User's Manual for
Aeros®with EasyMatch® Essentials

The world's true measure of color
HunterLab

Hunter Associates Laboratory
11491 Sunset Hills Road
Reston, Virginia 20190 USA
www.hunterlab.com

A60-1018-193 Version 2.4
For EasyMatch®Essentials Version 1.06.0097 and Above

PREFACE

Copyrights and Trademarks

Safety Notes

Caution: If the equipment is used in a manner not specified by HunterLab, the overall safety may be impaired. - The instrument is for indoor use only and not suitable for a wet location.

Caution: There is a potential UV Light hazard in using this instrument. Please avoid looking directly at the light. The frequency of this flashing light is in the range of sensitivity for those prone to epileptic seizures. When reading a sample, the illuminated spot flashes in the range of 5 Hz to 6 Hz. User discretion is advised.

Safety Notes

For your safety when using the Aeros, you should pay attention to the following types of statements in this User's Manual:

- General safety instruction that should be observed at all times while operating the instrument.
- Specific safety instruction critical to the type of instrument operation being explained in the manual where the caution appears.
- Use of this equipment in a manner not specified by the manufacturer may impair the protection afforded by the equipment.
- Danger of electric shock if liquids are spilled and fire if volatile or flammable liquids are spilled. Use care when measuring liquid samples.

- This instrument sensor moves up and down during standardization and creating a measurement profile. Please keep fingers and other items out of the way of the sensor.
- The turntable will rotate if turned on in ***READ OPTIONS > MEASUREMENT*** configuration. Please take care to remove fingers, jewelry and clothing to prevent damage.
- The Aeros is for indoor use only .

Legal Disclaimers: Instrumental – Visual Evaluation

The HunterLab Aeros Colorimetric Spectrophotometer is designed for precision color and appearance measurement. It measures numerical color and related data in absolute and relative terms. HunterLab cannot guarantee the accuracy, completeness, efficacy, and timeliness of the data due to inherent uncertainties in instrumental readings, variations in sample presentation, and potential inconsistencies in human color perception. It is strongly advised that each user verify the instrumental data with meticulous visual evaluation.

Disclaimer of Liability: Utilization of Data, Metadata and Information

Hunter Associates Laboratory, Inc (including its employees, agents and assignees) assumes no responsibility for consequences from the use of the data derived from its colorimetric spectrophotometer or from the information contained herein or in any respect for the content of such information including but not limited to errors or omissions, the accuracy or reasonableness of factual or scientific assumptions, studies or conclusions, the defamatory nature of statements, ownership of copyright or other intellectual property rights and the violation of property, privacy or personal rights of others. Hunter Associates Laboratory, Inc. is not responsible for and expressly disclaims all liability for damages of any kind arising out of use, reference to or reliance on such data and/or information. No guarantees or warranties, including but not limited to any express or implied warranties of merchantability or fitness for any particular use or purpose made by Hunter Associates Laboratory, Inc. with respect to such data and/or information.

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Setting Up the Aeros

What Is HunterLab Aeros & EasyMatch Essentials?

Aeros is a reflectance-only color measuring instrument capable of measuring the color of irregularly shaped/textured products. All samples are measured by placement in a tray or container under the sensor head. With features like Auto Height Positioning, a rotating sample platform, large touch-screen display, and smart communications, the innovative Aeros can measure products like coffee beans, snack foods, plastic pellets, even industrial minerals.

The Aeros system contains two major components – the sensor head and the turntable base. The sensor head contains the spectrophotometer with an LED light source, distance measuring components and a touch screen for Essentials. The turntable base provides the electronics and the mount for the sensor with automated vertical positioning and horizontal manual adjustment. The turntable rotates the product under the optical sensor.

Standard Accessories

- Calibration Box with calibrated white tile, black glass and green diagnostics tile
- Certificate of Traceability
- Power Supply
- Aeros Quick Start Guide
- 12-in and 6-in Sample Dishes
- USB Flash Drive

Figure 1. Calibration Box

Selecting A Space for the Aeros

The following illustrates a successful installation. Set up the HunterLab Aeros in a laboratory setting with controlled, consistent temperature and humidity. It is recommended that access to the rear connectors be maintained. The selected workspace should be free of drafts and characterized by proper room lighting. Place the spectrophotometer on a stable and vibration-isolated surface to minimize vibrations that could affect measurements. Input power from the utility company must be 'perfect' power, i.e. constant voltage, current and frequency without harmonics.

Laboratory Environment – The HunterLab Aeros Spectrophotometer is a high-precision laboratory instrument. Laboratory grade environments are required and should be maintained

to ensure precise and accurate measurements. This includes environmental factors and conditions such as temperature humidity, atmospheric pressure, and cleanliness. The environment should be free of contaminants such as airborne dust and/or particulate matter and aerosols to avoid contamination of the precision equipment.

Samples – Implement protocols for handling and preparing samples to minimize contamination to the inside of the instrument.

Personnel – Train laboratory personnel on clean practices, including wearing appropriate attire, using cleanroom-like protocols and being mindful of their actions to prevent contamination.

Power Required: Voltage: 100-240 VAC, 3.75A, 47/63 Hz; Single Phase; 60 VA maximum.

Installation Category (Over Voltage): II

Safety

- Do not view the instrument LED's directly as it may be damaging to the eyes.
- Do not submerge the instrument in water.
- Do not take the instrument apart as there are 'no user serviceable parts' in the instrument.
- Do not disassemble the instrument and attempt to clean the optical components.
- Do not open the instrument or remove any covers except using the instructions given in this User's Manual or under the direction of HunterLab Technical Support.

Note: Failure to comply with these conditions and protocols set forth in this document may adversely affect the instrument performance.

For more information, please refer to **SPECIFICATIONS**.

Cleaning the Aeros

Clean the outside surfaces of the Aeros using a soft cloth. Do not spray liquids directly on the instrument. . Care should be taken to avoid degradation of optical surfaces. Refer to **MAINTENANCE** for more detail.

Getting Started

UNPACK YOUR BOX

Place the Aeros on the bench. Retain the packaging in case of instrument return to HunterLab.

POWER JACK

The instrument is supplied with a 24 VDC (3.75A) power supply. The power supply is plugged into the back of the instrument as shown along with the Ethernet port and the USB port.

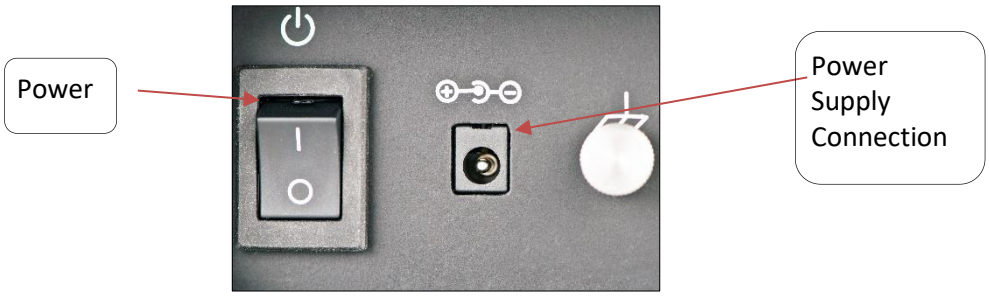


Figure 2. Rear View with Connectors

CAUTION: Use only the power cord included with this instrument or a replacement obtained from HunterLab. Be certain that the power cord is in good condition before connecting it.

POWER SWITCH

To turn the instrument on, press the rocker switch on the back of the instrument.

KEYBOARD AND MOUSE

The Aeros works with the following keyboard and mouse:

- L02-1017-434 Wireless keyboard and mouse kit.

To use this accessory, turn the power off. Plug in the micro USB adaptor to the rear of the instrument and then attach the nano-receiver for the keyboard into the USB port. Install the batteries into the keyboard/mouse and turn the power back on.

FRONT AND REAR USB CONNECTORS

There are two USB connectors on the Aeros. The one in the front is typically used for exporting jobs and workspaces, backing up the instrument and updating software. The USB port on the back of the instrument is typically used to connect a printer or a keyboard to the Aeros.

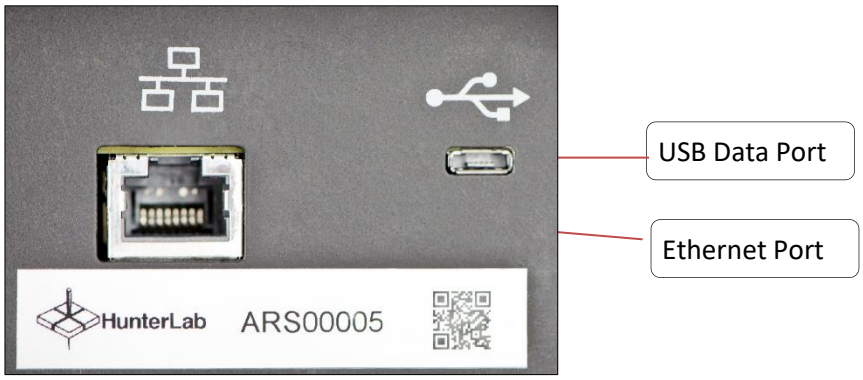


Figure 3. USB Port on Rear of Instrument

ETHERNET PORT

This port is used to connect the Aeros to:

- Computer or to a network with the purpose of sending data (ASCII) to a server.
- Connect with EasyMatch QC and EasyMatch ER
- Remote Support
- Network printer.

Moving The Unit

Use care in moving the instrument which weighs 50 lbs. Training on lifting heaving objects is recommended. To lift from the box, a two-person lift is suggested. When moving it from a table to another location, balance this instrument by lifting from behind and by the base.

If moving the Aeros any distance, please secure the optics using ***DIAGNOSTICS > ADVANCED > PARK*** for Shipping.

Taking a Simple Measurement

Connecting The Sensor And Taking A Measurement

After unpacking and setting up the instrument, turn on the power using the rocker switch on the back of the instrument base.

Once inside the software, the main measurement screen is displayed – **COLOR DATA TABLE** (D65/10).

Figure 4. Measurement Screen

The instrument is automatically connected and this is reported on the status bar. Next, the unit must be Standardized.

STANDARDIZATION

- Press the ***WORKSPACE*** icon  and select ***STANDARDIZATION*** User will be prompted to remove all samples from under the sensor. .

  Alternately, press the ***STANDARDIZATION*** status area on the status bar to initiate Standardization.

- **MOVE SENSOR TO TOP**: Press ***OK*** to move the sensor to the highest position.

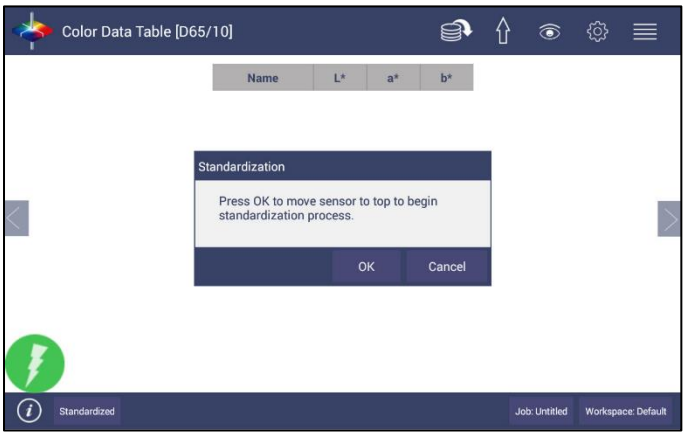


Figure 5. Sensor Moves to Top

- ***READ BLACK GLASS***: When the sensor stays at the top, attach the standardization box to the sensor. Then attach the black glass to standardization box and press ***READ***.

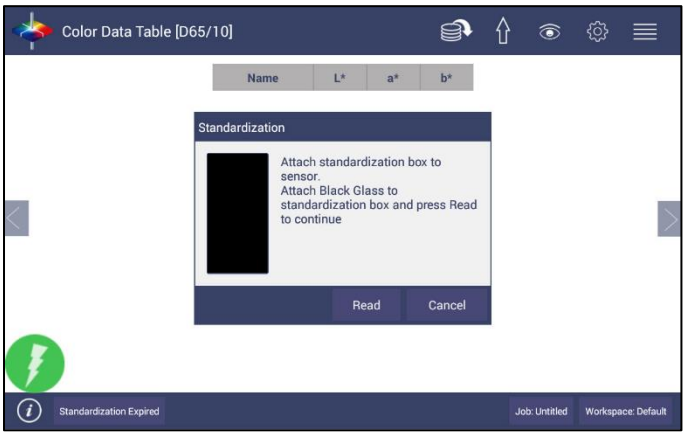


Figure 6. Read the Black Glass for Bottom-of-Scale

- ***READ WHITE TILE***: Remove the black glass and attach the calibrated white tile to standardization box. Press ***READ*** to continue.

Figure 7. Read the White Tile for Top-of-Scale.

- Remove the calibration box when standardization is completed. Click ***OK***

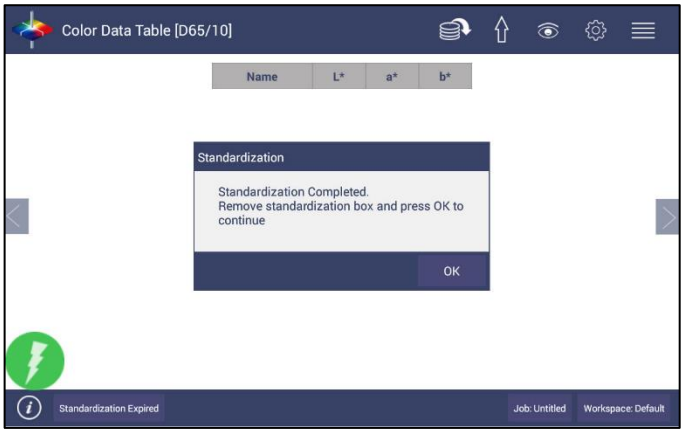


Figure 8. Completed Standardization

- If the user has selected the ***GREEN TILE READING DURING STANDARDIZATION*** under ***WORKSPACE > PREFERENCES***, the user will be prompted to read the green tile too. The target values are the ones on the back of the green tile.
- Standardization is updated and reported as **STANDARDIZED** on the bottom of the screen.

Figure 9. Standardization Status Bar

READING THE GREEN TILE

Note: It is highly recommended that a Green Tile test be performed after standardization. Do not proceed without successfully passing the Green Tile Test. If needed, contact the Service Department of HunterLab.

As a check on instrument performance, go to ***SYSTEM SETTINGS > DIAGNOSTICS > GREEN TILE.***

Enter the values on the back of the green tile.

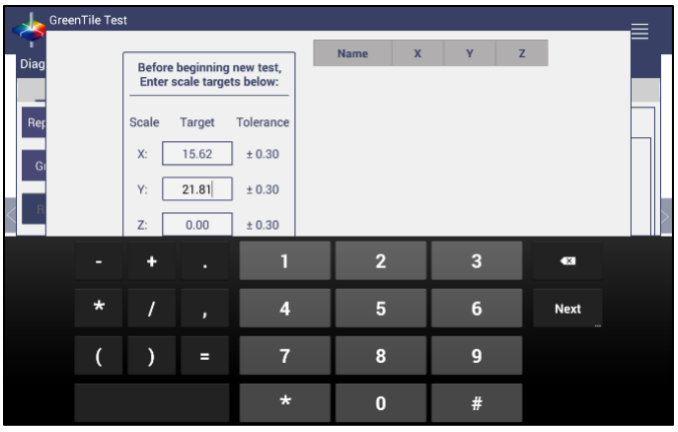


Figure 10. Input Target Values for Green Tile

Once the target values have been entered, press ***NEXT***. Standardize the instrument and attach the Green Tile. Press ***OK*** to continue.

Ten readings are taken and compared to the tolerance as an average. This test is then automatically saved and can be printed by pressing ***PRINT***.

Figure 11. Green Tile Readings

If the test result is a Pass, continue to ***CREATING A WORKSPACE*** and reading ***SAMPLES***. If needed, contact the Service Department at HunterLab.

To clean the White Reference Tile, Green Tile and or Black Glass refer to Aeros Maintenance & Safety.

CREATE A NEW WORKSPACE

- Create a workspace for your product. To **CREATE A NEW WORKSPACE**: From the ***WORKSPACE*** Menu, press ***NEW WORKSPACE*** and enter a name for this Workspace. A new job will be opened together with this new workspace.

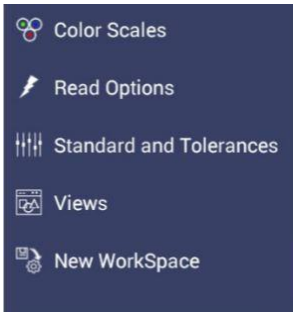


Figure 12. New Workspace

Note: The active workspace name is displayed in the lower right corner of the screen.

- **CONFIGURE THE NEW WORKSPACE**: With this new workspace open, you can start to change the settings in Color Scales, Read Options, Standard and Tolerances, Views and View Options. All these changes will be automatically saved in this new workspace.
- **DEFAULT SETTINGS: Following are the default settings for a new workspace:**

Table 1. Workspace Parameters

Parameter	Selection
Color Scales	CIE L*a*b*
Illuminant	D65/10
Indices	None
Differences	None
Read Options > Options	Prompt for Sample Name, Auto Save
Read Options > Measurement Configuration	Turntable ON, Auto Height selected, Measurement time = 5 sec
Standard and Tolerances	None
Views	Color Data Table only
View Options for Color Data Table	Latest Data First selected, Precision = 2

- When **AUTO HEIGHT** is selected as default, the sensor head will adjust its position automatically for each sample measurement.
- Users can also choose to read samples with the sensor head at a fixed distance. ***FIXED HEIGHT***: No matter what height the sensor is detected, it will use the height that customer enter here to do color calculation. This is used when the sample is hard to detect the height (e.g. sample has absorption at 880mm. The laser of height sensor is absorbed by sample)
- **CREATE SAMPLE PROFILE** is covered in ***WORKSPACE > READ OPTIONS > MEASUREMENT CONFIGURATION*** portion of this manual. (Create sample profile is to use the detected height for all sample measurements. If sample height out of the desired range (+/- 0.5inches), then it will prompt the error. Sensor will use the detected height to calculate each sample measurement.

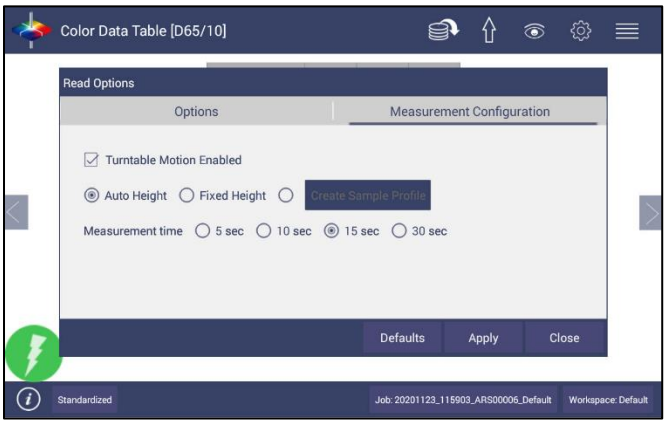


Figure 13. Read Options: Measurement Configuration

- Now your instrument is ready to read your product under this new workspace. If you'd like to start a new job for this product, you can press ***NEW JOB*** and load this configured workspace to continue.

READ SAMPLE

- **PREPARE SAMPLE**: Place the sample dish on the turntable.
- **READ SAMPLE**: To read a sample, press the green lightning bolt.

