PATsmart™ ZipChip® Interface

Quick Reference Guide

24/7/365 Support: 1-888-927-3035

Table of Contents

General Guidance & Specifications

Intended Use

The ZipChip Interface (ZCI) is a Microfludic Zone Electrophoresis (MZE) - Electrospray Ionization (ESI) source. It is available in two mounting configurations: ZCI Classic is designed to be used in conjunction with Thermo Exactive, Q Exactive and LTQ families of Mass Spectrometers (MS) while the ZC-Ti is designed for Thermo Orbitrap Fusion and TSQ2 Series MSs. The ZipChip Interface and its accessories/consumables are intended for research use only.

General Safety Warnings

Do not use the ZipChip MZE-ESI unless properly trained in its safe operation. This equipment uses voltages which may result in injury. The ZipChip MZE-ESI system is a Class 1 Laser Product. Safety features have been incorporated in the design, but for continued safety, only trained personnel are allowed access to the equipment. Use only Repligen approved AC power supplies, cables, accessories and consumables. Contact Repligen directly to obtain any necessary additional, consumable, or replacement components. Damage to the device may result from improper use. The ZCI should only be operated in a clean laboratory environment. All maintenance should be performed by a qualified technician. Contact Repligen to obtain additional information.

Specifications

Physical (ZCI Classic):	7” x 6” x 10.5”
Physical (ZC-Ti):	8” x 7.5” x 11.6“
Weight:	~16lbs
Power:	24V DC, 65W
Certifications:	UL/CSA/IEC 61010-1 3rd Edition
Class 1 Laser Product:	21CFR 1040.10 & 1040.11
Ingress Protection:	IP X0 (per IEC 60529)
Operating Range:	20°C - 40°C
Storage Temp:	0°C - 60°C

Manufacturer

REPLIGEN

Repligen Corporation
685 Route 202/206
Bridgewater, NJ 08807, USA
TechSupport@repligen.com
24/7/365 Support 1-888-927-3035

Getting Started

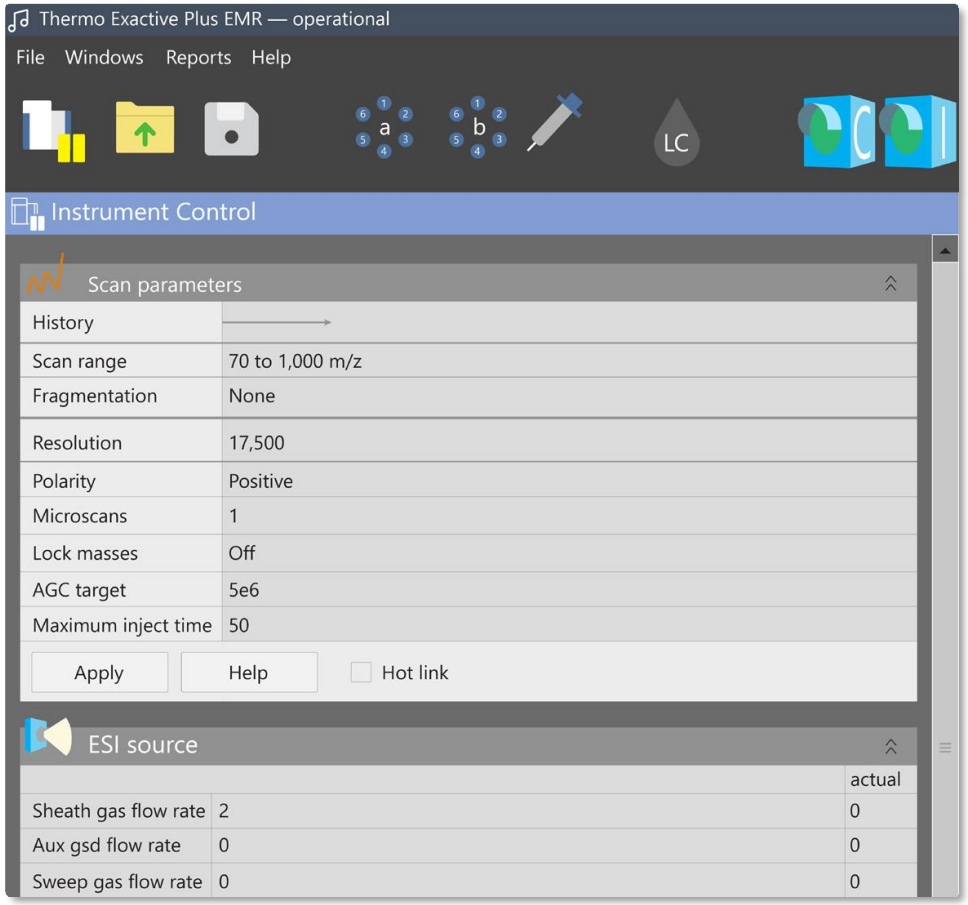
Device Setup & Installation

ZipChip Interface Installation: ZCI Classic

Step One

Thermo Exactive MS Configuration: MS Tune File/MS Standby

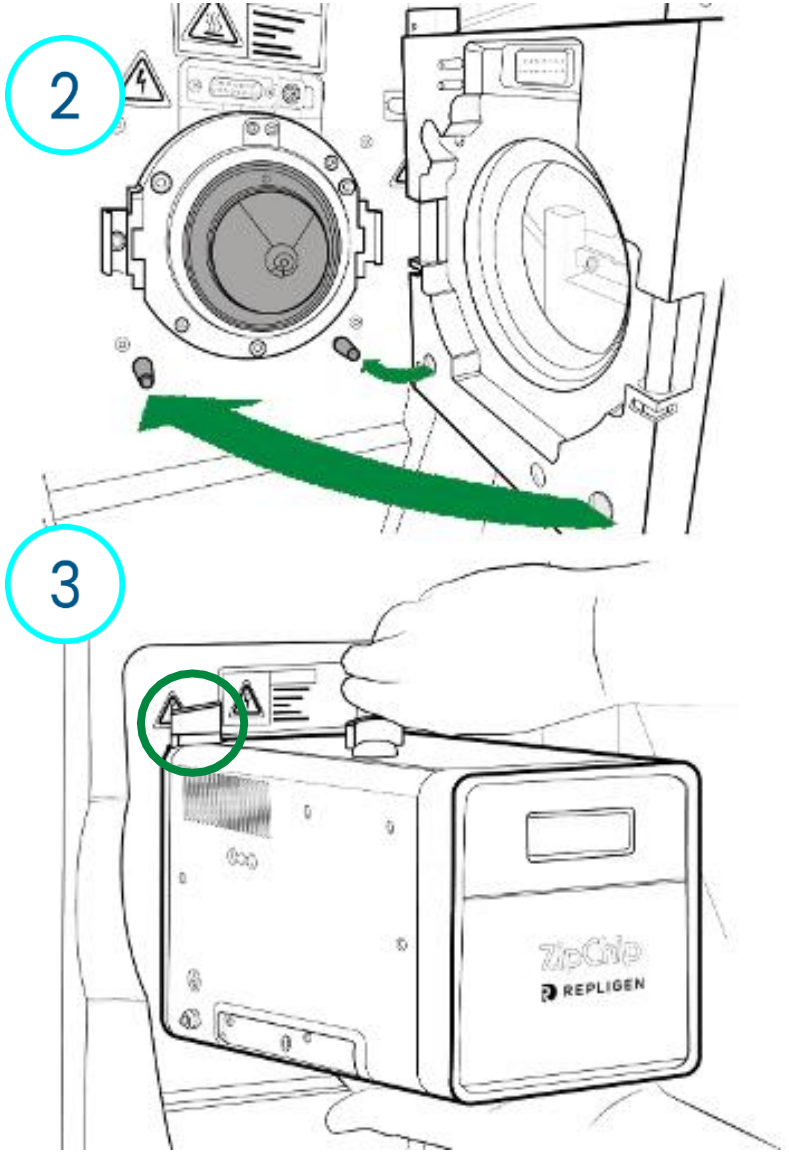
1. Save any unsaved/important changes in your existing Tune File.
2. Create a new Tune File: click **Save As** and use **ZipChip Default** for your tune file name.
3. Put the MS into Standby Mode.



Step Two

Thermo Exactive MS Configuration: Mounting the ZCI to a Q Exactive, Exactive, LTQ or Orbitrap Series MS

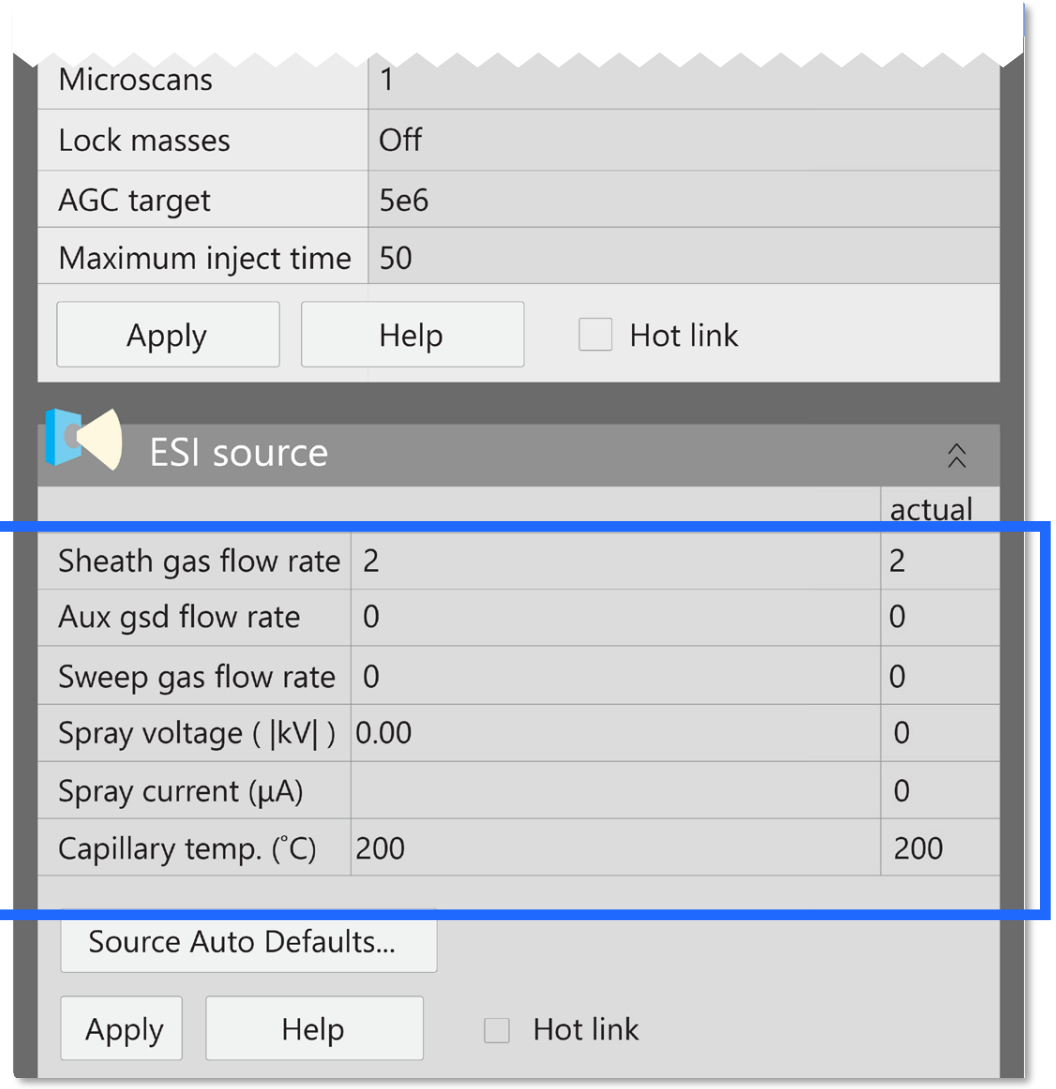
1. Remove your existing source (if any), including the sweep cone.
2. Mount the ZCI by aligning the mechanical mounts for the ZCI with the Thermo MS mounts.
3. Secure the ZCI on the MS mounts by turning the latches on the top of the ZCI system.



Step Three

Thermo Exactive MS Configuration: MS ZCI Settings

1. Confirm that the Tune page recognizes an **ESI** source.
2. With the MS still in standby mode, configure the settings shown at RIGHT for the **ESI** source.
    - Sheath gas flow rate: 2
    - Aux gas flow rate: 0
    - Sweep gas flow rate: 0
    - Spray voltage: 0
    - Capillary temp: 200
3. Save the Tune file **ZipChip Default**
4. Put the MS in the **ON** state.

