



DustCount 8899

Model DustCount 8899-05/06

User Manual

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Rev1.5

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Table of Contents

1	Introduction.....	9
1.1	Device Overview.....	9
1.2	Contents of the Box	10
2	Getting Started.....	10
2.1	Out of the Box	10
2.2	Charging.....	10
2.3	Prepping the Impactor	10
2.3.1	Cleaning the impactor	10
2.3.2	Oiling the Impactor	10
2.4	Validating DustCount 8899 Prior to a Test	12
2.5	Performing a Gravimetric or Sample Test	13
2.6	Using with Default Settings.....	13
2.7	Configuring for Other Test Settings	13
2.8	Installing and Removing the Filter.....	13
2.8.1	Removing the Filter	13
2.8.2	Installing a New Filter	15
3	Device Operation	17
3.1	LCD Display and Buzzer.....	17
3.1.1	Start-up screen	17
3.1.2	Normal operation	17
3.1.3	Battery Alarm.....	18
3.1.4	Concentration alarm	19
3.1.5	Memory alarm.....	19
3.1.6	Flow Rate alarm	20
3.1.7	Leak detection alarm	20
3.1.8	Concurrent alarms	20
3.1.9	Power Button and Muting the Buzzer	21
3.1.10	Bluetooth Connection Buzzer Feedback	21
3.2	User Interface Application for PC or Mac.....	22
3.2.1	Connect DustCount 8899 via USB	23
3.2.2	Connect DustCount 8899 via Bluetooth	23
3.2.3	UI Page Layout.....	23
3.2.4	Live Data.....	29

3.2.5	Managing and Clearing DustCount 8899 Logs via UI	29
3.2.6	Reconfigure DustCount 8899 via UI.....	29
3.2.7	Log Read Out Field	30
3.2.8	Interpretation of Data.....	31
3.2.9	Sample of Data Dumped in Log Read Out Field.....	33
3.2.10	User Settings via UI.....	34
4	Maintenance	35
4.1	<i>Battery</i>	35
4.1.1	Battery replacement procedure.....	35

List of Figures

Figure 1. Respirable Dust Impactor Assembly: Impactor Cap and Impact Plate.....	11
Figure 2. Cleaning Impact Plate.....	11
Figure 3. Impactor Oil and Impactor Oil Applicator.....	11
Figure 4. Use the Impactor Oil Applicator to apply one drop of oil to a fiber-free paper pad.....	12
Figure 5. Replenish the Impactor Plate’s oil by pressing it on the oiled paper.....	12
Figure 6. Place Impact Plate Back into the Holder.....	12
Figure 7. Loosen filter Cassette cover screws with a small Philips screwdriver.....	14
Figure 8. Extract filter Cassette by pulling up on the screws.....	14
Figure 9. Slide filter Cassette off filter Cassette cover.....	14
Figure 10. Pull the Filter Cassette Halves Apart to Access Filter.....	15
Figure 11. Filter Exposed for Removal. Slide Filter Out of Cavity with Tweezers.....	15
Figure 12. Remove Filter with Tweezers.....	15
Figure 13. Installing Filter with Tweezers.....	16
Figure 14. Press the Cassette Halves Together in Several Places, then Slide the Cassette onto the Cover.....	16
Figure 15. Start-up LCD.....	17
Figure 16. Position of Information Fields on the LCD.....	18
Figure 17. Critical (10% - 15%] Battery State-of-Charge as displayed on the LCD.....	18
Figure 18. Shutdown (0 - 10%] Battery State-of-Charge as displayed on the LCD.....	18
Figure 19. Concentration Alarm (buzzer un-muted) as displayed on the LCD.....	19
Figure 20. Concentration alarm (buzzer muted) as displayed on the LCD.....	19
Figure 21. Memory alarm as displayed on the LCD.....	20
Figure 22. Flow Rate Alarm on the LCD.....	20
Figure 23 Leak detection alarm as displayed on the LCD.....	20
Figure 24 Multiple Alarms on the LCD.....	21
Figure 25 Buzzer Un-muted as Displayed on the LCD.....	21

Figure 26 Buzzer Muted as Displayed on the LCD	21
Figure 27 Bluetooth Connected as Displayed on the LCD	22
Figure 28 Bluetooth Disconnected as Displayed on the LCD	22
Figure 29. DustCount 8899 Serial Interface Link to PC via USB	23
Figure 30. DustCount 8899 Serial Interface Link to PC via Bluetooth	23
Figure 31. UI Connection Section when DustCount Found but Not Connected.....	24
Figure 32. UI Connection Section when Connected to a DustCount.....	24
Figure 33. UI Real-time Data Section.....	24
Figure 34. UI Action Buttons when Continuous Logging is Enabled.....	24
Figure 35. UI Action Buttons when Logging is Disabled	25
Figure 36. UI Action Buttons when One-shot Logging is Enabled.....	25
Figure 37. UI Action Buttons for Read Logs	25
Figure 38. UI Action Buttons for Read Logs with Particle Distribution.....	25
Figure 39. UI Clear Logs Action Buttons	26
Figure 40. UI Log Read Out.....	26
Figure 41. UI Log Read Out with Particle Size Distribution.....	26
Figure 42. UI User Settings	27
Figure 43. UI Server Settings Tab	28
Figure 44. Loosening and removing Screw for Rear Battery Cover	35
Figure 45. Sliding Off Rear battery cover	36
Figure 46. Removing Screw to release Battery Cable Tie	36
Figure 47. Disconnecting or re-connecting Battery	36

