AEROCET 532
MANUAL

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AEROCET 532 Manual

Technical Support

This manual is structured by customer feedback to provide the required information for setup, operation, testing, maintaining, and troubleshooting your AEROCET 532. Should you still require support after consulting your printed documentation, we encourage you to contact one of our expert Technical Service representatives during normal business hours of 7:00 a.m. to 4:00 p.m. Pacific Time, Monday through Friday. In addition, technical information and service bulletins are often posted on our website. Please contact us and obtain a Return Authorization (RA) number before sending any equipment back to the factory. This allows us to track and schedule service work and to expedite customer service. Please have your instrument serial number available when contacting the manufacturer.

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NOTICE

CAUTION—Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

WARNING—This product, when properly installed and operated, is considered a Class I laser product. Class I products are not considered to be hazardous.

There are no user serviceable parts located inside the cover of this device.

Do not attempt to remove the cover of this product. Failure to comply with this instruction could cause accidental exposure to laser radiation.

Table of Contents

1. Introduction

The AEROCET 532 is a full–featured, battery operated, handheld particle counter or mass monitor.

In count mode, the unit will measure particle counts at eight fixed sizes (0.3 µm, 0.5 µm, 1.0 µm, 2.5 µm, 4.0 µm, 5.0 µm, 7.0 µm, and 10.0 µm).

In mass mode the unit will measure PM1, PM2.5, PM4, PM7, PM10 and TSP mass concentration levels.

This instrument can store up 15,000 sample events including data from the ambient temperature (AT) / relative humidity (RH) probe. Sample history events can be viewed on the LCD display and downloaded to a computer.

An optional Docking Station complements the Aerocet 532. It charges the unit and increases communication options with RS-485, Ethernet, and WiFi.

2. Setup

The following sections cover unpacking, layout and performing a test run to verify operation.

2.1. Unpacking

Unpack and inspect the contents of the shipping container. Standard items (included) are shown in
Figure 1 - Standard Equipment**.** Optional accessories are shown in Figure 2 – Optional Accessories. Contact the supplier if any items are missing. Any damages incurred during shipping are the responsibility of the carrier. If any damage to the shipment is noticed before unpacking, a claim must be filed with the commercial carrier immediately. You should follow any special unpacking instructions provided by the carrier as you then carefully remove all items from the containers and inspect each component. It is recommended to document and photograph all damaged packages and items before, during, and after unpacking them. Contact Met One Instruments, Inc. (see the Technical Support section at the beginning of this manual) to arrange for any replacement items needed.

ATTENTION:
A Silicon Labs CP210x Driver for the USB connection must be installed before connecting to the USB Type C port.

Driver download weblink: https://metone.com/usb-drivers/

AEROCET 532
PN AEROCET-532

Manual
AEROCET-532-9800

Calibration Certificate
AEROCET 532-9600

USB Cable
PN 502116

Battery Charger
PN 80116

Power Cord
PN 400113

ISO-Kinetic Probe
PN 83117

Zero Count Filter
PN G3111

Carrying Case
PN 8517

Rubber Boot
PN 83549

Figure 1 - Standard Equipment

Flow Meter
PN 9801

Flow Meter
PN Swift 6.0

Docking Station
PN 83529

Figure 2 – Optional Accessories

2.2. Layout

Figure 3 shows the layout of the AEROCET 532 and provides a description of each of the components.

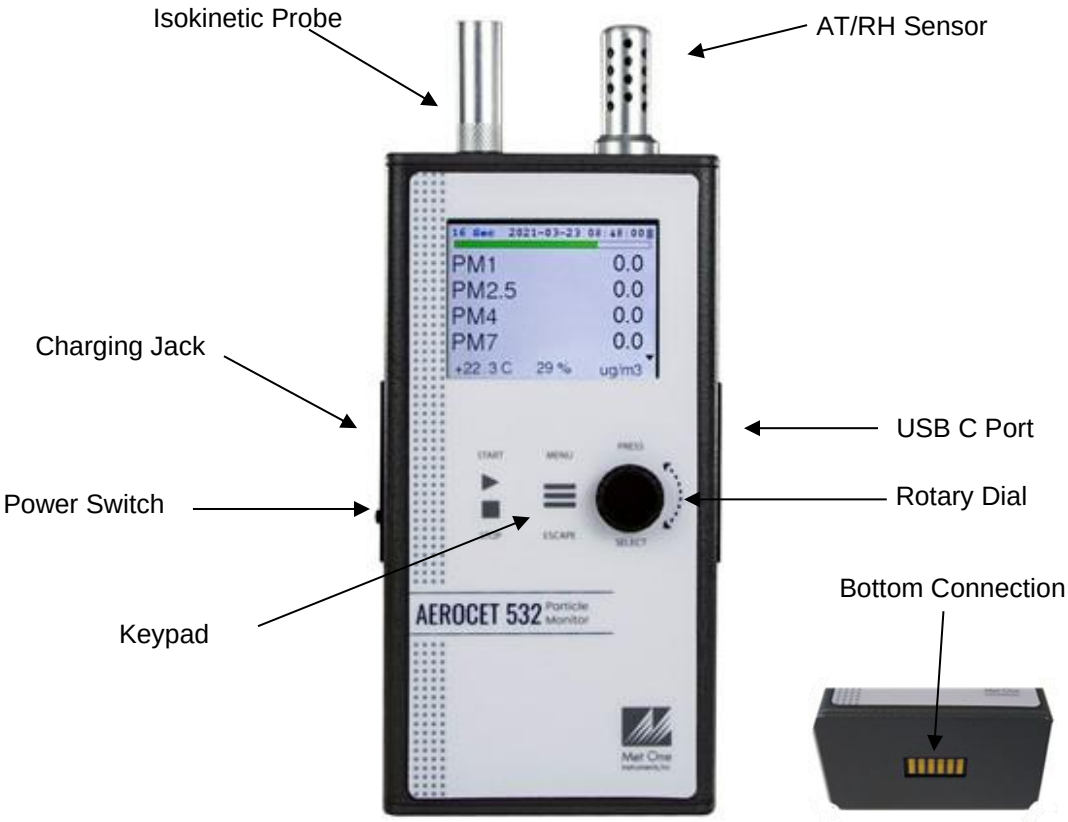


Figure 3 – AEROCET 532 Layout

Component	Description
Power Switch	Switch that turns the AEROCET 532 on or off. Slide up (towards inlet nozzle) to turn on and slide down to turn off.
Charging Jack	Input jack for the battery charger. This connection charges the internal battery pack and provides continuous operating power for the unit.
Keypad	2 key membrane keypad.
USB C Port	For USB serial communication.
Rotary Dial	Multifunction dial (rotate and press).
AT/RH Sensor	Integrated sensor that measures ambient temperature and relative humidity.
Isokinetic Probe	The isokinetic probe reduces turbulence in the air sample. It attaches over the air inlet nozzle.
Bottom Connection	For use with the optional 83529 Docking Station. This is used to charge the unit and transfer data through the docking station.

2.3. Default Settings

The AEROCET 532 comes with the user settings configured as follows.

Parameter	Value
Sample Type	Mass (µg/m^3)
Sample Mode	Continuous
Count Mode	Cumulative
Sample Time	1 Min
Sample Hold Time	0 seconds
Volume (concentration)	CF (particles / ft^3)
Temperature Units	C
USB Baud Rate	115200

2.4. Initial Operation

Before operating the AEROCET 532 for the first time, it is recommended that the unit be fully charged. Information regarding charging the battery is found in section 6 of this manual.

Complete the following steps to verify proper operation.

1. Slide the power switch up to turn on the power.
2. Observe the Startup screen for 2 seconds then the Operate screen (Section 4.3)
3. Press **START/STOP** key. The AEROCET 532 will begin sampling.
4. Observe the PM levels on the display.
5. Turn the rotary dial to view other PM levels.
6. The unit is ready for use.

3. User Interface

The AEROCET 532 user interface is composed of a rotary dial, 2 button keypad, and an LCD display. The following table describes keypad functionality. Note some keys have more than one function.

Key	Description
	• Operate Screen: Starts or stops a sample. • Settings Menu: Return to Operate screen. • Edit Setting: Cancel edit mode and return to Operate screen.
	• Operate Screen: Display the Settings menu. • Settings Menu: Return to previous screen. • Edit Setting: Cancel edit mode and return the previous menu.

	**Press Function** • Operate Screen: Display the sample history. • Settings Menu: Select the highlighted menu item. • Edit Setting: Enter setting edit mode. **Dial Function** • Operate Screen: dial to scroll parameter list. • Settings Menu: dial to move/scroll highlight to menu item. • Edit Setting: dial to change picklist and numerical parameters

4. Operation

The following sections cover the basic operation.

