

WEATHERPAK[®]M



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1. System description

The WEATHERPAK[®] M¹ measures wind speed and wind direction, air temperature, relative humidity, and barometric pressure. In addition, the WEATHERPAK M calculates the wind stability class and provides location information. Atmospheric conditions are sampled every second and the system computes a 5-minute running average. Data is then transmitted every 30 seconds to the display and plume model.



FIGURE 1-1. WEATHERPAK M with the WEATHERPAK M display

¹WEATHERPAK is a registered trademark of Campbell Scientific.

WEATHERPAK M was specifically designed for use by Hazardous Materials Responders. The following is a list of some of the features that make the WEATHERPAK M unique:

- WEATHERPAK M features an advanced electronic interface and unique automatic networking capability.
- The ultrasonic wind sensor has no moving parts, is very accurate (particularly at very low wind speeds), and does not require periodic calibration.
- WEATHERPAK M features a multi-function, 10.1-inch full color, flat panel touch screen display. Multiple windows display data from different WEATHERPAK M weather stations.
- Automatically updates **CAMEO®/ALOHA®**¹ and most other plume modeling software programs.
- Built-in electronic compass allows the WEATHERPAK M to be set up in any orientation – will automatically determine True North and give you true wind direction.
- Set-up time is less than one minute.
- The electrical connections are designed to be intrinsically safe and the housing and tripod are constructed of 6061-T6 aluminum, a non-corrosive and non-sparking alloy.
- Designed to withstand decontamination procedures. The WEATHERPAK M housing is double O-ring sealed and dried with a desiccant to protect the electronics against moisture.
- All electronics are grounded at a single point to protect the WEATHERPAK M against EMI (electro-magnetic interference) and RFI (radio frequency interference), thus assuring reliable data and transmission.

This manual will familiarize you with the installation, operation, and maintenance of the WEATHERPAK M. Please read all of the instructions before attempting to operate or troubleshoot the system.

¹Both ALOHA and CAMEO are registered by National Oceanic and Atmospheric Administration (NOAA) U.S. Department of Commerce FEDERAL AGENCY UNITED STATES.

WEATHERPAK M components:

- Ultrasonic wind sensor with integrated compass and GPS
- Barometer
- Air temperature and relative sensor
- **WEATHERPAK M** display with AC power supply
- Communications options:
 - Wired serial (requires quick release with data mount)
 - UHF radio (467.8000 MHz)
 - spread-spectrum radio (900 MHz)
- Mounting options:
 - Portable 3 meter quick-deploy tripod—includes tripod and carry case
 - Quick releases—for custom mounting applications
 - Portable telescopic mast—includes mast and carry case
- WEATHERPAK M carry case
- WEATHERPAK M Quick Deploy Guide for assembly and **ALOHA**

2. Siting and setup

2.1 Siting considerations

The following siting considerations must be addressed:

2.1.1 Compass accuracy

The WEATHERPAK M contains an electronic compass for automatic alignment to True North. To prevent erroneous compass readings, install the WEATHERPAK M at least 30 meters (99 feet) laterally from large vans, buses, cranes, or other large magnetic objects. (The top of a van is suitable, but next to it is not an ideal location.)

2.1.2 Proper wind measurement

Locate the WEATHERPAK M away from obstructions such as trees and buildings. The distance between wind sensors and the nearest obstruction should be ten times the height of the obstruction.

2.1.3 Radio transmission

Deploy the WEATHERPAK M as close as safety permits to the hot zone. The WEATHERPAK M UHF radio has a range of 5 to 7 miles line-of-sight. The spread-spectrum radio has a range of 1 to 2 miles.

CAUTION:

Do not attempt to transmit through structures containing steel, or through hills.

2.1.4 GPS operation

The WEATHERPAK M wind sensor includes an integrated GPS receiver with internal antenna. The GPS receiver provides elevation data, which is used to calibrate the internal barometer as well as location information used by the display. The display then uses the location data to calculate the distance and bearing between the WEATHERPAK M station and the display.

The performance of a GPS receiver at power-up is determined largely by the availability and accuracy of the satellite ephemeris data and the availability of a GPS system almanac. When the WEATHERPAK M is powered up, the GPS searches for satellites from a cold start (no almanac). The GPS will begin to compute position solutions within the first two minutes.

NOTE:

Immediately power up the WEATHERPAK M system as soon as you arrive on site to allow the GPS to find the satellite and computer position.

2.2 System assembly

2.2.1 *WEATHERPAK M* display connections

The *WEATHERPAK M* display contains an integrated UHF or spread-spectrum radio, and is designed to work in conjunction with one or more WEATHERPAK M stations. The radio antenna receives the signal from the WEATHERPAK M using narrow-band UHF or spread spectrum. In addition, a GPS antenna and electronics allow the WEATHERPAK M location to be shown in relation to the display location.

1. Connect the external GPS and radio antennas to the appropriate connectors on the side of the *WEATHERPAK M* display (see [FIGURE 2-1](#) (p. 5)).



FIGURE 2-1. Side of **WEATHERPAK M** display

2. Plug the **WEATHERPAK M** display power supply into an AC power source then insert the power supply barrel connector into the power jack on the bottom of the display and tighten.

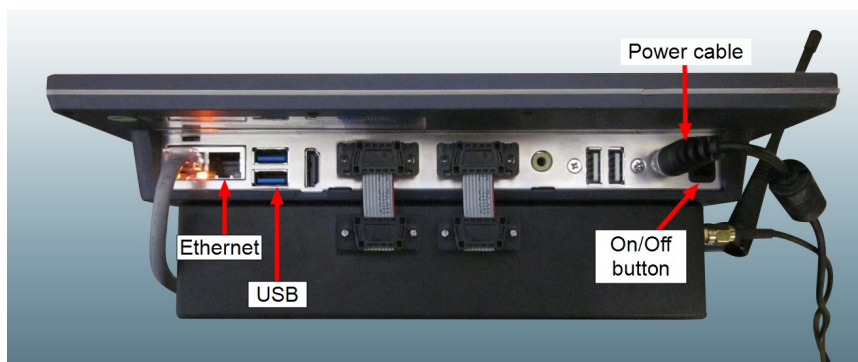


FIGURE 2-2. Bottom of **WEATHERPAK M** display

3. The power-indicator light on the bezel illuminates as the display starts up. The **WEATHERPAK M** application will automatically launch and begin receiving data from any WEATHERPAK M units available.



FIGURE 2-3. Front of **WEATHERPAK M** display

2.2.2 Connecting to a computer with USB to serial converter

The **WEATHERPAK M** display comes with a USB-to-serial converter cable. Use this cable to connect the display to a computer or server. The **WEATHERPAK M** software can be configured to output **ALOHA** messages to the display USB ports. Refer to [ALOHA Export Configuration](#) (p. 16) for information about configuring the WEATHERPAK M to export **ALOHA** strings to a TCP client or server.

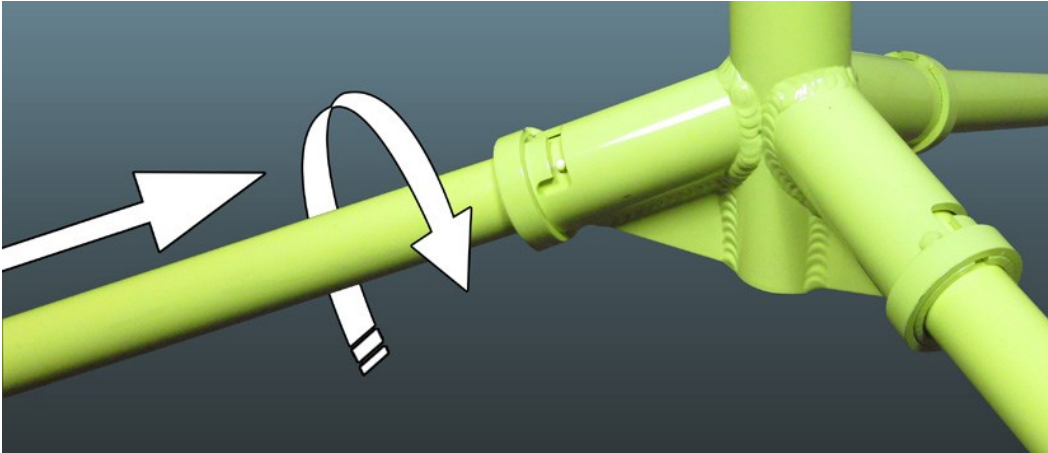
2.2.3 Connecting the **WEATHERPAK M** display to a network

The **WEATHERPAK M** display can be connected to a local network or internet by connecting an Ethernet cable to the Ethernet port on the bottom of the display. The display is configured for DHCP by default.

2.2.4 Tripod and WEATHERPAK M setup

Assemble the tripod in the following manner:

1. Insert and lock the legs onto the tripod base.



2. Align the slot on the WEATHERPAK M with the guide pin on the quick release and push straight in. The cam lock connector provides a precision sealed fit and may require an extra push to seat the WEATHERPAK M properly.



CAUTION:

DO NOT screw the WEATHERPAK M onto the cam lock connector; push straight in.

