

# REBEL<sup>®</sup> XT System (Software V2.1)

## User Guide



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#### **Customer Support**

[analytics-support@repligen.com](mailto:analytics-support@repligen.com)

1-888-927-3035

#### **Sales**

[analytics-sales@repligen.com](mailto:analytics-sales@repligen.com)

#### **Repligen Corporation**

Process Analytics Offices and Manufacturing Facility  
685 Route 202/206  
Bridgewater, NJ 08807, USA  
[www.repligen.com](http://www.repligen.com)

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## 1. Precautions for Safe Use/Warnings

Table 1. Safety Symbols and Descriptions

Symbols	Description
	<p>Safety features have been incorporated in the design, but for continued safety, only trained personnel are allowed access to the equipment. Make sure that covers and doors are closed before starting the REBEL® XT System. Servicing of the equipment may only be performed by qualified personnel. Damage to the device may result from improper use.</p> <p>This equipment must be lifted and carried by two or three people or a lifting device will be required (product weight: 41 kg/90 lb).</p> <p>This equipment is designed to be operable in pollution degree 2 environments that may have non-conductive pollution that might temporarily become conductive due to occasional condensation.</p>
	<p>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.</p> <p>Verify waste lines from REBEL XT System are routed into a site-approved external waste vessel (not provided), free from obstruction, and dispose of waste stream, including spillage and overflow, in accordance with local laws. Verify waste vessel is empty before use.</p>
	<p>The system must be connected to a suitable mains power supply with a correctly installed protective earth conductor. Removal of panels may expose users to high voltage. For that reason, this should only be done by qualified service personnel. Disconnect the system from the mains power supply by removing the mains power cord before removing protective panels. Replace or repair damaged mains power cords immediately.</p> <p>Replace blown fuses only with types indicated in the specifications. User replaceable fuses located on the AC input module (rear) are 250VAC, 3.15A (LittleFuse 02153.15MXH). The internal fuse is not user accessible. Return to manufacturer for repair.</p> <p>Protective grounding required (3-wire power supply cord, for connection to a grounded mains socket-outlet). Only the manufacturer-supplied 3 wire grounded AC cord is to be connected to the AC inlet on the device. Replacing detachable mains supply cord with inadequately rated cords is prohibited. Equipment must be positioned with power cord accessible for easy disconnection from the power outlet/inlet.</p>
	<p>This equipment contains a 532 nm, 5 mW Class 3R laser diode with a beam divergence of &lt;1.2 mrad but is classified as a Class 1 Laser Product as an end-use product as evaluated to IEC 60825-1:2014. Avoid direct eye exposure to the beam and do not remove the laser for any other purpose.</p>

## 2. Compliance

The REBEL® XT System is intended to be used for Research Use Only (RUO), and not for use in diagnostic procedures.

**Table 2. Compliance Information**

Region	Compliance Information
United States of America	<p><b>Federal Communication Commission</b> This equipment has been tested and found to comply with Part 18 of the FCC Rules.</p>
	<p><b>Safety</b> This apparatus is tested and found to comply with Safety Requirements pursuant to standard UL 61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements".</p>
	<p><b>Federal Drug Administration</b> This device contains a Class 1 Laser that has been tested and found to comply with CFR Title 21, Chapter I, Subchapter J, Part 1040.10.</p>
European Union	<p><b>Electromagnetic Compatibility</b> This device has been tested and found comply with standard EN 61326-1:2013 "Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements".</p>
	<p><b>Safety</b> This apparatus is tested and found to comply with Safety Requirements pursuant to standard EN 61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements". This device contains a Class 1 Laser that has been test and found to comply with standard EN 60825-1 "Safety of laser products - Part 1: Equipment classification and requirements".</p>
Japan	<p><b>Electromagnetic Compatibility</b> This device has been tested and found comply with Japanese standard JIS C 61326-1:2017 "Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements".</p>
	<p><b>Safety</b> This apparatus is tested and found to comply with Safety Requirements pursuant to standard EN 61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements". This device contains a Class 1 Laser that has been tested and found to comply with Japanese standard JIS C 6802:2014 "Safety of laser products - Part 1: Equipment classification and requirements".</p>
Republic of Korea	<p><b>Electromagnetic Compatibility</b> This device has been tested and found to comply with Korean standard KS C IEC 61326-1:2008 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements".</p>
	<p><b>Safety</b> This apparatus is tested and found to comply with Safety Requirements pursuant to Korean standard K 61010-1:2010 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements". This device contains a Class 1 Laser that has been tested and found to comply with Japanese standard KS C IEC 60825-1:2013 "Safety of laser products - Part 1: Equipment classification and requirements".</p>
	<p>This product has an affixed label with following information:</p> <ul style="list-style-type: none"> <li>• Manufacturing name</li> <li>• Product and model name</li> <li>• Country of origin</li> <li>• KC Mark logo and KC (MSIP) number</li> </ul>

**Note:** For biosafety-related information and biohazard evaluation, please inquire with customer service.

3. About the REBEL XT System

The REBEL XT System is a Capillary Electrophoresis-Electrospray Ionization (CE-ESI) source integrated with a mass analyzer based on high-pressure mass spectrometry (HPMS). The REBEL XT System is designed for life science applications, including the detection of analytes in spent cell culture media. The REBEL XT System is designed only to detect analytes loaded in the deployed library.

3.1 Specifications

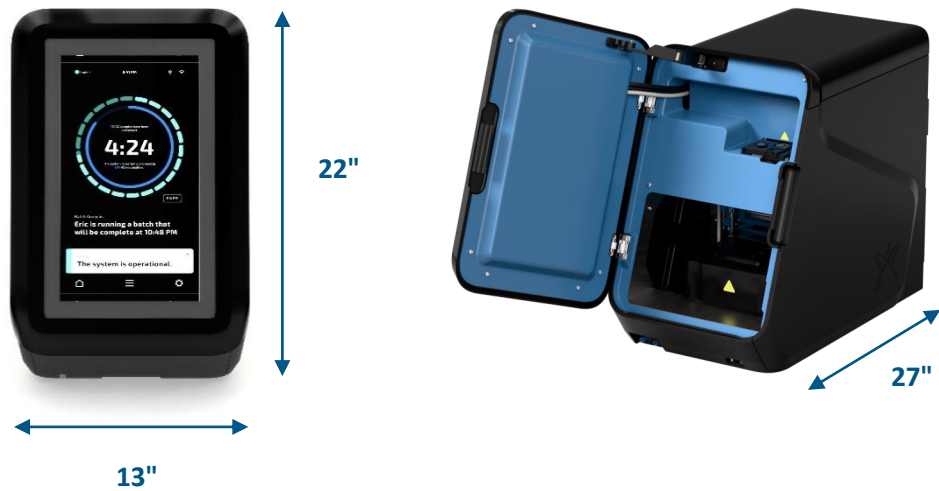


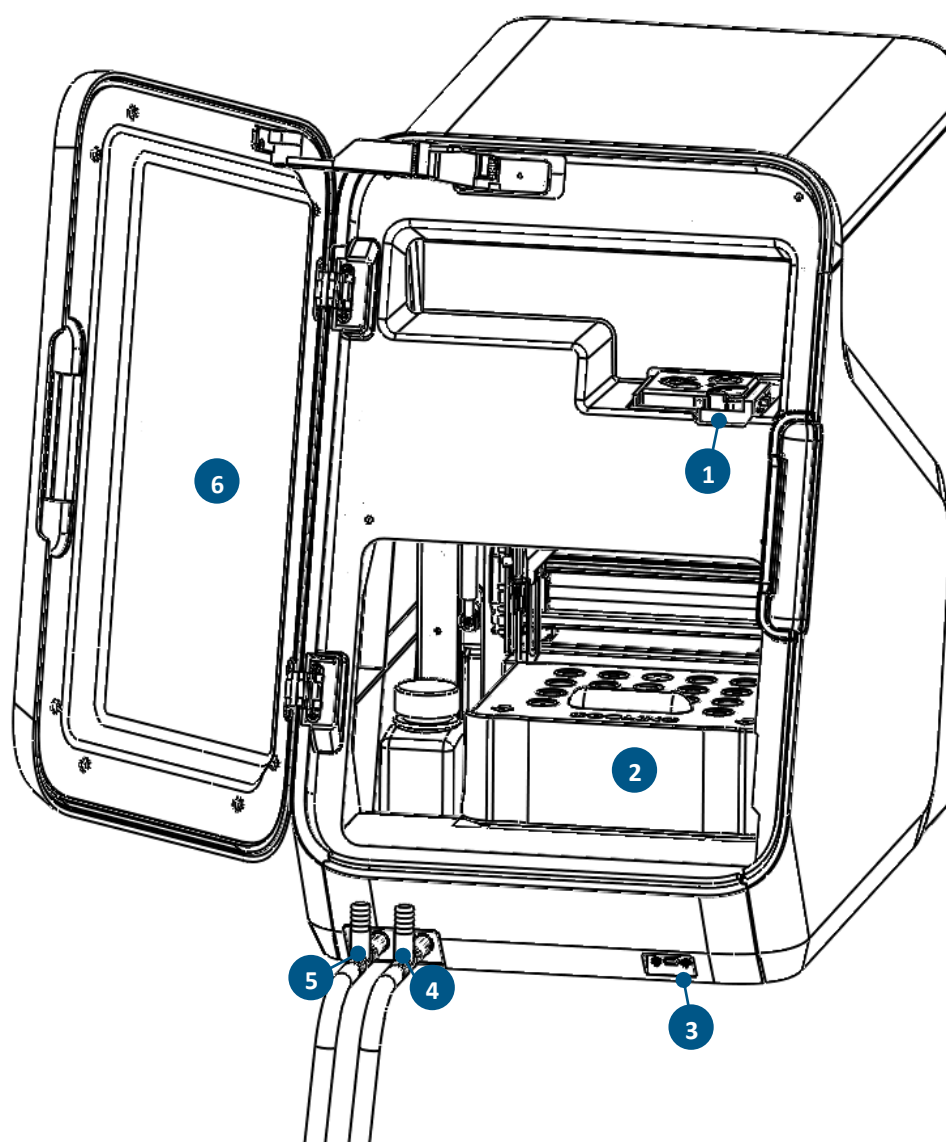
Table 3. REBEL XT System Specifications

Operating Considerations	
Dimensions (W x H x D)	13 x 22 x 27 in (33 x 56 x 69 cm)
Weight	90 lb (41 kg)
Power	100–240 AC, 50–60 Hz, 350 W
Overvoltage Cat II	Max transients up to 2.5 kV
Laser Class	Class 1 Laser Product per 21 CFR 1040.10 & 1040.11
Certifications	UL/CSA/IEC 61010-1 3rd Edition
Ambient Operating Temperature	20°C–25°C
Ambient Humidity	20–80% RH (non-condensing)
Altitude	0–2000 m

Device Specifications	
Calibration	Automated calibration and QC with consumable kits
System Interfaces	Ethernet, USB-A port (2), USB-C port (1) Solvent waste and condensate (water) collected in an appropriate external vessel (customer supplied)
Safety/Compliance	UL/CSA/IEC 61010-1 3rd Edition; CE marked; EU & China RoHS; EU REACH
Software	Designed for operation in cGLP/cGMP, with support for 21 CFR Part 11-compliance
Data	Output: Values reported in “mM” concentration Report format: CSV and PDF

### 3.2 Anatomy

Figure 1. Front of the REBEL XT System

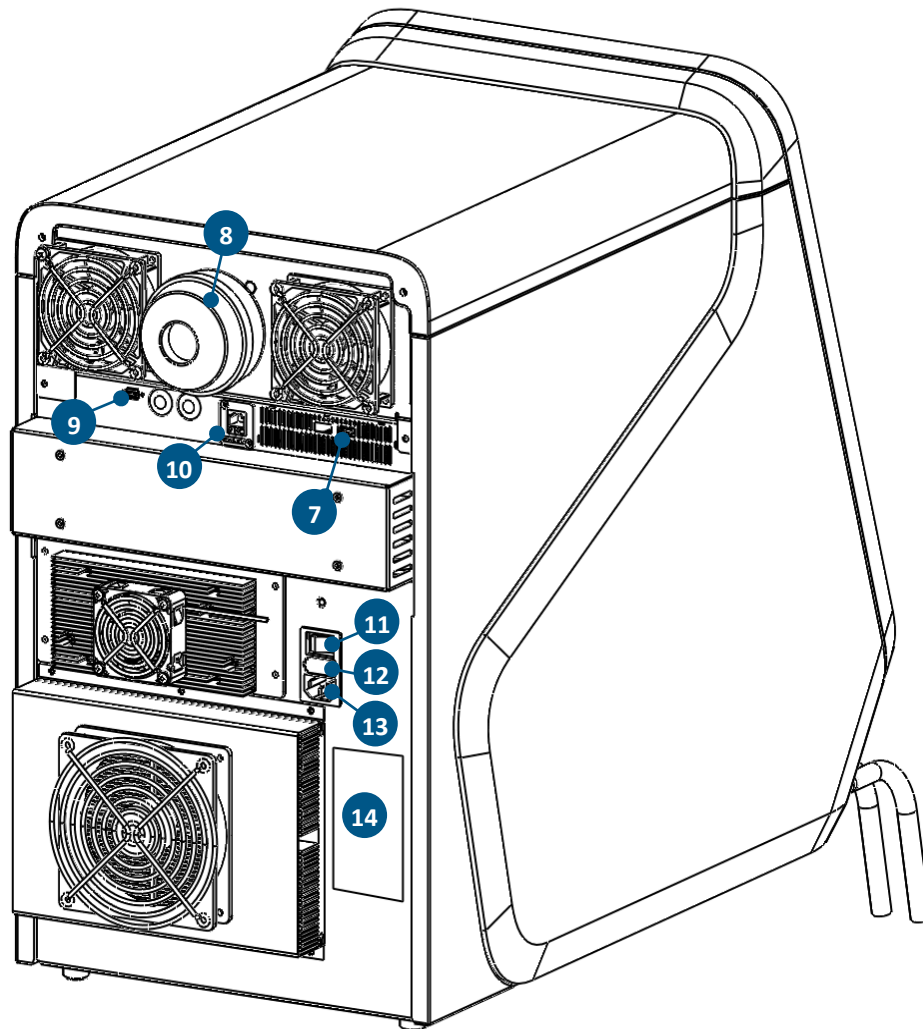


#### Components (Front)

1. REBEL XT chip with chip cover
2. Sample tray cover
3. USB-C port
4. Condensate tubing port
5. Waste tubing port
6. Door with latch



Figure 2. Installation/Connectivity of the REBEL XT System



### Components (Back)

- 7. USB ports (2)
- 8. VOC filter
- 9. Micro-USB port (for service only)
- 10. Ethernet port
- 11. Power switch
- 12. External fuses
- 13. AC power supply (3 wire grounded)
- 14. Product label



**Important:** Ensure that all vents are free from obstruction due to the large volume of air the device pulls in during normal operation. A minimum of three (3) inches behind the device and six (6) inches above the device are recommended.

