TROUBLESHOOTING 3 BEEPS (Part 2)

By Lonnie Clayton: The following is part 2 of the article on troubleshooting 3 beeps. In Volume 207 we discussed how to troubleshoot the Float Switch, Water Inlet valve, Control Board and Toggle Switch as it relates to the 3-beep error alarm. Below you will find information concerning the Hot Gas Valve, Headmaster, Compressor and Expansion Valve, etc.

Hot gas valve (HGV): To check the hot gas valve allow the unit to run in the freeze cycle for five minutes. Next place a temperature sensor on the outlet side of the HGV (about 3 to 5 inches down stream from the valve body) we should be reading approximately ambient temperature. If the temperature is high, confirm the valve is not being energized by checking voltage from the pink wire on the K1 connector to neutral. If no power is present the valve body is stuck open mechanically and should be replaced. When replacing any Hot Gas Valve always replace the strainer as well, along with the system drier. If power was present on the pink wire the control board is defective or a rare possibility of back feed voltage keeping the coil to energize. (Remember make sure the board is in the freeze cycle; see information under water pump in Volume 207).

After checking that the HGV is operating correctly, we will now look at the remaining refrigeration system. To continue the testing it will now be necessary to install your gauges and check for the high and low side pressures at five minutes into the freeze cycle. (Refer to the performance data pages in the Tech Spec pocket guide for proper refrigerant pressures). You will also need to know the ambient temperature at the condenser, water inlet supply temperature and compressor amperage.

If you find that the pressures are low on the suction and high side we recommend that you check for leaks. If a leak is found use proper refrigeration practice to repair the leak and weigh in the nameplate charge.

Head Master: If the headmaster has failed in the “by-pass” mode you will find the liquid line and the discharge line close to the same temperature and at the same time, the head pressure is well above the headmaster setting. This causes discharge gas to be directed to the receiver tank instead of being routed through the condenser. This may cause the unit to cycle on the high pressure switch. Also, in some cases the discharge bypass will result in long freeze cycles or possibly a (1 beep) high evaporator temperature safety shutdown. The liquid line temperatures should be ambient plus 10 to 20°F. (See Tech Tip 206 for detailed information on Headmaster troubleshooting and the Tech Spec guide for individual Headmaster settings).

With a Water Cooled machine, make sure that the head pressure is adjusted correctly by checking the condenser outlet water temperature this should be adjusted between 100 and 110°F, if not you should adjust the water regulating valve. (Note: Please refer to the individual Tech Spec. guide for actual setting for your model).

TXV: To test the expansion valve or valves, remove the remote sensing bulb from the suction line during the freeze cycle. Hold the sensing bulb or bulbs in your hand and watch the suction line pressure increase,
when this pressure settles in, drop the bulb or bulbs into a glass of ice water. The suction pressure should start falling. Once it has “bottomed out”, check to see if the swing of the TXV(s) was more than 7 to 10 psig for R-404a units and 10 to 15 psig. If the suction pressure has less swing the TXV(s) would be suspect and should be replaced. If the swing is found acceptable we then look towards our compressor.

When checking the compressor, first look at the amp draw for the compressor at 5 minutes into the freeze cycle along with the refrigerant pressures. Compare these readings to the Performance data chart for that model (Found in the Tech Spec guide). If the amp draw and head pressure are found to be low and the suction pressure is high, an inefficient compressor is possible. It is a good idea to eliminate all other possibilities before considering the compressor as some of the symptoms are similar between a faulty HGV, TXV, low charge, etc.

Other possibilities are Liquid line solenoid valves and driers that are restricted. Restrictions in these components will typically cause frost during the freeze cycle. If completely restricted however, you may see extremely low suction pressure possibly even a vacuum condition.

Hopefully the information provided in this article will help you easily diagnose the cause of a 3 beep safety shutdown.

2004 TRAINING SEASON
The Hoshizaki Technical Support Department is proud to announce that the 2004 basic seminar schedule is available for review on our website at www.hoshizakiamericai.com. (See Support/training info/Latest training schedule) If you would like to attend one of these seminars please contact the local sponsoring distributor for an invitation and location. This schedule changes periodically so check the website often or with your local distributor, if you do not see a location near you.

For more information on these classes you can also call 1-800-233-1940 ext. 358.

Service Q & A: Question: I understand that Hoshizaki does not recommend the use of a sight glass for charging an ice machine. Why?

Answer by Frank Neely: This is a common question and there are more factors involved than you might think. Many things have to be taken into consideration when designing an ice machine. Let’s take a look at some of those factors when considering the charge.

Once the components are selected, the first thing that is taken into consideration is selecting the type of refrigerant needed to match the system requirements and designed production. Other considerations include proper sub-cooling, superheat, evaporator and condenser temperatures, refrigerant pressures, etc. We must also take into consideration the compressor manufactures specifications. We must not exceed the manufacturer's limits for dome temperature, discharge pressure, amp draw under maximum load etc. Finally, the machine is monitored cycle after cycle to insure consistent and maximum performance. As you see there are many variables that are looked at before deciding on the correct factory charge. This is what makes an ice machine a critically charged unit.

Because of the many factors involved in correctly charging any refrigeration system and a constantly changing load on the evaporator during the freeze cycle, it may be normal to have bubbles in a sight glass with a correctly charged unit. When charging, if you clear the sight glass of bubbles, you may have inadvertently overcharged the system. Therefore, our only recommendation for properly charging any of our models is by weighing in the correct charge according to the nameplate. If you do encounter a Hoshizaki machine with a sight glass it should only be used as a moisture indicator and not to charge the machine.

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Volume 208 page 2