3. Once the weather station is properly seated, press the arms of the cam lock down to assure a tight fit. The battery indicator LED (on the tripod junction box) should illuminate when the WEATHERPAK M is properly seated into the cam lock connector.



4. Place the entire unit (tripod top and WEATHERPAK M) onto the tripod base, engage the twist-lock and turn clockwise a quarter turn.
5. The WEATHERPAK M is now running and sampling data. When the WEATHERPAK M is removed from the cam lock connector, it will stop sampling and shut itself off.

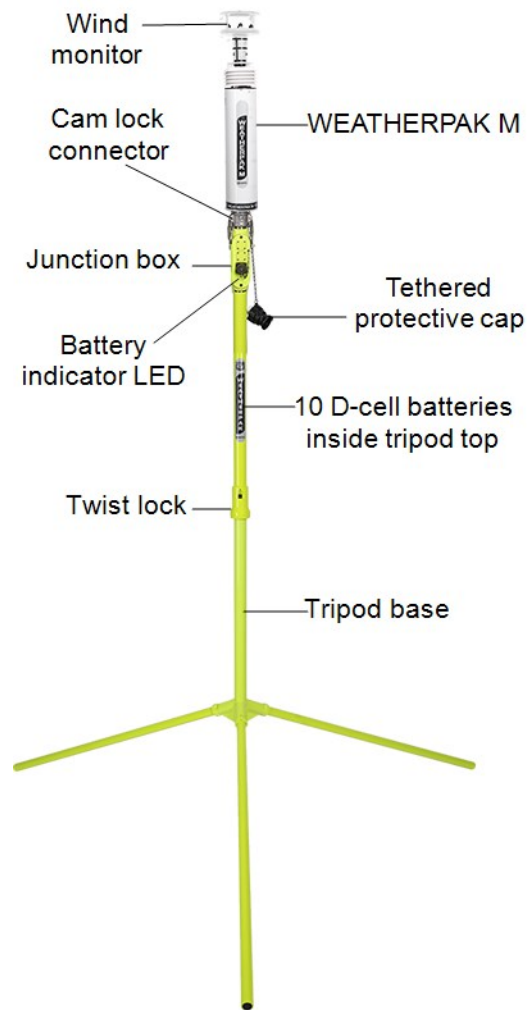


FIGURE 2-4. Tripod setup

2.2.5 Additional mounting options

The WEATHERPAK M weather station typically is deployed in (or near) a Hazmat hot zone using the portable 3-meter tripod mounting option. However, Campbell Scientific offers other mounting options that are suited for other applications. For example, customers have found it convenient to mount the system on a vehicle (or trailer) when the WEATHERPAK M is used for wildland or structure fires. The following describes the other mounting options:

1. The telescopic mast vehicle mount includes a modified, side-mount telescopic pole (Model 530), provided by Fire Resources Corporation, Inc., a premier manufacturer of emergency lighting products, to accept the WEATHERPAK M. It also includes a power cable for connecting the station to a 12 V source.



FIGURE 2-5. Side mount "push-up" mast

- The quick release option allows the user to mount the WEATHERPAK M to a mast of your choice. It includes a quick-release cam lock with a male 1 1/2-inch NPT (national pipe thread) on the bottom and a 7.6 m (25-foot) power cable that must be connected to a 12 VDC source.



FIGURE 2-6. Quick release

- The quick release with data option includes a quick-release cam lock with a male 1 1/2-inch NPT thread, a piece of pipe, and serial and 12 V power cable. The pin-out information for the serial and power cable is provided in [Table 2-1](#) (p. 12).



FIGURE 2-7. Quick release with data

Pin	Function
A	Common
B	12 V power
C	12 VDC output
D	RS-232 TX
E	RS-232 RX
F	Temperature signal
G	
H	Precipitation signal
J	RS-232 G
K	Ethernet TX-
L	Ethernet TX+
M	Ethernet RX-
N	Ethernet RX+
P	
R	
S	24 V power
T	Common

NOTE:

To use these mounting solutions, the WEATHERPAK M must be serial number 1325 or higher, have radio telemetry, and a 17-pin cam lock connector.

3. System operation


Once set up, the WEATHERPAK M automatically begins sampling weather conditions and transmits data to the *WEATHERPAK M* display every 30 seconds. The *WEATHERPAK M* display takes approximately 20 to 30 seconds to complete a startup routine. When this process is

complete, the plume modeling software requires five minutes of data before a valid plume can be presented.








3.1 WEATHERPAK M display

The main **WEATHERPAK M** display screen shows a summary of current values from all reporting WEATHERPAK M systems available to the display. Use [Field Configuration](#) (p. 15) to specify the values to be displayed. Click a column heading to sort on that column. Click the column heading again to toggle ascending or descending order.

Click a **Station ID** to display more detailed values for that station.

Click  to lock/unlock/delete stations on the display. Locked stations will always be displayed, even when no data is being received. Unlocked stations will be removed from the display after no data is received for an hour. Deleting a station will remove historical data for the station.

Use the icons on the main page to navigate to:

-  Lock/Unlock/Delete stations as previously described
-  [Field Configuration](#) (p. 15)
-  [ALOHA Export Configuration](#) (p. 16)
-  [Alarm Status](#) (p. 17)
-  Help
-  [WEATHERPAK M log](#) (p. 19)
-  [Received ALOHA station messages](#) (p. 18)

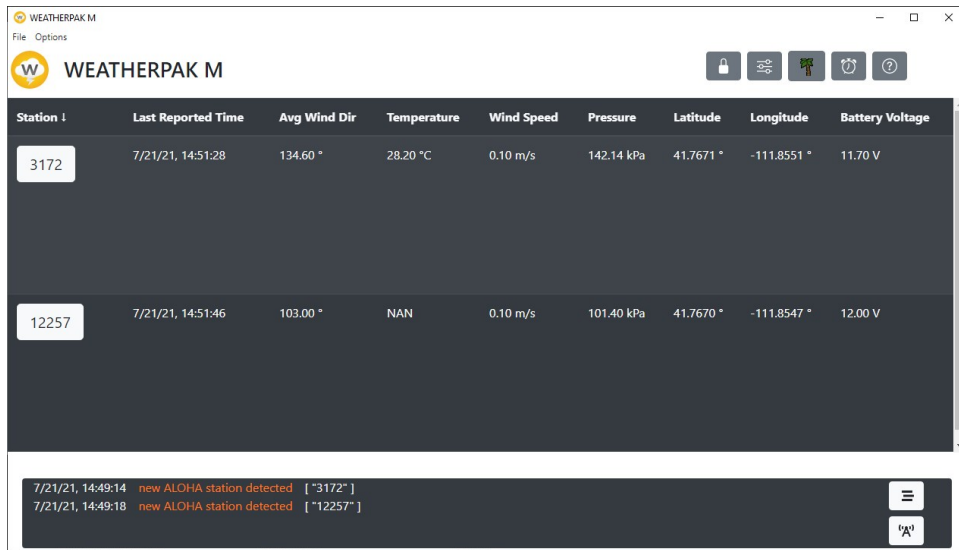


FIGURE 3-1. WEATHERPAK M display

3.2 Station view

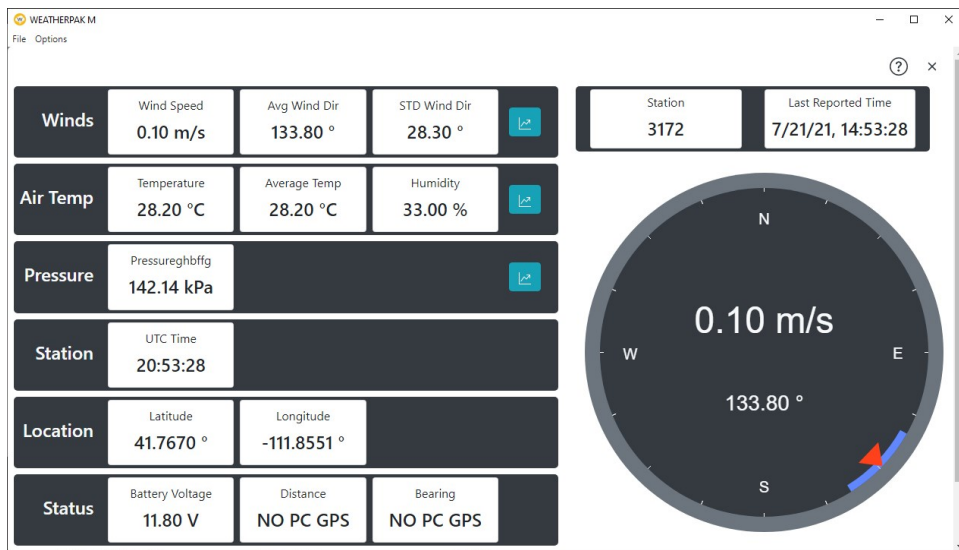



FIGURE 3-2. Station summary

Click the station number to get the station summary. If there is a GPS connected, **Status** will show the **Distance** between the station and the display, and the **Bearing** of the station compared to the display.

