# Wireless Vantage Pro2™ & Vantage Pro2™ Plus Stations

(Including Fan-Aspirated Models)



6163

**VANTAGE PRO2** 

Vantage Pro2™ (6152, 6153) and Vantage Pro2™ Plus (6162, 6163) Wireless Weather Stations include two components: the Integrated Sensor Suite (ISS) which houses and manages the external sensor array, and the console which provides the user interface, data display, and calculations. The ISS and Vantage Pro2 console communicate via an FCC-certified, license-free, spread-spectrum frequency-hopping (FHSS) transmitter and receiver. Userselectable transmitter ID codes allow up to eight stations to coexist in the same geographic area. The frequency hopping spread spectrum technology provides greater communication strength over longer distances and areas of weaker reception. The Wireless Vantage Pro2™ Plus weather station includes two additional sensors that are optional on the Vantage Pro2: the UV sensor and the solar radiation sensor. The console may be powered by batteries or by the included AC-power adapter. The wireless ISS is solar powered with a battery backup. Use WeatherLink™ for Vantage Pro and Vantage Pro2 to let your weather station interface with a computer, to log weather data, and to upload weather information to the internet.

The 6152 and 6162 rely on passive shielding to reduce solar-radiation induced temperature errors in the outside temperature sensor readings. The Fan-aspirated 6153 and 6163 combine passive shielding with a solar-powered fan that draws outside air in over the temperature and humidity sensors, providing a much more accurate temperature reading than that available using passive shielding alone.

## Integrated Sensor Suite (ISS)

Operating Temperature	40° to +150°F (-40° to +65°C)
Non-operating Temperature	40° to +158°F (-40° to +70°C)
Current Draw (ISS SIM only)	0.14 mA (average), 30 mA (peak) at 4 to 6 VDC
Solar Power Panel	0.5 Watts (ISS SIM), plus 0.75 Watts (Fan-Aspirated)
Battery (ISS SIM /Fan-Aspirated)	CR-123 3-Volt Lithium cell / 2 - 1.2 Volt NiCad C-cells
Battery Life (3-Volt Lithium cell)	8 months without sunlight - greater than 2 years depending on solar charging
Battery Life (NiCad C-cells)	1 year
Fan Aspiration Rate (Fan-Aspirated Only)	190 feet/min. (0.9 m/s) (full sun), 80 feet/min. (0.4 m/s) (battery only) (intake flow rate) 500 feet/min. (2.5 m/s) (full sun), 280 feet/min. (1.4 m/s) (battery only) (sensor chamber flow rate)
Connectors, Sensor	Modular RJ-11
Cable Type	4-conductor, 26 AWG
Cable Length, Anemometer	40' (12 m) (included) 540' (165 m) (maximum recommended)
Wind Speed Sensor	Wind cups with magnetic switch
Wind Direction Sensor	Wind vane with potentiometer
Rain Collector Type	Tipping bucket, 0.01" per tip (0.2 mm with metric rain adapter), 33.2 in $^2$ (214 $cm^2)$ collection area
Temperature Sensor Type	PN Junction Silicon Diode
Relative Humidity Sensor Type	Film capacitor element
Housing Material	UV-resistant ABS, ASA plastic
ISS Dimensions:	

Product #	(Length x Width x Height)	Package Weight
6152	11.00" x 9.38" x 14.00" (279 mm x 238 mm x 355 mm)	5.7 lbs. (2.6 kg)
6162		6.1 lbs. (2.6 kg)
6153	11.00" x 9.38" x 21.00" (279 mm x 238 mm x 533 mm)	8.6 lbs. (3.9 kg)
6163		9 lbs. (4.1 kg)

