SMART™ Explorer

User Guide

SMART™ Explorer Reader and the SMART™ Explorer App

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How to Use This Guide

- Sections 1-4 describe the product, its components, operating limits, and pre-run checks.
- Sections 5-7 cover physical setup, power-on, and starting a new run.
- Sections 8-13 follow the touchscreen workflow in the order encountered during a normal run.
- Sections 14-16 cover the advanced settings in the menu and banner, exported data, and troubleshooting.

> **NOTE**
>
> **Screenshot values are examples**
>
> Device IDs, Run IDs, dates, and sample values shown in screenshots are illustrative examples. Use the values approved for the actual protocol and record the software version displayed on the reader.

1. Purpose, Scope, and Document Status

This document provides instructions for the initial setup, calibration, operation, monitoring, experiment note-taking, manual sampling, stopping, data export, and menu settings of the SMART™ Explorer. The SMART™ Explorer consists of the SMART™ Explorer Reader - a touchscreen unit and a reader unit with an integrated inductive coupler - and the SMART™ Explorer app used to control the run and display cell-growth information in real time.

1.1 Scope Exclusions

- Operation of the connected fermenter, bioreactor, flask, or culture vessel.
- Validation of sterility assurance, cleaning chemistry, or data-integrity controls.
- Interpretation of the SMART™ Growth Index as a direct replacement for a validated analytical method unless established by the approved protocol.
- Software updates, which are performed with Skroot support.
- Set-up and use of the Skroot Data Portal.

2. SMART™ Explorer Overview

The SMART™ Explorer provides real-time cell-growth information from a culture vessel fitted with a SMART™ sensor. The Reader interrogates the sensor wirelessly through its inductive coupler and reports a SMART™ Growth Index, shown as SGI on the touchscreen and in exported data. Scans can be taken continuously on a timed interval or on demand, one scan at a time.



Figure 1. SMART™ Explorer Reader: touchscreen unit and reader unit with the inductive coupler plate.

2.1 How the SMART™ Sensor Works

1. The SMART™ sensor is in contact with the culture inside the vessel.
2. A selective transduction membrane responds to metabolites secreted during cell growth.
3. As the membrane softens, the resonant sensor response changes.
4. The Reader measures the response through the inductive coupler and reports the resulting trend as the SMART™ Growth Index.
5. The touchscreen displays the measured signal and SMART™ Growth Index trend; run data can be exported to a USB drive.

NOTE

The SMART™ Growth Index is a growth-trend metric

The SMART™ Growth Index is the platform output used to follow culture progression. It is not displayed as an OD600 value. Manual measurements (OD600, lactate, glucose, or live cell count) may be recorded in the Sampling tab to compare an independent measurement with the SMART™ Growth Index trend.

3. System Components and Operating Limits

3.1 System Components, Function, and Use

COMPONENT	FUNCTION	KEY USE NOTES
SMART™ Explorer Reader	Two-part system: a **touchscreen unit** running the SMART™ Explorer app, and a **reader unit** connected by the supplied cable.	Use the touchscreen for run setup, calibration, monitoring, notes, sampling entries, and export.
Inductive coupler	Black coupler plate on top of the reader unit that interrogates the SMART™ sensor wirelessly.	Keep the coupler area empty during reference calibration. Keep other SMART™ sensors away from the coupler.
SMART™ sensor	Skroot sensor integrated with the culture vessel.	Position the sensor directly over the inductive coupler plate for reliable readings (Section 9).
USB-A data port	Receives a USB flash drive for run and diagnostic data export. Located on the rear of the touchscreen unit.	Do not remove the drive while an export is in progress.
Power input	Connects the supplied reader power adapter.	Use the supplied adapter.

CAUTION

Power the SMART™ Explorer Reader only using the supplied adapter

Use with a nonconforming adapter may lead to unexpected behavior and result in irreversible damage of the equipment.

3.2 Physical Dimensions

DEVICE	DIMENSIONS	WEIGHT
Touchscreen Unit	7.5625" (H) x 5.6875" (W) x 4" (D)	1.76 lb.
Reader Unit	3.5" (H) x8" (W) x1.1875" (D)	0.42 lb.

3.3 Operating Limits

PARAMETER	SPECIFICATION	OPERATING GUIDANCE
Sweep range	50-250 MHz (the reader's calibrated band)	Set per run on the setup form and adjustable live from the Sensors tab. The start frequency must be less than the stop frequency. Each live change is recorded as an automatic note on the run.
Self-resonant frequency margin	At run start the stop frequency is capped automatically at 10 MHz below the reader's self-resonant frequency (rounded to a whole MHz)	The self-resonant frequency and the resulting cap are shown on the Calibration result page after each calibration. A range retuned live from the Sensors tab is not capped; keep it below the cap, because scanning within 10 MHz of the self-resonant frequency risks inaccurate data.
Scan rate (continuous mode)	0.2, 0.5, 1, 2, 5, or 10 minutes (default: 2)	A wide sweep range can take longer to scan than a short interval allows; the reader then increases the rate automatically and reports the change in the banner.
Equilibration time (continuous mode)	0, 0.2, 2, 12, or 24 hours (default: 0.2)	Time allowed for the sensor to equilibrate before the SMART™ Growth Index baseline (zero point) is set.
Run data retention	90 days on the reader	Run data older than 90 days is deleted automatically (checked hourly). Export individual runs (Section 14.2) or everything at once (Section 14.3) before then.

4. Materials and Pre-Run Checks

ITEM	PROVIDED WITH PLATFORM / SITE SUPPLIED	NOTES
SMART™ Explorer Reader and power adapter	Platform	Inspect the enclosure, screen, inductive coupler plate, USB port, cable, and connector before use.
Culture vessel with integrated SMART™ sensor	Platform / site	Confirm packaging and sterile status according to the approved protocol.
USB flash drive	Site	Required for local export.
Manual sampling equipment (OD600, lactate, glucose, or cell counting), if required	Site	Optional - use for correlation and entry in the Sampling tab.
Approved PPE and spill-response materials	Site	Based on organism, medium, vessel, and facility requirements.

5. Physical Setup

1. Place the SMART™ Explorer Reader on a stable, level bench or cart, with enough space to position the culture vessel at the reader unit.
2. Confirm the reader unit is connected to the touchscreen unit with the supplied cable.
3. Keep the USB port and power input accessible.
4. Keep the inductive coupler plate on top of the reader unit empty. Do not place the vessel or any SMART™ sensor on the coupler until reference calibration is complete (Section 8).



Figure 2. Rear of the touchscreen unit: power connection, Ethernet, and USB-A data ports, with the supplied cable connecting the reader unit.

6. Power-On and System Verification

1. Connect the supplied power adapter to the Reader power input and then to the approved wall outlet.
2. Allow the touchscreen application to load completely. It opens directly into the application screen.
3. Confirm the home screen displays the large plus (+) control and that the interface responds to touch.

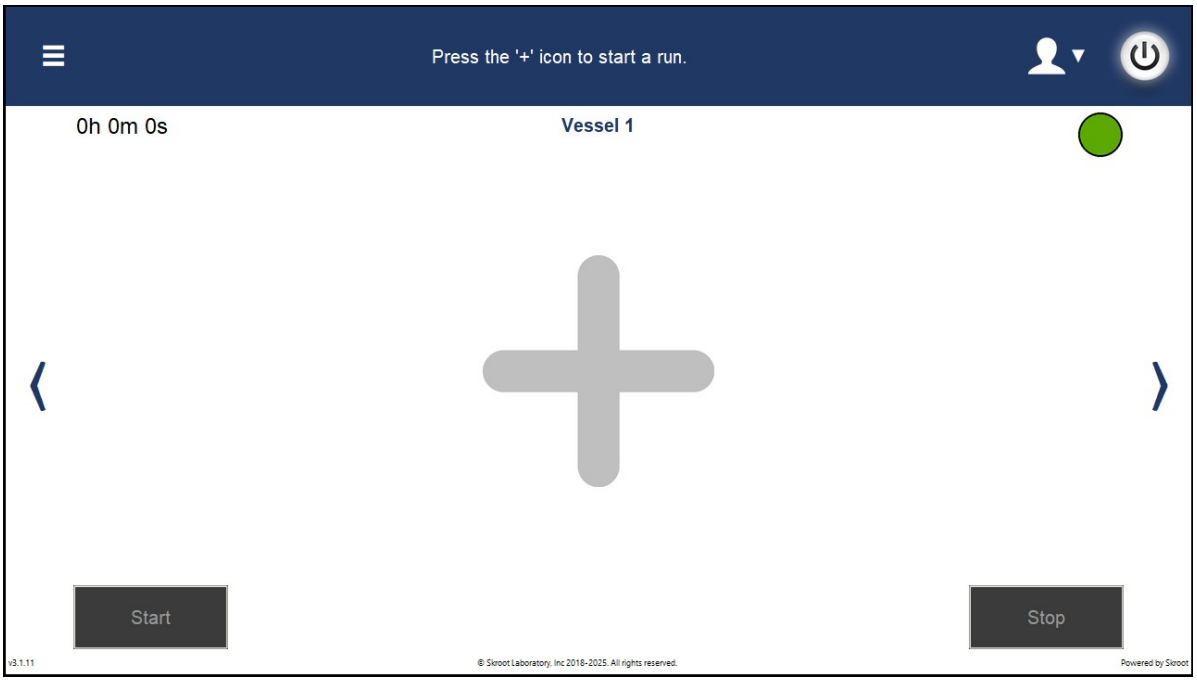

Figure 3. Home screen of the SMART™ Explorer app. Tap the large plus (+) control to begin a run.

7. Starting a New Run

1. **Open run setup** - From the home screen, tap the large plus (+) control.
2. **Select the scan mode** - Continuous (timed scans) or Discrete (one scan per button press). See Section 7.1.
3. **Confirm Device ID** - The Device ID is configured for the Reader and is shown read-only in the setup form.
4. **Enter or confirm Run ID** - The Run ID defaults to a randomly generated identifier. Tap the field to open the on-screen keyboard and type a Run ID that can be matched to the vessel, organism, and run record if desired.
5. **Set the Sweep Range (MHz) - Defaults to the reader's calibrated band (50 to 250 MHz). The start frequency must be less than the stop frequency. At run start the stop frequency is capped at the recommended maximum from calibration (Section 8.1).**
6. **Continuous runs only** - Select the Scan Rate (minutes between scans) and Equilibration Time (hours before the SMART™ Growth Index baseline is set).
7. **Submit** - Tap Submit to create the run. Tap Cancel to return without creating the run.

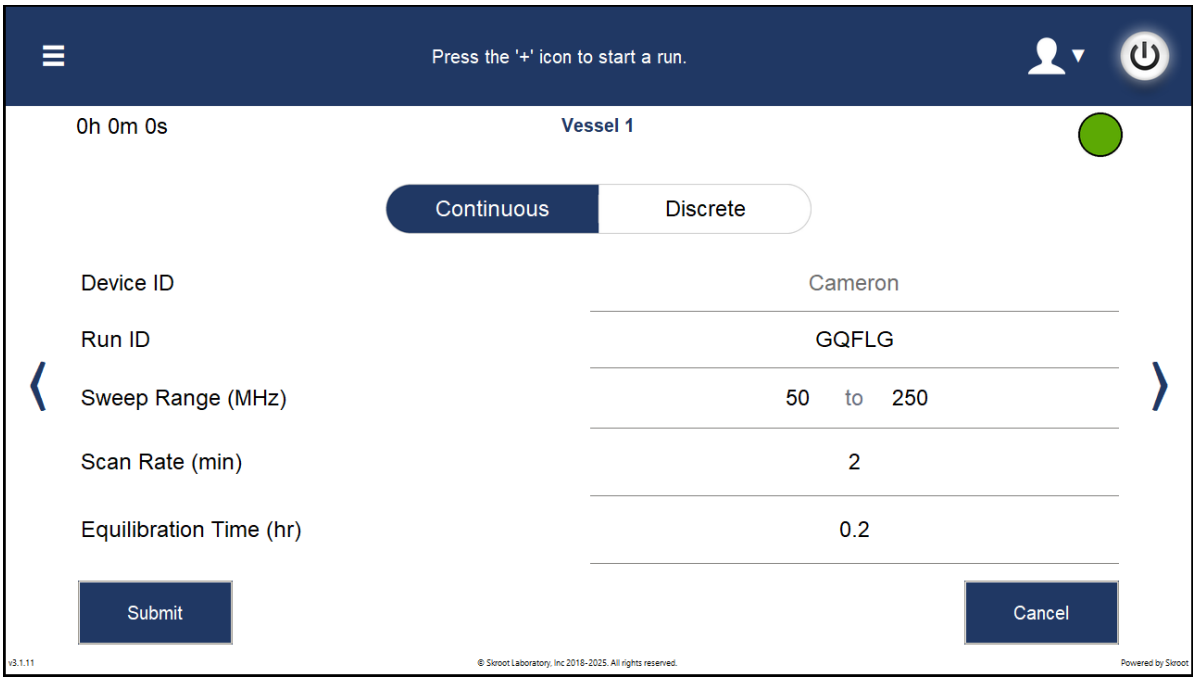

Figure 4. Run-setup form with the Continuous scan mode selected. Values shown are examples.

