Davis

Integrated Sensor Suite Installation Manual

for Vantage Pro Weather Stations

Product # 6320, 6320C, 6321, 6321C, 6325, 6325C, 6326, 6326C

Contents

Introduction

The Integrated Sensor Suite (ISS) collects outside weather data and sends the data to a Vantage Pro console or Weather Envoy. Wireless and cabled versions of the ISS are available, as well as standard and plus versions. The Wireless ISS is solar powered and sends data to the console via a low-power radio. The Cabled ISS sends data and receives power via the console cable.

Standard versions of the ISS include a rain collector, temperature sensor, humidity sensor and anemometer. The ISS Plus adds a solar radiation sensor and an ultra-violet (UV) sensor. Temperature and humidity sensors are mounted in a passive radiation shield to minimize the impact of solar radiation on sensor readings. The anemometer measures wind speed and direction and can be installed adjacent to ISS or apart from it, *see "Siting the ISS and Anemometer" on page 9* for siting guidelines.

The solar and UV sensors are mounted next to the rain collector cone. Solar and UV sensors are available separately to upgrade a standard ISS. See "Appendix B: Optional Accessories" on page 20.

The Sensor Interface Module (SIM) contains the "brains" of the ISS and is located on the bottom of the radiation shield. The SIM collects outside weather data from the ISS sensors and then transmits the data to your Vantage Pro console or Weather Envoy.

Included Components and Hardware

The ISS comes with all the components and hardware shown in the following illustrations. If you purchased your ISS as part of a Weather Station, additional components may be included in the package that are not shown here.

Components

Component labels
UV and Solar Sensors (ISS Plus Only)
Debris Screen (Place inside cone after installation)
Console Cable 100' (30 m) (Cabled ISS Only)
Anemometer Vane
Sensor Mounting Shelf (ISS Plus Only)
Rain Collector
Control Head
Solar Panel (Wireless ISS Only)
Drip Ring
Anemometer Base
ISS Base
Wind Cups
Radiation Shield
Anemometer Arm
SIM Housing
Anemometer Cable 40' (12.2 m)

Note: *Do not touch the small white diffusers on top of the UV and solar radiation sensors. Oil from skin reduces their sensitivity. Clean using ethyl alcohol on a soft cloth. NO RUBBING ALCOHOL.*

Hardware

U-Bolts (2)	#6 x 1/2" (3.5 x 12 mm) Self-Threading Screws (2)	1/4" x 3" (~6 x 75 mm) Lag Screws
1/4" Flat Washers (4)	3-Volt Lithium Battery (Wireless ISS only)	#4 x 1-1/8" Machine Screw
1/4" Lock Washers (4)		#4 Tooth Lock Washer
1/4" Hex Nuts (4)	.05" Allen Wrench	#4 Flat Washer
Backing Plate		#4-40 Hex Nut
8" Cable Tie		
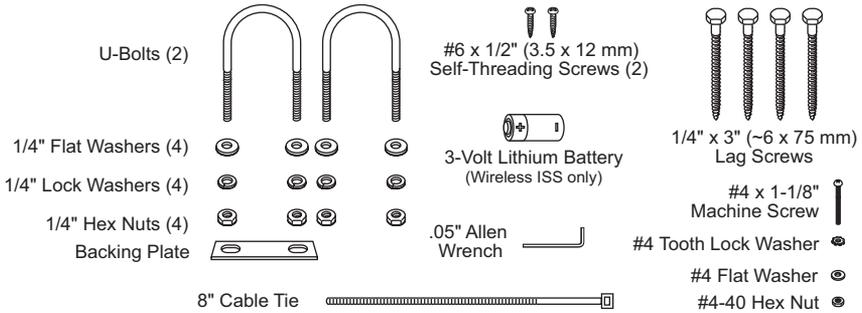
Tools for Setup

- Small Phillips-head screwdriver
- Scissors or wire-cutters
- Adjustable wrench or 7/16" wrench
- Compass or local area map
- Ballpoint pen or paper clip (small pointed object of some kind)
- Drill and 3/16" (5 mm) drill bit (if mounting on a vertical surface)

Preparing the ISS for Installation

Please follow the steps in the order they are presented. Each step builds on tasks completed in previous steps.

Note: *We recommend using a well-lit worktable to prepare the ISS for installation.*

The steps to prepare the ISS for installation are:

- Assemble the anemometer
- Check the factory-installed sensor cable connections to the SIM.
- Connect the anemometer sensor cable to the Sensor Interface Module, or "SIM".
- Apply power to the ISS and test communications with the console.
- Change the transmitter ID for wireless communication, if necessary

Assemble the Anemometer

The anemometer measures wind direction and speed. The wind vane is already attached to the anemometer arm, but you will need to install the wind cups and attach the arm to the base.
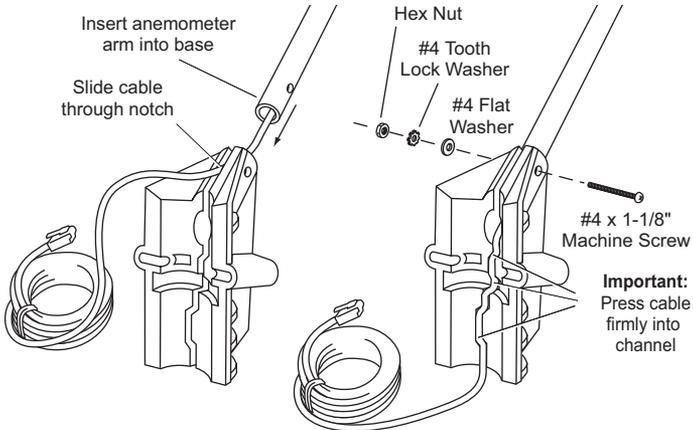
Please locate the following parts to prepare the anemometer:

- Anemometer arm (wind vane and cable already attached)
- Anemometer base
- Wind cups
- Drip ring
- Allen wrench (0.05")
- #4 machine screw, #4 tooth-lock washer, #4 flat washer, #4 hex nut

Attaching Anemometer Arm to Base

1. Insert the anemometer arm into the base, sliding the cable through the notch in the base as shown in illustration.
Be sure to line up the small hole in the arm with the holes in the base.

Insert anemometer arm into base

Slide cable through notch

Hex Nut

#4 Tooth Lock Washer

#4 Flat Washer

#4 x 1-1/8" Machine Screw

Important: Press cable firmly into channel

2. Insert the machine screw through the holes in the base and arm.

3. Slide the flat washer, tooth-lock washer and hex nut onto the machine screw. Tighten the hex nut while holding the screw with a Phillips screwdriver to prevent it from turning.

4. PRESS the sensor cable firmly and completely into the zig-zagging channel in the base, taking up any slack between arm and base.

> *Note:* *The U-bolt used to mount the ISS can pinch or cause wear on the anemometer cable if the cable is not pressed completely into the channel,.*

Attaching the Drip Ring and Wind Cups

The drip ring attaches to the bottom edge of the anemometer head to help protect the wind cups from icing over. Install the drip ring first, then install the wind cups.

