



NRG IceFree3™ Wind Vane Electrically Heated

User Manual



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Introduction

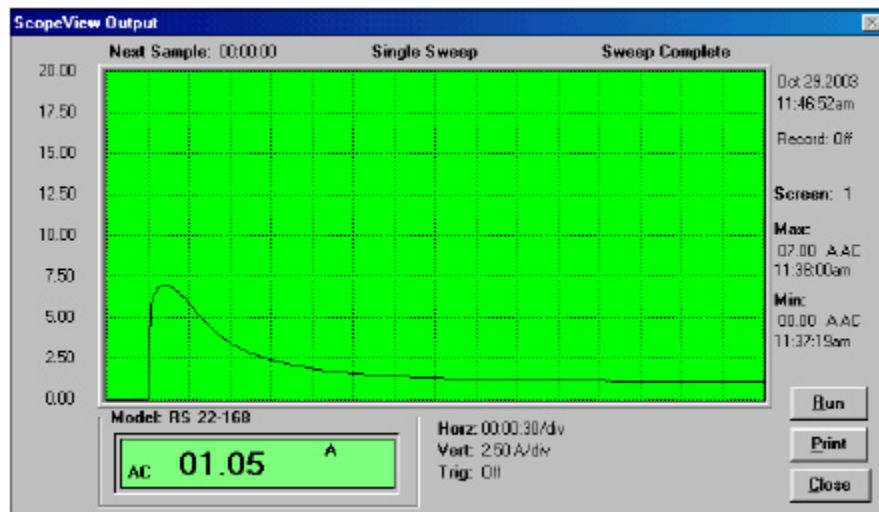
The NRG IceFree3™ vane is an electrically-heated potentiometer wind direction sensor, designed for wind resource assessment at ice-prone sites. The IceFree3™ is reliable in heavy and light winds. It is rugged enough to accurately measure winds in excess of 90 meters per second (200 miles per hour). Yet its low moment of inertia permits it to respond to winds as low as 1 m/s.

Operation

Rotation of the vane head moves a potentiometer. With an applied excitation voltage, a ratiometric DC voltage output is produced. The signal range is 352 degrees (8 degrees open), and the "deadband" is centered around North.

The IceFree3's heat source is a self-regulating constant-temperature heater. In severe wind and icing conditions, the IceFree3 draws full power and remains clear of ice. When conditions improve, the IceFree3 draws less power. The IceFree3's self-regulating feature increases its reliability, insuring that the head does not reach excessive temperatures. Excessive temperatures can stress bearing lubricants, wiring and present a hazard in the presence of combustible materials. The IceFree3 heater is powered by 24 volt power, AC or DC, making it compatible with a wide range of remote site equipment. An optional 120/240V - 24 VAC transformer is also available.

Typical IceFree Inrush Curve (24 V AC supply)



Following a brief inrush current, the heater quickly settles into its temperature-controlled mode

It is recommended that a 15 A slow-blow fuse be put in line with the heater.

ESD Protection

The potentiometer of the IceFree3™ sensor is sensitive to Electro Static Discharge (ESD). For this reason, the case of the potentiometer is connected to the shield ground wire in order to protect the potentiometer. ESD can occur when the sensor is installed without the ground wire attached to a suitable ground. As charges build up on or around the sensor a static charge will seek a path through the electronics and out the signal cable to a ground. Metal Oxide Varistor (MOV) technology is also used to protect the sensor from overvoltage situations.

