

# WEATHER STATIONS for PSD MONITORING

## FEATURES:

- **Stand-alone, Fold-over 10-m Tower**
- **High Accuracy & Reliability Sensors**
- **Pre-wired Plug & Play Installation**
- **Industry Standard ASCII Data Format**
- **Data Retrieval & Communications Options**

U.S. Environmental Protection Agency guidelines assist operators of potential air pollution sources in complying with the 1977/1990 Clean Air Act Amendments. Operators are required to gather ambient air quality measurements, including meteorological data, at the site of the new air pollution source to estimate its impact on the vicinity and prevent significant deterioration (PSD) of the existing air quality.

The meteorological database should include hourly average wind speed and direction and the standard deviation of wind direction, measured at a standard height of 10 meters. Sites with complex terrain or tall structures often require monitoring at higher levels. The air temperature and the global hemispherical solar radiation are measured at a height of 2 meters above the ground, plus the vertical temperature difference (Delta-T) between 2 and 10 meters above the ground. These measurements will provide the required database for determining the site atmospheric stability category based on the EPA preferred SRDT (Solar Radiation, Delta Temperature) method. The EPA may also require other measurements such as relative humidity (dew point temperature), precipitation or barometric pressure. Minimum equipment specifications are detailed in the sensor section.

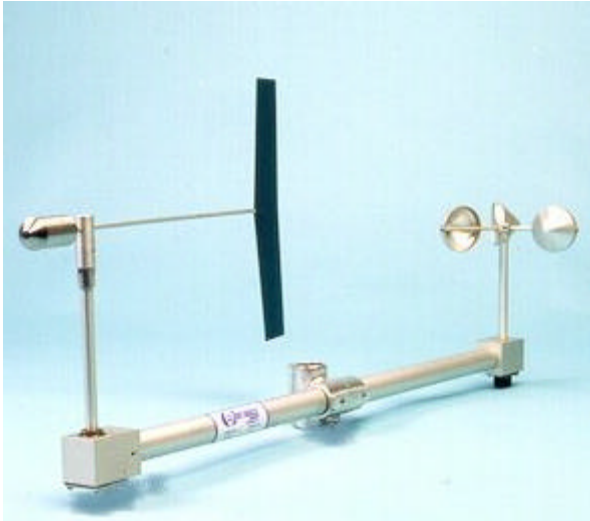
All temperature sensors must be protected from the effects of solar radiation, and, therefore, must be properly aspirated. A minimum of 90 percent data recovery and periodic calibrations and inspections, no less than every six months, are required for every meteorological system. Quality assurance of your meteorological data may be achieved by employing a monitoring system that complies with all of the requirements listed above.



## SENSOR DESCRIPTION:

### WIND SENSOR

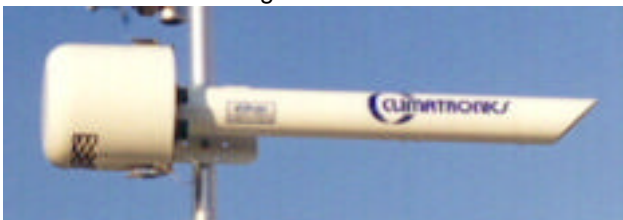
Our WM-III sensors are the most widely used for PSD measurements by federal, state and local governments, industry and consultants. The low starting threshold of .45 m/s (.95 mph) is far less than PSD requires, which allows room for normal bearing degradation. The WM-III sensors have a low power design so that they can be used in both AC and DC applications. Where multilevel measurements are specified, the F460 wind speed, P/N 100075, and direction, P/N 100076,



sensors, with their better accuracy and plug-in modular design, are preferred. If the highest reliability and accuracy is desired, consider our P/N 102263 Sonimometer™ (sonic anemometer), which measures both wind speed, and wind direction using no moving parts.

