	The small, upper control knob on a FIG pump that is used to adjust the stroke frequency of the pump. This knob is calibrated in gallons per hour.
Percent Stroke Knob	The large center knob on the face of a FIG pump. This knob adjusts the stroke length and is calibrated in percent. Pump output is the gallons per hour from the frequency knob multiplied by the percent setting of the percent stroke knob.
Mister Mist'r®	The patented injection check valve provided by Agri-Inject for use on Agri-Inject chemical injection systems (see Injection Quill above).
Solution	The liquid in the tank to be injected resulting from mixing of one or more feed chemicals with a carrier.
Specimen Label	The label provided with all approved agricultural feed chemicals

4.0 SAFETY

4.1 IDENTIFICATION OF SAFETY NOTES

The following signal words are used in these operating instructions to denote different severities of danger:

Signal Word	Meaning
WARNING	Denotes a possibly dangerous situation. If this is disregarded, you are in a life threatening situation and this can result in serious injuries
CAUTION	Denotes a possibly dangerous situation. If this is disregarded, it could result in slight or minor injuries or material damage.
DANGER	Denotes a possibly dangerous situation. If this is disregarded, a situation may exist that will present dangers of injury to personnel or severe damage to equipment or the environment.

4.2 WARNING SIGNS DENOTING DIFFERENT TYPES OF DANGER

The following signal words are used in these operating instructions to denote different severities of danger:

Warning Signs	Type of danger
	**Warning - Automatic Start-Up**
	**Warning - High-Voltage**
	**Warning - Danger Zone**

4.3 INTENDED USE

Only use this system to meter and inject liquid feed chemicals. Only use this system to mix chemicals that are compatible and are at or below the maximum viscosity supported by the mixing system and/or the pump. Only use the system after it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions. Observe the general limitations with regard to viscosity limit, chemical resistance, and density. A chemical resistance chart is available at www.agri-inject.com. All other uses or modifications are prohibited. The injection pump is not intended for the metering of gaseous media or solids. The injection pump is not intended for the metering of flammable or explosive media. The system is not intended for operation in areas at risk from explosion. The system should only be operated by

trained and authorized personnel. See **Section 4.6**. You are obliged to observe the information contained in the operating instructions at the different phases of the unit's service life

4.4 SAFETY INFORMATION

WARNING!
Warning about personal and material damage
The injection system can start to pump and mix as soon as it is connected to the main voltage OR at such a time that the irrigation system starts up. Ensure that the control switches are set to the OFF positions before servicing the machine.

WARNING!
Danger of electric shock
Main voltage exists in the switch enclosure, the transformer, and in the wiring boxes of the pump and mixer motor.
When handling this system or making any wiring connections, disconnect the main power. If there is damage to any of these components, disconnect it from the main power immediately and only return to service after an authorized repair has been made.

WARNING!
Warning of a dangerous or unknown feed chemical leak
Should a dangerous or unknown feed chemical be used, it may escape from the wetted fittings/tubing when working on the system. Take appropriate measures before working on the system (e.g. proper PPE, consult label or SDS of the chemical). Drain and flush all the plumbing before working on the system

WARNING!
Warning of dangerous or unknown feed chemical fumes
Fumes may exist inside the tank.
Take appropriate measures before working on the system (e.g. a respirator may be needed, consult the label or SDS of the chemical). Open in a well ventilated area. Drain tank before working on anything inside the tank.

WARNING!
Danger from hazardous substances
Possible consequence: Fatal or very serious injury
Please ensure that when handling hazardous substances that you have read the latest safety data sheets provided by the manufacturer of the hazardous substance. The actions required are described in the Safety Data Sheet (SDS). Check the SDS regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings. The system operator is responsible for ensuring these SDS sheets are kept up to date, as well as for producing an associated hazard assessment for the work areas affected.

WARNING!
Danger to environment and personnel due to improper chemical disposal
The operator should follow all rules and regulations from local, regional and federal agencies as well as any directives from the feed chemical label concerning proper disposal of excess chemical and used chemical containers.

WARNING!
Always follow the chemical label
The system operator should always consult the specimen label of the chemical being pumped before making the application. Ensure that the target crop, target pest, application rate, and application method are all in compliance with the label prior to injecting said chemical. The label is the law! Fines and punishment could result from off-label application

WARNING!
Warning of feed chemical spray during disconnection
Feed chemicals can spray out of the discharge hose if they are manipulated or opened due to pressure in the pump head and adjacent parts of the system. Disconnect the pump from the main power supply and ensure it cannot be switched on again by unauthorized personnel. Depressurize the system before commencing any work on wetted parts.

WARNING!
Warning of feed chemical spray due to piping blockage
The metering pump can generate extreme pressure. Discharge fittings/tubing can rupture if the discharge line is blocked.
Ensure that the hose and injection check valve (Mister Mist'r®) is clear before pumping.
Ensure that the suction filter is clean and the filter element is installed properly and in good shape before pumping.

WARNING!
Warning of feed chemical spray due to material compatibility
An unsuitable feed chemical can damage the wetted parts of the system.
Take into account the chemical resistance of the wetted materials when selecting the chemical to be pumped. Visit www.agri-inject.com for a chemical resistance chart.

CAUTION!
Danger of injury to personnel and material damage
The use of untested, non-conforming, third-party components can result in injury to personnel and material damage. Only fit parts to this system that have been tested and approved by Agri-Inject.

CAUTION!
Danger from incorrect operation or poor maintenance
Danger can arise from this system due to incorrect operation and poor maintenance. Ensure operators are familiar with this manual and have access to SDS and specimen labels. Adhere to good maintenance practices.

CAUTION!
Warning against illegal operation
Observe the regulations (local, state, federal) that apply where the system is installed.

CAUTION!
Lifting Hazard
The System is heavy. Single person lift could cause injury. When necessary, use assistance when moving or lifting.

DANGER!
Danger of property and/or equipment damage
The use of feed chemicals and/or feed chemical mixtures which are too viscous, laden with particles, or otherwise not suitable for mixing and/or pumping can cause damage to the pumping system, mixing system, tank or a combination thereof. Always follow feed chemical specimen label recommendations for pumping and mixing AND follow the limitations set forth in this operator's manual.

DANGER!
Danger of environmental damage or contamination
The use of this system without the recommended and proper backflow, check valve, and control interlock provisions can result in improper operation of the equipment resulting in unintended contamination of water supplies. Always follow local, state, and federal laws, codes, and regulations; specimen label recommendations; and operator's manual recommendations for proper installation and operation of fluid injection equipment.

DANGER!
Danger of feed chemical splash
When the lid on the system tank is open, there is a danger of feed chemicals splashing up and out of the lid during the filling process, operation, maintenance, and/or clean-up. Take appropriate measures to protect skin and eyes with proper PPE before opening the lid.

WARNING!
System must not be used to transport chemicals
This injection system is NOT designed to be transported with any chemicals present in the tank.
This tank is NOT approved by the Department of Transportation for the transportation of chemicals.
Empty the tank into suitable containers (using the supplied drain assembly if necessary) prior to transporting the system.

WARNING!
Only return systems for repair in a cleaned state and with flushed discharge and suction plumbing
Ensure systems are cleaned thoroughly, flushed multiple times with water, and fully drained prior to sending or delivering the system to a service location. This protects the transportation company as well as the service provider from dangerous or hazardous chemicals.

CAUTION!
Danger of material damage
This system can be damaged by incorrect or improper storage or transportation. The system should only be stored or transported in a well packaged state. The packaged system should also only be stored or transported in accordance with the stipulated storage conditions. The packaged system should be protected from moisture and the ingress of chemicals.

4.5 INFORMATION IN THE EVENT OF AN EMERGENCY

In an emergency, disconnect the main power, turn all system switches to OFF, or disconnect the main power supplying power to the injection system.

If feed chemical escapes or is spilled, ensure that the pressure on the discharge side of the pump is relieved, all tank valves are closed, and adhere to the chemical Safety Data Sheet (SDS) for proper cleanup and disposal.

For pesticide poisoning, call 911 if the person is unconscious, has trouble breathing, has convulsions, or is otherwise showing life threatening signs. Otherwise, call Poison Control at 1-800-222-1222.

For chemical spills, CHEMTREC provides access to technical experts on chemical products and hazardous materials and maintains a large database of Safety Data Sheets (SDS). CHEMTREC can be reached at 1-800-262-8200.

4.6 QUALIFICATION OF PERSONNEL

Task	Qualification
Storage, transport, unpacking	Instructed person
Assembly	Technical personnel, service
Planning the installation	Qualified personnel who have a thorough knowledge of metering pumps and injection systems
Installation	Technical personnel, service
Installation, electrical	Electrical technician
Operation	Instructed person
Maintenance, repair	Technical personnel, service
Decommissioning, disposal	Technical personnel, service
Troubleshooting	Technical personnel, electrical service, instructed person, service

Explanation of the table:

Qualified Personnel
A qualified person is deemed to be a person who is able to assess the tasks assigned to him and recognize possible dangers based on his/her technical training, knowledge and experience, as well as knowledge of pertinent regulations. A qualification of equal validity can also be gained by several years of employment/experience in the relevant field of work.

Electrical technician
An electrical technician is able to complete work on electrical systems and recognize and avoid possible dangers independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations.

The electrical technician should be specifically trained for the working environment in which he/she is employed and know the relevant standards and regulations.
An electrical technician must comply with the provisions of the applicable statutory directives on accident protection.

IN NO WAY does an electrical technician substitute for a Licensed Electrician and should NOT perform any function that must/should legally be performed by a Licensed Electrician.

Instructed person
An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper actions, as well as having been instructed in the required protective equipment and protective measures.

Service
The service designation refers to service technicians who have received proven training and have been authorized by Agri-Inject to work on the system.

5.0 STORAGE, TRANSPORT AND UNPACKING

5.1 SAFETY INFORMATION

	**WARNING!** **System must not be used to transport chemicals** This injection system is NOT designed to be transported with any chemicals present in the tank. This tank is NOT approved by the Department of Transportation for the transportation of chemicals. Empty the tank into suitable containers (using the supplied drain assembly if necessary) prior to transporting the system.
	**CAUTION!** **Danger of material damage** This system can be damaged by incorrect or improper storage or transportation. The system should only be stored or transported in a well packaged state. The packaged system should also only be stored or transported in accordance with the stipulated storage conditions. The packaged system should be protected from moisture and the ingress of chemicals.
	**CAUTION!** **Lifting Hazard** The System is heavy. Single person lift could cause injury. When necessary, use assistance when moving or lifting.
	**WARNING!** **Only return systems for repair in a cleaned state and with flushed discharge and suction plumbing** Ensure systems are cleaned thoroughly, flushed multiple times with water, and fully drained prior to sending or delivering the system to a service location. This protects the transportation company as well as the service provider from dangerous or hazardous chemicals.

5.2 UNPACKING

Compare the packing list with the delivered system. The system should be equipped with a startup kit. Ensure that there is no damage to the system as a result of freight transportation. Report any damage immediately to the freight company. Properly dispose of all packing materials.

5.3 STORAGE

Storage should be indoors in a clean, dry, protected area free from rodents and excessive insects. If the storage area is susceptible to freezing conditions, ensure that the system has been properly winterized by pumping a safe antifreeze solution through the system. Agri-Inject recommends windshield washing solvent with a minus 20 degree Fahrenheit (or colder) rating.

5.4 TRANSPORTATION

Ensure the system is tied down and secured during transportation. Extreme bumps and jarring can have a negative impact on the mixer shaft during transportation. Accommodation for a smooth ride is preferred. Do NOT transport with chemicals or liquid in the tank. Ensure the tank is completely empty prior to transportation. Never lift the system by grabbing the pump or the mixer motor.

6.0 PRE-INSTALLATION

6.1 PROTECTIVE CLOTHING

WARNING!
Warning of a dangerous or unknown feed chemical
Should a dangerous or unknown feed chemical be used, it may escape from the wetted fittings/tubing when working on the system. Take appropriate measures before working on the system (e.g. proper PPE, consult label or SDS of the chemical). Drain and flush all the plumbing before working on the system

Always wear the proper Personal Protective Equipment (PPE) when working on or near this Insectigator® system. PPE can include the following:

PPE Category	Typical PPE Items
Eye and Face Protection	Goggles with side shields Face shield
Hand Protection	Gloves (hand) Gloves (lower arm)
Body Protection	Protective suit Shoe/boot covers
Respiratory	Face mask Respirator

Precautions should be taken dependent on the chemical being used. You should ALWAYS consult the Safety Data Sheet (SDS) of the chemical being used to determine the type of PPE to be used.

Refer to the following chart to order safety supplies. Consult your local Agri-Inject dealer/distributor for pricing.

Description	Quantity	Part Number
Nitrile Gloves	1 box (100 gloves)	419-15-000000-0
Protective Suit	1	419-15-000001-0
Boot Covers	1	419-15-000002-0
Safety Glasses	1	419-15-000003-0
Face Guard	1	419-15-000004-0

6.2 TEST FLUIDS

All Insectigator® systems are fully tested before leaving the factory. Agri-Inject uses windshield washing solvent when testing and some of this liquid is normally present within the suction fittings and pump head assembly. If the intended feed chemical is not compatible with this solvent, flush the system with water and turn on the pump briefly to clear the liquid from the pump head prior to filling the system with feed chemical.

6.3 TUBING CONNECTIONS

Suction and discharge tubing or pipe sizes must not be reduced. Make certain that all tubing/hose is securely fastened and tight prior to startup. Always use Agri-Inject supplied tubing with your Insectigator®, as these supplies are designed for maximum compatibility with the system operation.

Refer to the following table to order replacement tubing and hose kits. Consult your local dealer for pricing.

Description	Quantity	Part Number
Discharge hose kit, high pressure, ¼ x ⅜, 12 ft.	1	849-10-008012-0
Suction tubing, ⅜”	1	260-02-375250-0
Bleeder valve tubing, 3/16”	1	260-02-250150-0

6.4 ELECTRICAL CONNECTIONS

All wiring diagrams should be consulted and followed to reduce the risk of electrical shock. It is strongly recommended that the electrical installation be performed, supervised, or approved by a Licensed Electrician (See wiring diagram later in the manual)

6.5 PLUMBING CONNECTIONS

Always adhere to your local plumbing codes as well as regional and national regulations for chemical injection. Agri-Inject is not responsible for improper installation. Copies of state and local regulations can be found at www.agri-inject.com. It is the responsibility of the user, however, to ensure that the installation is in compliance with the most current code. Agri-Inject makes no guarantee that such posted regulations are entirely up to date.

6.6 AGRICULTURAL APPLICATIONS

Always follow guidelines for chemigation as defined in federal, state and local regulations. Almost all states have defined chemigation and fertigation rules and regulations. Many States require annual inspections of any facility where chemigation or fertigation are practiced. There may be severe penalties enforced for not following a particular state's rules and regulations.

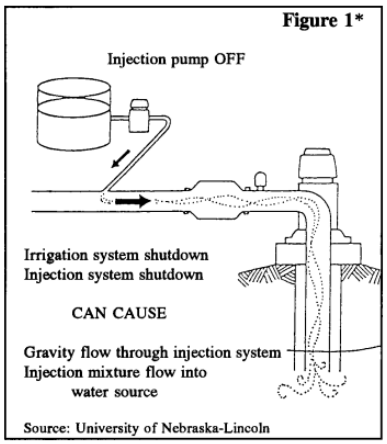
While the details of particular state regulations vary somewhat from state to state, there are three components to every chemigation of fertigation facility that must always be installed and properly functioning:

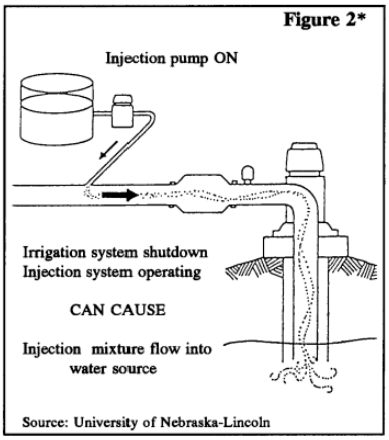
1. Backflow prevention valve. Backflow prevention valves prevent irrigation water from flowing backwards (e.g. from a pivot back into the groundwater) in the event of irrigation pump shut down or failure. In the case of chemigation or fertigation this is especially important as the treated irrigation water would contaminate the groundwater

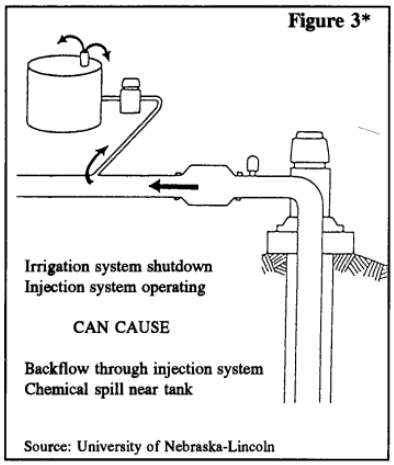
2. Injection check valve. Injection check valves provide two very important functions. First, the injection check valve prevents chemicals from entering the irrigation water unless the chemical is being pumped. The check valves on most positive displacement metering pumps are not spring loaded. They will typically allow liquid to flow freely through the pump by gravity means alone. Without an injection check valve, chemical can continue to flow into the irrigation water pipe after the irrigation event has stopped creating a very hazardous concentration of chemical in the pipe. Second, the injection check valve prevents water from flowing backward through the injection system in the event of injection pump failure. Backflow of water could flood the supply tank creating a hazardous material spill. The Agri-Inject Mister Mist'r® is a regulatorally approved injection check valve.