## Console

Console Operating Temperature	.+32° to +140°F (0° to +60°C)
Non-Operating (Storage) Temperature	.+14° to +158°F (-10° to +70°C)
Current Draw	. 0.9 mA average, 30 mA peak, (add 120 mA for display lamps, add 0.125 mA for each optional wireless transmitter received by the console) at 4 - 6 $$ VDC
AC Power Adapter	.5 VDC, 300 mA, regulated
Batteries	. 3 C-cells
Battery Life	. up to 9 months
Connectors	. Modular RJ-11
Housing Material	. UV-resistant ABS plastic
Console Display Type	. LCD Transflective
Display Backlight	.LEDs
Dimensions (console: length x width x height, display ler	ngth x height)
Console with antenna down	. 10.625" x 6.125" x 1.625" (270 mm x 156 mm x 41 mm)
Console with antenna extended up	.10.625" x 9.625" x 1.625" (270 mm x 245 mm x 41 mm)
Display	. 5.94" x 3.375" (151 mm x 86 mm)
Weight (with batteries)	.1.88 lbs. (.85 kg)

# **Data Displayed on Console**

Data display categories are listed with General first, then in alphabetical order.

## General

Historical Data	Includes the past 24 values listed unless otherwise noted; all can be cleared and all totals reset
Daily Data	Includes the earliest time of occurrence of highs and lows; period begins/ends at 12:00 am
Monthly Data	Period begins/ends at 12:00 am on the first of the month
Yearly Data	Period begins/ends at 12:00 am on the first of January unless otherwise noted
Current Display Data	Current display data describes the current reading for each weather variable. In most cases, the variable lists the most recently updated reading or calculation. Some current variable displays can be adjusted so there is an offset for the reading
Current Graph Data	Current graph data appears in the right-most column in the console graph and represents the latest value within the last period on the graph; totals can be set or reset. Display intervals vary. Examples include: Instant, 15-min., and Hourly Reading; Daily, Monthly, High and Low
Graph Time Interval	.1 min., 10 min., 15 min., 1 hour, 1 day, 1 month, 1 year (user-selectable, availability depends upon variable selected)
Graph Time Span	.24 Intervals + Current Interval (see Graph Intervals to determine time span)
Graph Variable Span (Vertical Scale)	Automatic (varies depending upon data range); Maximum and Minimum value in range appear in ticker
Alarm Indication	Alarms sound for only 2 minutes (time alarm is always 1 minute) if operating on battery power. Alarm message is displayed in ticker as long as threshold is met or exceeded. Alarms can be silenced (but not cleared) by pressing the DONE key.
Transmission Interval	. Varies with transmitter ID code from 2.25 seconds (#1=shortest), to 3 seconds (#8=longest)
Update Interval	.Varies with sensor - see individual sensor specs

## **Barometric Pressure**

Resolution and Units	.0.01" Hg, 0.1 mm Hg, 0.1 hPa/mb (user-selectable)
Range	. 16.00" to 32.50" Hg, 410 to 820 mm Hg, 540 to 1100 hPa/mb
Elevation Range	. -999' to +15,000' (-600 m to 4570 m) (Note that console screen limits entry of lower elevation to -999' when using feet as elevation unit.)
Uncorrected Reading Accuracy	.±0.03" Hg (±0.8 mm Hg, ±1.0 hPa/mb) (at room temperature)
Sea-Level Reduction Equation Used	. United States Method employed prior to use of current "R Factor" method

Equation Source . . . . . . . . . . . . . . . . Smithsonian Meteorological Tables

Change 0.02" (.7hPa/mb, .5 mm Hg)= Slowly

Current Display . . . . . . . . . . . . . . . . Instant

Low Threshold from Current Trend for Storm Warning (Falling Trend)

Range for Rising and Falling Trend Alarms . . . . . . . . . 0.01 to 0.25" Hg (0.1 to 6.4 mm Hg, 0.1 to 8.5 hPa/mb)

#### Clock

that observe it in AUTO mode, MANUAL setting available for all other areas)

Date: Automatic Leap Year

Alarms . . . . . Once per day at set time when active

### Dewpoint (calculated)

Range.....-105° to +130°F (-76° to +54°C)

 Accuracy
 ±3°F (±1.5°C) (typical)

 Update Interval
 10 to 12 seconds

Current Display Data ..... Instant Calculation

## Evapotranspiration (calculated, requires solar radiation sensor)

rounded to the nearest 0.2 mm

Range...... Daily to 32.67" (832.1 mm); Monthly & Yearly to 199.99" (1999.9 mm)