The REBEL XT System should be placed on a secure table/bench or other flat, level surface rated for the specified size and weight.

### 3.3 SMarT Kit Analyte Measurements

The REBEL XT System measures 22 analytes using the Spent Media Analysis Kit (SMarT Kit).

#### Analytes

- Alanine
- Alanyl-glutamine
- Arginine
- Asparagine
- Aspartic acid
- Cystine
- Glutamic acid
- Glutamine
- Glycine
- Histidine
- Isoleucine
- Leucine
- Lysine
- Methionine
- Phenylalanine
- Proline
- Serine
- Threonine
- Tryptophan
- Tyrosine
- Valine
- Choline

Figure 3. REBEL SMarT Kit

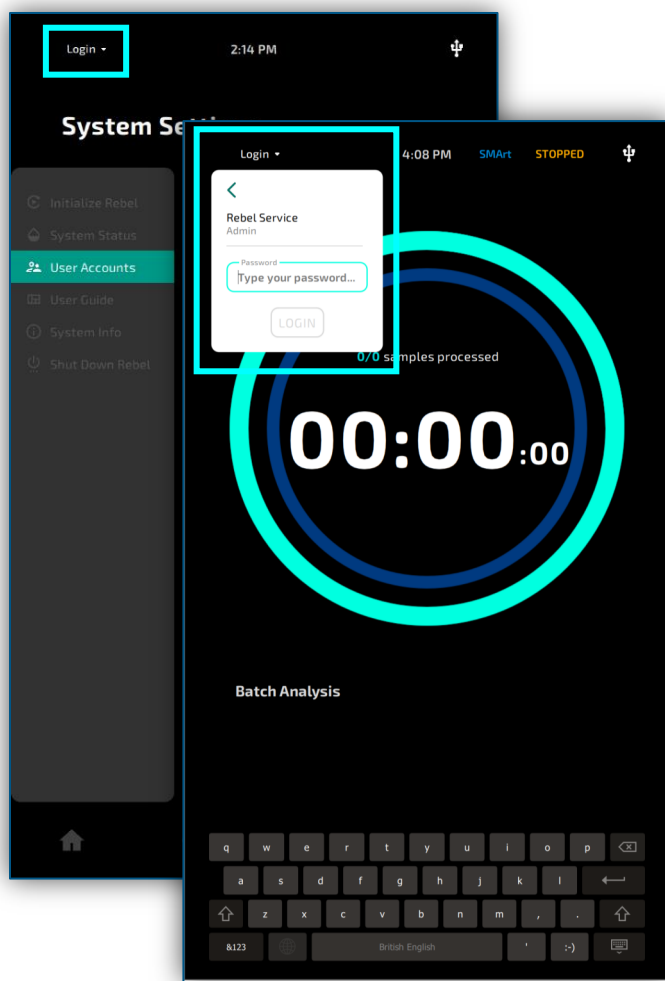


## 4. Setting Up The REBEL XT System

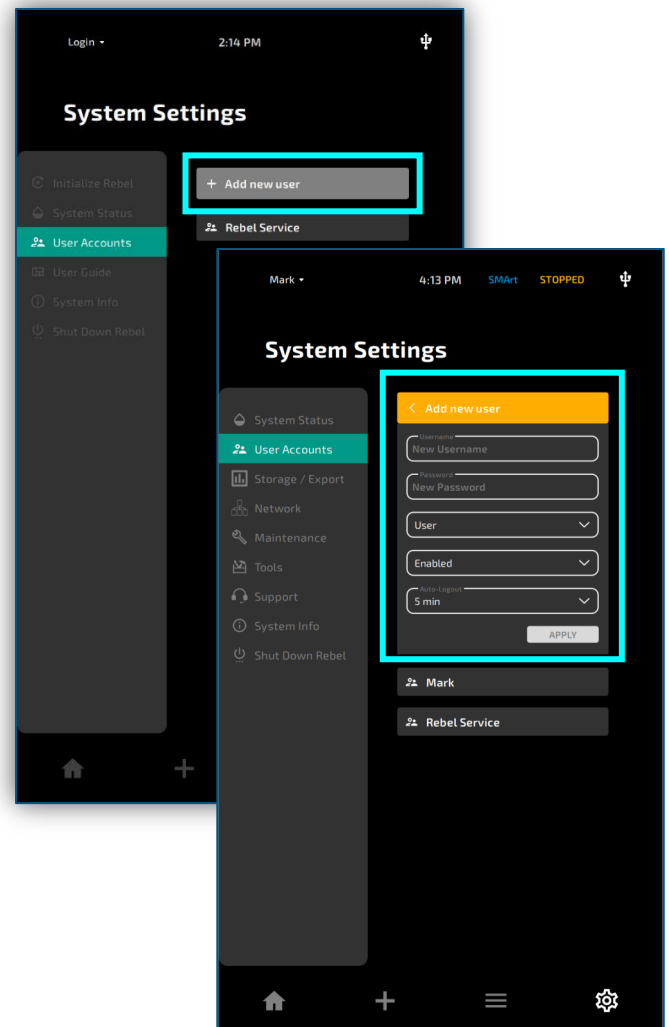
### 4.1 Boot-up and User Management

- Manually toggle the REBEL XT System power switch on.
- Go to System Settings > User Accounts. (The system opens this page automatically during training only for initial user setup)
- Log in as an existing user or create a new user.
- Each user can be enabled/disabled, assigned user or admin rights, and assigned a custom auto-logout (5, 10 or 30 min).

Figure 4. Login screens



Logging in as an existing user



Creating a new user account

4.2 Dashboard





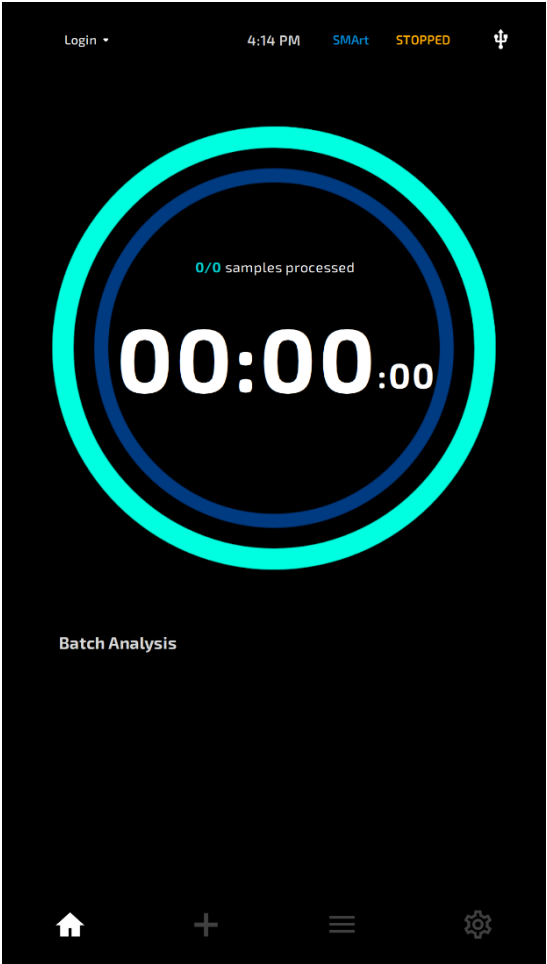
-  **Home**  
View progress of samples in a batch analysis.
-  **Run Setup**  
Import batch sheet, edit sample parameters, and start run.
-  **Timeline**  
View queue in progress and quant result history.
-  **System Settings**  
Start and shut down the REBEL XT System and edit settings.

Figure 5. Dashboard



### 4.3 SMarT Consumables Kit

- REBEL SMarT System Standards\*: 3 sets x 7 vials
- Background Electrolyte† (BGE): 2 x 250 mL
- Diluent with internal standards†: 2 x 125 mL
- 96 microwell plates with covers (2)
- REBEL XT Chip rated for 200 analyses

\* Standards ship in separate cold box. Refrigerate upon arrival to store.

† Store BGE and diluent at room temperature.



**Table 4. Quantitation Range for Optimal Dilution of Samples**

SMA V2 Analytes	Short Name	Upper Limit of Quantitation (ULOQ)	Lower Limit of Quantitation (LLOQ)
DL-alanyl-DL-glutamine	AQ	100 µM	5 µM
DL-Alanine	Ala		
DL-Arginine	Arg		
DL-Asparagine	Asn		
DL-Aspartic Acid	Asp		
Choline	Choline		
DL-Glycine	Gly		
DL-Histidine	His		
DL-Isoleucine	Ile		
DL-Leucine	Leu		
DL-Lysine	Lys		
DL-Methionine	Met		
DL-Phenylalanine	Phe		
DL-Proline	Pro		
DL-Serine	Ser		
DL-Threonine	Thr		
DL-Tryptophan	Trp		
DL-Tyrosine	Tyr		
DL-Valine	Val		
DL-Glutamine	Gln	75 µM	
DL-Glutamic acid	Glu		
Cystine	Cystine	50 µM	

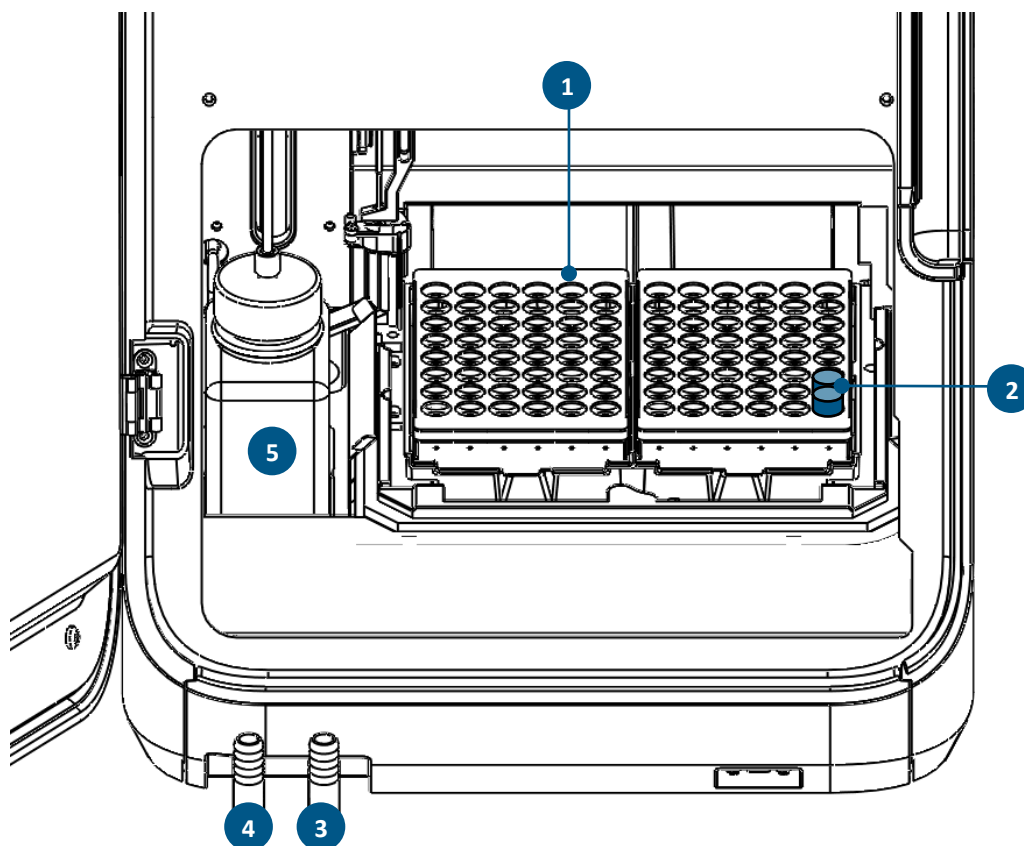
#### 4.4 Loading Consumables

**Important**

- Refrigerate SMARt standards (ideal temperature range: 2–8°C) until use. Do not freeze.
- Once pierced, standards expire after 14 days.
- Once in use in REBEL XT System, BGE and Diluent expire after 30 days.
- Refer to unique expiration dates on the standards pouch and bottles in kit.
- Solvents in Diluent and Background Electrolyte (BGE) are volatile. Cap bottles when not in use.
- Ensure waste and condensate tubing are connected and flow into a site-approved waste vessel.

