IceFree3 for WRA Installation Planning

Introduction

The IceFree3 anemometer and wind direction vane are proven and reliable heated sensors ideal for maximizing wind measurement data availability on meteorological towers in climates that experience frequent icing. Because the heaters require more power than typical meteorological sensors, careful planning is necessary to ensure optimal performance. The following document has been created to assist in the planning and installation of IceFree3 sensors on meteorological towers.

Parts Required for IceFree3 Installation

- IceFree3 Sensors:
    - IceFree3 Anemometer, AC Sine Wave, 10m Cable (Part Number 3447)
    - IceFree3 Wind Vane, 10K Potentiometer, 8m Cable (Part Number 2450)
- 2 x Boom – Single Sided, Heavy Duty, 76”, ¾” IPT for 8” - 10” towers (Part Number 3258)
    - Lattice tower alternative exists - contact Sales for details
- 2C & 3C Sensors/Power Cable Kit (multiple kits w/ cable lengths of 10m to 90m), kits include:
    - Power Cable (from transformer or power supply to Junction Box)
    - 2C Sensor Cable (from logger to Junction Box for IceFree3 Anemometer signal)
    - 3C Sensor Cable (from logger to Junction Box for IceFree3 Wind Vane signal)
    - Junction Box
    - Hose Clamps

AND

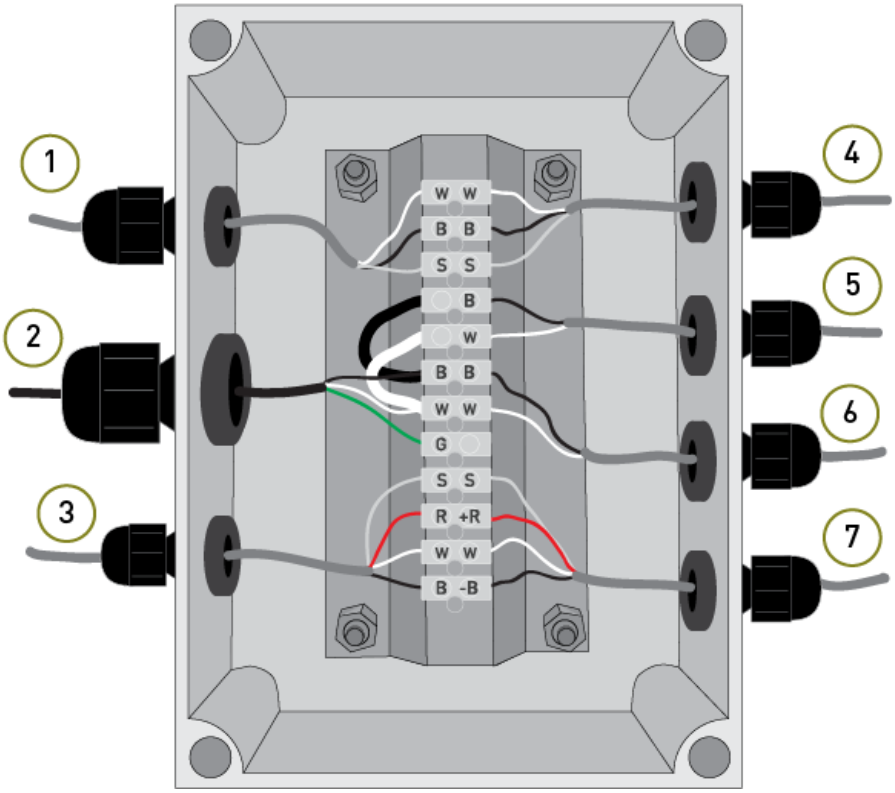
- Transformer for 120/240 VAC to 24 VAC, 250W (Part Number 2218)
    - For powering the heaters with AC Grid Power

OR...

- DC Power Supply for remote installations (see page 4 for more details)

Installation of Sensors

1. ¾" booms are installed on the tower at the desired height and the sensors are mounted on them.
2. The sensor signal cables and heater power cables are run through the booms and down to the Junction box, which is generally mounted a couple meters down from the booms.
3. The cables are wired into the Junction box in the following manner:

