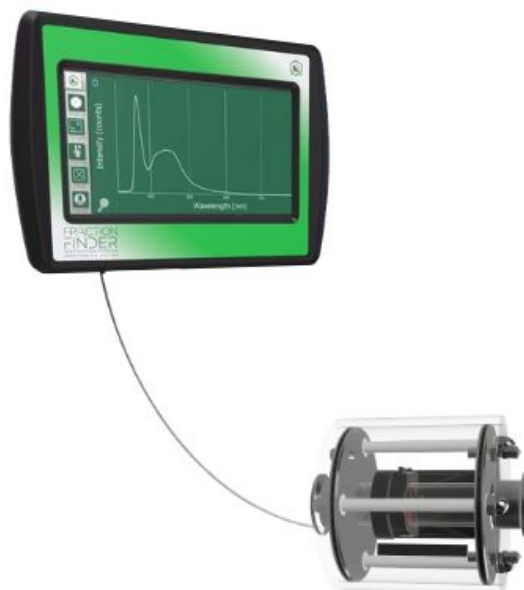




EXTRACTION FINDER

*APPLICATION NOTE FOR
ETHANOL EXTRACTION*



YOU MUST READ THIS MANUAL BEFORE USE

WARNING: NEVER LOOK DIRECTLY INTO THE LIGHT SOURCE

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Section 1: Description and Principles of Operation

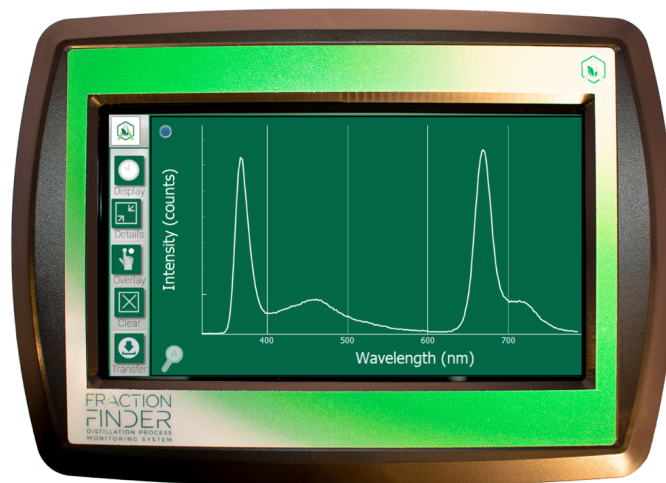
The Fraction Finder detects the presence of extraction molecules via induced fluorescence. While many molecules can show fluorescence simultaneously, looking at the wavelength of the fluorescence peaks helps inform the extraction operator what molecule is being detected. By monitoring key molecules' intensity over time, users can find the precise end of their extraction.

Purpose of using the Fraction Finder for Ethanol Extraction:

- **Instantaneous Molecule Graphing** - The system detects key molecules during extraction: Cannabinoids and Chlorophyll. It can also broadly detect Lipids.
- **Extraction Endpoint** - The system can be used to determine the end of the extraction. Operators can watch when the readings are showing that the solvent is no longer efficiently extracting cannabinoids. In turn, operators can avoid wasted time and cut process duration.

The relevant molecules that the Fraction Finder can detect during Ethanol Extraction, and their respective peak positions are:

- **Reference Peak @ 360-370 nm**
 - The Reference/Excitation peak is from the sensor device and is not indicative of any distillation fractions or molecules.
- **Cannabinoids @ 450-470 nm**
- **Chlorophyll**; may show 1 or 2 peaks @ 680 nm and 710 nm
- **Lipids @ 530-630 nm**
 - Lipids aren't one chemical, but a class of chemicals.
 - Lipids might not always be detected. If Lipids are detected during cryogenic ethanol extraction, your ethanol is not cold enough OR you have over-extracted your plant material.



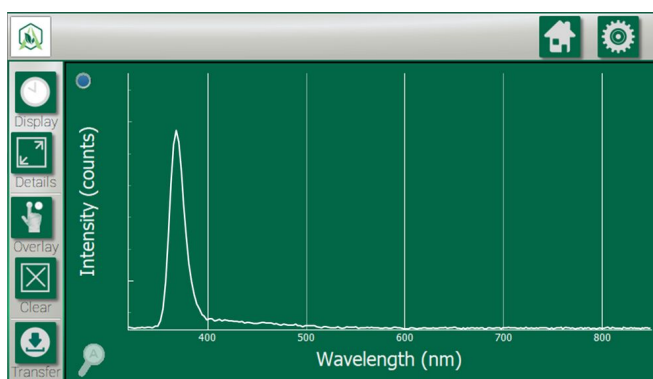
Section 2: Spectrum View

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). In this section, we will go over the Spectrum view, which is an instantaneous representation of what molecules are passing through the sensor.

Graph 1 - Spectrum View

Understanding the Graph

- **X-axis = Wavelength (nm):** The location of where the line shoots up (or fluoresces) indicates the molecule; 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.

