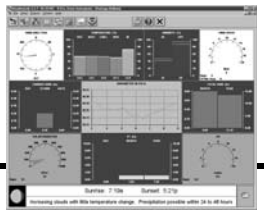
WeatherLink® for Vantage Pro® and Vantage Pro2™



6510SER 6544
6510USB 6550
6540 6560

Software and Data Logger

WeatherLink® for Vantage Pro® and Vantage Pro2™ consists of our WeatherLink software and a specialized data logger that connects to a Vantage Pro or Vantage Pro2 console. The software and data logger transfer your Vantage Pro or Vantage Pro2 weather data to your computer, allowing you to create a permanent weather database. Once stored in the database, your weather information can be used to generate a wide variety of reports and graphical displays, and can also be shared via the Internet. WeatherLink is packaged with one of the following data loggers:

- **Serial Data Logger (# 6510SER)** — Connects your Vantage Pro or Vantage Pro2 console to a computer via a serial connection or a remote modem connection.
- **USB Data Logger (# 6510USB)** — Connects your Vantage Pro or Vantage Pro2 console to a computer via a USB connection.

WeatherLink is also available in specially designed models:

- **WeatherLink for APRS with Streaming Data Logger (# 6540)** — Connects a Vantage Pro2 console or Weather Envoy to a ham radio with TNC modem for instant transmission of both your location and the local weather conditions via APRS.
- **WeatherLink with Alarm Output with Connector Block (# 6544)** — Allows you to use the weather station to control fans, heaters, etc., based on weather parameters you set.
- **WeatherLink for Emergency Response Teams (# 6550)** — Provides real-time weather data needed to map the footprint of a hazardous plume, predict its dispersion, and help make critical public safety decisions.
- **WeatherLink for Irrigation Control with Connector Block (# 6560)** —Allows you to use your weather station to turn your irrigation system on or off.

Each also simultaneously logs and stores the data, which can later be downloaded to your PC for all the graphing, charting, and analysis available in WeatherLink.

WeatherLink Software Features

- Displays the current weather station data in a real-time “bulletin” on the computer.
- Allows you to set and clear data in the weather station console (time and date, highs and lows, alarm thresholds, calibration numbers, etc.) from the computer.
- Graphs archived weather data on an hourly, daily, weekly, monthly, or yearly basis.
- Generates Weather Watcher reports in the National Climatic Data Center (NOAA) format.
- Collects data from multiple weather stations on the same computer.
- Internet support for creating your own weather website and for uploading other files such as web cam images.
- Includes support for GLOBE, an international weather-related science program for students from elementary through high school. Visit www.globe.gov for more information.
- APRS data protocol allows volunteers in the Citizen Weather Observer Program (CWOP) to send real-time weather data to the National Weather Service. CWOP data is used for weather education and research projects. Visit www.wxqa.com for more information.

WeatherLink Data Logger Features

- Archives weather data for subsequent transfer to the computer.
- Manages data communication between the weather station and the WeatherLink software.
- Information on WeatherLink communications protocols and data formatting can be found on the Software Support page at our website: (http://www.davisnet.com/support/weather/).

Software System Requirements (6510SER, 6540, 6544, 6550, or 6560)

Computer running Windows™ 95, 98, ME, NT 4.0, Windows 2000 or XP with at least one free serial port and 5 MB of free disk space. The amount of disk space necessary for the data files depends on the archive interval. Each archive record in the database is 88 bytes. Every day in the database has an additional two records totalling 176 bytes that

store daily summary information. A database containing data stored at a 30-minute archive interval requires approximately 4400 bytes of disk space per day or 132 KB of disk space per month. The file size changes in a linear fashion depending on the archive interval. For example, data stored at a one-minute interval requires approximately 3.9 MB a month while the data stored at a two-hour interval requires approximately 33 KB a month.

For phone modem connections, the following additional hardware is required: One external modem to connect to the WeatherLink and one internal modem or external modem connected to your computer (modems must be Hayes compatible), and Telephone Modem Adapter (# 6533).