1. Load SMARt standards into F1–F7 in right vial holder with blue capped vials in F1–F2.
2. Remove BGE cap. Attach dip tube and cap, ensuring dip tube is fully submerged in REBEL BGE solution.
3. Use REBEL System Diluent to dilute samples and load into vial tray or 96-well plate.
4. Load into left tray position and replace sample tray cover.

Figure 6. Consumables loading locations



#### Components

1. Sample tray (Left)
2. SMARt standards (Right F1–F7)
3. Condensate
4. Waste
5. BGE

## 4.5 Loading the REBEL XT Chip

### Navigation

Select System Settings > System Status > Chip, Replace

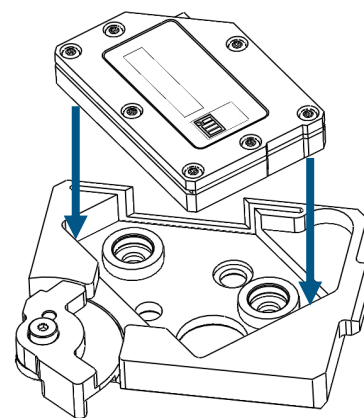
### Replace Chip

Follow on-screen walkthrough:

1. Expose the chip assembly.
2. While wearing gloves, remove chip from foil pouch.
3. Use the barcode scanner or manually enter the REBEL XT chip serial number.
4. Install the REBEL XT chip into the adapter plate.
5. Insert the adapter plate into the chip carrier.
6. Close the latch on the adapter plate.

Run Quantitative Calibration (see next page).

Figure 7. Chip Assembly



Chip assembly: REBEL XT chip + adapter plate

Figure 8. Exposed Corner

Face the exposed corner of the chip into the REBEL XT System.

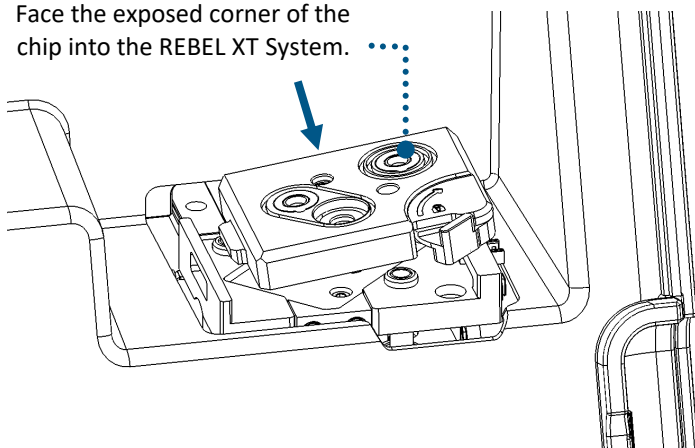
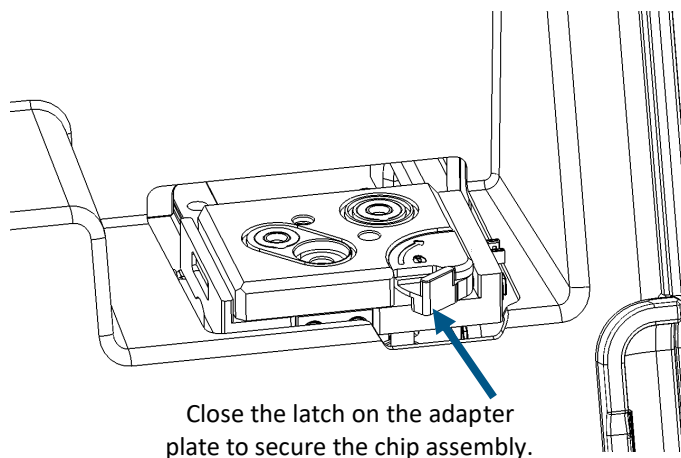


Figure 9. Close the Latch



### Best Practices

- Always wear gloves when handling REBEL XT chips.
- Avoid bumping the exposed glass corner of chip and ensure there is no damage to the glass before using.
- Ensure wells are empty before flipping chip.
- Confirm sealing rings on chip cover are clean and dry.

## 4.6 Quantitative Calibration and Performance Qualification (PQ)

### About

- **Quantitative Calibration** calibrates instrument response for a new consumables kit and finishes in about two and half hours. This process uses vials F3–F7 (right tray). Navigate to System Settings > Tools > Quantitative Calibration.
- **Performance Qualification (PQ)** automatically makes a pass/fail check after every five samples to confirm that the REBEL System remains calibrated during analysis of a batch. This process pulls from vials F1–F2 (blue caps). To run a PQ manually, navigate to System Settings > Tools > Performance Qualification.

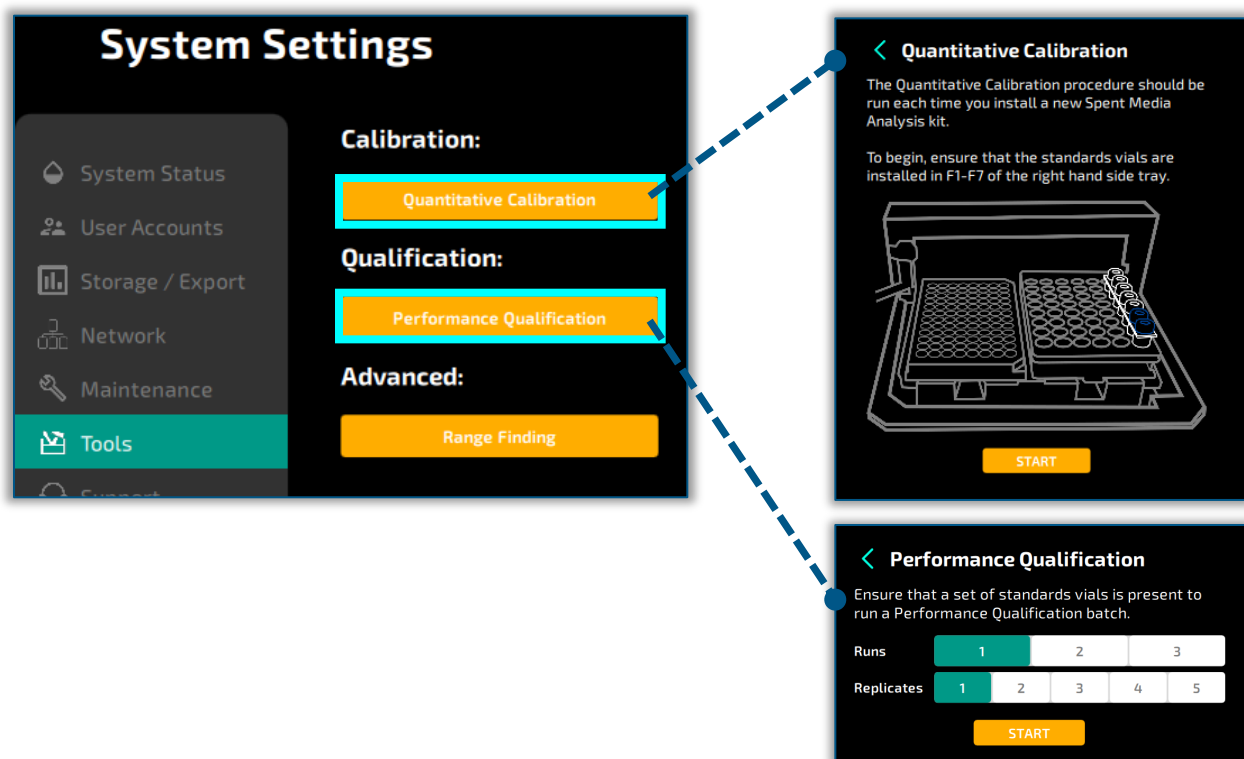
### When to run a new Quantitative Calibration

- Required when using a fresh kit
- Required whenever the chip or standards vials are replaced
- Recommended when the BGE bottle is replaced or after several days of inactivity
- Recommended when PQ results repeatedly fail

### Recommendations

- Review Quantitative Calibration and PQ reports in History with PASS/FAIL metrics.
- If Quantitative Calibration does not complete or fails, contact the Repligen technical support team at [techsupport@repligen.com](mailto:techsupport@repligen.com).

Figure 10. Calibration and Qualification functions



**Note:** Pressing the Start button here will add a Quantitative Calibration or Performance Qualification to the batch queue, but it will not execute until the user begins the run by pressing the main Start button on the home screen. Users may wish to prepare and load samples so that the entire batch queue is run automatically after a successful Quantitative Calibration.



4.7 Reviewing Quantitative Calibration Reports

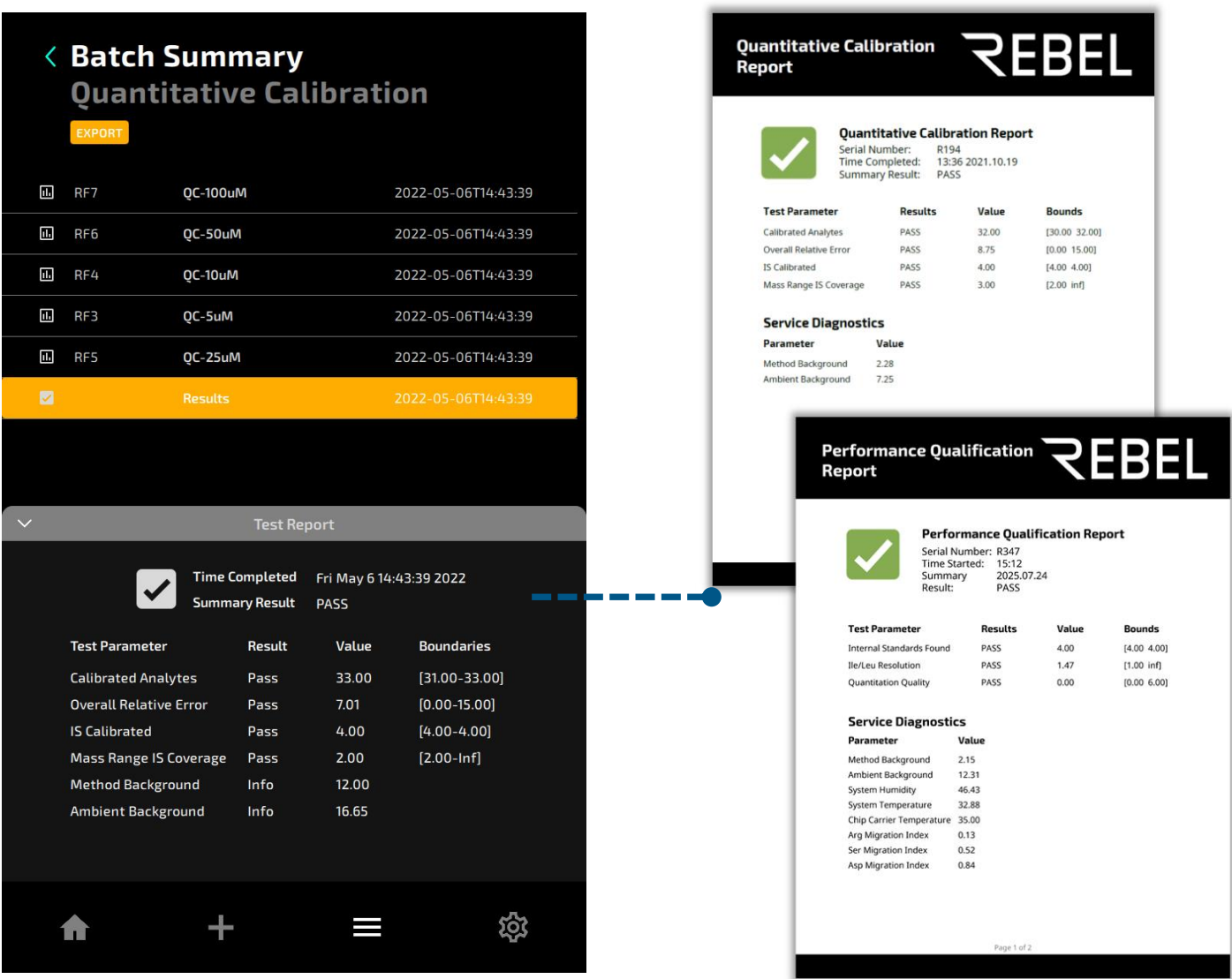
Quantitative Calibration and Performance Qualification (PQ) reports show current performance metrics along with ideal ranges.



