

Air Injection

INSTALLATION & OPERATION MANUAL

READ THIS MANUAL

This manual covers installation, operation, and maintenance requirements for an **AIR INJECTION SYSTEM**.

It is important that those responsible for the installation of this equipment, as well as the owner / operator, read this manual and carefully follow the instructions and guidelines.



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INTRODUCTION:

Air injection offers a chemical free low maintenance way to control most iron, sulfur, or manganese water problems, without producing potentially harmful by-products.

- ▶ **PLEASE READ THIS MANUAL COMPLETELY BEFORE INSTALLING THIS AIR INJECTION SYSTEM.**
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CONDITIONS OF OPERATION:

- ⇒ **Iron-** Limit of up to 10 ppm clear (ferrous) or red water (ferric) iron.
- ⇒ **Sulfur (hydrogen sulfide gas)** - Limit of up to 2 ppm.
- ⇒ **Manganese-** Limit of up to 2 ppm.
- ⇒ **pH** - Must be maintained at 7.0 and above.
- ⇒ **Dissolved oxygen** - (after installation) - Must be at least 15 % of total iron and manganese expressed as ppm.

For satisfactory performance, indicated conditions of operation should not be exceeded. Flow rates specified are adequate for normal residential applications. When sizing commercial applications or if treated water is to supply a geothermal heat pump, swimming pool, etc. (contact dealer before selecting equipment). Maximum service flow rates have a rated pressure drop of less than 10 psi.

- ☛ For system to operate properly, the well pump capacity (gpm) **MUST BE SUFFICIENT** for proper backwashing.

EQUIPMENT CHECKLIST:

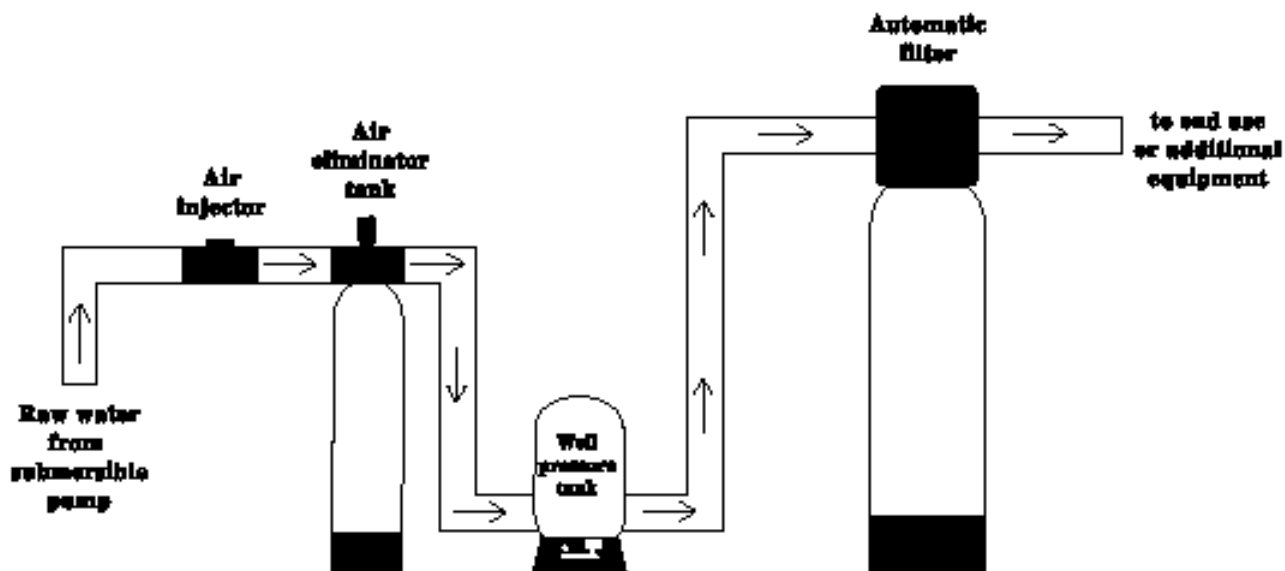
- U1020 1" Adjustable Air Injector
- Air Eliminator Tank, ARF-1 or ARF-2
- Automatic Filter

INSTALLATION REQUIREMENTS:

- ⇒ 1. pH must be equal to or above 7.0.
- ⇒ 2. Equipment location must be protected from freezing.
- ⇒ 3. A properly grounded 110 VAC outlet will be required for the automatic filter.
- ⇒ 4. Submersible pump well system.
- ⇒ 5. Access to pipe between well pump and pressure tank to install the air injector and the air eliminator tank.
- ⇒ 6. Refer to instruction manual included with the automatic filter for requirements of that unit.
- ⇒ 7. Be sure that there is adequate space to install and service the system.