Software System Requirements (for 6510USB)

Computer running Windows™ 98 SE, ME, Windows 2000 or XP with at least one free USB port and 5 MB free disk space. The amount of disk space necessary for the data files depends on the archive interval. Each archive record in the database is 88 bytes. Every day in the database has an additional two records totalling 176 bytes that store daily summary information. A database containing data stored at a 30-minute archive interval requires approximately 4400 bytes of disk space per day or 132 KB of disk space per month. The file size changes in a linear fashion depending on the archive interval. For example, data stored at a one-minute interval requires approximately 3.9 MB a month while the data stored at a two-hour interval requires approximately 33 KB a month.

Communication Protocol

Data Channel Characteristics . . . . . 1200, 2400, 4800, 9600, 14,400 and 19,200 baud (software-selectable), RS-232, half-duplex, data only (no CTS or RTS)

Data Logger Functions

Control Functions . . . . . Set archive interval, set/clear calibration numbers, set Longitude/Latitude, set Year-to-Date rain total, set/clear alarm thresholds, clear total values, set time/date.

Download . . . . . Data may be transferred automatically to your computer once an hour using the Auto Download command. More frequent downloads can be selected to support Internet file transfers. Only new archive data is transferred during the download.

Data Logger Archived Data

The Data Logger stores up to 2560 archive records (one 52-byte record per archive interval) for later transfer to your computer. The archive records are stored in 128K of non-volatile memory; protecting the data even if the console loses power. Maxima, minima, averages, and totals are taken over the archive interval.

Archive Record Data . . . . . Time/Date of Record, Inside Temperature (last or avg.), Outside Temperature (last or avg.), Maximum Air Temperature, Minimum Air Temperature, Wind Direction (dominant), Wind Speed (average), Maximum Wind Speed, Rainfall (total), Rain Rate, Inside Humidity (last), Outside Humidity (last), Barometric Pressure (last), Solar Radiation, Hi Solar Radiation, UV, Hi UV, Evapotranspiration, Forecast, Leaf Temperature (2), Leaf Wetness (2), Extra Humidity (2), Extra Temperature (2), Soil Temperature (4), Soil Moisture (4), Wind Samples, Wind Tx, Length of Archive Interval, ISS Reception

Archive Interval . . . . . User-selectable from the following intervals (in minutes): 1, 5, 10, 15, 30, 60, or 120

Archive Storage Capacity (the amount of time before the archive is completely filled):

- 1 Minute Archive Interval . . . . . 42 hours
- 5 Minute Archive Interval . . . . . 8 days
- 10 Minute Archive Interval . . . . . 17 days
- 15 Minute Archive Interval . . . . . 26 days
- 30 Minute Archive Interval . . . . . 53 days
- 60 Minute Archive Interval . . . . . 106 days
- 120 Minute Archive Interval . . . . . 213 days

Download . . . . . Data may be transferred automatically from the data logger to your computer up to once an hour using the Auto Download command. Data can be transferred more frequently, from once a minute to once every two hours, to support Internet uploading and other data sharing features. Only new archive data is transferred during the download.

Data Display Options

Some of the weather data and reports listed below require optional sensors.

Real-Time Displays (these displays update in real-time):

Graphical Bulletin	Inside Temperature, Outside Temperature, Wind Direction (0°- 360°), Wind Speed, Daily Rain Total, Monthly Rain Total, Year-to-Date Rain Total, Storm Total, Rain Rate, Inside Humidity, Outside Humidity, Barometer, Barometer 6-hour Plot, Evapotranspiration (ET) (day, month, year), Today's Highs and Lows, Forecast Icons, Forecast Text, and Illuminated Fraction of the Moon Disk.
Text-Based Summary	Inside Temperature, Outside Temperature, Wind Direction (0°- 360°), Wind Speed, Daily Rain Total, Monthly Rain Total, Year-to-Date Rain Total, Storm Total, Rain Rate, Inside Humidity, Outside Humidity, Barometer, UV, Solar Radiation, ET (day, month, year), Today's Highs and Lows, Forecast Text, and Moon Phase.
Update Interval	Two seconds (approximately)

Plotting Displays:

Plot Window	Enables graphing of all database information (multiple variables may be plotted on a single graph) over any of the following spans (1 hr, 4 hr, 8 hr, 12 hr, 1 day, 3 days, Week, Month, Year). Multiple dates may also be plotted on the same graph.
Strip Charts	Four stacked line graphs (multiple variables may be plotted on a single graph), which update at the time of each archive interval. Strip charts may use any of the following spans (1 hr, 4 hr, 8 hr, 12 hr, 1 day, 3 days, Week, Month, Year).