List of Tables

Table 1 Data Log Columns	31
Table 2 Additional Log Columns for Particle Distribution Data	32
Table 3 User Settings Section Action Button/Command List.....	34

List of Notes

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.....	16
Note 2: User action for critical battery state-of-charge (1 ALM).....	18
Note 3: User action for shutdown battery state-of-charge (1 ALM).	18
Note 4: User action for memory alarm (2 ALM).....	19
Note 5: User action for flow-rate alarm (4 ALM)	20
Note 6: User action for leak detection alarm (5 ALM)	20
Note 7: Connecting DustCount 8899 via USB.	23
Note 8: Pairing and connecting DustCount 8899 via Bluetooth.	23
Note 9: Save log read out field data using 'Save' button. (Default File Name: logs.csv).....	30
Note 10: Calibration Coefficients.....	34

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 $\mu\text{g}/\text{m}^3$. It also provides real-time information on the mass concentration distribution over the respirable fraction of the particle size range.

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 (UI) 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 with the required ancillary components. Please refer to the packing slip of 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 seconds.
- 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, tap the cap on a flat surface and the plate will pop out.
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 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.

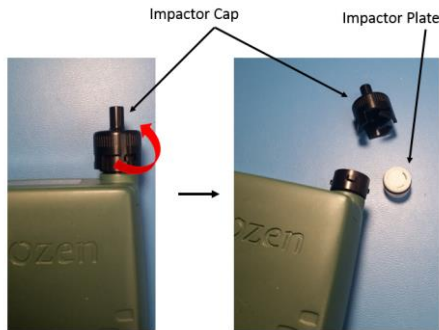


Figure 1. Respirable Dust Impactor Assembly: Impactor Cap and Impact Plate.

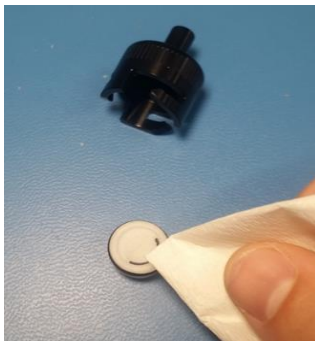


Figure 2. Cleaning Impact Plate

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.

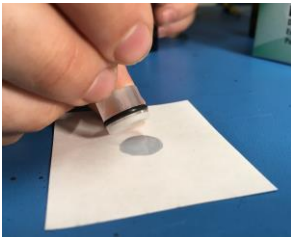


Figure 5. Replenish the Impactor Plate's oil by pressing it on the oiled paper.



Figure 6. Place Impact Plate Back into the 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 $<10 \mu\text{g}/\text{m}^3$ 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 Average Concentration (AVCC) readings should settle to less than $1 \mu\text{g}/\text{m}^3$ within 2 minutes. The Current Concentration (CC) readings should be $0.00 \mu\text{g}/\text{m}^3$, but sporadically higher readings are normal.

4. Further validation can be done by ensuring 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 comes with a Teflon® (PTFE) filter with 5-micron pore size to 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, remove the protection filter and 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).

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/m³.

2.7 Configuring for Other Test Settings

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

2.8 Installing and Removing the Filter

The DustCount 8899 has a Cassette for a 25mm filter disc. 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

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. Pull the two halves of the filter Cassette apart to open. See **Figure 10**. If the two halves do not separate easily, insert a flat screwdriver at the tabs, and gently pry the halves apart.
7. Slide the filter out of the cavity. See **Figure 11**.
8. Remove the filter(s) with tweezers, being careful not to cause any collected dust to come off the filter.
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