Accuracy ....... Greater of 0.01" (0.25 mm) or ±5%, Reference: side-by-side comparison against a

CIMIS ET weather station

Management Information System) including Net Radiation calculation

Current Display Data . . . . . . . . . Latest Hourly Total Calculation

Current Graph Data ...... Latest Hourly Total Calculation, Daily, Monthly, Yearly Total

Historical Graph Data . . . . . . . . . . . . . Hourly, Daily, Monthly, Yearly Totals

Alarm ...... High Threshold from Latest Daily Total Calculation

## Vantage Pro2<sup>™</sup>

## Forecast

Variables Used	Barometric Reading & Trend, Wind Speed & Direction, Rainfall, Temperature, Humidity, Latitude & Longitude, Time of Year
Update Interval	.1 hour
Display Format	. Icons on top center of display; detailed message in ticker at bottom
Variables Predicted	. Sky Condition, Precipitation, Temperature Changes, Wind Direction and Speed

## Heat Index (calculated)

Resolution and Units	1°F or 1°C (user-selectable) °C is converted from °F rounded to the nearest 1°C
Range	40° to +165°F (-40° to +74°C)
Accuracy	±3°F (±1.5°C) (typical)
Update Interval	10 to 12 seconds
Source	
Formulation Used	Steadman (1979) modified by US NWS/NOAA and Davis Instruments to increase range of use
Variables Used	Instant Outside Temperature and Instant Outside Relative Humidity
Current Display Data	Instant Calculation
Current Graph Data	Instant Calculation; Daily, Monthly High
Historical Graph Data	
Alarm	

## Humidity

Inside Relative Humidity (sensor located in console)
Resolution and Units1%

Range	0 to 100% RH
Accuracy	±3% (0 to 90% RH), ±4% (90 to 100% RH)
Update Interval	1 minute
Current Display Data	Instant (user-adjustable offset available)
Current Graph Data	Instant; Hourly Reading; Daily, Monthly High and Low
Historical Graph Data	Hourly Readings; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Reading
Outside Relative Humidity (sensor located in ISS)	
Resolution and Units	1%
Range	0 to 100% RH

Accuracy	.±3% (0 to 90% RH), ±4% (90 to 100% RH)
Temperature Coefficient	.0.03% per °F (0.05% per °C), reference 68°F (20°C)
Drift	.±0.5% per year
Update Interval	. 50 seconds to 1 minute
Current Display Data	. Instant (user-adjustable offset available)
Current Graph Data	. Instant; Hourly Reading; Daily, Monthly High and Low
Historical Graph Data	. Hourly Readings; Daily, Monthly Highs and Lows
Alarms	. High and Low Threshold from Instant Reading

Extra Outside Relative Humidity (sensor located inside Temperature/Humidity Station)

ra Guisiae Relative Flamilary (Gerioor located moide 1	emperature/rialmany etation)
Resolution and Units	.1%
Range	.0 to 100% RH
Accuracy	.±3% (0 to 90% RH), ±4% (90 to 100% RH)
Temperature Coefficient	.0.03% per °F (0.05% per °C), reference 68°F (20°C)
Drift	.±0.5% per year
Update Interval	. 50 seconds to 1 minute
Current Display Data	. Instant Reading (user adjustable)
Alarms	. High and Low Threshold from Instant Reading

### Leaf Wetness (requires leaf wetness sensor)

Range..... 0 to 15

Dry/Wet Threshold . . . . . . . . . . . . . . . . . User-selectable

Accuracy ..... ±0.5

Current Graph Data . . . . . . . . . . . . Instant Reading; Daily High and Low; Monthly High Historical Graph Data . . . . . . . . . . . . Hourly Readings; Daily Highs and Lows; Monthly Highs

Alarms ...... High and Low Thresholds from Instant Reading

#### Moon Phase

resolution)

Range...... New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning

Gibbous, Last Quarter, Waning Crescent

#### Rainfall

 Daily/Storm Rainfall Range
 0 to 99.99" (0 to 999.8 mm)

 Monthly/Yearly/Total Rainfall Range
 0 to 199.99" (0 to 9999 mm)

