Ag-Pro™
SOLUTION INJECTION

OWNERS MANUAL

600 & 300 Gallon Models

ATTENTION:
Carefully read (and save) these instructions before operating the injection unit.

Manufactured exclusively for:

Western Minerals

1-(888) 88 AG-PRO

A Division of Western Gypsum, Inc.

FWB

Ag-Pro™
SOLUTION INJECTION

Limited Warranty

This Ag-Pro™ brand solution injection system is warranted by the original manufacturer to be free from defects in material and workmanship under normal use and service for a period of: **One (1) Year** on fiberglass tank, steel frame, fittings, agitation shaft and bearings, mixing blades and general assembly, **One (1) Year** on pumps and electric motors, **Two (2) Years** on Yanmar diesel engines, **Two (2) Years** on Honda gas engines.

Who receives this warranty: This warranty covers only the original retail purchaser (not purchased for resale) of the Ag-Pro injector. Warranty period begins on the date of purchase (invoice date), or the date of deliver, whichever is sooner.

Who gives this warranty: All warranties, expressed and implied, are provided by the original equipment manufacturer of each of the major components, and by Spraying Devices, Inc.,

What is not covered under this warranty:

A) Normal wear and tear. Failures resulting from the use of abrasive amendments and/or normal operating wear and tear is not covered under this warranty.

B) This warranty does not cover belts, hoses, pump valves and diaphragms, ball valves, orifices, tires, wheel bearings, oil, lubricants, filters and all other normal maintenance items.

C) Any failure that results from an accident, abuse, neglect or failure to operate the system in accordance with normal operating procedures as described in the Owners Manual.

D) Any failure that results from introducing non-compatible amendments, chemicals or other substances into the tank, OR introducing compatible amendments and chemicals, (including solution gypsum), in a form or in an amount that exceeds the limitations set forth in the "Compatible Amendments" section of the Owners Manual.

Limitations of this warranty: Any incidental, indirect, or consequential loss, damage or expense that may result from any defect, failure or malfunction of any of the components comprising the injection system are not covered under this warranty. Implied warranties, including those of merchantability and fitness for a particular purpose, are limited to one (1) year from date of original purchase. Some states do not allow limitations or exclusions on incidental and consequential loss, or implied warranties, so this paragraph may not apply to you.

Manufacturers' sole liability under this warranty is limited to the repair or replacement, at manufacturers' option, of covered products or components which have failed during the term of their respective warranty period upon return freight prepaid to place of manufacture.

Who to contact: Hypro pump warranty info (800) 468-3428. Honda engines contact your local Honda dealer. Yanmar diesel engines contact Hanco at (800) 413-6688. For all other warranty repair work, including the fiberglass tank and general materials and workmanship, contact your local Ag-Pro dealer. If you have any questions, or do not get a timely response in resolving your warranty problems, contact Western Minerals toll-free at 1-(888) 88 AG-PRO, Monday through Friday, 7:00 a.m. to 4:30 p.m. P.S.T.

CONGRATULATIONS!

You have purchased a superior injection system, designed for ease of use and built to provide many years of trouble-free service. By following some simple procedures and guidelines, this injection system will perform safely and reliably for many years to come.

Please take a moment to read through this documentation and familiarize yourself with the construction and proper operation of the Ag-Pro Injection System.

CAUTION: Misuse or improper operation could cause property damage and/or bodily injury. Please read and remember the following precautions...

KEEP WORK AREA SAFE

- Keep work area clean. Water, oil, and other spills can make the ground or cement pad slippery, as well as create shock hazards.
- Never store flammable liquids or gases near the machine.
- Only experienced operators should be allowed to work on or near the machine, keep all others at a safe distance.

KEEP UNIT GROUNDED

- Wiring and electric motors must be properly grounded. Improperly grounded motors are shock hazards. All wiring and fuses must be sized to comply with state and local electrical codes and meet proper current capacity.
- Western Minerals may provide plumbing assistance only. All electrical hookup must be done by a certified electrician.

CHECK FOR WORN OR DAMAGED PARTS

- Examine hoses, belts, fittings and wires for wear or damage.
- If you have questions about how to operate and service your Ag-Pro injection system, or to order repair parts, please contact your local representative, or call our main office at (800) 247-4497.
- Check drive belts, hoses and bearing packing regularly. Tighten or replace as necessary.
- Always operate belt driven models with belt guard attached.

DRAIN TANK

- Always run the unit until all amendments have been injected and only fresh water remains in the tank before shutting down for any length of time.
- During storage or long idle periods, it is best to drain the main tank and hoses to prevent freezing and stagnate water conditions.

DISCONNECT POWER

- Disconnect all power and depressurize hoses before beginning any repairs or maintenance.
- Before moving trailer-mounted models, be especially careful that all hoses and electrical connections have been detached and properly stored to prevent accidents.

INJECTION PRECAUTIONS

- Injection unit should be located on hard, level ground or on a cement pad only.
- Use only appropriate high-pressure hose and fittings for installation and operation.
- Keep top lid closed during operation to prevent unwanted debris from entering the mixing tank.
- Never fill and operate the injector without one-way check valves in place.
- WARNING: This unit operates at very high water pressures (up to 250 psi). Never modify or obstruct the pressure regulator or bypass system. Damage or injury may result.

! WARNING - DANGER !

THIS INJECTION SYSTEM IS DESIGNED TO MIX AND INJECT NON-HAZARDOUS, NON-FLAMMABLE SOIL AMENDMENTS ONLY. NEVER ATTEMPT TO USE THE AG-PRO SYSTEM TO INJECT CORROSIVE ACIDS OR OTHER HAZARDOUS OR FLAMMABLE PRODUCTS. THE USE OF SUCH PRODUCTS OR PROCEDURES IS PROHIBITED AND MAY RESULT IN SEVERE DAMAGE OR INJURY.

Thank You **for choosing**

Ag-Pro™ brand products.

Please remember to fill out and return the enclosed Warranty Registration Card within 10 days.

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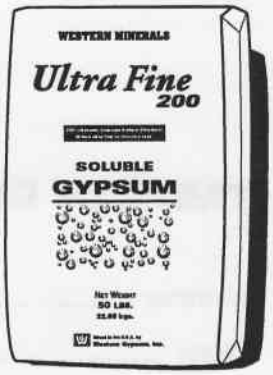
We're GROWING™ With *You!*

INTRODUCTION

For hundreds of years, farmers have been applying fertilizers and amendments to maintain proper soil conditions and provide an environment for healthy crops.

Gypsum, being the most common and least expensive amendment, has been in use for over two centuries. It's only in the last several years, though, that the myriad benefits of gypsum have become widely understood and exploited. Up until recently, the vast majority of gypsum used in agriculture was field spread, typically using the low-grade form found in abundance in the West. However, this procedure dramatically limits the application, and thus, the benefits, that gypsum provides.



Realizing the potential, several attempts have been made over the years to introduce a gypsum solution directly into the irrigation water. But the low purity and coarse grind of commonly available gypsum limited success and continued to plague the process, especially in micro and drip irrigation.

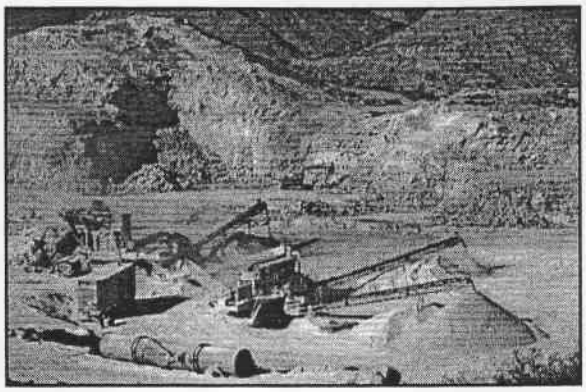
Then, in the early 1990's, Western Minerals built its own proprietary mills designed exclusively for grinding gypsum to a very fine powder for agricultural use. This new technology, combined with Western's vast supply of high-grade gypsum (typically 95%+), led to the development of what is now known as "Ultra Fine 200" soluble gypsum.

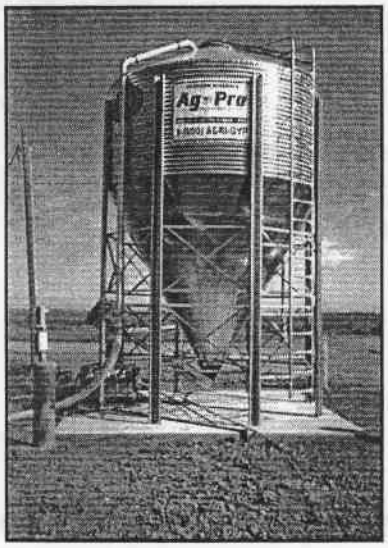
With this high-purity and fine grind gypsum now readily available, Western Minerals was able to eliminate the need for the complicated "extractor" based machines that were originally developed using low grade "wallboard" gypsum. The Ag-Pro system was specifically designed to be simple, durable and virtually maintenance free, taking advantage of the new, higher grade of gypsum now readily available.

Along with gypsum, the Ag-Pro machine is also suitable for the injection of other soil amendments like limestone and potassium products to mention just a few.

By applying only approved amendments, and taking care to apply them at the appropriate time and rate, you will enjoy many years of service from your Ag-Pro injection system.

We welcome your questions, suggestions or comments. Please feel free to call or write any time...





GENERAL OVERVIEW

The Ag-Pro Solution Injection System is designed to allow a variety of soil amendments to be thoroughly blended and then injected directly into irrigation water. It works great in all types of irrigation systems including flood, sprinklers, micro-sprinklers, drip and subsurface tape. A high pressure diaphragm pump is standard on all models for flexibility in injection pressure adjustment.

It's simplicity, durability and virtually maintenance-free design make it unique among other injection systems. With its thicker agitation bar and patented super strength bearings, the Ag-Pro system is the only injector of its kind that does not require frequent grease and maintenance!

And, we offer most every model with options like Honda gas engines, hydraulic motors instead of electric, automatic fill and automatic injection rate capability, trailer packages and more.