The blue line on the wind compass indicates the standard deviation of the wind direction over the last five minutes.

Click  next to a value to display a [Graph view](#) (p. 15) of that value.

3.3 Graph view



Use the **Date**, **Range**, and **Interval** fields to select the time frame for the graph. Click  to update the display.



FIGURE 3-3. Graph

3.4 Field Configuration

Click  to access the **Field Configuration**. This screen displays all values for the station. Enter the **Display Name** that will be used for each field on the **WEATHERPAK M** display. Under **Included in Summary**, select each field that should be included in the summary on the main **WEATHERPAK M** screen. Use **Precision** to set the number of decimal places that will be used for each numeric value. Select the **Units** to be used for those fields that have a choice of units.

Name	Display Name	Included in Summary	Precision	Units
name (Station ID)	Station	<input checked="" type="checkbox"/> Include		
time (Last Reported Time)	Last Reported Time	<input checked="" type="checkbox"/> Include		
WD (Vector Mean Wind Direction)	Avg Wind Dir	<input checked="" type="checkbox"/> Include	2	
TI (Air Temperature)	Temperature	<input checked="" type="checkbox"/> Include	2	°C
VS (Vector Mean Wind Speed)	Wind Speed	<input checked="" type="checkbox"/> Include	2	m/s
BP (Average Barometric Pressure)	Pressureghbfg	<input checked="" type="checkbox"/> Include	2	kPa
SD (Standard Deviation Wind Direction)	STD Wind Dir	<input type="checkbox"/> Include	2	
TA (Mean Air Temperature)	Average Temp	<input type="checkbox"/> Include	2	°C
RH (Humidity)	Humidity	<input type="checkbox"/> Include	2	
UTC (UTC Time)	UTC Time	<input type="checkbox"/> Include		
SAT (Number GPS Stations Reported)	GPS Hit	<input type="checkbox"/> Include		
LAT (GPS Latitude)	Latitude	<input checked="" type="checkbox"/> Include	4	
LNG (GPS Longitude)	Longitude	<input checked="" type="checkbox"/> Include	4	
distance (Distance)	Distance	<input type="checkbox"/> Include	4	km
bearing (Bearing)	Bearing	<input type="checkbox"/> Include		
B (Battery Voltage)	Battery Voltage	<input checked="" type="checkbox"/> Include	2	

3.5 ALOHA Export Configuration

Click  to access the ALOHA Export Configuration screen then select an export type.

ALOHA Export Configuration

ALOHA Export Type

Disabled ⌵

- Disabled
- Export to Serial Port
- Export as TCP Client
- Export as TCP Server

ALOHA Export Status

Status: disabled

- **Disabled:** *ALOHA* strings are not exported.
- **Export to Serial Port:** *ALOHA* strings are exported to a serial port. Specify the **ALOHA Export Station** to be exported, as well as the **ALOHA Export Serial Port** and **ALOHA Export Serial Baud** to use for the export.
- **Export to TCP Client:** *WEATHERPAK M* connects as a client to a TCP server and exports the *ALOHA* strings. Specify the **ALOHA Export Station** to be exported, as well as the **ALOHA TCP Server Address** and **ALOHA TCP Port** to use for the export.

- **Export to TCP Server:** *WEATHERPAK M* accepts connections from multiple TCP clients and exports the *ALOHA* strings to each client. Specify the **ALOHA Export Station** to be exported, as well as the **ALOHA TCP Port** to use for the export.

The color of the **ALOHA Export** button on the main screen indicates the status of the exports:

- Gray: Disabled
- Green: Good
- Red: Failing

3.6 Alarm Status

Click  to set up and view alarms based on data values exceeding a defined limit. Data values that have triggered alarms are listed in the [WEATHERPAK M log](#) (p. 19) The main *WEATHERPAK M* screen will also indicate that a data value has triggered an alarm if that data value is typically displayed on the main screen.

To add a new alarm, click , then .

Enter an **Alarm Name** that will be shown in the log when an alarm is triggered.

By default, an alarm is applied to all stations. To apply an alarm to only certain stations, clear **Apply to All**. Check boxes for all available stations will be displayed. Select the desired station(s).

Under **Alarm Conditions**, select the data value that will trigger the alarm.


Select a comparator:

- > greater than
- < less than
- >= greater than or equal to
- <= less than or equal to
- = equal to
- != not equal to

Enter a number to specify the value to which the data value should be compared.

NOTE:

Alarms will be evaluated based on the units selected for display. If the display units are changed, you will need to change the alarm thresholds to match the new display units.

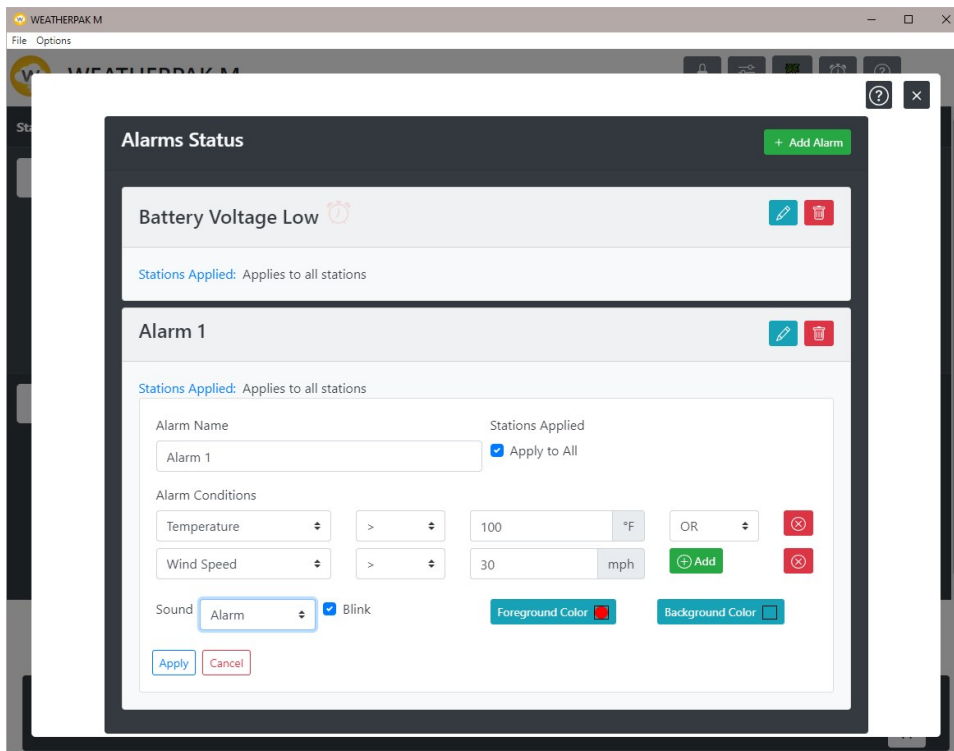
Click  to add more condition(s) to trigger the alarm. To trigger the alarm only if all conditions are true, choose **AND** from the drop down menu. To trigger the alarm if any of the conditions are true, choose **OR**.

Select a **Sound** file to be played, when the alarm is triggered.

Select **Blink** to have the alarm icon blink when the alarm is triggered.

Choose the **Foreground Color** and **Background Color** for the icon that will be displayed when the alarm is triggered. (When selecting a color, the top slider selects the color. The bottom slider selects transparency. If the slider is all the way to the left, the color is transparent.)



Click **Apply** to save the alarm.



3.7 Received ALOHA station messages

Click  to view the received ALOHA station messages.

Use **Raw** and **Table** to toggle between raw (comma separated) messages and a tabular format.

Click  to temporarily pause the log and analyze messages. Click  to restart a paused log.



Clear a **Station ID** check box to filter out that station messages from the log.

3.8 WEATHERPAK M log

Click  to access the *WEATHERPAK M* rolling active log that shows:


- ALOHA Export
 - ALOHA Export Service Started
 - ALOHA Export Service Failed
 - ALOHA Message exported
- Alarms
 - Alarm triggered
 - Alarm reset
- Station Status

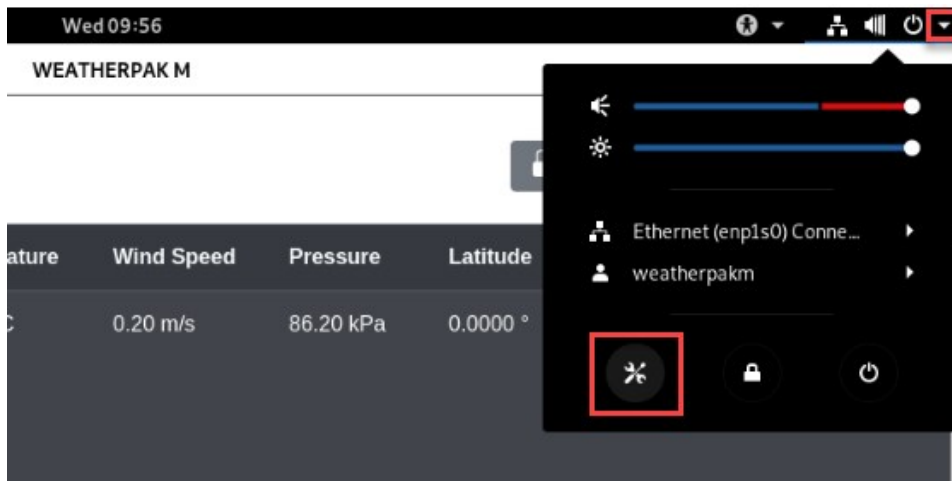
Clear **ALOHA Export**, **Alarms**, or **Station Status** to filter out those messages from the log.

