WESTELL

Application Note

Protecting Electronic Equipment in Cold Climates

Introduction

When critical electronic equipment must be housed in an outdoor enclosure, consideration must be given to the protection of that equipment from extreme temperature fluctuations. However, in cold climates, there is sometimes more caution taken than is necessary. If the equipment in the outdoor enclosure is temperature hardened, it can often be protected *without* the use of additional heating elements.

Heating Variables

Without actively cooling the equipment chamber, variables which affect internal temperature are external temperature, solar loading, and heat dissipation from active equipment.

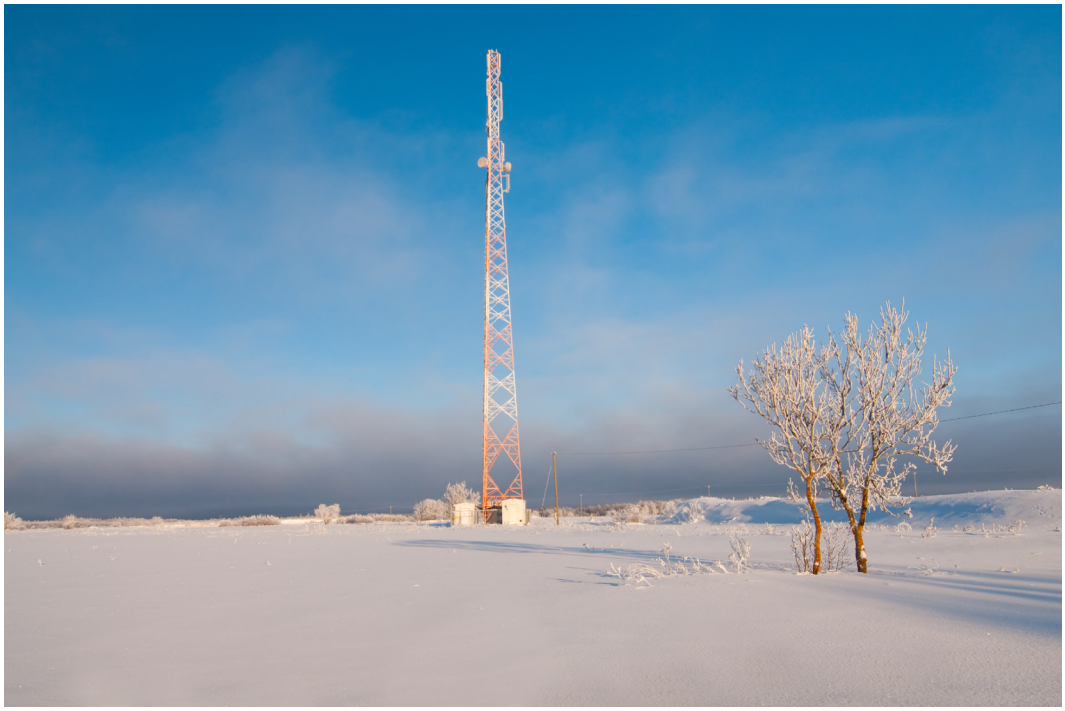
- When the equipment is not powered up the internal temperature will be controlled by the outside variables of temperature and solar loading. The internal temperature will equal the external temperature.
- When equipment is powered on it adds another variable. The internal temperature will be controlled by outside temperature, solar loading and heat dissipation from active equipment.

Active equipment within the chamber acts as a heating element. With active equipment the internal air temperature will always be warmer than the external air temperature.

Cooling Variables

Westell Boxer™ enclosures with heat exchangers actively cool the equipment chamber. The TWH-1 and TWH-2 Boxers have heat exchangers with constant active cooling. In other words, the heat exchangers run regardless of the temperature. The TWH-3 Boxers use a temperature-controlled heat exchanger that shuts off when the internal temperature drops to +77°F (+25°C).

- Because the Boxer is cooled with a heat exchanger, the internal temperature can never be less than the external temperature.
- Because active equipment acts a heating element, the internal temperature will always be warmer than the external temperature.



Extreme Cold

Temperature hardened equipment is designed to operate in temperatures ranging from -40˚F to +149˚F (-40˚C to +65˚C). Westell recommends that only temperature hardened equipment be installed inside the Boxer enclosure. If you do not trust that your equipment will operate at -40˚F (-40˚C) then you can install a temperature controlled heating element. But the extra cost of a heating element is typically not worth the extra expense. For regions that experience extreme cold, the TWH-3 Boxer may be the better choice.

How often does the air temperature get down to -40˚F (-40˚C)? Wind chill is not a variable when measuring cold temperature because that is a measure of evaporation on living tissue. Ambient air temperature is used to measure cold temperature as it relates to inanimate objects.

Wisconsin temperature records are maintained at the Wisconsin State Climatology Office. January is, on average, the coldest month. The lowest temperature in Wisconsin between the years of 2000 and 2009 was -40˚F (-40˚). There was one recording in January 2005 at Douglas County and again in January 2009 at Buffalo County. From 1971 to 2000, the minimum average temperature (for the month of January) never dropped below -2˚F (-18˚C).

Summary

When using Boxer enclosures Westell recommends the use of temperature hardened equipment. This equipment is rated to operate in the temperature range of -40˚F to +149˚F (-40˚C to +65˚C). During cold weather, heat dissipation from active equipment ensures that the internal temperature will always be warmer than the external ambient air temperature. Data from the Wisconsin State Climatology Office indicate that, for the state of Wisconsin, the minimum temperature averages -2˚F (-18˚C). On only two occasions in a ten-year period did the temperature drop to -40˚F (-40˚C). Because the average minimum temperature is so high and -40˚F (-40˚C) events are so rare, the expense of using additional heating elements is generally not justified.

The A90-BXM1019-TWH3 Westell Boxer™ is equipped with a temperature-controlled heat exchanger. When the internal temperature reaches +90˚F (+32˚C), the heat exchanger is engaged and the equipment chamber is actively cooled. When the internal temperature drops to +77˚F (+25˚C) the heat exchanger is disengaged and the equipment chamber is no longer actively cooled. Without active cooling, the installed equipment is a heat source and ensures that the internal air temperature is always warmer than the external air temperature. When deployed with temperature hardened equipment, additional heating elements are not required. The temperature controlled heat exchanger of the A90-BXM1019-TWH3 makes this the preferred Boxer enclosure for northern climates.

About Westell

Westell Technologies, Inc., headquartered in Aurora, Illinois, designs, distributes, markets and services a broad range of carrier-class communications equipment, including digital transmission, remote monitoring, power distribution and demarcation products used by wireline and wireless telecommunications service providers, industrial customers, and home network users.

Additional information can be obtained by visiting http://www.westell.com.

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