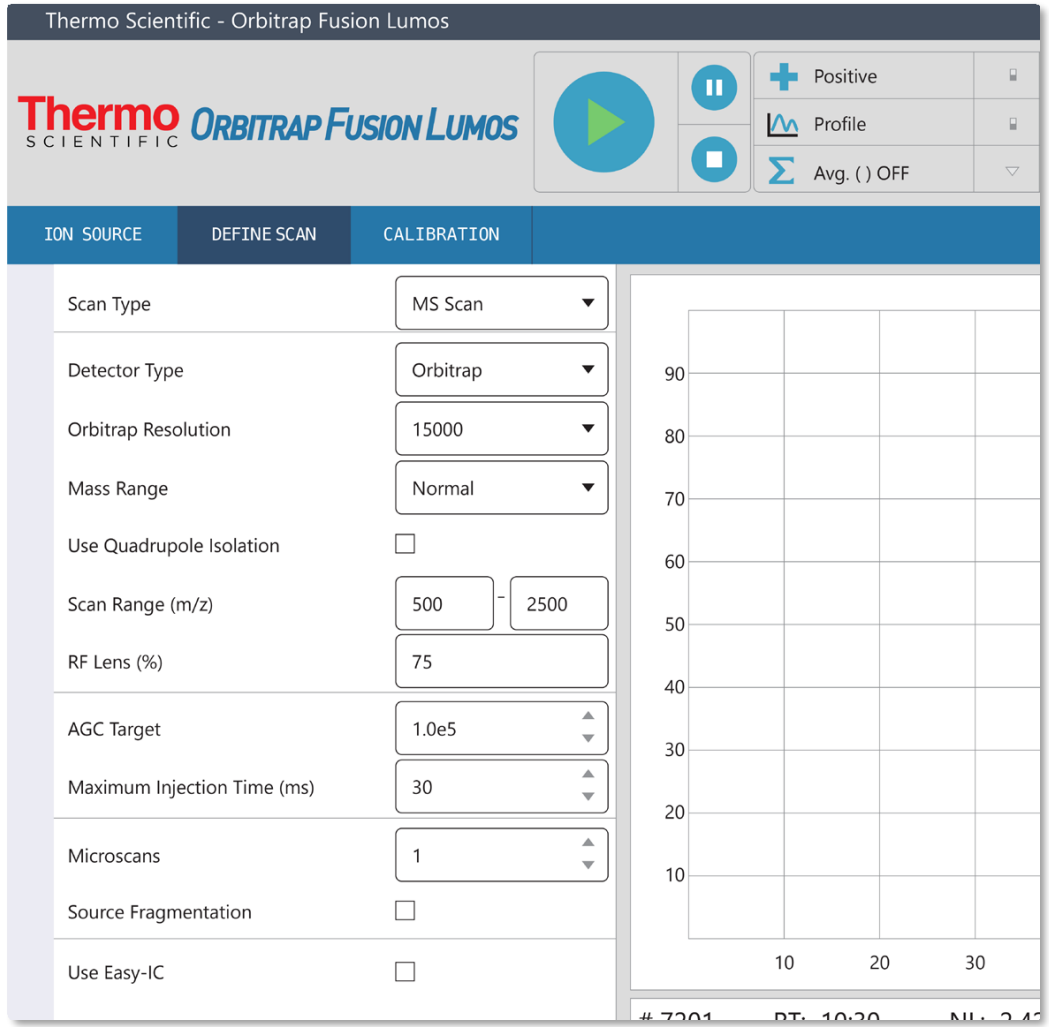


ZipChip Interface Installation: ZC-Ti

Step One

Thermo Orbitrap Fusion MS
Configuration: MS Tune File/MS Standby

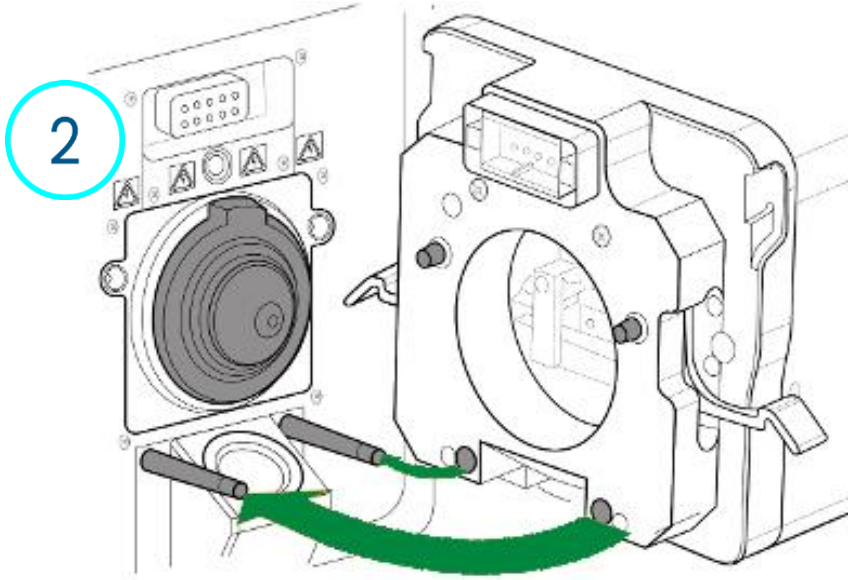
1. Save any unsaved/important changes in your existing Tune File.
2. Create a new Tune File: click **Save As** and use **ZipChip Default** for your tune file name.
3. Put the MS into Standby Mode.

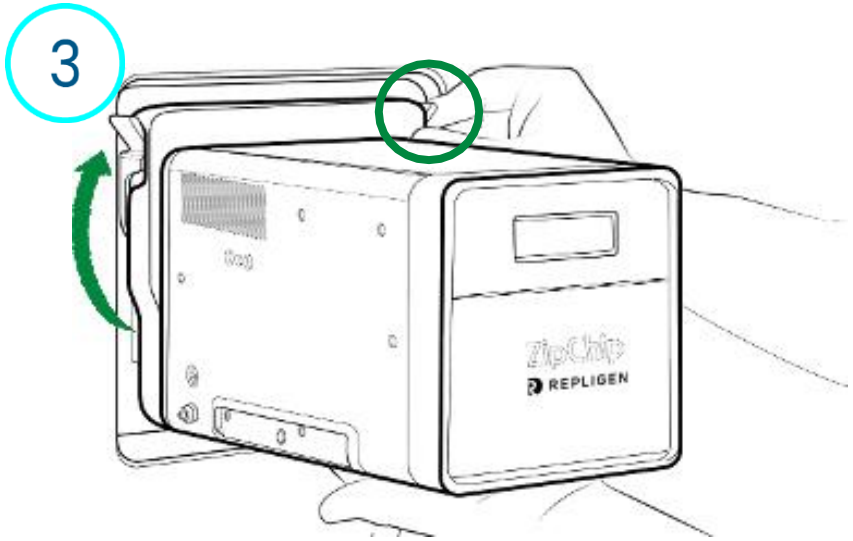


Step Two

Thermo Orbitrap Fusion MS Configuration: Mounting the ZC-Ti to a Orbitrap Fusion or TSQ2 Series MS

1. Remove your existing source (if any), including the sweep cone.
2. Mount the ZCI by aligning the mechanical mounts for the ZCI with the Thermo MS mounts.
3. Secure the ZCI on the MS mounts by turning the latches on the top of the ZCI system.

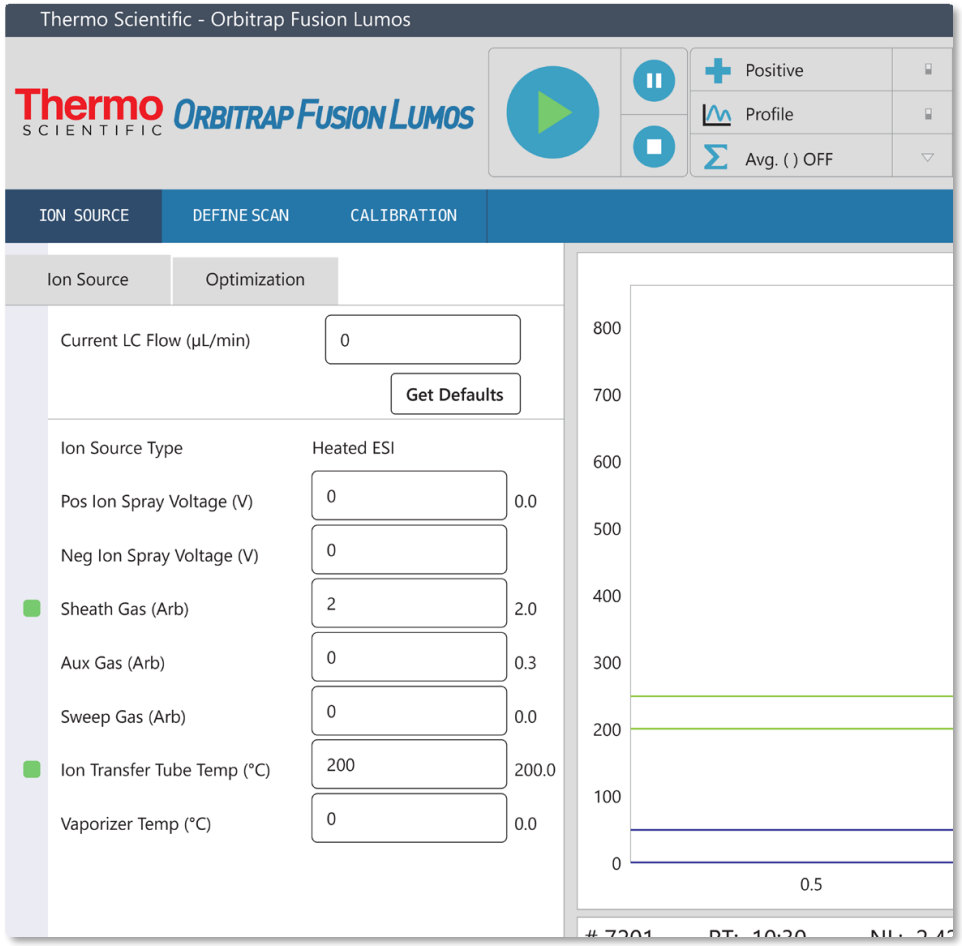




Step Three

Thermo Orbitrap Fusion MS Configuration: MS ZC Settings

1. Confirm that the Tune page recognizes a **Heated ESI** source.
2. With the MS still in standby mode, configure the settings shown at RIGHT for the **Heated ESI** source.
    - Pos Ion Spray voltage: 0
    - Neg Ion Spray voltage: 0
    - Sheath gas flow rate: 2
    - Aux gas flow rate: 0
    - Sweep gas flow rate: 0
    - Ion Transfer Tube Temp: 200
    - Vaporizer Temp: 0
3. Save the Tune file **ZipChip Default**
4. Put the MS in the **ON** state.

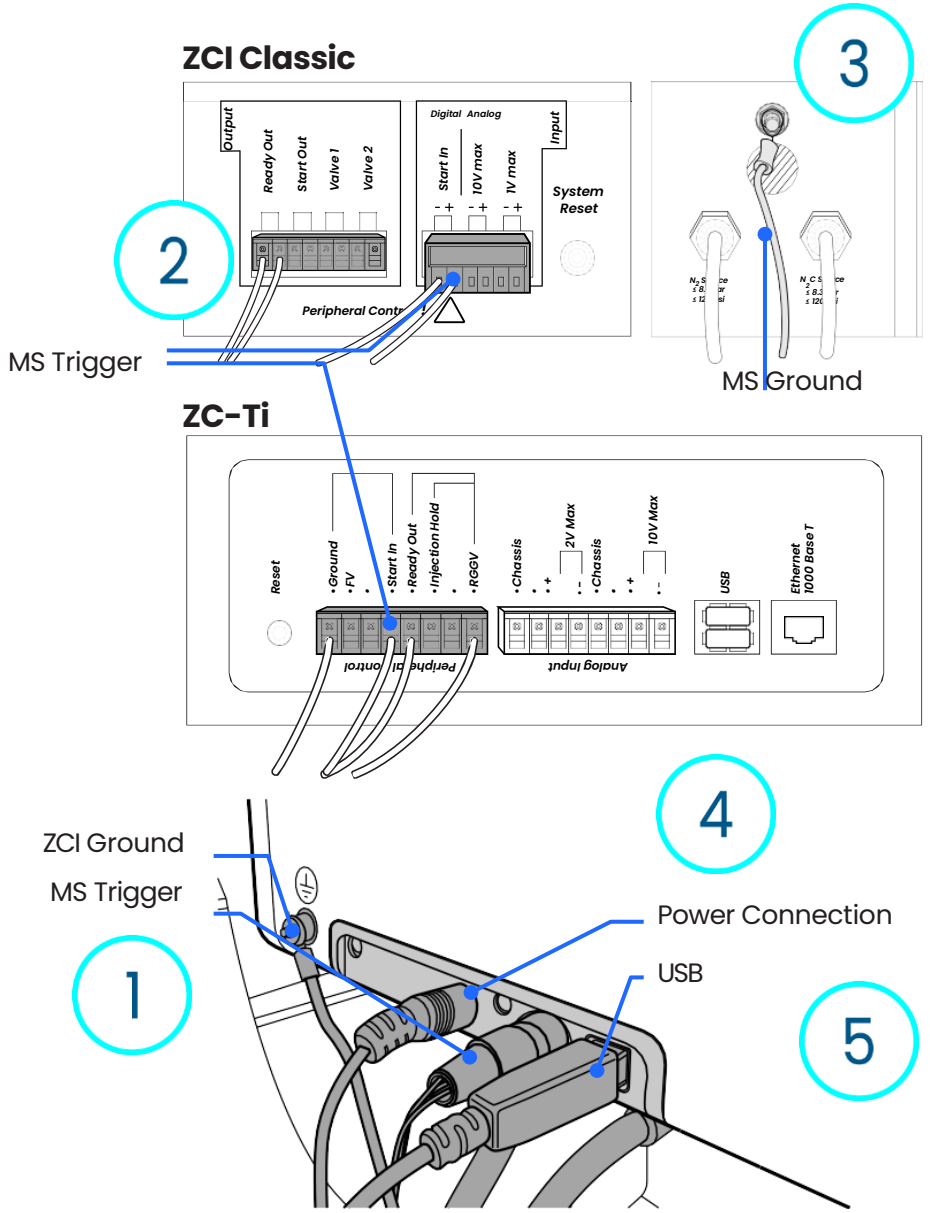


ZipChip Interface Installation: Both

Step Four

Attach the ZCI Cables

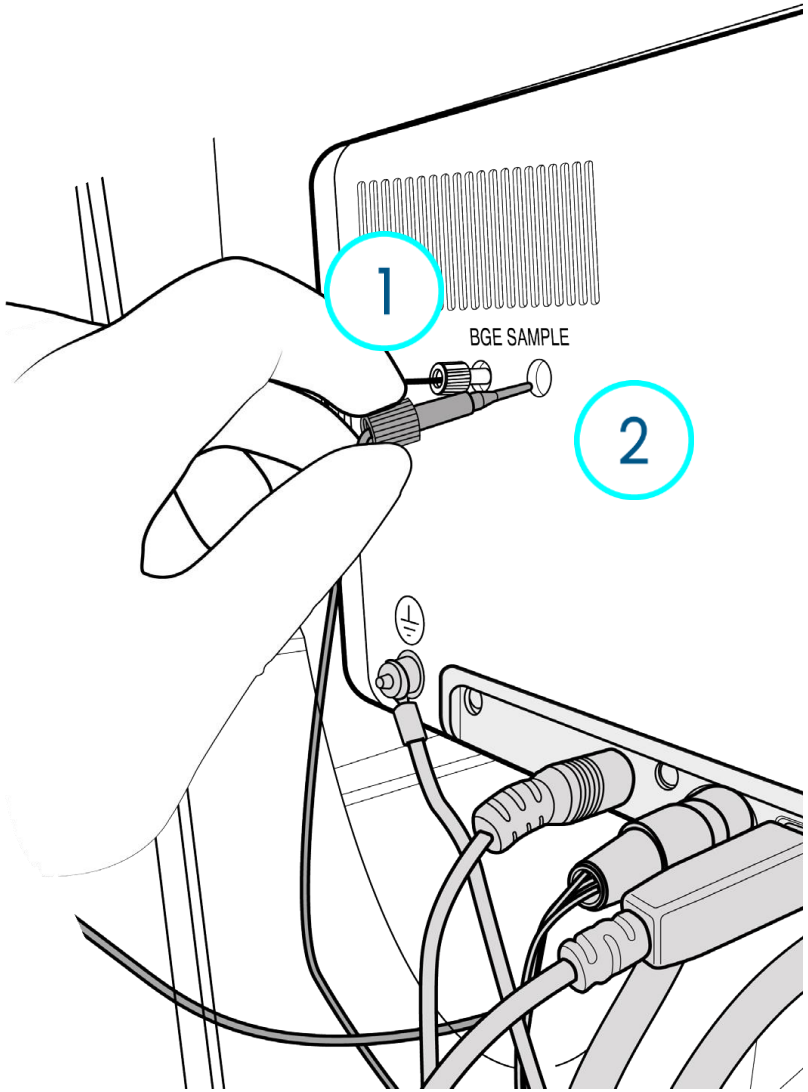
1. Attach the MS Trigger cable and grounding cable to the ZCI.
2. Connect the green terminal connector(s) of the MS trigger cable to the Peripheral Control port(s) on the MS.
3. Connect the other end of the grounding cable to the ground bolt on the back of the mass spectrometer.
4. Plug in the ZCI AC power cable.
5. Attach the USB cable to the ZCI and then the ZCI-controlling laptop/PC. The ZCI will not turn on until the USB connection is made on the ZCI.