Important

- Check every Quantitative Calibration and PQ report on screen or as a PDF to confirm that all performance metrics are in range.
- In case of repeated PQ FAIL messages, run Quantitative Calibration again.

Figure 11. Calibration and Qualification reports



4.8 Reviewing Performance Qualification (PQ) Reports

**Performance Qualification (PQ)** check automatically runs every five (5) samples and takes just a few minutes to confirm that the REBEL XT System is still calibrated during analysis of a batch.

Results

There are three possible results for each test:

- **Pass** indicates that parameters are within ideal operational range.
- **Pass (Warn)** indicates that the measured value is close to failure thresholds, but analysis can proceed as planned. Please check for changes in metrics of the service diagnostics (e.g. background) or consumable status at the earliest convenience.
- **Fail** indicates that parameters are outside of ideal operational range.

**Note:** Information from the Service Diagnostics section may be requested by Technical Support.

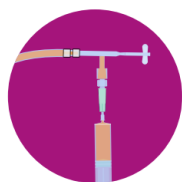
Figure 12. Performance Qualification Report Example



## 5. REBEL XT System Sample Preparation

### 5.1 REBEL System Sample Preparation

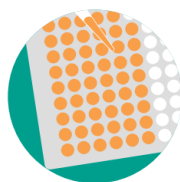
Figure 13. Workflow



Filter sample



Dilute and mix  
with REBEL System  
diluent



Load samples in  
vials or plate



Import batch and  
press Start



Batch report  
complete!

### Important Considerations for Sample Dilution

1. **Filter:** To remove cellular debris, run samples in centrifuge using sterile microcentrifuge tube filters or use (0.22 µm) syringe lock filters with nylon membrane.
2. **Volume:** Make enough diluted sample.
  - Vial: 1000 µL minimum per 2 mL vial
  - Plate: 200 µL minimum per microwell
3. **Range:** Utilize range-finding tool for optimal dilution factor. Consider that several dilutions may be needed to get all analytes in range.
  - Calibration range for all analytes: see [Table 4](#)
  - 10X is the minimum dilution factor.
4. **Mixing:** Vortex vials or aspirate dilutions in wells with pipette to ensure thorough mixing.
5. **Cover:** Secure vial caps or well plate covers properly to avoid evaporation. REBEL XT System diluent is volatile. Do not reuse covers.

Table 5. Sample Dilution

Media Example	Try Diluting...
Feed supplement	1000X
Microbial	250X
CHO, Insect, HEK293	100X
MSC	10–50X
T-cell	25X
DMEM	10X
Yeast	10X



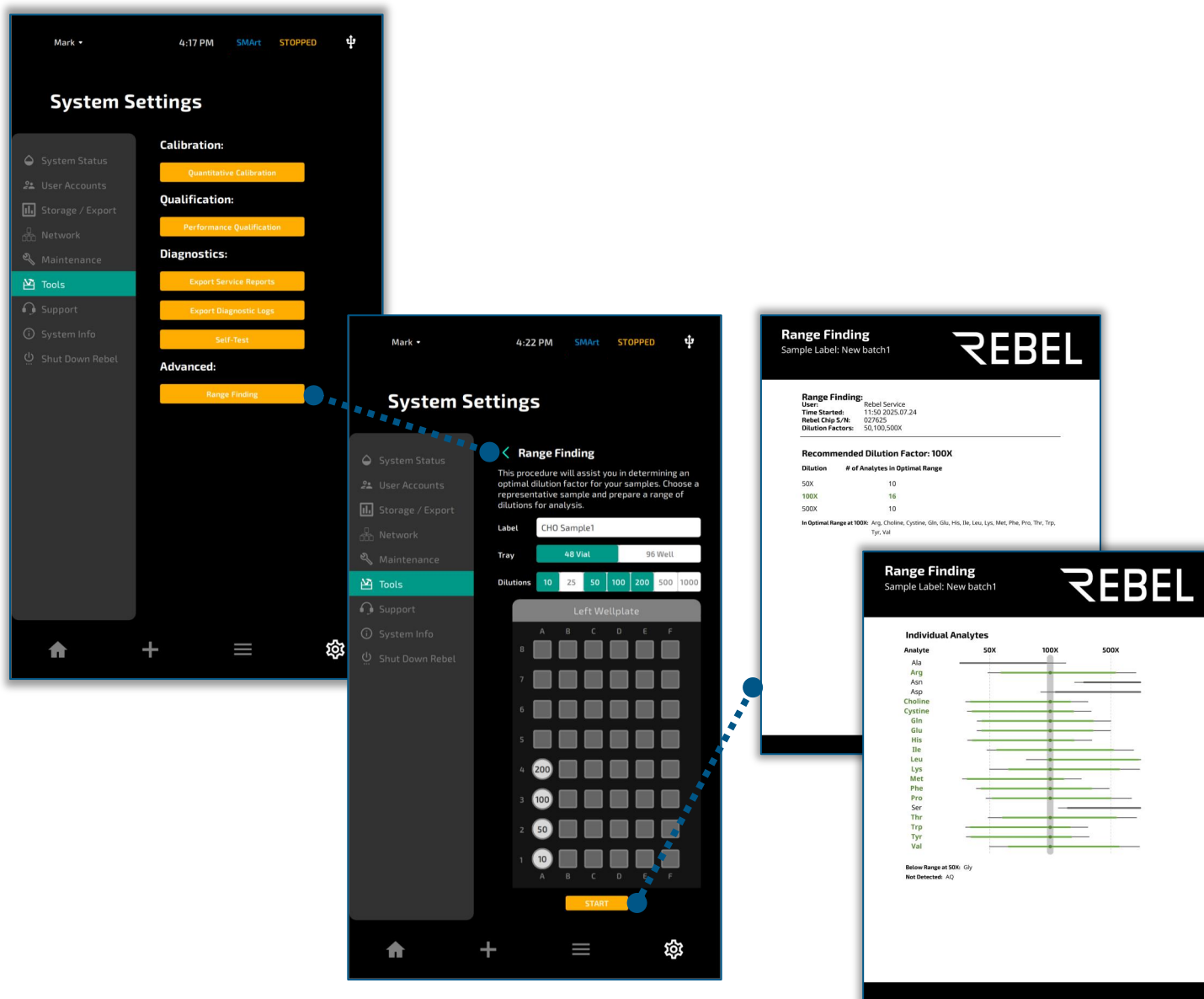
**Tip:** Consider robotic dilutions or multichannel pipettes for heavy routine sample prep (i.e., batches routinely 20+ samples).

## 5.2 Range Finding Tool

This tool is designed to assist in determining the optimal dilution factor for a sample.

- Choose a representative sample and prepare a range of dilutions for analysis.
- Navigate to the Systems Settings menu and then the Tools tab.
- Within the Tools tab, select Range Finding.
- Select the desired dilutions and begin.

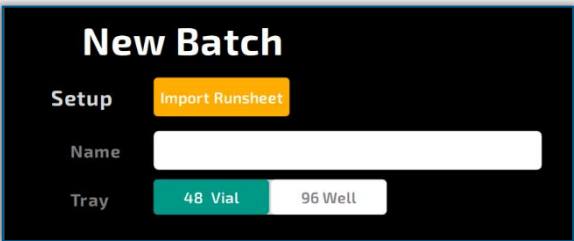
Figure 14. Range Finding tool and output



6. Set Up a Batch

Best option: Import

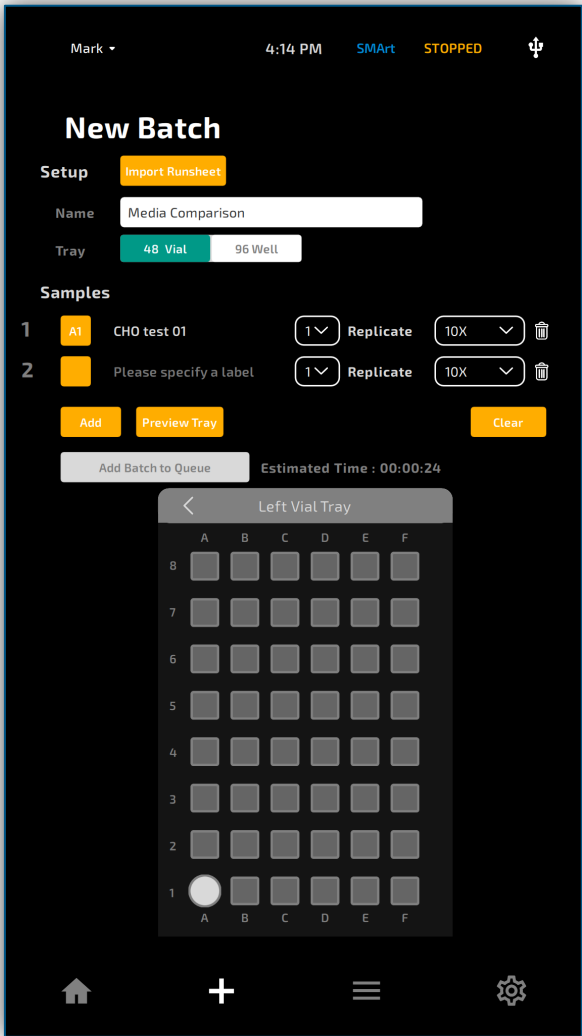
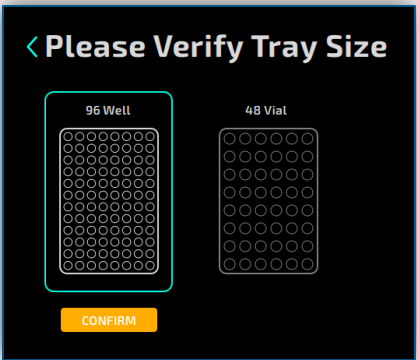
- Complete the batch sheet ([Section 6.1](#)).
- Select +, then Import Runsheet.
- Locate the batch sheet on network or USB, then press Select.
- Place vial tray or well plate in the left tray.



Manual option

For a single sample or small batches:

- Confirm tray size, name the batch, and add sample information directly on screen.
- Add each sample, then click Add Batch to Queue.



## 6.1 What Is a Batch Sheet?

A batch sheet (\*.csv or \*.xlsx) tells the REBEL XT System essential information about the batch, user, and sample.

- Download the batch sheet template from Repligen website.
- After sample prep, complete required fields in the batch sheet.
- If a **required field** turns red in the \*.xlsx formatted sheet, review and fix the entry. The REBEL XT System will not be able to run a batch with sheet errors.
- You may also add custom columns (in column H and beyond) for additional sample descriptions or other metadata, which will be exported with the results.
- Save the batch sheet on the network drive or USB for import.

**Figure 15. Batch sheet example**

	A	B	C	D	E	F	G
1	Header	3					
2	Name	(enter batch name)					
3	User	(enter user name)					
4	Tray Type	(enter: 48, 96 low)					
5	Comment	(enter comment)					
6							
7	PlateRow	PlateColumn	SampleLabel	Replicates	DilutionFactor	UserName	Comment
8	A	1	Media Z	1	100	bob	100x dilution of media received 9/15/19
9	B	1	Media Y	1	100	bob	100x dilution of media received 9/15/19
10	C	1	Media X	1	100	bob	100x dilution of media stored 8/15/19
11	D	1	Media X	1	100	bob	100x dilution of media stored 8/21/19
12	E	1	Media X	1	100	bob	100x dilution of media stored 9/1/19

## 6.2 Review & Edit Sample Info

- Overview displays sample info for a selected batch.
- Tap the desired area to view or modify existing sample info or add a new sample.

Once selected, these options may be modified:

- Sample Label
- Comment
- Dilution Factor
- Replicates

For an imported runsheet, these options may be modified:

- Batch Name
- Tray type
- Sample location
- Sample label
- Replicates
- Dilution factor

**Note:** For imported runsheets, custom fields (such as Comment) cannot be modified via the touchscreen interface. Review in Batch Overview then select Add Batch to Queue.

- Review in Batch Overview then select Add Batch to Queue.

