DustCount 8899

Model DustCount 8899-05/06

User Manual

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Rev1.4

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Table of Contents

List of Figures

List of Tables

List of Notes

1 Introduction

1.1 Device Overview

The DustCount 8899 measures the ambient level of respirable dust particles in real-time. It detects and counts respirable particles, and calculates their mass concentration in µg/m³. It also provides real-time information on the mass concentration distribution over the respirable fraction.

The DustCount 8899 also has a sample collecting filter, enabling post-measurement dust content analysis and total dust mass determination for each test period.

The DustCount 8899 also provides the user the ability to feedback gravimetric and density information into the device.

The DustCount 8899's User Interface (GUI) runs on a PC with Windows 7.1 or newer operating system, and connects to the DustCount 8899 via USB or Bluetooth. The GUI allows the user to easily configure the DustCount 8899, and download test results for post-processing and display.

1.2 Contents of the Box

The DustCount 8899 comes in various kits, from 1 to 5 units per kit. Each kit is equipped the required ancillary components. Please refer to the packing slip for your kit for a list of the components included.

2 Getting Started

2.1 Out of the Box

- The DustCount 8899 is shipped with the battery installed and connected. If the battery is disconnected (due to shipping regulations), re-connect the battery as shown in section ***4.1.***
- Turn on the DustCount 8899 by pressing the power push-button switch on the side of the unit. The screen should illuminate, and the air pump should start within a few σεχονδσ.
- Batteries are shipped with less than 100% state-of-charge. Charging to 100% is recommended prior to further use.

2.2 Charging

- To charge the battery, remove the battery charger from the box, and plug it into the mains. Insert the cylindrical plug into the charge port on the side of the DustCount 8899. The charger accepts 100-240 V_{ac} at 50/60 Hz.
- To shorten charging time, turn off the DustCount 8899, and wait for the green light on the charging unit to illuminate, indicating that full charge has been reached. *Note: charging from 70% to 100% should take about 45 minutes if the DustCount 8899 is off.*

2.3 Prepping the Impactor

The DustCount 8899 comes equipped with a particle impactor installed inline at the inlet. This allows the DustCount 8899-05 to measure dust mass concentrations according to the NIOSH respirable exposure guidelines, and DustCount 8899-06 to measure dust mass concentrations according to the EPA PM 2.5 guidelines. The impactor plate comes oiled from the factory, but to operate properly, the impactor plate must be cleaned and have its oil replenished before every test.

2.3.1 Cleaning the impactor

1. To access the impactor plate, the impactor cap must be removed. Rotate the cap until it is unclipped and pull it away from the DustCount 8899 unit to remove it, see ***Figure 1.***
2. If the impactor plate is lodged in the cap, use a pen or other long object to pop out the plate.
3. Apply a small amount of rubbing alcohol to a non-fibrous paper (such as a Kimwipe) and wipe off any visible dust or fibers collected on the white porous surface. See ***Figure 2***.

2.3.2 Oiling the Impactor

1. Use the Impactor Oil Applicator to apply one drop of oil to a fiber-free paper pad. (such as a Kimwipe), see ***Figure 4.***

2. Replenish the Impactor Plate's oil by pressing it on the oiled paper, see ***Figure 5.*B.** There should not be any excess oil flowing or pooling on the impactor plate. There should only be a sheen of oil. If there is any excess oil, remove it by pressing the impactor plate on an un-oiled paper pad.
3. Place the impactor back into the holder on the DustCount 8899 ensuring that the oiled white surface is facing away from the DustCount 8899 unit, see ***Figure 6.***
4. With the impactor plate in place, reconnect the impactor cap by pressing and turning the cap against the holder until it is locked in place.

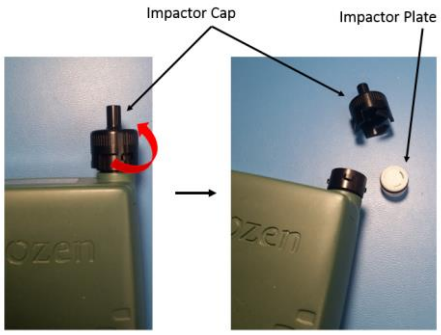

Figure 1. Respirable Dust Impactor Assembly: Impactor Cap and Impact Plate.

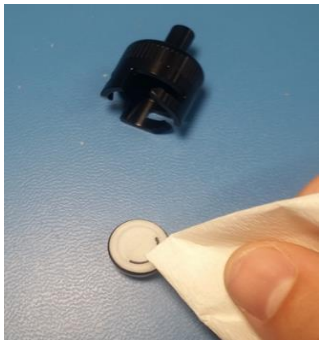

Figure 2. Cleaning Impact Plate

Clean dirt off the impact plate with a fiber-free paper and Alcohol.

Figure 3. Impactor Oil and Impactor Oil Applicator.

Figure 4. Use the Impactor Oil Applicator to apply one drop of oil to a fiber-free paper pad.

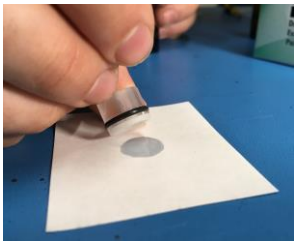

Figure 5. Replenish the Impactor Plate's oil by pressing it on the oiled paper.

Figure 6. Place Impact Plate Back Into Holder.

Ensure that the white surface is oiled and facing away from the DustCount 8899.

2.4 Validating DustCount 8899 Prior to a Test

Prior to performing a test, it is a common procedure to validate that a particle detector is reading zero under clean-air conditions. A HEPA filter is used to create these conditions. To ensure that the HEPA filter can provide clean air, it is best to perform the following test in a relatively clean environment, such as an office with <10 μg/m^3 dust concentration.

1. Use a piece of the anti-static tubing about 3 inches long to connect the HEPA filter to the DustCount 8899 input.

2. Put one end of the tube on the outlet-barb of the HEPA filter, and the other end on the input of the impactor. Double check that the HEPA filter flow direction is correct.

3. Turn on the unit and let it go through its calibration procedure. With the logging period set to the one-minute default value, the unit's AVCC readings should settle to less than 1 μg/m^3 within 2 minutes. The CC readings should also be 0.00 μg/m^3, but may sporadically have higher readings.

4. Ensure that the average particle count-per-minute is less than 300 within 2 minutes of starting the HEPA test. Particle Count information can be read from the UI. See ***Section 3.2*** for using the User Interface.

5. The DustCount's function with clean air has now been validated.

6. If the concentration and counts are not below the above-specified range, clean the impactor and try the above procedure again. If they are still not low enough, return the unit for maintenance.

2.5 Performing a Gravimetric or Sample Test

- The Cassette always has a Teflon® (PTFE) filter with 5-micron pore size to support the optional sampling filter and protect down-stream channels from dust. This filter may need to be changed periodically. If the protection filter becomes clogged to the point that it needs replacing, a low flow alarm (4 ALM) will appear on the unit's LCD.
- To perform a gravimetric or sample test, install a 25mm Teflon® (PTFE) filter with 2 µm pore size, or a Poly Vinyl Chloride (PVC) filter with 5 µm pore size (see section ***2.8***) upstream of the protection filter. To ensure untainted results, replace the existing PTFE protection filter with a clean one.

2.6 Using with Default Settings

- To use the DustCount 8899 with the default settings, simply turn it on and commence testing. The default settings are for Arizona Road Dust, 1-minute logging period, and a concentration alarm threshold of 50 µg/m^3.

