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Freezing Rain Sensor Model 6496

Overview

The AWI Model 6496 Freezing Rain Sensor uses an ultrasonically vibrating probe to detect the presence of icing conditions. The vibrating frequency of the probe (nominally 40,000 hertz) decreases with the accumulation of ice, frost, or wet snow. After ice has accumulated on the probe to a pre-determined thickness, the frequency decreases by approximately 130 Hz and an internal heater inside the probe assembly turns on to deice the probe.

The internal heater draws 35 W during deicing and stays on for 60 seconds. The sensing probe cools within a few seconds.

A 24-byte string reporting whether ice is present and status information for the Freezing Rain Sensor is sent to the AWOS computer when polled. The computer combines information from the Freezing Rain Sensor with data from other AWOS sensors to generate reports describing the nature of the freezing rain ice, frost, or wet snow that has accreted on the sensor probe.

Design

The Freezing Rain Sensor uses an ultrasonic axially vibrating probe to detect the presence of icing conditions. This sensing probe is a nickel alloy tube mounted in the strut at its midpoint with 1 inch (25.4 mm) exposed to the atmosphere. This tube exhibits magnetostrictive properties and expands and relaxes under the influence of a variable magnetic field. A magnetic bias field is provided by a magnet mounted inside the strut and modulated by a drive coil surrounding the lower half of the tube. A magnetostrictive oscillator (MSO) circuit is created by the addition of a pickup coil and operational amplifier. The ultrasonic axial

movement of the tube resulting from the activation of the drive coil causes a current to be induced in the pickup coil. The current from the pickup coil drives the operational amplifier, which provides the signal for the drive coil. The oscillation frequency of the circuit is terminated by the natural resonant frequency of the sensor tube, which is tuned to approximately 40,000 Hz. As the ice detector encounters an icing environment, ice collects on the sensing probe. The added mass of accreted ice causes the frequency of the sens-

ing probe to decrease in accordance with the laws of classical mechanics. A 0.02-inch (0.5 mm) thickness of ice on the probe causes the operating frequency of the probe to decrease by approximately 130 Hz. The ice detector control circuitry utilizes a microprocessor to monitor probe frequency when instructed by the CDP. The ice detector deices itself through internal heating elements in both the strut and probe. After the ice detector is deiced, the sensing probe cools quickly and is ready to sense ice formation again.



- Rugged Stainless Steel Enclosure
- Reliable Freezing Rain Reporting
- Self-Testing for Reliability
- Transport Canada Approved

SENSORS

SPECIFICATIONS

Parameter	Specification
Set Point	Ice signal activates when ice thickness on probe exceeds 0.020 ± 0.005 in (0.5 ± 0.1 mm)
Deicing	Operates when ice thickness on probe exceeds the set point
Discrete Output Signals	<ul style="list-style-type: none"> Ice signal Operating status signal
Built-In-Test (BIT)	<ul style="list-style-type: none"> Performed at initial power-up. If a failure is detected and verified, the sensor stops detecting and annunciating ice presence, the probe heaters are disabled; and a failure is annunciated. Hardware and software BIT verifies that internal electronics are functioning properly during ongoing operation.
Output Format	
Serial Output	RS-485 (half duplex)
Baud Rate	4800 bps
Serial Parameter Setting	8-N-1 (8 data bits, no parity, 1 stop bit)
Serial Connector	Conxall® Mini-Con-X® 7280-5SG-300 Field Connector
Data Output	In response to poll
Electrical	
Supply Voltage	85-265 V AC 47-64 Hz, 50 W
Environmental	
Operating Temperature	-55°C to +70°C (-67°F to +158°F)
Storage Temperature	-65°C to +70°C (-85°F to +158°F)
Relative Humidity	0-100%, non-condensing
Environmental	
Enclosure	NEMA 4X electropolished stainless steel
Mounting	Single-Leg Pedestal; 2.5" pipe, unistrut mounted

ORDERING INFORMATION

Part Number	Description
6496-A	Freezing Rain Sensor with stainless steel enclosure
6496-B	Freezing Rain Sensor with mounting bracket
Accessories	
M105737-00	Probe Assembly Replacement Gasket
M482221-00	Sensor Assembly (used by DND)
M105753	Electronics Enclosure
2715	Universal Power and Communication Module
M406306-00	256MB microSD Card
M442089-00	10 A 250 V, 5x20 mm slow blow fuse
M491747-00	Backup Battery
M491742-00	Data Cable (connects Sensor to DCP)
M491745-01	50 ft Power Cable
Enclosure Option	
M105753-00	Stainless Steel Enclosure
M488397-00	Mounting Kit
Bracket Option	
M408614-00	Mounting Bracket
M488430-00	Mounting Kit

DIMENSIONS & WEIGHTS

Product Dimensions (without mounting tabs)	9" x 12" x 20.4" (230 x 305 x 517 mm)
Product Weight	12 lb (5.5 kg)
Shipping Weight	17 lb (7.5 kg)



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