



WSD-100 Wind Speed and Direction Sensor  
For XR5 Data Loggers

## Installation Guide

May, 2005



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## WSD-100 Wind Speed and Direction Sensor

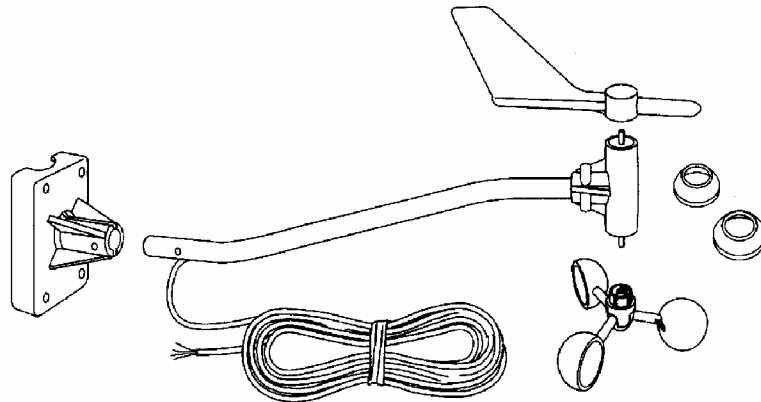


The WSD-100 can withstand hurricane-force winds, yet is sensitive to a very light breeze. It features a hand-balanced wind direction vane for optimal stability and accuracy. The wind speed signal connects directly to one pulse input of an XR5-SE Data Logger. The wind direction signal connects to an XR5 analog input. No external power is required. It features sealed stainless steel ball bearings for long life, and includes 40 feet (12 meters) of attached cable. Typical mounting hardware is included for mounting to a pipe, wooden post, antenna mast, or similar structure. Some assembly is required, and additional mounting hardware may be required, depending on the installation (details follow).

### Included Components

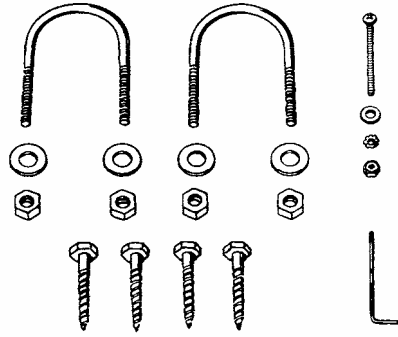
The WSD-100 Wind Speed and Direction Sensor include the components listed below. Please be sure you have all listed components before continuing. The installation hardware contains items commonly needed for most installations. You may need to adapt or purchase additional hardware for your particular installation. Please make sure you have all necessary parts, tools, and materials before you begin.

- Arm with cable
- Base
- Wind Cups
- Wind Vane
- Drip Rings



## Included Installation Hardware

- Two U-Bolts
- Four 1/4" Flat Washers
- Four 1/4" Flat Nuts
- Four 1/4" x 1 1/2" Lag Screws
- One #4-40 x 1 1/4" Pan Head Screw
- One #4 Flat Washer
- One #9 Lock Washer
- One #4-40 Hex Nut
- Allen Wrench



## Required Tools and Materials

- Weather-resistant Cable Ties or clips
- Stainless Steel Hose Clamps
- Adjustable Wrench
- Compass or Local Area Map

## Bench Test

Before beginning the installation, we recommended you connect the WSD-100 to an XR5-SE Data Logger to test the unit's wind speed and direction functions.

## Wiring

Wire the WSD-100 Cable to the XR5 as follows:

WSD-100 Wire Color	XR5 Terminal	Function
Black . . . . .	"X"	Wind speed contact closure
Green . . . . .	"1"	Wind direction potentiometer
Yellow . . . . .	"D"	2.5v Potentiometer supply voltage
Red . . . . .	"C"	Ground

## Software Setup

Using LogXR Software, send a setup to the XR5 with the following selections:

- Log Mode: Manual/Slow  
 Log Interval: 10 seconds
- Channel 1: Type: 0-2.5v  
 Slope: 144 (for wind direction readings from 0 to 360 degrees)  
 Offset: 0
- Channel X: (Pulse tab)  
 Type: Solid State Switch  
 Slope: 2.25 (wind speed in MPH – see page 12 for other units of measure)  
 Offset: 0  
 Frequency: Checked

From LogXR Software's main menu click Real Time | Standard.

## Real Time readings

While the Real Time screen is active, push the wind cups onto the smaller of the two stainless steel shafts at the end of the arm, and gently spin the wind cups. Careful, the wind cups are not secured to the shaft; do not spin too fast or they may fly off the shaft!

### Real Time readings for Channel X

You should see increasing pulse counts while the cups are spinning, and every 10 seconds the count should reset. Actual MPH readings display in the transferred data, but not in the Real Time display.

