Agera®
Supplemental Manual for EasyMatch® QC

The world's true measure of color

HunterLab

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

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For EasyMatch QC 4.99 and Above

Preface

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EasyMatch and Agera are registered trademarks for Hunter Associates Laboratory, Inc.

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Safety Notes

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

Caution: There is a potential of a 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.

For your safety when using the Agera, 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**.**

Legal Disclaimers: Instrumental – Visual Evaluation

The HunterLab Agera 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 denies 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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Contents

Setting Up the Agera

Agera is a multi-purpose 0/45° color and appearance measurement system that provides users with 400-700 nm reflectance color, ASTM 60-degree gloss, and sample imaging capabilities in either a port up or port forward configurations. UV controlled LED illumination provides superior color accuracy and repeatability on standard and fluorescent samples. An internal camera provides on-screen 45/0° sample viewing during the measurement preparation and will capture and save a sample image for retrieval with the sample data. All measurement results are simultaneously displayed on a seven inch high resolution touch screen interface via the embedded EasyMatch Essentials quality control software, which includes most color scales, indices and Illuminant/observer combinations desired for industrial applications. With Ethernet, wireless and USB connectivity, data results can be saved, emailed directly from the Agera instrument, printed to local or networked printers, and streamed to LIMS and SPC systems.

Standard Accessories

- Calibration Box with Agera calibrated white tile, Agera calibrated black glass standard and Agera green diagnostics tile
- Area of View Port Plates - Set of 3: XLAV: 51 mm (2 in),
  - LAV: 25.4 mm (1 in),
  - MAV 16.9 mm (0.625 in)
- Certificate of Traceability
- Power Supply
- Agera Quick Start Guide
- USB Flash Drive

Selecting a Space for the Agera

The following illustrates a successful installation. Set up the HunterLab Agera 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 Agera 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 Agera

Clean the outside surfaces of the Agera 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 Agera on the bench. Remove wrappings and cable ties. Inspect for damage and notify the carrier and HunterLab immediately if any is discovered.

Retain the packaging in case of needing to return the instrument return to HunterLab.

Unlocking the Shipping Bolt

Before measurements can be taken, the shipping bolt must be unlocked. Located on the underside of the instrument, a Phillips screw driver is needed to turn the bolt counterclockwise.

Note: The shipping bolt has been recently added to the instrument. Please ignore this step if there is no shipping bolt in Agera.

If the instrument is to be shipped, then the go to Essentials *WORKSPACE MENU > DIAGNOSTICS > ADVANCED DIAGNOSTICS*. Then select *PARK FOR SHIPPING* to move carousel to the parked position. Then lock the shipping bolt, and power off the Agera.

Figure 1. Shipping Bolt
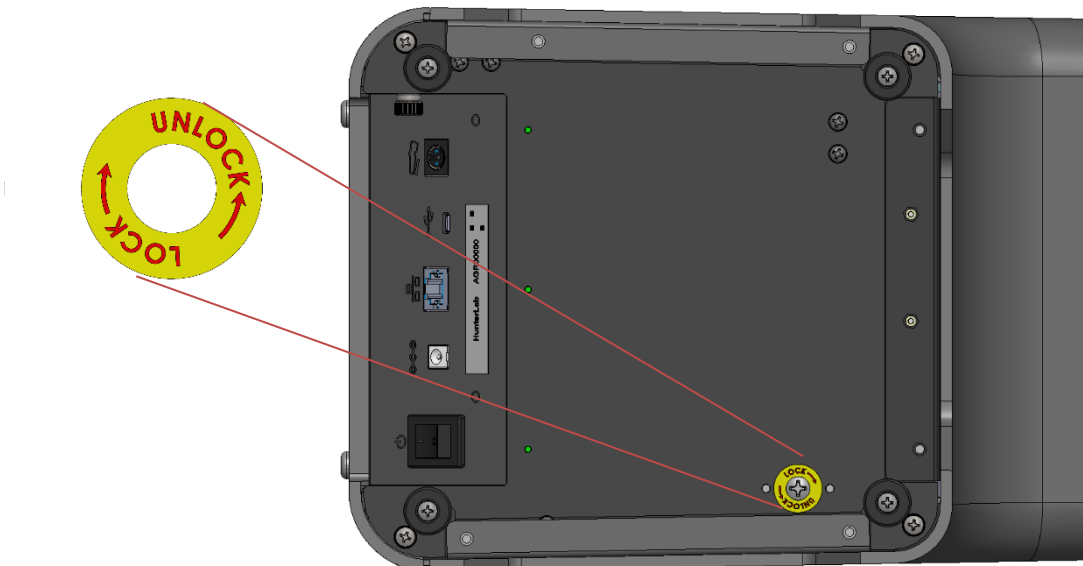
Power Jack

- 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.

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

Agera is grounded using the grounding portion of this power supply. Only plug this supply into a properly grounded power outlet. Do not use an inappropriate adapter to plug the instrument into an ungrounded outlet or electric shock may occur. More information on the wiring of the power supply can be found in the Agera Specifications section of this manual.
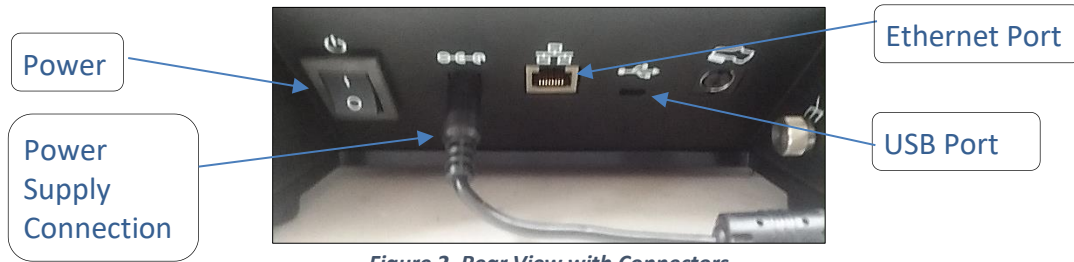

Power

Power Supply Connection

Ethernet Port

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.*

Ethernet Port

This port is used to connect the Agera to:

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

For more information see Appendix A.

Agera Installation

The Agera is simple to set up and attach to your computer. The following instructions guide you through the initial installation of your Agera system.

1. Ensure that the on/off switch on the back of the sensor is set to off.
2. Connect the power supply to the sensor and plug it into a power outlet.

   Note: Refer to the Agera Specifications section of this chapter for recommendations concerning the power line and its conditioning.

3. Connect the ethernet cable to the computer and to the Agera ethernet port.

   Note. Since the Agera uses an ethernet cable to communicate with the computer, select the highest number COM Port No. offered.

Power Switch

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

Front and Rear USB Connectors

- There are two USB connectors on the Agera. Both can be used for exporting jobs and workspaces, backing up the instrument data and updating software. If the user wants to connect multiple devices at the same time, a USB hub can be plugged in to the front of the instrument.

Figure 3. USB Port on Front of Instrument

Port Forward Orientation

- The Essentials screen is default setup for port up Agera. If port forward orientation is required, then go to **WORKSPACE > PREFERENCES** and check **REVERSE SCREEN ORIENTATION** and click **APPLY**. Power off/on Agera to get the screen orientation changed.

Agera Options and Sample Devices

For the latest information, please refer to support.hunterlab.com.

> *Note: 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.*

Agera Installation

Install EasyMatch® QC Software

Complete the following steps:

1. Log into the system using an account that has **ADMINISTRATOR** privileges for the PC — network or local.

2. Insert the installation CD into the CD-ROM drive. If the system is setup to automatically run CD programs, the menu will appear and you may skip to Step 5. Otherwise, continue with Step 3.

3. Select the EasyMatch QC Icon or from Windows, go to *START > RUN > EasyMatch QC_MENU* and *OPEN*. The following screen will be shown.

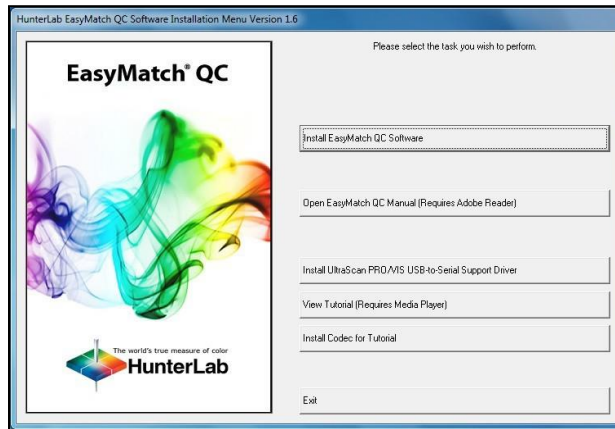*Figure 4. EasyMatch QC Installation*

4. Select *INSTALL EasyMatch QC SOFTWARE* and follow the screen prompts.

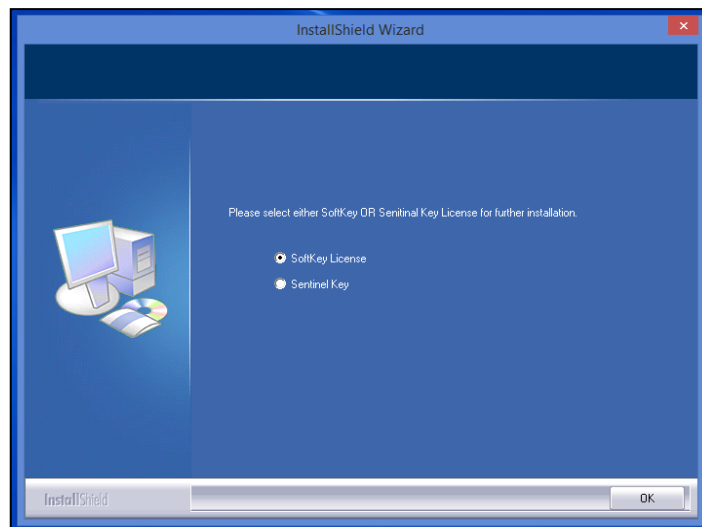5. Select *SOFTKEY LICENSE* as the type of key to use with the software.