- Visually inspect the sample to confirm that the instrument readings agree with visual assessment.
- **SAMPLE NAME**: The default sample name is Sample + numerical increment. To customize the sample name, go to ***WORKSPACE > READ OPTIONS > PROMPT FOR SAMPLE/STANDARD NAME***. Select the ***PROMPT for SAMPLE NAME*** to manually input the name during the measurement cycle. Or change the default Sample Name to another name for numerical sequence. Press ***APPLY*** when done.

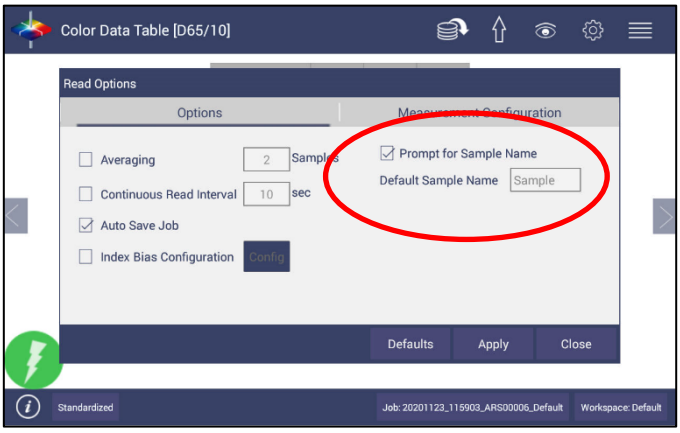


Figure 14. Configure Sample Name

***Note:** The standard/sample name in Essentials should not be empty and should not contain any of the characters , : ; ' " + = ? * < > \ /.*

- **MAIN MEASUREMENT SCREEN**: The Color Data Table view shows the configured Color Scale results for the standard and sample measurements in the job. The configured tolerances can be applied to the Job and Pass/Fail results will also be displayed. To add the color differences, indices and tolerances to the Color Data Screen, see ***WORKSPACE > COLOR SCALES*** and ***WORKSPACE > STANDARD AND TOLERANCES.***
- To add a product standard and tolerances, see ***STANDARDS AND TOLERANCES***. To change the color scale, etc., see ***WORKSPACE > COLOR SCALES***. The setups are saved automatically in Workspace.
- A long press on the Sample name will show a menu with the following options:
  - ***SET AS STANDARD*** – to set the sample as Standard.
  - ***RENAME*** – to rename the sample.

- ***DELETE*** – to delete the sample.

Figure 15. Changing, Renaming or Deleting a Sample

- A long press on the Standard name will show a menu with the following options:
  - ***EDIT*** – to edit the standard. If Edit is selected, the Workspace > Standard and Tolerances dialog box is presented to allow for editing the name, assigning tolerances or changing the type of standard.
  - ***DELETE*** – to delete the standard. The deleted Standard is reverted into the samples list with its original name.

Figure 16. Edit/Delete a Standard

Note: It is strongly recommended that you routinely back up the data from your Essentials-based instruments. You can back up the entire HunterLab folder, which contains all instrument data, onto a thumb drive or onto a network drive.

Navigating the Essentials Screen

The EasyMatch Essentials Tools and Status features are shown below.

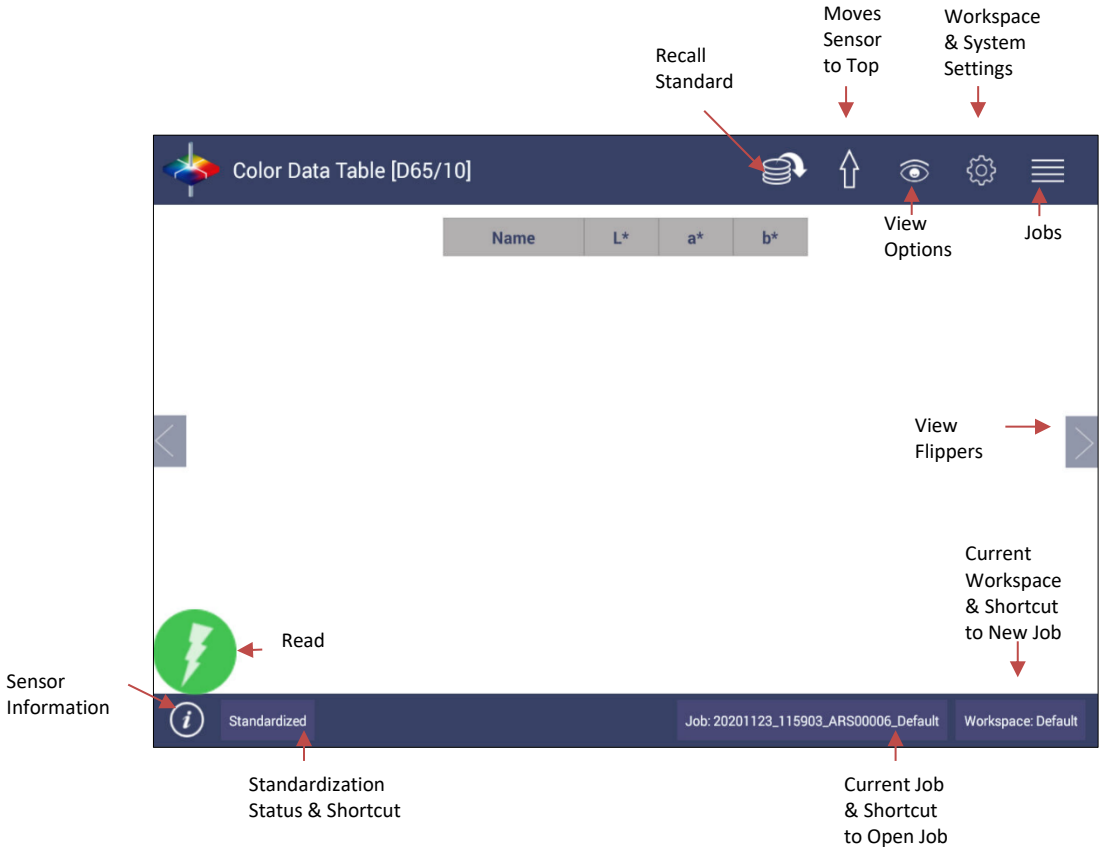
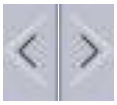


Figure 17. User Interface Screen for Aeros & Essentials

Tools: Read

Samples are read using this key. This tool can be moved around the screen by pressing and moving the icon.

Tools: View Flippers



Switching between Views can be accomplished by using the semi-transparent ***NEXT*** and ***PREV*** buttons placed at the side edges of the screen or by swiping left or right with two fingers on the screen.

Tools: Status Bar

INFORMATION

The sensor type and serial number is shown at the bottom left side of the System Bar when the ***i*** is pressed. When application security is enabled and the user logs into Essentials, the User Account will also be shown in the Information box.

Figure 18. Sensor Serial Number

STANDARDIZATION STATUS

The current state of standardization is reported. To initiate standardization, one can press on the ***SENSOR STATUS*** to open the standardization dialog.

JOBS STATUS

JOB Status is reported on the bottom right side of the System Bar. To open a Job, one can click on the ***JOB NAME*** in the status bar.

WORKSPACE STATUS

WORKSPACE Status is reported on the bottom right side of the System Bar. . To load a Workspace, click on the WORKSPACE NAME in the status bar.

Tools: Recall Standard

- This menu option provides a selection of saved standards to use when measuring samples.

Tools: Move Sensor To Top

This tool moves the sensor head to the top.

Tools: View Options

This menu shows the configuration options for the active view. A total of six views are available. Each view shows a different option. Views can be added or removed in ***WORKSPACE > VIEWS***.

Tools: Workspace & System Settings

The **WORKSPACE** menu sets up the data screen with **MEASUREMENT COLOR SCALES, READ OPTIONS, STANDARDS, TOLERANCES** and **VIEWS**.

SYSTEMS SETTINGS initiates **STANDARDIZATION, DIAGNOSTICS, PREFERENCES**, and the **USER MANAGER** for System Security.

Tools: Jobs

A **JOB** is a collection of all the sample measurements and a workspace used for a task, product, or customer. Jobs are the readings of EasyMatch Essentials. Jobs can be created for many different reasons, such as to hold data for a certain customer or a specific product line. Each operator may maintain their own job with preferences or create separate jobs for different operations.

A **WORKSPACE** is a collection of the measurement parameters for a job along with tolerances and the standard, i.e. analogous to word processing documents containing text and formatting. Each job has only one workspace.

Toolbar: Search/Recall Standards

Allows for efficient recall of standards from the main screen. Each standard is shown with color scale values based on current configured Ill/Obs and rendering color. If a standard is selected, the details are shown on the right side of the screen. Details include:

- Standard Name,
- Category, Type (Numeric Or Hitched),
- Time Created,
- Sensor Type,
- Sensor Serial Number,
- Sensor Mode,
- Illuminant/Observer.

Customer can filter standard search by CATEGORY and/or by STANDARD NAME.

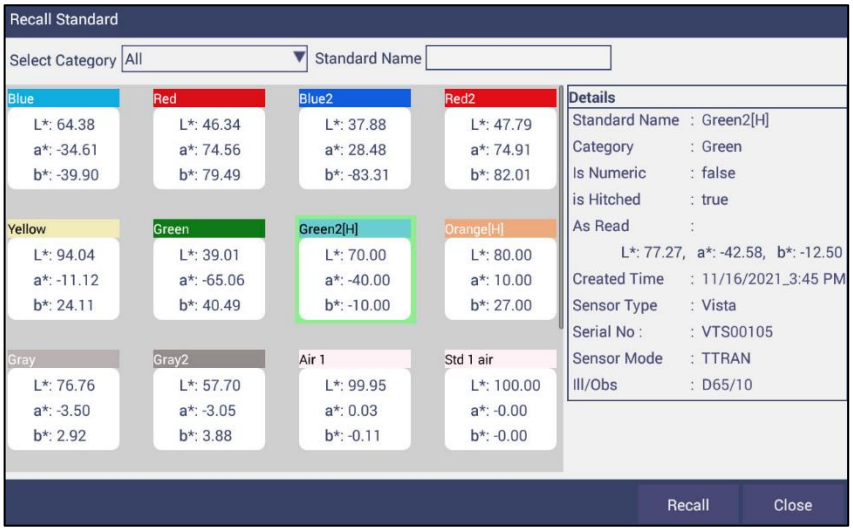


Figure 19. Recall Standard

Toolbar: Options (Views)

Views Icon 

VIEWS are selected using a dialog box under ***WORKSPACE***. Simply check on the box of the screen needed. Press ***APPLY*** to save one or all screens. The default screen is the Color Data Table. To navigate between screens once the selections have been applied, use the ***VIEW FLIPPERS*** on the left and right of the screen.

Figure 20. Workspace > select Views.

Once the views have been selected, then ***VIEW OPTIONS*** are available to add additional information to the screen. Each screen has a unique set of options associated with it.

Views > EZ View

This view provides a simple display of **STANDARD** vs**. SAMPLE** and ***PASS/FAIL*** results.

Figure 21. EZ View Display

- **VIEW OPTIONS** includes the selection of ***NO COLOR SCALE***, ***PASS/FAIL, PRECISION*** and ***FONT SIZE***.

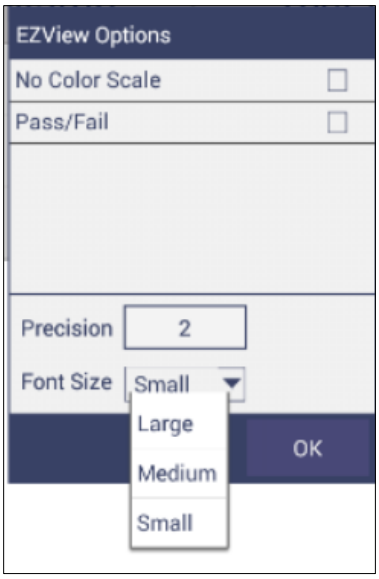


Figure 22. EZ View Options

Views > Color Data Table

The **COLOR DATA TABLE** view shows ***COLOR SCALE***, ***COLOR DIFFERENCE***, and ***INDEX*** data for the **STANDARDS** and **SAMPLES** in the job.

Figure 23. Color Data Display

- Options such as ***TOLERANCES***, ***DATA ORDER, INTERVAL, DATE, DISTANCE, TURNTABLE MOVEMENT, HEIGHT, TIME***, ***USER NAME, SENSOR NUMBER*** and ***PASS/FAIL*** can be selected for viewing using the ***VIEW OPTIONS***..

Figure 24. Color Data Screen: View Options Needs new screen.

- A long press on the ***SAMPLE*** can enable the user to make the sample into a Standard, change the name or delete the reading.

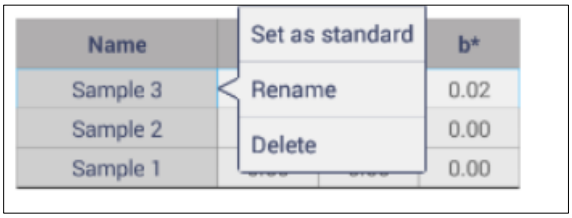


Figure 25. Changing a Sample into a Standard

  - To delete a Sample (or Standard), select ***DELETE*** and then confirm the action.

Figure 26. Delete the Sample Measurement

A long press on the ***STANDARD*** will enable the user to edit or delete the Standard. Edit opens the Standard and Tolerances dialog box. Delete will delete the standard from the current workspace.

Figure 27. Edit Standard Name or Delete the Standard

Views > Spectral Data Table

The ***SPECTRAL DATA TABLE*** displays percent reflectance or absorbance values for each selected measurement at the wavelengths being measured.

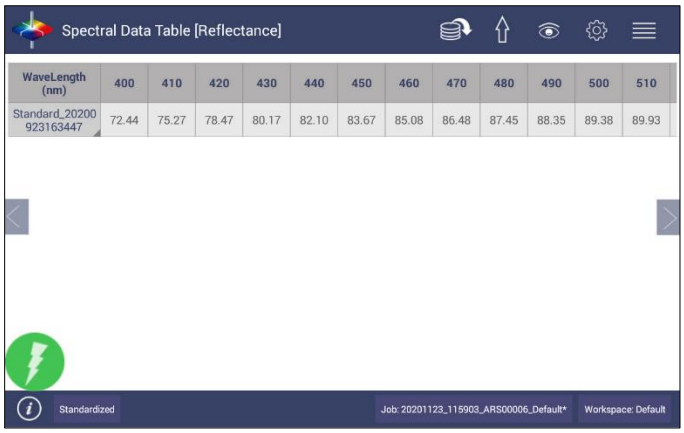


Figure 28. Spectral Data Table

- Selections include **ABSOLUTE OR DIFFERENCE, REFLECTANCE OR K/S**. Enter the start and stop wavelength, the interval and the precision and press ***OK*** to continue.

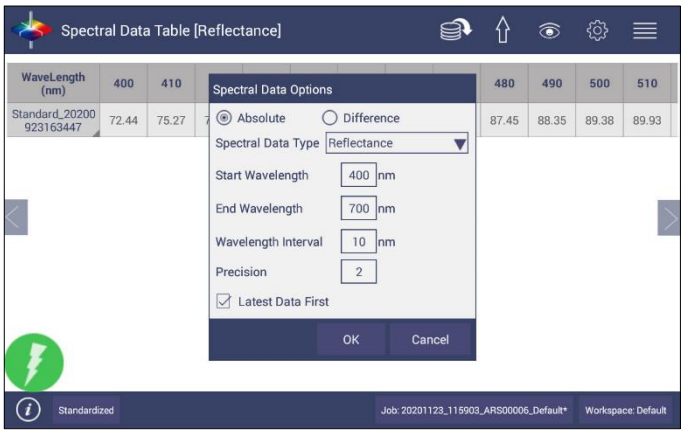


Figure 29. Spectral Data Table Options

Views > Spectral Plot

- This view provides a plot of wavelength vs. spectral measurement parameter.

Figure 30. Spectral Plot View

- Press ***CLEAR ALL*** to remove all the samples to display. Press ***SELECT ALL*** to enable display of all samples. To select an individual sample, click on the respective Sample in the list located on the right edge of the screen.
- The Samples List is paginated. Click the ***LEFT*** and ***RIGHT ARROW*** buttons below the samples list to navigate between pages.
- Press and hold on the left/right page number arrows under the sample list to show a small dialog box. This dialog allows you to select the number of records per page to display and the page number to display.

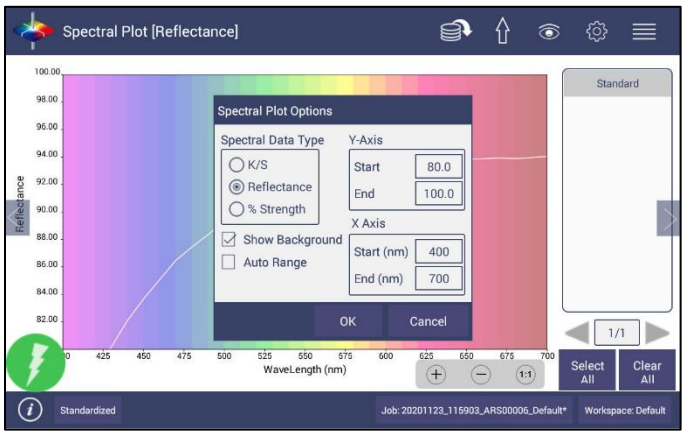


Figure 31. Spectral Plot Options

- ***Spectral Plot Options***: There are three choices for spectral plot options:
  - ***K/S*** – mathematical calculation based on reflectance and determined at each wavelength for the standard and sample.
  - ***REFLECTANCE*** - Displays the reflectance value at each wavelength.
  - ***% STRENGTH –*** Percentage of the ratio of the K/S of the sample to the K/S of the standard.
- Uncheck the ***OPTIONS > SHOW BACKGROUND***, to display the plot with white background color.

- Check ***OPTIONS > AUTO RANGE*** to automatically scale the contents to fit. If ***AUTO RANGE*** is not selected, then enter the ***Y***- and ***X***-axis range to display.

Views > Trend Plot

This tool can be used to study the trends in production and identify color variations. There are four parameters of color measurement (three scale values and optional indice) which can be represented in four traces. If a sample point is selected in one of the four traces, it is highlighted in the other 3 traces in blue. The name is shown at the bottom right hand corner of the View. The ***AVERAGE*** and ***STANDARD DEVIATION*** can be shown as per the view configuration settings.

Figure 32. Trend Plot

- ***VIEW OPTIONS*** for the ***TREND PLOT*** includes the type of display, the statistics and the number of readings per display.

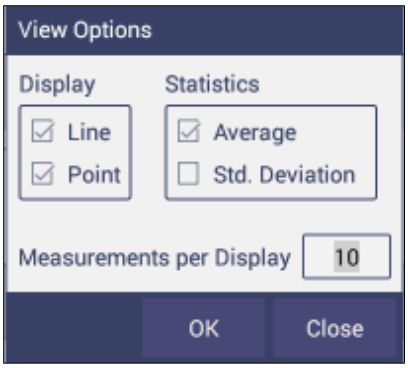


Figure 33. Trend Plot Options

- ***VIEW OPTIONS > TRACES*** set the ranges for the traces or allow selection of ***AUTO RANGE***. Trace 1 to 3 uses the current Color Measurement Scale and Trace 4 will allow for measurement of differences or an index. The user can select which Traces to view and set control limits as a percent.