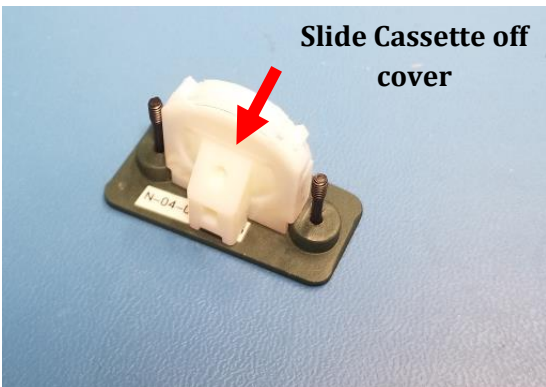


Figure 9. Slide filter Cassette off filter Cassette cover

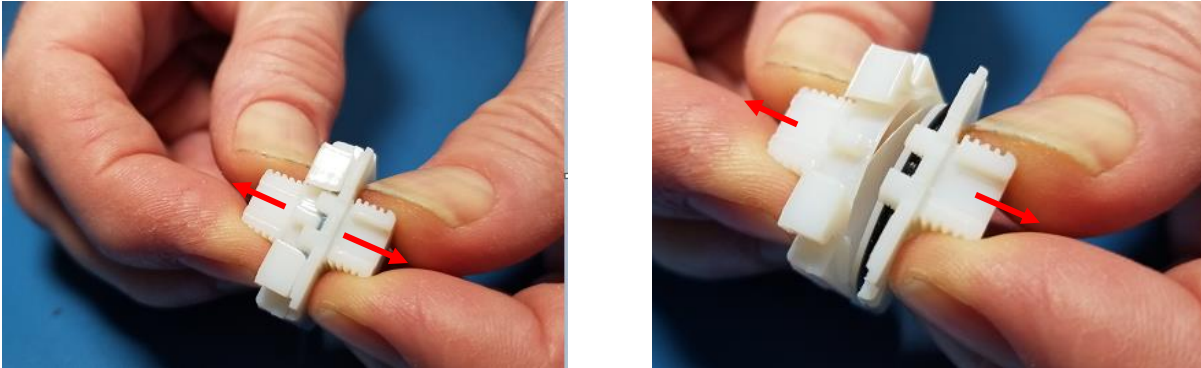


Figure 10. Pull the Filter Cassette Halves Apart to Access Filter

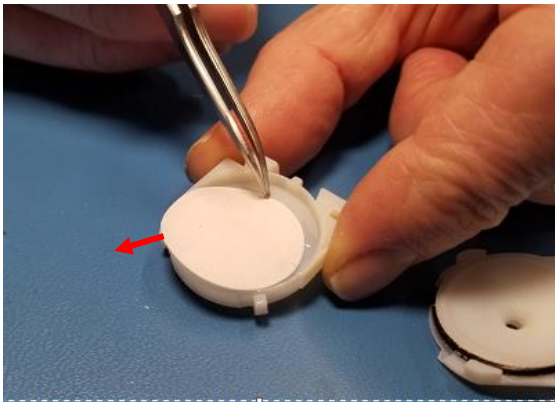


Figure 11. Filter Exposed for Removal. Slide Filter Out of Cavity with Tweezers

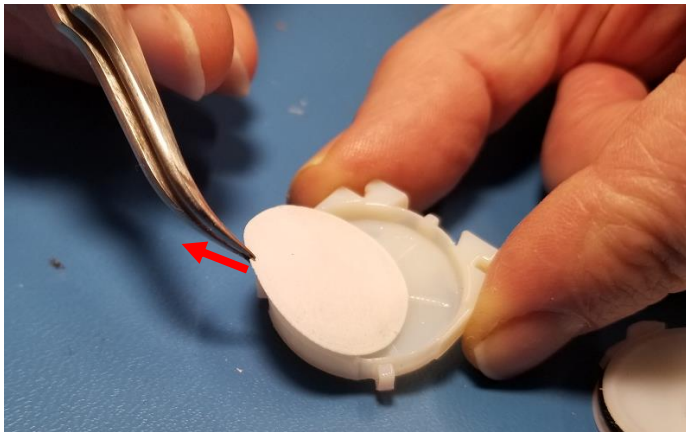


Figure 12. Remove Filter with Tweezers

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 25 mm sampling filter in the cavity. **See Figure 13.**
3. If a sampling filter is not needed, install a 25 mm PTFE filter with 5 micron pore size. This filter will keep downstream channels 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. Reassembling the filter Cassette is the reverse of the process shown in **Figure 10** through **Figure 12**.
5. Press the two halves together at several points around the Cassette to ensure everything is in its correct place. See **Figure 14**. The two halves do not need to be perfectly tight together. They will tighten further when the cartridge is installed in the DustCount.
6. Slide the filter Cassette into the Cassette cover. Please note that the cassette can only be slid on one way. See **Figure 14**.
7. Reinstall the Cassette and lid assembly into the rear housing cover and tighten the two screws. Please note that the filter Cassette cover can only fit in the housing one-way. This is the reverse of the process shown in **Figure 7** and **Figure 8**.

➔ 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.