2.7 Configuring for Other Test Settings

- The user can reconfigure the device with other settings via the User Interface. See ***Section 3.2*** to re-configure the DustCount 8899 with other test settings using the UI.

2.8 Installing and Removing the Filter

The DustCount 8899 has a Cassette for a 25mm filter disc. When a filter is installed in this housing, any air that is drawn into the instrument passes through this filter. Installing a 25mm filter disc will allow dust to be collected for post analysis and weighing.

2.8.1 Removing the Filter(s)

1. Before removing the filter, turn on the DustCount 8899. This will pull any loose dust onto the filter.
2. Turn the unit off.
3. Loosen the two screws that hold the rear filter Cassette in place, see **Figure 7**.
4. Pull the cover out of the housing to expose the filter Cassette, see ***Figure 8.***
5. Slide the filter Cassette out of the lid. See ***Figure 9.***
6. Twist the filter Cassette halves to release and open. See ***Figure 10.***
7. Remove O-ring. See ***Figure 11.***
8. Remove the filter(s) with tweezers, being careful not to cause any collected dust to come off the filter. If the protection filter sticks to the O-ring when the Cassette is opened, leave the protection filter there. If the protection filter is in the well of the inlet side, remove the protection filter and set aside.
9. Follow steps in section ***2.8.2*** below to reinstall a new filter.

Figure 7. Loosen filter Cassette cover screws with a small Philips screwdriver

Figure 8. Extract filter Cassette by pulling up on the screws

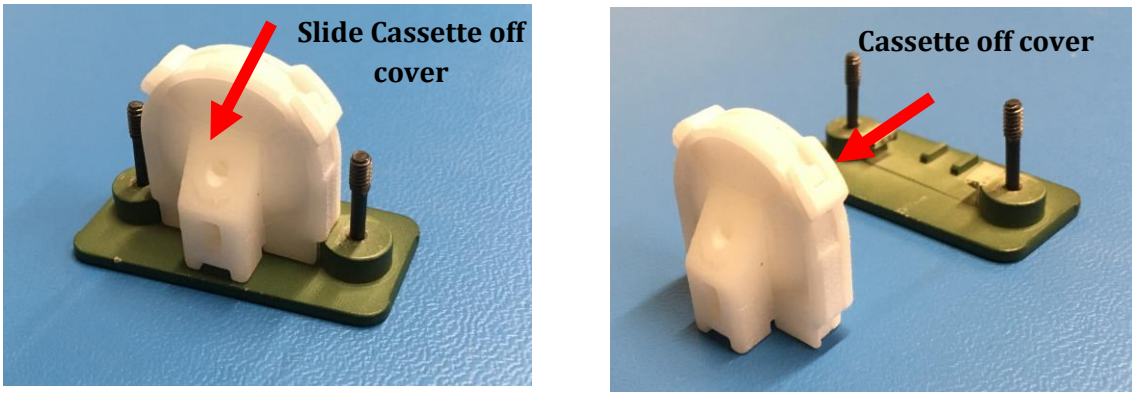

Figure 9. Slide filter Cassette off filter Cassette cover

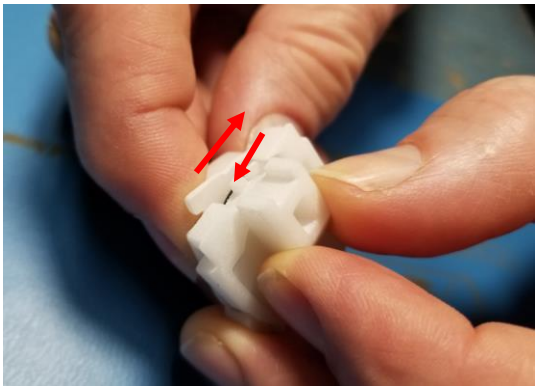

Figure 10. Twist the filter Cassette halves to unlock them, and then pull them apart

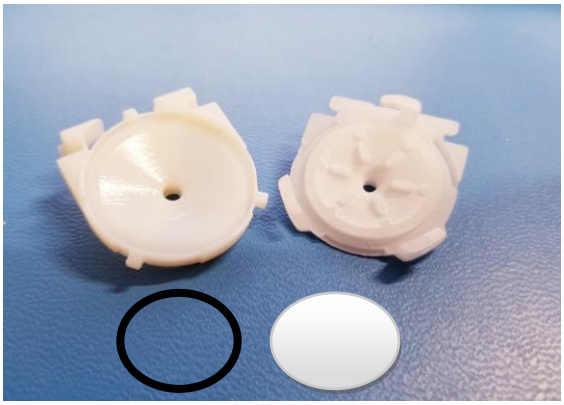

Figure 11. Remove O-ring and filter(s)

2.8.2 Installing a New Filter

1. Remove the old filter as described in section **2.8.1** above.
2. If gravimetric or sampling analysis is desired, use tweezers to place the sampling filter first. See ***Figure 12***. If a sampling filter is not needed, skip this step and proceed to the next step.
3. Use tweezers to place a 25 mm 5µm protection filter disc in the filter Cassette, with the Teflon support matrix down. See ***Figure 13***. This protection filter will keep the down-stream channels of the DustCount 8899 clean. If this filter eventually becomes clogged, the DustCount 8899 will give a low-flow alarm (4 ALM), and the filter will need to be replaced.
4. Install O-ring.
5. Prepare to reassemble the filter Cassette halves as shown in ***Figure 14***.
6. Press the two halves of the Cassette together at several points around the Cassette to ensure everything is in its correct place.
7. Twist the filter Cassette halves to latch them together. Turn them until the filter Cassette mounting tabs are aligned. See ***Figure 15*** and ***Figure 16.***
8. Slide the filter Cassette into the Cassette cover. Please note that the cassette can only be slid on one way. See ***Figure 17.***
9. Reinstall the Cassette and lid assembly into the rear housing cover and fasten with two slotted screws. Please note that the filter Cassette cover can only fit in the housing one-way.

Note 1: Please tighten filter Cassette screws until the filter lid is flush with the rear panel. These screws must be tight to ensure no air leaks.

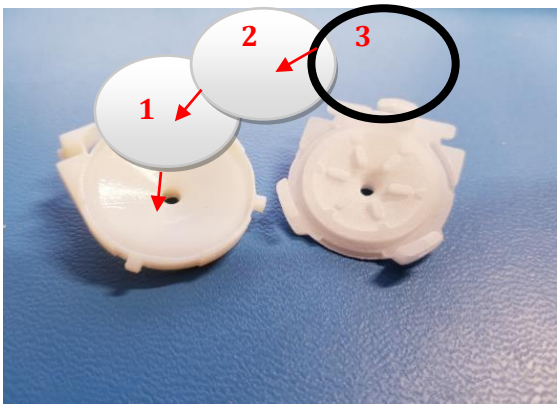

Figure 12. Protection Filter and Sample Analysis Filter:

Place sampling filter (1), followed by a clean protection filter (2), followed by the O-ring (3) in the cavity side of the filter Cassette. The filters and O-ring must be placed in this order.

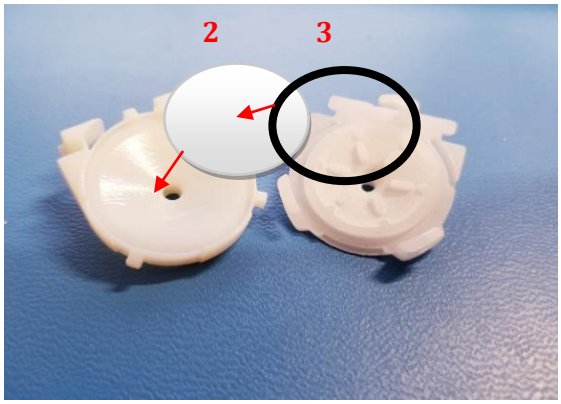

Figure 13. Protection Filter Only:

Place a clean protection filter (2), followed by the O-ring (3) in the cavity side of the filter Cassette. The filters and O-ring must be placed in this order.

