

Summit

High-throughput plate-based SEC and Concentration



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1. Introduction

The Summit instrument is a benchtop automated sample-preparation system for size-exclusion chromatography (SEC) and ultrafiltration concentration. It processes 4–48 samples per run and is operated entirely from an integrated touchscreen.

Summit performs three operations that can be run alone or chained together in a single workflow:

- **Wash** — flushes plates and dispenser lines with buffer. An optional regeneration step can condition Apex columns when Wash is run on its own.
- **Isolation** — runs SEC fractionation on Apex 4B or 6B plates or Apex columns to separate the target species from aggregates and small molecules. Collects 1–3 fractions per sample at 0.5–2.0 mL.
- **Concentration** — uses ultrafiltration on Altitude concentration plates to reduce sample volume to a user-defined final volume.

1.1. Key components

- **Touchscreen** — four menus: RUN (workflows), DATA (run logs — coming in a future release), SERVICE (manual hardware control), and CONFIG (instrument settings).
- **Bottles** — four positions: Buffer, Water (rinse), Regeneration Buffer, and Waste.
- **Deck** — positions for the SEC plates (Apex), three rockers for concentration / collection plates, input plate and output plate (tubes or 96-well plate), tip box, and tip-waste box.
- **Safety hardware** — liquid-level sensors on all bottles and a door interlock that prevents the run from starting until the door is closed.
- **Connectivity** — rear USB-C port for firmware updates (see §6).

1.2. Glossary

- **SEC** — Size-Exclusion Chromatography.
- **UF** — Ultrafiltration.
- **RC** — Regenerated Cellulose (membrane material).
- **DI** — Deionized water.
- **PBS** — Phosphate-Buffered Saline.
- **Apex 4B / 6B** — Everest Biolabs SEC column types with different yield and purity (see Apex datasheet for selection guidance).
- **Altitude** — ultrafiltration or collection plate.
- **Smart Reuse** — lets you skip wells, plate rows, and tip rows that have already been used so partial consumables can be re-run.
- **Smart Collect** — transfers each sample to the output plate as soon as its concentration completes, rather than waiting for the slowest sample.

2. Safety And Hazards

2.1. General Precautions



Everest Biolabs is committed to providing high-quality products that are safe for the user and the environment. Everest Biolabs has followed requirements set by the IEC 61010 series of standards harmonized under the Low-Voltage Directive (LVD). We have carefully designed this instrument to minimize potential hazards to the user.

The user should always follow the directions described in this document, as well as current Good Laboratory Practices (cGLP) and local guidelines.



Only qualified technical personnel should perform service on the instrument.

The instrument weighs 60 kg / 133 lbs. Caution should be used when lifting the box or instrument. Always lift with two people to avoid personal injury.

2.2. Mechanical Hazards



This instrument was designed with safety precautions in place and can only exert minimal force. Some areas of the instrument or its components can present pinch hazards when the instrument is operating. Keep hands and fingers clear of moving parts when the instrument is in operation. Do not open the door during operation.

2.3. Electrical Hazards



The instrument's power supply or power cord must be connected to a power receptacle that provides voltage and current within the specified rating for the system. The use of an incompatible power receptacle may produce electrical shock and fire hazards.

Avoid spilling liquids on the instrument; fluid seepage into internal components creates a potential for shock hazard or instrument damage. If a spill occurs while the instrument is running, abort the program and turn the instrument off. Wipe up all spills immediately. Do not operate the instrument if internal components have been exposed to fluid.

Always turn off the power switch and unplug the power supply before cleaning the outer surface of the instrument.

2.4. Chemical & Biological Hazards



The instrument contains no potentially harmful chemical or biological materials. Some samples may pose a biological hazard. Adequate safety precautions should be taken. Always wear proper protective equipment, such as gloves, glasses, and lab coats. Always follow current Good Laboratory Practices.

Follow all local guidelines for the proper disposal of biohazardous material.

2.5. Disposal



The instrument contains electronic or electrical materials; it should not be disposed of as unsorted waste and must be collected separately, according to the European Union Directive: Waste Electrical and Electronic Equipment - WEEE Directive. The user is fully responsible for ensuring that the obsolete equipment and/or consumables are recycled or disposed of in accordance with this and/or any other relevant laws and regulations in the jurisdictions where the instrument is being recycled or disposed of.

3. Compliance

Everest Biolabs has followed requirements set by the IEC 61010 series of standards harmonized under the Low-Voltage Directive (LVD). EN 61010-2-81 lists “automatic sampler / pipettor / aliquoter” in its extended scope definition. Its general scope is defined as “automatic and semi-automatic laboratory equipment for analysis and other purposes”. According to EU law, conformity may be declared to either the Low Voltage Directive (LVD) or the Machinery Directive (MD), not both. Therefore, conformity for this instrument is declared to the LVD.

FCC Declaration of Conformance: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference (2) This device must not accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

3.1. RoHS

All components and manufacturing processes used in the production of the instrument are compliant with the Restriction of Hazardous Substances (RoHS) 3 directive (2015/863/EU). The EN 62321 standard is used to verify all parts are compliant with RoHS.

3.2. CE Certification

Based on the testing performed and information contained herein, this instrument bears the CE mark.