4.1. About the Measurement

The AEROCET 532 counts and sizes particles in 8 different size ranges then uses a proprietary algorithm to convert count data to mass measurements (µg/m^3). This calculation includes a K-Factor setting that can be adjusted to compensate for local particulate characteristics and improve measurement accuracy. The AEROCET 532 provides a separate K-Factor setting for each measurement range (PM1, PM2.5, PM4, PM7, PM10, and TSP). These K-Factors can be modified on the K Factor screen as discussed in section 5.3.3, with serial commands, or with Comet software.

K-Factor values should be empirically derived via comparison with a reference unit. Refer to Section 5.3.3.

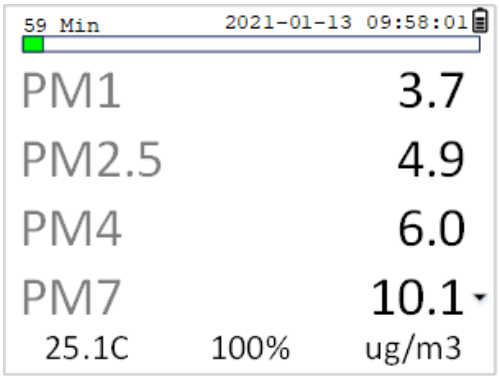
4.2. Power Up

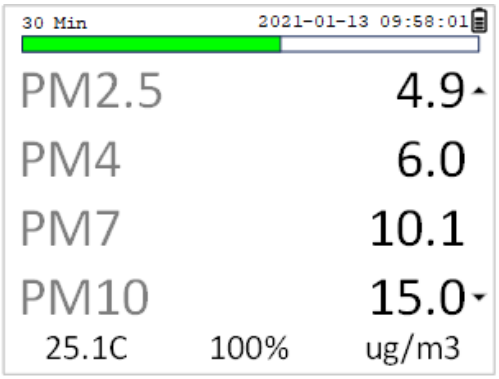
AEROCET 532 power is controlled by a slide switch located on the left hand side of the unit. Move the power switch to the on position (towards the top of the case) to power up the unit.

The first screen shown on power up is the Startup screen. This screen briefly displays the company logo before loading the Operate Screen.

4.3. Operate Screen

The Operate screen displays the count or mass measurement. It is determined by the `Measure` setting. The Operate screen displays the sample status, date and time, battery status, sample data, location, temperature, and relative humidity. Figure 4 and Figure 5 show the Mass and Count screens. Four size channels are displayed. Rotate the dial to display additional sizes and the location.





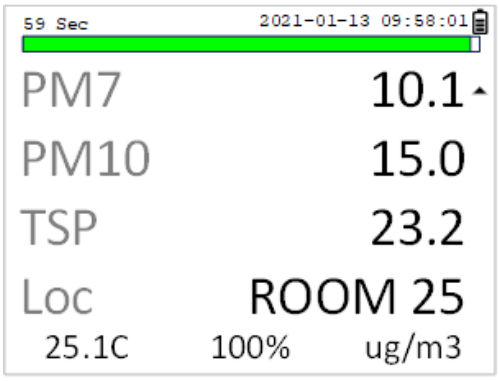
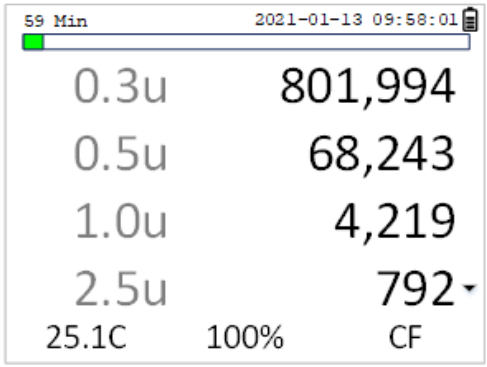
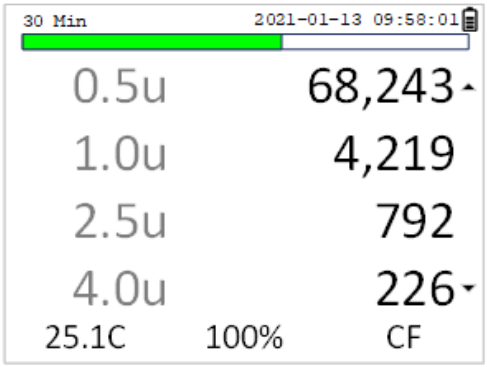


Figure 4 – Mass Operate Screen





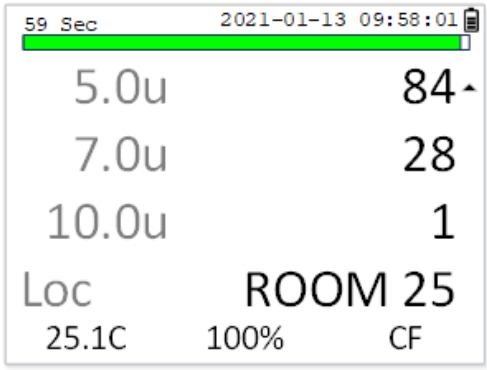


Figure 5 – Count Operate Screen

4.3.1. Sampling

The Operate screen displays current sample information when the unit is sampling (real time data). Concentration values are time dependent so these values may fluctuate early in the sample; however, after several seconds the measurement will stabilize.

4.3.2. Sample Status

The top of the Operate screen displays the status of the AEROCET 532 while the unit is sampling. The time remaining is shown at the top left of the screen. A status bar fills with green as time progresses. If a hold time is entered, the status bar will fill yellow during the hold time.

4.3.3. Sample History

Sample history (previous data) can be viewed on the Operate screen when the unit is stopped or sampling. Pressing the knob puts the operate screen in History Mode. History mode allows you to scroll through previously recorded samples and view the historical data.

In history mode, use the dial action of the rotary knob to scroll through the previous sample data records. Note the red arrows at the top indicate record scrolling mode (see Figure 6). To see additional data for a given record, press down on the rotary dial to enter the data scrolling mode. Using the dial action of the rotary knob will scroll the data up and down and enable users to view the data stored on each channel. Data scrolling mode is indicated by black arrows on the right side of the display (see Figure 7). Press down on the rotary knob again to switch back to record scrolling mode; use the ESC button to exit history mode. A new sample can be started without exiting the history mode by pressing the START button.

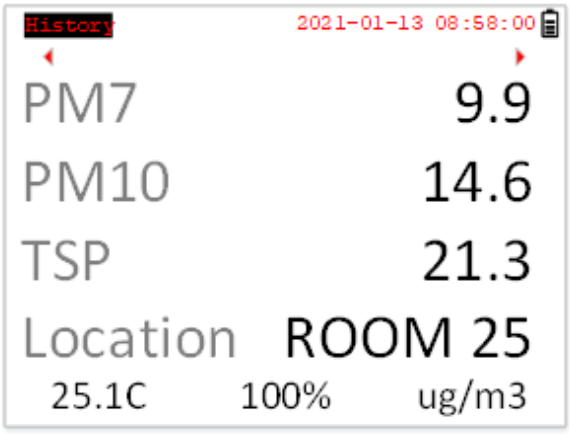


Figure 6 - History Record Scroll Screen

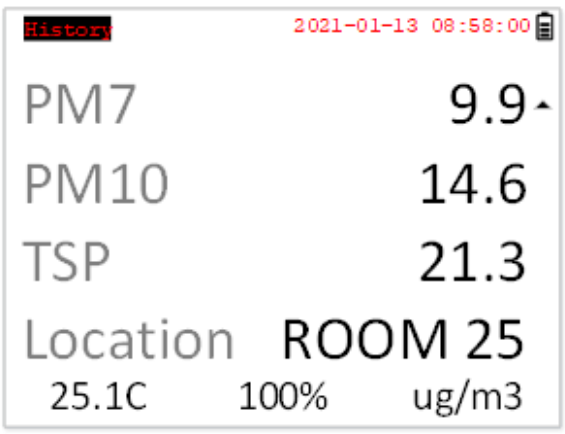


Figure 7 – History Data Scroll Screen

4.4. Sample Related Functions

The following sub-sections cover sample related functions.

4.4.1. Starting/Stopping

To start or stop a sample, press the **START/STOP** key. A sample event can be manually started or stopped from either the Operate screen or the menu.

4.4.2. Measurement Type

The measurement type determines if the instrument reports mass (µg/m^3) or particle concentration (particles/volume). Measurement type is discussed in section 5.2.

4.4.3. Sample Mode

The sample mode controls single sample or continuous sampling. Sample modes are discussed in section 5.2.3

4.4.4. Count Mode

The count mode determines if particle counts are displayed in `Cumulative` or `Differential` mode. Count modes are discussed in section 5.2.4

4.4.5. Sample Time

The sample time is the length of time the unit will sample for. The sample time is user selectable for 1, 2, 5, 10, 15, 30, or 60 minute samples.

4.4.6. Hold Time

The hold time is used when the sample mode is set to auto (continuous sample). The hold time represents the time from the completion of the last sample to the start of the next sample. The hold time is user settable from 0 – 9999 seconds and is discussed in section 5.2.6.