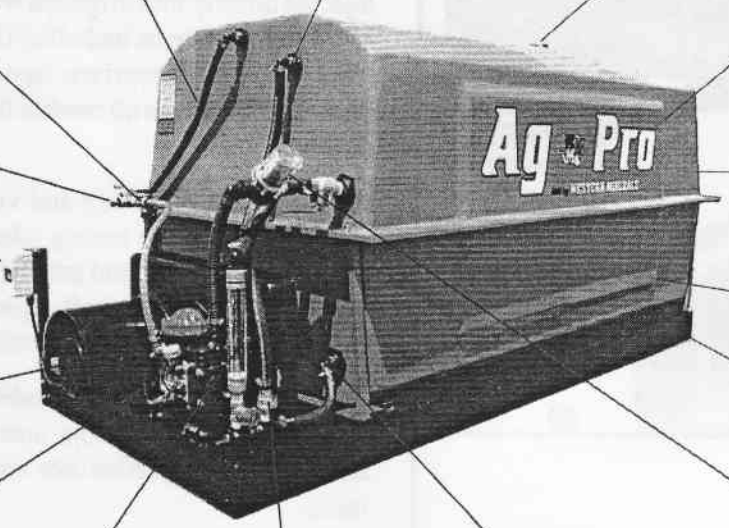
In normal use, the heavy-duty fiberglass main tank is first filled with water near full. The fresh water source can either be an existing pressurized irrigation line, or, with an optional fill pump, water may be pumped from a ditch, pond or other similar source.

With the machine running, Western Minerals' Ultra Fine 200 solution gypsum is then added to the water. Gypsum, and other amendments, may be conveniently added by 50 pound bag, 1-ton bag or from a storage silo via an auger feed mechanism. All are available directly from Western Minerals.

The stainless steel agitation blades near the bottom of the tank mix the solution thoroughly to form a uniform slurry. Then, the high-pressure diaphragm pump injects the mixture into the irrigation flow at a predetermined rate throughout the irrigation set.

Another unique feature of the Ag-Pro injection system is its ability to inject a solution either on a declining curve basis, or at a fixed or flat rate–without additional equipment! Each 300 & 600 gallon model is already equipped with a ball float valve and a floating suction intake. Controlled irrigation users can simply leave the fresh water intake valve open maintaining a constant fluid level in the tank. Flood users, or anyone desiring a constant rate of application, simply shut the fill valve! The slurry will then be output at a constant rate without dilution throughout the irrigation set as the level in the main tank is drawn down. Install a simple timer, and the machine will automatically refill itself and be ready for the next use.

At Western Minerals, *We're Growing With You!...*



Discharge return line returns slurry to tank when discharge valve is closed during operation.

Fresh water inlet for filling tank. Includes auto shut-off valve (inside).

Large, vented lid opens for easy access filling and *includes* stainless steel basket inside to help prevent large debris from accidentally entering the tank.

Output Check Valve Prevents irrigation water from backing up into the injection machine.

Floating suction hose (inside) allows tank to be pumped empty for simple and accurate "constant rate" metering into irrigation flow.

Discharge valve & outlet Begins injection of amendments into the flow of irrigation water.

Heavy-duty fiberglass mixing tank.

Mag Starter w/On Off switch provided for convenience and safety.

One-piece stainless-steel agitation shaft (inside) with exclusive patent pending greaseless bearings.

480v 3ph, 2 hp motor is standard, with many others available.

Sturdy, all-steel frame.

High pressure diaphragm pump requires little maintenance and has excellent durability.

Filter screen protects diaphragm pump from debris and includes a redirect valve to allow screen to be cleaned without turning off machine.

Fresh Water Bypass allows simple metering adjustment for any application.

Fill Valve opens to allow fresh water in to fill tank and pre-dilute output slurry.

Lower Level Ball Float allows fresh water in to maintain a minimum amount of water in the machine in pump-down mode.

OPTIONS NOT SHOWN:

Trailer package with heavy duty axle(s) and tires.

Honda gas engine with 20 gallon auxiliary fuel tank.

Hydraulic motor eliminates the need for gas or electricity.

Auxiliary fill pump to rapidly fill tank from ditch or pond.

EQUIPMENT DIAGRAM AND DESCRIPTION

Fresh Water Inlet fills the holding tank with fresh water. A mechanical **float valve** attached inside automatically adjusts the flow of incoming fresh water to prevent the tank from overflowing.

Large, Vented Lid opens for adding gypsum and other compatible amendments from bags or bulk silos. (See "Compatible Amendments" chart later in this manual.) A removable **stainless-steel basket** fits inside the opening to prevent large bag fragments or other debris from accidentally entering the mixing tank.

Floating Withdrawal Hose (inside tank) consists of a flexible hose with a float attached to keep the inlet opening floating near the top of the slurry. Allows the injector to either maintain a constant fluid level in the tank for declining rate applications, or pump the tank down for "batch" mode operation.

Heavy-Duty Fiberglass Tank is molded as two pieces, then attached and fiberglassed together to form one solid tank –eliminating the possibility of leaking at the seam. Exterior steel supports add additional stability and strength for years of dependable service.

Stainless-Steel Agitation Shaft (inside tank) is a full 1 1/4" diameter with stainless steel mixing blades. (Unlike other brands, the Ag-Pro agitation shaft does not require a bearing support inside the mixing tank.) The Ag-Pro unit also features all-stainless bearing housings and exclusive, patented bearings which do not require grease!

Filter Screen on the suction side of the diaphragm pump prevents damage to the pump. A **redirect valve** is conveniently located just before the screen allowing the user to temporarily shut off the flow of liquid to clean the screen, without having to completely shut down the injector. This also allows the pump to draw from an alternate source.

Lower Level Float (inside tank) automatically allows fresh water in, maintaining a minimal level of water in the bottom. This keeps the tank from running completely dry when operating in the "pump down" mode, and keeps the tank clean inside. (Optional on some models.)

Fresh Water Bypass provides a simple method for operators to adjust the amount of slurry injected into the irrigation water. This setup includes a GPM calibrated sight glass and gate valve for adjusting the output of slurry. It's pre-dilution feature also allows for heavier gypsum and other amendment loading increasing run time between recharges.

High-Pressure Diaphragm Pump is mounted to the metal frame on the front of the machine. This high-quality pump allows the injection system to be used in most any irrigation system–including flood, sprinklers, microsprayers and drip. The diaphragm pump is a positive displacement pump which resists abrasion and won't be damaged if run dry.

240/480v, 3 Phase Electric Motor is standard to power the diaphragm pump and rotate the agitation shaft. A variety of options, including 110v, single phase motors are also available and may be pre-installed if requested at time of order. Optional gas engines and hydraulic motors are also available for portability or use in applications where electricity is not readily available.

Fiberglass Belt Guard protects the operator from accidental contact with the drive belt operating the pump and agitation shaft. A unique sun shade is built-in to shield the electric motor from direct sunlight. This reduces the operating temperature of the motor and helps extend motor life.

Mag Starter with On/Off Control (optional on some models) is pre-wired at the factory and provides the necessary equipment for hooking up an electrical source to the injection machine. It includes a built in On/Off switch which allows the operator a more convenient (and safe) method to turn the injection system on or off.

Discharge Valve and Outlet located near the pump begins the discharge of slurry into the flow of irrigation water. When closed, the slurry automatically returns back into the main tank via the bypass line.

Discharge Check Valve prevents irrigation water from backing up into the injection machine if the injector is turned off while the irrigation line remains pressurized.

IMPORTANT SAFETY INFORMATION

PLEASE READ BEFORE OPERATING PUMP

- Use of a pressure relief device on the discharge side of the pump is included and required to prevent damage from pressure build up if the discharge is closed or blocked while the power source is still running.
- **WARNING: DO NOT PUMP CORROSIVE OR HAZARDOUS CHEMICALS OR FLAMMABLE /EXPLOSIVE FLUIDS. DO NOT USE IN EXPLOSIVE ATMOSPHERES.** The pump should be used only with liquids compatible with the pump component materials. **DO NOT PUMP** any amendments/chemicals not shown on the Approved Amendments Chart enclosed. **PERSONAL INJURY OR PROPERTY DAMAGE MAY RESULT AND THE WARRANTY WILL BE VOID**. If you have any questions about using the pump, please call our toll free number: 800-247-4497.
- Do not operate pump above set rpm. If a sheave must be replaced for any reason, be certain the replacement is the same diameter as the original factory sheave.
- Do not pump at pressures higher than 200 psi, (150 psi maximum continuous).
- Operate the pump between a temperature range of 45° to 140°F.
- Make certain that the power source conforms to the requirements of your equipment and that the motor is wired to turn in the proper direction (note arrow on belt guard).
- Never operate the pump and motor without the belt guard mounted in place.
- Always disconnect all power before repairing or servicing the pump.
- Release all pressure within the system before servicing any component.
- Drain all liquids from the system before servicing.
- Secure the discharge lines before starting the pump. An unsecured discharge line may whip, causing personal injury and/or property damage.
- Check hoses for weak or worn condition before each use. Make certain that all connections are tight and secure.
- Periodically inspect the pump and the system components. Perform routine maintenance as required.
- When wiring an electrically driven pump, follow all electrical and safety codes, as well as the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
- **WARNING: BECAUSE OF RISK OF ELECTRICAL SHOCK, ALL WIRING SHOULD BE DONE BY A QUALIFIED ELECTRICIAN.**
- **WARNING: DO NOT HANDLE A PUMP OR PUMP MOTOR WITH WET HANDS OR WHEN STANDING ON A WET OR DAMP SUR FACE, OR IN WATER.**
- Do not operate a gasoline engine in an enclosed area. Be sure the area is well ventilated.
- Use only pipe, hose and fittings rated for maximum rated pressure of pump or pressure at which pressure relief valve is set at. **DO *NOT* USE *USED* PIPE OR HOSE!**
- Do not use this system for pumping anything intended for human or animal consumption.

INSTALLING THE AG-PRO INJECTION SYSTEM

1. *Select a Location*

a) Locate the injector on a smooth hard surface. Keep in mind that you will need to tap into a pressurized line to fill the Ag-Pro tank. (6 psi minimum, 30 psi maximum. Install a pressure regulator if above 30 psi.)

b) If your irrigation system has a main filter, the tap for the solution *injection* port should be located *before* the filter.

c) You will also need to allow convenient access to the machine for filling and maintenance.

2. *Pre-Operation Setup*

a) Check the ball float located on the inside of the main tank at the fresh water inlet fitting. Adjust the ball arm by bending it so that it does not come in contact with the top of the tank when in the fully closed (up) position.

b) If your model has a lower level float near the bottom, make sure the fitting is tight and that the ball float moves freely in a vertical plane.

c) Insert the stainless steel filter basket into top hatch opening.

3. *Fresh Water Supply*

If your Ag-Pro system is equipped with an optional auxiliary fill pump, skip this step and refer to "Optional Equipment Operation and Maintenance" later in this manual.

a) Locate or install a 3/4" NPT fitting at the pressurized fresh water source. Install a shut-off valve (not included), and attach a 3/4" hose barb.