Figure 5. Software Key License

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6. When the EasyMatch QC installation is finished, select the **OPTION BUTTON** next to **YES, I WANT TO RESTART MY COMPUTER NOW** and then **FINISH** restarting the computer and log back in.
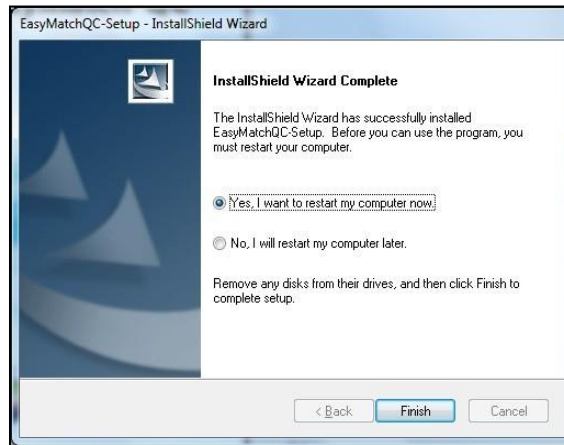

Figure 6. Completed Install

7. The CD can now be removed.

Activate the SoftKey License

1. From the Desktop, select the EasyMatch QC Icon or from the Windows Start menu, choose the following to open the software:

   START > PROGRAMS > HUNTERLAB > EasyMatch QC

2. A warning message to activate the license will be displayed as shown in the figure below.

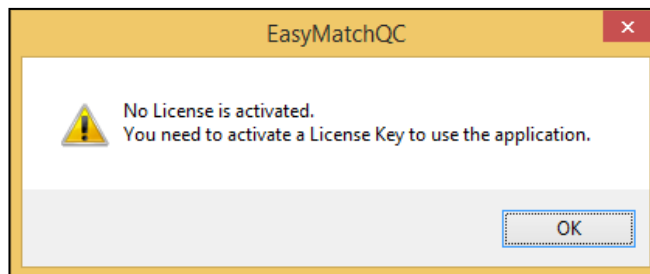   *Note: EasyMatch QC functions are unavailable before key activation.*

Figure 7. No License Warning

3. The SoftKey License is uniquely associated with the sensor serial number and is provided on a thumb drive supplied with EasyMatch QC or via email from HunterLab.

4. Go to **HELP > LICENSE REGISTRATION > ACTIVATION**.
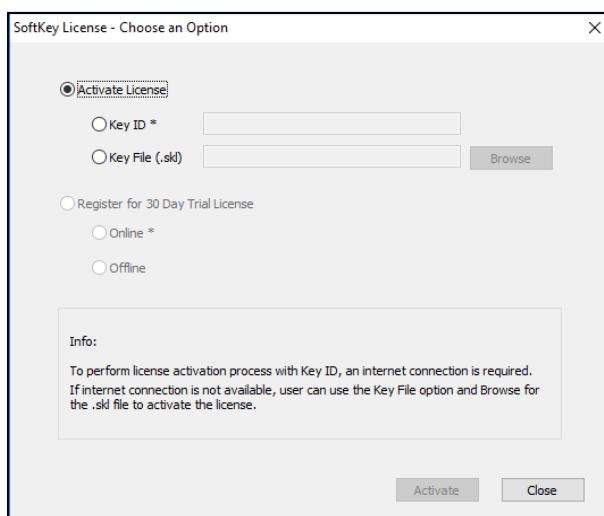
5. Select **ACTIVATE LICENSE**.

Figure 8. Activate License

i. ***Option #1: Key ID.***

This method is for copying the ID from an email or writing down the 32-digit code. This requires an internet connection.

a. From the ***CHOOSE AN OPTION*** page (Figure 8), select ***KEY ID***.

b. Paste-in or type-in the License Key ID and click ***ACTIVATE***.

c. An acknowledgement will be displayed showing the activation status.

ii. ***Option #2: Key File (.skl)***

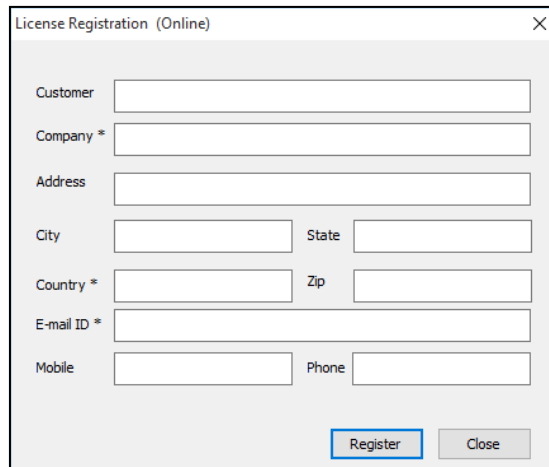This method is for using the SoftKey License (.skl file) on the thumb drive.

a. Place the thumb drive with the SoftKey License in the USB port.

b. From the ***CHOOSE AN OPTION*** page (Figure 8), select ***KEY FILE*** (.skl).

c. Browse the USB to find the **SOFTKEY LICENSE** (.skl) file, then click ***ACTIVATE***.

d. An acknowledgement will be displayed showing the activation status.

iii. ***Option #3: Sentinel Key***

a. If the user has a HunterLab USB hardware key, then it can be used with a new sensor on the same computer. Return to Install the Software, Step 5 (Figure 5) and select the Sentinel Key to continue.

iv. ***Option #4: 30-day trial***

a. Fill out the registration form provided for the 30-day trial. Connect to the internet. HunterLab will approve the trial and email the SoftKey license back. Follow the directions for Option #1 or #2 to complete.

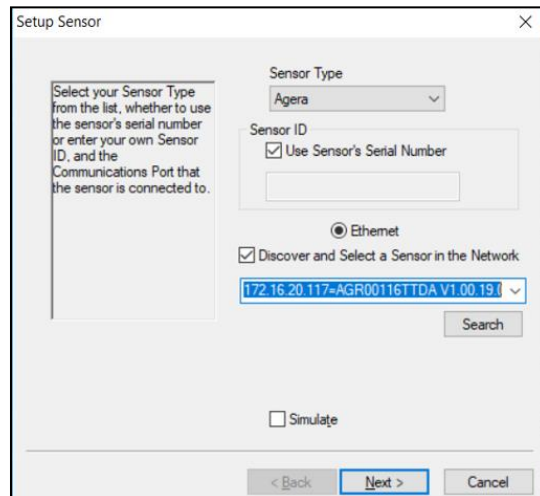*Figure 9. Request 30-day Trial*

Connect the Agera to a Computer

1. See Appendix A

Sensor > Install and Setup

1. Open EasyMatch QC in the computer.

2. From the *SENSOR MENU*, select *ADD SENSOR*.

Figure 10. Add Agera Sensor

3. Select *Agera* as the Sensor Type and use the Ethernet (selected as default) to connect Agera to the network and EasyMatch QC. Click *NEXT* to search available Agera.
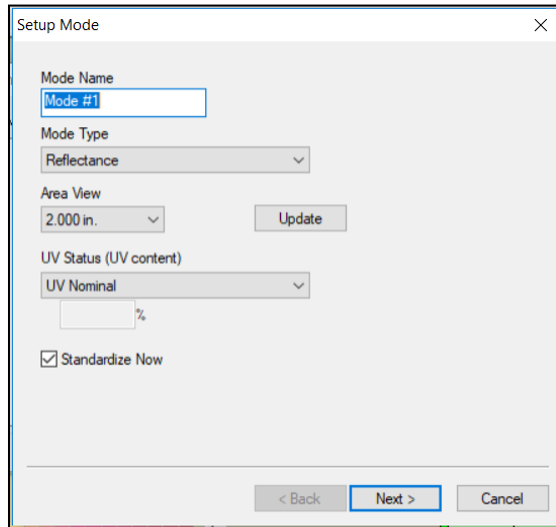
Figure 11. Setup Sensor in EasyMatch QC

4. Edit the **SETUP MODE** for your instrument,

    a. Edit the *MODE NAME* in the first dialog box.

    b. The area view information is updated based on the current port plate attached. To change to another **PORT PLATE/AREA VIEW**, place the new port plate on the instrument and click the *UPDATE* button.

    c. The **UV STATUS** can also be selected. The instrument should be standardized in the chosen configuration before measurements are made. For the measurement of optical brighteners or UV-induced fluorescence, the calibration and control of the UV energy is important. For some applications, the elimination of fluorescence from a measurement is important. Fluorescence is caused by ultraviolet (UV) excitation of the sample, where a material absorbs nonvisible wavelengths of energy and re-emits the energy as light in the visible spectrum. Since UV light is part of the normal sample illumination, measurements may include UV excitation. To eliminate fluorescence from the measurement, select UV-excluded.

        I. *UV-Nominal -* This mode includes UV. The UV for this mode can only be calibrated/updated at HunterLab.

        II. *UV-Excluded* – This option allows the user to negate the effect of optically-brightened agents or when used in multi-mode with UV-nominal or UV-calibrated, determines the amount of optical brightening agents present.

        III. *UV-Calibrated* – When UV-Calibrated is configured in a mode, users need to do UV calibration under Sensor/ UV calibration. This UV calibration procedure optimizes the UV content to match D65 Daylight over time using a Fluorescent Standard with an assigned whiteness index value such as WI Ganz [D65/10] and WI E313 [D65/10]. When UV calibration is done correctly (i.e., the measurement is <0.5 from the calibration value), it will show port plate size, calibrate date and Whiteness index in this dialog as a stamp. If the measurement is >0.5, then the user will be asked to re-standardize and re-read the fluorescent standard. If the tolerance is not met after

three standardization and measurement, then UV calibration will be failed and users need to start the UV calibration process again. Please see the detailed process of UV calibration at Page 19.