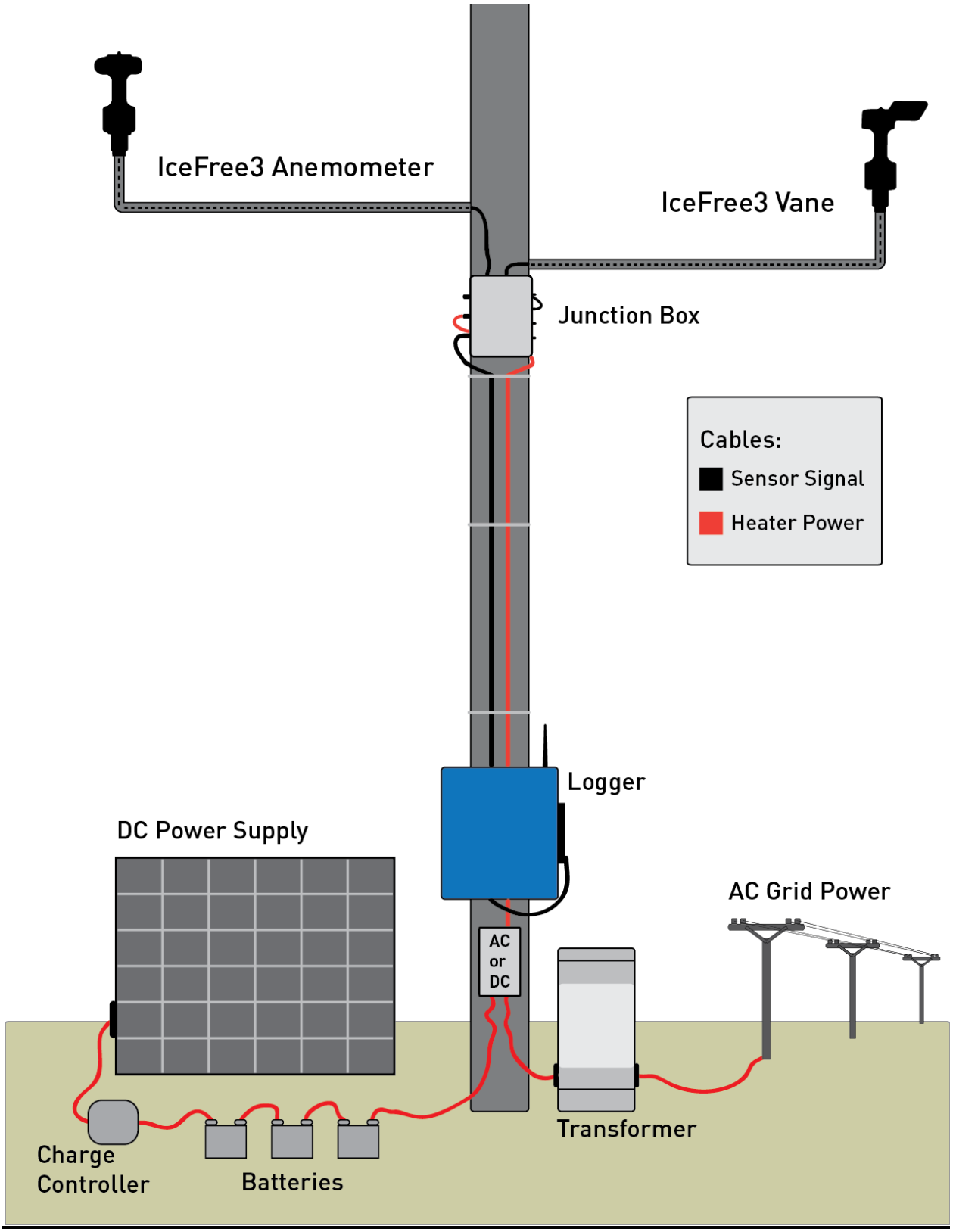


Left Side – Connections between Logger and Junction Box	Right Side – Connections between Junction Box and Sensors
1. Anemometer Signal Cable to Logger (White, Black, Shield)	**4.** Signal Cable from Anemometer (White, Black, Shield)
2. Heater Power from Power Source (Black, White, Green) * From Transformer or DC Power Supply	**5.** Heater Power to Anemometer (Black, White)
3. Wind Vane Signal Cable to Logger (Shield, Red, White, Black)	**6.** Heater Power to Wind Vane (Black, White)
	7. Signal Cable from Wind Vane (Shield, Red, White, Black)

4. The cables from the "2C & 3C Sensor Power Cable Kit" are connected to the Junction Box and run down the tower to the logger and power source (either Transformer or DC Power Supply).

**Power requirements for the DC Power Supply can be found on page 4.*

Typical IceFree3 Configuration:



*The above image shows both a remote DC Power Supply **and** an AC Grid Power Supply. Generally one or the other will be used, **not both.***

Heater Power Considerations

- IceFree3 sensors require 24V AC or DC power for the heater (+/- 3V).
- Upon initial startup, there is an in-rush current of approximately 9A with a duration of roughly 3 seconds.
- After 1 minute, the current settles under 3A constant (1A typical).
- The heater is self regulating at a constant internal temperature of 170°C and will draw the appropriate current in order to maintain the right temperature.
    - This operating current can range from 0.8A (~ 20W) up to 3A (~70W).
- When possible, use grid power! Connecting the 120/240 VAC to 24 VAC Transformer to the grid is simple and dependable. Wiring for the transformer can be found on pages 4 and 5.
- If necessary, a remote power supply can be built and used to provide 24 VDC to the heaters. The Power Supply Requirements section below explains the required specifications for the system.