4.4.7. Sample Timing

The following figures depict the sample timing sequence for both manual and auto sampling modes. Figure 8 shows the timing for manual sample mode. Figure 9 shows the timing for auto sample mode.

Figure 8 – Manual Mode Sample

Figure 9 – Auto Mode Sample

5. Menu Selections

The Main Menu is accessible by pressing the **MENU** key on the Operate screen. The table below and Figure 10 show the Main Menu items. Use the rotary dial to highlight the desired menu item and then press it to enter that menu screen.

Menu Item	Description
`Sample Setup`	View / change location ID, Mass / count mode, single or continuous mode, cumulative or differential count mode, sample time and hold time.
`Toolbox`	View / change units, memory, K-factors, flow, and display.
`Initial Setup`	View / change serial settings, clock, and locations.
`About`	Display firmware version, serial number, service contact, calibration date, and run time.

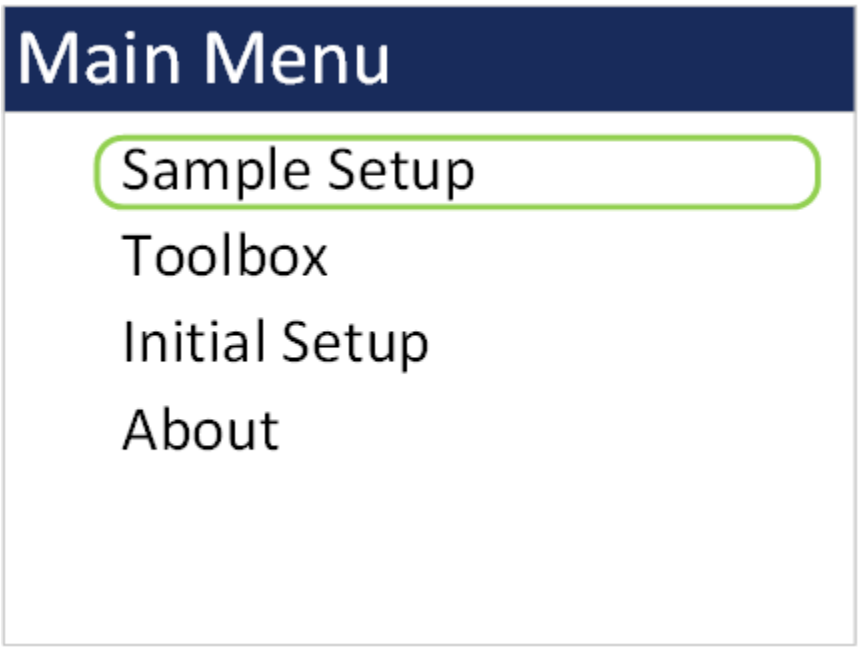


Figure 10 – Main Menu Screen

5.1. Edit Menu Items

To change settings, press **MENU** to display the Main Menu, rotate the dial to navigate to the desired item and press the dial to display the item view/edit screen.

To edit pick list items (e.g. `Sample Setup: Single` or `Continuous`), rotate the dial to navigate to the item. Press the dial to select the item. Rotate the dial to change the setting. Press the dial to save the setting or **ESCAPE** to cancel and return to the previous screen.

To edit alpha-numeric and numeric values (e.g. `Location`), rotate the dial to navigate to the item. Press the dial to select the item. Rotate the dial to increment or decrement a value. Press the dial to select the next character. Press the dial for all remaining characters to save the value or **ESCAPE** to cancel and return to the previous screen.

5.2. Sample Setup Screen

Figure 11 shows the `Sample Setup` Screen. The 6 parameters are covered in the following sections.

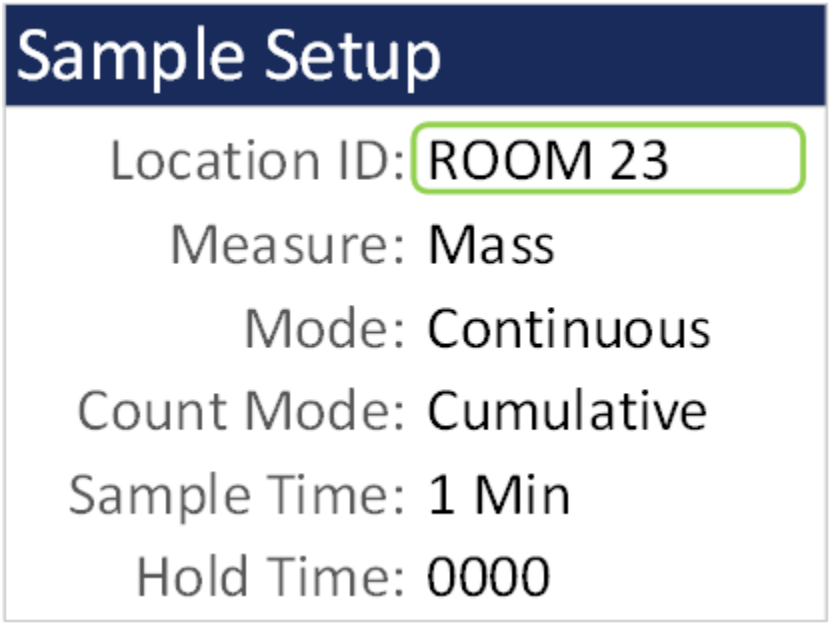


Figure 11 – `SAMPLE SETUP` Screen

5.2.1. Location ID

The `Location ID` is used to assign a unique name to a location or area. This important field is included in sample data records (display and csv output). Use the dial to scroll through a list of custom location IDs. To edit the list, see toolbox location ID in section 5.4.4.

5.2.2. Measure

The `Measure` is either `Mass` or `Counts` concentration. It determines whether the counter is operating in the mass measurement or particle counting mode.

When sampling in mass mode, the size selection represents the upper threshold of your sample. For example, when you read the value for PM10 it contains all mass that is size PM10 and lower. Conversely, when sampling in count mode, the size selections represent the lower threshold of your sample. An example would be that the 1.0 µm cumulative size contains all particulate that are 1.0 µm and larger.

Selection	Description
Mass	When MASS is selected the unit will report PM levels PM1, PM2.5, PM4, PM7, PM10 and TSP in µg/m^3.
Counts	When COUNTS is selected the unit will report fixed particle sizes: 0.3 µm, 0.5 µm, 1.0 µm, 2.5 µm, 4.0 µm, 5.0 µm, 7.0 µm, and 10.0 µm.

5.2.3. Mode

The sample Mode controls single sample or continuous sampling as illustrated below.

Selection	Description
Single	The Single setting configures the unit for a single sample.
Continuous	The Continuous setting configures the unit for continuous sampling.

5.2.4. Count Mode

The count mode determines if particle counts are displayed in Cumulative or Differential mode. Cumulative mode displays the particles as all sizes greater than the selected size. Differential mode displays the counts as all particles between the selected size and the next larger size channel. This setting is only valid for count measurement type and will not appear on the Sample Setup screen if Mass measure is selected.

5.2.5. Sample Time

The Sample Time is the length of time the unit will sample for. In Single mode the unit will stop sampling after this period and in Continuous mode the unit will continue to sample at the sample time interval. The sample time is user selectable from 1 minute, 2 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, or 60 minutes.

5.2.6. Hold Time

The Hold Time is the time between samples when sampling in Continuous mode. The Hold Time is user settable from 0 – 9999 seconds. The pump will remain on during the hold period if the HOLD time is 60 seconds or less. The pump will stop after each sample, and start a few seconds before the next sample, if the Hold time is greater than 60 seconds. Hold times greater than 60 seconds will increase pump life, as well as increase operating time because of lower battery usage. This setting will not appear on the Sample Setup screen if Single mode is selected.

5.3. Toolbox Screen

Figure 12 shows the `Toolbox` screen.

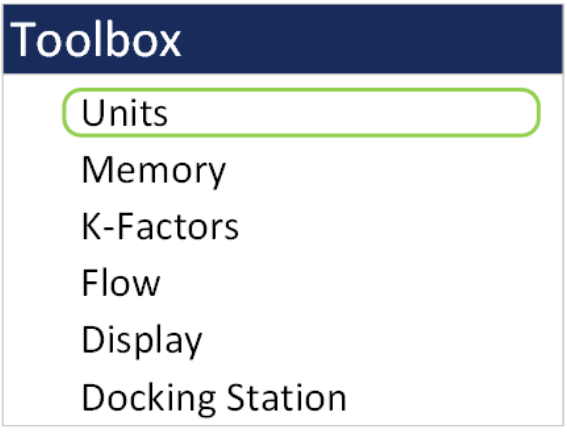


Figure 12 – `Toolbox` Screen

5.3.1. Units

The `Units` setting allows the volume and temperature units to be selected.

`Volume:` The AEROCET 532 supports total counts per timed sample (TC), particles per liter (/L), particles per cubic foot (CF), and particles per cubic meter (M3). Particle count information updates while the unit is sampling. Concentration values (/L, CF, M3) are time dependent so these values may fluctuate early in the sample; however, after several seconds the measurement will stabilize.