5. After adding the sensor into EasyMatch QC successfully, please restart EasyMatch QC.
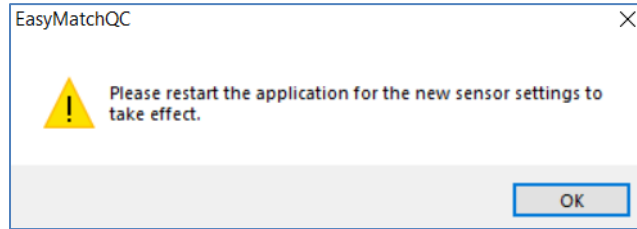
Figure 12. Restart EasyMatch QC

6. You are now ready to use EasyMatch QC with the Agera.

Sensor > Standardize

The Agera must be standardized on a regular basis to keep it operating properly. Standardization sets the top and bottom of the photometric scale. During standardization, the bottom of the scale is set using a black tile read on the Agera. The top-of-scale is set using a white tile.

It is recommended that the instrument be standardized at least once every eight hours. Only reflectance is available on the Agera.

The instrument can be standardized at any time by selecting **SENSOR > STANDARDIZE** or by clicking the **STANDARDIZE** button on the default toolbar. You are first prompted to indicate the instrument configuration.

To standardize, read the bottom-of-scale and the top-of-scale.
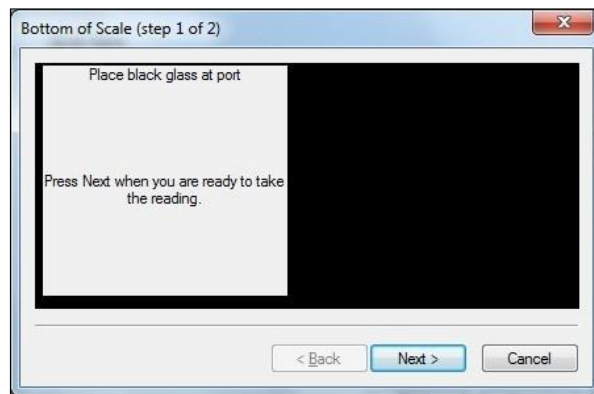
Figure 13. Read Bottom-of-Scale
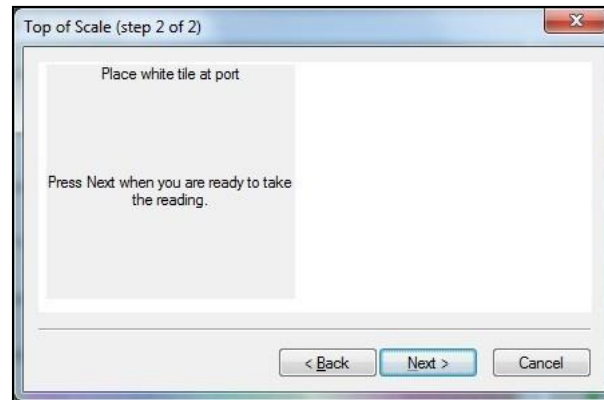
Figure 14. Read Top-of-Scale

- Remove the calibrated white tile when standardization is completed. Click *OK*.
- Standardization is updated and reported as **STANDARDIZED** in the bottom status bar along with UV Mode and Port Plate Size.

Note: Agera supports multiple UV modes allowing for switching among different valid UV modes after standardization.

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.

For step by step instructions on the Green Tile Test, click here.

Take Sample or Standard Measurement

Using Agera and EasyMatch QC to Take Measurements

1. Select a mode under **SENSOR > SET MODES** and **APPLY**.

2. Click **SAMPLE/STANDARD** measurement. Make sure that the right port plate is attached for the current mode. Otherwise, it will prompt the error message below.

Figure 15. Port Plate Error Message

3. In the **COLOR DATA TABLE** View, right click to select **CONFIGURE** to select indices and information that you want to use.

Note: Gloss is listed under indices. UV status and port plate information is listed under Text field.
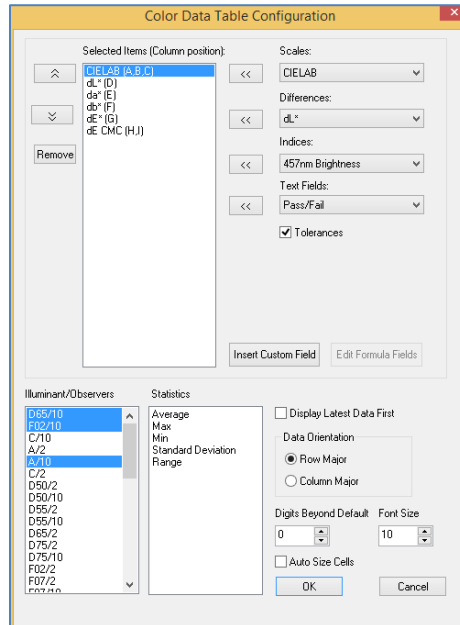
Figure 16. Color Data Table Configuration

Figure 17. Measurement

Agera Multiple Read Modes

EasyMatch QC supports multiple read mode for the Agera sensor. Multiple modes can be configured if using the same area of view. A sample can be read by all modes at once by pressing the **READ** button. For example, users can measure the contribution of optical brighteners on a paper sample using Multi-Read Modes: 1''Area View - UV calibrated and 1'' Area View - UV excluded modes.

Here are the steps to use multiple read mode in Agera:

1. From **SENSOR > SET MODES**, add modes that are needed. e.g. 1'' UV-calibrated, 1'' UV-nominal and 1'' UV-excluded.

Figure 18. Configure UV-calibrated Mode
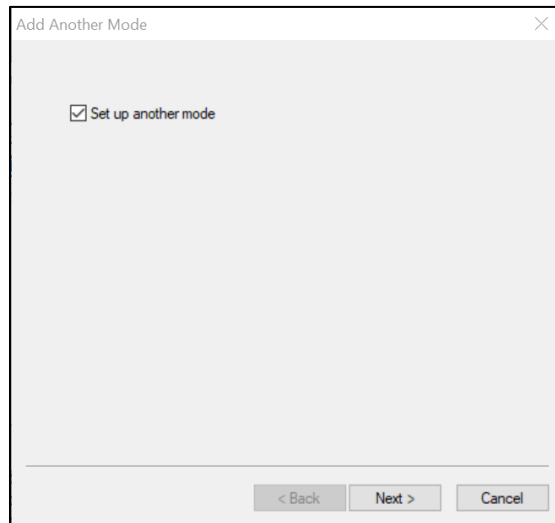
Figure 19.. Setup Another Mode
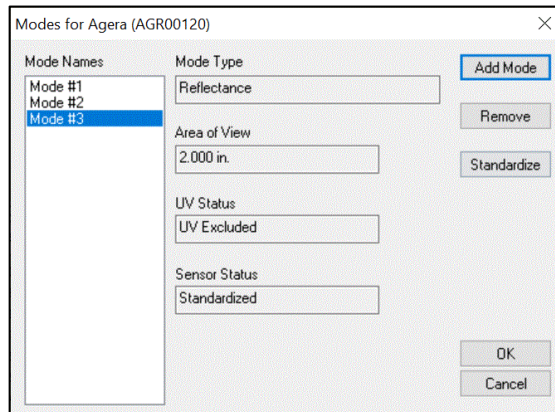
Figure 20. Completed Set Modes

If UV calibrated mode is added, continue to calibrate under **SENSOR > UV CALIBRATION** for this mode. Here are the steps to do UV calibration:

a. Once UV-Calibration is selected*,* the ***SENSOR > UV CALIBRATION*** selection will change from gray to black on the Sensor Menu. Select this action and continue.
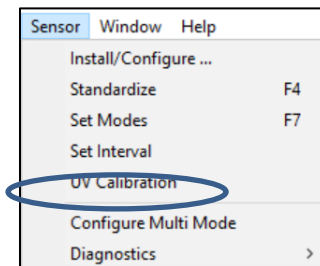
Figure 21. Select UV Calibration

b. The UV-calibration screen is shown. Press ***UV CALIBRATE*** to complete this action.
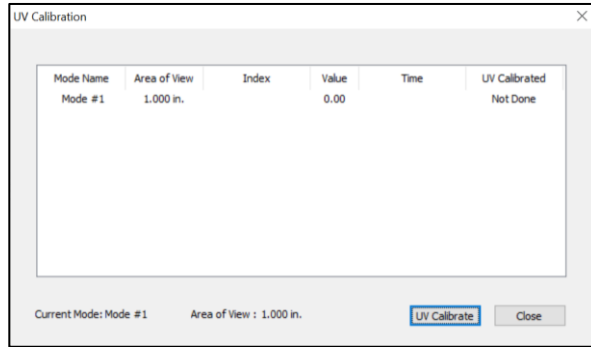
Figure 22. Press UV Calibrate