1. Place the black plastic drip ring on the bottom edge of the anemometer head. Gently push the drip ring onto the head until it clicks into place.

2. Make sure the lower edge of the drip ring is aligned with the lower edge of the anemometer head.

Anemometer Head

Drip Ring

Lower edge of drip ring aligned with lower edge of anemometer head
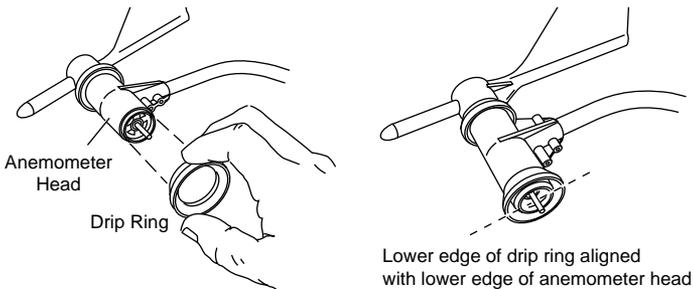
Attaching the Drip Ring

3. Push the wind cups up onto the anemometer's stainless steel shaft.

4. Slide the wind cups up the shaft as far as possible.

5. 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.

Push cups onto stainless steel shaft

Tighten set screw with Allen wrench

Attaching Wind Cups

6. Spin the wind cups.

7. If the wind cups spin freely, the anemometer is ready and can be set aside while you prepare the rest of the ISS for installation.

8. If the wind cups don't spin freely, repeat steps 1, 2 and 3.
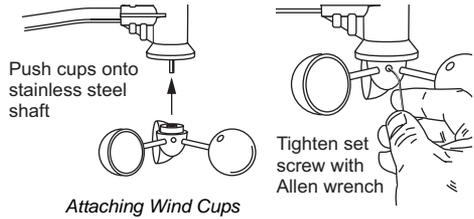
Check SIM Sensor Connections

Open the SIM Housing Cover

1. Turn ISS upside down with the rain collector cone on the bottom.

2. Push back on the two plastic latches to release the SIM cover, then open the cover. You should now be able to see the SIM.
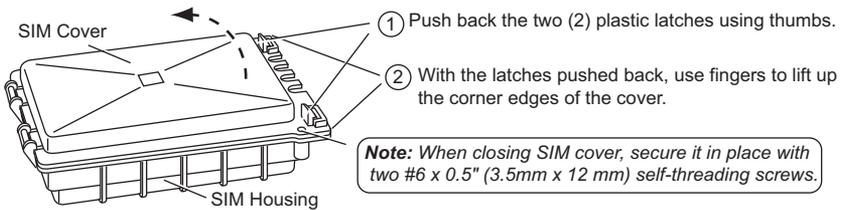
SIM Cover

① Push back the two (2) plastic latches using thumbs.

② With the latches pushed back, use fingers to lift up the corner edges of the cover.

Note: When closing SIM cover, secure it in place with two #6 x 0.5" (3.5mm x 12 mm) self-threading screws.

SIM Housing

Opening the SIM Housing Cover

Check the Factory Installed Sensor Connections

1. Verify that the rain sensor and temp/hum sensor cables are plugged into the receptacles labeled "RAIN" and "TEMP HUM" on the SIM.

3-Volt Lithium Battery
(Wireless ISS Only)

Optional { UV / Solar

Solar Panel Power
(Wireless ISS Only)

Rain Collector
Anemometer

AC Power (optional)

Temp/Humidity

UV SUN RAIN WIND HUM   TEMP

Console Cable
(Cabled ISS Only)

Cable Channels
(press cables fully into channel)

DIP Switches
(Wireless ISS Only)
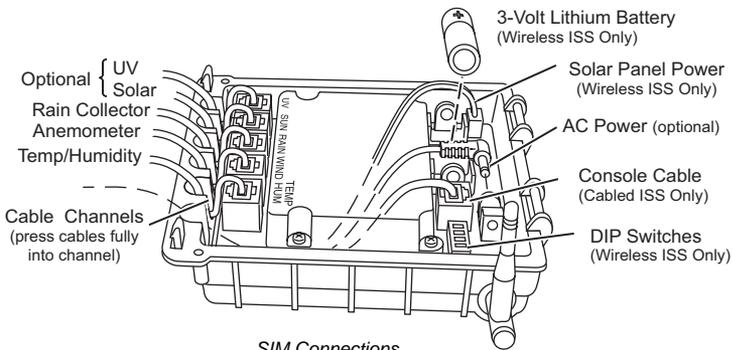
SIM Connections

2. If your station includes UV and/or solar radiation sensors, verify that the sensor cables are plugged into the SIM.

4

Connect the Anemometer Cable to the SIM

1. Unwind the coil of cable enough to work with the anemometer. Do not unwind the entire coil of anemometer cable just yet.

2. Gently insert the end of the anemometer cable into the connector labeled "WIND" on the SIM.

3. Press the cable fully into the channel next to the connector as shown on the next page.

Cabled ISS: Powering and Testing

Applying Power

The 100' (30 m) console cable provides power to the ISS and is used to send data from the ISS to the console. The console cable can be extended up to 1000' (305 m) in length'.

1. Locate the 100' console cable included with your system.

2. On the SIM, gently insert one end of the 4-conductor cable into the modular connector located apart from the sensor connectors. Refer to the figure "SIM Connections" on this page.

3. If you haven't powered up the console yet, refer to the installation instructions in the *Vantage Pro Console Manual* and apply power to the console.

4. On the back of your console, insert the other end of the console cable into the modular receptacle labeled "ISS."

Plugging the console cable into the console powers the ISS and establishes communication between the ISS and the console. Your ISS should immediately begin collecting weather data and start sending the data to the console. Data is sent through the cable that you connected during the preceding step in order to power the ISS.

Verifying Communication

Use these steps to verify reception of ISS data at the console for a Cabled Vantage Pro and to test the operation of the ISS sensors.

1. If the console is in Setup Mode, press and hold down the **DONE** key until the "Current Weather" screen appears.

The console should now display sensor readings from the ISS.

2. Near the center of the screen, look for inside and outside temperatures.

3. Spin the wind cups to check wind speed, pressing the **WIND** key if necessary to alternate between speed and direction in the compass rose.

4. Turn the wind vane, and allow 5 seconds for the wind direction display to stabilize before moving it again.

5. Approximately one minute after power-up the outside relative humidity reading should be displayed on the console.

6. If you have a UV sensor and or solar radiation sensor, press the **UV** key for current ultraviolet readings or press **2ND** then press **SOLAR** for solar radiation readings.

UV and solar readings should be zero or close to zero if the ISS is inside. Zero is a valid reading — dashes are displayed if no data comes from the sensors.

7. Current weather data displayed on the console confirms successful communication. If the console is not receiving data, proceed to "Troubleshooting Cabled ISS Reception."

8. You may wish to disconnect the console cable from the SIM at this point to ease the installation of the ISS.

9. Close the SIM housing cover on the ISS.

10. Continue on to "Prepare the Rain Collector" on page 8.

Troubleshooting Cabled ISS Communication

If your console is not receiving sensor readings from the ISS, please try the following troubleshooting procedures.