EU Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Everest Biolabs Inc.
204 Second Avenue
Suite 102
Waltham, MA 02451
USA

For the product: **Summit**

This product conforms with the following European Directives:

Directive 2014/30/EU: Electromagnetic Compatibility

Directive 2014/35/EU: Machinery Safety

Directive (EU) 2015/863 : Restriction of Hazardous Substances (RoHS3)

This product has been designed and manufactured according to the following standards:

EN 61326-1-2021: Electrical Equipment for Measurement, Control, & Laboratory Use

EN 61000-4-2: Electrostatic Discharge

EN 61000-4-3: Radiated EM Fields

EN 61000-4-4: Electrical Fast Transient/Burst

EN 61000-4-5, Surge Immunity

EN 61000-4-6: Conducted Disturbances from RFI

EN 61000-4-11: Voltage Dips, Short Interruptions and Variations

EN 61010-1: Safety requirement for electrical equipment for measurement, control and laboratory use. Part 1, General requirements

EN 61010-2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

EN IEC 63000:2018: Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Name and address of the person authorized to compile the technical file:

Everest Biolabs Inc., 204 Second Avenue, Suite 102, Waltham, MA 02451

X *David Freedman*

David Freedman
President and COO

X *Steven Scherr*

Steven Scherr
VP of Product Development

4. Summit Overview

4.1. Summit Specifications

SUMMIT INSTRUMENT SPECIFICATIONS		
Units	<i>Imperial</i>	<i>Metric</i>
Dimensions (W x D x H)	37" x 26" x 30"	93 x 65 x 76 cm
Weight	133 lbs.	60 Kg
Bottle Capacity	1 U.S. gallon	4 L
User Interface	5.6"	143 mm
Environmental Temperature	50°F-75°F	10°C -24°C
Relative Humidity	30-80% RH	
Input Power	100~240 VAC (50-60 Hz)	
Power Supply Unit	24 VDC, 5 A, 120 W	
Connectivity	USB 3.1 for software update	
Chemical Compatibility	PBS, DI, 70% ethanol, dilute sodium hypochlorite	

4.2. Summit Consumables

Part Name	Vendor (Mfg)	Vendor Part # (Mfg Part #)
1. Apex 24-well SEC plate	Everest Biolabs	APEX-4B-PLATE24 APEX-6B-PLATE24
2. Altitude 10k UF Plate (2 pack)	Everest Biolabs	ALTITUDE-RC-10K-2
3. Altitude Collection Plate (10 pack)	Everest Biolabs	ALTITUDE-COLLECT-10
4. Deep well plate	Fisher (Eppendorf)	E0030504305 (0030504305)
5. Pipette tips	Fisher (Fluotics)	NC2195934 (LHA1000.ST)
6. Alternative pipette tips	Thermo Fisher	904-021
7. 2.0 mL Low Bind Tubes	Fisher (Eppendorf)	13-698-795 (022431102)

4.3. Summit Possible Run Settings

The Summit instrument is capable of running a variety of plates, columns, collection, and concentration plates. Physical limitations limit the available options, e.g. you cannot run 48 samples with tubes since the tub holder can only hold 24 samples. The table below shows the various run configurations available depending on the run settings.

SEC Type	1 Fraction	2-3 Fractions	Smart Reuse	Cleaning Solution
1 Plate	All options available	96 Deepwell plate required for >8 samples	All options available	Available with wash only
2 Plates	96 Deepwell plate required for >24 samples	Not available	All options available	Available with wash only
1 Column Adapter	All options available	96 Deepwell plate required for >8 samples	Cannot skip wells	Available with wash only
2 Column Adapter	All options available	Not available	Cannot skip wells	Available with wash only

4.4. Summit Contents

BOX CONTENTS

Summit Instrument
Buffer Bottles (Qty. 4) – Buffer, Water, Regeneration Buffer, Waste
Apex Column Adapter (Qty. 2)
Apex Mini Column Adapter (Qty.1)
SEC plate tip holder
Power Supply and Cable
USB-C Cable

4.5. Setup Instructions



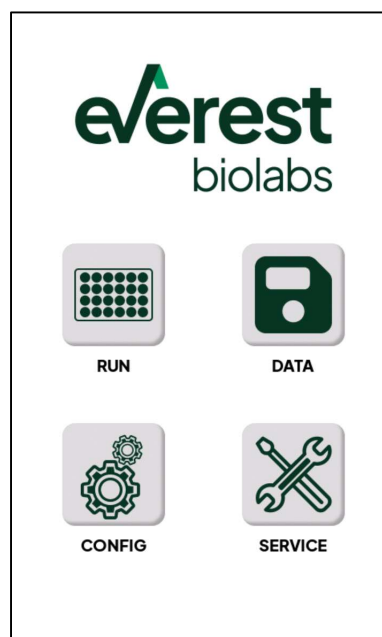
The Summit instrument is heavy. Caution should be used when lifting the box or instrument. Always lift with two people to avoid injury. A trained technician must unbox and install the summit.

Do not unbox the instrument. Only trained personnel should unbox and set up the Summit.

4.6. Operating Instructions

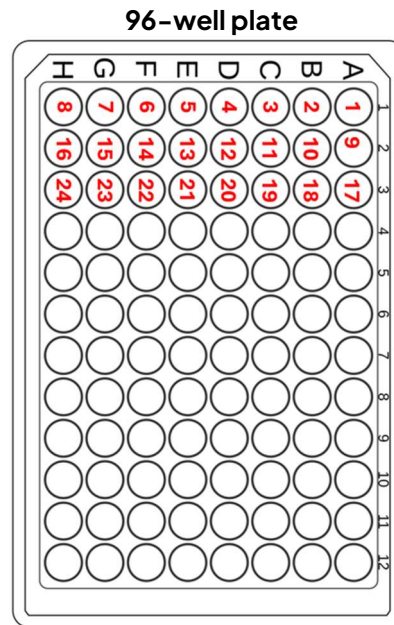
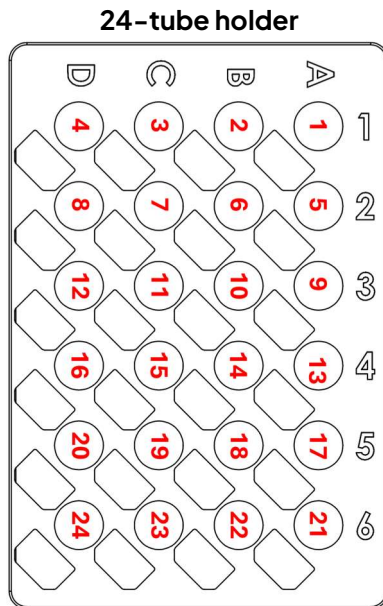
The Summit instrument is controlled by the onboard touch screen. The "HOME" screen is visible when you power on the instrument. From this screen, you have four options: RUN, DATA, CONFIG, and SERVICE.