The volume unit represents `Count` measure only. `Mass` measure volume is always displayed in µg/m^3.

`AT:` The AEROCET 532 displays ambient temperature (AT) in Celsius (C) or Fahrenheit (F).

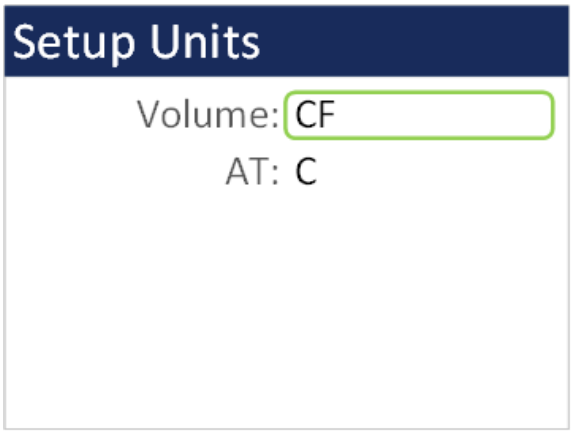


Figure 13 - `Units` Setup Screen

5.3.2. Memory

The AEROCET 532 can store up to 15,000 sample records in its memory. For instructions on viewing stored data, see section 4.3.3. Because this memory is circular, once all 15,000 records are full, any new samples taken will overwrite the oldest stored sample data.

The Memory screen provides indication of the available memory capacity and a means to completely erase all data currently saved in memory. The Free field shows the percentage of space available for data storage. When 0% is displayed, the memory is full and the oldest data will be overwritten by new data.

Press down on the rotary dial to activate the CLEAR command and erase the unit's memory. A confirmation screen will appear. Select the CLEAR option on the confirmation screen to continue with erasing the data and then returning to the memory screen. Selecting CANCEL on the confirmation screen will return to the Memory screen without erasing the data.

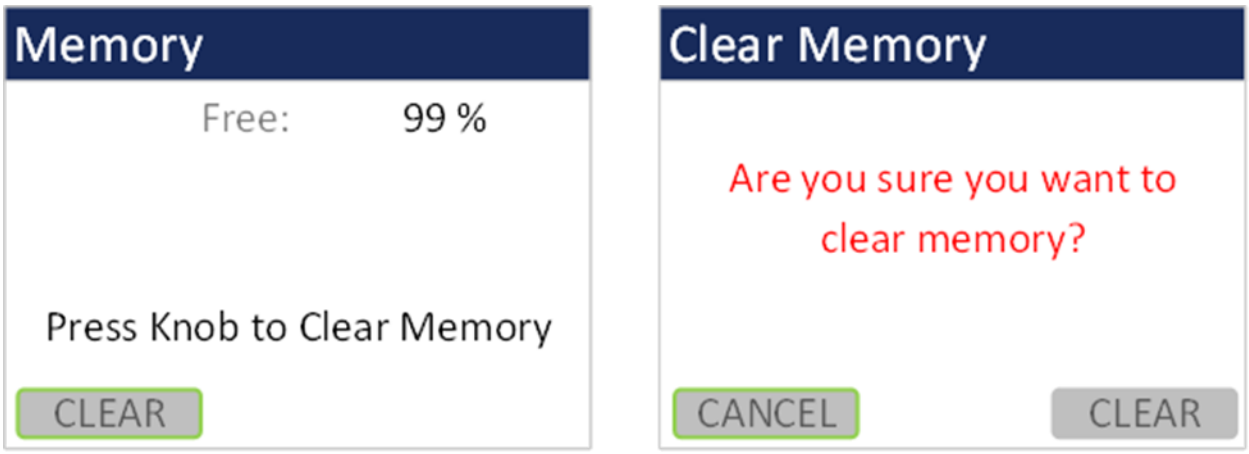


Figure 14 - `Memory` Screens

5.3.3. K-Factors

The K-Factor for each PM mass fraction can be set in the `K-Factor` screen. A K-Factor is a multiplier that is related to the specific gravity of the air being measured. It improves the accuracy of the mass measurement when derived from a reference or gravimetric device, because not all air is created equal. The accuracy of the mass output can be affected by variations in size, color, shape, and index of refraction of the sampled particles.

The individual user k-factors for each mass channel can be set from 0.1 to 20.0.

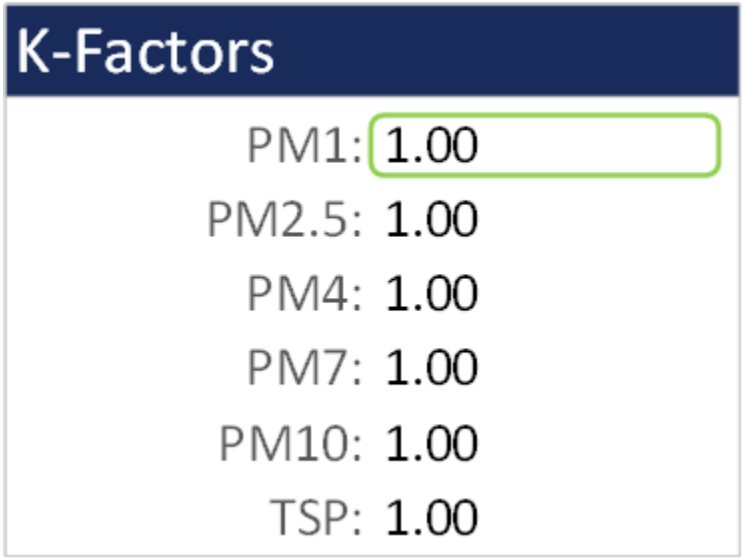


Figure 15 - `K-Factor` Screen

The AEROCET 532 calibration is performed using ideal polystyrene latex (PSL) spheres, which provide a powerful tool for assessing the sensitivity, accuracy, resolution, and false count level. The particle detector is compared to a reference mono-dispersed (single size) suspension of PSL spheres in clean filtered air for both calibration and certification of performance specifications. This calibration technique provides a standard traceable reference and a measure of how well the unit maintains its reproducibility.

Calculate the K-Factor for each particulate size fraction as the reference concentration divided by the AEROCET 532 light scatter concentration over the same time period. For example, if the reference total concentration was 51 µg/m^3 and the AEROCET total concentration was 38 µg/m^3, then the K-Factor would be 51 divided by 38 or 1.34. The K-Factor is only valid at the same site and for the same particulate type. If the local particulate source changes, the K-Factor may no longer be valid.

5.3.4. Flow

The `Flow` screen is where a flow calibration is performed. When this screen is selected, a warning will appear to use an external flow meter to adjust the AEROCET 532 flow to 2.83 LPM. Select OK to proceed or CANCEL to exit.
The pump will start automatically when you enter the `Flow` screen and stop when you leave the screen. Use the following procedure to adjust the flow rate when a periodic flow rate check (Section 8.3) indicates a flow rate error greater than ± 5%.

1. Remove the isokinetic inlet.
2. Connect a reference flow meter to the inlet fitting on the top of the unit and allow the flow to stabilize.
3. Twist the dial clockwise to increase the flow rate and turn the dial counterclockwise to decrease the flow rate until the measured flow rate is 2.83 LPM (0.1 CFM) ± 5%.
4. Press the dial to save the calibration. Press ESCAPE to cancel without saving.

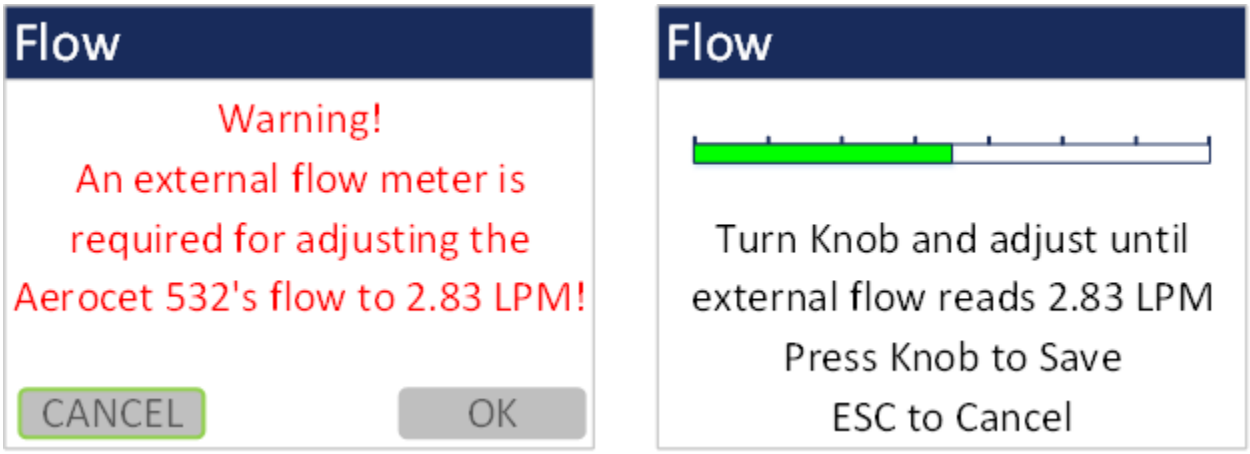


Figure 16 - `Flow` Screen

The progress bar shows the pump pulse width modulation (PWM) as a percentage. A green progress bar means the PWM is in a good place. An orange progress bar indicates the filter is getting close to needing to be replaced. A red progress bar indicates the filter needs to be replaced.