c. When prompted, select the **INDEX** to be measured and enter the **TARGET VALUE** for the fluorescence standard. Press **CALIBRATE UV** to continue. Next, the user will be prompted to standardize and then read the fluorescent standard.
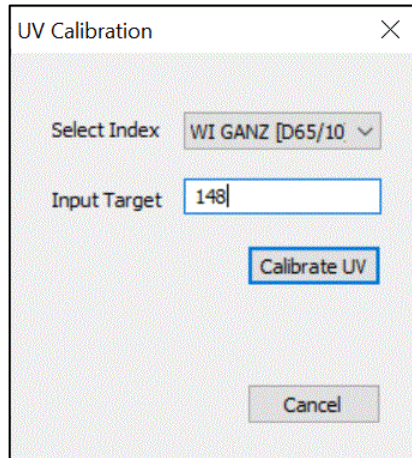
Figure 23. Select Index and Input Target Value
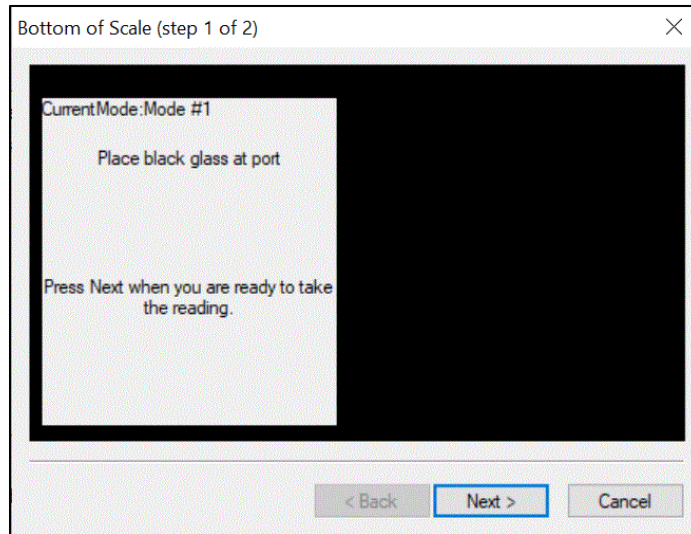
Figure 24. Black Glass Standardization
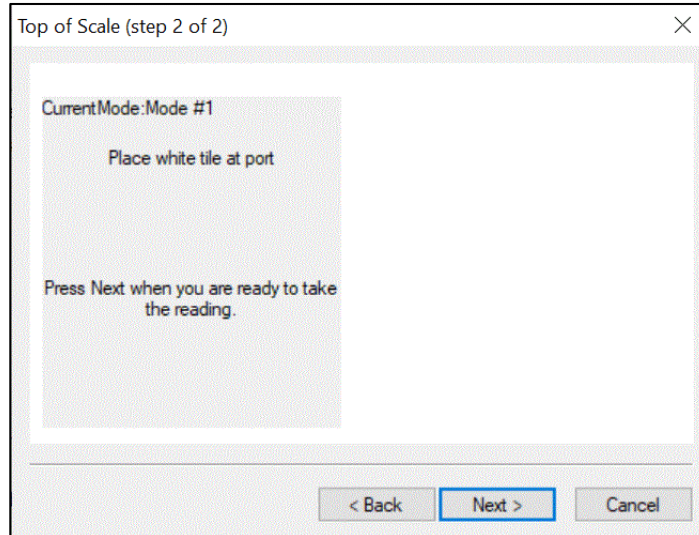
Figure 25. White Tile Standardization

Figure 26. Fluorescent Tile Standardization

d. If the measured WI is about +/- 0.5 different from the target, the UV calibration is done. If the WI difference is out of +/- 0.5 range after three cycles (3 standardizations), then UV calibration has failed. I this case, the UV calibration process must be done again.
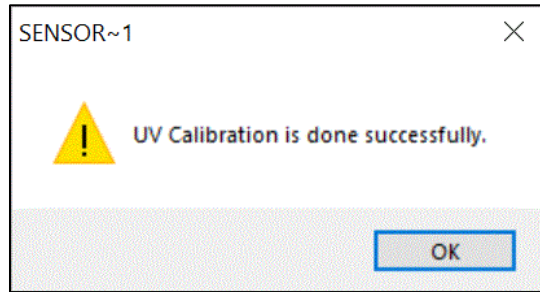
Figure 27. UV Calibration Success

e. The UV-calibration screen shows the port size, index, value, and time taken and UV-calibration status. Press **CLOSE** to continue.
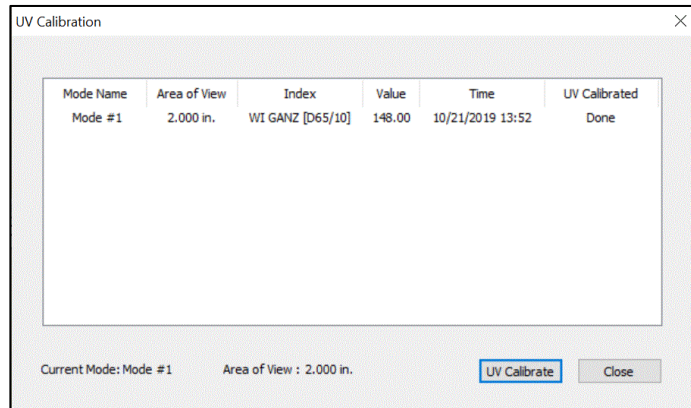
Figure 28. Press Close to Continue

2. Go to **SENSOR > MULTI-MODE** and select the two or three modes by highlighting the desired mode and press **INCLUDE** to select.
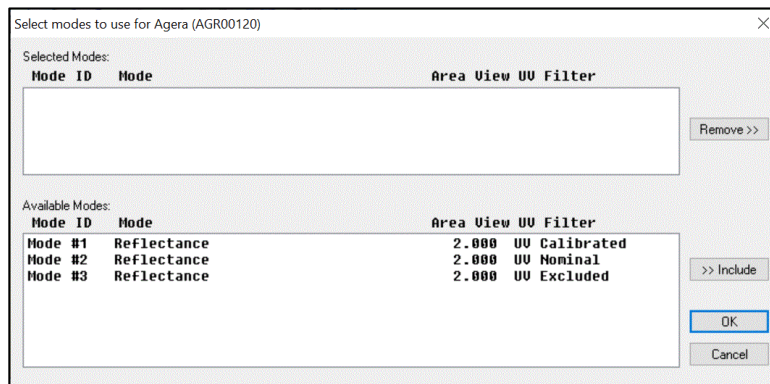
Figure 29. Modes for Measuring Optical Brighteners

3. When all desired modes have been selected, press **OK** to continue. The user can select one, two or three modes as needed.
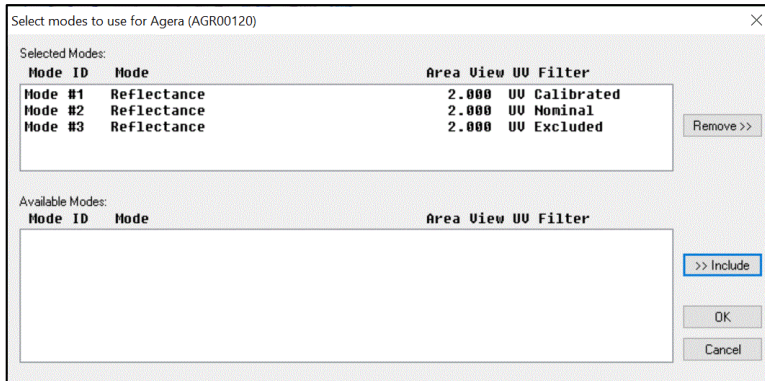
Figure 30. Selected Modes

4. Go to **OPTIONS > READ METHOD** and select **MULTIPLE READ MODE**. Press **OK** to continue.
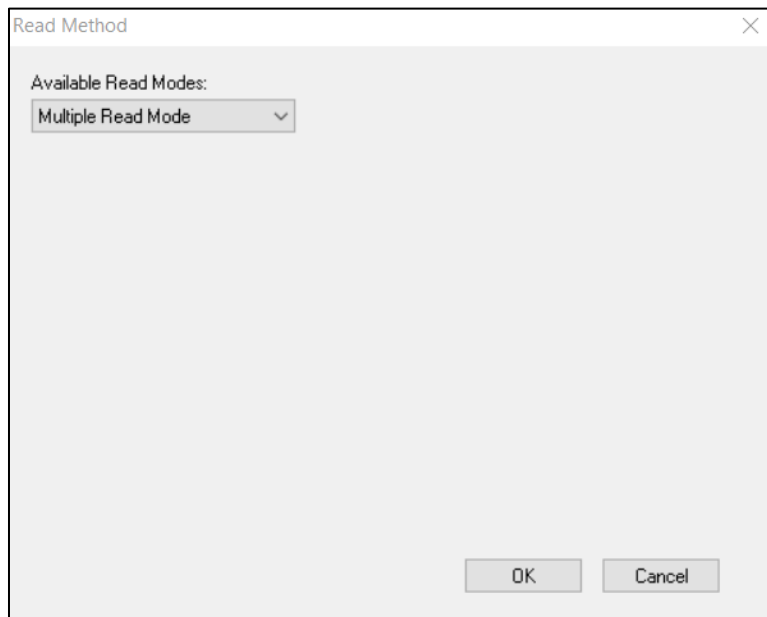
Figure 31. Select Multiple Read Mode

5. **RIGHT CLICK** on Color Data Table Screen to configure for UV measurements. When UV Status is selected, the screen can display the modes as selected.
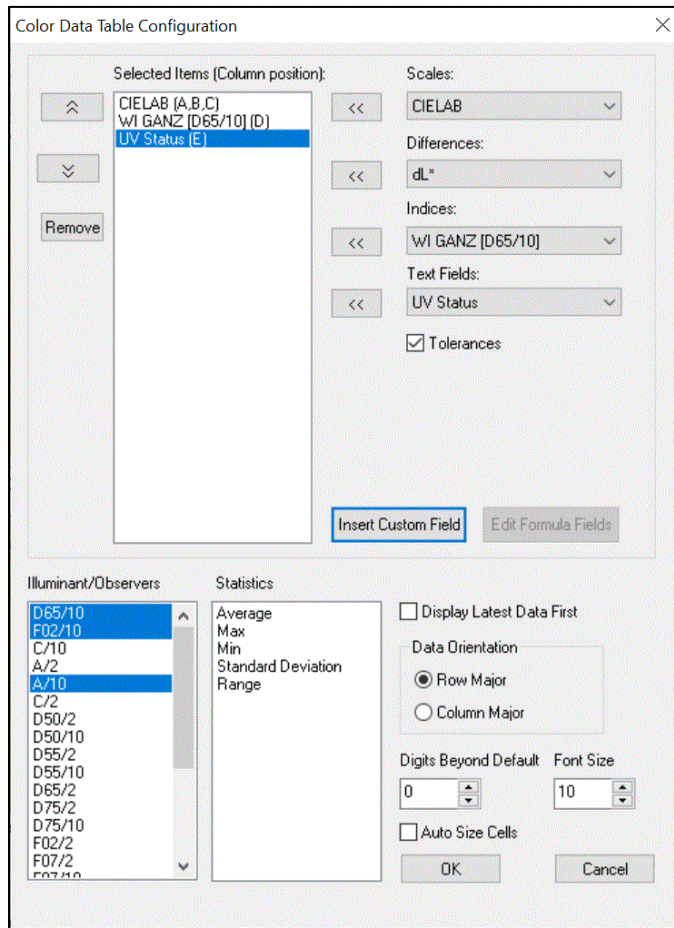
Figure 32. Color Data Table Configuration for Measuring UV

6. Take measurements of standards and/or samples. This screen shows measurements for Ganz Whiteness with UV-calibrated, UV-excluded and UV nominal. Just one or two or all methods can be used for measurements.