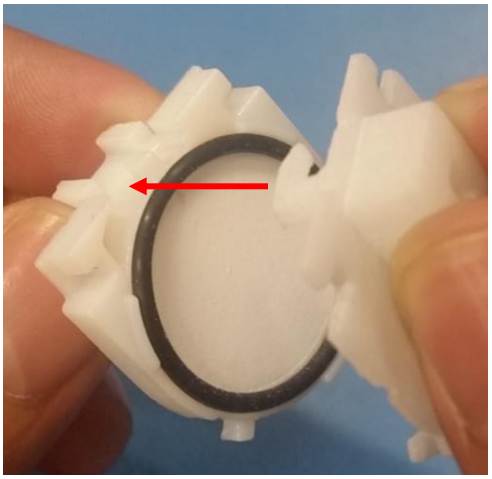

Figure 14. Prepare to reassemble the filter Cassette halves

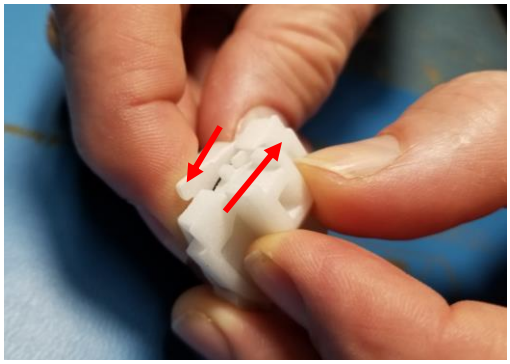

Figure 15. Twist the Cassette halves together until mounting tabs align

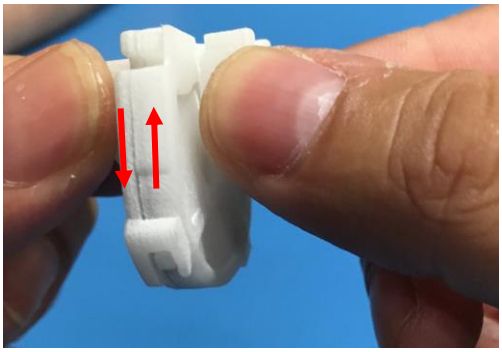

Figure 16. Mounting tabs aligned and filter Cassette ready to be re-attached to the filter Cassette cover

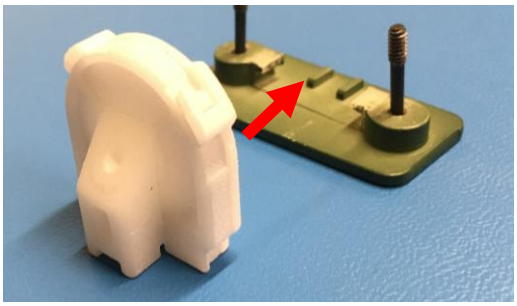

Figure 17. Slide filter Cassette onto filter Cassette cover

3 Device Operation

After pressing the power button to power-up the DustCount 8899, the unit starts in *self-test and calibration* mode. This mode lasts for up to 30 seconds. In the last phase of this mode, the pump speed is calibrated to achieve a 0.5 Litres/minute flow rate.

Once the *self-test and calibration* mode is complete, the DustCount 8899 starts logging the particle count, dust mass concentration and other operational data. It also starts displaying mass concentration and important operational data in real-time on its LCD. Note: pump calibration may continue a for few seconds into this operating mode.

Subsequent sections of this document discuss the LCD display screens, command line interface and the User Interface application in detail.

3.1 LCD Display and Buzzer

3.1.1 Start-up screen

Upon power-up, information identifying the unit, such as its hardware and its firmware identifiers, will be displayed on the screen for 5 seconds. See ***Figure 18***. This information is intended for Nanozen technical staff, and may be requested during a technical support call. The first screen also indicates that the DustCount 8899 is running through other set-up tests, including calibrating the pump flow rate.

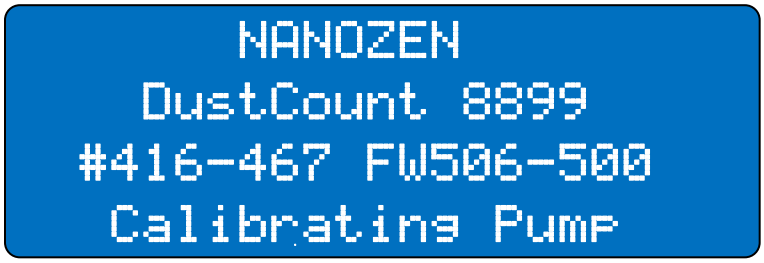

Figure 18. Start-up LCD

The pump calibration state can persist for up to 30 seconds, depending on how long it takes for the pump speed to reach its flow-rate set-point.

3.1.2 Normal operation

Figure 19 shows the positions of the information fields on the LCD. The LCD is refreshed once per second. It provides real-time feedback to the user. Note: '4 ALM' may be seen for a few seconds after the start-up screen to indicate that the unit is further fine tuning its pump speed to achieve 0.5 L/min.

The top line shows current time and date (hh:mm:ss yy/mm/dd). To the right of the top line is either a bell shape, indicating that the audible alarm is on, or an X indicating that audible alarms are muted/OFF. The last character in the first line is a B, which appears if there is a link-level Bluetooth connection.

The current concentration (CC) over the last second is on the second line. CC shows concentration in µg/m^3 for low concentrations or µg /m^3 for high concentrations.

The average concentration (AvCC) taken over the previous logging period is on the third line. AvCC shows concentration in µg/m³ for low concentrations or µg /m³ for high concentrations. The default logging period is 60 seconds, which is user-modifiable via the User Interface as discussed in section ***3.2.5.***

The battery's state of charge (in %) is on the fourth line. Any system alarm conditions appear at the right side of the fourth line.

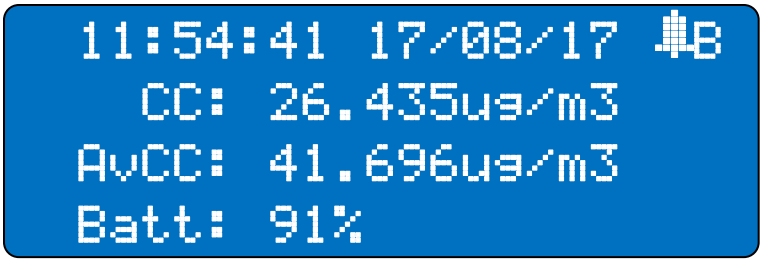

Figure 19. Position of Information Fields on the LCD

3.1.3 Battery Alarm

When the battery's state of charge drops below 15%, '1 ALM' will appear on the display, see ***Figure 20***. The DustCount 8899 will continue to operate normally, but it is recommended that the charger be plugged into the unit. Equivalent alarms can be seen via the command line user interface or the PC application user interface. The unit will beep 3 times at the end of every minute for as long as '1 ALM' persists.

