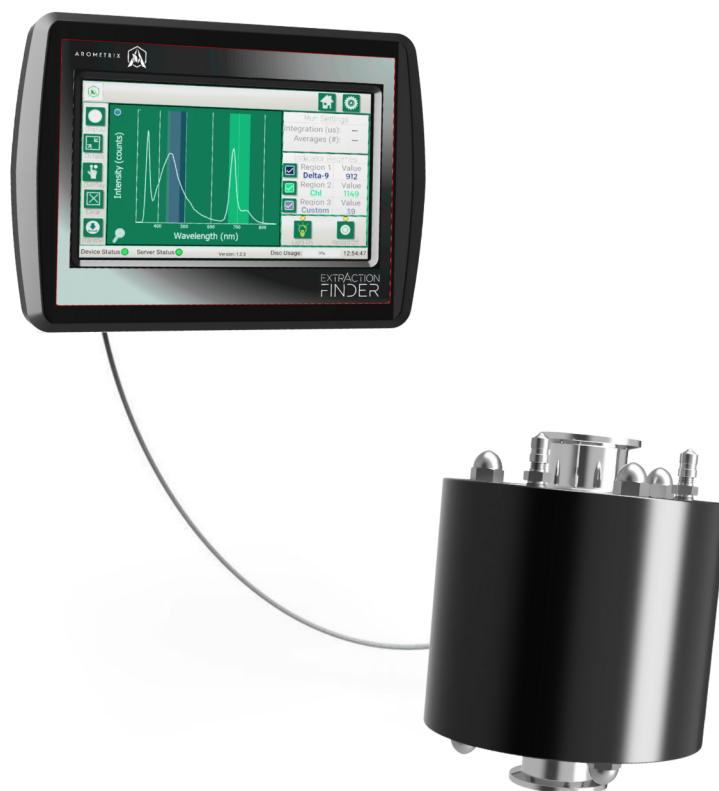




AROMETRIX EXTRACTION FINDER

USER MANUAL



YOU MUST READ THIS MANUAL BEFORE USE | WARNINGS ON PAGE 3

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IMPORTANT: For Applications Other Than Extraction

This system was designed initially for extraction. Thus, section 7 of this user manual will focus on how to operate the system for extraction.

*If you are using the system for other applications that can utilize the same metal connections -- including **wiped film or thin film distillation, column chromatography, or conversion reaction** -- please refer to our Application Notes and information on arometrix.com/resources, in addition to reading this user manual.*

Section 1: Warnings ⚠️

The complete contents of this manual must be reviewed to ensure that the product is used safely. When integrating the EXTRACTION FINDER, the total extraction system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user. Below are Arometrix's warnings about safe operating conditions for the EXTRACTION FINDER:

1. Ensure the system and installation conform to all applicable laws and ordinances, including Fire Marshall code certifications.
2. Ensure all supporting electronics are installed in a compliant manner.
3. Ensure all connections are properly installed and specifications are appropriate.
4. If you have any indications of malfunction, return to the manufacturer immediately by emailing brains@arometrix.com.
5. Tampering with this equipment is prohibited, and will result in a void of warranty.
6. Never look directly into the light source.
7. **MISUSE MAY CAUSE SEVERE INJURY OR DEATH.** Proper care should be taken when setting up and operating this equipment.

Section 2: Overview

What the EXTRACTION FINDER is:

The EXTRACTION FINDER is Arometrix's real-time molecular monitoring system for botanical extraction. The technology used induced fluorescence to detect the presence and track the levels of molecules, such as Cannabinoids, Chlorophyll, and Lipids in-line. This helps operators optimize extraction process efficiency.

What the EXTRACTION FINDER is not:

The EXTRACTION FINDER is not a quantitative measure. It provides qualitative process information that directly tracks the relative concentration of Cannabinoids. It is Arometrix's goal to amass enough spectral data from the EXTRACTION FINDER to eventually be able to determine quantitative purity **in the future**.

The EXTRACTION FINDER cannot replace good laboratory practice and experience. The EXTRACTION FINDER's data, in combination with good lab practice, will help technicians further perfect their craft.

Section 3: Fundamentals

The Arometrix EXTRACTION FINDER is composed of three key components: the **Digital Display** and the **Ultra-Sensitive Sensor**, which is housed inside of the **Sensor Housing (aka Extraction Adapter)**.