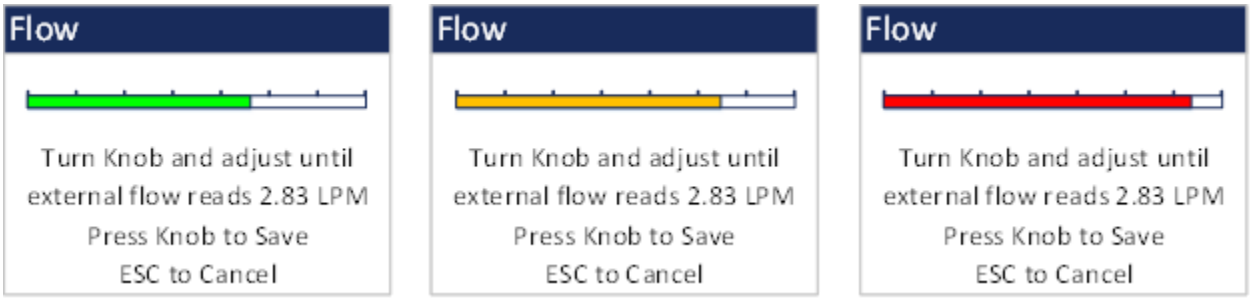


Figure 17 - `Flow` Screen Progress Bar Color Changes

5.3.5. Display

The `Display` screen allows the user to change the backlight brightness from 10-100% and select the display timeout to dim the screen for none, 1, 5, or 10 minutes.

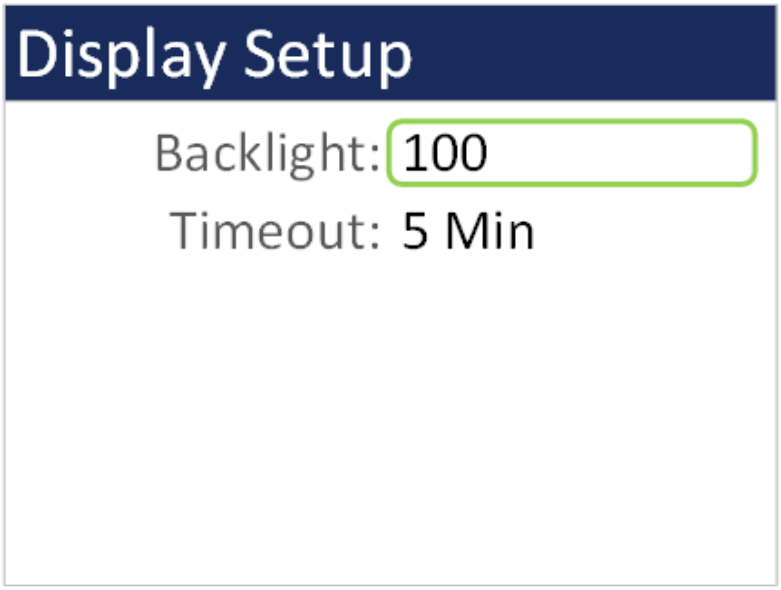


Figure 18 - `Display` Setup Screen

5.3.6. Docking Station

The `Docking Station` screen is a troubleshooting feature that determines the unit WiFi credentials if it was set up as a DHCP connection instead of a static connection and the IP address changes. The 83529 Docking Station quick setup manual explains how to connect the unit to the optional docking station. Select WiFi Discovery to begin the procedure.

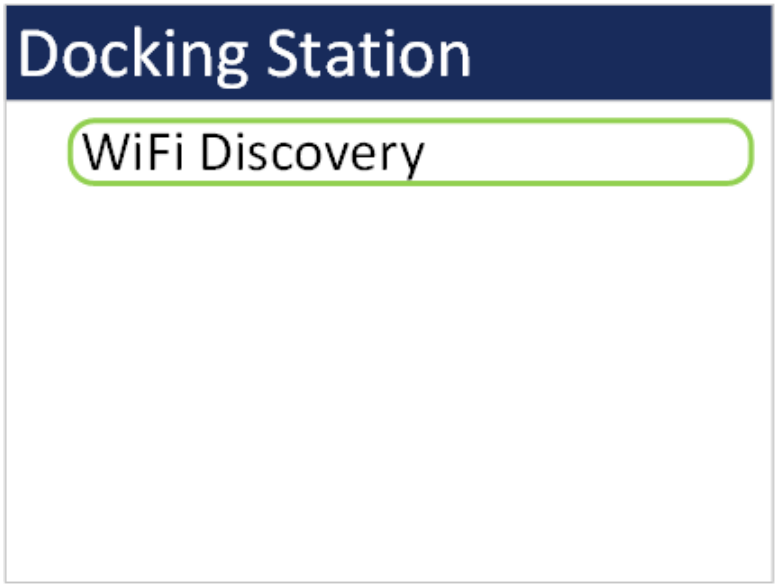


Figure 19 - Docking Station Screen

The subsequent screens describe each process step. An initial warning explains that this is only intended to be used with the Docking Station to recover a lost IP Address. Select CONTINUE. Remove the unit from the Docking Station. Then remove the power plug from the back of the Docking Station (it will receive power from the unit during this procedure). Make sure the network switch on the Docking Station is set to WiFi and not Ethernet. Select NEXT and then place the unit in the dock. A green bar will show the progress of the scan.

Figure 20 - WiFi Discovery Screens

Once the scan completes the WiFi connection credentials will display on the screen. If the procedure was not performed correctly (e.g. dock plugged in/unit not docked/ network switch set to Ethernet) a time out message will appear. The Docking Station can be plugged back in once the scan completes. Press escape to exit this screen.

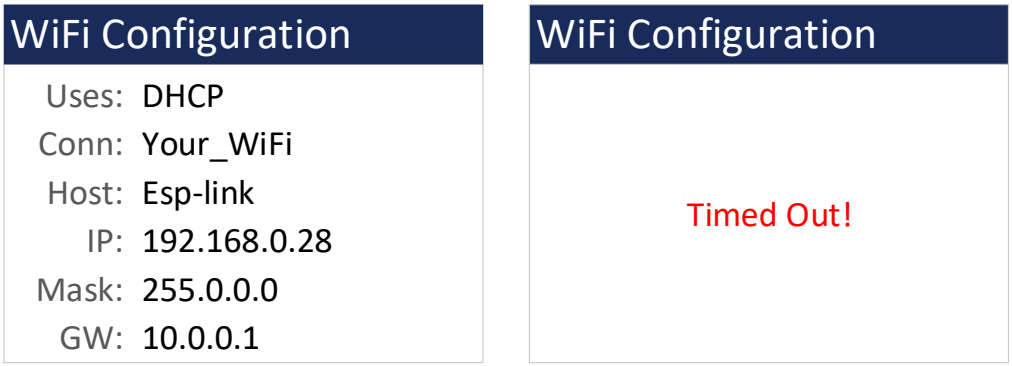


Figure 21 - WiFi Configuration Results (left) and Time Out Screen (right)

5.4. Initial Setup Screen

Figure 22 shows the `Initial Setup` screen. These items are not expected to need to be changed frequently but need to be configured when first using the instrument.

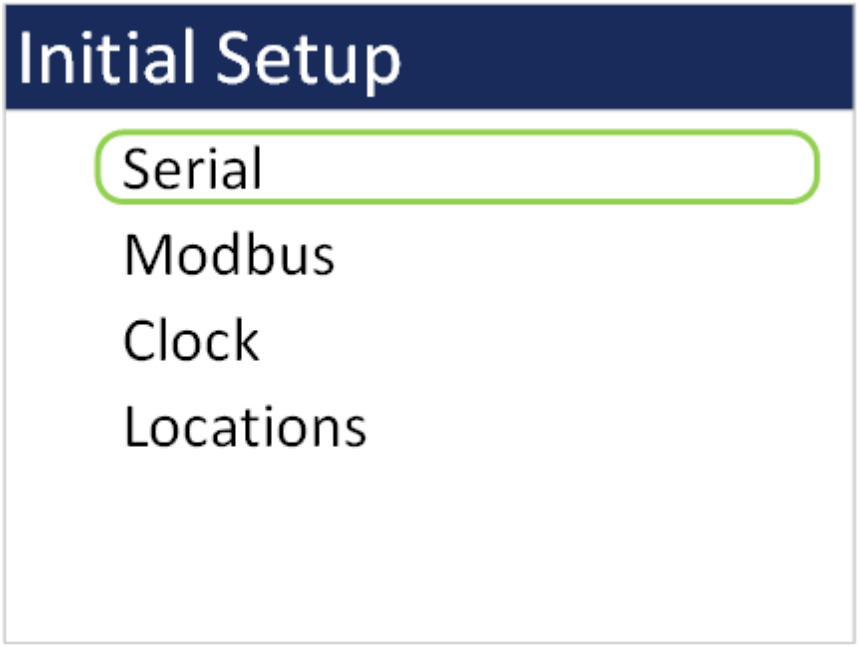


Figure 22 – Initial Setup Screen

5.4.1. Serial

The `Serial` setting controls the behavior of the AEROCET 532 serial output hardware available on the optional docking station. The following table lists the `Serial` settings and describes their meanings.