Click  to temporarily pause the log and analyze messages. Click  to restart a paused log.

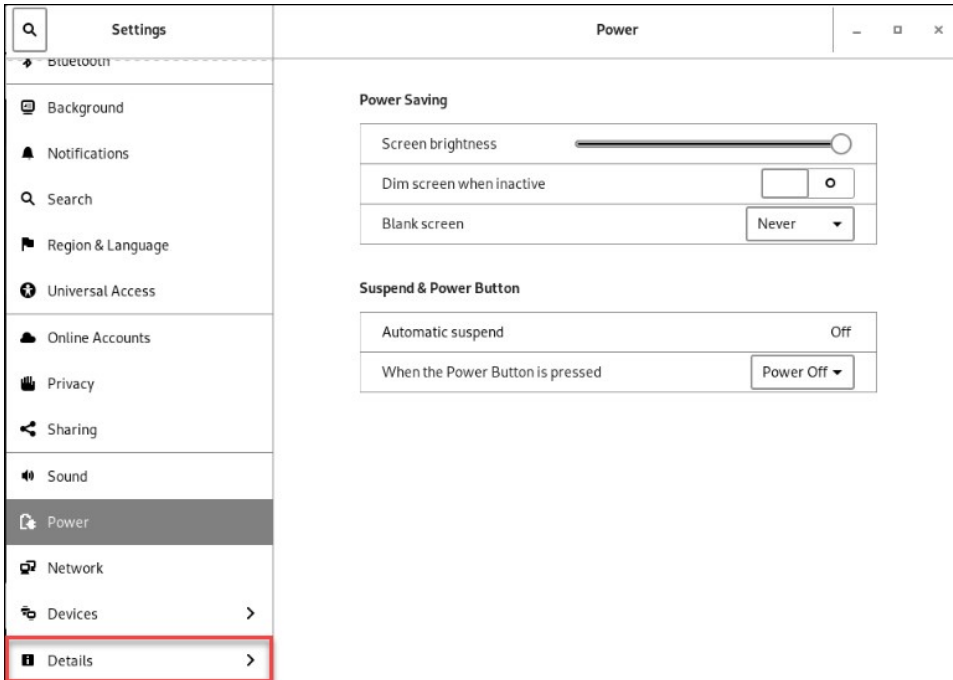
3.9 Changing the user password

Campbell Scientific recommends that you change the default user password. To change the password:

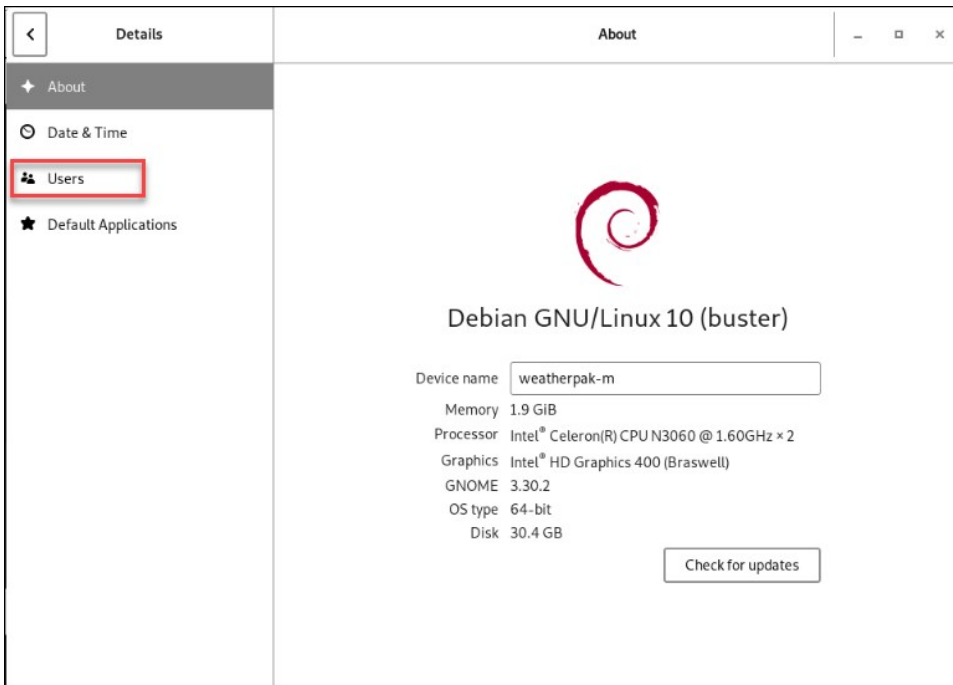
1. Click the down arrow in the upper black bar and then click  to open the **Settings**.



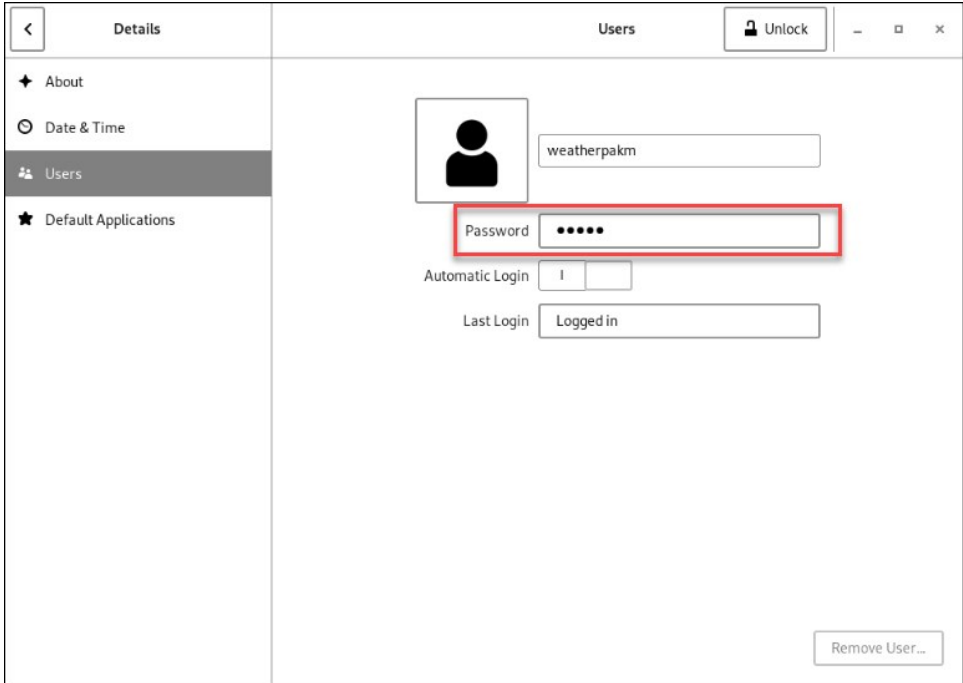
2. Click **Details**.



3. Click **Users**.



4. Click in the **Password** field.



5. Enter the current password, campbell21X. Enter and confirm the new password.




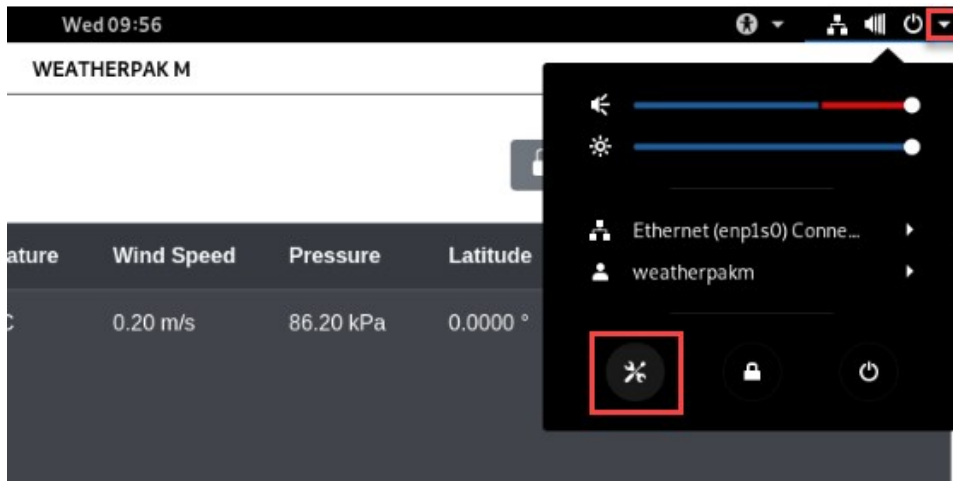
CAUTION:

Do not forget your password. A forgotten password can only be reset at the factory.

