

Integrated Sensor Suite Installation Manual



For Vantage Pro2™ & Vantage Pro2 Plus™ Weather Stations

DAVIS 

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FCC Part 15 Class B Registration Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modification not expressly approved in writing by Davis Instruments may void the warranty and void the user's authority to operate this equipment.

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EC EMC Compliance

This product complies with the essential protection requirements of the EC EMC Directive 89/336/EC.

Integrated Sensor Suite Installation Manual

Rev. A, September 14, 2004

Document Part Number: 07395.249

For Vantage Pro2 Weather Stations # 6322, 6322C, 6323, 6327, & 6327C

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Introduction

The Integrated Sensor Suite (ISS) collects outside weather data and sends the data to a Vantage Pro2 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.

The standard version of the ISS contains a rain collector, temperature sensor, humidity sensor and anemometer. In addition to the standard weather features, 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 the ISS or apart from it. (See “Locating the ISS and Anemometer” on page 15 for siting guidelines.)

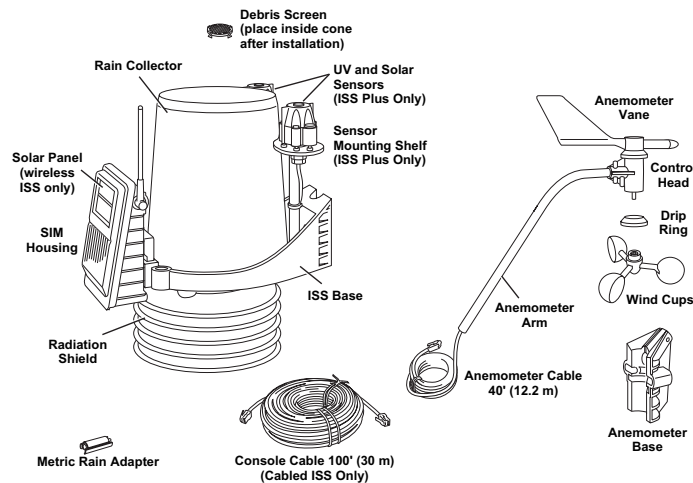
The solar and UV sensors are mounted next to the rain collector cone. Solar and UV sensors are available separately to upgrade a standard ISS. See “Appendix A: Re-orienting the Wind Vane” on page 28 for more information.

The Sensor Interface Module (SIM) contains the “brains” of the ISS and the radio transmitter. The SIM is located on the front of the radiation shield in the SIM box. The SIM collects outside weather data from the ISS sensors and then transmits the data to your Vantage Pro2 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 package containing the Vantage Pro2 console, additional components may be included in the package that are not shown here.

Components

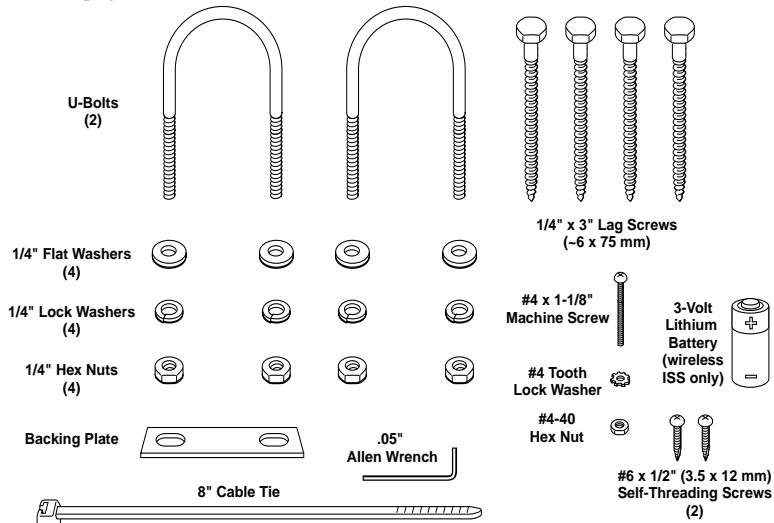


Preparing the ISS for Installation

Note: Some of the components pictured are available with the Vantage Pro2 Plus ISS model and do not come with the standard models. If the ISS is a plus model and contains the UV and solar radiation sensors, do not touch the small white diffusers on top of the sensors. Oil from skin reduces their sensitivity. Clean using denatured alcohol on a soft cloth. Do not use rubbing alcohol.

Hardware

The following hardware is included with the ISS and weather station assembly. Some of the hardware is optional based on how the ISS is assembled and installed. (See "Installing the ISS" on page 19 for more information.)



Note: If any of the hardware components are missing or not included, contact Customer Service toll free about receiving replacement hardware or other components.

Tools for Setup

The following are additional tools required to set up and install the ISS:

- Small Phillips head screwdriver
- Scissors or wire-cutters
- Adjustable wrench or 7/16" wrench
- Compass or local area map
- Ballpoint pen or paper clip (or other small pointed object)
- 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: Using a well-lit work table or work area to prepare the ISS for installation is recommended.

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 (SIM).
- Apply power to the ISS and test communication with the console.
- Change the transmitter ID for wireless communication, if necessary.

Assemble the Anemometer

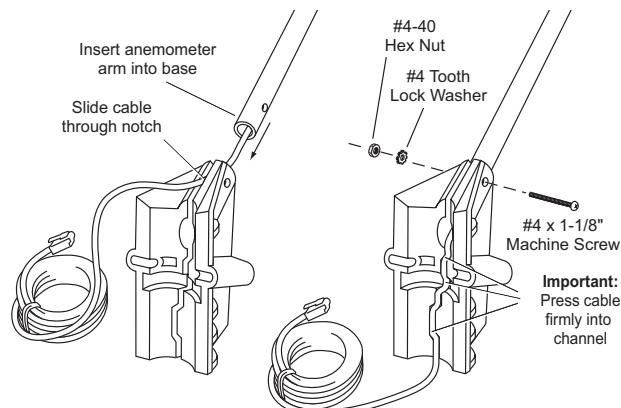
The anemometer measures wind direction and speed. The anemometer arm comes partially assembled with the wind vane attached. The anemometer arm requires assembly before it can be assembled with the rest of the ISS.