### Real Time readings for Channel 1

Rotate the shaft opposite the wind cups. You should see real time readings vary from about 0 to 360.

When you are finished testing the WSD-100, terminate the Real Time screen, and disconnect the four wires from the XR5's Terminal Block.

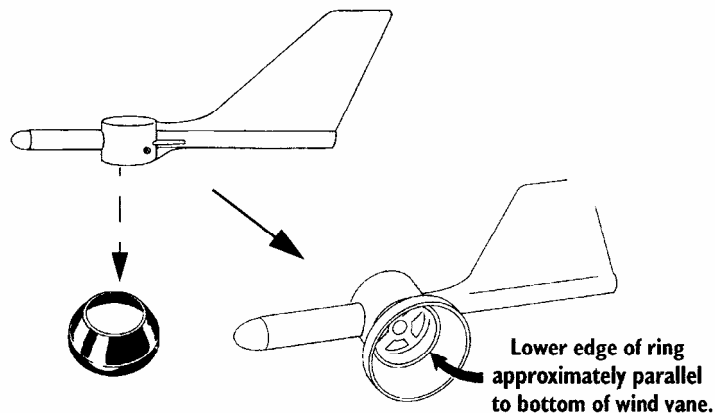
## Assembling the WSD-100

Attach the drip rings and the wind cups to the WSD-100 and check the mounting base orientation before you install it. The wind vane is attached after the WSD-100 has been installed at the chosen site.

### Attaching the Drip Rings

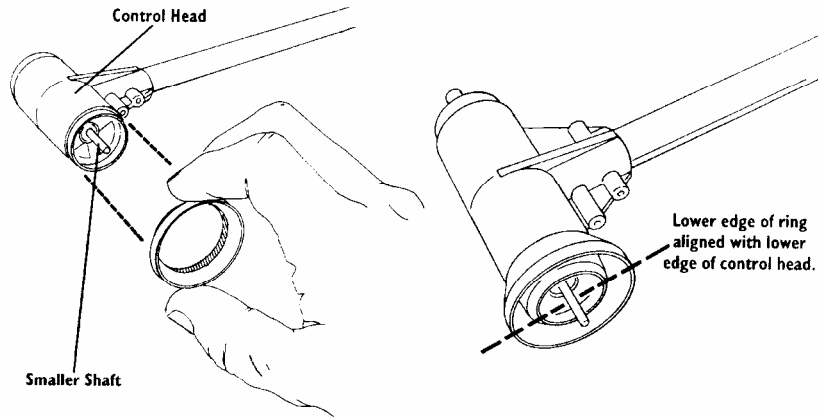
The drip rings provide protection against icing of the wind vane and wind cups. Follow the instructions below to attach the two drip rings.

1. Place one of the drip rings on a flat surface with the small hole facing up.
2. Securely press the wind vane on top of the drip ring.  
*It may be easier to attach the drip ring if the wind vane is tilted slightly.*
3. Make sure the ring fits securely between the two ridges on the vane with the lower edge parallel to the bottom of the wind vane.



*Installing the drip ring onto the wind vane*

4. Install the small end of the other drip ring on the wind cup end of the WSD-100 control head as shown below. Note the wind cup end of the control head has the smaller of the two stainless steel shafts.
5. Gently push up the drip ring until it reaches the groove on the control head.
6. Make sure the lower edge of the drip ring is aligned with the lower edge of the control head.

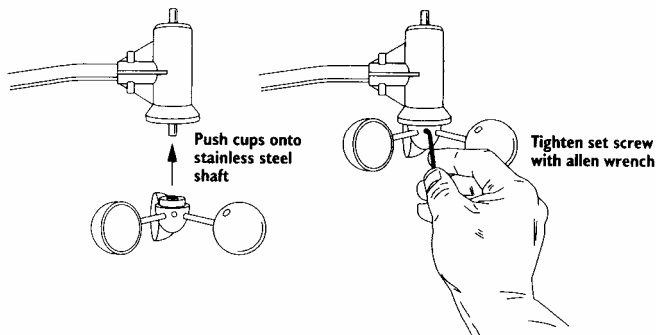


*Installing the drip ring onto the control head*

### **Attaching the Wind Cups**

Before installing the WSD-100 on site, attach the wind cups. Wait until you have installed the WSD-100 on its site before you attach the wind vane.

1. Push the wind cups onto the smaller of the two stainless steel shafts at the end of the arm.
2. Slide the wind cups as far up the shaft as possible.
3. Use the allen wrench provided to tighten the set screw on the side of the wind cups.  
*When you let go of the wind cups, they should drop slightly*
4. Spin the wind cups. If they do not spin freely, loosen the set screw, lower the cups slightly, then retighten the set screw.
5. Repeat Step 4 until the wind cups spin freely.



*attaching the wind cups*

### **Checking the WSD-100 Base Orientation**

You will need to know which way to orient the base before installing it.