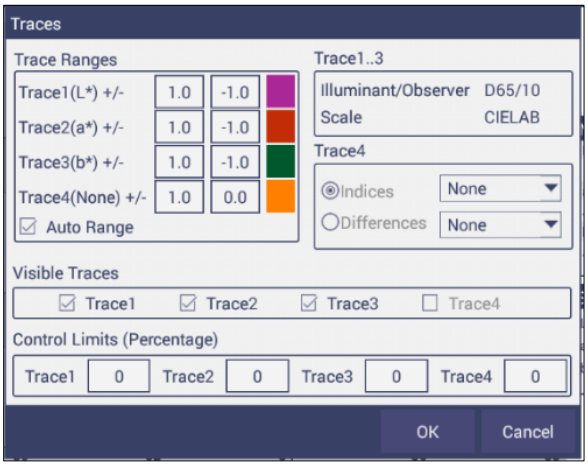


Figure 34. Trend Plot Traces

Views > Color Plot

This shows the sample location in two-dimensional Color Space with respect to the standard for difference measurements or the samples in absolute measurement. For differences, the standard is the center point of the plot and the samples are plotted separately on the graph.

The displayed samples are shown in a list box on the right of the screen. The color plot can be zoomed, and the data points can be viewed in detail.

Press and hold on the left/right page number arrows to show a small dialog box. This dialog allows you to select the number of records per page to display and the default page number to display.

Figure 35. Color Plot View

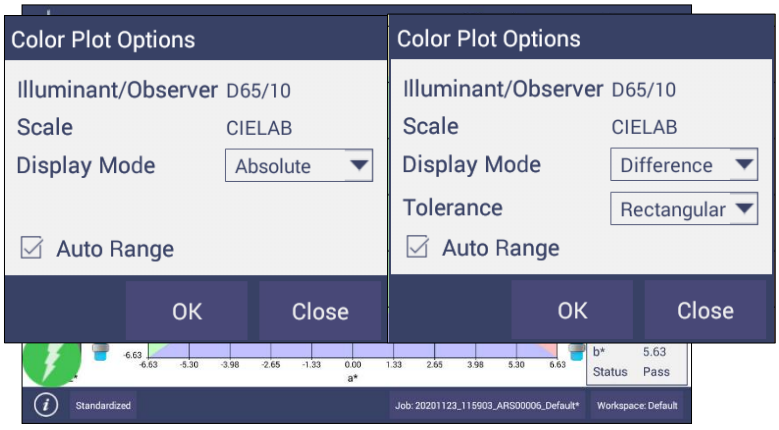


Figure 36. Color Plot Options

The tolerance plot is available in rectangular and elliptical color space. The ***PASS/FAIL*** sample points are shown in green and red when in difference mode, respectively. In Absolute Mode, they are shown in green.

Tool Bar: Workspace & System Settings

Workspace Icon 

Under the ***WORKSPACE & SYSTEMS SETTINGS***, the following tasks can be accomplished:

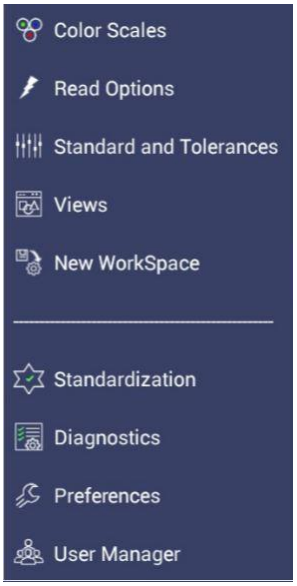


Figure 37. Workspace Parameters

Workspace > Color Scales

- Color Scales provide four tabs in which the **SCALES**, **INDICES**, **DIFFERENCES** and **ILLUMINANT/OBSERVER** (**ILL/OBS)** can be configured.

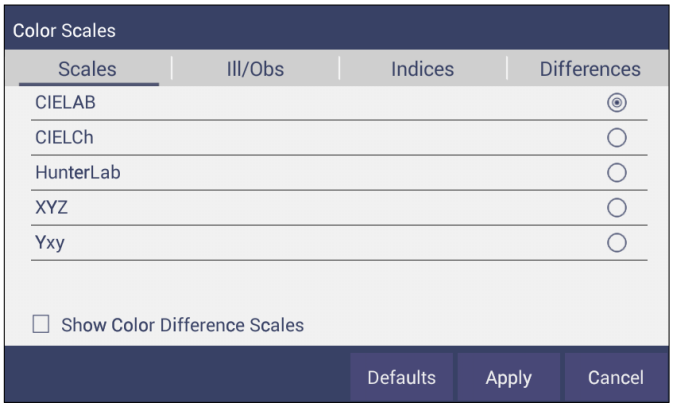


Figure 38. Color Measurement Scales

- The Scales Tab showsthe five scales available for measurement. Select the absolute scale or color difference scales (if a standard is selected). Press ***APPLY*** and begin to read your samples.

- The ***ILLUMINANT/OBSERVER*** tab displays combination selections for these parameters. To see all of the choices, you can scroll through the selections by viewing the screen.

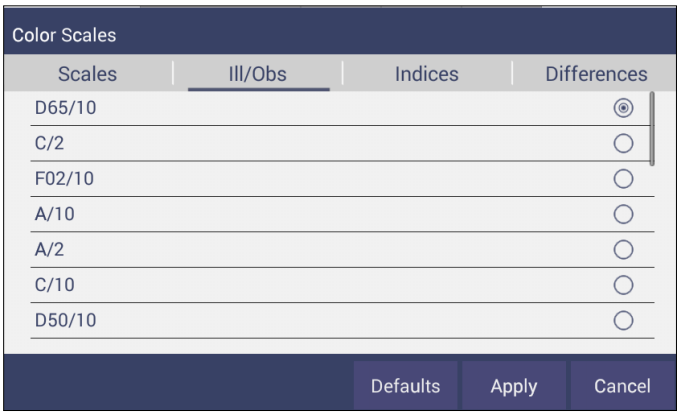


Figure 39. Illuminant/Observer Configuration

- To select indices, go to the ***INDICES*** tab and check the corresponding box on the right side. Multiple selections are available. To see more choices, the screen can be scrolled. Press ***APPLY*** to continue. **CUSTOM INDICES** allows user to add reflectance value at a selected wavelength (400-700) as a indice or to customize **HCCI.**

Figure 40. Index Configuration

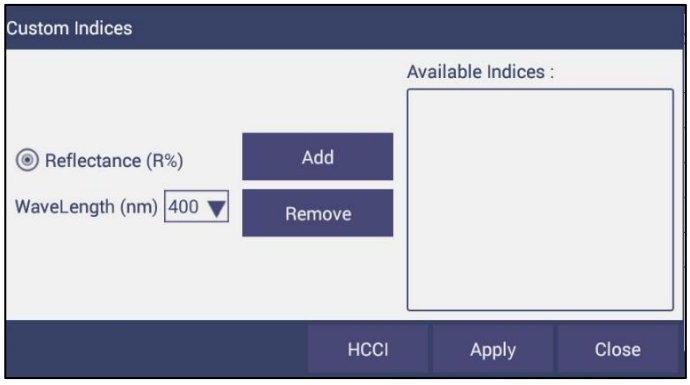


Figure 41. Custom Indices

- To select differences, go to the ***DIFFERENCES*** tab and check the corresponding box on the right side. Press ***APPLY*** to continue.

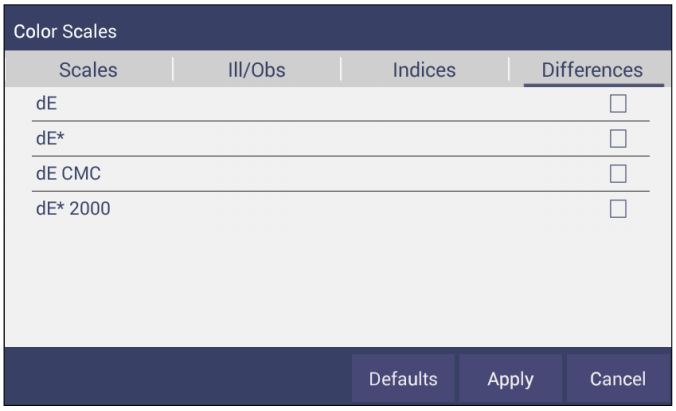


Figure 42. Color Measurement Differences

Table 3. Overview of Color Measurement Parameters for EZ View, Color Data Table, Trend Plot & Color Plot

Illuminant	Observer	Scales	Differences	Indices	View Options
D65	2/10	CIE Lab	dL*a*b*	457nm Brightness	Pass/Fail[1]
C	2/10	CIE LCh	dL*C*h	Tint E313	Tolerances
F02	2/10	Hunter Lab	dLab	WI E313	Time[3]
D50	2/10	XYZ[1]	dXYZ	Y Bright	Date[3]
D55	2/10	Yxy[1]	dYxy	YI D1925	Trace Range 1[2]
D75	2/10		dE	YI E313	Trace Range 2[2]
F07	2/10		dE CMC	Z%	Trace Range 3[2]
F11	2/10		dE* 2000	SCAA/G	Trace Range 4[2]
TL84	2/10		dE*	SCAA/C	Auto Range[2]
ULT 30	2/10			BCU	Display: Line[2]
ULT 35	2/10			HCCI	Display: Point[2]
	2/10			Custom[4]	Zoom
				My, Mc, dM, Tint Strength	Average[2]
					Std. Deviation[2]
					Meas per Display[2]

[1]Not Available on Color Plot, [2]Trend Plot Only, [3]Color Data Table Only, Custom Indice[4] means selection of a reflectance value at a selected wavelength

Workspace > Read Options

READ OPTIONS > OPTIONS

Shows a dialog box to configure ***AVERAGING, CONTINUOUS READ INTERVAL, AUTO SAVE, INDEX BIAS CONFIGURATION, SAMPLE NAME,*** and ***STANDARD NAME***. The Read command performs the operation based on the configured options.

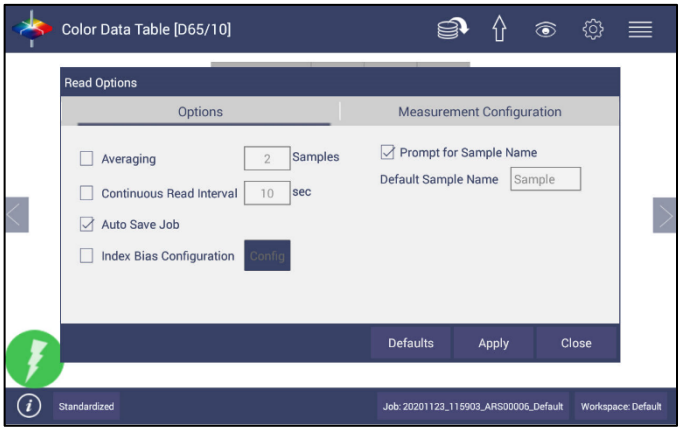


Figure 43. Read Options

Average

Select the number of readings to average to produce the final measurement. The total number of readings to be averaged can be no less than two. Press ***APPLY*** to close the screen and press ***READ*** to initiate Readings.

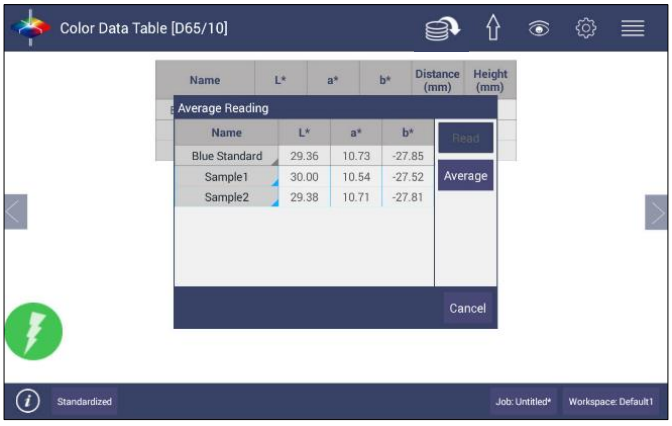


Figure 44. Reading and Averaging

Once the ***READ*** button is pressed, the instrument will display a unique dialog box to **READ AND AVERAGE** the readings. The second reading is taken using the dialog box button, ***READ***. Once all the readings are taken, press ***AVERAGE*** to obtain the results. Average and Continuous Read are mutually exclusive.

Continuous Read Interval

This feature performs measurements continuously. In **CONTINUOUS READ** mode, measurements are initiated and stopped using the ***READ*** Button. The minimum value of the Read interval is 3 seconds and it will read as fast as it can update. When in ***CONTINUOUS READ*** mode, the Read Button is enhanced with a checkmark.

When taking measurements, the Read button is greyed out. When waiting to take the next measurement, the Read button turns green.

Figure 45. Continuous Read

To stop the Continuous Read, press the ***READ*** button when the button is green.

Auto Save Job

This selection will automatically save a job. Once this feature is selected, a dialog box will be displayed to name the job. If there is no name for a job yet, the file name will default to date, time, instrument and workspace.

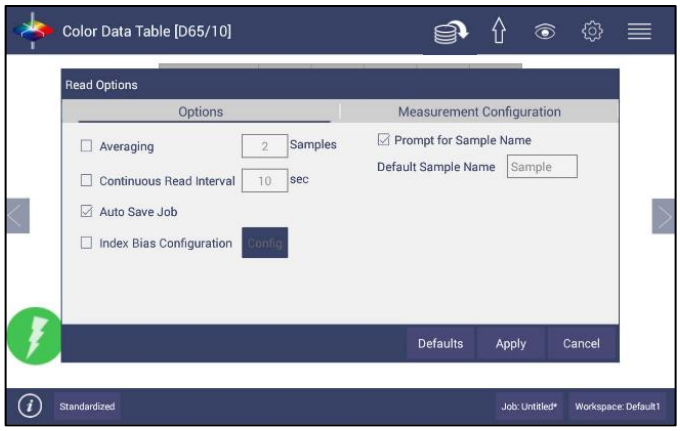


Figure 46. Auto Save Job

Index Bias Correction

This option allows the user to input a custom slope and intercept correction for indices. The user can select any Index from the list of applicable indices and input the desired **GAIN** and **BIAS** values. After selecting the required Indices, select the ***APPLY*** button to save the selected Indices values and update the Views accordingly. The Bias-corrected Indices will be marked with * (e.g.: HCCI *) in the respective view display.

To calculate the slope and bias correction, read a series of samples around the target values of interest. Three methods can be used to provide corrected values:

1. **ONE STANDARD DATA POINT**: In this case, the single data point is compared to the expected value. The Gain remains at 1.0 and the Bias is corrected:

BIAS= EXPECTED VALUE- MEASURED VALUE

2. **TWO DATA POINTS**: In this case, the two readings are compared to the expected values.

BIAS CORRECTION=EXPECTED VALUE 1-(MEASURED VALUE 1*GAIN)
GAIN CORRECTION= (EXPECTED VALUE 1-EXPECTED VALUE 2)/
(MEASURED VALUE 1- MEASURED VALUE 2)

3. **LINEAR REGRESSION**: Create a y=mx + b relationship comparing actual readings to target values, where target values is on the Y-axis and actual readings are on the x-axis. Enter the slope correction under Gain and the intercept correction under Bias.

Select Index Bias Configuration

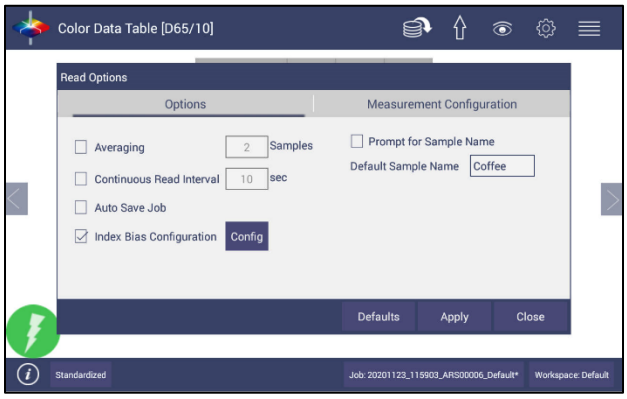


Figure 47. Slope & Bias Correction

Figure 48. Input Gain & Bias

The indices with bias correction include: 457nm Brightness, BCU, HCCI, SCAA, Tint E313, WI E313, Y Brightness, YI D195, YI E313, Z%, and custom indices.

Prompt For Sample/Standard Name

Select this feature to input the Sample (or Standard) name manually during the measurement cycle so that the Sample measurement will be inserted with the specified name. If this option is not selected, the Samples will be inserted with the specified default sample name suffixed with the auto incremented index number. Press ***APPLY*** when done.

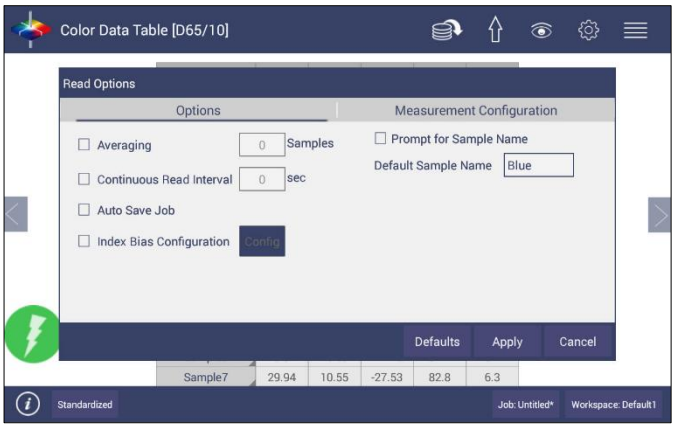


Figure 49. Prompt for Sample (Standard) Name

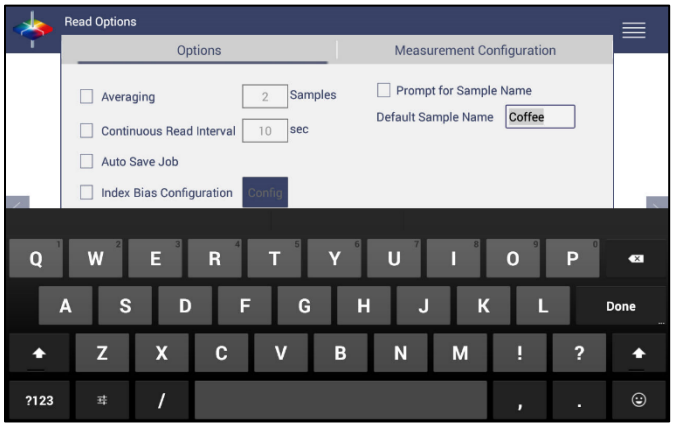


Figure 50. Input Sample Name

READ OPTIONS > MEASUREMENT CONFIGURATION

Enables the motion of the turntable, selects the height of the measurement and measurement time.

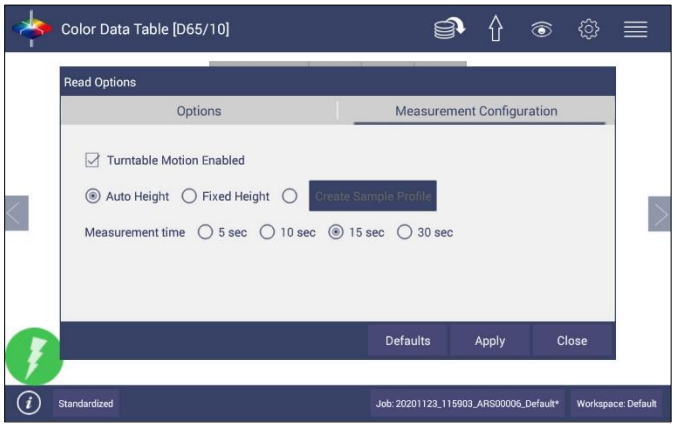


Figure 51. Measurement Configuration

Select ***TURNTABLE MOTION*** to enable rotation.

When ***AUTO HEIGHT*** is selected as a default, the sensor head will adjust its position to read samples automatically for each sample measurement based on the sample height detected by sensor.

FIXED HEIGHT will enable the user to select a height and move sensor head to a fixed location. No matter what sample height is measured by sensor, the sample height that user entered here will be used to do color calculation of each samples. This is usually applied when sensor could not detect sample height very well, e.g. sample has high absorption at 880mm.