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 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.
2. Be sure to line up the small hole in the arm with the holes in the base.
3. Insert the machine screw through the holes in the base and arm.



Attaching Anemometer Arm to Base

4. Slide the tooth-lock washer and hex nut onto the machine screw. Tighten the hex nut while holding the screw with a Phillips head screwdriver to prevent it from turning.
5. Press the sensor cable firmly and completely into the zig-zagging channel in the base, starting from the arm and progressing downward to the bottom of the base. Be sure to press the cable into the channel at the bottom of the groove.

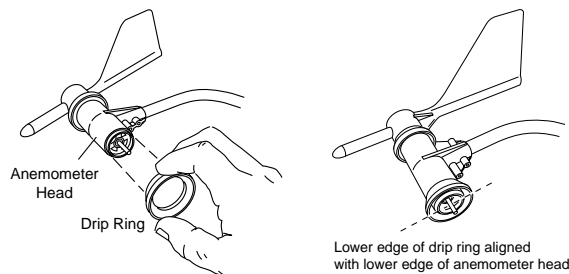
Check SIM Sensor Connections

Note: The pole can pinch or cause wear on the anemometer cable if the cable is not pressed completely into the channel at the bottom of the groove.

Attaching the Drip Ring and Wind Cups

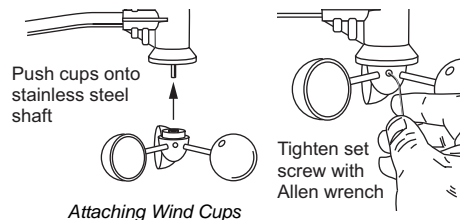
The drip ring attaches to the bottom edge of the anemometer head to help protect the wind cups from icing over. Install the drip ring first, then install the wind cups.

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.



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.
The wind cups should drop slightly when you let go.



6. Spin the wind cups.
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.

Note: If the wind cups don't spin freely, take off the wind cups and repeat the wind cup installation process.

Check SIM Sensor Connections

The SIM is located in the housing on the front of the ISS station. The SIM contains all the connections for the weather sensors of the ISS. Check the SIM to ensure that all sensors are connected properly.

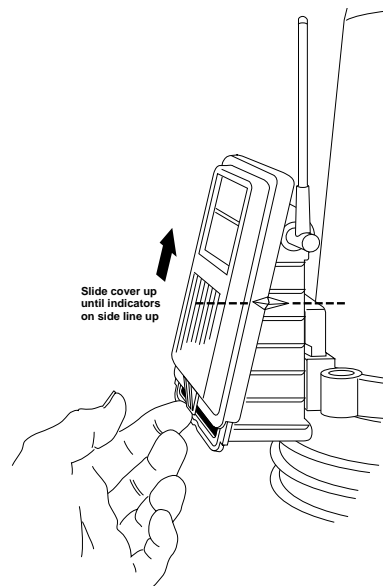
Open the SIM Box

1. Locate the white box with the solar panel containing the SIM on the front of the ISS unit.
2. Locate the white tab at the bottom center of the SIM box cover.
3. Lift the tab away from the box while sliding the cover up.

Look on the side of the SIM box. The box cover can be easily removed from the box when the alignment indicator on the cover is lined up with the alignment indicator on the box

4. Lift the cover off the box, **being careful not to stress the solar panel cable.**

The SIM and sensor connectors are visible once the SIM cover has been removed.

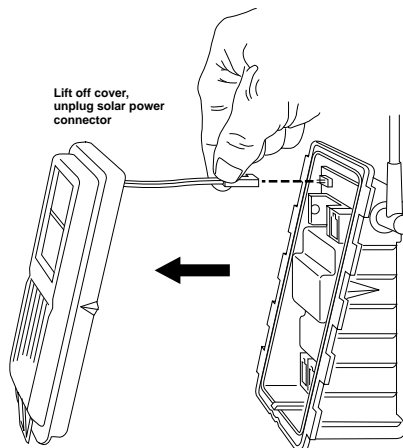


Note: See "SIM Board Display and Contents" on page 30 for information on locating the components and points of interest on the SIM board.

Optional: Disconnect the solar panel connection

The solar panel on the box cover is connected to the SIM by a wire. If the cover can not be set aside while still connected to the SIM box safely, it should be disconnected from the SIM box. To disconnect the solar power connection:

1. Locate the red connector for the solar power wire.
2. Pull the connector outward off the red solar power tab. The solar panel is no longer connected to the SIM.
3. Set the SIM cover aside.

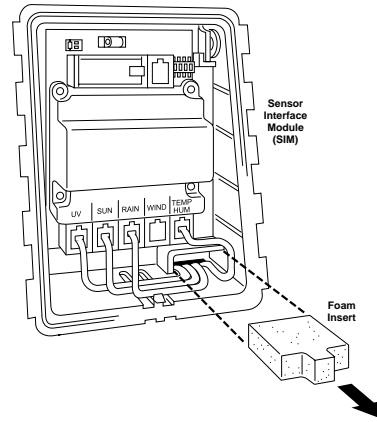


Check the Factory Installed Sensor Connections

1. Verify that the rain collector and temperature/humidity sensor cables are plugged into the receptacles labeled RAIN and TEMP/HUM on the SIM.
2. If the station includes UV and/or solar radiation sensors, verify that the sensor cables are plugged into the receptacles labeled UV and SUN on the SIM.

