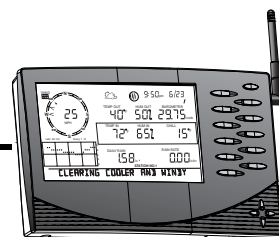


# Wireless Vantage Pro® & Vantage Pro Plus™ Stations

Including Fan-Aspirated Models



6150  
6160  
6151  
6161

**VANTAGE PRO**

The Vantage Pro (6150, 6151) and Vantage Pro Plus (6160, 6161) 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, A/D conversion, and calculations. The ISS and Vantage Pro console communicate via an FCC-certified, license-free transmitter and receiver. User-selectable DavisTalk ID codes allow up to eight stations to coexist in the same geographic area. The Wireless Vantage Pro Plus Weather Station includes two additional sensors that are optional on the Vantage Pro: 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 to interface your weather station with a computer, to log weather data, and to upload weather information to the internet.

The 6150 and 6160 rely on passive shielding to reduce solar-radiation induced temperature errors in the outside temperature sensor readings. The Fan-aspirated 6151 and 6161 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.

## Specifications

### Console

Console Operating Temperature	+14° to +140°F (-10° to +60°C)
Display Temperature	+32° to +140°F (0° to +60°C)
Non-operating Temperature	-5° to +158°F (-20° to +70°C)
Current Draw	0.67 mA average, 15 mA peak, (plus 80 mA for display lamps, plus .125 mA for each optional wireless transmitter received by the console) at 4 to 6 VDC
AC Power Adapter	5 VDC, 200 mA, regulated
Batteries	3 C-cells
Battery Life	up to 1 year
Connectors	Modular RJ-11
Housing Material	UV-resistant ABS plastic
Console Display Type	LCD Transflective
Dimensions	
Console with antenna	10.375" x 6.125" x 1.5" (264 mm x 156 mm x 38 mm)
Display	5.94" x 3.375" (151 mm x 86 mm)
Weight (with batteries)	1.88 lbs. (.85 kg)

### Integrated Sensor Suite (ISS)

Operating Temperature	-40° to +150°F (-40° to +65°C)
Non-operating Temperature	-50° to +158°F (-45° to +70°C)
Current Draw (ISS SIM only)	0.07 mA (average), 10 mA (peak) at 4 to 6 VDC
Solar Power Panel (ISS SIM / Fan)	0.5 watts / .75 watts
Battery (ISS SIM / Fan (Fan-Aspirated))	CR-123 3-Volt Lithium cell / 2 - 1.2 Volt NiCad C-cells
Battery Life (3-Volt Lithium cell)	up to 2 years, 1 year with no sun
Battery Life (NiCad C-cells)	1 year
Fan Aspiration Rate (Fan-Aspirated)	190 feet/min. (0.9 m/s) (full sun), 80 feet/min. (0.4 m/s) (battery only)
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	Tip bucket, 0.01" per tip, 33.2 in2 (214 cm2) collection area
Temperature Sensor Type	Platinum wire thermistor
Relative Humidity Sensor Type	Film capacitor element
Housing Material	UV-resistant ABS plastic
Dimensions	
6150, 6160	11.0" x 9.375" x 14.0" (279 mm x 238 mm x 356 mm)
6151, 6161	11.0" x 9.375" x 21.0" (279 mm x 238 mm x 533 mm)
Weight	
6150, 6160	5.42 lbs. (2.17 kg) / 6.35 lbs. (2.88 kg)
6151, 6161	5.8 lbs. (2.62 kg) / 6.76 lbs. (3.06 kg)

### Wireless Communications

Transmit/Receive Frequency	US Models: 916.5 MHz, Overseas Models: 868.35 MHz
DavisTalk® ID Codes Available	8
Output Power	916.5 MHz: FCC-certified low power, less than 1 mW, no license required 868.35 MHz: CE-certified, less than 10 mW, no license required

**Range**

Line of Sight .....	up to 400 feet (122 m)
Through Walls .....	100 to 200 feet (30 to 60 m)

**Sensor Inputs**

RF Filtering .....	RC low-pass filter on each signal line
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**Sensor Outputs (as displayed on console)**

**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 Data .....	Current 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
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.
Update Interval .....	Varies with sensor - see individual sensor specs Also varies with DavisTalk transmitter ID code - #1=shortest, #8=longest