Reports:

NOAA Monthly Summary	Based on the National Oceanic and Atmospheric Administration (NOAA) Monthly Weather Watcher report
NOAA Yearly Summary	Based on the National Oceanic and Atmospheric Administration (NOAA) Yearly Weather Watcher report
Yearly Rainfall	Calculates rainfall totals broken down by month and year. Rainfall data may be altered and data may be added to reflect rainfall totals for months and years which are not contained in your weather database.
Degree-Days	Tracks degree-days and progress towards development for an unlimited number of crops or pests; base and upper development thresholds and development totals entered by user.
Temperature/Humidity Hours	Calculates the number of hours the temperature has been either above or below a given threshold, and that during which time the humidity was above a given threshold from a given start date. Typically used to track conditions for the development of agricultural pests and molds.
Soil Temperature Hours	Calculates the time that soil temperature has been above freezing (or some other threshold). Typically used to determine a time to plant crops.
Chilling Requirements	Calculates the number of hours spent below a specified temperature during a specified period of time. Typically used to determine if the coldness requirement for a fruit tree in dormancy has been met.
Bright Sunshine Hours	Calculates amount of sunshine for a selected time period.
Leaf Wetness Hours	Calculates the amount of leaf wetness hours over a selected time period.
Fuel Demand	Estimates fuel usage based on past usage and outside temperatures.
Total ET	Calculates ET for a selected time period.
Sunrise & Sunset Times	Calculates sunrise and sunset times for any given latitude, longitude and date.

WeatherLink for APRS with Streaming Data Logger (6540)

The Streaming Data Logger is designed for ham radio operators with the capability of accepting APRS data packets. The product will allow the user to transmit weather data over ham radio without the need for a PC. Some configurations may require a TNC modem. TNC (Terminal Node Controller) modems translate the data from a Vantage Pro or Vantage Pro2 into packets for transmission via ham radio.

Hardware Installation and Requirements

In addition to the WeatherLink requirements, the streaming data capability has the following additional hardware requirements.

- Ham radio with attached TNC modem capable of accepting APRS data packets.
- Computer running any version of Windows™ with at least 3 MB of RAM and 512 KB of hard disk space.

For further and more detailed information on APRS, please visit the following website: http://web.usna.navy.mil/~bruninga/aprs.html.

Streaming Function Specifications

Time Out Period:	The streaming data logger utilizes a time-out period for ceasing streaming whenever software attempts to communicate to the logger. Once communications to WeatherLink are initiated and successful, the streaming data logger will be unable to communicate with the Streaming Data Utility until the Time Out Period expires.
Range	5 to 255 seconds (user selectable)
Default Value	5
Streaming Interval:	
Range	1 to 99 minutes (user selectable)
Default Value	5 minutes
Streaming Baud Rate	Available Rates: 1200, 2400, 4800, 9600, 19200 (WeatherLink 5.6 or later
Default:	9600
Streaming Data Output Parameters:	Day of the Month, Time in GMT & 24 hour format, Latitude & Longitude, Wind direction (in degrees), Wind Speed (1 min. avg. in mph), High Wind Speed (in mph in the last 5 min.), Temperature (°F), Rainfall (inches) in the last hour, Rainfall (inches) in the last 24 hours, Daily Rainfall (inches since midnight), Humidity (in %, omitted if missing), Barometric pressure (mb/hPa, omitted if missing), Solar Radiation (in W/m2, omitted if missing).