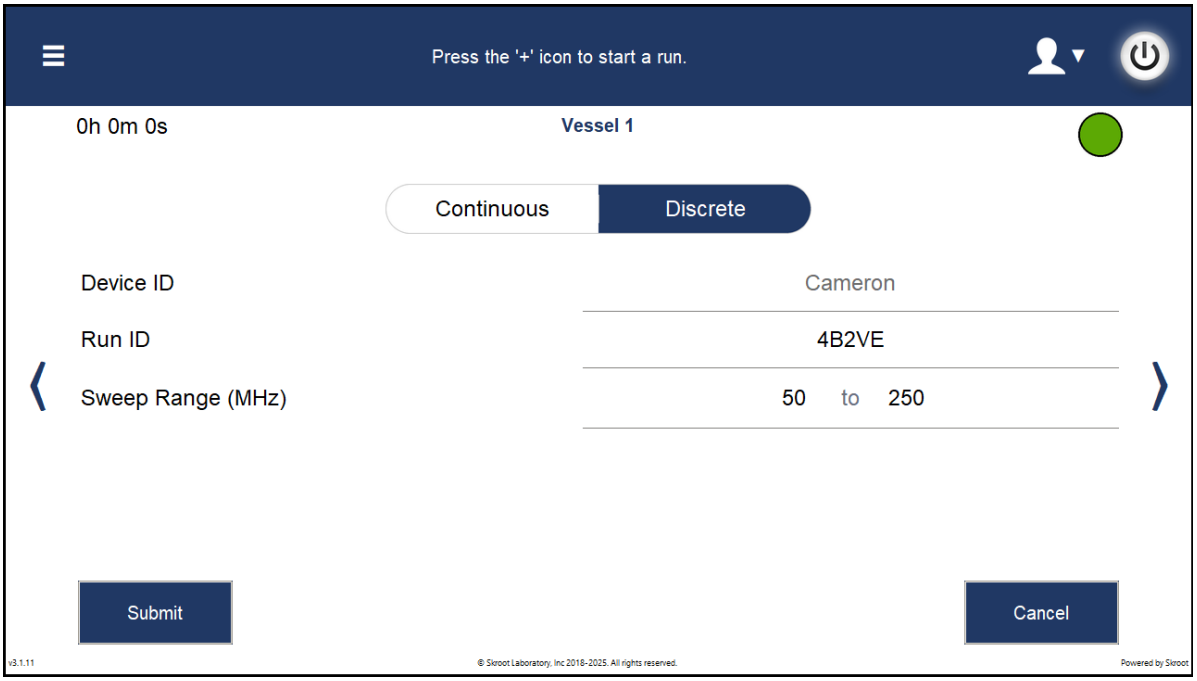

Figure 5. Run-setup form with the Discrete scan mode selected. The Scan Rate and Equilibration Time fields are hidden because each scan is taken manually.

7.1 Continuous vs. Discrete Scan Modes

Continuous - the Reader automatically records a scan every Scan Rate minutes for the duration of the run. After the selected Equilibration Time has elapsed, the SMART™ Growth Index baseline (zero point) is set and the plot switches to the SMART™ Growth Index trend.

Discrete - the Reader takes no scans on its own. Each press of the Take Scan button records a single scan, and the first scan sets the SMART™ Growth Index baseline. Use discrete mode for spot checks and short experiments (see Section 10.3).

7.2 Start the Setup Wizard

After the run is created, the run screen displays the Run ID and enables the green Start button. Tap Start to open the three-step setup wizard: reader calibration, the calibration result, and sensor alignment. Cancel on the first step returns to the setup form with the entries intact.



Figure 6. Run created and ready to begin. Tap Start to open the setup wizard.

8. Reader Calibration

> **WARNING**
>
> **Calibrate with the coupler clear**
>
> Keep the culture vessel and any SMART™ sensors away from the inductive coupler before starting reference calibration. Do not touch or move the Reader while calibration is in progress.

1. In Step 1 of 3, verify that the coupler area is empty and unobstructed.
2. Tap Calibrate reader.
3. Wait for the reference calibration to complete. This takes a few seconds.
4. Proceed after the calibration completes and the Next control is enabled.
5. Skip is available only when a stored calibration from a previous run exists.

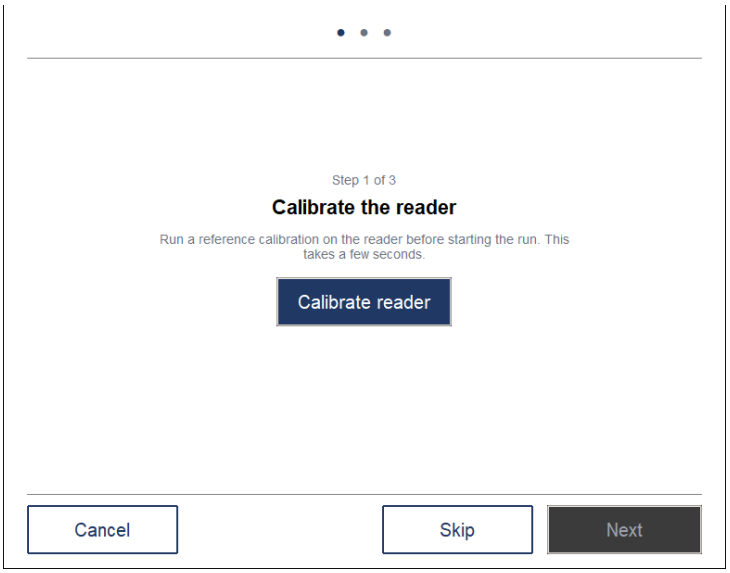

Figure 7. Step 1 of 3: reader calibration. Keep the inductive coupler empty during calibration.

8.1 Review the Calibration Result

Step 2 of 3 plots the calibration curve and marks the reader's self-resonant frequency; the shaded band marks the 10 MHz margin to stay below. The text under the plot states the self-resonant frequency and the cap that will be applied: if the run's stop frequency lies above it, the reader lowers the stop frequency automatically at run start and the Sensors tab shows the range actually in use. If the self-resonant frequency could not be determined, the range is applied as configured.

Tap Next to continue to the sensor alignment step (Section 9).

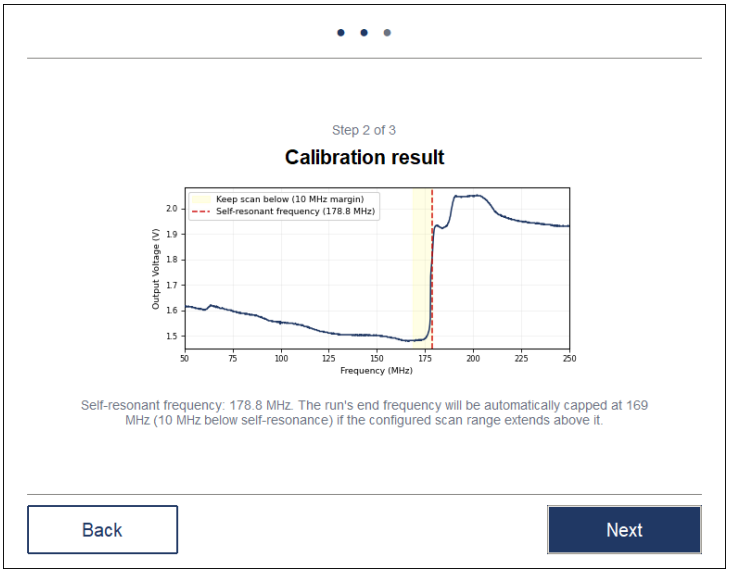

Figure 8. Step 2 of 3: calibration result with the self-resonant frequency marked, the 10 MHz caution band shaded, and the cap that will apply to the run.

8.2 Calibration Troubleshooting

- Remove the vessel and any nearby SMART™ sensors from the coupler area, then retry.

- Confirm that the Reader is stationary on a stable surface.
- If repeated calibration attempts fail, record the exact message and software version and contact support.

9. Align the SMART™ Sensor with the Coupler

Step 3 of 3 of the setup wizard verifies that the SMART™ sensor is coupled to the reader before the run starts. Align the sensor, take a verification scan, and start the run only when the scan finds the sensor's resonance peak.

1. Place the culture vessel at the reader unit.

> **WARNING**
>
> **Make sure there is media inside the culture vessel submerging the sensor**
>
> The resonant frequency of the sensor with air inside culture vessel will be outside the reader’s range. Make sure the sensor is submerged in aqueous media before proceeding.

1. Center the SMART™ sensor directly over the inductive coupler plate on top of the reader unit.
2. Keep the sensor face parallel to the coupler plate and as close to it as the vessel allows.
3. Confirm the vessel is stable and cannot shift or rotate during the run.
4. Tap Scan. The button reads "Scanning…" while the reader sweeps the run's configured range; the measured sweep and the detected peak are then plotted.
5. "✓ Sensor detected — peak at <frequency> MHz." enables Start run. Tap Re-scan after any adjustment; a failed re-scan locks Start run again until a scan succeeds.
6. "× No sensor peak — adjust the sensor and scan again, or skip." means the peak was not found. Reposition the sensor and scan again. Skip starts the run without a verified alignment and is recorded in the log.
7. "× Scan failed — check the reader connection and try again." indicates a communication problem. Check the cable between the touchscreen unit and the reader unit, then scan again.
8. Tap Start run. The reader begins scanning; confirm the first scans on the Signal Check plot. If the banner later reports "Sweep analysis failed, check vessel placement.", reposition the sensor and wait for the next scan (or take another scan in a discrete run).

Verification scans are not saved with the run data; the run's first recorded scan is the one taken after Start run.

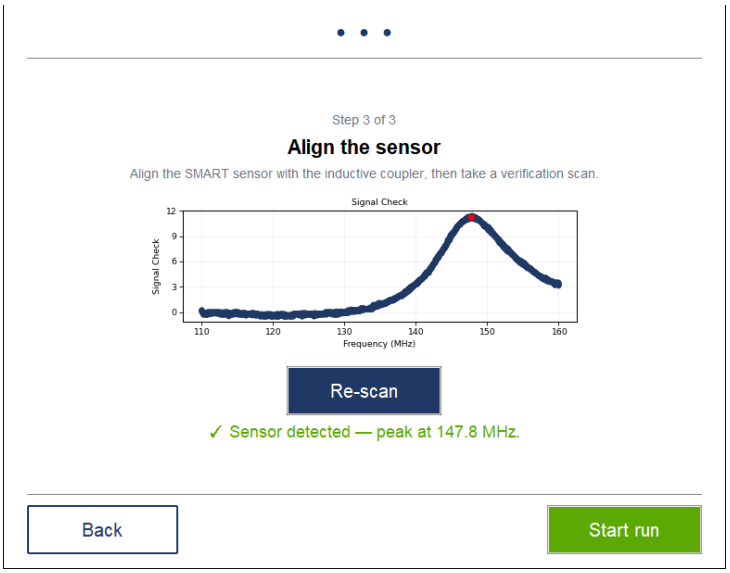

Figure 9. Step 3 of 3: sensor alignment after a successful verification scan. Start run is enabled.

NOTE

Alignment is critical for data quality

The Reader cannot correct for a misaligned sensor. A tilted, off-center, or shifting sensor weakens the inductive coupling and can produce failed scans or unreliable SMART™ Growth Index values. Recheck the alignment whenever the vessel is moved.



Figure 10. The black inductive coupler plate on top of the reader unit. Center the SMART™ sensor directly over this plate.

10. Monitoring a Run

After Start run is selected, the active-run interface opens. The top of the screen shows the elapsed run timer, the vessel and Run ID, and a status indicator dot (green: last scan succeeded; yellow: scan in progress; red: scan failed). The left side provides Sensors, Notes, and Sampling tabs with an Export Run button (and, in discrete

runs, Take Scan) available from every tab. Stop remains available at the bottom right. When more than one reader is connected, the arrow controls on either side of the screen switch between vessels.

10.1 Sensors Tab

- Current SGI: the latest calculated SMART™ Growth Index. Shows "-" until the SMART™ Growth Index baseline is set.
- Run ID: the identifier assigned during run setup.
- Sweep (MHz): the sweep range in use. After run start it shows the capped range when the configured stop frequency was lowered (Section 8.1). Tap either box to retune the range while the run is in progress; values are kept within 50-250 MHz and the start frequency must remain below the stop frequency. Each change records an automatic note ("Sweep range updated to 80 MHz to 150 MHz.") on the Notes tab, on the plot, and in Notes.csv. Live changes are not capped, so keep the stop frequency below the recommended maximum from calibration.
- Export Run: exports run data to an inserted USB drive at any time during the run.
- Stop: opens the stop workflow.