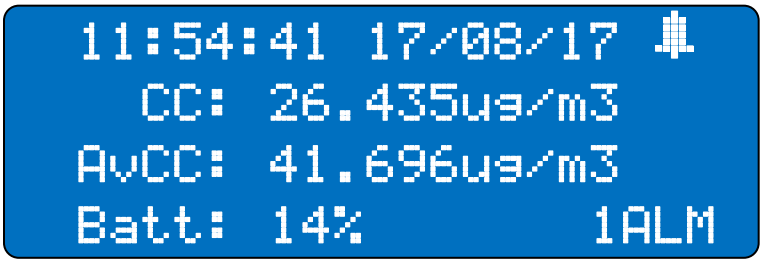

Figure 20. Critical (10% - 15%] Battery State-of-Charge as displayed on the LCD

Note 2: User action for critical battery state-of-charge (1 ALM).
It is recommended that the user plug in the charger.

To mute the audible alarm, press the power button once. The bell symbol will change to an X, indicating that the audible alarm is muted. All audible alarms will remain muted until the user presses the power button again.

When the battery state of charge drops below 10%, the display will prompt the user to plug in the charger. The DustCount 8899 will disable: pump, gathering data and logging data. See ***Figure 21.***

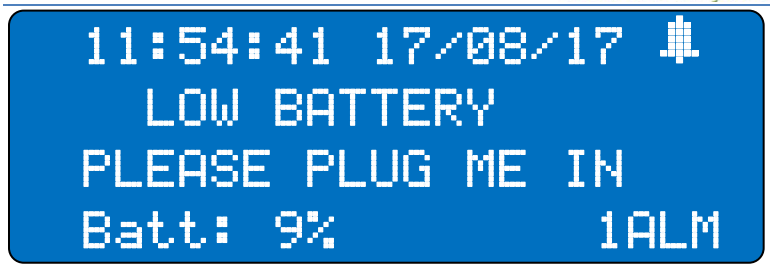

Figure 21. Shutdown (0 - 10%] Battery State-of-Charge as displayed on the LCD

Note 3: User action for shutdown battery state-of-charge (1 ALM).
When battery state-of-charge drops below 10%, the DustCount 8899 MUST be plugged in for it to operate normally. After saving the most recent incomplete or complete log, logging is disabled and the pump is stopped. As soon as charger is plugged in and battery state-of-charge rises above 10%, the unit will re-enable the pump, then start gathering and logging data in a new logging period.

3.1.4 Concentration alarm

When the average concentration of the previous logging period (AvCC) is above the user-defined or factory-defined concentration alarm threshold, the display indicates '3 ALM', as shown in ***Figure 22.*** The DustCount 8899 will continue to operate normally. The unit will flash its LCD screen and beep every second for as long as the '3 ALM' condition persists.

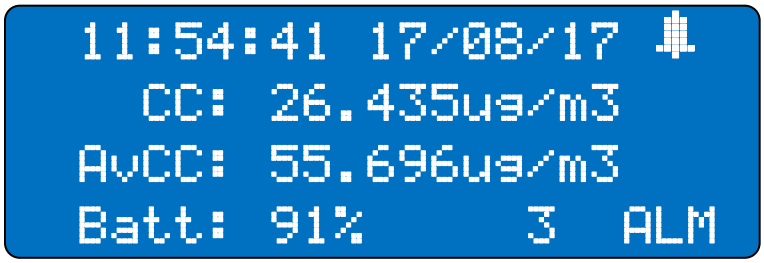

Figure 22. Concentration Alarm (buzzer un-muted) as displayed on the LCD

To acknowledge the high concentration alarm, and stop the audible alarm, press the power button briefly. The bell symbol will change to an X, indicating that the audible alarm is muted/OFF. All audible alarms will remain muted/OFF until the user briefly presses the power button again.

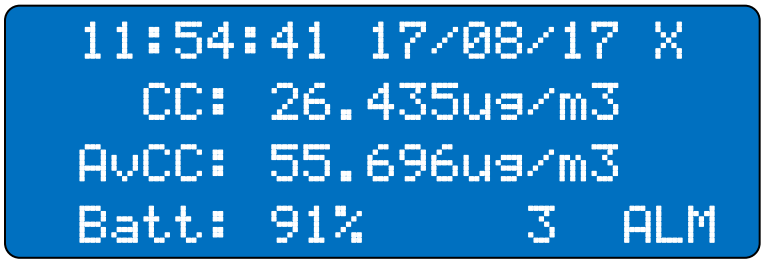

Figure 23. Concentration alarm (buzzer muted) as displayed on the LCD

3.1.5 Memory alarm

If the memory in the DustCount 8899 is corrupt, the display will show '2 ALM', as seen in ***Figure 24***.

Note 4: User action for memory alarm (2 ALM)

DustCount 8899 data logging will not occur while the memory alarm persists. Please contact Nanozen for technical support if you see '2 ALM'.

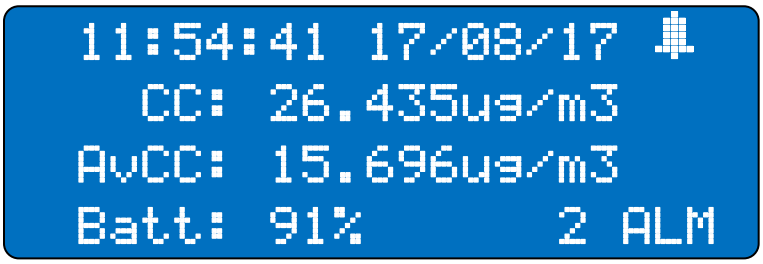

Figure 24. Memory alarm as displayed on the LCD

3.1.6 Flow Rate alarm

If the flow rate is not within 15% of the factory-defined 0.5 L/min flow rate, '4 ALM' will appear on the screen, as shown in ***Figure 25***.

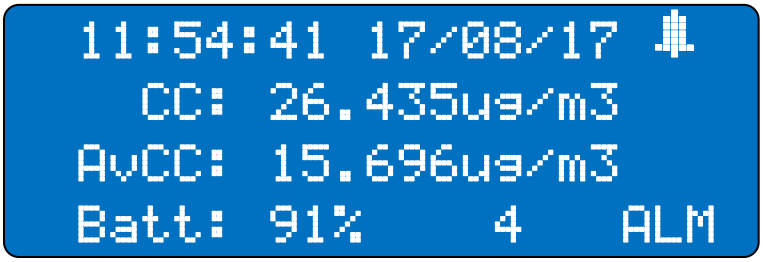

Figure 25. Flow rate alarm as displayed on the LCD

Note 5: User action for flow-rate alarm (4 ALM)

If this alarm persists, 'System Air Purge' button on the User Interface application can be used to possibly clear the alarm. If you do not have access to the User Interface, power down the unit and power it back on. If this alarm condition persists, clean the impactor and replace the filter(s). If '4 ALM' still persists, please contact Nanozen for technical support for additional help.

3.1.7 Leak detection alarm

If there is a leak in the DustCount 8899 filter Cassette i.e. the filter Cassette screws have not been tightened properly, '5 ALM' will appear on the screen, as shown in ***Figure 26***.

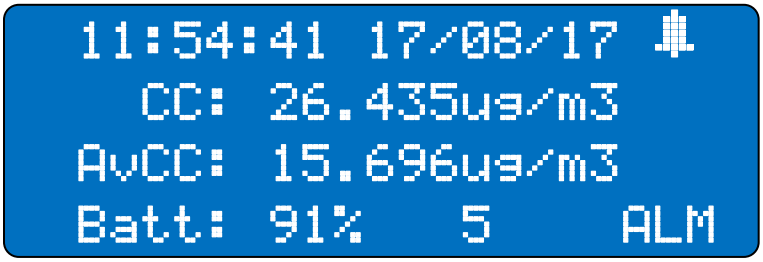

Figure 26 Leak detection alarm as displayed on the LCD

Note 6: User action for leak detection alarm (5 ALM)

Tighten the filter Cassette screws to clear this alarm. If this alarm persists, please contact Nanozen for technical support.