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. Pull the foam insert out of cable access port in between the cables and set the foam insert aside.
3. Insert the anemometer cable end into the cable access port from beneath the SIM box.
Slide the cable through the cable access port with the connector lever down.
4. Firmly insert the end of the anemometer cable into the connector labeled WIND. The lever clicks into place.
5. Make sure that the cables lie flat on the bottom the cable access port.
6. Firmly insert the foam in between the cables and at the top of the cable access port, taking care to ensure that the foam seals the access port entirely, leaving no holes or gaps for weather or insects.=



Note: If you are assembling a cabled station, wait to reinsert the foam until cable assembly is complete. See "Cabled ISS Assembly" on page 7.

Once the sensor connections have been checked and the anemometer cable has been inserted, a connection between the ISS and the Vantage Pro2 console must be made.

7. Read the following instructions that best apply to your ISS and Vantage Pro2 assembly:
 - See "Cabled ISS Assembly" on page 7 for assembling Vantage Pro2 weather stations that contain a cabled connection between the ISS and the console.
 - See "Wireless ISS Assembly" on page 9 for assembling Vantage Pro2 weather stations that use a wireless connection to transmit and receive data.

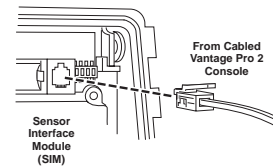
Cabled ISS Assembly

The Cabled ISS system contains a cable for connecting the ISS to a Vantage Pro2 console. Once the anemometer has been installed and the sensors have been checked, a cabled connection between the ISS and the console can be established. Follow the steps below for powering the ISS and connecting to the console.

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 with extension cables purchased from Davis Instruments.

1. Locate the 100' console cable included with your system.
2. Pull the foam insert out of cable access port, if it has been reinserted, and set the foam aside.
3. Insert the console connector cable end into the cable access port from beneath the SIM box.



Note: Slide the cable through the cable access port with the connector tab down.

4. On the SIM, firmly insert one end of the 4-conductor cable into the modular connector located apart from the sensor connectors next to the battery insert. This connector is labeled CONSOLE.

Note: If you haven't powered up the console yet, refer to the installation instructions in the *Vantage Pro2 Console Manual* and apply power to the console.

5. On the back of your console, insert the other end of the console cable into the modular receptacle labeled **ISS**.
6. Firmly insert the foam in between the cables and at the top of the cable access port, taking care to ensure that the foam seals the access port entirely, leaving no holes or gaps for weather or insects. See the graphic on page 7 for more information on inserting the foam insert.

Plugging the console cable into the console powers the ISS and establishes communication between the ISS and the console. The ISS should immediately begin collecting weather data and start sending the data to the console.

Verifying Communication with the Console

Use these steps to verify reception of ISS data at the Cabled Vantage Pro2 console and to test the operation of the ISS sensors.

1. If the console is in Setup Mode, press **DONE** until the Current Weather screen displays.
Sensor reading from the ISS should display on the screen.
2. Near the center of the screen, look for the outside temperature.
3. Spin the wind cups to check wind speed, pressing **WIND** 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.

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

5. If the ISS contains a UV sensor and/or solar radiation sensor, press 2ND and then press RAIN YR for current ultraviolet readings or press 2ND then press RAIN DAY for solar radiation readings.

The UV reading displays in the center of the console. The solar reading displays at the in the bottom right corner of the console display. 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.

6. Current weather data displayed on the console confirms communication.

Once the ISS has been powered and the console has successfully received accurate readings from all the sensors, prepare the ISS for installation. Continue on to “Preparing the ISS for Installation” on page 13 for more information.

If the communication problems still exist between the cabled ISS and the console, see “Troubleshooting Cabled ISS Communication”.

To ease the installation process of ISS at a location, disconnect the console cable from the SIM. Remove the foam and slide the cable out through access port. Once a location for both the ISS and the console has been arranged, reinsert the cable through the access port, into the console connector, and reinsert the foam.

Troubleshooting Cabled ISS Communication

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

- Check the console to make sure it is being powered with the AC adapter supplied in the Vantage Pro2 packaged box or three C batteries.

Note: The supplied adapter is a five-volt positive center AC to DC adapter. Other adapters may not work if the voltage or adapter type is different.

- Make sure the cable is firmly plugged into the ISS connector on the console.
- Check that the console cable is firmly plugged into the correct connector on the SIM.
- Verify that all sensor cables are firmly plugged in.
- A LED indicator light on the SIM flashes each time the ISS transmits, which is about once every 2.5 seconds. If the LED remains dark, there is a problem with the ISS transmitter. Call Technical Support. See “Contacting Davis Instruments” on page 27.

See “SIM Board Display and Contents” on page 30 for information on locating the LED indicator light and the DIP switches.

Note: If the LED is flashing rapidly, call Technical Support. See “Contacting Davis Instruments” on page 27 for more information.

If the console is still not receiving readings, ensure that the console is in Setup Mode and reboot the console by disconnecting the AC power adapter from the console and removing the console batteries for at least 30 seconds. If the console is still not displaying sensor readings from the ISS, please contact Davis Technical Support.

Wireless ISS Assembly

The ISS has a wireless connection to a Vantage Pro2 wireless console. Once the anemometer has been installed and the sensors have been checked, the ISS must be powered and a wireless communication channel must be established between the ISS and the console. Follow the steps below for powering the ISS and establishing a connection to the console.

- Applying Power to a Wireless ISS
- Verifying Communications with the Console
- Verifying Data from the ISS Sensors
- Troubleshooting ISS Reception

Applying Power to a Wireless ISS

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

Note: The SIM stores energy from the solar panel for power at night. The battery is an alternative power source the SIM uses when it is depleted of energy.