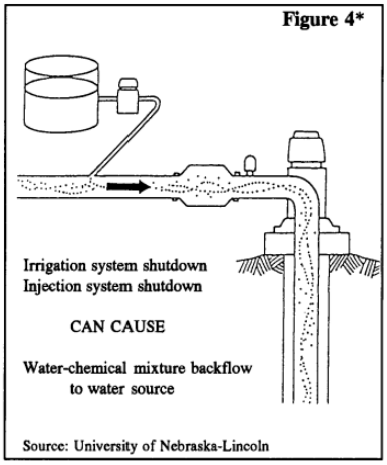
3. Positive interlock. Injection systems must be positively interlocked to the irrigation system. In most cases, the interlock can either be electrical or logical. The interlock interrupts the electrical power to the injection when irrigation stops for any reason. Typically this interlock is provided by a water pressure activated "Chem Switch" circuit in a pivot panel or a contactor actuated by the same circuit that activates the irrigation water pump motor.

See the following Figures 1-4 depicting the importance of these three safety devices:









In addition to state rules and regulations, always follow the rules for application as defined on the chemical specimen label. The chemical specimen label is approved by the United States EPA, so it may include federal regulations that override state rules. The chemical specimen label very likely includes additional rules and regulations that apply specifically to the chemical being injected. Remember: THE LABEL IS THE LAW. When necessary, post warning signs to alert people about treated water and re-entry restrictions.

Refer to the following chart for more information or supplies. Consult your local dealer for pricing.

Description	Quantity	Part Number
Danger sign with post	1	419-15-000005-0
Complete Chemigation manual	1	Bulletin 1031
Chemigation Q&A Guide	1	Bulletin 1050
Approved chemical for Chemigation list	1	Call for assistance
Economic Payback Guide	1	Bulletin 1034

6.7 OTHER APPLICATIONS

Consult local, municipal, state, provincial, and federal laws, regulations, and codes and always conform to standards for chemical injection. Make sure there are functioning backflow prevention devices, injection check valves, system interlocks, and back pressure valves consistent with regulations and industry best practices.

Always follow chemical labels and consult Safety Data Sheets (SDS) for additional information about the feed chemical.

6.8 CHEMICAL DISPOSAL

WARNING!
Danger to environment and personnel due to improper chemical disposal
The operator should follow all rules and regulations from local, regional and federal agencies as well as any directives from the feed chemical label concerning proper disposal of excess chemical and used chemical containers.

Please consult your local chemical representative for suggested disposal of excess feed chemicals as well as chemical containers in order to be compliant with laws and regulations and to assure environmental safety.

6.9 MIXING CHEMICALS

WARNING!
Danger from hazardous substances
Possible consequence: Fatal or very serious injury
Please ensure that when handling hazardous substances that you have read the latest safety data sheets provided by the manufacturer of the hazardous substance. The actions required are described in the Safety Data Sheet (SDS). Check the SDS regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings. The system operator is responsible for ensuring these SDS sheets are kept up to date, as well as for producing an associated hazard assessment for the work areas affected.

WARNING!
Danger to environment and personnel due to improper chemical disposal
The operator should follow all rules and regulations from local, regional and federal agencies as well as any directives from the feed chemical label concerning proper disposal of excess chemical and used chemical containers.

Important!
Many chemicals, carriers, adjuvants, and other liquids do not combine well and may form mixtures that will not pump adequately. It is highly recommended that the following “jar test” be performed with the planned chemicals before taking the system and chemicals to the field.

There are times when it may be necessary or preferred to mix feed chemicals with water, a carrier, a synergistic additive or even another chemical. Mixing chemicals is a process that must be performed with great care. Read product labels and follow directions for all products that you mix. Agri-Inject recommends that a small scale “jar test” be done to test for compatibility prior to tank mixing in the field. Instructions for the jar test are as follows:

1. Place the carrier (water, liquid fertilizer, crop oil, etc) into a quart jar.
2. Add each pesticide (or other active feed chemical) into the carrier one at a time.
    a. The amount of feed chemical added should be at the same proportion to the carrier as it will be used in the actual tank mix.
3. Close the lid tightly and shake well with each addition.
4. Invert the jar ten times, then allow the mixture to sit quietly for 30 minutes.
5. Inspect the mixture.
    a. If a uniform mixture cannot be made, or if non-dispersible oil, sludge, or clumps of solids form, the mixture is incompatible and should not be used.
    b. If the jar test shows minor separation after 30 minutes, without sludge or clumps, which re-mixes readily with ten jar inversions, it is tolerable for use with an Insectigator® system equipped with a mixer.
    c. If the jar test shows separation, it is recommended that the agitation remain on at all times until the mixture is completely used. Do NOT allow the mixture to stand overnight for any significant length of time without agitation.
    d. If the jar test shows no visible separation or coagulation, continuous mixing is usually not necessary. In fact, some mixtures perform very poorly during over-agitation.
6. Dispose of the mixture properly or add it to the tank mix.

7.0 INSTALLATION

7.1 SAFETY

CAUTION!
Lifting Hazard
The system is heavy. Single person lift could cause injury. When necessary, use assistance when moving or lifting.

DANGER!
Danger of environmental damage or contamination
The use of this system without the recommended and proper backflow, check valve, and control interlock provisions can result in improper operation of the equipment resulting in unintended contamination of water supplies. Always follow local, state, and federal laws, codes, and regulations; specimen label recommendations; and operator's manual recommendations for proper installation and operation of fluid injection equipment.

WARNING!
Warning about personal and material damage
The injection system can start to pump and mix as soon as it is connected to the main voltage OR at such a time that the irrigation system starts up. Ensure that the control switches are set to the OFF positions before servicing the machine.

WARNING!
Danger of electric shock
Main voltage exists in the switch enclosure, the transformer, and in the wiring boxes of the pump and mixer motor.
When handling this system or making any wiring connections, disconnect the main power. If there is damage to any of these components, disconnect it from the main power immediately and only return to service after an authorized repair has been made.

7.2 SYSTEM LOCATION

Locate the system in an area convenient to pipeline plumbing and electrical connections. The Insectigator® system should be placed on a hard, flat, level surface (such as packed dirt or gravel, or concrete). The location should be elevated to protect the system from sitting in or being immersed in water. The location should be easily accessible by the operator for operation, calibration, service, and maintenance.

The following table shows the standard hose and wire lengths to assist in determining proper location

Description	Length
Discharge hose	12 ft.
Incoming power cord	15 ft.

The system is designed as a totally enclosed system suitable for outdoor use. In cases of extreme environmental conditions, steps should be taken to protect the system. Conditions with continuous sunshine exposure and ambient temperatures above 90°F should be avoided if possible. Good installation practice would call for an open-sided sun shade over the top of the system.

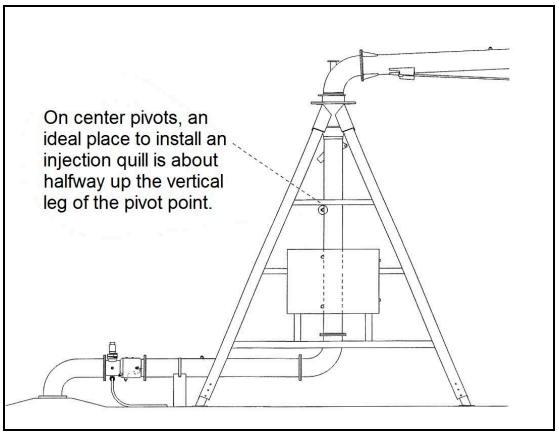
7.3 DISCHARGE PLUMBING CONNECTIONS

Note: Follow all local, state, and federal laws concerning backflow and check valve requirements for fluid injection into irrigation systems.

The system injects into the irrigation pipeline by means of an injection check valve known as a Mister Mist'r®. This valve is nearly always required by law. A ¾" FNPT full clearance port must be present in the pipeline for proper connection. This port MUST be downstream from the backflow valve. It must be installed far enough away from the backflow valve so as to not interfere with the backflow valve's mechanical function. It must be installed at least three feet upstream of the nearest irrigation output, such as a sprinkler nozzle or drip emitter.

On a center pivot sprinkler system, there are usually many choices for a location to install the injection check valve. One location that is preferred is a point about halfway up on the center pivot riser pipe. This point is downstream of the backflow valve and usually a satisfactory distance from any sensing devices such as flow or pressure sensors that may be negatively impacted by injected feed chemicals. It is an acceptable distance from the nearest sprinkler outlet. It is downstream from and above the lower elbow, which tends to help break up ice and other larger objects that may be in the pipe during spring start-up and could cause damage to the quill. Finally, it is usually above the tank level and this helps prevent siphoning should the injection quill ever break or fail; it also helps bleed air from the discharge line during system start-up. See **Figure 1** for location.

Figure 1



If no port is present, Agri-Inject recommends that a ¾" FNPT stainless steel half coupling be welded into the pipeline. In the case of plastic piping, a ¾" FNPT saddle is recommended.

Refer to the following chart to order half couplings and other items. Consult your local dealer for pricing.

Description	Quantity	Part Number
Half coupling, ¾" SS	1	111-50-020020-0
Welding rod, SS	1	430-50-000000-0
Backflow valves and parts		Many items available. Consult your dealer for different options.

Once the half coupling is in place, apply thread sealant to the ¾" MNPT threads of the Mister Mist'r® and tighten into the half coupling. Agri-Inject recommends a generous application of Teflon tape for Mister Mist'r® threads.

Refer to the following chart to order thread sealant. Consult your local dealer for pricing.

Description	Quantity	Part Number
Rectorseal, ½ pint container	1	401-02-000005-0
Teflon tape, ½" x 520"	1	401-03-008520-0

Please refer to Section 15.0 INSTALLATION AND PIPING APPENDIX for a more thorough discussion of suction and discharge piping considerations.

7.4 ELECTRICAL CONNECTIONS

WARNING!
Danger of electric shock
Main voltage exists in the switch enclosure, the transformer, and in the wiring boxes of the pump and mixer motor.
When handling this system or making any wiring connections, disconnect the main power. If there is damage to any of these components, disconnect it from the main power immediately and only return to service after an authorized repair has been made.

The Insectigator® system can be configured to work with five different power sources:

- 110VAC single phase
- 220VAC single phase
- 230VAC three phase
- 480VAC three phase
- 12VDC

The most common configuration is 480VAC three phase, and this manual will cover the details of that configuration. If this system has been manufactured to work with a different electrical supply, there may be a supplementary addition to this manual specific to that configuration; or visit our website at www.agri-inject.com.

The system comes with the supply power wire pre-stripped for connection to a rated plug connector OR direct into a control panel. It is highly recommended that the power supply for the injection system be isolated and independently fused according to the table below. We recommend using time-delay, slow acting fuses rated properly for both voltage and current such as an FNQ Class CC.

Component	Full Load Amps (460V/AC)
Mixer motor	0.6 A
FIG injection pump	0.5 A
Transformer (480:110)	0.25 A
TOTAL	**1.35 A**

Typically, the operator will install a plug onto the wire to connect to a corresponding receptacle at the main power panel. We recommend adhering to the following plug and receptacle specifications for code compliance and safety. However, always consult with a local Licensed Electrician to ensure complete compliance.

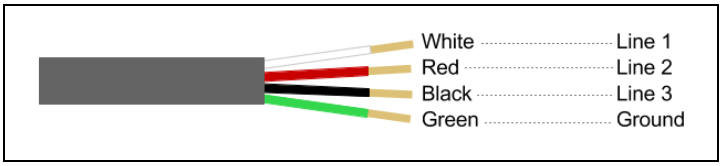
Electrical Plug and Connector Specifications
Industrial grade, locking devices
NEMA L16-30, 30A, 3⌀ 480V/AC, 3P-4W
Thermoplastic and/or elastomeric construction
Brass contacts
Grommet size appropriate for 16/4 SO cord
Water-tight rating optional based on environmental and installation conditions

Before connecting the plug to the main power, ensure that both the mixer control switch and the pump control switch are in the OFF position.

7.4.1 WIRE COLOR AND PHASING

It is recommended to specifically connect system power wires to main power phases according to the diagram in **Figure 2**. Prior to connection, it is important to verify with a voltmeter that there is 480V/AC from line to line (1-2, 1-3, 2-3) and NO voltage present on the ground lug (ground to isolated earth).

Figure 2



7.4.2 MOTOR ROTATION

The mixer motor on the system is designed to run in CLOCKWISE rotation. A decal is present on the motor as a reminder. See **Figure 3**. After connecting power according to the schematic in **Figure 2**, confirm the rotation of the mixer motor by engaging the mixer

control switch on and off quickly while watching the mixer shaft inside the tank. If the direction of the shaft rotation is clockwise, the wiring for that installation is properly 'phased'. If the direction is counterclockwise, two line connections must be switched to reverse the rotation. Typically, swapping the wire connections (e.g. L1 and L3) in the electrical plug is the most appropriate.

Important!
If the Insectigator® system is used at multiple irrigation systems, it will be necessary to confirm motor rotation (and adjust wiring as necessary) at every site.

Figure 3

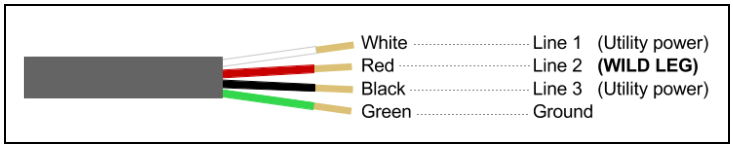
7.4.3 ROTARY PHASE GENERATOR POWER SUPPLY

If three phase power for the irrigation system is being supplied by a Rotary Phase Generator, then special wiring instructions apply when connecting the Insectigator® system.

Rotary phase generators generate the third phase of three phase power. In the irrigation industry, rotary phase generators are typically sized for the entire potential 'load' of the system plus a small safety factor. In the case of center pivots, the irrigation system is usually running at far below the rated maximum load. As a result, the Rotary Phase Generator is often producing more power than what is being consumed. This results in the third phase, or the 'generated' leg, of power having high and/or variable voltage levels relative to ground and the other two legs. Thus, this third leg has been dubbed in the industry as the 'wild leg'.

Important!
It is very important that the 'wild leg' of the three phase rotary phase generated power be connected to the RED wire of the Insectigator® system power cord. See **Figure 4**.

Figure 4



Important!
Check mixer motor for rotation per **Section 7.4.2**. If the mixer motor is rotating counter clockwise, swap the WHITE and BLACK wires only

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8.0 OPERATION

8.1 SAFETY

WARNING!
Warning about personal and material damage
The injection system can start to pump and mix as soon as it is connected to the main voltage OR at such a time that the irrigation system starts up. Ensure that the control switches are set to the OFF positions before servicing the machine.

WARNING!
Danger of electric shock
Main voltage exists in the switch enclosure, the transformer, and in the wiring boxes of the pump and mixer motor.
When handling this system or making any wiring connections, disconnect the main power. If there is damage to any of these components, disconnect it from the main power immediately and only return to service after an authorized repair has been made.

