UltraScan® PRO
Supplemental Manual for EasyMatch® QC

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Caution: If the equipment is used in a manner not specified by the HunterLab, the overall safety may be impaired. – This 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.

Contents

UltraScan PRO Features

The UltraScan PRO is a dual beam xenon flash spectrophotometer with a wavelength range from 350 to 1050 nanometers (nm). All tristimulus integrations are based on a triangular bandpass having a full width half max of five nm, and are calculated per Paragraph 7.3.1 of ASTM Standard E308. The wavelength interval is five nm.

The sensor uses an integrating sphere that is six inches in diameter and coated with Spectraflect™ to diffuse the light from the three installed xenon flash lamps. One of the lamps provides light in the UV region only, one provides IR light only, and the third provides light across the spectral range. The instrument can measure both reflected and transmitted color of products.
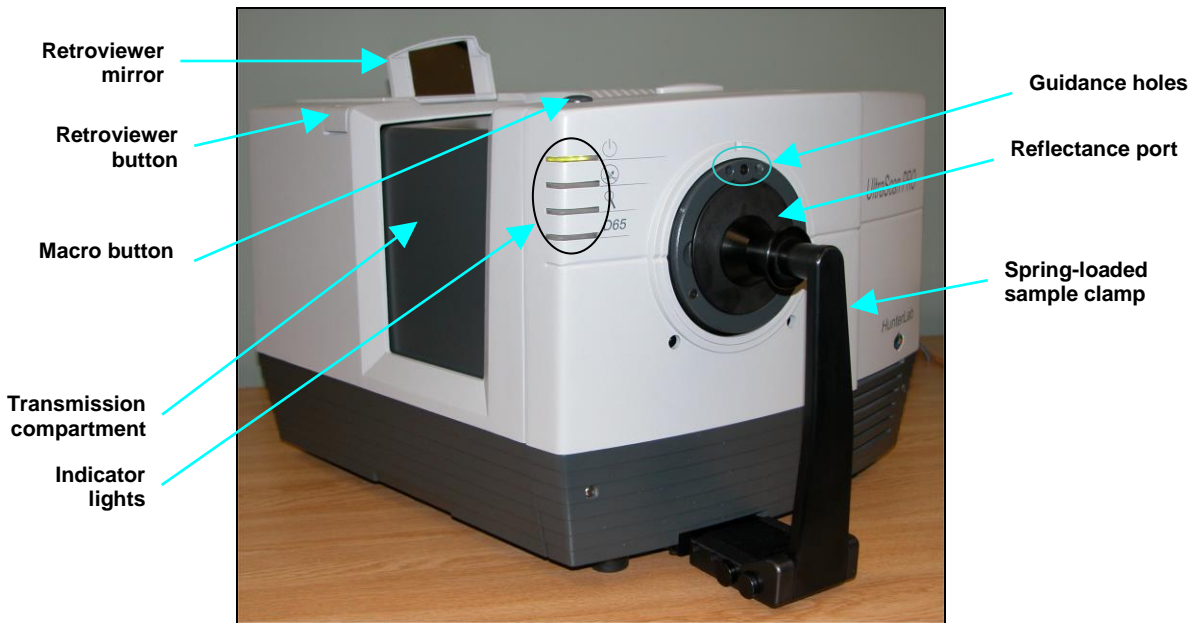
Figure 1.The UltraScan PRO

Note: Dropping the instrument or using it 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 liquids are spilled. Use care when measuring liquid samples.

The UltraScan PRO possesses the following default features:

- Reflectance port
- Sample Clamp
- Transmittance compartment
- Specular-Included/Excluded Port

Reflectance Port

The reflectance port is located at the front of the sensor. The port is covered by a spring-loaded sample clamp which is used to hold the specimen in place during measurement. Two guidance holes

are present to aid in placement of the white tile and light trap at the reflectance port. When the small area of view lens is in use, the small area or large area port plate is installed at the reflectance port.
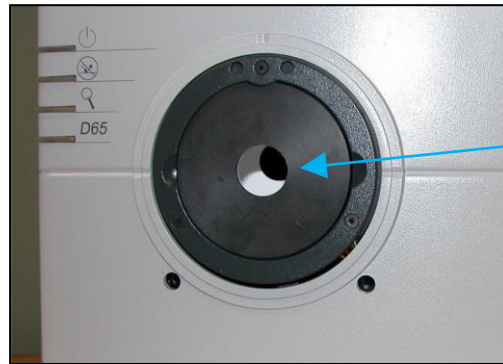
The reflectance port with the large area view port plate installed.

Figure 2. Reflectance Port

Sample Clamp

The UltraScan PRO includes a spring-loaded sample clamp that can be used to hold samples flat and securely at the reflectance port. The clamp has two buttons, one which raises and lowers the arm, and one that moves the clamp toward and away from the reflectance port. The white line at the bottom of the clamp marks the appropriate clamp position for standardization; in this position both the light trap and white tile may be placed at the reflectance port by simply pulling back the spring-loaded head of the clamp.

A magnetic white ceramic disk on the face of the clamp provides a consistent white background for measurements. A non-slip, magnetic black pad is also included that can be used to replace the white disk for applications that require a non-slip or dark backing. To change to the pad, simply pop out the white disk and insert the non-slip pad.

Figure 3. Port Clamp

Transmittance Compartment

Figure 4. Transmittance Compartment

The transmittance compartment located in the middle of the sensor is used for measuring the transmitted color of transparent solids and liquids. The transmittance compartment door should be closed while standardizing and taking measurements[1].

Specular Included/Excluded Port

The UltraScan PRO sphere contains a specular exclusion port door which is closed during specular included and transmittance measurements and opened during specular excluded measurements. The position of the door is controlled through the software. See the 'UltraScan PRO Standardization' section for more information on the various measurement modes.
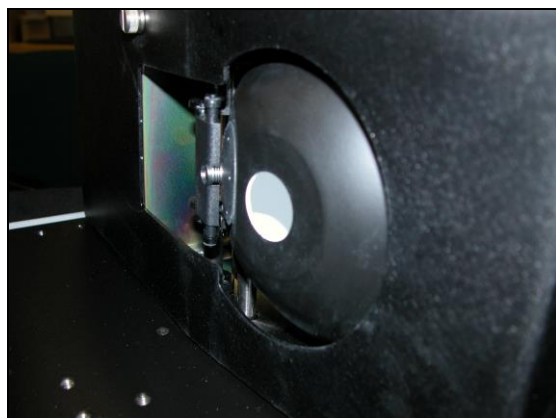

Figure 5. Specular Exclusion Port Closed

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[1] Closing the transmission compartment door while making both reflectance and transmittance measurements is the best practice for this instrument. For more information, see the note in the UltraScan PRO Standardization section.

Figure 6. Specular Exclusion Port Open

The UltraScan PRO features automated specular included/excluded port control and sensing. This feature allows you to set the port to the desired position from EasyMatch QC. The software reports the position, thereby allowing errorless measurements.

Indicator Lights

The UltraScan PRO's indicator lights let you know what mode of standardization is currently in use. The top light indicates that power is on. The second light indicates that the specular exclusion port is open. The third light indicates that small or medium area view is in use, and the bottom light indicates that the Ganz-Griesser UV filter calibration is in use.
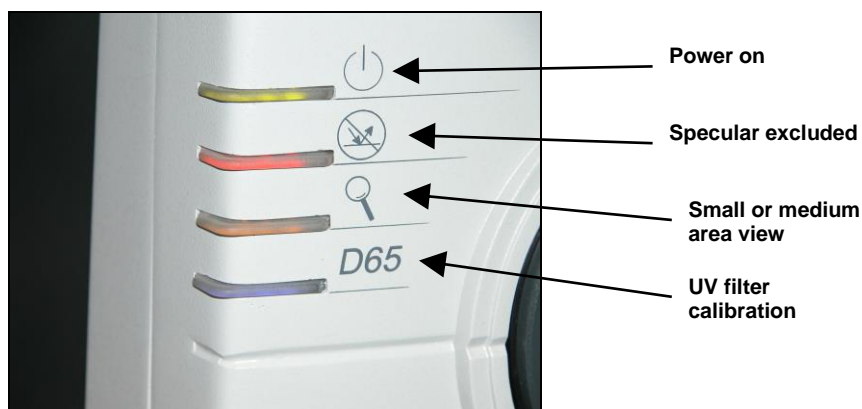
Figure 7. Indicator Lights

Automated UV Control

The UltraScan PRO performs a Ganz-Griesser calibration, which uses a 400-nm UV filter to achieve and maintain the proper ratio of the energy in the UV region of the electromagnetic spectrum to that in the visible region of the spectrum. This improves the agreement of the illumination between different instruments and keeps illumination constant as the instrument's lamp ages. This calibration should be used when measuring colors that fluoresce due to illumination by light in the UV range of the electromagnetic spectrum (such as optically-brightened whites).