Figure 16. Batch info

The figure displays two screenshots of the 'New Batch' interface on a touchscreen device. The top screenshot shows the 'Setup' section with the following details:

- Mark:** Mark -
- Time:** 4:20 PM
- Status:** SMART STOPPED
- Section:** New Batch
- Setup:** Import Runsheet
- Name:** Test Batch 1
- Tray:** 48 Vial (selected), 96 Well
- Samples:** 1 A1 Test Sample 1 (1 Replicate, 100X dilution)
- Buttons:** Add, Preview Tray, Add Batch to Queue, Clear
- Estimated Time:** 00:00:16

The bottom screenshot shows the 'Samples' section with a list of 11 samples:

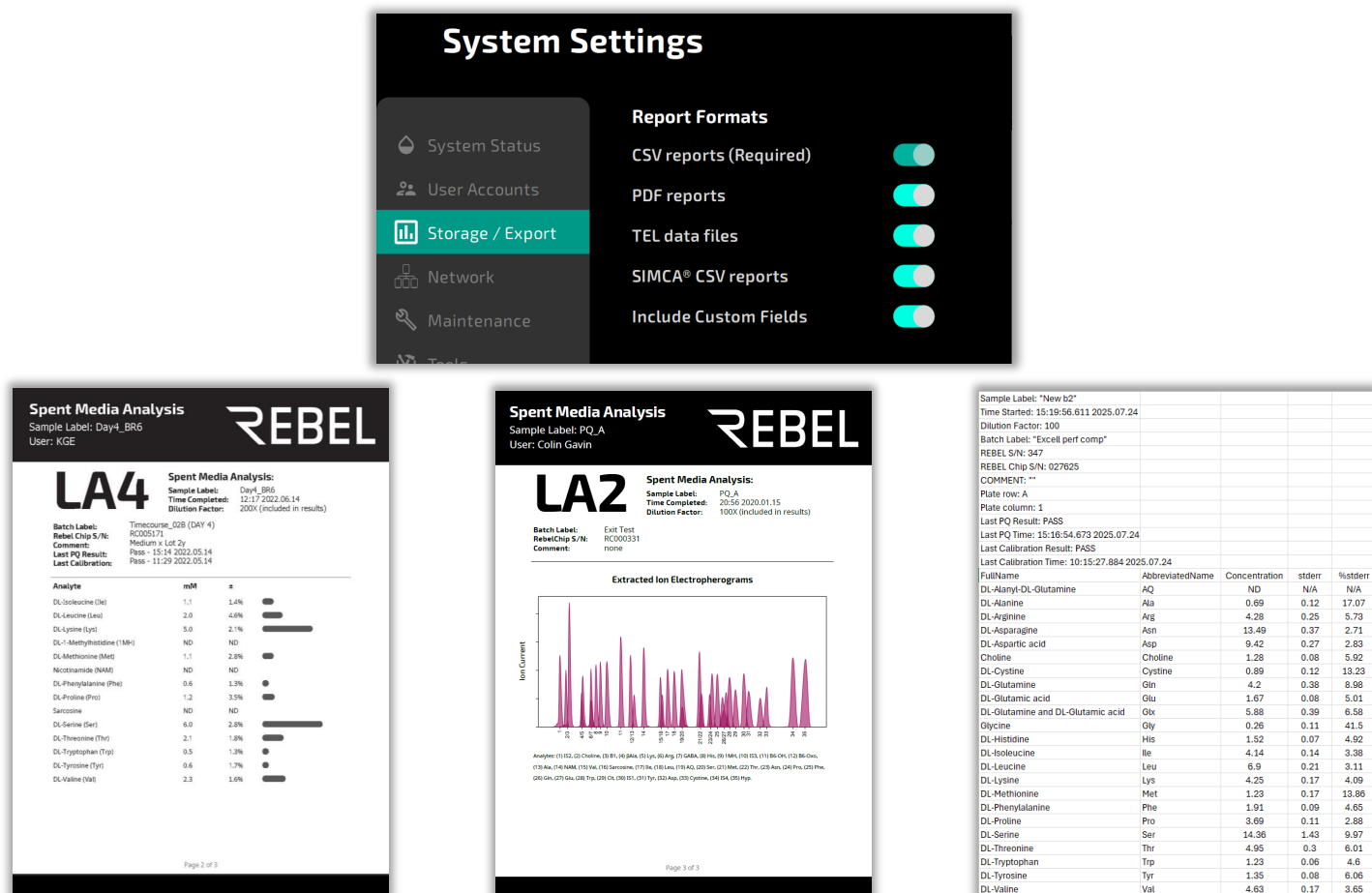
Sample ID	Well Label	Sample Name	Replicate	Dilution Factor
1	A1	Sample1	1	100X
2	A2	Sample2	1	100X
3	A3	Sample3	1	100X
4	A4	Sample4	1	100X
5	A5	Sample5	1	100X
6	B1	Sample6	1	100X
7	B2	Sample7	1	100X
8	B3	Sample8	1	100X
9	B4	Sample9	1	100X
10	B5	Sample10	1	100X
11	B6	Sample11	1	100X

Buttons at the bottom of the bottom screenshot include: Add, Preview Tray, Add Batch to Queue, Clear, and Estimated Time: 00:01:52.

## 6.3 Report Formats

- Report format options are located under System Settings > Storage/Export. See [Section 10.4](#) for approximate file sizes.
- Analyte concentrations are listed in mM  $\pm$  standard error.
- Error is calculated from calibration for each run, not standard deviation based on replicates.
  - On screen: concentration as mean of all replicates for that sample
  - CSV report: single CSVs with concentration per replicate and a batch result summary CSV with all replicates in a batch
  - PDF report: concentration per rep
  - TEL data file: raw data for technical support
  - Include Custom Fields: additional metadata for statistical software packages (e.g., JMP)

**Figure 17. Storage/Export settings and sample reports**





## 7. Running Samples

### 7.1 Starting a Run

Press Start to bring up the batch initialization checklist. All checklist items must be completed before analysis begins.

- Some actions are automatically confirmed by the REBEL XT System.
  - ✓ Completed/valid
  - User action required. Follow the on-screen guidance.
- Actions with square checkboxes (☐) must be manually confirmed by the user before continuing.

On the Start Batch screen, this system will alert you if you need to:

- replace the chip
- refresh BGE supply
- refresh REBEL SMARt System standards

To proactively check the status of consumables, see 9.2 System Status. Press Replace for further instructions before opening the instrument door.

Figure 18. Batch initialization

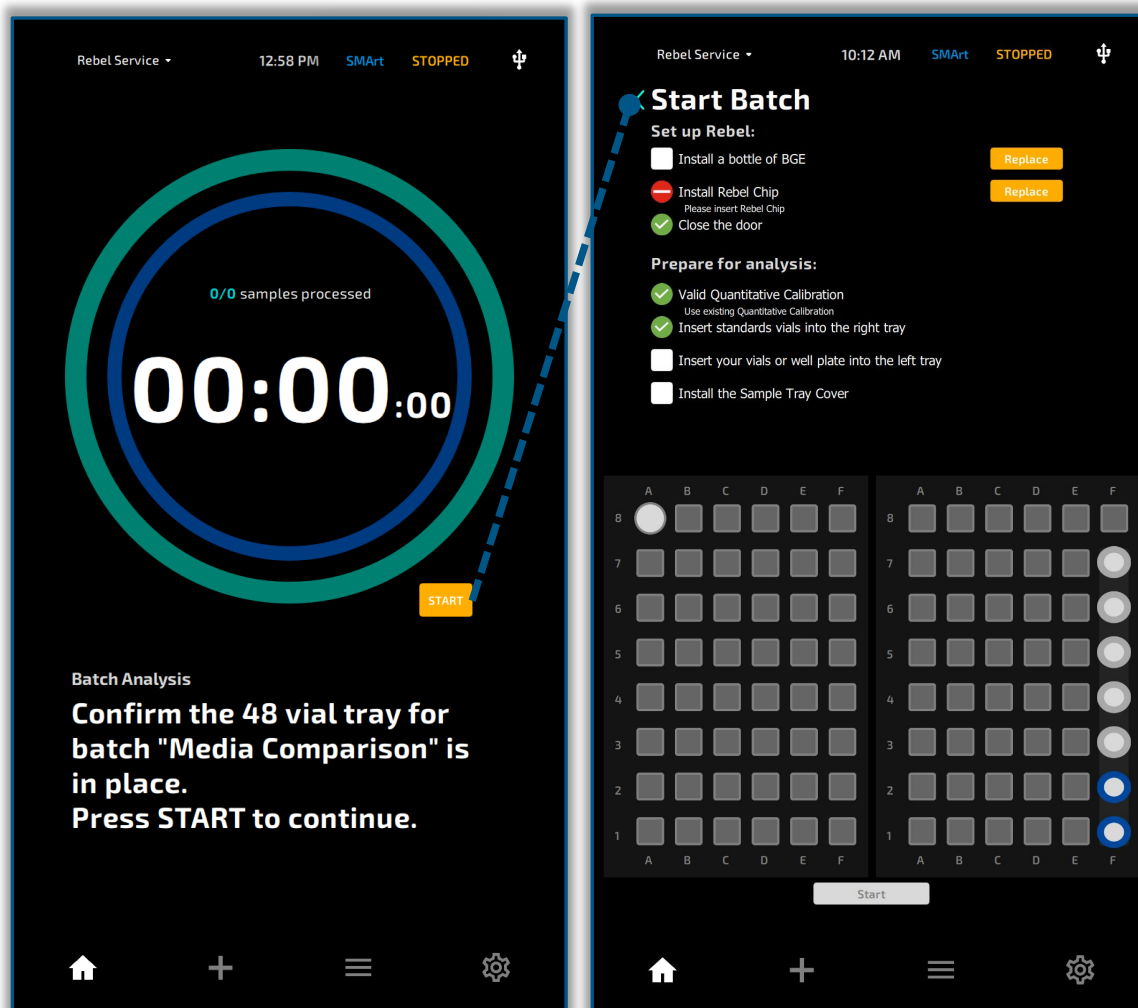
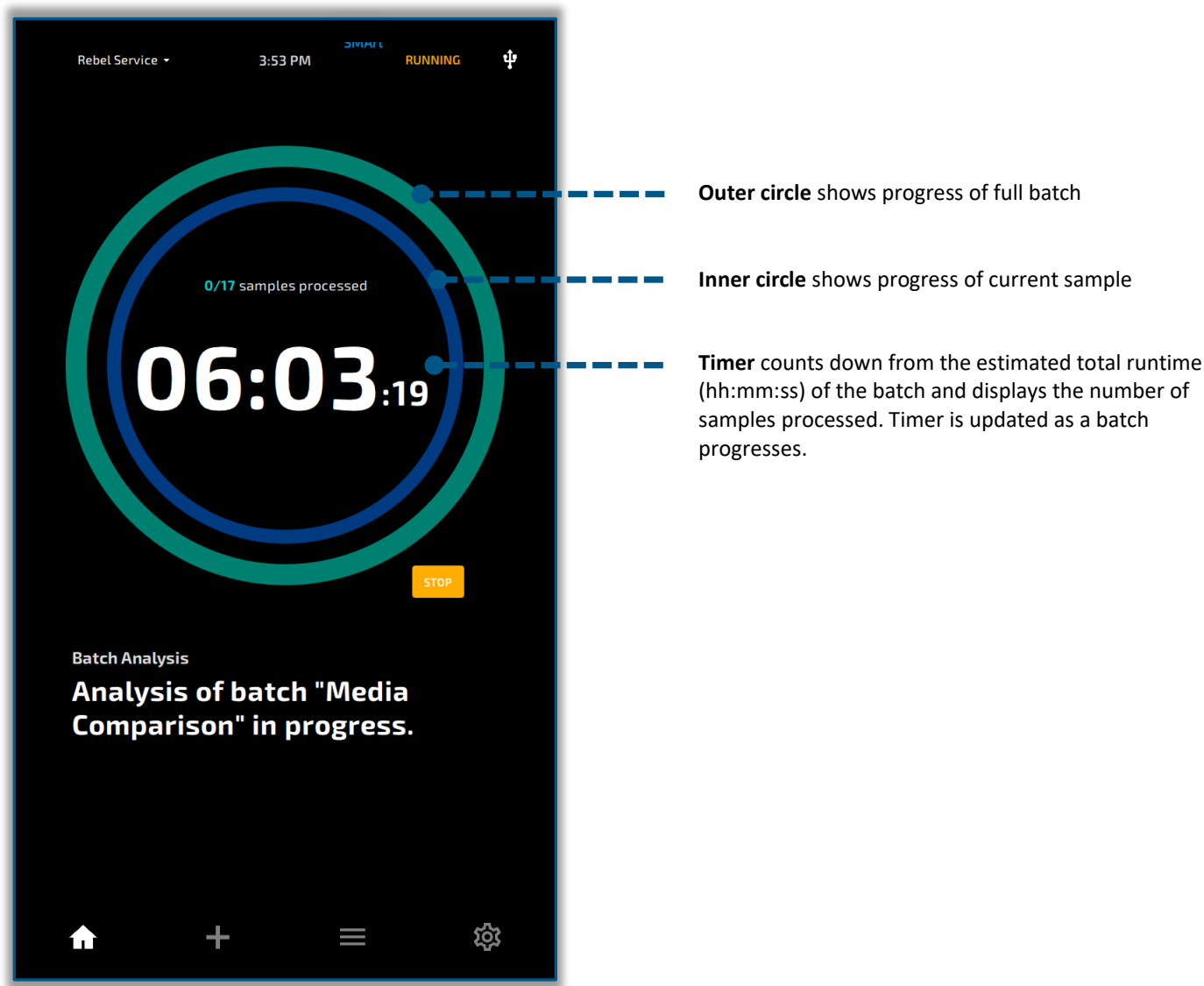


Figure 19. Batch progress screen



*If the REBEL XT System is idle with a chip installed for 4 hours, the chip will be automatically rinsed and dried to prepare for the next batch.*