ID	L*	a*	b*	WI GANZ [D65/10]	UV Status
Standard 1	100.08	0.20	-4.55	148.29	UV Calibrated
+Tolerances					
-Tolerances					
Standard 2	100.11	0.19	-4.79	150.68	UV Nominal
Standard 3	99.37	-1.54	2.83	75.36	UV Excluded
Sample 3	100.08	0.19	-4.56	148.39	UV Calibrated
Sample 4	100.11	0.19	-4.80	150.70	UV Nominal
Sample 5	99.37	-1.53	2.84	75.32	UV Excluded

Figure 33. Color Data Table showing UV Contribution

Gloss Measurements

Agera includes a built-in 60-degree gloss meter with a single LED illumination (filtered to C/2°)/detector pair in conformance with ASTM D523 and located right below the sample port plate. Gloss is measured for each sample and standard measurement. To show the Gloss value, please select **GLOSS INDEX** in the **COLOR DATA SCREEN** under **INDICES**.

Some optional port plates such as those with protective, or UV blocking glass or the sample cup port plate will cause the geometric measurement conditions for gloss to change. When the Agera determines that one of these optional ports is installed, the gloss measurement is disabled.

Visual Inspection

Visually inspect the sample to confirm that the instrument readings agree with visual assessment.

Agera Maintenance and Testing

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

Routine Maintenance

The following schedule outlines recommended maintenance procedures for the Agera. The actual frequency of maintenance required will be determined by the measurement application and plant operating conditions.

Weekly
Clean the exterior of the sensor and mounting. The Agera is NOT waterproof, but the exterior of the case may be wiped with a damp cloth. Keep the glass cover under the port plate free of dust, smears, and fingerprints..

Monthly
Clean the standards as per the directions below. If a Hitch Standard has been used, then compare hitch standard values for the Agera to those of the off-line colorimeter. Re-hitch the Agera if necessary or desired.

As Needed
Perform Diagnostics.

System Warm-Up

If power to any of the system components has been turned off, it must be restored to all components before operation can resume.

When restoring power to system components:

- Restore power to the instrument and computer (if included).

- Allow at least thirty minutes of warm-up time.

- Standardize.

- Select the desired product setup and begin operation.

Cleaning the Instrument Standards

The White Standard tile and Black Glass are unique to each individual instrument and should be treated with great care. They should always be protected from physical damage and dirt .

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 durable, care should be taken to prevent contaminants such as finger oils from contacting the material's surface. Always keep tiles in the Standards box when not in use

- For Agera Serial Number >AGR00405: 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.

- For Agera Serial Number AGR00305 to AGR00405: This is a white porcelain tile. See instructions below for Green Tile.

- For Agera Serial Number <AGR00305: The White Standard has a durable optical coating and should be handled with care to prevent contamination of finger oils, scratches, and harsh chemicals. If the surface appears lightly soiled, it may be air brushed with a jet of clean dry air. For heavier soil, the White Standard 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% 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 for 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.

Diagnostics on the Agera

Diagnostics are included with the Agera EasyMatch QC. To initiate, select **DIAGNOSTICS** from the **SENSOR MENU. THE GREEN TILE TEST, REPEATABILITY TEST and GLOSS** are the available tests.

Green Tile Test

To begin the Green Tile Test, standardize the instrument and place the Green Tile at the port. The software first prompts for the values on the back of the tile.

Figure 34. Enter Green Tile Values

To standardize, read the bottom-of-scale and the top-of-scale.

Figure 35. Read Bottom-of-Scale
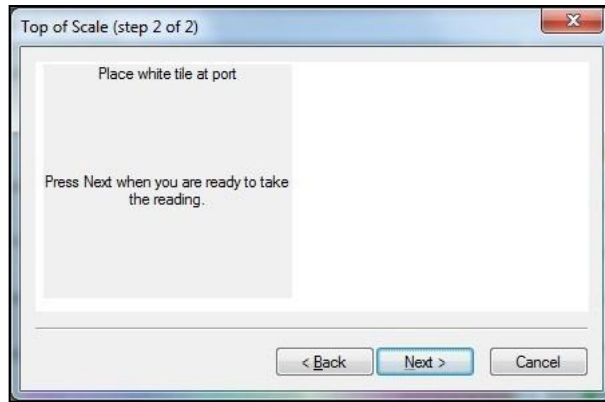
Figure 36. Read Top-of-Scale

Place the green tile at the port and press **NEXT** to continue. The test begins and the results are displayed when complete.
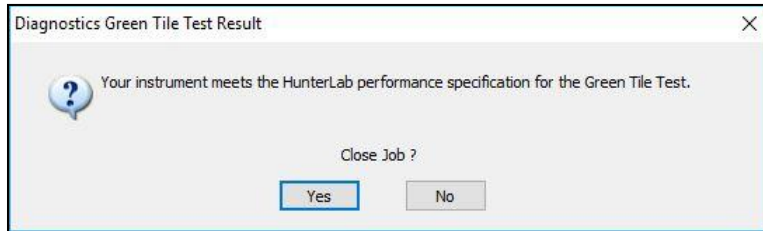
Figure 37. Screen Display for Test Results

To close the green tile test, press **YES**; to return to the Green tile test menu, press **NO**.
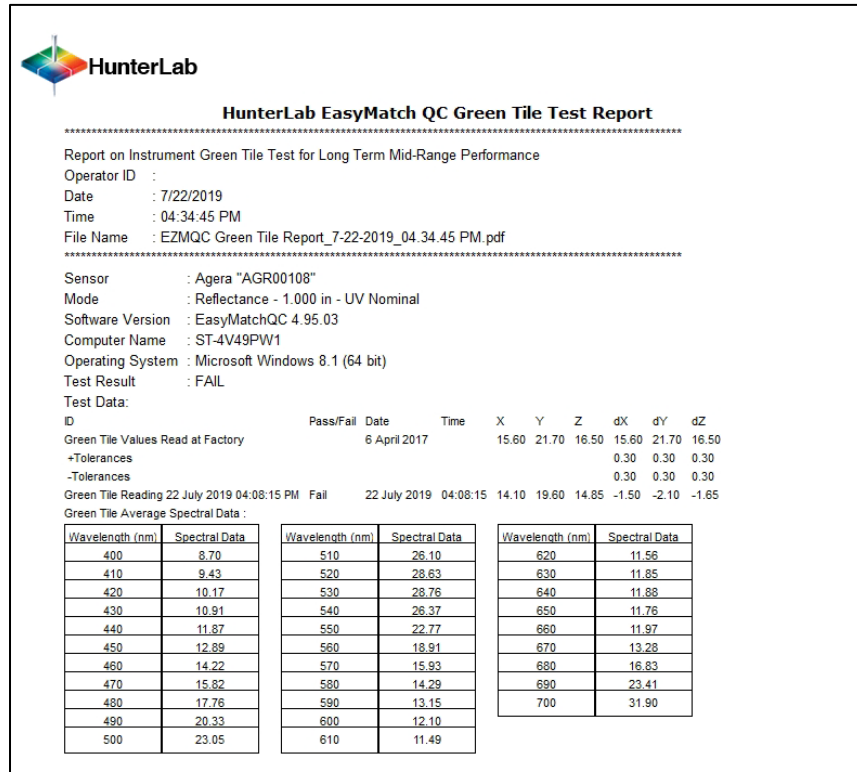
Figure 38. Green Tile Test Results

Repeatability Test

The repeatability test is initiated by standardizing and leaving the white tile in view. Each white tile reading is reported along with a pass/fail evaluation.

To standardize, read the bottom-of-scale and the top-of-scale.

Figure 39. Read Bottom-of-Scale

Figure 40. Read Top-of-Scale

The test will begin automatically, and each reading will be shown.

Figure 41. Repeatability Readings

When the test is complete, results are shown and output as a report.