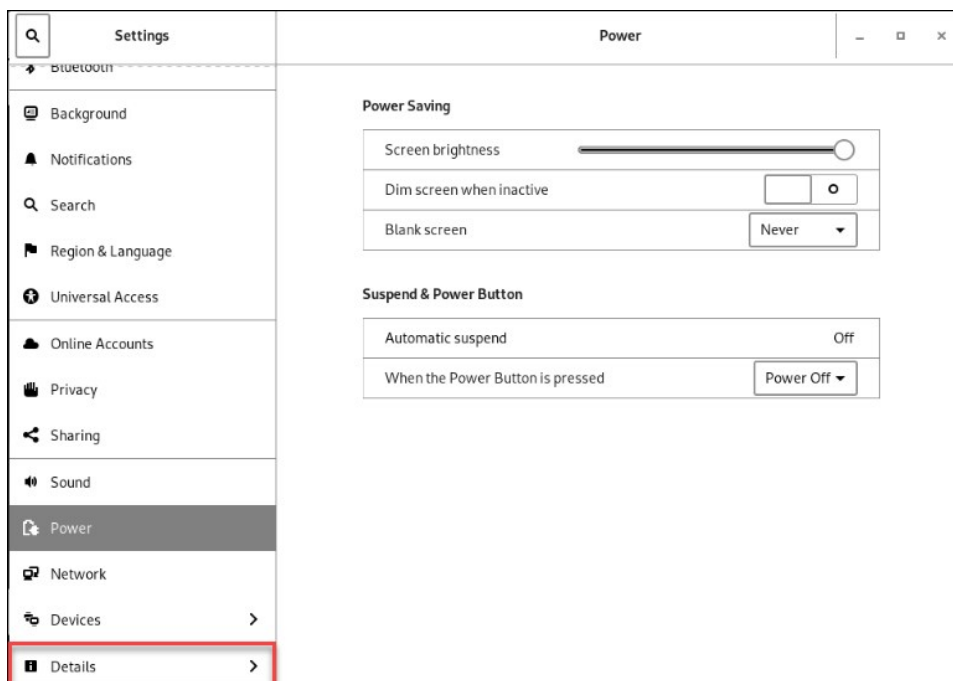
3.10 Station time

The station time reported by the *WEATHERPAK M* is the time received by GPS, corrected with the system time zone setting. To change the time zone setting:

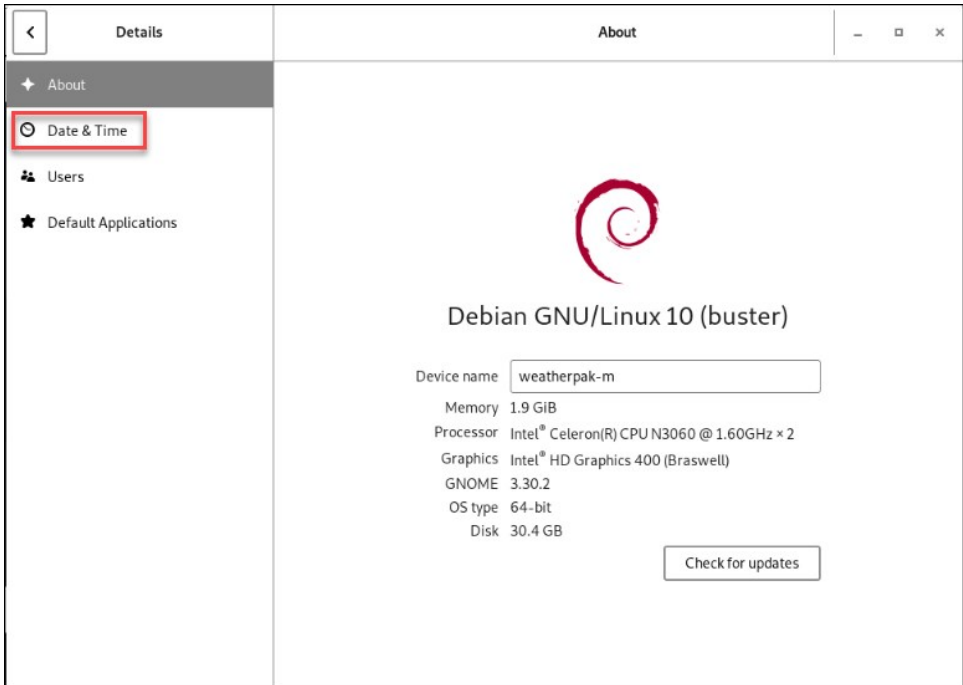
1. Click on the upper black bar and then click  to open the **Settings**.



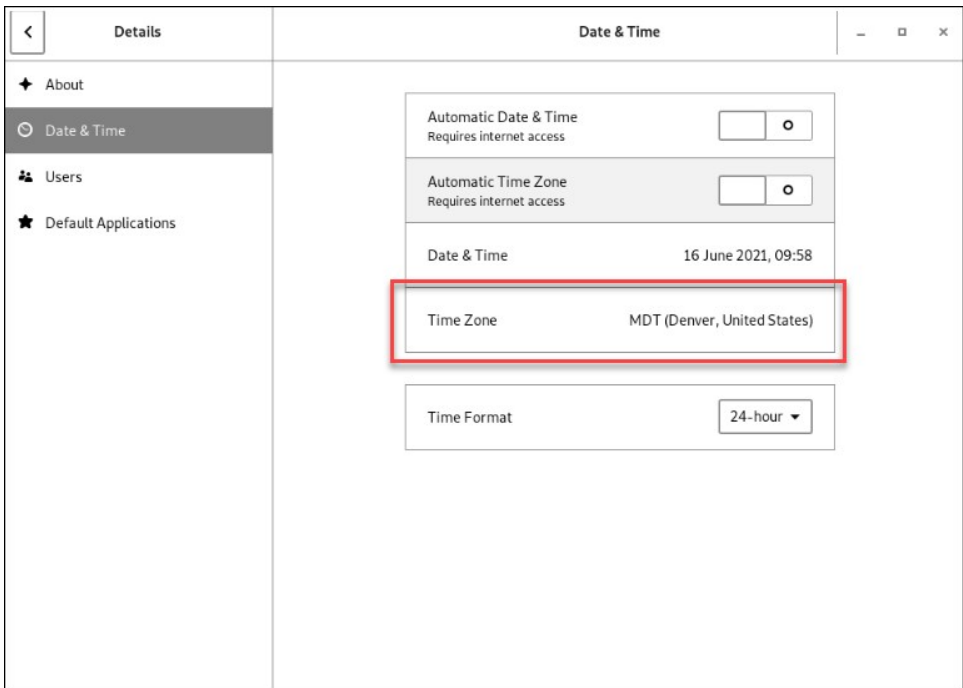
2. Click **Details**.



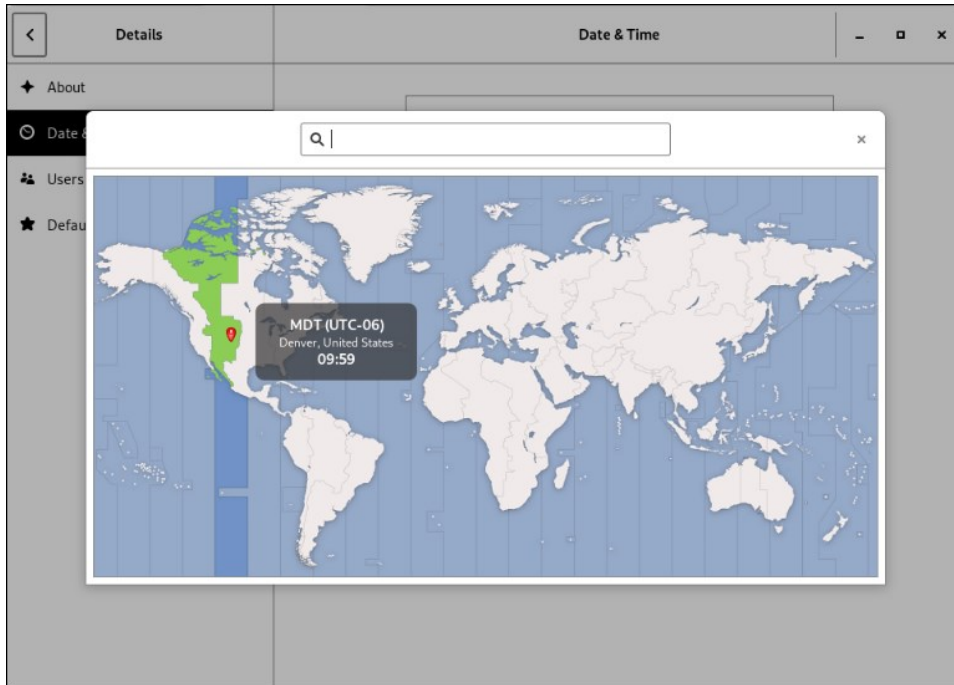
3. Click Date & Time.



4. Click Time Zone.



5. Select the time zone.



4. WEATHERPAK M and plume modeling software

When the WEATHERPAK M is assembled and operational and a computer is connected to the *WEATHERPAK M* display, real-time data is available to run air dispersion plume modeling software.

