200-WS-04

User Manual

WeatherPort

Wind Direction Sensor

200-WS-04

Phone (530) 823-7185
Email nova@novalynx.com **Website** www.novalynx.com

Receiving and Unpacking

Carefully unpack all components and compare to the packing list. Notify NovaLynx Corporation immediately concerning any discrepancy. Inspect equipment to detect any damage that may have occurred during shipment. In the event of damage, any claim for loss must be filed immediately with the carrier by the consignee. Damages to equipment sent via Parcel Post or UPS require the consignee to contact NovaLynx Corporation for instructions.

Returns

If equipment is to be returned to the factory for any reason, call NovaLynx between 8:00 a.m. and 4:00 p.m. Pacific Time to request a Return Authorization Number (RA#). Include with the returned equipment a description of the problem and the name, address, and daytime phone number of the sender. Carefully pack the equipment to prevent damage or additional damage during the return shipment. Call NovaLynx for packing instructions in the case of delicate or sensitive items. If packing facilities are not available take the equipment to the nearest Post Office, UPS, or other freight service and obtain assistance with the packaging. Please write the RA# on the outside of the box.

Warranty

NovaLynx Corporation warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment from the factory. NovaLynx Corporation's obligations under this warranty are limited to, at NovaLynx's option: (i) replacing; or (ii) repairing; any product determined to be defective. In no case shall NovaLynx Corporation's liability exceed product's original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by NovaLynx Corporation, or that has been subjected to misuse, negligence, or accident. It is expressly agreed that this warranty will be in lieu of all warranties of fitness and in lieu of the warranty of merchantability.

Address

NovaLynx Corporation
431 Crown Point Circle, Suite 120
Grass Valley, CA 95945-9531 USA
Phone: (530) 823-7185
Email: nova@novalynx.com
Website: www.novalynx.com

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1 FORWARD

Thank you for purchasing NovaLynx products. NovaLynx has been designing and manufacturing weather instruments since 1988. NovaLynx represents several well-known brands of quality manufacturers, including Gill Instruments, RM Young, Kipp & Zonen, and Vaisala. It is our hope that our products will meet all your monitoring requirements.

2 INTRODUCTION

WeatherPort 200-WS-04 Wind Direction Sensors are moderately priced and designed for general applications up to 125 mph (56 m/s). The sensors are easy to install and maintain. They are constructed of injection molded thermoplastic, anodized aluminum, and stainless steel for reliable operation in adverse environments.

The base of the sensor is designed to mount on a vertical 1.07" (27 mm) diameter mast. If the sensor cannot be mounted at the top of the mast, an optional side-mount boom (NovaLynx 200-153) is available. Each sensor includes 40-feet (12 m) of cable.

The 200-WS-04 is a vane-style direction sensor. Air movement (wind) impinging on the tail fin causes the vane to align with the wind direction. Fluctuations in the wind direction are measured by the sensor as the aerodynamics of the counterweight and the tail try to keep aligned to the path of the wind.

The wind vane is coupled to a 20K ohm single turn potentiometer. When connected to a well-regulated voltage source the output voltage of the sensor is proportional to the wind direction and can be read by a single-ended analog input channel.

The potentiometer has a “dead band” of approximately 5 degrees between the ends of the resistive media in the potentiometer. This gap is aligned to the north indicator on the body of the sensor.

3 PRECAUTIONS

Handle the sensor carefully to avoid undue stress on the potentiometer. The shield wire in the sensor cable is electrically connected to the shaft holding the vane assembly. The purpose is to bleed off static that would otherwise affect the sensor output. Therefore it is important to earth ground the shield wire for best results.

Installations where nearby lightning strikes are likely should include a properly grounded lightning rod above the level of the sensor, preferably on a separate tower.