7.2 Timeline

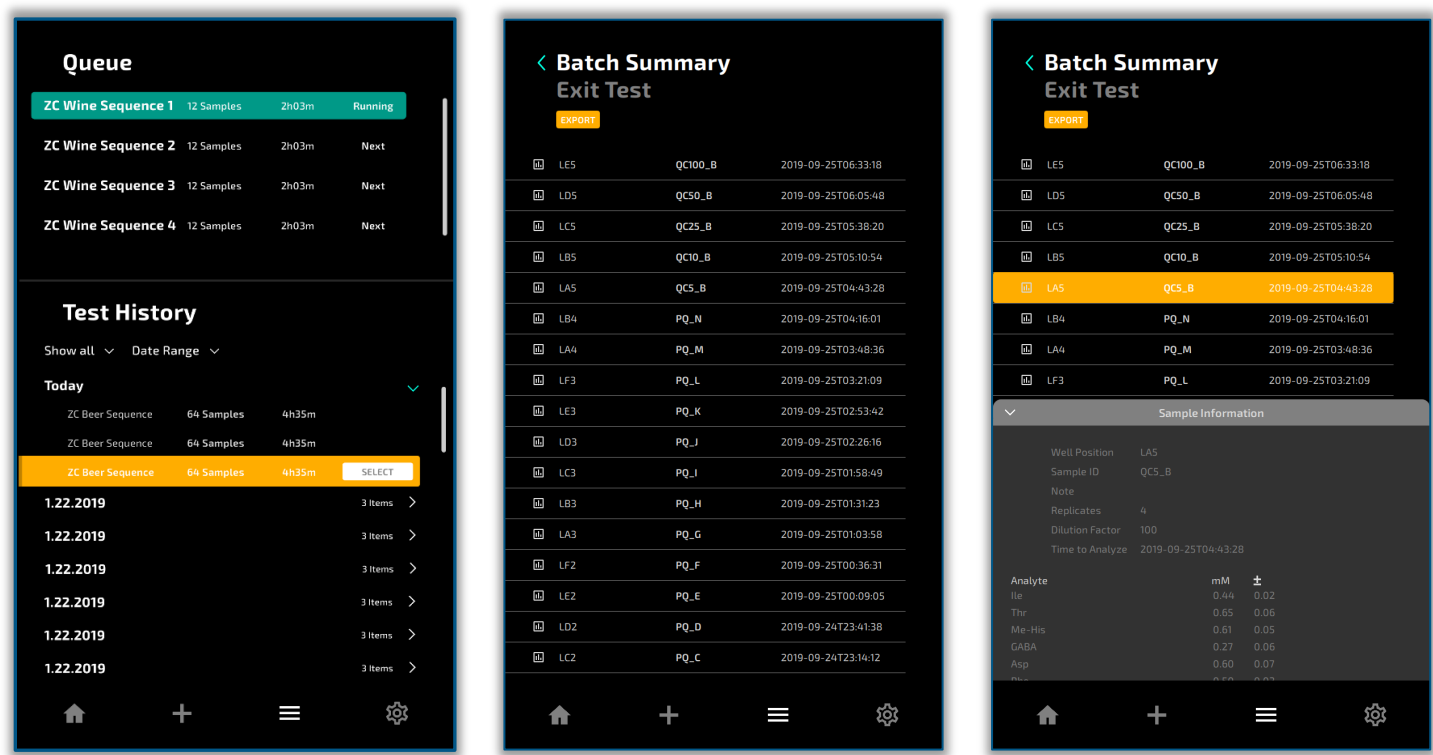
Queue

View batch in progress and the subsequent action.

Test History

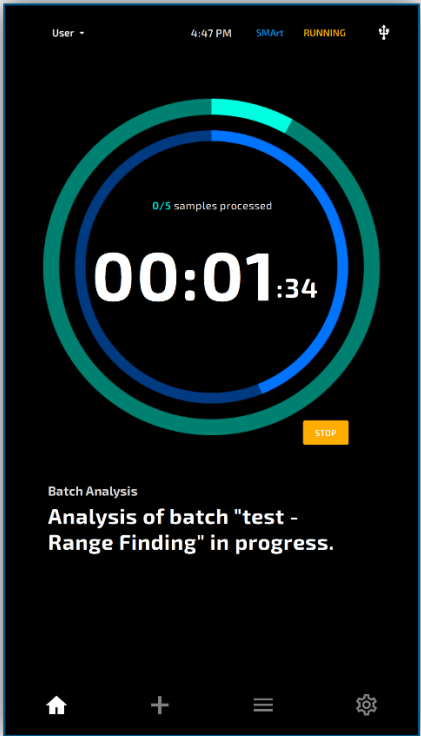
Select any batch sample to view quantitative results on the screen.

Figure 20. Prior batch results

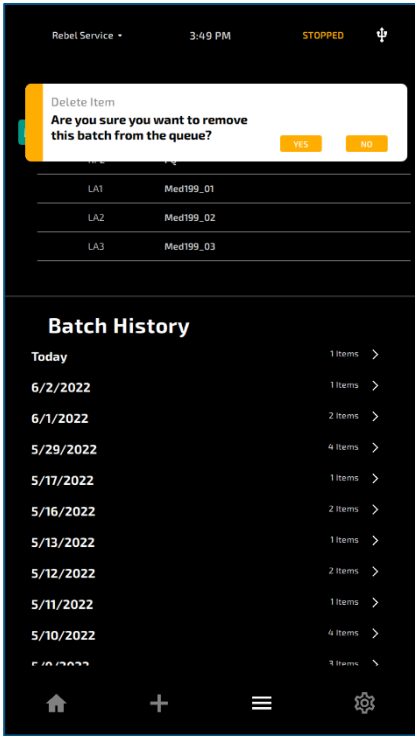
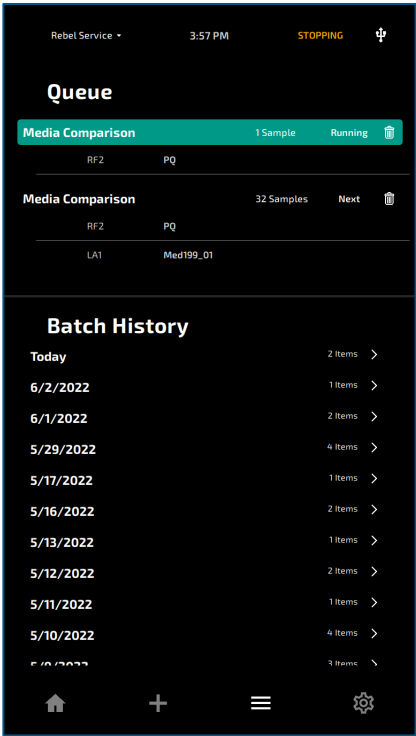


7.3 Manage a Batch in Queue

- To stop a batch run, select Stop on the home screen. Batch will pause after all replicates of the current sample are complete.
- To resume the batch run, select Start on the home screen.



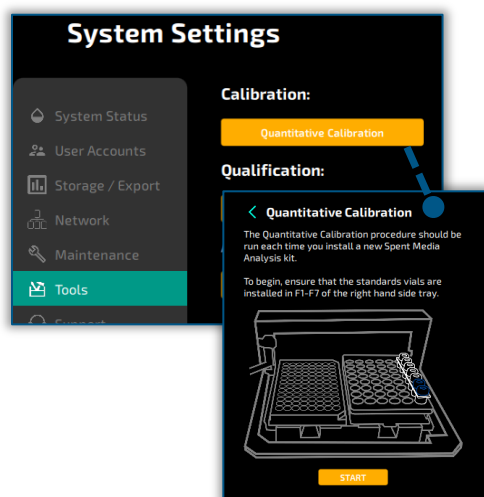
- To remove a batch from Queue, select the trash icon (🗑️).



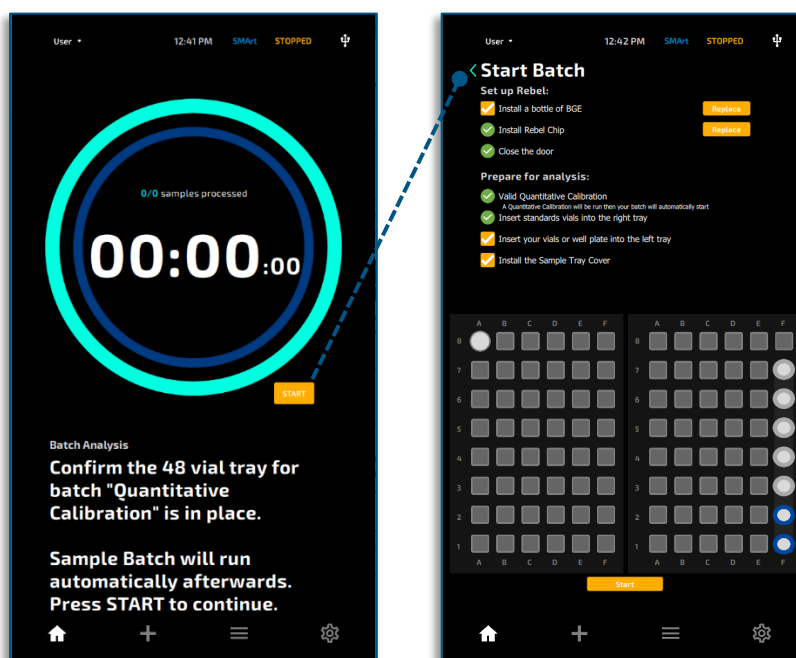
## 7.4 Queuing a Batch to Run After Quantitative Calibration

To streamline analysis, users can queue a batch of samples to be analyzed following a successful Quantitative Calibration.

1. Add Quantitative Calibration to the Queue.
  - Navigate to System Settings > Tools > Quantitative Calibration > START.
  - Do NOT press start on the home screen to start the Quantitative Calibration yet.



2. Add Batch to the Queue
  - Follow the procedure in [Section 6](#).
3. Start Batch Analysis
  - The home screen will confirm both the Quantitative Calibration and sample batch are queued for analysis.
  - Press START.
  - Complete the batch initialization checklist and press START.

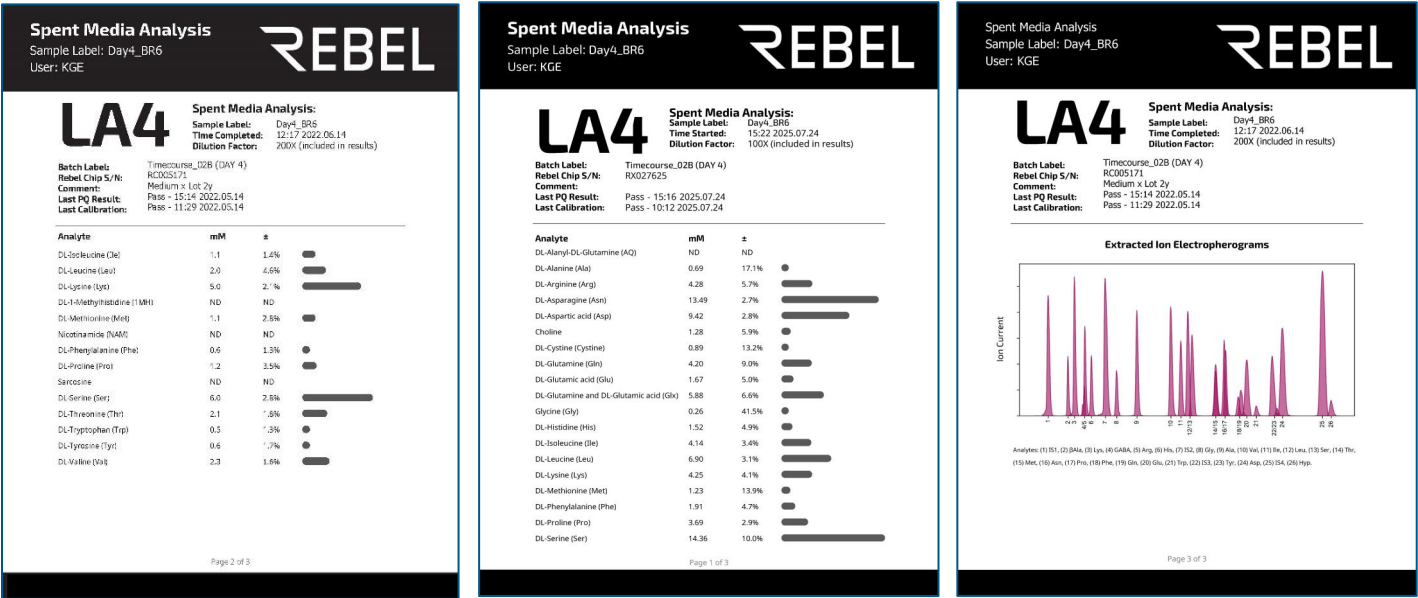


**Note:** If the Quantitative Calibration fails, the queue will stop, and the next batch will not start automatically.

8. Reviewing Results

Results are available in several convenient report formats. See [Section 6.3](#) for more information on changing report settings.

Figure 21. Sample results reports



**Did the REBEL System report an expected target out of range?**

- If over the LOQ (>LOQ), dilute further and run again.
- If not detected (ND), re-dilute based on data and run again for size and weight.

DL-Cystine (Cystine)	>LOQ	N/A	
DL-Glutamine (Gln)	2.7	0.9	
DL-Glutamic acid (Glu)	1.8	0.6	
DL-Glutamine and DL-Glutamic acid (Glx)	4.5	1.1	
Glycine (Gly)	ND	ND	



**JMP Add-In**

For easy data visualization, ask your Repligen representative about our add-in for the popular statistical software JMP.