For the Ganz-Griesser calibration, a stable, fluorescent white transfer standard marked with an assigned Ganz whiteness (normally assigned in reflectance-specular excluded mode) is used to set the

correct illumination conditions. The assigned value is traceable to a four-step cotton white scale calibrated by the Hohenstein Institute in Germany.

Instructions for using UV control are described in the 'Sensor Menu' section.

Medium Area View and Small Area View

The medium area view (MAV)/small area view (SAV) feature includes MAV and SAV lenses, port plates, and a retroviewer (lamp in the sphere that allows viewing of the sample in a flip-up mirror for determining the proper placement of samples). To use the MAV/SAV feature:

1. Remove the original port plate from the reflectance port and replace it with the MAV or SAV port plate, as desired.

2. Standardize the instrument. Be sure to select 0.390 inch (9.906 mm) [MAV] or 0.190 inch (4.826 mm) [SAV] as the area view in the Setup Mode window in EasyMatch QC. The lens will automatically adjust.

3. Place the sample at the reflectance port.

4. Press the retroviewer switch on the top left of the sensor (about halfway back). The sample is illuminated and an image appears on the screen on the top of the sensor. If necessary, adjust the door above the screen to see a mirror image of the screen display.

5. Be sure that the sample completely covers the reflectance port. Adjust the position of the sample if necessary.

6. Read the sample.

The *Retroviewer* lamp has two modes of operation. Select the desired mode of operation using the retroviewer button as follows:

1. *Lamp Stay on Mode*: Press and hold the retroviewer button until a beep is heard. To turn the lamp off, press and immediately release the retroviewer button three times in a row.

2. *Lamp Turn Off Mode*: Press and immediately release the retroviewer button. The lamp will automatically turn itself off when you take a reading.

Note: To prevent heat build-up, the lamp will turn off automatically after four minutes of inactivity, regardless of the selected mode.

Macro Button

The macro button, also known as the 'Sensor button', activates a sample measurement.

UltraScan PRO Accessories

The following accessories are provided with the UltraScan PRO system and can be found in the standards case:

- White calibrated tile - an everwhite tile placed at the reflectance port (with pegs in the guidance holes) during standardization. This tile is traceable to the National Institutes of Standards and Technology (NIST).

- Light trap - placed at the reflectance port (with pegs in the guidance holes) during standardization in reflectance modes.

- Black card device - placed in the transmittance compartment during standardization in a transmittance mode.

- Fluorescent standard - used to calibrate the position of the UV filter.

- Green tile - placed at the reflectance port (with pegs in the guidance holes) to check instrument performance.

- Didymium filter - screwed into the lens as a check for wavelength accuracy.

- Tile data sheet - Gives calibration information for the standard tiles.

- Non-slip pad for sample clamp - can be placed into the sample clamp as a replacement for the white disk for applications that require a non-slip or dark backing.

- Standards care card - gives instructions on how to clean the standards.

- Fuses - two fuses are provided as spares.

- Allen wrench - one 1/8" wrench is provided.

- RS-232 communications cable.

- USB to serial adapter cable.

- Power cord.

- Certificate of traceability for the standard tile.

UltraScan PRO Options and Sample Devices

There are many options and devices available for positioning samples at the measurement ports of the UltraScan PRO and for making the instrument easier to use. For the latest information, please refer to ***https://support.hunterlab.com/hc/en-us/articles/218375923-Accessories-for-HunterLab-Instruments***.

UltraScan PRO Installation

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

1. Unpack all cartons and remove wrappings and cable ties. Inspect for damage and notify the carrier and HunterLab immediately if any is discovered. Save the packing material in case it becomes necessary to return the instrument to the factory.

2. Place the UltraScan PRO on a flat working surface where the measurements will be made. Place the computer near the sensor.

3. Ensure that the on/off switch on the back of the sensor is set to off.

4. Connect the power cord to the sensor and to a power outlet.

5. Connect the female end of the 9-pin communications cable to the appropriate computer port. Connect the male end of the 9-pin cable to the sensor. To use USB communications, connect the USB cable from the computer to a USB to serial adapter and then the serial cable to the instrument.

Note: The UltraScan PRO should be lifted from under the base plate, near the center of the unit. It should not be carried by grasping any part of the plastic housing. Do not block the vents in the top cover of the UltraScan PRO or the instrument may overheat.

Note: Refer to the UltraScan PRO Specifications section for recommendations concerning the powerline and its conditioning.

CAUTION: Use only the power cord included with this instrument or a replacement obtained from HunterLab (HL#A13-1002-655 for 110V, A13-1002-656 for 220V). Be certain that the power cord is in good condition before connecting it. The UltraScan PRO is grounded using the grounding portion of this power cord. Only plug this cord 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 cord can be found in the UltraScan PRO Specifications section.
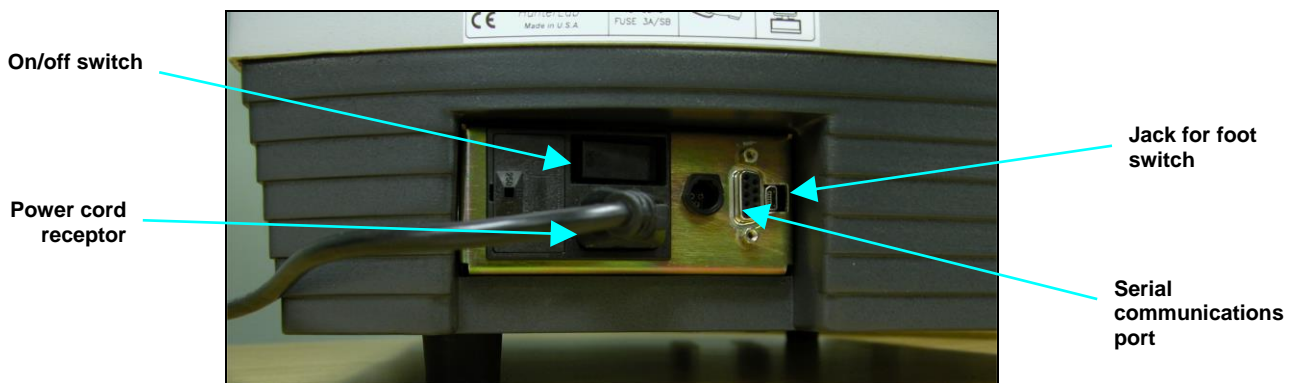

Figure 8. Connectors and Power

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 Easy Match QC Icon or from Windows, go to **Start > Run >EZMQC_Menu** and **Open**. The following screen will be shown.

Figure 9. EasyMatch Installation
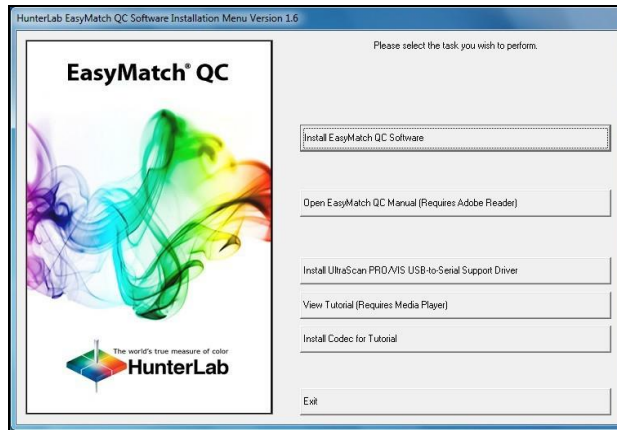
4. Select **Install EasyMatch QC Software** and follow the screen prompts.