### TEMPERATURE SENSORS

Climatronics' Temperature Sensor, P/N 100093 is used for measuring ambient and differential

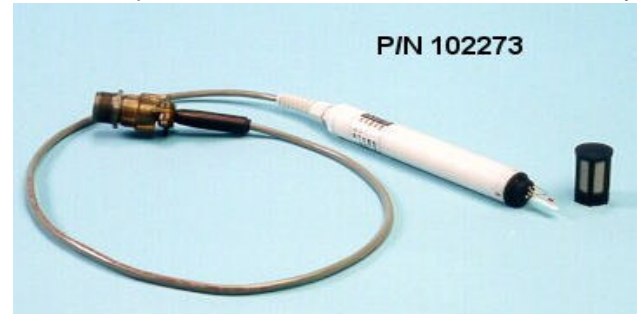


temperatures. When this thermistor sensor is used with a P/N 100325 motor aspirated shield, it yields an accuracy of  $\pm 0.15^{\circ}\text{C}$  ( $\pm 0.1^{\circ}\text{C}$  for Delta-T with a matched pair). Naturally aspirated shields are also available and should be used with the P/N 102259 sensor/connector assembly.

### RELATIVE HUMIDITY SENSOR (DEW POINT)

The Relative Humidity Sensors P/N 102273 or P/N 102425 measures the relative humidity of the atmosphere using a highly accurate, fast response capacitive polymer transducer. If the humidity measurement is of significant concern, we recommend that the P/N 102273 sensor be used due to its higher accuracy. A separate naturally aspirated shield is required for this sensor, while the

P/N 102425 sensor will fit in one of the P/N 100325 motor aspirated shield. The relative humidity



combined with the air temperature measurement is used to calculate the dew point temperature.

### PRECIPITATION GAUGE

Climatronics' Precipitation Gauge is a tipping bucket type with a collection diameter of 6 or 8 inches. A frictionless, reed switch gives a contact closure for each .25 mm (0.01") event. Heaters can be provided to convert snow and freezing rain to a measurable liquid state. Windshields are also available.



### SOLAR RADIATION SENSOR

The Solar Radiation Sensor uses a thermopile transducer protected by a quartz glass dome that provides the 285 – 2800 nanometer spectral range required when providing data for the SRDT method. A silicon cell (photovoltaic) pyranometer is also available and is ideal where a narrower spectral range and 5 percent measurement accuracy is acceptable.



### BAROMETRIC PRESSURE SENSOR

The barometric pressure sensor, P/N 102270, uses a glass fused ceramic capacitive transducer with excellent thermal stability and low hysteresis. The standard range is 800 – 1100 hPa, but other ranges are available. This sensor is typically mounted in the system NEMA-4X enclosure with the data logger and other peripherals.

When deciding what weather station will be needed for your particular application you should consider the following questions:

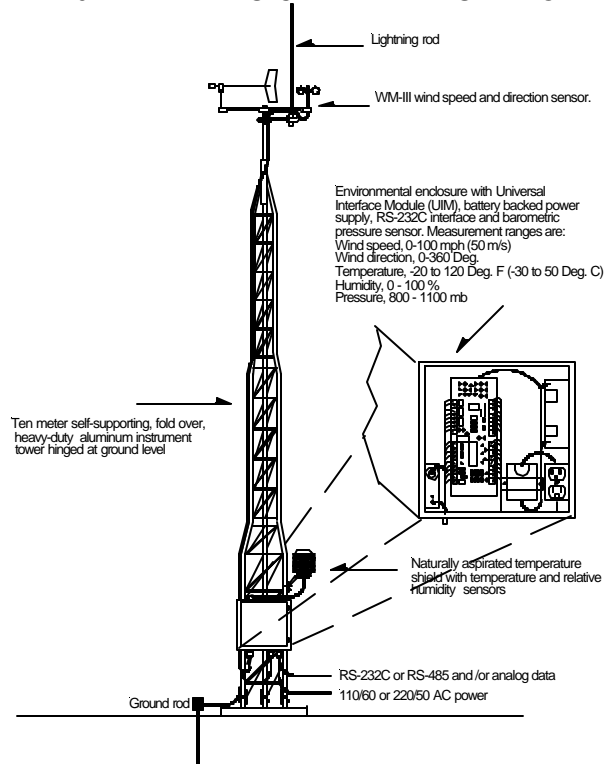
1. Is this a PSD requirement?
2. AC or DC site power?
3. Preferred data retrieval method?
4. Outside of the required parameters of wind, temperature, delta temperature and solar radiation, does any other variable(s) have to be recorded?
5. What is the desired data logger program definition – scan rates, averages, standard deviations, etc.