1. Check the console to make sure you are using the supplied AC adapter. Other adapters may not work.
2. Make sure the console cable is firmly plugged into the ISS connector on the console.
3. At the ISS, check that the console cable is firmly plugged into the correct modular connector. Refer to the figure "SIM Connections" on page 4.
4. Verify that all sensor cables are firmly plugged in.
5. If you still don't get readings, reboot the console by disconnecting the AC power adapter from the console and removing the console batteries for at least 30 seconds.
6. If your console is still not displaying sensor readings from the ISS, please contact Davis Technical Support. See page 18 for details.

Wireless ISS: Powering and Testing

Use these steps to power a Wireless ISS, to verify communication with the console, and to verify the operations of ISS sensors.

Note: *A super capacitor stores energy from the solar panel for power at night. The battery powers a Wireless ISS when the super capacitor is depleted.*

Applying Power to a Wireless ISS

1. Insert the 3-volt lithium battery into the SIM.
Once powered, your ISS will immediately begin transmitting data to the console.

CAUTION: *Be sure to match the "+" sign on the battery with the "+" sign on the SIM.*

Checking Transmitter ID

A Vantage Pro console can receive data from up to eight different wireless stations.

1. The default transmitter ID for the ISS and console is '1'.

In most cases it will not be necessary to change the transmitter ID. Your console and ISS should begin communicating automatically when power is applied.
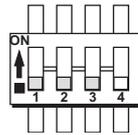
Settings for Transmitter ID 1:
DIP Switch 1 = OFF
DIP Switch 2 = OFF
DIP Switch 3 = OFF

2. If it is necessary to change the transmitter ID, remember to use the same the ID for the ISS and console. See "Appendix A: Wireless Transmitter IDs" on page 19.

Verifying Communication with the Console

1. If you haven't powered up the console yet, refer to the *Vantage Pro Console Manual* and apply power the console.

Note: *The console automatically enters Setup Mode when powered up.*

2. If the console is not in Setup Mode, press and hold the **DONE** key then press the **"-"** key.
You should see the words: "RECEIVING FROM..." and "STATION NO." followed by the transmitter IDs that your console detects.
3. Look for the ISS transmitter ID which will be '1' unless you have changed it. If the console shows the ISS transmitter ID then your ISS is being detected.

4. If you see the ISS ID number, press and hold down the **DONE** key to view ISS data.

> ***Note:*** *Be sure to allow up to a minute for the ID number to appear on the screen.*

5. If the console does not display the number of the ISS transmitter ID setting, refer to "Troubleshooting Wireless ISS Reception" later in this section.

Verifying Data from the ISS Sensors

Your console should now display weather readings from the ISS. Refer to the *Vantage Pro Console Manual* for more information.

1. Near the center of the screen, look for inside and outside temperatures.

2. Spin the wind cups to check wind speed. Press the **WIND** key if necessary to toggle the wind display between speed and direction readings.

3. Turn the wind vane, and allow 5 seconds for the wind direction display to stabilize before moving it again.

4. The outside relative humidity reading takes approximately one minute to display after power-up.

5. If you have a UV sensor and or solar radiation sensor, press the **UV** key for current ultraviolet readings or press **2ND** then press **SOLAR** for solar radiation readings.
UV and solar radiation readings should be zero or close to zero if the ISS is inside. Zero is a valid reading — dashes are displayed if no data comes from the sensors.

6. Display of current weather data confirms communication. If the console is not receiving ISS data, proceed to "Troubleshooting Wireless ISS Reception" below.

7. Press the **DONE** key to exit Setup Mode.

8. Close the SIM housing cover on the ISS.

9. Continue on to "Prepare the Rain Collector" on page 8.

Troubleshooting Wireless ISS Reception

If the console isn't displaying data from the ISS, perform the following steps:

1. Verify that the console is powered and is not in Setup Mode.

2. Make sure that all ISS sensor cables are firmly connected to the SIM and the ISS battery is properly installed.

3. Walk around the room with the console, standing for a few moments in various locations to see if you are picking up signals from the ISS. Look on the screen's lower right corner. An "X" toggles on and off when the console receives a transmission.

4. If you do not see the "X" slowly blinking, no matter where you stand with the console, put your ISS in Test Mode.

Setting for Test Mode
DIP Switch #4 = ON

  • DIP switch #4 on the SIM (see the diagram below) is the Test Mode switch. Switch it to the ON position, using a ballpoint pen or paper clip.

  • An LED indicator light on the SIM will flash each time the ISS transmits, which is once every 2.5 seconds.
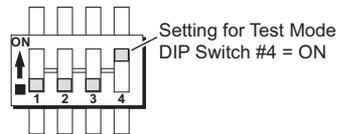
5. If the LED remains dark, there is a problem with the ISS transmitter. See "Contacting Davis Instruments" on page 18.

6. If the LED flashes repeatedly but your console isn't picking up a signal anywhere in the room, it could be related to one of the following causes:

- • You changed the ISS transmitter ID at the ISS or console, but not at both.

- • Reception is being disrupted by RF (radio frequency) interference. Interference has to be strong to prevent the console from receiving a signal while in the same room as the ISS! In high-interference environments, it may be preferable to install the Cabled Vantage Pro.

- • There is a problem with the console.

7. If you are unable to resolve a problem with the wireless transmission, please contact Technical Support for assistance (see page 18).

8. When you are finished testing wireless transmission, set DIP switch # 4 to OFF to take the SIM out of Test Mode.

Note: *If the SIM is left in Test Mode, the blinking LED will significantly reduce ISS battery life.*

Prepare the Rain Collector

Prepare the rain collector by releasing the tipping bucket. The tipping bucket is secured at the factory to protect it from wear and damage during shipping.

1. Remove the rain collector cone from the ISS base by rotating the cone counter-clockwise. When the cone's latches line up with openings in the base, lift the cone off the ISS base.

Twist to Open
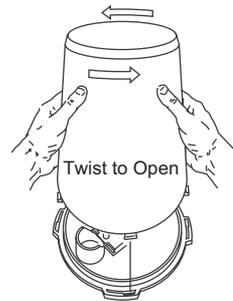
Note: *When new the cone fits tightly in the base and may require extra pressure to remove the first few times.*

Tip: *Steady the ISS base between your knees when removing the cone.*

2. On Vantage Pro Plus, the UV and solar radiation sensor cables are routed through the ISS base. Please make sure the cables are not moved during this procedure. Make sure the cables do not interfere with the tipping bucket mechanism or with your ability to get the cone latched back onto the base.

3. Carefully cut and remove the plastic cable tie (usually black in color) that holds the tipping bucket mechanism in place during shipping.

4. On your console screen, look for DAILY RAIN display.

5. While watching the daily rain display, slowly tip the bucket mechanism until it drops to opposite side. Each tip indicates 0.01" of rain and may take up to 10 seconds to register at the console. If the number doesn't change, you may be tipping the bucket too quickly. Try again, more slowly this time.