4 SPECIFICATIONS

200-WS-04 Wind Vane Specification	
Measurement Range	0-360 degree azimuth
Potentiometer Gap	5 degree (approximate)
Accuracy	±3 degrees
Vane Threshold	1.2 mph (0.5364 m/s)
Distance Constant	1.5 feet (45.72 cm)
Time Constant	2 seconds
Damping Ratio	0.4
Transducer Type	20k ohm, 20% tolerance, 1% linearity, bushing type bearing
Maximum Rating	1/4 watt
Turning Radius	10.5 inch (26.67 cm)
Cable	40 feet (12 m), 3 conductor, 24 AWG, shielded, tinned leads
Mounting	1.07 inch diameter by 0.82 inch socket (27 mm dia x 21 mm)
	(fits standard 3/4" IPS pipe)
Assembled Dimensions	11.4" H x 15.2" W x 1.6" D (29 x 39 x 4 cm)
Weight / Shipping	1.65 lbs (0.75 kg) / 2 lbs (0.9 kg)

5 SITE SELECTION

WARNING: Avoid overhead power lines whenever possible. If there are overhead power lines, use extreme care to prevent contact with the power lines while installing the equipment.

Choose a mounting location for the wind sensor that is free of obstructions since nearby objects can create eddy currents that will affect the wind measurements. Try to locate the wind sensor so that the nearest object is 10 x T away from the wind sensor mast, where T is the height of the object.

Roof mounted sensors should be placed on the upwind side of the building and away from all exhaust vents. If the sensor is located on top of a building the sensor height should be 1.5 x H, where H is the height of the building.

In all cases when the wind sensor data is to be correlated to National Weather Service data or World Meteorological Organization data, the standard exposure is 33 feet (10 meters) above the ground.

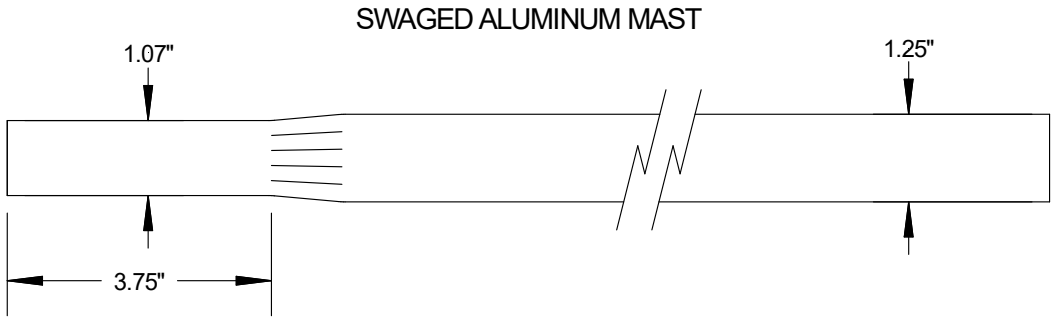
Birds of all sizes find the shaft of the wind vane a desirable place to land. The weight of a large bird can easily damage the potentiometer by breaking it loose from the body of the sensor. The best way to reduce this hazard is to provide an alternate landing site nearby that would be more attractive to the weary bird.

6 MOUNTING OPTIONS

CAUTION: Be careful when working on equipment that is mounted above you. Do not allow others to stand below when equipment is being installed as falling objects can be hazardous.

The support for the sensor must be rigid or supplemented with guy wires. A mast can be assembled from pipe, using larger pipe at the base and ending in ¾" IPS pipe at the top. The mast should be easy to reach for servicing the sensor. A tilt-down arrangement can eliminate the need for lifts or ladders during installation and service.

NovaLynx tripods are a convenient alternative for temporary and permanent installations. The tripods are available in three sizes: 3', 5' and 10' tall (Appendix A). Masts are available in various lengths. Swaged mast segments can be fitted together to obtain the overall height needed. The swaged end is the correct diameter for mounting 200-WS-04 sensors.



Note: *The base of the 200-WS-04 sensor accepts 1.07" (27 mm) diameter pipe.*

If the wind direction sensor cannot be mounted at the top of the mast, the NovaLynx 200-153 Mounting Arm (sold separately) can be mounted to the mast or tower leg at the desired height.

200-153 Mounting Arm

The supporting mast or tripod should be properly grounded. In areas where lightning is likely, install a lightning rod to minimize lightning damage. NovaLynx 190-Series Lightning and Surge Protection products are available to accommodate most applications.

7 TAIL ASSEMBLY

The tail piece must be assembled to the vane shaft before installing the sensor.* Locate the tail piece (packed with this manual). Remove the blue tape from the shaft and save the two screws stored there. Slide the tail piece into the slot in the shaft and align the screw holes. Secure the tail with two screws using a #1 Phillips screwdriver.