**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 Changes

**Outside Temperature (sensor located in ISS)**

Resolution and Units .....	Current Data: 0.1°F or 1°F or 0.1°C or 1°C (user-selectable) nominal (see Fig. 1) Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range .....	-40° to +150°F (-40° to +65°C)
Sensor Accuracy .....	±1°F (±0.5°C) up to 110°F (43°C), ±2°F (±1°C) over 110°F (43°C) (see Fig. 2)
Drift .....	up to ±2% per year
Radiation Induced Error (Passive Shield) .....	+4°F (2°C) at solar noon (insolation = 1040 W/m <sup>2</sup> , avg. wind speed ≤ 2 mph (1 m/s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)
Radiation Induced Error (Fan-Aspirated) .....	+0.6°F (0.3°C) at solar noon (insolation = 1040 W/m <sup>2</sup> , avg. wind speed ≤ 2 mph (1 m/s)) (reference: RM Young Model 43408 Fan-Aspirated Radiation Shield)
Update Interval .....	10 to 12 seconds
Current Data .....	Instant Reading (user adjustable); Daily, Monthly, Yearly High and Low
Historical Data .....	Hourly Readings; Daily, Monthly, Yearly Highs and Lows
Alarms .....	High and Low Thresholds from Instant Reading

**Extra Temperature Sensors or Probes**

Resolution and Units .....	1°F or 1°C (user-selectable) Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range .....	-40° to +150°F (-40° to +65°C)
Sensor Accuracy .....	±1°F (±0.5°C) up to 110°F (43°C), ±2°F (±1°C) over 110°F (43°C) (see Fig. 2)
Update Interval .....	10 to 12 seconds (40 to 48 seconds for Leaf Wetness/Temperature and Soil Moisture/ Temperature Stations)
Current Data .....	Instant Reading (user adjustable)
Alarms .....	High and Low Thresholds from Instant Reading

**Inside Temperature (sensor located in console)**

Resolution and Units .....	Current Data: 0.1°F or 1°F or 0.1°C or 1°C (user-selectable) Historical Data and Alarms: 1°F or 1°C (user-selectable)
Range .....	+32° to +140°F (0° to +60°C)
Sensor Accuracy .....	±1°F (±0.5°C) up to 110°F (43°C), ±2°F (±1°C) over 110°F (43°C)
Drift .....	up to ±2% per year
Update Interval .....	1 minute
Current Data .....	Instant Reading (user adjustable); Daily and Monthly High and Low
Historical Data .....	Hourly Readings; Daily and Monthly Highs and Lows
Alarms .....	High and Low Thresholds from Instant Reading

**Wind Speed**

Resolution and Units .....	1 mph, 1 km/h, 0.1 m/s, or 1 knot (user-selectable)
Range (large wind cups) .....	2 to 150 mph, 2 to 130 knots, 1 to 67 m/s, 3 to 241 km/h
Range (small wind cups) .....	3 to 175 mph, 3 to 150 knots, 1.5 to 79 m/s, 5 to 282 km/h