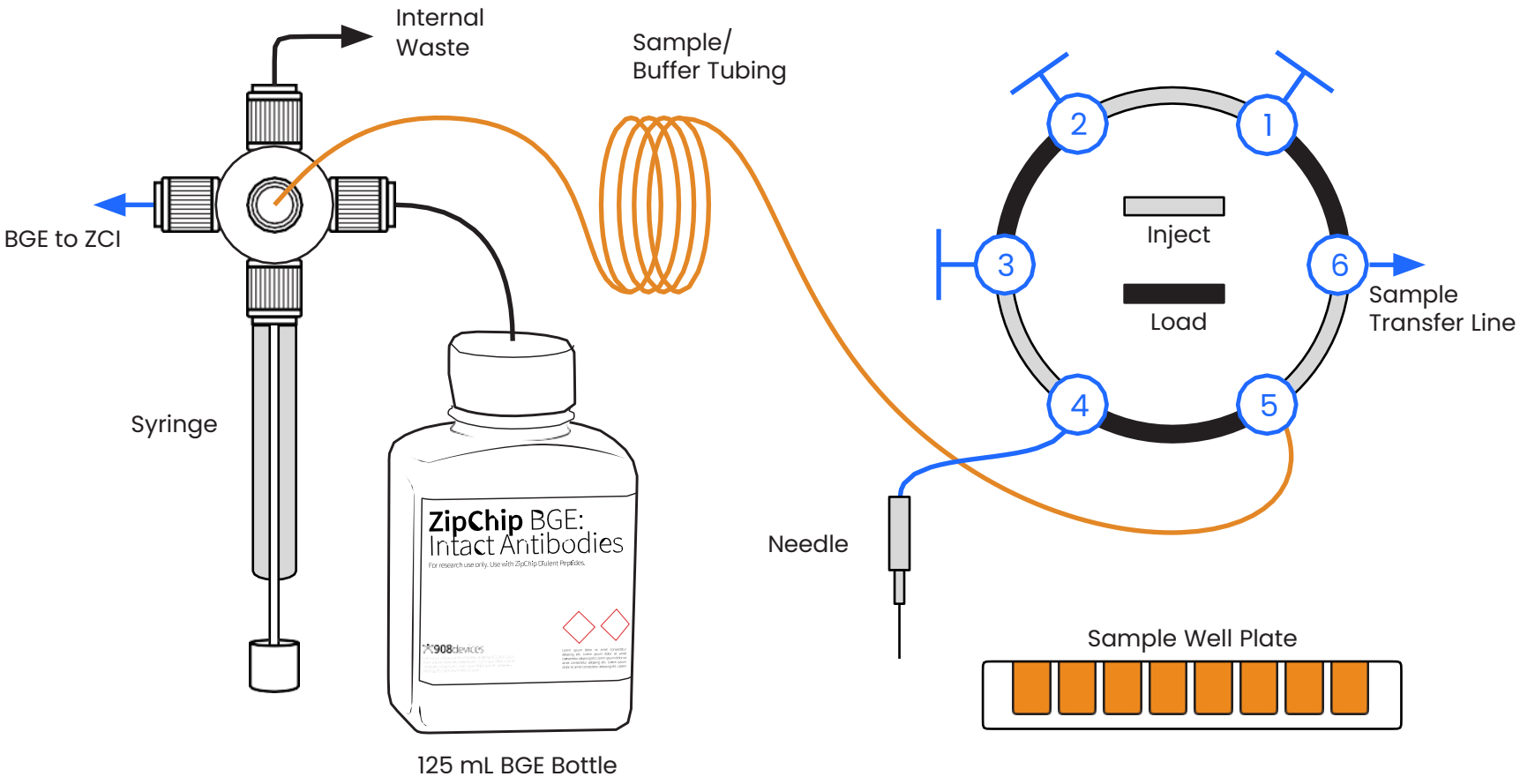
Step Five (Autosampler Only)

Attach the Autosampler Transfer Lines & Waste Tubing

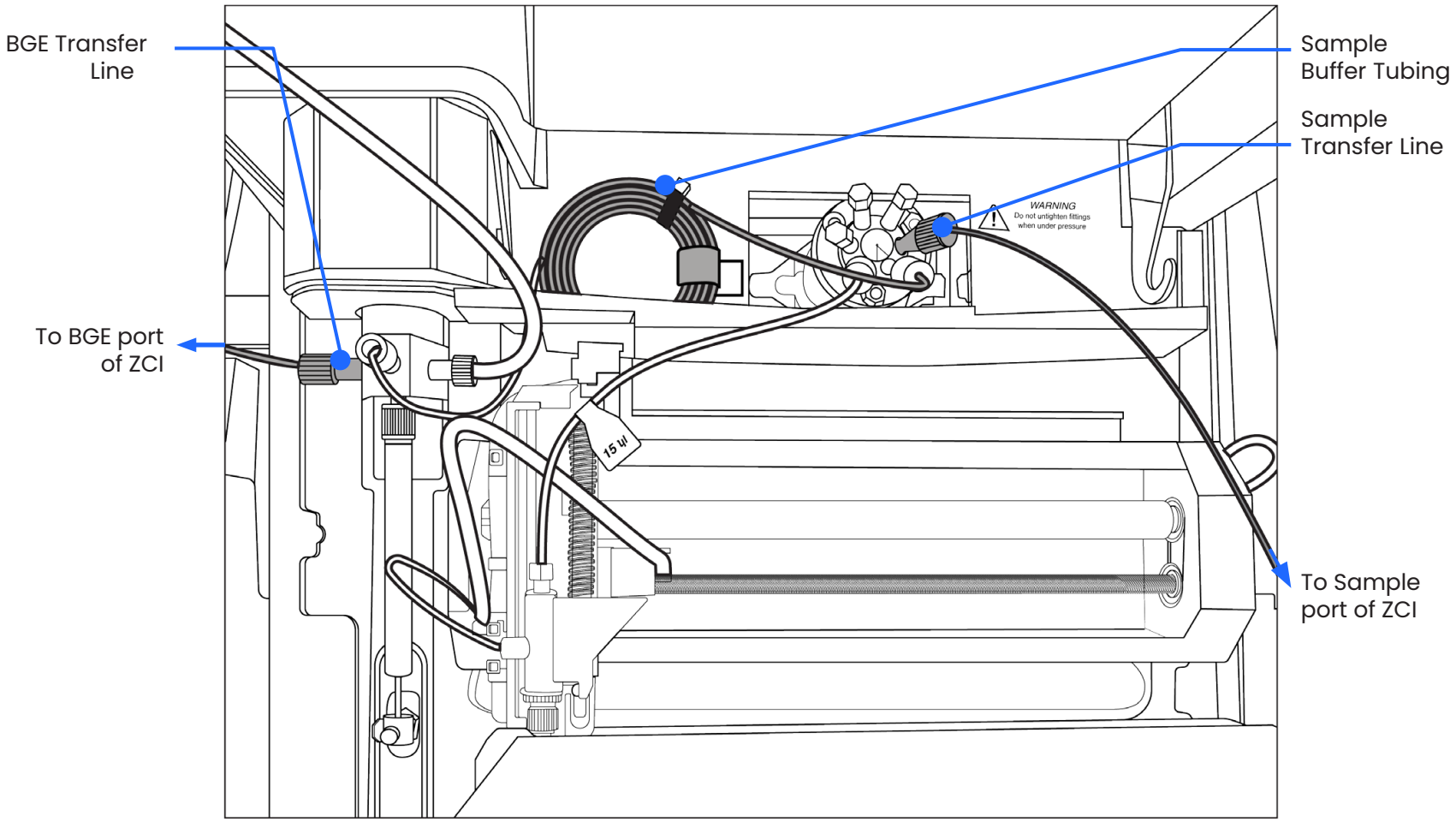
1. Connect the BGE transfer line to the port labeled **BGE**.
2. Connect the Sample transfer line to the port labeled **Sample**.
3. Connections should be made finger tight.
4. See next two pages for identification of transfer lines.
5. Connect the two waste tubes to the hose barbs on the bottom of the ZCI and place the other ends of the waste tubing into an external, customer-supplied, locally-approved waste container.



ZC Autosampler Plumbing Schematic



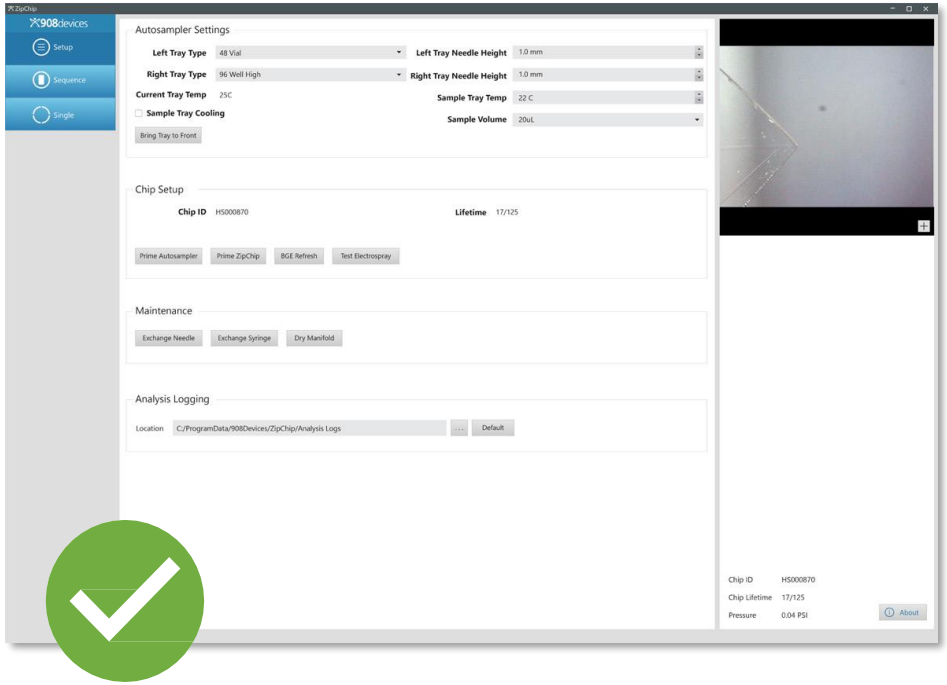
Autosampler Plumbing Layout

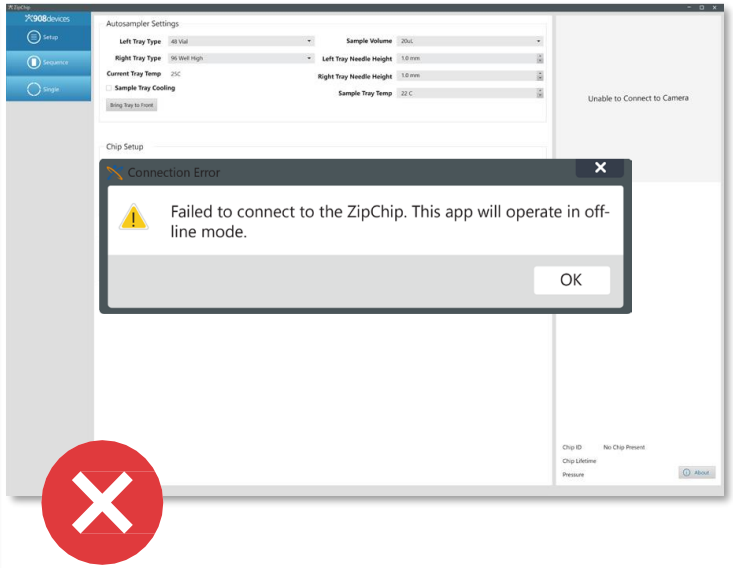


Step Six

ZCI Operating Software

1. Open the ZipChip App.
2. Verify that the control software and video monitor screens both load fully.
3. If the computer cannot connect to the ZCI the software will open in off-line mode.





Trouble!

If the ZipChip app loads, but seems unable to communicate with the ZCI, ensure that the USB cable is connected and close and restart the ZipChip App.

