NRG Turbine Control Anemometer
Digital, PNP, 8.0 m

User Manual

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Introduction

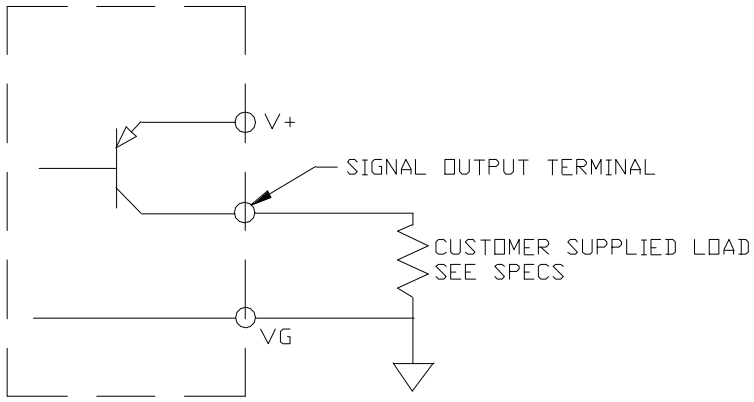
The NRG turbine control anemometer is a wind speed sensor designed for wind turbine control at year round warm weather sites and is based on the rugged components of NRG's successful IceFree™ sensor line. The sensor is mounted to the turbine nacelle and provides an electrical output signal with frequency directly proportional to windspeed.

The NRG turbine control anemometer 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 relatively low moment of inertia permits it to respond rapidly to gusts and lulls.

PNP Output Circuit Operation

The NRG turbine control anemometer with Hall Effect output provides a high level square wave output signal. Rotation of the anemometer head rotates the four pole magnet past a solid state Hall Effect sensor. The Hall Effect sensor signal is internally converted to PNP by way of a robust PNP transistor and other components. With this PNP configuration, an active output sources current from the sensor supply to the grounded load on the sensor output (the input stage of turbine controller contains the grounded load).

The output signal frequency is directly proportional to the wind speed. The NRG turbine control Hall Effect sensor's linear frequency output makes the turbine control anemometer ideal for use with wind turbine controllers.



EQUIVALENT CIRCUIT FOR PNP OUTPUTS

ESD, Circuit Protection, and Cautions

- Do not apply greater than 30 Volts to the outputs at any time.
- We suggest that you not mount the sensor until the proper grounding is available. When you mount the sensor, protect the signal wires and connect the ground first. After connecting to ground, attach the signal wires from the sensor.
- There are internal TVS diodes on the output. If the output voltage is pulled above 30 V, or below ground, the diode will clamp the output to ground.
- Do not apply constant reverse voltages to the outputs. The internal diode is intended only to protect the sensor output from transient reverse voltages, for example, the inductive turn-off spike caused by driving reed-relay coils directly from the output.