The following shows the steps taken to produce an *ALOHA* plume model on a computer. This section assumes the user is familiar with *ALOHA* and that the program is properly loaded onto the computer. Campbell Scientific recommends consulting the *ALOHA* website and/or a certified *CAMEO/ALOHA* instructor for training, program details, and limitations.

1. Click the *ALOHA* desktop icon or select *ALOHA* from the Windows® **Programs** menu. An **Air Model Limitations** dialog box will appear with important notes on program limitations. Read and click **OK**.
2. Confirm that **Site Data** information provided in the **Text Summary** window is correct. If required, use the **Site Data** drop-down menu to change data.
3. Go to **SetUp > Chemical** and select the appropriate chemical.

4. Select **SetUp > Atmospheric > SAM Station** to display a series of dialog boxes that require user observations or assumptions.

NOTE:

Relative humidity is not captured automatically by the **ALOHA** model but may be entered manually using data from the WEATHERPAK M display.

5. (Optional) To confirm that WEATHERPAK M data is being delivered to **ALOHA**, go to **SAM Options > Processed Data** and the **Processed SAM Data** window will display the data delivered to **ALOHA**.

NOTE:

The user gets a warning message in both the **Text Summary** and **Processed SAM Data** windows if the WEATHERPAK M has been collecting data for less than five minutes.

6. **ALOHA** requires the SAM station to be operating for five minutes before selecting the source of release (tank, pipe, direct, etc.). Go to **SetUp > Source** and select the leak source such as tank. A series of dialog boxes will appear requiring user observations or assumptions.
7. Select **Display > Threat Zone** and the **Level of Concern** window will display the default **ERPG** ranges. Select **OK** to show the plume footprint. Displaying the footprint in **ALOHA** is essential before the plume can be overlaid on a **MARPLOT®** or other street map.

8. (Optional) Select the **Display** menu to produce graphs for source strength and concentration.

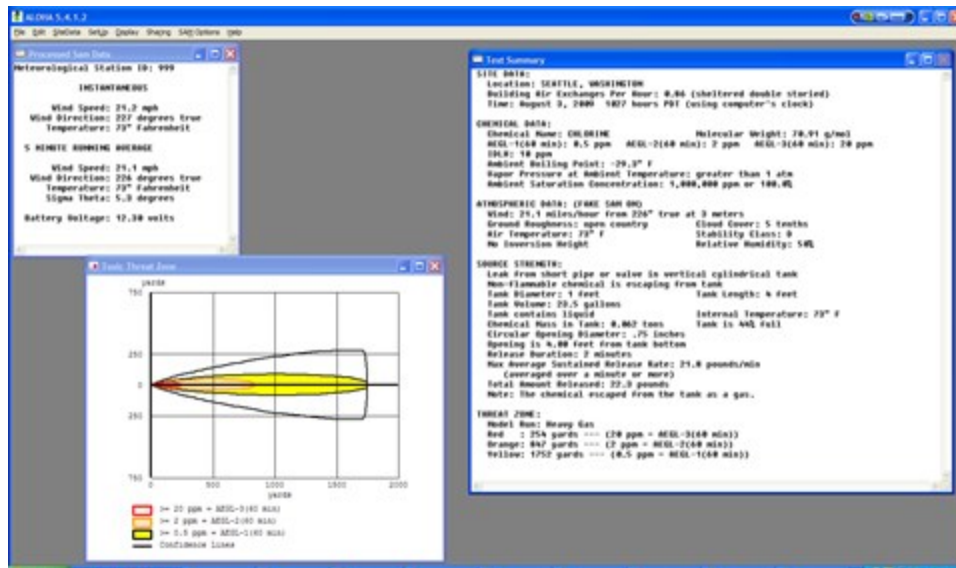


FIGURE 4-1. ALOHA window

9. Select the **Sharing** menu to plot the plume onto a **MARPLOT** (or other) map. As weather conditions change, the plume size and position will change on the map, shortly after the WEATHERPAK M provides updated data.

NOTE:

MARPLOT software requires that the **ALOHA** window overlay the map window for the map-plume to update automatically (FIGURE 4-2 (p. 27)).

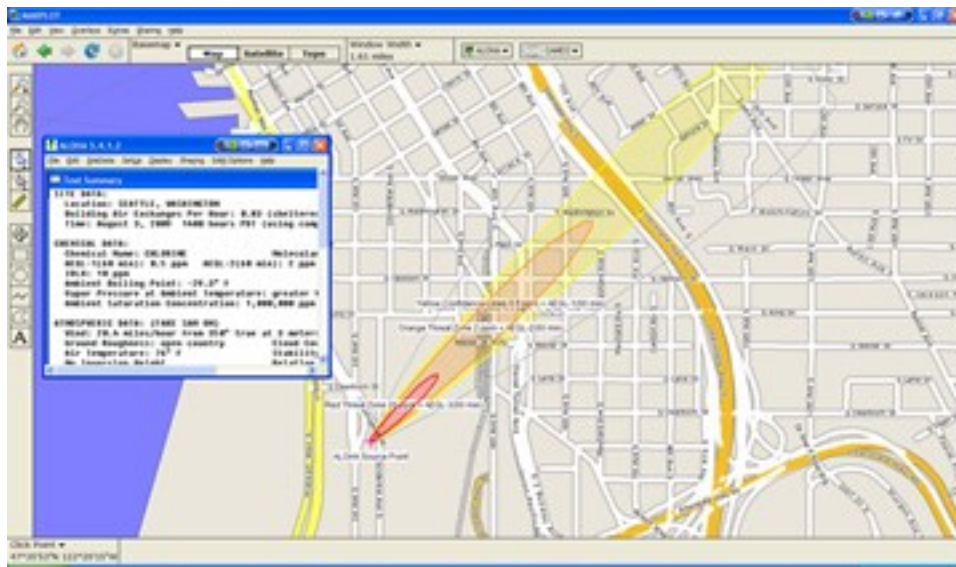


FIGURE 4-2. ALOHA with MARPLOT map

WEATHERPAK M reads the sensors every second and calculates five-minute running averages. The running averages are included with the **INSTANTANEOUS** data on the **WEATHERPAK M** display, and subsequently the plume model. In addition, the WEATHERPAK calculates Sigma Theta, which is an air-turbulence measurement that affects the mixing or dispersion of a chemical in the atmosphere. Sigma Theta is also referred to as stability.

The **INSTANTANEOUS** data is the last direct sensor reading prior to the thirty-second update and the battery voltage. The operator may detect a trend such as wind shift by comparing the **5 MINUTE RUNNING AVERAGE** and **INSTANTANEOUS** data. The WEATHERPAK M battery voltage is also transmitted.

NOTE:

Replace the WEATHERPAK M batteries when the battery voltage falls below 10.7 VDC.

To display the ASCII data being sent by the WEATHERPAK M, go to **Main > SAM Options** and select **Raw Data**. The data should be similar to the following:

421, 0.9, 225, 1.0, 23.9, 1.0, 226, 23.9, 14.0, 1917, 999, 46, 2536

Most of these numbers also appear in the **Processed SAM Data** window in **ALOHA**, along with some additional checksum numbers, but without the labels. The raw data is delivered in metric units (millibars, m/s, °C), whereas the processed data is converted to standard English units (inches, MPH, °F).

Two checksums are performed to ensure the message was sent correctly. The computer adds up the ASCII value of the data line (each character, such as numbers, letters, and punctuation, have a numeric value universal to all computers) to make sure the computer received the same number that the WEATHERPAK M transmitted.

4.1 **ALOHA** data line interpretation

The data line fields are as follows:

ID, MW, MD, ST, AT, SI, DI, TI, BV, CKSUM1, BP, RH, CKSUM2

ID –	WEATHERPAK M unique identification number
MW –	5 minute averaged wind speed in meters per second
MD –	5 minute averaged wind direction in degrees
ST –	Stability class in degrees
AT –	5 minute averaged air temperature in degrees Celsius
SI –	Instantaneous wind speed in meters per second
DI –	Instantaneous wind direction in degrees
TI –	Instantaneous air temperature in degrees Celsius
BV –	Battery voltage in volts
CKSUM1 –	First checksum
BP –	Barometric pressure in millibars
RH –	Relative humidity in percent
CKSUM2 –	Second checksum

5. Maintenance

NOTE:

All factory repairs and recalibrations require a returned material authorization (RMA) number and completion of the “Statement of Product Cleanliness and Decontamination” form. Refer to the [Assistance](#) page at the end of this document for more information.

5.1 Periodic maintenance schedule

Perform routine maintenance on the WEATHERPAK M every 12 to 24 months to ensure that the overall system and its sensors are within specification. In addition, the entire WEATHERPAK M should be examined for wear, damage, or other non-conforming variances.

5.2 Troubleshooting

CAUTION:

Taking the WEATHERPAK M or the *WEATHERPAK M* display apart will void the warranty. If the following procedures do not solve the problem, contact Campbell Scientific (see [Assistance](#)).