Tipping Bucket Mechanism

Cable Tie

Cut the plastic cable tie.

6. Temporarily reinstall rain collector cone until you are ready to mount the ISS outside.
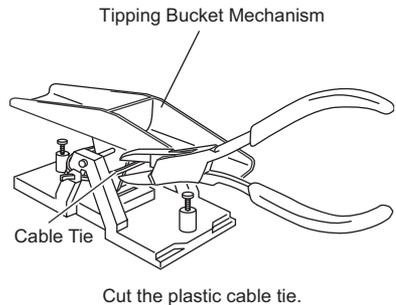
Siting the ISS and Anemometer

For your weather station to perform at its best, use these guidelines to select the best mounting locations for your ISS and anemometer. Be sure to take ease of access for maintenance, sensor cable lengths and wireless transmission range into consideration when siting your station.

General ISS Siting Guidelines:

- Place the ISS at least 5' (1.5 m) away from sources of heat such as chimneys and exhaust vents.
- Avoid placing the ISS near or above any object or area that collects and radiates heat in the sunshine. This includes any kind of paving, patio or deck, or metal or concrete structures or objects.
- Ideally, place the ISS 5' (1.5 m) above the ground in a grassy area.
- Avoid locating the ISS in an area that is prone to precipitation runoff — look out for trees and nearby buildings.
- If you have a wireless ISS, or if you have a solar radiation or UV sensor, look for a location with good sun exposure throughout the day.
- Mount a Wireless ISS so that the solar panel receives the maximum amount of sunshine available at that location.
- For Agricultural applications install the ISS and anemometer as a single unit 6.5' (2 m) above the ground. This is especially important for evapotranspiration (ET) calculations.

Anemometer Siting Guidelines

- Generally, the anemometer and ISS have different siting requirements and will provide better readings when mounted apart from each other.
- For best results place the Anemometer above local objects that obstruct the wind flow.
- If mounting on a roof, mount the anemometer at least 4' (1.2 m) and ideally 10' (3 m) above the roof line.
- The standard for meteorological and aviation applications is to place the anemometer 33 feet (10 m) above the ground.

Note: *For roof mounting, and for ease of installation in other locations, we recommend using the optional Mounting Tripod #7716.*

Cable Length Considerations

- All Vantage Pro stations include a 40' (12m) cable to go between the ISS and the anemometer. This can be extended up to 540' (165m) using optional cables. See "Extending Wireless Transmission Range" on page 15
- The Cabled Vantage Pro includes a 100' (30m) cable to go between the console and the ISS. This can be extended up to 1000' (300m) using optional cables.

Wireless Transmission Considerations

The range of the radio transmission depends on several factors. Try to position the transmitter and the receiver as close as possible for best results.

- Typical maximum ranges:
  - Line of sight: 400 feet (120 m)
  - Under most conditions: 75 to 150 feet (23 to 46 m)

- Range may be reduced by walls, ceilings, trees, foliage, a metal roof or other large metal structure or objects such as aluminum siding, metal ducting, and metal appliances such as a refrigerator.
- Radio-frequency interference (RFI) will also reduce transmission distance. Cordless phones (900 Mhz) and ham radios are common examples of RFI.
- Transmission between wireless units may be obscured by something you cannot identify, or by some obstacle that you can't work around.
- As a general rule, orient the ISS antenna and the console antenna so that they are parallel with each other.
- The signal may be weak directly underneath the ISS. Try rotating the ISS and the console antennas to parallel, horizontal positions if you are installing the ISS directly over the console.
- Turn the gain on to improve reception for a weak signal. Refer to the *Vantage Pro Console Manual* for information on setting the console gain.
- If necessary, consider using a Wireless Repeater #7624 or #7625, to strengthen the signal or increase the distance between your ISS and the console. See "Optional Wireless Stations" on page 16

Testing Wireless Transmission at ISS Location

Note: *After you have found a suitable place for your wireless ISS, it is very important to test reception from that location before permanently mounting it there.*

1. Set the ISS where you intend to install it. You may want to have someone hold it in place during the test.
2. Set console where you intend to use it.

> **Note:** *For example, let's say you are installing a Wireless Vantage Pro with the ISS mounted on a fence at the back of the property. With the ISS up on the fence temporarily, test the console's reception where you intend to use it.*

3. On the console, press and hold the **TEMP** button and press the **TIME** button to display reception statistics.
   - It's a good idea to test the console's reception anywhere that you might want to use or mount it now or in the future. Take your time. If you aren't picking up a strong signal where you intend to place your console, try rotating the antenna on the console and ISS or try moving the console and ISS to different positions.
   - If you have irregular terrain in the area, it may interfere with the signal. For example, if the ISS is mounted downhill from the console, the ground may block a wide angle of the transmitted signal.
4. Press and hold the **DONE** button to return to the normal screen when finished testing.

Note: *See the Troubleshooting section of the* Vantage Pro Console Manual *for information on how to check wireless signal strength and for more information on troubleshooting reception problems.*

Installing the ISS

The anemometer and the main part of the ISS can be installed either together as a single unit on a pole, or apart from each other. The main part of the ISS includes the rain collector, the temperature and humidity sensors, the radiation shield, and the SIM housing. Use the U-bolts to install the ISS and anemometer the together or separately on a pole. Use the lag screws to install them separately on a flat, vertical surface.

The anemometer comes with a 40' (12 m) cable so you can flexibly configure your system to monitor wind conditions. For example, you could mount the anemometer at the highest point of a roof, then place the main part of the ISS on a fence closer to ground level.

General ISS Installation Guidelines

- Install the ISS as level as possible to ensure accurate rain measurements. Use a bubble level or carpenter's level to make sure the ISS is level
- In the Northern Hemisphere, the solar panel should face south for maximum sun exposure.
- In the Southern Hemisphere aim the solar panel North for maximum sun exposure.
  Either install the ISS and anemometer separately, each facing North, or mount them as a single unit with solar panel facing north and the wind vane re-oriented to the south. See "Appendix C: Re-orienting the Wind Vane"
- If you are near the equator aim the solar panel east or west. Pick the direction that receives the maximum sunshine at your location.

Guidelines for Securing Cables

- To prevent fraying or cutting of cables, secure them so they will not whip about in the wind.
- Secure a cable to a metal pole using cable ties or by wrapping electrical tape around them both.
- Place clips or ties approximately every 3 – 5' (1 – 1.6 m).

Cable Clip   **Cable Tie**

- Mounting clips, cable ties or additional hardware not included with your station can be easily obtained at a hardware or electronics store.
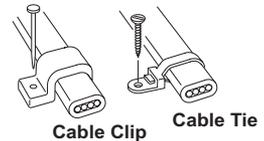
Note: *Do not use metal staples or a staple gun to secure cables. Metal staples — especially when installed with a staple gun — have a tendency to cut the cables.*

Orient the Wind Vane

The wind vane rotates 360° to display current and dominant wind directions on the compass rose of the display. To obtain accurate readings, the vane must be *correctly oriented* when you mount the anemometer outside. By default, the wind vane on the anemometer detects the correct wind direction if the anemometer arm points North.