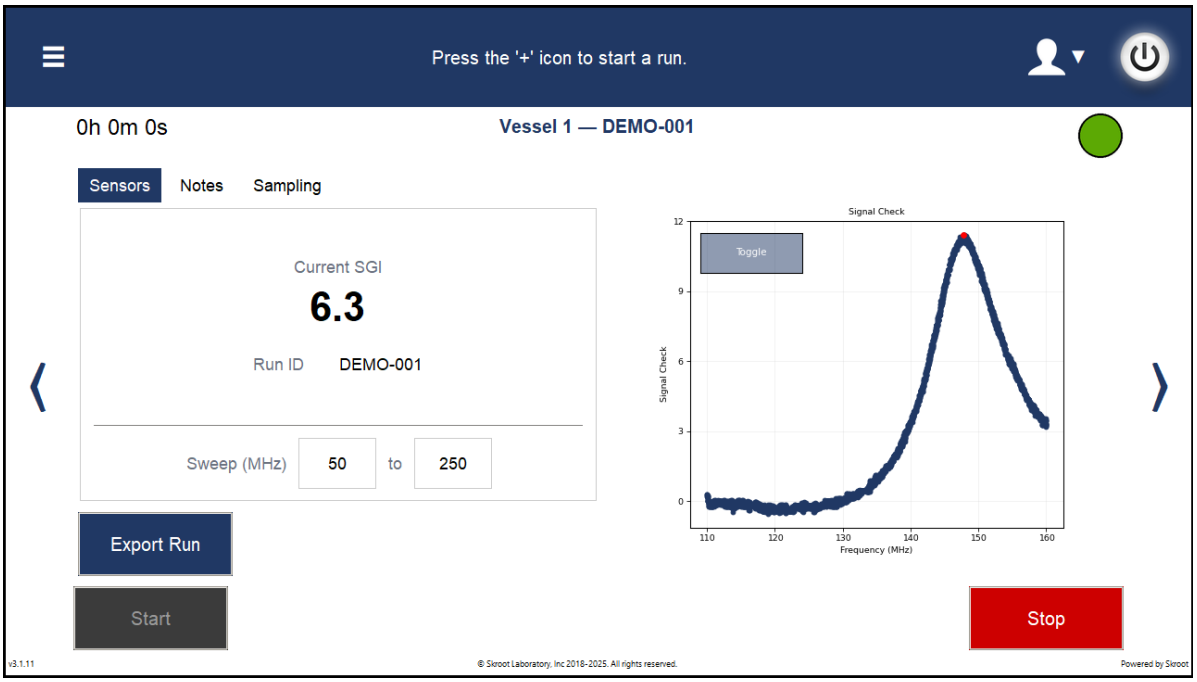

Figure 11. Sensors tab during a continuous run, showing the current SGI, Run ID, sweep range, and the Signal Check plot.

10.2 Plot Views

The Toggle button on the plot cycles through four views. The Toggle appears once the SMART™ Growth Index baseline is set - after the equilibration time in continuous runs, or immediately in discrete runs - and the plot switches to the SGI view automatically at that point.

VIEW	X AXIS	DESCRIPTION
Signal Check	Frequency (MHz)	The current raw scan with the detected resonance peak.
Resonant Frequency	Time (hours)	The detected resonance-peak frequency over time.
SGI	Time (hours)	The SMART™ Growth Index trend.
dSGI	Time (hours)	The rate of SMART™ Growth Index change (SGI/hr). In discrete runs this is the direct change between scans; in continuous runs it is a smoothed rate.

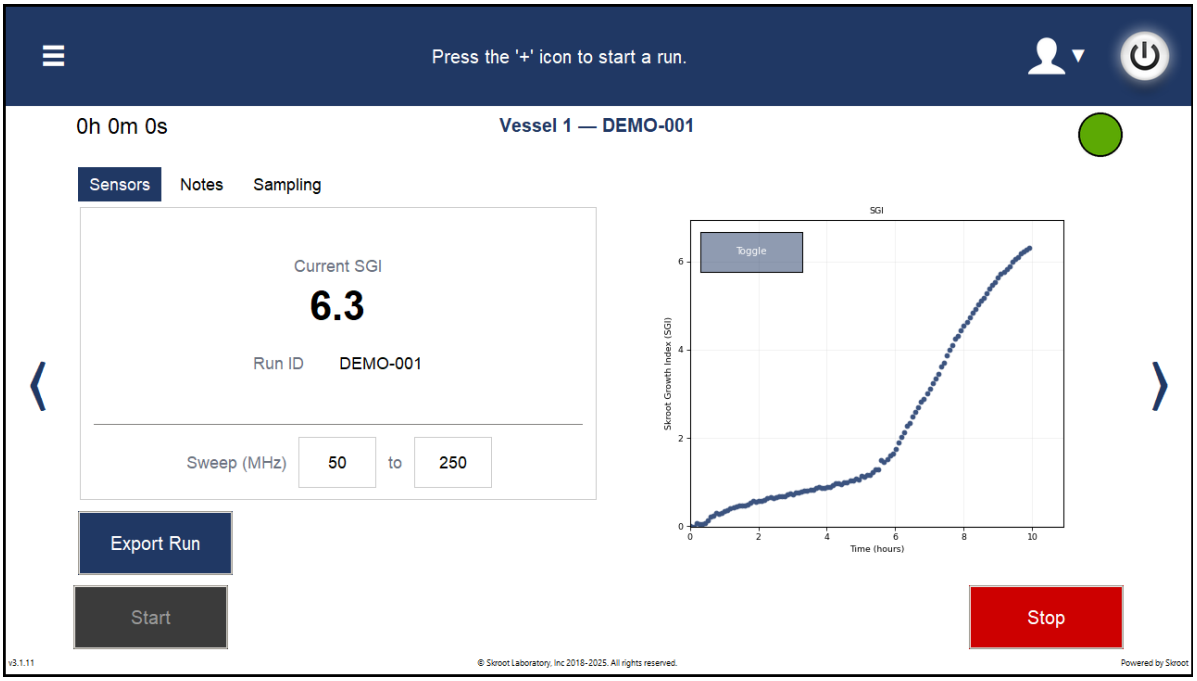

Figure 12. SGI-over-time view in the active-run interface.

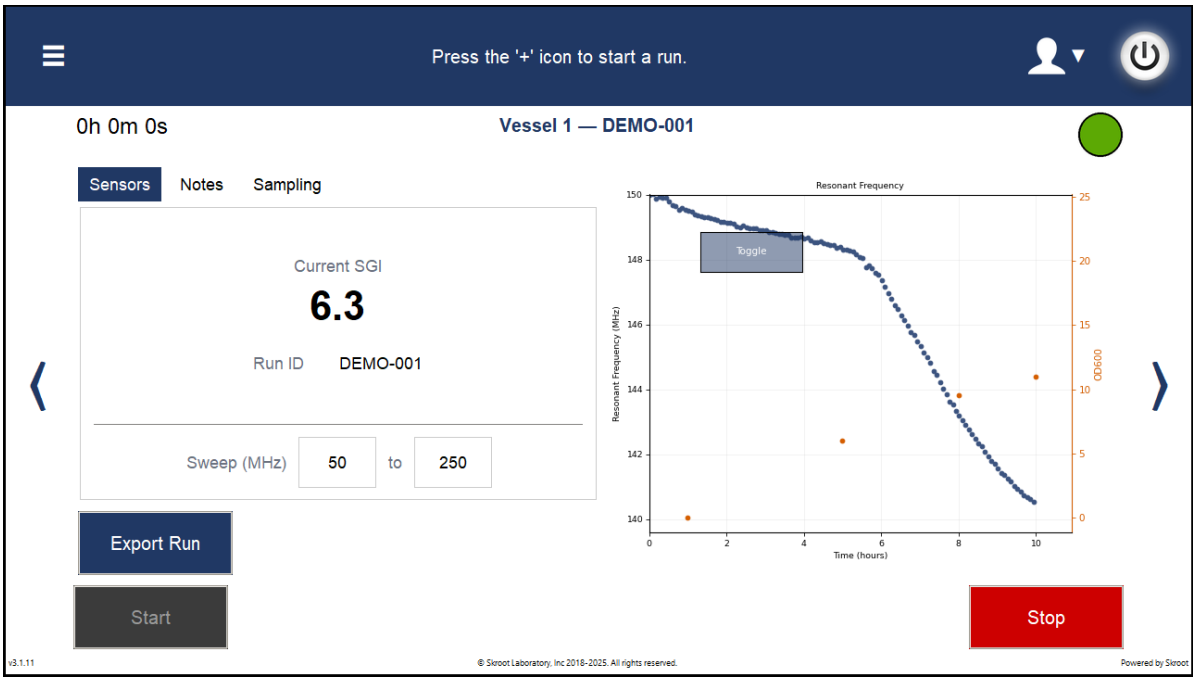

Figure 13. Resonant Frequency view. Manually entered sample points appear on the secondary axis.

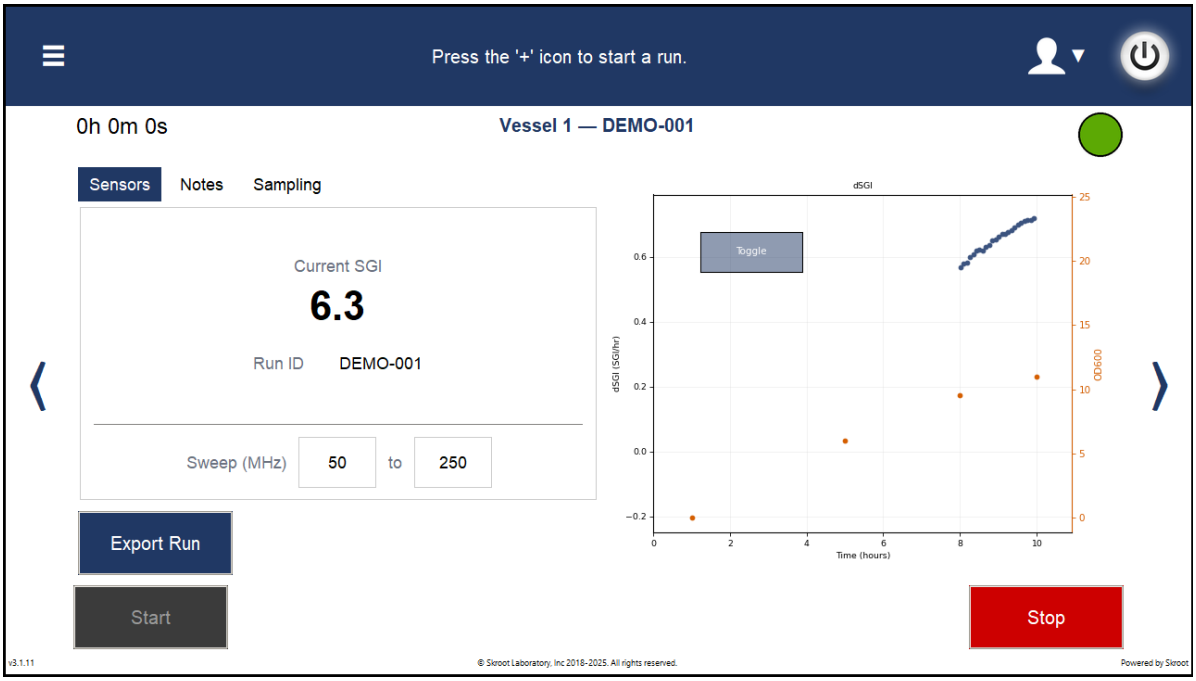

Figure 14. dSGI view showing the rate of SMART™ Growth Index change.

10.3 Taking Discrete Scans

In a discrete run, the Take Scan button is shown next to Export Run below the tabs.

1. Press Take Scan to record a single scan. The button reads "Scanning..." and is disabled until the scan completes.
2. The banner reports "Reader has recorded a sweep." after each successful scan.

