



Bringing Sensible Solutions to Difficult Problems

Air-Whip Pump Installations and Results

Numerous KeysTec Air-Whip pumps have been installed on DAF systems throughout the country. Some have replaced the various recycle pumps that were previously installed. Some have eliminated the recycle function, using the full flow or "split" flow pressurization/aeration option. Some have been installed on new production DAFs as the aeration pump of choice. Below, the various installations are listed, stating the general location, application, time in service, type of operation and installation details. Following this list is a review of all known problems with Air-Whip installations.

Table with 6 columns: MODEL, LOCATION, APPLICATION, IN SERVICE, OPERATION INFORMATION, DAF SIZE/TYPE. It lists various pump installations across different states like Indiana, North Carolina, Georgia, and Iowa, detailing the pump model, what it replaced, the application, and the DAF system specifications.

Equipment

KT-M-2-1/2 X 2	Re-sold	Unknown	1-1/2 years	Unknown	Unknown
KT-M-4 X 2-1/2, 50 HP	Mississippi	Vegetable Processing Plant	1 yr	Clarification of re-use water	Installed with " split influent flow " configuration on FRC 1000 GPM DAF
KT-M-4 X 2-1/2, 50 HP	Louisiana	Vegetable Processing Plant	1 yr	Clarification of re-use water	Installed with " split influent flow " configuration on FRC 1000 GPM DAF
KT-M-3 X 2-1/2 X 7i Replaces Original Equipment	North Carolina	Textile Dye and Finishing	1 yr	Textile dye and finishing wastewater	Installed with " recycle " flow configuration on Stuart DAF
KT-M - 2½ x 2, Replaces SIHI / Sterling pump	Maryland	Rendering	8 months	Rendering Wastewater	Installed with split " split influent flow " on Nujhuis DAF
KT-M - 3 x 2-1/2-8i Replaces dual SIHI / Sterling pumps	Georgia	Poultry Processing	7 months	Poultry Kill Processing Wastewater	Installed as " recycle flow " on FRC 2,000 GPM Plate Pac style DAF. One Air-Whip pump replaces dual SIHI pumps
KT-M - 4 x 2-1/2-8i Pump re-sold by Polytec	Texas	Poultry Processing	7 months	Poultry Kill Processing	Never properly installed, never properly operated. Management change
KT-M - 2½ x 2, Replaces SIHI / Sterling pump	California	Rendering	7 months	Rendering Wastewater	Installed as " full flow " pressurization on FRC open style DAF with very heavy solids loading. Abrasive sand passing through wore through the cast stainless steel volute. Pump was replaced and a sand trap installed upstream. No further problem
KT-M - 3 x 2-1/2-8i Replaces Edur pump	Alabama	Poultry Processing	7 months	Poultry Kill Processing Wastewater	Installed as " recycle flow " on Stuart 1000 GPM open style DAF.

KT-M - 3 x 2-1/2-8i Replaces dual SIHI / Sterling pumps	Kentucky	Poultry Processing	7 months	Poultry Kill Processing Wastewater	Installed as " recycle flow " on FRC 2,000 GPM Plate Pac style DAF. One Air-Whip pump replaces dual SIHI pumps. Standby pump subsequently installed
KT-M - 3 x 2-1/2-8i Installed on two Alloy Hardface Clarifiers	North Carolina	Poultry Processing	5 months	Poultry Kill Processing Wastewater	Installed as " recycle flow ", converting two "grease separators" into DAFs
KT-M - 2 x 1½ Original Equipment Installation	Unknown Location	Poultry Further Processing	New		Installed as " full flow " pressurization on P-Tec Original Equipment Micro-DAF
KT-M - 2½ x 2 Replaces Cornell Pump	Georgia	Heavy Equipment Metals Fabrication	New	Wastewater from heavy equipment manufacturing, coolants and oils	Installed as " recycle Flow " on unknown manufacturer circular DAF

If you have any questions about these installations, please call for further information. Some clients are willing to share their experience while others prefer not to. Their preference is always honored by KeysTec, LLC.