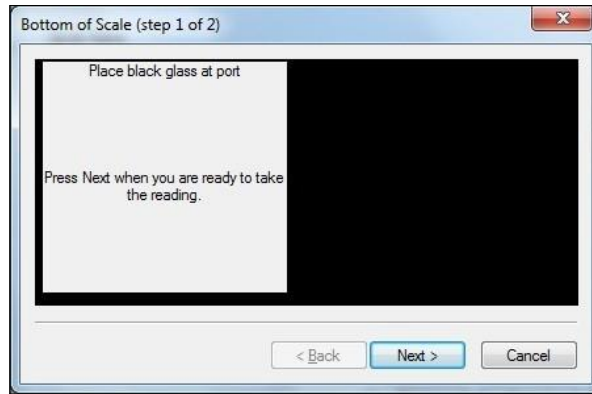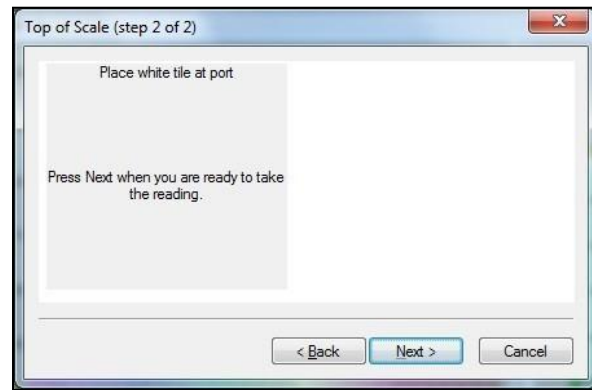| ID	Pass/Fail	Date	Time	X	Y	Z	L*	a*	b*	dE*
White Tile Standard 25		25 July 2019	2:17:33	92.07	97.17	104.61	98.90	-0.11	-0.21	
+Tolerances										0.02
-Tolerances										0.00
White Tile 1	Pass	25 July 2019	2:17:40	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 2	Pass	25 July 2019	2:17:45	92.08	97.18	104.62	98.90	-0.10	-0.21	0.00
White Tile 3	Pass	25 July 2019	2:17:49	92.07	97.17	104.61	98.90	-0.11	-0.21	0.01
White Tile 4	Pass	25 July 2019	2:17:54	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 5	Pass	25 July 2019	2:17:58	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 6	Pass	25 July 2019	2:18:03	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 7	Pass	25 July 2019	2:18:07	92.07	97.18	104.61	98.90	-0.11	-0.21	0.00
White Tile 8	Pass	25 July 2019	2:18:12	92.07	97.18	104.61	98.90	-0.11	-0.21	0.01
White Tile 9	Pass	25 July 2019	2:18:17	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 10	Pass	25 July 2019	2:18:21	92.08	97.18	104.61	98.90	-0.11	-0.21	0.00
White Tile 11	Pass	25 July 2019	2:18:26	92.07	97.17	104.60	98.90	-0.10	-0.21	0.00
White Tile 12	Pass	25 July 2019	2:18:30	92.08	97.18	104.61	98.90	-0.11	-0.21	0.01
White Tile 13	Pass	25 July 2019	2:18:35	92.08	97.18	104.61	98.90	-0.11	-0.21	0.01
White Tile 14	Pass	25 July 2019	2:18:39	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 15	Pass	25 July 2019	2:18:44	92.07	97.18	104.61	98.90	-0.10	-0.21	0.00
White Tile 16	Pass	25 July 2019	2:18:49	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 17	Pass	25 July 2019	2:18:53	92.08	97.18	104.61	98.90	-0.11	-0.21	0.00
White Tile 18	Pass	25 July 2019	2:18:58	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 19	Pass	25 July 2019	2:19:02	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 20	Pass	25 July 2019	2:19:07	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 21	Pass	25 July 2019	2:19:11	92.07	97.17	104.60	98.90	-0.10	-0.21	0.00
White Tile 22	Pass	25 July 2019	2:19:16	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 23	Pass	25 July 2019	2:19:21	92.07	97.17	104.60	98.90	-0.10	-0.21	0.01
White Tile 24	Pass	25 July 2019	2:19:25	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 25	Pass	25 July 2019	2:19:30	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 26	Pass	25 July 2019	2:19:34	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 27	Pass	25 July 2019	2:19:39	92.07	97.17	104.59	98.90	-0.11	-0.20	0.01
White Tile 28	Pass	25 July 2019	2:19:43	92.07	97.17	104.61	98.90	-0.11	-0.22	0.00
White Tile 29	Pass	25 July 2019	2:19:48	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 30	Pass	25 July 2019	2:19:53	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01

Figure 42. Repeatability Screen Results

HunterLab

HunterLab EasyMatch QC Repeatability Test Report

****

Report on Instrument Short Term Repeatability Performance
Operator ID   :
Date   : 7/25/2019
Time   : 2:20:12 PM
File Name   : EZMQC Repeatability Test Report_7-25-2019_2.20.12 PM.pdf
****

Sensor   : Agera "AGR00120"
Mode   : Reflectance - 1.000 in - UV Nominal
Software Version : EasyMatchQC 4.95.03
Computer Name   : ST-4V49PW1
Operating System : Microsoft Windows 8.1 (64 bit)
Test Result   : PASS
Test Data:

ID	Pass/Fail	Date	Time	X	Y	Z	L*	a*	b*	dE*
White Tile Standard 25 July 2019 2:17:33 PM		25 July 2019	2:17:33	92.07	97.17	104.61	98.90	-0.11	-0.21	
+Tolerances										0.02
-Tolerances										0.00
White Tile 1	Pass	25 July 2019	2:17:40	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 2	Pass	25 July 2019	2:17:45	92.08	97.18	104.62	98.90	-0.10	-0.21	0.00
White Tile 3	Pass	25 July 2019	2:17:49	92.07	97.17	104.61	98.90	-0.11	-0.21	0.01
White Tile 4	Pass	25 July 2019	2:17:54	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 5	Pass	25 July 2019	2:17:58	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 6	Pass	25 July 2019	2:18:03	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 7	Pass	25 July 2019	2:18:07	92.07	97.18	104.61	98.90	-0.11	-0.21	0.00
White Tile 8	Pass	25 July 2019	2:18:12	92.07	97.18	104.61	98.90	-0.11	-0.21	0.01
White Tile 9	Pass	25 July 2019	2:18:17	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 10	Pass	25 July 2019	2:18:21	92.08	97.18	104.61	98.90	-0.11	-0.21	0.00
White Tile 11	Pass	25 July 2019	2:18:26	92.07	97.17	104.60	98.90	-0.10	-0.21	0.00
White Tile 12	Pass	25 July 2019	2:18:30	92.08	97.18	104.61	98.90	-0.11	-0.21	0.01
White Tile 13	Pass	25 July 2019	2:18:35	92.08	97.18	104.61	98.90	-0.11	-0.21	0.01
White Tile 14	Pass	25 July 2019	2:18:39	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 15	Pass	25 July 2019	2:18:44	92.07	97.18	104.61	98.90	-0.10	-0.21	0.00
White Tile 16	Pass	25 July 2019	2:18:49	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 17	Pass	25 July 2019	2:18:53	92.08	97.18	104.61	98.90	-0.11	-0.21	0.00
White Tile 18	Pass	25 July 2019	2:18:58	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 19	Pass	25 July 2019	2:19:02	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 20	Pass	25 July 2019	2:19:07	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 21	Pass	25 July 2019	2:19:11	92.07	97.17	104.60	98.90	-0.10	-0.21	0.00
White Tile 22	Pass	25 July 2019	2:19:16	92.07	97.18	104.60	98.90	-0.11	-0.20	0.01
White Tile 23	Pass	25 July 2019	2:19:21	92.07	97.17	104.60	98.90	-0.10	-0.21	0.01
White Tile 24	Pass	25 July 2019	2:19:25	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 25	Pass	25 July 2019	2:19:30	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 26	Pass	25 July 2019	2:19:34	92.07	97.17	104.60	98.90	-0.11	-0.21	0.01
White Tile 27	Pass	25 July 2019	2:19:39	92.07	97.17	104.59	98.90	-0.11	-0.20	0.01
White Tile 28	Pass	25 July 2019	2:19:43	92.07	97.17	104.61	98.90	-0.11	-0.22	0.00
White Tile 29	Pass	25 July 2019	2:19:48	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01
White Tile 30	Pass	25 July 2019	2:19:53	92.07	97.18	104.60	98.90	-0.11	-0.21	0.01

Figure 43. Repeatability Test Report

Gloss Test

Select *GLOSS TEST* from the *DIAGNOSTICS MENU*.
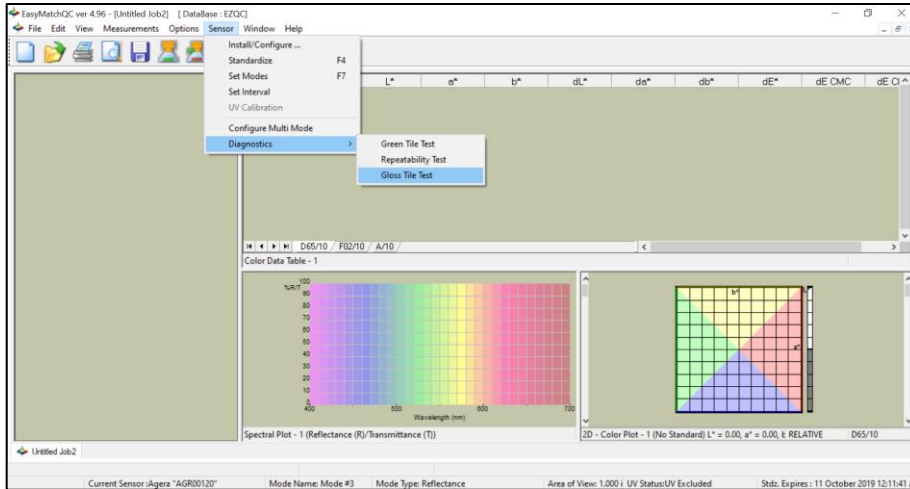
Figure 44. Select Gloss Test