WARNING!
Warning of a dangerous or unknown feed chemical leak
Should a dangerous or unknown feed chemical be used, it may escape from the wetted fittings/tubing when working on the system. Take appropriate measures before working on the system (e.g. proper PPE, consult label or SDS of the chemical). Drain and flush all the plumbing before working on the system

WARNING!
Warning of dangerous or unknown feed chemical fumes
Fumes may exist inside the tank.
Take appropriate measures before working on the system (e.g. a respirator may be needed, consult the label or SDS of the chemical). Open in a well ventilated area. Drain tank before working on anything inside the tank.

WARNING!
Danger from hazardous substances
Possible consequence: Fatal or very serious injury
Please ensure that when handling hazardous substances that you have read the latest safety data sheets provided by the manufacturer of the hazardous substance. The actions required are described in the Safety Data Sheet (SDS). Check the SDS regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings. The system operator is responsible for ensuring these SDS sheets are kept up to date, as well as for producing an associated hazard assessment for the work areas affected.

WARNING!
Danger to environment and personnel due to improper chemical disposal
The operator should follow all rules and regulations from local, regional and federal agencies as well as any directives from the feed chemical label concerning proper disposal of excess chemical and used chemical containers.

WARNING!
Always follow the chemical label
The system operator should always consult the specimen label of the chemical being pumped before making the application. Ensure that the target crop, target pest, application rate, and application method are all in compliance with the label prior to injecting said chemical. The label is the law! Fines and punishment could result from off-label application

WARNING!
Warning of feed chemical spray during disconnection
Feed chemicals can spray out of the discharge hose if they are manipulated or opened due to pressure in the pump head and adjacent parts of the system. Disconnect the pump from the main power supply and ensure it cannot be switched on again by unauthorized personnel. Depressurize the system before commencing any work on wetted parts.

WARNING!
Warning of feed chemical spray due to piping blockage
The metering pump can generate extreme pressure. Discharge fittings/tubing can rupture if the discharge line is blocked.
Ensure that the hose and injection check valve (Mister Mist'r®) is clear before pumping.
Ensure that the suction filter is clean and the filter element is installed properly and in good shape before pumping.

	**WARNING!** **Warning of feed chemical spray due to material compatibility** An unsuitable feed chemical can damage the wetted parts of the system. Take into account the chemical resistance of the wetted materials when selecting the chemical to be pumped. Visit www.agri-inject.com for a chemical resistance chart.
	**CAUTION!** **Danger of injury to personnel and material damage** The use of untested, non-conforming, third-party components can result in injury to personnel and material damage. Only fit parts to this system that have been tested and approved by Agri-Inject.
	**CAUTION!** **Warning against illegal operation** Observe the regulations (local, state, federal) that apply where the system is installed.
	**CAUTION!** **Lifting Hazard** The system is heavy. Single person lift could cause injury. When necessary, use assistance when moving or lifting.
	**CAUTION!** **Danger from incorrect operation or poor maintenance** Danger can arise from this system due to incorrect operation and poor maintenance. Ensure operators are familiar with this manual and have access to SDS and specimen labels. Adhere to good maintenance practices.
	**DANGER!** **Danger of property and/or equipment damage** The use of feed chemicals and/or feed chemical mixtures which are too viscous, laden with particles, or otherwise not suitable for mixing and/or pumping can cause damage to the pumping system, mixing system, tank or a combination thereof. Always follow feed chemical specimen label recommendations for pumping and mixing AND follow the limitations set forth in this operator's manual.
	**DANGER!** **Danger of environmental damage or contamination** The use of this system without the recommended and proper backflow, check valve, and control interlock provisions can result in improper operation of the equipment resulting in unintended contamination of water supplies. Always follow local, state, and federal laws, codes, and regulations; specimen label recommendations; and operator's manual recommendations for proper installation and operation of fluid injection equipment.
	**DANGER!** **Danger of feed chemical splash** When the lid on the system tank is open, there is a danger of feed chemicals splashing up and out of the lid during the filling process, operation, maintenance, and/or clean-up. Take appropriate measures to protect skin and eyes with proper PPE before opening the lid.
	**WARNING!** **System must not be used to transport chemicals** This injection system is NOT designed to be transported with any chemicals present in the tank. This tank is NOT approved by the Department of Transportation for the transportation of chemicals. Empty the tank into suitable containers (using the supplied drain assembly if necessary) prior to transporting the system.

8.2 SAFETY EQUIPMENT

It is important to have the proper safety equipment available and in-use during the operation of this system. See **Section 6.1** for Personal Protective Equipment.

8.3 OPERATING EQUIPMENT

The following list of equipment is recommended to have available for proper use of the system during operation.

Description	Purpose
Graduated pitcher	Measure feed chemicals when mixing Fill calibration tube if necessary
Stopwatch or Timer	Measure time during pump calibration Measure time of irrigation system
Paper towels	Clean up
Garden hose	Provide fresh water for clean up, flushing system, or filling tank
Drain pan	Drain excess feed chemical
Calculator	Make calculations when timing and/or calibrating
Calibration and Record worksheets	Making calibration calculations and recording application event
Mister Mist'r flush tool	Cleaning Mister Mist'r
Mist'r Mind'r	Making repairs to Mister Mist'r
Hose cutter	Making clean cuts on replacement hose and tubing

Refer to the following chart to order operating equipment. Consult your local dealer for pricing.

Description	Quantity	Part Number
Graduated pitcher	1	418-02-000001-0
Clock/timer	1	418-00-000001-0
Kwik-Cut cutters	1	411-01-000001-0
Replacement cutter blade	1	411-50-000001-0
Mister Mist'r flush tool	1	831-02-011000-0
Mist'r Mind'r	1	228-58-011016-0

8.4 FILLING THE SYSTEM

Important!
Make sure to use the proper Personal Protective Equipment (PPE) when filling the Insectigator® system.

The system is equipped with a 10 inch vented lid. This facilitates the filling process and allows complete closure of the system while pumping. The feed chemical(s) and carrier should be added to the tank in a certain order. See **Section 8.5** and follow the chemical specimen label. Be certain to measure accurately when adding the chemical and take precaution where chemical containers and measuring devices are located during this process to prevent spills and contamination.

8.5 MIXING

DANGER!
Danger of property and/or equipment damage
The use of feed chemicals and/or feed chemical mixtures which are too viscous, laden with particles, or otherwise not suitable for mixing and/or pumping can cause damage to the pumping system, mixing system, tank or a combination thereof. Always follow feed chemical specimen label recommendations for pumping and mixing AND follow the limitations set forth in this operator's manual.

Important!
Make sure to follow these instructions closely as well as the instructions in the specimen label of the feed chemical. Failure to do so can result in equipment failure, loss of chemical, and/or environmental damage.

Important!
Many chemicals, carriers, adjuvants, and other liquids do not combine well and may form mixtures that will not pump adequately. It is highly recommended that the following "jar test" be performed with the planned chemicals before taking the system and chemicals to the field.

Critical instructions for mixing are found on the warning decal on the mixer motor, which is reproduced below in **Figure 5**. Review **Section 6.9** and follow all mixing instructions carefully to keep both property and the operator safe, to stay within the limits of the label, and to have a successful injection event.

Figure 5

If the system is equipped with a mixer, the on/off control switch is located on the left side of the control/transformer package directly in front of the tank. Confirm the pre-installation check of

motor rotation by quickly turning the switch on then off while watching the mixer shaft through the tank opening. Ensure that the mixer shaft is rotating clockwise.

Prior to mixing, a calculation of how much total feed chemical is needed should be made. Use the following formula:

_____	X	_____	=	_____
Chemical rate (gal/acre)		Acres		Total Chemical Needed

Determine next how much carrier is required and/or desired for your injection. Note: A common approach is to fill the rest of the tank with the carrier. In this case simply subtract the Total Chemical Needed from the Total Tank Capacity to derive Carrier Needed.

_____	+	_____	=	_____
Total Chemical Needed		Carrier Needed		Total Mixture Volume

Order of Addition

It is very important to add products to the tank in a specific order for optimal mixing. Use this list as a guideline for mixing order. Additional instructions may also be found in the specimen label of the feed chemical.

First, close the tank valve on the plumbing assembly prior to adding any liquid. Then add the products in the order below, slowly and carefully to avoid spills or splashes.

1. Carrier
2. Wettable Powders and/or Water Dispensable Granules
3. Flowable Liquids
4. Emulsifiable Concentrates

Important!
It is recommended to turn on the mixer after you add the carrier and before you add other feed chemicals

Viscous mixtures

It is critical to keep the viscosity of the mixture below 1,000 centipoise (cps) or damage can occur to the pump, mixer, and/or tank. Adding more carrier or performing split treatments are alternatives to over-thickening the mix.

Important!
Allow the mixer to blend the products to a homogenous mixture prior to opening the tank valve and priming the pump. Follow the strategies defined in Section 6.9. Many mixtures require continuous agitation. Do NOT allow the mixture to sit for any significant length of time without the mixer running. Keep the mixer running until the product is completely pumped from the tank.

8.6 PRIMING THE INJECTION PUMP

Important!
Never adjust the Stroke Control (center) knob if the pump is not running. Adjusting the Stroke Control knob when the pump is not running will permanently damage the pump.

Important!
Prior to priming the pump, make sure that the system is properly mounted and secure, the Mister Mist'r injection quill and discharge hose assembly is properly installed and all fittings are tight.

Follow these steps to prime the injection pump

1. Make sure that the product in the tank is properly mixed and acceptable to pump.
    a. Note: If the product requires mixing, ensure that the mixer is running.
2. Turn the tank valve ON.
3. Crack the bleeder valve at the Mister Mist'r
    a. Note: There is a tube included with the Mister Mist'r and Bleeder Valve assembly that allows you to direct fluid from the bleeder valve into a container.
4. Engage the switch on the front face of the FIG injection pump to ON.
5. While the pump is running:
    a. Set the top knob (Gallons per Hour) at 1.5 (about 80% of capacity)
    b. Set the center knob (Percent of stroke length) at 100%.
6. The suction tube should begin to fill with solution from the tank.
7. Once the solution begins to exit the bleeder valve, the pump should be primed.
8. Shut the pump off.
9. Close the bleeder valve.

8.7 CALIBRATING THE INJECTION PUMP

Important!
Prior to calibrating the pump, make sure that the system is properly mounted and secure, the Mister Mist'r injection quill and discharge hose assembly is properly installed and all fittings are tight.

Because the FIG pump uses two interacting settings, Frequency Adjustment and Stroke Length Adjustment, there are literally an infinite combination of settings to arrive at a particular injection rate. The four methods suggested below are offered as straightforward calculation methods.

There are four effective ways to calculate the settings for pump calibration.

1. Use one of the three worksheets in this manual. See **Sections 11, 12, and 13**
2. Use the worksheet decal present on the tank. See **Figure 6**.

All four methods will guide you to complete calibration of your pump. However, we recommend the Simple-By Area Method found in **Section 11** and the Carrier Volume Adjustment Method found in **Section 12** as the easiest calculation methods.

Follow these steps to calibrate the injection pump:

8.7.1 SIMPLIFIED METHOD (calibration result in gallons per hour)

1. Ensure that the products are properly mixed.
2. Ensure the irrigation system is ON and operating properly.
3. Start the injection pump and ensure that it is fully primed and operating properly.
4. Preset the Frequency (Gallons per hour) Knob and the Percent Stroke (Percent of stroke length) Knob to the predetermined settings (H) and (I) from the completed Calibration Worksheet.

Important!
Never adjust the stroke control knob (center knob) if the pump is not running. Permanent damage will occur.

5. Preset the o-rings on the calibration tube to a convenient, even number of mL apart.
    a. Select a number that is an even ten, e.g.: 40 or 100 or 120 mL apart
    b. If there is enough liquid in the tank, position the o-rings in the middle of the liquid level
    c. Try to select a number that will result in at least 30 seconds test time
    d. Example: If the liquid level in the tank corresponds to 165 mL in the calibration tube, set the upper o-ring to 140 mL and the lower o-ring to 40 mL resulting in a 100 mL difference
6. Fill the calibration tube. This can be done in two ways.
    a. If the tank level is high enough, simply open both the tank valve and the calibration tube valve and let static pressure fill the calibration tube.
    b. If the tank level is low, shut the calibration tube valve and fill the tube from the top using a funnel. Note: Use the liquid from the tank to fill the tube (not water or unmixed carrier/chemical)
7. Isolate the calibration tube by closing the valve to the tank and opening the valve to the calibration tube.
    a. Ensure that the fluid level in the calibration tube is higher than the top o-ring.
8. With the pump running, start the stopwatch when the fluid level in the tube reaches the top o-ring. Stop the stopwatch when the fluid level reaches the bottom o-ring.
9. Calculate in discharge in gallons per hour:
    a. mL / seconds x 0.9511 = gallons per hour
    b. mL is the distance between the o-rings in milliliters
    c. Seconds is the time on the stopwatch in seconds
        i. Be careful to use seconds: 1:15 is 75 seconds
    d. 0.9511 is a constant that converts milliliters per second to gallons per hour
10. Adjust the Frequency (Gallons per hour) Knob as necessary.
    a. If the test gallons per hour is less than the desired gallons per hour (F), turn the Frequency (Gallons per hour) Knob up slightly and repeat.
    b. If the test gallons per hour is more than the desired gallons per hour (F), turn the Frequency (Gallons per hour) Knob down slightly and repeat.
    c. If the test gallons per hour is equal to the desired gallons per hour (F), the system is properly calibrated.
11. Allow the pump to completely drain the calibration tube.
12. Close the calibration tube valve while opening the tank valve to configure the pump to draw liquid from the tank.

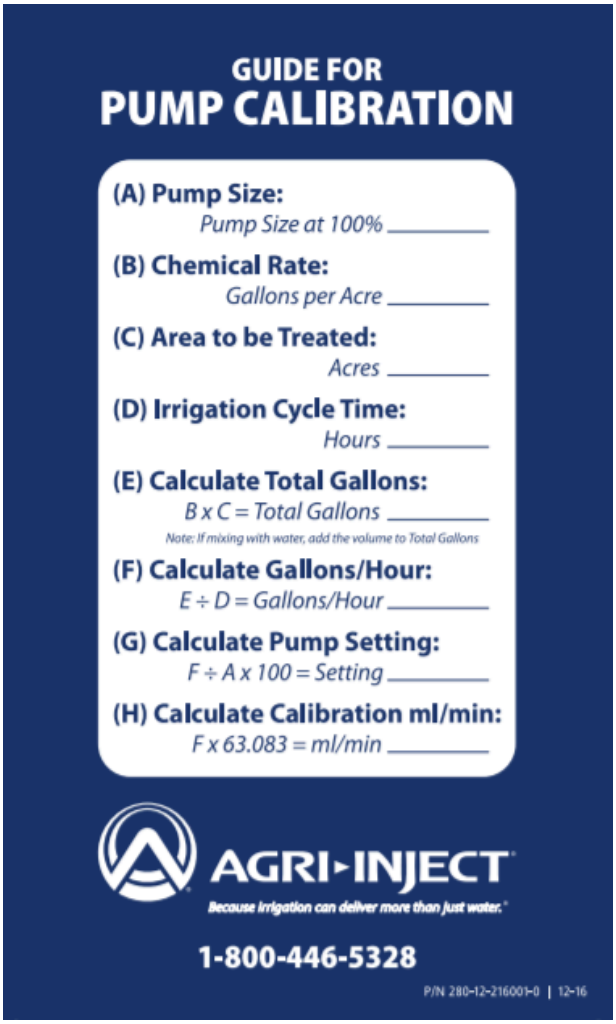
8.7.2 TRADITIONAL METHOD (calibration result in minutes)

1. Ensure that the products are properly mixed.
2. Ensure the irrigation system is ON and operating properly.
3. Start the injection pump and ensure that it is fully primed and operating properly.
4. Preset the Frequency (Gallons per hour) Knob and the Percent Stroke (Percent of stroke length) Knob to the predetermined settings (H) and (I) from the completed Calibration Worksheet.

Important!
Never adjust the stroke control knob (center knob) if the pump is not running. Permanent damage will occur.