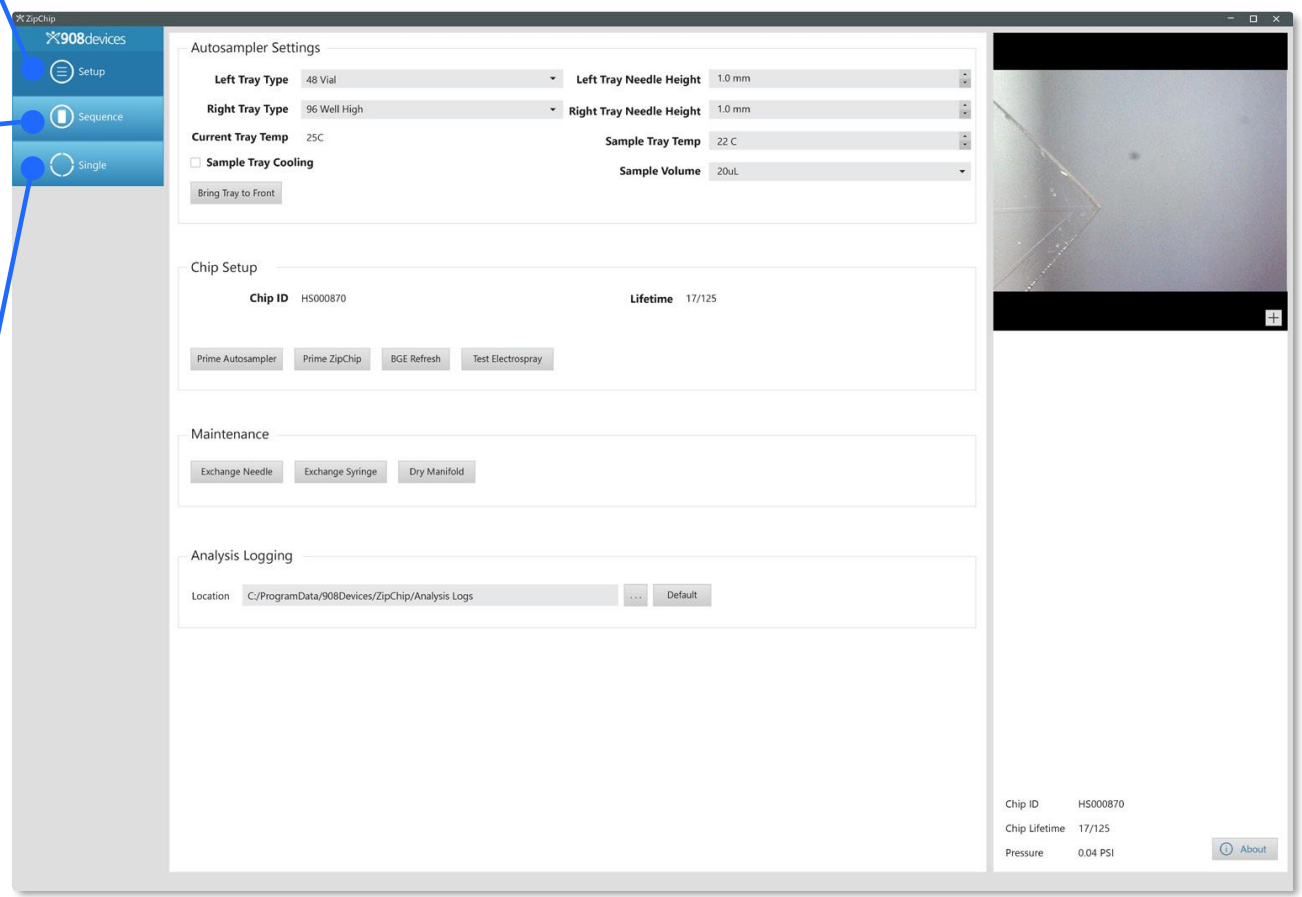
ZipChip Software

Navigation Panels

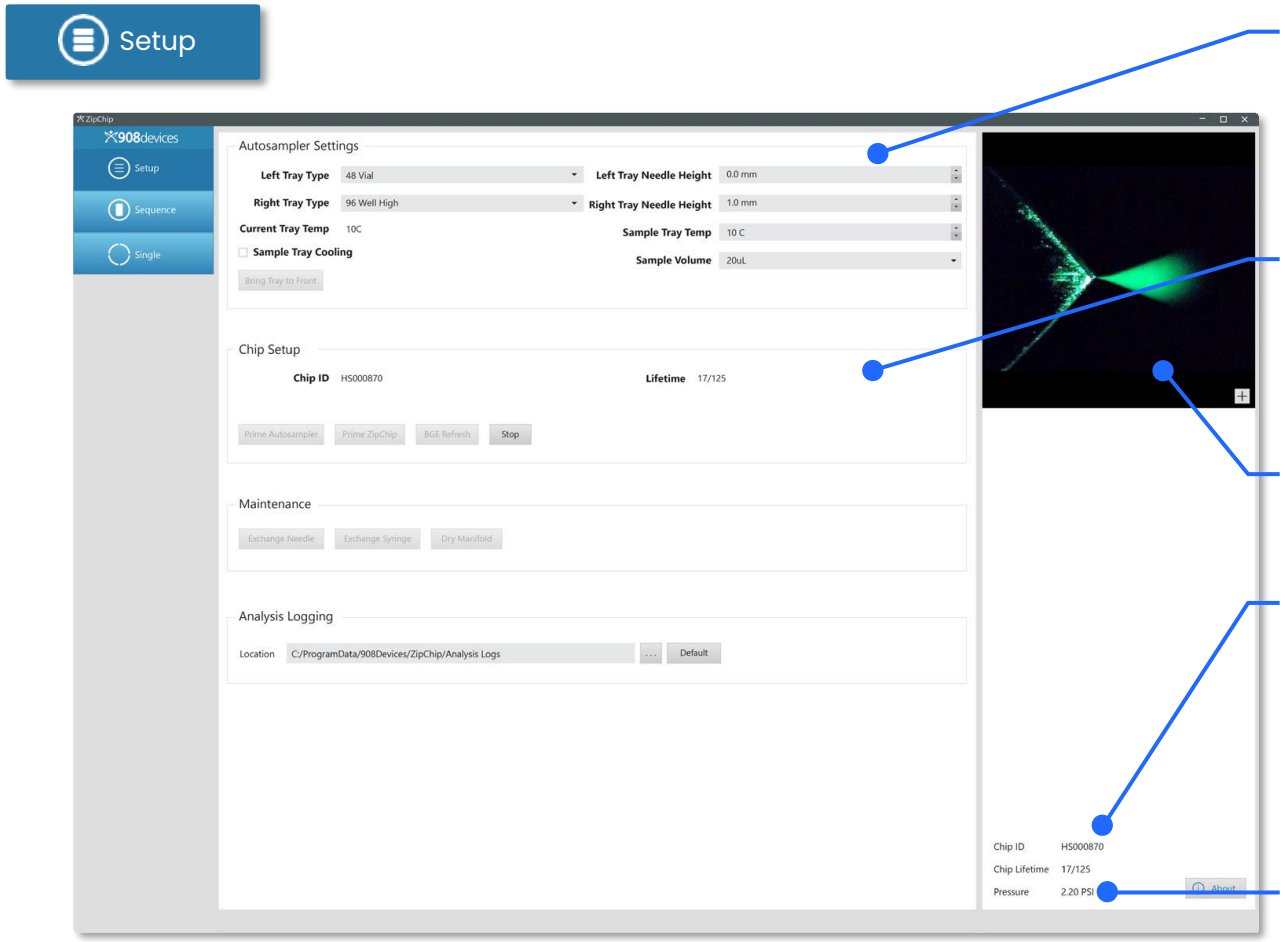
Setup
basic system setup and configuration

Sequence
defines sequences/ settings for ZipChip Autosampler execution

Single
configures/executes a single ZipChip injection/run



Setup Panel



Autosampler Settings
configure the autosampler

Chip Setup
prime the autosampler and the ZipChip to test electrospray

Electrospray
is awesome! ENJOY!

Chip ID
displays the chip type (HR or HS), the chip serial number, and the number of separations run on the chip