Power Supply Requirements

When designing a remote power supply to provide power to the heater, you need enough capacity to provide the maximum power (3A per sensor) for a predetermined amount of time.

Roughly, 3A for 24 hours is 72 Amp-hours (or 144 Ahr for a pair of sensors). If you expect to have 3 days of worst case conditions in a row, then your battery bank should to be rated for 216Ahr (or 432 Ahr for a pair of sensors). Ultimately, power supply sizing is dependent on multiple factors and is a judgment call.

Once the power requirement has been determined, a power supply will need to be created. Combinations of deep cycle 24V batteries, PV panels and/or a small wind turbine (1kW) have been used successfully in the past.

Transformer Wiring

When using grid power, the Transformer will need to be wired into the grid using the following diagrams (which vary depending on the electrical supply: 120 VAC or 240 VAC):

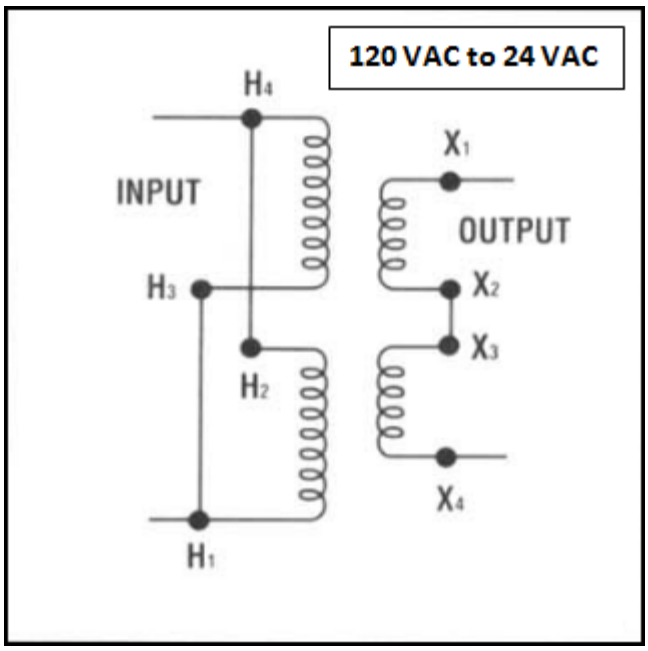
120 VAC to 24 VAC

Grid to transformer input:

- H4 & H2 tied together w/ wire nuts
- H3 & H1 tied together w/ wire nuts

Transformer to Junction Box output:

- X1 out
- X4 out
- X2 & X3 tied together w/ wire nuts



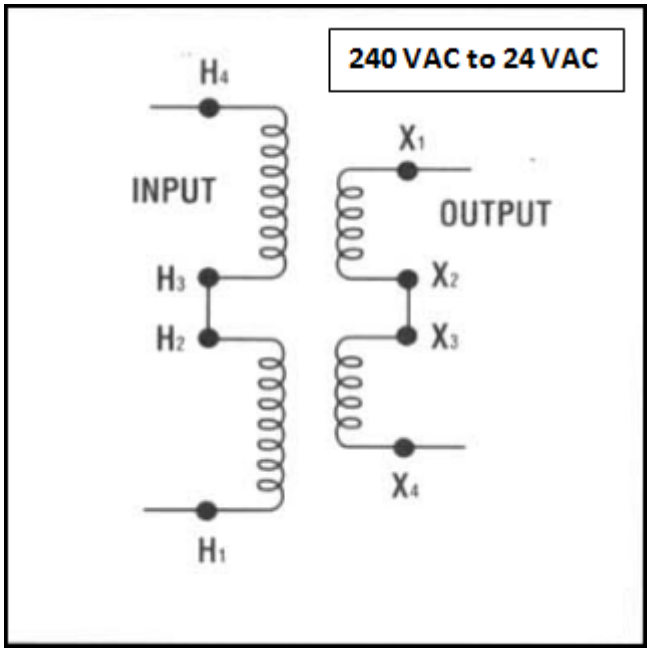
240 VAC to 24 VAC

Grid to transformer input:

- H4
- H1
- H2 & H3 tied together w/ wire nut

Transformer to Junction Box output:

- X1 out
- X4 out
- X2 & X3 tied together w/ wire nuts



➔ *The full wiring document for the transformer can be found on the product page under "Downloads": http://www.renewablenrgsystems.com/Products/2218.aspx#*

Maintenance

The sensors' readings in the data files should be checked on a regular basis. During winter months the data files should be checked more regularly to make sure the heaters are working properly. Site visits should be performed on a semi-annual basis to make sure booms, wiring and power sources are in good working condition.