EQUIPMENT PLACEMENT:

Submersible Pump	▶	Air Injector	▶	Air Eliminator Tank
Well Pressure Tank	▶	Automatic Filter	▶	Outside Taps (optional)
Softener (optional)	▶	Additional Equipment (i.e. reverse-osmosis)		
	▶	End Use		



EQUIPMENT HOOK-UP:

- ⇒ **Injector-** Note flow direction as indicated by the arrow on the side of the of the injector. There is a gray collar on the opposite side from the white check valve/air draw fitting. Inside this collar is a slotted screw head. Position the unit so that the gray collar is accessible for adjusting the screw. To assure maximum efficiency allow 24" of straight pipe after the injector. Where possible install unions for ease of servicing.
- ⇒ **Air Eliminator Tank-** Install between the injector and the well pressure tank. Be sure to follow the flow direction as indicated by the arrows on top of the tank head. If sulfur is being gassed off, a 3/8 inch polyethylene tube may be installed from the top of the vent assembly to outside of the building.
- ⇒ **Automatic Filter-** Follow the installation directions (series 163) included with the unit.

AIR-INJECTION SET-UP:

- ⇒ By-pass the automatic filter and turn the vent assembly on top of the ARF unit to the open position.
- ⇒ Turn the power on to the well pump and allow the system to fully pressurize. Check for and repair any leaks.
- ⇒ Open an outlet downstream from pressure tank to cause the well pump to cycle. With a timing device (watch, stopwatch) that counts seconds, time the cycle the well pump runs in seconds. Also, time the seconds which the injector draws air. **Divide** the air draw time by the pump cycle time, the **resulting number is the percent of air draw time**.

Example: pump cycle time 50 seconds
 air draw time 15 seconds

15 ÷ 50 = 0.30 ⇒ 30% air draw

The ideal air draw time is 30 % of the well pump cycle. This usually provides adequate performance for most situations without causing flow restriction or excessive air in the product water.

To adjust the air draw, turn the screw in the gray collar of the injector. To increase air draw, turn the screw clockwise. To decrease draw time, turn the screw counterclockwise.

Follow start-up procedures for the automatic filter and any additional equipment. To set backwash frequency use the following guidelines:

1. Estimate **DAILY IRON REMOVAL** by multiplying iron concentration by estimated daily water consumption (use 60 gallons water per person per day for normal household applications).

ESTIMATED DAILY WATER USAGE (gallons) _____	x	IRON CONCENTRATION (ppm) _____	=	DAILY IRON REMOVAL FACTOR _____
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2. Calculate **BACKWASH FREQUENCY** by the following formula:

IRON REMOVAL CAPACITY OF YOUR MODEL IS <u>12,000</u>	=	DAILY REMOVAL FACTOR _____	=	IRON BACKWASH FREQUENCY (days) _____
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The resulting number of days between back washings should be converted to the nearest **MORE FREQUENT** obtainable timer setting (i.e. 4.8 days should be converted to a 4 day interval, and a 8.3 frequency to a 6 day interval). *A 6 day interval is the maximum recommended for any normal application.* If your water contains high iron concentration, manganese, or hydrogen sulfide it may be advisable to increase the backwash frequency up to daily if necessary.

MAINTENANCE:

Under normal conditions the air injection system is a very low maintenance system.

Annually check the air draw to be sure it is within the original 30% of the pump run time, adjust if necessary, and clean the air vent assembly by turning the vent assembly to the closed position. Carefully unscrew the cap and float assembly. Clean the float and seals as necessary. Be careful to assemble the float as it was originally hung or the valve will not work properly. The O-Ring fits on the beveled edge at the base of the male threads. Screw the cap/float assembly back into place. **Do not over tighten!**

Replenishment of pH adjusting media may be required periodically, the frequency of which is dependent on raw water pH, manganese concentration and water consumption rate. Consult your dealer for more information.