The ***CREATE SAMPLE PROFILE*** button will allow the Aeros to look at the specimen and select the optimum fixed distance from the turntable. Each sample measurement under **CREATE SAMPLE PROFILE** mode will use the height detected by sensor for color calculation. If the detected height is out of preferred sample range (+/-0.5in), it will prompt the error message instead of moving sensor head.

When ***CREATE SAMPLE PROFILE*** is pressed, the Sensor will move to the Top position.

Figure 52. Creating a Sample Profile

Place sample on the turntable and press ***OK***.

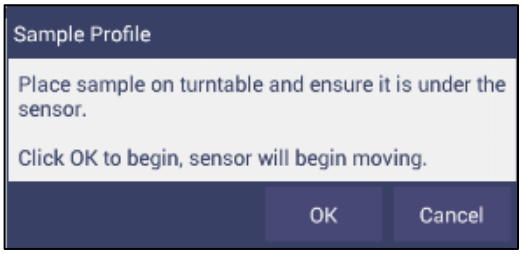


Figure 53. Place sample on Turntable

Figure 54. Sample Profile Complete

When profile is complete, press ***OK*** to continue. The sample height will be shown next to the ***CREATE SAMPLE PROFILE*** button.

The ***MEASUREMENT TIME*** is the amount of time used to average the readings together. The longer the time, the more the averaging.

Workspace > Standard And Tolerances

This command can be used to specify the type of **STANDARD AND TOLERANCES**. Standards can be one of four types: **RETRIEVED FROM DATABASE, PHYSICAL, AD HOC** and **NUMERIC**. A standard that is retrieved from Database has been previously stored. A physical standard is one that has been read as a sample and made into a standard. An Ad Hoc (or working) standard is one that is read at the beginning of a job and becomes the standard for a run. In this case, auto tolerances are recommended. A numeric standard is one that has color measurement values but is not present and cannot be read. A subset of this is the Hitch Standard. All types of standards can apply Hitch.

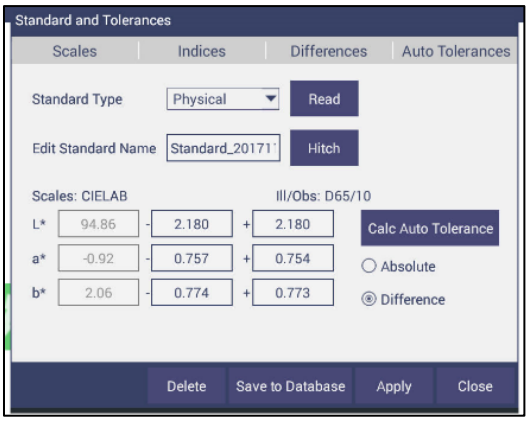


Figure 55. Tolerances Configuration

- Standard is saved with standard name, standard color value and standard tolerances to the database by pressing the button at the bottom of the screen. When there is a standard applied in a job, you must delete it first if you want to change the standard type (Recall. Physical/Adhoc and Numeric). You can click the ***CALC AUTO TOLERANCES*** here to calculate the tolerances of standards.
- **TOLERANCES** can be entered manually for a selected scale, index and difference.

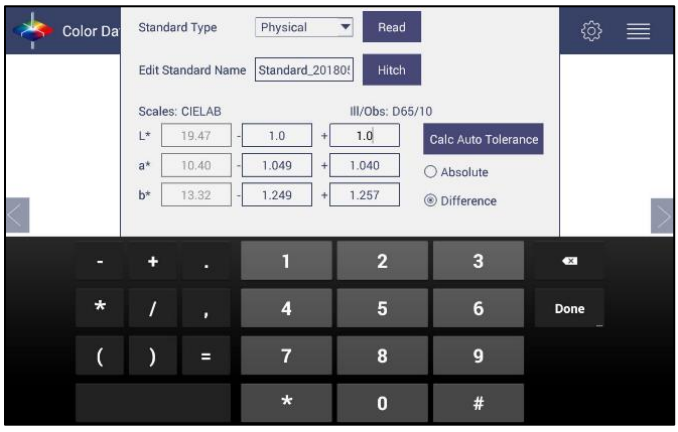
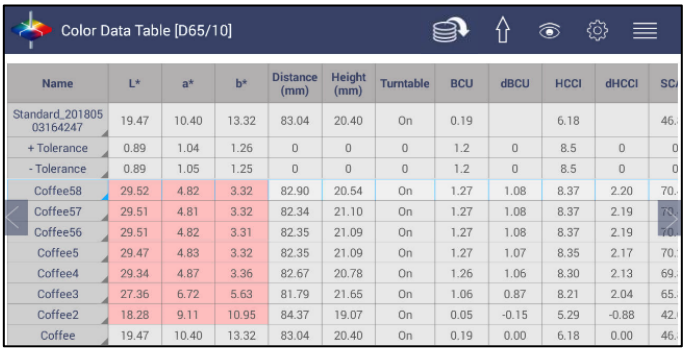


Figure 56. Enter Tolerances

Figure 57. Index Selection and Tolerances

- Tolerances will be displayed on the measurement screen if enabled under the **VIEW OPTIONS** for the **COLOR DATA** and the **COLOR PLOT** Screens.



Name	L*	a*	b*	Distance (mm)	Height (mm)	Turntable	BCU	dBCU	HCCI	dHCCI	SC
Standard_201805 03164247	19.47	10.40	13.32	83.04	20.40	On	0.19		6.18		46.
+ Tolerance	0.89	1.04	1.26	0	0	0	1.2	0	8.5	0	0
- Tolerance	0.89	1.05	1.25	0	0	0	1.2	0	8.5	0	0
Coffee58	29.52	4.82	3.32	82.90	20.54	On	1.27	1.08	8.37	2.20	70.
Coffee57	29.51	4.81	3.32	82.34	21.10	On	1.27	1.08	8.37	2.19	73.
Coffee56	29.51	4.82	3.31	82.35	21.09	On	1.27	1.08	8.37	2.19	70.
Coffee5	29.47	4.83	3.32	82.35	21.09	On	1.27	1.07	8.35	2.17	70.
Coffee4	29.34	4.87	3.36	82.67	20.78	On	1.26	1.06	8.30	2.13	69.
Coffee3	27.36	6.72	5.63	81.79	21.65	On	1.06	0.87	8.21	2.04	65.
Coffee2	18.28	9.11	10.95	84.37	19.07	On	0.05	-0.15	5.29	-0.88	42.
Coffee	19.47	10.40	13.32	83.04	20.40	On	0.19	0.00	6.18	0.00	46.

Figure 58. Indices & Tolerances on CDT

- **PASS/FAIL** based on these tolerances can be used on the **EZ VIEW** as well as **COLOR DATA VIEW**.

- HITCH STANDARDIZATION
  - **Hitch Standardization** is a process by which two or more instruments of similar design can be made to read the same color values on a group of specimens. This process is very useful in expanding the communications of color around the world or between vendor and customer.
  - The process of Hitch Standardization (also known as transfer standardization) involves assigning one instrument to be the reference, or master, unit and mathematically adjusting the secondary, or slave, unit(s) to read the "same" values. In this way, two or more instruments can be hitched together. Hitching a secondary unit to a reference instrument requires that a specimen be read on both units and the values compared and adjusted accordingly. This specimen, known as the hitch standard, is first read on the reference instrument and its values recorded as spectral data or colorimetric (tristimulus) data. The hitch standard is then physically moved to the secondary instrument where it is reread and the values from the reference unit are input into the secondary instrument's processor.
  - Steps for Hitch Standardization:
    1. ***READ*** a standard.
    2. Go to ***WORKSPACE > STANDARD AND TOLERANCES*** and select **HITCH**.
    3. The Standard is displayed under ***AS READ***. Enter the ***TARGET VALUES***.
    4. Check the ***APPLY HITCH BOX*** and press ***OK***.

Figure 59. Hitch Standardization

Table 4. Hitch Standardization By Additive or Ratio Application

	Hitch Standard		Calculate Additive	Calculate Ratio		Apply Hitch Additive	Apply Hitch Ratio
	Target	Measured	Hitch	Hitch	New Read	New Read	New Read
X	80.27	78.29	= +1.98	=*1.025	70.84	72.82	72.63
Y	81.00	79.21	= + 1.79	=*1.022	72.25	74.04	73.88
Z	50.71	47.76	= +2.95	=*1.061	46.07	49.02	48.91
			Hitch Factor	Hitch Factor		Hitch Calc	Hitch Calc
			1.98	1.025290586		70.84+1.98	=72.84*1.025
			1.79	1.022598156		72.25+1.79	=72.25*1.022
			2.95	1.061767169		46.07+2.95	=46.07*1.061

AUTOTOLERANCES SETTING

- Using Tab 4, AutoTolerances are calculated for a Color Scale using CMC. The default values of l:C – 2:1 with auto correction factor = 0.75 and commercial factor = 1. However, these ratios can be modified as needed.

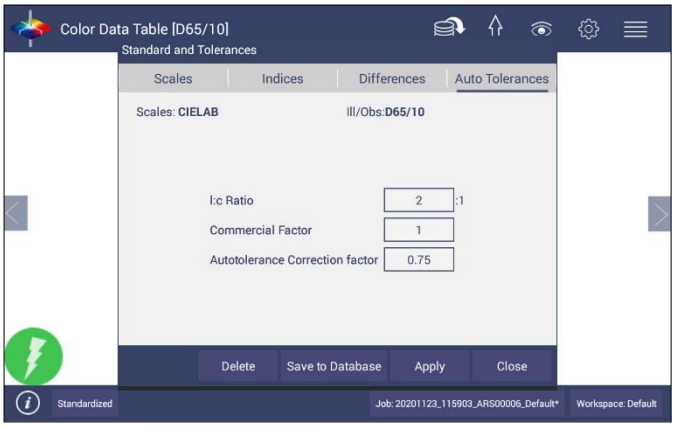


Figure 60. AutoTolerance Configuration

Note: If AutoTolerances are selected, the user cannot manually enter tolerances.

Figure 61. Difference Tolerance Configuration

TOLERANCES

- Tolerances can be entered for **SCALES, INDICES** and **DIFFERENCES**.

Figure 62. Indices Tolerance Configuration

Workspace > Views

This option can be used to select the views to be presented in the application. Simply check on the box of the screen needed. Press ***APPLY*** to save one or all of the screens. The default screen is the **COLOR DATA TABLE**. To navigate between screens once the selections have been applied, use the **VIEW FLIPPERS** on the left and right of the screen.

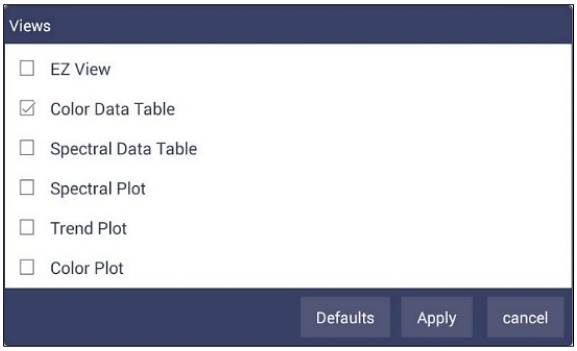


Figure 63. Workspace Views

Workspace > New Workspace

- This allows the user to create a new workspace. A warning is shown to make sure that the current Job is saved. All settings in the previous workspace will be loaded in the new workspace.

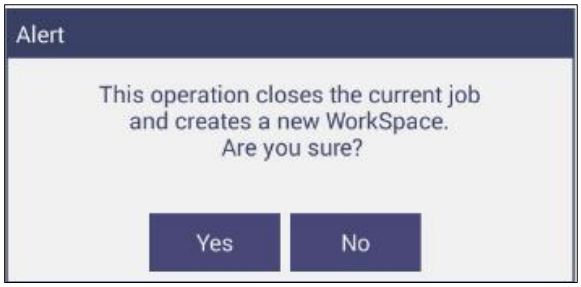


Figure 64. New Workspace

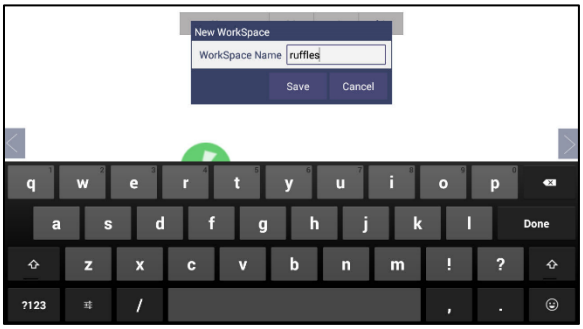


Figure 65. Name the New Workspace

System Settings: Standardization

From the ***TOOLS*** menu select ***STANDARDIZATION***. You can also press the Standardization key in the Status bar as a shortcut. The sensor will move to the top to begin.

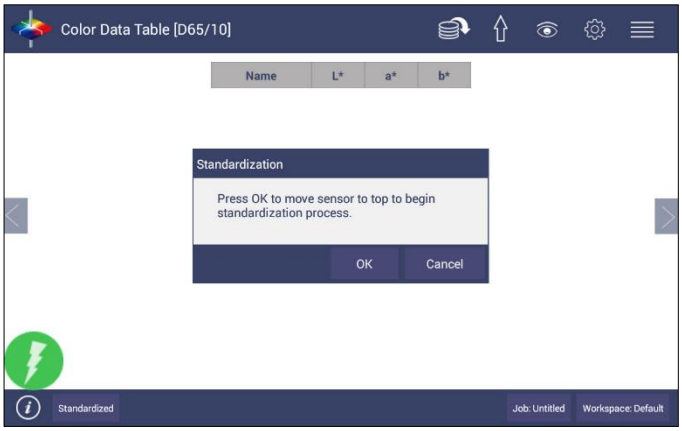


Figure 66. Begin Standardization

- ***READ BLACK GLASS***: Attach the standardization box to the sensor. Then attach the black glass and press ***READ*** to continue.

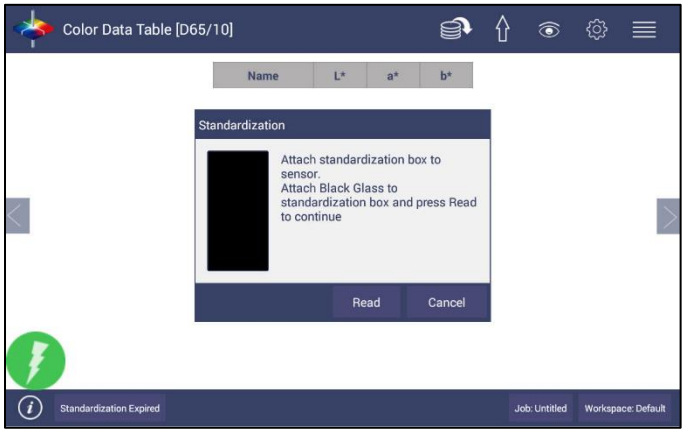


Figure 67. Attach Standardization Box with Black Glass

- ***READ WHITE TILE***: Remove the black glass and attach the calibrated white tile to the standardization box. Press ***READ*** to continue.

Figure 68. Change to White Tile

- If the user has selected the ***GREEN TILE READING DURING STANDARDIZATION*** under ***WORKSPACE > PREFERENCES***, the user will be prompted to read the green tile too. The target values are the ones on the back of the green tile.

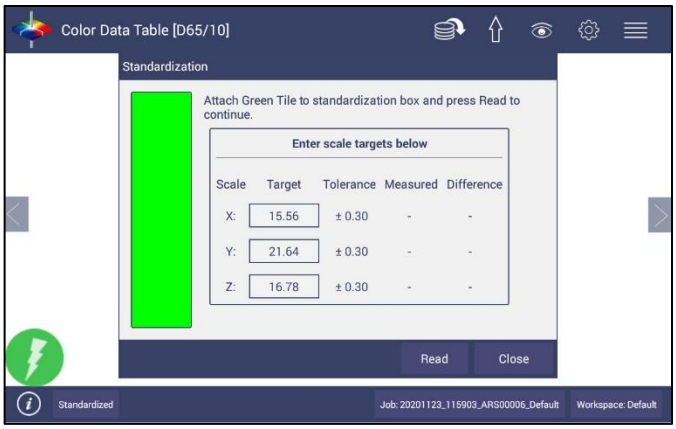


Figure 69. Green Tile Reading

- Remove the calibration box when standardization is complete. The instrument is ready to read samples.

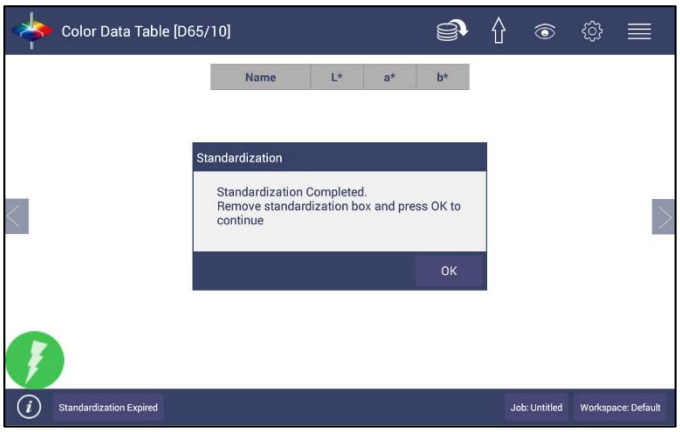


Figure 70. Standardization is Complete.

System Settings > Diagnostics

Three performance diagnostics and EasyCert are included with software version 1.05.0090 and higher. The three performance diagnostics are REPEATABILITY, GREEN TILE and AUTO DIAGNOSTICS. The EasyCal™ programs under "Validate" offers instrument qualification and performance validation for end-users to self-certify their Vista with traceable standards.

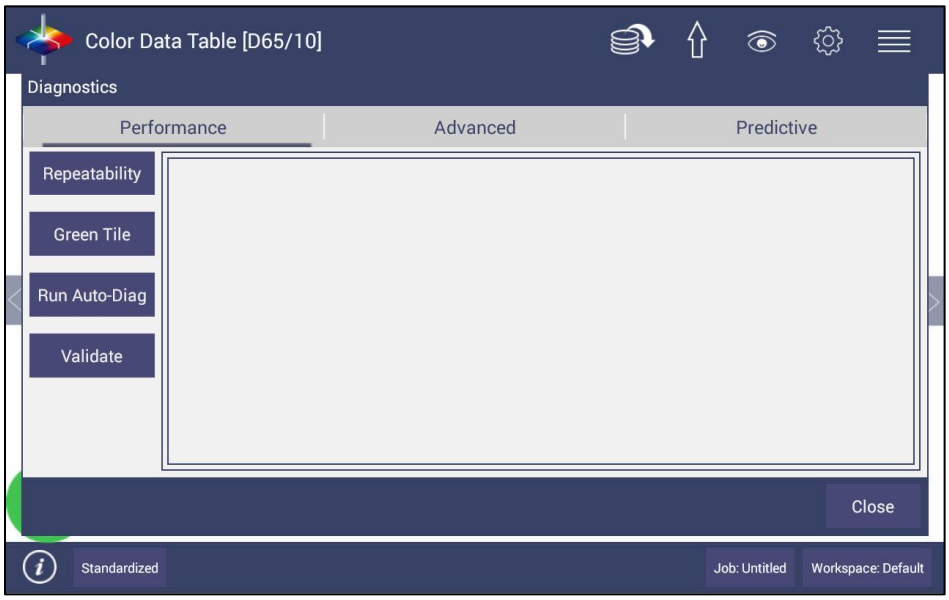


Figure 71. Performance Diagnostics Menu

Note: If the instrument fails any part of the diagnostics, then continued operation may lead to unreliable results. It is strongly recommended to contact the HunterLab Service Department for guidance.