Arometrix Digital Display: The *display* contains the "brains" of the system. This 7 inch LCD TFT display consists of a compute module that creates a visualization for the user where both flow and relative potency are deduced. The *display* has a pole-mounting bracket installed in the back of it so it can easily be mounted to a lab pole. It also includes an extended 30' sensor cable and 10' power supply extension to move the display outside of the C1D1/C1D2 environment. *Note: This unit is intended for laboratory use. Care should be taken not to spill anything on it, as it is not waterproof.*

Arometrix Ultra-Sensitive Sensor: The **sensor** contains the “eyes” of the system”. The **sensor**, attached to size 34 high pressure glass *inside* the Extraction Adapter, connects and transmits to the digital display. The ultra-sensitive sensor has a new filter that allows it to be more sensitive than Arometrix’s original sensor.

Arometrix Sensor Housing (aka Extraction Adapter): The **sensor housing** houses the ultra-sensitive sensor and is installed in-line.

Section 4: Unpacking & Inspecting

After the instrument is received, it should be carefully unpacked and inspected for damage during shipment and to confirm that all components are present.

Each EXTRACTION FINDER comes with:

- Digital Display + pole-mounting screw
 - *Color of sticker will be black or green*
- Sensor Housing with Ultra-Sensitive Sensor
 - Sensor pre-installed inside of housing
- 30’ Sensor Cable, USB
- International Power Supply
- 10’ Power Supply Extension

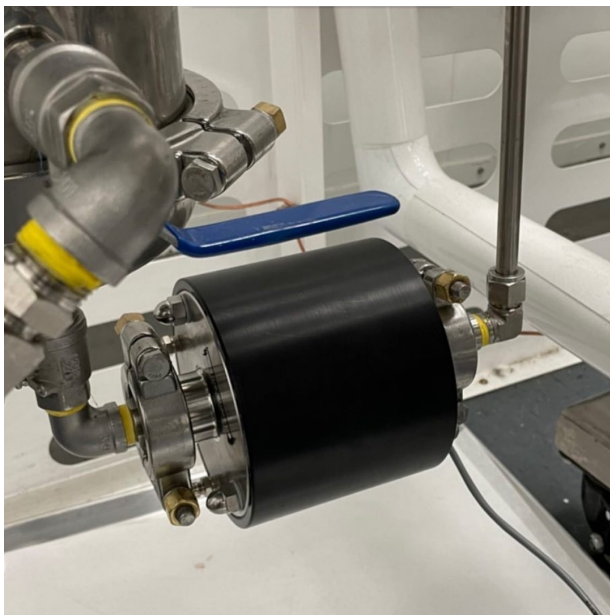


Section 5: Installation & Software Quick Start

The equipment should be in a clean, dry environment for the best results.

Installation of the Sensor Housing involves the following steps (illustrated on our Quick Start Guide):

1. **Mount the Sensor Housing securely** onto the extractor's 1.5” or 2” sanitary end clamps.



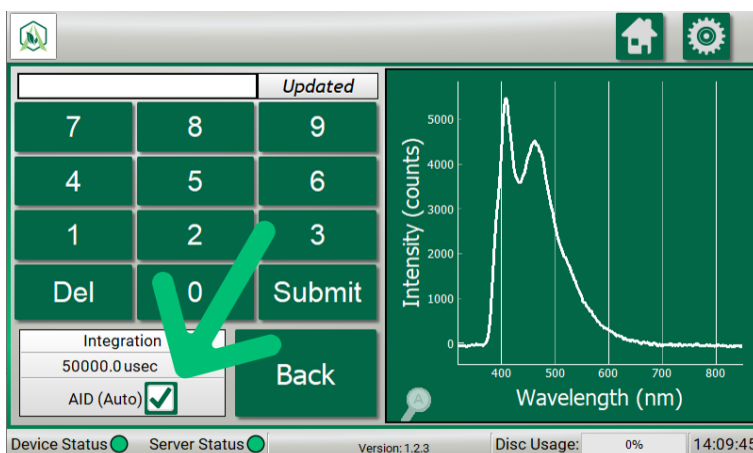
2. **On the bottom-end of the Sensor Housing**, connect a 1.5" Sanitary Flange to Hose Adapter (or NPT adapter or another appropriate connection) for incoming flow.
3. **On the top-end of the Sensor Housing**, connect a second 1.5" Sanitary Flange to Hose Adapter for outgoing flow.
4. Install a **bypass, valved bleedport** and **pressure gauge** for optimal safety and performance.
5. **Best Practice:** Set up an extraction adapter bypass (that can be quickly actuated through 3 way valves), a vent, and a pressure gauge.