1. The **RUN** button (§4.8) guides you through the steps for isolating samples, washing plates, and/or concentrating samples.
2. The **DATA** button (§4.9) is reserved for a future release.
3. The **SERVICE** button (§4.10) lets you control the individual functions of the instrument's hardware.
4. The **CONFIG** button (§4.11) lets you set and save instrument features.

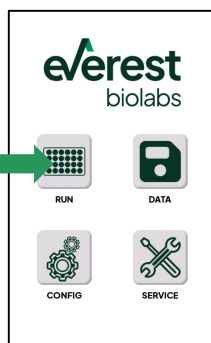


4.7. Sample Loading

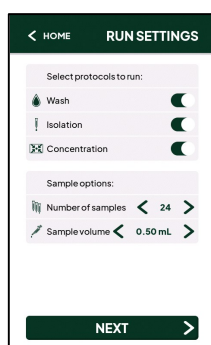
Load samples starting at A1 and row 1, from right to left, before moving to row 2. Load the input into the Summit with A1 in the back right of the input plate holder. The same procedure is used for loading samples in the 24-tube holder.



4.8. Setting Up a Run



1. From the home screen press the “RUN” button.



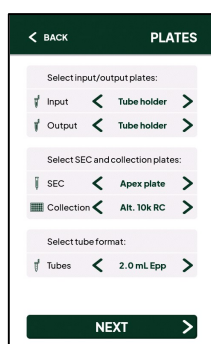
2. On the “RUN SETTINGS” screen, configure your collection parameters. First, select the processes you want to run: **Wash**, and/or **Isolation**, and/or **Concentration**.

Then choose the sample options.

- a. Number of samples: 4-48
- b. Sample volume: 0.1-1.0 mL

NOTE: Apex columns cannot be used if you select greater than 24 samples

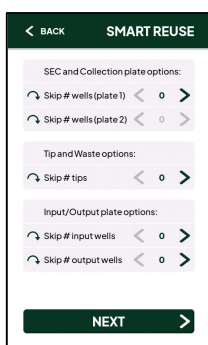
3. Select “NEXT” to go to the “PLATES” screen. This screen lets you set the additional options:
set



- a. Input Plate: Tube holder, Epp96 plate, none
- b. Output Plate: Tube holder, Epp96 plate, none
- c. SEC: Apex plate or Apex columns
- d. Collection: Alt. 10kRC, Alt. 10kPES, Alt. Collection,
- e. Tube Format: 2.0mL Epp

NOTE:

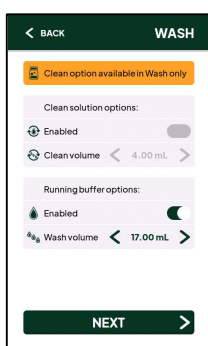
- The “none” option on the input plate, is only an option when using the concentrate only protocol. Sample must be manually loaded directly into the filter plate.
- If “none” is selected on the output plate, then samples will remain in the collection plate and not be transferred to the output plate.



4. Select “NEXT” to go to the “SMART REUSE” screen.

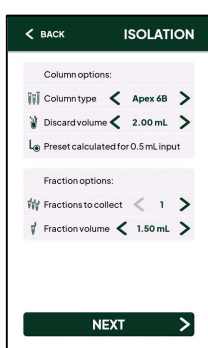
You can skip wells in the SEC and collection plate, rows of pipette tips, and rows in the input and output plates. This allows you to use partial plates or tips and reduce waste.

NOTE: It is not recommended to use partial concentration plates. The membrane is very delicate and used wells may not hold vacuum properly.



5. Select “NEXT” to go to the “WASH” screen.

You can only enable the regeneration option if Wash is the only protocol selected in the RUN SETTINGS screen. Regeneration wash will dispense regeneration wash buffer followed by the standard buffer wash.



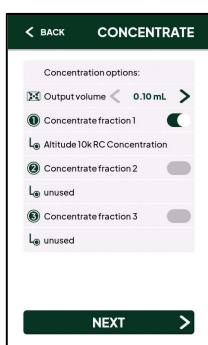
6. Select “NEXT” to go to the “ISOLATION” screen. Here you define the column options and fraction options.

Column Options.

- a. Column type: Apex 4B, Apex 6B, or Apex MM
- b. Discard Volume: 0-4.0 mL

Fraction Options.

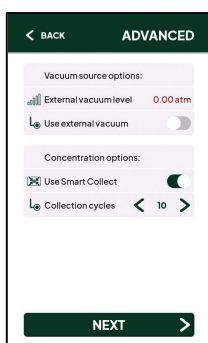
- a. Fractions to collect: 1-3
- b. Fraction volume: 0.5-2.0 mL



7. Select “NEXT” to go to the “CONCENTRATE” screen.

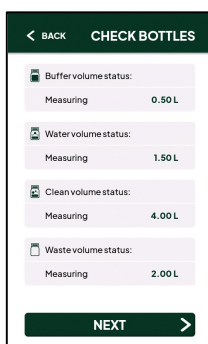
Here you select which fractions (or plates) to concentrate and the final volume of the resuspended sample.

