Appendix A
Weather Data

Refer to this appendix to learn more about the weather variables that are measured, displayed, and logged by your Vantage Vue station. The following variables are arranged below in the order they are viewed on the console screen: left to right, top to bottom, starting with time.

Time

A built-in clock and calendar track the time and date. The console automatically adjusts for daylight saving time and leap year in most of North America, and Europe (and allows manual adjustment elsewhere). The console also displays the sunrise and sunset times based on the latitude and longitude, time and date, and your time zone/UTC offset.

Moon Phases

The moon phase icons and moon phase description in the Weather Center section of console screen are calculated based on latitude and longitude, time and date and your time zone/UTC Offset. The following table displays the moon phase icons and description for the Northern and Southern Hemispheres.

Icon: Northern Hemisphere	Moon Phase Description in the Weather Center	Icon: Southern Hemisphere
	NEW MOON	
	WAXING CRESCENT MOON	
	FIRST QUARTER MOON	
	WAXING GIBBOUS MOON	
	FULL MOON	
	WANING GIBBOUS MOON	
	LAST QUARTER MOON	
	WANING CRESCENT MOON	

Forecast

The forecast icons show what weather conditions may occur within the next 12 hours. The console generates a weather forecast based on the barometric reading and trend; wind speed and direction; rainfall; temperature; humidity; latitude and longitude; and time of year. The forecast is updated once an hour, on the hour and requires three hours of data. Predictions are made for cloud cover and the likelihood of precipitation.

Forecast Icon	Description of Forecasted Weather
	Mostly clear
	Partly cloudy
	Mostly cloudy
	Rain likely
	Snow likely
	Rain possible but not likely
	Snow possible but not likely
	Rain, freezing rain, sleet and/or snow likely
	Rain, freezing rain, sleet and/or snow possible but not likely

Wind

The anemometer measures wind speed and direction, and is part of the Integrated Sensor Suite (ISS). The console calculates a 2-minute average wind speed, a 10-minute average wind speed and 10-minute dominant wind direction. The 2- and10-minute average wind speed are displayed in the Weather Center whenever wind has been selected on the console. The last six 10-minute dominant wind directions are included in the compass rose wind display.

Beaufort Scale

The Beaufort Scale is an empirical measure for describing wind speed which ranks wind speeds in classes. The Beaufort Scale classification for the current wind condition is listed in the Weather Center when WIND is pressed and WxCEN is pressed several times. See “Wind Speed and Direction” on page 17 for more information.

Wind Speed	Beaufort Number	Description
0 -1 mph; (0 -1.6 kph)	0	Calm
1-3 mph; (1.6 - 4.8 kph)	1	Light Air
3 - 7 mph; (4.8 - 11.3 kph)	2	Light Breeze
7 -12 mph; (11.3 - 19.3 kph)	3	Gentle Breeze
12 - 18 mph; (19.3 - 29.0 kph)	4	Moderate Breeze
18 - 24 mph; (29.0 - 38.6 kph)	5	Fresh Breeze
24 - 31 mph; (38.6 - 49.9 kph)	6	Strong Breeze
31 - 38 mph; (49.9 - 61.2 kph)	7	Near Gale
38 - 46 mph; (61.2 -74.1 kph)	8	Gale
46 - 54 mph; (74.1 - 86.9 kph)	9	Strong Gale
55 - 63 mph; (88.5 - 101.4 kph)	10	Storm
64 - 73 mph; (103.0 - 117.5 kph)	11	Violent Storm
74 mph or above; (119.1 kph)	12	Hurricane

Temperature

The ISS houses the outside temperature sensor in a vented and shielded enclosure that minimizes solar radiation-induced temperature error. The console houses the inside temperature sensor.

Humidity

Humidity itself simply refers to the amount of water vapor in the air. However, the total amount of water vapor that the air can contain varies with air temperature and pressure. Relative humidity takes into account these factors and offers a humidity reading which reflects the amount of water vapor in the air as a percentage of the amount the air is capable of holding. Relative humidity, therefore, is not actually a measure of the amount of water vapor in the air, but a ratio of the air’s water vapor content to its capacity. When we use the term humidity in the manual and on the screen, we mean relative humidity.

It is important to realize that relative humidity changes with temperature, pressure, and water vapor content. If a parcel of air with a capacity for 10 g of water vapor contains 4 g of water vapor, the relative humidity would be 40%. Adding 2 g more water vapor (for a total of 6 g) would change the humidity to 60%. If that same parcel of air is then warmed so that it has a capacity for 20 g of water vapor, the relative humidity drops to 30% even though water vapor content does not change.

Relative humidity is an important factor in determining the amount of evaporation from plants and wet surfaces since warm air with low humidity has a large capacity to absorb extra water vapor.

Wind Chill

Wind chill takes into account how the speed of the wind affects our perception of the air temperature. Our bodies warm the surrounding air molecules by transferring heat from the skin. If there is no air movement, this insulating layer of warm air molecules stays next to the body and offers some protection from cooler air molecules. However, wind sweeps away that warm air surrounding the body. The faster the wind blows, the faster heat is carried away and the colder you feel. Wind has a warming effect at higher temperatures.