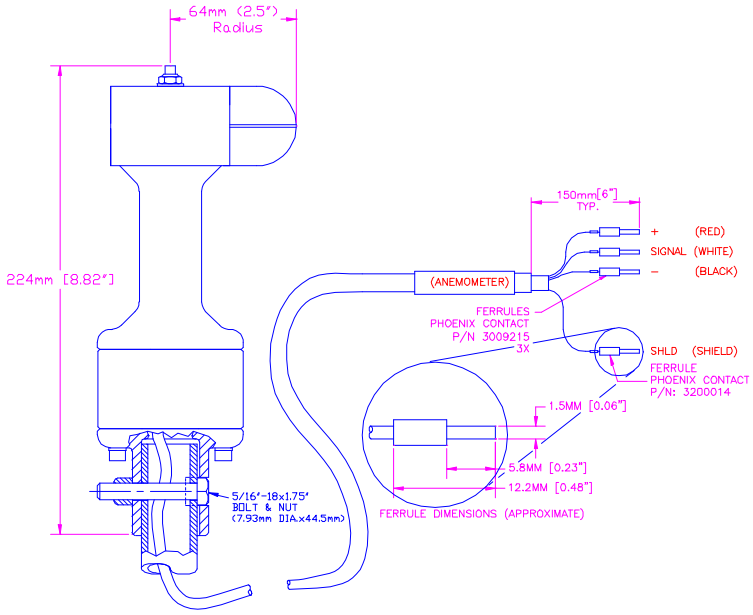
Installation

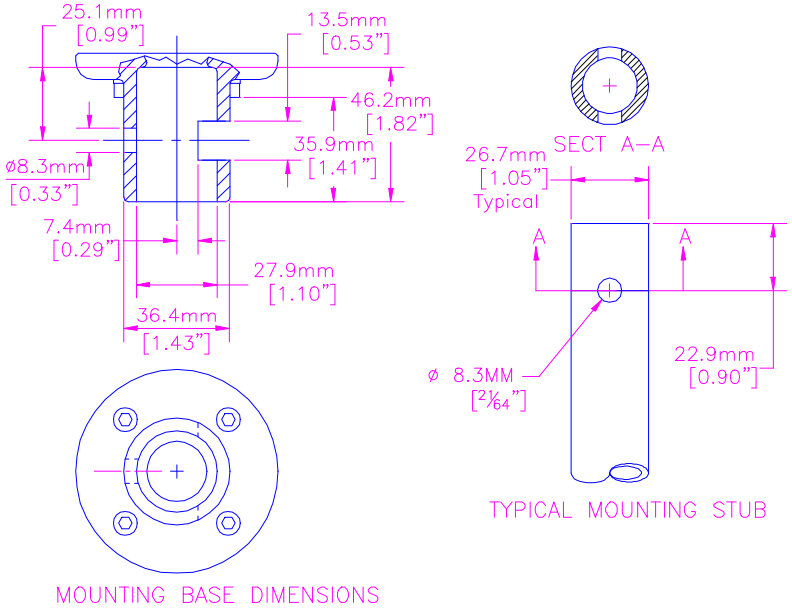
1. Tape the ends of the cables to prepare them for feeding through the mounting boom. Maintain the isolation of the signal leads from the boom. Remove the nut and bolt from the base of the unit. Feed the cables through the mounting boom until the sensor is on the boom. Align the bolt hole in the base (not the slot) with the hole in the boom such that the hole in the base points forward toward the rotor blades.

2. Check to be sure that the sensor is secure against the top of the boom. Insert the bolt into the slot side of the base. Place the nut on the end of the bolt and tighten.

3. Using the notations on the individual wires, connect the ground (common) lead to your controller first. Then connect the signal leads. Connect power last, especially if power is on during connection. Confirm input on controller.

Sensor and Mounting Outline





Specifications

Description	Sensor type	3 cup anemometer
	Applications	wind turbine control
	Sensor range	maximum rated wind speed is 90 m/s (200 miles per hour)
	Instrument compatibility	digital inputs of turbine controllers and PLCs
Output signal	Signal type	• square wave with frequency proportional to wind speed • amplitude approximately equal to supply voltage • PNP output: active high output sources current to the sensor output load from the sensor power supply; inactive low, low output is pulled down to ground by sensor output load • can source up to 25 mA to within 1 V of the supply voltage • inactive output leakage is less than 100 uA
	Transfer function	m/s = (Hz x 0.572) + 1.00 [miles per hour = (Hz x 1.28) + 2.24]
	Sensor to Sensor Variation	99.7% of sensors fall within 4.3% of stated transfer function (based on over 800 samples)
	Calibration	available upon request - contact NRG for more information.
	Output signal range	0 Hz to 155 Hz
Power requirements	Supply voltage	5 V DC to 24 V DC
	Supply current	9 mA max + output load current
Response characteristics	Distance constant (63% recovery)	7.6 m (25 feet)
Installation	Mounting	mounts to a 27 mm (1.05 inch) diameter pipe (3/4 inch pipe size) with a 5/16 inch nut and bolt; cabling exits into mounting pipe
	Tools required	13 mm (0.5 inch) nut driver
Environmental	Operating temperature range	-40 °C to 60 °C (-40 °F to 140 °F)
	Operating humidity range	0 to 100% RH
Physical	Connections	Signal Cable • white: signal • black: ground • red: sensor power • shield drain
	Cable length	• Signal cable: 8.0m (26.2 feet) • extension kits available
	Weight	1.45 kg (3.2 pounds)
	Dimensions	• overall assembly height : 224 mm (8.82 inches) • body diameter: 70 mm (2.75 inches) • swept diameter of rotor: 127 mm (5 inches)
Materials	Cups	precision balanced aluminum with black anodized finish and heat-resistant black paint
	Body	cast aluminum with black anodized finish and heat-resistant black paint
	Shaft	centerless ground, stainless steel
	Bearing	stainless steel ball bearings with application specific lubrication
	Magnet	4 pole ceramic

	Cable	• Signal: 3 conductor 20 AWG, chrome PVC jacket with overall foil shield and drain
	Enclosure	• sealed to IP55 • sensor electronics encapsulated to IP65
	Base	cast aluminum with black anodized finish and heat-resistant black paint