The type of plate needed is shown after making this selection

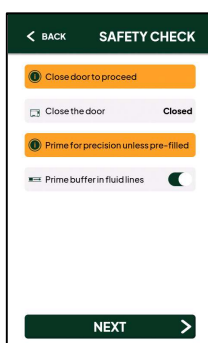


8. Select “NEXT” to go to the “ADVANCED” screen. This screen allows:
- select house vacuum or internal vacuum
 - Configure concentration options. Smart Collect will transfer samples to the output as they complete concentration. Turning this off will transfer all samples once the last one has completed.

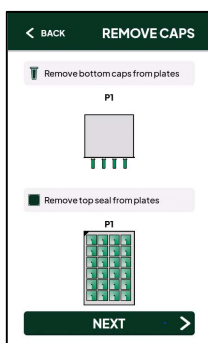
NOTE: House vacuum must reach 0.3 atm or lower to use on the Summit



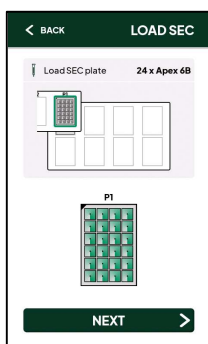
9. Select “NEXT” to go to the “CHECK BOTTLES” screen. This screen uses liquid level sensors to determine if you need to add additional volume or empty the waste container. You cannot proceed until all check marks are green.



10. Select “NEXT” to go to the “SAFETY CHECK” screen where you are required to close the door. You may also choose to prime buffer lines. We recommend priming whenever precision dispensing is required. After selecting next, the instrument will initialize all hardware required for the selected run

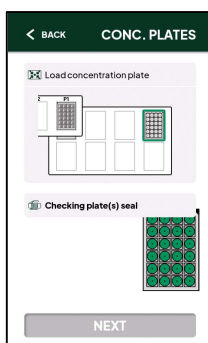


11. Remove bottom caps from the plate or columns at this point. Remove the top seal from the plate after you place it in the holder, to avoid droplets falling.



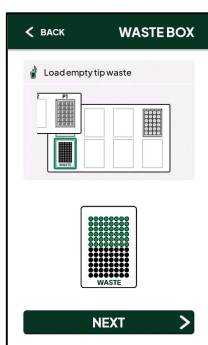
- Select "CONTINUE" to go to the "LOAD SEC" screen. Place the plate on the correct position as indicated on the screen. Finally, remove the upper plate seal.

If only a fraction of the plate is being used (<24 wells), after placing the plate in the SEC plate position, gently cut the plate seal using a blade before removing the upper plate seal from the wells to be used. This will keep the unused wells sealed.

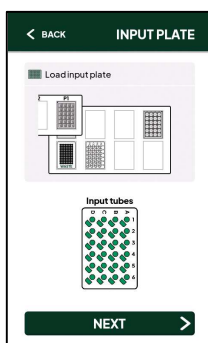


- Select "NEXT" to go to the "CONC. PLATES" screen where you are asked to load Altitude UF filter plates for the SEC fractions. If you are not concentrating, you are asked to load Altitude collection plates. Vacuum is applied to the plate to ensure it is properly seated. If the plate fails this test and is properly seated, replace it with a new plate.

NOTE: Place the plate in the rocker and press down until it **snaps into place**. Concentration plates can only be used one time, even if they are partially used. Once the membrane is wetted and dried, it may crack and lose its integrity.

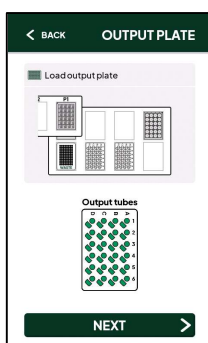


- Select "CONTINUE" to go to the "WASTE BOX" screen, where you are asked to load an empty tip waste collection box.

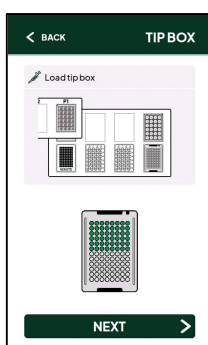


- Select "CONTINUE" to go to the "INPUT PLATE" screen where you are asked to load your input plate. Use only the recommended deep well plate or tube rack. Refer to plate map for additional information on loading samples.

NOTE: Load an additional 25uL sample in the input plate to account for the well dead volume.

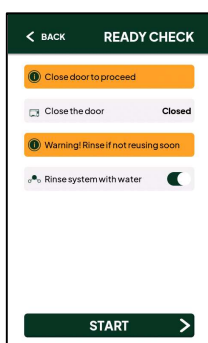


16. Select “CONTINUE” to go to the “OUTPUT PLATE” screen where you are asked to load the output plate. Use only the recommended deep well plate or tube rack.

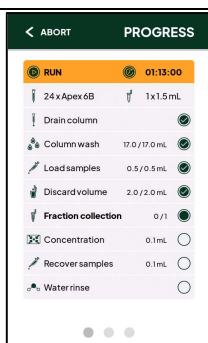


17. Select “CONTINUE” to go to the “TIP BOX” screen, where you load a box of the compatible 1 mL tips. Place the front edge of the tip holder in the box first, then press the edge closest to you. Make sure the tips snap into place.

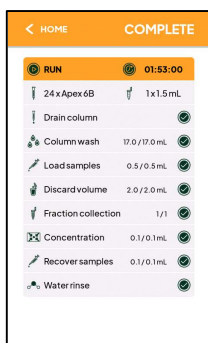
NOTE: Only use the tips recommended in this document.



