

# GUIDE TO BUYING A PROFESSIONAL WEATHER STATION



*Monitoring weather conditions is critical to the safety of utility workers.*

## **So, you've been tasked with finding a weather station for a project.**

Whether you are a professional purchasing agent, a technical engineer, or the office intern, when your organization is contemplating a weather station purchase, doing some legwork up front will help you work up better specifications for a better RFQ.

Whether you need to spec a weather station to comply with regulatory requirements, make operational decisions, or for public safety, having this information in hand will help you make the right decision for your requirement.

## **1. What are your OBJECTIVES for weather monitoring?**

**Why does your organization need a weather station?** Try to be as specific as possible. For example, is your organization looking for:

- Decision Criteria – such as stop work (for example based on 15 mph wind speed and/or 56 degrees low temperature)
- Regulatory Compliance (state the regulations)
- Public Information (safety during extreme events based on specific criteria)
- Incident Reporting (documentation)
- Industrial Automation Process Improvement (SCADA integration)

Consider the actions that might be taken based on meteorological data.

It doesn't need to be complicated, but, if appropriate, be sure to get input and consensus up and down the chain from the decision-makers, such as supervisors or Command Chief, to end-users such as data analysts, field technicians, or hazmat safety leader.



*Portable Weather Stations, popular with HazMat teams and environmental researchers alike, offer a rapid-deployment option for short-term on-site weather monitoring.*

## 2. What CONFIGURATION of weather station do you need?

**This is one of the easiest questions to answer** – as in Fixed-base, Portable, or Vehicle-Mounted configuration. (This also has to do with how your weather station sensors will be mounted. Be sure to note whether additional hardware may be required.)

Will you be installing it on a building? If yes, then fixed-base is your answer. Is there an existing mast for the sensors or will additional mounting hardware need to be specified?

Are you utilizing it on a Mobile Command Center? Then a vehicle-mounted weather station will be the solution. This configuration comes with a telescoping mast and mounting brackets.

Do you need to set-up the meteorological sensors in a temporary and/or remote location? A portable weather station with line of site monitoring can be used for incident response. For a remote research location where data will be downloaded for future analysis, a portable weather station with data logging capability might be in order. Portable weather station systems include a tripod mast in a carrying case.

Some sensor models are better suited to the different configurations. For example, GPS can be an especially useful feature for Portable or Vehicle-Mounted Weather Stations.

## 3. What PARAMETERS AND MEASUREMENTS are critical to your application?

**Make a list of the measurements desired**, noting any spec requirements, as well as measurements like averages or accumulations.

This list should include parameters such as wind speed and direction, temperature, etc. (See common met sensors below.) Don't forget about calculated parameters such as wind chill and heat index – combinations of temperature and wind speed or relative humidity.

Sensor specifications, such as accuracy and resolution, can be a consideration. For example, the Doppler radar rain gauge in the Pulsar Weather Station offers precipitation resolution of 0.0004 inches. This might be overkill for most applications, but necessary for others. The Capricorn FLX's tipping bucket rain gauge offers 0.01 inch resolution – a difference in spec and, correspondingly, price.

Different sensor configurations offer different benefits. All-in-one sensor modules such as Orion and Pulsar weather stations offer ease of installation and low maintenance, as well as heated sensors for cold climates. Modular sensor suites, such as the Capricorn FLX weather station, offer individual sensor placement according to meteorological best practices, as well as more varied sensor options.

### Common met sensors:

- Wind speed and direction
- Temperature
- Barometric Pressure
- Precipitation
- Humidity

### Calculated parameters:

- Dew point
- Wind chill
- Wet bulb temperature
- Rain rate
- Max/Min

*(Right) Weather station models feature different precipitation measurement technologies.*



**Additional optional sensors:**

- Snow Level
- Solar Radiation
- Ultraviolet Radiation
- Photosynthetically Active Radiation (PAR)
- Visibility
- Additional Temperature: Panel, Soil, Water

**Additional features to consider include:**

- Compass (for auto-alignment of wind direction)
- GPS (handy for mobile applications)
- Heated sensors for cold climates
- All-in-one sensor head for ease of installation
- Individual sensor placement

**4. How is the weather data going to be MONITORED?**

**What are your data monitoring and display requirements?** Who needs to see the data and how will they access it? Address the physical hardware aspect of monitoring device, such as stand-alone display console or computer monitor, as well.