3. The first scan sets the SMART™ Growth Index baseline; each later scan adds a point to the time-axis plot views.

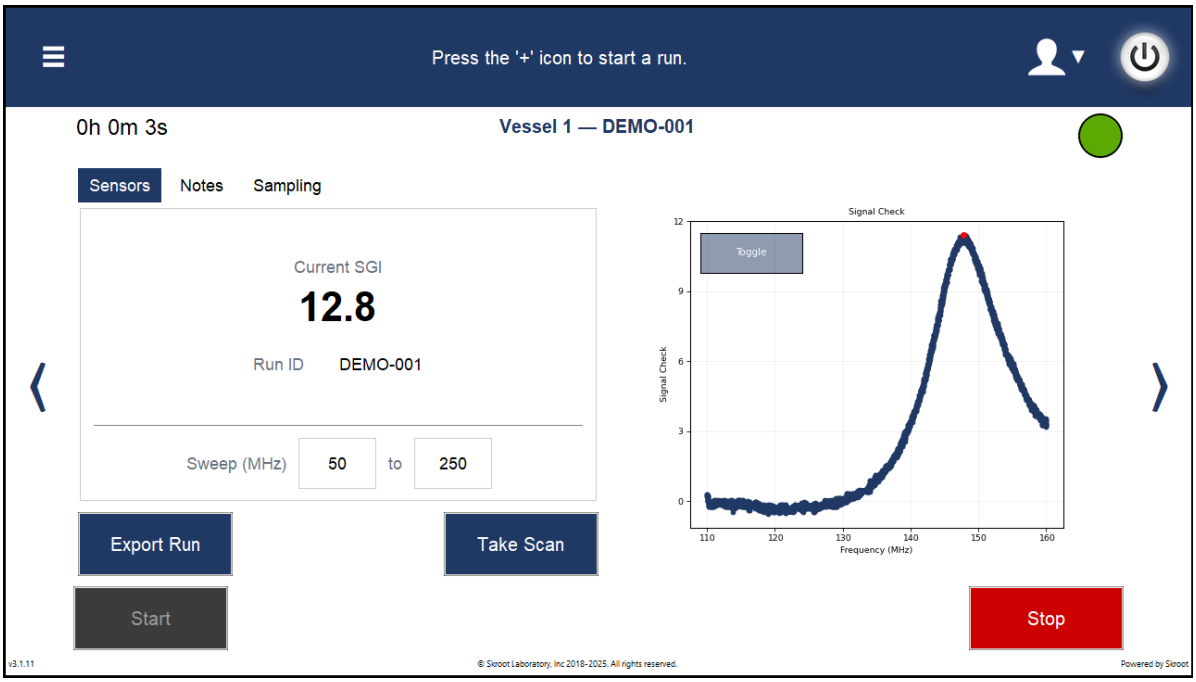

Figure 15. Sensors tab during a discrete run. Each press of Take Scan records one scan.

11. Experiment Notes

The Notes tab records timestamped observations during the run - additions, process events, or anything worth correlating with the growth trend.

1. Open the Notes tab.
2. Tap the "Tap to write a note..." field and type the note using the on-screen keyboard.
3. Tap the submit arrow to save the note.
4. The note appears in the list below the compose field (tap an entry to expand its full text) and as a dashed vertical marker at that time on every time-axis plot view.

Notes are saved with the run (Notes.csv), included in exports, and marked in the exported run movie.

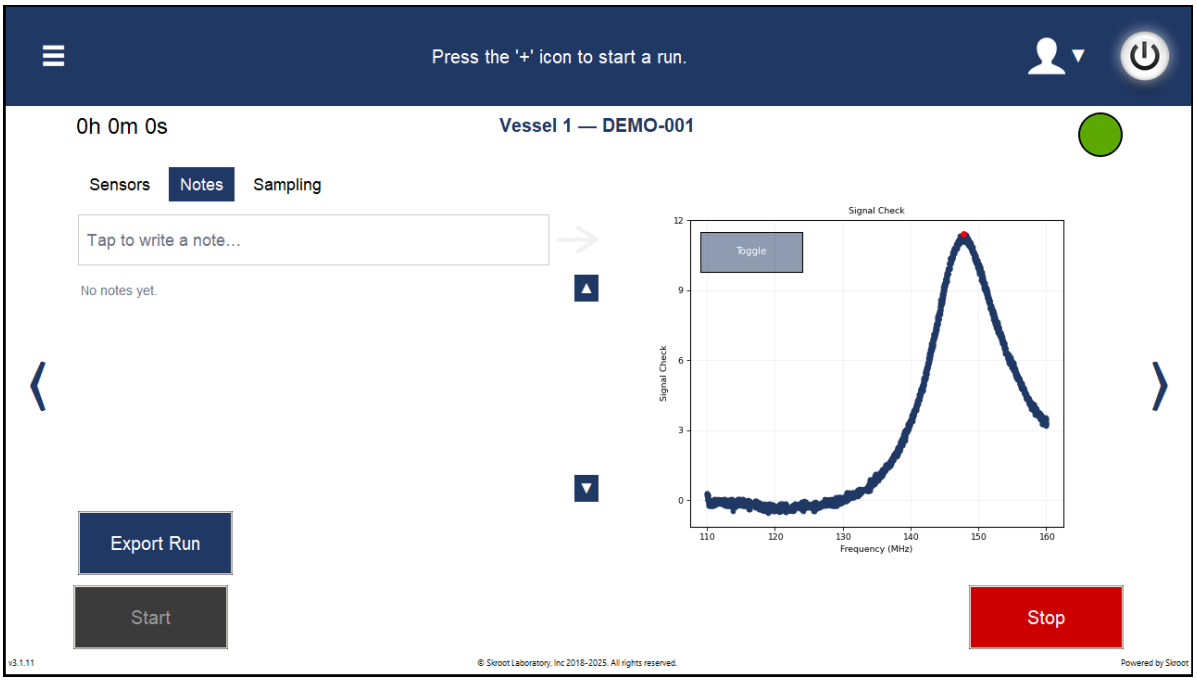

Figure 16. Notes tab with the compose field and note list.

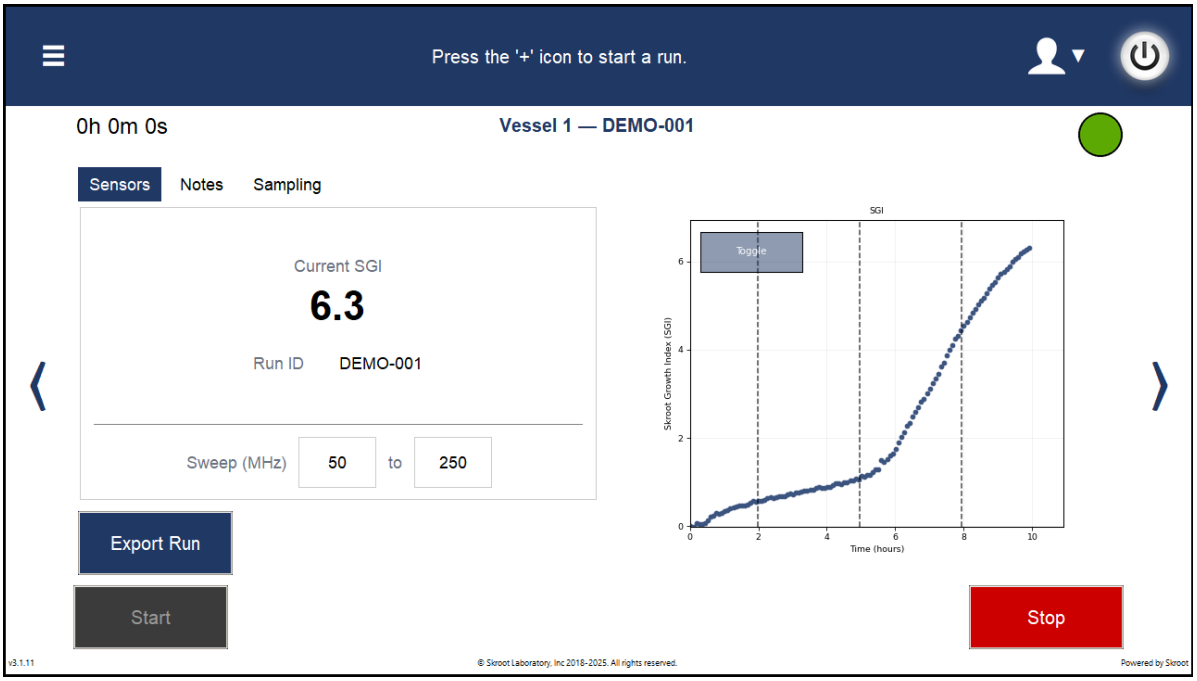

Figure 17. SGI view with dashed vertical markers at each recorded note.

12. Manual Sampling and Plot Review

The Sampling tab allows an operator to enter an independent measurement during the run. Available analytes are OD600, Lactate (mM), Glucose (mg/dL), and Live Cell Count (x10^6 cells/mL). Manual entries are shown on the time-axis plot views on a secondary axis.

1. Collect and measure the sample according to the approved vessel and analytical procedure.
2. Open the Sampling tab.

3. Select the analyte (example: OD600).
4. Enter the measured value exactly as reported by the analytical method.
5. Tap the submit arrow and confirm the entry appears on the plot. The banner confirms each entry (for example, "Added OD600 of 12.5").

The secondary axis shows the currently selected analyte; selecting a different analyte in the dropdown switches the plotted series.

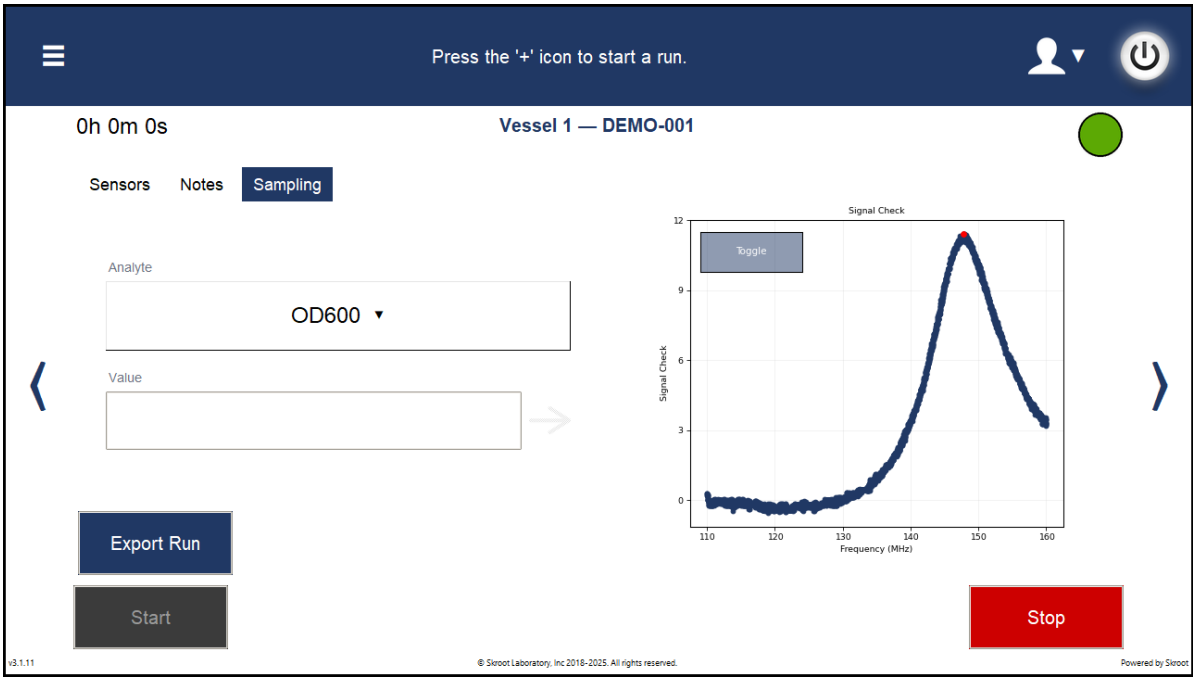

Figure 18. Sampling tab for entering a manual measurement.

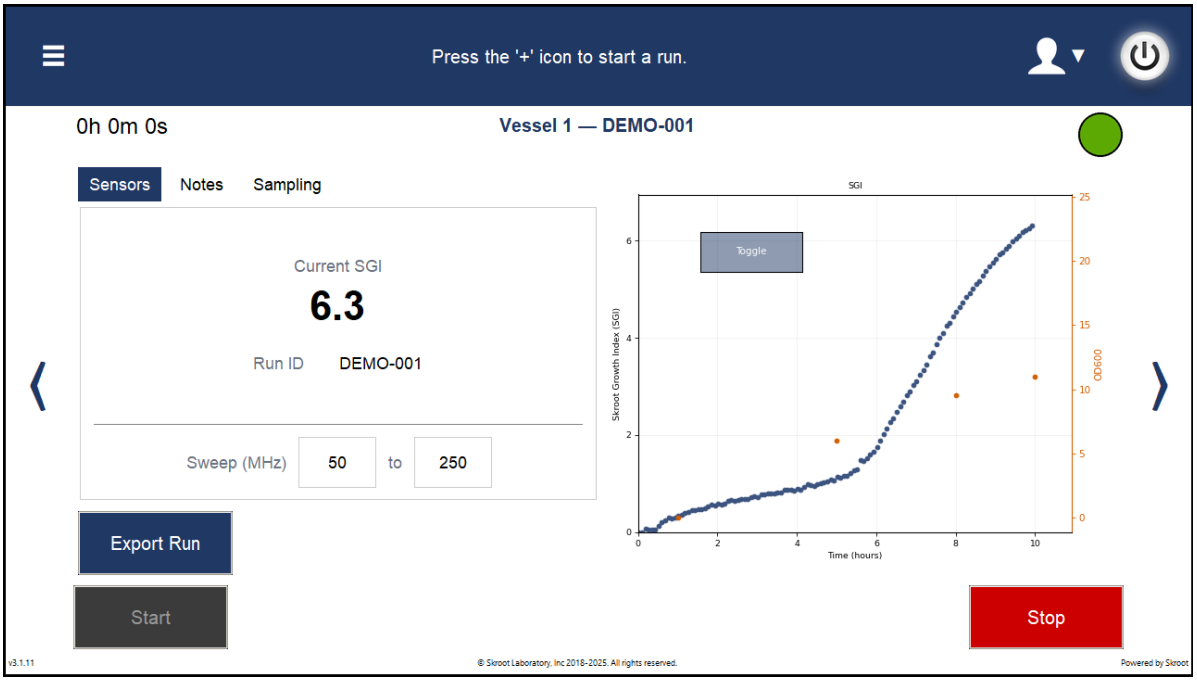

Figure 19. SMART™ Growth Index trend with manually entered sample points displayed on a secondary axis.