## BASIC WEATHER STATION

Battery-Operated 10-Meter System with data logger or Universal Interface Module (UIM). Climatronics' Basic Weather Station (BWS) operates on AC or DC power. The data logger or the UIM card provides the power and interface for the sensors. Data can be recorded remotely, on site with the logger or to a local PC with the UIM and WeatherView software. The system can operate from batteries for up to one week or indefinitely with the solar panel/rechargeable battery option or from commercial AC power.

- 102083 Wind speed & direction sensor
- 102090 Temperature sensor w/connector
- 102425 Relative Humidity sensor (Optional)
- 102080 Shield
- 102270 Pressure sensor (Optional)
- 100508 Precipitation sensor (Optional)
- 102342 Solar radiation sensor (Optional)
- 102467 Data logger
- LOGGNET Data Logger Support software
- 102278 UIM (Optional, instead of data logger)
- 102455 WeatherView software (Optional)
- 101423 J-Box Mounting Brackets
- C33HD 10-meter tower w/ tilt down base
- 100924 Full height grounding kit
- PS1282L 8 Ah rechargeable battery
- 100800-G1 10-Watt solar panel (Optional)\*\*
- Cables and various mounting hardware
- Data retrieval or communications options.
- Data display options.

## 10-METER BASIC WEATHER STATION



## SRDT WEATHER STATION

### 10-Meter Level

- 100075 F460 Wind Speed Sensor
- 100076 F460 Wind Direction Sensor
- 101994 Prewired Crossarm
- 100093 Temperature Sensor
- 100325 Motor Aspirated Temperature Shield

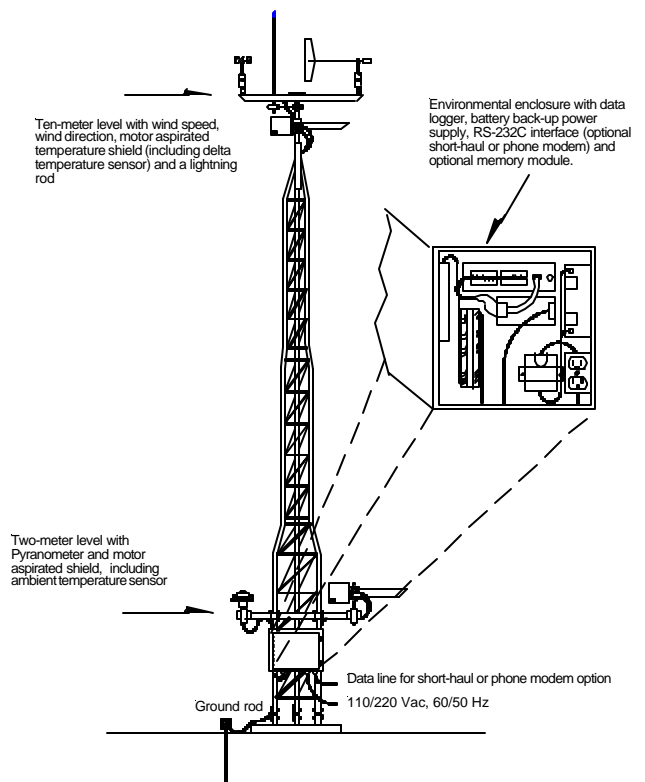
### 2-Meter Level

- 100093 Temperature Sensor
- 102425 Relative Humidity sensor
- 100325-1 Motor Aspirated Temperature/RH Shield
- 102318 Pyranometer (with mount & boom)

### Ground Level

- 100508 Precipitation Gage, (Optional)
- 101760-G0-H0 Data logger
- LOGGNET Data Logger Support software
- 102278 UIM (Optional, instead of data logger)
- 101423 J-Box Mounting Brackets
- 102455 WeatherView software (Optional)
- C33HD 10-meter tower w/ tilt down base
- 100924 Full height grounding kit
- 101139 Power supply w/ battery backup\*\*
- Cables and various mounting hardware
- Data retrieval or communications options.