WeatherLink for Alarm Output with Connector Block (6544)

The Connector Block is designed to allow you to turn heaters, fans, and other devices on or off using the data from your weather station. The utility software steps you through the choices. For each of four outputs, you can enter up to eight different weather parameters. Enter threshold values for each, select from nine different test conditions, and logically combine the entries together as you choose. Our connector block provides the interface between your Vantage Pro2 console or Weather Envoy and an electrical device. For high-power devices, you may also need to add electrical relays (not supplied by Davis Instruments).

Hardware Installation and Requirements

In addition to the requirements for WeatherLink, the Irrigation capability has the following additional hardware requirements.

- Computer running any version of Windows™ with at least 3 MB of RAM and 512 KB of hard disk space.
- Relays: You may need to obtain your own relays in order to switch equipment at voltages higher than 28 volts or power levels above 10 Watts.

Caution: The Alarm Output data logger is not suitable for any use in which the health or safety of any person or the value or protection of valuable property is dependent on the operation of the device.

Function Specification

Operating Temperature	-40° to +140°F (-40° to +60°C)
Output Contact Closures	4 Alarm Contact Specifications, Terminal Block with stainless steel cage clamp screw terminals.

Each of the four output contacts is rated as follows:

Type	Photo-coupled MOS FET
Load Voltage	28VAC or 48VDC
Peak Voltage	± 60 V, maximum
Load Current	± 1.8 A, continuous maximum at 77°F (25°C), derated to 0.7 A at 185°F, (85°C)
Peak Load Current	6 A for 100 msec., maximum
ON Resistance	0.12 Ohms, maximum
OFF Leakage	1 uA, maximum
Power Dissipation	550 mW, maximum

Output Contact Closure Functions (Set through the configuration software utility):

Station Configuration	Allows user to configure available test parameter list based on station model and accessories.
Units	Allows user to enter test parameters in English or metric.
Available Test Parameters	Outside Temperature, Outside Humidity, Outside Dewpoint, Current Wind Speed, 10 min Avg. Wind speed, Wind Direction, Wind Chill, Outside Heat Index, Barometer Value, Barometer Trend: (Rising Rapidly, Rising Slowly, Steady, Falling Slowly, Falling Rapidly), Daily Rain, Storm Total Rain, Monthly Rain, Yearly Rain, Rain Rate, Solar Radiation, UV Radiation, Inside Temperature, Inside Humidity, Inside Dewpoint, Inside Heat Index, Extra Temperature (1- 8: # based on Tx ID), Extra Humidity (1- 8: # based on Tx ID) Daily ET, Monthly ET, Yearly ET, Leaf Wetness (1-2), Soil Moisture (1-4), Leaf Temperature (1-2), Soil Temperature (1-4), Time, Transmitter Battery Status (ID# 1-8), Repeater Battery Status (ID# A-H), Console Batteries, ISS Reception (% since midnight)
Test Conditions	Greater Than or =, Less Than or =, Between, Not Between, True (or False, used for Barometer Trend and Battery Status Parameters), Trending, Equal, Minus (Difference), Missing (if data is dashed)
Logical Grouping Options	Alarm Triggers on any user-selected logical grouping of up to 8 test conditions (up to 7 if using the Minus or Difference Test Condition/ Check Type): OR (any test conditions can be true), AND (all test conditions must be true), XOR (only one test condition can be true), DONE (only on test condition used)
Alarm Logging	The log will consist of which output became active, which parameters caused the alarm to become active (useful for the AND type alarm) along with the date and time that the alarm became active. This log is cleared whenever any of the output alarms are cleared. Can be activated or deactivated by the user.

Output Contact Closure Functions

Duration	0 to 255 minutes (user selectable). Determines how long the alarm output should stay active once it is triggered. Default = 10 minutes
Reactivation	0 to 255 minutes (user selectable). Determines how long to leave the alarm output deactivated once it is deactivated. Default = 0.
Pulse Width	0 to 9999 milliseconds (user selectable). Default = 2000 milliseconds (2 seconds).
Activation	Continuous or Pulse (1-time) (user selectable). Determines whether a pulse for alarm activation is continuous throughout the activation time or a one time pulse. Pulsed relay oriented devices will require the one-time pulse. Default = Continuous
Circuit Behavior	Normally Open or Normally Closed (user-selectable). Determines whether the circuit stays open or closed when no alarms are active. The opposite behavior occurs for an active alarm condition. Normally closed is the most typical operation for Irrigation controller use. Default = Normally Closed.
Test Mode Function	Available. Continuous, Open, or Closed circuit (user-selectable).