TESTING THE AEROS FOR COLORIMETRIC REPEATABILITY

The Repeatability Test assesses how consistently the instrument can measure color. To begin the sample pan should be free of samples and obstacles. Click ***NEW*** button to start the repeatability test and the user is prompted to press ***OK*** to standardize. All sample readings must be within the tolerances to pass the test.

Figure 72. Set up for Colorimetric Repeatability.

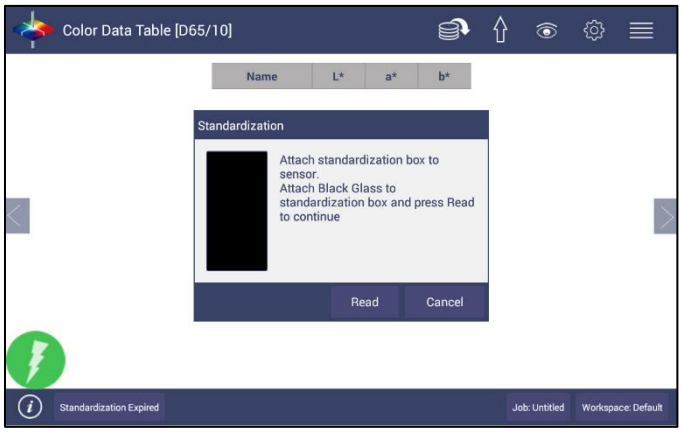


Figure 73. Standardize the Instrument.

- Read the black glass and then the white tile.

Figure 74. Read White Tile

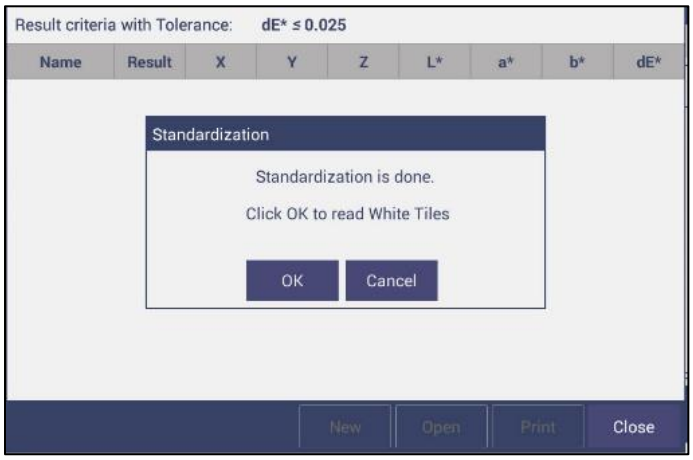


Figure 75. Begin Repeatability Readings on White Tile

- Leave the white tile at the port and press *OK* to initiate the repeatability readings. The white tile is read 30 times and the individual results reported. A table of the difference between the current reading and Standard is shown after every measurement. By comparing each reading to the tolerance, a Pass/Fail assessment is shown.

Figure 76. Repeatability Readings with Pass/Fail

When all 30 readings have been made, the final test result is shown and saved automatically. To print the results, press the ***PRINT*** button or click to ***OPEN THE FILE*** and then **PRINT**.

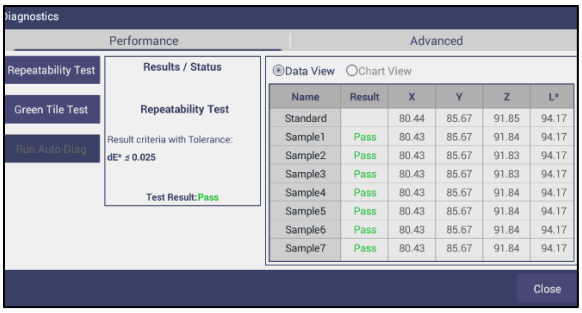


Figure 77. Diagnostics Repeatability Test Results

READING THE GREEN TILE

This test requires entry of the target values for the Green Tile.

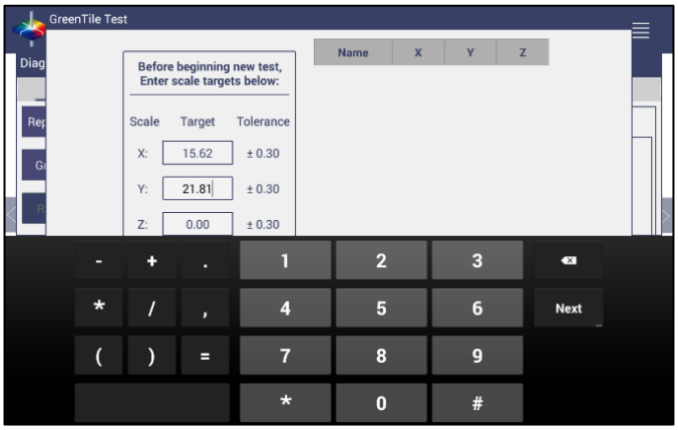


Figure 78. Input Target Values for Green Tile

Once the target values have been entered, press ***NEXT***. Standardize the instrument and attach the Green Tile. Press ***OK*** to continue.

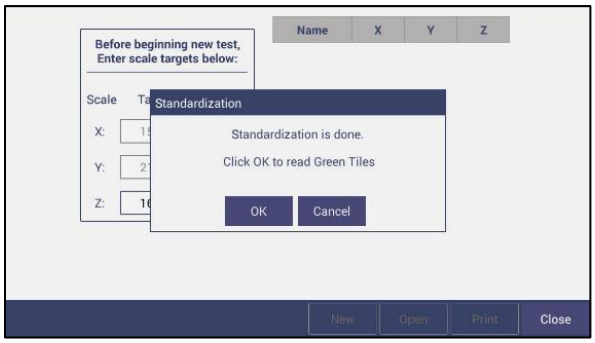


Figure 79. Attach the Green Tile

Ten readings are taken and compared to the tolerance as an average. This test is then automatically saved and can be printed by pressing ***PRINT***.

Figure 80. Green Tile Readings

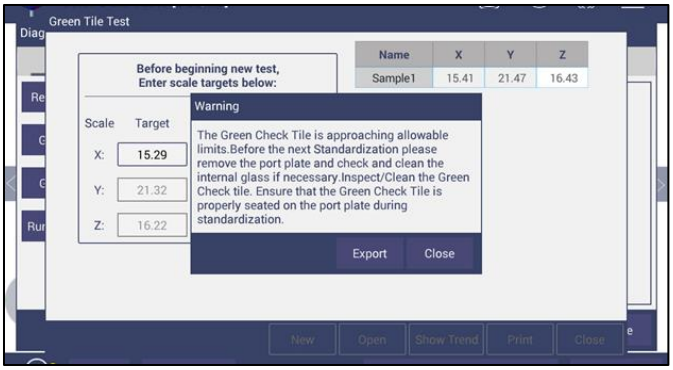


Figure 81. Green Tile Warning

Note: Continuing to operate the instrument under a warning may lead to unreliable results. It is strongly recommended that you contact the HunterLab Service Department for guidance.

RUN AUTO DIAGNOSTICS

Auto Diagnostics is for use by the service department at HunterLab and not recommended for customer use. It runs all tests and detailed readings for short term repeatability and green tile measurements are available by opening the CSV file.

VALIDATE

Aeros Essentials offers instrument validation options for end-users who wish to self-certify their color measurement instrumentation with traceable color standards. Standards are available in individual or three-sample sets, representative of the end user's working color range. Each standard is supplied with a Certificate of Analysis with traceable values and uncertainties.

For more information, please contact HunterLab.

ADVANCED TESTS

Advanced Tests are primarily for use by HunterLab's Service Department. However, this menu supports the upload of Printer Drivers, Parking of the sensor for Shipping, and remote support settings.

Figure 82. Advanced Menu

- ***SENSOR HEAD POSITION***: To test the movement of the sensor head up or down. To prepare for shipping, use the ***PARK FOR SHIPPING*** command under System.
- ***READ SIGNAL, DARK, ZERO***: This function will enable the Service Department to determine proper performance of the instrument. These tests can be performed as a single measurement or a continuous loop. The **SIGNAL DATA** for the white tile are shown in the next figure.
- The ***TURNTABLE*** can be tested next by pressing ***START***. Press again to stop the turntable.
- ***ENABLE LOG:*** Once check enabled, this feature **r**ecords the instrument actions for tracking purposes. When complete the user returns to this screen and exports the data to a thumb drive. Once the data export is completed the data size becomes '0' again.
- ***STANDARDIZE:*** Initiates standardization from the Diagnostics screen.
- ***MEASURE:*** Initiates the measurement of a sample from the Diagnostics screen. The reflectance spectra data will be shown in this dialog.
- ***PARK FOR SHIPPING***: Move sensor down to secures the optics for transportation.
- ***PRINTER DRIVER:*** To upload a new print driver or apk file, download the apk file needed from the internet onto a flash drive. Place the flash drive into the instrument (front port) so that it can access the list of apk files. Select the driver to upload and press ***OK***.

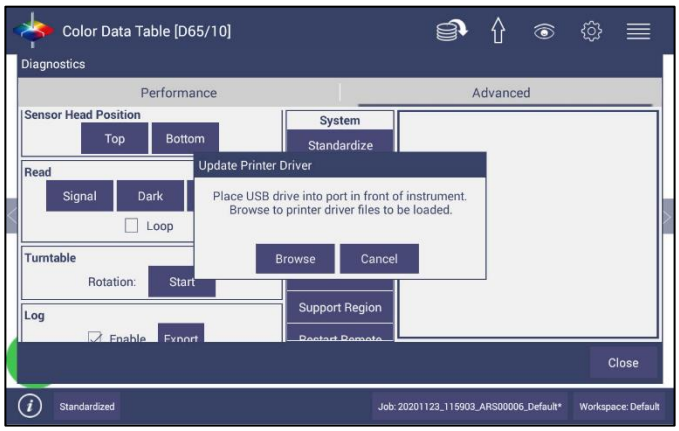


Figure 83. Insert USB with Printer Driver

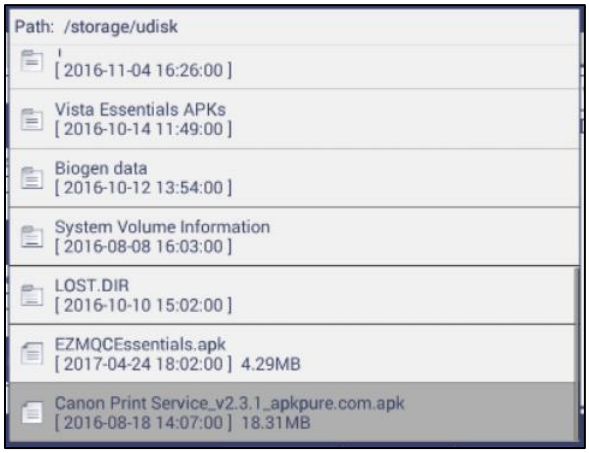


Figure 84. Select Printer Driver

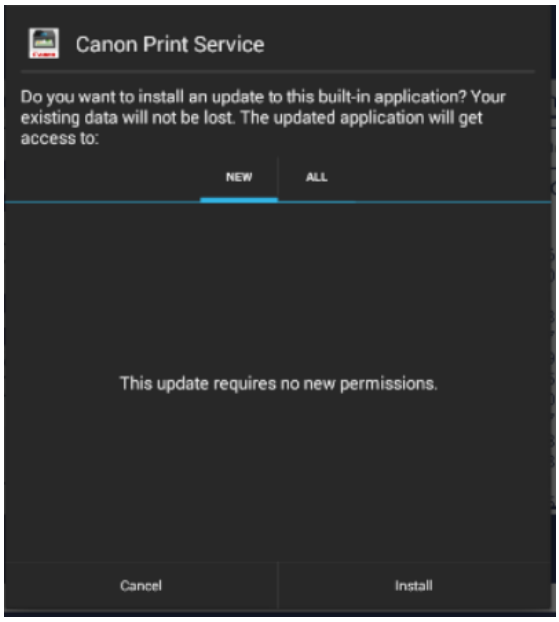


Figure 85. Updating Printer Drivers

- The Aeros will install the new printer driver and it will be then available to use.

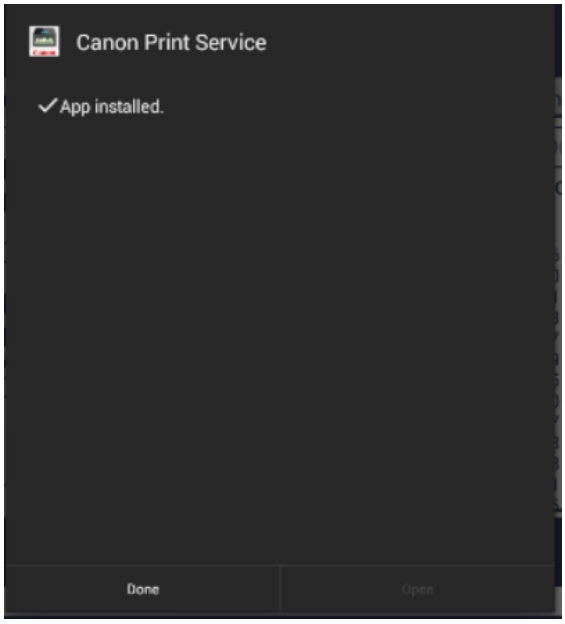


Figure 86. Printer Driver Installed

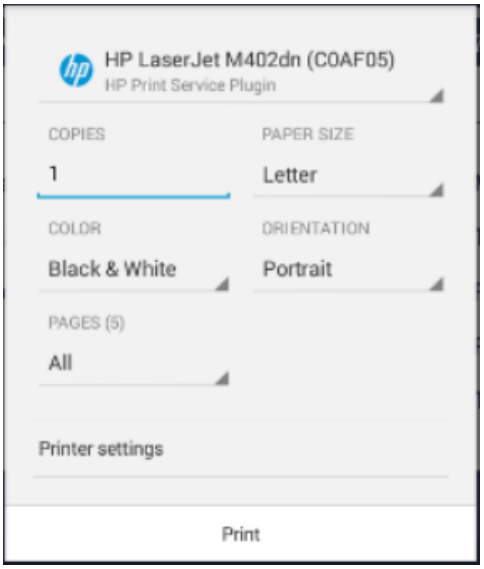


Figure 87. Printer Page

- ***RESTART COMM*** can be used to reset the ethernet communications for EasyMatch QC.
- ***RESTART REMOTE***
  - Select ***RESTART SUPPORT*** to view the Netops Host Screen. From the top right side of the Netops Host screen, select the ***3 DOTS***. From the list menu, select ***RESTART.***

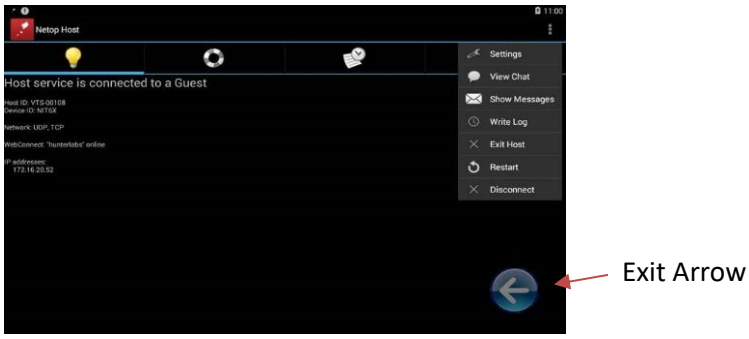


Figure 88. Remote Access Screen

  - To ensure that your application is successfully restarted, make sure that you see the message ***WEBCONNECT: 'HUNTERLABS' ONLINE***. If this message does not appear, please contact our support team. To exit press the arrow at the bottom of the screen.

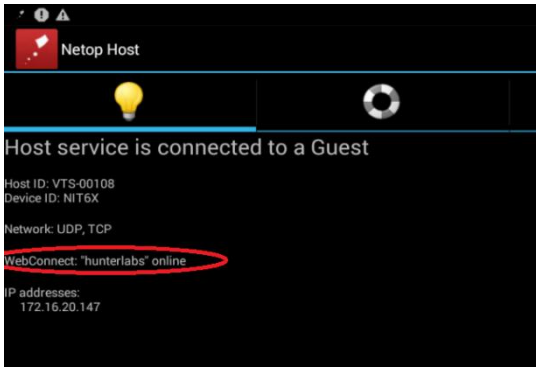


Figure 89. WebConnect to HunterLab

- ***RESTORE TILE DATA***
  - When a replacement instrument white tile is needed, a new white tile mounted in a puck and a thumbdrive with data is provided. Attach the thumbdrive to the front USB port of the Aeros.
  - Go to ***WORKSPACE > DIAGNOSTICS/ADVANCED*** and select ***RESTORE TILE DATA***.
  - When prompted select the white tile data from the thumbdrive.

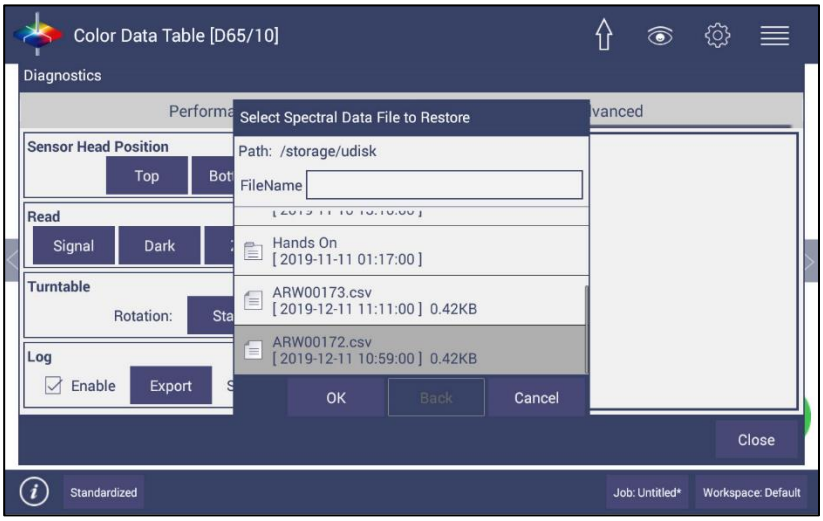


Figure 90. Example of Tile Data on Thumbdrive

  - The new white tile data is ready to use for standardization and sample measurement.
- ***VACUUM DB***
  - This removes all of the unnecessary data saved on the instrument. This avoids delays in performance.
- ***RESET TO DEFAULT***
  - This removes all of the stored measurement data and Workspace settings when moving the unit between customers.

PREDICTIVE TESTS

HunterLab Predictive Diagnostic is designed to monitor the software and hardware components of the Aeros. Predictive Diagnostic is used to capture different low-level and user-initiated data during normal operation. Following are predictive diagnostics features that have in Aeros 1.05 and above.

Note: Accurate record keeping is crucial for precision instrumentation in laboratory-grade environments. The maintenance and detailed records of experimental procedures, observations and data will ensure traceability and reproducibility throughout the lifetime of the product. The assigned owner of the equipment is expected to keep such records and study them to ensure that the equipment is functioning within HunterLab's recommendations.

1. In ***WORKSPACE MENU > DIAGNOSTICS > PREDICTIVE.***
2. Setup reminder interval days for the white (repeatability) and green tiles. Select the number of days for the reminder**.** Select to ***DISABLE/ENABLE*** the **TEST EXPIRY ALERT**.
3. Select a trend and press ***SHOW*** to display the data trend for repeatability, green tile, or monitor channel**.** Press ***APPLY*** to view the data trends over time. Export the predictive diagnostics data in csv files to thumb drive.