Note: You must install a valve to shut off the water supply *to* the injection system, for maintenance and safety. A shut off valve is also required in order to use the pump-down capability of the Ag-Pro machine.

b) Attach a length of hose from the hose barb to the fresh water inlet located on front of the main tank, down at the bottom near the vertical sight glass. Be sure to use hose rated for the highest pressure in your irrigation system, and attach each end with two hose clamps.

c) If filtered water is not already available, splice a debris screen into the filler hose near the fresh water inlet fitting.

4. *Solution Injection Hookup*

a) Locate or install a 1/2" NPT fitting (not included) into the irrigation system at a point *before* any main filters. For best results, solution should be injected at about a 45 degree angle, pointing in the direction of the flow of water.

b) Attach a 1/2" hose barb and one end of the high-pressure hose (included) to the injection tap.

c) Attach the other end of the 1/2" hose to the discharge outlet located on the front of the Ag-Pro machine.

d) Splice the one-way check valve into the hose at a point near the solution injection tap. Use only high-pressure design hose and hose clamps, and be sure that the arrow on the valve points *towards* the irrigation system.

Note: The check valve is included to prevent irrigation water from backing up into the Ag-Pro machine.

5. *Electrical Connection*

If your Ag-Pro system is equipped with an optional gas engine or hydraulic motor, skip this step and refer to "Optional Equipment Operation and Maintenance" later in this manual.

a) The electric motor that drives the pump and agitation bar is pre-wired to a mag-starter in a weather tight control box to turn the Ag-Pro machine on and off. (Optional on some models.)

Ensure that the supply voltage is correct for the motor, (i.e., 110, 240/480 volt, single or 3 phase). A breaker must be in place to automatically disconnect the power at the source in case of accidental contact or downed lines.

Follow all state and local electrical and safety codes, as well as the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

WARNING: BECAUSE OF RISK OF ELECTRICAL SHOCK, ALL WIRING SHOULD BE DONE BY A QUALIFIED ELECTRICIAN.

DO NOT HANDLE PUMP OR PUMP MOTOR WITH WET HANDS OR WHEN STANDING ON A WET OR DAMP SURFACE, OR IN WATER.

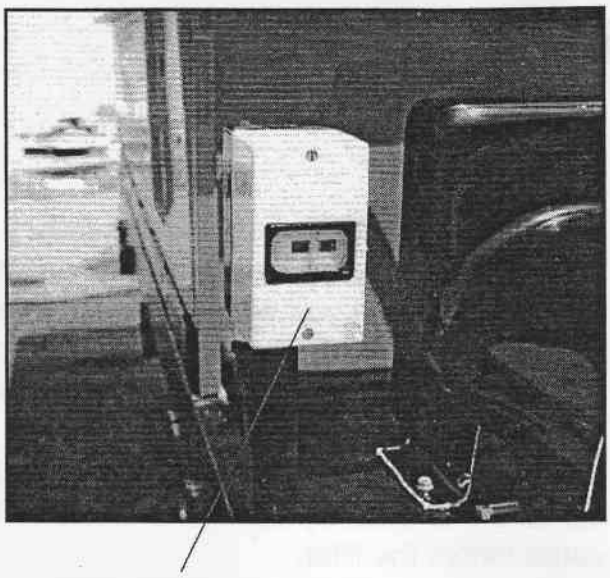
6. Final Equipment Check

a) Take time to check over all fittings, clamps and connections to make sure all are secure. Check that the belt is tight and the belt guard is mounted securely in place.

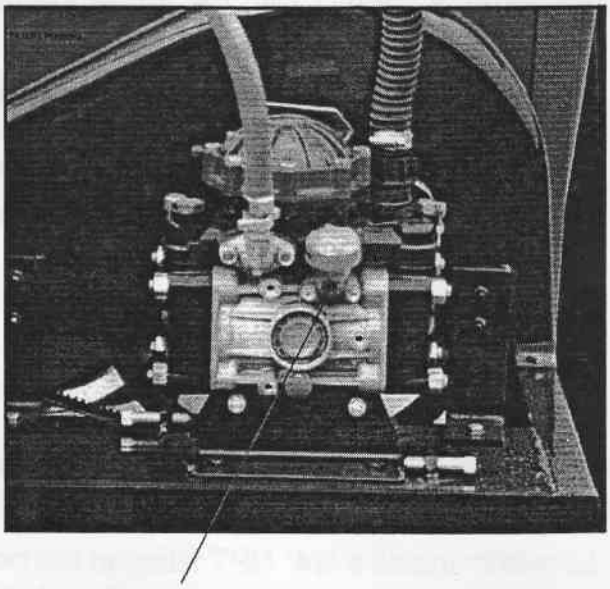
b) If you have the optional trailer package, be sure that the machine is level and that the wheels are secured to prevent trailer movement.

c) Double check to make sure all ball float are mounted and adjusted correctly inside the tank.

d) Check the oil is visible half way up the clear sight tube on the diaphragm pump. (Fill with 30W non-detergent motor oil as necessary.)



On/Off Control. Includes mag starter and is pre-wired to ensure proper motor rotation.



Oil Sight Tube. Oil should be visible approximately half way up the clear fill tube.

If your Ag-Pro system is equipped with an auxiliary fill pump, gas engine, hydraulic motor or other optional devices, refer to "Optional Equipment Operation and Maintenance" later in this manual for deviations to the following general operating instructions.

1. Fill the Main Tank with water

a) With irrigation system pressurized, open the fresh water fill valve "A" to begin filling the holding tank with water. As the tank nears full, the internal ball float valve will automatically shut off the flow of incoming water.

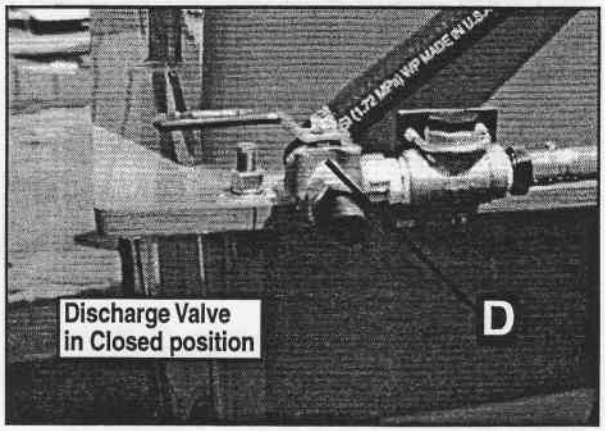
b) For *constant rate* output, close the fill valve once the tank is full. This will allow the tank to empty, injecting a consistent, non-diluted solution.

For most controlled irrigation systems, the fill valve may be left open to maintain a *constant fluid level* in the tank. This will inject the soil amendment on a declining curve as the incoming water dilutes the slurry mix.

2. Turn the System On

a) Check that the redirect valve located adjacent to the pump inlet debris screen is in the CLOSED position to draw liquid from the tank. (The handle should be turned to point at the debris screen.) If left open, the pump will only draw air and no injection will take place.

b) The discharge outlet valve "D" should be turned to the CLOSED position. (Handle should be at a 90° angle to the discharge flow.) This allows the pump to start up under no-load conditions to increase motor or engine life.



c) Turn the machine "ON" at the control box to energize the pump and agitation bar.

d) Check for leaks around all fittings and the agitation shaft front bearing. A leaking front bearing housing can usually be stopped by turning the machine off and simply tightening the packing gland. (See "Maintenance" later in this manual.)

3. Add Amendments

a) For gypsum application, add approximately 4 pounds of Ag-Pro Solution Grade Gypsum for each gallon of water in the mixing tank (i.e., 300 gallon tank = 1,200 pounds of gypsum, 600 gallon tank = 2,400 pounds).

CAUTION: This Ag-Pro machine was designed for use with true solution grade gypsum only. Use of substandard gypsum can cause excessive wear, frequent filter flushing, clogging and may void the factory warranty. Please refer to "Solution Gypsum Specifications" later in this manual for the minimum specifications of acceptable product prior to operation.

When adding other amendments with, or instead of gypsum, be sure to first refer to "Compatible Amendments" in the Owners Manual to verify that it is an approved

amendment, and also confirm how and at what rate to apply it.

If adding gypsum from 1-ton bulk bags, be careful not to empty a full bag into the 300 gallon model as this will overload the machine.

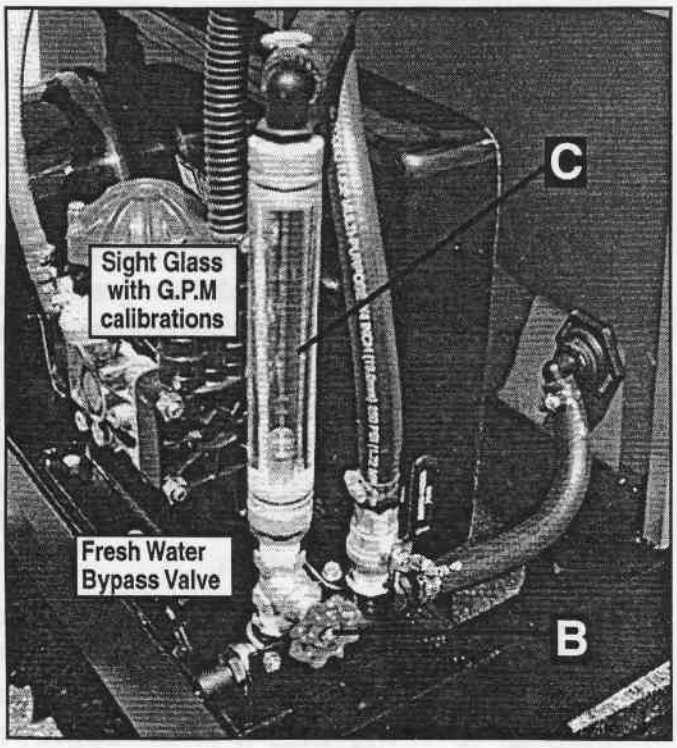
b) Allow the machine to operate for a few minutes to insure the slurry is completely and uniformly blended.

4. Adjust Output and Begin Injection

a) If a manual valve has been installed in the irrigation pipe at the point of injection, be sure to check that it is in the OPEN position.

b) Slowly rotate the Discharge Outlet valve "D" to the OPEN position (parallel to the outlet) to begin injection. The diaphragm pump will automatically adjust discharge pressure to compensate for any irrigation line pressure, up to 150 p.s.i.

c) Rotate the Fresh Water Bypass valve "B" counter-clockwise to the fully OPEN position. Then, read and note the <u>total</u> Gallons Per Minute water flow by reading the calibration lines on the fresh water sight glass. (Should be around 5-6 g.p.m. with a standard pump.)