5. Preset the o-rings on the calibration tube to the predetermined level (G) from the completed Calibration Worksheet.
    a. Example: If (G) is 125 ml, set the o-rings 125 ml apart. Ie. Set one at 200 and the other one at 75.
6. Fill the calibration tube. This can be done in two ways.
    a. If the tank level is high enough, simply open both the tank valve and the calibration tube valve and let static pressure fill the calibration tube.
    b. If the tank level is low, shut the calibration tube valve and fill the tube from the top using a funnel. Note: Use the liquid from the tank to fill the tube (not water or unmixed carrier/chemical)
7. Isolate the calibration tube by closing the valve to the tank and opening the valve to the calibration tube.
    a. Ensure that the fluid level in the calibration tube is higher than the top o-ring.
8. With the pump running, start the timer when the fluid level in the tube reaches the top tube. Stop the timer when the fluid level reaches the bottom o-ring.
    a. If the timer is less than one minute, turn the Frequency (Gallons per hour) Knob down slightly and repeat.
    b. If the timer is more than one minute, turn the Frequency (Gallons per hour) Knob up slightly and repeat.
    c. If the timer is one minute, the system is properly calibrated.
9. Allow the pump to completely drain the calibration tube.
10. Close the calibration tube valve while opening the tank valve to configure the pump to draw liquid from the tank.

Figure 6



8.8 SYSTEM OPERATION

Important!
Prior to operation of the system, make sure that the system is properly mounted and secure, the Mister Mist'r injection quill and discharge hose assembly is properly installed and all fittings are tight. Make sure the irrigation system is properly configured and the proper safety interlocks are in place. Follow all local, regional, state, and federal rules and regulations for chemigation. Follow all feed chemical specimen label instructions.

After the system has been fully calibrated, it is ready for operation. Since the product is mixed and currently mixing, then both pump and mixer should be properly operating.

After the irrigation system is operating, charged, and up to pressure, set the On-Off-Aux switch on the front of the pump to "On". When the irrigation cycle is complete, the electrical interlock mechanisms will turn the Insectigator® off.

Important!
The irrigation electrical interlock mechanisms will shut off the power to the whole Insectigator® system, including the mixer. If the mixture in the tank is likely to “set up” if it is not agitated, ensure personnel are available to handle the mixture in the tank when the irrigation system shuts down.

Important!
If the mixture in the tank has set up, do not turn the mixer on. Attempting to rejuvenate a set up mixture with the mixer is very likely to damage the mixer shaft, mixer motor and tank.

The following points are very important for operation:.

Ensure the following operating conditions:

- System is on level ground and will not shift or move during operation
- System is not in an area that would accumulate standing water during operation.
- Electrical cord is free from nicks and away from areas where snagging or other damage may occur.
- Electrical connections are tight and/or locked, shielded from water spray or other environmental hazards, and properly insulated.
- Tank lid is tight and the lid vent is operating properly.
- Tank valve is open.
- Suction filter element is clean and seated properly.
- All plumbing connections are tight and in good shape.
- Bleeder valve relief port is fully closed.
- Discharge hose is positioned to eliminate potential snagging or damage.
- Mister Mist’r check valve is in good condition and the seal and spring are suitable for operation.
- Backflow prevention upstream of the injection point is installed and in proper operating condition.
- System is interlocked with the irrigation control (either electrical or logical) to ensure system shutdown in the case of irrigation system stoppage or failure.
- Irrigation system is in suitable operating condition, nozzles and/or emitters are in good shape, and timers and/or controls are properly set.
- There are no human and/or non-target animals/crops that are within range of the irrigation coverage.
- Weather conditions are suitable for irrigation and feed chemical application

9.0 POST OPERATION

9.1 SAFETY

	**WARNING!** **Danger of electric shock** Main voltage exists in the switch enclosure, the transformer, and in the wiring boxes of the pump and mixer motor. When handling this system or making any wiring connections, disconnect the main power. If there is damage to any of these components, disconnect it from the main power immediately and only return to service after an authorized repair has been made.
	**WARNING!** **Warning of a dangerous or unknown feed chemical leak** Should a dangerous or unknown feed chemical be used, it may escape from the wetted fittings/tubing when working on the system. Take appropriate measures before working on the system (e.g. proper PPE, consult label or SDS of the chemical). Drain and flush all the plumbing before working on the system
	**WARNING!** **Warning of dangerous or unknown feed chemical fumes** Fumes may exist inside the tank. Take appropriate measures before working on the system (e.g. a respirator may be needed, consult the label or SDS of the chemical). Open in a well ventilated area. Drain tank before working on anything inside the tank.
	**WARNING!** **Warning of feed chemical spray during disconnection** Feed chemicals can spray out of the discharge hose if they are manipulated or opened due to pressure in the pump head and adjacent parts of the system. Disconnect the pump from the main power supply and ensure it cannot be switched on again by unauthorized personnel. Depressurize the system before commencing any work on wetted parts.
	**WARNING!** **Warning of feed chemical spray due to piping blockage** The metering pump can generate extreme pressure. Discharge fittings/tubing can rupture if the discharge line is blocked. Ensure that the hose and injection check valve (Mister Mist'r®) is clear before pumping. Ensure that the suction filter is clean and the filter element is installed properly and in good shape before pumping.
	**CAUTION!** **Warning against illegal operation** Observe the regulations (local, state, federal) that apply where the system is installed.

9.2 SAFETY EQUIPMENT

It is important to have the proper safety equipment available and in-use during post operation actions. Please consult **Section 6.1** for a list of the recommended safety equipment.

9.3 DRAINING THE SYSTEM

Important!
Make sure to use the proper Personal Protective Equipment (PPE) when draining the Insectigator® system.

This system has been designed and equipped to minimize wasted chemicals. The tank is completely drainable and the system is equipped with a drain assembly.

When the injection application is complete and it is necessary to drain the tank of the remaining chemical mixture, follow the instructions below.

1. Make sure you have a container or pan that is large enough to contain the volume of product remaining in the tank.
2. Use the injection pump to remove all of the liquid from the plumbing.
    a. Close the tank valve and open the calibration tube valve.
    b. On the discharge line, open the bleeder valve and direct the small bleeder tube into the container.
    c. Turn on the pump and capture all of the product from the plumbing into the container.
    d. When the plumbing is 'dry', turn off the pump and close the bleeder valve.
3. Remove the calibration tube from the plumbing assembly using the cam lock style coupler.
4. Insert the drain assembly into the coupler and place the end of the drain tube into the container to capture the product.
5. Open the tank valve and drain the product

Important!
It is important to properly store and/or dispose of the chemical mixture. Consult the chemical specimen label and comply with all label guidelines.

9.4 FLUSHING THE SYSTEM

Important!
Make sure to use the proper Personal Protective Equipment (PPE) when flushing the Insectigator® system. Be sure to follow all instructions on the feed chemical specimen label with regards to clean up and disposal of unused chemical and rinsate.

This system has been designed and equipped to allow the operator to flush the entire system and clean any chemical mixture out of the tank, plumbing, and pump. The system should be flushed after each use.

Water is normally an excellent flushing agent. However, some chemicals and/or chemical mixtures may be incompatible with water. If this is the case, please use the appropriate solution to flush.

To flush the system, follow the steps below:

1. Remove the calibration tube from the plumbing assembly using the cam lock style coupler.
2. Attach a garden hose to the Flush Assembly and place the assembly into the female cam lock coupling on the plumbing assembly.
3. Open the tank valve.
4. Turn the pump on and turn the water on.
5. The water pressure will flush the plumbing to the tank.
6. Close the tank valve to isolate the plumbing while doing this.
7. Allow the pump to run for a short time to clean and clear the plumbing and injection line.
8. The tank will now have some rinsate which can be drained or used in the next mixture.
9. Run water through the calibration column assembly to clean it.

9.5 STORAGE

Important!
Make sure to use the proper Personal Protective Equipment (PPE) when cleaning and storing the Insectigator® system. Be sure to follow all instructions. on the feed chemical specimen label with regards to clean up and disposal of unused chemical and rinsate.

If the system will not be in use for more than one month, the following storage procedure is recommended.

1. Rinse the tank with ammonia, detergent water, or tank cleaner. Check for product incompatibility before performing this step. (see 'jar test' in Section 9.8)
2. Remove the filter bowl and thoroughly clean the filter element and the bowl. Check the condition of the filter, gasket, and bowl. Replace as necessary.
3. Flush the plumbing and injection pump liquid end with fresh water for at least five minutes.
4. Fill the calibration tube, pump and plumbing assembly with cleaning solution and let it sit for 30-60 minutes. Flush with fresh water.
5. Inspect hose, plumbing, and calibration column. Replace if cracked, discolored, or otherwise defective.
6. Fill the calibration tube, pump and plumbing assembly with windshield washer solvent rated for -20 degrees fahrenheit in preparation for storage.
    a. Pump the windshield washer solvent through the system
    b. If 480V power is not available, unplug the pump from the transformer and run the pump on 120V power
    c. Alternatively, blow out all liquid with an air hose.
7. Store the system in a sheltered area out of the sun and harsh weather.

10.0 MAINTENANCE

10.1 SAFETY

WARNING!
Danger of electric shock
Main voltage exists in the switch enclosure, the transformer, and in the wiring boxes of the pump and mixer motor.
When handling this system or making any wiring connections, disconnect the main power. If there is damage to any of these components, disconnect it from the main power immediately and only return to service after an authorized repair has been made.

WARNING!
Warning of a dangerous or unknown feed chemical
Should a dangerous or unknown feed chemical be used, it may escape from the wetted fittings/tubing when working on the system. Take appropriate measures before working on the system (e.g. proper PPE, consult label or SDS of the chemical)
Drain and flush all the plumbing before working on the system

WARNING!
Warning of dangerous or unknown feed chemical fumes
Fumes may exist inside the tank.
Take appropriate measures before working on the system (e.g. a respirator may be needed, consult the label or SDS of the chemical). Open in a well ventilated area. Drain tank before working on anything inside the tank.

WARNING!
Warning of feed chemical spray due to piping blockage
The metering pump can generate extreme pressure. Discharge fittings/tubing can rupture if the discharge line is blocked.
Ensure that the hose and injection check valve (Mister Mist'r®) is clear before pumping.
Ensure that the suction filter is clean and the filter element is installed properly and in good shape before pumping.

10.2 PERIODIC AND PREVENTIVE MAINTENANCE

To avoid excessive downtime in the event of a parts malfunction, it is a good idea to keep some common replacement parts in stock. See the chart below. See also Figure 7 and Figure 8 for a breakdown of the relevant parts.

Description	Quantity Required	Part Number
Plug In Elbow, 3/8 X 3/8 PP	1	199-09-012012-1
Tube X Hose, 3/8 X 1/4	1	199-13-012008-0
Hose Clamp, SS #4 J	1	365-50-000004-0
Fig Seat Ring Polyprel	2	906-29443
Fig Ball Check Valve	2	906-10338
Clock/timer	1	418-00-000001-0
Kwik-Cut cutters	1	411-01-000001-0
Replacement cutter blade	1	411-50-000001-0
Mister Mist'r flush tool	1	831-02-011000-0

The FIG metering pump is designed to operate in the agricultural environment with minimal trouble. However, routine maintenance of the check valves is recommended for optimum performance. The check valve seat rings should be replaced at least once annually.

These pump parts can be obtained by contacting your local dealer.

Parts orders must include the following information:

- Part number
- Part description
- Quantity
- Pump model number (on pump nameplate)
- Pump serial number (on pump nameplate)

Always include the pump serial number and the model number in all correspondence regarding the unit.

10.3 ROUTINE MAINTENANCE

The Insectigator® is designed to provide reliable service with a minimal amount of maintenance. In normal operation, a periodic check of the pump is recommended every 24 to 48 hours to confirm satisfactory operation.

- Confirm the pump calibration (follow steps in section 8.7)
- Inspect the suction and discharge lines for indication of leaking or seepage around the pump head and injection point
- Check to see that the mixer is running quietly, smoothly and mixing properly

10.4 PARTS REPLACEMENT

The Insectigator® is designed to provide reliable service with a minimal amount of maintenance. In normal operation, it is recommended that the check valve seats be replaced at least annually.

Seat replacement is straightforward:

1. Carefully remove the check valve body from the pump head:
    a. Remove and replace one check valve at a time.
    b. While externally similar, the suction and discharge check valve bodies are very different internally and can be easily confused.
    c. Be careful not to lose the check valve ball.
2. Locate and remove the old seat ring:
    a. The seat rings typically remain in the pump head.
    b. Use an o-ring pick to carefully remove the seat ring.
    c. In the suction check valve, the ball will fall out when the seat ring is removed.
3. Install new seat ring:
    a. The seal ring has a small o-ring on one side and a groove on the other.
    b. The o-ring side is always oriented up and the groove side oriented down.
    c. The ball is always above the seat ring and seats on the small o-ring.
    d. The groove mates with a matching ridge on the suction check valve body and a matching ridge in the head under the discharge check valve body.

4. Install the check valve body carefully:
    a. Do not use thread sealant
    b. Ensure the threads are not cross-threaded
    c. Do not overtighten. The check valve body seals against the soft seat material. Slightly more than hand tight is usually sufficient.

The remainder of the pump is extremely reliable and requires little, if any, further maintenance.

11.0 INSECTIGATOR® CALIBRATION WORKSHEET

SIMPLE (BY AREA) METHOD

Note: This method works well for almost all irrigation methods including center pivot, linear, and drip

Field Number: _____ Date: _____

Unit No:_____ Tank Capacity: _____ Max Pump GPH:__**1.9**

1. DETERMINE THE INJECTION PUMP SIZE **1.9 GPH** **A**

Determine the capacity of the injection pump at maximum rate (100%) (in Gal/Hr)

2. DETERMINE THE CHEMICAL APPLICATION RATE _____ **B**

Determine how many gallons of chemical will be applied per acre of treated area (Gal)

(Note: 1 gal. = 128 oz.)

3. DETERMINE AREA TO BE TREATED _____ **C**

Enter the entire area to be treated under irrigation. (Acres)

4. DETERMINE THE IRRIGATION CYCLE TIME _____ **D**

Determine how long the irrigation system is ON during which injection will occur. (Hours)

Factors that can influence this time: specimen label chemigation instructions, irrigation application rate, irrigation set time, transit time of water from pump to nozzles, and the amount of chemical to be applied.

5. CALCULATE TOTAL VOLUME TO BE APPLIED

Calculate the total volume needed to be applied including the carrier. (Gal)

(Note: See section 8.5 for assistance)

(**B**) x (**C**) + _____ carrier desired/needed = _____ **E**

6. CALCULATE PUMPING RATE NEEDED

Calculate the pumping rate needed to apply the liquid in time allowed (Gal/Hr)

(**E**) ÷ (**D**) = _____ **F**

7. CALCULATE CALIBRATION TARGET

Calculate the volume target for use when calibrating pump (milliliters)

(**F**) x 63.083 = _____ **G**

8. ESTIMATE FREQUENCY KNOB AND PERCENT STROKE KNOB

A. Set the Frequency (Gallons per hour) Knob and the Percent Stroke (Percent of stroke length) Knob according to the following table:

Gallons per hour required (F)	Frequency (Gallons per hour) Knob Setting (H)	Percent Stroke (Percent of stroke length) Knob Setting (I)
Between 1.0 and 1.9 GPH	Gallons per hour required (F)	100%
Between 0.5 and 1.0 GPH	GPH required (F) X 2	50%
Between 0.25 and 0.5 GPH	GPH required (F) x 4	25%
Between 0.2 and 0.35	GPH required (F) x 5	20%
Between 0.1 and 0.19	GPH required (F) x 10	10%

B. Almost all applications can be handled at either 100% or 50% Percent Stroke Settings

C. FIG pumps typically over-pump by 0.1 - 0.2 gallons per hour, so there is usually plenty of overlap between the range settings.

D. These knob setting estimates will get close. Always use the calibration procedure in section 8.7 to fine tune the system. It is much easier to make fine adjustments with the Frequency (Gallons per hour) Knob

Determined from Column Two = _____ **H**

Determined from Column Three = _____ **I**

12.0 INSECTIGATOR® CALIBRATION WORKSHEET

CARRIER ADJUSTMENT METHOD

Note**:** This method uses the pump at a known injection rate at maximum output setting and typically works best using Insectigator® with 30 gallon tanks. This method can be very handy when using the system with several pivots with similar irrigation cycle times. The idea is that once the pump is set, the pump is never adjusted and water is added to the tank to accommodate the irrigation cycle time for each application. As every FIG pump is slightly different, use the calibration tube to establish a baseline pumping volume for your pump at 100% Stroke Length and set to 1.9 gallons per hour. The method will not work at 1.9 gallons per hour if irrigation cycle time is longer than 15 hours. If 1.9-2.0 gallons per hour is too large for your applications, select a lower set point to establish a known injection rate.