13. Stopping a Run and Exporting

13.1 Stop the Run

1. Confirm the Run ID and that the experiment is ready to stop.
2. Tap the red Stop button.
3. Review the confirmation prompt ("Stop <Run ID>" - "Are you sure you wish to stop <Run ID>?") and select Yes to stop or No to return to the run.



Figure 20. Stop confirmation prompt.

13.2 Export Run Data

After the run stops, the Export run data screen opens.

1. Insert the USB flash drive into the USB-A port.
2. Confirm the Run ID.
3. Leave "Include plot movie" on to render an mp4 replay of the run alongside the data files. Turning it off skips the movie and shortens the export for very long runs.
4. Tap the download icon and allow the export to complete. Movie rendering progress is shown ("Generating movie… N%"), followed by "Copying to USB…".
5. A successful export displays "Experiment data for <Run ID> exported to USB drive." Do not remove the USB drive while data is being written.
6. Select Done and verify the exported files are present and readable on an approved computer before deleting or reusing any record.

The same export is available at any time during a run from the Export Run button, and after a run from the menu (Section 14.2).

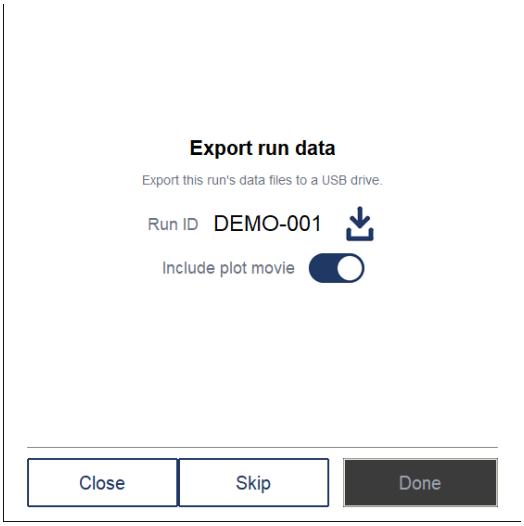

Figure 21. Export run data screen at the end of a run with the "Include plot movie" toggle enabled.

14. Advanced Settings: Menu and Banner Controls

The banner and the ☰ menu hold the controls that are not part of a run: exports of earlier runs, reader configuration, network, time, and restart. Each subsection gives the situation in which the control is used, the steps, and the messages the reader displays.

14.1 Finding Your Way Around

Banner controls

- ☰ **(upper left):** opens the Menu. Tapping anywhere outside the menu closes it.
- **Status banner (center):** one-line messages about the current operation - scan results, export progress, and the confirmation and error text quoted throughout this section.
- **Profile icon ▼ (upper right):** shows "Not signed in" with a Sign In item, or the signed-in user with Sign Out (Section 14.11).
- **Power icon (far right):** reboots the reader after a confirmation (Section 14.13).
- **Wi-Fi icon:** appears between the profile and power icons only after Wi-Fi has been enabled (Section 14.12).
- **Footer:** the software version is shown in the lower-left corner. Record it when contacting support.

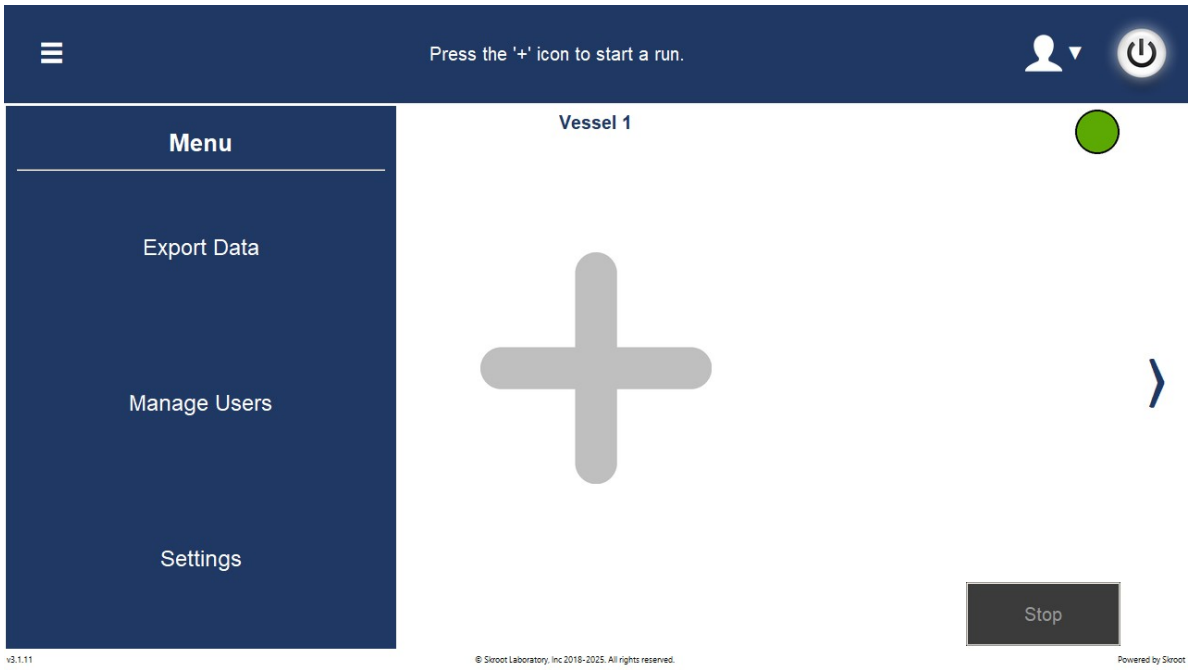

Figure 22. Main menu opened from the ☰ icon, with the banner controls across the top of the screen.

Menu map

MENU PATH	WHAT IT DOES	AVAILABLE ON SMART™ EXPLORER
Export Data → Export Run	Copies one saved run to a USB drive by its Run ID (Section 14.2).	Always
Export Data → Export All	Archives every run still on the reader, plus the audit trail, in one zip file (Section 14.3).	Always
Export Data → Export Diagnostics	Bundles the logs and calibration records Skroot support asks for (Section 14.4).	Always
Export Data → Export Audit Trail	Exports the authorization log for a date range (Section 14.5).	Always
Export Data → Export Users	Exports the user roster as a PDF (Section 14.6).	Authentication enabled
Manage Users → Register User / Modify User / Restore User	Creates, edits, retires, and restores user accounts (Section 14.7).	Authentication enabled; administrator
Settings → Configuration → System Configuration	Wi-Fi, authentication, and the Device ID (Section 14.8).	System administrator sign-in

MENU PATH	WHAT IT DOES	AVAILABLE ON SMART™ EXPLORER
Settings → Configuration → System Time	Time zone, date, and time (Section 14.9).	Always
Settings → Manage Passwords	Password rotation and password requirements (Section 14.10).	Authentication enabled; system administrator

> **NOTE**
>
> **No sign-in is needed out of the box**
>
> SMART™ Explorer ships with authentication and Wi-Fi turned off. Every run control and every export works without signing in. The one exception is System Configuration itself, which always asks for the system administrator sign-in.

14.2 Export Data → Export Run

Scenario. A QA reviewer asks for the data from a run that ended last week. The reader has since been reset and started on another vessel, so the Export Run button described in Section 13 is no longer on screen. Every run the reader has recorded stays on the reader and can be exported again by its Run ID.

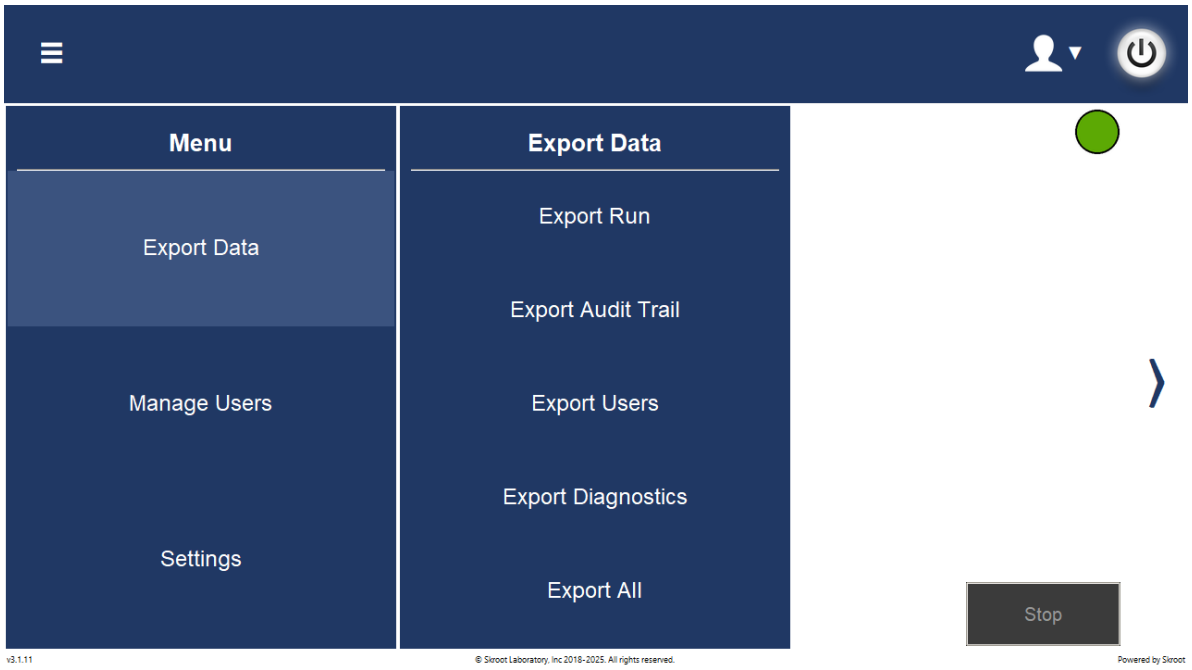

Figure 23. Export Data submenu.

1. Insert a USB flash drive into the USB-A port.
2. Tap ☰, then Export Data, then Export Run.
3. Tap the Run ID field and type the Run ID exactly as it was entered at run setup.
4. Leave "Include plot movie" on to render the mp4 replay, or turn it off to shorten the export of a very long run.
5. Tap the download icon and wait. The dialog shows "Generating movie… N%" and then "Copying to USB…". Do not remove the drive until the result message appears.
6. Tap Close and verify the exported files on an approved computer.

What you'll see

- "Experiment data for <Run ID> exported to USB drive." - the run folder was written under Run Results on the drive (Section 15).
- "No data found for <Run ID>" - no run with that ID exists on the reader. Check the spelling and capitalization.
- "USB drive not found. Please plug in USB drive and try again." - the drive was not detected. Reinsert it and tap the download icon again.
- "Movie could not be generated." appended to the success message - the data files were exported but the replay failed. Retry later or export with "Include plot movie" off.

Keep in mind

- Exporting never removes data from the reader. A run stays available for export until the reader's 90-day retention period deletes it (Section 14.3).
- Export All (Section 14.3) does not include movies. Export a run on its own when the replay is wanted.

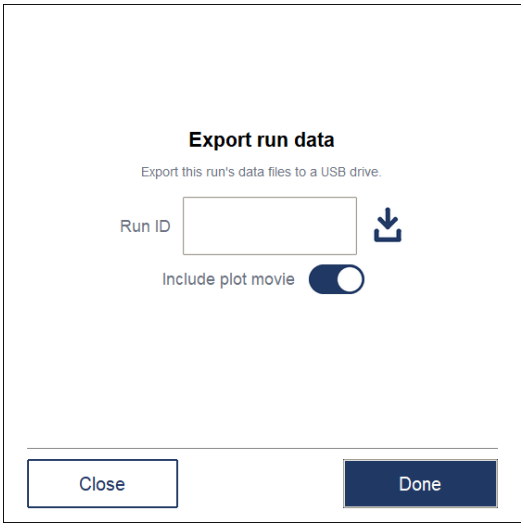

Figure 24. Export run data dialog opened from the menu. Any saved Run ID can be typed.

14.3 Export Data → Export All

Scenario. The reader deletes run data 90 days after it was recorded. The site's data-management procedure therefore uses Export All on a fixed schedule - monthly or quarterly - to move every run still on the reader, together with the audit trail, to the site archive before that happens.

1. Insert a USB flash drive.
2. Tap ☰, then Export Data, then Export All.
3. Wait for the banner to confirm the export before removing the drive. A reader holding many runs takes correspondingly longer.