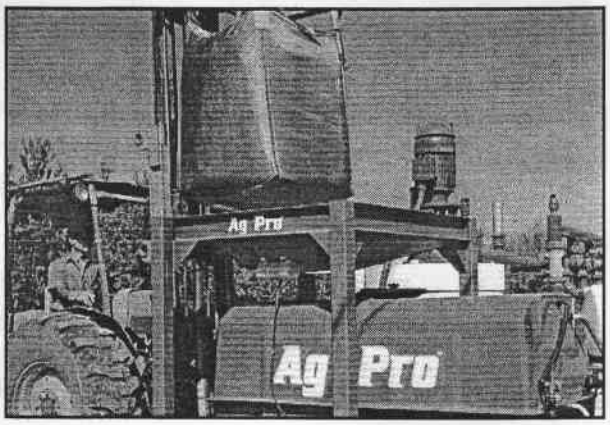


d) Refer to the "Discharge Rate Chart" in this manual to determine the desired <u>G.P.M.</u> of <u>slurry</u> output for the desired application rate. Then, subtract this number from the <u>total</u> G.P.M. flow determined in Step C above.

e) Watch sight glass "C" and slowly rotate the Fresh Water Bypass valve "B" clockwise to <u>reduce</u> the flow of fresh water <u>down</u> to the newly calculated net rate determined in Step D above.

Example: With fresh water bypass valve "B" turned all of the way open, sight glass indicates 6 g.p.m. <u>total</u> water flow. Desired injection rate is determined to be 2 gallons per minute of <u>slurry</u>. (6 - 2 = 4). Slowly close fresh water valve "B" until the sight glass reads 4 gallons per minute. This will then cause the diaphragm pump to automatically draw 4 gallons of fresh water, plus 2 gallons of slurry from the holding tank.

f) Reload the machine as desired when the water runs clear, or after refilling the tank in the constant rate (pump down) mode.



MAINTENANCE

You have selected the most user-friendly, maintenance-free injection system available for gypsum and other powdered amendments. Care in selecting and using only true high-grade solution gypsum (and other compatible amendments) will help keep your injector running smoothly with minimal attention.

Your Ag-Pro machine was designed with common, brand name components wherever possible to reduce replacement costs and insure parts availability when maintenance is necessary.

For parts pricing or orders, call your local Western Minerals Representative or call:

toll free: ***1-(888) 88 AG-PRO***

The following outlines the steps necessary to service and maintain your Ag-Pro injection system to keep it running at its peak performance.

Before Each Start-up

a) Check that the oil is visible half way up the clear sight tube on the diaphragm pump. (Fill with 30W non-detergent motor oil as necessary.)

b) Turn the redirect valve to close off the fluid in the main tank and clean the debris filter located on the front of the machine. (As well as any other debris screens that may be installed.) Remember to turn the valve back on before starting the machine.

c) Check that internal ball float valve(s) are adjusted and working properly.

d) Take time to check over all fittings, clamps and connections to make sure all are secure and not leaking. Check that the belt is tight and the belt guard is in place.

e) If agitation shaft front bearing is leaking, simply tighten the adjusting nuts until the leak stops. **Do not overtighten the Adjusting Nuts. Only about 1/4 to 1/2 turn on each of the adjusting nuts should be required to stop any leak. Overtightening will lead to rapid wear of the packing material and possibly the shaft itself!** Occasional small adjustments are required to maintain the integrity of the seal. **DO NOT attempt to avoid the regular interval by overtightening the packing nuts!** If one or more turns of the adjusting nuts do not stop the leak, replace the packing material or severe wear on the agitation shaft may result. (See *Replace Packing Material* below.

Every 500 Hours

a) Change the oil every 500 hours or three months, whichever comes first. To drain the oil follow these procedures:

D30 and D50; Remove the drain plug and oil sight glass covers, and rotate shaft until the oil stops flowing out. Install the drain plug.

Slowly pour new oil into sight tube while turning the pump shaft. (Turning the pump shaft purges all the air out of the crankcase.) Always change oil when replacing diaphragms.

Safety Note: The bypass return outlet on the discharge valve and pressure relief valve must be connected directly to the main tank without any restrictions or valves.

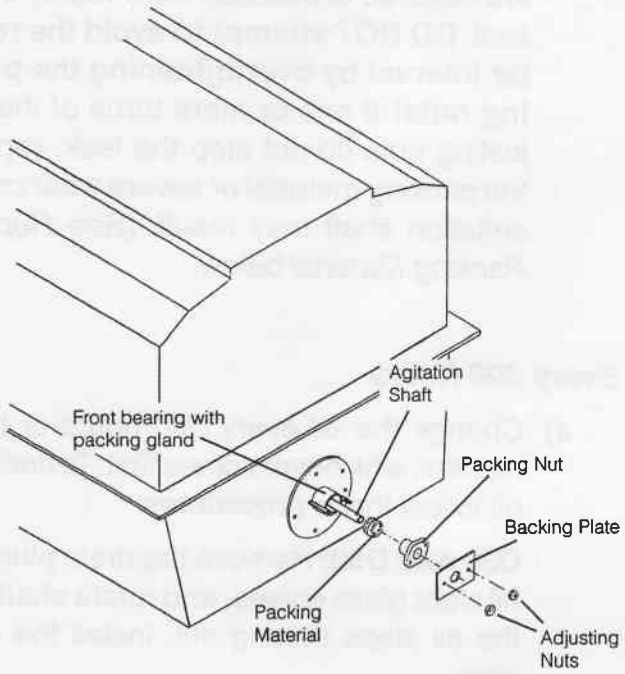
Annually or As Needed

Replace Packing Material

The packing gland is located on the front of the machine where the main agitator shaft extends out of the mixing tank. Once or twice a year, (or whenever excessive leaking occurs that routine tightening of adjustment nuts will not stop), the packing material in the packing gland must be replaced as follows:

1) Turn off injector and secure against accidental start up.

2) Remove fiberglass belt guard. Loosen both adjusting nuts and slide the backing plate and packing nut out away from the packing gland.



3) Dig out and discard any remaining pieces of the old packing material.

4) Wind new packing material around the shaft, then use a screwdriver to push the packing material firmly down into the packing gland. Continue this process until the packing gland is full, then cut the packing rope off.

5) Slide the packing nut and backing plate back towards the packing gland, then tighten the adjusting nuts down hand tight.

6) Replace the belt guard and start the injection machine. If the packing is leaking, turn off the machine and tighten the adjustment nuts approximately 1/4 turn each. Continue this procedure until the leaking stops. DO NOT OVERTIGHTEN!

Valve Replacement

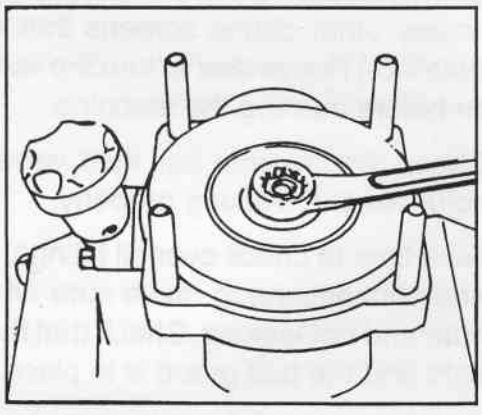
Occasionally debris can build up and cause improper seating of the valves and/or damage to the o-rings, causing the pump to pulsate. To check for damage, follow these steps:

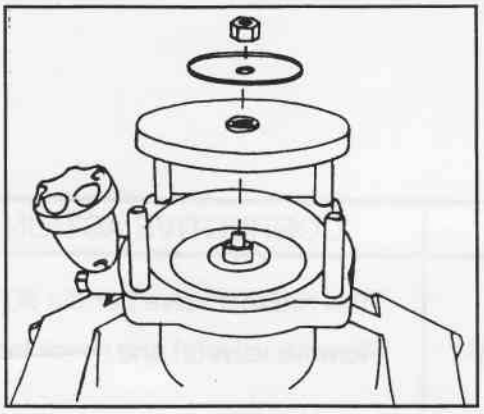
Remove the pump manifolds (heads). With the manifolds removed, valves can easily be removed and inspected for debris and wear. Replace valves, o-rings and manifolds as necessary.

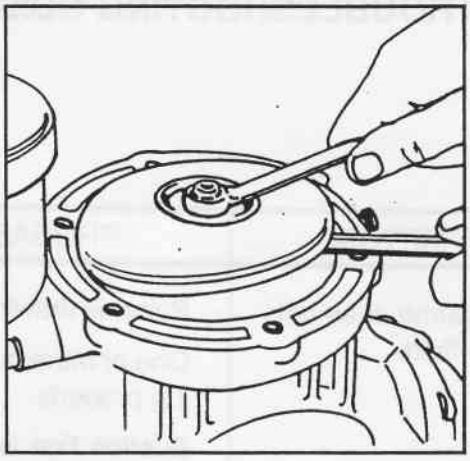
Diaphragm Replacement

If pump oil becomes milky or it comes out the discharge outlet, one or more of the diaphragms have ruptured. The diaphragm material does age and should also be replaced annually or earlier under heavy use. To change diaphragms:

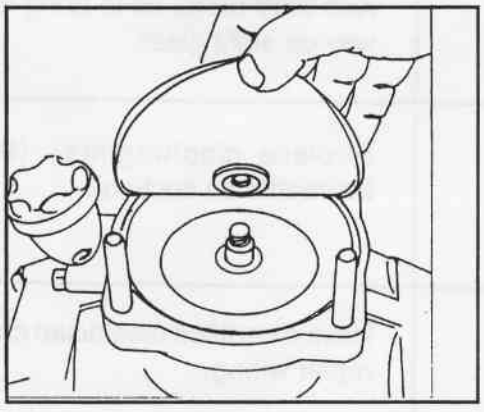
1. Drain the oil as instructed previously.
2. Remove the pump manifolds and valves.
3. Remove the pump head retaining nuts and heads.
4. Turn the crankshaft to bring the diaphragm to the top of its stroke. Insert a drift pin into the hole in the retaining stud to hold it in place. Remove the retaining nut, retaining washer and the diaphragm.