Selection	Description
`Network ID`	Unique ID assigned to each device for networking mode (1 – 999)
`485 Baud`	Baud rate for the 485-serial port. The baud rate list includes 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
`Dock Baud`	Baud rate for the optional docking station WiFi/Ethernet port. Same baud rates as listed above.
`Flow Ctrl`	Flow control for the optional docking station Ethernet Netburner (None, XON/XOFF).

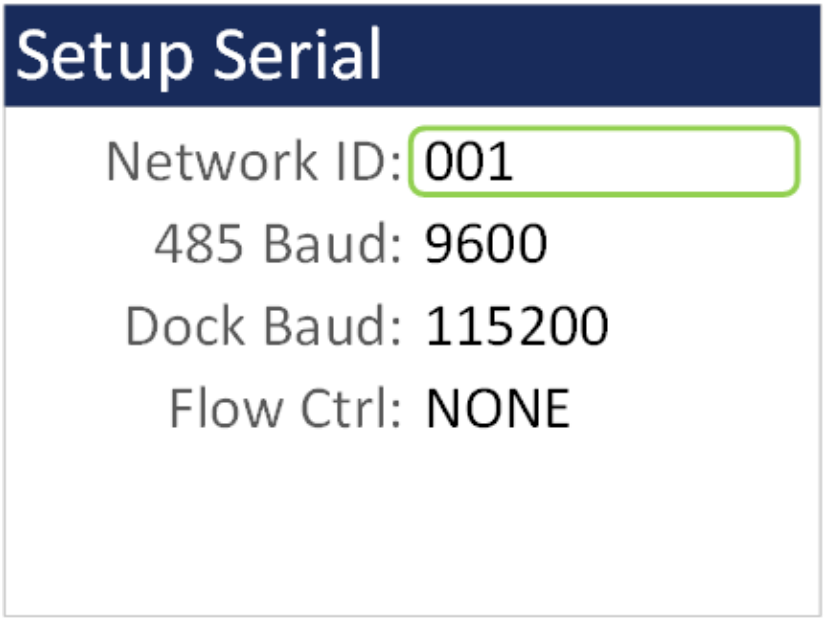


Figure 23 – Serial Setup Screen

5.4.2. Modbus

The `Modbus` setup allows the user to choose which communication port to use if employing Modbus. Port options are USB, RS-485, or Network. RS-485 and Network options are available through the optional 83529 Docking Station. Network options are either WiFi or Ethernet and are selected by a switch on the Docking Station. The equipment Modbus address is also set in this screen with values of 1-247.

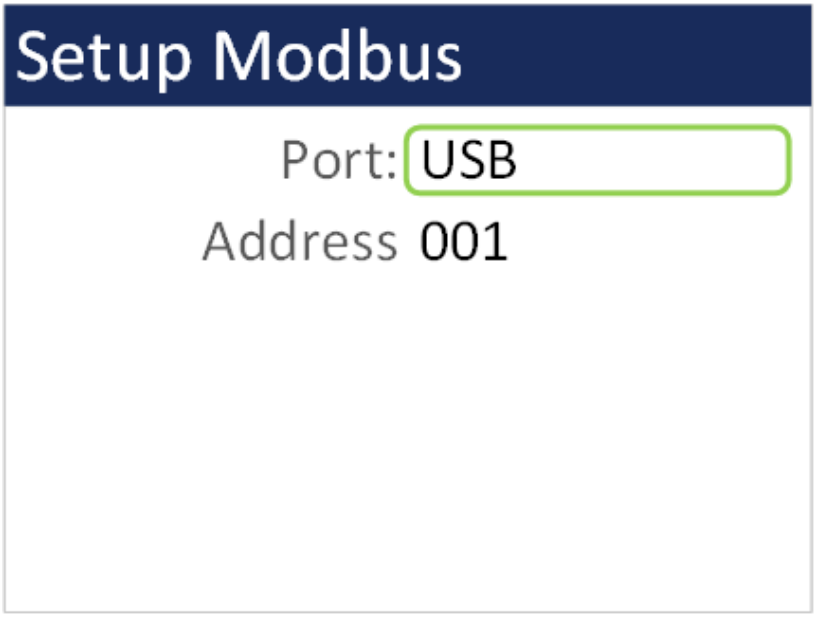


Figure 24 - Modbus Setup Screen

5.4.3. Clock

Use the `Clock` selection to set the date and time. Turn the dial to select year/month/date/hour/minute/second to change. A green box will surround the selection. Press the dial to edit. Turn the dial to change, then press to confirm the change. Press the dial on the SET box to change the settings and return to the Initial Setup screen.

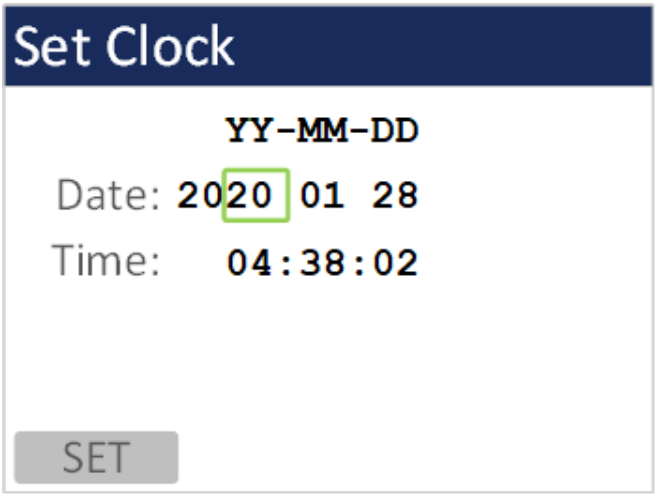


Figure 25 - Clock Screen

5.4.4. Locations

The `Locations` screen allows the user to set up to 10 predefined alpha numeric locations. Each location can use up to 7 characters. To enter a new location, press the dial on the location to change. Rotate the dial to scroll through alpha/number/space options for each character. Press the dial to select each character. All 7 characters must be selected to save the location ID. It is suggested to use spaces for a location with less than 7 characters.

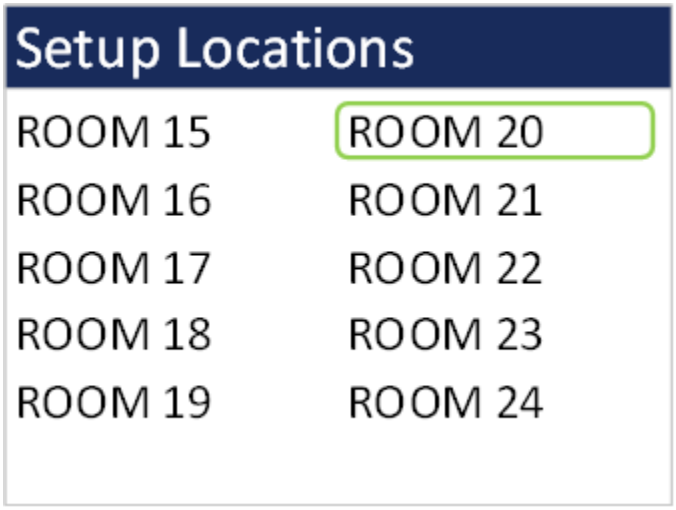


Figure 26 - `Locations` Screen

5.5. About Screen

Figure 27 shows the ABOUT screen. The ABOUT screen shows the manufacturer's serial number, the firmware version, Met One Instruments, Inc. service contact details, date of last calibration, and instrument run time.

