MAVERICK
User Manual

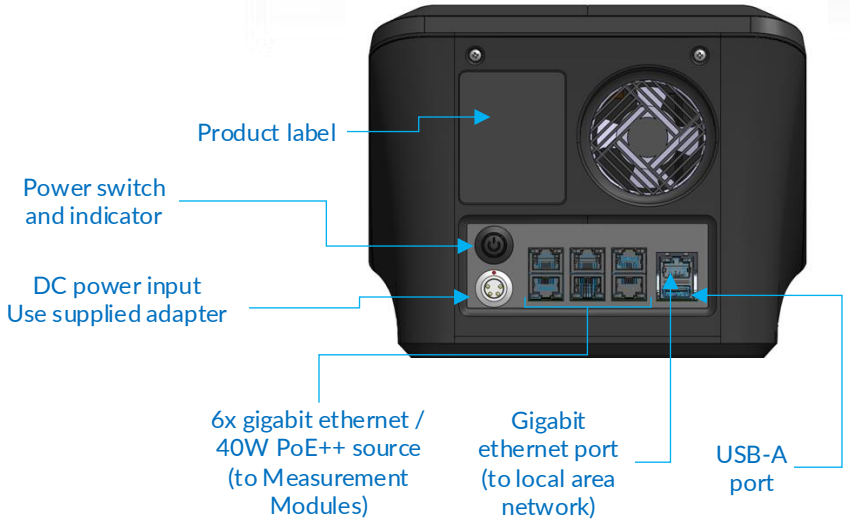
SW1.3 • September 2024

908devices

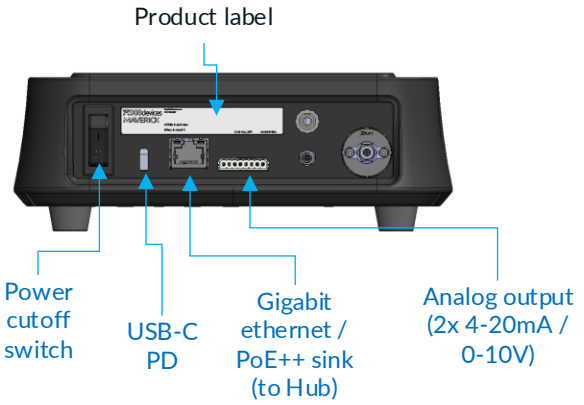
Contents

Specifications & Components

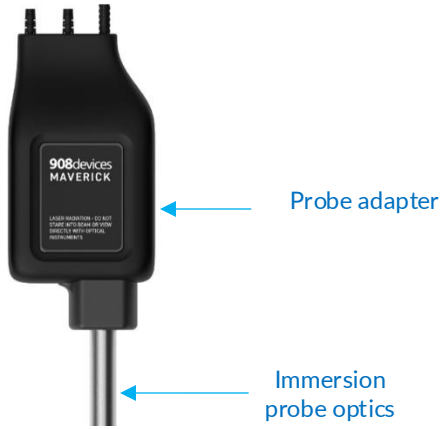
Hub



Measurement Module



Probe



Specifications & Components

Hub

- Size: 8” h, 8” w, 10” d / 21cm h, 17cm w, 26cm d
- Weight: 4.5 lbs / 2 kg
- Power: Input: 52-57V DC, 270W; Output (x6): 56V, 40W max

Measurement Module

- Size: 4” h, 8” w, 10” d / 11cm h, 21 cm w, 26 cm d
- Weight: 4.5 lbs / 2 kg
- 785 nm excitation, up to 450 mW
- Class 3B Laser Product: 20CFR 1040.10 & 1040.11 / IEC EN 60825-1 2014
- Dispersive spectrometer, cooled CCD detection
- Spectral range ~200–3200 cm^{-1}, resolution ~ 6 cm^{-1}
- Optical probe: USP Class IV approved materials; autoclavable for up to 10 cycles

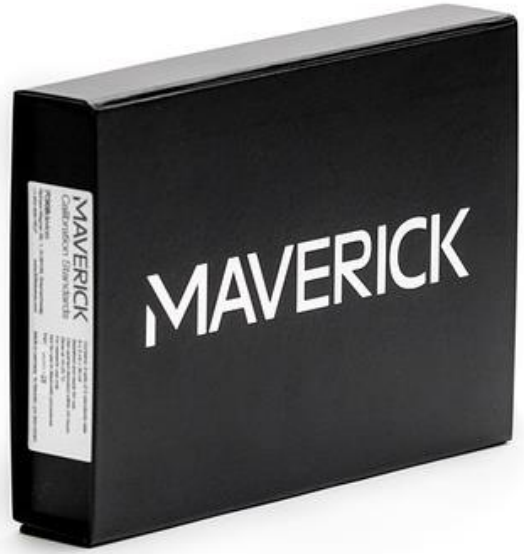
General

- Certifications: UL/CSA/IEC 61010-1 Third Edition
- Ambient Operating Temperature: 15°C–25°C
- Ambient Humidity: 20–80% RH (non-condensing)
- Maximum Altitude: 10k feet
- Intended use: this device is intended for Indoor use only
- Pollution Degree: Type 2; typical manufacturing environment
- Multiplex: one hub can control/power up to 6 measurement modules
- Outputs: Digital out from Hub via OPC-UA or standard CSV, and each measurement module has an analog (V or I) output for direct connection to a feeding system
- Built under ISO 9001:2015 quality controls
- RoHS, China RoHS, WEEE and REACH conforming
- NRTL certified: FCC/FDA/UKCA/CE (TUV & Bureau Veritas)

Specifications & Components

Probe calibration stand

Calibration & System Suitability Standards



Safety

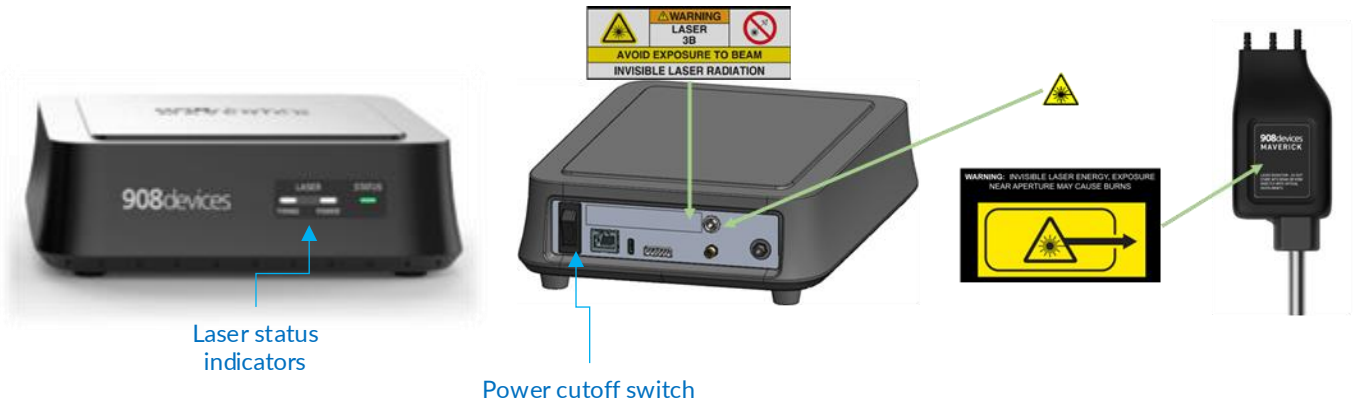
Laser Access Control, Emission Indicator, and Power Switch

The MAVERICK system is equipped with an access control system that prevents unauthorized users from operating the laser in each connected Measurement Module. Users must supply an individual password or PIN to access the software and begin operation. User accounts and passwords must be strictly controlled and only given to personnel who have been trained on the safe use of the system.

Each Measurement Module is equipped with a laser emission indicator and power switch as shown in the diagram below. The laser emission indicator will flash white whenever the laser is active. At any time, the power switch may be used to immediately stop laser emission.

Laser Emergency Stop

A MAVERICK Measurement Module will only emit laser radiation when a calibration or measurement is initiated by the user. When radiation is being emitted, the icon of the module in the hub's status bar will be illuminated. An ***Emergency OFF*** button is available in every screen on the hub and can be used to stop laser emission from all connected modules at any time.



Safety Labels & Locations

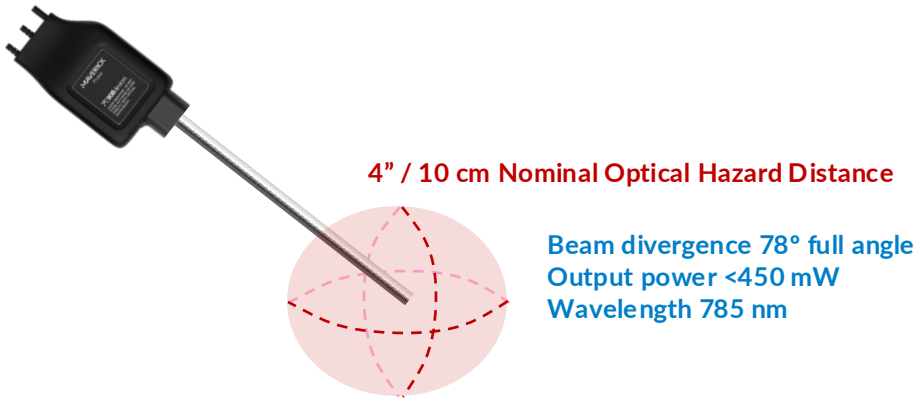
French: Avertissement: Éviter l'exposition au faisceau. Rayonnement laser invisible.

Class 3B laser system warning. Rear of Measurement Module.

French: Avertissement: Énergie laser invisible. L'exposition près de l'ouverture peut provoquer des brûlures.

Laser aperture warning. Probe adapter.

Laser aperture warning. Fiber optic connection on rear of Measurement Module.

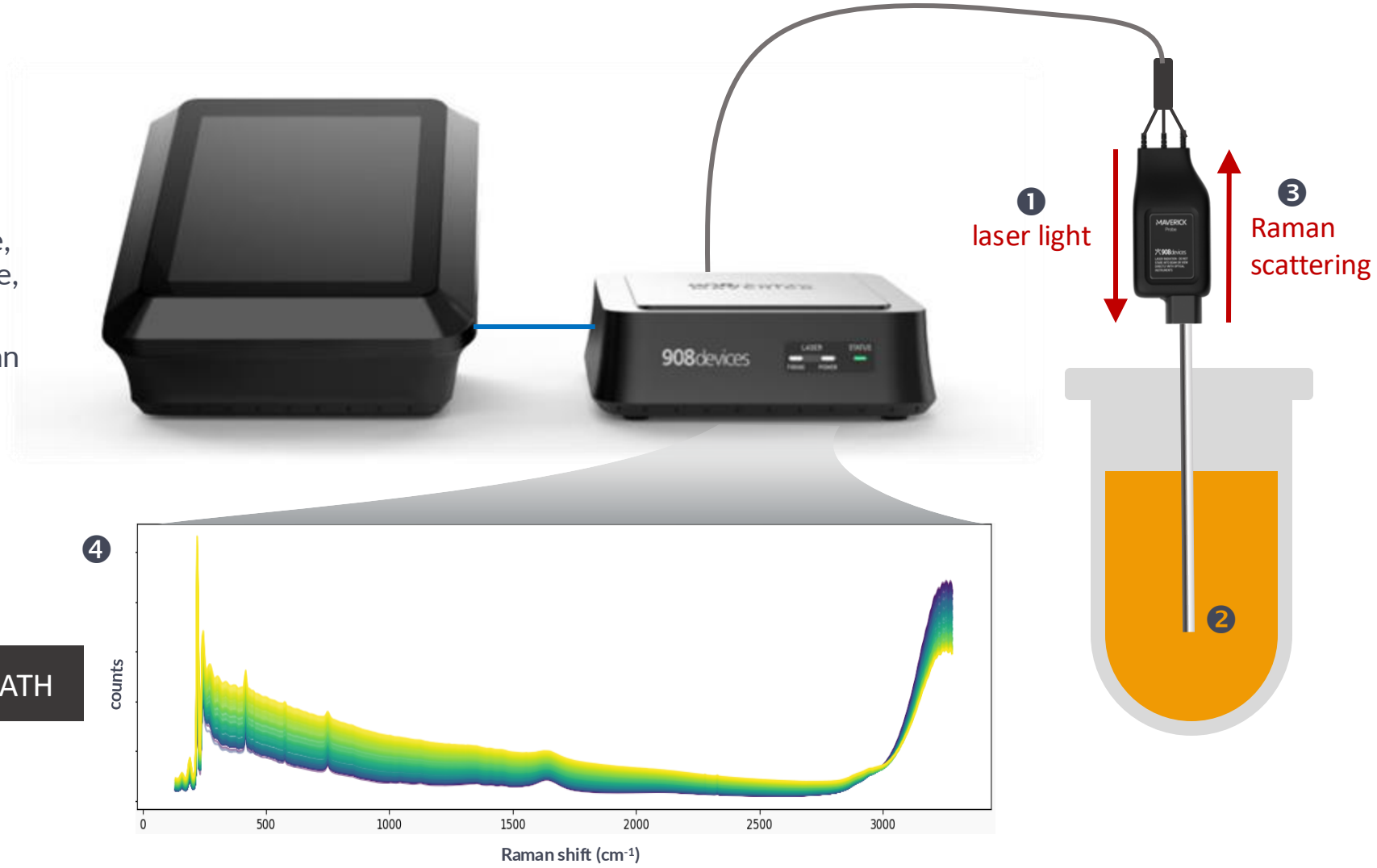


4" / 10 cm Nominal Optical Hazard Distance

Beam divergence 78° full angle
Output power <450 mW
Wavelength 785 nm

How MAVERICK Works

1. Laser light is delivered via the probe.
2. Probe focuses in the culture media
3. Chemical components of the media produce Raman scattering
4. Scattered light is collected by the probe, and routed to the Measurement Module, which records the Raman spectrum
5. On-board software interprets the Raman spectrum to estimate attributes

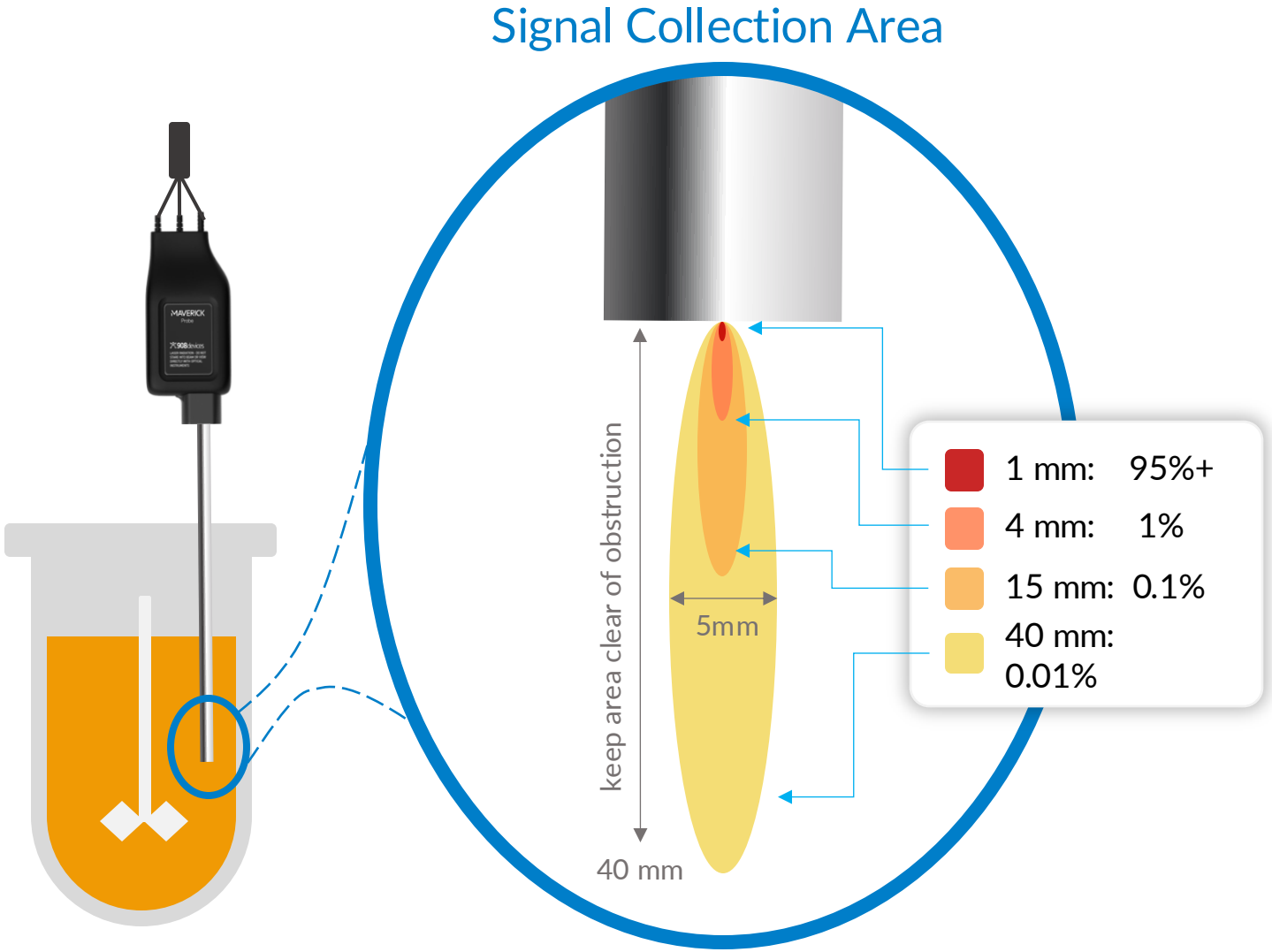


Probe Signal Collection Area

The MAVERICK optical probe collects most of the necessary signal from an area very close (1 mm) to the end of the probe.