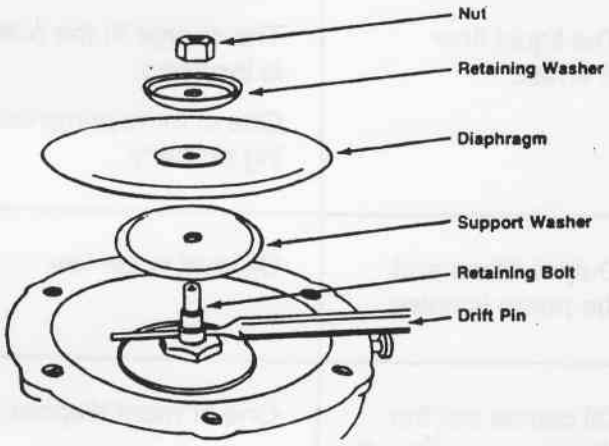






5. Turn the crankshaft to bring the piston to the bottom of its stroke and seat the new diaphragm into the sleeve groove. Install the retaining washer and tighten the retaining nut while holding the retaining stud in place with the drift pin.





6. Clean any excess oil from the area and install the heads, valves and manifolds.

Pulsation Diaphragm Replacement

1. Replace the pulsation dampener diaphragm by first bleeding the air from the dampener. Remove the cover retaining bolts from the dampener cover and replace the diaphragm. Reassemble the cover and bolts in place and charge the dampener to 20% of operating pressure with a minimum of 10 psi.

2. Refill crankcase with 30W motor oil. Rotate shaft to distribute oil and fill to proper level.

Winter Storage or Freezing Conditions

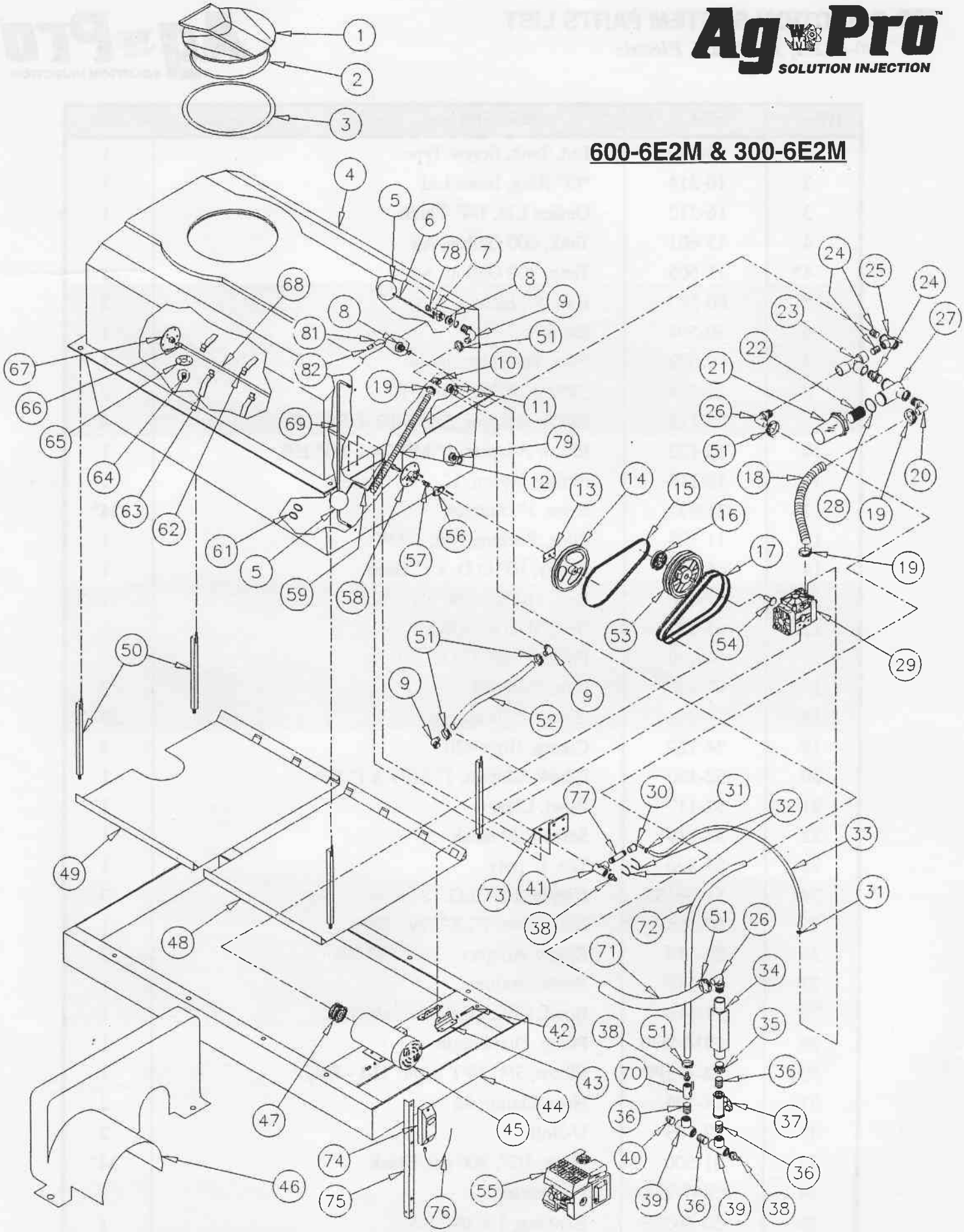
1. Drain water from main tank.
2. Open all valves.
3. Flush pump with a 50/50 mixture of water and antifreeze while rotating the crankshaft.

TROUBLESHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
The pump does not draw fluid.	Pump is drawing air. One or more pump valves are not seating properly. Suction line is plugged or collapsed. Clogged debris filter.	Turn redirect valve handle 90° Remove valve(s) and check for debris. Examine suction hose for blockage. Clean debris filter.
The liquid flow is erratic.	The charge in the pulsation dampener is incorrect. One or more pump valves are not seating properly.	Check pressure in pulsation dampener (20-40% working pressure). Remove valve(s) and check for debris. Check and clean valve seats.
Output drops and the pump is noisy.	Oil level is too low.	Add 30W motor oil to bring level half way up sight glass.
Oil comes out the discharge port or oil is a milky color.	One or more diaphragms split.	Replace diaphragm(s). (Refer to Maintenance section.)
Pump seems to operate in reverse.	Electric motor wired backwards.	Have a certified electrician check and repair wiring.
Agitation shaft bearing leaking.	Packing gland loose. Worn out packing material.	Tighten packing nut on front. Replace with 1/4" Teflon packing.
Irrigation filters plugging or requiring frequent flushing.	Injecting too thick of slurry. Poor quality gypsum. Fresh water is contaminated.	Increase fresh water bypass g.p.m. Use Ag-Pro™ brand Solution Gypsum. Install a screen on the incoming fresh water line.

Ag Pro
SOLUTION INJECTION

600-6E2M & 300-6E2M



INJECTION SYSTEM PARTS LIST

600-6E2M, 300-6E2M, Electric

Ag Pro SOLUTION INJECTION

Item #	Part #	Description	Qty
1	15-040	Lid, Tank, Screw Type	1
2	16-214	"O" Ring, Inner-Lid	1
3	16-212	Gasket Lid, 1/4" Thick	1
4	15-601	Tank, 600 Gallon, Ag	1
4*	15-605	Tank, 300 Gallon, Ag	1
5	60-503	Ball, 5", Float	2
6	60-504	Stem	1
7	60-502	Float Valve Assembly	1
8	16-114	Fitting, Nylon, 3/4", Hex.	2
9	52-112	Elbow Adapter, 3/4" MPT x 3/4" HB	4
10	52-122	Elbow Adapter, 1" MPT x 1-1/4" HB	1
11	16-116	Fitting, Nylon, 1"	1
12	21-931	Hose, 1", Suction	34"
13	11-105	Plate, Packing Nut, 1-1/4"	1
14	66-111	Pulley, 10" O.D. x 1" Bore	1
15	67-420	Belt, 5L420 - 600 gal.	1
15*	67-420	Belt, 5L410 - 300 gal.	1
16	66-136	Pulley, 3.60" O.D., 1" Bore	1
17	67-630	Belt, 3VX630	2
18	21-931	Hose, 1" Discharge	23"
19	24-120	Clamp, Hose #20	3
20	52-120	Elbow Adapter, 1" MPT x 1" HB	1
21	57-117	Bowl, Clear	1
22	57-119	Screen, 20 mesh	1
23	53-826	Tee, 1" poly	1
24	51-601SS	Nipple, 1 x CLO. S.S.	3
25	60-325-3PP	Ball Valve, 1", 3-Way - Poly	1
26	52-119	Elbow, Adapter - 1" x 3/4" HB	2
27	57-115	Body, Strainer	1
28	57-116	Bowl, Clear Gasket, Strainer	1
29	9910-D30	Pump, Diaphragm	1
30	52-115PP	Elbow, 3/4" FPT x 3/4" HB - Poly	1
31	24-106	Hose Clamp, #6	2
32	47-103	U-Bolt	2
33	81-500	Hose, 1/2", 800 psi, Black	34"
34	5847-238	Flowmeter	1
35	50-663SS	Bushing, 1 x 3/4" S.S.	1

Continued

Item #	Part #	Description	Qty
36	51-501SS	Nipple, 3/4 x CLO S.S.	4
37	60-203	Gate Valve, 3/4"	1
38	53-134	Fitting, 3/4 MPT x 3/4" HB	2
39	50-520	Tee, 3/4" Galv	2
40	50-580	Plug, 3/4" Galv	1
41	60-324-3PP	Ball Valve, 3/4", 3-Way - Poly	1
42	45-230	Screw, 1/2" x 2"	4
43	11-251	Pump Mount Plate, D-30	2
44	10-601	Frame, 600 Gallon, AG	1
44*	10-320	Frame, 300 Gallon, AG	1
45	20-096	Motor, Electric, 2HP- 3 PH	1
46	15-615	Belt Guard, Fiberglass	1
47	66-229	Pulley, Motor, 3" O.D. x 7/8"	1
47	66-227	Pulley, with optional Honda Engine	1
48	10-653	Saddle, 600 Gallon, *(Only)*	1
49	10-652	Saddle, 600 Gallon *(Only)*	1
50	10-501	Strap, 600 Gallon Hold Down	4
50*	10-304	Strap, 300 Gallon Hold Down	4
51	24-112	Clamp, Hose #12	6
52	21-930	Hose, 3/4" 200 PSI	22"
53	66-214	Pulley, 14" O.D., 2 Groove	1
54	63-310	Pump, Shaft	1
55	20-107	Engine, 5.5 HP Honda, Optional *(See Item #47)*	1
56	16-275	Nut, Packing, 1"	1
57	16-950	Packing, Teflon, 1/4"	25 1/2"
58	11-350	Packing, Gland, 1"	1
59	11-659	Bracket, Ball Float	1
61	58-020	Tie, Plastic, 1/2" x 12"	2
62	16-267	Paddle, 600 Gal. Agitator, Right	6
62*	16-299	Paddle, 300 Gal. Agitator, Right	6
63	16-266	Paddle, 600 Gal. Agitator, Left	6
63*	16-298	Paddle, 300 Gal. Agitator, Left	6
64	50-780	Plug, 1-1/4", Galv	1
65	16-119	Fitting, Nylon, 1-1/4" - Poly	1
66	16-285	Collar, 1-1/4" - 600 gal.	2
66*	16-283	Collar, 1" - 300 gal.	2
67	11-351	Bearing, Rear, 1"	1
68	16-671	Shaft, Agitator, 1-1/4" x 86"	1
68*	16-353	Shaft, Agitator, 1" x 59"	1