When completely assembled, the WEATHERPAK M system automatically powers up, locates True North, and begins sampling the atmospheric conditions; it then transmits weather data every 30 seconds. If it does not, check the following:

- Confirm the WEATHERPAK M is properly secured in the cam lock connector on the tripod base.
- Check the batteries in the tripod. The red LED voltage indicator light on the tripod base will remain illuminated when the battery voltage is higher than 10.7 VDC. If the LED indicator is not illuminated or if it is flashing, replace the batteries with fresh alkaline D-cells. When replacing tripod batteries, use only high-quality alkaline batteries.

CAUTION:

Do not use rechargeable or bargain batteries.

- Check the fuse. The in-line fuse holder is in the junction box at the top of the tripod base. Access the fuse by removing the two screws on the junction box cover. If the fuse is blown, replace with an AGC 3 fuse. If the fuse blows repeatedly, contact Campbell Scientific. See [Replacing tripod batteries and fuse](#) (p. 31).

If the **WEATHERPAK M** display does not illuminate shortly after the on/off button is pressed, check the following:

- Be sure the **WEATHERPAK M** display is plugged in and turned on. Double check the power cord connections at the wall, power supply and bottom of the **WEATHERPAK M** display. If this does not correct the problem, contact Campbell Scientific.


5.2.1 Data receipt

If the **WEATHERPAK M** data does not update on the **WEATHERPAK M** display and the **WEATHERPAK** is within range, check the following:

- Double check the power cord. Be certain the **WEATHERPAK M** display is plugged in and turned on. Check the power indicator light on the **On/Off** button on the front panel.
- Make certain you have direct line-of-sight to the **WEATHERPAK M**, that it is within 5 to 7 miles, and not blocked by obstructions such as hills, vehicles, or steel buildings.
- Check that both the **WEATHERPAK M** antenna and the receiving antenna are securely connected.
- Reset the system by removing the **WEATHERPAK M** from the cam lock connector on the tripod base. Wait 10 seconds, then replace the **WEATHERPAK M** on the tripod.
- Check the tripod battery voltage and ensure the batteries are properly aligned (positive towards the top of the tripod). Replace batteries if necessary. ([Replacing tripod batteries and fuse](#) (p. 31).)
- View logs.


5.2.2 Computer

If the **WEATHERPAK M** display shows data, but your computer is not receiving the data, do the following:

- Check all connections from the **WEATHERPAK M** display to the computer.
- Ensure the most recent version of **ALOHA** software is installed on the computer. Some earlier versions of **ALOHA** (for example, version 5.2.1) need to be upgraded to work with an automatic weather station like the **WEATHERPAK M**. The U.S. EPA provides **CAMEO/ALOHA** software downloads, support, and information at its web site: www.epa.gov/cameo .
- Ensure the virtual COM port configuration is not used by another device. **ALOHA** must receive data on COM 1, 2, 3 or 4. If these ports are used by other devices or if Windows® has assigned **ALOHA** a port other than COM 1, 2, 3 or 4, the software will not receive the

weather station data. For more information, refer to [WEATHERPAK M USB connection and set up](#) (p. 33).

Error messages while running the plume model are from the plume modeling software. If an error message occurs:

- Consult the **CAMEO/ALOHA** web site: www.epa.gov/cameo .
- Contact Campbell Scientific. Although not certified **CAMEO/ALOHA** trainers or representatives, we may be able to help.

5.3 Replacing tripod batteries and fuse

WARNING:

Do not leave batteries in tripod when storing or shipping tripod assembly. Batteries may leak, causing damage to upper tripod section.

5.3.1 Tripod batteries

The WEATHERPAK M uses ten alkaline D-cell batteries, located in the upper vertical section of the tripod. Rechargeable and bargain batteries do not perform well in the WEATHERPAK M. Always use high-quality alkaline batteries. (See [FIGURE 5-1](#) (p. 31).)

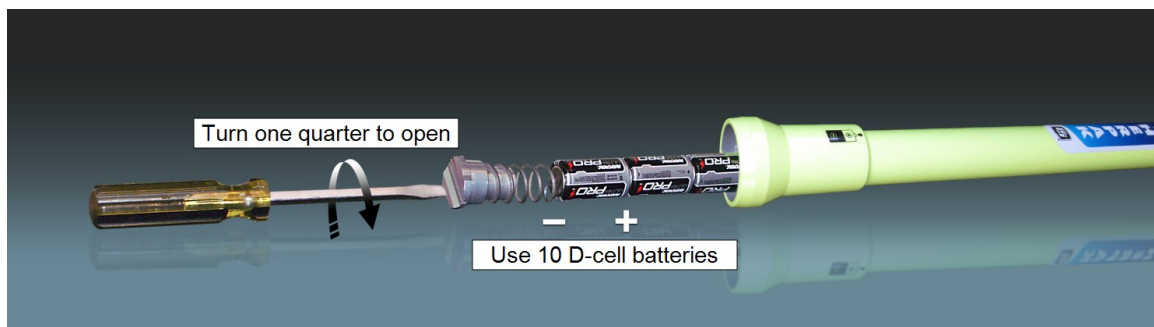


FIGURE 5-1. Battery replacement

Remove the battery plug using a large screwdriver. Insert the blade of the screwdriver into the slotted plug, gently push the spring-loaded plug, then rotate the plug one-quarter turn either direction. The plug and spring will come out followed by the batteries. Insert the new batteries by tilting the tripod section at an angle of approximately 45 degrees. A steeper angle will cause the batteries to impact the top terminal too forcefully, denting the positive terminal of the batteries. This may cause the batteries to leak or create a faulty electrical connection. Slide the batteries in, positive end first, then replace the spring-loaded plug using the reverse procedure.

The red LED voltage indicator light on the tripod base will remain illuminated when the battery voltage is higher than 10.7 VDC. View the precise battery voltage using the **Weatherpak Status** window on the **WEATHERPAK M** display. If monitoring multiple WEATHERPAK M stations, ensure the status window for the appropriate WEATHERPAK M station is viewed by using the **ALOHA** plume model. To use **ALOHA**, open it on the computer, and go to **MISC > Processed SAM Data**. One of the items shown is battery voltage. With new batteries installed, the voltage should be between approximately 13 and 15 volts.

5.3.2 Tripod fuse

The in-line fuse is located in the tripod junction box (see [FIGURE 5-2](#) (p. 32)). Gain access to the fuse holder by removing the two Philips screws on the junction box faceplate; then carefully separate the faceplate from the junction box. Inspect the in-line fuse and replace if necessary with an AGC 3 fuse.