 Rain Rate
 0 to 96" (0 to 2438 mm)

tip of the bucket), whichever is greater. For rain rates from 2"/hr (50 mm/hr) to 4"/hr (100 mm/hr):  $\pm 3\%$  of total or +0.01" (0.25 mm) (0.01" = one tip of the bucket),

whichever is greater

a storm event

Current Display Data . . . . . . . . . . . . . . . Totals for Past 15-min

Current Graph Data . . . . . . . . Totals for Past 15-min, Past 24-hour, Daily, Monthly, Yearly (start date user-

selectable) and Storm (with begin date); Umbrella is displayed when 15-minute

total exceeds zero

Historical Graph Data . . . . . . . . . . . . . Totals for 15-min, Daily, Monthly, Yearly (start date user-selectable) and Storm

(with begin and end dates)

24-Hour Total, Storm Total,

Range for Rain Alarms . . . . . . . . . . . . . . . . . 0 to 99.99" (0 to 999.7 mm)

## Rain Rate

Calculation Method . . . . . . . . . . . . . . . . . Measures time between successive tips of tipping bucket. Elapsed time greater

than 15 minutes or only one tip of the rain collector constitutes a rain rate of zero.

Current Display Data ..... Instant

Current Graph Data . . . . . . . . . . . . Instant and 1-min. Reading; Hourly, Daily, Monthly and Yearly High

Historical Graph Data . . . . . . . . . . . . . . . . . 1-min Reading; Hourly, Daily, Monthly and Yearly Highs

Alarm ...... High Threshold from Instant Reading

## Vantage Pro2<sup>™</sup>

### Soil Moisture (requires soil moisture Sensor)

 Resolution
 1 cb

 Range
 0 to 200 cb

 Update Interval
 75 to 90 seconds

## Solar Radiation (requires solar radiation sensor)

Cosine Response......±3% for angle of incidence from 0° to 75°

Current Graph Data . . . . . . . . . . . . . . . . . Instant Reading and Hourly Average; Daily, Monthly High

#### Sunrise and Sunset

## **Temperature**

Inside Temperature (sensor located in console)

°F rounded to the nearest 1°C

Historical Data and Alarms: 1°F or 1°C (user-selectable)

Range.....+32° to +140°F (0° to +60°C)

Outside Temperature (sensor located in ISS)

 $^{\circ}\text{C}$  is converted from  $^{\circ}\text{F}$  rounded to the nearest 1  $^{\circ}\text{C}$  Historical Data and Alarms: 1  $^{\circ}\text{F}$ 

or 1°C (user-selectable)

Range.....-40° to +150°F (-40° to +65°C)

Radiation Induced Error (Passive Shield) . . . . . . . . +4°F (2°C) at solar noon (insolation = 1040 W/m², avg. wind speed ■ 2 mph (1 m/

s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)

Radiation Induced Error (Fan-Aspirated Shield) . . . . +0.6°F (0.3°C) at solar noon (insolation = 1040 W/m², avg. wind speed 🗈 2 mph

(1 m/s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)

Extra Temperature Sensors or Probes

nearest 1°C

Historical Data and Alarms: 1°F or 1°C (user-selectable)

 $Sensor\ Accuracy \dots \qquad \pm 1^{\circ}F\ (\pm 0.5^{\circ}C)\ above\ 20^{\circ}F\ (-7^{\circ}C),\ \pm 2^{\circ}F\ (\pm 1^{\circ}C)\ under\ 20^{\circ}F\ (-7^{\circ}C)\ (see\ Fig.\ 2)$ 

Moisture/Temperature Stations)

### Temperature Humidity Sun Wind Index (requires solar radiation sensor)

Range.....-90° to +135°F (-68° to +64°C)

Sources and Formulation Used . . . . . . . . . . United States National Weather Service (NWS)/NOAA

Steadman (1979) modified by US NWS/NOAA and Davis Instruments to increase

range of use and allow for cold weather use

Variables Used . . . . . . . . . . . . . . . . . Instant Outside Temperature, Instant Outside Relative Humidity, 10-minute