5. Select **SoftKey License** as the type of key to use with the software.
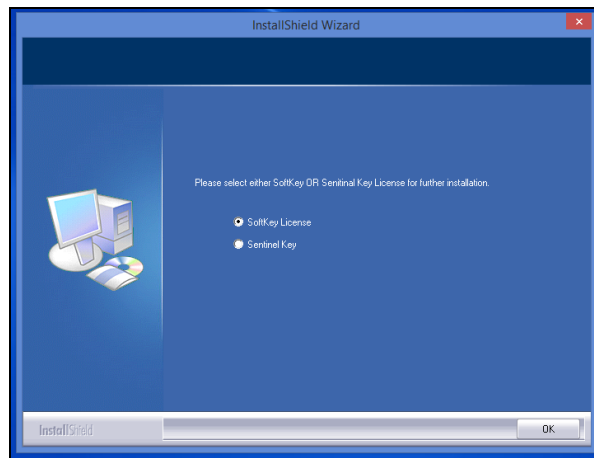

Figure 10. Software Key License

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** to restart the computer and log back in.
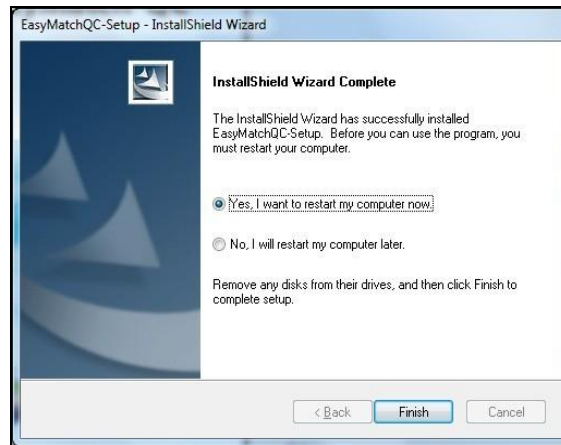
Figure 11. Completed Install

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 12. 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 13. 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 13), select *Key ID*.
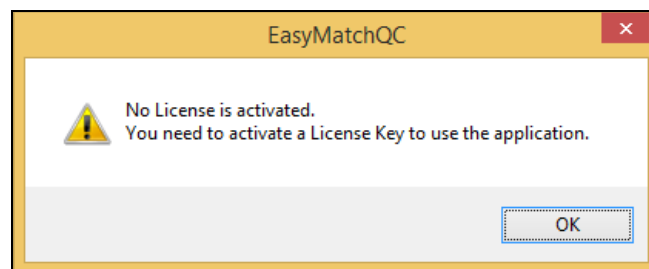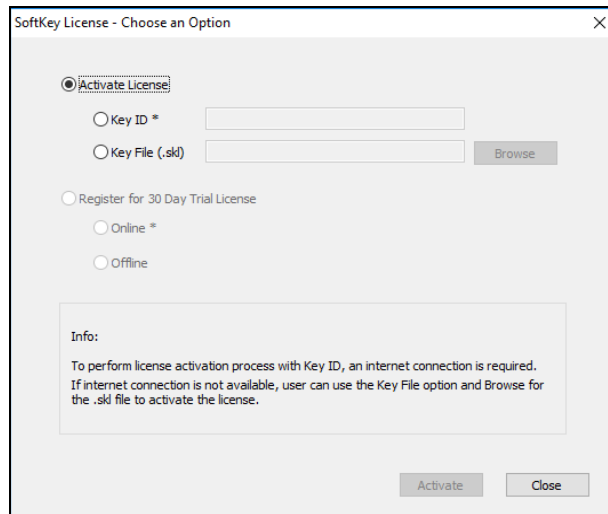
   b.   Paste-in or type-in the License Key ID and click Activate.

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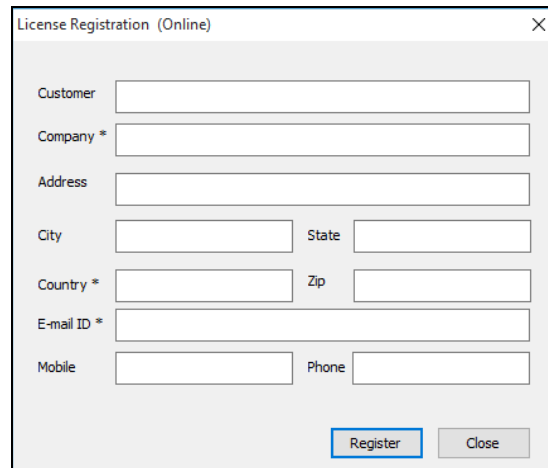
   a.   Place the thumb drive with the SoftKey License in the USB port.

   b.   From the Choose an Option page (Figure 13), 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 11) and select Sentinel Key to continue.

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

   b.   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.
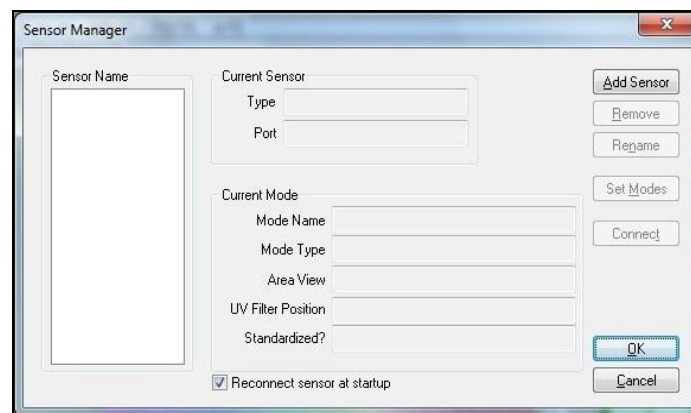
Figure 14. Request 30-day Trial

Add the Sensor

1. Upon initial startup, the following message will be displayed: ***Sensor not yet installed***. ***Please install a sensor to take measurements***. This message will remain until you proceed to the Install/ Configure command in the Sensor menu and install a new sensor.

2. The Sensor Manager appears first:

Figure 15. Sensor Manager

3. Select ***Add Sensor*** to install a new sensor. The Setup Sensor screen allows selection of the instrument model and the communications port. Select ***Next*** when ready.

Note: If using a typical 9-pin serial cable for communications between the sensor and PC, select COM1. If using USB-to-serial adapter, then select the highest number COM Port No. offered. If using USB communications, the COM port will automatically be selected.
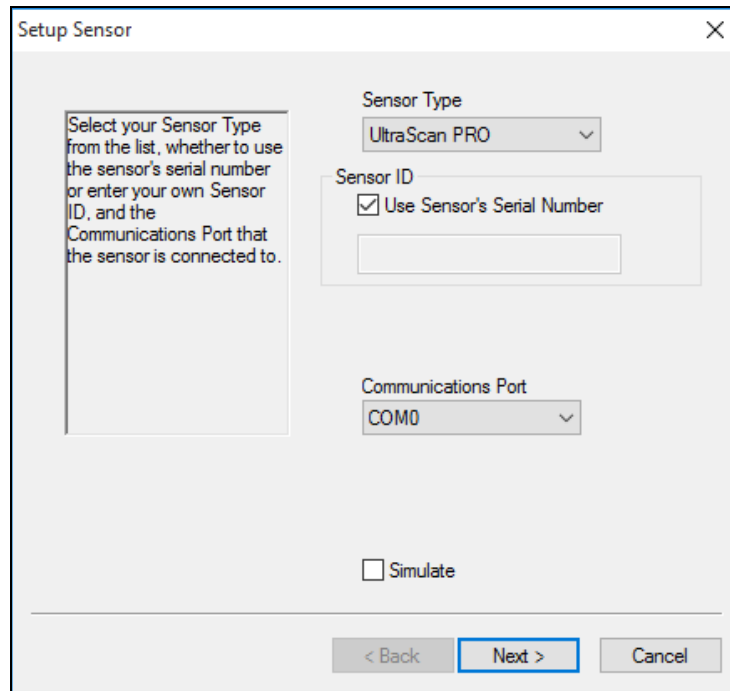
Figure 16. Setup Sensor

4. Remove the tape covering the reflectance port and the exterior of the sphere in the transmittance compartment.

5. Place the desired port plate at the reflectance port and snap it into place.

6. Locate the reflectance port sample clamp in the standards box and slide it into place at the reflectance port. Depress the back button to slide the clamp all the way in. Depress the front button to move the sample clamp up against the sphere. Covering the sample port when the instrument is not in use prevents dust from accumulating inside the sphere.

7. Turn on the UltraScan PRO by switching the on/off switch on the back of the sensor to the on position. Allow the instrument to warm up for two hours prior to standardizing and making measurements.