3.1.8 Concurrent alarms

Multiple concurrent alarms, '1 ALM' through '5 ALM', may appear on the display, as shown in ***Figure 27***.

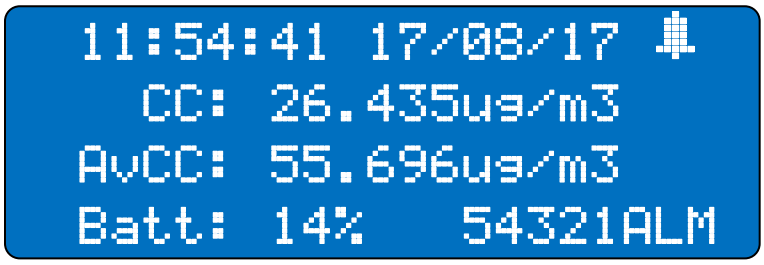

Figure 27 Multiple Alarms on the LCD

3.1.9 Power button buzzer feedback

The buzzer will beep once if the power button is pressed. When pressed once, user can mute the buzzer (if buzzer was un-muted) or un-mute the buzzer (if the buzzer was muted). If muted, the buzzer will not sound for any alarm conditions or Bluetooth connection. The LCD will show (🔇) for muted or (🔊) for unmuted on the top right corner of the screen, as shown in ***Figure 28*** and ***Figure 29.***

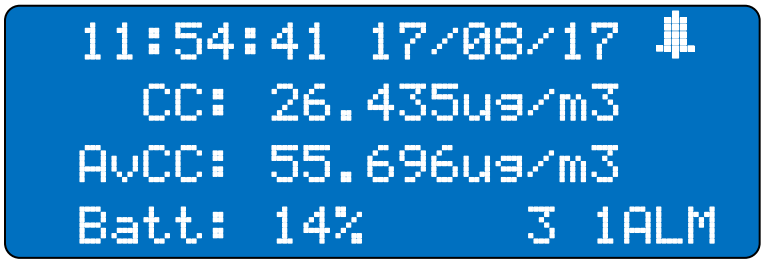

Figure 28 Buzzer un-muted as displayed on the LCD

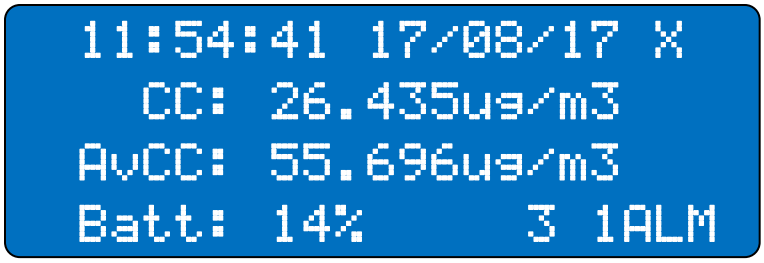

Figure 29 Buzzer muted as displayed on the LCD

Holding down the power button turns the unit off. If the power button is held down, the buzzer will beep once per second until the DustCount 8899 powers off.

3.1.10 Bluetooth connection buzzer feedback

The buzzer will beep anytime a Bluetooth host connects to the DustCount 8899. The buzzer will beep anytime a Bluetooth host disconnects from the DustCount 8899. LCD will also indicate a "B" in the upper right corner of

the LCD if the Bluetooth host is connected, and clear the "B" if no Bluetooth host is connected as shown in ***Figure 30*** and ***Figure 31***.

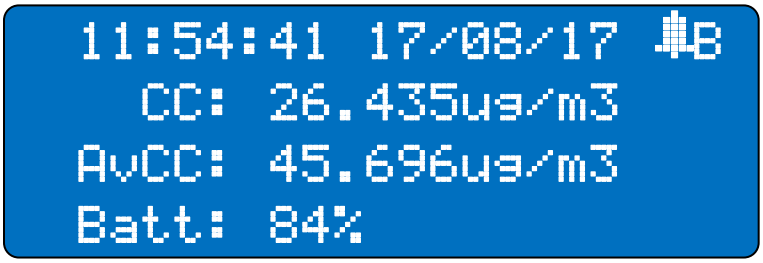

Figure 30 Bluetooth connected as displayed on the LCD

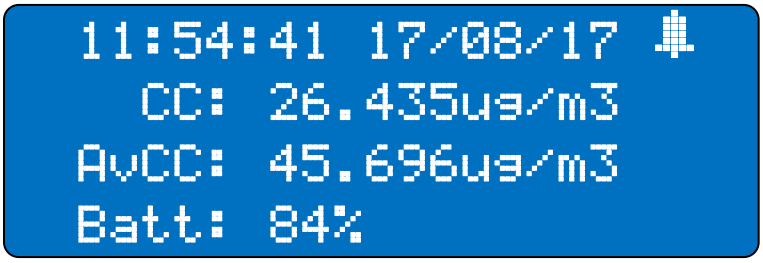

Figure 31 Bluetooth disconnected as displayed on the LCD

3.2 User Interface Application

This user interface application is simplified so that all the necessary user interface functions can be performed over the UI.

Install the DustCount 8899 UI application on the host PC. Note: the PC must have one of the following operating systems. Windows 7.1 or later. Mac OSX 10.11 or later. Please install the .exe file for windows and .dmg for MACs. To install the UI application, double-click on the .exe of .dmg file provided on the USB-drive that comes with the DustCount 8899 kit. Follow the instructions on the pop-up windows.

Once installed, software version can be viewed in the UI by clicking on *Help -> About DustCount 8899* in the menu, as seen in ***Figure 32.***

3.2.1 UI Web Page Layout

The UI application is divided into the following sections:

a) LCD display section displays real-time read-only data as seen on the LCD of the DustCount 8899 unit.

b) *Logging Mode* section displays currently selected mode of logging, and also allows the user to change this mode. The user can re-configure the logging by using one of the corresponding action buttons.

   Read Logs section allows the user to select number of log entries to read out.

   Read Logs with Particle Distribution section allows the user to select number of log entries to read out along-with particle distribution with binned diameters.

   Clear Logs section allows the user to clear logs entries from the memory in various way.

   Log Read Out section is a text box which is populated with downloaded logs. Logs are displayed after all the requested logs have been downloaded from the DustCount 8899.

   When the user selects and clicks on one of the buttons in the aforementioned sections, the button changes colour, indicating that the action is active. The button retains the active colour as long as the

action is in progress. Ex. Clicking on **Read Last N Logs** will return to its inactive colour after N logs have been read from the DustCount 8899.

c) *User Settings*.

In this section, the user can set the various parameters in the DustCount 8899 unit.

Enter the settings in the appropriate text boxes of the User Settings section, as seen at the bottom of the User Interface Application window, tab *User Settings.* These text boxes will display the most recent parameters.

If need be, user can click on **System Air Purge** to run the pump at maximum duty cycle for 10 seconds, followed by re-calibration of the pump.

If need be, user can click on **Sync Date and Time to Computer Time** to synchronize unit date and time with computer time.

a) *Factory Settings*.

Factory settings are not available to the end user.