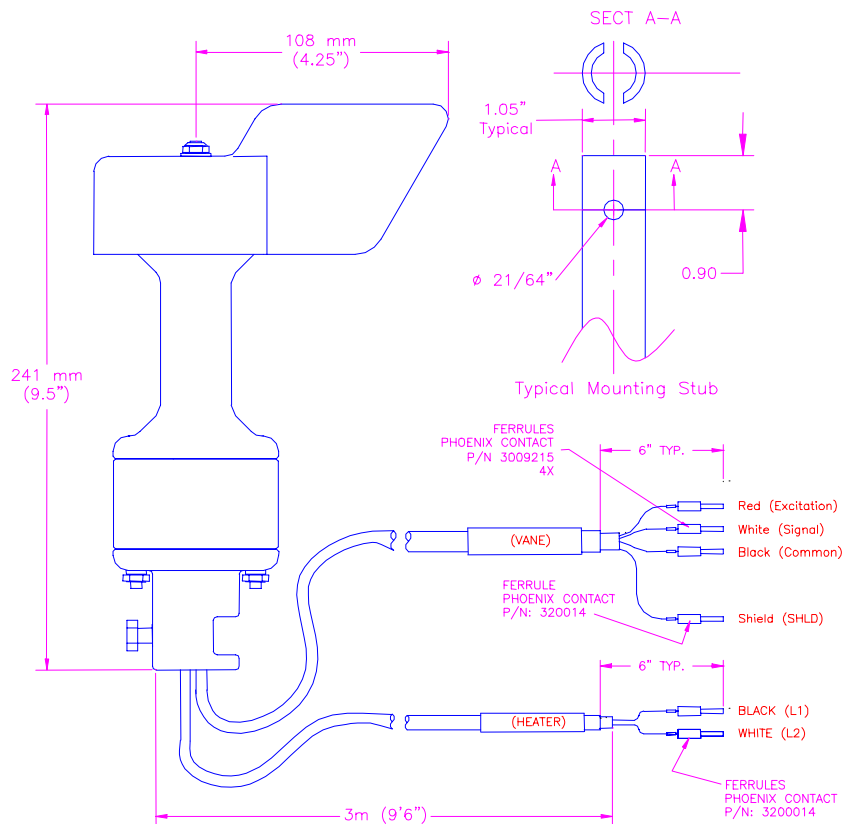
We suggest that you not mount the sensor until the proper grounding is available. When you mount the sensor protect the signal wires until the ground is attached. You may then attach the signal wires to the instrument.

Installation

1. Check to be sure that the IceFree3 is secure against the top of the boom. Insert the bolt into the slot side of the base and tighten.
2. Just remember "Nut is North".
3. Using the notations on the individual wires, connect the signal leads to your logger.
4. Connect the heater power cable to your power source and check to be sure that the Vane head is heating. Any warmth at the top of the stem (near the head) means that the heaters are working (the lower housing will take longer to warm up and will not get as hot).

Note: *The IceFree3 should be heated year-round to prevent moisture or condensation internally.*

Sensor Outline drawing



Specifications

Description	Sensor type	continuous rotation potentiometric heated wind direction vane
	Applications	<ul style="list-style-type: none"> wind resource assessment meteorological studies environmental monitoring
	Sensor range	360° mechanical, continuous rotation
	Instrument compatibility	all NRG Loggers
Output signal	Signal type	Analog DC voltage from conductive plastic potentiometer, 10K ohms
	Transfer function	Output signal is a ratiometric voltage
	Accuracy	potentiometer linearity within 1%
	Dead band	8° Maximum, 4° Typical
Power requirements	Supply voltage	Regulated potentiometer excitation of 1 V to 15 V DC
	Heater supply voltage	<ul style="list-style-type: none"> 24 V AC/DC optional transformer available
	Heater supply current	<ul style="list-style-type: none"> Inrush: 8 A maximum Steady state: 1 A at 20 °C (68 °F)
Response characteristics	Threshold	approximately 1.1 m/s (2.5 miles per hour)
Installation	Mounting	mounts to a 27 mm (1.05 inch) diameter (3/4 inch IPS) pipe with a 3/8 inch lock bolt; cabling exits into mounting pipe
	Tools required	13 mm (0.5 inch) nut driver
Environmental	Operating temperature range	-40 °C to 80 °C (-40 °F to 176 °F)
	Operating humidity range	0 to 100% RH
Physical	Connections	Signal Cable <ul style="list-style-type: none"> red: excitation black: common white: signal Heater Cable <ul style="list-style-type: none"> black/white: heater power (AC or DC)
	Cable length	2.9 m (9.5 feet) signal and heater cables
	Weight	1.23 kg (2.7 pounds)
	Dimensions	<ul style="list-style-type: none"> overall assembly height: 241 mm (9.5 inches) body diameter: 70 mm (2.75 inches) swept diameter: 216 mm (8.5 inches) center to tail radius: 108 mm (4.25 inches)
Materials	Body	cast aluminum with black anodized finish and heat-resistant black paint
	Shaft	centerless ground, stainless steel
	Bearing	<ul style="list-style-type: none"> upper: sealed, stainless steel, ball bearing with application specific lubrication lower: stainless steel bearing
	Wing	precision balanced aluminum with black anodized finish and heat-resistant black paint
	Cable	<ul style="list-style-type: none"> Signal: 3 conductor 20 AWG, chrome PVC jacket with overall foil shield and drain Heater: 2 conductor 20 AWG, Teflon jacket with overall foil shield and drain
	Signal generator	glass reinforced thermoplastic shell
	Heater	fully encapsulated, self-regulating, ceramic
	Base	cast aluminum with black anodized finish and heat-resistant black paint