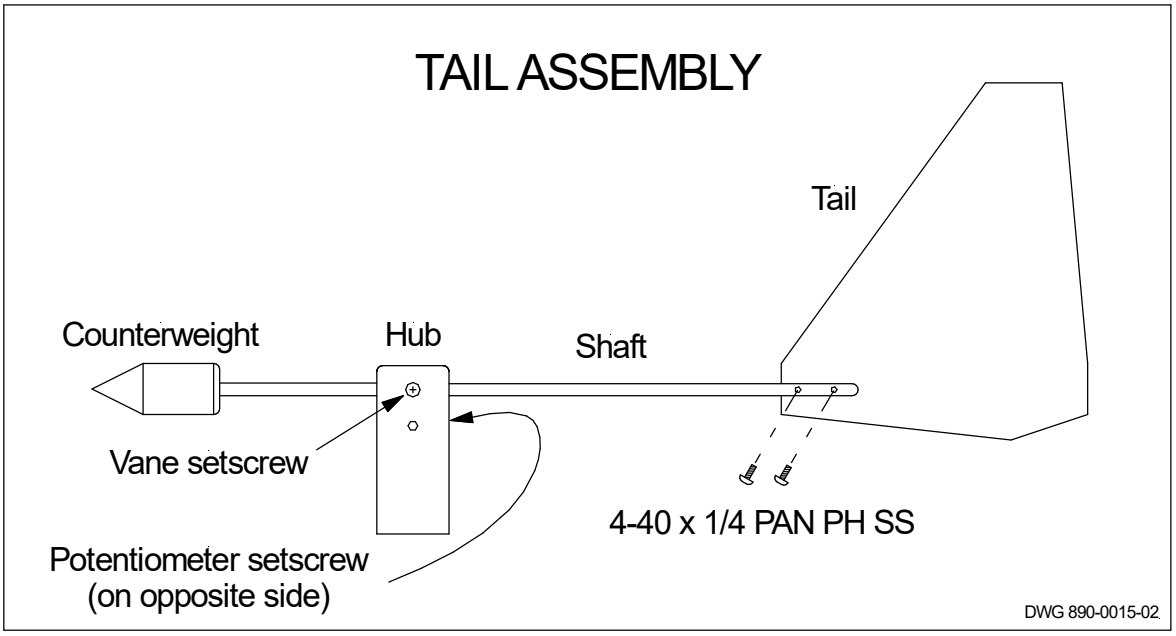


Figure 1

*Pre-assembled in some cases.

8 INSTALLATION

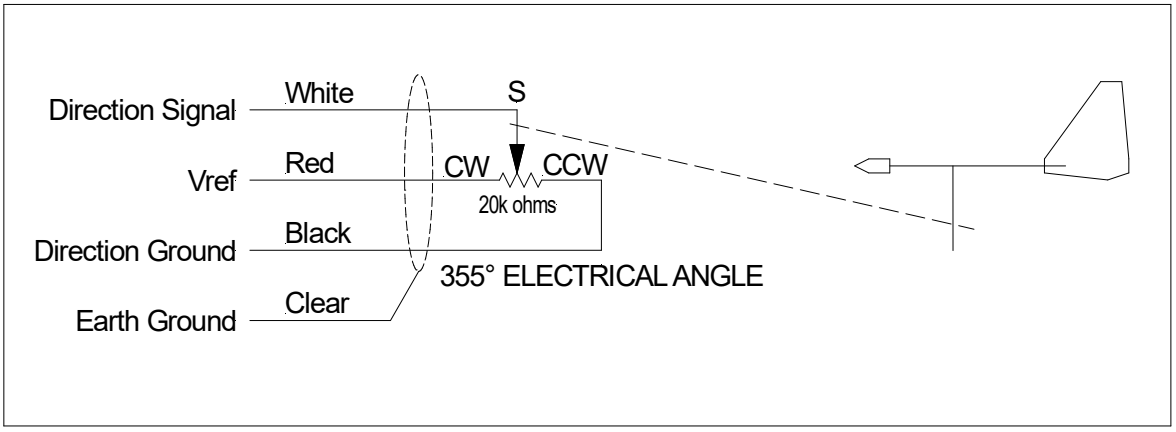
NOTE: Wind direction sensors are usually aligned to true north, rather than magnetic north. True north is usually found by reading a magnetic compass and applying the correction for magnetic declination. On-line calculators are available to enter your location and obtain the correction factor. One such website is: https://www.ngdc.noaa.gov/geomag-web/#declination

1. Loosen the two mounting screws on the base of the sensor.
2. Place the sensor on the top of the mast or mounting stub.
3. Align the north indicator label to geographic (true) north.
4. Tighten the mounting screws using moderate torque.