What you'll see

- "System information exported to USB drive." - a single file named System Snapshot_<number>.zip was written to the root of the drive.
- "Failed to export system information." - retry with another drive; record the message and contact support if it repeats.
- "USB drive not found. Please plug in USB drive and try again." - reinsert the drive and retry.

Keep in mind

- The zip contains a Run Results folder with every run's data files (the same files as a single-run export, Section 15.1, but without Run Movie.mp4), the audit trail for the last 12 months, and the user roster PDF.
- Retention runs hourly on the reader: run data older than 90 days is deleted and cannot be recovered. Export All itself deletes nothing.

14.4 Export Data → Export Diagnostics

Scenario. Calibration has failed three times in a row and Skroot support has asked for the reader's logs. Export Diagnostics packages what support needs in one file, without including the run measurements.

1. Insert a USB flash drive.
2. Tap ☰, then Export Data, then Export Diagnostics.
3. Wait for the completion banner; the bundle can take a minute on a reader with many runs.
4. Send the zip file to Skroot support together with the Run ID, the date and time of the problem, and the software version shown in the footer.

What you'll see

- "Exporting diagnostics, this may take some time..." while the bundle is built.
- "Diagnostics exported to the USB drive." - Diagnostics_<number>.zip was written to the root of the drive.
- "Failed to export diagnostics." - retry; record the message if it repeats.

Keep in mind

- The bundle holds the application logs, a Usage Metrics PDF (lifetime scan counts and running time), and, for each run, only its cpu-info.csv and the Calibration.csv it ran with.

- With authentication enabled, this item requires the system administrator sign-in.

14.5 Export Data → Export Audit Trail

Scenario. During an internal review, QA asks who changed the reader's clock in March and whether anyone altered the system configuration. The reader keeps an authorization log of sign-ins, exports, configuration changes, and user-management actions; the audit trail export writes that log for a chosen date range.

1. Insert a USB flash drive.
2. Tap ☰, then Export Data, then Export Audit Trail.
3. In the Export Date Range dialog, pick the Start Date and End Date on the two calendars (the range defaults to the last 12 months) and tap Submit. Cancel abandons the export.
4. Wait for the completion banner.

What you'll see

- "Audit trail exported to USB drive." - an Audit Trail folder on the drive now holds Audit Trail_<number>.pdf and a System Logs subfolder.
- "Audit trail export cancelled." - Cancel was tapped in the date-range dialog.
- "Failed to extract authentication logs." - no entries exist for the range, or the log could not be read.
- "Failed to extract file integrity logs." - the weekly integrity summaries could not be copied; the authorization PDF is still written.

Keep in mind

- The PDF lists Timestamp, Username, Authorizer, Category, Action, Result, and Extra for each entry. With authentication off the Username column is blank, but configuration changes, time changes, and exports are still recorded.
- System Logs contains the weekly file-integrity summaries (aide-weekly-summary-<year>W<week>.log) that record changes to protected files on the reader.

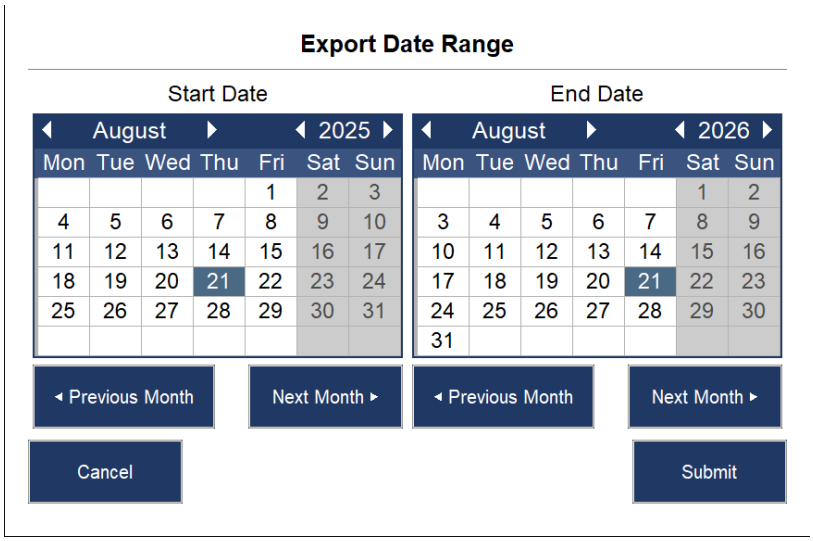

Figure 25. Export Date Range dialog. The start date defaults to one year before today.

14.6 Export Data → Export Users

Scenario. The site is commissioning a second SMART™ Explorer and wants the same people to have access on both. Export Users produces a PDF of every account on this reader for the administrator who sets up the next one.

Requires: *Authentication Enabled (Section 14.8.3).*

1. Insert a USB flash drive.
2. Tap ☰, then Export Data, then Export Users, and sign in if prompted.

What you'll see

- "User information exported to USB drive." - Users_<number>.pdf was written to the Audit Trail folder on the drive.
- "Cannot export users, user authentication is disabled." - authentication is off on this reader, so there is no roster to export.

Keep in mind

- The PDF ("User Account Details") lists each account's Username, First Name, Last Name, Role, Password Last Changed, Password Expires, Password Inactive, and Last Active. Passwords are never exported; the accounts on the second reader are created with Register User (Section 14.7.1).

14.7 Manage Users

Scenario. A new technician joins the lab, a contractor finishes their project, and a returning colleague needs their old account back. Manage Users covers all three. Accounts only matter once authentication has been enabled (Section 14.8.3); until then each of these items answers with a banner such as "Cannot register a user, authentication is disabled."

Requires: *Authentication Enabled. Register User, Edit User Role, and Restore User need an administrator sign-in; Reset Password and Retire User are also available to a user for their own account.*

Roles. A User can run the reader and export data. An Administrator can also register, retire, and restore users and change roles. The System Administrator is the single account supplied with the reader: it is the only role that can change the system configuration and the password policy, and it cannot be retired or have its password reset from these screens.

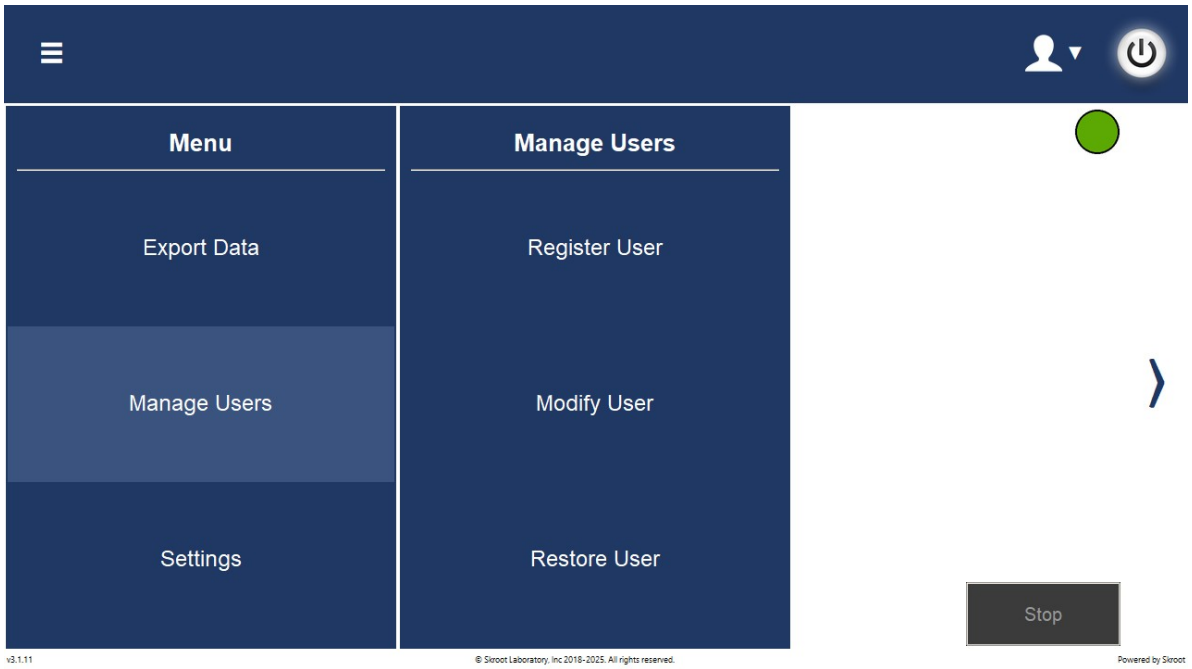

Figure 26. Manage Users submenu. Modify User opens a third panel with Reset Password, Retire User, and Edit User Role.

14.7.1 Register User

1. Tap ☰, Manage Users, Register User, and sign in as an administrator if prompted.
2. Choose the Role: Administrator or User.
3. Enter the Username, the first and last Name, and the Password twice. Tap Show to check what was typed.
4. Submit stays greyed out until the password meets the requirements (at least 8 characters with an upper-case letter, a lower-case letter, a digit, and a symbol, unless the site has changed the policy in Section 14.10) and both entries match. A red message under the field explains what is missing.
5. Tap Submit.

What you'll see

- "Successfully registered Administrator: jdoe" (or "Successfully registered User: …").
- "System user `jdoe` already exists." - choose another username; retired accounts keep their names.
- "Bad Password" or "Failed to create system user jdoe." - the password was rejected by the policy or the account could not be created. Record the message and retry.

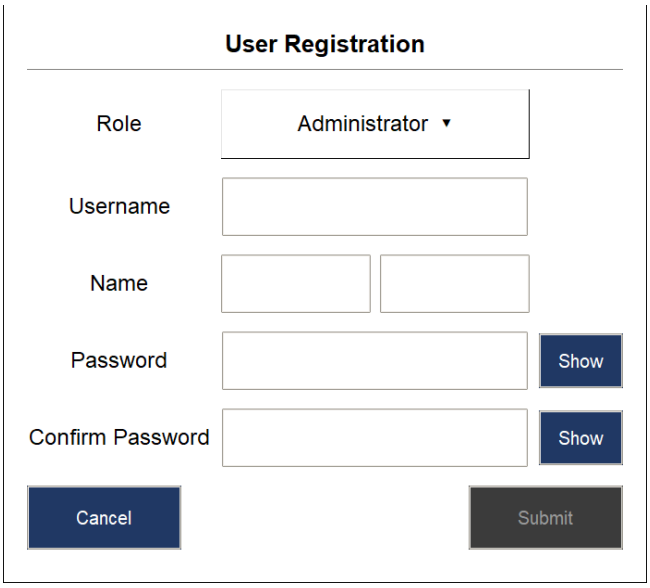

Figure 27. User Registration dialog. Submit is enabled once the password meets the policy and the confirmation matches.

14.7.2 Modify User → Reset Password, Retire User, Edit User Role

Reset Password. Any user can reset their own password and an administrator can reset a user's. Enter the Username and the new password twice, then tap Submit. "Password reset for jdoe was successful." confirms the change. A user who tries to reset someone else's password sees "Users can only reset their own password", and the system administrator's password cannot be reset here ("You cannot reset the system administrators password.").

Retire User. Removes an account's access without deleting it. Enter the Username, tap Submit, and answer Yes to "Are you sure you would like to retire user: jdoe?". The banner reads "System user 'jdoe' has been retired." The system administrator cannot be retired.

Edit User Role. The dialog is titled Modify User Group. Enter the Username, choose User or Administrator under User Group, and tap Submit. The banner reads "System user `jdoe` is now an Administrator." (or "... is already an Administrator" when nothing changed). The system administrator's role cannot be changed.

> **NOTE**
>
> **Retiring is reversible; deleting is not offered**
>
> A retired account keeps its username, role, and history and can be brought back with Restore User (Section 14.7.3). Accounts cannot be deleted from the touchscreen, so a username cannot be reused for a different person.

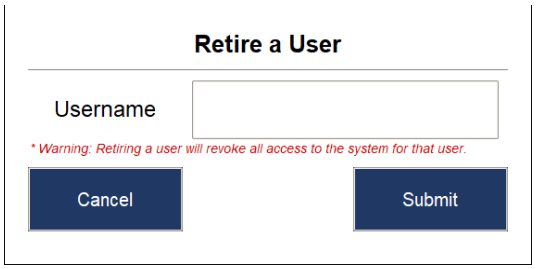

Figure 28. Retire a User dialog.

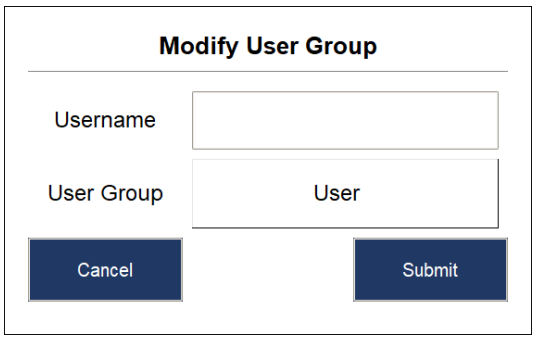

Figure 29. Modify User Group dialog, opened from Edit User Role.