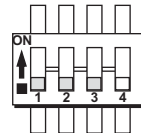
Be sure to match the “+” sign on the battery with the “+” sign on the SIM. See “SIM Board Display and Contents” on page 30.

Checking Transmitter ID

A Vantage Pro2 console can receive data from up to eight different wireless stations.

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

In most cases it will not be necessary to change the transmitter ID. The 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

Note: If it is necessary to change the transmitter ID, remember to use the same ID for the ISS and console. See “Appendix A: Re-orienting the Wind Vane” on page 28. See “SIM Board Display and Contents” on page 30 for locating the components and points of interest on the SIM board.

Verifying Communication with the Console

1. Power the console if it does not already have power. Refer to the *Vantage Pro2 Console Manual* and apply power the console.
The console automatically enters Setup Mode when powered up.
2. If the console is not in Setup Mode, press and hold DONE then press the down arrow.
The message RECEIVING FROM... and STATION NO. followed by the transmitter IDs that the console detects displays on the console screen.
3. Look for the ISS transmitter ID. The number 1 displays unless the transmitter ID has been changed. If the console displays the ISS transmitter ID, the ISS is being detected.

Note: If the console does not display the number of the ISS transmitter ID setting, see “Troubleshooting Wireless ISS Reception” on page 10 for more information.

4. Press and hold DONE to view ISS data once the ISS transmitter ID displays.
5. Be sure to allow up to a minute for the ID number to display on the screen.

Verifying Data from the ISS Sensors

Use these steps to verify reception of ISS data at the wireless Vantage Pro2 console and to test the operation of the ISS sensors.

1. Press and hold DONE until the Current Weather screen displays, if the console is in Setup Mode.
Sensor readings from the ISS should display on the screen.
2. Near the center of the screen, look for the outside temperature.
3. Spin the wind cups to check wind speed, pressing WIND 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.
Approximately one minute after power-up the outside relative humidity reading should be displayed on the console.
5. If the ISS contains a UV sensor and/or solar radiation sensor, press 2ND and then press RAIN YR for current ultraviolet readings or press 2ND then press RAIN DAY for solar radiation readings.

The UV reading displays in the center of the console. The solar reading displays at the bottom right corner of the console display. 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.

6. Current weather data displayed on the console confirms successful communication.

Once the ISS has been powered and the console has successfully received accurate readings from all the sensors, prepare the ISS for installation. Continue on to “Preparing the ISS for Installation” on page 13 for more information.

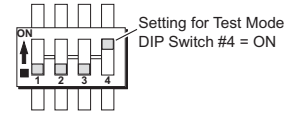
If the communication problems still exist between the wireless ISS and the console, see “Troubleshooting Wireless ISS Reception”.

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.

- The DIP switch #4 on the SIM (see the diagram below) is the Test Mode switch. Switch it to the ON position, using a ball-point pen or paper clip.
- An LED indicator light on the SIM flashes each time the ISS transmits, which is about once every 2.5 seconds.



Note: If the LED is flashing rapidly, call Technical Support. See “Contacting Davis Instruments” on page 27 for more information.

- See “SIM Board Display and Contents” on page 30 for information on locating the components and points of interest on the SIM board.
5. If the LED remains dark, there is a problem with the ISS transmitter. Call Technical Support. See “Contacting Davis Instruments” on page 27.
 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 frequency interference from outside sources. 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 Pro2.
 - There is a problem with the console.
 7. If a problem with receiving the wireless transmission still exists, please contact Technical Support. See “Contacting Davis Instruments” on page 27.
 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.

Optional: Changing ISS Transmitter ID

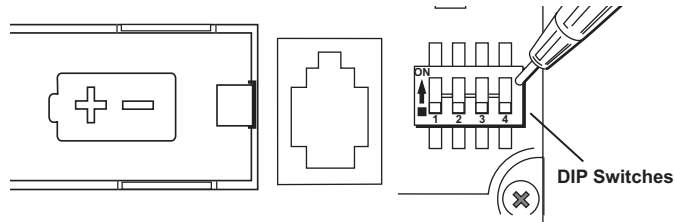
Each wireless transmitting station, including the Integrated Sensor Suite (ISS), uses one of eight selectable transmitter IDs. DIP switches #1, 2 and 3 on the transmitter control the ID — or “channel” — the station transmits on. (DIP switch #4 is used for transmission testing, not for transmitter ID.)

Note: The transmitter on the ISS and receiver on the console 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 Pro2 console, and should work fine for most situations. Change the transmitter ID if any of the following issues are true:

- Another Davis Instruments wireless weather station operating nearby already uses transmitter ID **1**.
- Additional wireless transmitting stations have been purchased with the Vantage Pro2 or Vantage Pro2 Plus and one of the stations has been designated as Station No. 1 instead of the selected 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 Box” on page 5.



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 on the next page.

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

Set the Vantage Pro2 console to the same ID as the transmitters, as described in the *Vantage Pro2 Console Manual*.

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

Using Multiple Transmitting Stations

This table shows the maximum number of each type of station that can be used with a single Vantage Pro2 console.

TRANSMITTER TYPE	MAXIMUM (8 TOTAL)
Integrated Sensor Suite (ISS)	1
Anemometer Transmitter Kit	1
Leaf & Soil Moisture/Temperature Station	2
Temperature Station	8
Temperature/Humidity Station	8

Preparing the ISS for Installation

Once all the sensors have been connected and communication between the ISS and the console has been successfully established, continue to prepare the ISS unit for installation. The steps for preparing the ISS for installation are as follows.

- Close the SIM Box
- Prepare the Solar Panel
- Prepare the Rain Collector
- Site the ISS and Anemometer

Close the SIM Box

To close the SIM box and continue assembling the ISS:

1. If the solar panel wire was disconnected during ISS assembly, reconnect the wire on the SIM box cover to the solar panel tab on the SIM board.