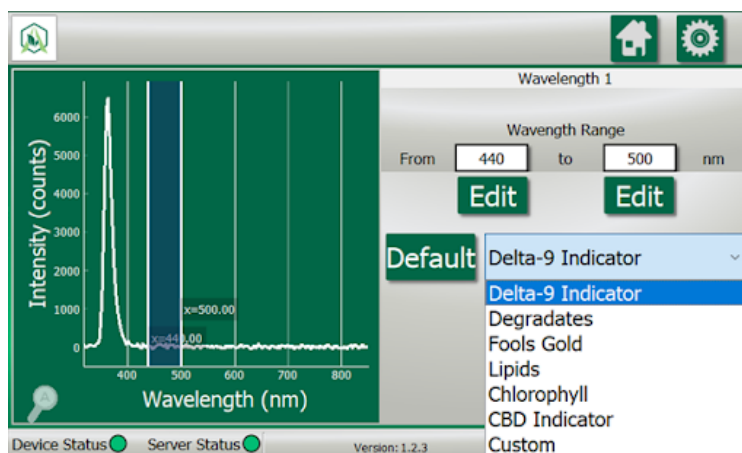
6. **Warning:** Ensure all connections are properly installed. Ensure the system and installation conform to all applicable laws and ordinances.

Installation of the Display and wiring involves the following steps (illustrated on our Quick Start Guide):

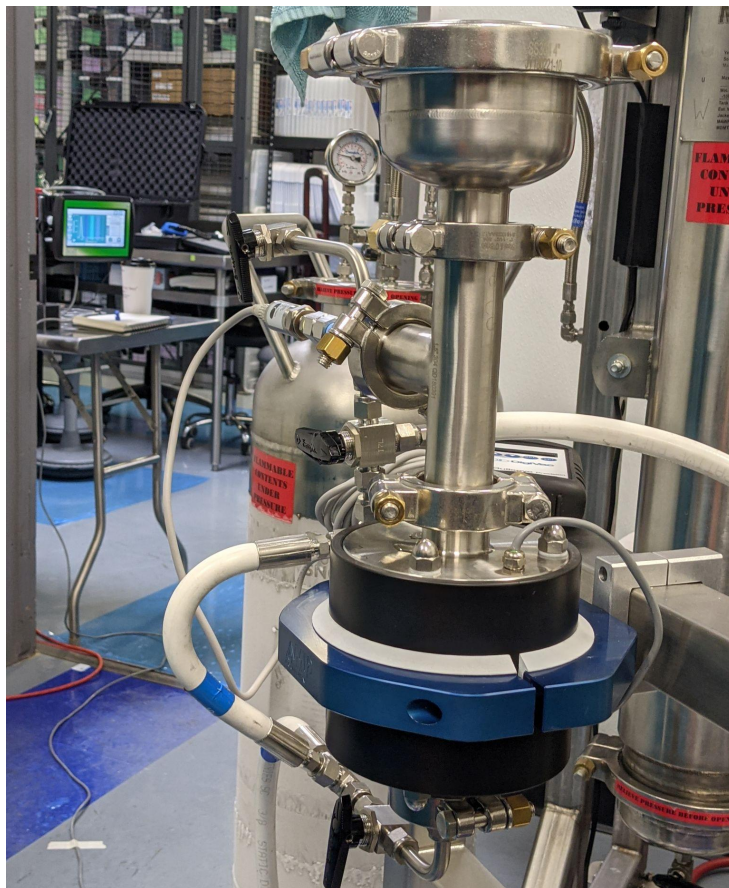
1. **Install the Extraction Finder display(s)** outside of the C1D1-designated area. Use the supplied AC adapter and 10' power supply extension to power your display. This adapter provides clean short protected power to protect and ensure the accuracy of the internal circuitry.
2. Connect the other end of the **sensor cable** to the bottom of the **display**. The display will take a few seconds to turn. You will see splash screens, followed by the interface screen. Give it ~2-5 minutes to boot up.
3. You can mount the **display** to a lab pole using the provided pole-mounting screw; the back of the display has a pole-mounting bracket pre-installed. Alternatively, it can be placed on a desktop by placing the unit in a separate tablet stand.
4. In the **Settings** section on the display's UI:
 - a. Set Auto Integration by checking the AID (Auto) checkbox