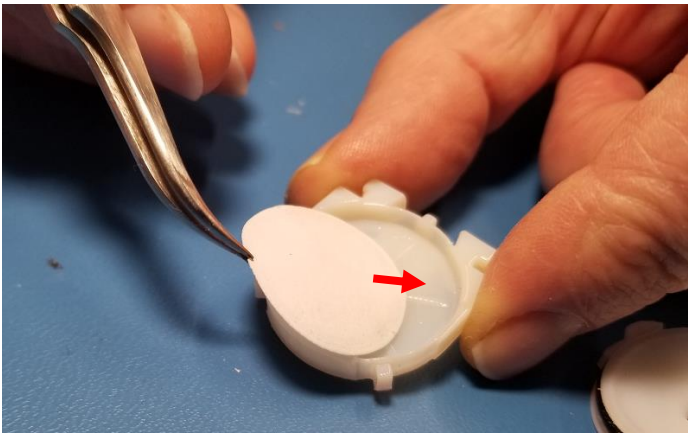


Figure 13. Installing Filter with Tweezers

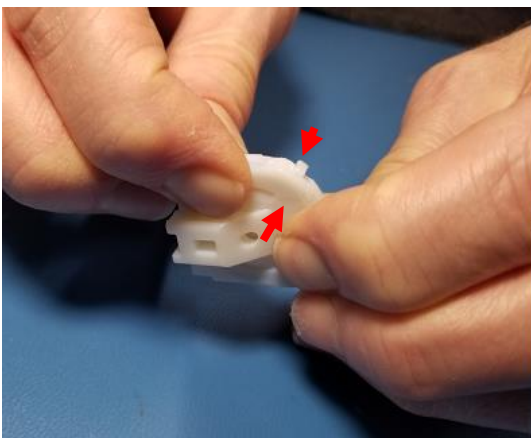


Figure 14. Press the Cassette Halves Together in Several Places, then Slide the Cassette onto the Cover.

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 15**. 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.

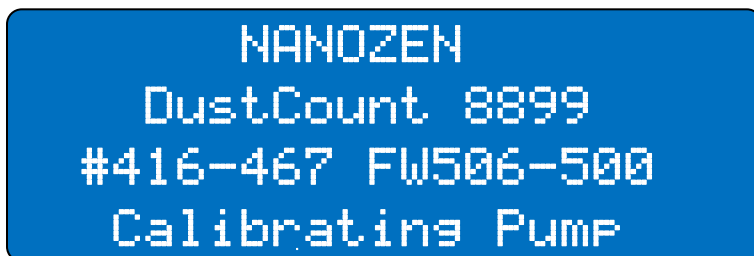



Figure 15. Start-up LCD

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 16 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 $\mu\text{g}/\text{m}^3$ for low concentrations or mg/m^3 for high concentrations.

The average concentration (AvCC) taken over the previous logging period is on the third line. AvCC shows concentration in $\mu\text{g}/\text{m}^3$ for low concentrations or $\mu\text{g}/\text{m}^3$ for high concentrations. The default logging period is 60 seconds, which is user-modifiable via the User Interface as discussed in section **3.2.10**.

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.

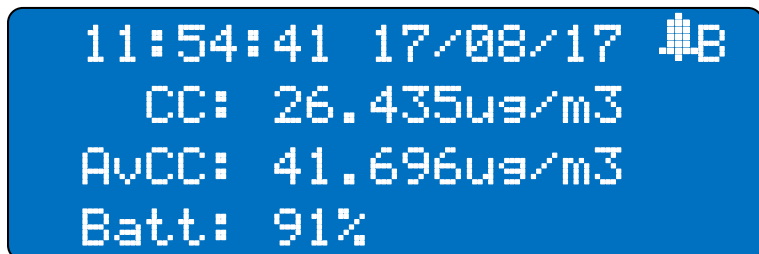


Figure 16. Position of Information Fields on the LCD

3.1.3 Battery Alarm

When the battery's state of charge drops below 15%, '1 ALM' will appear on the display, see **Figure 17**. 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.

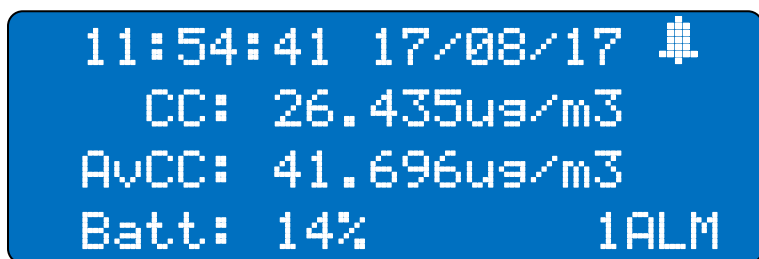


Figure 17. Critical (10% - 15%) Battery State-of-Charge as displayed on the LCD

➡ 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 the pump, as well as the gathering and logging of data. See **Figure 18**.

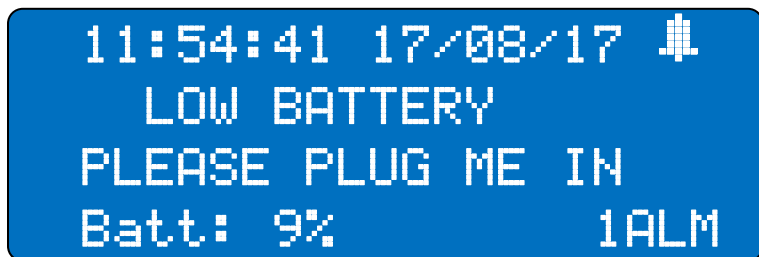


Figure 18. Shutdown (0 - 10%) Battery State-of-Charge as displayed on the LCD

➡ 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 19**. 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.

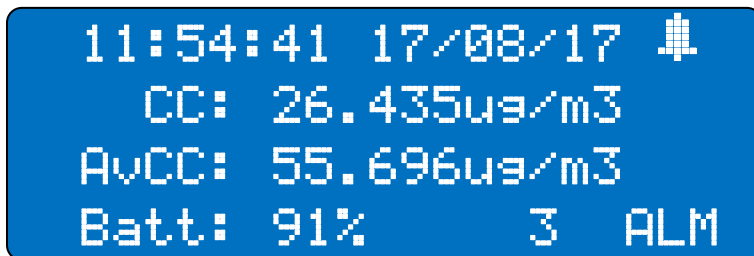


Figure 19. Concentration Alarm (buzzer un-muted) as displayed on the LCD

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.