14.7.3 Restore User

1. Tap ☰, Manage Users, Restore User, and sign in as an administrator if prompted.
2. Enter the Username of the retired account and tap Submit.
3. Answer Yes to "Are you sure you would like to restore user: jdoe? They will regain permissions previously allowed."

What you'll see

- "System user 'jdoe' restored successfully."
- "System user jdoe is not retired. Cannot restore an active user."
- "Failed to restore user. `jdoe` does not exist."

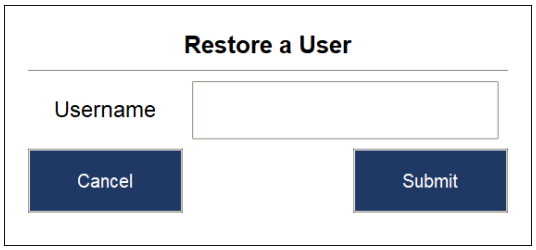

Figure 30. Restore a User dialog.

14.8 Settings → Configuration → System Configuration

Scenario. Site IT is commissioning the reader. It should carry the bench's name instead of the factory one, join the lab Wi-Fi so runs appear on the Skroot Data Portal, and - because the lab works under controlled access - require each operator to sign in. All of these settings are on one dialog.

Requires: *the system administrator sign-in, using the system administrator account supplied with the reader. This prompt appears even while authentication is otherwise disabled.*

1. Tap ☰, Settings, Configuration, System Configuration.
2. Sign in on the System Admin Sign In dialog (Username and Password; Show reveals the password).
3. Change the settings described below and tap Submit. Cancel discards every change.

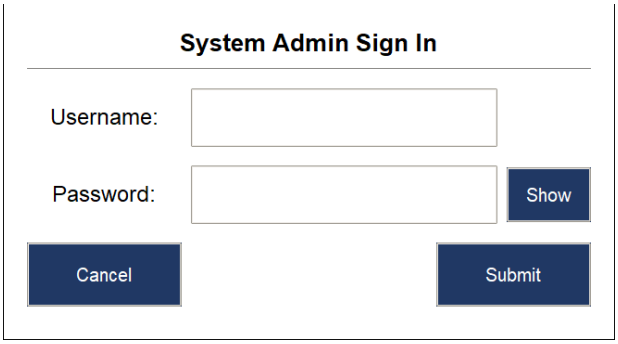

Figure 31. System Admin Sign In prompt shown before System Configuration opens.

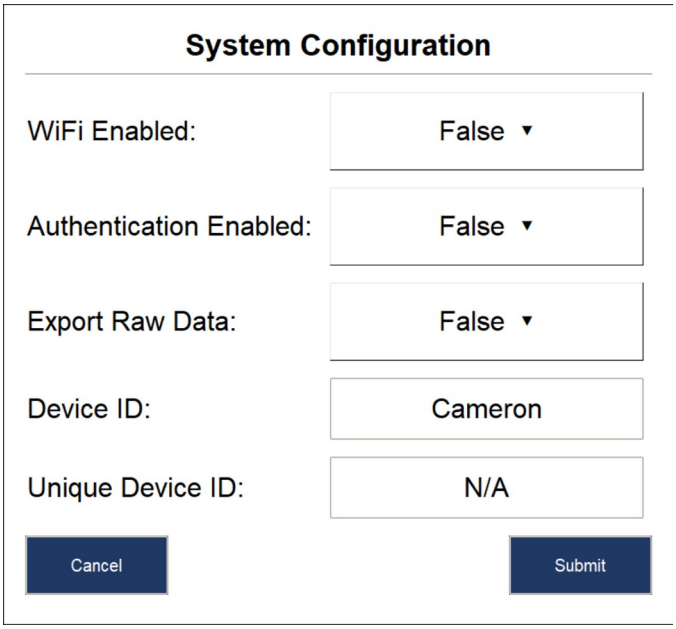

Figure 32. System Configuration dialog with the SMART™ Explorer defaults (Wi-Fi and authentication off). Values shown are examples.

14.8.1 Device ID

The Device ID is the reader's name. It is shown read-only on the run-setup form, written to every run's RunConfiguration.csv as Device Name (Section 15.6), and printed in the diagnostics Usage Metrics PDF, so a meaningful name - a bench or a room, for example - makes exported data easier to trace.

1. Tap the Device ID field and type the new name with the on-screen keyboard. Use letters, digits, and hyphens only, with no spaces.
2. Tap Submit.

What you'll see

- "Device ID updated to <name>."
- "Failed to update Device ID." - check the Device ID shown on the run-setup form before retrying; if it already shows the new name, no further action is needed. Otherwise try a shorter name without special characters.

14.8.2 Wi-Fi Enabled

Wi-Fi is off by default and the radio is switched off at every start-up, so the reader cannot join a network even if one was saved earlier. Enabling Wi-Fi is what lets a provisioned reader upload run data to Skroot's cloud for the Skroot Data Portal and keep its clock synchronized.

1. Set WiFi Enabled to True and tap Submit. The radio turns on immediately.
2. Reboot the reader (Section 14.13). The Wi-Fi icon appears in the banner after the restart.
3. Join the lab network as described in Section 14.12.

Keep in mind

- Wi-Fi has no effect on runs or on USB exports.
- Uploads to the Skroot Data Portal also require the reader to be provisioned by Skroot; the Unique Device ID field shows a value rather than N/A on a provisioned reader.
- Setting WiFi Enabled back to False turns the radio off again; the icon disappears at the next restart.

14.8.3 Export Raw Data

Export Raw Data is off by default, so a run export copies only the run's summary and run files. Turn it on if you need the raw scan data for offline processing. Each export then also copies the run's raw scan files, one CSV per scan named by its timestamp, into the run's folder on the USB drive.

Keep in mind

- A long run can have thousands of scan files, and copying them can take up to an hour. Leave the USB drive plugged in until the export finishes.
- Make sure the drive has enough free space. If it fills up, the export reports a failure.
- Export All never includes raw scan files.

14.8.4 Authentication Enabled

With authentication on, the reader asks for a sign-in before any run control or export and records the user against every action in the audit trail. Turning it on is also what makes Manage Users, Manage Passwords, and Export Users active.

1. Set Authentication Enabled to True and tap Submit.
2. Register the lab's accounts (Section 14.7.1). The system administrator can sign in to register the first administrator.
3. Hand out the sign-in procedure (Section 14.11) and the password rules in force (Section 14.10).

What you'll see

- When False is selected, a red warning appears in the dialog: "* Warning: Disabling user authentication will result in a system that is not CFR compliant."

> **CAUTION**
>
> **Turning authentication off removes user accountability**
>
> With authentication disabled, actions are no longer attributed to a named user and the reader no longer meets 21 CFR Part 11 expectations for access control. Change this setting only under the site's quality procedures and record the change.

14.8.5 Unique Device ID

Read-only. The Unique Device ID is the identity Skroot assigns when a reader is provisioned for cloud access, and it is written to RunConfiguration.csv as Unique Device Name. N/A means the reader has not been provisioned; contact Skroot if access to the Skroot Data Portal is wanted.

14.9 Settings → Configuration → System Time

Scenario. A reader shipped from the Midwest is installed in a lab on the West Coast, and the reader has no network connection. Every timestamp in smoothAnalyzed.csv, Notes.csv, and RunConfiguration.csv comes from the reader's clock, so the time zone - and, offline, the date and time - should be corrected before the first run.

1. Tap ☰, Settings, Configuration, System Time. The dialog is titled Current Date and Time and opens showing the reader's present clock.
2. Select the time zone from the dropdown.
3. If the reader is offline, set the hour, minute, and AM/PM and pick the date on the calendar. When the reader has an internet connection the date and time are synchronized automatically; change only the time zone.
4. Tap Submit.

What you'll see

- "System time changed to <date and time> (<time zone>)".
- "System time change failed." - retry; record the message if it repeats.

Keep in mind

- Do not change the clock during a run. Elapsed-time columns are computed from the run's start timestamp, and a clock change mid-run shifts them.
- Time changes are recorded in the audit trail (Section 14.5). Note any correction in the run record as well, because it may affect run timestamps.

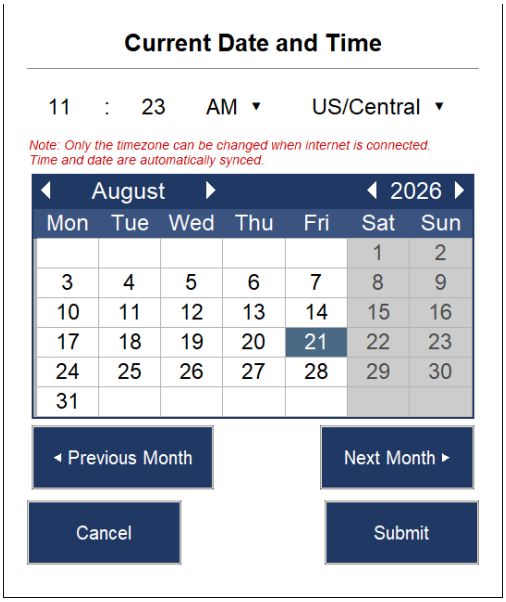

Figure 33. Current Date and Time dialog (Settings → Configuration → System Time).

14.10 Settings → Manage Passwords

Scenario. The site's IT policy requires passwords to be rotated every 60 days and accounts to lock after five failed attempts. Both rules are set on the reader's two password screens and apply to every account on it.

Requires: *Authentication Enabled and the system administrator sign-in.*

Password Configuration opens the Password Rotation dialog:

- "Password expires N days after creation." (default 90).
- "User is locked out N days after expiration." (default 30) - an account that has not signed in for this long after its password expired is locked until an administrator resets the password.
- "User cannot re-use last N password(s)."

Password Requirements opens the dialog of the same name:

- "Minimum password length is N characters." (default 8; 6 to 16 allowed).
- "User is allowed N attempt(s) before lockout." (default 3; up to 10).
- "User is disabled for N minute(s) on lockout." (default 10; up to 24 hours).

1. Tap ☰, Settings, Manage Passwords, then Password Configuration or Password Requirements, and sign in as the system administrator.
2. Tap a value, type the new number with the on-screen keyboard, and tap Submit.

What you'll see

- "Configuration Updated."
- "Invalid configuration:" followed by the rule that was broken, for example "Minimum Password Length must be between 6 and 16 characters".
- "Cannot change password configurations, authentication is disabled." or "Cannot change password requirements, authentication is disabled." while authentication is off.

Keep in mind

- Password complexity (upper- and lower-case letters, a digit, and a symbol) is fixed and is not changed by these screens.
- A user whose password has expired can still sign in once; the reader then shows "Authentication successful. Password expired, please reset to avoid lockout." and opens the Reset Password dialog.
- The values in the figures are examples; confirm the defaults on the delivered reader before writing them into a site procedure.

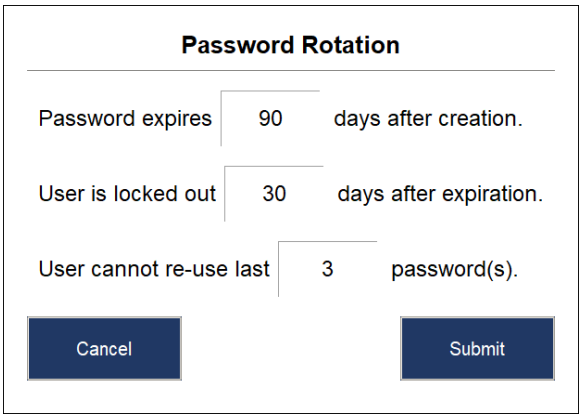

Figure 34. Password Rotation dialog (Manage Passwords → Password Configuration).

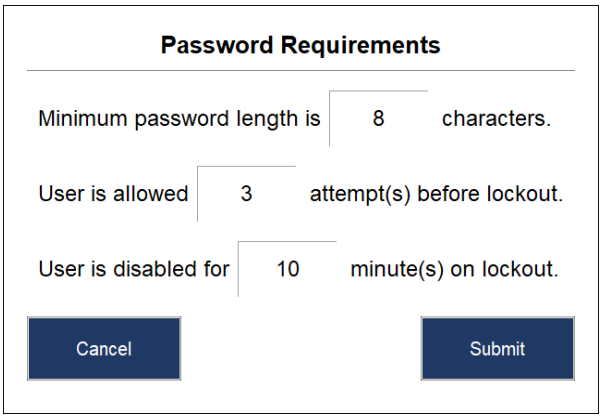

Figure 35. Password Requirements dialog (Manage Passwords → Password Requirements).

14.11 Signing In and Out

Scenario. With authentication enabled, an operator arriving for the morning shift signs in, starts the run, and signs out before leaving the bench, so that the next action on the reader is attributed to the right person.

Requires: *Authentication Enabled (Section 14.8.3). While authentication is off the profile menu still offers Sign In, but nothing requires it.*

The profile icon ▼ in the banner shows "Not signed in" and a Sign In item, or "User: <name>" and Sign Out once someone is signed in. A sign-in is also requested automatically the first time a protected control is tapped - the + tile, Start, Stop, Export Run, the power icon, and every Export Data and Settings item - so signing in from the profile menu first is optional.