- b. Set Scans to Average: 5
- c. Ensure that the Device Status and Server Status indicator on the bottom left-hand side of the display are green – If not, make sure the cords are properly connected.
- d. Ensure that the “Light On/Light Off” toggle button is turned on. The light above it should be green.
- e. To set ranges, go to Settings, select “Wavelength Settings” to track specific molecules. For extraction, we recommend setting:
 - i. Region 1: Delta-9 (or CBD Indicator)
 - ii. Region 2: Lipids
 - iii. Region 3: Chlorophyll
 - iv. *Pro-tip: Once you return back to the homescreen, check each region’s checkbox for easier tracking during the process.*

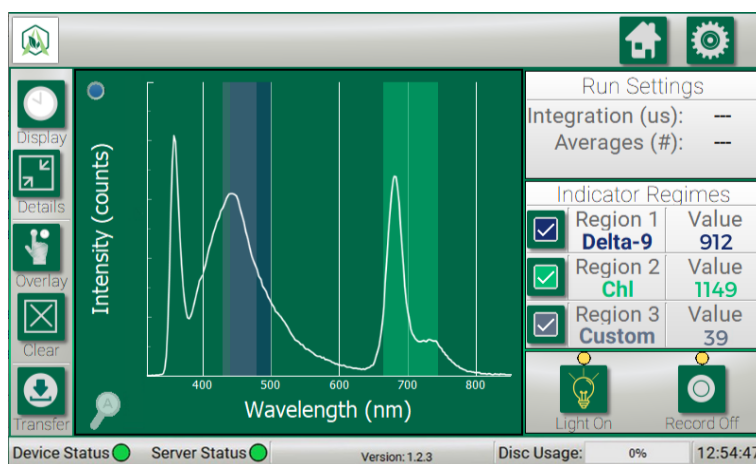


5. **Record on (optional) at the start of the run:** Toggle the Record button to On. Ensure the Record indicator is green.
6. Once the Extraction Finder system is safely in operation, **prepare extraction** as you typically would.



7. Monitor molecular signals during your extraction process.

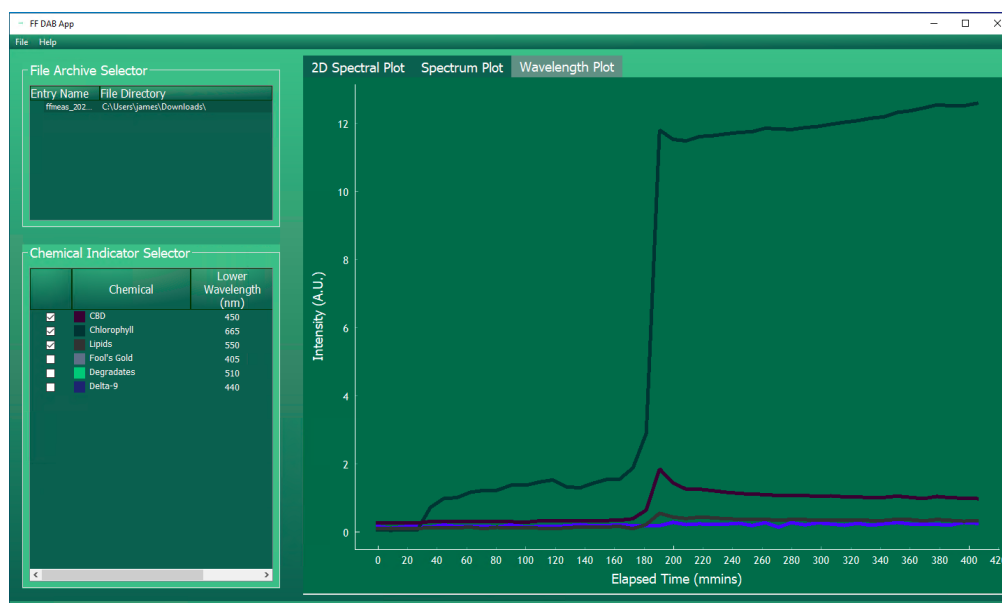
- Observe no signal or noisy signal on XF from reverberations during initial startup.
- Identify XF signal spiking then dropping after initial fluid flow.
- Identify XF signal equilibrate during full flow.
- Observe Delta-9, Lipid, and Chlorophyll levels on the Display. Switch views by tapping the “display” button. Use the changes in relative potency levels in order to inform your extraction process decisions.



- 8. Record off (optional) after the run is finished:** Toggle the Record button to Off to save XF data.