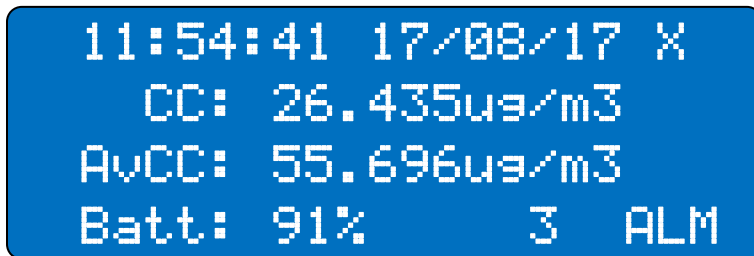


Figure 20. Concentration alarm (buzzer muted) as displayed on the LCD

3.1.5 Memory alarm

If the memory in the DustCount 8899 is corrupt, the display will show '2 ALM', as seen in **Figure 21**.

➡ **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'.

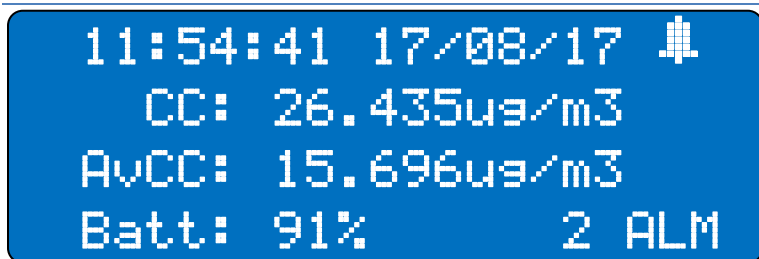


Figure 21. Memory alarm as displayed on the LCD

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 22**.

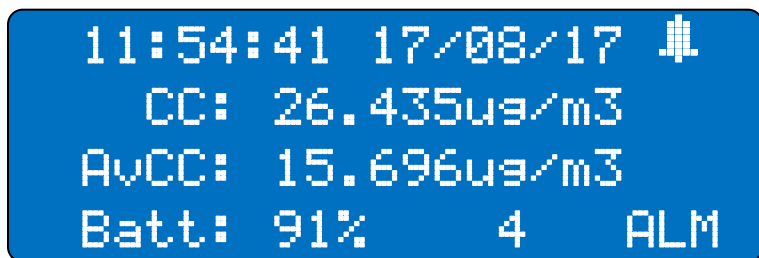


Figure 22. Flow Rate Alarm on the LCD

➡ 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, the filter Cassette screws have not been tightened properly. '5 ALM' will appear on the screen, as shown in **Figure 23**.

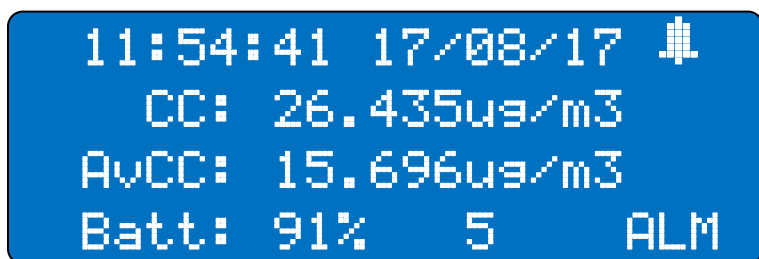


Figure 23 Leak detection alarm as displayed on the LCD

➡ 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 24**.

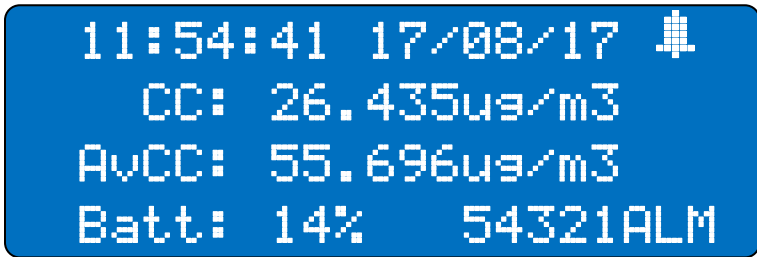


Figure 24 Multiple Alarms on the LCD

3.1.9 Power Button and Muting the Buzzer

The buzzer will beep once if the power button is pressed. When pressed once, the buzzer will toggle between the muted and unmuted states. If muted, the buzzer will not sound for any alarm conditions or Bluetooth connection. The LCD will show (X) for muted or (🔊) for unmuted on the top right corner of the screen, as shown in **Figure 25** and **Figure 26**.

