

ESD Protection of IceFree II \hat{O} Sensors

Introduction

The IceFree II Anemometers and Wind-Vanes incorporate internal protection against Electrostatic Discharge (ESD) damage. This Application note describes the protection provided, to assist the user in coordinating system-wide lightning and ESD protection.

Protection Components

Protection of the circuitry of the sensors is provided using non-linear resistor surge suppressors. These devices have excellent energy-dissipating capability for their size, but are not as fast as some semi-conductor surge suppressors. The specific suppressors used in the IceFree II sensors are of Zinc Oxide ceramic construction. They have typical turn-on times of 50 ns, and are specified using a surge waveform with an 8 μ s risetime and a 20 μ s pulse width.

The IceFree II Anemometer

The IceFree II Anemometer has one surge suppressor, connected across the pickup coil. This differential mode protection does not prevent common mode over-voltage. However, in use, the typical system holds one anemometer lead at ground or nearly so. This prevents large common-mode voltages from building on the coil.

The suppressor used in this sensor is rated to clamp to 36 Volts at 5 Amperes with the standard test pulse waveform.

The energy rating for this suppressor is 2.6 Joules. This rating assumes a pulse with 10 μ s risetime, 1000 μ s duration.

The IceFree II “Yaw Vane” Yaw Error Sensor

The IceFree II Yaw Error Sensor has four surge suppressors, connected from each output to signal ground. In addition, reverse-polarity protection diodes, rated 1 Ampere, are connected to each output to prevent the output being pulled negative with respect to signal ground. Since the protection components are referenced to the signal ground, it is critical that the grounds be connected immediately when the sensor is installed, and before the signal wires are connected. This protects the Vane’s output circuitry from ESD damage.

The suppressors used in this sensor are rated to clamp to 86 Volts at 1 Ampere with the standard test pulse waveform.

The energy rating for each suppressor is 1.2 Joules. This rating assumes a pulse with 10 μ s risetime, 1000 μ s duration.



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110 Commerce Street • Hinesburg • VT 05461 USA • TEL (802) 482-2255 • FAX (802) 482-2272 • EMAIL sales@nrgsystems.com