UltraScan PRO Standardization

The UltraScan PRO 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 scale is set first. For this, you simulate the case where all the light is absorbed by the sample. For UltraScan PRO, the bottom of scale is set with the light trap for reflectance. The light blocker (a.k.a. black card) is used to set the bottom of scale for transmittance measurements.

Top of scale is then set by scaling the light which is reflected or transmitted to a calibrated standard. This is done using a calibrated white tile for reflectance measurements. For top of scale in transmittance, you are prompted to place the white calibrated standard at the reflectance port. Alternatively, a plug of barium sulfate ($BaSO_4$) or magnesium oxide (MgO) may be used to more closely approximate the actual sphere wall reflectance. When taking transmittance measurements, the calibrated white tile or the plug used during standardization must be kept at the reflectance port. When the instrument is to be used for transmittance measurements of liquids, a clear liquid (distilled water for water-based samples, toluene or benzene for resins, or mineral oil for oils) in a cell of the desired size should be used to set the top of the scale.

It is recommended that the instrument be standardized at least once every eight hours. Also, standardize the instrument whenever the hardware changes, such as the placement of the UV filter or with any environmental changes, such as temperature.

Standardization Modes

Four modes of measurement are available when you standardize the UltraScan PRO:

- RSIN: Reflectance - Specular Included

- RSEX: Reflectance - Specular Excluded

- TTRAN: Total Transmittance

- RTRAN: Regular Transmittance

With varying hardware configurations such as UV filter in/out and the different areas of view, there are many ways to standardize the UltraScan PRO. 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.

Place the cell in the transmittance compartment as close to the *sphere* as possible for measuring total transmittance.

Figure 17. Setting Top of Scale TTRAN

Place it as close to the **lens** as possible when measuring regular transmittance.

Note: Closing the transmittance compartment door while making transmittance measurements is the best practice for this instrument. However, when measuring the transmittance of liquids that are volatile and/or toxic, it may be more important to measure the samples quickly than to eliminate ambient room light. To see if leaving the door open will adversely affect your color measurements, standardize the instrument in the desired transmittance mode with the transmittance compartment door closed, then measure either air or a typical sample with the door open and then with the door closed. Compare the measurements. If the difference is acceptable under your measurement method, you may measure your samples with the door open. This test should be repeated if the instrument is moved to a new location.

Haze Measurements

A transmission haze measurement is a ratio of the diffuse light to the total light transmitted by a specimen. Useful measurements of haze can be made on the HunterLab instruments listed below, although the results do not conform exactly to ASTM method D1003 because of differences in instrument geometry. Haze is calculated as follows:

$$\text{Haze} = \frac{Y_{\text{Diffuse Transmission}}}{Y_{\text{Total Transmission}}} \times 100 \ .$$

Haze measurements can be made only in a transmission mode on a benchtop sphere instrument (UltraScan PRO, UltraScan VIS, or Vista).

To measure and display haze values, follow the steps outlined below:

1. Select **Options > Read Method**.

2. Select Haze from the dialog box that appears. The screen changes to allow additional options.
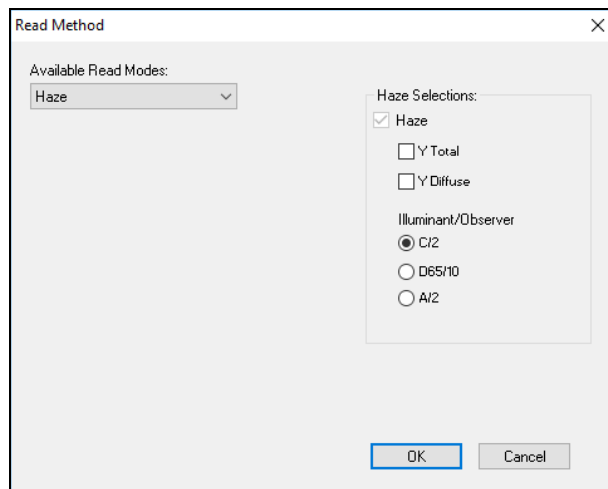
Figure 18. Read method: Haze

3. Haze is automatically selected for display in your Color Data Table. Check the boxes next to Y Total and/or Y Diffuse to also show these components of the haze calculation. Click the radio button next to the illuminant/observer combination you wish to use. Then click **OK**.

4. Standardize the instrument in TTRAN mode. There are three parts to standardization for haze measurements – 1) Place white tile at reflectance port and read the black card in front of the lens. Then 2) Remove the black card and leave the white tile at the reflectance port. 3) Remove the white tile and replace with the light trap.

Figure 19. Haze Standardization: Black Card
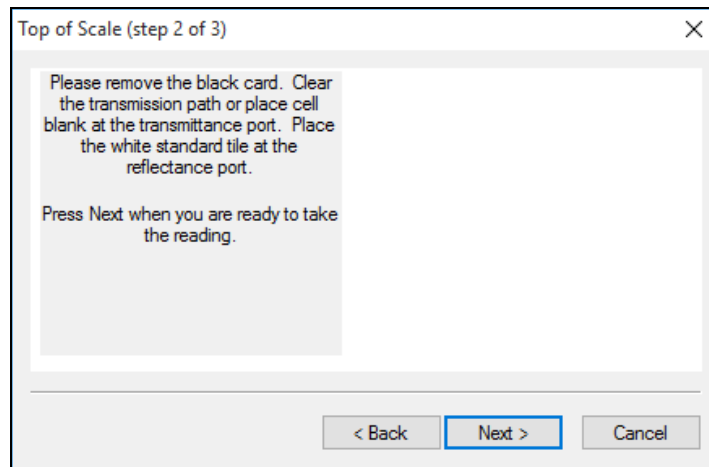
Figure 20. Haze Standardization: White Tile
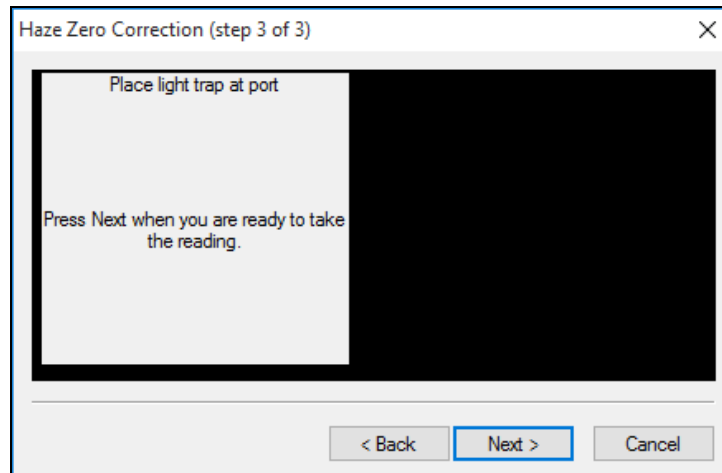
Figure 21. Haze Standardization: Light Trap

5. Read the standard or sample by choosing **Measurements > Read Standard** or **Measurements > Read Sample**, clicking the **Read Standard** or **Read Sample** button on the toolbar, or pressing **F2** or **F3**. The following prompt appears.

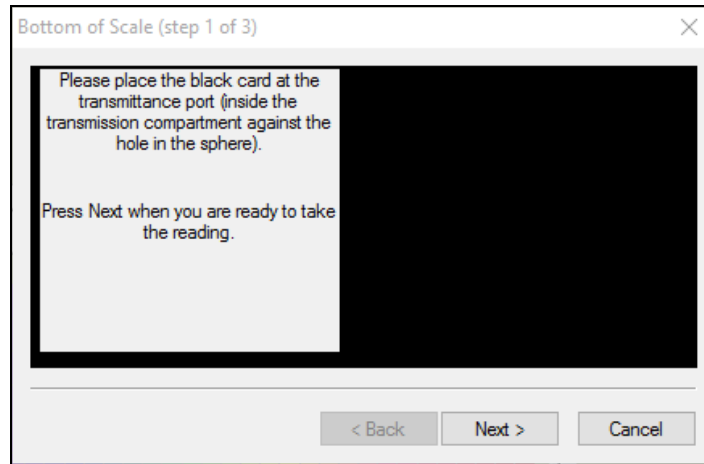6. Place your sample against the transmission port (the hole in the sphere inside the transmission compartment) and place the white calibration tile at the reflectance port. Click **Read**. The instrument reads and then the following prompt appears.
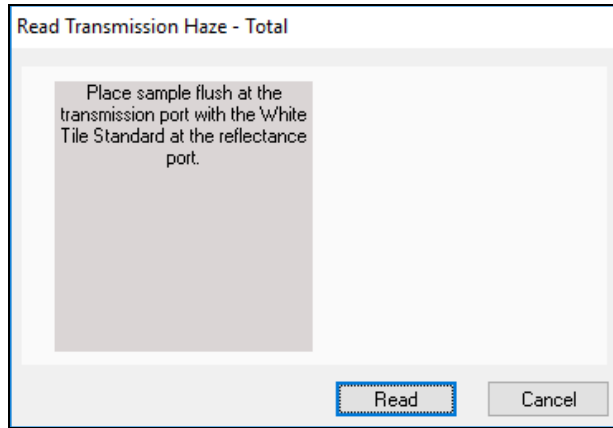
Figure 22. Read Sample with White Tile