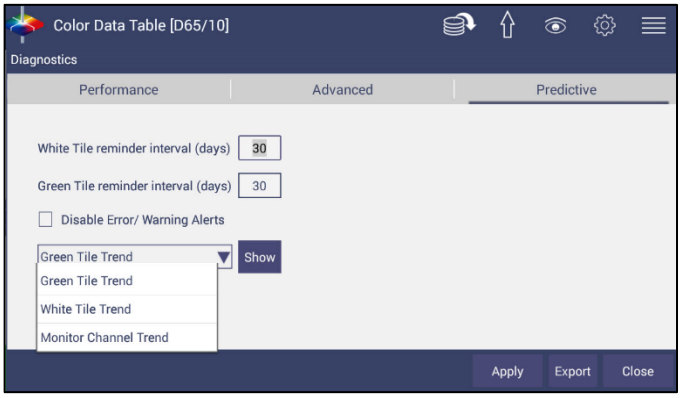


Figure 91. Predictive Diagnostics

In each trend plot, first select the **TIME RANGE**, then click ***SHOW*** to display the data. In the plot, click each data point to get the details showing in the right side.

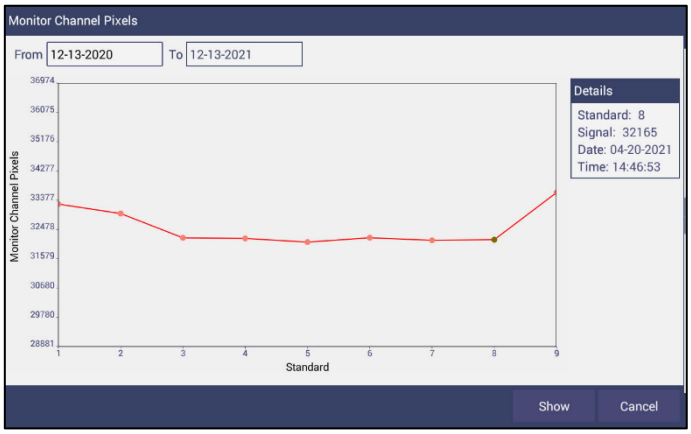


Figure 92. Monitor Channel

4. Select ***EXPORT*** to send the predictive diagnostics data to a thumb drive. Select the data to export and press ***OK***. This data will be sent in CSV format for use in a spreadsheet.

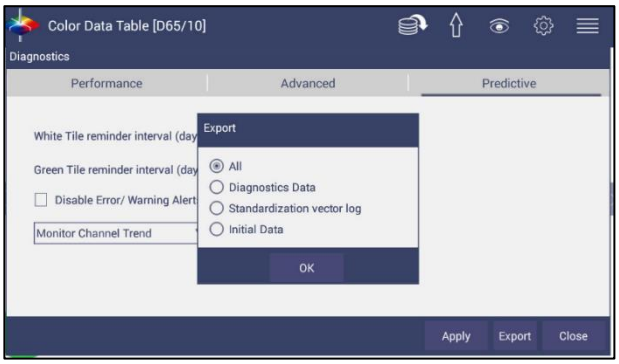


Figure 93. Predictive Test Options

There are three types of predictive diagnostic files.

Diagnostics Data: Records all of the diagnostics tests (i.e. White Tile Repeatability and Green Tile Tests.

Standardization Vector Log: Records raw data from the sample and monitor channel during each standardization.

Initial Data: The original raw data from the sample and monitor channel. This data should not be modified by users.

5. Warning Messages – Collect the following raw data:

Test	Sample to Measure	Warning alert
Standardization vector data		
Sample channel signal Data	Black Glass	Max BOS is above 700.
Monitor Channel Signal Data	White Tile	Max monitor data is below 21000.
Sample Channel Signal Data	White Tile	Max monitor data is below 21000
XYZ Difference	Green Tile	Between 0.25 – 0.3
Service Date	Green Tile	Within 1 month

Once the Disable Error/Warning Alerts is unchecked and applied in Workspace Menu > Diagnostics > Predictive, the info button in the tool bar will list all of the existing warning and error messages. It will be labeled with a different colored dot – Red dot for errors, a yellow dot for warnings and no color for no error or warning,

System Settings > Preferences

PREFERENCES > GENERAL

This allows the user to set preferences to: Load the last used workspace and job, Set standardization time interval, Set screen brightness and date/time, Enable novice tooltip, Enable application security, Use last login credentials, Configure and enable network data export, and Configure network settings.

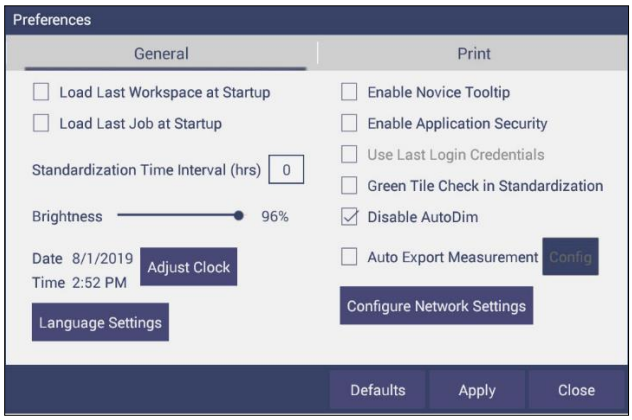


Figure 94. System Settings> Preferences> General Page

- To ***LOAD THE LAST WORKSPACE AT STARTUP*** check this box and press ***APPLY***.
- To ***LOAD THE LAST JOB AT STARTUP***, check this box and press ***APPLY***.
- The ***STANDARDIZATION TIME INTERVAL*** is a useful reminder to restandardize. Press ***APPLY*** to set the new interval. When the time has lapsed, a prompt to restandardize will be displayed before measurements can be taken.
- Set the screen ***BRIGHTNESS*** using a sliding scale and press ***APPLY***.
- Set the ***DATE*** and ***TIME***, time zone, and format use the ***ADJUST CLOCK*** feature.
- ***LANGUAGE*** can be selected here along with a keyboard change. Languages supported include English, Chinese, Japanese and German.

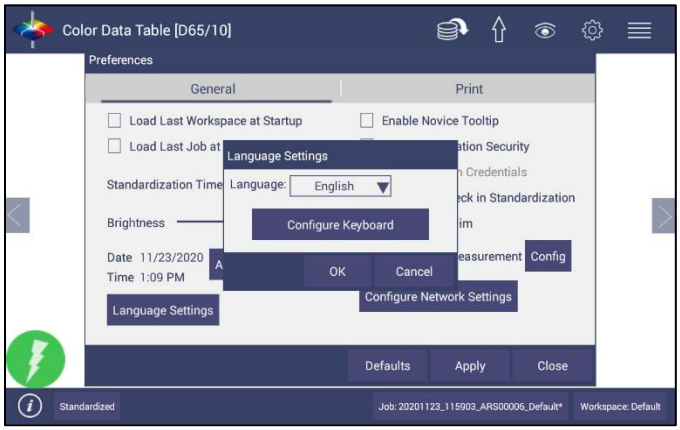


Figure 95. Language & Keyboard Selection

- ***ENABLE NOVICE TOOLTIPS*** by checking on the box. Once enabled, on screen tips are displayed for 3 seconds. To display again, roll over the **LIGHTBULB ICON** on the lower right part of the screen.

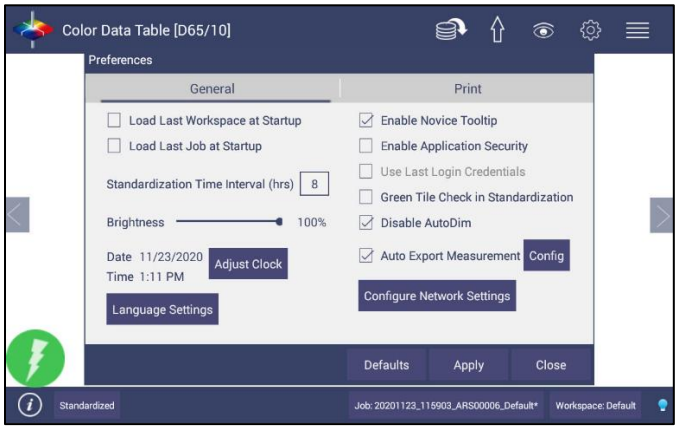


Figure 96. Novice Tool Tip Settings

Figure 97. Example of Novice Tool Tip

- ***ENABLE APPLICATION SECURITY***. This selection is available after the User Manager has been set up. Please refer to the ***SYSTEM SETTINGS > USER MANAGER*** for more information.
    - When this is selected, the application will require valid login credentials at startup. On successful login, the user name will be shown in the status bar. If ***USE LAST LOGIN CREDENTIALS*** is checked, the user will be automatically logged in on subsequent startups.
- ***GREEN TILE CHECK*** adds the green tile reading to the standardization process.
- ***AUTO DIM*** darkens the screen after Essentials idle 15min. To disable, check the box ***DISABLE AUTO DIM***.
- To ***CONFIGURE AND ENABLE THE NETWORK DATA EXPORT*** and ***NETWORK SETTINGS***, please connect the Aeros to a computer as described in ***SPECIAL FUNCTIONS*** (Chapter 7). In Network settings, one can use an Ethernet cable.

PREFERENCES > PRINT

This page allows the user to configure:

- The ***READINGS*** to print.
- The option to ***PREVIEW*** before print.
- ***PRINT REPORT TITLE*** and ***LOGO.*** To apply a logo, import the logo first to the HunterLab folder.
- Orientation of the report (**Portrait or Landscape**) orientation.
- To save changes, press ***APPLY***.

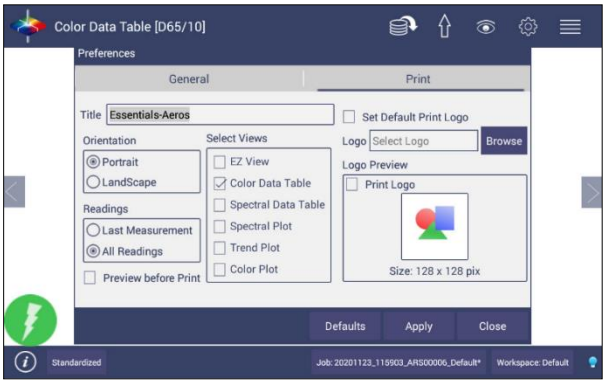


Figure 98. System Settings> Preferences> Configure Print Page

System Settings > User Manager

Security can be enabled on the Aeros to ensure that operators cannot modify/delete folders or files and limit their functionality. An administrator is identified to set up the users/groups with selected privileges.

- To begin, go to ***WORKSPACE > USER MANAGER*** to set up ***CREATE ADMINISTRATIVE GROUPS*** first followed by ***CREATE USER GROUPS***.

Figure 99. Create a Group.

- Once the groups have been established, then individual users with **USER NAMES** and ***PASSWORDS*** can be setup for both Administrator and User Groups**.**

Figure 100. Setup Administrative & General Users

- Users in Administrative Groups have all features enabled. For Users in User Groups, Privileges can be setup as shown below. Press ***UPDATE PROFILE*** to complete.

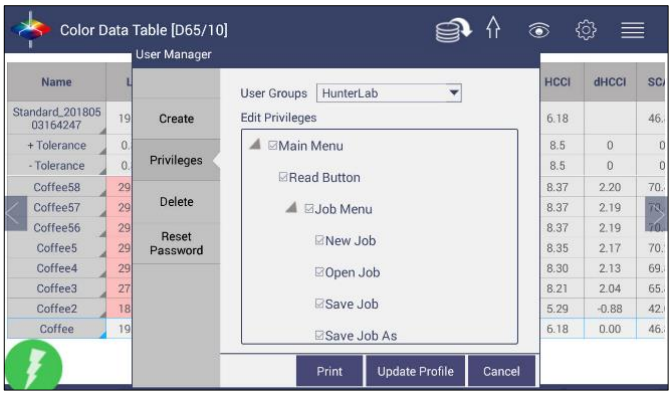


Figure 101. User Privileges

- If a printer is attached, you can ***PRINT*** a list of Privileges selected.
- To complete enabling security, go to ***WORKSPACE > PREFERENCES*** and enable security on the right side.

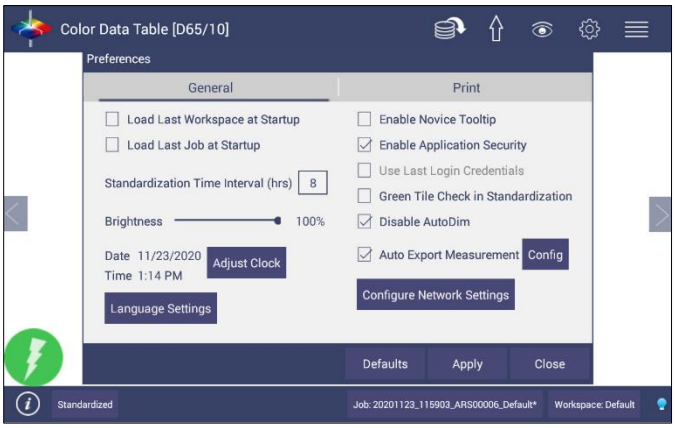


Figure 102. Enabling Security

- After enabling security, each user must enter a name and password when logging into the Aeros. For convenience, the user can check the box under ***WORKSPACE > PREFERENCES> GENERAL*** to use the ***LAST LOGIN CREDENTIALS***.

Figure 103. Login Credentials

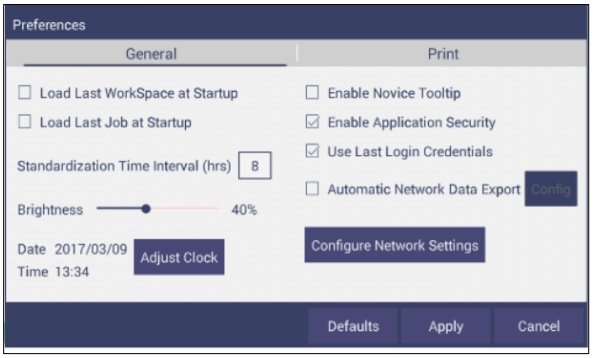


Figure 104. Enable Last Login Credentials

- If needed, the administrative user can delete groups / users and reset passwords of all Groups & Users.
- After ***ENABLE APPLICATION SECURITY*** is checked, the Logoff feature will be listed in Job menu. User can click ***LOGOFF*** to exit Essentials***.***

Figure 105. Log Off

Tool Bar: Jobs Function

Jobs Icon 

Under the Job function, the following tasks can be accomplished:

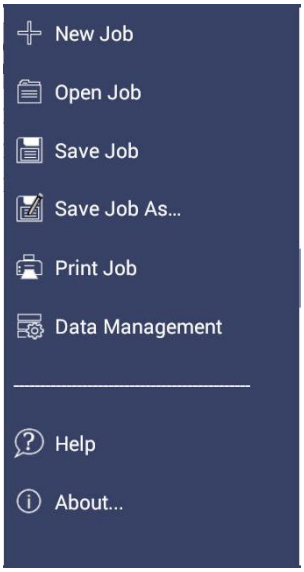


Figure 106. Job Menu

Jobs

JOBS VS. WORKSPACE: A job consists of samples measured according to a specific workspace.

A workspace is a template with measurement conditions such as **STANDARD & TOLERANCES, COLOR SCALE, INDEX, ILLUMINANT**, etc. There can be only one workspace associated with a job. The main tool bar provides the options to create a **NEW JOB**, **OPEN AN EXISTING JOB** and **SAVE A JOB**.

JOBS > NEW

When click ***NEW JOB***, the ***LOAD WORKSPACE*** dialog will pop out. The default selected workspace is the current workspace. User can change the workspace and click ***LOAD*** then the selected workspace is opened in the new job. Once the Workspace has been loaded to the New Job, the Workspace name associated with this job cannot be edited.

- ***Shortcut:*** press Workspace name in the lower right status bar

JOBS > OPEN

OPEN a saved Job: A list of available jobs under the current path are displayed for selection. If the job that is needed exists in another folder, then it is an option to change the folder. When the job to be opened is displayed select the file and press ***OPEN***. We also provide a short cut for Jobs: Open in main tool bar.

- **Shortcut:** press job name in the status bar on the lower right.

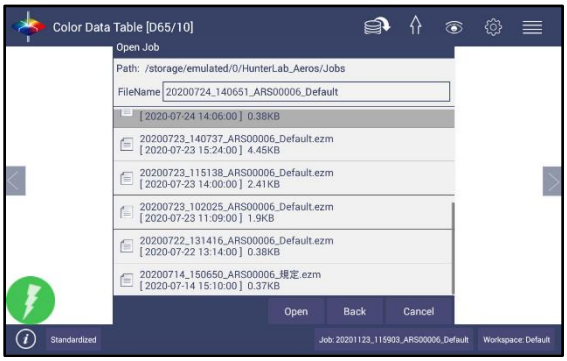


Figure 107. Open A Job

JOBS > SAVE & SAVE AS

SAVE THE JOB under the desired name: To save a job, ***SELECT THE FOLDER***, ***NAME THE JOB*** and ***SAVE THE JOB*** contents into a file. These files have an '.ezm' or a CSV extension. There will be a default name filled in Filename box as date&time&instrument#&workspace. You can edit it if needed.

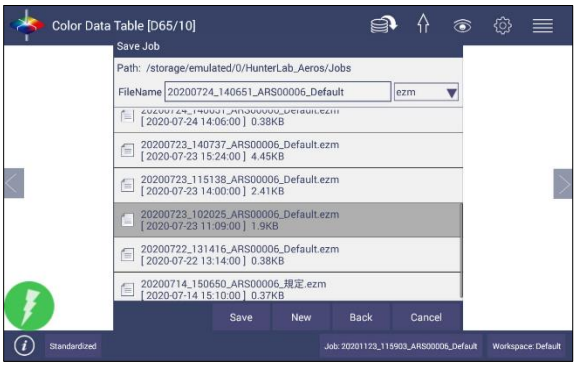


Figure 108. Save A Job

JOBS > PRINT

PRINT AN OPEN JOB using the parameters set up under ***WORKSPACE & SYSTEMS SETTINGS > PREFERENCES.***

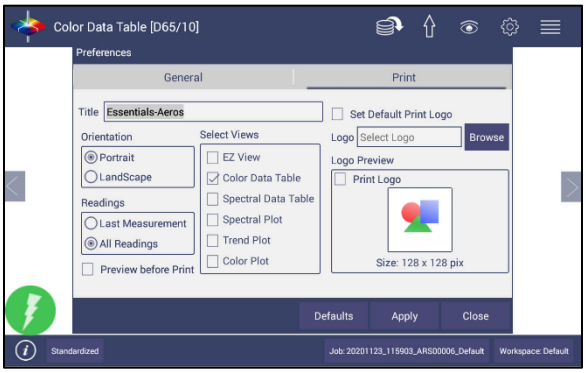


Figure 109. Workspace & System Settings > Preferences > Print

Drivers included in the Aeros are shown below. Additional printer drivers can be added under ***WORKSPACE > DIAGNOSTICS > ADVANCED***.

Table 2: Printer Drivers Included

Printer	Driver
Canon	Canon Print Service 4.4+
HP	HP Print Service Plugin 4.1+
Epson	Epson Print Enabler 4.4+
Konica Minolta	Konica Minolta Print Service Plugin 4.4+
Kyocera	Kyocera Print Service Plugin 4.4+
Lexmark	Lexmark Print Service Plugin 4.4+
Sharp	Sharp Print Service Plugin 4.4+
Xerox	Xerox Print Service Plugin 4.4+

- Printing can be downloaded to a pdf file by selecting, ***SAVE AS PDF***. Once this is selected, the parameters for the output are presented. Please save the file to the download folder.