We recommend ensuring that adequate clearance is available around the end of the probe to avoid obstructing the signal collection.

Where possible, keep the area indicated at right clear of obstruction (*e.g.*, impellers, other probes, wall of the bioreactor vessel)

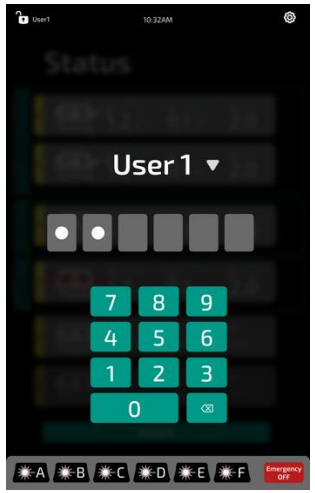


Software: User Account Management

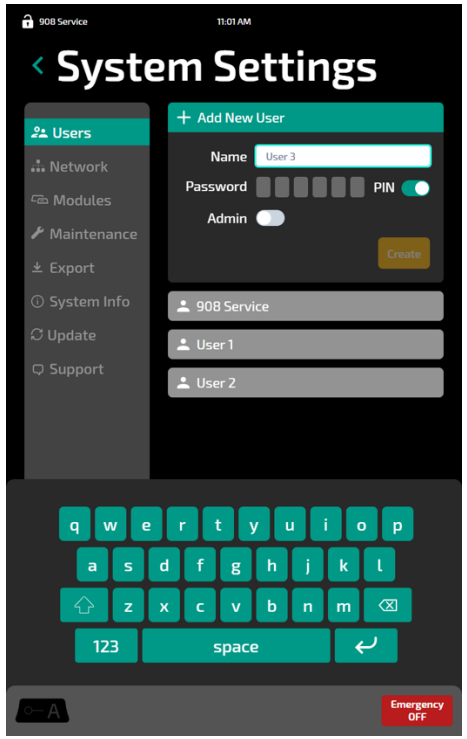
MAVERICK includes a user management and authentication system to limit device access to authorized users. (See the “Safety” section of this manual for information on how authorized users must be trained.)

When the system is **locked** (denoted by a closed lock icon in the upper left corner of the screen), users may view the system status and use the ***Emergency OFF*** button, but no other functionality is available.

The system may be **unlocked** by tapping the “Unlock” button or the lock icon in the upper left corner of the screen. Enter the user PIN or alphanumeric password to unlock the system. Once unlocked, the user may control measurements and modify settings.



New user accounts may be added by navigating to ***Settings > Users***.



User Levels

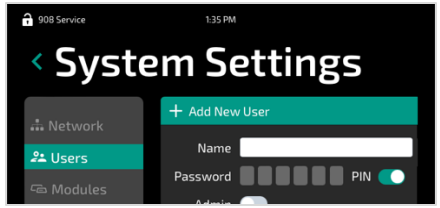
Non-Admin users are permitted to operate all analytical functions on the MAVERICK system, including calibration, creating batches, and viewing the resulting data.

Admin users are permitted to perform all the functions above, plus system administration tasks such as pairing measurement modules, user account creation, changing network configuration and performing maintenance/support tasks.

The **908 Service** user account allows service personnel to perform maintenance tasks. It cannot be removed or modified.

PIN v. Password setting

The toggle button on the user account creation screen allows the user to designate a short numeric PIN for account access, or a longer alphanumeric password. Please discuss the ramifications of password complexity with your IT team to ensure compliance with GLP/GMP requirements.



Hardware: Setting Up

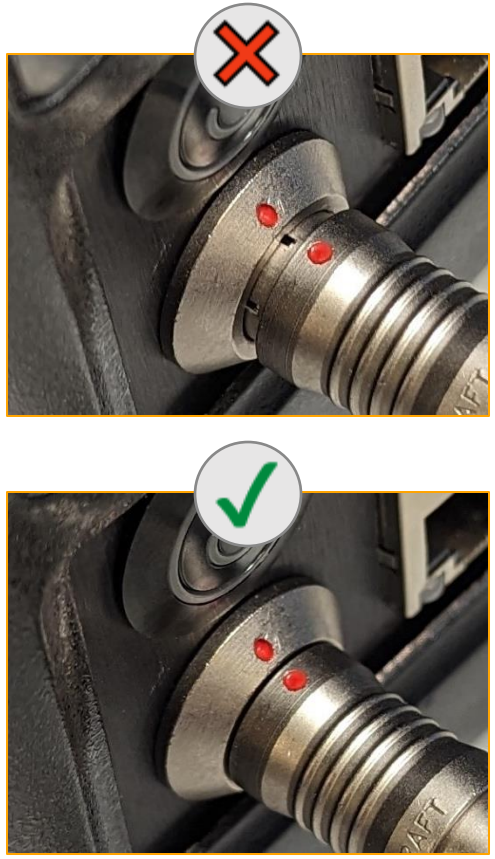
MAVERICK Hub

1. Unpack and place the Hub on a stable, firm, flat surface such as a lab bench or table. Ensure that the rear of the Hub is at least 2in. / 5cm from walls or other obstructions.
2. Connect the external DC power adapter to the power input port on the rear of the Hub.
3. Connect the external DC power adapter to mains using a 908 Devices supplied power cord.
4. Optionally, connect the rear ethernet port labelled “LAN” to a network of your choice. (Do not connect this port to a Measurement Module.)
5. Briefly press the power button on the rear of the Hub.

MAVERICK Measurement Module

1. Unpack and place the Module on a hard, flat surface such as a lab bench or table. Ensure that the rear of the module is at least 3in. / 7cm from walls or other obstructions.
   Caution: The cable attached to the Module contains glass optical fiber. Although this cable is reinforced, it must be treated with care to avoid damage: avoid bending the cable excessively; avoid dropping the Probe Adapter or snagging the cable when moving the Module.

   Note: Module temperature control is important for accurate results. Place Module at least 3 inches away from nearby objects so that cooling airflow is not restricted. Do not place Module near hot exhaust of other equipment.
2. Ensure that the power switch on the rear of the module is in the OFF position (labeled “O”).
3. Use a 908 Devices-supplied ethernet cable to connect the Module to the Hub. Connect one end of cable to one of the numbered RJ-45 ports on the rear of the Hub and one end to the RJ-45 port on the rear of the Module.
4. Optionally, a USB-C PD power supply (15V / 2.7A) may be connected to the Module via its rear USB-C port to supply backup power in the case of accidental disconnection or malfunction of the Hub.
5. Toggle the power switch on the rear of the module to the ON position (labelled “I”).



Caution: Ensure the power plug is firmly seated into the back of the Hub without gaps.

Software: Pairing Measurement Modules to the Hub

Pairing

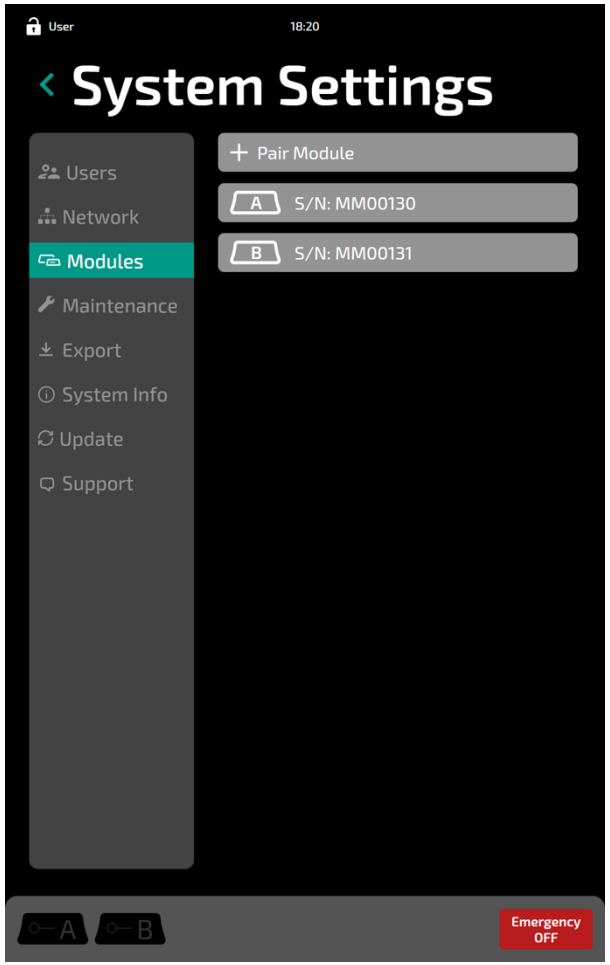
Measurement Modules must be paired with the Hub before use.

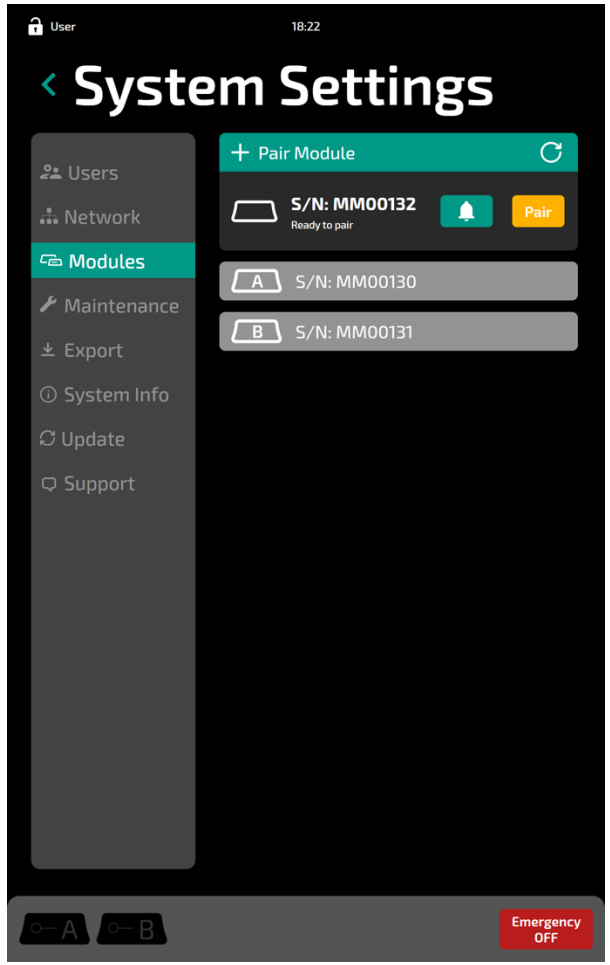
Step 1: Connect the measurement module to a power source, and the Hub via ethernet. (The measurement module may be directly powered over ethernet from the Hub as well.) Turn on the measurement module.

Note: If no modules are shown available for pairing, check that power is supplied to the Measurement Module, that is has been turned on at the rear of the module, and that an ethernet cable connects the module to the hub.

Step 2: Navigate to ***Modules*** > ***Pair Module***, which will bring up a list of connected modules that can be paired by serial number (*e.g.*, S/N: MM00126). Click "Pair" to complete the pairing and begin using the measurement module. See next page for settings information.

Tip: Pressing the bell icon ( ) flashes the status LED on the Measurement Module blue to facilitate distinguishing modules.





Measurement Module Settings

Measurement Module Settings

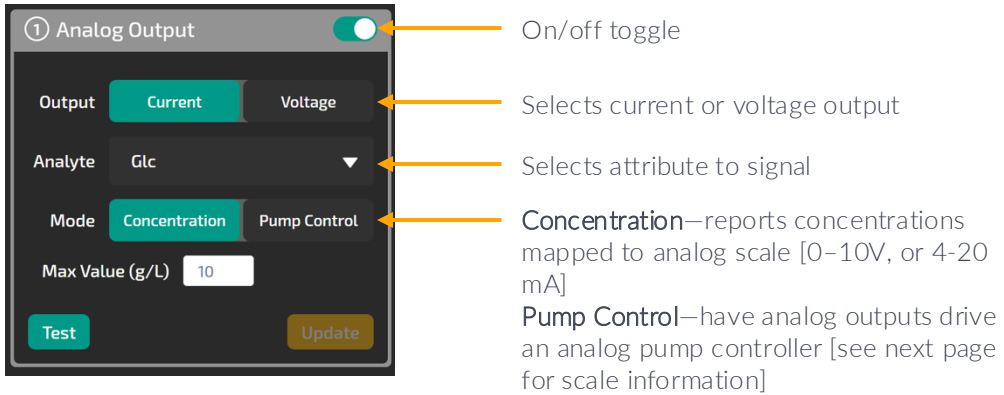
Measurement Modules must be **paired** before their settings can be accessed. (See previous page for directions)

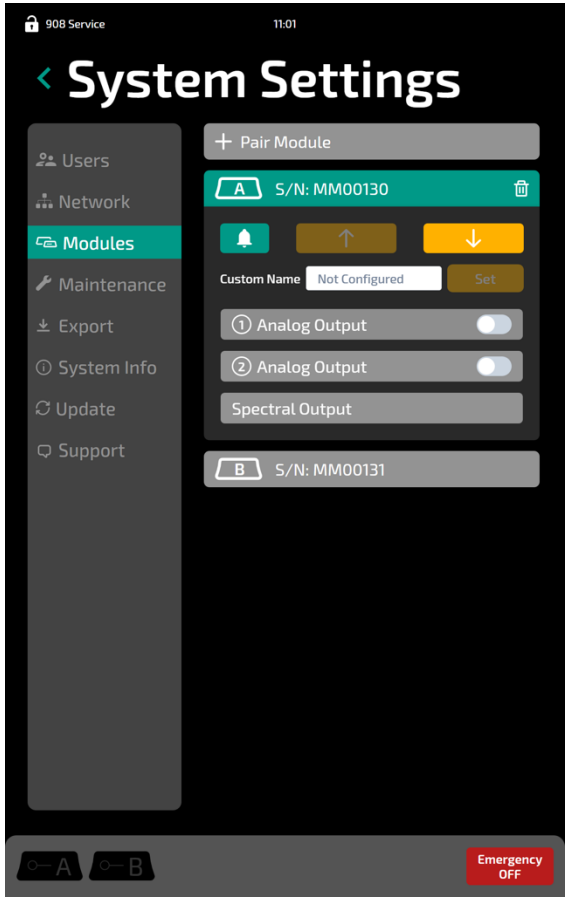
To unpair a Measurement Module from a Hub, press the trash icon (🗑) on the right.

