



# HOSHIZAKI TECHNICAL SUPPORT TECH -TIPS

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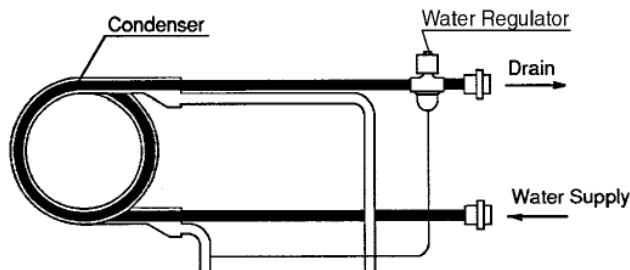
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## ***WATER-COOLED SYSTEMS & ADJUSTING WATER REGULATING VALVES*** By Paul Arbic

Water-cooled ice machines have a few advantages over air cooled equipment. They provide for greater ice production during high ambient conditions. The noise level and local heat load are less, and there is none of the routine maintenance associated with air filter and condenser cleaning.

The design of a basic water-cooled condensing system is shown below. Water circulates through a central tube while high-pressure gas flows in the opposite direction through a baffled or rifled outer tube annulus. This counter flow design increases the heat transfer efficiency by 20%.



A water regulating valve is located at the water outlet of the condenser. By placing the regulator at the outlet we gain the advantages of reduced fouling (scaling) and increased efficiency. The regulator modulates with refrigerant head pressure. This allows the regulator to open (reject heat) during the freeze cycle. Water flow shuts down completely during the harvest cycle, or with

the machine off. The regulator valve is factory set and will not require any adjustment at start-up as long as the supply water temperature and pressure are within specifications.

Over time fouling may occur in the water passage of the condenser. This forms an insulating barrier, which reduces heat transfer efficiency resulting in higher than normal refrigerant head pressure. This condition will require an adjustment of the regulator. Adjustment is accomplished by rotating the adjusting screw on top of the valve body. Rotate the adjusting screw CCW to increase water flow and decrease head pressure. Head pressure and water discharge temperature must be monitored during this process. The objective is to bring head pressure to within published specifications. Generally, discharge water temperature will fall within the range of 100 ~ 114 °F. Please note that later model ice machines are equipped with a regulator manufactured by Johnson Controls (Penn). On this valve, rotation is opposite that stated above.

Some conditions will require further action. If increasing water flow does not significantly lower refrigerant head pressure, then the condenser coil must be cleaned or replaced. If the water-regulating valve is stuck continuously in either the open or closed position, then the valve must be replaced. On rare occasions a water-cooled condenser can rupture. If not detected in time, this breach can cause contamination of the refrigeration system.

Water-cooled units have several advantages as previously discussed. The final decision to utilize water

cooling should account for the economics of the situation. City water is not free. Unless there is a plentiful supply of clean, free water available, this cost consideration, along with any cost for sewage release, should figure into the final decision.

### ***IM-51 SERVICE INDICATOR LED***

The IM-51 control board includes a red LED marked LED-5 that serves as a diagnostic indicator. This LED will light or flash to identify the area of the service problem. A pictorial diagnostic chart is included in the service manual to help direct the technician to the problem.

If a problem or fault has occurred, access the control board by removing the control box cover at the rear of the unit. If the red LED is either “ON” or flashing inspect the ice making assembly and review the diagnostic chart.

There are three main scenarios, which may occur in a fault situation. The technician should notice the location of the water plate and whether the LED is “ON” continuously or flashing.

If the LED is “ON” and the water plate is closed (up), it likely indicates that the control board, temperature back-up timer has stopped the machine. This would occur if a set evaporator temperature is not reached within a specific time. A possible cause for this fault is high ambient or water temperature conditions. If you know that the temperatures are a problem, correct them. If temperature problems are not obvious, components that would result in a long freeze cycle should be checked. The pictorial guide will direct the technician to these components.

If the LED is “ON” and the water plate is open (down), the control board has stopped the machine due to excessive harvest time. In this case look for a problem that will cause a long harvest time. The guide will direct the technician to check the compressor, refrigerant charge, and hot gas circuit.

The LED may also flash with the water plate either up or down. If this occurs on the first cycle, the problem is likely the actuator motor, toggle switch, or the switch actuator cam arm. These items should be checked

thoroughly for a problem. If the unit went through several cycles and this fault indication occurs, the control board is likely suspect.

The technician will find the LED and simple diagnostic chart helpful in diagnosing a service problem on the IM-51 model.

### ***SERVICE TIP: FLAKER MECHANICAL SEAL***

A heavy-duty carbon to ceramic mechanical seal is used in the flaker evaporator assembly. Its purpose is to seal around the lower auger-bearing shaft. A carbon to ceramic seal is usually used in high-speed applications however, it provides long life and high durability in this slow speed auger application.

The mechanical seal has two sections. The ceramic disk is held in place in the brass lower housing with a rubber insert boot. This disk and boot remain in place when the auger is removed. Access to change these parts is through the top of the evaporator cylinder or under the evaporator cylinder that is unbolted from the housing and lifted upward.

The spring, seal, and carbon disk slide onto the lower auger-bearing shaft. These parts generally remain on the auger when it is removed. Use a little food grade grease or silicone spray on the rubber boot and lower auger shaft so that the spring assembly slides in place easily. This will also allow the auger to spring up and down properly providing a proper seal. Care should be taken so as not to get grease or dirt on the carbon or ceramic disk when installing them. This will eliminate possible abrasive damage to the sealing surface.

The spring will have either a flat top or a small bend at the top. If a bend is present, it will fit into a hole where the spring meets the auger bottom. Assure that the spring tip is in the hole before lowering the auger in place. If no hole is present for the spring tip, you have the wrong mechanical seal.

This tip is helpful when replacing or installing a flaker mechanical seal. The mechanical seal can be fished out of the evaporator with a stiff piece of stick solder having a hook bent on the end. It can be replaced in the same manner so that the evaporator cylinder does not have to be removed from the lower housing. This

hook can also be used to remove the spring assembly if it remains inside the evaporator cylinder after the auger is removed.

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***COMING NEXT MONTH...***

1. Water Cooling-Tower Applications
2. F-450M Bin Control
3. Service Q & A Volume 166 Page  
2