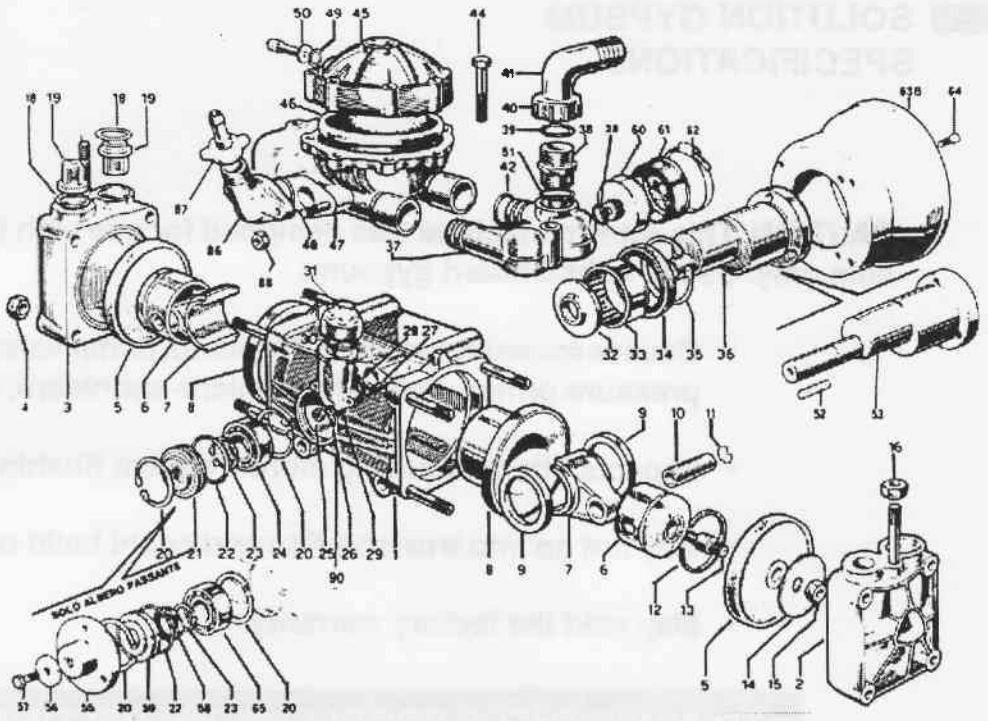
**300 Gallon Model*

Continued

Item #	Part #	Description	Qty
69	11-035	Guide Bar, Suction Hose - 600 gal.	1
69*	11-034	Guide Bar, Suction Hose - 300 gal.	1
70	60-324	Ball Valve, 3/4"	1
71	21-930	Hose, 3/4", 200 PSI	16"
72	21-930	Hose, 3/4", 200 PSI	38"
73	11-146	Bracket, Relief Valve	1
74	56-012	Control Box Assembly	1
75	11-344	Stand, Control Box	1
76	56-011	Cable, 4" x 14 ga., Bulk Per Foot	3.5'
77	51-504SS	Nipple, 3/4" x 4" S.S.	1
78	53-885	Plug, 3/4" - Poly	1
79	16-115	Fitting, 3/4" DT Nylon	1
80	W16-205	Basket, Strainer - S.S.	1
81	52-275	Elbow, 3/4" x 45, SXS, PVC	1
82	53-120	Nipple, 3/4" x 2", TOE, PVC	1

**300 Gallon Model*

DIAPHRAGM PUMP
HYPRO D-30



Ref. No.	Part Number	Description	Qty. Req'd.
1	9910-620010	Pump Body	1
2	9910-620101	Head Assembly (Right Hand)(DX)	1
3	9910-620102	Head Assembly (Left Hand)(SX)	1
4	9910-320130	Nut (12MA)	8
■5	9910-620085	Diaphragm, Desmopan (std.)	2
5	9910-620080	Diaphragm, Buna-N (opt.)	2
5	9910-62008T	Diaphragm, Teflon (opt.)	2
6	9910-620120	Piston	2
7	9910-620140	Connecting Rod	2
8	9910-620110	Piston Sleeve	2
9	9910-580130	Retainer Ring	2
10	9910-380300	Connecting Rod Pin	2
11	9910-380080	Retainer Ring	4
12	9910-160230	Piston Ring	2
13	9910-550270	Retaining Bolt	2
14	9910-620090	Retaining Washer	2
15	9910-550131	Lock Nut	2
16	9910-180150	Nut (10MA)	2
□■▲18	9910-620030	O-Ring	4
□19	9910-1049050	Check Valve Assembly	4
20	9910-11120	Retainer Ring	1
21	9910-620020	Oil Sealing Cap	1
▲22	9910-620210	O-Ring	1
23	9910-620291	Retaining Ring	1
24	9910-620190	Ball Bearing	1
25	9910-390440	Nut	2
26	9910-550331	Washer	2
27	9910-550330	Stud	1
▲28	9910-180101	O-Ring	1
29	9910-550030	Oil Sight Glass	1
▲30	9910-550040	O-Ring	1
31	9910-550055	Cap for Oil Sight Glass	1
32	9910-620160	Spacer Washer	1
33	9910-550060	Roller Bearings	1
34	9910-620130	Seal	1
35	9910-620330	Retainer Ring	1
36	9910-620170	Crankshaft	1
37	9910-620150	Manifold	1
38	9910-550340	Threaded Adapter	1
▲39	9910-550350	O-Ring	1
40	9910-550242	Barb Nut	1

Ref. No.	Part Number	Description	Qty. Req'd.
41	9910-550310	Hose Barb (Straight)	1
▲42	9910-390060	O-Ring	4
44	9910-621780	Bolt (8MAx40)	8
45	9910-620230	Accumulator Head	1
45B	2270-0004	Washer	2
■46	9910-550190	Accumulator Diaphragm	1
47	9910-620180	Accumulator Manifold	1
48	9910-30211	Studs	2
▲49	9910-650542	O-Ring	1
50	9910-180020	Air Valve	1
▲51	9910-390290	O-Ring	1
52	9910-620680	Key (AP-A Model)	1
53	9910-620172	Crankshaft 20 mm ThruShaft (AP-A Model)	1
55	9910-620661	Retainer (AP-A Model)	1
56	9910-620670	Washer (AP-A Model)	1
57	9910-180370	Bolt (AP-A Model)	1
58	9910-620630	Seal (AP-A Model)	1
59	9910-620021	Spacer (AP-A Model)	1
60	9910-650660	Dampener Body	1
61	9910-650670	Dampener Diaphragm	1
62	9910-650690	Clamp	1
63A	2840-0028	Steel Safety Shield	1
63B	9910-540660	Durable Plastic Shield (Optional)	1
64	9910-820670	Bolt (10MAx16)	4
65	9910-620190	Ball Bearing (AP-A Model)	1
86	9910-450145	Discharge Flange Housing	1
87	9910-10130	Hose Barb and Nut (1/2" barb)	4
88	9910-390270	Nut	2
89	9910-0009	Name Plate	1
90	9910-30171	Plug, Drain	1

REPAIR & MAINTENANCE KITS AVAILABLE

▲ O-Ring Parts Kit No. 9910-KIT1916 consists of: Ref. 18 (4 ea.) O-Rings, Ref. 22 (1 ea.) O-Ring, Ref. 28 (1 ea.) O-Ring, Ref. 30 (1 ea.) O-Ring, Ref. 39 (1 ea.) O-Ring, Ref. 42 (4 ea.) O-Ring, Ref. 49 (1 ea.) O-Ring, Ref. 51 (1 ea.) O-Ring, Ref. 89 (1 ea.) O-Ring.

■ Diaphragm Parts Kit No. 9910-KIT1724 consists of: Ref. 5 (2 ea.) Diaphragm (Desmopan), Ref. 18 (4 ea.) O-Rings, Ref. 46 (1 ea.) Accumulator Diaphragm.

□ Valve Parts Kit No. 9910-KIT1917 consists of: Ref. 18 (4 ea.) O-Rings, Ref. 19 (4 ea.) Valves.

SOLUTION GYPSUM SPECIFICATIONS

CAUTION: This Ag-Pro machine was designed for use with true solution grade gypsum only. Use of substandard gypsum:

- **Causes excessive wear to the pump, pump valves, pressure relief valve, pressure orifice, ball valves, micro-sprinklers, emitters, etc.**
- **Impacts filters requiring more frequent flushing.**
- **May not go into true solution and could build up inside irrigation lines.**
- **May void the factory warranty.**

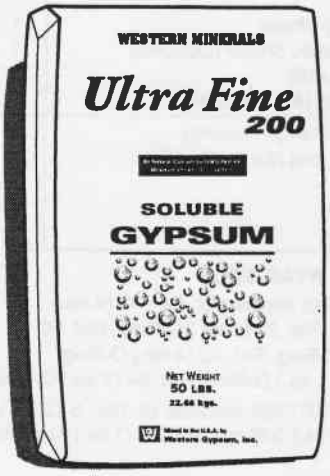
TO AVOID THESE PROBLEMS, WE RECOMMEND USING ULTRA FINE 200™ BRAND SOLUTION GRADE GYPSUM.

Western Minerals' 100%-natural gypsum is mined from one of the largest deposits of high-grade gypsum in the world, and it's guaranteed to be the best quality soluble gypsum you can buy.

Typical Analysis:

Purity: Average 95%. *(92% guaranteed.)*

Grind: 100% thru 200 mesh, 95% passes thru 325 mesh.