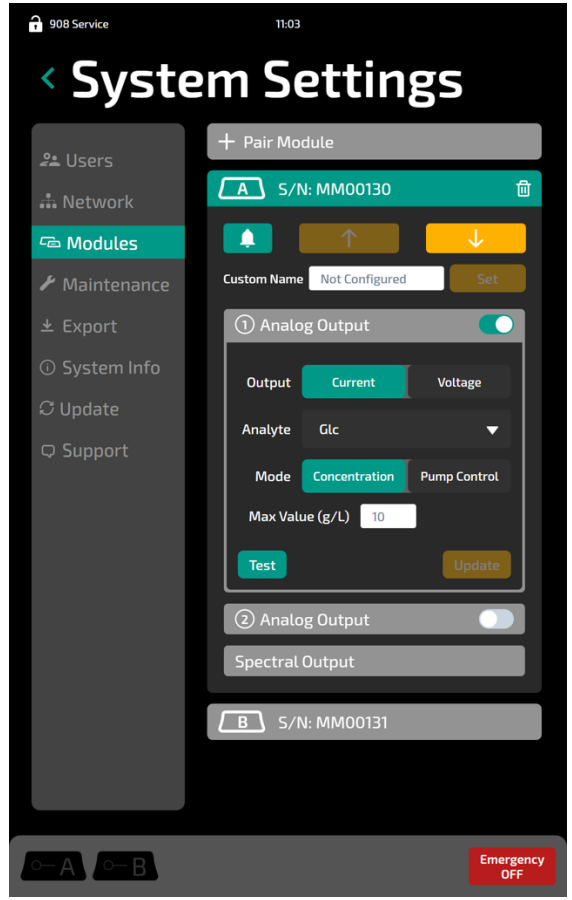
Note: The settings for a given Measurement Module will persist even if the Measurement Module is disconnected / unplugged / powered off.

Measurement Modules have several settable attributes that can be accessed under ***Settings*** > ***Modules***.

- The ***bell icon*** (🔔) can be pressed to have the Measurement Module identify itself by blinking its LED status indicator blue.
- The ***up/down arrows*** (↑ ↓) can change the order of the measurement module in the A–F stack.
- A ***Custom Name*** can be set for easy identification (e.g., location, batch, etc.)
- The ***Analog Output*** panel allows two independent analog output channels to be configured for Current/Voltage output. See below for more information.



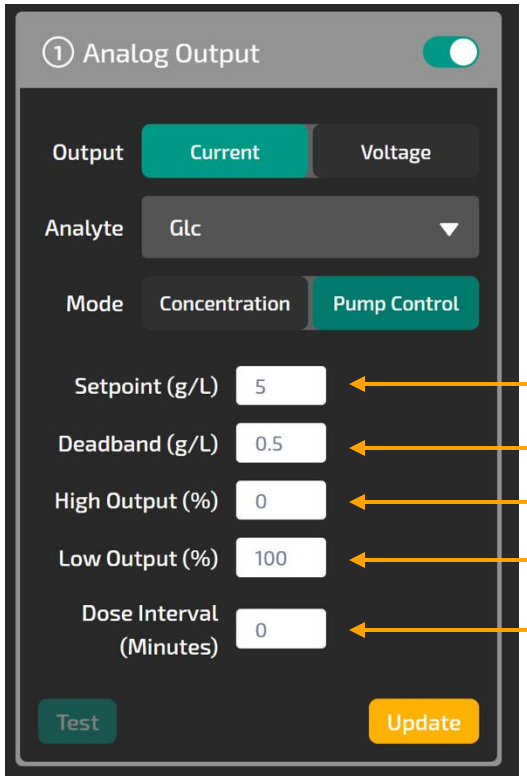




Analog Output Settings (1)

Pump Control Settings & Behavior

MAVERICK can be used as a closed-loop controller for your feed pump.



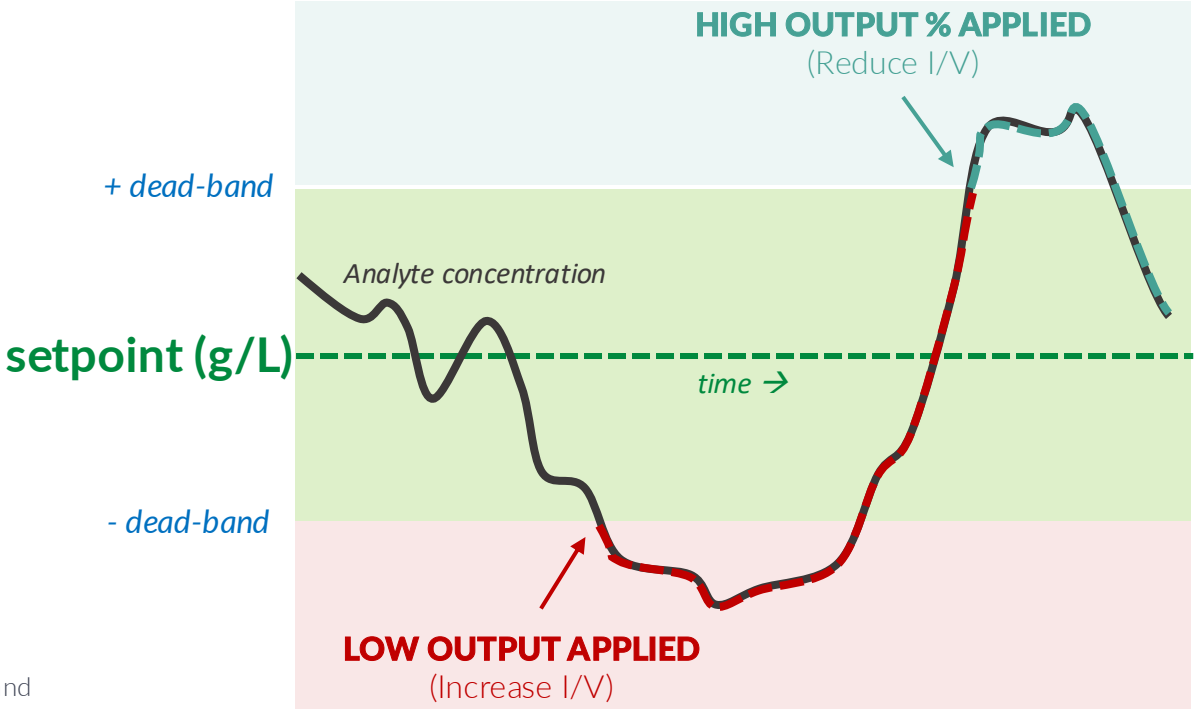
Target concentration

Upper and lower limits of deviance from setpoint before pump is activated

Pump rate when concentration is above the "+" dead-band

Pump rate when concentration is below the "–" dead-band

If set to zero, pump operates continuously; otherwise, pump activates for one-minute doses, with user-set minutes between doses.



Setting	Setting (%)	Current	Voltage
Low Output	*e.g.* 100%	20 mA	10 V
High Output	*e.g.* 0%	4 mA	0 V

An illustration of MAVERICK as a pump controller, with example values below. When concentration declines below the lower deadband, the low output feed setting is applied until concentration reaches above upper deadband, whereupon the high output feed setting is applied.

Notes

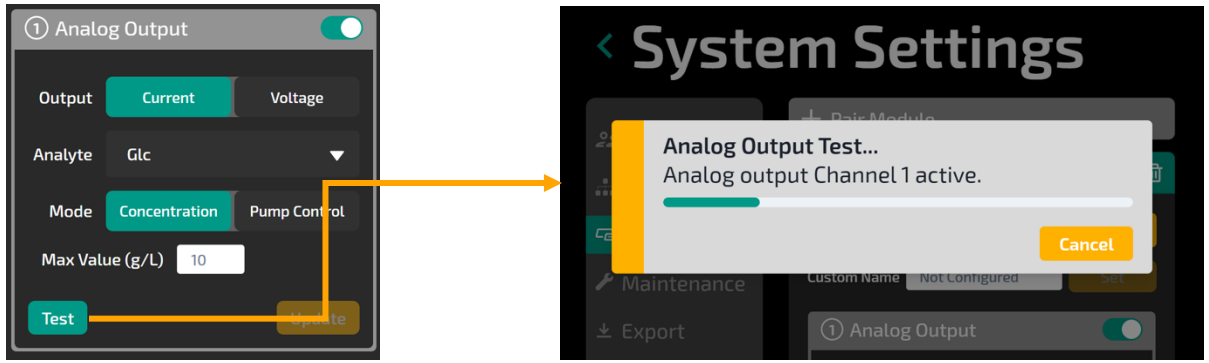
- At initialization, the "High Output" is applied if the analyte concentration is above the "+" dead-band.
- While in the dead-band, the output condition is unchanged.

Analog Output Settings (2)

Electrical Configuration & Testing

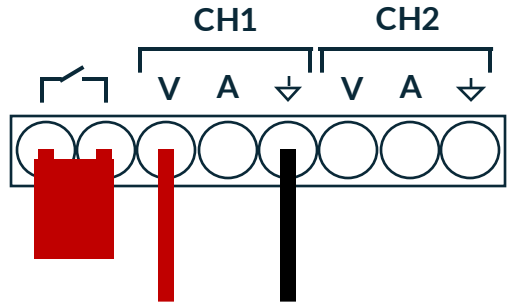
- Refer to the documentation of the equipment that you wish to connect to determine whether voltage or current output is appropriate
- Connect the appropriate pins of the analog output connector to the external equipment. Example configurations are shown on the right.
- When the connection has been made, the ***Test*** function can be used to verify communication is functional:
    1. Navigate to ***Settings > Modules > Analog Output***.
    2. Ensure that the desired channel is configured as intended and enabled.
    3. Press ***Test***.
    4. Maverick will check for issues with the electrical connection and then activate the analog signal for 30 seconds. While the "Analog Output Test" progress bar is shown active on screen, verify that the connected equipment is receiving the desired signal.

Note: In Concentration mode, the maximum value for the channel (either 20mA or 10V) is emitted. In Pump Control mode, the configured Low Output level is emitted.

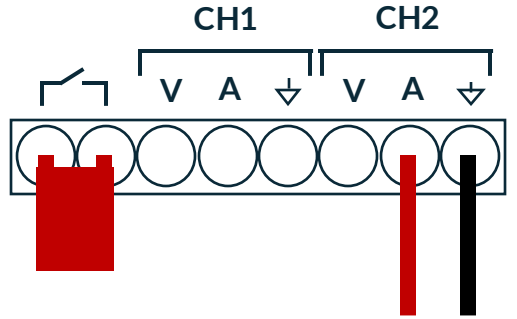


Example Pin Configurations

Configuration to use 1-10V voltage output via **Channel 1**



Configuration to use 4-20mA current output via **Channel 2**



Spectral Output Settings

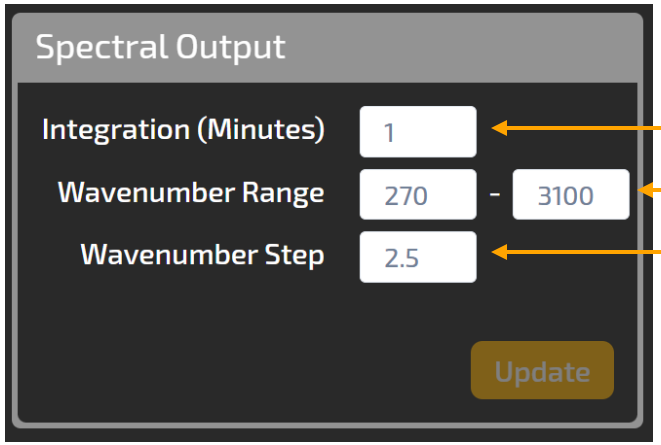
Spectral Output Settings

Spectral data can be accessed in two ways

- File export CSV or SPC format (see Page 27)
- Via OPC-UA protocol

Spectral output can be configured independently for each Measurement Module under ***Settings > Modules***

Changes to these settings can be made whenever the Module is idle and are applied both to newly collected data and subsequent exports of existing data

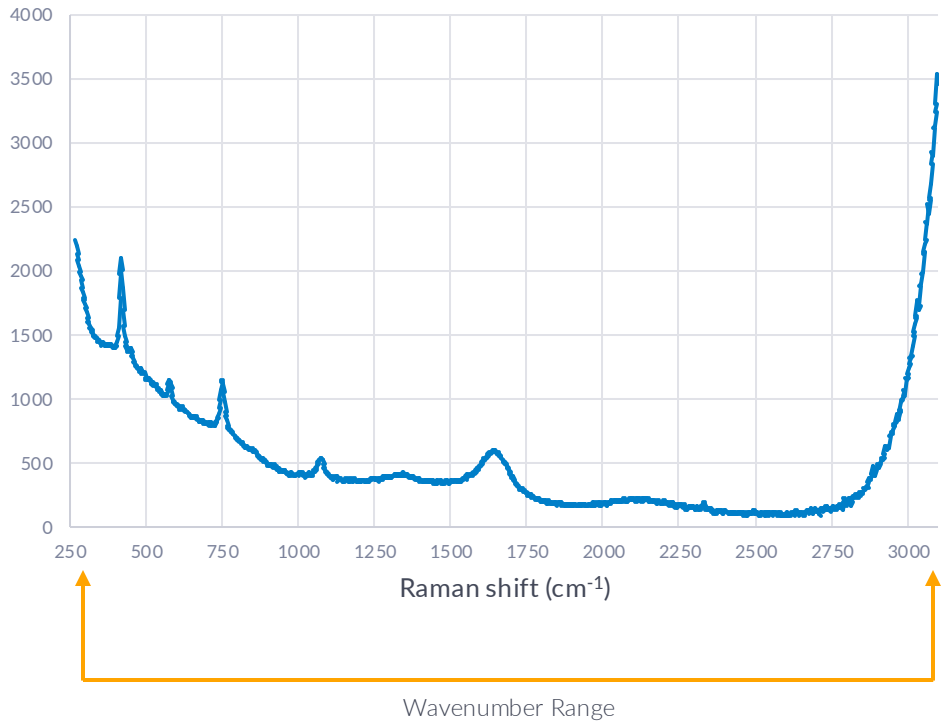


Data integration time for each reported spectrum (minimum 1; maximum 60)

Lower and upper bound of wavenumbers for reported spectra in cm^{-1} (minimum 270; maximum 3100)

Wavenumber spacing of reported spectra in cm^{-1} (minimum 1; maximum 10)

Example Spectrum



Note: These settings **do not** modify the behavior of the acquisition, processing or reporting time of the built-in De Novo model. Maverick uses *software* integration to provide spectral data at the designated Integration time/setting.

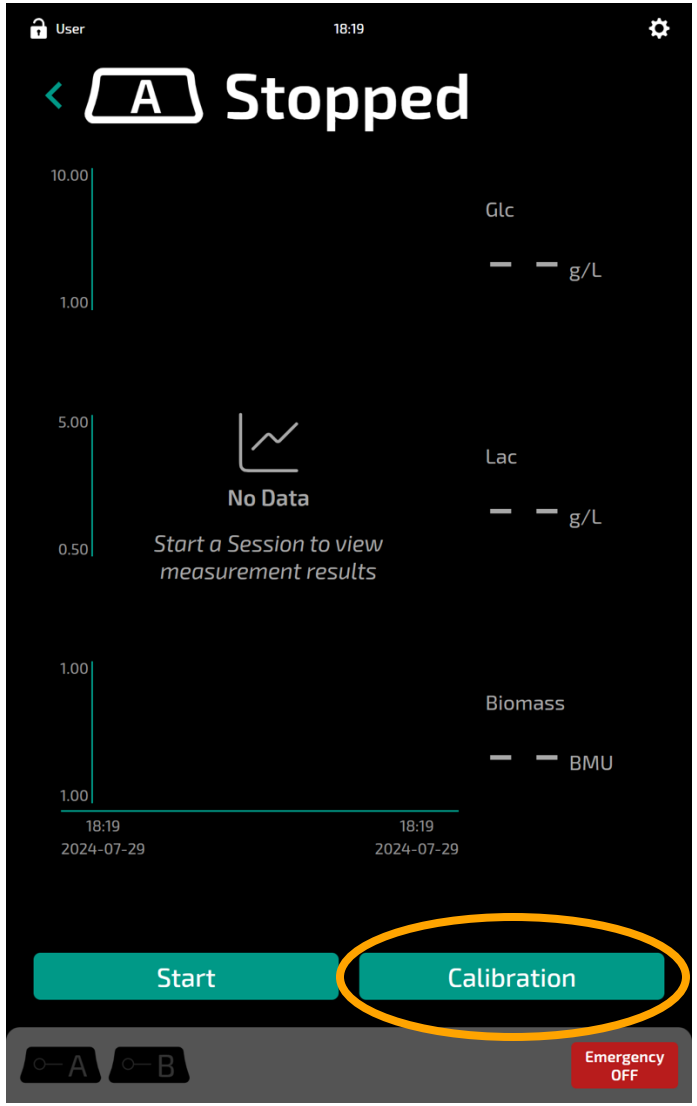
Software: Calibrating a Probe (1)

Calibration (1)

- Each combination of Measurement Module and Immersion Probe must be calibrated prior to performing inline bioprocess measurements.
- Calibration should be performed prior to each bioprocess batch measurement.
- The MAVERICK Standards Kit includes two liquid calibration standards, labeled “High” and “Low” for use during the calibration process.

