METROPOLITAN NY CHAPTER
Refrigeration Service Engineers Society

Continued Education for the HVAC/R Industry

"Better Service Through Knowledge"

****

March 2014

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PSC MOTORS

PSC (permanent split capacitor) motors are very common within the air conditioning and refrigeration industry. When servicing these types of motors, failures can generally be classified as either electrical or mechanical in nature. Knowing which type of failure has occurred can assist the service engineer in the correct diagnostic path to follow.

Electrical problems can be easily diagnosed by knowing how the motor is internally wired. The PSC motor consists of two motor windings: a run winding and a start winding. In addition to the motor windings, a PSC motor has a run capacitor which is wired externally to the motor housing and in series with the start winding

The first step in diagnosing an electrical problem in a PSC motor is to determine if the correct voltage has been applied to the motor. This is done by locating the data plate on the motor to determine the correct voltage to be applied. A voltmeter should then be used to determine if that voltage is being applied to the motor. If no voltage, or the incorrect voltage, is applied, the next step would be to determine the cause, and then to repair. Be cautious of a blown fuse. A blown fuse is an indication of a serious electrical problem. Before replacing a fuse, thoroughly inspect the electrical system to determine the cause of that problem.

If the voltage is correct and the motor still does not start, or if it is suspected that the motor caused the fuse to blow, then the continuity of the run and start windings should be checked.

Disconnect power to the motor and with an ohm meter check the resistance between the common- to-run winding and the common-to-start winding. The exact reading will vary from motor to motor. What the service technician should look for is to see if the motor is open (an infinite resistance reading on the ohm meter) or shorted (a zero resistance reading on the ohm meter). If either of these problems exists, the motor needs to be replaced.

Another possible electrical problem is a defective run capacitor. To check a run capacitor, first remove it from the circuit. If the capacitor does not have a bleed resistor across its terminal, place an 18K ohm, 2-watt resistor across its terminals. This will discharge the capacitor of any voltage.

Next take an analog-type ohm meter and place the leads across the terminals of the capacitor. A shorted capacitor will read a resistance of zero and an open capacitor will read an infinite resistance. A good capacitor will deflect the needle to the right and then move it back to the left.

Mechanical problems are generally the result of defective bearings within the motor. A motor that checks out fine electrically but still does not run generally has a mechanical failure. The motor bearings are probably seized and do not allow the motor to turn.

When a mechanical problem of this nature is discovered, it is easier to replace the entire motor than to attempt to replace the bearings. Always replace the PSC motor with one that matches the original motor's capacity and configuration. When possible, obtain an exact replacement from the OEM (original equipment manufacturer).

A final test of a PSC motor is to check its amperage draw with the motor running under full load. Check the motor data plate for its full-load amperage draw and compare it to the actual amperage draw. Any major deviance from the full-load amperage draw to the actual amperage draw should be questioned and the cause determined.

Electrical Safety

When replacing or repairing any electrical components, always verify that the voltage source is truly disconnected from the circuit. Test the circuit for the presence of voltage with some type of voltmeter or voltage indicator. Do not solely rely on the electrical disconnect to ensure the voltage is disengaged. Always verify this yourself.

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SOME HVAC/R DEFINITIONS:

Anemometer: Instrument for measuring the rate of airflow or motion.
Flash Gas: Instantaneous evaporation of some liquid refrigerant in the evaporator which cools the remaining liquid refrigerant to the desired evaporation temperature.
Heat of Compression: Mechanical energy of pressure changed into energy of heat.
Hygrometer: An instrument used to measure degree of moisture in the atmosphere.
Latent Heat: Heat energy absorbed in the process of changing state without changing temperature.
Manometer: Instrument for measuring pressures and gases and vapors.
Micron: Unit of length in the metric system; a thousand part on one millimeter.
Molliers Diagram: Graph of refrigerant pressure, heat and temperature properties.
Saturated Refrigerant: Liquid and vapor in contact with each other in equilibrium
Subcooling: Heat removed from the liquid refrigerant that causes its temperature to drop below its saturation temperature.
Superheat: Heat added to the refrigerant vapor that causes its temperature to rise above its saturation temperature.

Wednesday March 12th, 2014 at 7:30pm

at

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Torch Use & Safety – Back to Basics

By

Mark Paternoster of TurboTorch / MAP Sales

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EDUCATIONAL PROGRAM
Wednesday March 12th, 2014
at 7:30pm
SEE DETAILS – THIS PAGE

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