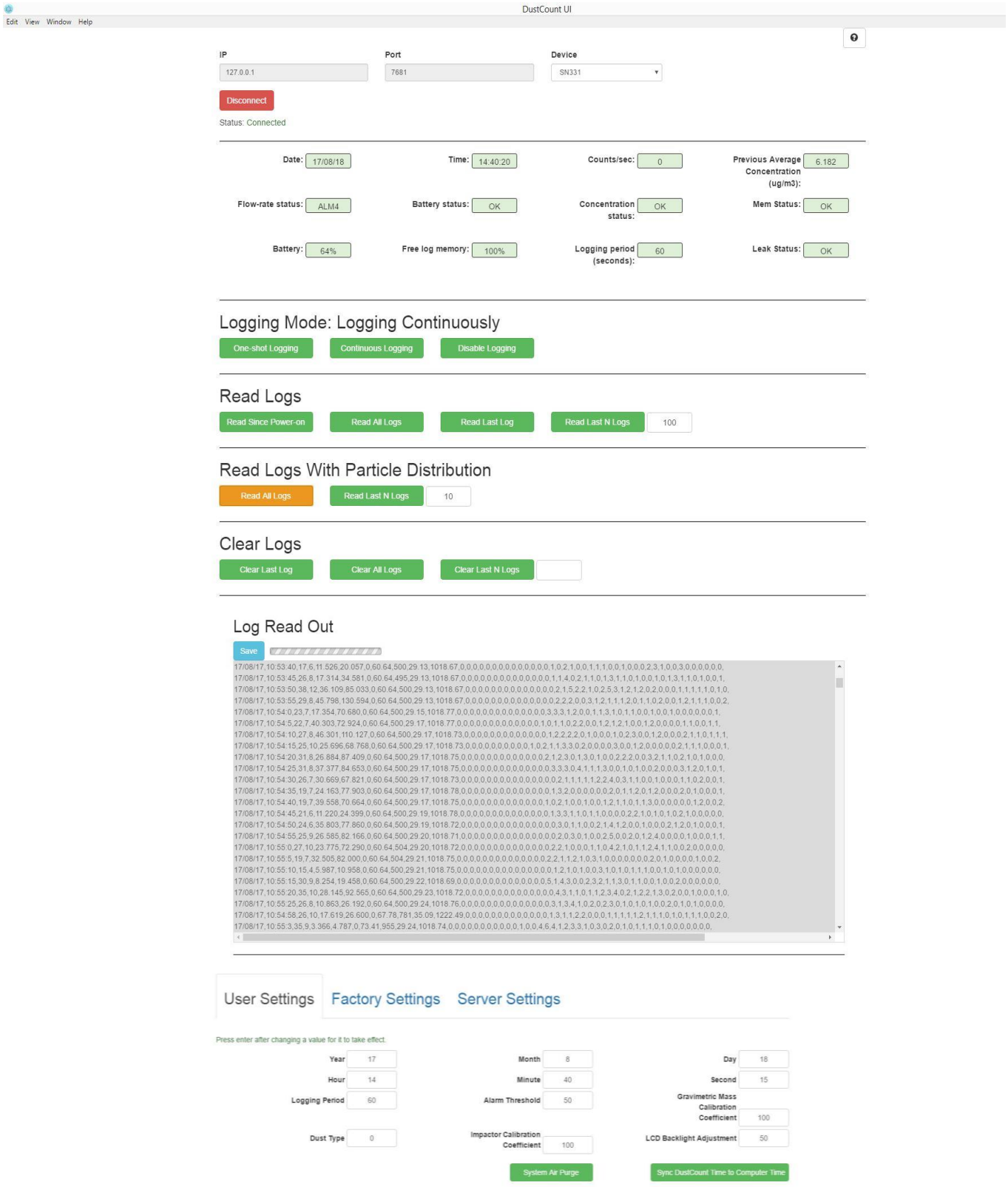

Figure 32. User Interface Application with a DustCount 8899 connected via USB

3.2.2 Connect DustCount 8899 via USB

Connect the DustCount 8899 as shown in ***Figure 33*** and ensure that the User Interface application is installed on the PC. Note that '**tooltips'** can be turned on/off by clicking on the '?' at top right corner of the UI window. Refer to ***Figure 32*** for a screenshot of the UI Application.

To connect the UI to the DustCount 8899, leave the default values in the **IP** and **Port** text boxes, and click the **Connect** button. **Not Connected'** message will change to **'Status: Connected'**. NOTE: Connected simply means that the UI is now able to look for DustCount 8899 devices to communicate with. The UI will automatically start communicating with the **first** DustCount 8899 that it detects, and it will list all others (if there are any) in the drop-down **Device** menu. Detecting DustCount 8899 devices may take up to a minute, depending on the internal state of the serial port drivers in the host PC. Scroll through the drop-down **Device** menu, selecting the DustCount 8899 SNxxx that you wish to communicate with, if it is not the first device detected by the UI.

Note 7: Connecting DustCount 8899 via USB.
'SNxxx' will be listed in the drop-down Device menu, where <xxx> is the serial number of the DustCount 8899.

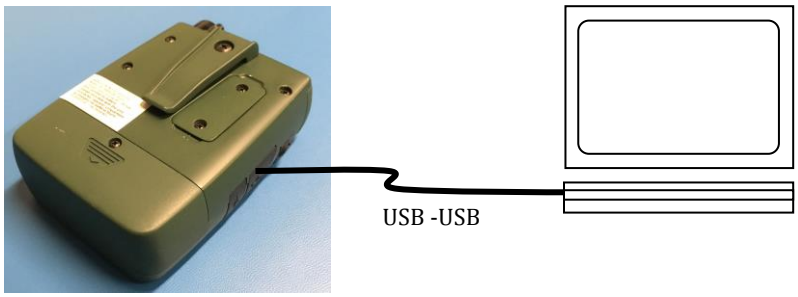

Figure 33. DustCount 8899 Serial Interface Link to PC via USB

3.2.3 Connect DustCount 8899 via Bluetooth

To connect to the DustCount 8899 via Bluetooth, you must set up your PC to pair with the DustCount 8899. Note: Choose "Yes" if prompted with a code during the pairing process. The Serial number of the DustCount 8899 that the UI has discovered, followed by "Bluetooth" will appear in the drop-down **Device** menu. All other connection procedures are as described above.

Note 8: Pairing and connecting DustCount 8899 via Bluetooth.
In order to pair the DustCount 8899, turn Bluetooth on and pair with 'DUSTCOUNTxxx', where <xxx> is the serial number of the DustCount 8899. When connected via Bluetooth, 'SNxxx (Bluetooth)' will be listed in the drop-down Device menu.

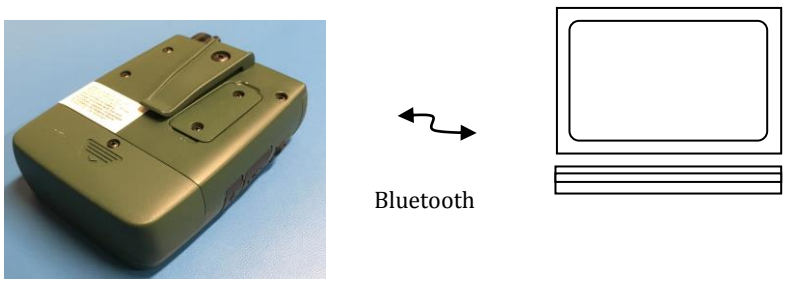

Figure 34. DustCount 8899 Serial Interface Link to PC via Bluetooth

3.2.4 Live Data

This data is displayed at the top of the UI window as shown in ***Figure 32***. The following data are refreshed in this section at least once per second.