Step 1: Navigate to the page for the module that you wish to calibrate. Attach the Immersion Probe that will be used with the module. Press the ***Calibration*** button.

(continued next page)



Software: Calibrating a Probe (2)

Calibration (2)

Step 2: Place the Low and High concentration calibration standard vials into the calibration stand. Insert the immersion probe into the Low standard vial, following the diagram shown on screen. After entering the eight-digit serial number of the vial, press the ***Start*** button. The screen will display a countdown timer showing progress.

Note: For calibration, the PG13.5 compression fitting on the probe must be positioned low enough to allow clearance with calibration stand.

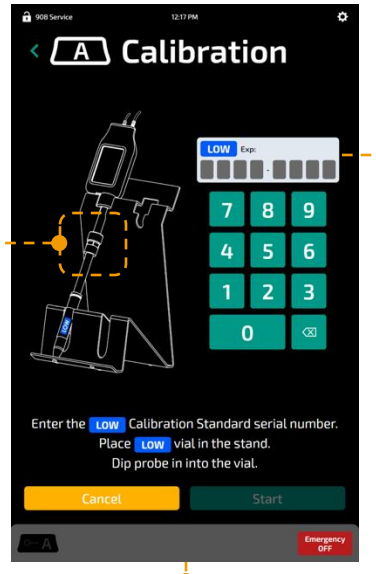
Warning: The module's laser will begin emitting when the ***Start*** button is pressed. Do not press ***Start*** prior to placing the probe in the calibration solution vial. Do not move the probe when the laser is powered as indicated by the "Power" LED on the front panel of the module.

Step 3: Once measurement of the Low standard is complete, follow the on-screen prompts to dry the probe with a lint-free wipe before transferring the probe to the High standard vial. After entering the eight-digit serial number of the vial, press ***Continue***.

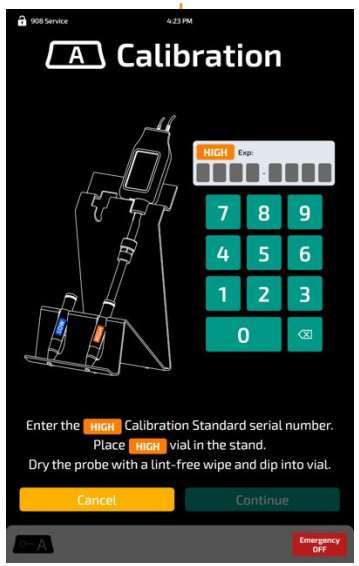
Warning: As with step 2, when ***Continue*** is pressed, the laser will begin firing. Follow all the precautions noted in the previous warning.

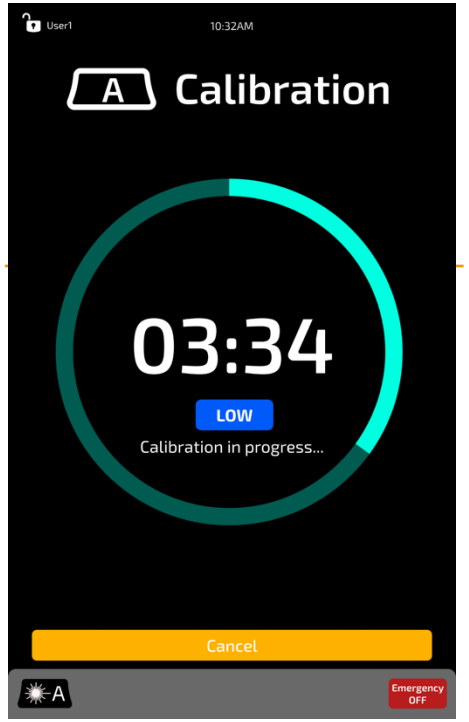
Step 4: When measurement of the High standard is complete, a calibration will be processed and results will be displayed on screen. Press ***Done*** to return to the module's status page.

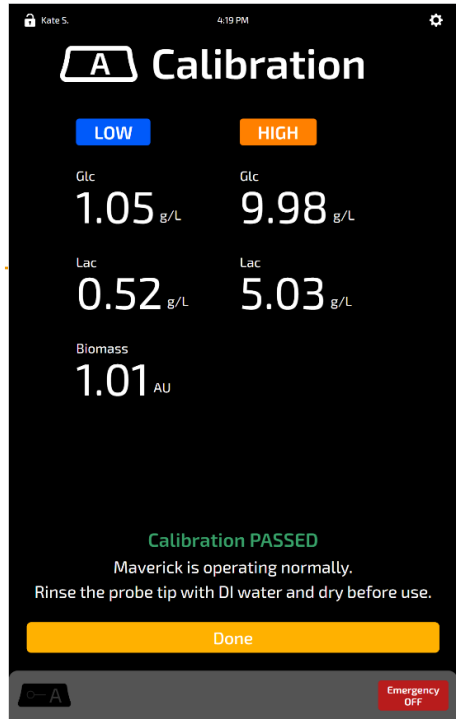
Calibration is complete.



Note: Location of serial numbers on calibration standard vials. Entering expired or incorrect codes will result in an error message.







Probe Cleaning & Sterilization

Cleaning & Sterilization

MAVERICK probes have been designed to withstand sterilization procedures by autoclaving (heat & steam treatment) at up to 121°C (250°F).

Note: MAVERICK probes contain small printed circuit boards and other components that will NOT withstand gamma irradiation.

- **For reusable benchtop reactor systems**: Assemble the bioreactor vessel according to the user's standard operating procedures. Install the Immersion Probe into a PG13.5 port of the reactor headplate or equivalent. Attach the autoclave safety cap to the probe. Autoclave the reactor vessel according to standard operating procedures.
- **For single use reactor systems**: Seal the immersion probe in an autoclave sterilization pouch. Autoclave according to standard operating procedures. Install the probe into the reactor system using sterile technique.

Lifetime

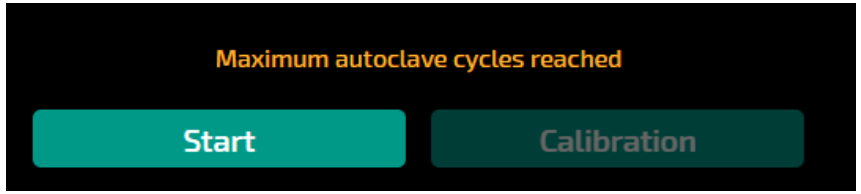
MAVERICK probes have been designed and tested to withstand 10 autoclave cycles. Afterwards, the probe is susceptible to seal failures, which can cause a breach in its working optics and put the sterility of your bioprocess at risk. The system keeps track of the number of autoclave cycles and will not permit calibration with a probe that has reached the maximum number of autoclave cycles.

The calibration & system suitability standards were designed to verify the analytical integrity of the MAVERICK probe for continued use.

Caution: the probe comes with a safety cap to help the optical components withstand autoclave conditions. The autoclave cap should not be completely disassembled, only loosened enough to attach to the probe during the sterilization process.

To remove the probe autoclave cap:

- Grasp the bottom (larger) nut in one hand.
- With the other hand loosen the top (smaller) nut but down not fully remove.
- Without twisting the probe cap, slide the cap on and off the probe.



Note: If the maximum number of autoclave cycles have been reached, the system will still allow you to start a Session but will use the last stored probe calibration data. This functionality should only be used in exceptional cases where a session was stopped inadvertently after the final autoclave cycle.

Monitoring a Bioprocess

Bioprocess Measurement

In-line measurement of a bioprocess is the primary function f the MAVERICK system. Follow these steps to begin measurement of a bioprocess batch.

Step 1: Ensure that the module and probe to be used have been calibrated following the instructions in this manual.

Step 2: Ensure that the probe has been sterilized as noted previously in this manual.

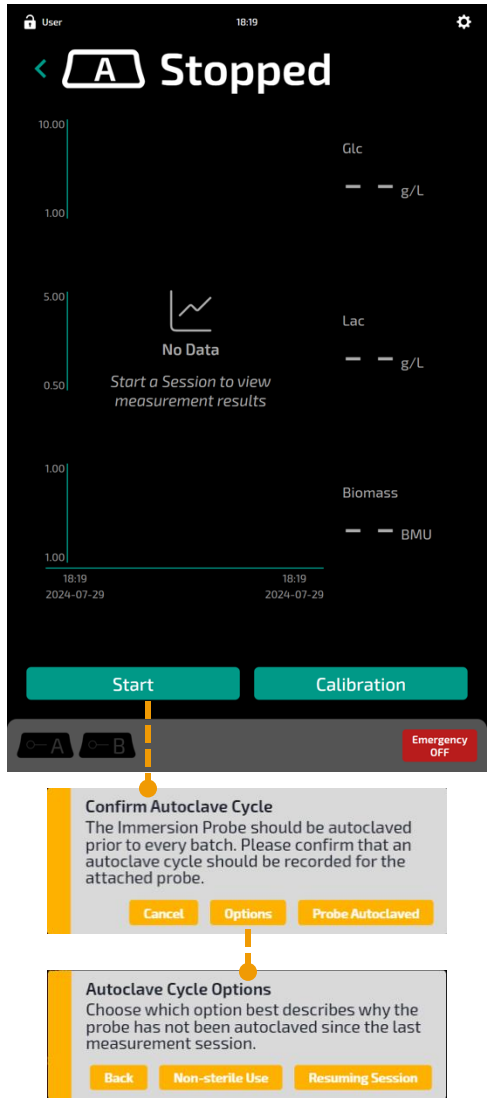
Step 3: Fill the reactor with media according to standard operating procedures.

Step 4: Connect the Probe to the Measurement Module's probe adapter. Navigate to the module's status page.

Step 5: Select ***Start*** to begin measurement.

Note: You will be prompted to confirm that the probe has been autoclaved for logging and SOP purposes. If it has not, other options will be presented.

Warning: The module's laser will begin emitting when the ***Start*** button is pressed. Ensure that all precautions described in the Safety section are followed and that the probe is installed as directed above before pressing ***Start***.



Measurement Sessions

Measurement Sessions

Sessions are groups of measurement modules that are associated.

1. They can be controlled as group with start/pause/stop actions
2. The data is managed as a group, so a single unified export includes data from all modules

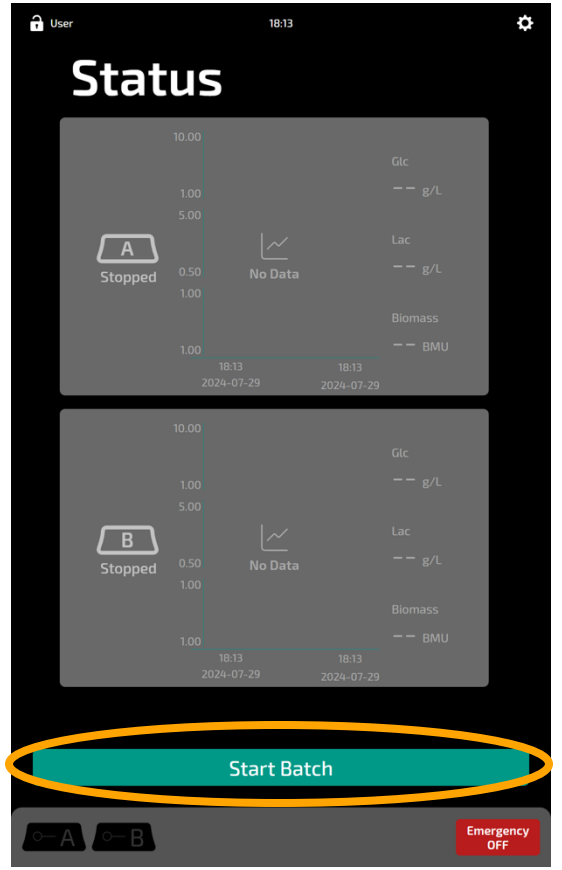
Starting a Session

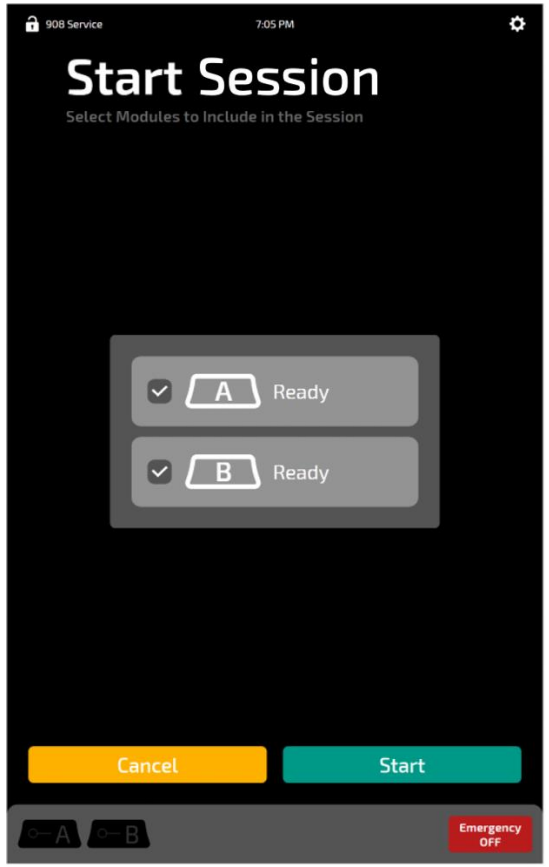
Step 1: Select ***Start Session*** on the Status screen

Step 2: Toggle on/off which measurement modules you would like to include in the measurement Session.

Step 3: Select ***Start*** to begin the measurement Session.

Note: Each measurement module/probe adapter must have been calibrated before starting the Session.





Pausing or Stopping a Measurement in Process

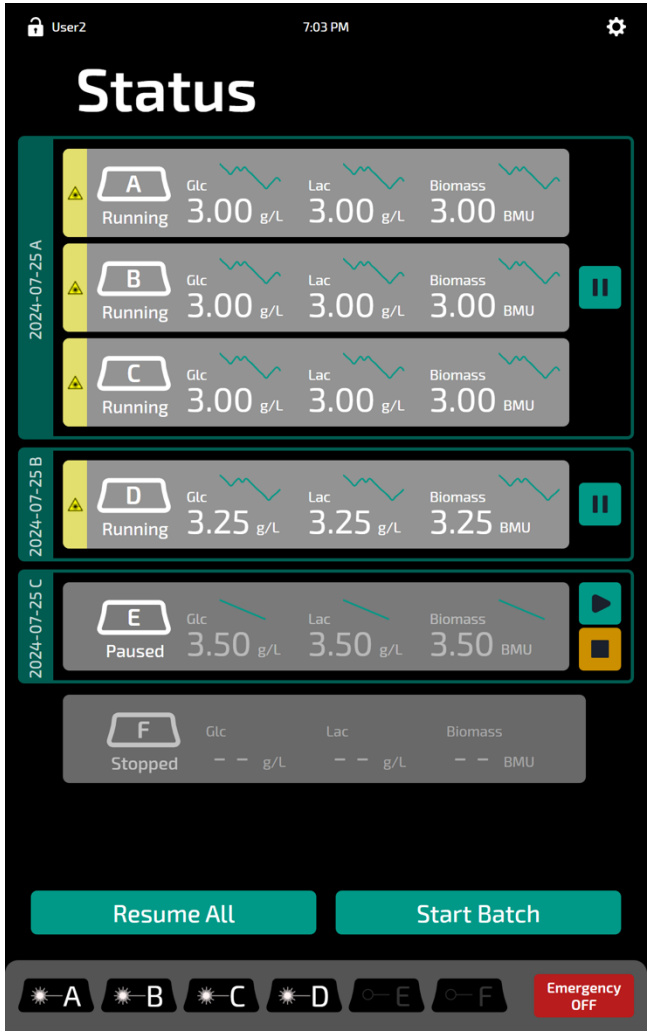
Pausing or Stopping Sessions

On the status screen, each Session has ***Pause***, ***Resume***, and ***Stop*** buttons available on the right of the screen.