Ensure the Record indicator is red. Install USB thumb drive (ensure that no files are on the USB stick first). Finally, press the Transfer function.

9. **Pro-tip:** Once done, upload logged run data file(s) into our [DAB \(Data Analysis Breakdown\) App](#).



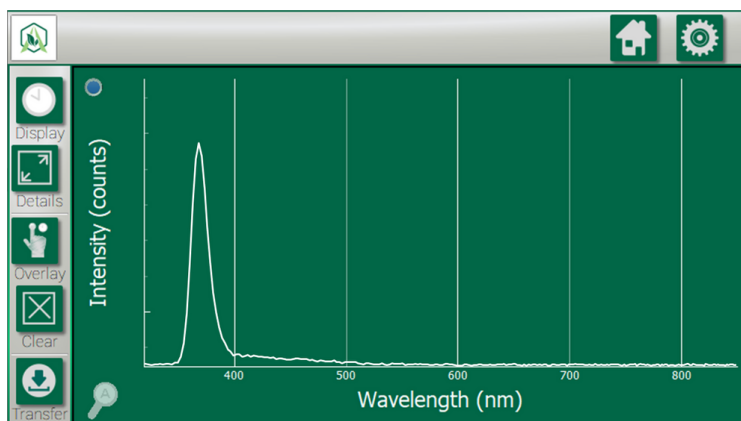
Section 6: Understanding the Interface

After installation, the system is ready for immediate operation.

Different Viewing Options

There are currently two viewing options: the **Spectrum view** and the **Wavelength view**. These display options can be toggled between each other by tapping the “display” button (located in the top-left corner).

Spectrum View (Spectrograph) - *Instantaneous Tracking*



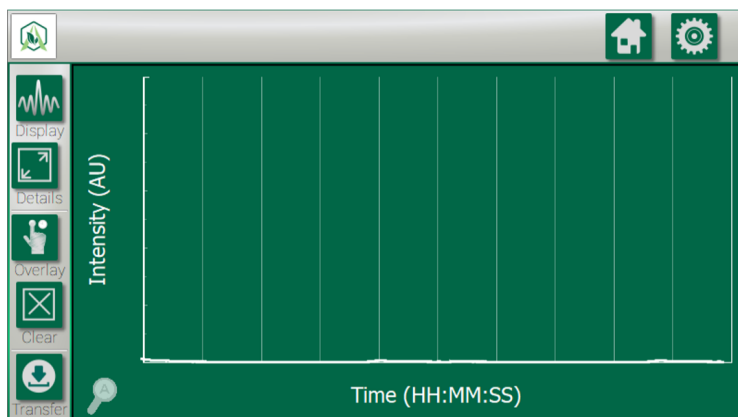
What it does: This is an instantaneous representation of the current spectral state. It displays the current background/ambient light corrected spectral measurement.

Important Note: The peak at 360-390nm is an internal excitation/reference peak (not a process indicator); tap the small circle on the top-left corner of the graph if you wish to remove this peak.

Understanding the Graph (X-Y Axis)

- *X-axis = Wavelength (nm)*: The location of where the line shoots up (or fluoresces) indicates the molecule(s) passing through; different molecules have different wavelength regions
- *Y-axis = Intensity (counts)*: The height of this line, *in general*, indicates how much of that substance is present at that moment relative to earlier.

Wavelength View - Time Tracking

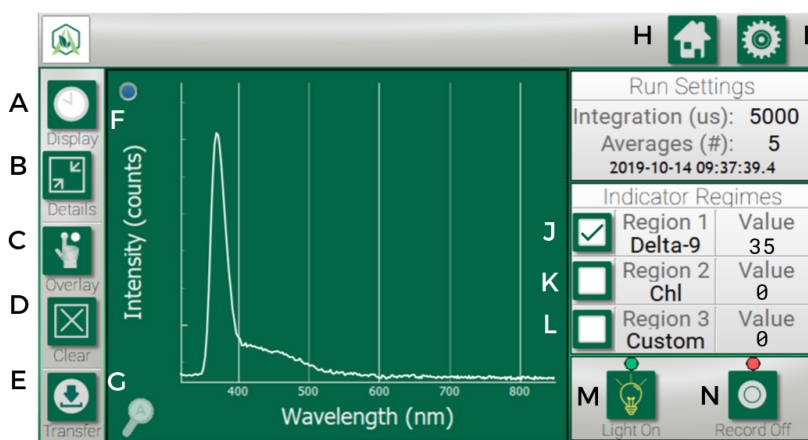


What it does: Displays and tracks the interpreted values from your measurement. This plot reduces the raw data and shows you the “highlights” of the run. This view is especially useful for seeing how molecular levels changed over time. **Arometrix recommends that Extraction Finder users prioritize this view.**