Field Number: _____ Date: _____

Unit No:_____ Tank Capacity: _____ Max Pump GPH:__**1.9**

1. DETERMINE THE KNOWN INJECTION RATE _____ **A**

Using the calibration tube, determine the actual injection rate of your injection pump at maximum output setting or some lower setting if maximum rate is too high. (Gal/Hr)

2. DETERMINE THE CHEMICAL APPLICATION RATE _____ **B**

Determine how many gallons of chemical will be applied per acre of treated area (Gal)

3. DETERMINE THE AREA TO BE TREATED _____ **C**

Enter the entire area to be treated under irrigation. (Acres)

4. DETERMINE THE IRRIGATION CYCLE TIME _____ **D**

Determine how long the irrigation system is ON during which injection will occur. (Hours)

Factors that can influence this time: specimen label chemigation instructions, irrigation application rate, irrigation set time, transit time of water from pump to nozzles, and the amount of chemical to be applied.

5. CALCULATE THE TOTAL CHEMICAL VOLUME

Multiply Chemical Application Rate (B) times Area To Be Treated (C) (Gal)

B x **C** =_____Gallons of Chemical = _____ **E**

6. CALCULATE THE TOTAL VOLUME TO INJECT

Multiply the Known Pumping Rate (A) times the Irrigation Cycle Time (D) (Gal)

A x **D** =_____Gallons to Inject = _____ **F**

7. CALCULATE THE VOLUME OF CARRIER

Subtract Total Chemical Volume (E) from Total Volume to Pump (F) (Gal)

F - **E** =_____Gallons of Carrier = _____ **G**

8. FILL TANK TO TOTAL VOLUME TO PUMP

A. Add approximately ½ of the carrier to volume to the tank
B. Start mixer if mixing will be necessary
C. Carefully add all of chemical
D. Add the remaining carrier ensuring that tank level indicates Total Volume to Pump (F)

Note: Growers will typically add an extra amount (maybe 1 gallon) of carrier to ensure the tank does not run empty if the irrigation system runs slow.

9. OPERATE SYSTEM NORMALLY

A. Do not change knob settings from Known Injection Rate knob settings
B. It is highly recommended to double check the calibration of the Known Injection Rate immediately after starting the system.
C. With sufficient tank volume, this is a pretty straightforward exercise while the system is running.
D. Use the calibration procedure in **Section 8.7.1**

13.0 INSECTIGATOR® CALIBRATION WORKSHEET

CENTER PIVOT TRADITIONAL METHOD

Field Number: _____ Date: _____

Unit No:_____ Tank Capacity: _____ Max Pump GPH: **1.9**

1. CALCULATE SPEED OF PIVOT

There are two ways of doing this.

1. Retrieve the data from the center pivot sprinkler nozzle chart
    a. Wetted Radius (Radius) or Wetted Area (A)
    b. Time of revolution (at the percentage of desired irrigation) (D)
2. Manually calculate the speed using measurements and timing at the end tower.
    a. We recommend doing this at least once annually to verify your nozzle chart.
    b. If you don't own the system and/or control the maintenance and repairs of the center pivot, it is a good idea to use the manual calculation as well.

A. WETTED AREA

(Radius)^2 x 3.1416 = _____ ÷ 43,560 = wetted acres per circle _____ **A**

Note: Radius = length of entire sprinkler system plus throw of end gun (in feet)

B. REVOLUTION TIME

1. Determine Circumference

    Radius at last wheel track x 6.2832 = Circumference _____ **B**

2. Calculate end tower speed. (Run at the speed setting expected during the irrigation event)

    A. Specify time taken to travel 100 ft (at last wheel track)

    100 feet ÷ minutes taken = feet/minute _____ **C_A**

    B. Measure distance traveled in 10 minutes (at last wheel track)

    Feet traveled _____ ÷ 10 = feet/minute _____ **C_B**

3. Determine Revolution Time (in hours)

    Circumference (**B**) ÷ Feet/Minute (**C_A** or **C_B**) ÷ 60 = _____ **D**

2. APPLICATION RATE

1. Determine the total amount of mixture (chemical/carrier) to be applied across the entire circle in gallons _____ **E**
2. Total Amount (**E**) ÷ Revolution Time (**D**) = Gallons per Hour required _____ **F**
3. GPH (**F**) ÷ 60 x 3,785 = Milliliters per Minute for calibration _____ **G**

3. ESTIMATE FREQUENCY (GALLONS PER HOUR) KNOB SETTING

1. If Gallons per Hour required (**F**) is less than 1.6, add 0.3 to determine the Frequency (Gallons per hour) Knob setting.
    a. This helps keep the Percent Stroke (Percent of stroke length) Knob in the recommended operating area.
2. If Gallons per Hour required (**F**) is greater than 1.6, set the
3. Frequency (Gallons per hour) Knob to slightly over the value of (**F**).

_____ **H**

4. ESTIMATE PERCENT OF STROKE SETTING

Gallons per Hour required (**F**) ÷ GPH dial setting (**H**) = Percent Stroke Setting _____ **I**

5. FINE TUNE STROKE SETTING THROUGH CALIBRATION

Set Stroke Setting knob to (**I**), then fine tune through the calibration process until the proper value of (**G**) is attained.

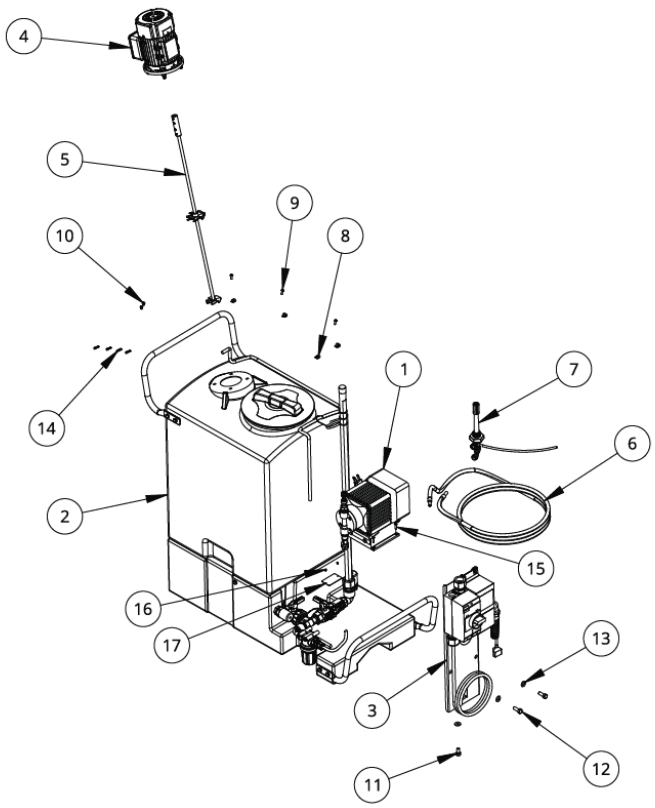
14.0 PARTS BREAKDOWN

1 | Complete System View

Item No.	Qty	Part Number	Description	
1 - 18		**887-34-312902-0**	**INSECT,3PH, 30 GAL, MIXER/TRAN, 2SW, FIG 1.9 GPH**	
1	1	506-02-000019-1	P FIG 1.9 GPH, W/OUT SWITCH, PREPPED	*
2	1	870-03-000007-0	BASIC UNIT, 30 GAL INSECTIGATOR, 7/8 CAL TUBE, 3PH	*
3	1	865-03-100250-0	SWITCH ASSEMBLY, INSC TRAN/MXR 1SW/3PH,1X.6-1AMP,	*
4	1	869-34-000100-0	INSECT MIXER ASSEMBLY, 3PH, IEC MOTOR	*
5	1	861-50-030002-0	MIXER SHAFT ASSEMBLY, IEC MOTOR, 30 GAL, INCLUDES PROPS	*
6	1	849-10-008012-0	HOSE KIT, HI-PRES.1/4X3/8 12`	*
7	1	820-02-000000-0	MISTER & BLEEDER ASSEMBLY	*
8	4	367-50-012000-0	CORD CLAMP, 3/8``	
9	3	351-50-103216-0	SCREW, 10-32 X 1/2 PHILIPS PAN HEAD	
10	2	351-50-103208-0	SCREW, 10-32 X 1/4 SS PHIL PAN	
11	1	301-50-012024-0	BOLT, SS 3/8-16X3/4 HEX HEAD	
12	2	301-50-012032-0	BOLT, SS 3/8-16X1 HEX HEAD	
13	3	335-50-012000-0	WASHER, SS 3/8 X 1 FLAT	
14	4	660-60-002000-0	WIRE TERM FORK SPADE BLUE	
15	4	351-50-103224-0	SCREW, 10-32 X 3/4, SS PHIL PAN	
16	2	350-50-004006-0	SCREW, THREAD ROLLING, SS, 4-40 X 3/16	
17	1	280-50-000000-2	PLATE, SERIAL/ UNIT ID, GREEN IMPRINTED	

* *Indicates this subassembly has a breakdown on a subsequent page*

Applicable Model Numbers
887-34-312902-0

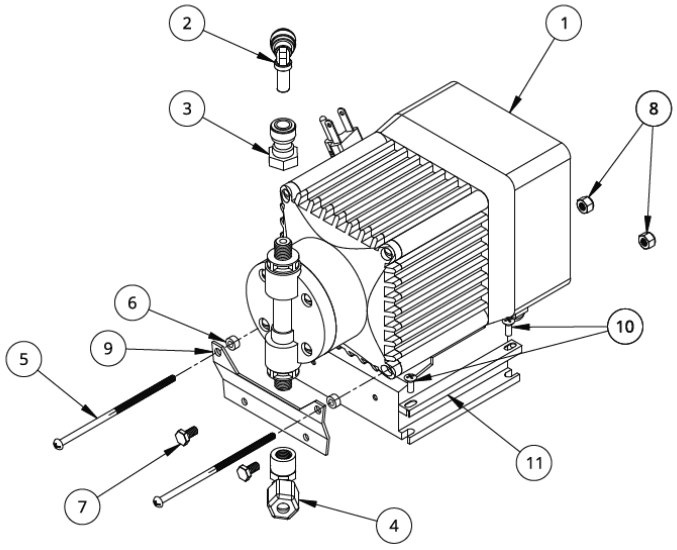


2 | Pump Prep

Item No.	Qty	Part Number	Description
1-9		**506-02-000019-1**	**P FIG 1.9 GPH, W/OUT SWITCH, PREPPED**
1	1	506-02-000019-0	PUMP FIG 1.9 GPH WITHOUT SWITCH *
2	1	199-09-012012-1	JG PLUG IN EL, 3/8 X 3/8 PP - VITON
3	1	199-02-012008-1	JG FC, 3/8 X 1/4 - VITON
4	1	197-01-012008-1	FEMALE EL, 3/8 X 1/4 PP - VITON
5	2	354-50-102450-0	SCREW, 10-24 X 5" SS ROUND HEAD
6	2	335-03-008000-0	WASHER, 1/4 NYLON SPACER
7	2	301-50-008016-0	1/4-20 X 1/2 Hex Head Bolt
8	2	321-50-008000-0	NUT, SS LOCK 1/4 NYLON
9	1	203-59-050598-0	LMI BRACKET MAT: 5052-H3 ALUM / BLK ANOD
10	4	351-50-012024-0	SCREW, SS 12" X 3/4" PHILLIPS
11	1	906-10461	FIG MOUNTING KIT

* *Indicates this subassembly has a breakdown on a subsequent page*

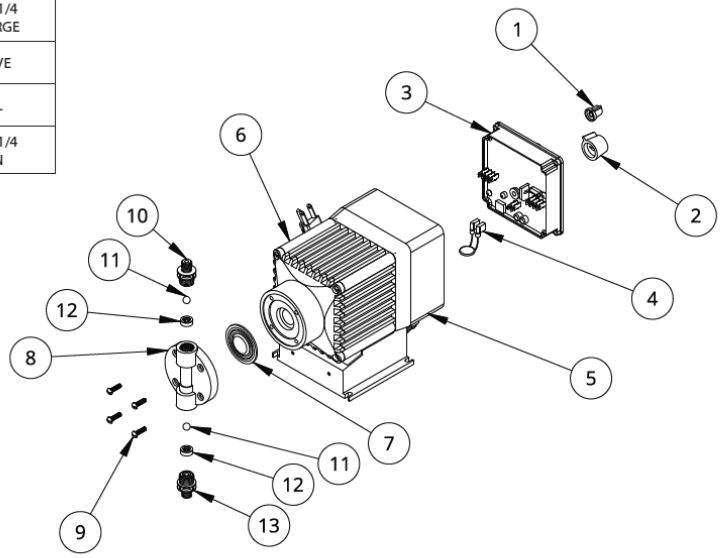
Applicable Model Numbers
506-02-000019-1



3 | Pump Breakdown

Item No.	Qty	Part Number	Description
(1) - (12)		**506-02-000019-0**	**PUMP FIG 1.9 GPH WITHOUT SWITCH**
(1)	1	906-30709	FIG SPEED KNOB (TOP)
(2)	1	906-31891	FIG STROKE KNOB 3 PC. (BOTTOM)
(3)	1	906-36596	FIG CONTROL PANEL ASSEMBLY WITH NAMEPLATE
(4)	1	906-10626	FIG VARISTOR ASM 115V
(5)	1	906-36514	FIG HOUSING
(6)	1	906-25068	FIG HOUSING SLEEVE
(7)	1	906-30917	FIG DIAPHRAGM
(8)	1	906-29611	FIG PUMP HEAD PVDF 0.9
(9)	4	906-10340	FIG SCREW PUMP HEAD
(10)	1	906-31562-1	FIG VALVE HOUSING 1/4 MNPT PVDF DISCHARGE
(11)	2	906-10338	FIG BALL CHECK VALVE
(12)	2	906-29443	SEAL RING, POLYPREL
(13)	1	906-31561-1	FIG VALVE HOUSING 1/4 MNPT PVDF SUCTION

Applicable Model Numbers
506-02-000019-0

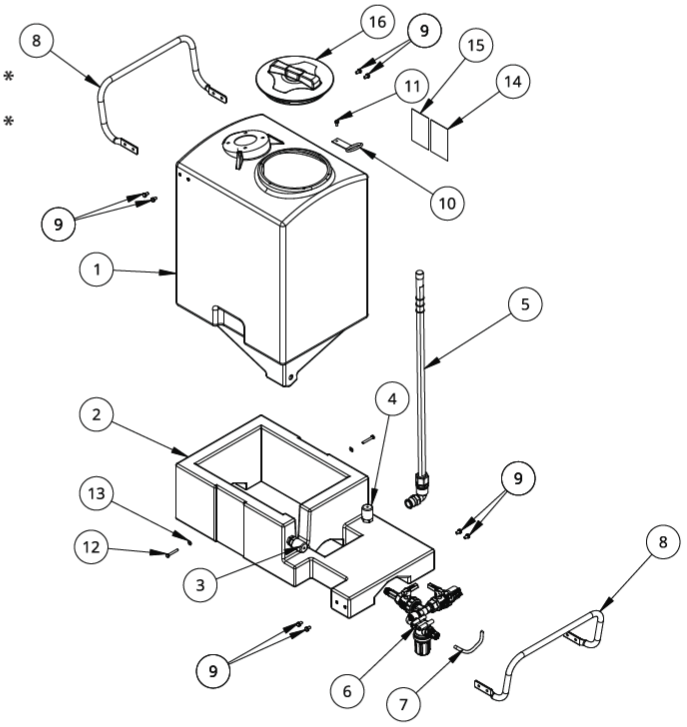


4 | Tank & Base Assembly

Item No.	Qty	Part Number	Description
1 - 15		**870-03-000007-0**	**BASIC UNIT, 30 GAL INSECTIGATOR, 7/8 CAL TUBE, 3PH**
1	1	215-02-000030-0	TANK, 30 GAL W/PREP, 3PH IEC
2	1	216-02-001008-0	BASE, INSECT, BLUE, W/ HANDLE INSERT, AI
3	1	800-04-001000-0	DRAIN ASSEMBLY
4	1	800-04-002000-0	FLUSH ASSEMBLY - UNITS
5	1	822-03-034028-0	CAL TUBE ASSY. 7/8 X 34 IN (210 ML)
6	1	804-02-000099-0	BV&S 1/2 INSECTIGATOR III
7	1	849-50-012001-0	HOSE SUCTION 3/8 X 10", INSECT PLUMBING TO PUMP, CLEAR
8	2	203-50-000024-0	BRACKET, INSECTIGATOR HANDLE, SS
9	8	301-50-010016-0	Bolt, SS 5/16-18 X 1/2 Hex Head
10	1	203-50-370000-1	BRACKET, CAL TUBE 1.4
11	1	301-50-008024-0	BOLT, SS 1/4-20 X 3/4 HEX HEAD
12	2	301-50-008080-0	BOLT, SS 1/4-20X2 1/2 HEX HEAD
13	2	335-50-008000-0	WASHER, SS 1/4 FLAT
14	1	280-12-216001-0	DECAL, TANK, PUMP CALIBRATION GUIDE
15	1	280-12-216002-0	DECAL, TANK CALIBRATION INSTRUCTION
16	1	236-01-010002-0	10" TANK LID & RING SET VENTED