18. Select “CONTINUE” to go to the “READY CHECK” screen. Close the door and press “START” to begin the run. If you are planning to use the instrument again the same day, you may turn off water rinse. Otherwise, we recommend leaving it on.



19. The “PROGRESS” screen shows the steps the instrument will perform, along with the current step, and experimental time.

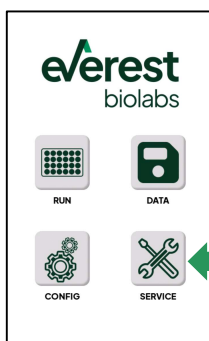


20. The “COMPLETE” screen is displayed when the run has finished successfully. You may now retrieve your samples. Select “HOME” to return to the HOME screen.

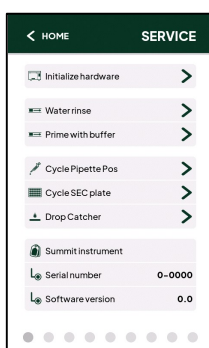
4.9. Data

Functionality of the data menu will be added via a future software update.

4.10. Service Menu

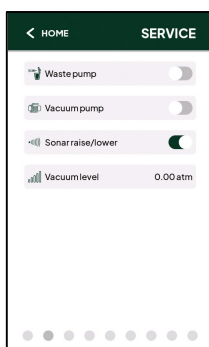


1. From the home screen press the “SERVICE” button.



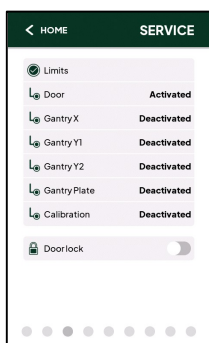
2. On the “SERVICE” screens you can control most of the instrument functions independently.

- a. Initialize Hardware – Initializes stages, pumps, and pipettes
- b. Water rinse
- c. Prime with buffer
- d. Cycle Pipette Pos – Moves the pipettes
- e. Cycle SEC Plate – Moves the SEC plate holder
- f. Drop Catcher – Moves the drop catchers

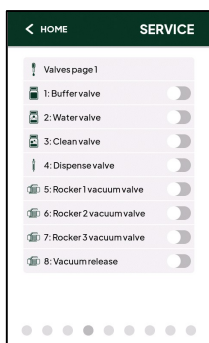


3. The second “SERVICE” screen allows you to toggle on and off the waste pump and vacuum pump, as well as extend the ultrasonic sensor.

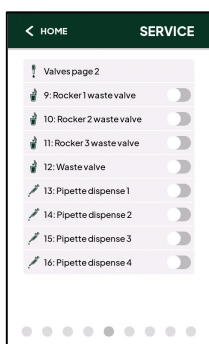
NOTE: Do not lower the sonar unless there is >100mm clearance below it.



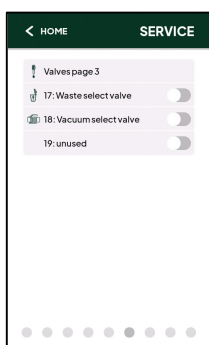
4. The third “SERVICE” screen allows you to see the state of the integrated proximity sensors. You can also toggle the door lock when the door sensor is activated.



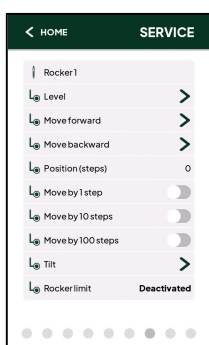
5. The fourth “SERVICE” screen allows you to toggle on and off the listed valves



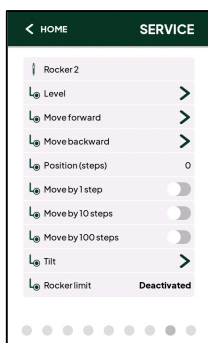
6. The fifth “SERVICE” screen allows you to toggle on and off the listed valves



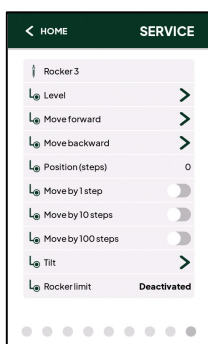
7. The sixth “SERVICE” screen allows you to toggle on and off the listed valves



8. The seventh “SERVICE” screen allows you to level or tilt rocker 1. You can also manually adjust the position by selecting a number of steps and moving forward or backward.

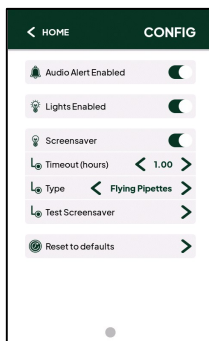


9. The eighth “SERVICE” screen allows you to level or tilt rocker 2. You can also manually adjust the position by selecting a number of steps and moving forward or backward.



10. The ninth “SERVICE” screen allows you to level or tilt rocker 3. You can also manually adjust the position by selecting a number of steps and moving forward or backward.