Understanding the Graph (X-Y Axis)

- *X-axis = Time (HH:MM:SS)*: As opposed to the Spectrum view, this tracks molecular levels for pre-set ranges as a function of time.
- *Y-axis = Intensity (AU)*: The height of this line indicates how much of that substance is present at that moment relative to earlier. (*Note: These are AU as in Arbitrary Units; this is not quantification of potency.*)

Setup Screen Tutorial



List of buttons:

- A. Display: Toggles between the two viewing options (Spectrum View & Wavelength View)
- B. Details: Expands the graph and removes the data on the right-hand side
- C. Overlay: Traces or “overlays” a peak of interest so you can compare it to a future peak
- D. Clear: Clears an “overlay” that you no longer want to track
- E. Transfer: Transfers recorded run data to a flash drive
- F. Reference Peak Remover: Removes the internal reference/excitation peak from Spectrum view
- G. Auto-Zoom: Returns zoom view to normal. You can zoom with 1 finger by drawing a bounding box.
- H. Home: Returns you to the Home if you are in Settings
- I. Settings: Allows you to adjust settings, such as Auto Integration Time, Scans to Average, and the Wavelength Tracker
- J. Region 1-3 Checkboxes: For Wavelength View - By checking this box, it will populate the Wavelength plot with the corresponding molecule tracking. For Spectrum View - By checking this box, it will highlight the Spectrum plot with the region that molecule fluoresces at. For Wavelength View - By checking this box, a color-coordinated line will track the molecules' intensity levels.
- K. Region 2 Checkbox: See I.
- L. Region 3 Checkbox: See I.
- M. Light on/off: Turns the light on. This toggles between states.
- N. Record on/off: Turns the recording mode on. This toggles between states.

Settings Tutorial

When you tap the *Settings* button, you will see:

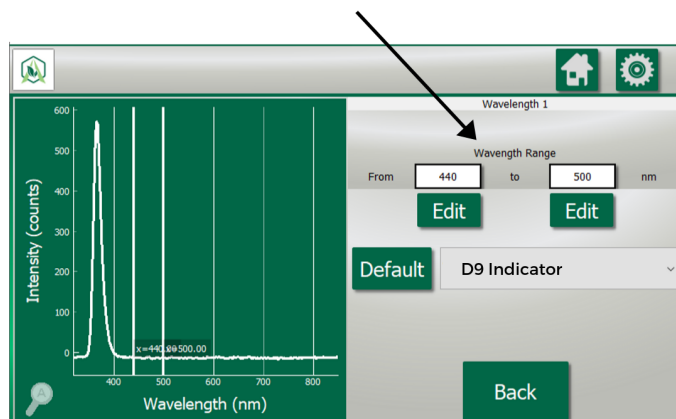
- Wavelength Settings
- Set Integration Time
- Set Scans to Average
- Clock Settings
- System Data

Wavelength Settings

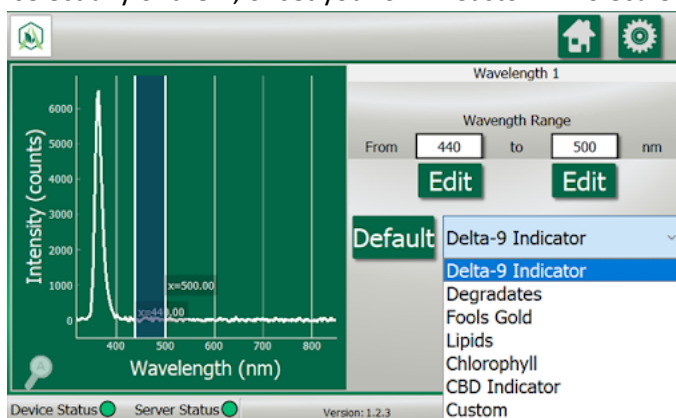
In this tab, you will see:

- Edit Wavelength 1
- Edit Wavelength 2
- Edit Wavelength 3

These correspond with the Region 1, Region 2, and Region 3 that are shown on the plots. When you press one of these, you will see a Wavelength range. These will come preset with manufacturer's defaults; however, you can edit the *From* and *To* how you see fit. *See below.*



Click "Default" to return back to manufacturer default. Next to the "Default" button, you will see a molecule dropdown. When you press the Molecule Indicator dropdown, you will see different molecule tracking options. You can select any of them, or set your own "Custom" molecule and region. *See below.*



Set Integration Time

This is meant to enable "AID (Auto)" by clicking the checkbox in the bottom-left corner of the screen. Auto integration ensures that the signal from the spectrometer is maximized.