Note: See "SIM Board Display and Contents" on page 30 for information on locating the solar panel tab.

2. Look on the side of the SIM box. Match up the box cover alignment indicator with the alignment indicator on the SIM box and place the cover against the box.
3. Slide the cover down until it snaps securely in place.

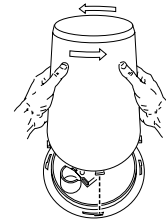
Prepare the Solar Panel

The solar panel is covered when you first receive it to prevent powering the SIM during shipping or prematurely during assembly. Remove the covering from the solar panel once the SIM box is closed so that the SIM can start using solar energy.

Prepare the Rain Collector

The tipping bucket is secured at the factory to protect it from damage during shipping. To use the ISS properly, the bucket must be released. To release the bucket:

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. Steady the ISS base between your knees when removing the cone.

Prepare the Rain Collector

2. Carefully cut and remove the plastic cable tie (usually black in color) that holds the tipping bucket in place during shipping.
3. On your console screen, look for DAILY RAIN display.

If the console is cabled to the ISS, reconnect the cable to see if the console is receiving the rain readings.

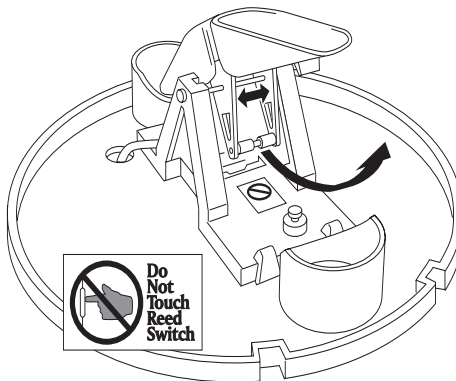
4. While watching the daily rain display, slowly tip the bucket until it drops to the opposite side. Each tip indicates 0.01" of rain and may take up to 10 seconds to register at the console. If the bucket is tipped too quickly, the number on the console display may not change. Tip the bucket slowly when testing the rain collector.
5. Temporarily reinstall the rain collector cone until you are ready to mount the ISS outside.

If you are installing the metric measurement adapter, keep the rain collector cone open.

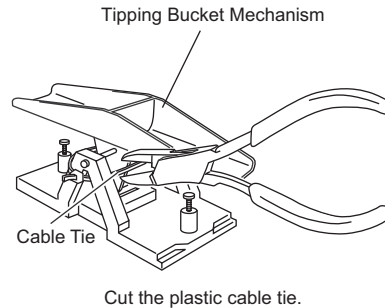
Optional: Insert the Metric Measurement Adapter

The rain collector tipping bucket mechanism contains a standard measurement weight magnet that takes measurements in .01". The ISS assembly contains a metric adapter that adjusts the weight of the tipping bucket mechanism so that it takes .2 mm metric measurements for every tip of the bucket. To install the metric adapter:

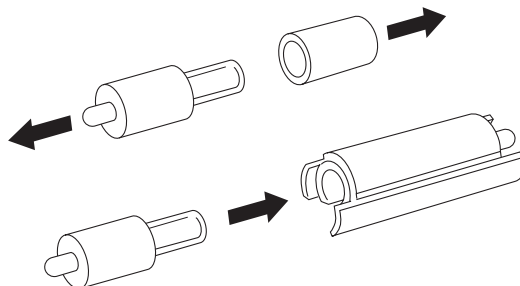
1. Find the metric adapter included in the hardware.
2. Locate the magnet between the arms of the bucket.
3. Open the arms slightly with one hand while pulling the magnet out with the other hand.



Open plastic tipping mechanism arms, pull out magnet

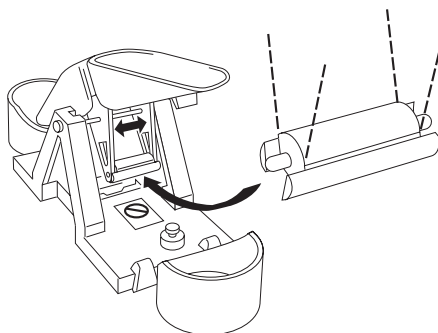


4. Separate an end cap from one end of the magnet.



*Separate magnet from one end cap
Insert magnet with other end cap into metric measurement adapter*

5. Slide the magnet, exposed end of the magnet first, into the open slot of the metric adapter.
6. Insert the metric adapter and magnet between the arms of the bucket, with solid side of the metric adapter facing up.



*Open plastic arms to insert metric measurement adapter,
with adapter in "V" position*

Note: The above procedure converts the collector to 0.2 mm measurements. The console must be set accordingly. See the *Vantage Pro2 Console Manual* for more information.

Locating the ISS and Anemometer

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

Note: When selecting a location for installing your ISS, especially on a rooftop, make sure it is a location far from power lines and electrical wiring.

General ISS Siting Guidelines

- Place the ISS at least 6' (2 m) away from sources of heat such as chimneys and exhaust vents.

Locating the ISS and Anemometer

- Avoid placing the ISS near or above any object or area that collects and radiates heat in the sunshine. This includes paving, deck, metal, or concrete structures.
- 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.
- Site the ISS in a location with good sun exposure throughout the day, if the ISS is wireless or includes a solar radiation or UV sensors.
- 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.

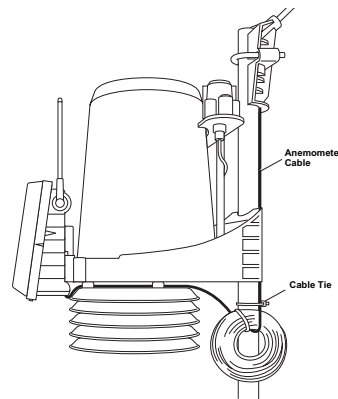
Anemometer Siting Guidelines

- For best results, place the anemometer above local objects that obstruct 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' (10 m) above the ground.
- The standard for agricultural application is to place the anemometer 6' (2 m) above the ground. This is important for evapotranspiration (ET) calculations.