4.11. Config Menu



1. The CONFIG screen allows you to modify certain instrument settings. In the first screen you can enable/disable:
 - a. Audio Alert
 - b. Lights
 - c. Screensaver

5. Maintenance

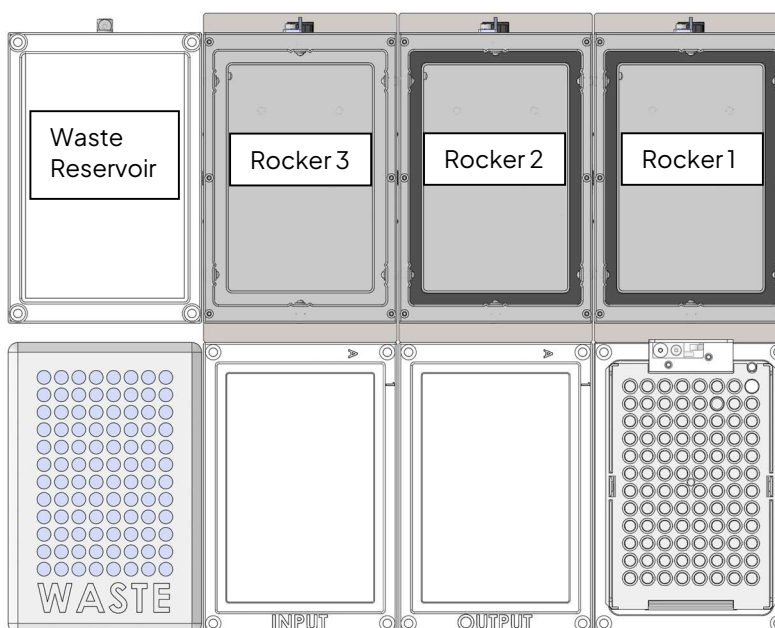
Regular maintenance is required to achieve optimal performance on the Summit instrument. This section provides guidelines and instructions for regular maintenance.

5.1. Water Rinse

The Summit instrument has a built-in feature that flushes the fluidic lines and dispenser needles with water at the end of every run. The water rinse feature is turned on by default in the READY CHECK screen during a run. The water rinse feature can prevent buildup of salt or other material and reduce the likelihood of clogs or poor performance.

5.2. Cleaning Waste Reservoir and Rockers

The waste reservoir and rockers on the deck of the instrument may appear dirty due to dried salt build up. Cleaning should be done monthly or any time it appears visually dirty. To clean the waste reservoir and rockers:



1. Open the door and clean the surface of the waste reservoir and rockers using DI water followed by 70% ethanol and a non-abrasive laboratory wipe or clean rag. Make sure the gaskets are clean of debris and free of damage.

5.3. Preventative Maintenance

Preventative maintenance should be performed monthly under normal use or as needed to avoid contamination. To perform preventative maintenance:

1. Follow the instructions above for cleaning the waste reservoir.
2. Fill the Buffer bottle with 1000 mL of 0.5% sodium hypochlorite solution (10% bleach) and re-connect the tubing.
3. Navigate to the first service screen and *Initialize Hardware*. Once initialization is complete, select *Prime with buffer* on the first service screen.
4. Let the fluid sit for 10 minutes.

5. Replace the sodium hypochlorite solution in the buffer bottle with water. Make sure to thoroughly wash the bottle.
6. Select *Prime with buffer* on the first service screen.
7. Replace the remaining fluid in the buffer bottle with working buffer (PBS).
8. Select *Prime with buffer* on the first service screen.
9. Using a non-abrasive laboratory wipe or clean rag, gently clean the dispensing needles and rails with DI followed by 70% ethanol.

5.4. Decontamination

To decontaminate the surfaces of the instrument, ensure that the instrument is turned off and unplugged. The entire instrument exterior and interior may be cleaned with 70% ethanol using a non-abrasive laboratory wipe or towel.

To decontaminate the fluidic lines:

1. Fill the Buffer bottle with 1000 mL of 0.5% sodium hypochlorite solution and re-connect the tubing.
2. Navigate to the first service screen and *Initialize Hardware*. Once initialization is complete, select *Prime with buffer* on the first service screen.
3. Let the fluid sit for 1 hour.
4. Replace the sodium hypochlorite solution in the buffer bottle with water. Make sure to thoroughly wash the bottle.
5. Select *Prime with buffer* on the first service screen.
6. Disconnect, empty the bottle, and reconnect the empty bottle. Note: The instrument will not function without a bottle attached.
7. Select *Prime with buffer* on the first service screen.

5.5. Transport

Never move the instrument without support from Everest Biolabs. Moving the instrument on your own may cause injury and void the warranty.

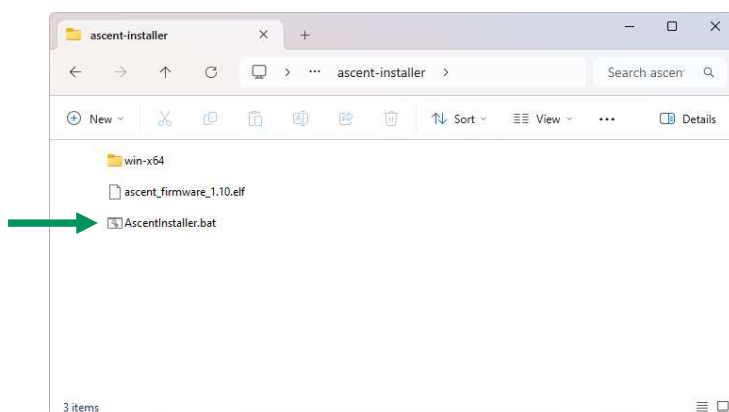
6. Updating Firmware

This procedure requires a Windows (x64) computer with a USB port and a USB-C cable to connect to the instrument.