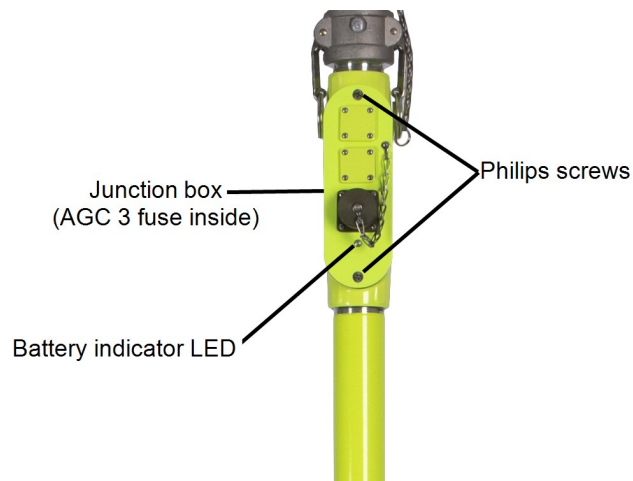

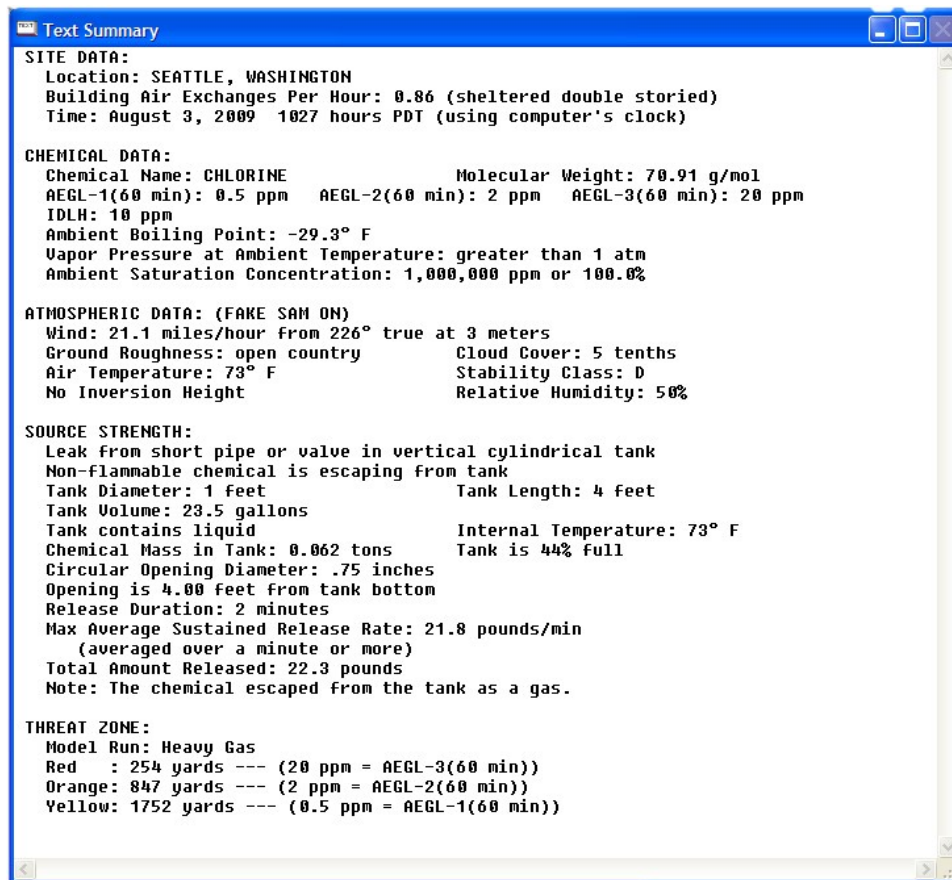


FIGURE 5-2. Fuse location

Appendix A. WEATHERPAK M USB connection and set up

Depending upon the type of connection, when the WEATHERPAK M system is first connected to a computer, Windows® automatically establishes a communications link between the *WEATHERPAK M* display and the computer, which allows data to pass to the plume model or other software. USB or Ethernet connections may require additional drivers.

1. Verify that data is being received from the WEATHERPAK M. Start **ALOHA** on the computer and set the COM port to the COM port the cable is plugged into. Be certain the most recent version of **ALOHA** is running. Check or download the most current version from the U.S. EPA web site: www.epa.gov/cameo .
2. With the WEATHERPAK M set up and transmitting, open the **ALOHA Text Summary** window. It should look similar to this:



```
Text Summary
SITE DATA:
Location: SEATTLE, WASHINGTON
Building Air Exchanges Per Hour: 0.86 (sheltered double storied)
Time: August 3, 2009 1027 hours PDT (using computer's clock)

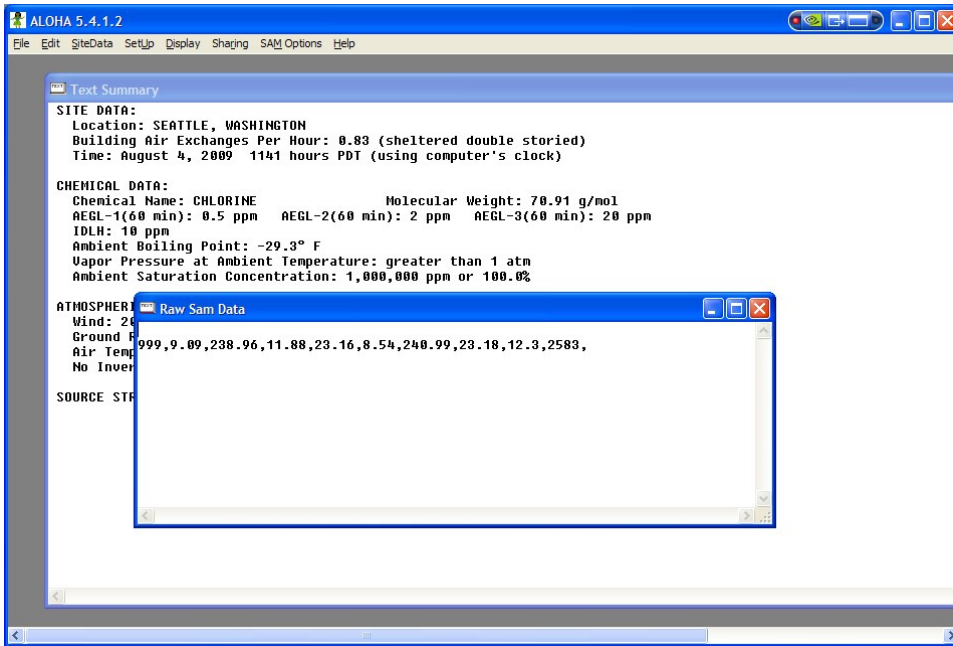
CHEMICAL DATA:
Chemical Name: CHLORINE Molecular Weight: 70.91 g/mol
AEGL-1(60 min): 0.5 ppm AEGL-2(60 min): 2 ppm AEGL-3(60 min): 20 ppm
IDLH: 10 ppm
Ambient Boiling Point: -29.3° F
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (FAKE SAM ON)
Wind: 21.1 miles/hour from 226° true at 3 meters
Ground Roughness: open country Cloud Cover: 5 tenths
Air Temperature: 73° F Stability Class: D
No Inversion Height Relative Humidity: 50%

SOURCE STRENGTH:
Leak from short pipe or valve in vertical cylindrical tank
Non-flammable chemical is escaping from tank
Tank Diameter: 1 feet Tank Length: 4 feet
Tank Volume: 23.5 gallons
Tank contains liquid Internal Temperature: 73° F
Chemical Mass in Tank: 0.062 tons Tank is 44% full
Circular Opening Diameter: .75 inches
Opening is 4.00 feet from tank bottom
Release Duration: 2 minutes
Max Average Sustained Release Rate: 21.8 pounds/min
(averaged over a minute or more)
Total Amount Released: 22.3 pounds
Note: The chemical escaped from the tank as a gas.

THREAT ZONE:
Model Run: Heavy Gas
Red : 254 yards --- (20 ppm = AEGL-3(60 min))
Orange: 847 yards --- (2 ppm = AEGL-2(60 min))
Yellow: 1752 yards --- (0.5 ppm = AEGL-1(60 min))
```

If errors appear in this window, verify the computer is receiving data. To do this, in **ALOHA**, go to **SAM Options** on the top menu bar and select **Raw Data**. A window displays a string of numbers similar to the following. The data line should refresh every 30 seconds (window blinks and overwrites the previous data string).



Appendix B. Important information for North American users

The following Note pertains to WEATHERPAK M stations using the wired serial communication option.

NOTE:

This equipment has been tested and found to comply with the limits for a Class-A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

The following Note and Warning pertain to WEATHERPAK M stations using the UHF or 900 MHz radio options.

NOTE:

This equipment has been tested and found to comply with the limits for a Class-B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING:

Changes or modifications to this device not expressly approved by Campbell Scientific could void the user's authority to operate this equipment.

Limited warranty

Products manufactured by Campbell Scientific are warranted by Campbell Scientific to be free from defects in materials and workmanship under normal use and service for twelve months from the date of shipment unless otherwise specified on the corresponding product webpage. See Product Details on the Ordering Information pages at www.campbellsci.com[↗]. Other manufacturer's products, that are resold by Campbell Scientific, are warranted only to the limits extended by the original manufacturer.


Refer to www.campbellsci.com/terms#warranty[↗] for more information.

CAMPBELL SCIENTIFIC EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Campbell Scientific hereby disclaims, to the fullest extent allowed by applicable law, any and all warranties and conditions with respect to the Products, whether express, implied or statutory, other than those expressly provided herein.

Assistance

Products may not be returned without prior authorization.

Products shipped to Campbell Scientific require a Returned Materials Authorization (RMA) or Repair Reference number and must be clean and uncontaminated by harmful substances, such as hazardous materials, chemicals, insects, and pests. Please complete the required forms prior to shipping equipment.

Campbell Scientific regional offices handle repairs for customers within their territories. Please see the back page for the Global Sales and Support Network or visit www.campbellsci.com/contact  to determine which Campbell Scientific office serves your country.

To obtain a Returned Materials Authorization or Repair Reference number, contact your CAMPBELL SCIENTIFIC regional office. Please write the issued number clearly on the outside of the shipping container and ship as directed.

For all returns, the customer must provide a "Statement of Product Cleanliness and Decontamination" or "Declaration of Hazardous Material and Decontamination" form and comply with the requirements specified in it. The form is available from your CAMPBELL SCIENTIFIC regional office. Campbell Scientific is unable to process any returns until we receive this statement. If the statement is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer's expense. Campbell Scientific reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND tripodS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, tripodS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, tripods, and attachments to tripods and tripods only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.com. You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which tripods, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, tripods, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Protect from over-voltage.
- Protect electrical equipment from water.
- Protect from electrostatic discharge (ESD).
- Protect from lightning.
- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations.
- Use only qualified personnel for installation, use, and maintenance of tripods and tripods, and any attachments to tripods and tripods. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and tripods.
- **Do not climb** tripods or tripods at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tripod sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tripod, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 6 meters (20 feet), or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tripod, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.
- Only use power sources approved for use in the country of installation to power Campbell Scientific devices.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tripod and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

Internal Battery

- Be aware of fire, explosion, and severe-burn hazards.
- Misuse or improper installation of the internal lithium battery can cause severe injury.
- Do not recharge, disassemble, heat above 100 °C (212 °F), solder directly to the cell, incinerate, or expose contents to water. Dispose of spent batteries properly.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, tripodS, OR ATTACHMENTS TO TRIPODS AND tripodS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.



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