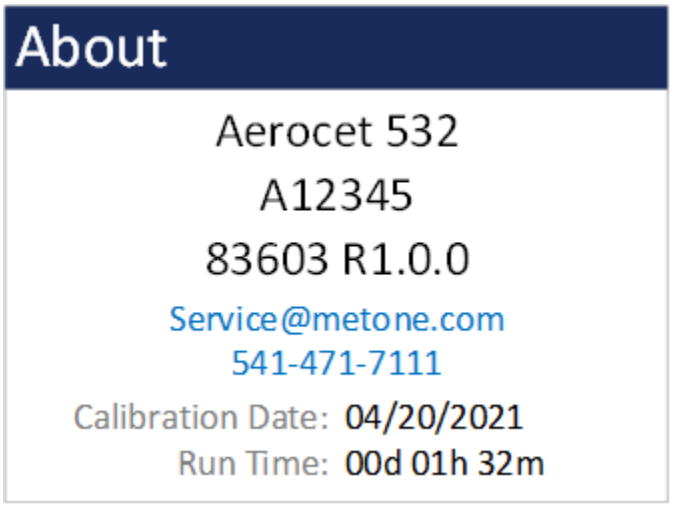


Figure 27 – About Screen

6. Charging the Battery

Caution:
The provided battery charger is designed to work safely with this device. Do not attempt to connect any other charger or adapter to this device. Doing so may result in equipment damage.

To charge the battery, connect the battery charger to an AC power outlet and the DC barrel connector to the socket on the left side of the AEROCET 532. The battery charger is universal and will work with power line voltages of 100 to 240 volts, 50 to 60 Hz. A discharged battery pack will take approximately 2.5 hours to fully charge.

When fully charged the battery inside the AEROCET 532 will power the unit for over 8 hours of continuous sampling. For continuous operation, operate the unit with the battery charger attached. Charge the battery before storing the AEROCET 532. Storing a discharged battery will degrade its performance.

The Aerocet 532 can also be charged using the optional 83529 Docking Station. The device will fit securely onto the Docking Station when encased in its rubber boot. If the rubber boot is not used, an 83584 bootless adapter is placed at the base of the docking station to hold the device.

7. Serial Communications

The AEROCET 532 provides serial communications via the USB connector located on the right hand side of the unit. RS-485, WiFi, and Ethernet communications are also available with the optional 83529 Docking Station. Refer to the 83529 Docking Station Quick Setup Guide to configure the optional communications. The following sections discuss the various serial communications available with AEROCET 532.

ATTENTION:
A Silicon Labs CP210x Driver for the USB connection must be installed before connecting to the USB Type C port.

Driver download weblink: https://metone.com/usb-drivers/

7.1. Commands

The AEROCET 532 provides serial commands for accessing stored data and settings. All commands are terminated by a carriage return. These commands are not case sensitive. The following table lists the available commands. These commands are available via USB, WiFi, ethernet, and RS-485 hardware interfaces. The settings (baud rate, parity and stop bits) must match the computer setting for proper communication regardless of the hardware interface type.

Settings (must match computer settings):

- Baud Rate = 115200 (USB Default); 9600 (RS-485 Default); 38400 (Dock Default
- Parity = None
- Stop Bits = 1
- Flow Control = None (XON/XOFF available for Ethernet)

The following table lists the available commands:

Command	Description
?	Help command
1	Report settings
2	Report all the data
3	Report the new data
4	Report the last record(s)
A	Network address command
C	Clear the data file
E	Stop sample
H	Help Menu
Q	Exit Terminal Mode
S	Start sample
X	Exit Terminal Mode
BL	Back Light (%)
CM	Count Mode: CM 0=Cumulative, CM 1=Differential
CU	Count Units: CU 0=CF, CU 1= /L, CU 2= TC, CU 3=M3
DS	Report data log channel descriptors
DT	Date / Time
ID	Location ID
LN	Get/Set the location name for a specific location index using LN i n, where i – Location Index (1 – 10); n – Location Name (Capitol Letters and numbers only) (no symbols except spaces) (7 characters max)
MA	Modbus Address (1-247)
MM	Measure Mode MM 0=Counts, MM 1=Mass
NW	Network On/Off
OI	Output Interval OI 0=Off, OI 1=On
PR	Print File
QH	Report data record header
RQ	Report (ReQuest) data record readings
RV	Report Firmware Revision
RZ	Report Measurement Sizes
SB	Get/Set USB Baud Rate. 3=2400, 4=4800, 5=9600, 6=19200, 7=38400,8=57600,9=115200.
SH	Hold Time (0-3600)
SK	Set PM K Factors. K Factor range is 0.1-20.0. PM1=1, PM2.5=2, PM4=3, PM7=4, PM10=5, TSP=6
SM	Sample Mode. SM 0=Single, SM 1=Continuous
SS	Serial Number
ST	Sample Time. ST 0=1-min, ST 1=2-min, ST 2=5-min, ST 3=10-min, ST 4=15-min, ST 5=30-min, ST 6=1-hour.
TU	Temperature Units. TU 0=C, TU 1=F
DISPTO	Manual Display Timeout. 0=None, 1=1-min, 2=5-min, 3=10-min.

7.2. Comma Separated Value (CSV)

The CSV report will be generated for each data inquiry. The CSV format for `Mass` and `Counts` is determined by the `Measure` setting. Both formats are fixed field length.

7.2.1. Counts Format

```
Count Data Report
2021-05-10 08:53:10
Serial Number, B12561


Time,0.3(M3),0.5(M3),1.0(M3),2.5(M3),4.0(M3),5.0(M3),7.0(M3),10(M3),AT(C),RH(
%),Location,Seconds,Status
2021-05-07
15:39:09,06768198,01445936,00022968,00003180,00001413,00000706,00000353,00000
353,+024.9,030,LOC1   ,0060,0000
```

CSV Fields		
Field	**Parameter**	**Example Value**
1	Date and Time	2021-05-07 15:39:09
2	Channel 1 Size 0.3 (TC, /L, CF, M3)	06768198
3	Channel 2 Size 0.5 (TC, /L, CF, M3)	01445936
4	Channel 3 Size 1.0 (TC, /L, CF, M3)	00022968
5	Channel 4 Size 2.5 (TC, /L, CF, M3)	00003180
6	Channel 5 Size 4.0 (TC, /L, CF, M3)	00001413
7	Channel 6 Size 5.0 (TC, /L, CF, M3)	00000706
8	Channel 7 Size 7.0 (TC, /L, CF, M3)	00000353
9	Channel 8 Size 10 (TC, /L, CF, M3)	00000353
10	AT (C, F)	+024.9
11	RH (%)	030
12	Location	LOC1
13	Seconds	0060
14	Status	0000

7.2.2. Mass Format

```
Mass Data Report
2021-05-10 08:40:14
Serial Number, B12561

Time,PM1(ug/m3),PM2.5(ug/m3),PM4(ug/m3),PM7(ug/m3),PM10(ug/m3),TSP(ug/m3),AT(
C),RH(%),Location,Seconds,Status
2021-05-07 15:39:09,001.6,001.6,001.7,001.8,001.8,001.9,+024.9,030,LOC1
,0060,0000
```

CSV Fields		
Field	**Parameter**	**Example Value**
1	Date and Time	2021-05-07 15:39:09
2	PM1 (µg/m3)	001.6
3	PM2.5 (µg/m3)	001.6
4	PM4 (µg/m3)	001.7
5	PM7 (µg/m3)	001.8
5	PM10 (µg/m3)	001.8
6	TSP (µg/m3)	001.9
7	AT (C, F)	+024.9
8	RH (%)	030
9	Location	LOC1
10	Seconds	0060
11	Status	0000

7.2.3. Status

The last entry of the CSV output is the status indicating alarms or errors. Status bits combinations are possible. For example, 18 = IOP Alarm and Temperature Sensor Alarm.

Status Bits		
Bit	**Value**	**Condition**
	0	OK (no alarms or errors)
0	1	Not used
1	2	IOP Alarm (Laser)
2	4	Not used
3	8	Not used
4	16	Temperature Sensor Alarm
5	32	Pressure Sensor Alarm

7.3. MODBUS Communication

The Aerocet 532 supports MODBUS communications protocol with any serial connection that is set in the Modbus Setup in Section 5.4.2. The serial transmission is RTU mode. Flow Control must be set to none if using Ethernet. The following MODBUS registers are used to access various readings.

7.3.1. Instantaneous Real Time Readings

Note: the instantaneous PM levels are also the last measurement values due to how the mass is calculated. All other values are instantaneous.