* *Indicates this subassembly has a breakdown on a subsequent page*

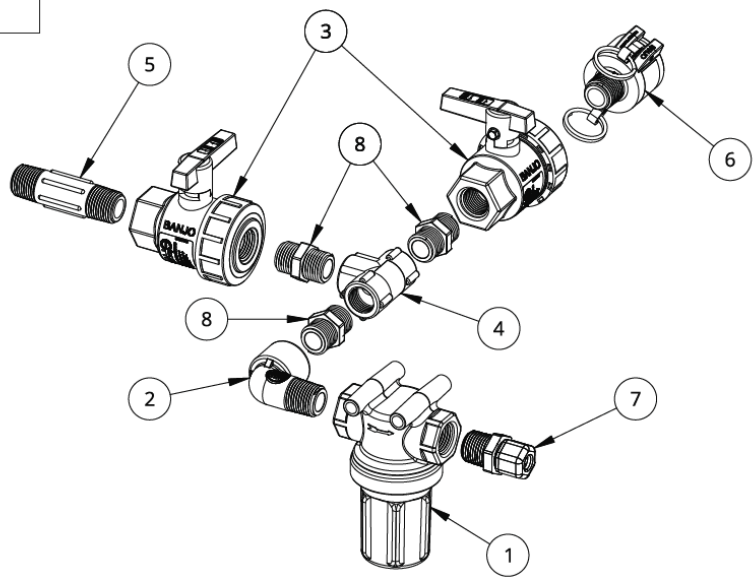
Applicable Model Numbers
870-03-000007-0



5 | Strainer Assembly

Item No.	Qty	Part Number	Description
1 - 10		**804-02-000099-0**	**BV&S 1/2 INSECTIGATOR III**
1	1	150-01-016030-0	1/2" MInI Strainer, Black Bowl, 30 Mesh
2	1	104-01-016000-0	ST. ELBOW, 1/2 90 PP
3	2	160-01-016000-0	1/2" Ball Valve
4	1	106-01-016016-2	1/2" Short Tee
5	1	101-01-016096-0	1/2" X 3" NIpple
6	1	138-01-016000-0	1/2" Cam Lever Coupler
7	1	188-01-016012-1	1/2 X 3/8 Male Connecter Fast-TIte - VIton
8	3	101-01-016000-1	1/2" Short NIpple

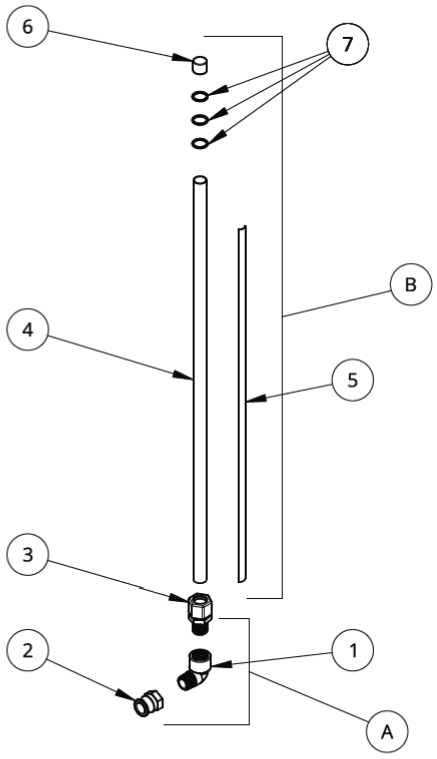
Applicable Model Numbers
804-02-000099-0



6 | Calibration Tube Assembly

Item No.	Qty	Part Number	Description
(1) - (10)		**822-03-034028-0**	**CAL TUBE ASSEMBLY, 7/8 X 34 IN (210 ML)**
(A)	1	822-01-024028-0	CAL TUBE ELBOW ASSEMBLY, 7/8 IN
(1)	1	104-01-024000-0	ST. ELBOW, 3/4 90 PP
(2)	1	135-04-024000-0	ADAPTER, 3/4 FNPT
(3)	1	187-01-028024-0	MC, 7/8 X 3/4 JA PP
(B)	1	822-02-034028-0	CAL TUBE CONVERSION 7/8 X 3/4 IN
(4)	1	246-13-028034-0	TUBE, 34 IN CAL. UL, 7/8 IN
(5)	1	280-12-080034-0	DECAL, UL CAL. TUBE 7/8 IN, 34 IN
(6)	1	172-14-087575-0	CAP, CAL TUBE .875 X .75
(7)	3	171-31-000028-0	O-RING, CAL-TUBE 7/8 FLUID LEV

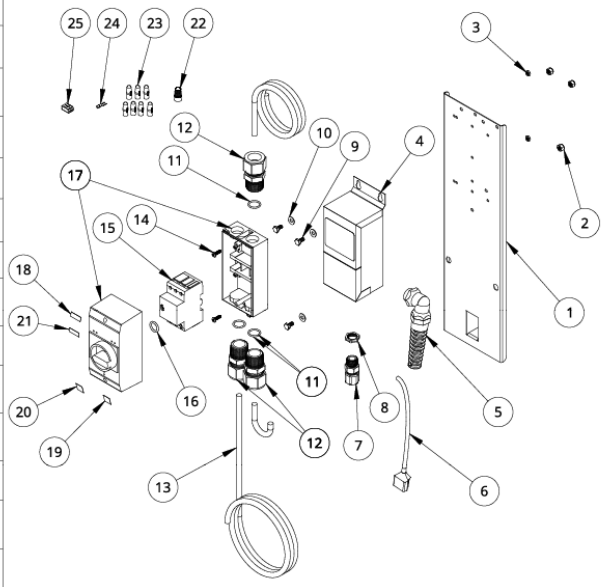
Applicable Model Numbers
822-03-034028-0



7 | Transformer & Switch Assembly

Item No.	Qty	Part Number	Description	Quantity Needed**
1 - 10		**865-03-100250-0**	**SWITCH ASSY, INSC TRAN/MXR 1SW/3PH,1X.6-1AMP,**	
1	1	203-50-220676-0	BRACKET, INSECT TRANSFORMER, SWITCH	
2	3	321-50-008000-0	NUT, SS LOCK 1/4 NYLON	
3	2	323-50-103200-0	NUT, 10-32 KEPS, SS	
4	1	665-03-480120-3	TRANSFORMER, .250 KVA 480-120	
5	1	657-08-016000-E	STRESS CONNECTOR, PG16 ELBOW W/ COIL	
6	1	662-03-183110-2	PIG TAIL, 30IN 110V FEMAILE PLUG	
7	1	657-07-015000-0	STRESS CONNECTOR, 1/2 PLASTIC	
8	1	657-07-015015-0	RELIEF LOCK NUT, 1/2 PLASTIC.	
9	3	301-50-008016-0	1/4-20 X 1/2 HEX HEAD BOLT	
10	3	335-50-008000-0	WASHER, SS 1/4 FLAT	
11	3	195-26-028036-0	O-RING, 3/4 X 15/16	
12	3	657-07-025000-0	STRESS CONNECTOR, M25 DOME TOP PLASTIC	
13	1	862-00-022164-0	POWER CORD, 3PH 16/4 23FT, A&P ASSEMBLY, INSECT	
14	2	301-50-103262-0	BOLT, 10-32 X 5/8 S/S PHIL PAN	
15	1	615-01-006010-0	SWITCH, .63-1.0 AMP, MANUAL MOTOR PROTECTOR	
16	1	195-26-010014-0	O-RING, 5/16ID X 7/16OD ENCL	
17	1	608-01-000001-0	ENCLOSURE, SURFACE MOUNT	
18	1	280-12-900001-4	DECAL, MIXER	
19	1	280-12-900001-0	DECAL, 1.0 AMPS MAX	
20	1	280-12-900008-1	DECAL, 480 VOLTS, 3 PH, 60HZ	
21	1	280-12-900002-2	DECAL, WARNING! HIGH VOLTAGE SM	
22	1	655-03-002210-0	WIRE NUT, CONNECTOR YELLOW 18-12AWG	
23	7	655-04-002214-0	WIRE NUT, CONNECTOR BRONCO 22-14	
24	1	660-60-002000-0	WIRE TERM FORK SPADE BLUE	
25	1	655-05-241202-0	COMPACT SPLICING CONNECTOR	

Applicable Model Numbers
865-03-100250-0



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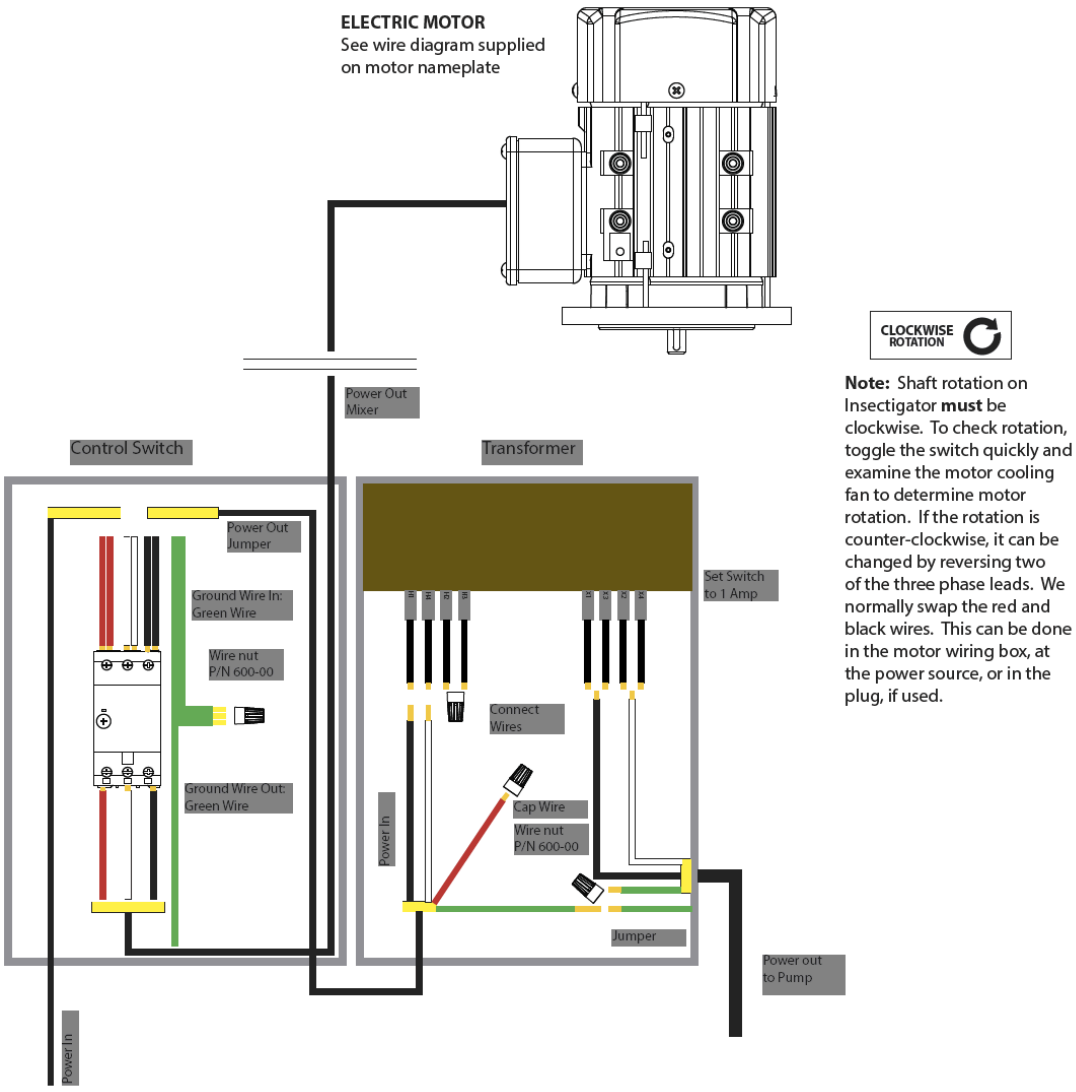
8 | Three Phase Wiring Diagram

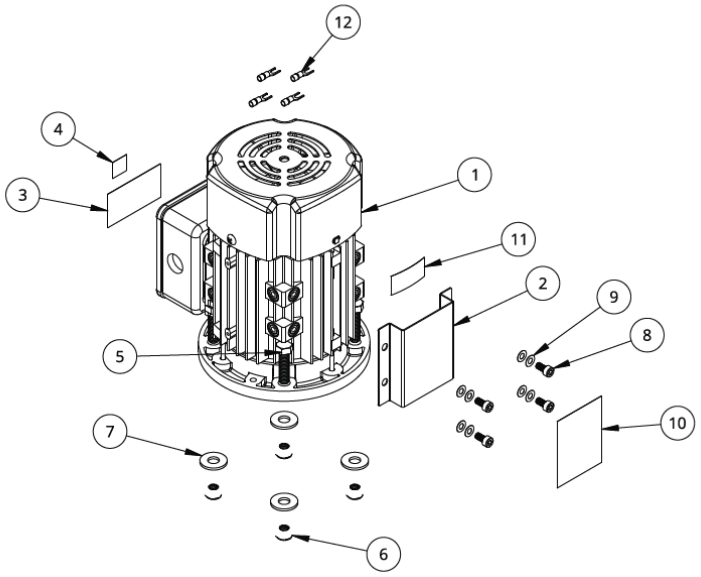


Note: Shaft rotation on Insectigator **must** be clockwise. To check rotation, toggle the switch quickly and examine the motor cooling fan to determine motor rotation. If the rotation is counter-clockwise, it can be changed by reversing two of the three phase leads. We normally swap the red and black wires. This can be done in the motor wiring box, at the power source, or in the plug, if used.