Stand-alone Weather Display console for desktop or wall-mounting is a popular option for place-based monitoring. Display consoles can also be configured in 19" rack-mount or panel mount for server rooms or emergency vehicles. Dedicated touchscreen displays are cyber-secure options for immediate data monitoring with limited historic data trend and/or graph capability. Additional features include alarms for data extremes.

Computers offer monitoring with proprietary software and/or via internet browser if your weather station offers internet connectivity such as with the Weather MicroServer. Each option offers unique advantages.

Software programs such as WeatherMaster Software create a database for historical data archiving and analysis and integrate features such as email reporting, alarm notification, and interfacing with other programs such as CAMEO for plume modeling.

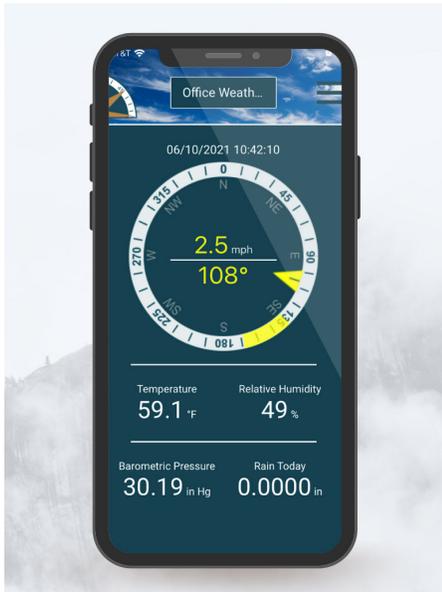
The Weather MicroServer also serves data to integrate with popular net-



Weather Display console with “intelligent” touch-screen technology.



WeatherMaster™ Software provides real-time computer weather monitoring with display and automatic logging of parameters.



Check current conditions quickly with the CWS Weather Monitor App™ for decision-making in the field.



works such as CWOP and Weather Underground. The Internet capability allows data to be accessed from any device with an Internet connection. Organizations can serve their own data on their website, internal network, or with the CWS Cloud-based Weather Server and CWS Weather Monitor App.

The Weather MicroServer also offers data logging capability, for example, for a remote research location where data may be downloaded periodically for future analysis.

Monitoring via SCADA or other industrial automation system can be accomplished with 4-20 mA signal interface or with the Weather MicroServer for protocol standards such as Modbus, DNP3, BACnet, SNMP. These options allow weather data to be integrated with other devices and control systems for monitoring and automation.

For the desired option, does the standard dashboard meet your requirements? If not, a custom display may be created to highlight specific decision criteria or messages based on your weather data.

## 5. Where will the system components be LOCATED and INSTALLED?

**Sensors:** Consider best practices for sensor placement, balanced against the needs of your installation/requirement. For most installations, for example, it simply isn’t feasible (or necessary) to mount wind sensors 30-feet above a building structure.

All-in-one sensor configurations are popular for ease of use and installation. However, optimum placement for each sensor may be different. For example, temperature and humidity sensors should be installed four to six feet above the ground in a shaded location; rain gauges should be sited out in the open about two feet above ground; and the standard height of an anemometer is 10 meters (33 feet) above ground. For most applications, compromise is in order and measurement references are relative.

Also, all-in-one sensors utilize a built-in radiation shield to “shade” temperature and humidity sensors.

Are you located in a cold climate? Orion and Pulsar weather station models offer heated sensor transmitter options to mitigate the effect of extreme weather on winter operations.

Unless you are looking for a vehicle-mounted or portable weather station, the sensors will generally be installed on a mast mounted on a building wall or rooftop. *Is there an existing mast the sensors can be mounted upon?* Due to the various mounting options, weather stations usually don’t include a mast, so be sure to add mast and accompanying hardware if needed to your specification.

If the sensor mast will be mounted on a tripod at ground level for an extended period of time, consider security measures such as fencing.

No matter what type of sensor, location planning is crucial for specifying communication options from the sensor to the control hub, for example the required length of cable or desirability of wireless data transmission.