You can ensure correct orientation of the wind vane in one of two ways:

1. Mount the anemometer so that the arm points north.
   The wind vane will be ready for use immediately if you do this.
2. If you mount your anemometer so that it does not aim North, you will need to remove the wind vane and re-attach it aiming toward the preferred direction.
   Refer to the instructions in "Appendix C: Re-orienting the Wind Vane" on page 21.

Installing the ISS on a Flat Surface

Refer to the following illustration to install the ISS on a post or flat, vertical surface.

Anemometer Base
1/4" Flat Washers
1/4" Lock Washers
1/4" x 3" Lag Screws
Backing Plate
1/4" x 3" Lag Screws
40' of Anemometer Cable
ISS Base

Note: *Typically the anemometer and rain collector are mounted on opposite sides of the post. They are shown mounted on adjoining sides to clarify the installation details.*
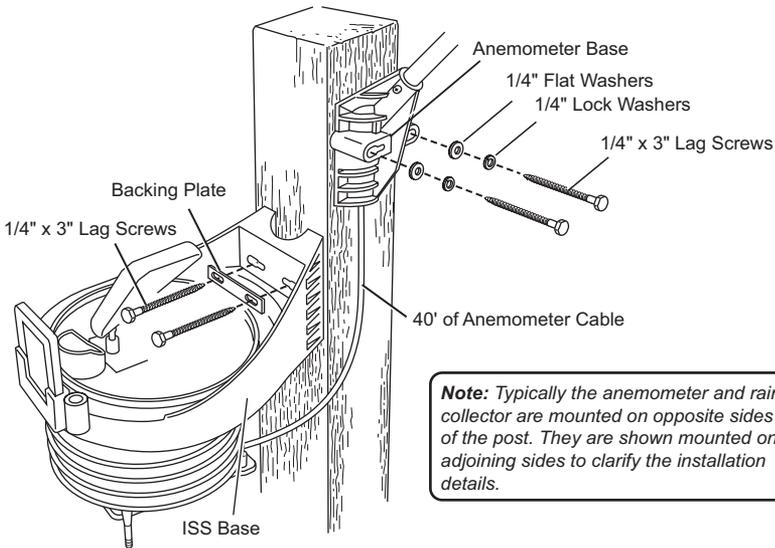
Installing the ISS on a Post or Flat Surface

1. With a 3/16" (5 mm) drill bit, drill two holes approximately 2-1/8" (54 mm) apart. Use a carpenter's level to ensure the holes will be level.
Use the metal backing plate as your guide when marking the holes.

2. Remove the rain collector cone if it is installed on the ISS mounting base.

3. Insert the 1/4" x 3" lag screws through the metal backing plate and the holes in the mounting base into the post.

4. Using an adjustable wrench or 7/16" wrench, tighten the lag screws.

5. Re-attach the rain collector cone. Set the cone back on the base so its latches slide downward into the latch openings on the base. Rotate cone clockwise.

6. Place the debris screen (shown in the illustration on page 2) inside the cone, "feet-down" over the funnel hole.

Installing the Anemometer on a Post or Flat Surface

1. With a 3/16" (5 mm) drill bit, drill two holes approximately 2-1/8" (54 mm) apart. Use a carpenter's level to ensure the holes will be level.

2. Insert the 1/4" x 3" lag screws through the flat washers and the holes in the anemometer mounting base into the post.

3. Using an adjustable wrench or 7/16" wrench, tighten the lag screws.
If the anemometer arm is not pointing north, follow the instructions in "Appendix C: Re-orienting the Wind Vane" on page 21.

Installing the ISS on a Pole

When installing the ISS on a pole, the rain collector and radiation shield section of the ISS can be mounted as a single unit with the anemometer section, or the two sections can be mounted separately.

Refer to the following illustration when installing the ISS or anemometer on a pole:
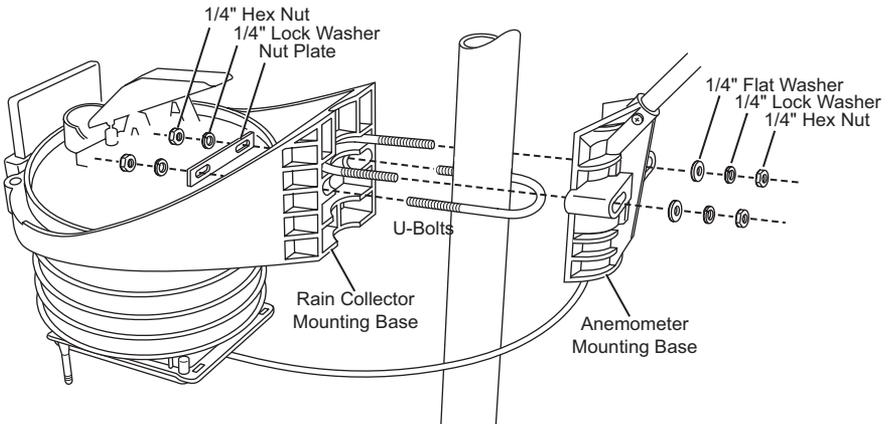
Mounting the ISS on a Pole

Accessories for Pole Mounting

- Use the Mounting Tripod #7716 for easy roof-mounting.
- The Mounting Pole Kit #7717 can raise the installation height of your ISS by up to 37.5" (0.95 m).

General Guidelines for Installing on a Pole

- With the supplied U-bolts, the ISS can be mounted on a pole having an outside diameter ranging from 1-1/4" to 1-3/4" (32 – 44mm).
- Larger U-bolts (not supplied) can be used to mount to a pole with a maximum outside diameter of 2-1/2" (64mm).
- To mount on a smaller diameter pole, obtain a U-bolt that fits the base openings but that has a shorter threaded section. If you try to mount on a smaller pole with the included U-bolts, the threaded parts of the bolt will interfere with the rain collector cone.

Guidelines for Installing the ISS on a Pole

- It is very important to remember, when mounting both sides together, that whichever side of your ISS is mounted first, the U-bolt from the opposite side ALSO must be placed around the pole before you tighten anything. (If it is not, there is no way to slide it in later.)
- In each side's mounting base, there is a groove to accommodate the other side's U-bolt.
- Once you loosely mount the two sides of your ISS together on a pole, you'll be able to swivel the unit to the correct direction and then tighten the hex nuts.
- You will also be able to slide it vertically to the desired height.

Installing ISS and Anemometer Together

Please remember to install your ISS so the anemometer arm is aiming North. If the arm doesn't point North you will need to re-orient the wind vane. See "Appendix C: Re-orienting the Wind Vane" on page 21.