Enter the **GLOSS VALUES** on the back of the tile.
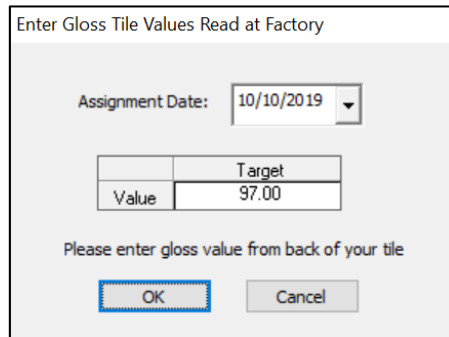
Figure 45. Enter Target Value

Place the black glass standard at the port and press *OK* to continue. If the LAV 25.4 mm (1") port plate is not installed, you are prompted to insert this port plate and then standardize. Ten measurements of the Gloss Standard are taken and then results are shown as *PASS/FAIL*.
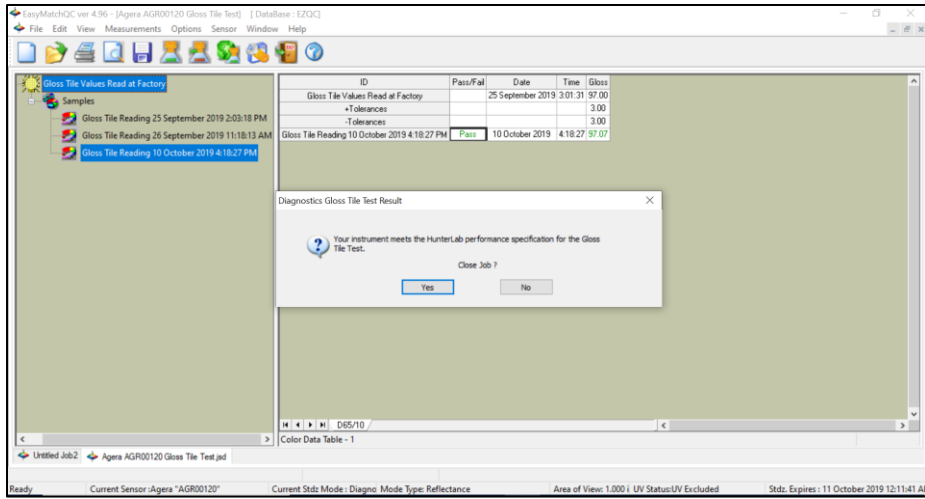
Figure 46. Display of Gloss Test Results
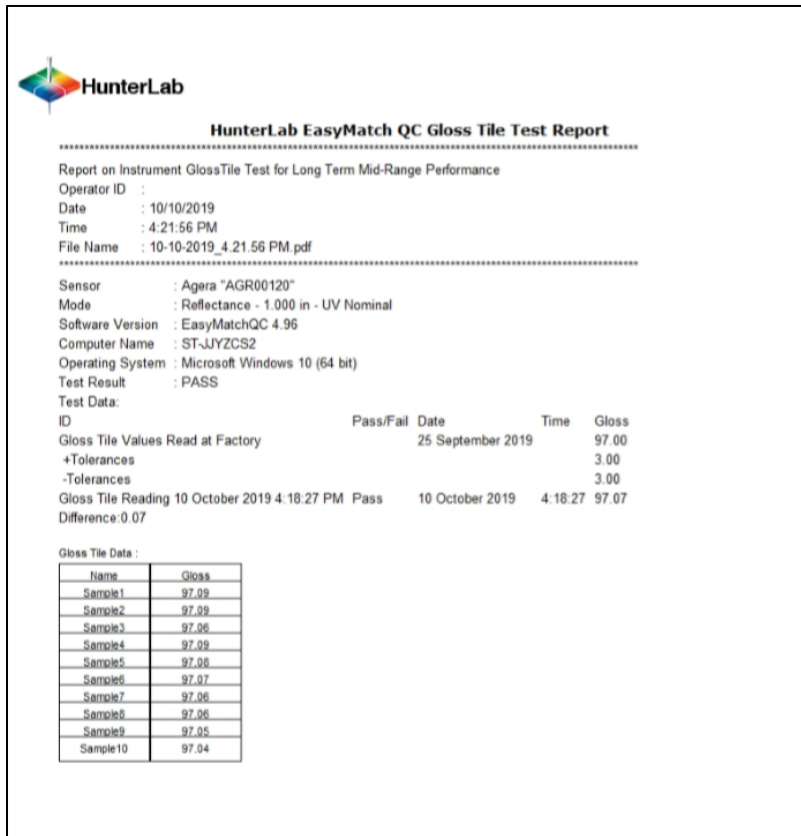
Figure 47. Gloss Test Report

Agera 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 Agera 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 85%

Physical Characteristics

Weight	6.35 kg (14.0 lbs.)
Dimensions (Height x width x depth)	28 cm x 21.6 cm x 31 cm (11.0 in x 8.75 in x 12.25 in)
Communications I/O: USB	Connectivity to thumb drive, printer, keyboard, mouse, and other peripherals.
Ethernet RJ45	Print directly to standalone or network printers; email directly from the instrument; stream data to LIMS and SPC systems.
Remote Access Support External Inputs:	Enabled via internet-based support tool Computer, Wireless Mouse & Keyboard Remote footswitch or similar closed contact switching device.
System Power	100 – 240 VAC, 47 – 63 Hz to universal power supply @ 24 VDC/3.75A
Display	Touch screen, high resolution 1280x800
External PC Software	Compatible with HunterLab EasyMatch QC and EasyMatch QC-Electronic Records Quality Control Software

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,
Geometry	0°/45° circumferential ASTM E1164
Measurement Conditions	Port Forward, Port Up

Instrument Performance

Spectral Data	Range: 400 nm -700 nm; Reporting Interval (nm): 10 nm
Illumination Range	360 nm – 700 nm
Spectral Resolution	<3 nm
Effective Bandwidth	10 nm equivalent triangular
Photometric Range	0 to150%
Measurement Duration	<3 second; <5 sec interval
LED life	5 years typical
Inter-instrument Agreement	Color: ΔE 2000 < 0.15 CIE L*a*b* (Avg) on BCRA II Tile Set Gloss: 0-100; ≤ 0.5 GU
Colorimetric Repeatability	Color: ΔE 2000*< 0.03 CIE L*a*b* (Max) on White Tile Gloss: 0-100 GU: ≤0.1 GU
UV Control	UV Nominal; UV-Calibrated; UV-Excluded; UV-Compare

Measurement

Image Capture	High-resolution, D65 illuminated, 0°/45° image viewing, image capture and image recall
Area Measured	xLAV - 54 mm (2.125 in) illumination; 51 mm (2.0 in) measured; LAV - 28.6 mm (1.125 in) illumination; 25.4 mm (1.0 in) measured; MAV - 17.46 mm (0.6875 in) illumination; 16.9 mm (0.625 in) measured
Data Views	Color Data, Spectral Plot, EZ View, Tristimulus Color Plot, Trend Plot; Pass/Fail Color indication, time and date stamp, auto-naming, auto-saving, data backup and recovery.
Illuminants	A, C, D50, D55, D65, D75, F02, F07, F11,
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	Gloss (ASTM D423, ASTM D2457, ISO 2813, ISO 7668, JIS 28741), E313 Yellowness, E313 Whiteness, YI D1925, Y Brightness, Z%, 457nm Brightness, Baking Contrast Units, Tint, HCCI, SCAA/G, SCAA/C, Custom Indice, ASTM E1349
Indices by CMR	Tomato Paste, Sauce, Catsup, Juice, Color Index, Lycopene, a/b Ratio, TDS.
Gloss	60° Gloss conformance to ASTM D523 and ISO2813
Data Storage	1 million Records max; 8 GB
Languages	English, Japanese

Standard Accessories

Standard Accessories	Calibrated instrument White Tile with Certificate of Traceability, Black Glass Standard, Green Diagnostic Tile, Standards Box, Port Plates of xLAV, LAV and MAV, Power Supply, Quick Start Guide, Agera User's Manual on USB

Standards Conformance

Standard	CIE 15:2018, ASTM E1164, DIN 5033, Teil 7, JIS Z 8722 Condition C

Regulatory Notice

The world's true measure of color

HunterLab

Declaration of Conformance

Applicable Directives:	**2014/30/EU Electromagnetic Compatibility** **2014/53/EU Radio Equipment Directive** **EN61010-1 Product Safety**
Manufacturer:	**Hunter Associates Laboratory, Inc.** **11491 Sunset Hills Rd, Reston, VA, USA**
European Representative: Representative's Address:	**Christian Jansen** **Dr. August Einsele Ring 15** **D-82418 Murnau, Germany**
Type of Equipment:	**Reflectance Spectrophotometer**
Model No.:	**Agera**

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

Place:	*Reston, VA, USA*	Signature	*Tim Barrett*
Date:	*January 22, 2019*	Full Name	*Tim Barrett*
		Position	*Senior Electrical Engineer*

A61-1018-855 REV A

Agera Maintenance & Safety

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

Cleaning the Agera

- The Agera is NOT waterproof, but the exterior of the case may be wiped with a damp cloth.
- When cleaning the optical window, take precautions to clean without scratching the optical window glass or the coating. Use a soft microfiber cloth or lens wipe.

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 durable, care should be taken to prevent contaminants such as finger oils from contacting the material's surface. Always keep tiles in the Standards box when not in use

- For Agera Serial Number >AGR00405: 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.
- For Agera Serial Number AGR00305 to AGR00405: This is a white porcelain tile. See instructions below for Green Tile.
- For Agera Serial Number <AGR00305: The White Standard has a durable optical coating and should be handled with care to prevent contamination of finger oils, scratches, and harsh chemicals. If the surface appears lightly soiled, it may be air brushed with a jet of clean dry air. For heavier soil, the White Standard 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% 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 for 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.

