United Medical Maintenance Services

Engineering Publications

Balzer, Leybold, Sumitomo T/S Tips

Revised:
6/12/2010 – Revised charging and running pressure of Balzer systems. Added notations on knocking and ratcheting of Balzer cold heads. Added notations on compressor recharging after a cold head change.

Useful tips when diagnosing or installing a Balzer. Leybold or Sumitomo system

Water must be at least 1.5 gallons per min (1.1 LPM) (Balzer, Leybold, Sumitomo)

Water temperature must be 45 to 55 degree F. (Balzer, Leybold, Sumitomo)

Check for correct static pressure after installation and operating for at least 10min. Static pressure should be 230 – 240 psi with an operating pressure of 300psi for a minimal of 10 minutes to obtain the correct static pressure. (Leybold)

Check for correct static pressure after installation and operating for at least 10min. Static pressure should be 150 psi on both the supply and return sides when the compressor pressure has equalized with an operating pressure of 210-220 psi on the supply side with a return pressure of 70 -100 psi. Perform this check after a minimal of 10 minutes to obtain the correct static pressure. (Balzer)

Check for correct static pressure after installation and operating for at least 10min. Static pressure should be 1.5 – 1.65 kpa with an operating pressure of 2.2 – 2.3 kpa for a minimal of 10 minutes to obtain the correct static pressure. (Sumitomo)

Record the hour meter reading after installation of compressor. (Balzer, Leybold, Sumitomo)

If unit will not start check the engage the K1 manually and see if the compressor starts. If so, then a over temperature, low pressure or flow rate fault has occurred. (Balzer)

If the unit runs for a short time and shuts down and the compressor is excessively hot. Check the phases for reversal. (Balzer, Leybold, Sumitomo)

Ensure that the solenoid light is illuminated on the compressor. If not, this indicates too much pressure for the solenoid valve to operate. (Sumitomo)

It's very important that the chilled water line flow in the correct direction with these compressors. Monitor the shield temperatures and magnet pressure after turning on the cold head and compressor. If the magnet pressure rises abnormally and the shield temperature rise instead of falling, turn off the cold head and compressor and ensure that the cold side of the chiller line goes into the inlet side and that the hot side of the chiller line goes into the outlet. This reversal of the lines will result in the cold head pumping in heat into the shields instead of cooling. (Balzer, Leybold, Sumitomo) Note – Sumitomo system do not monitor water flow.

Use a black light to check for any oil contamination in the LhE supply or return lines to the cold head. If contaminated it's highly recommended that replace the compressor, cold head and both supply and return lines. In some cases, depending on the severity of the contamination, changing the absorber in combination of purging the helium lines, cold head and compressor may improve or revive the system. This method, however, will NOT work if there is severe contamination within the system. (Balzer, Leybold, Sumitomo)

Mild contamination of the cold head system will result in knocking of the cold head at low temperatures, a sluggish motor actuation, hesitation or skipping.

Severe contamination of the system will result in seizures of the cold head motor.

Some knocking and ratchet are common on a Balzer system. Ensure that supply pressure of the compressor in not over 220 psi. Over pressure can put a strain on the mechanics of the cold head.

Verify that the compressor absorber has been replaced on a regular basis based on the number of hours of use. This varies between the Balzer, Leybold and Sumitomo compressor. Consult the manufacture guide on replacement. (Balzer, Leybold, Sumitomo)

Measure using a Fluke 187 or 189 DMM meter, measure the 80K and 20K magnet shields. The 80K should be nominally read about 1100mV. The 20K shield should read about 1300mV. This is after 5 – 7 days of operation. (Oxford Magnets)

Measure using a Lakeshore 208 or 211 meter the 80K and 20K shield temperature. For GE magnets utilizing a Balzer or Leybold cold head system the 80K is typically 45K to 65K and the 20K shield is 7K to 17K. Consult the manufactures specifications for the type of magnet you are dealing with. (Balzer, Leybold)

Measure using a Lakeshore 211 meter the Cold Head and Recondensor temperatures. The cold head RUO reading should be 4.2K to 4.5K. The recondensor should read 4.2 to 4.5. The recondensor temperature should always be higher than the cold head side. If not, this may indicate a thermal contact issue or failure of the cold head assembly.Also check the main shield temperature. Spec is < 45K. (Sumitomo)

Verify that the cold head does not knock, grind or hesitate in its pumping action. This could be a sign of a failing motor or gear mechanism or contamination inside the cold head. (Balzer, Leybold, Sumitomo)

If you're unable to obtain the nominal 80K and 20K temperature values you may want to readjust the cold head in further to make better contact with the shields. Ensure that cold head itself is seated evenly in the chamber. If the cold head is uneven, will result in a lack of thermal transfer to the shields. (Balzer, Leybold, Sumitomo)

If the pressure of the magnet will not maintain between 3.90 and 4.20 indicates one of several items. 1) Cold head or compressor is not performing well. 2) Helium meter may have either a pressure builder or a liquid helium sampler malfunction. Disconnect J7, at the meter leading to J403 on the magnet. If the pressure subsides, indicates that the meter is at fault. (Sumitomo)

Ensure that adequate vacuum exists in the cold head chamber. >= 26.5 in Hg. Common sign is that cold head becomes cold; sweats or forms ice on its exterior section. (Balzer, Leybold, Sumitomo)

Before recharging any compressor after a cold head change, allow the cold head to operate for a least 24 hours then evaluate the compressor supply pressure. The pressure 9 times out 10 will go down due to the thermal dynamics of the cooling process.