Update Interval	Instant Reading: 2.5 to 3 seconds, 10-minute Average: 1 minute
Accuracy (large wind cups)	±2 mph (2 kts, 3 km/h, 1 m/s) or ±5%, whichever is greater
Accuracy (small wind cups)	±3 mph (3 kts, 5 km/h, 1.5 m/s) or ±5%, whichever is greater
Maximum Cable Length	540' (165 m)
Current Data	Instant Reading; 10-minute and Hourly Average; Hourly High; Daily, Monthly and Yearly High with Direction of High
Historical Data	10-min. and Hourly Averages; Hourly Highs; Daily, Monthly and Yearly Highs with Direction of Highs
Alarms	High Thresholds from Instant Reading and 10-minute Average
<b>Wind Direction</b>	
Display Resolution	16 points (22.5°) on compass rose, 1° in numeric display
Accuracy	±7°
Update Interval	2.5 to 3 seconds
Current Data	Instant Reading (user adjustable); 10-min. Dominant; Hourly, Daily, Monthly Dominant
Historical Data	Past 6 10-min. Dominants on compass rose only; Hourly, Daily, Monthly Dominants
<b>Wind Chill (Calculated)</b>	
Resolution and Units	1°F or 1°C (user-selectable)
Range	-120° to +130°F (-84° to +54°C)
Accuracy	±2°F (±1°C) (typical)
Update Interval	10 to 12 seconds
Source	United States National Weather Service (NWS)/NOAA
Equation Used	Siple and Passel (1948)
Variables Used	Instant Outside Temperature and 10-min. Avg. Wind Speed
Current Data	Instant Calculation; Hourly, Daily and Monthly Low
Historical Data	Hourly, Daily and Monthly Lows
Alarm	Low Threshold from Instant Calculation
<b>Rainfall</b>	
Resolution and Units	0.01" or 0.25 mm (user-selectable) (1 mm at totals ≤ 2000 mm)
Daily/Storm Rainfall Range	0 to 99.99" (0 to 9999 mm)
Monthly/Yearly/Total Rainfall Range	0 to 199.99" (0 to 19999 mm)
Rain Rate	0 to 199.99" (0 to 19999 mm)
Accuracy	For rain rates up to 2"/hr (50 mm/hr): ±4% of total or +0.01" (0.25 mm) (0.01" = one tip of the bucket), whichever is greater For rain rates from 2"/hr (50 mm/hr) to 4"/hr (100 mm/hr): ±5% of total or +0.01" (0.25 mm) (0.01" = one tip of the bucket), whichever is greater
Update Interval	10 to 12 seconds
Storm Determination Method	0.02" (0.5 mm) begins a storm event, 24 hours without further accumulation ends a storm event
Current 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 Data	Totals for 15-min, Daily, Monthly, Yearly (start date user-selectable) and Storm (with begin and end dates)
Alarms	High Threshold from Latest Flash Flood (15-min. Total, default is 0.50", 12.7 mm), 24-hour Total, Storm Total,
Range for Rain Alarms	0 to 99.99" (0 to 999.7 mm)
<b>Rain Rate</b>	
Resolution and Units	0.01" or 0.25 mm (user-selectable) at typical rates (see Fig. 3 and 4)
Range	0, 0.04"/hr (1 mm/hr) to 100"/hr (0 to 1999.9 mm/hr)
Accuracy	±5% or ±0.04"/hr (1 mm/hr) (up to 10"/hr. (250 mm/hr.)), whichever is greater
Update Interval	10 to 12 seconds
Calculation Method	Measures time between successive tips of rain collector. Elapsed time greater than 15 minutes or only one tip of the rain collector constitutes a rain rate of zero.
Current Data	Instant and 1-min. Reading; Hourly, Daily, Monthly and Yearly High
Historical Data	1-min Reading; Hourly, Daily, Monthly and Yearly Highs
Alarm	High Threshold from Instant Reading
<b>Barometric Pressure (sensor located in console)</b>	
Resolution and Units	0.01" Hg, 0.1 mm Hg, 0.1 hPa/mb (user-selectable)
Corrected Range	26.00" to 32.00" Hg, 660.0 to 810.0 mm Hg, 880.0 to 1080.0 hPa/mb
Uncorrected Range	18.00" to 33.50" Hg, 457.0 to 850.0 mm Hg, 592.0 to 1130.0 hPa/mb
Elevation Range	-999' to +12,500' (-305 m to 3810 m)
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
Equation Accuracy	±0.01" Hg (±0.3 mm Hg, ±0.3 hPa/mb)
Elevation Accuracy Required	±10' (3m) to meet equation accuracy specification
Overall Accuracy	±0.04" Hg (±1.0 mm Hg, ±1.4 hPa/mb)
Trend (change in 3 hours)	Change ≤0.6" (2 hPa/mb, 1.5 mm Hg) = Rapidly Change ≤0.2" (.7hPa/mb, .5 mm Hg)= Slowly