**Monitoring Device:** What device is the sensor-suite connecting to and where is it/will it be located? Consider mounting/placement for the device



*System diagrams help plan the location of weather station components.*

as well as distance to sensors. Check out the system diagram of your desired configuration to help determine cable lengths between components and proximity to power.

**Power Access:** With the exception of the portable configuration which comes with its own battery pack, weather stations require AC power. Wired AC is the most reliable option, but solar power can be an option for remote locations. Sensor power is generally accomplished through an Interface Module which may be located near the sensors or closer to the monitoring device depending on the application. Various monitoring devices require access to power as well.

**Cable Lengths:** Be sure to determine cable lengths needed for your installation requirements. Weather station components comes with standard cable lengths. Depending on the application, additional cable lengths, or even communication options, might be required.

## **6. How will the sensors COMMUNICATE to the monitoring device?**

RS-232 cable is generally standard as a common and reliable method for up to about 200 ft.

RS-485 converters can be used to extend the RS-232 range from 200 to over 1000 feet.

Wireless weather stations can be created with transceivers available at 2.4 GHz for one-mile line-of-sight (LOS) and 900 MHz for 20 miles LOS.

Serial to Ethernet Converter transmits the serial data from the sensor transmitter to the monitoring computer using the existing Ethernet Local Area Network. The device driver will create a virtual serial port that can be used by WeatherMaster software. The serial to Ethernet converter is useful for large facilities such as an industrial plant or hospital. Instead of running miles of cable from the weather station on the roof to a computer on the first floor, users can take advantage of existing Ethernet cables to connect.

For TCP/IP communication over a LAN, the Weather MicroServer can make weather data available to any computer or device on the network. Examples include Weather Display consoles (device), computers running WeatherMaster software, or any device with an Internet browser. The MicroServer also can upload weather data automatically to Internet sites such as Weather Underground, CWOP, and the CWS Weather Server.

As you are planning for a weather station installation, consider how/where cables will be routed and/or connected to existing systems. Depending on the configuration and how much cable comes with the sensor, measure whether it will be sufficient or if additional cable will be required.

*Even if you don't have all the answers, feel free to send us an email ([info@columbiaweather.com](mailto:info@columbiaweather.com)) or give us a call (503-629-0887) to get the conversation started.*

## **CONCLUSION**

Use this guide to inform and educate yourself, so you can specify the best weather station for your application. The more information you have in hand, the better we can help you make the right decision for your requirement. The more specific your RFQ, the more thorough and accurate our quotation can be. And it will ensure that there are no missing pieces when the technician goes to install your weather station system -- the hardware is all there and the cable lengths are just right.

# Quick Checklist for Specifying a Weather Station

## SENSORS/PARAMETERS REQUIRED (Select all required)

- Wind speed
- Wind direction
- Temperature
- Barometric Pressure
- Humidity
- Precipitation
- Solar Radiation
- Lightning Detection

## NOTE ADDITIONAL SENSORS AND/OR SPECS

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## DATA MONITORING (select all required)

- WeatherMaster Software (Windows)
- Touchscreen Weather Display Console
- Weather MicroServer (Internet and Industrial Protocols, Cloud Server, App)
- 4-20 mA Interface

## CONFIGURATION/MOUNTING (select one)

- Fixed-base
  - Existing mast (need Universal Mounting Arm?)
  - Need mast/hardware
- Portable with Tri-pod mast
- Vehicle-Mount with telescoping mast

## COMMUNICATION (Select one)

- Portable includes 2.4 GHz wireless transceivers
- Vehicle-Mount includes 15-ft cable
- Fixed-Base Options (distance between sensor location and monitoring device)
  - Standard RS232 Serial Cable (up to 200 ft) (\_\_\_\_ ft total)
  - Wireless Transceivers (2.4 GHz one-mile LOS/900 MHz 20 miles LOS)
  - Ethernet (Serial to Ethernet (single display))/Ethernet with Weather MicroServer (Network)
  - RS-485 Cable (200-1000+ ft) (\_\_\_\_ ft total)

## ADDITIONAL ACCESSORIES/FEATURES

- Weatherproof Enclosure
- Solar Power
- Extended Warranty
- Battery Backup