7. Leave your sample at the transmission port and replace the white calibration tile with the light trap. Click **Read**.
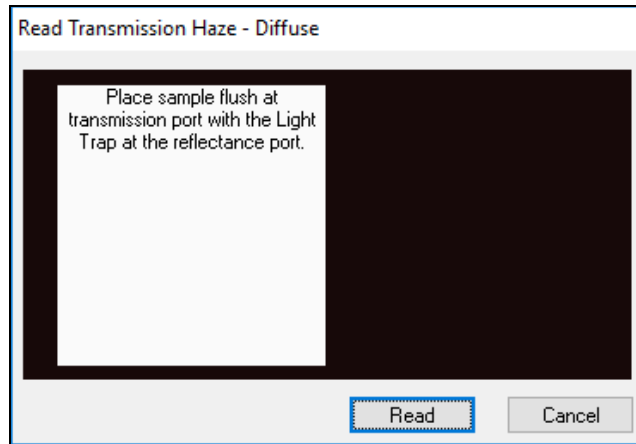
Figure 23. Read Sample with Light Trap

8. When the instrument takes the reading, you may be prompted to enter an ID for the measurement as usual. After you do so, Haze and the other parameters you chose to display will be shown in your Color Data Table.

ID	L*	a*	b*	Haze % C/2	Y Total C/2	Y Diffuse C/2
Haze sample	94.96	0.00	2.88	10.78	87.73	9.46

Figure 24. Haze Readings Reported

UltraScan PRO Maintenance and Testing

The UltraScan PRO does require some maintenance. This section outlines the parts of the UltraScan PRO you must maintain for the instrument to function properly and tests you may run to assess its performance.

> *Note: 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, the EasyMatch QC help file, or under the direction of HunterLab Technical Support.*

Running the Repeatability Test

You may test the repeatability of your instrument as follows:

1. Turn the UltraScan PRO on and allow it to warm up for two hours. Meanwhile, clean the white tile and allow it to return to room temperature.

2. Follow the instructions given in the **Sensor Menu > Diagnostics** section to run the repeatability test that is built into EasyMatch QC.

Running the Green Tile Test

The green tile is not used during the standardization process. Instead, the green tile is used to verify the long-term performance of your instrument. Perform the green tile test as described in the **Sensor Menu > Diagnostics** section once a week. You can then examine all green tile readings periodically and see any trends that develop over time.

The UltraScan PRO should be in its standard configuration, RSIN mode with the large area view port plate installed and UV filter nominal, when these readings are made. The illuminant and observer used in your display must match those on the green tile. The green tile test will configure these job settings.

Figure 25. Green Tile

The green tile reading should vary by no more than ± 0.15 **XYZ** units from the values given on the tile. If your reading is out of this specification, first clean the standard tiles. Then standardize and measure

the green tile again. If the reading still does not meet this specification, contact HunterLab Technical Support for assistance. Please read 'When You Need Assistance' prior to contacting HunterLab.

Running the Didymium Filter Test

The didymium filter can be used to check the wavelength accuracy of the UltraScan PRO. This check should be done on a regular basis (i.e., weekly or bi-weekly) as part of your routine instrument performance check.

To perform the wavelength check, follow the steps described in the ***Diagnostics > Sensor Menu*** in the EasyMatch QC Manual.

Replacing the Source Lamp

The xenon flash lamp provides over one million flashes. When the lamp no longer flashes or instrument repeatability has become unacceptable, it must be replaced.

CAUTION: Replace only with a specified xenon flash lamp assembly, HL#D02-1012-222.
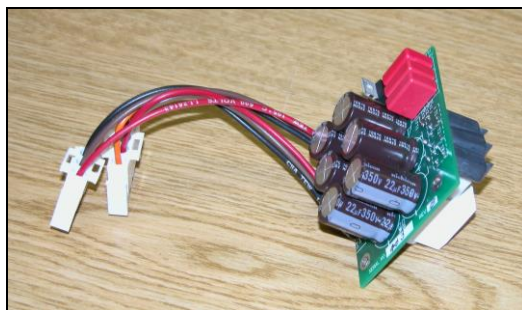
Figure 26. Source Lamp Assembly

Before you attempt to change the source lamp, ensure that the UV filter is out. If the UV filter is left in, the filter may be broken during the process of removing and re-inserting the bezel. Check the current standardization mode. If the mode indicates that the filter is in a position other than 'Nominal', you must restandardize the sensor in a mode with the UV filter nominal. (The filter can also be manually removed from the path, if necessary, by a trained representative of HunterLab.)

To change the source lamp:

1. Disconnect the UltraScan PRO from its power source.

2. Wait two minutes for complete discharge of the capacitors.

3. Disengage and remove the sample clamp.

4. Loosen the two screws on the front cover with a flat-head screwdriver.

Figure 27. Front Screws

Note: These screws are captive within the instrument cover housing and cannot be removed.

5. Loosen the thumb screw on the inner panel bezel.
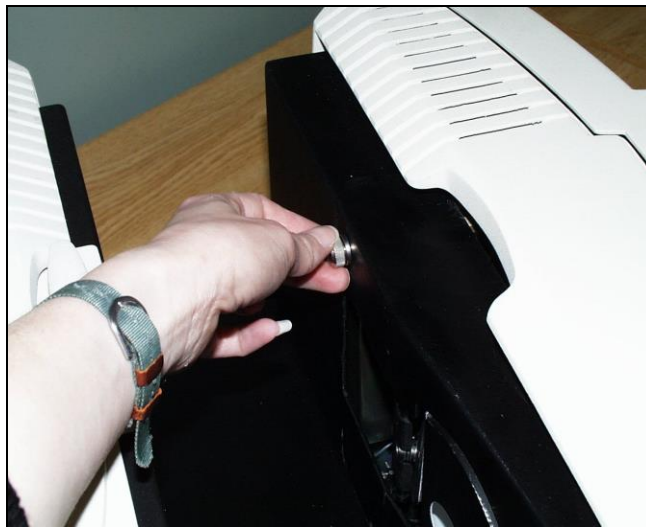
Figure 28. Inside Screws

6. Remove the front cover from the instrument and unplug the harnesses which connect the indicator lights and the macro button to the front cover.
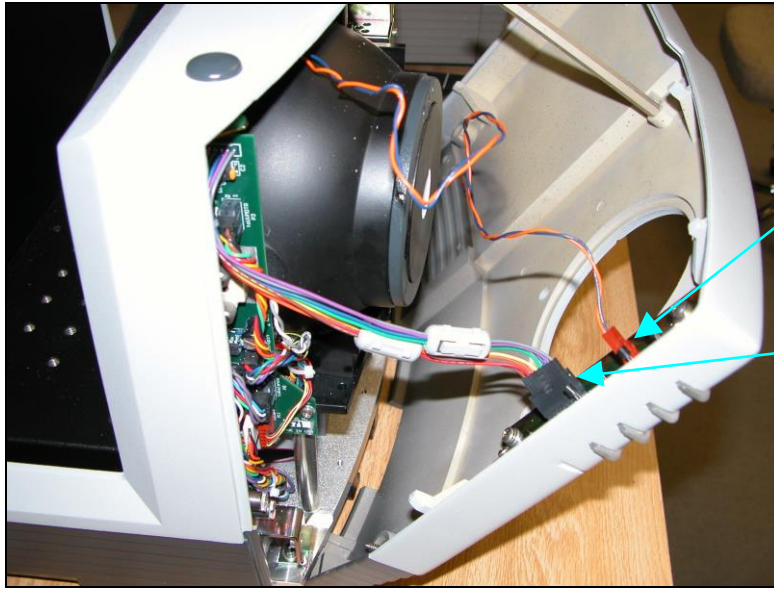
Figure 29. Remove Front Cover

