

# MAINTENANCE INSTRUCTIONS FOR THE CLEAN-FLO CONTINUOUS LAMINAR FLOW INVERSION / OXYGENATION SYSTEM

Maintenance is critical to the efficient performance of the CLEAN-FLO system. These maintenance activities do not involve very much time, but need to be completed quarterly for the system to perform at optimal performance. Failure to perform these activities may void any warranties and will limit the results achieved by the system. All maintenance supplies can be obtained from CLEAN-FLO.

## EVERY THREE MONTHS

- Feel the compressor outlet hoses coming out of the cabinet. If any hoses are cool, refer to TROUBLESHOOTING CHECK LIST for repairs.
- Listen to compressor noise. If it is making a loud rattling noise, the bearings may be worn out. If the bearings need replacing, take it to a local motor repair shop or package the compressor for shipping and return to CLEAN-FLO for repair work.
- Check for air coming out of pressure relief valve(s). If air is coming out, one or more diffusers are clogged or air lines pinched. During the winter months, the air line may have ice inside.

### CAUSES OF AIR LINE FREEZE-UP

- Water level has dropped, exposing the hose at the shoreline.
- Section of hose is floating in lake or pond.
- Hose between cabinet and shoreline is exposed or not buried deep enough.

### REMEDIES

Bury hose if possible.

If possible, tie bricks onto hose to sink it.

Try to bury hose deeper or cover it with more dirt.

### FAST SOLUTION TO AIR LINE FREEZE-UPS.

Pour one pint of fuel line de-icer (available at most gas stations) down the air hose through the port provided on the diffuser side of the tee fittings, coming out of the compressor or at the hose coupling at the compressor outlet. Re-connect the air hose to the compressor. Turn on the compressor and close the valve opposite of the frozen airline thus forcing entire airflow into the frozen airline. This will often times open the frozen air hose within a few minutes. After the airline is cleared, re-adjust control valves to balance air flow to all diffusers.

If the diffuser boil is not wearing through the ice and there is air trapped under the ice causing it to flex or bulge, do the following:

Using an ice auger, drill three holes through the ice. One at the edge of the trapped

air mass, the second halfway to the center and the third at the center of the air mass. **CAUTION:** Wear protective eyewear as bits of ice may be blasted out of the holes when pressure is released. Also, water may squirt out of the holes (like a small geyser) for a few seconds.

**CAUTION:** Working on thin ice can be very dangerous. Wear a life jacket and push a small boat onto the ice with you. When working on ice, bring another person with you along with a rope tied around you, which can be used to pull you to safety if needed.

- Turn off all compressors. Remove the cabinet filter at the bottom shelf and replace it with a new filter. Throw away all old filters. Do not try to clean and re-use any filters.
- Replace the filter on the top of each compressor. With the compressor turned off, remove the filter assembly end cap, change the filter cartridge and replace the end cap. Throw away all old filters. Do not try to clean and re-use any filters. Turn compressor back on. **Note: In dusty or dirty environments, filters may have to be changed more frequently to achieve maximum flow to diffusers. This is very important. A clogged filter creates a vacuum on the inlet to the compressor, creating strain on the compressor, reduced air flow to the diffusers, and premature vane wear.**
- The fans should be checked during each quarterly maintenance visit. The procedure is simple and is as follows:
  1. Disconnect the fans from the power supply (unplug them or turn off the circuit breaker).
  2. Wait until the fans stop spinning.
  3. Spin the fan with your finger. If it turns freely it is in good condition. If it binds, or does not turn freely, it is time to replace it.
  4. If your fan is in good operating condition, re-connect it to the electric power source and start it up.
- Always check diffuser boils. If diffuser is not functioning, the air hoses might have ice inside of them or something limiting the air flow.

All diffuser boils should be uniformly the same, with deep-water boils displaying a smooth current from the bottom, and shallow diffusers displaying a smooth-flowing “bump” in the middle of the boil. If the boil is splashing at the surface, there could be weeds wrapped around the diffuser, or a leak at the diffusers. Large bubbles and uneven spurts are a sure sign of problems. Refer to TROUBLESHOOTING CHECK LIST.

During the early stages of restoration, a coating may form on the diffuser. Once the water quality is improved, the diffuser usually remains clean. It is good to check the diffuser during the early stages to see if it is coated, as this will cut down the efficiency. Go out to the float(s) and lift up each diffuser. Holding the surface of the diffuser 1/4-inch under water, rub any algae or other material off with your fingers. If the material is caked on, scrape the surface with a wide blade putty knife, or use a wire brush on the ceramic diffusers. In extremely hard water, it may still be clogged. In this case, remove the diffuser from the water and pour hydrochloric acid or CLEAN-FLO Diffuser Descaler over the surface. Repeat every 10 minutes until no foaming occurs. Repeat in six months if necessary. Usually it will remain clean from then on. If the diffuser is clean, it will remain clean for many years without further attention. If the water is hard, CLEAN-FLO's Diffuser Descaler should be used for all cleaning.