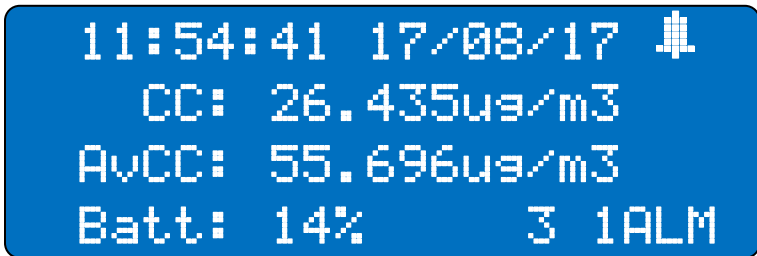


Figure 25 Buzzer Un-muted as Displayed on the LCD

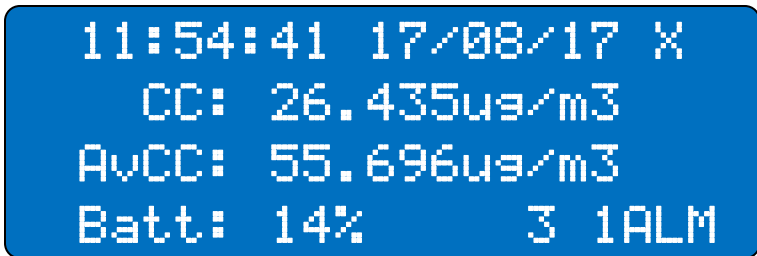


Figure 26 Buzzer Muted as Displayed on the LCD

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 or disconnects from the DustCount 8899. The LCD will also indicate a (📶) in the upper right corner of the LCD if a Bluetooth host is connected as shown in **Figure 27** and **Figure 28**.

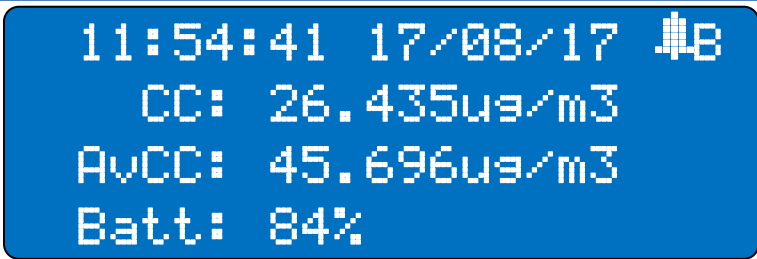


Figure 27 Bluetooth Connected as Displayed on the LCD

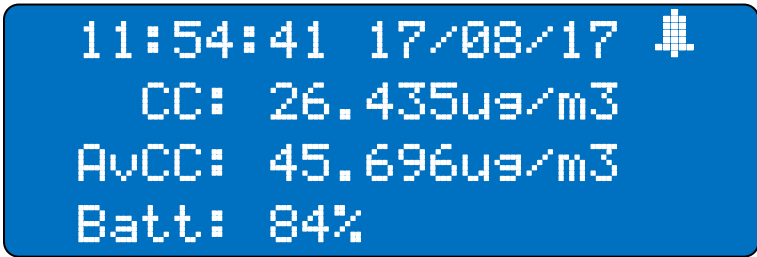


Figure 28 Bluetooth Disconnected as Displayed on the LCD

3.2 User Interface Application for PC or Mac

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 or .dmg file provided on the USB-drive that comes with the DustCount 8899 kit. Follow the instructions on the pop-up windows.

Once installed, the software version of the UI can be viewed by clicking on *Help* in the upper left corner of the UI screen, then clicking on *About DustCount 8899* in the menu. The following description is for UI version 1.0.12 and later.

3.2.1 Connect DustCount 8899 via USB

Connect the DustCount 8899 as shown in **Figure 29** 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.

➡ **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.

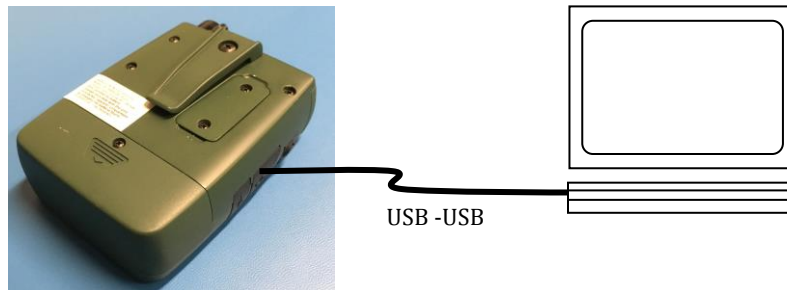


Figure 29. DustCount 8899 Serial Interface Link to PC via USB

3.2.2 Connect DustCount 8899 via Bluetooth

To connect to the DustCount 8899 via Bluetooth, you must set up your PC to pair with it. 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 *Select a device* window.