Pressure
manifold pressure should read ~2psi

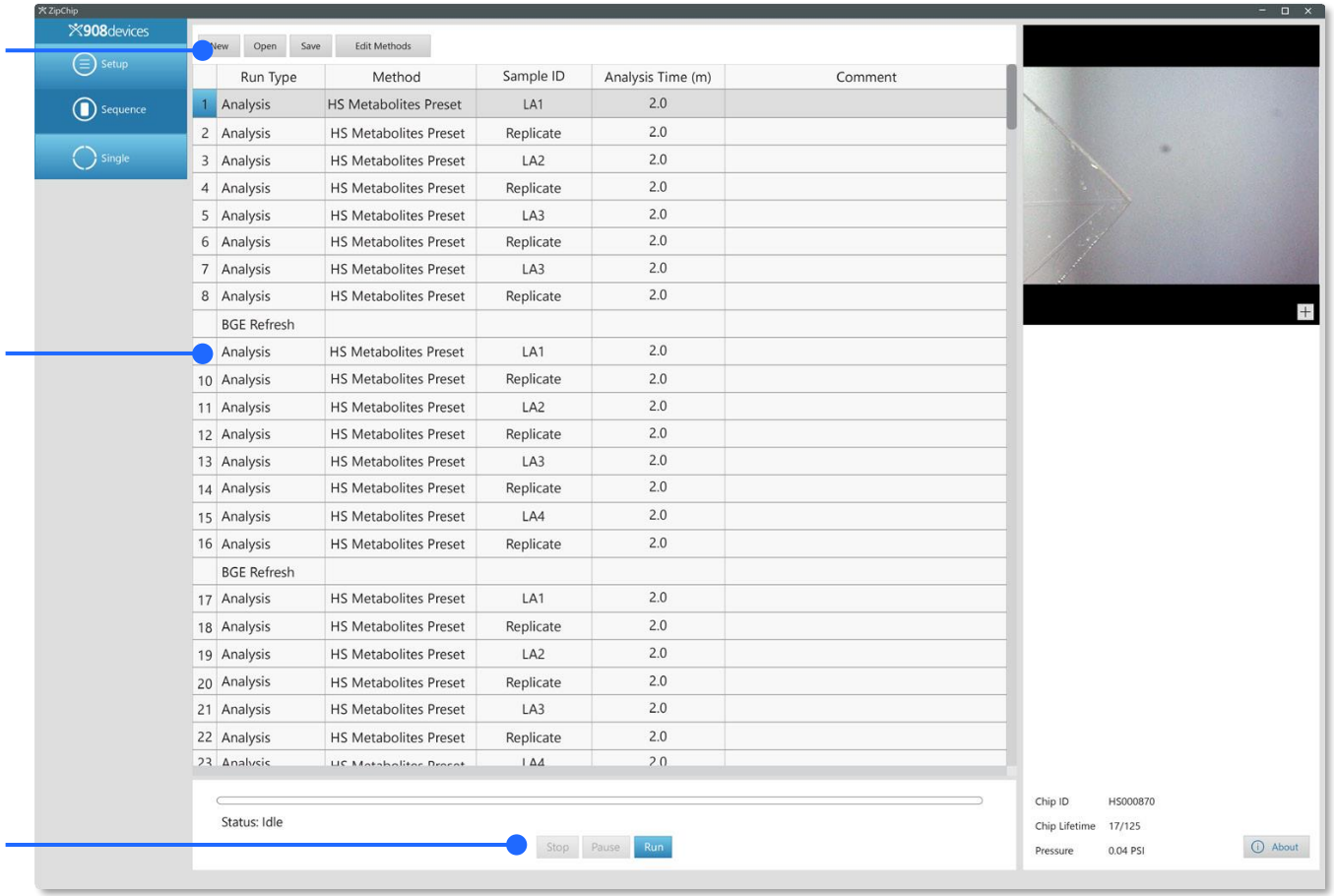
Sequence Panel

Sequence

File Management
create, open, save, export, and edit sequences

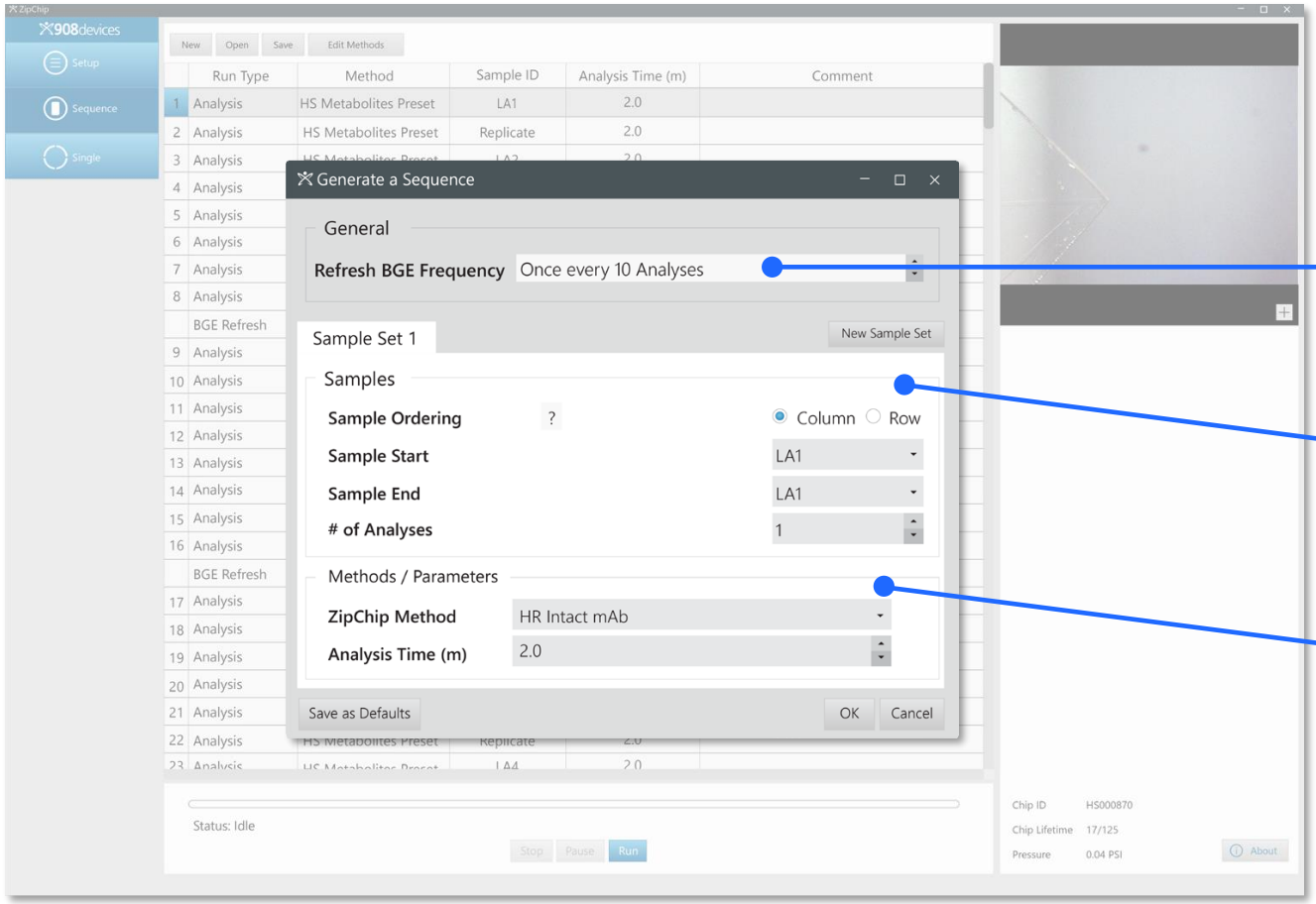
Sequence Table

Controls
run/stop/pause a sequence & status indicator



Sequence Panel: New/Open

Sequence > New Open

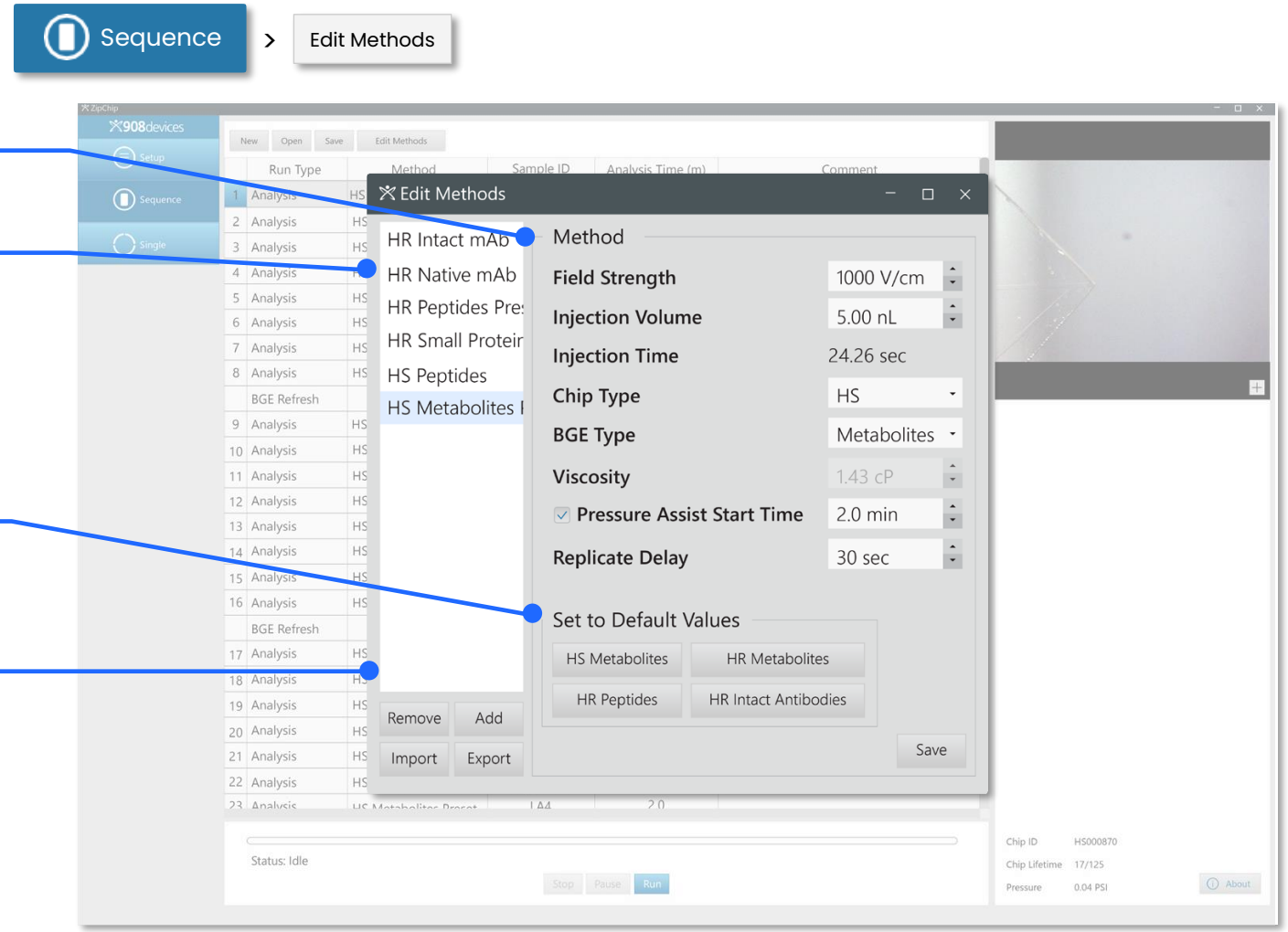


Background Electrolyte Refresh

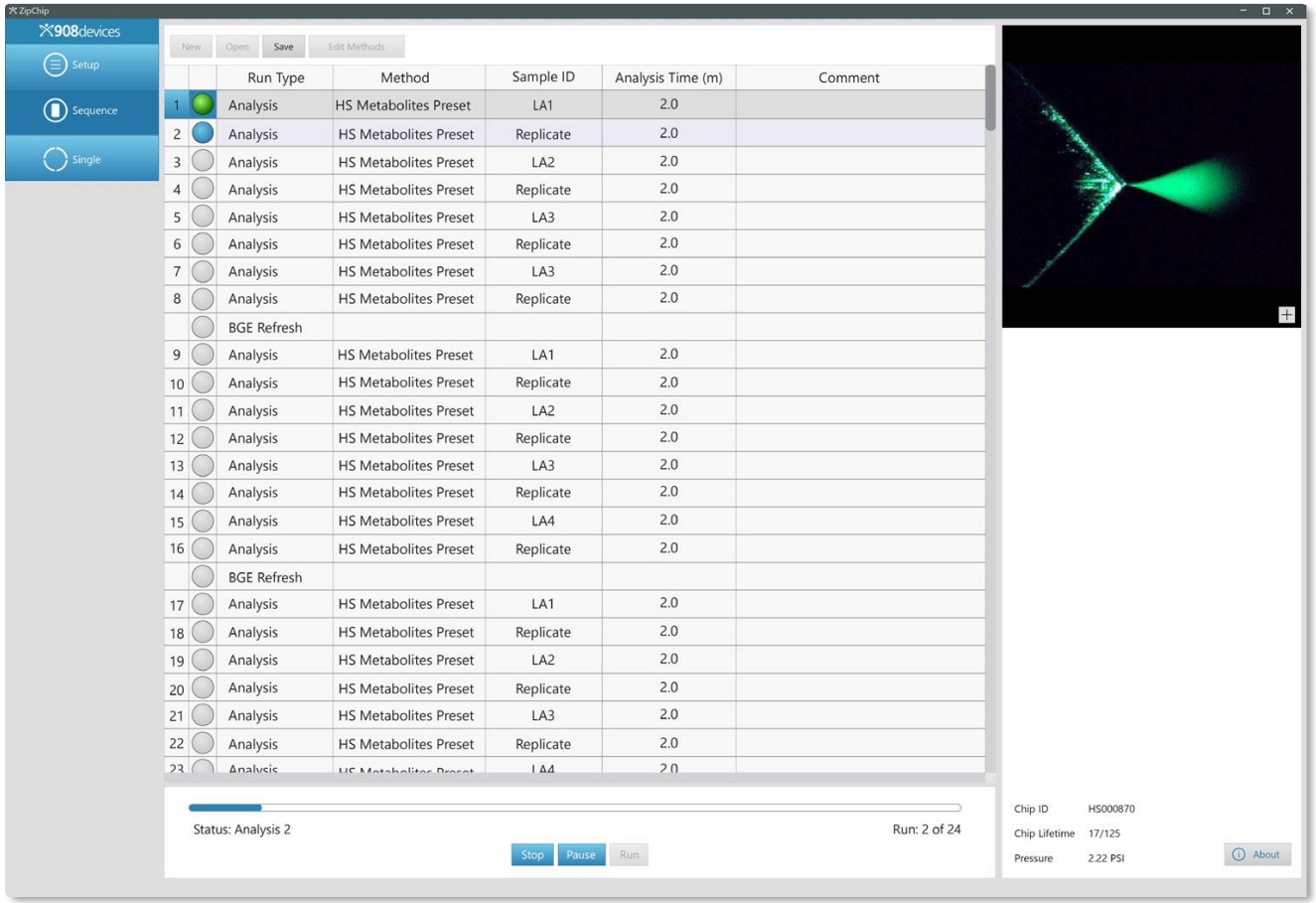
Sample
settings and replicates

Methods/ Parameters
ZipChip/MS operational methods and Analysis Time

Sequence Panel: Edit Methods



Sequence Panel: In Action Sequence

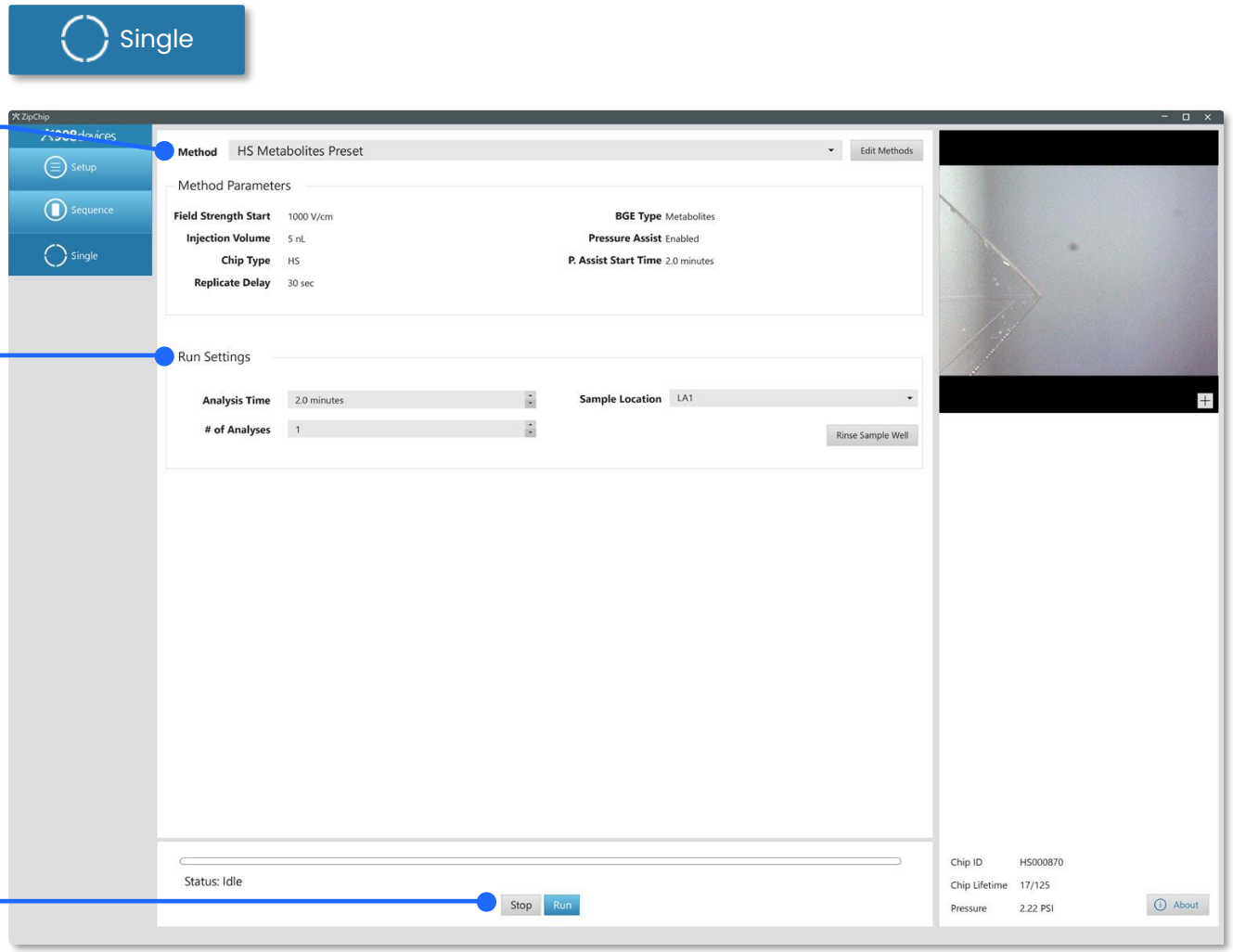


Single Panel

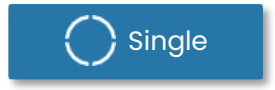
Method
description and selection

Run Settings

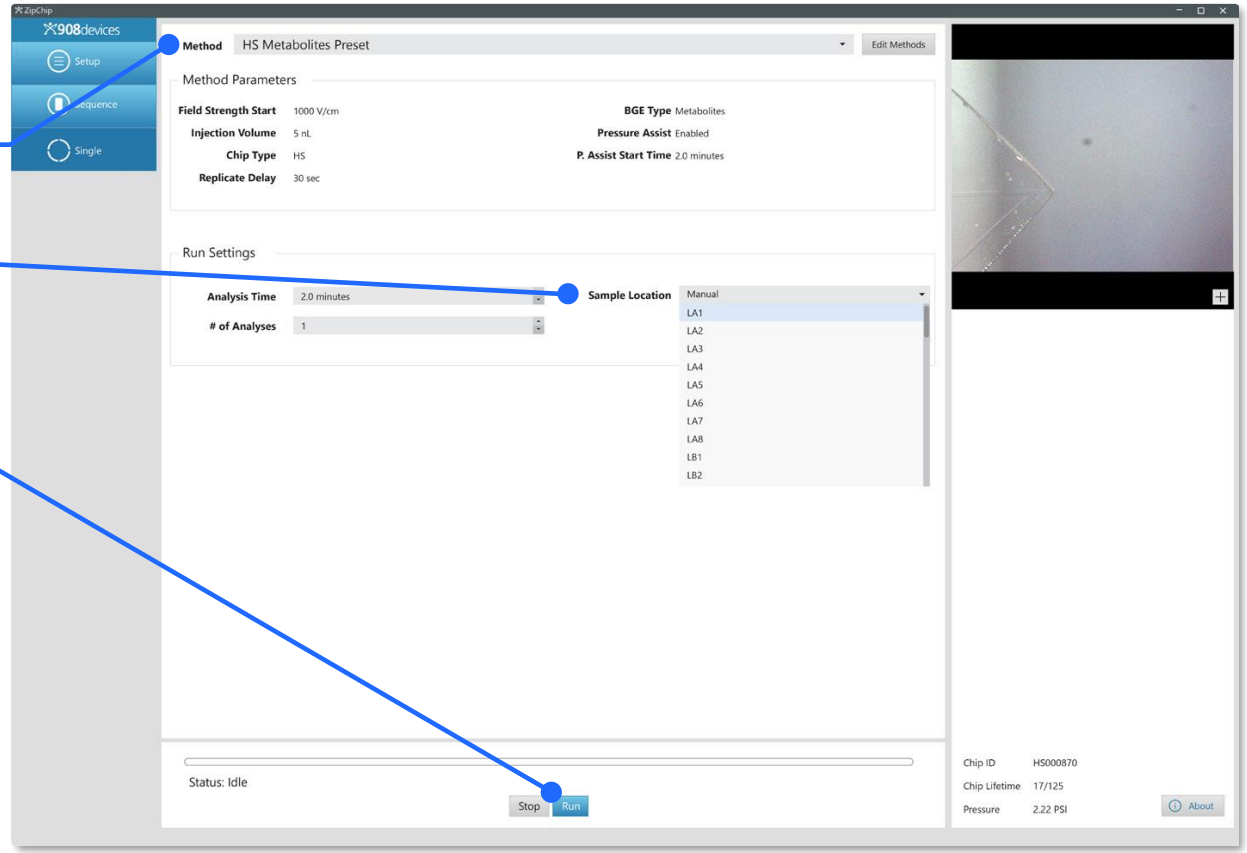
Controls
run/stop a sequence
& status indicator



Single Panel: Analysis Procedure



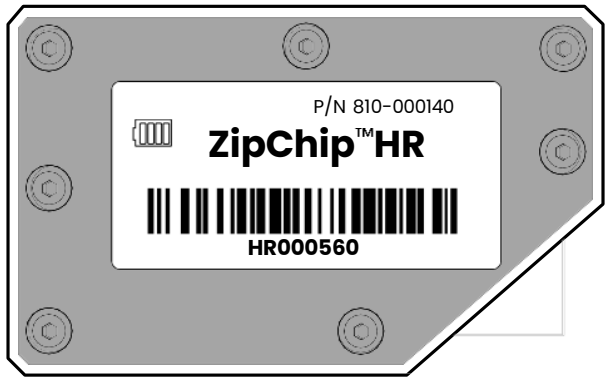
- Select the ZipChip method from the drop- down menu.
- To load a sample from the autosampler, select the location from the drop- down menu.
- To pipet a sample into the Sample well, set the sample location to **Manual**.
- Fill in remaining Run Settings and press **Run**.