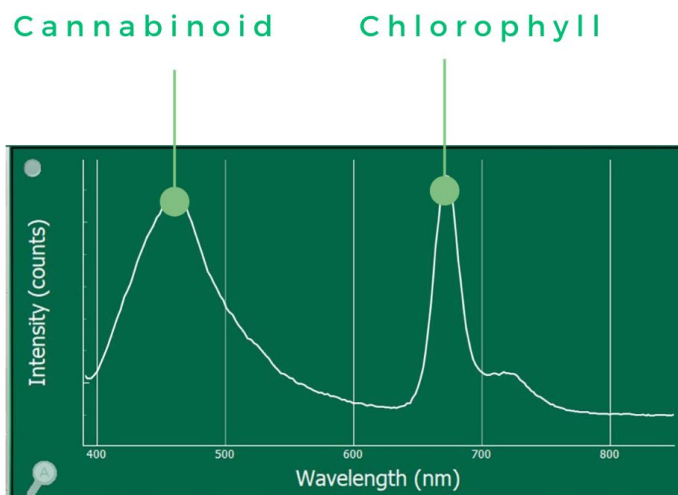


Note: The signal shown at 360-370 nm is the reference peak from the sensor’s light source. To remove this peak from view, press the blue “Reference Peak” remover button (available in 1.2.3.). Graph 2 below depicts what the Spectrum View looks like without the reference peak.

Graph 2 - Molecule Analysis in Spectrum View

Understanding the Graph

As stated in the Overview section, more than one molecule can fluoresce at a time. This is what makes the Fraction Finder useful to extractors: the ability to track both Cannabinoid content and Chlorophyll content simultaneously. Cannabinoids fluoresce at a peak centered at 460 nm, while Chlorophyll fluoresces as doublet peaks (680 nm and 710 nm) or as a singular peak.



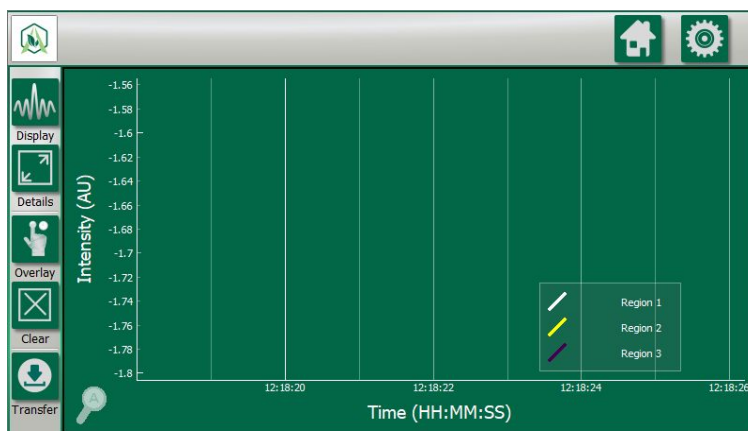
Section 3: Wavelength View (Recommended)

As opposed to Spectrum view, the Wavelength view on the Fraction Finder tracks fractions as a function of time. This view can be toggled by tapping the “display” button (located in the top-left corner). Whereas the Spectrum View is instantaneous, this view will show the entire run progress from start to finish over time. **Arometrix recommends that users use this view to determine the endpoint of their extraction process.**

Graph 3 - Wavelength View

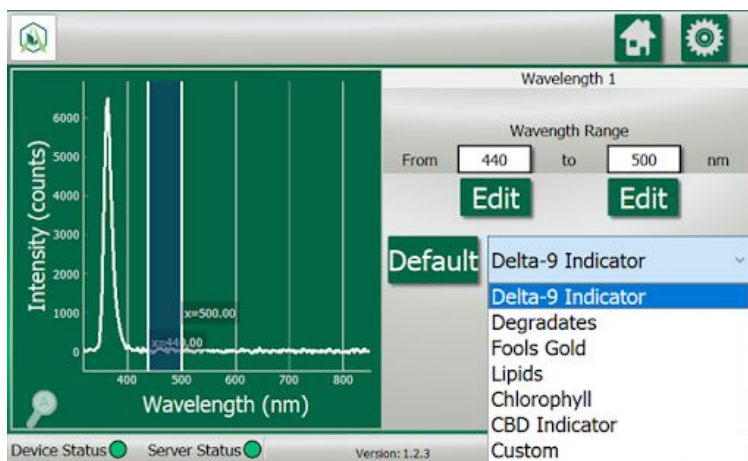
Understanding the Graph

- *X-axis = Time (HH:MM:SS)*: This tracks fractions 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.



Understanding the Range/Region Setting

On the bottom-right side of the display, you will notice “Region 1”, “Region 2”, and “Region 3”. These correspond to different wavelength ranges that users can select and set. These correspond with the Region 1, Region 2, and Region 3 that are shown on the **Wavelength View**. When you press one of these, you will see a Wavelength range. These will come with manufacturer defaults; however, you can edit the *From* and *To* how you see fit.



To set ranges, go to Settings, select “Wavelength Settings”, and select a Region.