1. Place the U-bolt for the anemometer around the pole so that its round end will fit in the top groove of the rain collector side's plastic mounting base.
   The groove is right above two large holes.
2. While holding the mounting base of the rain collector side against the pole, place the two ends of the remaining U-bolt around the pole and through the two holes in the base.
3. Slide the metal backing plate over the bolt ends as they stick out over the rain collector base. Secure the backing plate with a lock washer and hex nut on each of the bolt ends as shown previously. ***Do not tighten the nuts yet.***

   Note: *Leave the nuts loose enough to swivel the ISS base on the pole.*

   ---

4. The two ends of the anemometer's U-bolt should now be pointing away from the mounted rain collector side. Slide the anemometer's mounting base over the protruding bolt ends. Place a flat washer, a lock washer and a hex nut on each of the bolt ends as shown above. Do not tighten the nuts yet.
5. Raise the ISS unit to the desired height on the pole and swivel it so the anemometer arm is pointing north.
6. Using an adjustable wrench or 7/16" wrench, tighten all four hex nuts until the ISS is firmly fastened on the pole.
7. Re-attach the rain collector cone by setting the cone back on the base so its latches slide downward into the latch openings on the base, then rotate the cone clockwise.
8. Place the debris screen (shown in the illustration on page 2) inside the cone, "feet-down," over the funnel hole.

   Note: *When installing the ISS as a single unit, we recommend tucking the coil of anemometer cable between the rain collector cone and the ISS base.*

Installing ISS Only

1. While holding the mounting base against the pole, place the two ends of a U-bolt around the pole and through the two holes in the base.
2. Slide the metal backing plate over the bolt ends as they stick out toward the rain collector cone. Secure the backing plate with a washer, a lock washer, and a hex nut on each of the bolt ends. Do not tighten the nuts yet.
   For the wireless ISS, swivel the ISS base so the solar panel is facing south (in the Northern Hemisphere), or north (in the Southern Hemisphere).
3. Using an adjustable wrench or 7/16" wrench, tighten the nuts.
4. Re-attach the rain collector cone.
   Set the cone back on the base so its latches slide downward into the latch openings on the base. Rotate cone clockwise.
5. Place the debris screen (shown in the illustration on page 2) inside the cone, "feet-down," over the funnel hole.

Installing Anemometer Only

1. While holding the mounting base against the pole, place a U-bolt around the pole and through the two holes in the base.
2. Place a flat washer, a lock washer and a hex nut on each of the bolt ends.

3. Swivel the anemometer until the arm is pointing north.

   If the anemometer arm is not pointing north, go to "Appendix C: Re-orienting the Wind Vane" on page 21 after tightening the nuts.

4. Using an adjustable wrench or 7/16" wrench, tighten the nuts.

Finishing the Installation

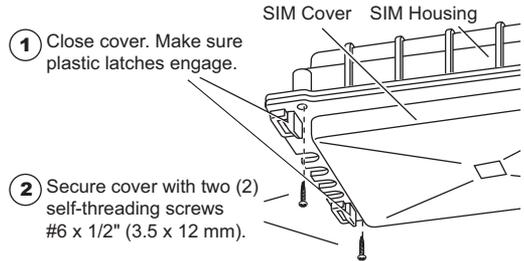### Level the Solar and UV Sensors

If your station includes a solar or UV sensor, use the bubble level on the sensor as a guide to verify that the sensor is level.

You can adjust the level by tightening or loosening the screws that hold the sensor onto the shelf.

Securing the SIM Cover

We recommend using screws to securely fasten the SIM cover.

1. Make sure the SIM cover is completely closed with the plastic latches engaged.

2. Secure the SIM cover using the two #6 1/2" (3.5 mm x 12 mm) screws included in the ISS hardware.

SIM Cover   SIM Housing

① Close cover. Make sure plastic latches engage.

② Secure cover with two (2) self-threading screws #6 x 1/2" (3.5 x 12 mm).

> **Note:** *Plastic latches alone may not keep the SIM cover fastened during windy conditions. Use screws to secure the SIM Cover in place.*

Clearing Data Collected During Testing and Installation

Now that your ISS is mounted outside, you may want to clear out all data that was collected in the Vantage Pro console during testing and mounting.

To clear all the collected data in the console:

1. Select the **WIND** key on the console so that graph icon appears adjacent to the wind data on the display.

2. Press the **2ND** key, then press and hold the **CLEAR** key for at least six seconds and until you see "CLEARING NOW" in the console ticker display.

Additional Mounting Options

Extending Wireless Transmission Range

You can use our optional repeater stations to extend the wireless transmission range:

- Wireless Repeater, AC-Powered #7624
- Wireless Repeater, Solar-Powered #7625

Extending the Console Cable (Cabled ISS Only)

You can install a Cabled ISS up to 1000' (300m) away from the console by using our extension cables, #7876.

Relocating the Anemometer

Using Extension Cables:

Note: *Not all cables are compatible with your Vantage Pro system. To be sure they will work, order Davis extension cables from your dealer or directly from Davis Instruments.*

If you would like to locate the anemometer more than 40' (12 m) from the ISS, use our extension cables #7876.

Be aware that the maximum measurable wind speed reading decreases as the total length of cable from the anemometer to the ISS increases. If the cable length is greater than 540' (165m), the maximum measurable wind speed may be less than 100 mph (161 km/h).

Using the Anemometer Transmitter Kit (Wireless ISS Only)

Use the Anemometer Transmitter Kit #6330 to add an independent wireless transmitter to your anemometer. The kit allows the anemometer to function as a transmitter station sending wind data directly to the console, instead of transmitting via the ISS.

Remote Mounting the Solar and UV Sensors

The solar and UV sensors have a 3' (0.9 m) cable. If you wish to install these sensors away from the ISS, you can extend the length of the sensor cables with our extension cables, #7876.

Note: *Not all cables are compatible with your Vantage Pro system. To be sure they will work, order Davis extension cables from your dealer or directly from Davis Instruments.*

Optional Wireless Stations

Use our optional wireless sensor stations to collect additional weather measurements, without the inconvenience of routing cables:

- Wireless Temperature Station #6370
- Wireless Temperature/Humidity Station #6380 or #6385
- Wireless Leaf & Soil Moisture/Temperature Station #6343

For more details, please visit our website or see the Weather Instruments catalog. Some information is also available in "Appendix A: Wireless Transmitter IDs" on page 19.

Maintenance

Maintaining UV and Solar Radiation Sensors

Make every effort to avoid touching the small white diffusers at the top of the sensors. Any skin oil will reduce the sensitivity of the sensors. For accurate readings, clean the diffusers at least once per month using ethyl alcohol on a soft cloth (NOT rubbing alcohol).

Due to the sensitivity of ultraviolet and solar radiation sensors it is common practice for manufacturers to recommend re-calibration after a period of time. Here at Davis Instruments we have seen less than 2% drift per year on the readings from these sensors. For applications demanding higher accuracy, however, the sensors should be calibrated once every year.
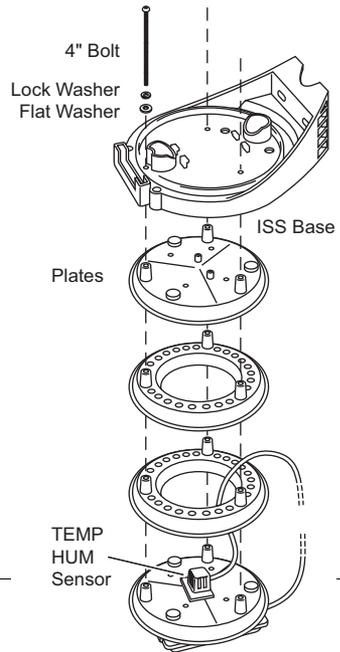
Contact Technical Support about returning your sensor for calibration. See "Contacting Davis Instruments" on page 18.