PROBLEMS ENCOUNTERED WITH Air-Whip INSTALLATIONS

Normally, the client is very pleased with the conversion to the Air-Whip solution. However, there are specific requirements for this installation or conversion. Failure to follow the installation instructions can result in a system that does not work. Primarily, these requirements are:

- A minimum of 115 psi air at the required flow capacity must be available
- A means of metering air must be installed (air flow meter with needle valve)
- As with any metal pump, highly abrasive sand or residue must not be present
- For reasonably abrasive inclusions, the Silicone Carbide seal option must be used
- Because the Air-Whip injects air in a pressurized zone, the reading on the flow meter must be corrected for pressure and temperature to calculate the true Standard Cubic Feet per Hour (SCFH) or Standard Cubic Liters per Hour (SCLH). KeysTec will provide, free of charge, a program for easily calculating these parameters. When replacing a typical turbine pump (SIHI, Edur, etc.) where the air is injected in the low or negative pressure pump inlet, the equivalent air flow under pressure in the Air-Whip must be calibrated and corrected for the differing pressure. For example, 30 SCFH injected at -5 psi pressure will result in a rotometer reading of 37.5 at 85 degrees F. The same volume of air injected under 110 psi pressure will result in a reading of 10.4. Contact us for your calibration program, free of charge, whether you are our customer or not.

With the preceding requirements in mind, the following information is provided to assist you in your decision to convert to the Air-Whip Aeration Pump in your DAF system. *ALL* negative situations to date are included.

1. Air-Whip pump installed in full flow pressurization mode on untreated wastewater stream in a rendering plant. This resulted in seal wear and abrasion damage to the pump casing, wearing completely through the wall. It was determined that very abrasive granite sand was included in the water stream. A simple hydro-cyclone sand separator was installed ahead of the pump and the silicone carbide seal was installed. There was no further problem and the Air-Whip is still in service.
2. An Air-Whip pump was installed on a DAF in a poultry processing plant in the Eastern US. The instructions for minimum air pressure were ignored and the client installed it with 60 psi air. Since this pressure is less than the pressure of the pump, it is impossible to inject air. The pump was removed and used elsewhere. This is a good example of adhering to the requirements for the Air-Whip listed previously.
3. An Air-Whip pump was delivered to a poultry processing plant in the South Central USA with detailed installation instructions reflecting the above simple requirements. The pump was never installed properly. We received the following message from our agent:

“I provided the attached schematic which you drew. When I went to inspect the installation the first time there was no air hooked up. I gave them a new schematic and part numbers for the air flow pieces. Next time I came back they had a pressure regulator but no flow control valve.”

As of this date, the pump has not been properly installed and obviously can't function.

4. In a small prepared meat processing plant, an Air-Whip pump was installed on a small Nijhuis DAF in the full flow mode. There is no screening of the wastewater which ordinarily is not a big problem. However it is possible to get some odd things in the pump. In this case, long metal-core tie wraps were flushed down the drain and entered the pump, wrapping themselves around the impeller. The DAF system is unattended and the problem was not noticed. The resulting imbalance caused continuous vibration which eventually broke the motor shaft. The motor was replaced and a basic “catch screen” was installed. The pump is still in operation and the client is very pleased with it.

These are all the problems that have come to our attention. We have occasionally had to explain that air delivered under pressure into a pressurized injection point results in the previously discussed difference in air flow readings. Regardless, the DAF performed flawlessly and the calculations were made.

DAF Installation Requirements

All DAF (*Dissolved* Air Flotation) installations have basic requirements. In order to achieve maximum dissolved air in the water, the following must be available:

- Significant air to water surface area interface (achieved within the pump)
- Pressure, provided by the pump (preferably 75 to 115 psi., depending on installation and design)
- Time. Dissolving air is not instantaneous. It requires time under pressure and interface. This is the purpose of the saturation tank/pressure header

For very large DAF installations having very high flows, the Air-Whip pump is capable of delivering flows to match the “white water” requirement up to about 400 GPM. It must be understood that as the flow increases, the residence time in the pump decreases, placing more dependence on the saturation vessel part of the system. In some cases, the client has simply injected directly into the influent line of the DAF with no problem generating “white water”. This can work if the flow through the Air-Whip pump is relatively low. For higher flows, a tank or larger diameter section of pipe of sufficient length must be provided to introduce sufficient residence time under pressure for the sheared air to be dissolved into the water. In many of the modern DAFs, this saturation tank is the pressure header from which “white water” is delivered to multiple points. All properly designed DAFs have some type of saturation vessel for this purpose. Some are capped large diameter pipe sections and some are tanks, but they serve the same specific purpose. An installation without this device can never perform to full capability.

Contact KeysTec, LLC to review the details of your installation to determine suitability for conversion to the Air-Whip. In many cases, the “Full Flow” or “Split Flow” configuration can give you a significant increase in the capacity of your DAF.