

## REFRIGERATED CHILLER INSTRUCTIONS

### PLEASE READ CAREFULLY BEFORE ATTEMPTING TO OPERATE THIS UNIT.

The RRC - Refrigerated Re-Circulating Chiller - are designed to provide a considerable amount of cooling power for demanding applications, even to the replacement of tap water cooling systems. It will accurately control the temperature of a liquid system to within  $\pm 1.0^{\circ}\text{C}$  over its operating range of  $0^{\circ}\text{C}$  to  $40^{\circ}\text{C}$ . The chart below shows the cooling capacity that you can expect from your unit at several different operating temperatures.

	1/4 HP MODEL	1/3 HP MODEL	3/4 HP MODEL	1 HP MODEL
WATTS at $+5^{\circ}\text{C}$	200	300	650	1150
WATTS at $+10^{\circ}\text{C}$	350	450	1300	1600
WATTS at $+20^{\circ}\text{C}$	650	750	2200	2550

### AC POWER REQUIREMENTS

The exact power requirements for each model are permanently printed on the rear panel of the unit. Use only properly grounded outlets.

### LOCATION OF THE UNIT

Locate the unit on a strong, level surface that permits access to the top cover and provides unobstructed air flow through both the front and rear screens. The front wheels can be locked to keep the chiller in place while you are using it.

### CHOOSING A LIQUID

Use a liquid in the chiller that will flow freely. Units operated near the liquid's freezing point should be protected with an antifreeze. Ethylene glycol (a common automotive antifreeze) and water is excellent for applications near  $0^{\circ}\text{C}$ . An algicide should be used in water and in any other fluid conducive to algae growth. It is recommended that the use of caustic, corrosive or flammable liquids be avoided.

### HOSES AND COUPLINGS

To maintain a safe workplace, special care should be taken when choosing the hoses and connectors for the chiller.

1. Pressure ratings - The hoses should be able to withstand the largest pressure that they will encounter. The pump in the chiller is a very powerful 1/3 HP. If a blockage were to occur in its discharge side, the pressure in the hose between the pump and the obstruction would rise to the maximum amount as set by the internal pressure relief valve. This valve is a safety feature which limits the maximum pressure in the system to a predetermined safe amount. It is set at 80 psi at the factory, but can be adjusted by the user with the T-bar protruding from it. Turning the T-bar clockwise will raise the maximum allowable flow rate, while turning the T-bar counter-clockwise will decrease the maximum allowable flow rate. The valve itself is found inside the unit on the "Outlet" side of the pump, just before this hose exits through the case.
2. Diameter - The 2 plastic fittings supplied with your unit are for 1/2" diameter hoses, but other fittings can be used if a smaller hose diameter is desired. The couplings on the "Outlet" and "Inlet" lines on the back of the chiller are internally threaded, 1/2" female

N.P.T. It should be noted that the operating pressure will increase with a smaller diameter hose.

3. Clamps - The use of screw-tightened hose clamps is necessary on all joints to insure good, tight connections.

### FRONT PANEL CONTROLS

1. ON/OFF Switch - This is the power switch for the entire unit.
2. Heating and Cooling Lights - These red and blue lights respectively display the current operating mode of the machine. It is normal for the lights to switch back and forth once the chiller reaches the set temperature, for the unit is making the necessary adjustments for proper temperature control.
3. Temperature Adjust °C - This dial is used to set the temperature at which you desire the chiller to operate.
4. Recirculating Pressure - This gauge measures the amount of flow pressure present in the "Outlet" hose of the chiller. It is read in psi-pounds per square inch. Many users may notice only a slight movement of this gauge. This is normal because many installations with the chiller run on very low pressure. The pressure in the system must not be allowed to exceed the capabilities of your hoses, fittings or equipment.

### SET-UP AND OPERATION

1. How to Set-Up an Open-Bath System to the Chiller -
  - a) Connect the hoses from your bath to the "Inlet" and "Outlet" couplings on the back of the chiller. The "Inlet" coupling is the one through which the liquid will be drawn into the chiller, the "Outlet" coupling, located just below the "Inlet", is the one through which the liquid will be pumped out of the chiller. Considering this flow, position the hoses in your bath so that a good circular flow and stirring motion will be established in the bath.
  - b) Remove the 2 screws holding the metal cover to the top of the chiller. Removing this cover will expose the filler tank on the right side of the unit. Turn the filler cap slightly to release it and lift it up to remove it. Use a funnel to fill this tank with the same liquid that you are using in your bath. This is called priming the pump. It will help establish a flow once the unit is turned on. Replace the cap to the filler tank and turn slightly to lock it. Check for tightness. Make a final check of all hoses and fittings at this time. Make sure there are no bends or crimps in the hoses, and that the hose attached to the "Inlet" of the chiller is submerged in your bath. The level in the bath will drop slightly as the hoses in the system fill up with liquid, so have enough liquid in the bath to cover in the "Inlet" hose at the lower level.
  - c) You are now ready to start the chiller. After making sure the ON/OFF Switch is in the OFF position, plug the unit into the proper AC outlet. Then set the temperature on the Temperature Adjust Dial. Turn on the machine. The chiller will begin pumping liquid through your system. Check the Recirculating Pressure gauge on the front panel to make sure that the pressure is not exceeding the limits of your equipment. And finally, check for leaks throughout the system.
2. How to Set-Up a Closed System or Cooling Coil to the Chiller -
  - a) Connect your closed cooling system to the chiller with either hoses or pipes. The direction of the flow through the system can be controlled by the way the hoses or