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Trend Indication	5 position arrow: Rising (rapidly or slowly), Steady, or Falling (rapidly or slowly)
Update Interval	15 minutes or when console BAR key is pressed twice
Current Data	Instant, 15-min., and Hourly Reading; Daily, Monthly, High and Low
Historical Data	15-min. and Hourly Reading; Daily, Monthly Highs and Lows
Alarms	High Threshold from Current Trend for Storm Clearing (Rising Trend) 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 )
Inside Relative Humidity (sensor located in console)	
Range	10 to 90% RH
Accuracy	±5%
Update Interval	1 minute
Current Data	Instant (user adjustable) and Hourly Reading; Daily, Monthly High and Low
Historical Data	Hourly Readings; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Reading
Outside Relative Humidity (sensor located in ISS)	
Range	1 to 100% RH
Accuracy	±3% (0 to 90% RH), ±4% (90 to 100% RH)
Update Interval	50 seconds to 1 minute
Current Data	Instant (user adjustable) and Hourly Reading; Daily, Monthly High and Low
Historical 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)	
Range	0 to 100% RH
Accuracy	±3% (0 to 90% RH), ±4% (90 to 100% RH)
Update Interval	50 seconds to 1 minute
Current Data	Instant Reading (user adjustable)
Alarms	High and Low Threshold from Instant Reading
Dewpoint (calculated)	
Resolution and Units	1°F or 1°C (user-selectable)
Range	-105° to +130°F (-76° to +54°C)
Accuracy	±3°F (±1.5°C) (typical)
Update Interval	10 to 12 seconds
Source	World Meteorological Organization (WMO)
Equation Used	WMO Equation with respect to saturation of moist air over water
Variables Used	Instant Outside Temperature and Instant Outside Relative Humidity
Current Data	Instant Calculation; Daily, Monthly High and Low
Historical Data	Hourly Calculations; Daily, Monthly Highs and Lows
Alarms	High and Low Threshold from Instant Calculation
Heat Index (calculated)	
Resolution and Units	1°F or 1°C (user-selectable)
Range	-40° to +135°F (-40° to +57°C)
Accuracy	±3°F (±1.5°C) (typical)
Update Interval	10 to 12 seconds
Source	United States National Weather Service(NWS)/NOAA
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 Data	Instant Calculation; Daily, Monthly High
Historical Data	Hourly Calculations; Daily, Monthly Highs
Alarm	High Threshold from Instant Calculation
Evapotranspiration (calculated, requires solar radiation sensor)	
Resolution and Units	0.01" or 0.25 mm (user-selectable)
Range	Daily to 99.99" (999.9 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
Update Interval	1 hour
Calculation and Source	Penman-Monteith Equation as implemented by CIMIS (California Irrigation Management Information System) including Net Radiation calculation
Current Data	Latest Hourly Total Calculation, Daily, Monthly, Yearly Total
Historical Data	Hourly, Daily, Monthly, Yearly Totals
Alarm	High Threshold from Latest Daily Total Calculation
Solar Radiation (requires solar radiation sensor)	
Resolution and Units	1 W/m2
Range	0 to 1800 W/m2
Accuracy	±5% of full scale (Reference: Eppley PSP at 1000 W/m2)
Drift	up to ±2% per year
Cosine Reponse	±3% for angle of incidence from 0° to 75°
Temperature Coefficient	-0.067% per °F (-0.12% per °C); reference temperature = 77°F (25 °C)

Update Interval	50 seconds to 1 minute (5 minutes when dark)
Current Data	Instant Reading and Hourly Average; Daily, Monthly High
Historical Data	Hourly Average, Daily, Monthly Highs
Alarm	High Threshold from Instant Reading
<b>Temperature Humidity Sun Wind Index (requires solar radiation sensor)</b>	
Resolution and Units	1°F or 1°C (user-selectable)
Range	-90° to +135°F (-68° to +64°C)
Accuracy	±4°F (±2°C) (typical)
Update Interval	10 to 12 seconds
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
Formulation Description	Uses Heat Index as base temperature, affects of wind and solar radiation are either added or subtracted from this base to give an overall effective temperature
Current Data	Instant and Hourly Calculation; Daily, Monthly High
Historical Data	Hourly Calculation; Daily, Monthly Highs
Alarm	High Threshold from Instant Reading
<b>Ultra Violet (UV) Radiation Index (requires UV sensor)</b>	
Resolution and Units	0.1 Index
Range	0 to 16 Index
Accuracy	±5% of full scale (Reference: Yankee UVB-1 at UV index 10 (Extremely High))
Cosine Reponse	±4% (0° to 65° incident angle); 9% (65° to 85° incident angle)
Update Interval	50 seconds to 1 minute (5 minutes when dark)
Current Data	Instant Reading and Hourly Average; Daily, Monthly High
Historical Data	Hourly Average, Daily, Monthly Highs
Alarm	High Threshold from Instant Calculation
<b>Ultra Violet (UV) Radiation Dose (requires UV sensor)</b>	
Resolution and Units	0.1 MEDs to 19.9 MEDs; 1 MED above 19.9 MEDs
Range	0 to 199 MEDs
Accuracy	±5% of daily total
Drift	up to ±2% per year
Update Interval	50 seconds to 1 minute (5 minutes when dark)
Current Data	Latest Daily Total (user resetable at any time from Current Screen)
Historical Data	Hourly, Daily Totals (user reset from Current Screen does not affect these values)
Alarm	High Threshold from Daily Total
Alarm Range	0 to 19.9 MEDs
<b>Soil Moisture (requires soil moisture Sensor)</b>	
Resolution	1 cb
Range	0 to 200 cb
Update Interval	62.5 to 75 seconds
Current Data	Instant Reading; Daily and Monthly High and Low
Historical Data	Hourly Readings; Daily and Monthly Highs and Lows
Alarms	High and Low Thresholds from Instant Reading
<b>Leaf Wetness (requires leaf wetness Sensor)</b>	
Resolution	1
Range	0 to 15
Dry/Wet Threshold	User-selectable
Accuracy	±0.5
Update Interval	(to be provided)
Current Data	Instant Reading; Daily High and Low; Monthly High
Historical Data	Hourly Readings; Daily Highs and Lows; Monthly Highs
Alarms	High and Low Thresholds from Instant Reading
<b>Moon Phase</b>	
Console Resolution	1/8 (12.5%) of a lunar cycle, 1/4 (25%) of lighted face on console
WeatherLink Resolution	0.09% of a lunar cycle, 0.18% of lighted face maximum (depends on screen resolution)
Range	New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Wanning Gibbous, Last Quarter, Waning Crescent
Accuracy	±38 minutes
<b>Sunrise and Sunset</b>	
Resolution	1 minute
Accuracy	±1 minute
Reference	United States Naval Observatory
<b>Clock</b>	
Resolution	1 minute
Units	Time: 12 or 24 hour format (user-selectable)