Name	Address	Type	Points	Description
Time	1000	dword	2	Current Timestamp (Unix)
Stat	1002	dword	2	Current Status
Location	1004	string	4	Current Location Name
Elapsed	1008	dword	2	Current Elapsed Time
Size1	1012	float	2	Current Channel 1 Size
Size2	1014	float	2	Current Channel 2 Size
Size3	1016	float	2	Current Channel 3 Size
Size4	1018	float	2	Current Channel 4 Size
Size5	1020	float	2	Current Channel 5 Size
Size6	1022	float	2	Current Channel 6 Size
Size7	1024	float	2	Current Channel 7 Size
Size8	1026	float	2	Current Channel 8 Size
Count1	1028	dword	2	Current Channel 1 Counts
Count2	1030	dword	2	Current Channel 2 Counts
Count3	1032	dword	2	Current Channel 3 Counts
Count4	1034	dword	2	Current Channel 4 Counts
Count5	1036	dword	2	Current Channel 5 Counts
Count6	1038	dword	2	Current Channel 6 Counts
Count7	1040	dword	2	Current Channel 7 Counts
Count8	1042	dword	2	Current Channel 8 Counts
IOP	1044	float	2	Current IOP Laser Reading
AT	1046	float	2	Current Temperature Reading
RH	1048	float	2	Current Relative Humidity Reading
BP	1052	float	2	Current Barometric Pressure Reading
BV	1054	float	2	Current Battery Voltage Reading
PM_1	1056	float	2	Current PM 1 reading
PM_2_5	1058	float	2	Current PM 2.5 reading
PM_4	1060	float	2	Current PM 4 reading

Name	Address	Type	Points	Description
PM_7	1062	float	2	Current PM 7 reading
PM_10	1064	float	2	Current PM 10 reading
PM_TSP	1066	float	2	Current TSP reading

7.3.2. Last Data Record Readings

Name	Address	Type	Points	Description
Time	1500	dword	2	Last Timestamp (Unix)
Stat	1502	dword	2	Last Sample Status
Location	1504	string	4	Last Sample Location
Duration	1508	dword	2	Last Sample Duration
Size1	1512	float	2	Last Sample Size 1
Size2	1514	float	2	Last Sample Size 2
Size3	1516	float	2	Last Sample Size 3
Size4	1518	float	2	Last Sample Size 4
Size5	1520	float	2	Last Sample Size 5
Size6	1522	float	2	Last Sample Size 6
Size7	1524	float	2	Last Sample Size 7
Size8	1526	float	2	Last Sample Size 8
Count1	1528	dword	2	Last Channel 1 Counts
Count2	1530	dword	2	Last Channel 2 Counts
Count3	1532	dword	2	Last Channel 3 Counts
Count4	1534	dword	2	Last Channel 4 Counts
Count5	1536	dword	2	Last Channel 5 Counts
Count6	1538	dword	2	Last Channel 6 Counts
Count7	1540	dword	2	Last Channel 7 Counts
Count8	1542	dword	2	Last Channel 8 Counts
IOP	1544	float	2	Last Sample IOP
AT	1546	float	2	Last Sample Temperature
RH	1548	float	2	Last Sample Relative Humidity
BP	1552	float	2	Last Sample Barometric Pressure
BV	1554	float	2	Last Sample Battery Voltage
PM_1	1556	float	2	Last Sample PM 1
PM_2_5	1558	float	2	Last Sample PM 2.5
PM_4	1560	float	2	Last Sample PM 4
PM_7	1562	float	2	Last Sample PM 7
PM_10	1564	float	2	Last Sample PM 10
PM_TSP	1566	float	2	Last Sample TSP

8. Maintenance

Due to the nature of the instrument, there are minimal customer serviceable components in the AEROCET 532. The case of the AEROCET 532 should never be removed or opened for any reason. ***Opening or removing the case of the AEROCET 532 voids the warranty and may result in exposure to laser radiation, which can cause eye injury.***

8.1. Recommended Service Schedule

Although there are no customer serviceable components in the AEROCET 532, there are service items which ensure the proper operation of the instrument. Table 1 shows the service schedule for the AEROCET 532.

Time Period	Item	Manual Section
Weekly	Zero Count Test	8.2
Monthly	Flow Rate Test	8.3
Yearly	Annual Calibration	8.4
Yearly/As required	Filter change	8.5

Table 1 Service Schedule

8.2. Zero Count Test

Air leaks or debris in the particle sensor can cause false counts which may result in significant count errors when sampling clean environments. Perform the following zero count test weekly to ensure proper operation:

1. Attach zero count filter to the inlet nozzle (PN G3111).
2. Configure the unit as follows: Measure = Counts, Mode = Single, Sample Time = 1 minute, Volume Units = Total Count (TC).
3. Start and complete a sample.
4. The smallest particle size should have a count <= 1.
5. Run this test multiple times to flush out particles in the air stream if the goal is not met.

8.3. Flow Rate Test

The flow rate test verifies the sample flow rate is within tolerance. The reference flow meter must be non-loading because the vacuum pump can be loaded down by external restrictions. Met One Instruments, Inc. sells suitable flow meters (PN 9801 or Swift 6.0). The flow rate test is described in section 5.3.4.

8.4. Annual Calibration

The AEROCET 532 should be sent back to Met One Instruments, Inc. yearly for calibration and inspection. The annual calibration cannot be performed by the customer because this calibration requires specialized equipment and a skilled technician. Met One Instruments, Inc. maintains a calibration facility for calibrating particle counters according to industry accepted methods such as ISO and NIST. The annual calibration also includes inspection and preventative maintenance to improve product reliability.

8.5. Filter Change

The AEROCET 532 filter cartridge is located on the bottom back instrument panel. A 0.2 micron filter, MOI part number 580302, is used to prevent particles from contaminating the local sample area. It can be removed by unscrewing the black aluminum filter holders with a coin using the slot in the face of the holder. The frequency of filter changes depends on the particulate concentrations measured.

8.6. Flash Upgrade

The AEROCET 532 is firmware upgradeable via the serial connection using a Met One Instruments, Inc. update utility. The new firmware and update utility must be provided by Met One Instruments, Inc.

9. Troubleshooting

The following section covers some common failure symptoms, causes and solutions. It is important to note that there are no customer serviceable components in this product. The AEROCET 532 case should never be removed or opened for any reason. **Opening or removing the case will void the warranty and may result in exposure to laser radiation, which can cause eye injury.**

Symptom	Possible Cause	Solution
Display does not turn on	• Low Battery • Defective Battery	• Charge battery • Contact service center
Pump does not turn on when a sample is started	• Low Battery • Defective pump	• Charge battery • Contact service center
Flow rate does not reach 2.83 LPM setpoint	• Dirty filter • Defective pump	• Change filter • Contact service center
Keypad/dial does not work	• Loose connector • Internal hardware failure	• Contact service center
Sample result is lower than normal	• Atypical sample results may be real • Flow rate is low • Optics may be contaminated	• Perform flow rate test • Contact service center
Sample result is higher than normal	• Atypical sample results may be real • Flow rate is high • Optics may be contaminated	• Perform flow rate test • Contact service center
Battery does not hold a charge	• Defective or worn out battery • Defective charger	• Contact service center
Low battery	• Low Battery	• Charge battery – the unit can sample while running on the charger
Data does not transfer completely when using WiFi	• High data transfer speeds can cause data to drop.	• Lower the baud rate
Data does not transfer completely when using Ethernet	• High data transfer speeds can cause data to drop.	• Lower the baud rate • Set serial flow control to Xon/Xoff
Unit will not communicate using WiFi	• WiFi has not been set up • Unit is not seated in Docking Station/no power to Docking Station • No Internet connection • WiFi was originally configured to DHCP and the IP Address has changed	• Configure a WiFi connection per the Docking Station manual • Ensure the Docking Station is plugged in and powered. • Verify WiFi is enabled and detected at location • Perform a WiFi Discover per Section 5.3.6

10. Specifications

Performance

Particle Counter Sizes	0.3 µm, 0.5 µm, 1.0 µm, 2.5 µm, 4.0 µm, 5.0 µm, 7.0 µm 10 µm
Mass Ranges	PM1, PM2.5, PM4, PM7, PM10, TSP
Concentration Range	0 – 3,000,000 particles per cubic foot (105,900 particles/L)
Particle Size Accuracy	± 10% to calibration aerosol
Mass Concentration Limit	0-1,000 µg/m^3
Flow Rate	0.1 cfm (2.83 lpm)
Sample Time	1, 2, 5, 10, 15, 30, or 60 minutes
Hold Time	Adjustable: 0 to 9999 seconds

Electrical

Light Source	Laser Diode, 90mW, 780 nm
Battery	7.4V Li-ion battery pack.
Battery Life	8 hours continuous operation
Battery Charge Time	Fully changed in 2.5 hours
AC Adapter/Charger	Li-ion battery charger, 100 – 240 VAC, 50/60Hz
Communications	USB (WiFi, Ethernet, and RS-485 available on optional docking station)

Interface

Display	2.8 inch TFT full-color LCD
Keyboard	2 button membrane keypad with rotary dial

Physical

Height	8.8” (22.35 cm)
Width	3.75” (9.53 cm)
Depth	2.25” (5.72 cm)
Weight	1.00 lb 13.5 oz (0.84 kg)

Environmental

Operating Temperature	0º C to +50º C
Storage Temperature	-20º C to +60º C

Accessories

Supplied	Operation Manual	
	USB Cable	
	Comet Software	
	AC Adapter/Battery Charger	
	Iso-kinetic Sample Probe	
	RH and Temperature Probe	
	Carrying Case	
	Rubber Boot	
	Zero Particulate Filter	
Optional	Ball Flow Meter kit	(PN 9801)
	Digital Flow Meter	(PN Swift 6.0)
	Docking Station	(PN 83529)