TROUBLESHOOTING:

PROBLEM: Water is clear when drawn, but turns red upon standing or deposits iron stains.

⇒ **POSSIBLE CAUSE AND SOLUTIONS:**

1. Insufficient air draw. Check air injector, if unable to adjust for long enough draw, check pumping rate and repair or replace as required.
2. By-pass open or leaking. Close by-pass or repair as necessary.
3. Filter bed overloaded with precipitated iron due to insufficient backwash flow rate or frequency.
 - (a) Recheck well pump capacity (gpm) and repair or replace if necessary.
 - (b) Check for any restrictions of the drain line.
 - (c) Check for improper drain line flow controller (see filter valve manual).
 - (d) Check for malfunction of timer or unplugged control valve power cord.
 - (e) If none of the above apply, increase the backwash frequency as necessary.

Upon correction of this problem, if manual backwashing of filter does not clear the bed of iron, filter bed may need to be replaced.

4. Presence of manganese or iron bacteria. Recheck water analysis.

5. Service flow rate excessive for filter. Slow flow rate with proper flow control, or increase filtration with additional filter or larger single filter, provided backwash capacities are sufficient.
6. Pumping cycle too short. Well pressure tank may be water logged or a check valve in the well system may be malfunctioning. Correct as necessary.
7. PH of treated water too low, should be 7.0 or higher (with manganese must be above 8.2). Replenish MB700 in media or add an acid neutralizing system before the filter.

PROBLEM: Water is red when drawn from treated tap.

⇒ **POSSIBLE CAUSE AND SOLUTIONS:**

1. Filter bed overloaded with precipitated iron due to insufficient backwash flow rate or frequency.
 - (a) Recheck well pump capacity (gpm) and repair or replace as required.
 - (b) Check for any restrictions of the drain line.
 - (c) Check for improper drain line flow controller (see filter valve manual).
 - (d) Check for malfunction of timer or unplugged control valve power cord.
 - (e) If none of the above apply, increase the backwash frequency as necessary.
 - (f) Check air draw time.

Upon correction of this problem, if manual backwashing of filter does not clear the bed of iron, filter bed may need to be replaced.

PROBLEM: Excessive pressure loss through filter.

⇒ **POSSIBLE CAUSE AND SOLUTIONS:**

1. Filter bed overloaded with precipitated iron due to insufficient backwash flow rate or frequency.
 - (a) Recheck well pump capacity (gpm) and repair or replace as required.
 - (b) Check for any restrictions of the drain line.
 - (c) Check for improper drain line flow controller (see filter valve manual).
 - (d) Check for malfunction of timer or unplugged control valve power cord.
 - (e) If non of the above apply, increase the backwash frequency as necessary.
 - (f) Check injector for restriction.

Upon correction of this problem, if manual backwashing of filter does not clear the bed of iron, filter bed may need to be replaced.

2. Control inlet /outlet valves not fully open.
3. Cementing or channeling of filter bed, rebed filter with new media.

PROBLEM: Excessive flow loss between the injector and the filter.

⇒ **POSSIBLE CAUSE AND SOLUTIONS:**

1. Precipitated iron and/or manganese may build up in the piping system or the ARF tank manifold system. Clean or replace clogged components.

PROBLEM: “Milky “ or “ bubbly “ water at treated taps.

⇒ **POSSIBLE CAUSE AND SOLUTIONS:**

1. Excess air draw. Adjust the air draw to the original 30% of well pump cycle time.
2. Air not being vented off. If excessive air is noticed in the product water and the air draw is adjusted properly, check the air relief vent assembly, make sure it is turned to the open position. The air vent unit may be cleaned as follows:

Turn the vent assembly to the closed position. Carefully unscrew the cap and float assembly. Clean the float and seals as necessary. Be careful to assemble the float as it was originally hung or the valve will not work properly. The O-Ring fits on the beveled edge at the base of the male threads. Screw the cap / float assembly back into place, **do not over tighten!**