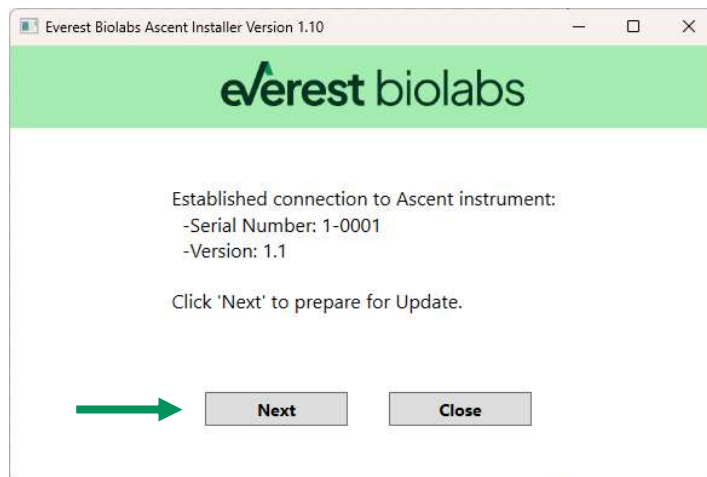
Note: The USB-C cable may be orientation dependent. If the instrument is not recognized when connected to the computer, flip the USB-C connector where it is plugged into the instrument or also on the computer.

1. Download or copy installer package onto the computer to be used for installation (<https://everestbiolabs.com/support/>).
2. Unzip the file.
3. Connect the USB between the computer and the instrument and turn on instrument power.

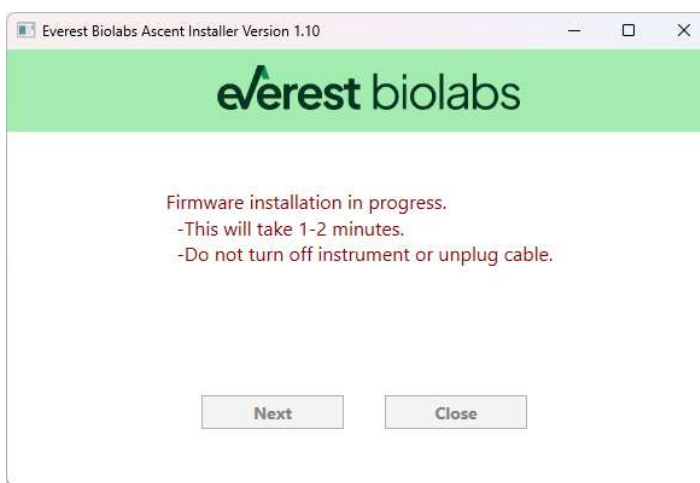
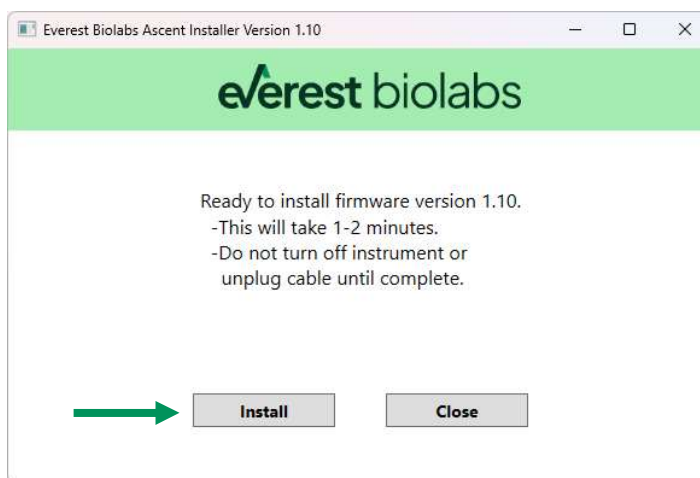
Note: The USB-C cable may be orientation dependent.
4. Open the unzipped folder and double-click the SummitInstaller.bat file.



5. For updating an instrument, click 'Next' to continue.



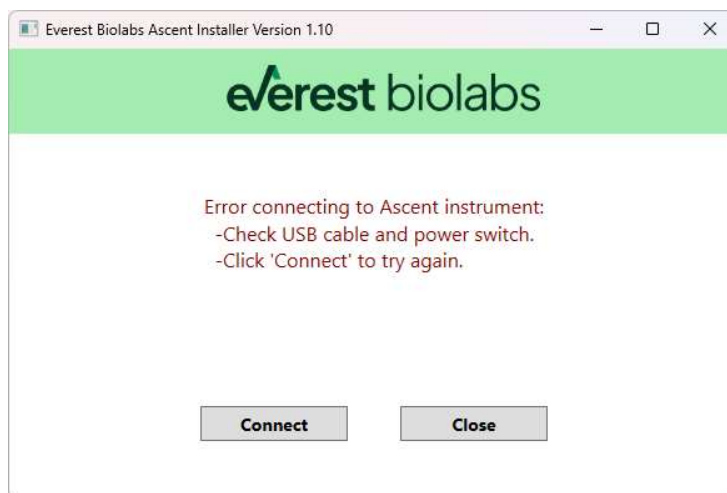
6. Click 'Install' when ready. It will take approximately 1 minute for the firmware to be downloaded to the instrument. Do not disconnect the cable or turn off the instrument power until it is complete.