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

Optional: Anemometer Cable Length Considerations

- All Vantage Pro2 stations include a 40' (12 m) cable to go between the ISS and the anemometer. This can be extended up to 540' (165 m) using optional extension cables purchased from Davis Instruments.
- If most of the anemometer cable length is unused, the coiled cable length can be stowed once the anemometer and ISS have been installed on a site. Attaching the anemometer cable to the mounting pole using the supplied cable tie is the recommended option.



Note: Keep the anemometer cable coiled if possible during the ISS and anemometer assembly so that it is easily stowed once installation is complete.

- The Cabled Vantage Pro2 includes a 100' (30 m) cable to go between the console and the ISS. This can be extended up to 1000' (300 m) using optional cables.

Optional: Wireless Transmission Considerations

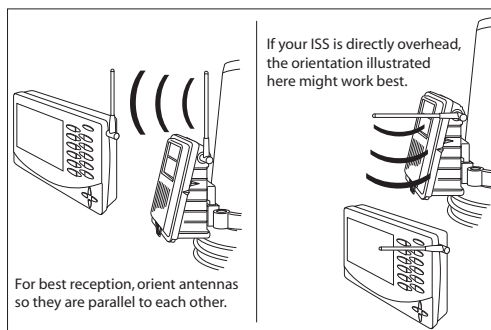
The range of the radio transmission depends on several factors. Try to position the transmitter and the receiver as close as possible for best results.

Typical maximum ranges include:

- Line of sight: 1000 feet (300 m).
- Under most conditions: 200 - 400 feet (60 - 120 m).

Other range and transmission considerations include:

- Range may be reduced by walls, ceilings, trees, foliage, a metal roof or other large metal structures or objects such as aluminum siding, metal ducts, and metal appliances, such as refrigerators.
- Frequency interferers also reduce transmission distance. Cordless phones (900 Mhz) is a common example of frequency interference.
- Transmission between wireless units may be obscured by something unidentifiable, or by some obstacle that can't be worked around.
- For best results, orient the ISS antenna and the console antenna so that the orientation and angles of the antennas are parallel to each other.



- If possible, align the pivot joints of both the ISS and the console antennas so that they are facing each other for maximum signal strength.
- Turn the gain on to improve reception of a weak signal. Refer to the *Vantage Pro2 Console Manual* for information on setting the console gain.
- For better reception over greater distances or for weaker signals, consider using a Wireless Repeater (product #7626 or #7627) to strengthen the signal or increase the distance between your ISS and the console.

Testing Wireless Transmission at ISS Location

Note: After a suitable place has been found for the wireless ISS, it is very important to test reception from the installation location before permanently mounting it there.

1. Set the ISS in the desired installation location.
2. Set the console in the desired location.
3. Press and hold TEMP and press HUM to display statistical and reception diagnostics on the console.

Locating the ISS and Anemometer

- 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.
 - Irregular terrain in the area may interfere with the signal. For example, if the ISS is mounted downhill from the console, the ground may block a large percentage of the transmitted signal.
4. Press and hold DONE to return to the normal screen when finished testing.

Note: See the Troubleshooting section of the *Vantage Pro2 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 together or separately on a pole. Use the lag screws to install them separately on a flat, vertical surface.

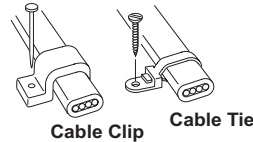
The anemometer comes with a 40' (12 m) cable for flexibility in configuring the system to monitor wind conditions. For example, the anemometer could be mounted at the highest point of a roof, and the ISS could be mounted on a fence closer to ground level.

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, the solar panel should face 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 A: Re-orienting the Wind Vane" on page 28.

Optional: Guidelines for Securing Cables

- To prevent fraying or cutting of cables, secure them so they will not whip about in the wind.
- Secure cable to a metal pole using cable ties or by wrapping tape around both the cables and the pole.
- Place clips or ties approximately every 3' – 5' (1 – 1.6 m).
- 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 console display. To obtain accurate readings, the vane must be *correctly oriented* when mounting the anemometer outside. By default, the wind vane on the anemometer detects the correct wind direction if the anemometer arm points north.

To ensure correct orientation of the wind vane, do one of the following:

1. Mount the anemometer so that the arm points north.
The wind vane will be ready for use immediately.
2. If the anemometer is mounted so that it does not aim north, remove the wind vane and re-attach it aiming toward the preferred direction. Refer to the instructions in "Appendix A: Re-orienting the Wind Vane" on page 28.

Installation Instructions

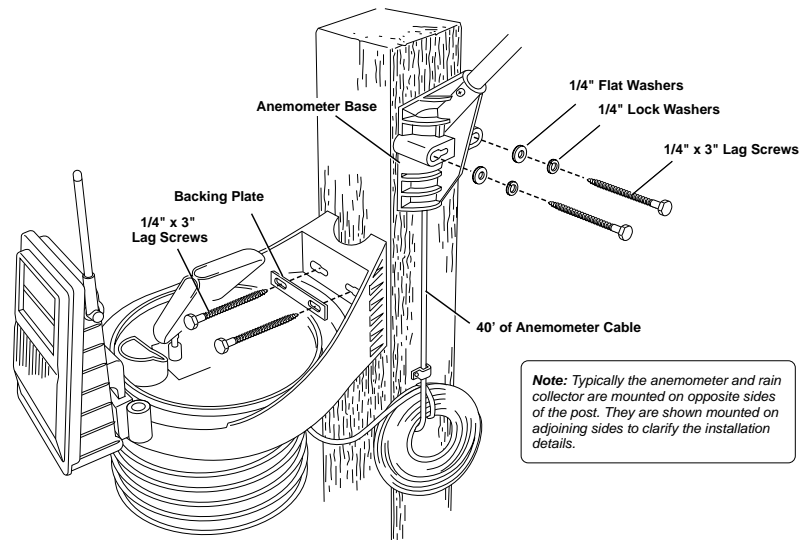
There are several ways to mount and install the ISS unit. The following are installation types that Davis Instruments recommends. Individual ISS locations and installations may vary.