7. Remove the two screws and cover from the lamp housing using a Phillips-head screwdriver.
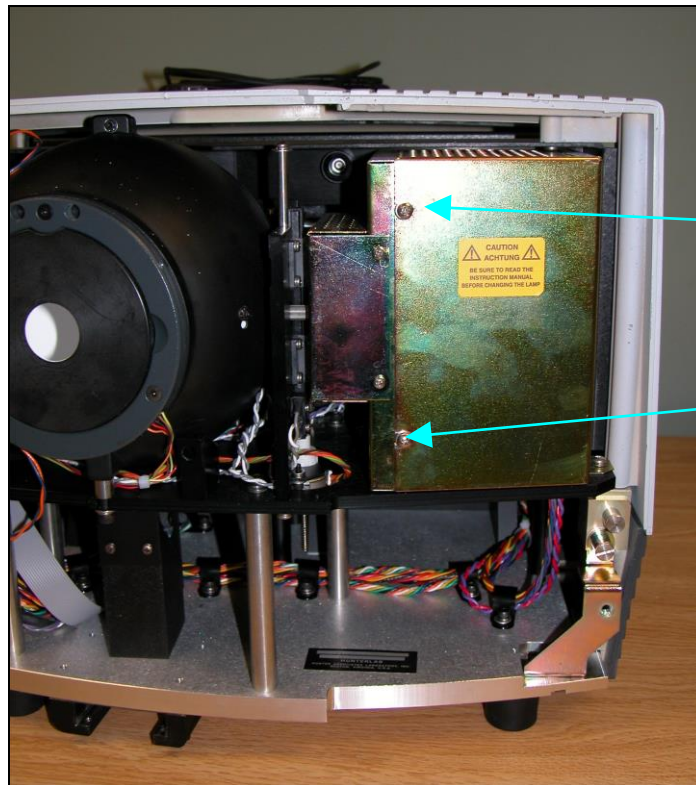
Figure 30. Lamp Cover Screws

Figure 31. Remove Lamp Housing

8. Unplug the two white connectors of the lamp assembly by squeezing the latches on the sides of the connectors.
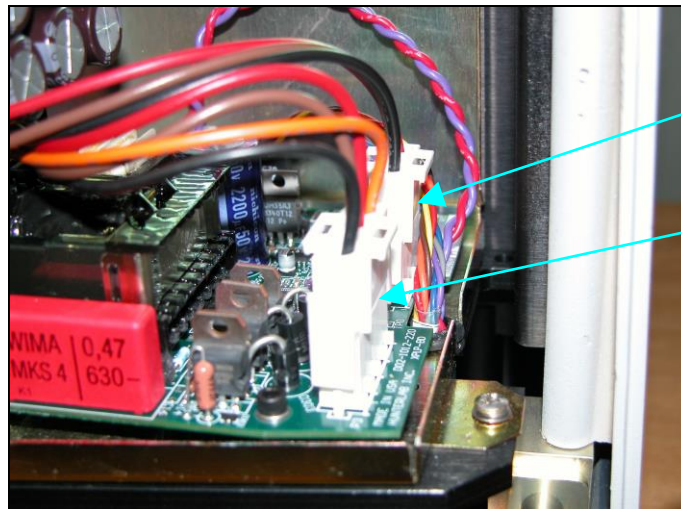
Figure 32. Unplug White Connectors

9. Release the three captive screws on the vertical board next to the sphere.
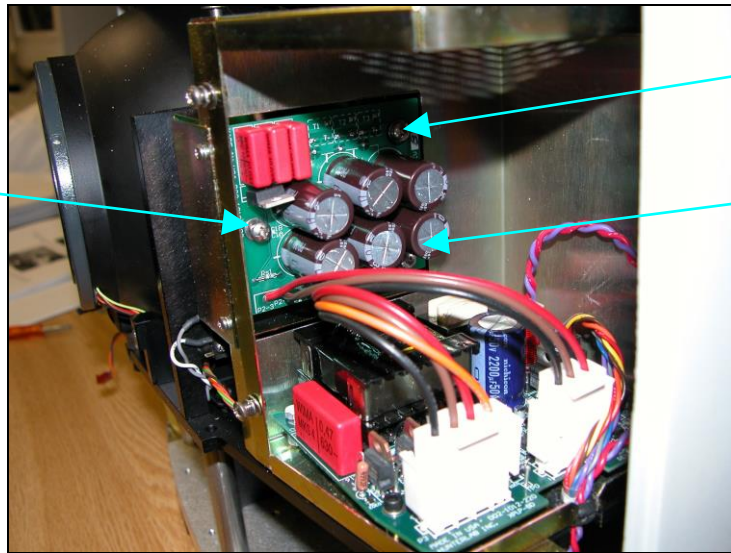
Figure 33. Three Captive Screws

10. Remove the lamp assembly (the board you just unscrewed) and replace with a new assembly. Secure the three screws.

11. Plug in the white connectors of the new lamp.

12. Replace the cover and screws on the lamp housing.

13. Plug the harnesses back into the front panel.

14. Line the cover up with the guides on the bottom of the instrument.

15. Replace the front cover on the instrument and tighten the two front screws as well as the inner bezel thumb screw.

16. Turn the UltraScan PRO power on.

17. Standardize the instrument.

Replacing the Fuses

The fuses are located on the back panel of the instrument. Follow the instructions given below to replace the fuses.

> *CAUTION: Replace only with specified fuses, HL#13-2600-30, or equivalent. More information concerning this fuse can be found in the UltraScan PRO Specifications section.*

1. Disconnect the UltraScan PRO from its power source by unplugging the power cord.

2. Remove the fuse cartridge from the back panel of the instrument. You may want to use a small, flat screwdriver to help you pry it out.

Figure 34. Fuse Cartridge

3. Pull back the tab to release the fuse holder.

Figure 35. Fuse Holder

4. Remove the fuses and replace with new ones.

Note: Use only the fuse specified above for your instrument or one which is identical in type, voltage rating, and current rating. Otherwise, there may be a risk of fire.
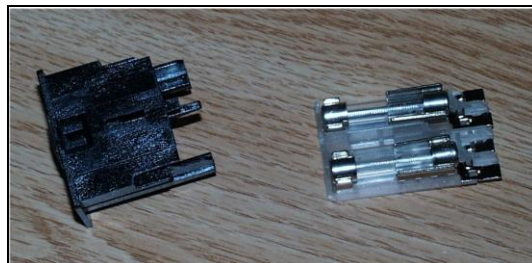
Figure 36. Fuse Holder

5. Replace the fuse holder in the cartridge.

6. Replace the cartridge in the back panel of the instrument.

Replacing the View Lamp

The view lamp is used to illuminate the sample when using the retroviewer feature. To replace the lamp, obtain part number HL#A13-1004-022.

Figure 37. Retroviewer Lamp Part

To change the view lamp:

1. Disconnect the UltraScan PRO from its power source.

2. Wait two minutes for complete discharge of the capacitors.

3. Disengage and remove the sample clamp.

4. Loosen the two screws on the front cover with a flat-head screwdriver.

Figure 38. Front Cover Screws

Note: These screws are captive within the instrument cover housing and cannot be removed.