Date: US or International format (user-selectable)  
 Accuracy ..... ±8 seconds/month  
 Adjustments ..... Time: Automatic Daylight Savings Time (for users in North America, Europe and Australia 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

## Sensor Charts

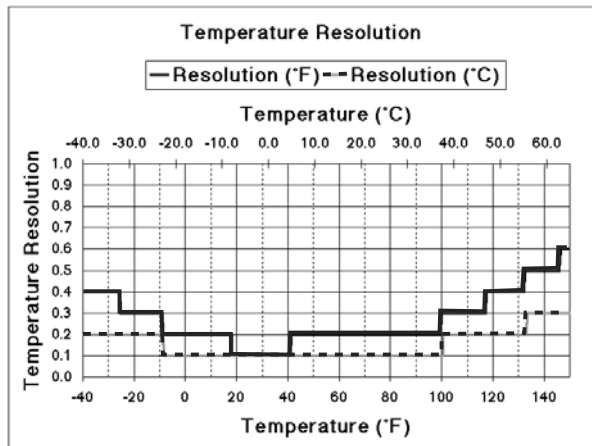


Figure 1. Temperature Resolution

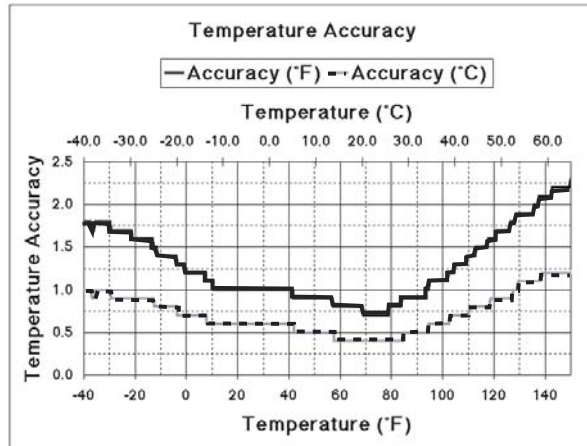


Figure 2. Temperature Accuracy

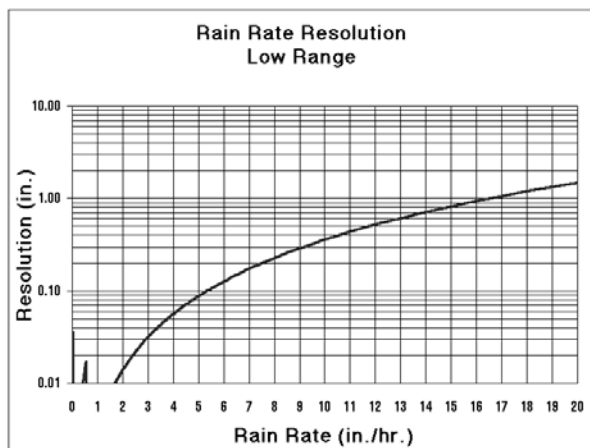


Figure 3. Low Range Rain Rate Resolution

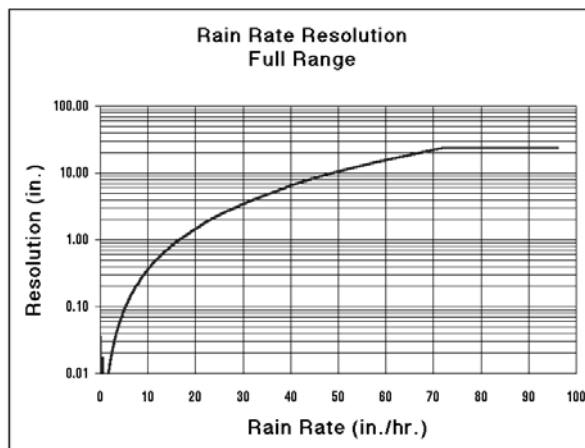


Figure 4. Full Range Rain Rate Resolution