- Installing the ISS on a flat surface
- Installing the Anemometer on a post or flat surface.
- Installing the ISS on a pole

Note: All installations require that the rain collector cone be removed for assembly.

Installing the ISS on a Flat Surface

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



Option 1: 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 are level.
Use the metal backing plate as a 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. Tighten the lag screws using an adjustable wrench or 7/16" wrench.
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.

Option 2: Installing the Anemometer on a Post or Flat Surface

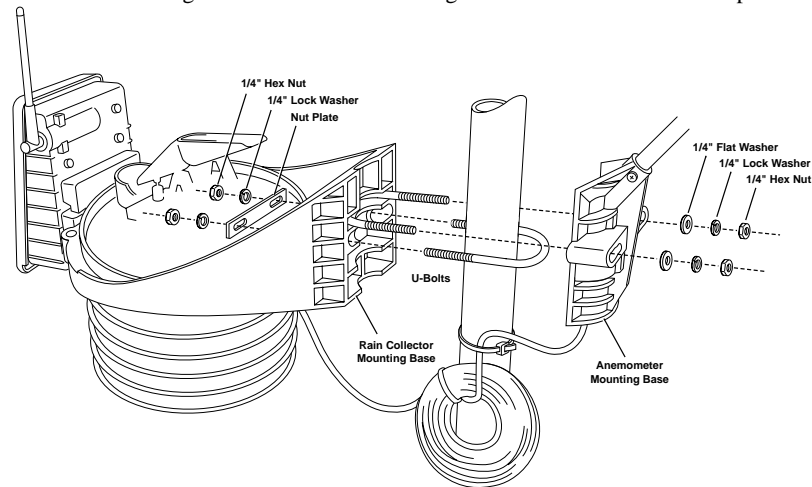
1. With a 3/16" (5 mm) drill bit, drill two holes approximately 2-1/8" (54 mm) apart. Use a carpenter's level to ensure the holes will be level.
2. Insert the 1/4" x 3" lag screws through the flat washers and the holes in the anemometer mounting base into the post.
3. Tighten the lag screws using an adjustable wrench or 7/16" wrench.

If the anemometer arm is not pointing north, follow the instructions in "Appendix A: Re-orienting the Wind Vane" on page 28.

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.



Accessories for Pole Mounting

- Use the Mounting Tripod #7716 for easy roof-mounting.
- The Mounting Pole Kit #7717 can raise the installation height of the 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 pole, obtain a U-bolt that fits the base openings but that has a shorter threaded section. If mounting the ISS on a smaller pole with the included U-bolts, the bolt interferes with the rain collector cone.

Guidelines for Installing the ISS on a Pole

- When mounting both sides together, remember that whichever side of the ISS is mounted first, the U-bolt from the opposite side must also be placed around the pole before tightening the U-bolts. (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 the two sides of the ISS have been loosely mounted together on the pole, swivel the unit to the correct direction and then tighten the hex nuts. The desired height can also be achieved by sliding the ISS vertically.

Option 1: Installing ISS and Anemometer Together

Try to install the ISS so the anemometer arm is aiming north. If the arm doesn't point north, re-orient the wind vane. See "Appendix A: Re-orienting the Wind Vane" on page 28.

1. Place the U-bolt for the anemometer around the pole so that its round end fits in the top groove of the side 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.

Note: Do not tighten the hex nuts yet. Leave the hex nuts loose 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. 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.

Option 2: 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. Tighten the hex nuts using an adjustable wrench or 7/16" wrench.
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.

Option 3: 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 A: Re-orienting the Wind Vane" on page 28 after tightening the hex nuts.
4. Using an adjustable wrench or 7/16" wrench, tighten the hex nuts.

Finishing the Installation

Level the Solar and UV Sensors

If you have a Vantage Pro2 Plus station that includes a solar or UV sensor, use the bubble level on the sensors as a guide to verify that the sensors are level.

Adjust the level by tightening or loosening the screws that hold the sensor onto the shelf.

Note: If you are installing the solar or UV sensors separately, see the Sensor Mounting Shelf installation manual and the Solar Radiation and UV Sensor Installation manuals for more information.

Clearing Data Collected During Testing and Installation

Now that the ISS is mounted outside, any data that was collected in the Vantage Pro2 console during testing and mounting can be cleared.

To clear all the collected data in the console:

1. Press WIND on the console so that graph icon appears adjacent to the wind data on the display.
2. Press 2ND, then press and hold CLEAR for at least six seconds and until you see "CLEARING NOW" in the console ticker display.

Additional Mounting Options

Extending Wireless Transmission Range

Optional repeater stations can be used to extend the wireless transmission range.

- Wireless Repeater, AC-Powered #7626
- Wireless Repeater, Solar-Powered #7627

Extending the Console Cable (Cabled ISS Only)

A Cabled ISS can be extended up to 1000' (300 m) away from the console by using Davis Instruments extension cables, #7876.

Relocating the Anemometer

Using Extension Cables:

Note: Not all cables are compatible with your Vantage Pro2 system. To be sure they will work, order Davis extension cables from your dealer or directly from Davis Instruments.

The Anemometer can be extended further than 40' from the ISS by using Davis Instruments 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.