1. Current date is displayed in **Date**.
2. Current time is displayed in **Time**.
3. Count for the previous second is displayed in **Counts/sec**.
4. Concentration for the previous logging period (in μg/m^3) is displayed in **Previous Average Concentration (μg/m^3)**.
5. Battery State-of-Charge % is displayed in **Battery**.
6. Available memory space is displayed in **Free log memory**.
7. Logging period is displayed in **Logging period (in seconds)**.
8. If battery alarm condition is triggered, '1 ALM' is displayed in the **Battery Status** window. Otherwise OK is displayed in this window
9. If memory card alarm condition is triggered, '2 ALM2' is displayed in the **Mem Status** window. Otherwise OK is displayed in this window.
10. If concentration alarm condition is triggered, '3 ALM' will be displayed in the **Concentration Status** window. Otherwise OK is displayed in this window.
11. If flow rate alarm condition is triggered, '4 ALM' is displayed in the **Flow-Rate Status** window. Otherwise 'OK' is displayed in this window.
12. If leak detection alarm condition is triggered, '5 ALM' is displayed in the **Leak Status** window. Otherwise, 'OK' is displayed in this window.

3.2.5 User Settings via UI

This section is at the end of the UI window as shown in ***Figure 32.*** This allows the user to update DustCount 8899 parameters.

Table 1 User Settings Section Action Button/Command List

UI Command Button	Valid Values	Result	Error message
Year	0-99	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 0 and 99.
Month	1-12	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 1 and 12.
Day	1-31	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 1 and 31 (depending on month and year).
Hour	0-23	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 0 and 23.
Minute	0-59	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 0 and 59.
Second	0-59	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 0 and 59.
Sync DustCount 8899 Time to Computer Time	n/a	Upon clicking the action button, current date and	n/a
System Air Purge	n/a	Upon clicking System Air Purge, the unit will run pump at	n/a
Logging Period (in seconds)	5-3600	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 5 and 3600.
Alarm Threshold (in µg/m³)	0-65535.999	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 0 and 65535.999.
Dust Type	0-10	Update valid value in text box	Invalid/Out of bounds value entered. Please enter a value between 0 and 10.
Gravimetric Mass Calibration Coefficient in %	0-65535.999	Update valid value in text box	Invalid/Out of bounds value. Please enter a value between 0 and 65535.999.
Impactor Calibration Coefficient in %	100-65535.999	Update valid value in text box.	Invalid/Out of bounds value. Please enter a value between 100 and 65535.999.

Note 9: Calibration Coefficients

1. **Gravimetric Mass Calibration Coefficient allows the end user to re-calibrate the DustCount 8899 to the concentration measured by gravimetric analysis of the paper filter in the DustCount 8899. This allows the DustCount 8899 to account for varying material properties of different dusts.**
2. **Impactor Calibration Coefficient allows the end user to scale up count and concentration, to account for particle loss through the impactor. Set to 105% for Nanozen Impactor.**

3.2.6 Log Read Out Field

This field displays the log data as requested by the Read Logs control buttons listed under *Read Logs* and *Read Logs with Particle Distribution* sections.

The user interface buffers the incoming data from the DustCount 8899 and greys out the action button until all the requested data has been received. Older data is overwritten in the log read out field, as new logs are received.

Click on 'Save' button to save log read out field data. Default file name and format are logs.csv, respectively.

Note 10: Save log read out field data using 'Save' button. (Default: logs.csv)

3.2.7 Interpretation of data

For every logging period, the data listed below is saved onto non-volatile memory. Data is read out in a comma-separated format so that it can be easily imported into other tools. User can choose to read back logged data with or without particle distribution.

Table 2 Data Log Columns

Column	Description	Format	Example
DATE	Date at the end of the logging period	yy/mm/dd	17/12/30
TIME	Time at the end of logging period	hh:mm:ss (24h format)	23:59:45
COUNT	Total number of particles counted during the logging period	Whole number	645
MAXCNT	Maximum number of particles counted per second, during the logging period	Whole number	2345
AVGCONC (µg/m³)	Average concentration for the logging period	Number with 3 decimal places	1.786
MAXCONC (µg/m³)	Maximum concentration that occurred for any second during the logging period.	Number with 3 decimal places	6.987
BATTERY	Battery state-of-charge at the end of the logging period	0: Normal (15% - 100%] 1: Critical (10% - 15%] 2: Shutdown(0% - 10%]	1
PUMP-PWM (%)	Average duty cycle of the pump for the logging period	Percentage with 2 decimal places	59.99
FLOWRATE (mL/min)	Average flow-rate for the logging period	Whole number	503
TEMP (degC)	Average ambient temperature inside DustCount 8899 for the logging period	Number with 2 decimal places	29.10
PRS (mBar)	Average ambient pressure for the logging period	Number with 2 decimal places	1018.69

Table 3 Additional Log Columns for Particle Distribution Data

Column headers	Description	Format	Example
0.500 (µm)	Bin for diameters closest to 0.5(mm)	Whole Number	35
1.000 (µm)	Bin for diameters closest to 1.0(mm)	Whole Number	98
1.500 (µm)	Bin for diameters closest to 1.5(mm)	Whole Number	29
2.000 (µm)	Bin for diameters closest to 2.0(mm)	Whole Number	36
2.500 (µm)	Bin for diameters closest to 2.5(mm)	Whole Number	57
3.000 (µm)	Bin for diameters closest to 3.0(mm)	Whole Number	72
3.500 (µm)	Bin for diameters closest to 3.5(mm)	Whole Number	86
4.000 (µm)	Bin for diameters closest to 4.0(mm)	Whole Number	56
4.500 (µm)	Bin for diameters closest to 4.5(mm)	Whole Number	13
5.000 (µm)	Bin for diameters closest to 5.0(mm)	Whole Number	11
5.500 (µm)	Bin for diameters closest to 5.5(mm)	Whole Number	9
6.000 (µm)	Bin for diameters closest to 6.0(mm)	Whole Number	59
6.500 (µm)	Bin for diameters closest to 6.5(mm)	Whole Number	34
7.000 (µm)	Bin for diameters closest to 7.0(mm)	Whole Number	22
7.500 (µm)	Bin for diameters closest to 7.5(mm)	Whole Number	79
8.000 (µm)	Bin for diameters closest to 8.0(mm)	Whole Number	30
8.500 (µm)	Bin for diameters closest to 8.5(mm)	Whole Number	50
9.000 (µm)	Bin for diameters closest to 9.0(mm)	Whole Number	56
9.500 (µm)	Bin for diameters closest to 9.5(mm)	Whole Number	35
10.000 (µm)	Bin for diameters closest to 10.0(mm)	Whole Number	4

3.2.8 Sample of Data Dumped in Log Read Out Field

A command to 'Read Last 6 Logs' will provide the following output:

```
DATE,TIME,COUNT,MAXCNT,AVGCONC(ug/m3),MAXCONC(ug/m3),BATTERY,PUMP-
PWM(%),FLOWRATE(mL/min),TEMP(degC),PRS(mBar)

17/09/27,20:16:31,1131,42,4.921,16.943,0,51.79,507,23.80,1018.21,

17/09/27,20:17:31,1080,32,3.044,14.394,0,52.40,507,24.09,1018.64,

17/09/27,20:18:31,1124,31,3.208,12.699,0,52.68,500,24.38,1019.00,

17/09/27,20:19:31,1086,32,2.721,13.720,0,52.68,500,24.68,1019.24,

17/09/27,20:20:31,1020,29,3.365,12.067,0,52.68,500,24.98,1019.54,

17/09/27,20:21:31,1133,39,3.234,13.882,0,52.68,500,25.28,1019.80,
```