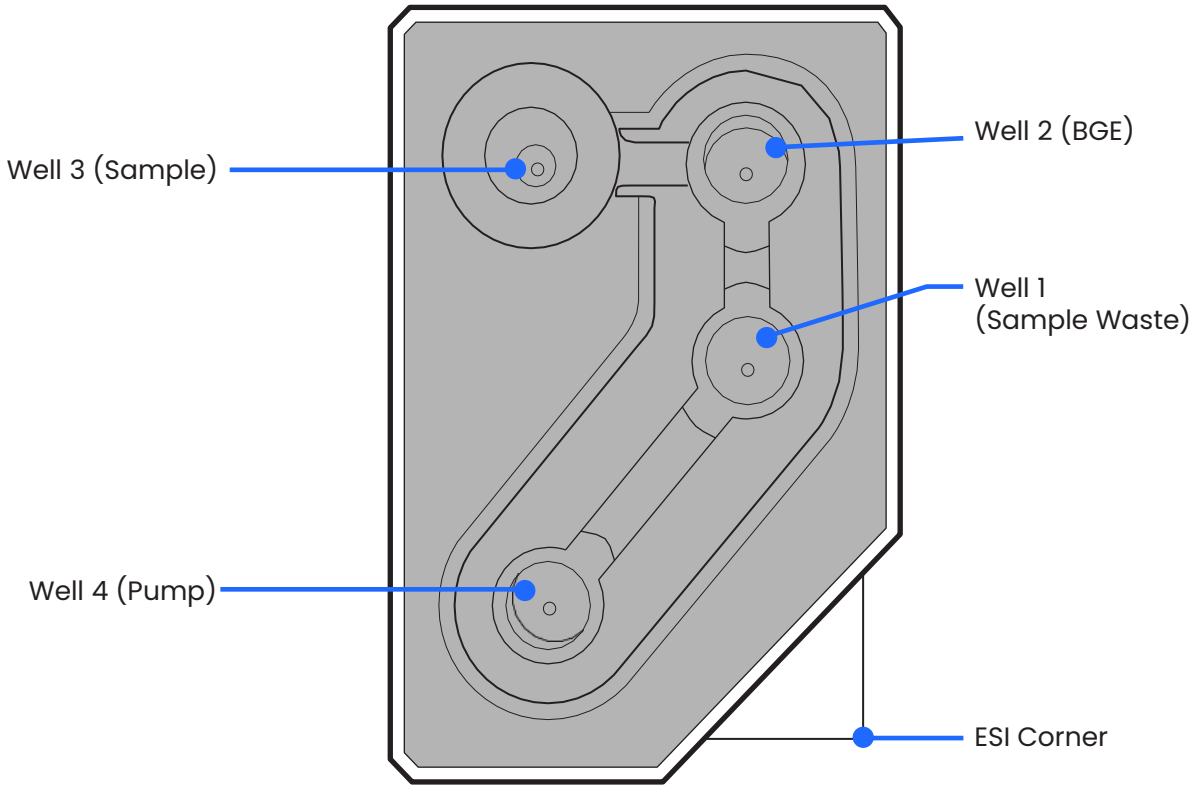


ZipChip Cartridge Overview

The ZipChip is a microfluidic zone electrophoresis chip with an integrated nano-ESI emitter. There are four reservoirs on the TOP of the chip as shown at right.

Note:
Take care when handling a ZipChip out of its packaging/holder to avoid damaging the ESI emitter corner of the chip.





Each ZipChip is serialized, and contains a microchip storing characteristics of each chip, its serial number, and chip type (e.g. HS or HR). These parameters will be automatically read by the ZipChip software.

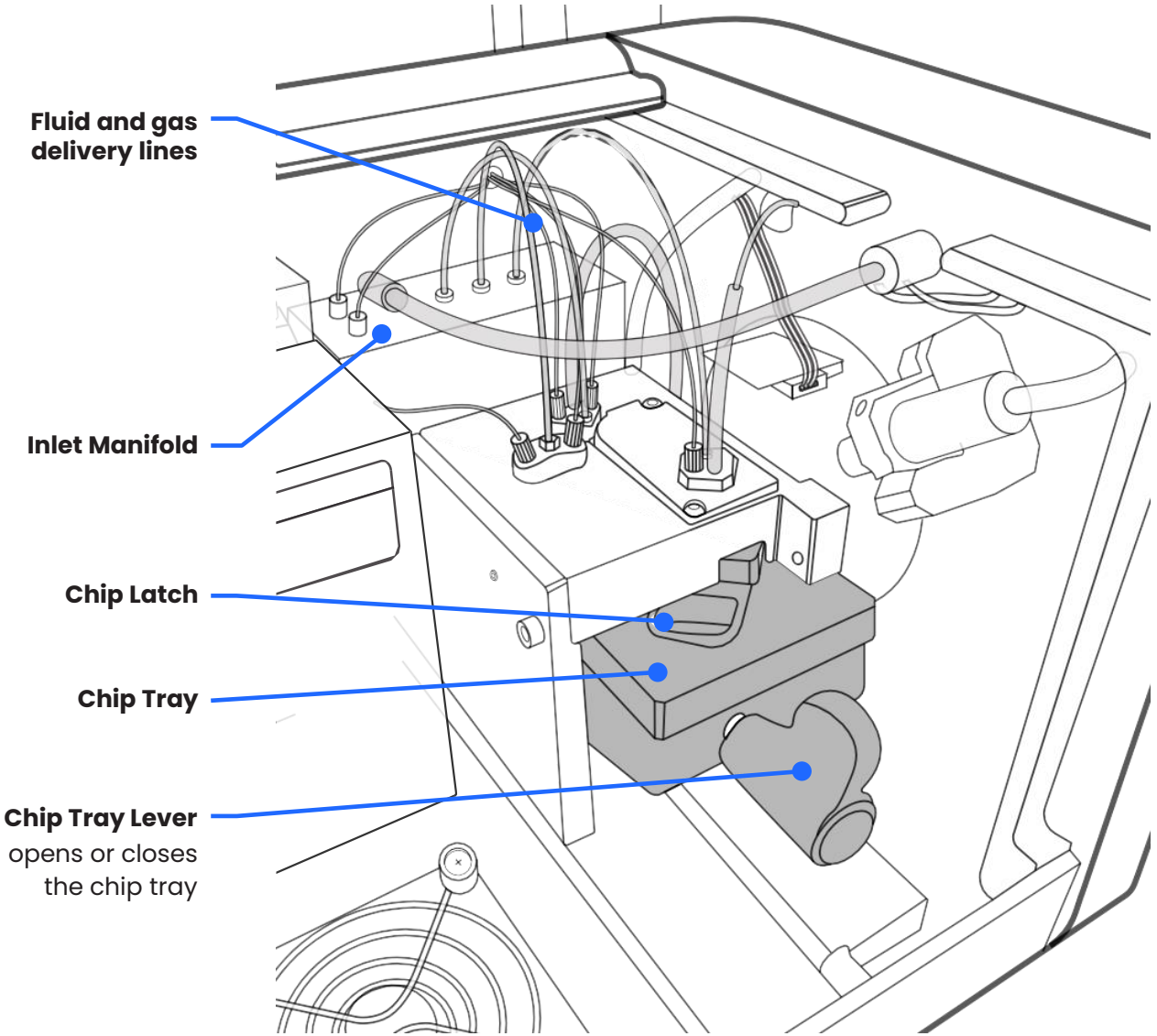
ZipChip Interface

Internal Overview

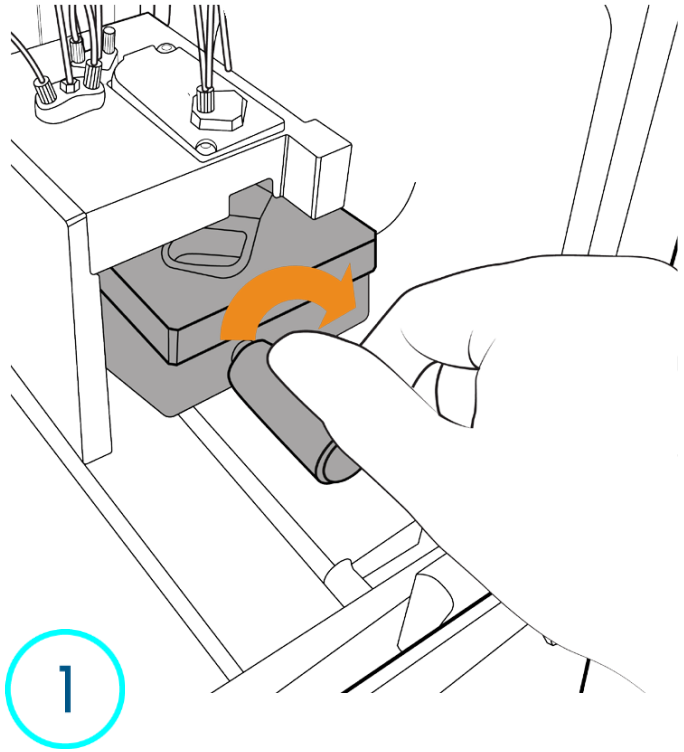
ZipChip Interface Chip Bay

Elements of the ZCI Chip Bay are highlighted and labeled at RIGHT.

The following pages provide a 6 step guide for loading/priming a ZipChip.

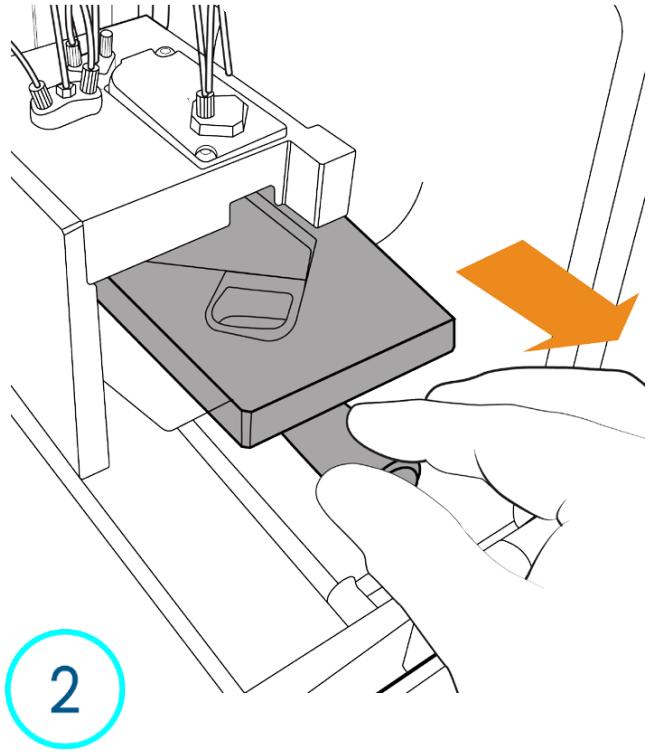


Loading a ZipChip



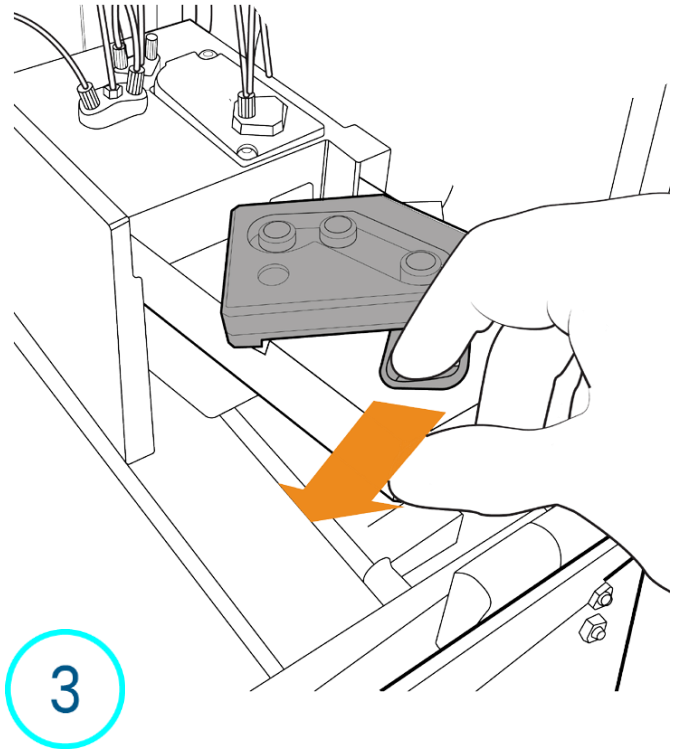
1

Rotate the chip loading lever



2

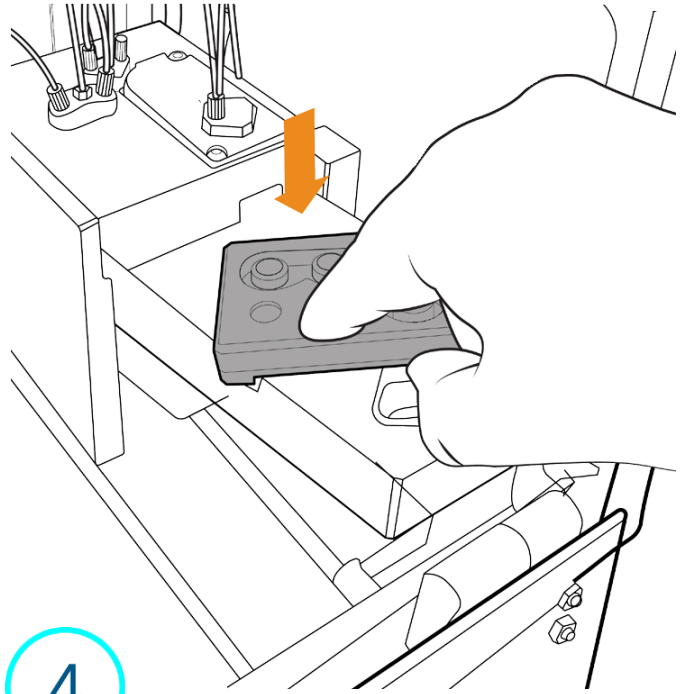
Lower and slide out the chip tray



3

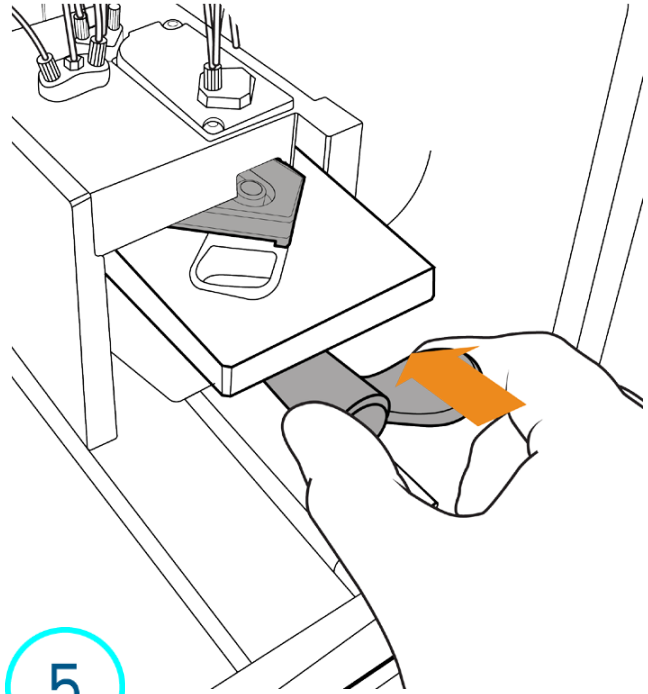
Place a ZipChip in the tray. Pull back the chip latch to seat it in the chip tray