Never use:

Anhydrous Gypsum (Anhydrite)

Agricultural Grade/Spreadable Gypsum

Ground up "Wallboard" Gypsum

GYPSUM APPLICATION RATE CHART

Ag Pro SOLUTION INJECTION

LBS./HOUR vs. MEQ/L

1MEQ		2MEQ		3MEQ		4MEQ		5MEQ		6MEQ	
GPM	LB/HR	GPM	LB/HR	GPM	LB/HR	GPM	LB/HR	GPM	LB/HR	GPM	LB/HR
100	4	100	9	100	13	100	17	100	22	100	26
150	6	150	13	150	19	150	26	150	32	150	39
200	9	200	17	200	26	200	35	200	43	200	52
250	11	250	22	250	32	250	43	250	54	250	65
300	13	300	26	300	39	300	52	300	65	300	78
350	15	350	30	350	45	350	60	350	76	350	91
400	17	400	35	400	52	400	69	400	86	400	104
450	19	450	39	450	58	450	78	450	97	450	117
500	22	500	43	500	65	500	86	500	108	500	130
550	24	550	48	550	71	550	95	550	119	550	143
600	26	600	52	600	78	600	104	600	130	600	156
650	28	650	56	650	84	650	112	650	140	650	168
700	30	700	60	700	91	700	121	700	151	700	181
750	32	750	65	750	97	750	130	750	162	750	194
800	35	800	69	800	104	800	138	800	173	800	207
850	37	850	73	850	110	850	147	850	184	850	220
900	39	900	78	900	117	900	156	900	194	900	233
950	41	950	82	950	123	950	164	950	205	950	246
1000	43	1000	86	1000	130	1000	173	1000	216	1000	259
1050	45	1050	91	1050	136	1050	181	1050	227	1050	272
1100	48	1100	95	1100	143	1100	190	1100	238	1100	285
1150	50	1150	99	1150	149	1150	199	1150	248	1150	298
1200	52	1200	104	1200	156	1200	207	1200	259	1200	311
1250	54	1250	108	1250	162	1250	216	1250	270	1250	324
1300	56	1300	112	1300	168	1300	225	1300	281	1300	337
1350	58	1350	117	1350	175	1350	233	1350	292	1350	350
1400	60	1400	121	1400	181	1400	242	1400	302	1400	363
1450	63	1450	125	1450	188	1450	251	1450	313	1450	376
1500	65	1500	130	1500	194	1500	259	1500	324	1500	389
1550	67	1550	134	1550	201	1550	268	1550	335	1550	402
1600	69	1600	138	1600	207	1600	276	1600	346	1600	415
1650	71	1650	143	1650	214	1650	285	1650	356	1650	428
1700	73	1700	147	1700	220	1700	294	1700	367	1700	441
1750	76	1750	151	1750	227	1750	302	1750	378	1750	454
1800	78	1800	156	1800	233	1800	311	1800	389	1800	467
1850	80	1850	160	1850	240	1850	320	1850	400	1850	480
1900	82	1900	164	1900	246	1900	328	1900	410	1900	492
1950	84	1950	168	1950	253	1950	337	1950	421	1950	505
2000	86	2000	173	2000	259	2000	346	2000	432	2000	518
2050	89	2050	177	2050	266	2050	354	2050	443	2050	531
2100	91	2100	181	2100	272	2100	363	2100	454	2100	544
2150	93	2150	186	2150	279	2150	372	2150	464	2150	557
2200	95	2200	190	2200	285	2200	380	2200	475	2200	570
2250	97	2250	194	2250	292	2250	389	2250	486	2250	583
2300	99	2300	199	2300	298	2300	397	2300	497	2300	596
2350	102	2350	203	2350	305	2350	406	2350	508	2350	609
2400	104	2400	207	2400	311	2400	415	2400	518	2400	622
2450	106	2450	212	2450	318	2450	423	2450	529	2450	635
2500	108	2500	216	2500	324	2500	432	2500	540	2500	648
2550	110	2550	220	2550	330	2550	441	2550	551	2550	661
2600	112	2600	225	2600	337	2600	449	2600	562	2600	674
2650	114	2650	229	2650	343	2650	458	2650	572	2650	687
2700	117	2700	233	2700	350	2700	467	2700	583	2700	700
2750	119	2750	238	2750	356	2750	475	2750	594	2750	713
2800	121	2800	242	2800	363	2800	484	2800	605	2800	726
2850	123	2850	246	2850	369	2850	492	2850	616	2850	739
2900	125	2900	251	2900	376	2900	501	2900	626	2900	752
2950	127	2950	255	2950	382	2950	510	2950	637	2950	765

DISCHARGE RATE CHART

Ag Pro™ SOLUTION INJECTION

AMENDMENT APPLICATION RATE Lbs./Hour	DISCHARGE RATE in gallons per minute GPM (Discharge Gallons/Minute) @ Slurry Mix (Dry Lbs./Gallon)					
	6 lbs. Dry/Gallon	5 lbs. Dry/Gallon	4 lbs. Dry/Gallon	3 lbs. Dry/Gallon	2 lbs. Dry/Gallon	1 lbs. Dry/Gallon
60	.16	.20	.25	.33	.50	1.00
120	.33	.50	.50	.66	1.00	2.00
180	.50	.60	.75	1.00	1.50	3.00
240	.66	.80	1.00	1.33	2.00	4.00
300	.83	1.00	1.25	1.66	2.50	5.00
360	1.00	1.20	1.50	2.00	3.00	6.00
420	1.16	1.40	1.75	2.33	3.50	7.00
480	1.33	1.60	2.00	2.66	4.00	8.00
540	1.50	1.80	2.25	3.00	4.50	9.00
600	1.66	2.00	2.50	3.33	5.00	10.00
660	1.83	2.20	2.75	3.66	5.50	11.00
720	2.00	2.50	3.00	4.00	6.00	12.00
780	2.16	2.60	3.25	4.33	6.50	13.00
840	2.33	2.80	3.50	4.66	7.00	14.00
900	2.50	3.00	3.75	5.00	7.50	15.00
960	2.66	3.20	4.00	5.33	8.00	16.00

Refer to the "Gypsum Application Rate Chart". Find your irrigation flow rate (in GPM) under the desired treatment level (MEQ) to determine the gypsum application rate (LBS/HOUR). Then;

1) Find the closest Lbs/Hour rate in the left hand column above.
2) Follow the table to the right under the column which reflects the Slurry Mix in the tank (Dry Pounds/Gallon).
3) Read the number indicated as the Discharge Gallons Per Minute (the g.p.m. of slurry to be injected).

SAMPLE – Setting slurry discharge for Gypsum. (Mixed in the tank at the recommended rate of 4 lbs. gypsum/gallon of water.) Desired gypsum application = 240 Lbs./Hour. Find 240 in the left column, then follow it to the right under "4 lbs. Dry/Gallon". Read Discharge Gallons/Minute = 1.00. Therefore, fresh water bypass should be opened fully, then reduced by 1 gallon per minute.

COMPATIBLE AMENDMENTS APPLICATION CHART

Ag-Pro SOLUTION INJECTION

The following dry materials are compatible with the Ag-Pro solution injection system.*

Always put gypsum into mixing tank first.
Never combine Phosphate based products with Calcium.

300 GALLON UNIT

Solution Grade Gypsum, alone: 1,500 lbs. (680 Kgs) **Max.****

	Mixed With Gypsum		*Without Gypsum*	
Description	**Lbs.**	Kgs	**Lbs.**	Kgs
Amonium Nitrate	**500**	227	**1800**	818
Amonium Sulfate	**200**	91	**1000**	455
Calcium Nitrate	**200**	91	**2000**	910
Humic Acid	**15** gal		**15** gal	
Milled Limestone* **	— ***Do Not Mix*** —		**200**	91
Magnesium Sulfate	**50**	23	**50**	23
Potassium Sulfate (Potash)	— ***Do Not Mix*** —		**600**	273
Potassium Nitrate	**200**	91	**600**	273
Zinc Sulfate	**50**	23	**50**	23
10-62-0	— ***Do Not Mix*** —		**1200**	546

600 GALLON UNIT

Solution Grade Gypsum, alone: 3,000 lbs. (1,360 Kgs) **Max.****

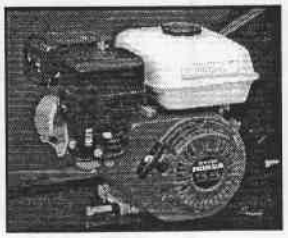
	Mixed With Gypsum		*Without Gypsum*	
Description	**Lbs.**	Kgs	**Lbs.**	Kgs
Amonium Nitrate	**1000**	454	**3600**	1636
Amonium Sulfate	**400**	182	**2000**	910
Calcium Nitrate	**400**	182	**4000**	1820
Humic Acid	**35** gal		**35** gal	
Milled Limestone* **	— ***Do Not Mix*** —		**400**	182
Magnesium Sulfate	**100**	46	**100**	46
Potassium Sulfate (Potash)	— ***Do Not Mix*** —		**1200**	546
Potassium Nitrate	**400**	182	**1200**	546
Zinc Sulfate	**100**	46	**100**	46
10-62-0	— ****Do Not Mix*** —		**2400**	1092

***CAUTION:** The above amendments are compatible with the construction of the Ag-Pro injection machine only when purchased in a form appropriate for direct injection. Therefore, always be sure to confirm with the amendment supplier that what you are buying is suitable for injection directly into irrigation water. Failure to do so may cause improper operation and/or damage to the injection machine, which is not covered by the manufactures' warranty. If you are unsure about an item, please call toll free 1-(888) 88-AG-PRO prior to using the material. **Based on using Western Minerals' Ultra Fine 200™ gypsum. Use of a sub-standard quality of solution grade gypsum can reduce the maximum by as much as 25%. ***Limestone must be ground to at least 325 mesh minus. Consult your supplier for details.

Electric Control Box

The electric control box provides a weatherproof "On/Off" switch and mag starter conveniently mounted directly to the machine, pre-wired to the motor at the factory to ensure proper hookup and rotation. (Included with some models.)

Gasoline Engine

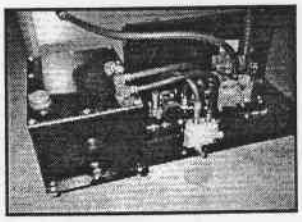


The gas engine provided is a standard recoil engine. Make sure that the Discharge Valve on the injection unit is in the *closed* position before starting the engine. This allows the engine to start easier and extends parts life. **Use a carbon-reducing fuel additive with gas models to help prevent carbon buildup on the pistons.** Follow the operating and maintenance procedures included separately for the engine installed in your application.