## 9. Routine Maintenance and Calibration

### 9.1 Routine Checks and Maintenance



#### *Tips for keeping the REBEL XT System in optimal working order*

- A **full shutdown** should be performed if the REBEL XT System will be idle for more than five (5) days. If the REBEL XT System is coming back online from a complete shutdown, it is recommended to perform a Self Test ([Section 9.5](#)) followed by a Quantitative Calibration ([Section 4.6](#)).
- A **single PQ** can also be run before beginning a new batch to ensure your REBEL XT System is still quantifying analytes within calibrated bounds. See [Section 4.6](#) for more information about Quantitative Calibration and Performance Qualification.

#### Weekly

- Wipe away dust and debris in immediate area (~1 foot) on each side of the REBEL XT System base with a clean, lint-free cloth dampened with water.
- Check consumable levels and replace if expired (see [Section 4.4](#) for more information on setting up the consumables kit).
- Run a self-test if the system is coming back online after:
  - a long-term shutdown, or
  - the system has remained online for five days or more.



## 9.2 System Status

The REBEL XT System will alert you when the chip, BGE, or Standard solutions need to be replaced on the Start Batch screen (see 7.1 Starting a Run).

However, to proactively check the status of the consumables, select System Settings, then System Status.

Press Replace on the corresponding consumable for further instructions before opening the instrument door.

### Chip

- Select Replace to expose the old chip.
- Remove the old chip, then load a new chip from the new REBEL System SMARt kit.

**Note:** Each REBEL XT chip is rated for 200 analyses; Quantitative Calibration & Performance Qualification (PQ) runs do not add to this count. It is recommended to use a fresh chip after 30 days, regardless of runs remaining.

### Background Electrolyte (BGE)

- Select Replace and follow the on-screen prompts, or confirm proactive swap.

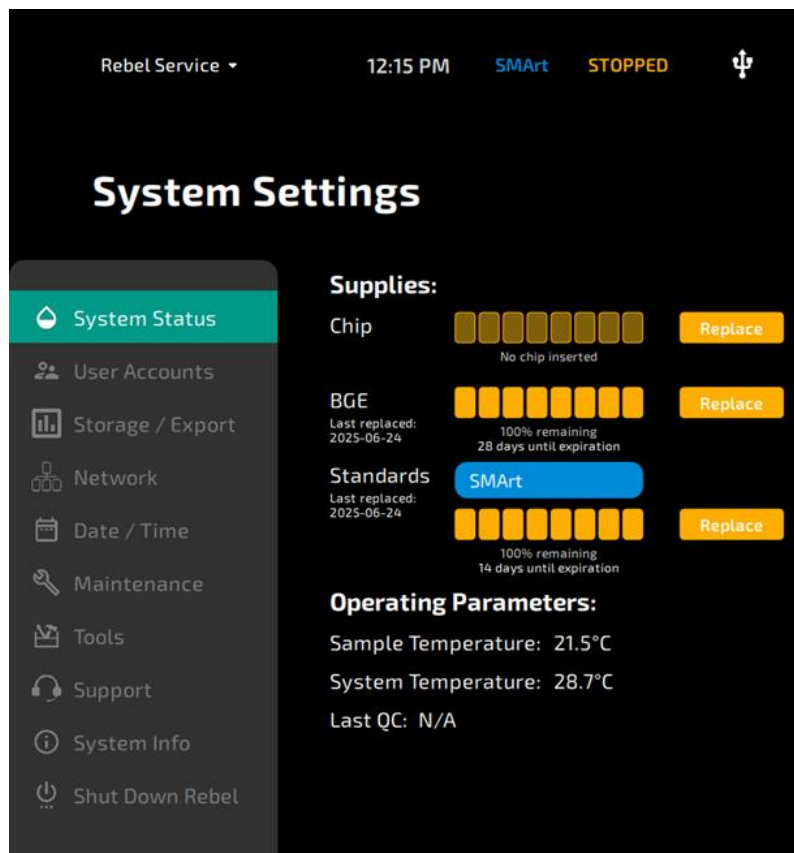
**Note:** REBEL XT System will not detect new BGE bottle. Volume remaining is calculated based on system operations performed.

### Standards

- Select Replace and follow prompts.

**Note:** The REBEL XT System will not detect new standards. Runs are tracked on standards to ensure sufficient volumes for sample loading. Each Standards strip is rated for 24 PQs.

Figure 22. System Settings page



**Remove the BGE bottle and replace it with a full bottle. Press confirm once the replacement is complete.**

Confirm

Cancel

**The BGE bottle level has been updated.**

Ok

**Remove the standards vials located in positions F1-F7 of the right hand side tray. Replace them with a new set of standards from the same kit. Ensure the vials with blue caps are in positions F1-F2.**

Confirm

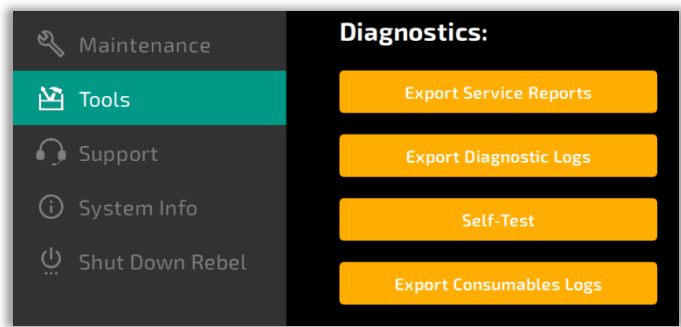
Cancel



9.3 Advanced Diagnostics

These advanced diagnostics may be necessary if requested by the technical support team. Navigate to System Settings > Maintenance.

Figure 23. Diagnostics menu



Self-Test

This function runs basic system functions to determine overall system health. For more information, see [Section 9.4](#).

System Rinse

Run System Rinse if requested by technical support. This step flushes the system fluidic lines for diagnostic purposes. Not needed for normal system operation.

Export Service Reports

To export Service Reports to a USB drive or network storage location for the technical support team, navigate to Tools > Diagnostics > Export Service Reports. Service Reports do not include any data from user samples; only system, calibration, and other diagnostic information are included.

Self-Test

To run the hardware Self-Test, ensure that a Rebel Chip is placed in the chip carrier.

CANCELCONFIRM

System Rinse

Use only if recommended by Rebel Support. This option rinses the system with BGE. To proceed, ensure that a Rebel Chip is placed in the chip carrier, and the BGE and waste bottles are installed.

CANCELCONFIRM

## 9.4 Advanced Diagnostics: Self-Test

### Self-Test

This operation runs basic system functions to determine overall system health. To access, navigate to System Settings > Maintenance. Several conditions identified by the Self-Test can be resolved by the user. If errors persist or parameters remain out of specification, please contact Technical Support.

- **Pump RPM/Difference**

#### Vacuum Pressure

These tests are related to the detector's vacuum system. If Pump RPM is too low, attempt the Clear Aperture Inlet function in the Maintenance menu.

- **20kV Supply Current**

#### 20kV Supply Voltage

#### 5kV Supply Voltage

These values are related to high voltages for capillary electrophoresis (CE) separation. If out of specification, restart system and reattempt the Self-Test.

- **Pneumatic Pressure**

#### Pressure Drop/Recovery

These values are related to the gas system and pressure sealing on the chip during analysis. If out of specification, remove chip and adapter plate. Make sure O-rings are on adapter plate. Reattempt Self-Test.

- **Trapping Voltage**

#### Ramp Voltage

These tests are related to the high-pressure mass spectrometry (HPMS) detector. If out of specification, attempt to run Quantitative Calibration. The calibration process should tune these parameters.

Hardware Self-Test

REBEL

✓

### Hardware Self-Test

Serial Number: R211  
Time Completed: 16:20 2023.08.21  
Summary Result: PASS

Test Parameter	Results	Value	Bounds
20kV Supply Current	PASS	0.07	[0.00 15.00]
Pneumatic Pressure	PASS	4.00	[3.88 4.12]
Pump RPM Difference	PASS	3.50	[0.00 200.00]
Pump RPM	PASS	1042.25	[800.00 inf]
Vacuum Pressure	PASS	0.60	[0.54 0.66]
20kV Supply Voltage	PASS	1046.46	[850.00 1150.00]
5kV Supply Voltage	PASS	1013.48	[850.00 1150.00]
Pressure Drop: BGE	PASS	5.13	[2.50 25.00]
Pressure Recovery: BGE	PASS	1.40	[0.00 3.00]
Pressure Drop: Sample	PASS	3.99	[2.50 25.00]
Pressure Recovery: Sample	PASS	1.22	[0.00 3.00]
Pressure Drop: Pump	PASS	5.02	[2.50 25.00]
Pressure Recovery: Pump	PASS	1.06	[0.00 3.00]
Trapping Voltage (D0)	PASS	242.44	[204.00 276.00]
Ramp Voltage (D0)	PASS	974.09	[850.00 1150.00]
Trapping Voltage (D1)	PASS	242.43	[204.00 276.00]
Ramp Voltage (D1)	PASS	967.09	[850.00 1150.00]
Trapping Voltage (D2)	PASS	243.31	[204.00 276.00]

Page 1 of 2

## 9.5 Shutdown

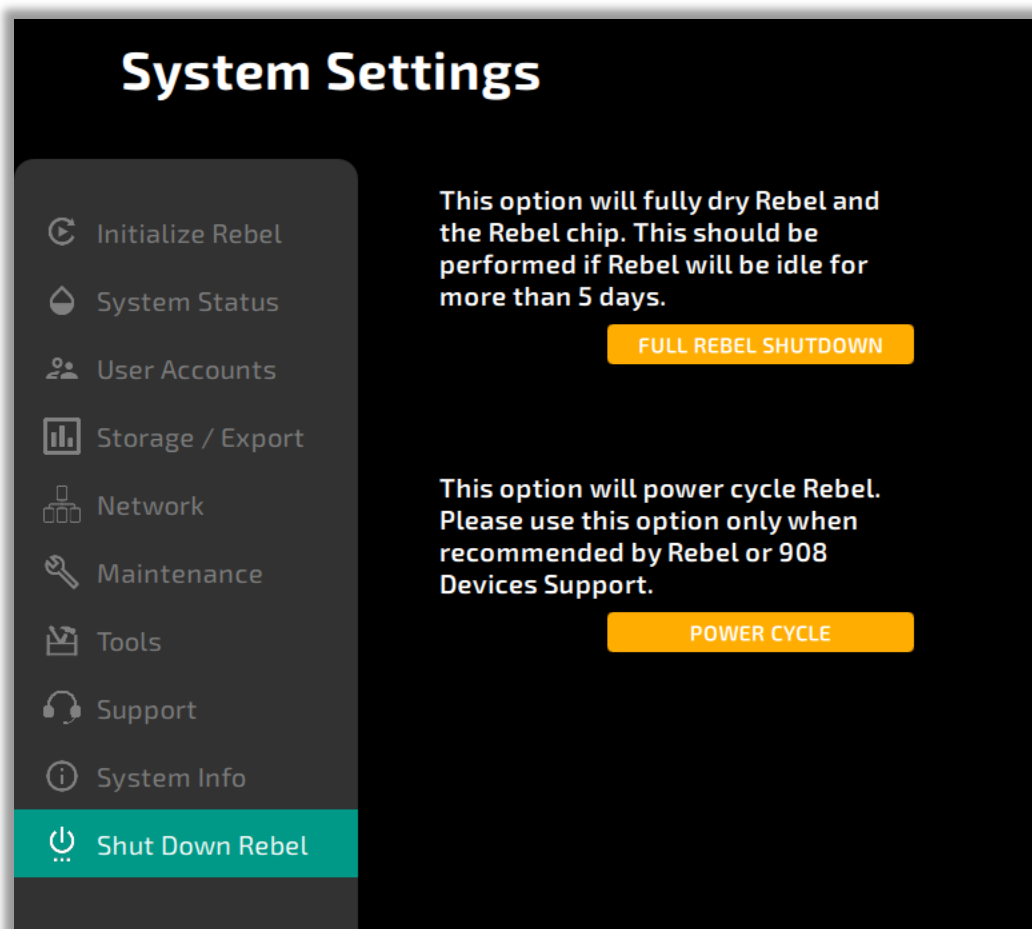
Navigate to System Settings > Shut Down REBEL XT System.

Select Power Cycle when prompted by the REBEL XT System or Technical Support.

Select Full REBEL Shutdown if the REBEL XT System will be idle for more than five days. Follow on-screen prompts to complete this 30-minute procedure to ensure proper function.

- Remove BGE and cap the bottle.
- Place empty bottle under BGE line for cleanliness during dry cycle.
- Sample tray cooler will power down, so remove vials/plates from BOTH left and right trays and refrigerate.
- AFTER shutdown, manually toggle power switch to OFF.