- Look for air leaks between cabinets and diffusers. Repair according to the TROUBLESHOOTING CHECK LIST.
- We recommend waxing to keep the shine on the cabinet. It should be waxed at least once a year.

### **SHUTDOWN PROCEDURE**

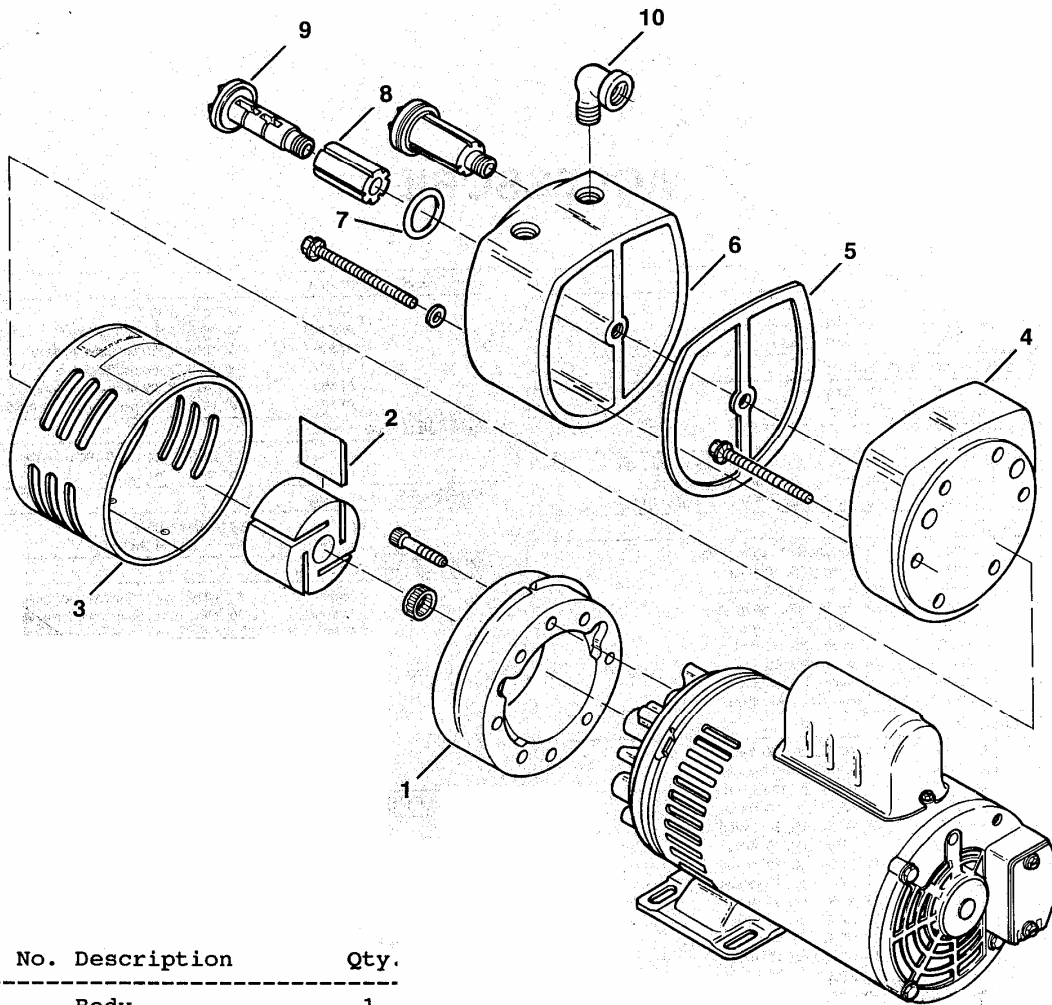
If the system is going to be shut down for longer than a few hours, it is very important to follow these shutdown procedures to prevent compressor damage.

- Disconnect all airlines from the manifold or the main supply line at the union.
- Run the compressor for approximately 5 minutes.
- Turn off the compressor and allow to cool.
- Plug open ports to prevent dust and dirt from entering compressor.

ATTACHMENT A

INSTALL.VAN

1/2 H.P. & 3/4 H.P. VANE COMPRESSORS



Ref. No.	Description	Qty.
1	Body	1
2	Vane	4
3	Shroud	1
4	End Plate	1
5	Gasket	1
6	Muffler Box	1
7	O-Ring	2
8	Felt	2
9	End Cap	2
10	Elbow	1

## VANE REPLACEMENT FOR QUIET MODEL:

- A. Unscrew End Caps 9. Discard Felts 8, if they are present.
- B. Unscrew bolts on Muffler Box 6.
- C. Unscrew bolts on End plate 4.
- D. Remove vanes 2 from compressor rotor slots
- E. Remove all broken vane parts. If any fragment is not removed, it will break the new vanes, when installed. Vacuum the rotor and Body 1. Then turn on the compressor with the vanes removed, to spin any vane fragments out of the rotor slots. Vacuum again.
- F. Put new vanes in with the taper on the vane ends facing in the same direction as the taper in the rotor slots. Make sure the vanes move freely in the vane slots and in the Body, and that no vane fragments are in the rotor slots. If necessary, unscrew the bolts to Body 1 and wipe the parts clean.
- G. Screw the Body 1 and End Plate 4 back on.
- H. Replace Gasket 5 with a new gasket.
- I. Screw Muffler Box 6 back on.
- J. Replace O-Rings 2 with new O-Rings.
- K. Screw End Caps 9 back on without the Felts 8.
- L. Compressor is ready for operation.