Set Scans to Average

This sets how many optical readings the sensor takes before plotting and displaying a result. More readings that are averaged imply less noise, but less information. Arometrix recommends that you select 5.

Clock Settings

This should be set during initial acquisition. Set the Date Settings and the Time Settings. Then, Submit.

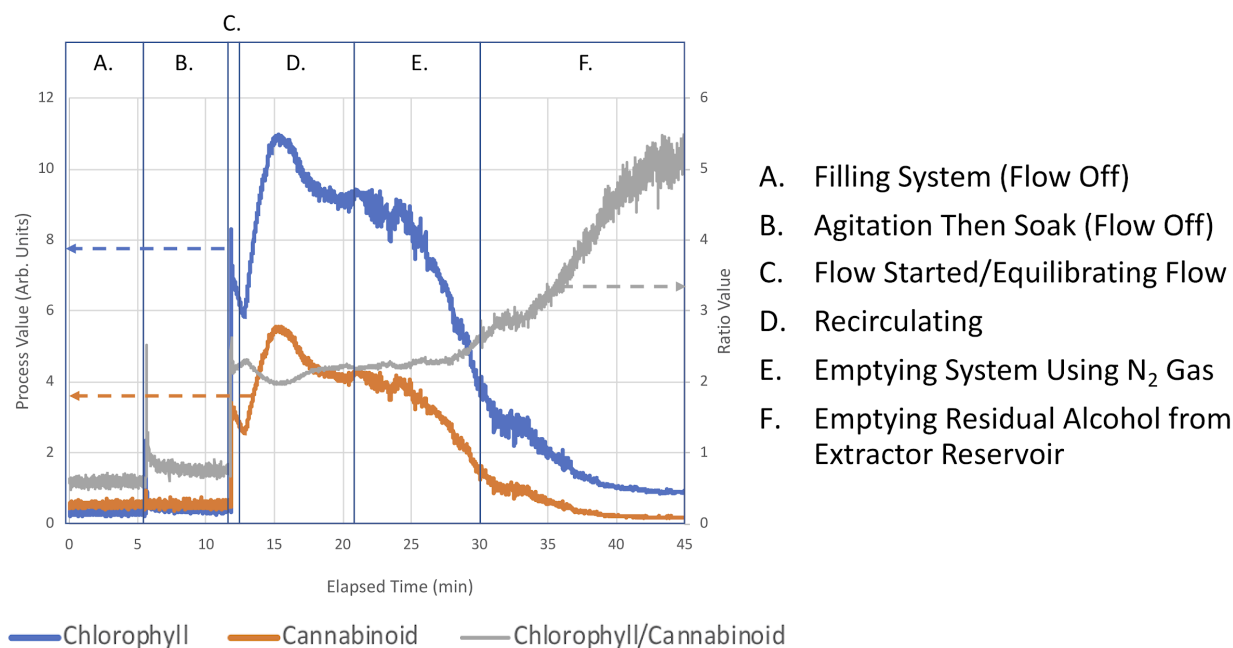
System Data

This will display "Bytes Available", "Bytes Used", and "Bytes Total". It will also show you % memory used, and give you an option to "Clear Data".

Section 7: Application Note - Solvent Saturation

Below is a real graph of a full extraction run using the Extraction Finder in Wavelength View. The Extraction Finder tracked Chlorophyll (blue) and Cannabinoid (orange) signals. *Note: The Chlorophyll/Cannabinoid ratio (grey) signal is for the purposes of this manual only.*