Cleaning the Radiation Shield

Check the radiation shield for debris or insect nests at least once a year and clean when necessary. A buildup of material inside the shield will reduce its effectiveness and may cause inaccurate temperature and humidity readings.

To clean the radiation shield:

1. Remove the rain collector cone.
2. Using a Phillips head screwdriver, loosen the three 4" (~100mm) bolts holding the radiation shield plates together.
3. Separate the plates as shown and remove all debris from inside the shield.
4. Reassemble the radiation shield plates and fasten them together using the bolts as shown in the illustration. Use a Phillips screwdriver to tighten the bolts.

Cleaning the Rain Collector

To maintain accuracy, thoroughly clean the rain collector several times a year.

Note: *Cleaning the tipping bucket may cause false rain readings. See your Vantage Pro Console Manual for instructions on clearing weather data.*

4" Bolt
Lock Washer
Flat Washer
ISS Base
Plates
TEMP HUM Sensor

ISS Radiation Shield Assembly

1. Separate the cone from the base by turning it counter-clockwise.
2. Use soapy water and a soft cloth to remove any debris from the cone, cone screen, and tipping bucket. Watch out for spiders — they seem to like rain collectors!
3. Use pipe cleaners to clear the funnel hole in the cone and drain screens in the base.
4. When all parts are clean, rinse with clear water.
5. Re-attach the cone and replace the debris screen.

Troubleshooting

If a Sensor Functions Intermittently

Carefully check all connections from the sensor to the ISS. See "Check SIM Sensor Connections" on page 4.

Loose connections account for a large portion of potential problems. Connections should be firmly seated in receptacles, and plugged in straight. If you think a connection may be faulty, try jiggling the cable while looking at the display. If a reading appears intermittently on the display as you jiggle the cable, the connection is faulty. Try removing and then re-installing the cable to correct the faulty connection. If the sensor still functions intermittently contact Davis Technical Support.

The Most Common Rain Collector Problem

If the rain collector seems to be under-reporting rainfall, remove the rain collector cone to clean the tipping bucket and clear out any debris.

The Most Common Anemometer Problems

> **Note:** *If the anemometer is sending no data, the wind display indicates 0 speed and a North direction.*

"The anemometer head is tilted when I mount the anemometer."

With your Allen wrench, loosen the screws holding the anemometer head on the arm. (The screws are on the bottom of the anemometer head, by the wind cups.) Turn the anemometer head so it is straight and then tighten the screws.

"The wind cups are spinning but my console displays 0 mph."

The signal from the wind cups may not be making it back to the display. Remove the cups from the anemometer (loosen the set screw shown on page 4). Put the cups back onto the shaft and adjust them up or down 1/16 – 1/8 inch (1.5 – 3 mm). Check your cables for visible nicks and cuts. Look for corrosion in the "WIND" jack on the SIM and on splices in the cable (if any). If you are using an extension cable, remove it and test using only the anemometer cable. If you still haven't resolved the problem, contact Technical Support and ask for a wind test cable.

"The wind direction is stuck on north, or displays dashes."

It is likely that there is a short or break somewhere between the wind vane and the display. Check your cables for visible nicks and cuts. Look for corrosion in the "WIND" jack on the Sensor Interface Module and on splices in the cable (if any). If possible, remove any extensions and try with the anemometer cable only. If none of these steps get the wind direction working, contact Technical Support and ask for a wind test cable.

"The wind cups don't spin or don't spin as fast as they should."

First check for and clear out any spider webs. Also, the anemometer may be located where wind is blocked by something, or there may be friction interfering with the cups' rotation. Friction usually can be remedied by the user — remove the wind cups (loosen the set screw shown on page 4) and clear out any bugs or debris. Turn the shaft the cups rotate on. If it feels gritty or stiff, contact Davis Technical Support. DO NOT LUBRICATE THE SHAFT OR BEARINGS IN ANY WAY. When replacing the cups, make sure they are not rubbing against any part of the anemometer head.

"Wind readings aren't what I expected them to be."

Comparing data from your ISS to measurements from TV, radio, newspapers, or a neighbor is NOT a valid method of verifying your readings. Wind speed and direction can vary considerably over short distances. How you site the anemometer can also make a big difference. If you have questions, contact Technical Support.

Contacting Davis Instruments

If you have questions about your ISS or Vantage Pro Station, or encounter problems installing or operating your weather station, please contact Davis Technical Support.

> **Note:** *Please do not return items to the factory for repair without prior authorization.*

(510) 732-7814 – Technical Support phone, Monday – Friday, 7:00 a.m. – 5:30 p.m. Pacific Time.

(510) 670-0589 – Technical Support Fax.

support@davisnet.com – E-mail to Technical Support.

info@davisnet.com – General e-mail.

www.davisnet.com – Download manuals and specifications from the Support section. Watch for FAQs and other updates. Subscribe to the e-newsletter.

Appendix A: Wireless Transmitter IDs

Changing ISS Transmitter ID

Each wireless transmitting station, including the Integrated Sensor Suite (ISS), uses one of eight selectable transmitter IDs. DIP switches #1, 2 and 3 on the transmitter allows you to control the ID — or "channel" — the station will transmit on. (DIP switch #4 is used for transmission testing, not for transmitter ID.)

Note: *The transmitter and receiver communicate with each other only when **both** are set to the same ID.*

The default transmitter ID is "1" for both the ISS and the Vantage Pro console, and should work fine for most situations. In some cases, such as those listed below, you may want to change the transmitter ID.

- Another Davis Instruments wireless weather station operating nearby already uses transmitter ID '1'.
- You purchased additional wireless transmitting stations with your Vantage Pro or Vantage Pro Plus and want to designate one of them as Station No. 1 instead of the ISS.

On the ISS the transmitter ID is set using the DIP switches located on the Sensor Interface Module (SIM). To access the SIM, open the SIM housing cover. See "Open the SIM Housing Cover" on page 4.
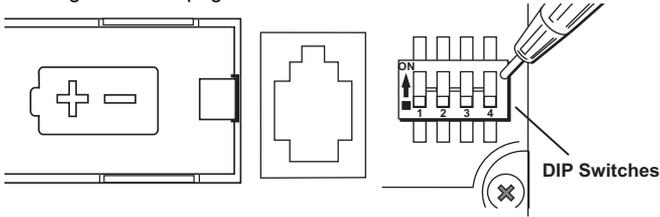
Transmitter ID DIP Switches in Top-right Corner of SIM

To change to another ID, use a ballpoint pen or paper clip to toggle DIP switches #1, 2, and 3. The settings for transmitter IDs 1 – 8 are shown in the table below:

ID Code	Switch 1	Switch 2	Switch 3
#1 (default)	off	off	off
#2	off	off	ON
#3	off	ON	off
#4	off	ON	ON
#5	ON	off	off
#6	ON	off	ON
#7	ON	ON	off
#8	ON	ON	ON

Use this table to ensure that each wireless transmitting station in your system is broadcasting on its own transmitter ID.