1. Tap the profile icon, then Sign In (or tap the protected control directly).

2. Tap the Username field and type the username with the on-screen keyboard, then type the Password. Show reveals what was typed.
3. Tap Submit.

What you'll see

- "Welcome, jdoe!" - signed in. The dialog title is Sign In, Administrator Sign In, or System Admin Sign In, depending on the role the control requires.

Keep in mind

- An administrator signing in is shown a "Warning: Users Locked Out" list when any account has been locked out since the list was last cleared; Confirm clears it.
- Sign out before handing the reader to a colleague, or the next export is recorded under the wrong name.

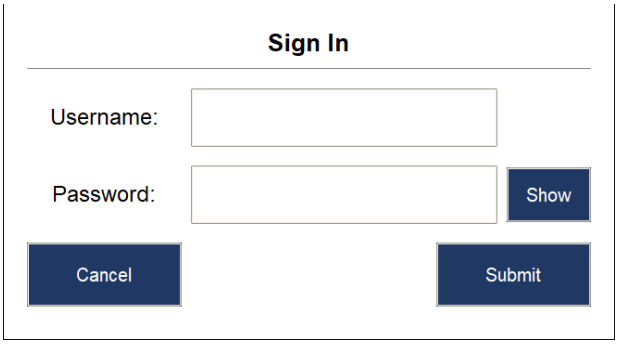

Figure 36. Sign In dialog.

14.12 Joining a Wi-Fi Network

Scenario. Site IT has enabled Wi-Fi (Section 14.8.2) and now connects the reader to the lab network so that run data reaches the Skroot Data Portal and the clock stays synchronized.

Requires: *WiFi Enabled set to True followed by a reboot (Section 14.8.2); the Wi-Fi icon is then present in the banner.*

1. Tap the Wi-Fi icon in the banner. The Network Connections dialog opens; Status shows "Checking..." and then "Connected to Internet" or "No Internet Connection".
2. Wait for the list of networks (tap Refresh to scan again). The network in use is marked with a check mark.
3. Tap the network. For a secured network the reader has not joined before, a Password field appears; type the password (Show reveals it).
4. Tap Connect, or double-tap the network.
5. Tap Close. The banner icon changes to the connected symbol once the reader has internet access; the reader re-checks every 10 seconds.

What you'll see

- "Connected to <network>" or "Disconnected from <network>".
- "No networks found" in the list when nothing is in range.

Keep in mind

- Wi-Fi never affects a run in progress or a USB export.
- Disconnect drops the current network but leaves Wi-Fi enabled; use System Configuration to turn the radio off.
- Access to the Skroot Data Portal is arranged with Skroot and is outside the scope of this document.

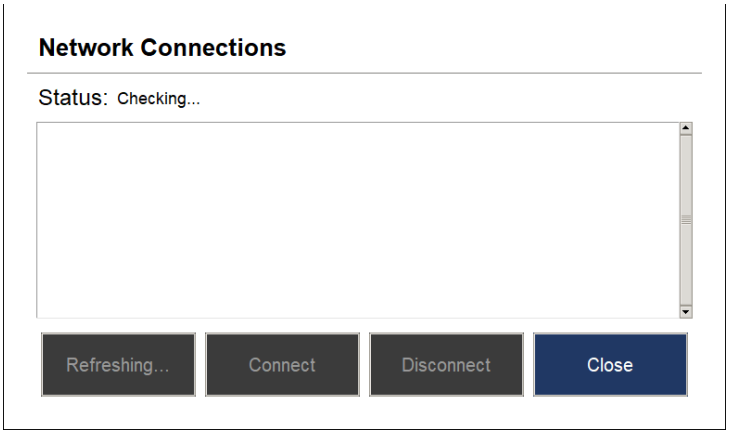

Figure 37. Network Connections dialog as it opens, before the network scan has completed.

14.13 Rebooting the Reader

Scenario. The touchscreen stopped responding after an export, or Wi-Fi was just enabled and the banner icon has not appeared yet. A reboot from the power icon restarts the reader cleanly without unplugging it.

1. Confirm that no run, calibration, or export is in progress.
2. Tap the power icon in the upper-right corner.
3. Tap Yes on the Reboot Reader prompt ("Are you sure you wish to restart the system?"). No returns to the screen.
4. Wait for the application to reload to the home screen (Section 6).

Keep in mind

- Rebooting during a run ends the run without an export. The data recorded up to that point stays on the reader and can be exported by Run ID (Section 14.2).
- With authentication enabled, the power icon asks for a sign-in first.

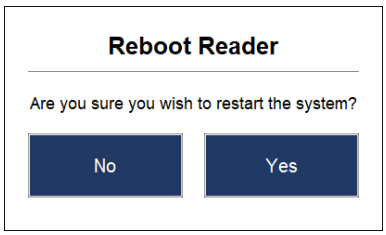

Figure 38. Reboot Reader confirmation prompt.

15. Exported Run Data

After a successful export, the SMART™ Explorer creates a run-specific folder within the Run Results directory on the USB drive. Data files use the comma-separated values (.csv) format and can be opened in Microsoft Excel or compatible data-analysis software. Run data is kept on the reader for 90 days after it is recorded and then deleted automatically.

15.1 Exported Folder Structure

Run Results/

└── "Start Date of Run"_"Run ID"/ (e.g. 2026-08-11_DEMO-001)

├── smoothAnalyzed.csv

├── Notes.csv

├── RunConfiguration.csv

├── Run Movie.mp4 (single-run export, movie enabled)

└── "sampling files" (e.g. od600.csv)

15.2 smoothAnalyzed.csv Data Dictionary

COLUMN	DESCRIPTION
Timestamp	Absolute timestamp associated with the data record.
Time (hours)	Elapsed time from the start of the run. This column should generally be used as the time axis when graphing run data.
SMART™ Growth Index (SGI)	Processed sensor measurement representing the response associated with culture growth.
Resonant Frequency (MHz)	Detected resonance-peak frequency of the SMART™ sensor.

Each row represents one data record collected at a specific elapsed time. In a continuous run the number of rows depends on the run duration and scan rate; in a discrete run there is one row per Take Scan press.

15.3 Notes.csv Data Dictionary

COLUMN	DESCRIPTION
Timestamp	Absolute timestamp when the note was recorded (YYYY-MM-DD HH:MM:SS).
Note	The note text as entered.

15.4 Sampling Data Files

Each analyte with at least one manual entry exports its own file: od600.csv, lactate.csv, glucose.csv, or liveCellCount.csv. Each contains the absolute Timestamp, the elapsed Time (hours), and the measured value for that analyte.

15.5 Run Movie

When "Include plot movie" is enabled during a single-run export, Run Movie.mp4 replays the run as a 2x2 grid of the four plot views - Signal Check (with the detected peak highlighted), Resonant Frequency, SGI, and dSGI - building over time. Each frame is titled with the Run ID and the date and time of that scan, and note markers appear on the time panels.

15.6 RunConfiguration.csv Data Dictionary

RunConfiguration.csv records the settings the run was started with, as Field,Value rows. It is written at run start with an empty End Datetime and completed when the run stops, so a run that ended unexpectedly still leaves a readable file.

FIELD	DESCRIPTION
Run ID	The identifier entered at run setup.
Device Name	The reader's Device ID (Section 14.8.1).
Unique Device Name	The Unique Device ID assigned by Skroot, or N/A when the reader has not been provisioned.
Software Version	Version of the SMART™ Explorer app that recorded the run.
Firmware Version	Reader unit firmware version, or N/A if it could not be read.
Start Datetime	Run start (YYYY-MM-DD HH:MM:SS).
End Datetime	Run end; blank until the run is stopped.

FIELD	DESCRIPTION
Scan Rate (min)	Continuous runs only: minutes between scans as selected at setup.
Equilibration Time (hr)	Continuous runs only: hours before the SMART™ Growth Index baseline was set.
Scan Mode	Continuous or Discrete.
Initial Sweep Range (MHz)	The range applied at run start, for example "50 to 133", after any cap from calibration. Later changes made from the Sensors tab are recorded in Notes.csv.

Not included in a run export: the raw per-scan sweep files, Analyzed.csv, Calibration.csv, and cpu-info.csv. The last two are available to support through Export Diagnostics (Section 14.4).

16. Troubleshooting

OBSERVATION	LIKELY CHECKS / CORRECTIVE ACTIONS
Reader does not power on	Verify the approved outlet, supplied adapter, and power cable. Inspect for visible damage. Do not open the enclosure; contact support if unresolved.
Touchscreen application does not load or respond	Allow boot to complete. If no run or export is active, reboot the reader from the power icon.
Calibration fails	Remove the vessel and nearby SMART™ sensors from the coupler; keep the Reader stationary; make sure the reader unit and the touchscreen units are properly connected by the micro-USB cable; retry. Record the exact error message if it persists.
Calibration. “Inductive coupler possibly disconnected.”	Make sure the inductive coupler has not been unplugged/moved from the reader unit; retry. Contact support if the error persists.
Banner: "Sweep analysis failed, check vessel placement."	Confirm the SMART™ sensor is positioned directly over the coupler and is stable (Section 9). Confirm the sweep range against the calibration result.
Current SGI shows "-"	The SMART™ Growth Index baseline has not been set yet. Continuous run: wait for the equilibration time to elapse. Discrete run: take the first scan.

OBSERVATION	LIKELY CHECKS / CORRECTIVE ACTIONS
Banner: "Current scan rate is infeasible, updated to N."	The sweep takes longer than the selected interval (common with wide sweep ranges). Accept the new rate or narrow the sweep range.
Banner: "Failed to set zero point. SGI values unreliable."	Check sensor placement and signal quality; record the event and restart the run if SMART™ Growth Index data are required.
Manual sample does not appear on the plot	Confirm the entry was submitted and that the plot's secondary axis is showing the same analyte selected in the Sampling tab.
USB export fails / "USB drive not found."	Confirm the drive is inserted, writable, and has available space; retry or use another approved drive. Record the Run ID and exact message.
Export message ends with "Movie could not be generated."	The CSV data was still exported. Retry the export, or export with "Include plot movie" off.
Date/time incorrect	Use Settings > Configuration > System Time. Record any correction because it may affect run timestamps.
Banner: "End frequency capped at N MHz to stay clear of the reader's self-resonance."	The configured stop frequency was above the recommended maximum from calibration; the run uses the capped range shown on the Sensors tab. No action is needed.
Banner: "Scan range exceeds the recommended maximum of N MHz; data may be inaccurate."	The whole configured range lies above the recommended maximum, so it was applied unchanged. Stop the run and set a lower range, or retune from the Sensors tab.
Wizard: "× No sensor peak — adjust the sensor and scan again, or skip."	Center the sensor over the coupler, keep it flat and close, and tap Re-scan. Confirm that the run's sweep range contains the sensor's resonance.
Banner: "A scan is already in progress."	Take Scan was pressed while a discrete scan was still running. Wait for "Reader has recorded a sweep." before pressing it again.
Banner: "Cannot <action>, authentication is disabled."	The menu item needs user accounts. Enable authentication in System Configuration (Section 14.8.3) or disregard the item.
Banner: "Failed to export system information." / "Failed to export diagnostics." / "Failed to export audit trail."	Confirm the drive has free space and is writable, retry with another drive, and record the message for support.

OBSERVATION	LIKELY CHECKS / CORRECTIVE ACTIONS
Banner: "Audit trail export cancelled."	Cancel was tapped in the Export Date Range dialog. Repeat the export and tap Submit.
Wi-Fi: "No Internet Connection" / "Incorrect password — please try again."	Check the network password and signal, tap Refresh, and connect again. Confirm with site IT that the network allows internet access.

Appendix A. Quick-Start Checklist

1. Place the Reader on a stable, level bench with clear access to the coupler, USB port, and power.
2. Connect power, allow the app to load, and record the Device ID and software version.
3. Keep the coupler area clear of the vessel and any SMART™ sensors.
4. Tap +, select Continuous or Discrete, confirm the Device ID, enter a unique Run ID, set the sweep range (and, for continuous runs, the scan rate and equilibration time), then Submit.
5. Tap Start and calibrate with the coupler empty.
6. Review the calibration result and the cap that will apply to the stop frequency, then tap Next.
7. Align the vessel so the SMART™ sensor sits centered over the inductive coupler plate, tap Scan, and tap Start run once the peak is detected (Section 9).
8. Monitor the run and cycle plot views with Toggle. In a discrete run, press Take Scan for each measurement.
9. Record observations in Notes and enter manual measurements in Sampling.
10. Tap Stop and confirm.
11. Insert the USB drive and export the run; leave "Include plot movie" on unless the run is very long.
12. Verify the exported files open on an approved computer; analyze the data and report every deviation or unresolved issue.
13. Retrieve earlier runs, set the clock, or change system settings from the ☰ menu (Section 14). Run data is deleted from the reader after 90 days.