1. Insert the arm into the base.
2. Attempt to push the #4-40 x 1 ¼" pan head screw through the holes in the arm and the base as described in "Attaching the Wind Vane" on page 10.
3. If the screw does not slide easily through the holes, rotate the base 180° to line up the opposite holes, and then try again.
4. Note the correct base orientation for use when you install the base later in the installation process.

### **Choosing an installation site for the WSD-100**

Use the following guidelines to select the best location for the WSD-100.

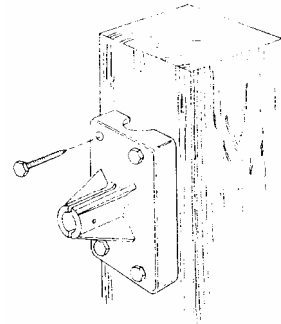
- Install in a location where wind flow is unobstructed by trees and nearby buildings.
- If mounting on a roof, the WSD-100 should be at least 4 feet (1.2 meter) above the roof line for the most accurate readings. This may be accomplished by mounting the WSD-100 on a television antenna mast, a wooden post, or a metal pipe.
- Make sure the antenna mast or metal post is properly grounded.
- If you are not certain about how to ground the installation, consult a qualified electrician.
- If you live in an area subject to frequent thunderstorms, installing a lightning rod nearby can reduce the risk of damage.

## Installing the WSD-100

Use the following procedures to mount the WSD-100

### Installing the Base on a wood post or wood surface.

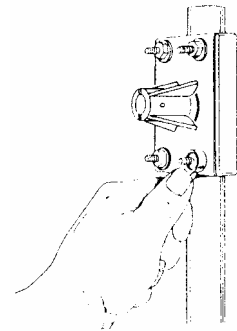
1. Hold the Base against the wood surface and use a pencil to mark the location of the four holes on the base.
2. Use a drill with a 3/16" (5 mm) drill bit to make pilot holes in the marked locations.
3. Drive the lag screws through the holes in the Base and into the wood.



*attaching base to wood post*

### Installing the Base on an Antenna Mast or Metal Pipe: Outside Diameter 7/8" to 1 1/4" (22 to 32 mm)

1. Hold the WSD-100 Base against the pipe and insert the two U-bolts through the back of the base so that the U-bolts wrap around the pipe.
2. Place a 1/4" washer and a 1/4-20 hex nut over each end of the U-bolts and use a wrench to tighten the hex nuts.



*attaching Base to a pipe using U-bolts*

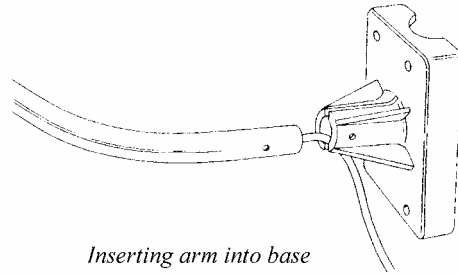
### Installing the Base on an Antenna Mast or Metal Pipe: Outside Diameter greater than 1 1/4" (32 mm)

Use stainless steel hose clamps to attach the mounting base to masts or pipes larger than 1 1/4" diameter.

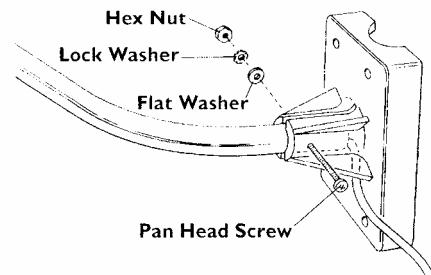
1. Use two stainless steel hose clamps large enough to fit around the mast or pipe and the WSD-100 Base. A local hardware store should carry suitable stainless steel hose clamps.
2. Hold the Base against the pipe and fasten the hose clamps over the Base and around the metal pipe or mast.

## Attaching the Arm to the Base

1. Insert the arm into the base. Guide the cable through the slot as you insert the arm.
2. Insert the pan head screw into one of the holes in the base and slide it through the arm.
3. Secure the pan head screw using the flat washer, lock washer, and hex nut as shown.



*Inserting arm into base*

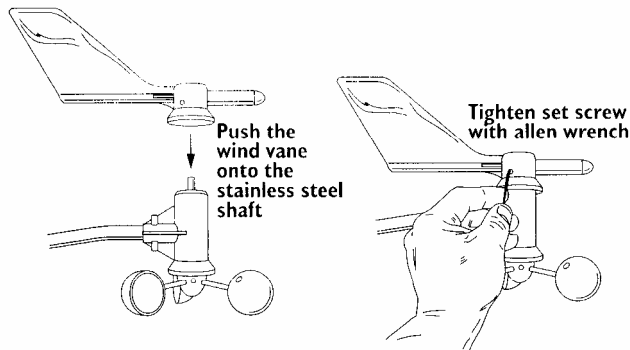
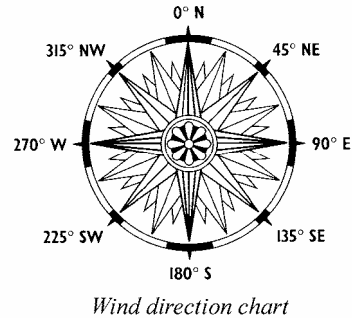


*Attaching arm to the base*

## Attaching the Wind Vane

To mount the wind vane, you will need to display the Real Time Data screen using LogXR Software.