Pause: While a Session is actively running (measuring), press this button to temporarily stop measurements.

Resume: If a Session has been paused (see above), it remains active, and pressing this button will cause data acquisition to continue seamlessly under the current session and data file.

Stop: ends the measurement session. Stopping a Session also terminates the data stream/file; it cannot be resumed without starting a new Session.



Overview of Status Screen

Status View

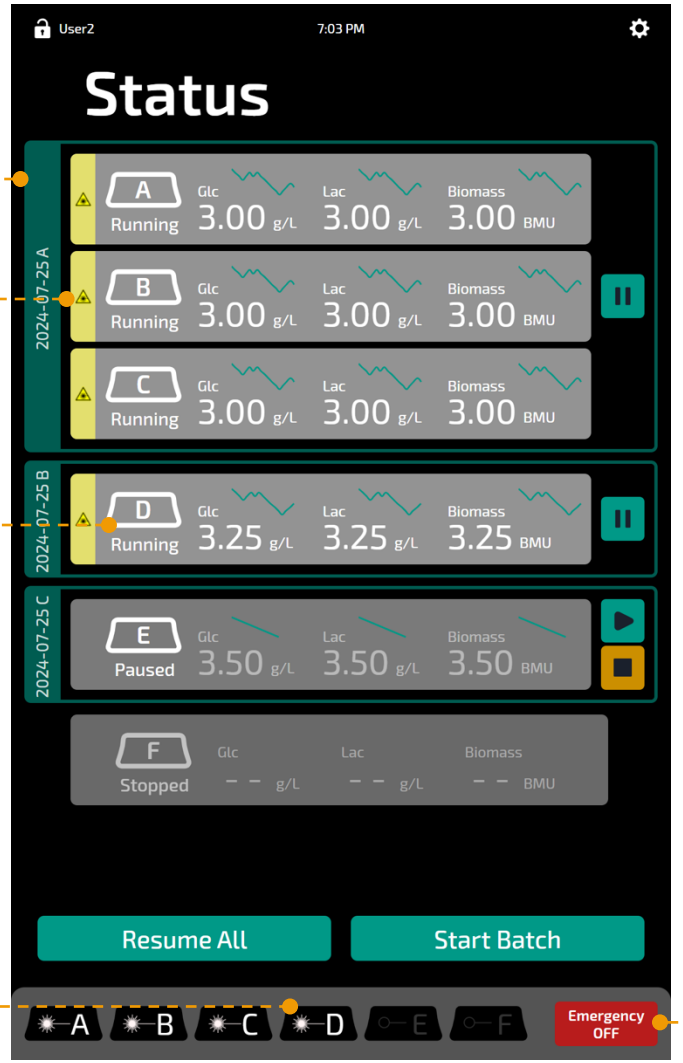
The status view shows the current state of all paired/connected modules, with their real-time reported analyte concentrations and attributes.

Paired measurement modules are labeled A–F per the Modules Settings screen. These are visually grouped by Session on the left.

Modules with active measurements will show a yellow triangle icon ( ) indicating that the laser is on.

Selecting Modules

You may view more detailed information about a given module by tapping on its panel on-screen or tapping its icon in the bottom tray.



Emergency Stop

An emergency stop button is located on the bottom-right part of the screen.

Pressing this button **immediately** stops all lasers for all modules.

Connecting Multiple Measurement Modules

Using Multiple Measurement Modules

Each Hub is capable of supporting communication and power with up to six Measurement Modules.

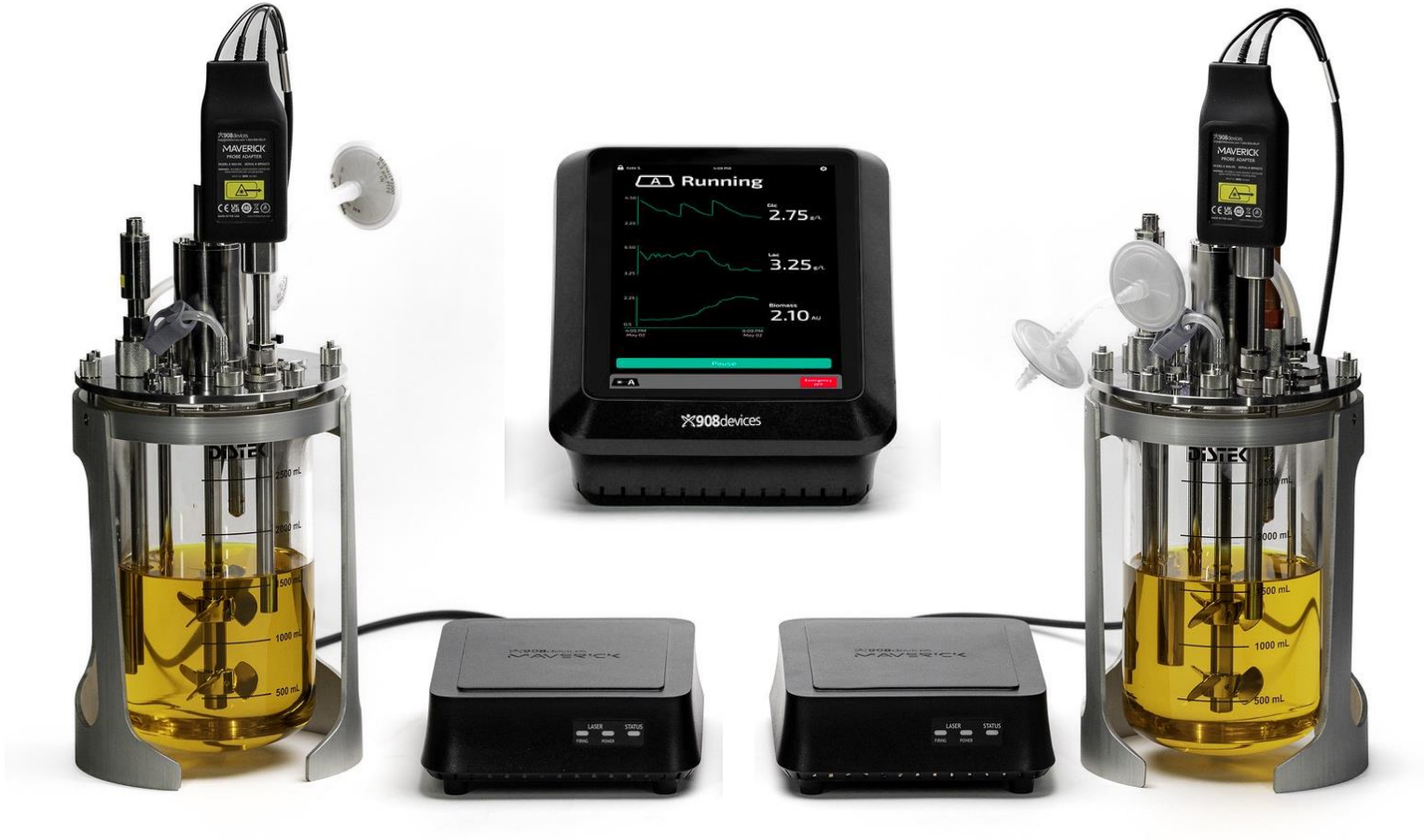
Step 1: Connect ethernet and power to each Measurement Module. Check that each is powered off.

Step 2: Connect each module's ethernet cable to an open ethernet port on the Hub.

Step 3: Activate power on the Hub, if not already. Power on each Measurement Module.

Step 4: On the Hub screen, go to ***Settings > Modules***. Verify that each Measurement Module appears under the list of connected Modules. If one or more modules has not been paired, follow the instructions on Page 11 to complete pairing.

The connected Measurement Modules are now available for use.



Status Lights

The indicator light marked “Status” changes color based on the current conditions of the device. See table to the right for details.

The two blinking indicator lights below “Laser” show the current conditions of the laser emitter.

- ***Power*** indicates that the laser is ready to fire but not currently emitting.
- ***Firing*** indicates that the laser is currently emitting.

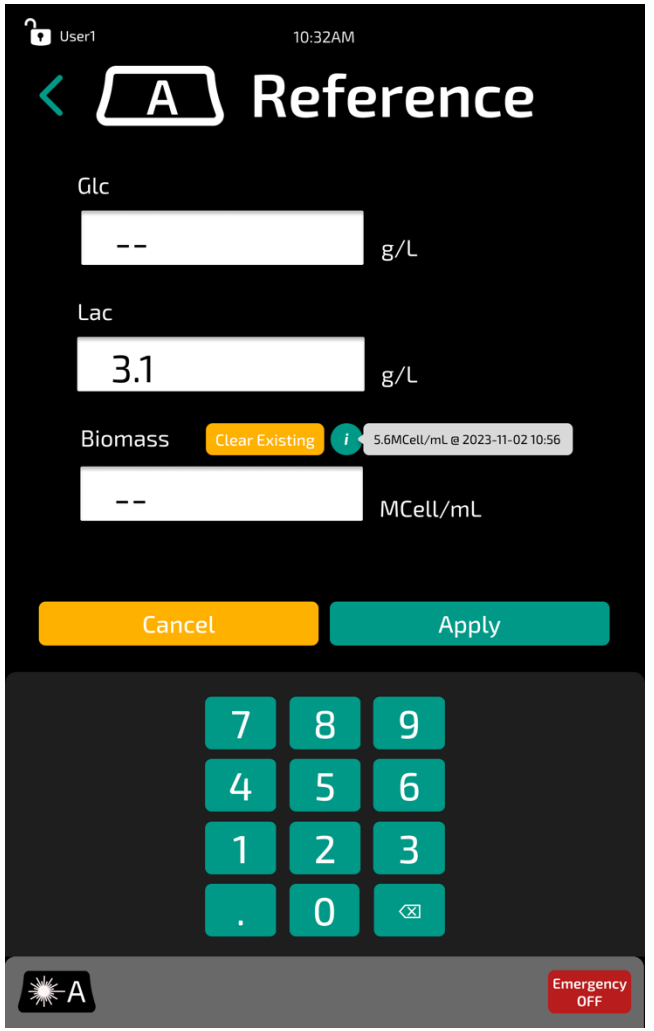
LED Indication	Status
~ Pulsing blue	Module is booting up
⌘ Flashing blue	Identification of module selected by user
● Solid red	Module software is starting
⌘ Flashing red	The module is in a non-operable state or has experienced an error
⌘ Flashing orange	The probe or probe adapter is disconnected
● Solid green	The module is idle and ready for calibration and/or measurement
⌘ Flashing green	Measurement in progress
~ Pulsing cyan	Module software update is in progress

Referencing to Offline Measurements

MAVERICK measurements can be Referenced to an at-line analyzer while in the process of a measurement Session. This can be useful to accommodate any systematic deviations that may be observed between the MAVERICK and a reference analyzer.

When a Session is actively running, press the ***Reference*** button to open the screen shown here. You can enter current offline readings for any or all of the analytes/attributes. Press ***Apply*** to correct for any differences between MAVERICK and the at-line analyzer. Previous reference inputs can be viewed using the information (***i***) button or erased with the ***Clear Existing*** button.

Previously applied reference measurements can be viewed in the Notes column of the exported results and in the History screen of the remote web interface (see Page 2).



Recommendations

- Once the bioprocess has begun, or after any major change in process parameters, wait at least one hour to allow the process to stabilize before performing a reference measurement.
- It is important for reference values to be entered in a timely manner (as soon as possible after sampling, ideally not exceeding 30 minutes). Using out-of-date reference values will cause discrepancies between MAVERICK and the at-line analyzer as the bioprocess continues.
- For best results, perform reference measurements before feeding. When referencing after a feeding, wait at least 30 minutes after feeding to allow the process to restabilize.
- Biomass can only be referenced after inoculation, when the cell density is greater than zero. The software will not allow entering zero MCell/mL for biomass.
- After inoculation, it is recommended to reference biomass to an at-line system following your normal workflows.
- For biomass, be sure to convert any at-line reference values to millions of cells per milliliter (i.e., x10^6 cells/mL, or Mcell/mL as noted on screen) if needed to align at-line measurements with MAVERICK measurements.

Network Configuration & Data Storage

Network Settings

MAVERICK can be configured to use a *static* or *dynamically* assigned (DHCP) IP address from an external network. Certain network configuration options are only available in one mode or the other. After making the desired changes to the Network settings, be sure to press the ***Apply*** button to save the corresponding changes before leaving the screen.

Discuss the configuration best for your circumstances with your network administrator or IT department.

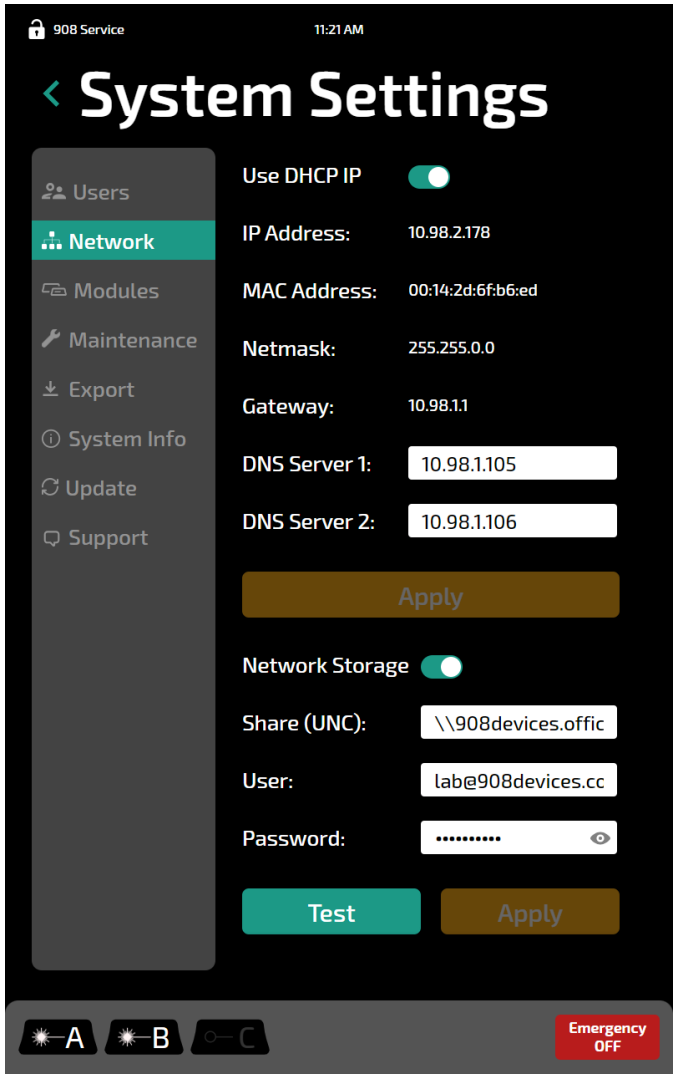
Network Storage

MAVERICK can be configured to export data to a network storage location using the SMB protocol. To enable network export:

1. Turn on the ***Network Storage***" switch.
2. enter the UNC path to the network share, your username, and password.
3. Press ***Test*** to verify the settings you have entered.
4. Press ***Apply*** to save the settings.

If Network Storage is not selected, data is stored internally to the MAVERICK and can be exported via USB. USB drives formatted as FAT or exFAT are supported for data export.

Note: MAVERICK should not be used as a secure long term data storage system. The storage space is limited and data loss may occur in cases of catastrophic system failure. Network Storage Mode is highly recommended, and necessary for 21 CFR Part 11 compliance.



Analytical Output Formats & Exports

Analyte Concentrations

MAVERICK can export analyte concentrations in two file formats: CSV and XLSX (Excel). Sample formatting shown to the right.