Average Wind Speed, 10-minute Average Solar Radiation

either added or subtracted from this base to give an overall effective temperature

Current Graph Data ...... Instant and Hourly Calculation; Daily, Monthly High

### Ultra Violet (UV) Radiation Dose (requires UV sensor)

Current Graph Data ...... Latest Daily Total (user resetable at any time from Current Screen)

Historical Graph Data . . . . . . . . . . . . . . . . . Hourly, Daily Totals (user reset from Current Screen does not affect these values)

### Ultra Violet (UV) Radiation Index (requires UV sensor)

Range..... 0 to 16 Index

Current Graph Data . . . . . . . . . . . . . . . Instant Reading and Hourly Average; Daily, Monthly High

### Wind

Wind Chill (Calculated)

1°C

 Accuracy
 ±2°F (±1°C) (typical)

 Update Interval
 10 to 12 seconds

Variables Used . . . . . . . . . . . . Instant Outside Temperature and 10-min. Avg. Wind Speed

Current Display Data . . . . . . . . . . . . . Instant Calculation

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Current Graph Data . . . . . . . . . . . . . . . . . Instant Calculation; Hourly, Daily and Monthly Low Historical Graph Data . . . . . . . . . . . . . . . . . Hourly, Daily and Monthly Lows

Alarm . . . . . Low Threshold from Instant Calculation

Wind Direction

Range.....0 - 360°

Accuracy .....±3°

Wind Speed

are converted from mph and rounded to nearest 1 km/hr, 0.1 m/s, or 1 knot.

Accuracy ......±2 mph (2 kts, 3 km/h, 1 m/s) or ±5%, whichever is greater

Maximum Cable Length ......540' (165 m) 

High with Direction of High

Direction of Highs

## Wireless Communications

Overseas Models: 868.0 - 868.6 MHz FHSS

ID Codes Available.......8

868.0 - 868.6 MHz FHSS. CE-certified, less than 8 mW, no license required

Range

Sensor Inputs

RF Filtering......RC low-pass filter on each signal line

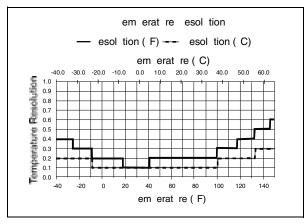


Figure 1. Temperature Resolution

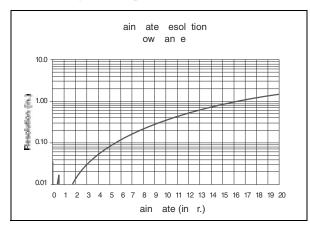


Figure 3. Low Range Rain Rate Resolution

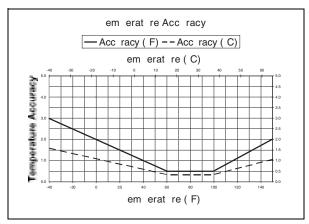


Figure 2. Temperature Accuracy

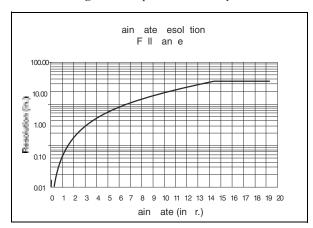


Figure 4. Full Range Rain Rate Resolution

## **Package Dimensions**

Product #	Package Dimensions (Length x Width x Height)	Package Weight	UPC Codes
6152 6152EU 6152UK	17.0" x 11.0" x 13.0" (410 mm x 264 mm x 330 mm)	12.8 lbs. (5.8 kg)	011698 00229 0 011698 00347 1 011698 00348 8
6162 6162EU 6162UK		13.3 lbs. (6.0 kg)	011698 00306 8 011698 00307 5 001698 00308 2
6153 6153EU 6153UK	15.0" x 13.0" x 24.0" (378 mm x 327 mm x 594 mm)	12.8 lbs. (5.8 kg)	011698 00335 8 011698 00336 5 001698 00337 2
6163 6163EU 6163UK		13.3 lbs. (6.0 kg)	011698 00341 9 011698 00342 6 001698 00342 3