WeatherLink for Emergency Response Teams with Streaming Data Logger (6550)

The Streaming Data Logger is designed for use with the free CAMEO® software developed by National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA). It provides the real-time weather data needed to map the "footprint" of a hazardous plume, predict its dispersion, and help make critical public safety decisions. Please note that this product is specifically designed to work with the ALOHA® software program and will not work with other such programs of this type. For further and more detailed information on this product, please visit the following website: http://www.epa.gov/ceppo/cameo/aloha.htm.

Note: CAMEO, or Computer-Aided Management of Emergency Operations, is a suite of three integrated software applications, including ALOHA® Areal Locations of Hazardous Atmospheres.

Hardware Installation and Requirements

In addition to the WeatherLink requirements, the streaming data capability has the following additional hardware requirements:

- Computer running any version of Windows™ with at least 1 MB of RAM and 2.5 MB of hard disk space

Streaming Function Specifications

Time Out Period:	The streaming data logger utilizes a time-out period for ceasing streaming whenever software attempts to communicate to the logger. Once communications to WeatherLink are initiated and successful, the streaming data logger will be unable to communicate with the Streaming Data Utility until the Time Out Period expires.
Range	5 to 255 seconds (user selectable)
Default Value	5
Station ID #	ALOHA® uses a station ID number in the streaming data transmission. Although a station ID number is included in each data transmission, ALOHA® does not use this value.
Range	0 to 999 (user selectable)
Default Value	1
Streaming Interval	30 seconds (fixed, as required by ALOHA® software)
Streaming Baud Rate	1200 (fixed, as required by ALOHA® software)
Streaming Data Output Parameters:	Station ID #, the vector mean wind speed, (5 minutes average in m/sec), mean wind direction (5 minutes average in degrees true), standard deviation of the wind direction ("sigma-theta") (degrees), mean air temperature, (5 minutes average in °C), instantaneous wind speed (m/sec), instantaneous wind direction (in degrees true), instantaneous air temperature (°C), instantaneous console or Envoy battery voltage as required by ALOHA®.

WeatherLink for Irrigation Control with Connector Block (6560)

The connector block is designed for use with most common irrigation systems, including Rain Bird, Rain Master, and Toro. For the industrial controllers used in agriculture and turf management, it provides electronic pulses for wind, rain, and evapotranspiration (ET). Homeowners can add our optional Solar Radiation Sensor to turn the system on or off based on evapotranspiration. All users can use the alarm settings in the Vantage Pro or Pro2 console or Weather Envoy to inhibit the irrigation cycle based on weather conditions. The device will inhibit the irrigation cycle if ANY of the alarms are active.

Hardware Installation and Requirements

In addition to the requirements for WeatherLink, the Irrigation capability has the following additional hardware requirements.

- Computer running any version of Windows™ with at least 3 MB of RAM and 512 KB of hard disk space.
- Industrial Irrigation Controller with inputs for wind, rain, and/or ET; or a Residential Controller with a Common or a Rain Sensor connection. Irrigation wire as appropriate to your Irrigation Controller
- Solar Radiation Sensor, P/N 6450 to use evapotranspiration (ET) to control the irrigation cycle. In addition to the

ET pulse output, the Rain - ET algorithm uses this information. More information is provided below.

- Relays: You may need to obtain your own relays in order to switch equipment at voltages higher than 28 volts or power levels above 10 Watts.

Note: An industrial controller can also be connected to the Alarm Output on the irrigation data logger if you want the irrigation system to also be suspended due to cold temperatures.

Note: A residential controller may be connected in series to both the ET and Alarm outputs on the Irrigation data logger if you want the irrigation system to also be suspended due to high winds or cold temperatures in addition to the Rain-ET balance.

Caution: The Alarm Output Module is not suitable for any use in which the health or safety of any person or the value or protection of valuable property is dependent on the operation of the streaming data logger.