## SRDT METEOROLOGICAL SYSTEM



\*\*Depending on site location and data retrieval method desired, battery powered systems with solar panel recharging require special engineering considerations. Please consult with Climatronics for further details.

### MULTI-LEVEL TOWER SYSTEM

Where multi-level, tall tower monitoring is specified, an expanded data logger system or a remote monitoring system such as a SODAR may be your best solution. With these types of systems, a variety of different options are available such as instrument elevators that bring the sensors to the ground level for service or calibration. Consult a Climatronics sales engineer with your specific requirements.

### DATA ACQUISITION

The IMP-850, IMP-860, IMP-890 data loggers or the UIM are extremely versatile, low-power units tailored to the requirements of meteorological data acquisition. The IMP-850 is a 24-channel unit with an integral keyboard and display. The IMP-850 provides all required sensor excitation and logs the sensor data directly to memory. Data processing functions include averages, max/min, standard deviations, and trigonometric functions. Data can be retrieved via an RS-232C port, remote data link, or from a removable, solid-state storage module.

The IMP-860 and IMP 890 are direct descendants of the IMP-850. The IMP-860 has 12 analog input channels and 2 counter inputs. Like the other IMP-800 series data loggers, it can be programmed from a computer (via an RS-232C interface) or via a remote telemetry link. The IMP-890 is designed specifically for a small station with a limited number of inputs (4 analog, 2 frequency) and no input expansion requirements. All three data loggers use the same Windows based, LOGGERNET PC support software.

The UIM module was designed to provide a cost effective interface between the various system sensors and a PC or SCADA system when real time data display is a requirement and on-site data storage is not. The UIM card connects directly to the sensors and has 8-analog and 2-counter inputs. The standard output is RS-232C compatible, printable ASCII with options for RS-422/485 and analog 0-1 or 0-5 VDC or isolated 4-20 mA. A limited amount of computations such as data averaging, standard deviation of wind direction (sigma theta), dew point or wet bulb temperature, etc., can be performed by the UIM.

For further information about the IMP-850, IMP-860 or IMP-890 data loggers, or the UIM module, please refer to their individual data sheets.

### DATA COMMUNICATIONS

Climatronics provides several types of communication equipment, which allow the user to relay the data to a central location. The IMP series data loggers can support both telephone and radio telemetry requirements. They can use either

dedicated copper or fiber optic lines for short-haul modems, or standard dial-up lines or mobile telephone using low power, auto-answer modems. The auto-answer modems communicate at 9600 baud. Radio telemetry systems use an RF Modem Interface coupled with a VHF or UHF transceiver, or RS-232C compatible license free Spread Spectrum radios. Complete systems with antennas and coaxial cables are available. Please consult one of our sales engineers for your specific needs.

### SOFTWARE

The LOGGERNET 32-bit software supports programming, communication, and reliable exchange of data between a PC and our IMP-800 series data loggers. It features a set of programs that allow the user to interact in real-time with a series of remote sites from a PC Windows environment. Further, the package can establish and maintain communication and automatic data retrieval with a network of up to 100 remote stations at individual sites. The software includes built-in help and error messages, which allow the user to learn and operate the network with a minimum need for manuals. Our "WeatherView" software is designed to run in a Windows environment and will display and record the data from one to eight weather stations. Two different types of displays are provided and engineering units may be selected from the menu bar "on the fly". The data may be networked through TCP/IP data protocol. For additional details, see the LOGGERNET or WeatherView data sheets.

Climatronics has several types of meteorological systems that comply with the PSD regulations. All systems meet the requirements of the EPA guidelines by offering the following features:

- Quality sensors with specifications that meet or exceed PSD Guidelines.
- Motor-aspirated shields with flow rates greater than 3 m/sec.
- Digital data loggers or UIM for primary data recovery. The digital data loggers and the UIM both will calculate the standard deviation of wind direction (sigma theta) using EPA-approved algorithms.
- Data retrieval software and NIST - traceable factory calibration services.

References: "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)," EPA-450/4-87-007, May 1987.

"Meteorological Monitoring Program Guidance for Regulatory Modeling Applications," EPA-454/R-99-005, February 2000.



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