The PVC jacket of the cable will last for many years outdoors under normal circumstances. In harsh environments it may be necessary to protect the cable with conduit.

Route the sensor cable down the mast and to the monitoring equipment in the most direct manner. Fasten the cable to the mast with cable ties to prevent whipping during high velocity winds. For best results, use plastic cable ties that are resistant to ultra-violet radiation and place them at two foot intervals. Leave a "drip loop" of cable below the entry point to the equipment enclosure to help keep moisture out.

Turn off power to the logger or other monitoring device before connecting the sensor.



9 MAINTENANCE

Wind sensors experience vibration due to high velocity wind. The vibration can loosen the mounting screws or the support structure. Regular inspection of the mounting hardware is required to prevent damage to the sensor.

1. Turn the wind vane to check whether it moves freely. If necessary, remove the vane assembly by loosening the potentiometer set screw (Figure 1). Clean out any dust and then apply a very small amount of light oil to the potentiometer shaft. Follow the instructions in the Functional Tests (Section 10) to re-align the potentiometer and vane. *Note: The set screw requires a 1/16" Allen wrench.*
2. Inspect the wind vane to ensure the tail is vertical and the screws holding it to the vane are snug. If the vane has loosened it must be re-balanced before tightening. First, inspect the counterweight to ensure it is firmly cemented to the vane. Repair if necessary. Next, remove the entire sensor and hold it horizontal to the ground. Adjust the distance of the counterweight until it exactly balances the tail. Make sure the tail is vertical to the sensor and then tighten the vane. Re-check the balance.
3. With the sensor mounted on the mast make sure the north indicating label is oriented correctly. Tighten the mounting screws using moderate torque.
4. Inspect the cable and ensure it is secured to the mast to prevent damage due to wind whipping.

10 FUNCTIONAL TESTS

The following checks can be done with an ohm-meter after the sensor has been dis-mounted from the weather station mast or tower. These tests can help determine whether the sensor needs repair or adjustment. Wind vane calibration involves checking the potentiometer output and verification of the sensor alignment to north.

Set the ohm-meter to the 20k range (or greater range if needed). Connect the black meter lead to the black sensor wire, and the red meter lead to the red sensor wire. The reading on the meter should be a stable output of about 20,000 ohms (+/-20%). Rotate the vane once around while watching the meter to ensure the reading does not change.

Connect the red meter lead to the white wire. Observe that the meter reading changes as you rotate the vane. Check the "dead band" where the meter goes to "infinite" and verify that the counterweight is pointing the same direction as the north indicator label on the base of the sensor. Now rotate the vane slowly clockwise and observe that the resistance changes smoothly from near zero to the maximum just before hitting the "dead band" again as you approach north.

If the "dead band" does not align with the North label then the position of the vane can be changed to correct the alignment:

1. Using a 1/16" Allen wrench, loosen the potentiometer set screw located on one side of the hub (Figure 1).
2. Lift upwards to remove the vane assembly from the sensor. Note that the potentiometer body is bonded to the sensor body and should not move.
3. Using an ohmmeter to monitor the potentiometer output, turn the potentiometer shaft until the center of the gap is located. You may wish to make a mark on the shaft aligned to the North label.
4. Aim the counterweight in the same direction as the north label and carefully lower the hub onto the potentiometer shaft. Tighten the set screw. ***Note:*** *There must be a small gap between the hub and the base, to allow the vane to turn freely.*
5. Check your work by observing the meter as you swing the vane across North.

The potentiometer test will indicate whether the sensor is working correctly. If there is no signal or the signal is not changing then either there is a problem in the cable or inside the sensor. Minor problems with the cable can be repaired on-site, but if the potentiometer is bad the whole assembly must be returned for repair.

APPENDIX A TRIPOD DIMENSIONS