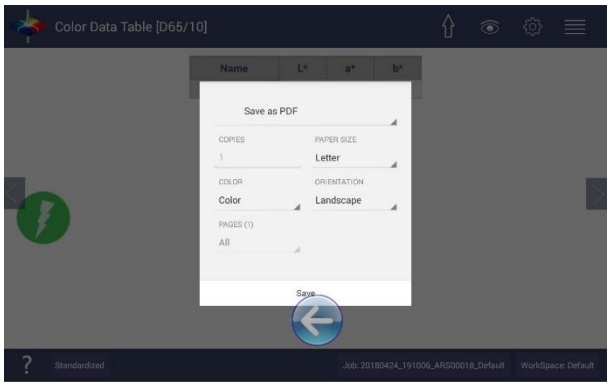


Figure 110. Save as PDF.

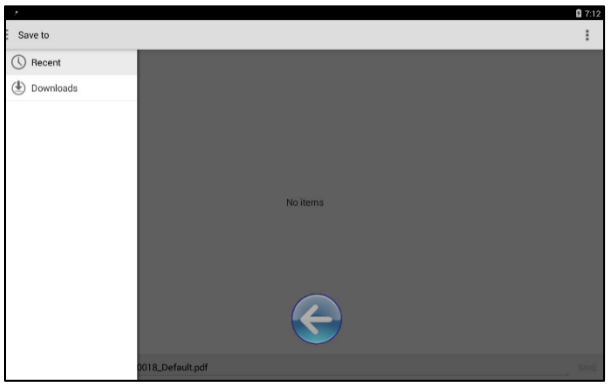


Figure 111. Save PDF to Downloads File

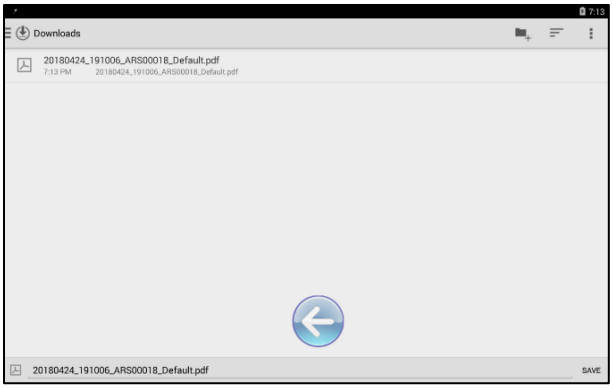


Figure 112. Download File Contents

JOBS > DATA MANAGEMENT

Standard(s) and sample measurements are saved in Job files and database along with the sensor information. The saved measurements are also associated with a respective Workspace and Job.

The ***DATA MANAGEMENT*** contains the features to **RECALL, IMPORT, EXPORT, EMAIL A JOB** and **BACKUP/RESTORE**.

- ***RECALL*** the measurements from the database.
- ***IMPORT*** a selected Job(s), Standard(s), Workspace(s)Diagnostics, photos for logo print setup and others from a USB flash drive.
- ***EXPORT*** the Job(s), Standard(s), Workspace(s), Diagnostics, pdf reports and others to a USB flash drive.
- ***EMAIL*** the selected Job(s), pdf reports and other files.
- ***DELETE*** Job(s), Standard(s), Workspace(s), Diagnostics, pdf reports and others.
- ***BACKUP*** the Hunter Lab folder (all jobs, database and user manager settings) into a USB Flash drive.
    - Your data security is of the utmost importance to us. All Essentials data are stored on an internal SD card. This is a localized data storage approach common for tablet-based software applications. This concentrated storage approach poses a potential risk of data loss if the SD card experiences issues or malfunctions.
    - We strongly recommend that you routinely back up the data from your Essentials-based instruments. You can back up the entire HunterLab folder, which contains all instrument data, onto a thumb drive or onto a network drive.
- ***RESTORE*** the Hunter Lab folder (all jobs, database and user manager settings) from a USB Flash drive.

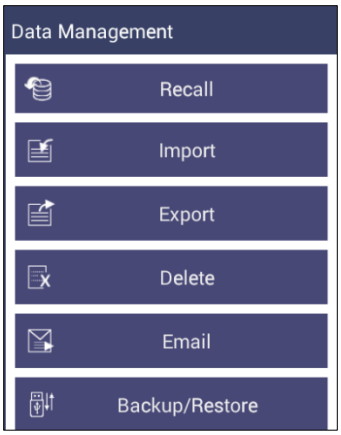


Figure 113. Data Management Menu

Jobs > Data Management > Recall

Recall measurements that have been stored to a job. Since there is a Recall Standard function, the Recall Measurement dialog is used to recall samples only.

Users can enter the sample name to search for the sample. Also, they can filter samples by Workspace or Job.

Select the samples that need to be recalled using a check in the box and press the ***RECALL*** button to bring these samples to the current job.

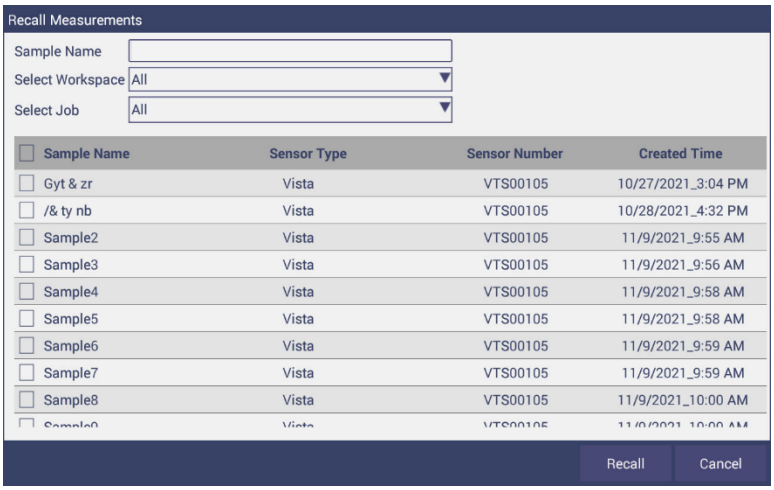


Figure 114. Recall Measurements

Jobs > Data Management > Import

This feature allows the user to import the below data from a USB flash drive into the instrument. Data can be one file or multiple files. All selected files should be in the same file path location. The following data can be imported: **JOBS, STANDARDS, WORKSPACE, DIAGNOSTICS**, and **OTHERS.**

- **IMPORT JOB**
  This option allows the user to browse and select a Job file(s) (.ezm) from the USB flash drive and import into the instrument. If a file name already exists, then the name will be incremented numerically. To use these functions, a USB flash drive must be present in the port.

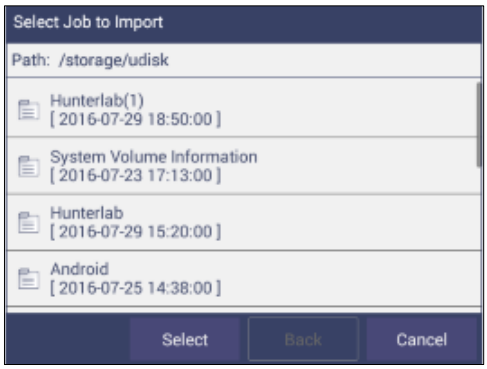


Figure 115. Import Job

- **IMPORT STANDARD**
  This option allows the user to browse and select a Standard(s)(extension *.std*) from the USB flash drive and import into the database. If required, the Standard Name can be changed.

- **IMPORT WORKSPACE**
  This option allows the user to browse and select a Workspace(s) (extension *.wsp*) from the USB flash drive and import into the database. If the workspace already exists, then the user is prompted to specify a different name.

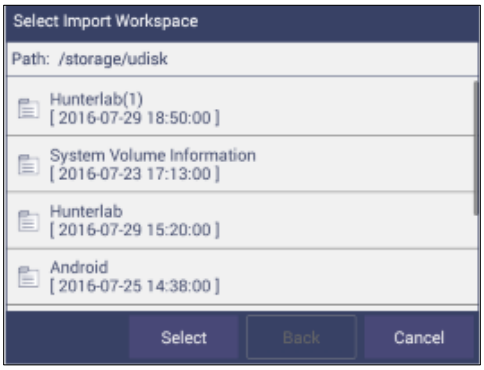


Figure 116. Import Workspace

- **IMPORT DIAGNOSTICS**
  This option allows the user to browse and select a Diagnostics file from the USB flash drive for import into the instrument database.

- **IMPORT OTHERS**
  This function is available to import other items such as a logo for the printed report. Once the logo is imported, go to ***WORKSPACE & SYSTEM SETTINGS > PREFERENCES > PRINT*** to add the logo to a report.

Jobs > Data Management > Export

This feature allows the user to export the below data from instrument into a USB flash drive. Data can be one file or multiple files. All selected files should be in the same file path location. The following data can be exported: Jobs, Standards, Workspace, Diagnostics and Others (e.g. all files in HunterLab folder, and all pdf reports in Download folder).

- **EXPORT JOB**
  This option allows the user to browse and select an existing Job(s) (*.ezm*) or the current active Job data and copy into a USB flash drive either in ***CSV*** or ***EZM*** file format. While exporting into EZM format, the current active Workspace settings can be applied. The color data shown in the Color Data View and the Spectral Data is saved in a CSV file. CSV Files can be exported through ***EXPORT > OTHERS***.

Note: In Rev 1.03.0070 and above, the .csv file will be automatically created/updated when a job is saved. CSV files are stored at HUNTERLAB > CSV FOLDER.

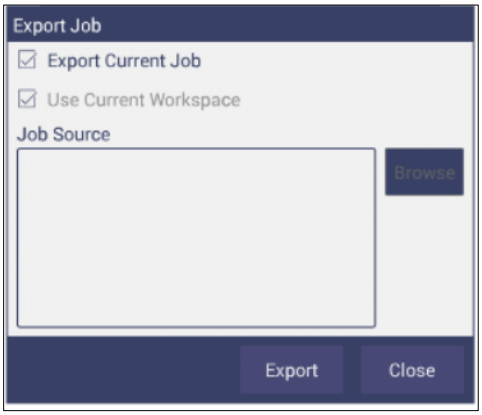


Figure 117. Export Current Job

- **EXPORT STANDARD**
  This option allows the user to browse and select an existing Standard(s) in the database and copy into the USB flash drive as a file (*.std*).

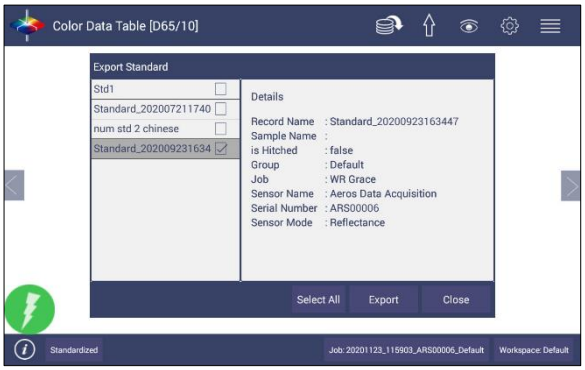


Figure 118. Export Standard

- **EXPORT WORKSPACE**
  This option allows the user to browse and select an existing Workspace(s) in the database and copy into the USB flash drive as a file (*.wsp*). To use the above functions, a USB flash drive must be present in the port.

- **EXPORT PDF**

  This allows the user to select a PDF file from the Downloads folder to export. Switch to the Download folder in the dropdown list and then select the pdf files to export.

Figure 119. Select Download Folder for PDF File Export

Jobs > Data Management > Email

Saved Jobs can be emailed if there is an active internet connection. When the ***EMAIL*** option is clicked, the following screen is shown prompting the user to browse and select a user and enter the recipient mail address. You can email any file in HunterLab folder as well as in the downloads folder. Data can be one file or multiple files, e.g. csv file in ***HUNTERLAB > CSV FOLDER***, pdf reports in Download folder. In Rev 1.03.0070 and above, the .csv file will be automatically created/updated when a job is saved. CSV files are stored at ***HUNTERLAB > CSV FOLDER***. These .csv files can be emailed.

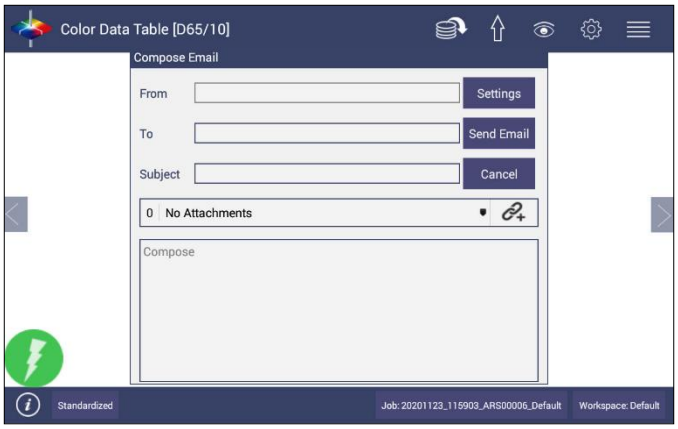


Figure 120. Enter an Address to Email a Job

- **EMAIL SETTINGS**

  Click ***MAIL SETTINGS*** button to configure the SMTP mail server configuration (Port, Server) as shown below. The mail settings configuration is mandatory to enable the mail job feature in the application. When done, press ***SEND*.**

Figure 121. Enter SMTP Mail Server Information

- ***JOBS > DATA MANAGEMENT > DELETE.*** The Delete function will allow deletion of Jobs, Standards, Workspace, Diagnostics and others. Data can be one file or multiple files. All selected files must be in the same file path location. In addition, one can delete PDF files from the Downloads folder. .
- ***JOBS > DATA MANAGEMENT > BACKUP/RESTORE.*** The ***BACKUP*** function will copy the entire Hunter Lab folder to a thumb drive. ***RESTORE*** enables the user to copy the backup folder of a thumb drive and upload to the Aeros. .

JOBS > HELP

To access the onboard manual, use Jobs: Help. **NOVICE HELP** can also be enabled under ***PREFERENCES> GENERAL***.

JOBS > ABOUT

The **ABOUT** menu provides information about HunterLab and the current software version.

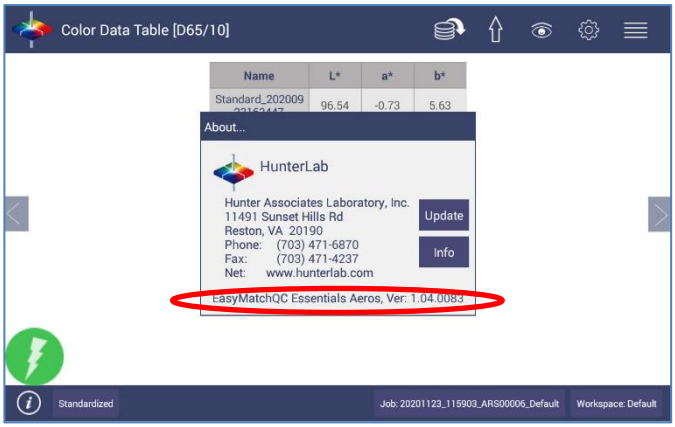


Figure 122. Job > About the Software

To update the software version from a USB flash drive, download the upgrade onto the flash drive. Then insert the USB flash drive into the port on the front of the instrument.

Figure 123. USB port on instrument

Open the ***JOBS > ABOUT*** menu and press ***UPDATE*** to continue. After update, open Essentials and it will prompt to enter or create an Administrator Account. If needed, you can edit this account in User Manager later.

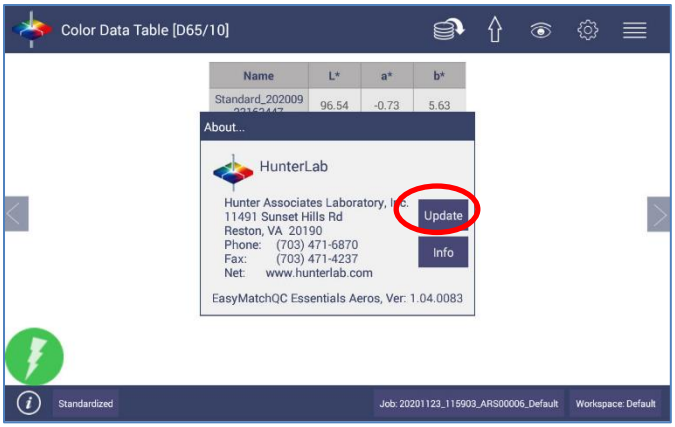


Figure 124. Update

For detailed information on firmware, enable a CMR and more, please press the ***INFO*** button on the screen.

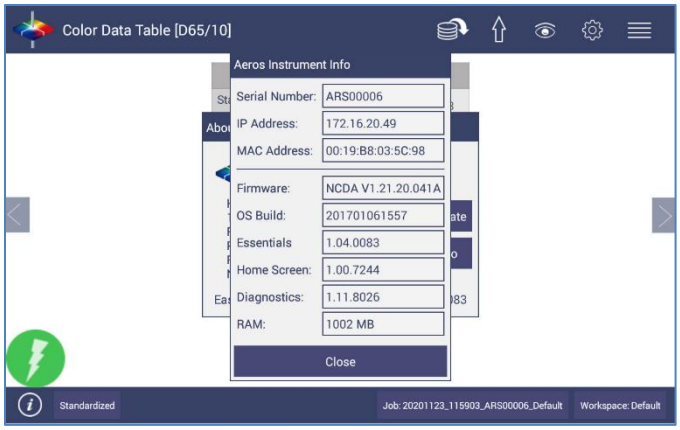


Figure 125. Instrument

Special Functions

Auto-Exporting Data Through A Network Connection

Connect Aeros to a Network. You can connect Aeros to a network hub using the Ethernet cable. The computer must be connected to the same network as the Aeros.

CONNECT TO A NETWORK HUB USING AN ETHERNET CABLE

- Hardware needed: Ethernet cable plugged into the back of the Aeros and the other end to a network hub.

Figure 126. Ethernet Cable

- To connect Aeros to network, go to ***WORKSPACES > PREFERENCES*** and Select ***CONFIG NETWORK SETTINGS***.

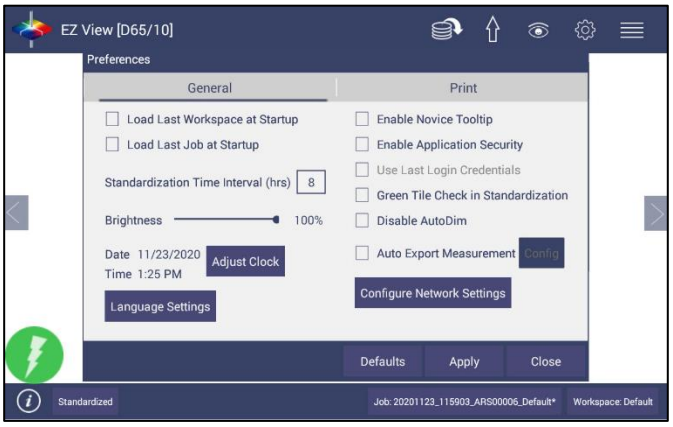


Figure 127. Preferences (General) > Network Settings

- Select **CONFIGURE ETHERNET SETTINGS**.
- Check ***USE DHCP FOR ETHERNET CONFIG***. Please write down the IP address showing in the Ethernet Setting dialog. You can also check the IP address of Aeros in ***JOBS > ABOUT > INFO.***

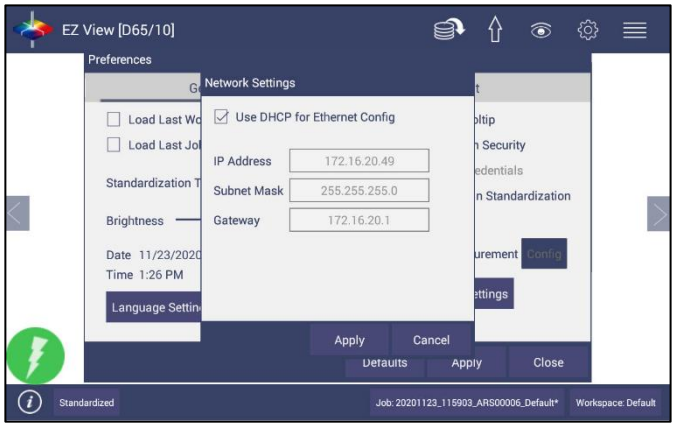


Figure 128. Select DCHP

- Go to ***WORKSPACE > PREFERENCES*** and select ***AUTO NETWORK DATA EXPORT MEASUREMENT*** using a check and select ***CONFIG***. Choose ***ACT AS SERVER*** and ***PORT*** number as ***11111***. You can also choose a delimiter to mark your data.