## TROUBLE-SHOOTING CHECK LIST FOR CLEAN-FLO SYSTEMS

<b>PROBLEM</b>	<b>CHECK FOR</b>	<b>CAUSE OF PROBLEM</b>	<b>CORRECTIVE</b>
No bubbles or less bubbles coming out of diffusers.	One air line hot, the other cool after tee at compressor outlet.	Control valves out of balance Unequal air flow through air holes.	Open both air line valves completely. Then slowly close valve on hottest air line until both lines are same temperature.
No bubbles or less bubbles coming out of diffusers.	Dirty filters. Worn compressor vanes.	Filters are dirty. Compressor vanes are worn out.	Replace compressor and cabinet filter. Replace vanes.
No bubbles or less bubbles coming out of one diffuser.	Air still does not get warm after opening both valves and slowly closing valve on hottest air line.	Air line bent and /or pinched between compressor and diffuser.	Pull up diffuser with no air coming out, then lower the diffuser, holding the line up. Lift air line hand over hand back to compressor until kink in line is found.
No bubbles or less bubbles coming out of one diffuser.	Pull up diffuser. Check for scale or bacteria and algal scum.	Diffuser clogged with algae, bacteria or scale.	Scrape off diffuser with wide blade putty knife and wire brush entire surface. If this doesn't open diffuser pores, disconnect diffuser and pour Descaler over it.
No bubbles	Both air lines at compressor cool.	Compressor failure	Repair compressor.
No bubbles at diffusers	Both air lines at compressor cool.	One air line cut or leaking at a fitting.	Look for large bubbles between diffuser and shore, and for air leak between shore and compressor. Repair leaking air line.
No bubbles at diffusers	Stream of single bubbles coming up between diffuser and shore.	Leak in air line or between fittings.	Cut off leaky section and splice fittings with Teflon tape and new fittings.

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No bubbles or less bubbles coming out of diffuser.	Air control valves open or closed.	Closed valves decrease air flow to diffusers.	Open control valves.
No bubbles	Compressor not running.	Unplugged compressor or circuit breaker tripped.	Plug in compressor or re-set circuit breaker.
Diffuser boil does not look normal – very large bubbles coming up.	Weeds wrapped around diffuser. Diffuser upside down.	Weeds interfere with flow of bubbles.	Remove weeds. Correct diffuser placement.
Diffuser boil does not look normal – very large bubbles coming up.	Cracked ceramic or torn membrane on diffuser.	Cracks and tears cause large bubbles to form.	Replace diffuser or membrane.
Algae increasing or D.O. dropping	Last time compressor filters and cabinet filters were changed.	Air flow drops up to 11% per month from dust and pollen on the filters.	Change cabinet filters every 3 months and compressor filters every 6 month at minimum.
Algae increasing or D.O. dropping	Clogged diffusers.	Algae, bacteria or scale reduce air flow from diffusers	Scrape diffuser with wide blade putty knife and wire brush entire surface. If still clogged, disconnect diffuser and pour Descaler over it slowly until all fizzing stops, and the acid quickly flows into the diffuser.
Air coming out of compressor pressure relief valve.	Clogged diffusers.	Algae, bacteria or scale reduce air flow from diffusers.	Clean diffusers.
Air coming out of compressor pressure relief valve.	Low pressure at compressor outlet.	Faulty pressure relief valve.	Replace pressure relief valve.
Compressor stopping and restarting later.	Compressor overheating.	Compressor is overheating and the thermal overload is turning off the compressor.	Repair compressor.

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<b>PROBLEM</b>	<b>CHECK FOR</b>	<b>CAUSE OF PROBLEM</b>	<b>CORRECTIVE</b>
Compressor stopped and circuit breaker is thrown.	Broken compressor vanes.	Broken pieces of vanes stop compressor operation.	Replace vanes.
Compressor noisy, makes rattling noises.	Compressor bearings.	Bearings worn out.	Replace bearings.
Compressor hums but will not start.	Broken vanes, worn or rusted bearings.	Vanes broken or bearings worn out.	Replace vanes and / or bearings.
Compressor will not run.	Compressor overheated.	Broken cooling fan inside cabinet.	Replace cooling fan.