Agera Sample Accessories

HunterLab Flash Drive (A10-1013-423)

2 GB USB 2.0 flash drive formatted for customer use with customized code for Setup backup and CSV Datalog export.

USB Flexible Keyboard (A13-1014-294)

This 88-character keyboard allows the user to enter IDs directly into the instrument.

USB Barcode Scanner (A13-1018-566)

Barcode Scanner scans product IDs directly into the instrument.

USB Adapter Cable (A21-1014-375)

Standard A receptacle to Standard B plug, 1 meter long. This allows connection to the USB receptacle on the instrument to other peripherals such as a Personal Computer or the A13-1014-259 USB Printer.

Disk Assembly (02-4522-00)

From Ring and Disk set.

Figure 48. Disk Assembly

Ring and Disk Set (02-4579-00)

For use in the glass sample cup (purchased separately). Used for transparent and translucent liquids or semi-solids where the sample path length must be fixed. The minimum sample volume required for the ring and disk in the sample cup is 25ml.

Figure 49. Ring and Disk Set

Sample Cup Opaque Cover (04-4000-00)

Provides a light trap to exclude the interference of external ambient light on the sample.

Figure 50. Sample Cup Cover

Ring Only (04-4230-00)

From Ring and Disk set (92-4579-00) to hold light inside sample cup.

Figure 51. Ring Only

Glass Sample Cup (04-7209-00)

Optically clear glass cup for sample presentation of liquids, powders, granules, and pellets. The sample cup measures 64 mm (2.5 inch).

Figure 52. 64mm Glass Sample Cup

Sample Cup Set (Agera-SC-Assy)

Consists of a 2.5 inch glass sample cup, sample cup opaque cover, ring and disk set and port insert.

Figure 53. Sample Cup Set

Skein/Swatch Holder (02-7396-00)

Sample Presentation Device used for measuring swatches, yarns, and string skeins.

Figure 54. Skein/Swatch Holder

Foot switch Assembly (D02-1010-327)

The footswitch is used to initiate sample measurement without the use of hands.

Figure 55. Foot Switch

Sample Clamp (D02-1018-462)

Used to hold samples in place in standard and port-forward orientation.

Figure 56. Sample Clamp

Gloss Check Tile (D02-1018-997)

Nominal 50 Gloss Units Check tile for Agera.

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.

Appendix A

Connecting Agera to EasyMatch® QC

EasyMatch QC Version 4.94 and above have the ability to connect with current Agera Sensors. For Agera with serial number less than VTS00135, there needs to be some hardware added and software updated (Agera Essentials 1.00.14 and above).

1. Connect Agera and PC with EasyMatch QC to a network hub.

2. Connect Agera to PC through a Hotspot

3. Connect Agera to a PC directly.

Connect Agera and PC with EasyMatch QC to the same network.

Connect to a network hub through Ethernet cable

Both Agera and PC with EasyMatch QC must be connected to Ethernet ports with the same Ethernet network.

Figure 57. Ethernet Cable

1. To connect Agera to network, go to **WORKSPACES > PREFERENCES** and select **CONFIG NETWORK SETTINGS**.
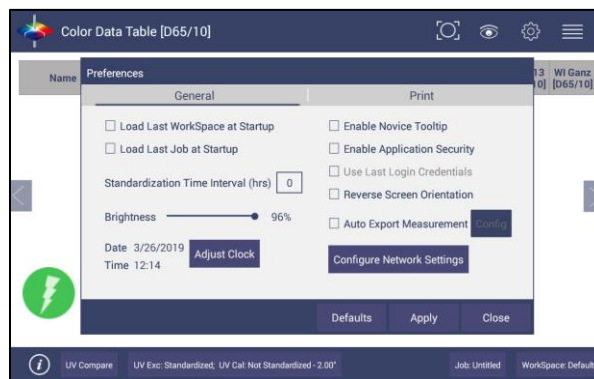

Figure 58. Preferences > Network Settings
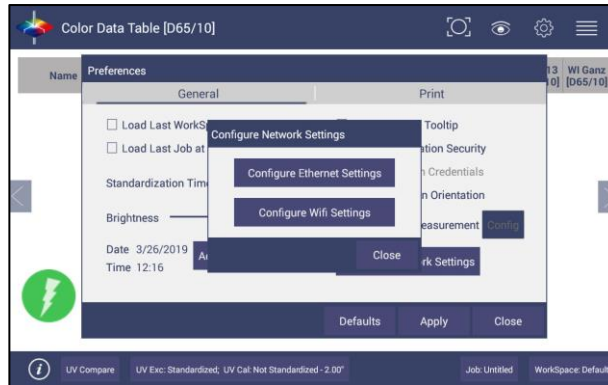
2. Select **CONFIGURE ETHERNET SETTINGS**.

Figure 59. Configure Ethernet

3. Check **USE DHCP FOR ETHERNET CONFIG** and click **APPLY**. If you used the other network setting before, please restart Agera to apply the new network setting.
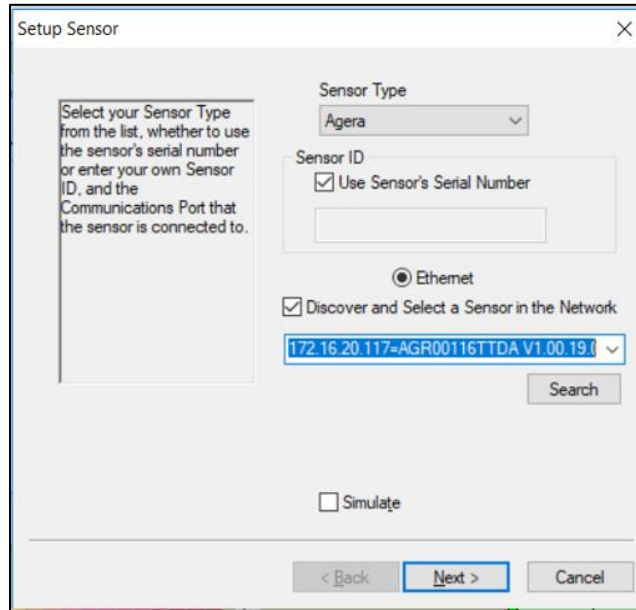

Figure 60. Setup Sensor

4. Agera is now ready to connect to EasyMatch QC. Open EasyMatch QC in the PC. In **SENSOR > ADD SENSOR** and select **AGERA**. Select **ETHERNET** and check the box **DISCOVER AND SELECT A SENSOR IN THE NETWORK** and then click **SEARCH** to do an automatically searching. There will be a drop-down list of all available Agera sensors. If the sensor is shown, then it is connectable. If the sensor in the list with "??????" instead of sensor name, it means that EasyMatch QC can find the AGERA, while AGERA is not free to connect to EasyMatch QC. If you meet this problem, you can restart AGERA and click search again. Also, you can go to Agera Essentials/Workspace menu/Diagnostics/Advanced, click "Restart Comm" to have Agera communication available, and then go back to EasyMatch QC and click search again.

Connect Agera and PC with an Ethernet cable directly.

(Note: You can use the ethernet adapter here to connect to USB port of the computer.)

1. Connect the Ethernet cable and then restart Agera and the computer.

2. Open **COMMAND PROMPT** in the computer. Type in **IPCONFIG**. Under the Ethernet adapter information, review the **AUTOCONFIGURATION IPV4 ADDRESS** and **SUBNET MASK**.
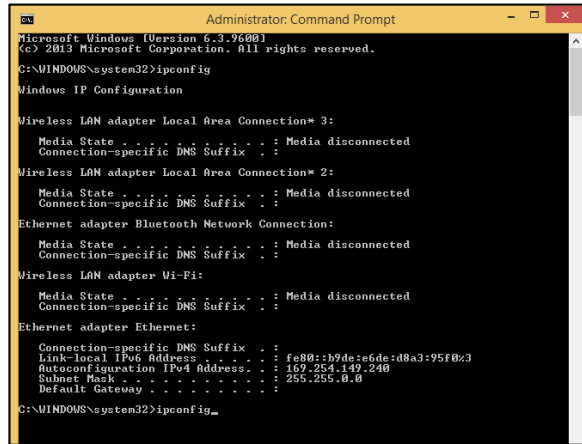

Figure 61. Configuration for EasyMatch QC

3. Open **Agera ESSENTIALS**, go to **PREFERENCES > CONFIGURE NETWORK SETTINGS**. Uncheck **USE DHCP FOR ETHERNET CONFIG**. Type in the **IP ADDRESS** and **SUBNET MASK** manually, then press **APPLY**. The IP address here should be exactly the same as the **AUTOCONFIGURATION IPV4 ADDRESS** in the PC, except changing the last two digits.
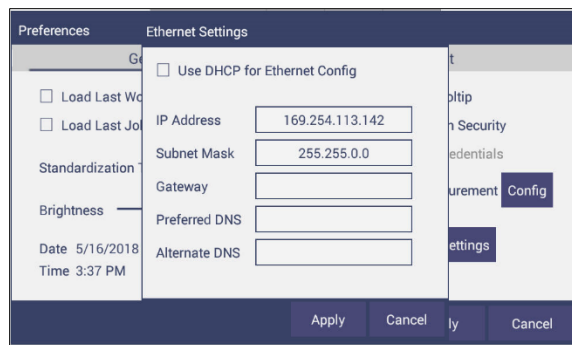
4. **RESTART** Agera to apply the network settings.

Figure 62. Configure IP Address & Subnet in Essentials

5. Open **EasyMatch QC** and from the **SENSOR** menu **> ADD SENSOR** and select **AGERA**. Select **ETHERNET** and uncheck the box to **DISCOVER AND SELECT A SENSOR IN THE NETWORK**. Then type in the **IP ADDRESS** which has been set up in Agera Essentials. Or you can check the box to **DISCOVER AND SELECT A SENSOR IN THE NETWORK** and **SEARCH** to find the Agera.

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