pipes are connected to the chiller. The "Inlet" coupling on the back of the chiller is the one through which the liquid will be drawn into the chiller; the "Outlet" coupling, located below the "Inlet", is the one through which the liquid will be pumped out of the chiller.

- b) Remove the 2 screws holding the metal cover to the top of the chiller. Removing this cover will expose the filler tank on the right side of the unit. Turn the filler cap slightly to release it, and lift it up to remove it. Use a funnel to fill this tank with the liquid that you want to use in the system. Remove the funnel, but do not replace the cap at this time. Make a final check of all connections to insure that they are tight and correct. Make sure there are no bends or crimps in any hoses that are used.
- c) You are now ready to start the chiller. After making sure the ON/OFF Switch is in the OFF position, plug the unit into the proper AC outlet. Then set the temperature on the Temperature Adjust Dial. Turn on the machine. The chiller will begin pumping liquid through the system. Check the Recirculating Pressure gauge on the front panel to make sure that the pressure is not exceeding the limits of your equipment. Check the entire system for leaks.
- d) As the chiller runs, the liquid level in the filler tank will decrease as the pipes and hoses in the closed system begin to fill with liquid. Slowly add more liquid to the filler tank with the funnel as the chiller is running. Continue adding more liquid a little at a time, until the level in the filler tank stops going down. This means that your system is completely filled with liquid and that the air has been purged from it. Replace the cap to the filler tank and turn slightly to lock it. Check for tightness.

The time it takes for the chiller to arrive at the set temperature depends on many factors. It is frequently helpful to the new user to monitor this process with a digital thermometer. The Heating and Cooling lights on the front panel will switch back and forth periodically when the set temperature has been reached.

It is normal for air bubbles to be present in the system for the first few minutes after starting the chiller. Excessive air bubbles flowing in the system continually, though, can cause a heavy strain on the pump. A blocked or restricted tube on the "Inlet" line, or a clogged water filter inside the machine, is particularly hard on the pump, also, for it sends the pump into a state of vibration and agitation called cavitation. This state is recognized by excessive air bubble formation in the "Outlet" line, along with a loud buzzing or ringing sound emitted from the pump. The source of all excessive bubbles should be investigated and repaired.

### DRAINING THE UNIT

1. Unplug the chiller from the AC outlet.
2. Remove both of your hoses from the back of the chiller, being careful, after they are off, that the liquid from your bath or cooling coil does not flow out through them.
3. The chiller drains from the "Inlet" side because this line is connected directly to the filler tank. Attach one end of a short hose to the "Inlet" fitting. The other end of the hose can go into the sink or bucket where you will be collecting the liquid from the chiller.
4. Remove the cap on the filler tank. This will release the liquid to drain out through the hose. Do not apply power to the unit to help this process.
5. Once this tank is drained, change the hose to the "Outlet" fitting on the chiller. Secure the hose in the sink or bucket in case of a pressure surge as the pump will have to be turned on briefly to empty this line. Plug in the chiller. Run it briefly to clear the "Outlet" line of liquid.

## MAINTENANCE

All power should be removed from the chiller when performing maintenance operations.

1. Pump Motor - The pump motor is located on the left side of the chiller, next to the filler tank, and rests on four rubber feet. The front and rear bearings may require periodic oiling. With heavy use, oil every year; With medium use, oil every 3 years; With light use, oil every 5 years. Use SAE 20 oil in each bearing. Refer to the manufacture's recommended instructions listed directly on the pump motor.
2. Water Filter - Accumulated particles in the water filter will restrict the flow of the liquid through the unit. But how often this filter will require maintenance depends on the environment and use of the machine. A chiller used in an open-bath system in a dusty environment will require frequent cleaning of the water filter, while the filter in a chiller operated with a closed system in almost any environment will not need much care. To reach this filter for cleaning the entire top wrap of the chiller must be removed. Take out both screws on each side of the chiller which hold down the top cover. Lift the cover from the unit and set aside. The water filter is located on the hose between the filler tank and the pump. Grip the plastic sediment bowl firmly and turn counter-clockwise to remove it. Clean the stainless steel wire mesh found inside, but do not replace it unless it is damaged.
3. LOWER Refrigeration System - The screens in the front and back panels of the chiller should be kept free of dust and dirt. A periodic check should be made to make sure that the refrigeration condenser, located behind the front screen is free of accumulated dust. Clean the fins of the condenser carefully with a fin comb or low-pressure compressed air.