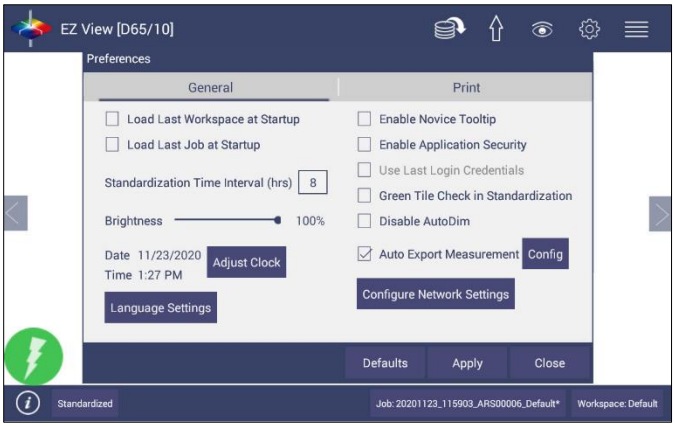


Figure 129. Auto Export Measurement

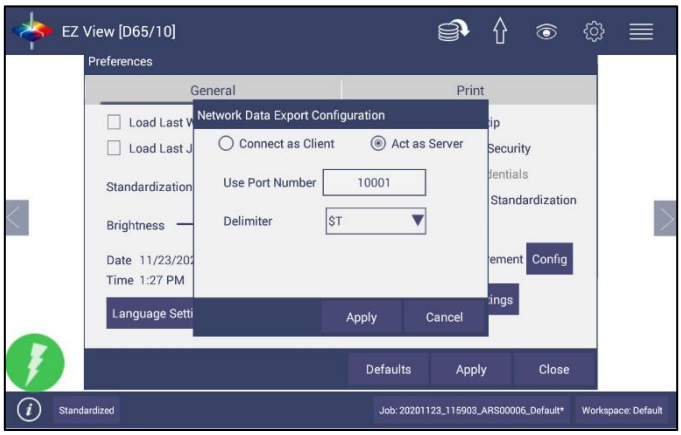


Figure 130. Network Data Export

- Configure the computer with the following settings:
  - ❖ Set computer as **CLIENT**.
  - ❖ Enter the **IP ADDRESS** of Aeros as recorded above.
  - ❖ Set the port number as **11111**.

- After all have been set, the data is ready to be exported from Aeros to the computer.

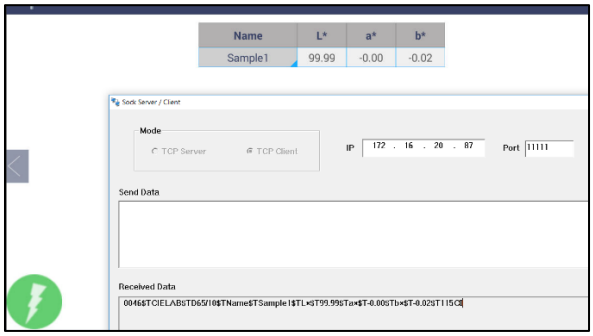


Figure 131. Data Export

Auto-Exporting Data Via Direct Connection Between Aeros And A Computer

Ethernet cable is plugged into the back of the Aeros and the other end is connected to the computer. Ethernet adapter USB can be applied here if the computer does not have an available Ethernet port.

- Materials Needed: Ethernet cable and Ethernet adapter to USB can be applied here if the computer does not have an available Ethernet port. Hardware needed: Ethernet cable and Ethernet adapter to USB can be applied here if the computer does not have an available Ethernet port.

Figure 132. Ethernet Cable

Figure 133. Ethernet to USB Adapter

- Connect Aeros to Computer:
  - Plug Ethernet cable into RJ-45 Ethernet connection at rear of Aeros.

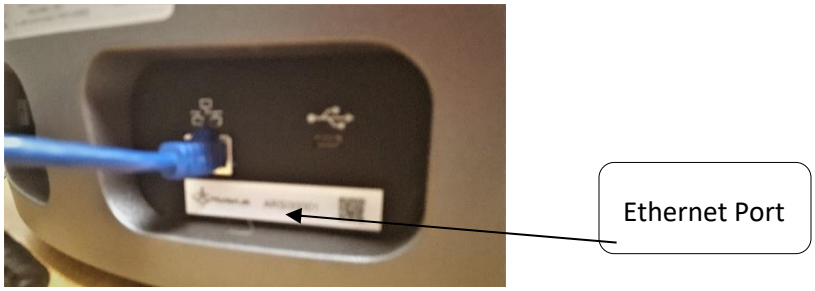


Figure 134. Rear View of Aeros

- Plug the other end into the Computer or into the Ethernet adapter

- Open Command Prompt in the PC.

  Type in ***IPCONFIG***, find the right ethernet (in this case, it is **Ethernet adapter Ethernet**) and write down **AUTOCONFIGURATION IPV4 ADDRESS** as well as the **SUBNET MASK**.

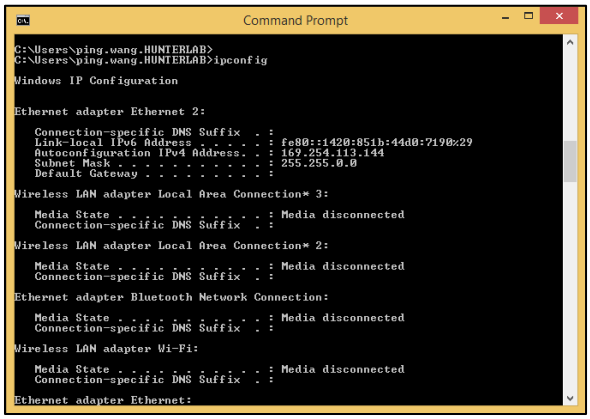


Figure 135. Command Prompt ipconfig

- Configure the Aeros

  Open Aeros Essentials, go to ***WORKSPACES > PREFERENCES > CONFIGURE NETWORK SETTINGS***. First, select the Ethernet configuration. Uncheck ***USE DHCP FOR ETHERNET CONFIG***. Type in ***IP ADDRESS*** and ***SUBNET MASK*** manually. The IP address here should be same as the autoconfiguration IPv4 Address in the PC, except changing the last number. The Subnet Mask is the exact same. Restart Aeros to get network setting applied.

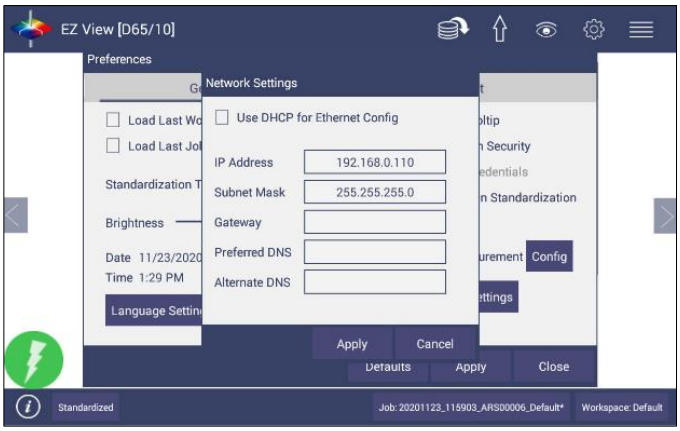


Figure 136. Configuration Parameters for Ethernet

- Press ***APPLY*** on the Ethernet Configuration and then ***APPLY*** on the Preferences Page to complete.

- Turn the instrument **OFF** and then back **ON**.

- Go to ***PREFERENCES*** and select ***AUTO NETWORK DATA EXPORT***.

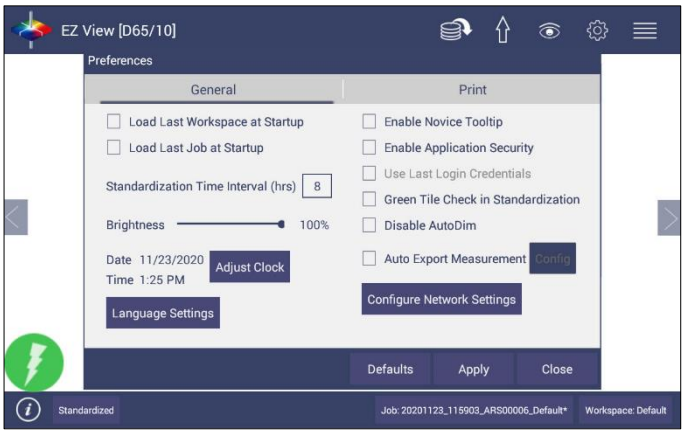


Figure 137. Read Options > Auto Export Measurements

- For a direct connection between Aeros and data collection computer, set up the Aeros as a **CLIENT**.
- Enter the **COMPUTER IP ADDRESS** here, in this case ***169.254.113.144*** and the **PORT** as ***10001***. Press ***APPLY*** on the screen to continue.

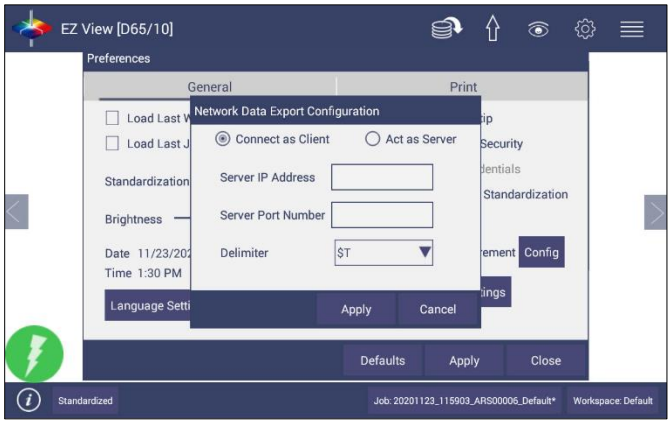


Figure 138. Read Options Export

- Aeros is now ready to send data.

- Configure the Computer:
  - Connection configurations differ depending on data collection software. The data collection computer will be set up as a Server.
  - Connect as follows:
    - Set computer as ***SERVER.***
    - Enter the computer IP address ***169.254.113.144***
    - Put the port number as ***10001***

- Send Data from the Aeros:
  - Configure the ***COLOR DATA TABLE*** with the color scale and parameters to be measured.

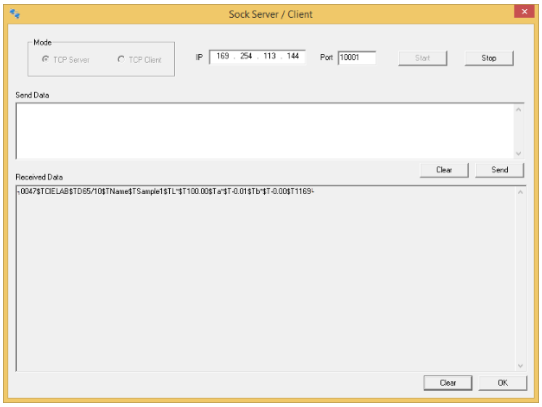


Figure 139. Data Output

Tips & Tricks: Recover Unsaved Measurement Data

- In the case where the application is closed unexpectedly, the data is temporarily stored in a table along with the Job details. When the application restarts, a prompt allows the user to recover the data.

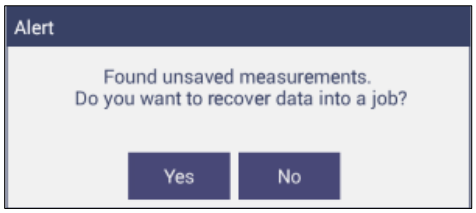


Figure 140. Recover Data

- If the user answers ***YES***, all measurements are recovered into a new job or appended to a saved job.

Specifications

The specifications and characteristics of the instrument are given in this chapter. For best performance, the instrument should be placed where there is ample workspace with medium or subdued illumination and no drafts. The operating conditions (temperature and humidity ranges) are given in the Operating Conditions section below.

Note: Do not leave Aeros in an area where temperature or humidity extremes are possible.

Operating Conditions

Storage Temperature (3weeks)	-20°C to 65°C (-5°F to 150°F)
Operating Temperature	4°C to 38°C (40°F to 100°F)
Noncondensing Humidity	10% to 90% for storage 10% to 85% RH noncondensing for operation

Physical Characteristics

Weight	23.0 kg (50.0 lbs.)
Dimensions (Height x width x depth)	56 cm x 38 cm x 51 cm (22.0 in x 15 in x 20 in)
Display	Touch Screen, high resolution color, 7in, 1280x800
Maximum Sample Height	65 – 140 mm (2.5 – 5.5 in)
Communications I/O: USB Ethernet RJ45 Remote Access Support	Connectivity to printer, keyboard, mouse and other peripherals. Front Panel USB: 2.0 bidirectional data export/import via thumb drive. Print directly to standalone or network printers; email directly from the instrument; stream data to LIMS and SPC systems. Enabled via internet-based support tool
System Power	100 – 240 VAC, 47 – 63 Hz to universal power supply @ 24 VDC/3.75A 90W

Conditions Of Illumination And Viewing

Light Source	Full spectrum balanced LED system array; 5 year typical LED life
Dual Beam Spectrophotometer	256 element diode array and high resolution, concave holographic grating; Sealed optics
Measurement Principle	Dual-beam Non-Contact Reflectance Spectrophotometer
Measurement Method	Port down, Non-contact, Rotating platter @ 12 RPM
Area Measured per Rotation	177.25 cm^2 (27.5 in^2)

Instrument Performance

Spectral Data	Range: 400-700 nm; Reporting Interval (nm): 10 nm
Spectral Resolution	<3 nm
Spectral Component	Excluded
Effective Bandwidth	10 nm equivalent triangular
Sampling Rate	Continuous at 7 measurements per second
Photometric Range	0-150%
Measurement Duration	User Selectable 5(, 10, 15, 30 seconds)
Measurements per Rotation	35
Maximum Sample Height	140mm (5.5in)
Inter-instrument Agreement	ΔE*L*a*b* < 0.30 (Avg) on CCSII BCRA Tile Set
Colorimetric Repeatability	ΔE*< 0.025 Max on White Tile

Measurement

Data Views	Color Data, Spectral Plot, EZ View, Color Plot, Trend Plot, Spectral Data
Illuminants	A, C, D50, D55, D65, D75, F02, F07, F11, TL84, ULT30, ULT35
Observers	2° and 10°
Color Scales	CIE L*a*b*, Hunter Lab, CIE L*C*h, CIE Yxy, CIE XYZ and differences
Color Difference Indices	ΔE*, ΔC*, ΔE, ΔE CMC, ΔE 2000
Indices and Metrics	E313 Yellowness, E313 Whiteness, YI D1925, Y Brightness, Z%, 457nm Brightness, Baking Contrast Units, Tint, HCCI, SCAA
Data Storage	>1 million Records; 8GB
Languages	English, Japanese, simplified Chinese
External Software	HunterLab EasyMatch QC, EasyMatch QC-Electronic Records

Standard Accessories

Standard Accessories	Calibrated instrument White Tile, Certificate of Traceability, Black Glass Standard, Green Diagnostic Tile, Standards Box, 30.5 cm (12-in) and 15.2 cm (6 in) sample pans, Power Supply, Quick Start Guide, Aeros User's Guide on CD

Regulatory Notice

HunterLab
ISO 9001 Certified

Declaration of Conformity

EU / EMC Directives:	**2014/30/EU Electromagnetic Compatibility** **2011/65/EU RoHS** **2006/42/EC** **2014/35/EU Low Voltage Directive**
Standard to which Conformity is Declared:	**IEC 61326-1: 2021** **EN61010-1 Product Safety**
Manufacturer:	**Hunter Associates Laboratory, Inc.** **11491 Sunset Hills Rd, Reston, VA, USA**
European Representative: Representative's Address:	**Christian Jansen HunterLab Europe GmbH** **Murnau D-82418 Germany**
Type of Equipment:	**Reflectance Spectrophotometer**
Model No.:	**Aeros®**

I, the undersigned, hereby declare that the equipment specified above conforms to the Directive(s) and Standard(s) above

Place: *Reston, VA, USA*
Date: *October 13, 2022*

Signature
Full Name *Kyle Fruth*
Position *Electrical Engineer*

A61-1018-847 REV E

Aeros Maintenance

The Aeros is engineered to be virtually maintenance free. This section outlines the few parts of the sensor that are to be maintained for the instrument to function properly.

CLEANING THE AEROS

The Aeros is NOT waterproof, but the exterior of the case may be wiped with a damp cloth.

CLEANING THE WHITE TILE

The White Standard is an optical coating and should be handled in much the same way as other optical surfaces. Although the material is very durable, care should be taken to prevent contaminants such as finger oils from contacting the material's surface. If the surface appears lightly soiled, it may be air brushed with a jet of clean dry air. For heavier soil, the material can be cleaned by scrubbing with a soft brush under running water. Blow dry with clean air or allow the material to air dry. If the material is heavily stained, soak with either an extremely mild mix of soap and water, 5% white distilled vinegar, or hydrogen peroxide. Then run under water while scrubbing with a soft brush. Always keep tiles in the Standards box when not in use

CLEANING THE BLACK GLASS AND GREEN TILE

The **Green tile and Black Glass** can be cleaned using a soft nylon-bristle brush, warm water, and laboratory grade detergent such as SPARKLEEN. Wipe the tiles dry using a clean, non-optically brightened, lint free paper towel, or use warm water as a rinse and let stand to air-dry in a couple of minutes.

Note: SPARKLEEN is manufactured by Fisher Scientific Co., Pittsburgh, PA 15219, and may be ordered from them using catalog number 4-320-4. Add one tablespoon of SPARKLEEN to a gallon of water.

The above procedure is particularly useful if the lab area is not clean. If, however, the lab is clean, an equally effective method for occasional tile cleaning is to use IPQ (isopropyl alcohol) sprayed onto a clean, non-optically brightened, lint free paper towel such as a Kim wipe. Wipe tile thoroughly watching for fingerprints and let air dry.

Keep the **Black Glass** in the standards case when not in use to prevent it from becoming scratched or collecting dust. Before standardizing the instrument, check the black tile for scratches and dust. Significant scratches that result in a hazy appearance to the finish may cause standardization to be in error. If the black tile is scratched, call the HunterLab Order Processing Department or contact your local HunterLab representative to order a replacement.

When You Need Assistance

If you need for technical or sales assistance on applications, troubleshooting, , service, warranty, accessory pricing and more, please contact the office nearest you:

- For the Americas, Support@hunterlab.com
- For Asia, AsiaSupport@hunterlab.com
- For Europe, EuropeSupport@hunterlab.com
- For India, Middle East and Africa, IMEASupport@hunterlab.com
- For all other regions, Support@hunterlab.com

Additionally, our global support website offers 24/7 assistance with a library of information on various color measurement and appearance topics such as applications, instrument operation, and troubleshooting. The HunterLab global support website is located at **support.hunterlab.com**.

For personalized assistance, go to support.hunterlab.com and locate the **Create A Ticket** button on the menu. A subsequent form gathers information on your request for response from our Customer Experience Teams around the globe.

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