	A	B	C	D	E	F	G
1	Session 2024-08-09 B	B (BR3) - MM00141					
2		Glc (g/L)	Lac (g/L)	Biomass (BMU)	Analog Output 1 (%)	Analog Output 2 (%)	Notes
3	2024-08-09 21:45:43						Started
4	2024-08-09 21:46:49						
5	2024-08-09 21:47:55	0.9535901	0.47895208	1.93296147	10%		
6	2024-08-09 21:49:01	0.95891828	0.47191	3.43771771	10%		
7	2024-08-09 21:50:07	0.9982938	0.47796015	2.20604649	10%		
8	2024-08-09 21:51:13	1.02511493	0.48354581	2.18614767	10%		
9	2024-08-09 21:52:19	1.0501504	0.49857818	2.16344242	11%		

Spectra

MAVERICK's raw spectral data can be optionally exported as in several formats.

- CSV (comma-separated value): Broadly supported human readable format. Can be viewed in spreadsheet tools such as Microsoft Excel®, or imported into modeling software
- SPC: An industry standard format for spectral data. Can be imported into analytical data analysis software such as Sartorius SIMCA®.
- MSP: Maverick's internal data format which contains raw detector data. **This option should be used for submitting data to 908 Devices service for support.** This format is based on the open-source HDF5 file format and documentation, including sample Python and MATLAB scripts, can be found on our Customer Support Portal (908devices.com/support).

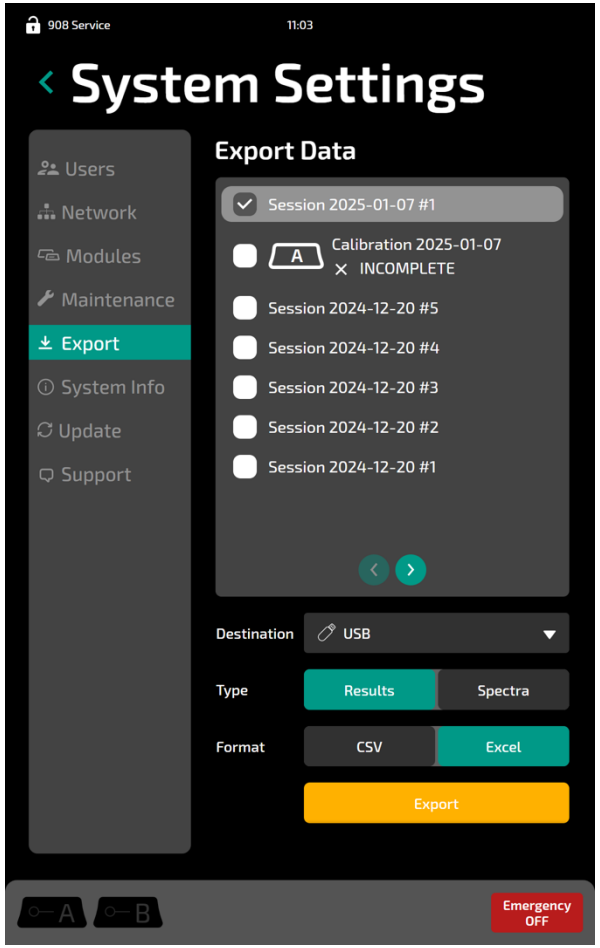
Calibration Reports

MAVERICK's calibration reports contain a summary of the calibration results with standards lot number and expiration information in an easy-to-read format.

Log Files

MAVERICK creates two types of log files during operation:

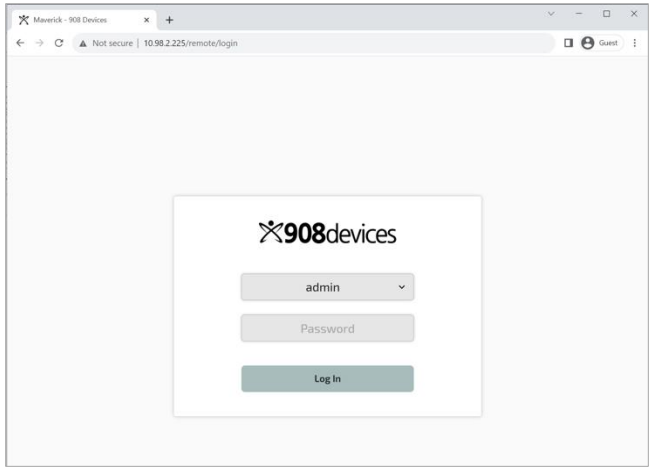
- **Audit Logs**: these are human readable files recording relevant MAVERICK system/user actions for 21 CFR Part 11 audit purposes.
- **System Logs**: these are system logs that may be useful for Technical Support staff during installation, or troubleshooting.



Remote (Web) User Interface

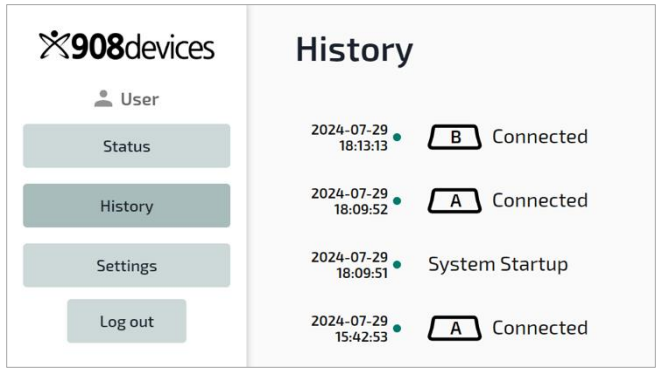
The remote interface can be accessed from most web browsers,* allowing users to conveniently manage multiple bioreactors.

1. Navigate to ***Settings*** > ***System Info*** in the MAVERICK Hub.
2. Note the IP address of the system.
3. Open a web browser. In the address bar, type http:// followed by the IP address from the above step.
4. Login with same user account information as on the Hub.

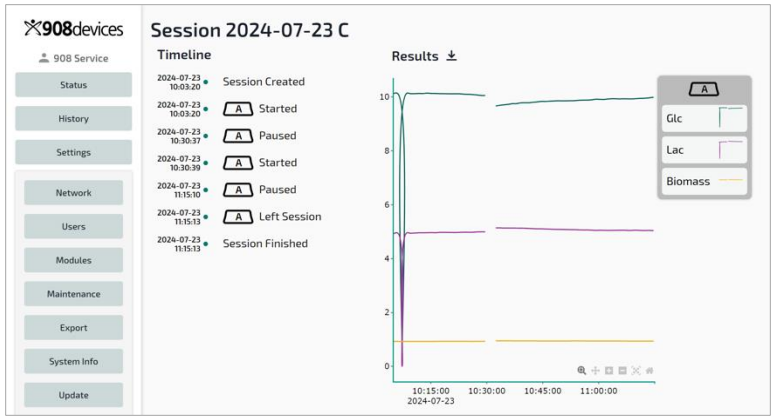


* Supported browsers:
Desktop: Google Chrome, Microsoft Edge (v109 or later)
Mobile: Safari, Chrome

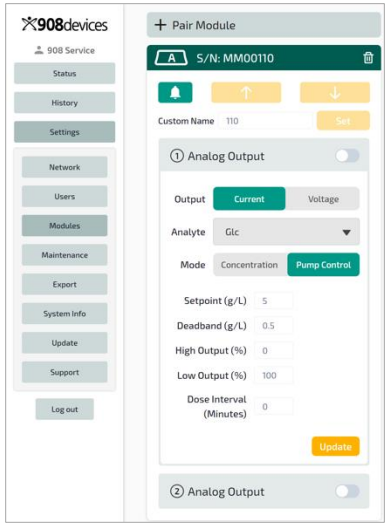
- The main screen displays status of connected modules. Click on any module to view its current results.
- ***History*** displays log of actions and measurements.



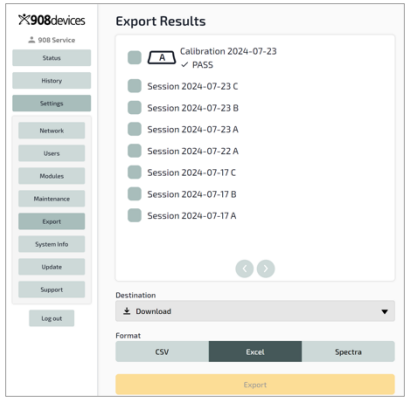
- Click on a specific Session to view its results and details.
- The download icon (⭳) saves a *.csv file of results from the batch.



Settings provides access to the same options that are available from the Hub.



Export allows the user to download results to PC in several formats.



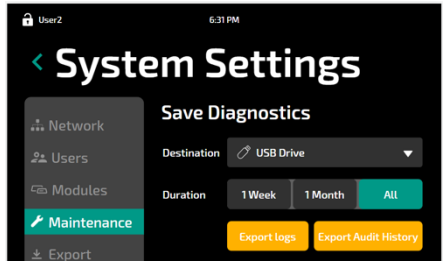
System Settings

Maintenance

Below are highlights of several important system settings within the Maintenance menu.

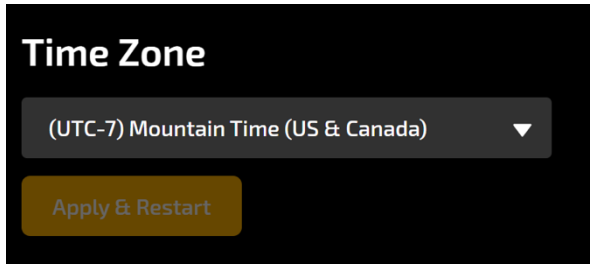
System Diagnostics

Export system information as requested by 908 Devices technical support.



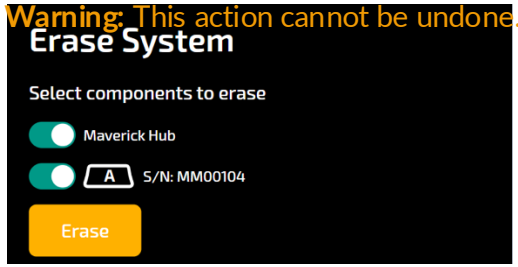
Time Zone

Choose your time zone from the dropdown list. Restart is required for the setting to take effect.



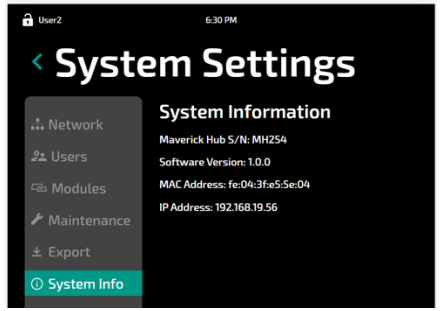
Erase System

Deletes all user data, calibrations, and history from selected Hub and Measurement Modules. Measurements must be stopped before proceeding.



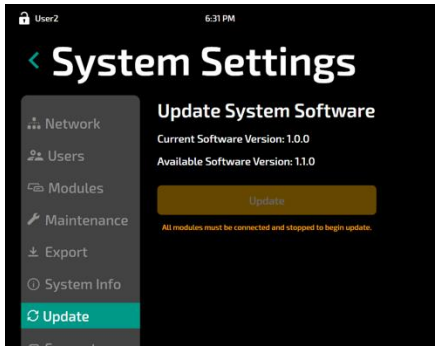
System Information

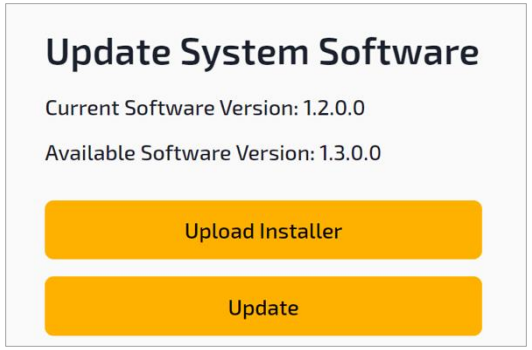
Serial number, software version, and other information are available.



Updates

Download the latest system software from the 908 Devices Customer Support Portal (www.908devices.com/support) and then follow the steps below to install by USB or through the remote (web) interface.





USB

1. Save the update file (*.908d) to the USB drive.
2. Insert the USB drive into the USB port on the back of the Hub.
3. Navigate to the ***System Settings > Update*** and click the yellow ***Update*** button.

Remote UI

1. Note the IP address of your networked MAVERICK Hub (Navigate to ***Settings*** > ***System Info*** in the MAVERICK Hub.)
2. Open a web browser. Type http:// and IP address from the above step. Log in using Hub ID/password.
3. Navigate to ***Settings > Update***. Click ***Upload Installer*** and located the update file (*.908d) downloaded from the Customer Support Portal.
4. Click ***Update.***

General Notes

- Once the Hub has updated to the new software version, the paired modules will automatically be updated.
- In both the Hub and remote interfaces, Modules can be manually updated by navigating to ***System Settings > Modules***, selecting an individual module from the list, and pressing the yellow ***Update*** button.
- While updating, the Module status LED will flash cyan.

Support

We're Here to Help!

Join us any time on our customer support portal: www.908devices.com/support

- Helpful tutorials
- Software updates
- Spreadsheet import macro

Stay connected!

- For service and assistance: help@908devices.com
- For consumable and service plan information & purchases: maverick@908devices.com
- Check out our blog and social media for the latest tips and more: www.908devices.com/blog

908devices.com/support

Compliance

MAVERICK Hub

United States of America
Federal Communication Commission
This equipment has been tested and found to comply with Part 18 of the FCC Rules.
Safety
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”

European Union
Electromagnetic Compatibility
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”.
Safety
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”

Japan
Electromagnetic Compatibility
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”
Safety
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”

Republic of Korea
Electromagnetic Compatibility
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”
Safety
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”

MAVERICK Measurement Module

United States of America
Federal Communication Commission
This equipment has been tested and found to comply with Part 18 of the FCC Rules.
Safety
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”
Federal Drug Administration
This device contains a Class 3B Laser that has been tested and found to comply with CFR Title 21, Chapter I, Subchapter J, Part 1040.10

European Union
Electromagnetic Compatibility
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”.
Safety
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 3B Laser that has been test and found to comply with standard EN 60825-1 2014 “Safety of laser products - Part 1: Equipment classification and requirements”

Japan
Electromagnetic Compatibility
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”
Safety
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 3B Laser that has been test and found to comply with Japanese standard JIS C 6802:2014 “Safety of laser products - Part 1: Equipment classification and requirements”

Republic of Korea
Electromagnetic Compatibility
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”
Safety
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 3B Laser that has been tested and found to comply with Korean standard KS C IEC 60825-1:2013 “Safety of laser products - Part 1: Equipment classification and requirements”

Your MAVERICK relies a range of patented or patent-pending technologies - www.908devices.com/patents/

WARRANTY. Seller warrants that the Products will operate or perform substantially in conformance with Seller's published specifications and be free from defects in material and workmanship, when subjected to normal, proper and intended usage by properly trained personnel, for the period of time set forth in the Seller's quote, for Products, or if none indicated then as specified in Seller's product documentation, published specifications or package inserts. If a period of time is not specified in Seller's quote, product documentation, published specifications or package inserts, the warranty period shall be one (1) year from the date of shipment to Buyer for equipment. Seller agrees during the Warranty Period, to repair or replace, at Seller's option, defective Products so as to cause the same to operate in substantial conformance with said published specifications; provided that Buyer shall (a) promptly notify Seller in writing upon the discovery of any defect, which notice shall include the product model and serial number (if applicable) and details of the warranty claim; and (b) after Seller's review, Seller will provide Buyer with service data and/or Return Material Authorization ("RMA"), which may include hazard decontamination procedures and other product-specific handling instruction, then, if applicable, Buyer may return the defective Products to Seller with all costs prepaid by Buyer. Replacement parts may be new or refurbished, at the election of Seller. All replaced parts shall become the property of Seller. Shipment to Buyer of repaired or replacement Products shall be made in accordance with the Delivery provisions of the Seller's Terms and Conditions of Sale. Consumables are expressly excluded from this warranty.

Notwithstanding the foregoing, Products supplied by Seller that are obtained by Seller from an original manufacturer or third party supplier are not warranted by Seller, but Seller agrees to assign to Buyer any warranty right in such Product that Seller may have from the original manufacturer or third party supplier, to the extent such assignment is allowed by such original manufacturer or third-party supplier.