9 | Mixer Motor Assembly

Item No.	Qty	Part Number	Description
1 - 10		**869-34-000100-0**	**INSECT MIXER ASSY, 3PH, IEC MOTOR**
1	1	603-63-014180-0	MOTOR 1/4HP, 3PH, IEC INSECT \ 192015.00
2	1	203-59-060100-0	BRACKET, INSECT MOTOR SHIELD, FORMED
3	1	280-12-900001-2	DECAL, WARNING! HIGH VOLTAGE, LG
4	1	280-12-900008-1	DECAL, 480 VOLTS, 3 PH, 60HZ
5	4	301-50-010040-0	BOLT, SS 5/16-18 X 1-1/4 HEX HEAD
6	4	321-50-010000-0	Nut, SS Lock 5/16 Nylon
7	4	335-57-012000-0	WASHER, 3/8 X 7/8 FLAT
8	4	353-50-050810-0	SCREW, M5X06X10 SOCKET HEAD
9	4	335-50-050010-0	WASHER, SS M5X10MM, FLAT
10	1	280-12-700002-0	DECAL, INSECT MIXER IMPORTANT
11	1	280-12-200000-3	DECAL, INSECT MIXER ROTATION CLOCKWISE
12	4	660-60-002000-0	WIRE TERM FORK SPADE BLUE

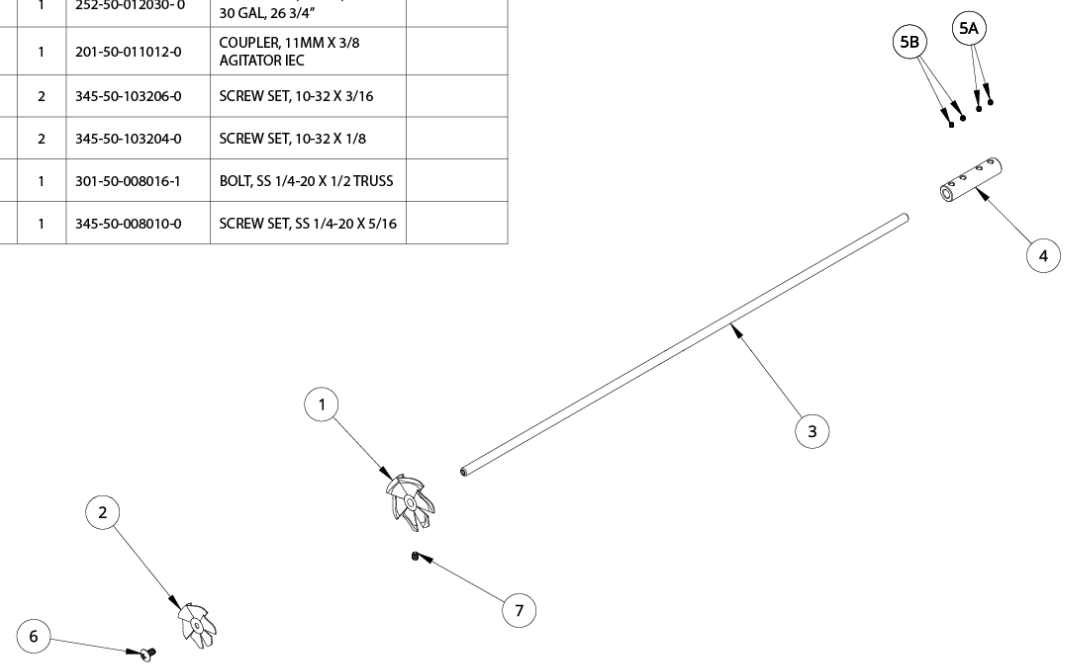
Applicable Model Numbers
869-34-000100-0



10.1 | Mixer Motor Shaft Assembly - 2021 & Earlier

Item No.	Qty	Part Number	Description	Quantity Needed**
(1) - (10)		**861-50-030002-0**	**MIXER SHAFT ASSY, IEC MOTOR, 30 GAL, INCLUDES PROPS**	
(1)	1	202-50-080012-1	PROP TURBINE, 2-1/2" X 3/8" W/ HUB/SET SCREWS	
(2)	1	202-50-064008-4	2" X 1/4" Prop	
(3)	1	252-50-012030- 0	SHAFT ONLY, 3/8 SS, INSECT 30 GAL, 26 3/4"	
(4)	1	201-50-011012-0	COUPLER, 11MM X 3/8 AGITATOR IEC	
(5A)	2	345-50-103206-0	SCREW SET, 10-32 X 3/16	
(5B)	2	345-50-103204-0	SCREW SET, 10-32 X 1/8	
(6)	1	301-50-008016-1	BOLT, SS 1/4-20 X 1/2 TRUSS	
(7)	1	345-50-008010-0	SCREW SET, SS 1/4-20 X 5/16	

Applicable Model Numbers
861-50-030002-0



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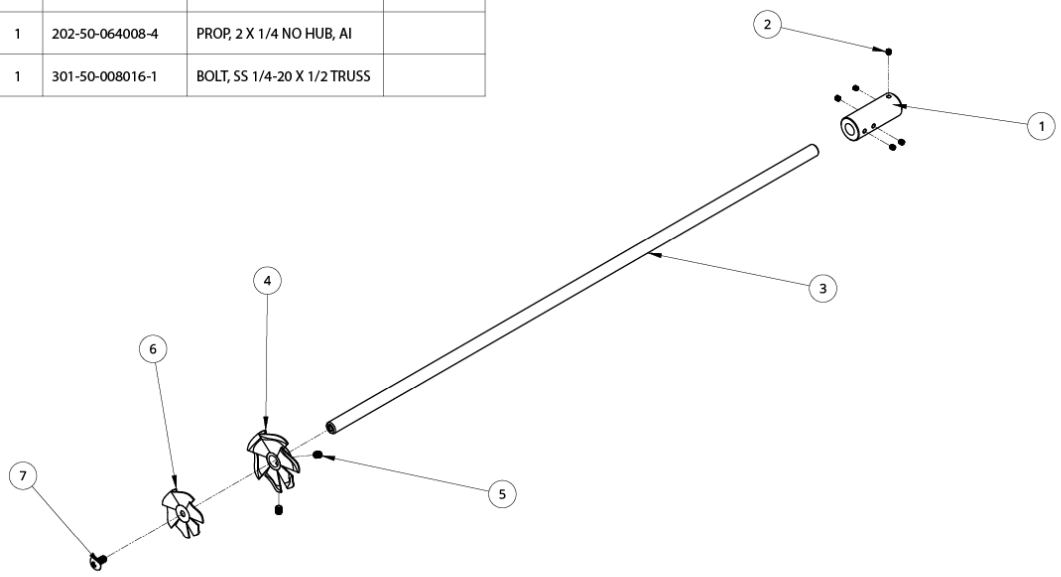
10.2 | Mixer Motor Shaft Assembly - 2022+

Item No.	Qty	Part Number	Description	Quantity Needed**
1 - 7		**861-50-030003-0**	**MIXER SHAFT, INSECT, 30 GAL,1/2 SHAFT, IEC MOTOR**	
1	1	201-50-011016-0	COUPLER, 11MM X 1/2 AGITATOR IEC, KEYWAY	
2	5	345-50-103206-0	SCREW SET, 10-32 X 3/16	
3	1	252-50-012030- 0	SHAFT, SS 1/2 x 27 30 GAL (New - 2022)	
4	1	202-50-008016-2	PROP, TURBINE, 2-1/2" X 1/2" W/HUB	
5	2	345-50-008010-0	SCREW SET, 1/4-20 X 5/16	
6	1	202-50-064008-4	PROP, 2 X 1/4 NO HUB, AI	
7	1	301-50-008016-1	BOLT, SS 1/4-20 X 1/2 TRUSS	

Applicable Model Numbers
861-50-030003-0



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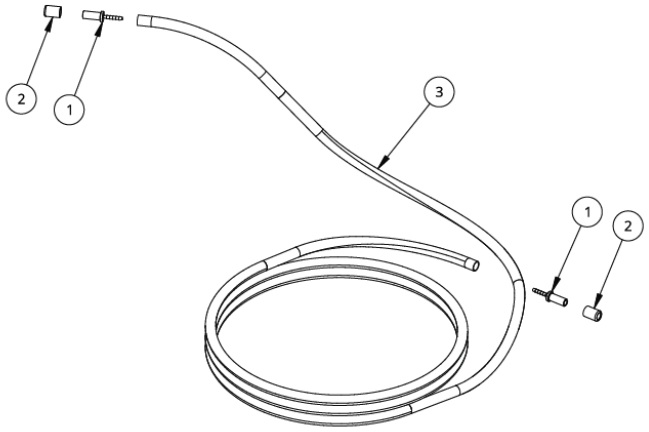
11 | Hose Kit

Item No.	Qty	Part Number	Description
1 - 3		**849-10-008012-0**	**HOSE KIT, HI-PRES.1/4X3/8 12`**
1	2	199-13-012008-0	JG TUBE X HOSE, 3/8 X 1/4
2	2	371-59-000550-0	FERRULE, #550
3	12	261-10-008000-0	HOSE,HI-PRESSURE 1/4" BLACK

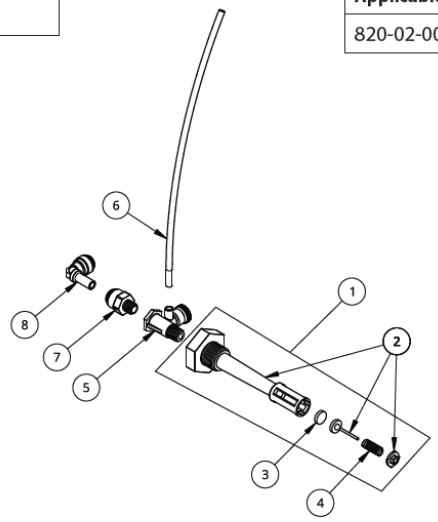
Applicable Model Numbers
849-10-008012-0



12 | Mister & Bleeder Assembly

Item No.	Qty	Part Number	Description
1 - 8		**820-02-000000-0**	**MISTER & BLEEDER ASSEMBLY**
1	1	820-02-008000-0	MISTER MIST'R, POLY 15PSI
2	1	226-01-000000-0	MISTER MIST'R, PP
3	1	226-26-594000-0	MISTER SEAL, .563 VITON (POLY) 1/8 VITON 10125
4	1	226-50-004015-0	MISTER 15 PSI SPRING CO360-045-1120-S
5	1	227-01-000000-0	BLEEDER VALVE, PP
6	1	260-02-187125-0	MT, PE-187 X 125 BLACK
7	1	199-01-012008-1	JG MC, 3/8 X 1/4 PP - VITON
8	1	199-09-012012-1	JG PLUG IN EL, 3/8 X 3/8 PP - VITON

Applicable Model Numbers
820-02-000000-0

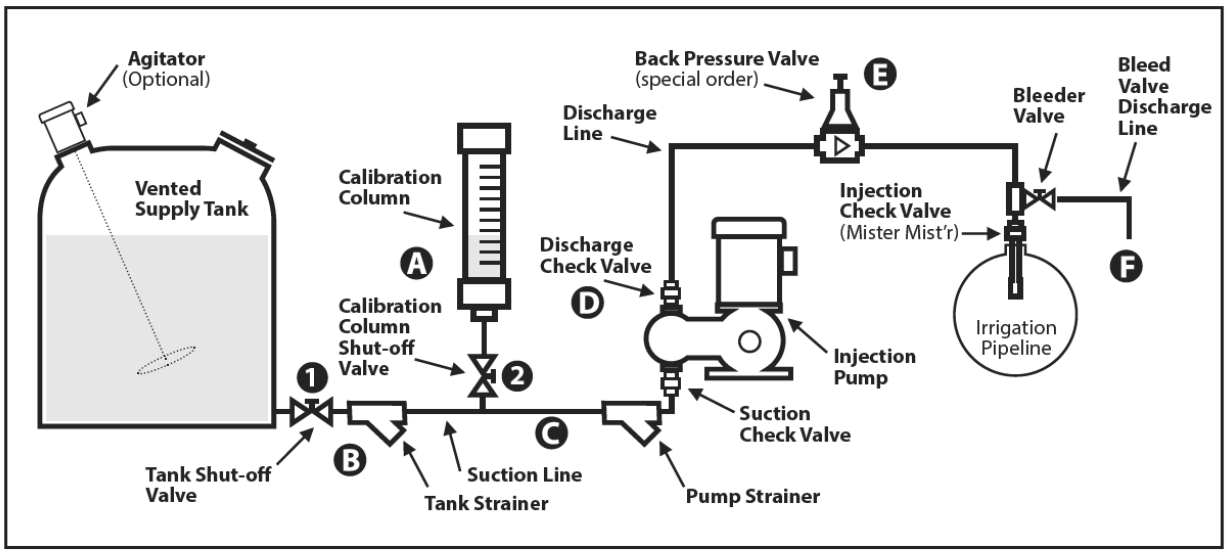


15.0 INSTALLATION AND PIPING APPENDIX

Installation - Piping

The figure below displays a typical installation schematic for a chemigation and/or a fertigation setup, including the recommended piping and accessories. This may not be an exact representation of every installation. Note: This is only a representation of the piping components and no electrical, mechanical or environmental representations are being made.

Typical Piping Diagram - Chemigation/Fertigation



General Piping Considerations

It is imperative to use proper materials for all piping components that are compatible with the liquid being pumped. Ensure that Agri-Inject is made aware of the process liquid so that the correct material of construction can be selected. Use piping rated for maximum pressures. Remove burrs, sharp edges, and debris from inside piping. Do NOT use teflon tape for thread sealant; use a non-teflon paste.* Only use approved suction and discharge hoses/tubing from Agri-Inject for the material being pumped.

Tank Considerations

The supply tank should be constructed of materials that are compatible with the pumped liquid AND suitable for the environmental conditions in which it is placed.

The tank must be vented (typically in the lid) to ensure easy and proper withdrawal of liquid from the container. Without proper and adequate venting, the system can vapor lock and cause piping, pump, and/or vessel damage.

The tank should be located close to the injection pump and physically above the injection pump if possible. Use a fully drainable tank when possible to minimize waste/leftover liquid.

When equipped with mixing apparatus, it is important that the action of the agitiation is properly mixing the solution and/or slurry to keep it in a homogenous state that will be suitable for pumping. Ensure that the mixing action does not introduce air into the suction piping which would cause inaccurate pump delivery. Ensure the mixing is effective enough to keep large particles from entering the suction line which may quickly clog the strainer and potentially foul the pump check valves. Some slurries require special considerations. Check with Agri-Inject for application recommendations.

* Teflon tape can easily plug up plumbing and pump components. Teflon paste is non-dissolvable if a 'glob' of it happens to get stuck in a check valve and can cause maintenance problems.

Suction Piping Considerations

Size suction piping to accommodate peak instantaneous flow, which is usually up to 5 times the average flow due to the reciprocating nature of the injection pump. See table on Page MRBL-005.

When pumping viscous fluids, it is often necessary to use suction piping up to four times larger than the size of the connection on the pump (or the size provided in the table on Page MRBL-005).

It is preferable to have the suction of the pump flooded by locating the liquid end of the pump below the lowest level of liquid in the tank. This greatly facilitates pump priming and allows the pump to operate the most accurately. Note: Agri-Inject chemigation systems are designed with this aspect in mind.

To minimize the chance of loss-of-prime condition, the pump should be installed as close as possible to the tank/supply container. To eliminate vapor problems, it is preferred to have a slight downward slope of piping from the tank to the pump suction check valve.

Avoid negative suction pressure conditions (ie. suction lift), as such conditions adversely affect metering accuracy. All Agri-Inject pumps have a maximum limit of about 6 ft (1.9m) of water column and require special equipment to operate properly.

Minimize the use of elbows, reducers and other fittings which will cause additional friction and reduced capacity in the suction piping.

At least one strainer should be used in the suction line to prevent foreign particles from entering the liquid end. This, and any other measures which prevent debris from entering and fouling the liquid end check valves (ie. double filtration), will give increased maintenance-free service. Check strainer frequently to prevent blockage which could lead to pump cavitation. In fertilizer pumping applications, it is often a good idea to have a strainer at the tank and another one at the pump. This ensures a cleaner liquid into the pump head with liquids that can frequently be 'dirty'.

If the injection pump is set up to draw from the top of the container (ie. a common arrangement is a pump mounted on top of a drum), it is necessary to have a foot valve/strainer on the bottom of the suction dip tube inside the container.

Suction piping must be absolutely airtight to ensure accurate pumping. Inspect for potential piping leaks after installation. Double check all fittings, hoses, and hose clamps.

Discharge Piping Considerations

Ensure that the size of the discharge piping is large enough to prevent excessive pressure losses on the discharge stroke of the pump. Maximum pressure at the discharge fitting on the pump must be kept at or below the rated pressure of the pump. The discharge pressure must be at least 10 psi greater than the suction line pressure for the pump to ensure a controlled flow. Ensure that the injection check valve spring pressure and/or irrigation pipe pressure is appropriate to achieve this difference. Otherwise a back pressure valve would be a suitable option (see diagram on previous page).

Valves

Back Pressure Valve

All metering pumps are prone to overpumping at low discharge pressures. To prevent this condition, ensure that there is proper back pressure against the pump (mRoy A/P: 50psi; mRoy B: 70 psi; MacRoy G: 20 psi; MacRoy D: 10psi | Note: In slurry applications with MacRoy pumps which necessitate stainless steel balls and seats, the required back pressure is 50 psi). This can be accomplished through the installation of a back pressure valve in the discharge line.

IMPORTANT: In the application where sulfuric acid, sulfuric acid based liquids, and other hazardous/corrosive liquids are being pumped, it is imperative that a back pressure valve be installed in the discharge line. The valve provides additional, redundant protection for the injection pump system AND the irrigation system should there be a failure of downstream component in the discharge line. With acids and other similar process fluids, the wear is accelerated on piping components, especially those that are interacting with irrigation water such as the injection quill. These components should be monitored and replaced regularly as well as safeguarded with additional protective devices such as back pressure valves.