Figure 24. Shutdown options

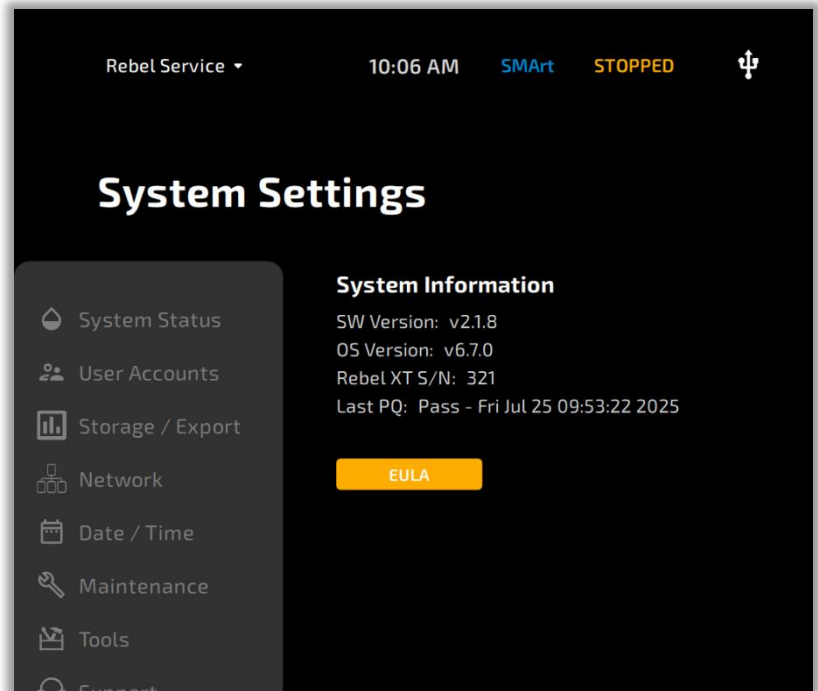


## 10. System Information and Networking

### 10.1 System Info

Navigate to System Settings > System Info to access the following information:

- REBEL XT System Serial Number (S/N)
- Software version
- Technical support



### 10.2 Networking and Storage—For IT Reference

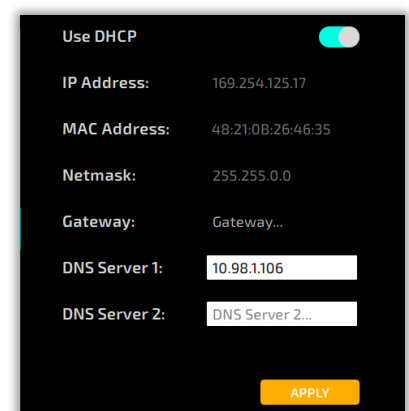
The system can run stand-alone or on a network (ethernet) connection. No external internet connection is required.



#### Network Configurations

1. None: Run standalone with USB-only data access.
2. Static IP
3. DHCP

Press **Apply** to commit any changes to these settings.



Storage Options

Internal storage

- Considered temporary for 21 CFR part 11 purposes

Network storage

- Write Location: Path where data will be saved
- Read Location: Path where batch runsheets will be read

**Note:** Read and Write locations need to be two separate folder paths.

Internal Storage

Storage Location

Internal

Internal storage should be considered temporary for record retention purposes

Apply Storage Location Settings

Network Storage

Storage Location

Network Location

Write Location (UNC):  
e.g. //Network1/OutputFolder

The Write Location will be used to automatically save a copy of reports to the specified location

Read Location (UNC):  
e.g. //Network1/InputFolder

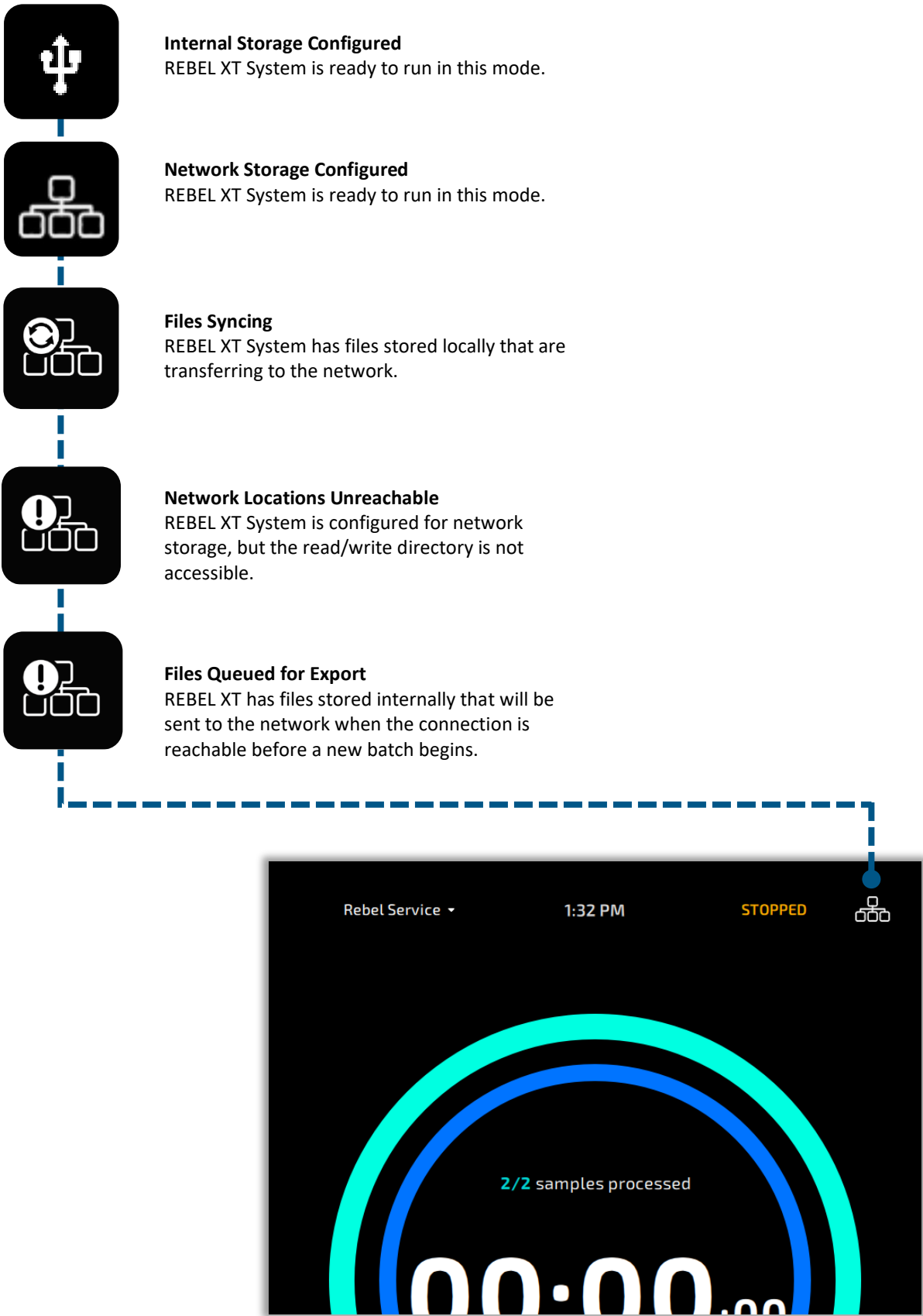
The Read Location will be used as an additional location to import data from

Export data into sub folders

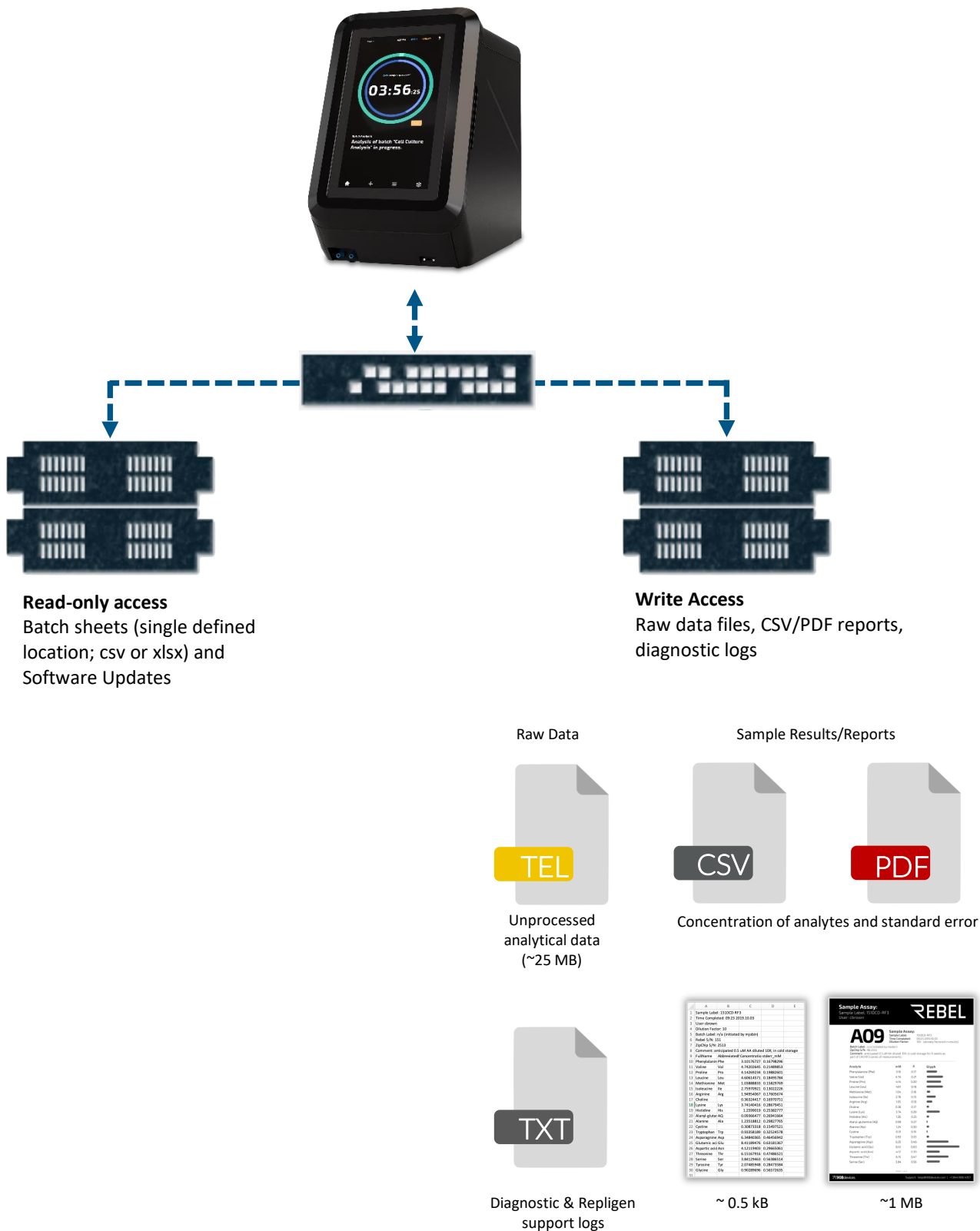
Test Permissions

Apply Storage Location Settings

10.3 Storage Status Icons



10.4 Read/Write Access & File Types



Appendix

Laminar Flow Cabinet Recommendations

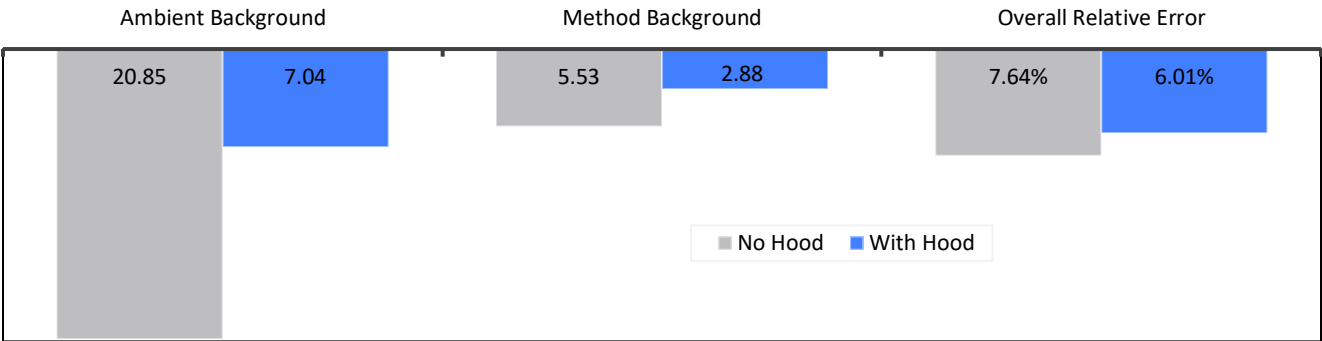
Depending on your laboratory conditions, you may have a laminar flow cabinet for your REBEL XT System. The Purair® FLOW Laminar Flow Cabinet was manufactured by Air Science® with a custom filter configuration (charcoal and HEPA dual filtration) and preconditioned to meet the requirements for use with the REBEL XT System.

Usage Recommendations

- Turn on the laminar flow cabinet and allow it to run for at least 1 hour before running the REBEL XT System.  
Tip: For best results, leave the laminar flow cabinet running overnight before running the REBEL XT System.
- Leave the laminar flow cabinet on while the REBEL XT System is on.
- Always ensure a minimum 3" (7 cm) clearance between the back of the REBEL XT System and the back of the laminar flow cabinet to ensure proper airflow into the REBEL XT System.



**Before & After: Laminar Flow Cabinet**  
Example Results from REBEL Quantitative Calibration  
(lower numbers are better)



Customer Service

Repligen Corporation  
685 Route 202/206  
Bridgewater, NJ 08807

[analytics-support@repligen.com](mailto:analytics-support@repligen.com)

(908) 707-1009

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