In no event shall Seller have any obligation to make repairs, replacements, or corrections required, in whole or in part, as the result of (i) normal wear and tear, (ii) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by Buyer, (iv) use of the Products in a manner for which they were not designed, (v) causes external to the Products such as, but not limited to, power failure or electrical power surges, (vi) improper storage and handling of the Products or (vii) use of the Products in combination with equipment or software not supplied by Seller. If Seller determines that Products for which Buyer has requested warranty services are not covered by the warranty hereunder, Buyer shall pay or reimburse Seller for all costs of investigating and responding to such request at Seller's then prevailing time and materials rates. If Seller provides repair services or replacement parts that are not covered by this warranty, Buyer shall pay Seller therefor at Seller's then prevailing time and materials rates.

ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN SELLER WITH SELLER'S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACE- MENT PARTS NOT SUPPLIED BY SELLER, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS. THE OBLIGATIONS CREATED BY THIS WARRANTY STATEMENT TO REPAIR OR REPLACE A DEFECTIVE PRODUCT SHALL BE THE SOLE REMEDY OF BUYER IN THE EVENT OF A DEFECTIVE PROD- UCT. EXCEPT AS EXPRESSLY PROVIDED IN THE WARRANTY STATEMENT, SELLER DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, WITH RESPECT TO THE PRODUCTS, INCLUDING WITHOUT LIMITATION ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

All components shall be disposed of properly, as required by local authorities and jurisdictions.

MAVERICK HUB Power Supply
Supplier: CUI
P/N: SDI300G-56-U-P219
Input of AC adapter: 100-240VAC, 50-60 Hz, 300W
Output AC adapter: 56V dc, 5.4A
Connector Type: 4-pin-circular

MAVERICK MEASUREMENT MODULE Supply
Input: 56V, 40W
Connector type: Power over Ethernet from Hub

908 Devices, Inc.
645 Summer Street
Boston, MA
02210

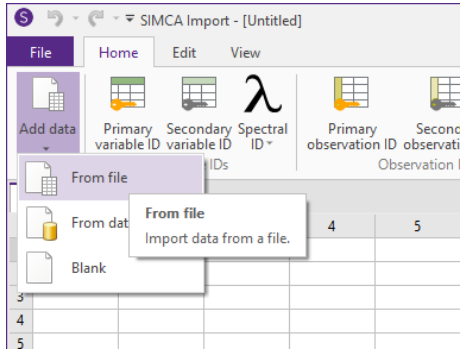
Made in the USA

Appendix: Importing Spectral Data into SIMCA® : SPC (1)

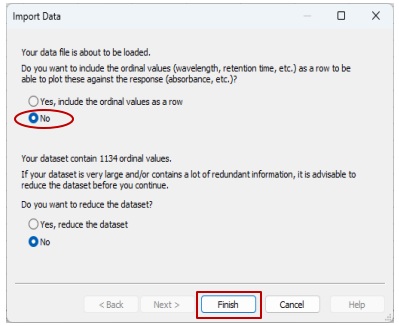
Introduction

Spectral data can be exported from MAVERICK as an SPC file. This data can be imported into Sartorius SIMCA® for advanced analysis and modeling. Follow these steps to begin.

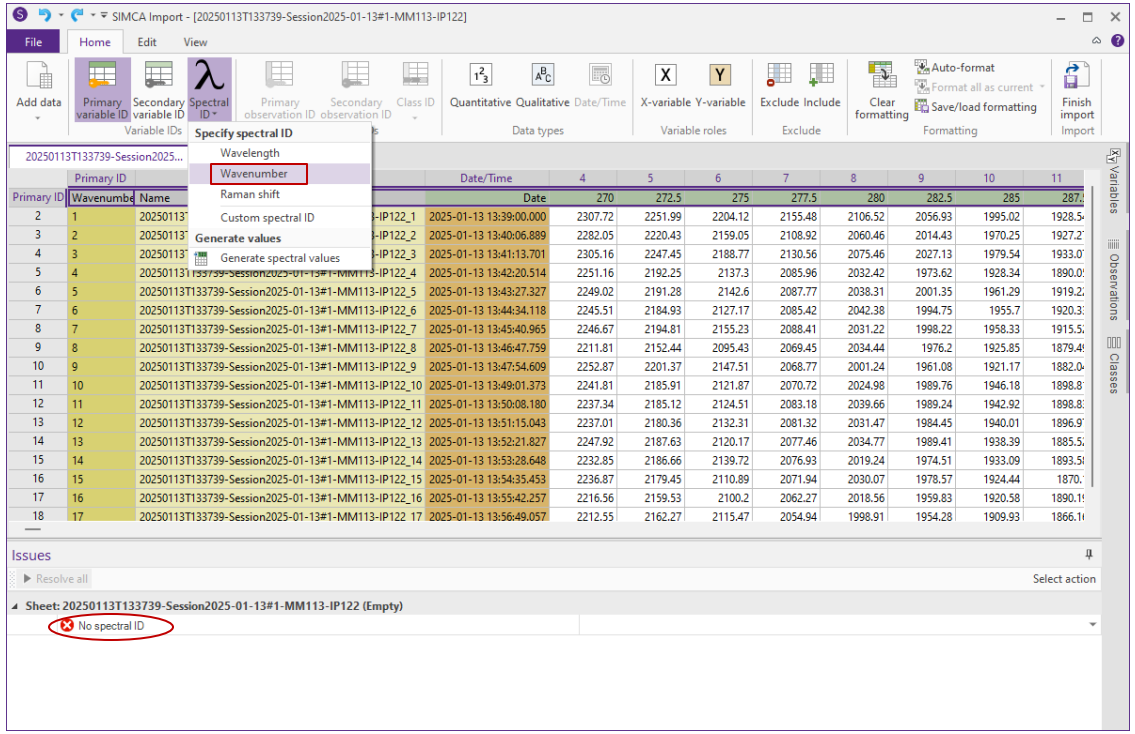
1. Open SIMCA and create a new *Spectroscopy project*
2. You will be prompted to select data to open. If not, select *Add data -> from file* and select an SPC file.



3. Once you have selected your SPC file, an Import Data dialog box will pop up. Select "No" to the first question (shown below)
4. Click Finish



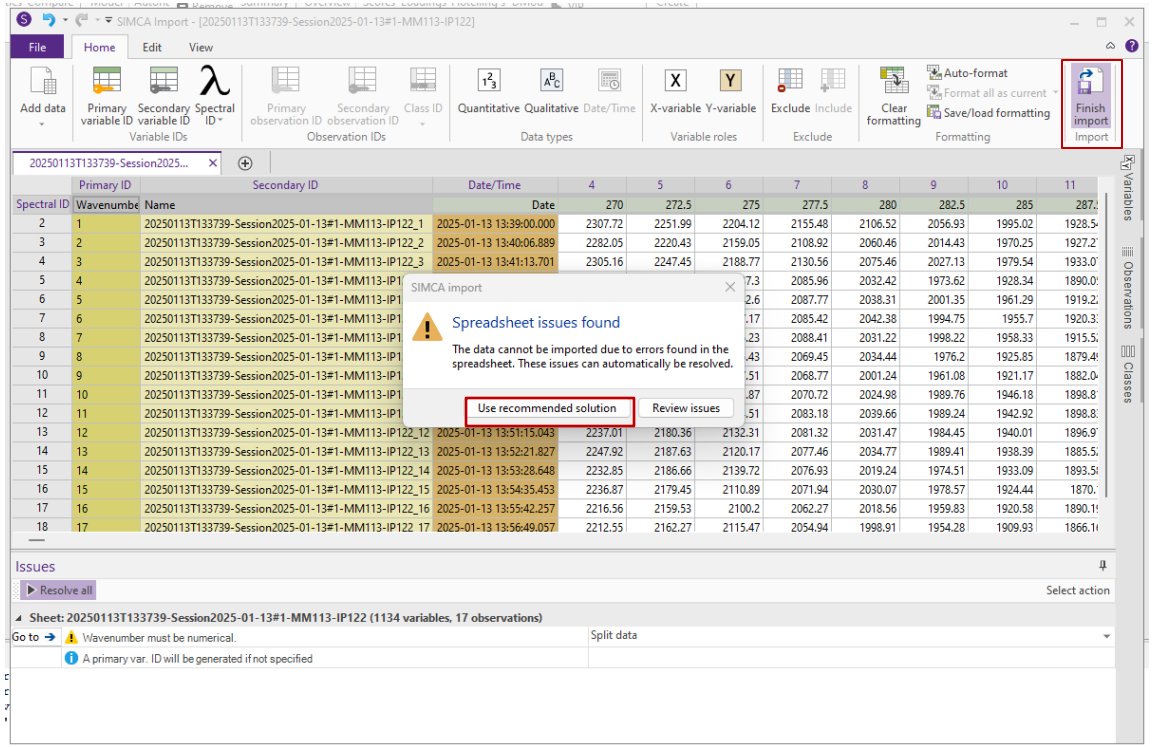
5. The imported data will have the error "No spectral ID". To resolve this, select the first row of the table and from the *Spectral ID* dropdown select *Wavenumber*. Once you have done this the red error indicator will have changed to a yellow warning symbol.



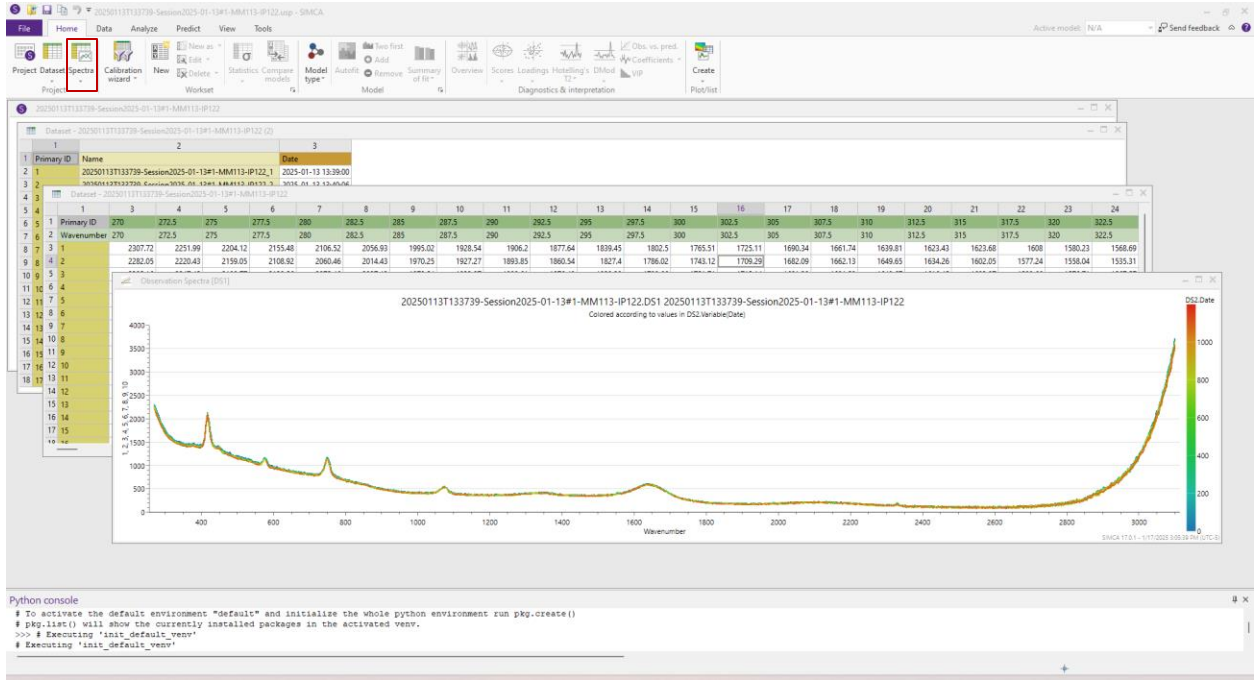
Appendix: Importing Spectral Data into SIMCA® : SPC (2)

6. Click "Finish import" and when the "Spreadsheet issues found" dialog box appears select "Use recommended solution"

7. Save the SIMCA project file (.usp)



8. You can view the spectra by clicking on the “Spectra” button on the ribbon.

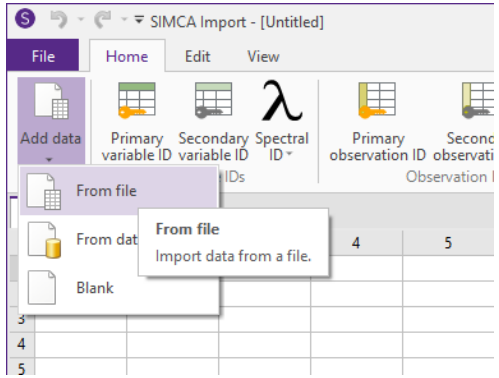


Appendix: Importing Spectral Data into SIMCA® : CSV (1)

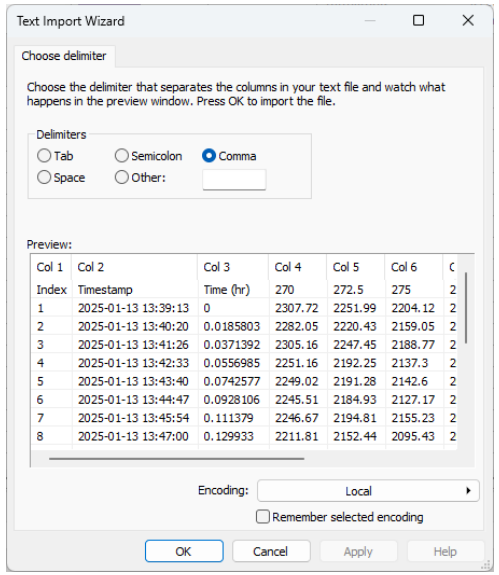
Introduction

Spectral data can be exported from MAVERICK as an CSV file. This data can be imported into Sartorius SIMCA® for advanced analysis and modeling. Follow these steps to begin.

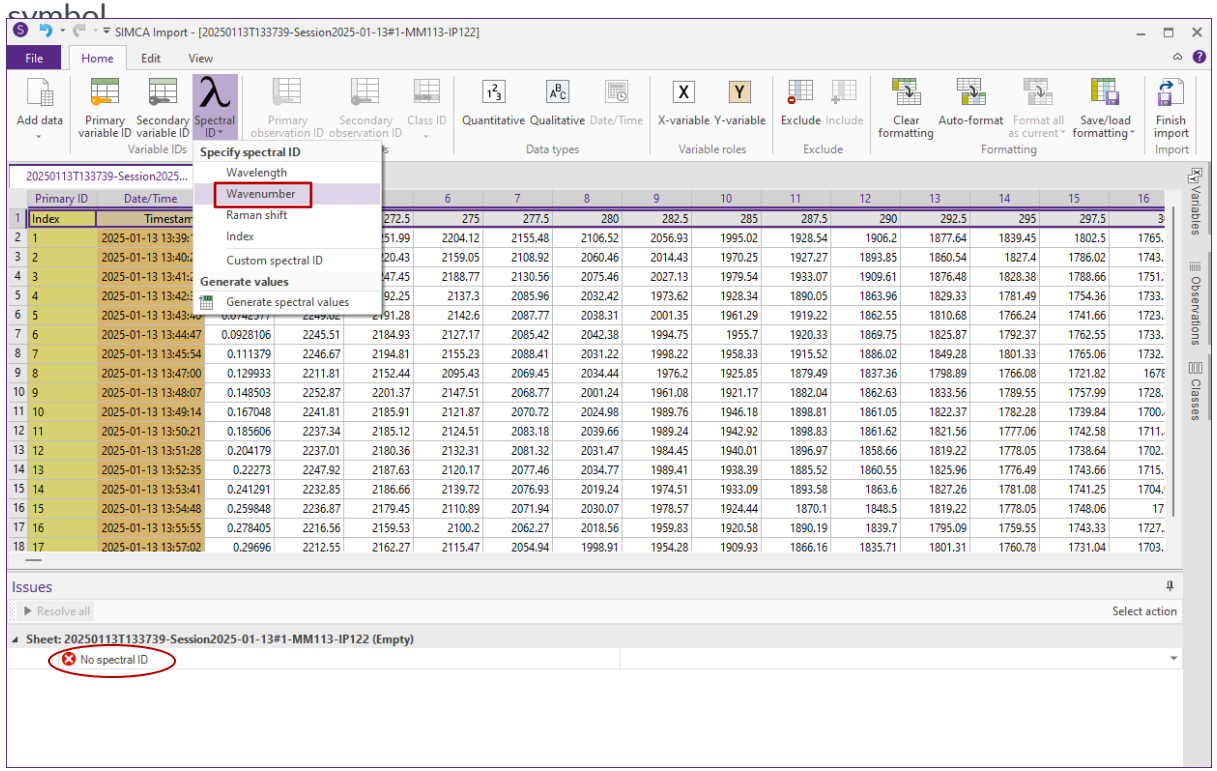
1. Open SIMCA and create a new *Spectroscopy project*
2. You will be prompted to select data to open. If not, select *Add data* -> *from file* and select an CSV file.