Cryo-Ethanol Extraction Run - Recirculation - Extraction Finder Logged Run Data



- A. Filling System - The extractor was being filled with ethanol**
 - a. No flow over sensor; no signal
- B. Agitation Then Soak - The extractor was agitated then went through a soak cycle**
 - a. No flow over sensor; initial signal noise due to mechanical vibrations
- C. Flow Started/Equilibrating Flow - The flow for recirculation began**
 - a. Full flow over sensor; signal spikes then drops after initial fluid flow
- D. Recirculating - Extractor recirculated ethanol over system**
 - a. Full flow over sensor; signal increases/decreases as Cannabinoid concentration equilibrates and becomes homogeneous in ethanol
 - b. End point determined by both Cannabinoid and Chlorophyll signals (and their ratio) becoming stable/unchanging
- E. Emptying System using N₂ Gas - Endpoint detected (solvent saturated)**
 - a. Extractor being emptied with nitrogen gas and system no longer chilled; Signal of both Cannabinoids and Chlorophyll decrease
- F. Emptying Residual Alcohol from Extractor - Extractor reservoir emptied**
 - a. Decrease in both Cannabinoid and Chlorophyll signals; increase in ratio of Chlorophyll to Cannabinoid from system heating (ethanol preferentially extracting Chlorophyll in reservoir)

Pictured here is the **Spectrum View**, which tracks molecules as a function of **Intensity over Wavelength**.



Pictured here is the **Wavelength View**, which tracks molecules as a function of **Intensity over Time**.



Section 8: Issues

- 1) If the signal is an abnormally low signal, a few things should be checked:
 - a. Ensure that the EXTRACTION FINDER system is properly installed.
 - b. Ensure that the integration time is set correctly by using the AID (Auto Integration) AUTO in Settings. The checkbox should be checked off.
 - c. Ensure that the Scans to Average is set to 5.
 - d. If none of the above seem to be the origin of the problem, please take a photo of both your spectrum plot and your wavelength plot, then email brains@arometrix.com.
- 2) If the signal looks sporadic and very abnormal, a few things should be checked:
 - a. Is there turbulent flow in the Extraction Adapter? Turbulent flow is not ideal. For the best signal, ensure consistent, full flow. The addition of a small sight glass somewhere on top of the Extraction Adapter might help you ensure this.
 - b. If the pressure is still changing quickly, wait for the pressure to become more constant.
 - c. Ensure that the integration time is set correctly by using the AID AUTO.
 - d. Increase the scans to average:
 - i. This should not be set significantly higher than 5 - keep the value below 15
 - e. Ensure that the Extraction Adapter is not in a location with a high amount of vibration
 - f. Ensure that the Extraction Adapter is not in a location monitoring the vapor phase
 - g. If none of the above are the problem – ensure that liquid is still flowing
 - h. If none of the above seem to be the origin of the problem, please take a photo of both your spectrum plot and your wavelength plot and contact customer service by emailing brains@arometrix.com or submitting the Support Request form on our website
- 3) If the system is not detecting the sensor (bottom left light on panel is red or yellow)
 - a. If the system was turned on, give the system up to 5 minutes, it may detect
 - b. Ensure that all cables are connected securely – especially the cable connecting the display unit to the sensor
 - i. It may be easier just to disconnect and reconnect the cables from the display unit and the sensor unit
 - c. Try identifying and using a new source of power to power the EXTRACTION FINDER display.
 - d. If none of the above seem to be the origin of the problem, please take a photo of both your spectrum plot and your wavelength plot and email brains@arometrix.com.

Other suggestions:

- 1) We have all of our EXTRACTION FINDER resources (including different application notes and our popular Chemical Cheat Sheet) available at arometrix.com/resources.
- 2) We are constantly working to fix any issues with the system, and appreciate you reporting any abnormal behavior, we will not leave you hanging and will address any issues you have ASAP.
- 3) If you find anything in this manual confusing or unclear, please **email us at brains@arometrix.com**; we are more than happy to assist you, and do our best to do so in a timely manner.
- 4) If you want to see something new in the software please let us know and give your suggestion, we strive to make the EXTRACTION FINDER the tool that works for you!

Section 9: Software Update Instructions

At Arometrix, we strive to tailor-make all our products to our customers' needs. As we advance our algorithms, add features, fix bugs, etc., we release software/firmware updates. These are field-updatable. If you own an EXTRACTION FINDER, you can download our latest Firmware update to your software in the field: Version 1.2.4 - (if you do not already have it). This update will make EXTRACTION FINDER systems more cohesive and user-friendly. Please visit arometrix.com/software to update your software.

Arometrix plans to release future software updates and encourages users to provide feedback.

Section 10: Terms and Conditions

TERMS OF USE, LIMITED WARRANTY & LIABILITY WAIVER

Arometrix offers all of its products with the following terms and conditions and notices as follows. By accepting and/or using an Arometrix product, you hereby acknowledge and agree to the following terms and conditions, and acceptance of these terms and conditions are a condition precedent to any purchase/sale agreement between you and Arometrix.

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