Note: 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 the 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 up to 125' (38 m) with Davis Instruments extension cables, #7876.

Note: Not all cables are compatible with your Vantage Pro2 system. To be sure they will work, order Davis extension cables from your dealer or directly from Davis Instruments.

Optional Wireless Stations

You may use our optional wireless sensor stations to collect 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 Davis Precision Weather Instruments catalog. Some information is also available in "Appendix A: Re-orienting the Wind Vane" on page 28.

Maintenance and Troubleshooting

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 denatured alcohol on a soft cloth (Do not use 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 27.

Cleaning the Radiation Shield

The outer plating of the radiation shield should be cleaned when there is excessive dirt and build up on the plating. Use a damp cloth to clean the outer edge of each ring.

Note: Spraying down or using water excessively to clean the radiation shield can damage the sensitive sensors or alter the data and readings the ISS is transmitting.

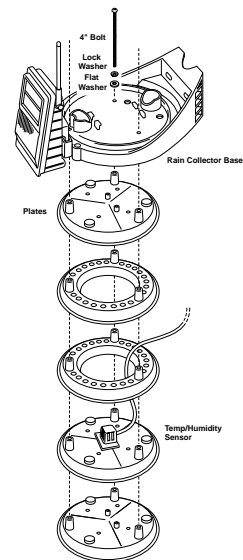
Check the radiation shield for debris or insect nests at least once a year and clean when necessary. A buildup of material inside the shield reduces its effectiveness and may cause inaccurate temperature and humidity readings.

To thoroughly 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 head screwdriver to tighten the bolts.

Cleaning the Rain Collector

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



Note: Cleaning the rain collector and tipping buckets may cause false rain readings. Unplug the RAIN sensor from the SIM before cleaning so that no inaccurate readings are logged, or clear the weather data that was logged on the Vantage Pro2 console after cleaning is complete. See your *Vantage Pro2 Console Manual* for instructions on clearing weather data.

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.
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. To check for a faulty connection, try jiggling the cable while looking at the display. If a reading displays intermittently on the console as the cable is jiggled, the connection is faulty. Try removing and then re-installing the cable to correct the faulty connection. If the sensor still functions intermittently contact Technical Support. See “Contacting Davis Instruments” on page 27.

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. Make sure the cable tie around the tipping bucket has been cut and removed.

Most Common Anemometer Problems

“The anemometer head is tilted when I mount the anemometer.”

With Allen wrench provided in the supplied hardware, 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). 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 connector on the SIM and on splices in the cable. If using an extension cable, remove it and test using only the anemometer cable. Contact Technical Support and ask for a wind test cable if the problem has not been resolved.

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

“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 the 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 possible, remove any extensions and try it 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. Remove the wind cups (loosen the set screw) and clear out any bugs or debris. Turn the shaft the cups rotate on. If it feels gritty or stiff, contact Davis Technical Support.

Note: 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.

“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. Readings can vary considerably over short distances. How you site the ISS and anemometer can also make a big difference. If you have questions, contact Technical Support.

Contacting Davis Instruments

If you have questions about the ISS or Vantage Pro2 system, or encounter problems installing or operating the 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.

Appendices

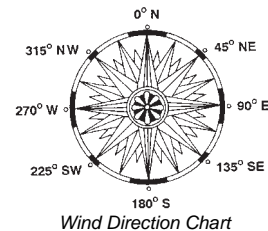
Appendix A: Re-orienting the Wind Vane

The Vantage Pro2 station is configured to register wind direction correctly if the anemometer points to true north. If the anemometer shaft can not be mounted to point to true north, use the following instructions to correct the wind vane orientation.

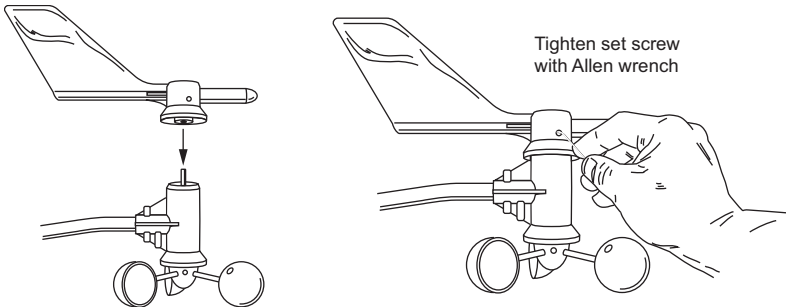
- Do not rely on a compass unless it is properly calibrated. In North America there can be up to 15° variation between true north and a raw compass reading.
- Correct the wind direction readings by calibrating the wind direction in the Vantage Pro2 console. See the *Vantage Pro2 Console Manual* for information.
- To orient the wind vane accurately, look at the console display. Have another person watch the console display while orienting the wind vane.
- Also, re-orient the wind vane before the anemometer is installed if the direction in which the anemometer will be installed is already known.

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 on the 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.
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. 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.



Installing Wind Vane on Anemometer Shaft

10. Test the 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.

Appendix B: Specifications

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

Cabled ISS

Temperature range: -40 to 150° Fahrenheit (-40 to 65° Celsius)
Power input: Console Cable from Vantage Pro2 console Optional
Vantage Pro2 AC power adapter

Wireless ISS

Temperature range: -40 to 150° Fahrenheit (-40 to 65° Celsius)
Transmission frequency: 902 - 928 MHz FHSS for North America
868.0 -868.6 MHz FHSS for overseas versions: EU, UK, and OV
Transmitter ID codes: 8 user-selectable
License: low power (less than 8 mW), no license required
Primary power: Solar power – Davis solar charger
Backup power: CR-123A 3-volt lithium battery (8 months without sunlight- greater than 2 years depending on solar charging)
Alternate 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

SIM Board Display and Contents