3. Once you have selected your CSV file, the Text Import Wizard will appear. Select OK



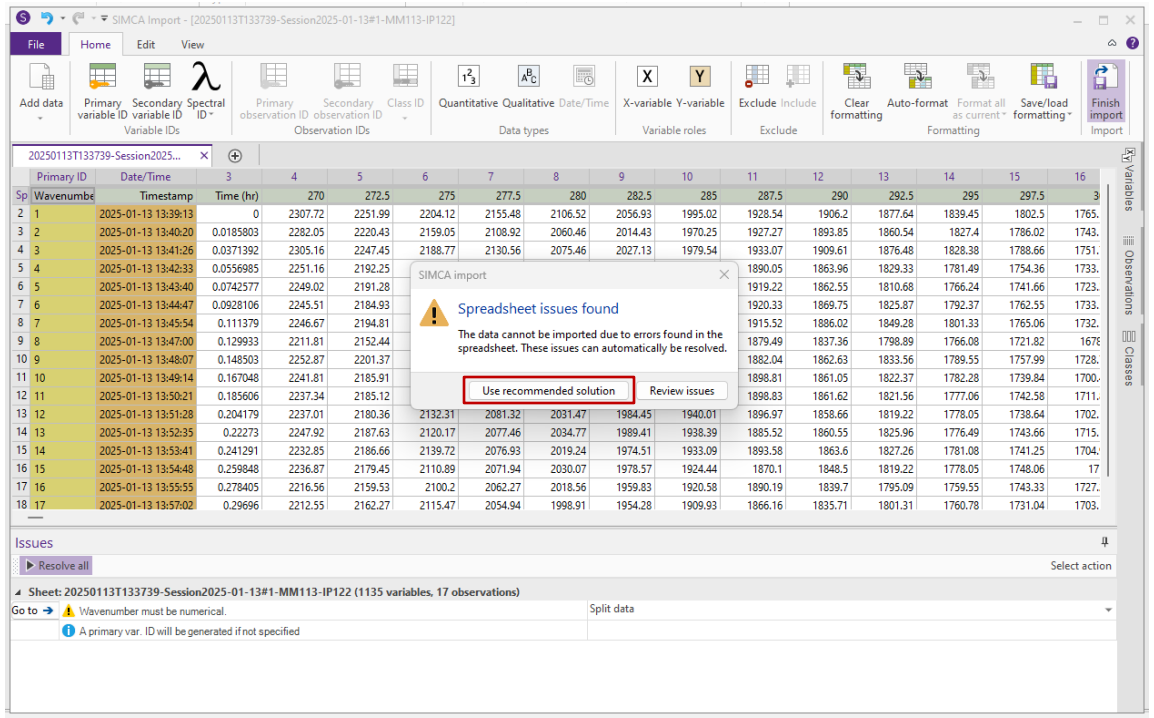
4. The imported data will have the error "No spectral ID". To resolve this, select the first row of the table and from the *Spectral ID* dropdown select *Wavenumber*. Once you have done this the red error indicator will have changed to a yellow warning symbol



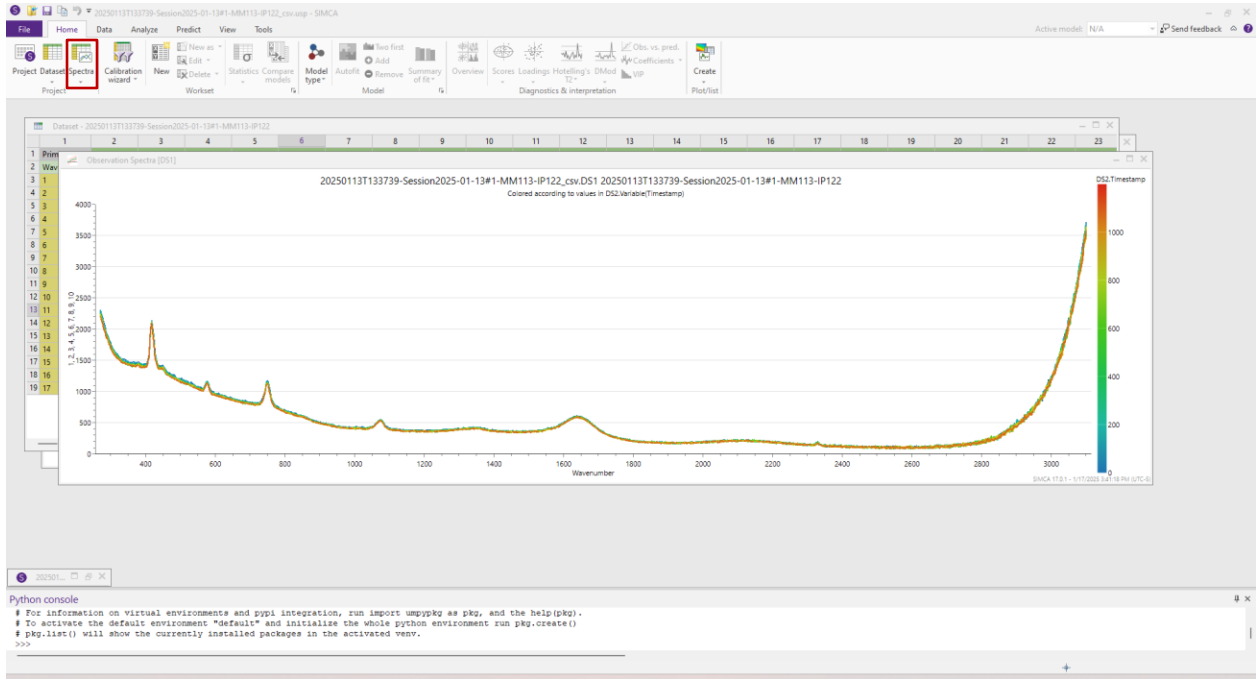
Appendix: Importing Spectral Data into SIMCA® : CSV (2)

5. Click "Finish import" and when the "Spreadsheet issues found" dialog box appears select "Use recommended solution"

6. Save the SIMCA project file (.usp)



7. You can view the spectra by clicking on the “Spectra” button on the ribbon.

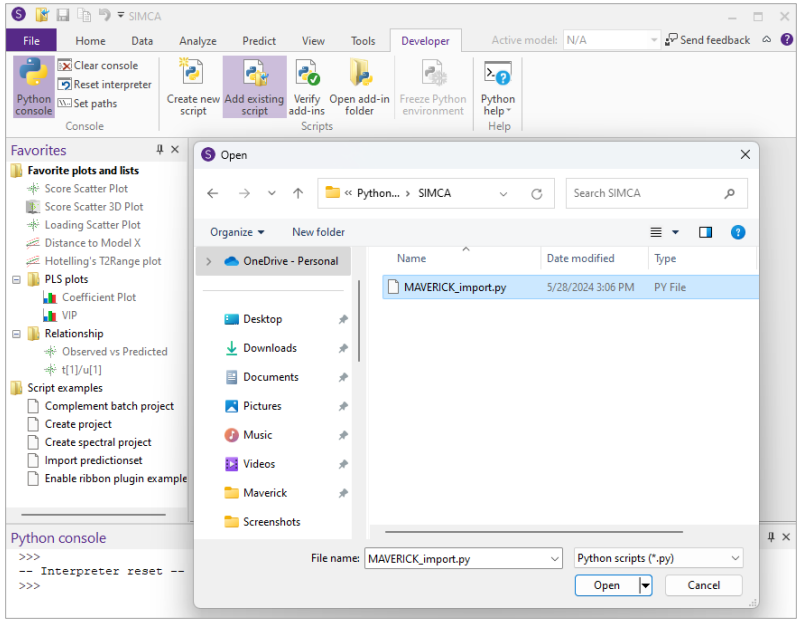


Appendix: Importing Spectral Data into SIMCA® MSP (1)

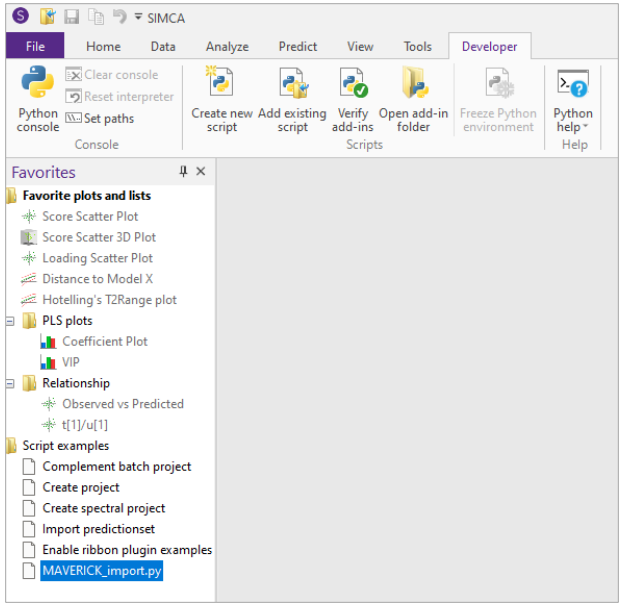
Introduction

Unprocessed spectral data (MSP format) from MAVERICK can be imported into Sartorius SIMCA® for advanced analysis and modeling. Follow these steps to begin.

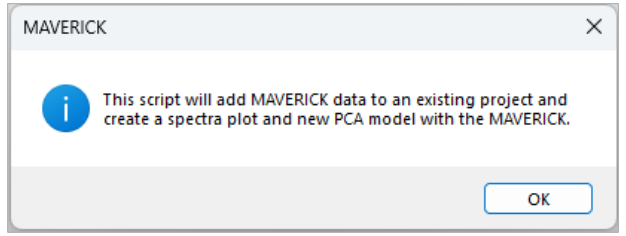
1. Open SIMCA and select the “Developer” tab.
2. Click the “Add Existing Script” button.
3. Locate the “MAVERICK_import.py” file and click “Open.”



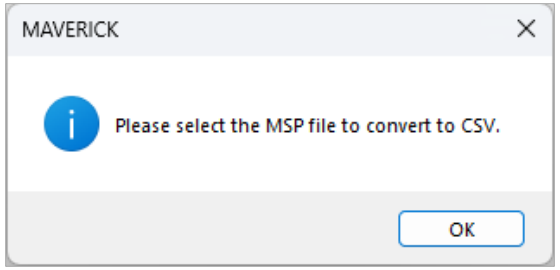
4. The Python code should appear in the “Favorites” sidebar (most likely under the “Script examples” folder).



5. Click on “MAVERICK_import.py” in the Favorites sidebar and this explanatory popup should appear. Click “OK.”

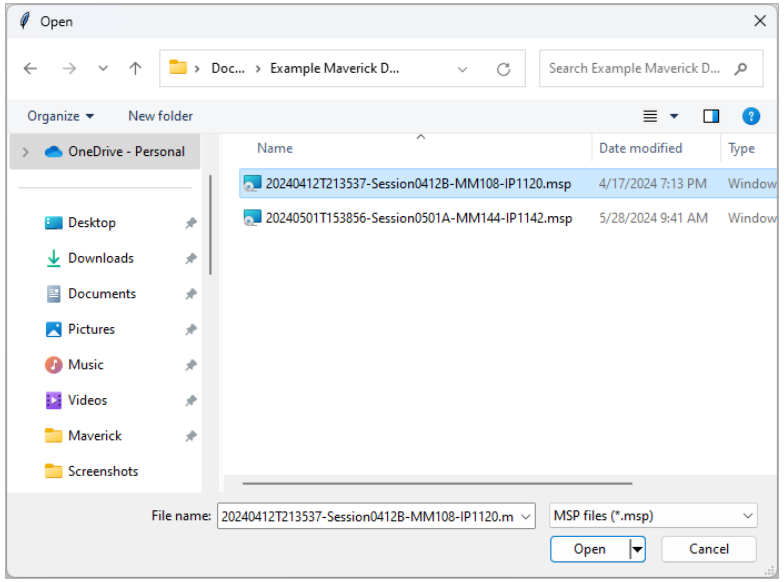


6. A popup will appear, explaining that in the next step, you will select the MAVERICK data (*.msp) file to be converted to a CSV file for opening in SIMCA. Click “OK.”

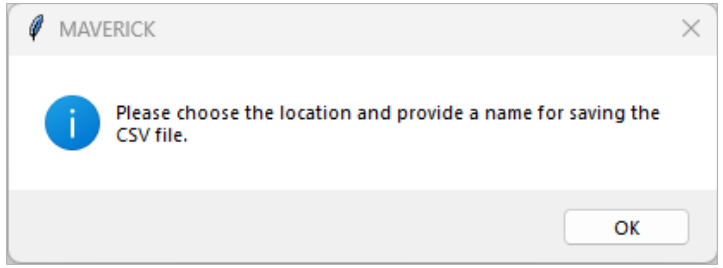


Appendix: Importing Spectral Data into SIMCA® MSP (2)

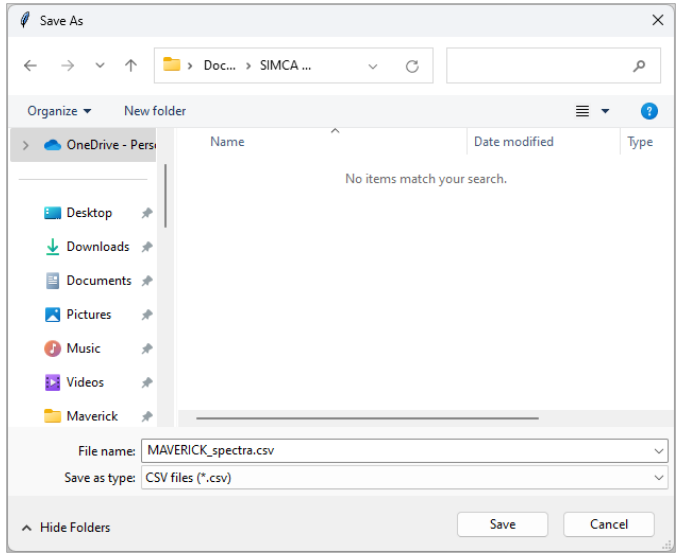
7. Select the desired MAVERICK spectral data (*.msp) file. Click “Open.”



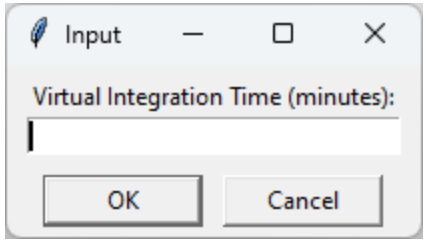
8. In the next step, you will set the location and name for saving the converted CSV file. Click “OK.”



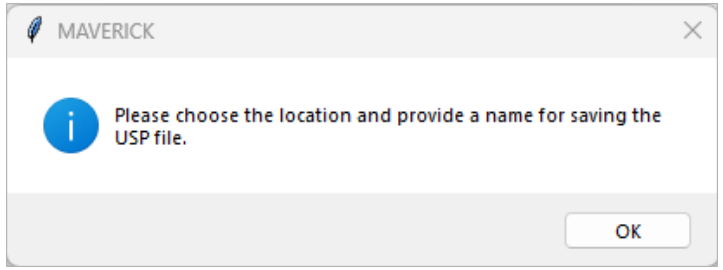
9. Choose a file name and location for saving the converted CSV file. Click “OK.”



10. If needed, adjust virtual integration time.
NOTE: Although MAVERICK does not allow the user to modify the spectrometer acquisition time, during data pre-processing and export, a virtual integration time may be selected. This will integrate the Raman spectra over the selected time in minutes. The minimum virtual integration time is 1 minute.



11. In the next step, you will set the location and name for saving the USP file.



Appendix: Importing Spectral Data into SIMCA® MSP (3)

11. Finally, a plot will be displayed in SIMCA based on the MAVERICK raw spectral data (*.msp).