When this CSV data is pulled into a spreadsheet, it can look like this:

DATE	TIME	COUNT	MAXCNT	AVGCONC (ug/m3)	MAXCONC (ug/m3)	BATTERY	PUMP-PWM (%)	FLOWRATE (mL/min)	TEMP (degC)	PRS (mBar)
2017-09-27	20:16:31	1131	42	4.921	16.943	0	51.79	507	23.8	1018.21
2017-09-27	20:17:31	1080	32	3.044	14.394	0	52.4	507	24.09	1018.64
2017-09-27	20:18:31	1124	31	3.208	12.699	0	52.68	500	24.38	1019
2017-09-27	20:19:31	1086	32	2.721	13.72	0	52.68	500	24.68	1019.24
2017-09-27	20:20:31	1020	29	3.365	12.067	0	52.68	500	24.98	1019.54
2017-09-27	20:21:31	1133	39	3.234	13.882	0	52.68	500	25.28	1019.8

A command to 'Read Last 3 Logs' (with Particle Distribution) will output:

```
DATE,TIME,COUNT,MAXCNT,AVGCONC(ug/m3),MAXCONC(ug/m3),BATTERY,PUMP-PWM(%),FLOWRATE(mL/min),TEMP(degC),PRS(mBar),0.500
(um),1.000 (um),1.500 (um),2.000 (um),2.500 (um),3.000 (um),3.500 (um),4.000 (um),4.500 (um),5.000 (um),5.500 (um),6.000
(um),6.500 (um),7.000 (um),7.500 (um),8.000 (um),8.500 (um),9.000 (um),9.500 (um),10.000 (um),

17/09/27,20:15:31,1185,35,9.144,40.826,0,50.96,484,23.94,1034.91,441,218,123,86,58,41,27,24,22,18,11,18,13,6,7,9,4,1,5,5,

17/09/27,20:16:31,1131,42,4.921,16.943,0,51.79,507,23.80,1018.21,420,183,101,67,46,23,21,7,19,7,9,5,4,2,5,1,2,2,1,3,

17/09/27,20:17:31,1080,32,3.044,14.394,0,52.40,507,24.09,1018.64,432,182,90,62,32,15,21,4,6,5,3,1,4,0,2,4,0,0,1,0,
```

This CSV data can be pulled into a spreadsheet to be more readable.

3.2.9 Managing and Clearing DustCount 8899 Logs via UI

Unused logs should be cleared from the DustCount's memory. The DustCount 8899 can hold up to a million logs, so it can hold a large amount of unused data if unused logs or unwanted logs are not cleared on a regular basis. To clear the logs via UI, follow the steps below.

1. Click **Disable Logging** to disable logging. **ALL CLEARING OF LOGS SHOULD BE DONE WITH LOGGING DISABLED**.
2. To clear logs:
    a. Click **Clear All Logs** to clear data for all logging periods.
    b. Click **Clear Last Log** to clear data for one previous logging period.
    c. Click **Clear Last N Logs** to clear data for N previous logging periods.

3.2.10 Reconfigure DustCount 8899 via UI

If the user wishes to reconfigure the unit via UI, follow the steps below after DustCount 8899 is connected to the UI.

1. Click **Disable Logging** to disable logging. **ALL FOLLOWING RECONFIGURATION SHOULD BE DONE WITH LOGGING DISABLED**.
2. If needed, click **Sync DustCount 8899 Time to Computer Time'** to synchronize date & time to PC time, or use the corresponding individual date & time fields (**Year, Month, Day, Hour, Minute, Second**).
3. If needed, update **Dust type** in the corresponding text box.
4. If needed, update **Logging period** in the corresponding text box.
5. If needed, update **Gravimetric mass calibration coefficient** in the corresponding text box.
6. If needed, update **Impactor mass calibration coefficient** in the corresponding text box. This should be 105% for the provided Nanozen impactors..
7. If needed, update **Alarm threshold** in the corresponding text box.
8. Click **Continuous Logging** to re-enable continuous logging.

4 Maintenance

4.1 Battery

The DustCount 8899 comes with the battery preinstalled. It should not need to be replaced, however in the event that it does, follow the instructions below.

4.1.1 Battery replacement procedure

1) Remove the rear battery cover using a small Phillips screwdriver. See ***Figure 35***.
2) Slide off the battery cover and remove the old battery. See ***Figure 36*** .
3) Remove the battery cable clamp from the case and unplug the battery from its receptacle. Sees ***Figure 37*** and ***Figure 38***.
4) Plug the new battery cable into the mating receptacle inside the DustCount 8899.
5) Reattach the battery cable clamp, reinstall the battery and the battery cover.
6) Restart the DustCount 8899. Set the date and clock using the UI or command line interface. Note: date and time are lost when the battery is disconnected.

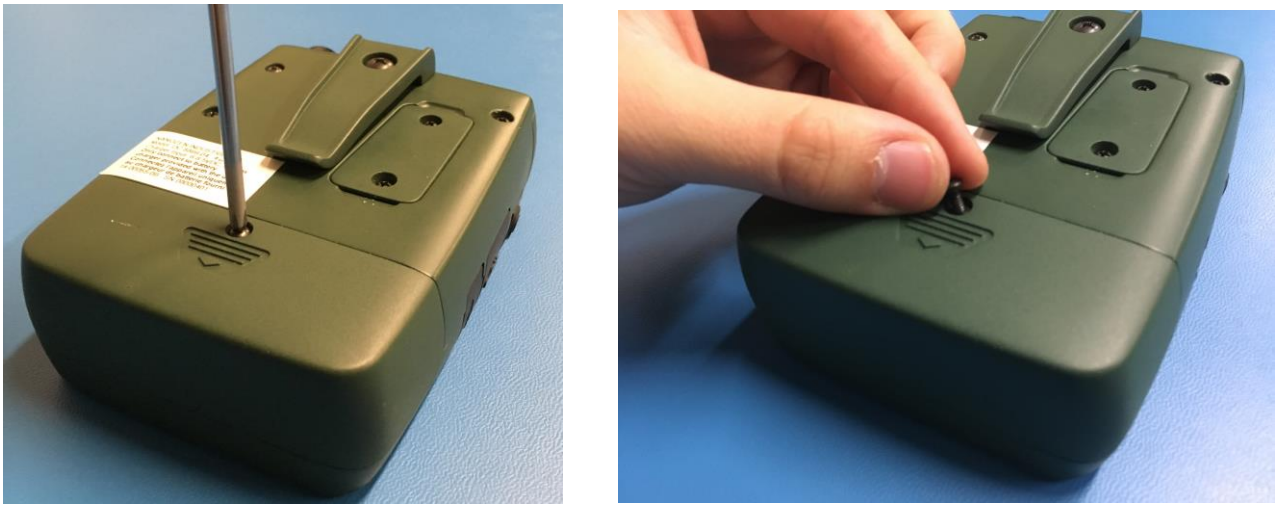

Figure 35. Loosening and removing Screw for Rear Battery Cover

Figure 36. Sliding Off Rear battery cover

Figure 37. Removing Battery Cable Tie

Figure 38. Disconnecting or re-connecting Battery