

Enclosure Heaters: “Life Insurance” for Electronics

Condensation – An Overlooked Cause of Failure

Moisture as a result of condensation, especially when combined with aggressive gases and dust, causes electrical and electronic components to corrode and fail prematurely. This problem can affect any components housed in electrical or electronic cabinets and enclosures. Electrical and electronic systems are at risk wherever humidity is present and variations in temperature occur. Corrosion caused by condensation, creates a destructive cascade of events which include changing contact resistances, flashovers, creep age currents and reduced insulation properties. The end result is system failure.

Up to a relative air humidity of 60 percent, the probability that condensation will form remains low. At relative humidity levels above 65 percent, however, the potential for condensation increases significantly. These problems can be reduced substantially by keeping the environment inside an enclosure at a temperature as little as 5°C higher than that of the ambient air.

The higher the ambient air temperature, the more invisible water vapor it can absorb. Even if the amount of water vapor remains the same, the air will become saturated as the temperature drops. When the air can no longer hold the water vapor it contains, it has reached the “dew point.” Unfortunately, the simple physics of condensation can be very destructive inside electronic enclosures.

Outdoor equipment is particularly at risk since condensation occurs with the shift between warm daytime and cooler nighttime temperatures. Greater damage can be brought about by condensation caused by seasonal climatic changes or by the sudden temperature drops during summer thunderstorms. Even indoor systems are imperiled by the formation of condensation through temperature variations, for example, when components in an enclosure heat up during operation and then cool down after being turned off.

Constant temperatures are a necessity for guaranteeing optimal operating conditions. Electronic components can be protected by cooling in the day and heating at night.

Enclosure Heaters – The other Thermal Management Solution

Modern enclosure heaters have been designed especially to afford protection against condensation. They heat the air inside enclosures and cabinets so that water vapor cannot condense on components. Modern heaters provide the greatest possible air circulation at very low energy consumption. This efficient performance is obtained through special designs (i.e. chimney-like shapes, which contribute to appropriate heat distribution). Intended for tall, narrow cabinets, these heaters function best when

mounted near the bottom of the enclosure, with a temperature controller such as a thermostat, located near the top.



Thermostats, hygrometers, or a combination of the two are recommended with all heaters for optimum temperature and

humidity control in enclosures. These regulators provide effective and efficient control, and offer the best solution for moisture problems, especially in situations where radical temperature variations exist or where high air humidity is a constant.

Enclosure heaters offer safe and effective protection against the problems caused by temperature variations and resulting condensation. When dealing with sensitive electronic equipment, the economic impact of failure and repairs makes the purchase, installation and operating costs of enclosure heaters and heater controls the far wiser alternative.

For more information contact Gary Steiger, STEGO, Inc. 1395 South Marietta Pkwy, Bldg 800 Marietta, GA; techsupport@stegousa.com; www.stegousa.com (888) 783-4611