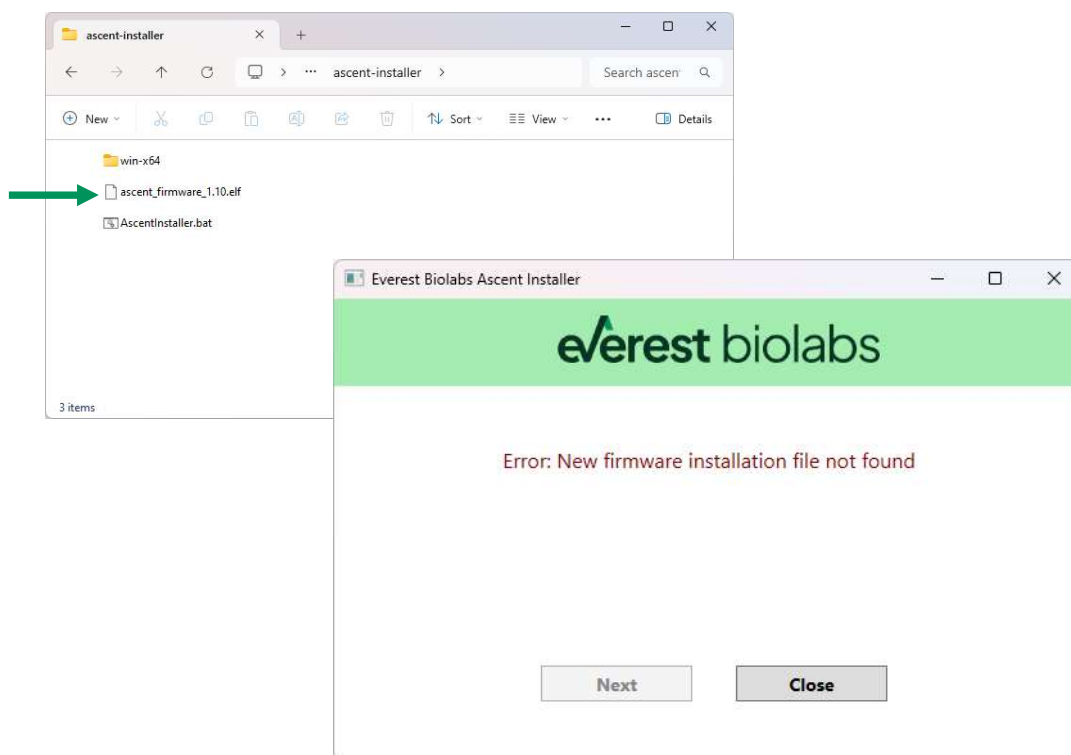
7. If installation completes successfully, close the program and disconnect the USB cable.



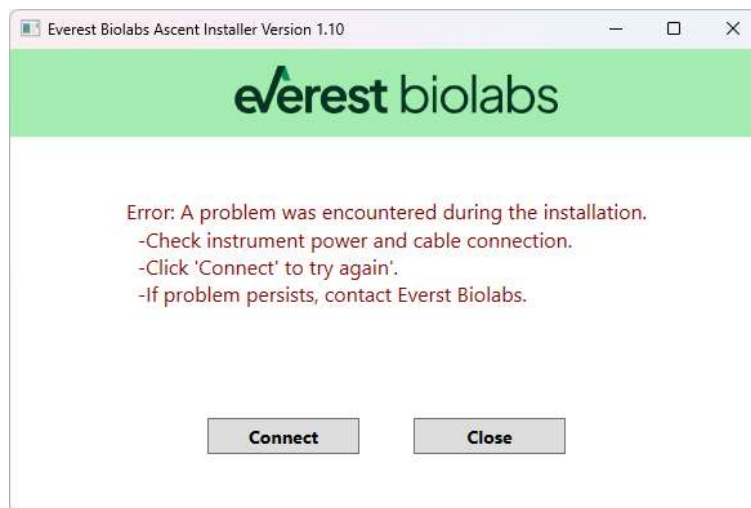
6.1. Firmware Troubleshooting



1. If the program fails to connect to the instrument at startup, confirm that the USB cable is connected, and the instrument is powered. Then click 'Connect'.
2. If the instrument still does not connect, flip the USB connector where it plugs into the back of the instrument. Then click 'Connect'.
3. If the firmware installation file is not found, confirm that the .elf firmware binary file is included in the installer folder from step 4.3. The filename should have the version number at the end (major and minor).



4. If an error occurs during the firmware download to the board, check the connections and try again. If the problem persists, open the win-x64 folder shown above and open the Summit_installer.log file and inspect it for error messages.



7. Troubleshooting

Problem	Possible Cause	What To Do
Instrument unresponsive	<ul style="list-style-type: none"> • Software malfunction • Electrostatic event 	<ul style="list-style-type: none"> • Power cycle the instrument
Liquid not dispensing properly	<ul style="list-style-type: none"> • Bottles may be out of liquid • Connector on bottle may not be connected properly • Salt build-up in dispensing needles • Salt build-up on outside of dispensing needle 	<ul style="list-style-type: none"> • Refill buffer and empty waste • Remove and re-connect the tubing. Ensure it is pushed in until it stops, and no bubbles are seen in the tube during priming • Perform monthly preventative maintenance and clean dispensing needles
Stage not moving, making loud noise, and not going to expected position	<ul style="list-style-type: none"> • Stage failed to home correctly • Salt build up on stage rails 	<ul style="list-style-type: none"> • Power cycle the instrument • Wipe stage rails with DI wetted Kimwipe
Run will not proceed	<ul style="list-style-type: none"> • Insufficient vacuum or damaged plate • Plates in wrong position • Door not closed • Insufficient buffer or waste volume • 	<ul style="list-style-type: none"> • Ensure the plates are in the correct slot • Ensure the tube rack platform is used if appropriate • Open and close door
LEDs are not turning on or show random colors	<ul style="list-style-type: none"> • Loose electrical connection • Electrostatic discharge • Damaged electronics • Water damaged electronics 	<ul style="list-style-type: none"> • Contact Everest Biolabs for assistance
Fractions are not expected volume	<ul style="list-style-type: none"> • Not enough buffer in bottle • Malfunctioning ultrasonic sensor 	<ul style="list-style-type: none"> • Fill buffer bottle to appropriate volume • Ensure cone on ultrasonic sensor is attached

If your problem is not listed, power cycle the instrument by toggling the power button on the rear of the instrument.

If your problem was not resolved by the troubleshooting options, please contact Everest Biolabs or report any issues at www.everestbiolabs.com/support/.