5. Loosen the thumb screw on the inner panel bezel.
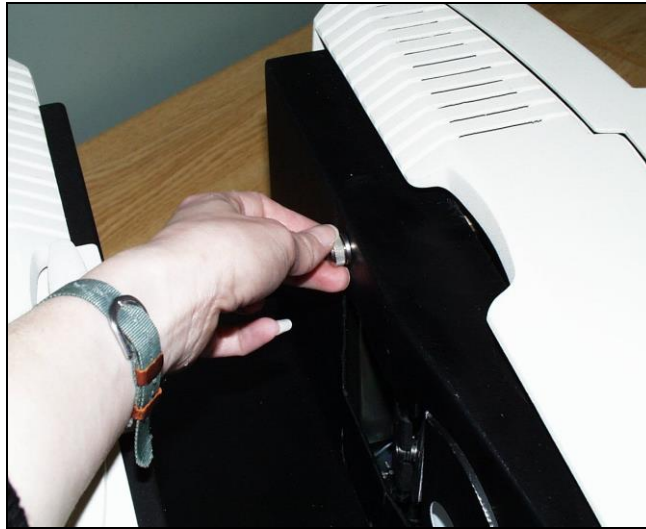
Figure 39. Inside Thumb Screw

6. Remove the front cover from the instrument and unplug the harnesses which connect the indicator lights and the macro button to the front cover.
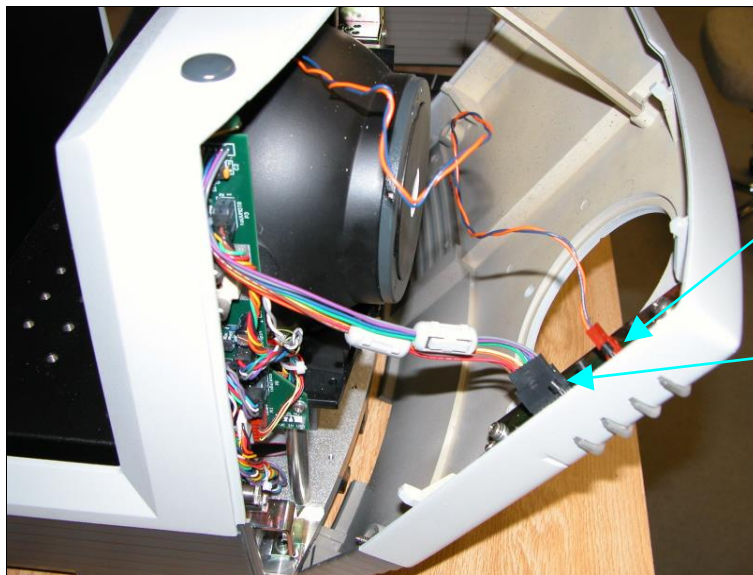
Figure 40. Front Cover Removal

7. Remove the view lamp assembly and replace it with a new one. Be sure not to touch the bulb of the lamp as fingerprints reduce lamp efficiency. If a fingerprint is deposited, remove it using a clean wipe and isopropyl alcohol.
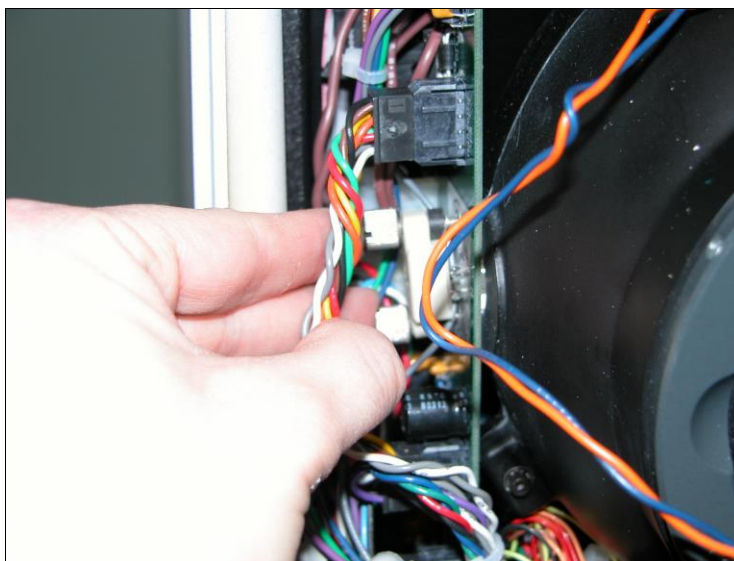
Figure 41. Replace View Assembly

8. Plug the harnesses back into the front panel.

9. Line the cover up with the guides on the bottom of the instrument.

10. Replace the front cover on the instrument and tighten the two front screws as well as the inner bezel thumbscrew.

Cleaning the Lens Surface and Didymium Filter

The lens and filter may be cleaned using photographic-quality lens solution and lens paper. Put a few drops of solution on the lens paper and gently wipe the lens or filter in a circular motion for a few seconds. Then wipe the lens or filter with a dry lens paper to remove streaks and any hazy film.

Cleaning the Sphere

Care should be taken to keep foreign materials from entering the sphere. The transmittance compartment should be closed and the sample clamp placed against the reflectance port when the instrument is not in use. The sphere is coated with Spectraflect™ which can be damaged by putting any objects into the sphere. If any foreign material (dust, lint, etc.) falls into the sphere, use the following steps to remove the material.

1. Move the sample clamp away from the reflectance port.

2. Open the transmittance compartment and place a vacuum cleaner hose at the sphere opening but do not insert the hose directly into the sphere. Cup your hand around the end of the hose to provide a good seal.

3. Quickly cover and uncover the reflectance port with your other hand. This creates gentle air currents to swirl the foreign matter around and out of the sphere.

When shipping the UltraScan PRO, remove the sample clamp and tape a pad of foam rubber at the reflectance port. Failure to do so may cause severe damage to the instrument.

UltraScan PRO Specifications

The specifications and characteristics of your instrument are given in this section.

For best performance, your instrument should be placed where there is ample work space with medium or subdued illumination and no drafts. For optimum results, a clean, air-conditioned area is recommended with a relative noncondensing humidity of 20-80% [10-85% for sensor only] and relatively constant temperature not exceeding 90°F (32°C) [100°F (38°C) for sensor only]. For specification performance, the recommended temperature range is 70-82°F (21-28°C).

The instrument should be connected to a stable, instrument-grade power line. If other equipment is connected to the same power line, a transient power surge may be produced when the other equipment is turned on. If this happens, restandardize the instrument before making measurements. HunterLab recommends using a line conditioner with a minimum 600 VA rating and a battery back-up system.

Physical Characteristics

Dimensions	Width: 42 cm (16.5 in) Height: 32.3 cm (12.7 in) Depth: 49.8 cm (19.6 in) Weight: 25.9 kg (57 lbs) not including the sample clamp
Communications interface:	RS-232C serial DB-9 or USB.

Environmental Requirements

Operating Temperature	40°F - 100°F (4°C - 38°C)
Operating Humidity	up to 85% relative, non-condensing
Storage Temperature	-21°C - 66°C (-5°F - 150°F) for up to three weeks

Power Required

Voltage	90-250 VAC, 50/60 Hz
Single Phase	100 VA maximum
Fuse	2A, SB (110 V) or 1A, SB (220 V)

Power Cord Wire Color Code:

	Color	Definition
220V Cord	Brown	LINE
	Blue	NEUTRAL
	Green/Yellow	SAFETY
110V Cord	Black	LINE
	White	NEUTRAL
	Green	SAFETY

Instrument-Computer Ground Potential Check:

Perform this check if the power cord wiring is being changed, such as for replacement of the cord or if changing the plug.

The instrument serial port ground connection is referenced to the instrument's internal frame and safety ground. Before connecting the communication cable to the instrument serial port, apply power to the instrument and the host computer. Check the ground potential (voltage) between the serial port ground pins on the computer and the instrument. The ground connection is pin 5 on DB-9 connectors and pin 7 on DB-25 connectors. Voltages more than 5VAC at 110V input power, or more than 10VAC at 220V input power may indicate a difference in ground wiring and can damage the instrument and/or the computer. Check the wiring and take other steps as needed to reduce this difference before connecting the communications cable. You may also use a data optoisolator.

Conditions of Illumination and Viewing

Geometry	Diffuse illumination, 8° viewing using a 152.4 mm (6 in) integrating sphere coated with Spectraflect™, port plate and specular exclusion port door coated with Duraflect™.
Illumination	Xenon lamps with 500,000 flashes minimum life
Polychromators (2)	Holographic grating
Detectors (2)	512 element diode array
Interface Mode	Serial RS-232 or USB
Area of View	Large area of view port size: 25.4 mm (1 in) diameter Large area of view measured area: 19 mm (.75 in) diameter Medium area of view port size: 13 mm (.5 in) diameter Medium area of view measured area: 9 mm (0.35 in) diameter Small area of view port size: 7 mm (.25 in) diameter

	Small area of view measured area: 4 mm (0.156 in) diameter
Measurement Modes	Reflectance - Specular Included (RSIN)
	Reflectance - Specular Excluded (RSEX)
	Total Transmittance (TTRAN) for path lengths up to 80 mm
	Regular Transmittance (RTRAN) for path lengths up to 80 mm

Instrument Performance

Wavelength Range	350-1050 nm
Wavelength Bandpass	Effective 5 nm triangular for 5 nm output
Wavelength Interval	5 nm
Wavelength Accuracy	0.75 nm
Photometric Range	0-150% reflectance or transmittance

Note: Every attempt at accuracy is made, but specifications are subject to change without notice.

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.