NOTE: Because of the complexity and cost of this item, the back pressure valve is not a standard item supplied by Agri-Inject and must be special ordered.

Discharge Check Valve

The top check valve of the metering pump is designed to open on the discharge stroke, allowing liquid into the discharge line, and close on the suction stroke, preventing liquid in the discharge line from returning into the pump head. Normally, this is accomplished by means of gravity and line pressure pushing the check ball against the seat and closing the valve. On certain Agri-Inject pumps (mRoy A/P/B), a spring can be installed in the discharge check valve that applies pressure to the check ball, keeping it normally closed. This spring provides the benefit of positive guaranteed closure in slightly non-level conditions or with higher NPSH* situations. It ensures no potential backflow into the pumping head should downstream components fail. Also, it usually (depending on NPSH* conditions) assists with preventing siphoning from occuring into the irrigation pipeline.

IMPORTANT: In the application where sulfuric acid, sulfuric acid based liquids, and other hazardous/corrosive liquids are being pumped with an mRoy A/P/B series injection pump, it is recommended that a discharge check valve spring be installed in the discharge check valve. The spring, as stated above, provides additional, redundant protection for the injection pump system AND the irrigation system should there be a failure of any component in the discharge line. With acids and other similar process fluids, the wear is accelerated on piping components, especially those that are interacting with irrigation water such as the injection quill. These components, including this spring, should be monitored and replaced regularly as well as safeguarded with additional protective devices such as back pressure valves and discharge springs.

NOTE: The discharge check valve spring is not a standard item supplied by Agri-Inject and must be special ordered.

* NPSH stands for Net Positive Suction Head. In simple terms, this means the amount of pressure (ie. head) exterted by the suction fluid. This is normally caused by the level of the tank. The higher the tank level, the higher the pressure (normally - there could be circumstances where this isn't always the case, but in agricultural applications, generally speaking, the pressure in the outlet plumbing of a 6 ft. tall full tank is less than the pressure from a 12 ft tall full tank.)

Injection Check Valve (Mister Mist'r®)

The injection check valve distributes the process fluid (fertilizer/chemicals/etc.) within the irrigation pipeline. This valve must be normally closed (usually spring loaded) to keep irrigation water from entering the discharge line. It is very important that this valve be selected to be chemically compatible with the process fluid (including the body, spring, and seal). The valve should be properly sized for the irrigation pipeline (Note: Agri-Inject recommends a discharge point at or near the center of the irrigation pipeline for maximum mixing as well as safety with highly reactive fluids). The valve should be sized appropriately for the intended capacity of the injection pump (Note: A valve that is too small will generate high discharge hose pressures. A valve that is too big will not discharge optimally). The valve should be periodically maintained and replaced as necessary, and more frequently when pumping acids or other corrosive fluids.

NOTE: Please read the Back Pressure Valve section. It is critical in certain applications to have redundant protection beyond the injection check valve.

Bleeder Valve

The bleeder valve facilitates pump start up by allowing air to be purged from the discharge line. The bleeder valve has a discharge port that allows tubing (Classic: 0.1875"x 0.125" | Ultra: 0.250"x 0.150") so that the purged air/liquid can be directed to a safe container. The valve also allows pressure in the discharge line after shutdown to be dissipated so that piping disconnections can be made safely.

Shut Off Valves

There should always be shut off valves present in the suction line to allow disconnection of the hose from the tank. It is best practice to have a valve very near the output fitting of the tank. In fertilizer applications, it is also very common to have another valve at the end of the suction hose right before the quick connection into the pump. This allows the suction hose to remain full after disconnection rather than leak on the ground. There should also be a shut off valve directly upstream of the calibration tube. This, in conjunction with the tank shut off valve, allows isolation of the calibration tube to calibrate the injection pump. See the Notes section for calibration process instructions.

Important Notes

A **Calibration Column**

It is preferred that the top level of the calibration column is above the top liquid level of the tank, and critical that the cap of the column is vented. If the column is shorter than the top liquid level of the tank, extreme caution must be used to prevent calibration column overflow.

Calibration Process: (Note: Care should be used when handling chemicals/fertilizers)
With the Tank Shut-off Valve (#1) in the open position, slowly open the Calibration Shut-off Valve (#2) to allow the static pressure of the fluid in the tank to fill the calibration column. If the column height is shorter than the top liquid level of the tank, make sure to close the Calibration Column Shut-off Valve before it overflows. If there is not enough fluid in the tank to adequately fill the calibration column, it will be necessary to fill the column from the top with a smaller container of the process fluid. Once the column is full, ensure that the Tank Shut-off Valve (#1) is closed and the Calibration Column Shut-off Valve (#2) is open. At this point, the pump can be operated for a prescribed amount of time and the output of the pump can be measured via the drop in fluid in the calibration column. See the operator's manual for full instructions. This can be repeated as necessary until the pump is set to the proper rate. Once calibration is finished, ensure that the calibration column is empty and the Calibration Column Shut-off Valve (#2) is closed, and the Tank Shut-Off Valve (#1) is opened.

B **Strainer Size**

It is very important that the strainer size is as large or larger than the nominal size of the suction piping. The recommended mesh size of the strainer is 20 mesh with fertilizer applications and 40 mesh with chemigation applications. Note: With some chemicals such as fungicides, it may be necessary to remove the filter element to allow the chemical to move throught the filter body.

C **Suction Hose/Tubing Size**

It is critical that the size (ie. inner diameter) of the suction tubing is appropriate given the length of the tubing and the maximum capability of the pump. Consult the following table for minimum sizes at 10 ft. and 25 ft. distances.

Pump Capacity	Minimum size of Suction Tubing required at given length	
	10 ft.	25 ft.
1.6 gph and lower	0.375 in.	0.375 in.
1.6 to 11 gph	0.375 in.	0.50 in.
11 gph to 18 gph	0.50 in.	1.00 in.
18 gph to 30 gph	1.00 in.	1.25 in.
30 gph to 55 gph	1.25 in.	1.50 in.
55 gph to 85 gph	1.25 in.	2.00 in.
85 gph to 110 gph	1.50 in.	2.00 in
110 gph to 170 gph	2.00 in.	3.00 in.
170 gph to 310 gph	2.00 in.	4.00 in.

D **Discharge Check Valve Spring Option**

All mRoy A/P/B pumps have the option of the installation of a spring in the discharge valve. This spring holds the ball closed until overcome by the pressure generated by the pump during it's discharge stroke. The spring provides added protection against siphoning from the tank into a non-pressurized pipe. This option is recommended for all sulfuric acid applications. This is not a standard item in the product selection table and must be ordered separately.

E **Back Pressure Valve**

Back Pressure Valves are not standard equipment on Agri-Inject systems. They are highly recommended to be installed in applications where acids or other potentially dangerous liquids are being pumped. This valve provides additional, redundant safeguarding for protection against unintended flow of either process fluid or irrigation water.

F **Discharge from Bleeder Valve**

When utilizing the Bleeder Valve either in priming or pressure relief, it is important that the discharged liquid be captured and contained so as to eliminate any waste or environmental impact.

16.0 END USER WARRANTY

The warranty obligations of AGRI-INJECT for this product are limited to the terms set forth below:

1.0 What is Covered
This Limited Warranty covers defects in materials and workmanship for AGRI-INJECT branded products purchased in the United States of America, when delivered in new condition in their original packaging. This Limited Warranty covers defects encountered only in normal, intended use of the product, under the ownership of the original buyer.

2.0 What is Not Covered
This Limited Warranty does not apply to the following cases: (1) Loss of or damage to AGRI-INJECT product due to abuse, mishandling, or improper packaging by buyer; (2) Failure to follow operating, maintenance, or environmental instructions prescribed in AGRI-INJECT's instruction manual and other operating guidelines; (3) Products not used for their intended purpose or used outside of "normal in the industry" practices; (4) Alterations to the product, purposeful or accidental, including attempted repair of an item that results in damage; (5) Electrical current fluctuations or any application where the Agri-Inject system is connected to a power source being supplied via a Rotary Phase Generator; (6) Corrosion due to aggressive materials not approved for your specific product; (7) Mishandling or misapplication of AGRI-INJECT product; (8) Products or parts that are typically consumed/worn during normal operation; (9) Use of parts or supplies (other than those sold by AGRI-INJECT) which cause damage to the products, or cause abnormally frequent service calls or service problems; (10) Exposure to excess moisture, heat, dust, and/or corrosive conditions; (11) Damage from Acts of God (fire, smoke, flood, lightning, etc), acts of terrorism, or negligence; (12) Display units, demonstration units, or free goods; (13) Merchandise obtained other than through an Authorized Dealer or Agri-Inject directly including merchandise purchased at auction or third party liquidation, or if the product has been obtained illegally or surreptitiously, or if the product is involved in bankruptcy sale/proceeding; (14) Products where the serial number designation is missing or unreadable; and (15) Systems/components that are returned in an unassembled condition. Items and component parts not manufactured by AGRI-INJECT (including, but not limited to, electric motors, metering pumps, electric control components and other devices), even if purchased from an authorized AGRI-INJECT dealer or customer, are not covered by this Limited Warranty. As such, AGRI-INJECT in no way warrants any defects or workmanship in individual component parts utilized in any of its products provided said components are assembled properly by AGRI-INJECT. All such items and component parts manufactured by third-party manufacturers shall be covered solely by said third-party manufacturer's warranty. AGRI-INJECT, will, however, assist dealers and customers in pursuing coverage under the appropriate third-party manufacturer's warranty. AGRI-INJECT maintains a database of all component parts, their respective manufacturers and warranty terms which it will provide to dealers and customers upon request. The following list provides a summary of negotiated manufacturer's warranties for commonly used component parts: Milton Roy mRoy A/P/B Metering Pumps (Drive end: 5 years, Liquid end: 1 year, Motor: per motor manufacturer warranty); Milton Roy MacRoy Series G Metering Pumps (Drive end: 5 years, Liquid end: 1 year, Motor: per motor manufacturer warranty); Milton Roy MacRoy Series D Metering Pumps (Drive end: 3 years, Liquid end: 1 year, Motor: per motor manufacturer warranty); LMI Metering Pump "FIG" (3 years); WEG Electric Motors (1 year); Most electric/electronic components -VFD, HMI, PLC, Power Supplies, Etc (1 year). Note: "Drive end" is defined as the gearbox type assembly that exists between the electric motor and the liquid end. "Liquid end" is defined as any component of the pump itself (not the connected plumbing) that touches the process fluid. This includes the pump head, check valves, diaphragm assembly, and, on MacRoy G and D pumps, the oil seal assembly.

3.0 How Long this Coverage Lasts
The standard limited warranty periods for AGRI-INJECT products are as follows: 882 - Fertigation Systems* (3 years); 883 - Reflex Systems* (3 years); 887 - Insectigator Systems* (3 years); 888 - Chemigation Systems* (3 years); 889 - Large Capacity Systems* (3 years); All other systems, custom and otherwise, includes BoundaryRider

(1 year); 820/821 - Mister Mist'r and Bleeder related items ** (1 year); Fabricated components (1 year); Singularly purchased molded items or assemblies (1 year). The start of the warranty period is defined as the date on which the product was sold to the end user, unless that cannot be properly determined, at which point it is the date on which the product was sold to the dealer. It is important that the end user register their AGRI-INJECT product to ensure accurate recording of this date by completion of the Warranty Activation Card.

4.0 Who is Covered

Only the original end user of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

5.0 What AGRI-INJECT Will Do

AGRI-INJECT will, at its sole option, provide one of the following two remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition.
2. Replace this product with a direct replacement or with a similar product deemed by AGRI-INJECT to perform substantially the same function as the original product AGRI-INJECT will deliver repaired products or replacements for defective products to the buyer (ground freight prepaid) to the destination provided in the original order. Products returned to AGRI-INJECT for which AGRI-INJECT provides replacement under this warranty shall become the property of AGRI-INJECT.

6.0 What AGRI-INJECT Will Not Do Under This Limited Warranty

If this product is returned to AGRI-INJECT or the authorized dealer from which it was purchased or any other party authorized to repair AGRI-INJECT products, this product must be insured during shipment, with the insurance and shipping charges prepaid by the Buyer. If this product is returned uninsured, the Buyer assumes all risks of loss or damage during shipment. AGRI-INJECT will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. AGRI-INJECT will not be responsible for any costs related to any setting up this product. A new warranty period shall not be established for repaired or replaced material, products, or supplied. Such items shall remain under warranty only for the remainder of the warranty period on the original materials, products, or supplies. In the event that the equipment is altered or repaired by the buyer without prior written approval by AGRI-INJECT, all warranties are void. Damage caused by equipment or accessories not manufactured by AGRI-INJECT may void the product's warranty.

7.0 How to Obtain a Remedy Under This Limited Warranty

To obtain a remedy under this Limited Warranty, the original end user must give AGRI-INJECT prompt notice of any defect or failure and satisfactory proof thereof. Any defective parts must be returned to the AGRI-INJECT factory or to an authorized service center for inspection. The Buyer shall prepay all freight charges to return any product to AGRI-INJECT factory, or to another repair facility designated by AGRI-INJECT. In order to pursue any remedy under this Limited Warranty, you must possess an original, dated receipt as proof of purchase from an authorized AGRI-INJECT dealer. You may also be directed to an authorized reseller or a person authorized by AGRI-INJECT to repair the product, or to the original manufacturer in the event of a defect not covered by this Limited Warranty as specified above. If it is decided that this product should be returned directly to AGRI-INJECT, this product should be properly packed, preferably in the original carton, for shipping and bear the proper reference marking number on the outside of the package per the Warranty Evaluation process. Any package not bearing the proper markings may be refused. Please call the Agri-Inject dealer or our factory direct to initiate the Warranty Evaluation process.

8.0 Limitation of Liability

THE MAXIMUM LIABILITY OF AGRI-INJECT UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, AGRI-INJECT SHALL NOT BE LIABLE FOR LOSS OF REVENUES OR PROFITS, OR INCONVENIENCES, EXPENSE FOR SUBSTITUTE EQUIPMENT OR SERVICE, STORAGE CHARGES, LOSS OF DATA, OR ANY OTHER SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGE CAUSED BY THE USE OR MISUSE OF, OR

INABILITY TO USE THE PRODUCTS, REGARDLESS OF THE LEGAL THEORY ON WHICH THE CLAIM IS BASED, AND EVEN IF AGRI-INJECT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
Some countries, districts or states do not allow the exclusion or limitation of relief, special, incidental, consequential or indirect damages, or the limitation of liability to specified amounts, so the above limitations or exclusions may not apply to you.

9.0 Exclusive Remedy

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. TO THE MAXIMUM EXTENT PERMITTED BY LAW, AGRI-INJECT SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF AGRI-INJECT CANNOT LAWFULLY DISCLAIM OR EXCLUDE IMPLIED WARRANTIES UNDER APPLICABLE LAW, THEN ALL IMPLIED WARRANTIES COVERING THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THIS PRODUCT AS PROVIDED UNDER APPLICABLE LAW. IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS A “CONSUMER PRODUCT” UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPLICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY AS PROVIDED UNDER APPLICABLE LAW.

10.0 Other Conditions

This Limited Warranty gives you specific legal rights, and you may have other rights which vary from country to country or state to state. This limited warranty is void if (i) the label bearing the serial number of this product has been removed or defaced; (ii) the product is not distributed by AGRI-INJECT; or (iii) this product is not purchased from an authorized AGRI-INJECT reseller. If you are unsure whether a reseller is an authorized AGRI-INJECT reseller, visit our web site at www.agri-inject.com or contact AGRI-INJECT directly. Thank you for purchasing an AGRI-INJECT product. We hope it will give you years of satisfaction.

AGRI-INJECT®

Because irrigation can deliver more than just water ®

Agri-Inject, Inc.
5500 US Highway 34
PO Box 437
Yuma, CO 80759 USA

Telephone (international): +1 970-848-5336
Telephone (toll free): 1-800-446-5328
Fax number (international): +1 970-848-5338
Fax number (toll free): 1-888-846-5328

Web: www.agri-inject.com
Email: info@agri-inject.com
Facebook: facebook.com/agriinject
Twitter: @agriinject
YouTube: youtube.com/agriinjectinc