Loading a ZipChip (continued)



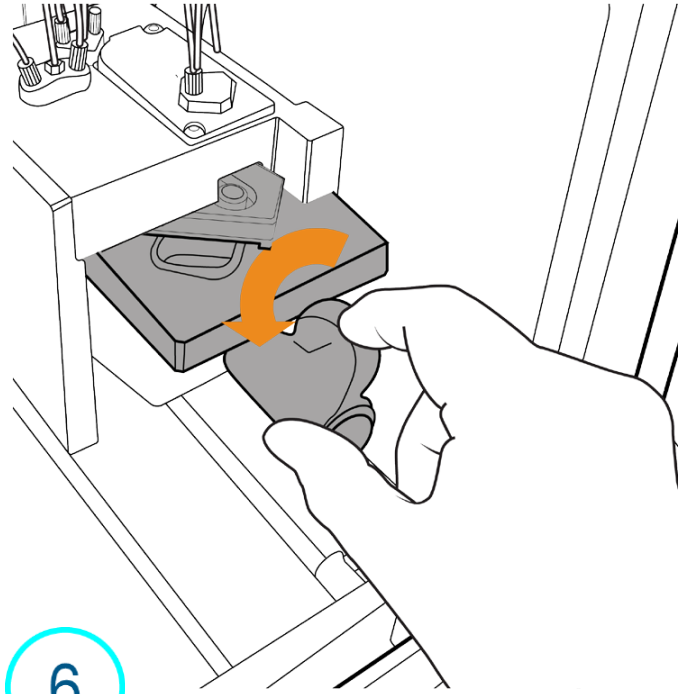
4

Lightly press down on the chip to secure it in the tray



5

Slide the chip tray back into the chip manifold



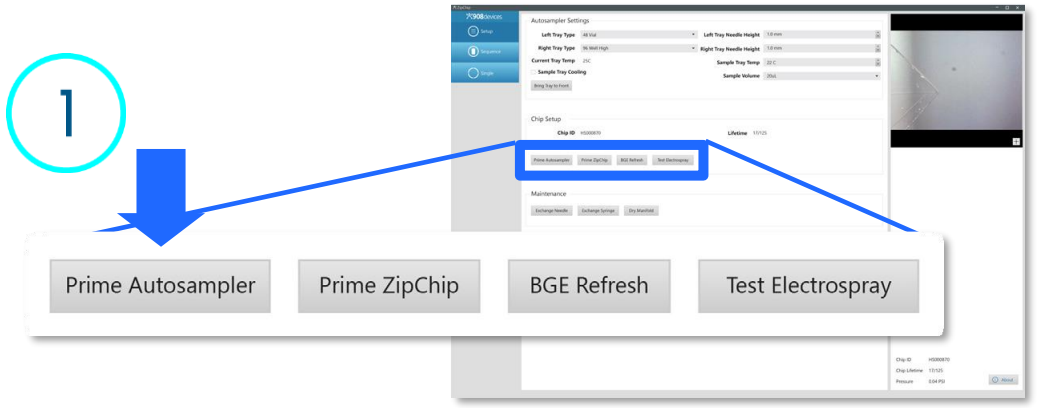
6

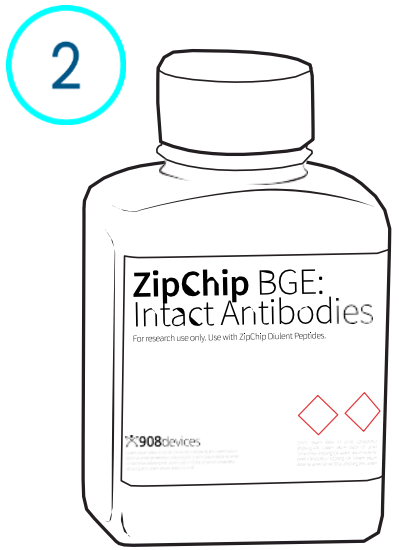
Raise the chip tray by turning the lever

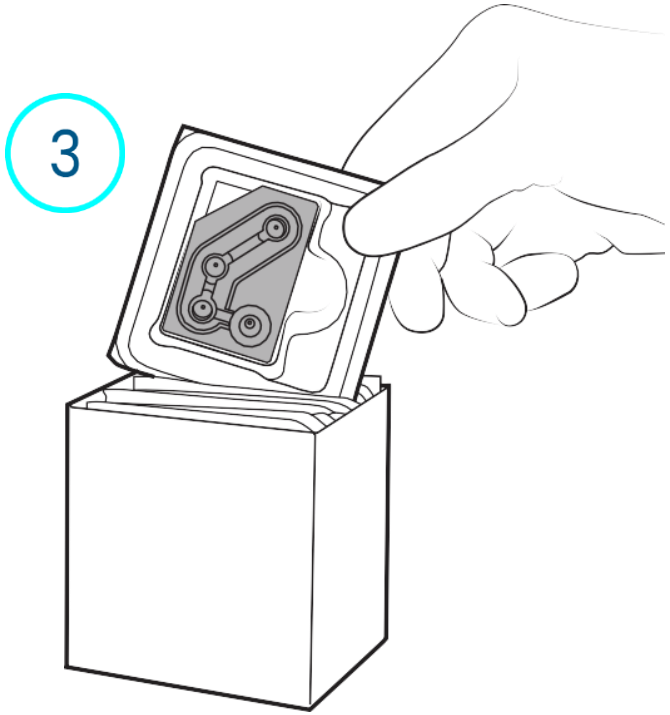
Priming the ZCI-AS System

1. In the Setup window of the ZipChip software, click **Prime Autosampler** and follow the on-screen prompts.
2. Load a fresh bottle of **ZipChip BGE*** into the ZipChip Autosampler.
3. Insert a blank chip.
4. Once the autosampler prime is complete, you may proceed to priming a ZipChip.

**When switching from one BGE type to another, it is advisable to first run a Dry Manifold operation and then the Prime Autosampler procedures with LCMS grade DI water to ensure the system is thoroughly flushed before priming with the new BGE.*

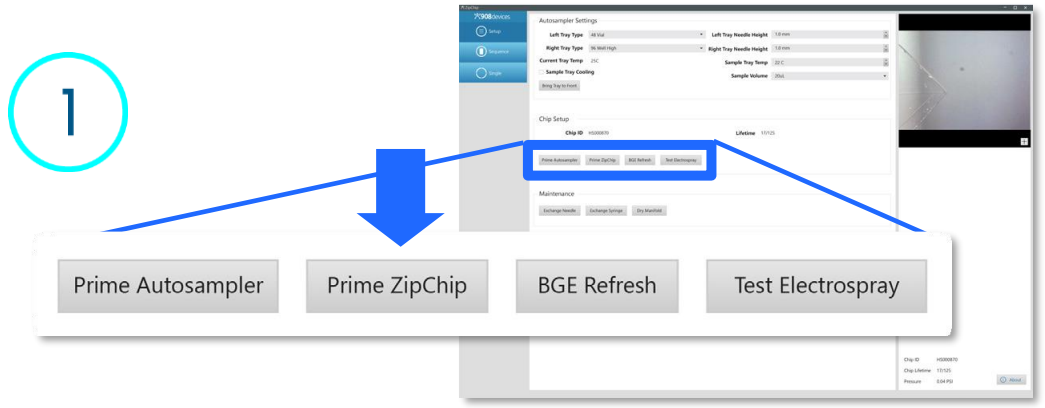


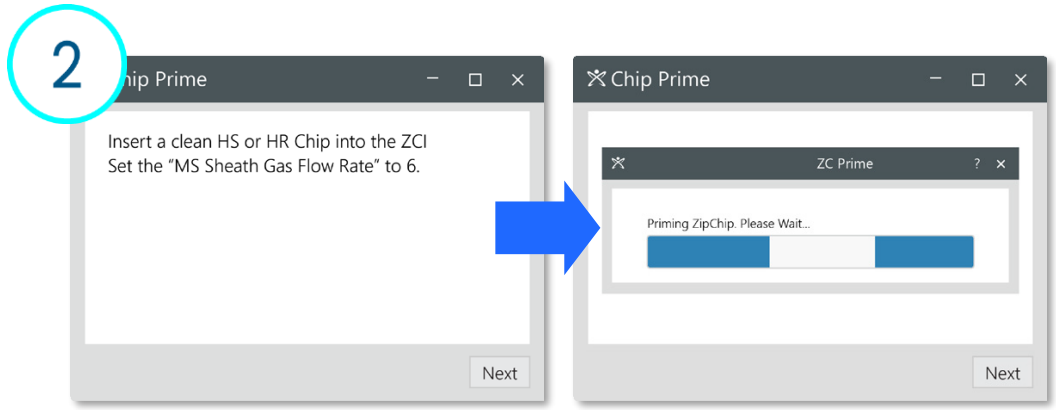


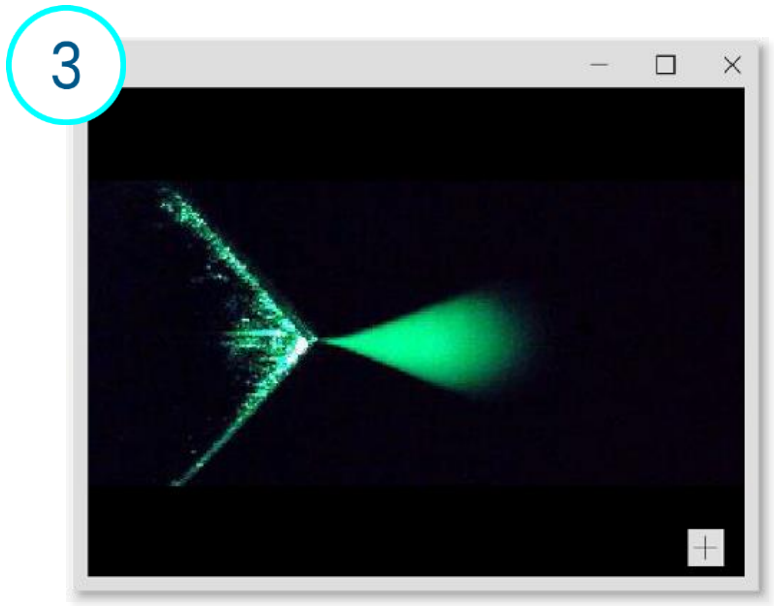


Priming a ZipChip

1. Load a ZipChip HS or HR chip into the ZCI and select **Prime ZipChip**.
2. Follow the ZipChip app on-screen instructions to prime the chip.
3. Test the electrospray.







Your Autosampler and Chip are now ready for operation.