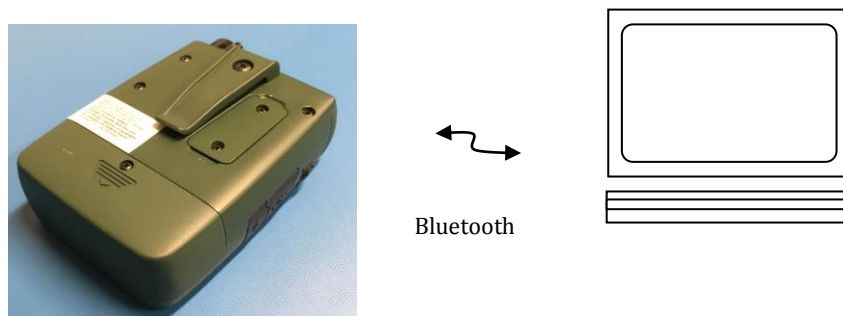


Figure 30. DustCount 8899 Serial Interface Link to PC via Bluetooth

3.2.3 UI Page Layout

The UI application is divided into the following sections:

- a) *Connection*

The UI automatically searches for any DustCount units connected to the host PC. The Connection Section at the top of the UI page lists all the DustCount units that the UI application has found connected to the host computer. These are listed as blue action buttons in the “Select a device” box. Each DustCount is identified by its serial number. If the connection is via Bluetooth, “(Bluetooth)” will also be shown.



Figure 31. UI Connection Section when DustCount Found but Not Connected

Clicking on one of these blue action buttons will commence communication between the UI application and the selected DustCount. The selected action button will turn Yellow. The **Device Selected** line will show the serial number of the selected Dustcount. The **Status:** line will change to “Connected to SNXXX”.

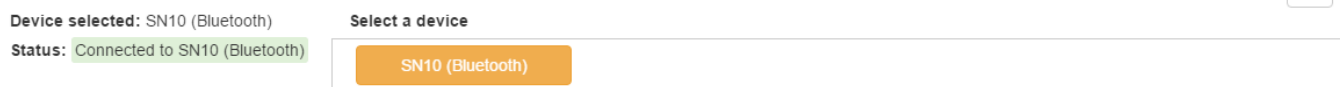


Figure 32. UI Connection Section when Connected to a DustCount

- b) Real-time display section displays data seen on the LCD of the DustCount 8899 unit as well as the percentage of logging memory free, the selected logging period. 1 ALM through 5 ALM seen on the LCD are shown as *Flow-rate status*, *Battery Status*, *Concentration status*, *Mem status* and *Leak status*. See sections 3.2.4 for more on these alarms. These data updates every second.

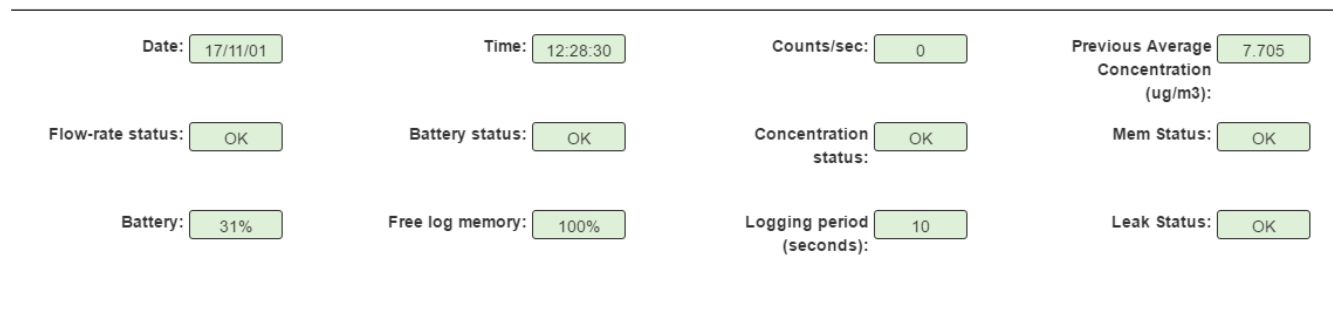


Figure 33. UI Real-time Data Section

- c) *Logging Mode*

This section displays the currently selected mode of logging, and allows the user to change this mode. *Continuous Logging* is the default mode.

Logging Mode: Logging Continuously

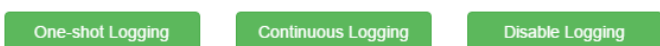


Figure 34. UI Action Buttons when Continuous Logging is Enabled

The user can change the mode to *Disable Logging* by selecting the corresponding action button. The Logging Mode title will indicate “Logging Disabled” when the mode has successfully been changed.

Logging Mode: Logging Disabled



Figure 35. UI Action Buttons when Logging is Disabled

The user can change the mode to *One-shot Logging* by selecting the corresponding action button. The Logging Mode title will indicate “One-shot Logging” when the mode has successfully been changed.

Logging Mode: One-shot Logging

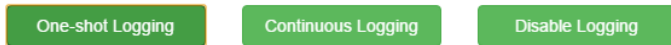


Figure 36. UI Action Buttons when One-shot Logging is Enabled

d) Read Logs

This section allows the user to select which log entries to display in the *Log Read Out* section. To read a specific number of the latest logs, enter a number into the box to the right of the *Read Last N Logs* action button. To read the most recent log, select the *Read Last Log* action button. To read all the logs stored on the DustCount, select the *Read All Logs* action button. To read all the logs that the DustCount has stored since it was last powered-on, select the *Read Since Power-on* button. The colour of the selected button will change to yellow while logs are being retrieved. The greater the number of logs requested, the longer the retrieval time.