Function Specification

Operating Temperature . . . . . -40° to 140°F (-40° to 60°C)

Output Contact Closures . . . . . 4: Wind, Rain, ET & Alarm Contact Specifications, Terminal Block with stainless steel cage clamp screw terminals.

Each of the four output contacts is rated as follows:

- Type . . . . . Photo-coupled MOS FET
- Load Voltage . . . . . 28VAC or 48VDC
- Peak Voltage . . . . . ± 60 V, maximum
- Load Current . . . . . ± 1.8 A, continuous Maximum at 77°F (25°C), derated to 0.7 A at 185°F, (85°C)
- Peak Load Current . . . . . 6 A for 100 msec., maximum
- ON Resistance . . . . . 0.12 Ohms, maximum
- OFF Leakage . . . . . 1 uA, maximum
- Power Dissipation . . . . . 550 mW, maximum

Output Contact Closure Functions:

- Wind . . . . . 1 pulse per 1 mph in 2 seconds. Frequency in Hz is half the wind speed in mph
- Rain . . . . . 1 pulse per tip of the rain bucket. Depends upon rain collector type setting in console (0.01" or 0.2 mm)
- ET . . . . . 1 pulse per 0.01" in Industrial mode only; acts as an alarm in Residential mode (see below) only
- Alarm . . . . . Triggers on any active alarm set on the Vantage Pro or Pro2 console/ Envoy. Functions according to settings listed below:
  - Duration . . . . . 0 to 255 minutes (user selectable). Determines how long the alarm output should stay active once it is triggered. Default = 10 minutes
  - Reactivation . . . . . 0 to 255 minutes (user selectable). Determines how long to leave the alarm output deactivated once it is deactivated. Default = 0.
  - Pulse Width . . . . . 0 to 9999 milliseconds (user selectable). Default = 2000 milliseconds (2 seconds).
  - Activation . . . . . Continuous or Pulse (1-time) (user selectable). Determines whether a pulse for alarm activation is continuous throughout the activation time or a one time pulse. Pulsed relay oriented devices will require the one-time pulse. Default = Continuous
  - Behavior . . . . . Normally Open or Normally Closed (user-selectable). Determines whether the circuit stays open or closed when no alarms are active. The opposite behavior occurs for an active alarm condition. Normally Closed is the most typical operation for Irrigation controller use. Default = Normally Closed.
  - Test Mode Function . . . . . Available. Continuous, Open, or Closed circuit (user-selectable).

Residential Mode . . . . . Used with a Residential Irrigation System Controller to inhibit the watering cycle. This type of sprinkler controller will be what is typically installed by most homeowners and will have inputs for a Common and in many cases a Rain Sensor. The following functions are available for this mode only:

Irrigation Cycle . . . . . 1 to 255 hours (user-selectable). Indicates the number of hours between entire watering cycles, which are the period of time it takes for all programmed cycles on the Irrigation controller to start, finish and then begin again. Default = 24 (daily watering cycle).

Rain - ET Threshold. . . . . -9.99" to +9.99", (253.7 mm) (user-selectable) Difference between the Total Rainfall minus the Total Evapotranspiration (ET) over the Irrigation Cycle (see above). Update Interval = 1 hour. Default = 0.

Rain Rate Cut-Off . . . . . 0.00" to 0.99"/hour (25.1 mm/hour) or off (user-selectable). Used to inhibit the irrigation cycle during heavy rain situations. Default = 0.30"/hour (7.6 mm/hour). This function can be disabled in the streaming data utility bundled with WeatherLink 5.6 or later.

Package Dimensions

Product #	Package Dimensions (Width x Height x Depth)	Package Weight	UPC Codes
6510SER	6.00" x 9.00" x 1.75" (152 mm x 229 mm x 45 mm)	8.0 oz. (0.23 kg)	011698 00726 4
6510USB			011698 00727 1
6540		9.6 oz. (0.28 kg)	011698 00736 3
6544		10.3 oz. (0.29 kg)	011698 00820 9
6550		8.6 oz. (0.24 kg)	011698 00737 0
6560		9.9 oz. (0.29 kg)	011698 00738 7