Note: There is no windchill when the air temperature is at or above 93° F (-34° C).

Heat Index

Heat index uses temperature and the relative humidity to determine how hot the air actually "feels." When humidity is low, the apparent temperature will be lower than the air temperature, since perspiration evaporates rapidly to cool the body. However, when humidity is high (*i.e.*, the air is more saturated with water vapor) the apparent temperature "feels" higher than the actual air temperature, because perspiration evaporates more slowly.

Note: Heat index and air temperature are equal at or below 0° F (-18° C).

Dew Point

Dew point is the temperature to which air must be cooled for saturation (100% relative humidity) to occur, providing there is no change in water vapor content. The dew point is an important measurement used to predict the formation of dew, frost, and fog. If dew point and temperature are close together in the late afternoon when the air begins to turn colder, fog is likely during the night. Dew point is also a good indicator of the air's actual water vapor content, unlike relative humidity, which takes the air's temperature into account. High dew point indicates high water vapor content; low dew point indicates low water vapor content. In addition a high dew point indicates a better chance of rain, severe thunderstorms, and tornados.

You can also use dew point to predict the minimum overnight temperature. Provided no new fronts are expected overnight and the afternoon relative humidity is greater than 50%, the afternoon's dew point gives you an idea of what minimum temperature to expect overnight. The higher the humidity is, the more accurate the dew point prediction.

Note: Dew point is equal to the air temperature when the humidity is 100%.

Rain

Vantage Vue incorporates a tipping spoon rain collector in the ISS that measures 0.01" or 0.2 mm for each tip of the spoon. Your station logs rain data in the same units it is measured in and converts the logged totals into the selected display units (inches or millimeters) at the time it is displayed. Converting at display time reduces possible compounded rounding errors over time.

Four separate variables track rain totals: "rain rate," "daily rain," "monthly rain," and "yearly rain." Rain rate calculations are based on the interval of time between each spoon tip, which is each 0.01" or 0.2 mm rainfall increment.

Barometric Pressure

The weight of the air that makes up our atmosphere exerts a pressure on the surface of the earth known as atmospheric pressure. Generally, the more air above an area, the higher the atmospheric pressure. This means that atmospheric pressure changes with altitude. For example, atmospheric pressure is greater at sea level than on a mountaintop. To compensate for this difference and facilitate comparison between locations with different altitudes, atmospheric pressure is adjusted to the equivalent sea level pressure. This adjusted pressure is known as barometric pressure. In reality, the Vantage Vue measures atmospheric pressure. When you enter your location's altitude in Setup Mode, the Vantage Vue stores the necessary offset value to consistently translate atmospheric pressure into barometric pressure.

Barometric pressure also changes with local weather conditions, making barometric pressure an extremely important and useful weather forecasting tool. High pressure zones are generally associated with fair weather while low pressure zones are generally associated with stormy weather. For forecasting purposes, however, the value of the absolute barometric pressure is generally less important than the change in barometric pressure. In general, rising pressure indicates improving weather conditions while falling pressure indicates deteriorating weather conditions.

Evapotranspiration (ET)

Evapotranspiration (ET) is a measurement of the amount of water vapor returned to the air in a given area. It combines the amount of water vapor returned through evaporation (from wet surfaces) with the amount of water vapor returned through transpiration (exhaling of moisture through plant stomata) to arrive at a total. Effectively, ET is the opposite of rainfall, and it is expressed in the same units of measure (inches, millimeters).

The Vantage Vue uses air temperature, relative humidity, barometric pressure, average wind speed, and solar radiation data to estimate ET, which is calculated once an hour on the hour. Measuring ET requires that the Vantage Vue console listen to a an optional Vantage Pro2 Plus station with a solar radiation sensor installed.

Solar Radiation

What we call "current solar radiation" is technically known as Global Solar Radiation, a measure of the intensity of the sun's radiation reaching a horizontal surface. This irradiance includes both the direct component from the sun and the reflected component from the rest of the sky. The solar radiation reading gives a measure of the amount of solar radiation hitting the solar radiation sensor at any given time, expressed in Watts/sq. meter (W/m^2). Measuring solar radiation requires that the Vantage Vue console listen to an optional Vantage Pro2 Plus station with a solar radiation sensor installed. Solar Radiation is displayed in the Weather Center when ET is pressed and WxCEN is pressed multiple times.

UV (Ultra Violet) Radiation

Energy from the sun reaches the earth as visible, infrared, and ultraviolet (UV) rays. Exposure to UV rays can cause numerous health problems, such as sunburn, skin cancer, skin aging, cataracts, and immune system suppression. Measuring UV radiation requires that the Vantage Vue console listen to an optional Vantage Pro2 Plus station with a UV radiation sensor installed. The UV Index is displayed in the Weather Center when ET is pressed and WxCEN is pressed multiple times.