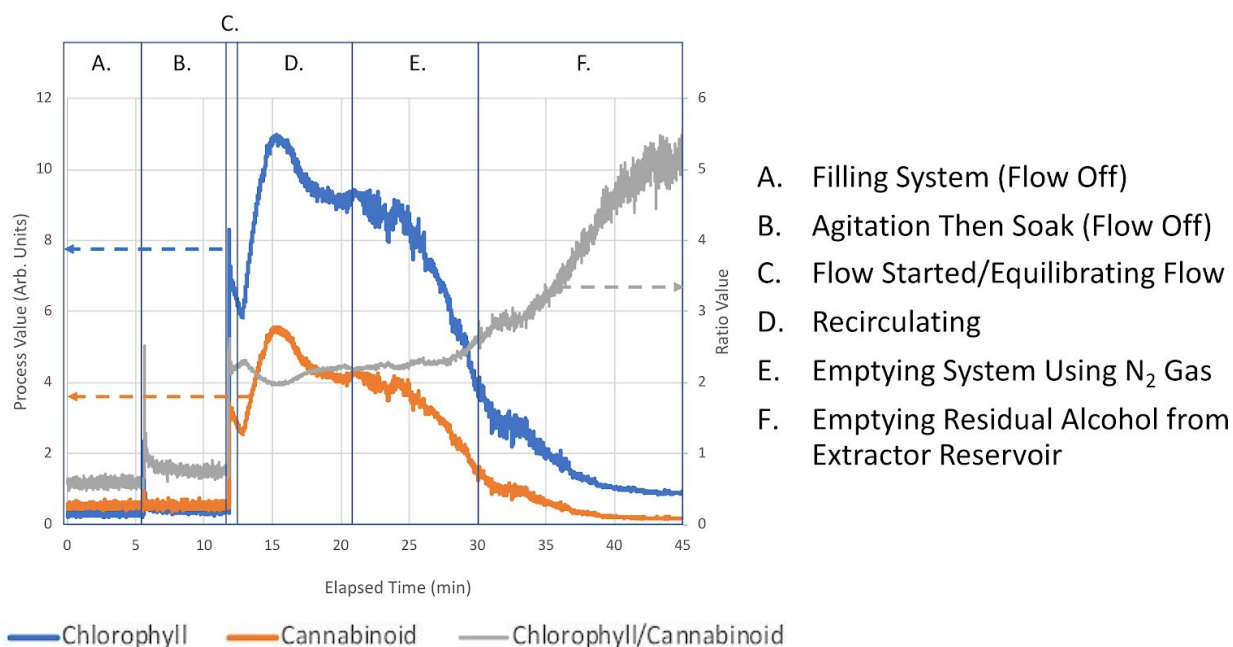
Arometrix recommends that operators use presets and perform the following settings:

- Set Region 1 as THC (or as CBD)
- Set Region 2 as Chlorophyll
- Set Region 3 as Custom. Perhaps, set Custom to 530-630 nm (this is our broad fluorescence range for common cannabis Lipids).

Section 4: Wavelength Run Data

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

Graph 4 - Full Cryo-Ethanol Extraction Run with the Fraction Finder



- A. Filling System** - *The extractor was being filled with ethanol*
- No flow over sensor; no signal
- B. Agitation Then Soak** - *The extractor was agitated then went through a soak cycle*
- No flow over sensor; initial signal noise due to mechanical vibrations
- C. Flow Started/Equilibrating Flow** - *The flow for recirculation began*
- Full flow over sensor; signal spikes then drops after initial fluid flow
- D. Recirculating** - *Extractor recirculated ethanol over system*
- Full flow over sensor; signal increases/decreases as Cannabinoid concentration equilibrates and becomes homogeneous in ethanol
 - 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)

Section 5: Unpacking and 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 FRACTION FINDER comes with:

- Fraction Finder Ultra-Sensitive Sensor (*Size 34*)
- Shielded Sight Glass (comes standard with 1.5" tri clamp connections; 2" inch extender available)
- Display (*with pole mounting bracket*)
- Sensor Cable, USB, 10 feet
- Light-Blocking Tape
- International Power Supply and Power Supply Extension, 10'
- Glass Adapter (optional)
- Warranty Card
- Instructions



Section 6: Installation

Operators that order the Fraction Finder for Ethanol Extraction bundle will receive a Shielded Sight Glass, containing the Fraction Finder Ultra-Sensitive Sensor, Light-Blocking Tape, and Sensor Cable 10'. Therefore, installation is simple and involves the following steps:

1. Attach the sight glass to the extractor's sanitary end clamps.
2. Install the Fraction Finder display.
3. Connect and power the system, then prepare extraction as you typically would.
4. Set integration to AID (Auto) in Fraction Finder Settings.
5. Set scans to average to 5 in Fraction Finder Settings.
6. Toggle the Record button to On to record your run.
7. Observe Cannabinoid and Chlorophyll levels, referencing both plots, but especially the Wavelength View
8. Toggle the Record button to Off to save that run data file.

Examples of the EXTRACTION FINDER on an extraction system. When installing it horizontally (as shown in Image 1) the system should be installed with the thicker part of the sensor facing down. When installing it vertically, have the sensor oriented so that the thicker part of it is on the side with more flow.

Image 1



Image 2



Image 3