Be sure to set your Vantage Pro console to the same IDs as the transmitters, as described in the *Vantage Pro Console Manual*.

Using Multiple Transmitting Stations

This table shows the maximum number of each type of station that can be used with a single Vantage Pro console.

Transmitter Type	Maximum (8 total)
Integrated Sensor Suite (ISS)	1
Anemometer Transmitter Kit	1
Leaf Wetness/Temperature Station	1
Soil Moisture/Temperature Station	1
Temperature Station	8
Temperature/Humidity Station	8

Appendix B: Optional Accessories

For more information on these accessories and other weather products, call Davis Instruments or visit our website: www.davisnet.com/eather/. See "Contacting Davis Instruments" on page 18. Also see "Additional Mounting Options" on page 15.

Solar Radiation and UV Sensors

You can upgrade your ISS to an ISS Plus by installing a solar radiation sensor and a UV sensor. For ease of installation, use the mounting bracket listed below:

- UV Sensor #6490
- Solar Radiation Sensor #6450
- Sensor Mounting Shelf #6672

Other Accessories

- Daytime Fan-Aspirated Radiation Shield Kit #7745 - Uses a solar-powered fan to reduce the effect of solar radiation on temperature readings.
- Rain Collector Heater #7720 - For use in cold climates, to measure the moisture content of frozen precipitation (freezing rain, snow, hail, etc.).
- Wireless Repeater #7624 or #7625 - For extending the range of wireless transmission. Go around corners or increase the distance between transmitter and console.
- Extension Cables #7876 - Extends the anemometer, solar radiation, UV, and console cable lengths. Available in lengths of 8' (2.4m), 40' (12m), 100' (30m), and 200' (61m).
- Complete System Shelter #7724 - To locate your Vantage Pro console outside.
- Complete System Shelter Heater #7726 - For use in sub-freezing temperatures.
- Solar Power Kit #6610 - To mount your Cabled Vantage Pro console outside where there is no AC power supply or to mount your wireless console outside without having to replace the console batteries as often.
- Car/Boat/RV Lighter Cord #6604 - To power your Cabled Vantage Pro console from a standard cigarette lighter.
- AC Power Adapter for Vantage #6625 - If your wireless ISS is mounted near a standard AC outlet, use the AC adapter as backup to solar power. (And leave the battery installed as backup to the AC power in case electricity goes out during a storm.)

Appendix C: Re-orienting the Wind Vane

Your Vantage Pro station is configured to register wind direction correctly if the anemometer points to true North. If you are unable to mount the anemometer shaft pointing to true North, use the following instructions to correct the wind vane orientation.

- Do not rely on a compass unless it is properly calibrated. In North America there can be up to 15° variation between true North and a raw compass reading.
- You can also correct the wind direction readings by calibrating the wind direction in the Vantage Pro console. See the *Vantage Pro Console Manual* for information.
- To orient the wind vane accurately, you will need to look at the console display. You may wish to have a friend or family member on the ground do this for you.
- You can also re-orient the wind vane before you install the anemometer if you know the direction in which the anemometer will be installed.

To re-orient the wind vane:

1. Loosen the Wind Vane set screw.
2. Pull the vane directly up and off the steel shaft on which it turns.
3. Press WIND key on console to display current wind direction in degrees.
4. Use a reliable map or a landmark to determine in which direction (S, E, W, etc.) the anemometer arm is now pointing.
5. Use the wind direction chart or compass markings to find the degree reading which corresponds to that direction.

Wind Direction Chart
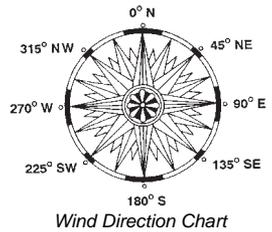
6. Slowly turn the stainless-steel wind direction shaft with your fingers. Stop turning when the display reaches the degree reading obtained in step 3.
   Please allow the wind direction display approximately 5 seconds to stabilize after the shaft is turned. You will have to turn the shaft, wait, and turn it again until the desired wind direction is displayed on the console.
7. Being careful to keep the stainless-steel shaft from turning, place the wind vane on top of shaft with the vane's nose pointing in the same direction as the arm.
8. Slide the wind vane down the shaft as far as it will go.
9. Use the Allen wrench provided to tighten the set screw on the side of the wind vane.

Tighten set screw with Allen wrench
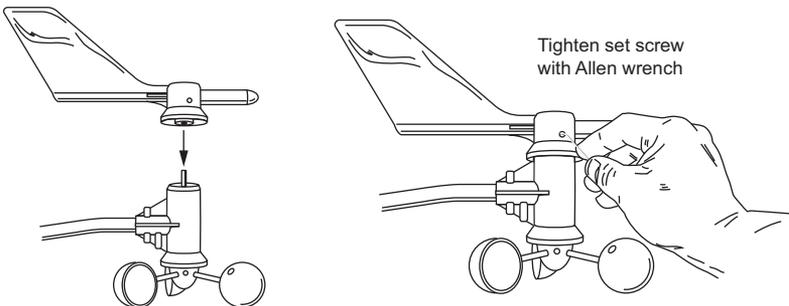
Installing Wind Vane on Anemometer Shaft

10. Test your anemometer by pointing the wind vane in any direction and making sure the console displays the correct wind direction. Remove and re-adjust the vane if it does not. Allow the wind direction display approximately 5 seconds to stabilize after turning the shaft.

Specifications

Complete specifications for the ISS and other products are available in the Weather Support section of our website: www.davisnet.com.

Cabled ISS

Temperature range: . . . . -40 to 140° Fahrenheit (-40 to 60° Celsius)
Power input: . . . . Console Cable from Vantage Pro console

Wireless ISS

Temperature range: . . . . -40 to 140° Fahrenheit (-40 to 60° Celsius)
Transmission frequency: . . . . 916.5 MHz for North America
868.35 MHz for overseas versions: EU, UK, and OV
Transmitter ID codes: . . . . 8 user-selectable
License: . . . . low power (less than 1 mW), no license required
Primary power: . . . . Solar power – Davis solar charger
Backup power: . . . . CR-123A 3-volt lithium battery (2 year service life)
Alternate primary power . . . . AC power adapter

ISS Weather Variable Update Intervals

Wind speed: . . . . 2.5 to 3 seconds
Wind direction: . . . . 2.5 to 3 seconds
Accumulated rainfall: . . . . 10 to 12 seconds
Rain rate: . . . . 10 to 12 seconds
Outside temperature: . . . . 10 to 12 seconds
Outside humidity: . . . . 50 seconds to 1 minute
Ultraviolet radiation: . . . . 50 seconds to 1 minute
Solar radiation: . . . . 50 seconds to 1 minute