Read Logs



Figure 37. UI Action Buttons for Read Logs

e) Read Logs with Particle Distribution

This section allows the user to select the number of log entries to read out along-with particle distribution with binned diameters. You can read all logs or read a specific number of the latest logs. The colour of the selected button will change to yellow while logs are being retrieved. The greater the number of logs requested the longer the retrieval time.

Read Logs With Particle Distribution



Figure 38. UI Action Buttons for Read Logs with Particle Distribution

f) Clear Logs

This section allows the user to clear log entries from the memory in the DustCount. The last log, all logs, or a user-specified number of the latest logs can be cleared by selecting the appropriate button. The colour of the selected button will change to yellow while logs are being cleared. The greater the number of logs requested the longer the time to clear them.

User Settings **Factory Settings** Server Settings

Press enter after changing a value for it to take effect.

Year	<input type="text" value="17"/>	Month	<input type="text" value="11"/>	Day	<input type="text" value="1"/>
Hour	<input type="text" value="14"/>	Minute	<input type="text" value="33"/>	Second	<input type="text" value="21"/>
Logging Period	<input type="text" value="10"/>	Alarm Threshold	<input type="text" value="50"/>	Gravimetric Mass Calibration Coefficient	<input type="text" value="100"/>
Dust Type	<input type="text" value="0"/>	Impactor Calibration Coefficient	<input type="text" value="105"/>	LCD Backlight Adjustment	<input type="text" value="50"/>
			<input type="button" value="System Air Purge"/>	<input type="button" value="Sync DustCount Time to Computer Time"/>	

Figure 42. UI User Settings

If need be, the 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, the user can click on **Sync Date and Time to Computer Time** to synchronize the date and time of the DustCount with the host computer's time.

i) *Factory Settings.*

Factory settings are not available to the end user.

j) *Server Settings* Tab.

The server settings tab is only needed when connecting over the internet to remote UI applications. If the Dustcount is connected via USB or Bluetooth to the same PC that the UI application is running on, then the default IP address and port numbers are used.

Settings shown in this tab should only be changed by an IT systems administrator who has the correct IP address and port numbers to connect over the internet to a remote UI application.

User Settings Factory Settings **Server Settings**

Press enter after changing a value for it to take effect.

Serial Helper Port

HTTP Port

Remote Access Settings

IP

Port

Status: Connected

Figure 43. UI Server Settings Tab

3.2.4 Live Data

Live data are displayed at the top of the UI window as shown in

Figure 43. The following data are refreshed in this section at least once per second.

1. Current date is displayed in the **Date** box.
2. Current time is displayed in the **Time** box.
3. Count for the previous second is displayed in the **Counts/sec** box.
4. Concentration for the previous logging period (in $\mu\text{g}/\text{m}^3$) is displayed in the **Previous Average Concentration ($\mu\text{g}/\text{m}^3$)** box.
5. Battery State-of-Charge % is displayed in the **Battery** box.
6. Available memory space is displayed in the **Free log memory** box.
7. Logging period is displayed in the **Logging period (in seconds)** box.
8. If a battery alarm condition is triggered, 'ALM1' is displayed in the **Battery Status** box. Otherwise 'OK' is displayed in this box.
9. If the memory alarm condition is triggered, 'ALM2' is displayed in the **Mem Status** box. Otherwise 'OK' is displayed in this box.
10. If the concentration alarm condition is triggered, 'ALM3' will be displayed in the **Concentration Status** box. Otherwise 'OK' is displayed in this box.
11. If the flow rate alarm condition is triggered, 'ALM4' is displayed in the **Flow-Rate Status** box. Otherwise 'OK' is displayed in this box.
12. If the leak detection alarm condition is triggered, 'ALM5' is displayed in the **Leak Status** box. Otherwise, 'OK' is displayed in this box.

3.2.5 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 the 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.

3.2.6 Reconfigure DustCount 8899 via UI

If the user wishes to reconfigure the unit via the UI, follow the steps below after the 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.

3.2.7 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. The action button will be yellow and the log read-out area will be grey 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.

 **Note 9: Save log read out field data using 'Save' button. (Default File Name: logs.csv)**

3.2.8 Interpretation of Data

For every logging period, the data listed below is saved onto non-volatile memory. Data are 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 1 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 2 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

3.2.9 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.

3.2.10 User Settings via UI

This section is at the end of the UI window as shown in **Figure 42**. This allows the user to update DustCount 8899 parameters.

Table 3 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 $\mu\text{g}/\text{m}^3$)	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 10: 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 its paper filter. 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.**

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 44**.
- 2) Slide off the battery cover and take the old battery out of the housing. See **Figure 45**.
- 3) Unscrew the battery cable clamp from the case, and unplug the battery from its receptacle. See **Figure 46** and **Figure 47**.
- 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.
- 7) Set the date and clock using the UI or command line interface. Note: date and time are lost when the battery is disconnected.



Figure 44. Loosening and removing Screw for Rear Battery Cover



Figure 45. Sliding Off Rear battery cover



Figure 46. Removing Screw to release Battery Cable Tie



Figure 47. Disconnecting or re-connecting Battery