Auxiliary Fuel Tank

The 20 gallon auxiliary fuel tank mounts directly to the Ag-Pro machine and allows gas engine models to run up to 48 hours without refueling. Fuel line, filter and shut off valve are included. Use caution when refueling to prevent spills. **Do not smoke or use near open flames.**

Hydraulic Motor

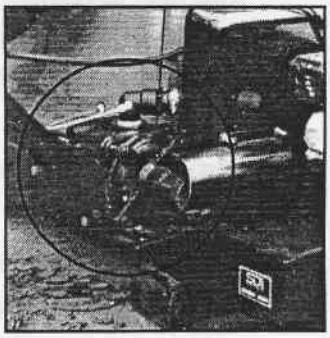


The hydraulic motor option includes the hydraulic pump assembly to operate the motor. A large oil reserve tank is mounted directly to the injection unit allowing heat to dissipate and keep oil temperatures down. The motor is preset at the factory for the appropriate operating speed. Do not attempt to speed up or slow down the hydraulic motor. (Hydraulic hoses are not included with the injection system and must be supplied separately.)

Trailer Package

All models are available with a trailer package for portability. Care should be taken to block the tires to prevent movement during operation. Keep tires inflated to their proper p.s.i. rating and pack wheel bearings annually. **WARNING: The 600 gallon single-axle trailer is designed to allow the machine to be moved while EMPTY.** You must have the optional tandem-axle trailer if you wish to move the 600 gallon machine while full. Standard trailer packages are not D.O.T. approved and may not be used on any public roads. (A D.O.T. upgrade package is available for all trailers.)

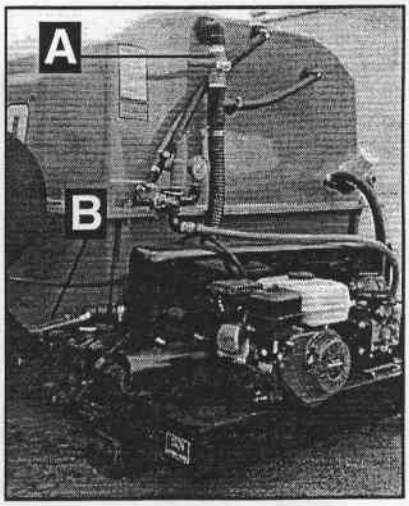
Auxiliary Fill Pump



Used to fill the main mixing tank from a ditch or pond, the auxiliary fill pump is a self-priming, centrifugal style pump providing a high volume of water at a relatively low pressure. It operates by a direct-drive belt from the motor's pulley, so the pump is working at all times when the injection unit is operating. To fill the tank:

a) Check that a suction hose is attached and that the free end is submerged in water. A debris screen should be attached to prevent large debris from being sucked into the pump. When drawing water from a pond, use a floating suction device to pump water from near the top of the pond to prevent sand, dirt or other debris from entering the pump and mixing tank.

b) With the injection machine ON, turn Fill Valve "A" to the open position (parallel with the hose). This allows the auxiliary fill pump to begin filling the main tank.



c) When the mixing tank is full, a float valve will automatically shut off the incoming water to prevent the tank from overflowing. You may then leave the Fill Valve open, for maintaining a *continuous level* of fluid in the machine, or you may turn off the valve and allow the mixing tank to *pump down* for flood and other uncontrolled irrigation applications.

CAUTION: The centrifugal pump continues to turn *even if the Fill Valve is closed.* A small fresh water bypass tube "B" is connected between the centrifugal pump and the main tank allowing a very small amount of fresh water to continue circulating to prevent the pump from overheating. **YOU MUST KEEP THE SUCTION HOSE SUBMERGED AT ALL TIMES DURING OPERATION**. Failure to do so will allow the auxiliary pump to run dry and cause the pump to burn up. Also, check the small bypass tube on a regular basis to ensure that it has not become clogged by debris. *Damage resulting from running the pump dry, or running to hot, is not covered under the factory warranty or the optional extended warranty.*

An optional hinge assembly is available to disengage the auxiliary pump when not needed in applications where this might be a problem. Contact your Ag-Pro representative for details.

For winter storage, be sure to drain all water from the pump and flush with a 50/50 mixture of water and antifreeze.

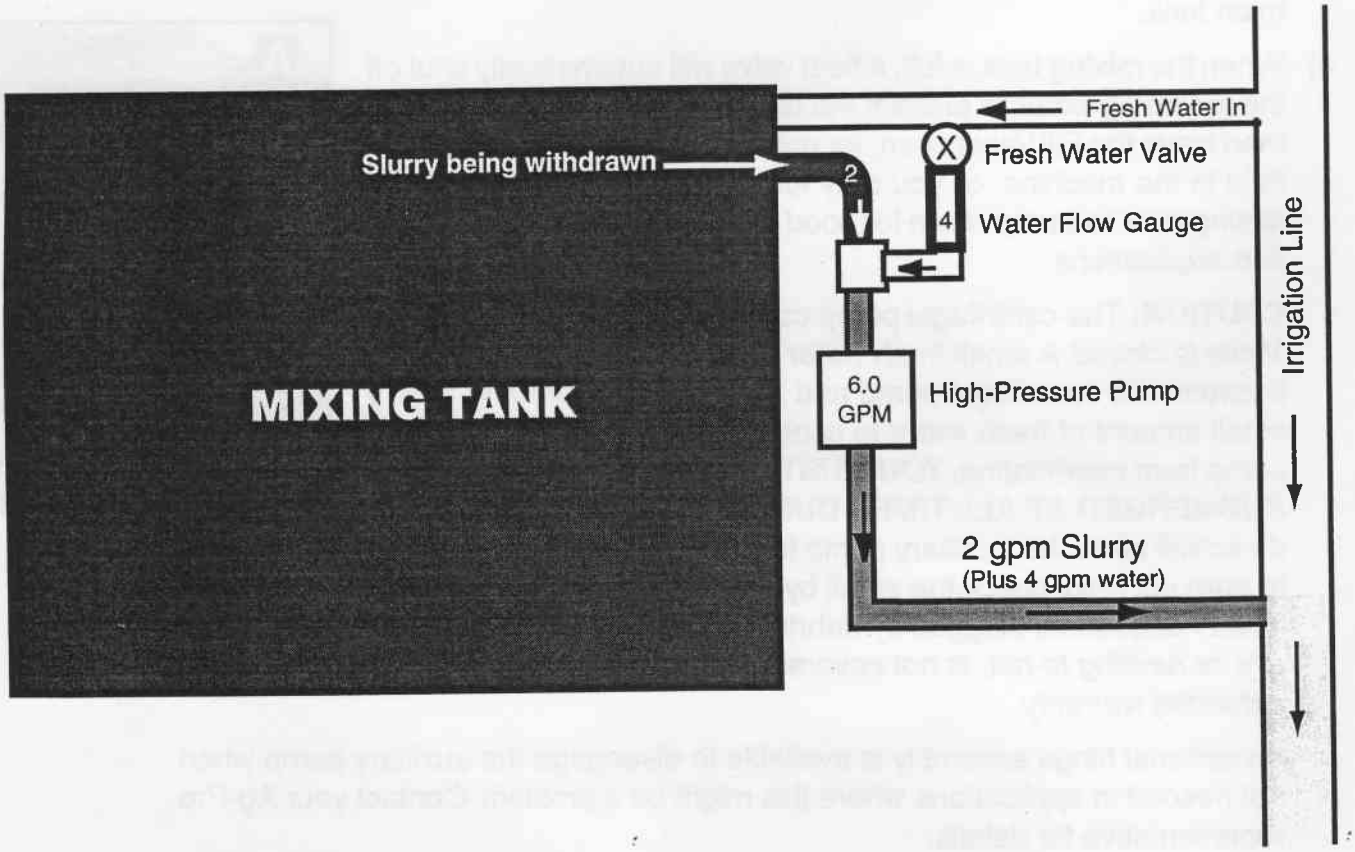
Fresh Water Bypass Operation

The high-pressure pump will first draw from the fresh water line. The amount of slurry injected is determined simply by setting the fresh water flow to the pumps maximum capacity, then reducing the fresh water gpm by the amount of slurry desired. The pump will then automatically withdraw the difference from the Mixing Tank.

Maximum Pump Capacity - Fresh Water Flow = Net Amount of gypsum slurry injected.

Example: Desired slurry output is determined to be 2 gpm. Maxium pump capacity is 6 gpm.

1. With the machine running, the fresh water valve is opened until the pump's maximum gpm rate is achieved (6 gpm in this example).
2. Since the desired slurry output is 2 gpm, slowly close the fresh water valve until the fresh water flow meter reads 2 gpm *less* (6-2=4 gpm in this example.)
3. With the fresh water restricted to only 4 gpm, the positive displacement pump will automatically make up the difference by withdrawing 2 gpm from the Mixing Tank.



MAIN ADVANTAGES: Able to put more gypsum in mixing tank, less wear and tear on pump, eliminates pressure relief valve and makes adjusting desired output much simpler.

MISCELLANEOUS CONVERSION DATA

GENERAL

acre = 43,560 square feet
acre foot = 43,560 cubic feet (ft^3)

WATER

cubic foot (ft^3) = 7.48 gallons
acre foot = 325,829 gallons
acre inch = 27,152 gallons

liter x 0.265 = gallons
gallons x 3.78 = liters
gallons / 325,829 = acre feet
acre feet x 325,829 = gallons

WATER FLOW

acres x depth (inches) = Acre Inches
AI x 27,152 = Total Gallons
TG / GPM = Irrigation Hours.

GYPSUM APPLICATION RATES - *SOIL*

Recommended tons/acre x acres to treat /2 = Total Gypsum Requirement.
TGR / 0.*x* = Total Tons Gypsum needed for injecting. (*x* = gypsum purity percentage. i.e., 50, 75, 92, etc.)
TTG x 2,000 = Total Pounds Gypsum
TPG / .0043 = Total Gallons. (TG / GPM / 60 = Total Hours of irrigation for full application in shortest time.)

GYPSUM APPLICATION RATES - *WATER*

Pounds Per Acre Foot / 325,829 = Pounds Per Gallon treatment rate.
Milliequivalents per liter (meq/ltr) x .000716 = Pounds Per Gallon treatment.
PPG x GPM x 60 = Pounds Per Hour application rate.
PPG x 325,829 = Pounds Per Acre Foot application rate.

(Meq/ltr x .000716 x GPM x 60 = Pounds Per Hour application rate.)

Thank You for choosing

Ag-Pro™ by WESTERN MINERALS

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