Manual ZipChip

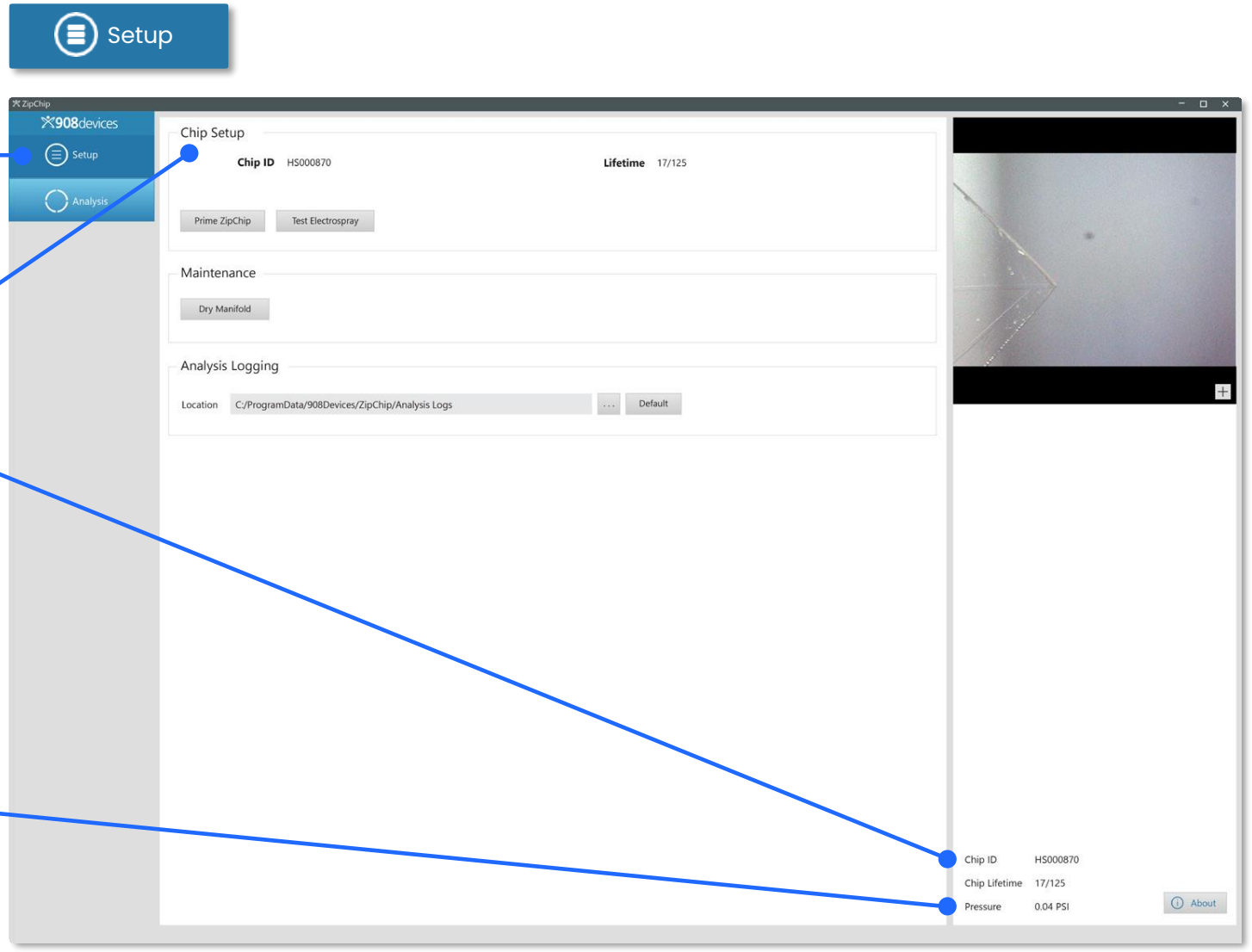
Software: Setup Panel

Setup
is simplified compared to the AS version of the app

Chip Setup
prime the ZipChip & test electrospray

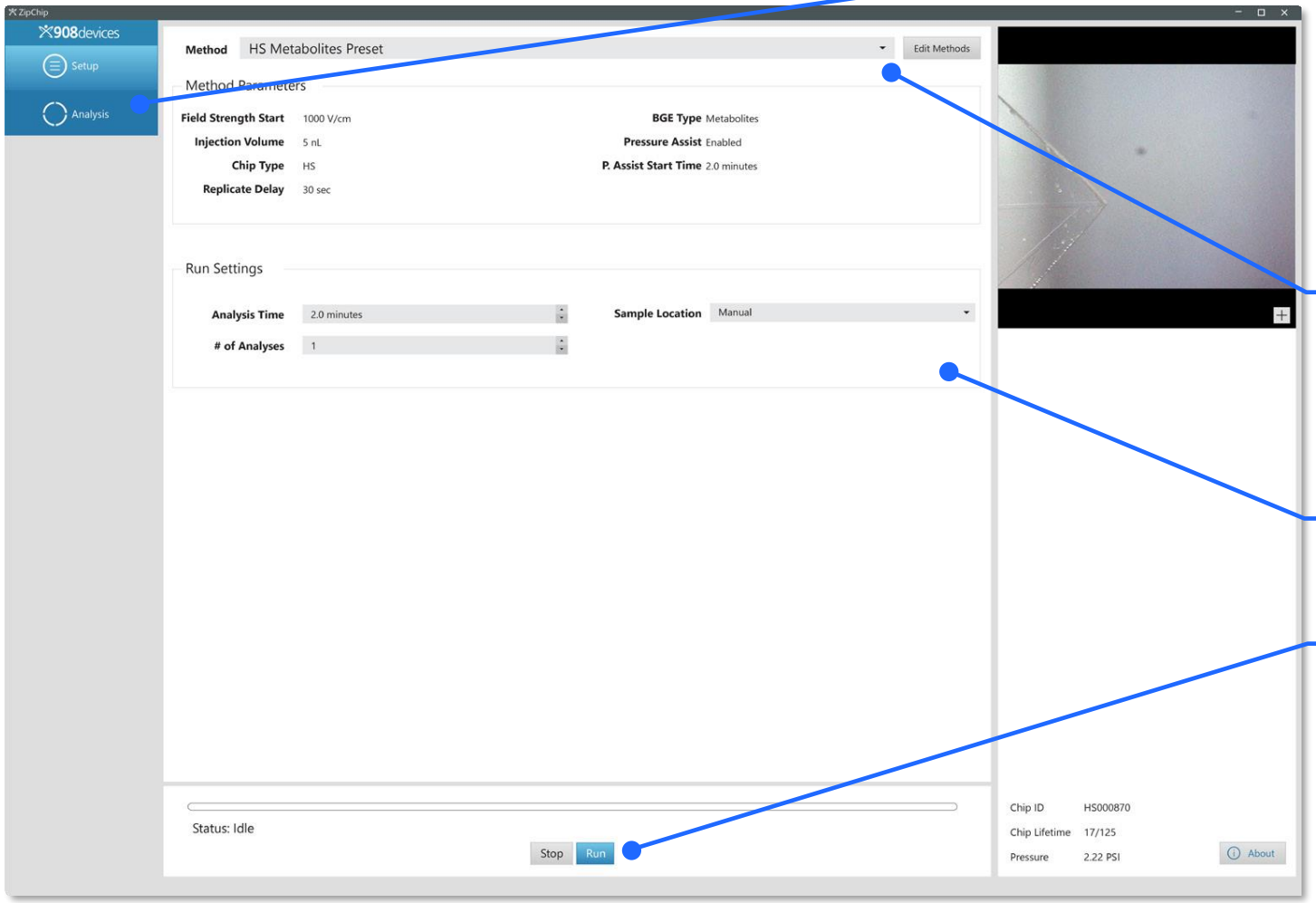
Chip ID
displays the chip type (HR or HS), the chip serial number, & the number of separations run on the chip

Pressure
should read ~2psi



Software: Analysis Panel

Analysis



Analysis Panel
replaces Single panel from the AS version of the app and the Sequence panel is no longer present

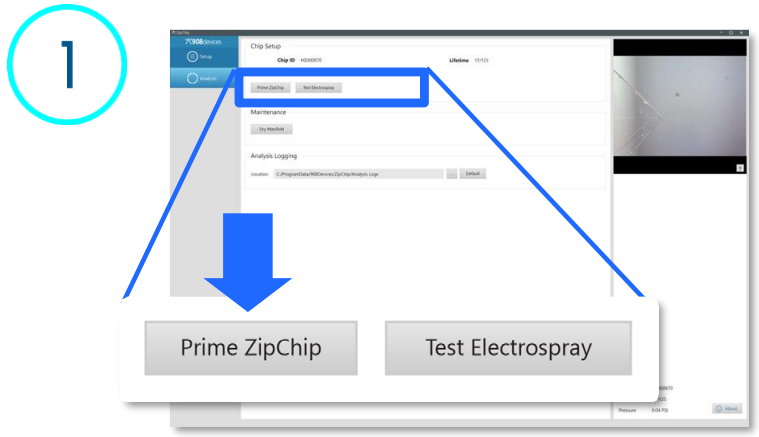
Method
description & selection

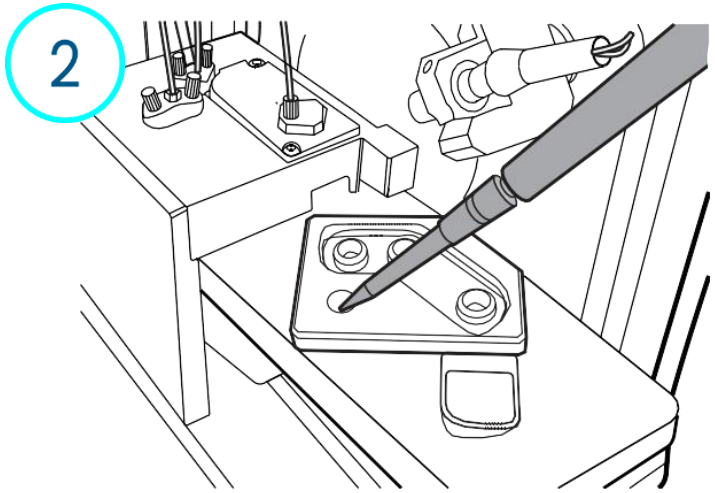
Run Settings

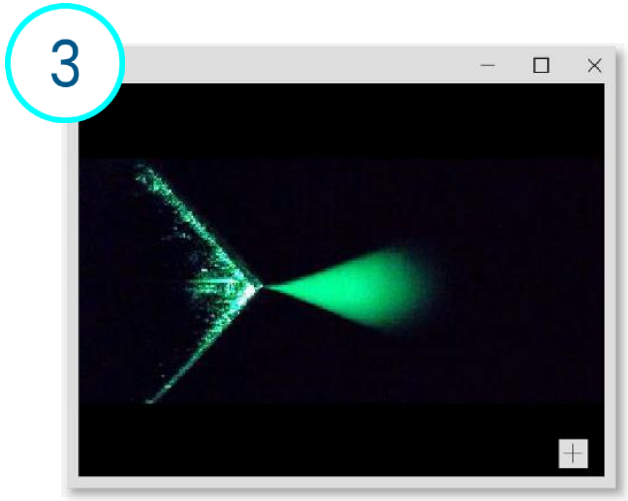
Controls
run/stop a sequence & status indicator

Priming a ZipChip

1. Load a ZipChip HS or HR chip into the ZCI and select **Prime ZipChip**.
2. Follow the on-screen manual priming wizard instructions to prime the chip.
3. Test the electrospray.







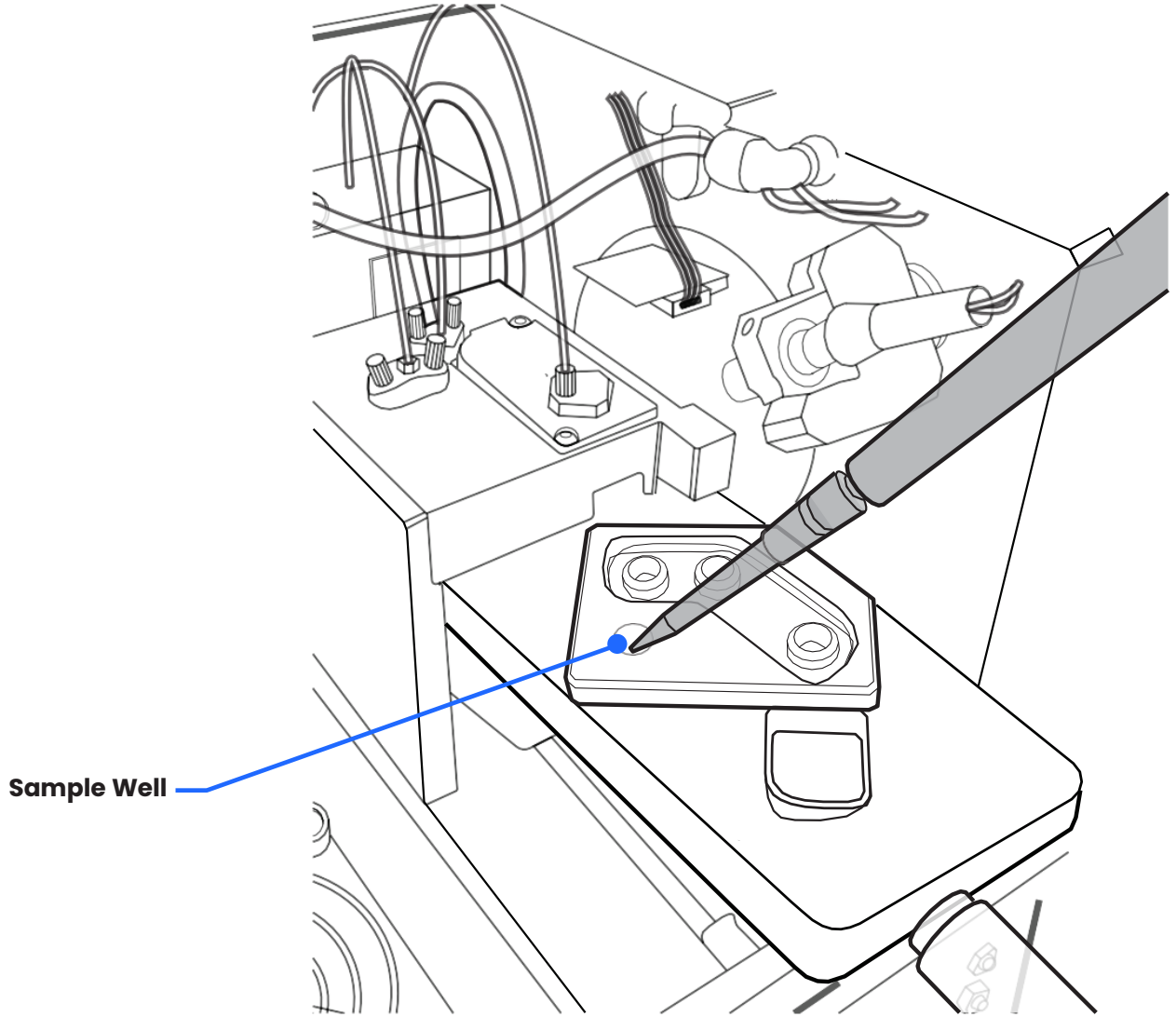
Your ZipChip is now ready for operation.

Loading a Sample

The manual ZCI requires the user to pipet the sample directly into the sample well.

It is recommended that sample volumes be 10-40 µL.

The sample well should be thoroughly rinsed prior to and between sample loads to minimize carry-over and contamination.



Troubleshooting & Safety

Solving Common ZCI Issues

Troubleshooting

Issue	Possible Causes	Solutions
The ZCI does not power on, fails to connect to the ZipChip software or does not respond to changes in the software	• The power supply cable is not connected • The USB cable is not connected to the ZCI	• Ensure the power supply cable is properly connected to the ZCI and a functional wall outlet • Ensure the USB cable is properly connected between the ZCI and the ZCI control PC. Restart the ZCI. • Power cycle ZCI by removing power cable. • Power cycle the autosampler if applicable. • Try additional USB ports on the ZCI control PC. • Restart the ZipChip software and the control PC
No electrospray is observed	• The door interlock is open (voltages will not come on with door open). • There is no pressure applied to the chip. • Chip not primed properly.	• Ensure that the door is closed and latched. • Ensure the MS system is on and pressure reading in the ZipChip software is ~2 psi. • Check to see if wells have liquid in them and reprime.
Electrospray is unstable	• The pressure applied to the chip is unstable or not properly set • Sample composition may be causing spray instability	• Confirm that the Sheath Gas pressure in the MS Tune page is set to 2. Monitor the manifold pressure in the bottom right of the ZipChip app. If the pressure isn't stable at ~2 psi contact the Help line at Repligen. • If ESI is stable to begin w/ but becomes unstable over the course of an analysis ensure the sample meets the guidelines outlined in the ZipChip Sample Guide.
The MS does not start collecting data upon ZCI analysis	• The MS Trigger cable is not properly connected • The Xcalibur software configurations are not set properly	• Ensure that the MS Trigger cable is properly connected (Refer to ZCI Installation instructions on pg. 5) • Ensure your Thermo Xcalibur settings are configured to properly accept a contact closure trigger (Refer to the appropriate Thermo MS user manuals)

Still having trouble?

For all other issues, or if you require further assistance or information about ZipChips and the ZipChip Interface, contact Repligen support at:

TechSupport@repligen.com

1-888-927-3035

Safety

There are live, high voltages present inside the unit during operation.

This equipment contains a 520 nm, 4.5 mW Class 3R laser diode with a beam divergence of 1.5 mrad but is classified as a Class 1 Laser Product as an end-use as evaluated to IEC 60825-1:2014. Avoid direct eye exposure to the beam and do not remove the laser for any other purpose.

Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

The internal fuse is not user accessible. Return to the manufacturer for repair.

Verify waste bottle is empty before use and dispose of waste liquid in accordance with local laws.

The end-user shall determine what personal protective equipment (PPE) is required per existing standard operating procedures and use standard protocols for chemicals and other potential hazardous materials.

Return the equipment to the manufacturer, or the manufacturer ’s representative for all servicing.

Technical Specifications

Physical (ZCI Classic)	7" x 6" x 10.5"
Physical (ZC-Ti)	8" x 7.5" x 11.6"
Weight	~16lbs
Power	24V DC, 65W
Certifications	UL/CSA/IEC 61010-1 3rd Edition
Class 1 Laser Product	21CFR 1040.10 &1 040.11
Ingress Protection	IP X0 (per IEC 60529)
Operating Range	20°C - 40°C
Storage Temp	0°C - 60°C
Power Requirements	110/240V/75W

ZCI Power Supply

Supplier	CUI Inc
P/N	SD165-24-UD-P5
Input	90-264V~, 50-60Hz, 1.4A
Output	24V, 2.71A
Barrel	5.5 x 2.1 mm, center pin +V

TechSupport@repligen.com
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