Regulatory Notice

A copy of the UltraScan PRO's Declaration of Conformity per ISO/IEC Guide 22 and EN 45014 follows on the next page.

HunterLab
ISO 9001 Certified

Declaration of Conformity

Application of Council Directive: 2004/108/EC (EMC)
2006/95/EC (LVD)

Standards to which Conformity is Declared: EN 61326-1:2013
EN 61010-1:2010

Manufacturer: Hunter Associates Laboratory, Inc.
11491 Sunset Hills Rd, Reston, VA, USA

European Representative: Christian Jansen
Representative's Address: Christian Jansen, Griesbraeustrasse 11, 82418 Murnau, Germany

Type of Equipment: **Spectrophotometer**

Model No.:   **UltraScanPro**

*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: *August 31, 2014*   Full Name   *Tim Barrett*

Position   *Systems Engineer*

Instrument Replacement, Repair, Problems, and Questions

The following HunterLab policies are described below:

- Warranty
- Claims
- Returns/Service
- Technical Assistance

Warranty

HunterLab warrants that all instruments it manufactures are free from defects in material and workmanship under normal use. This warranty is limited to repairing or replacing any defective hardware or software that may cause the instrument to perform outside of its specified tolerances. This warranty is one year from date of shipment of new instruments and two months from the date of shipment of repaired instruments.

Note that printers and computers are covered under the original manufacturer's warranty.

The warranty is void if the user has made unauthorized repairs, improperly installation, operated, or subjected the instrument to conditions outside of the specific operating conditions specified in the product documentation.

The HunterLab warranty does not cover consumable items such as lamps, fuses, batteries, etc. An instrument registration card is shipped with each HunterLab instrument. It is important that the instrument owner returns this card promptly upon receipt of equipment.

Questions concerning operation, maintenance, or repair of your equipment can be directed to the Service Department at Service@hunterlab.com. Additional information can be obtained at http://support.hunterlab.com.

Shipping Claims

All materials are sold F.O.B. from Reston, Virginia (unless otherwise specified) and HunterLab responsibility ends upon delivery to the first carrier. All claims for loss or damage must be rendered by the consignee against the carrier within fifteen days of receipt of goods. A copy of this notice must also be forwarded to HunterLab within five days of its receipt.

Breakage or Damage

Per the contract terms and conditions of the carrier, the responsibility of the shipper ends at the time and place of shipment. The carrier then assumes full responsibility. Perform the following procedures if your instrument arrives broken or damaged.

Freight or Express

1. Notify your local carrier.

2. Hold the damaged goods with their container and packaging for inspection by the examining agent. Do not return any goods to HunterLab prior to inspection and authorization of the carrier.

3. File a claim against the carrier. Substantiate this claim with the examining agent's report. A certified copy of our invoice is available upon request. The original B/L is attached to our original invoice. If the shipment is prepaid, write for a receipted transportation bill.

4. Advise HunterLab regarding replacement.

Parcel Post Shipment

1. Notify HunterLab at once in writing, giving details of the loss or damage. This information is required for filing a claim.

2. Hold the damaged goods with their container and packaging for possible inspection by postal authorities.

3. Advise HunterLab regarding replacement.

United Parcel Service

1. Contact your local UPS office regarding damage and insurance claim. Each UPS office has a different method of handling these occurrences and yours will advise you of its procedures.

2. Retain the container and packaging.

3. Notify HunterLab at once for replacement.

Shortage

Perform the following procedure if your order appears to be missing items.

1. Check the packing list notations. The apparent shortage may be a back ordered item and may be marked as an intentional short-ship.

2. Re-inspect the container and packing material, particularly to locate smaller items.

3. Ascertain that the item was not removed by unauthorized personnel prior to complete unpacking and checking.

4. Notify HunterLab immediately of the shortage in writing.

Incorrect Shipment

Perform the following procedure if material received does not correspond with your order.

1. Notify HunterLab immediately, referencing order number and item.

2. Hold incorrect items until return shipping instructions are received.

Returns

A service request order (SRO) number is required before any items can be returned to HunterLab. Contact HunterLab's Order Processing Department to obtain an SRO for damaged or incorrect parts, or HunterLab Service to obtain an SRO to return an instrument for service.

Do not return any damaged or incorrect items to HunterLab until all shipping instructions are received.

> *Note: HunterLab must be notified within fifteen days or we cannot accept responsibility for damaged or incorrect items.*

HunterLab offers complete repair service for all instruments it manufactures. Call HunterLab for the service facility nearest your location. If your equipment is not functioning properly, contact HunterLab Technical Support for maintenance or repair instructions. Many times, this on-the-spot diagnosis is all that is required.

If repair is required, HunterLab offers two means of servicing. Instruments may be returned to a HunterLab service facility for repair or a HunterLab Service Department technician can come to your location to perform on-site repair. For schedule and terms for on-site repairs by trained service technicians, call HunterLab Service. Please read "When You Need Assistance" prior to contacting HunterLab.

The customer is responsible for incoming and outgoing freight charges for instruments being returned to HunterLab for all repairs, including warranty repairs.

Packing and Shipping Instruments for Repair

Please regard the following instructions when packing your instrument to return it to HunterLab for repair. **Proper packing is crucial.** These instructions do not replace the recommended professional packaging for your instrument, but may assist in eliminating the need for a shipment claim due to faulty packaging. Purchasing freight insurance does not guarantee a successful damaged shipment claim if the carrier determines the instrument was not packaged properly.

- All instrument tiles, the didymium filter (if included), black glass or light trap, power supply, power cords, and cables for the instrument should be included in your

shipment. **Your repair estimate will be delayed if the instrument tiles are shipped separately later.**

- Remove the sample clamp (if you have one) from the instrument before packing.

- Cover the measurement port. If applicable, also cover the transmission port and tape the transmission compartment door closed. **Do not use duct tape.** "Painter's tape" is preferred, as it will not leave residue on the instrument.

- Insert the instrument into an anti-static or plastic bag prior to placing it in the carton. The bag will aid in keeping packing material out of the instrument.

- Place the bag-wrapped instrument into a new carton which includes, at a minimum, **6 inches of packing material** (preferably foam) around the instrument. Styrofoam peanuts should not be used as packing material for instruments, as they can suspend items weighing only up to 5 pounds. Observe the information listed on the bottom of most cartons regarding burst strength and gross weight limits. Single wall cardboard cartons should not be used. (A proper packing carton with packing material may be purchased from HunterLab, if desired.)

- Insure the shipment.

- Provide an itemized packing list of all contents of the shipment.

- Label the carton(s) as follows:

  > Hunter Associates Laboratory
  > Attn: SRO #_____
  > 11491 Sunset Hills Road
  > Reston, VA 20190
  > U.S.A.

When You Need Assistance

When you have a problem with an instrument or software or need technical advice concerning a specific application, you may consult the support website (support.hunterlab.com). There are numerous articles on applications, operations, instrument accessories, troubleshooting and more. This is available 24/7. If you don't find the information that you require, then you can open a support request on the website. Please include the following information when cooresponding with HunterLab.

1. The type of sensor you are using.

2. The serial number of the instrument (usually found on a tag on the back or bottom of the sensor, or inside the transmission compartment).

3. The type of software you use to access the sensor output (EasyMatch QC), the version of the software (seen after choosing **Help > About**), the operating system, and the brand and type of computer.

4. The specific nature of the problem, including the exact error message received or the number of units the sensor reads "off" from the standard tiles.

5. The steps performed prior to the start of the problem.

6. Steps already performed to reconcile the problem and/or results of any diagnostics.

7. The type of product being measured.

8. Operating environmental conditions under which the instrument is normally used, such as temperature, humidity, dust, fumes, etc.

9. Whether the instrument has recently been moved or the computer reconfigured.

10. The name(s) of any HunterLab personnel with whom you have previously discussed the problem.

To place an order, for prices on instruments, software, or replacement parts, or to return damaged or incorrect parts, ask for the Order Processing Department. For applications advice or for help in correcting instrument or software problems, ask for Technical Support . To return instruments to HunterLab for service, or to ask questions about the servicing or recalibration of instruments, ask for the HunterLab Service Department. To speak with HunterLab, please call 703-471-6870.

The mailing address for HunterLab headquarters is given below. Customers outside the United States should contact their HunterLab distributor for initial assistance.

Hunter Associates Laboratory, Inc.
11491 Sunset Hills Road
Reston, Virginia 20190 U.S.A.

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