1. Connect the WSD-100 Cable to the XR5 using the wiring instructions on page 4.
2. Use a compass or map to determine in which direction the WSD-100's arm is pointing.
3. Use the wind direction chart to find the degree reading which corresponds to that direction.
4. Slowly turn the wind direction shaft with your fingers. Stop turning when the Real Time Display reaches the degree reading obtained in step 3.
5. Being careful to keep the stainless steel shaft from turning, place the wind vane on the shaft with the bullet-shaped nose of the vane pointing in the same direction as the arm.
6. Slide the wind vane down onto the shaft as far as it will go.



*Installing the wind vane*

7. Use the allen wrench provided to tighten the set screw on the side of the wind vane.
8. Test your assembly by pointing the wind vane in any direction and (using the compass or map as a guide) making sure the console displays the correct wind direction. Readjust the vane if necessary.
9. Spin the cups to make sure you get a wind speed reading. Note that the Real Time Data screen displays accumulated pulses which are reset to 0 at the end of each log interval. Transferred wind speed data is converted to MPH.
10. Secure the cable to the metal mast or pipe with electrical tape or weather resistant cable ties. In all other places secure the cable using weather resistant cable ties or cable clips every 3 to 5 feet (1 to 1.6 meter). *Do not use metal staples or a staple gun to secure the cable – doing so could cause the cable to eventually fail.*

## Maintenance

The WSD-100 does not require any regular maintenance.

**CAUTION: DO NOT** attempt to lubricate the wind cup shaft and bearings or the wind vane shaft. Natural or synthetic lubricants will inhibit the normal operation of the WSD-100.

## WSD-100 Specifications

### Sensor Type

Wind Speed . . . . . Wind cups with magnetic switch  
Wind Direction . . . . . Wind vane and potentiometer  
Potentiometer resistance . . . . . 20 k ohms typical

### Attached Cable

Length . . . . . 40FT (12 meter)  
Type . . . . . 4-conductor, 26 AWG, unshielded  
Termination . . . . . Stripped and tinned leads

### Material

Wind Vane and Control Head . . . . . UV-resistant ABS  
Wind Cups . . . . . Polycarbonate  
Anemometer Arm . . . . . Black-anodized aluminum

**Overall Dimensions** . . . . . 18.5" long x 7.5" high x 4.75" wide (470 x 191 x 121 mm)

**Weight** . . . . . 2 lbs. 15 oz. (1.332 kg)

### Range

Wind Speed . . . . . 0 to 175 mph (150 knots, 78 m/s, 280 km/hr)  
Wind Direction . . . . . 0° to 360°

### Accuracy

Wind Speed . . . . . ±5%  
Wind Direction . . . . . ±7°

### Resolution

Wind Speed . . . . . 1 mph  
Wind Direction . . . . . 1° (0° to 360°)

WSD-100 Cable Termination		
Wire color	XR5 Terminal	Function
Black	Selected pulse input (X, Y, or Z)	Wind speed contact closure
Green	Selected analog input (1 – 8)	Wind direction potentiometer
Yellow	“D”	2.5v potentiometer supply voltage
Red	“C”	Ground

### LogXR Software Setup

Select the Channel tab that the Wind direction signal is wired to (Green wire), and select the following:

Type: 0-2.5v  
 Mode: Standard  
 Slope: 144 (for wind direction readings from 0 to 360 degrees)  
 Offset: 0

Select the Pulse tab that the Wind speed signal is wired to (Black wire), and select the following:

Type: Solid State Switch  
 Slope: (see table below)  
 Offset: 0  
 Frequency: Checked

Wind Speed unit of measure	Slope value*
Miles per Hour	2.25
Knots	1.954
Meters per Second	1.006
Feet per Second	3.3
Kilometers per Hour	3.621

\* In some cases the actual slope value may display additional digits of precision after it has been entered into LogXR, resulting in a slightly different value. This is OK and will not affect reading accuracy.

### Technical Support

For questions or comments regarding the WSD-100 or this document, please contact Pace Scientific Technical Support:

Phone: 704-799-0688 (8-5pm EST)

Email: [support@pace-sci.com](mailto:support@pace-sci.com)

Fax: 704-799-0177

Thank you!