

# UltraScan<sup>®</sup> VIS Supplemental Manual for EasyMatch<sup>®</sup> 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. - The UltraScan VIS 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.

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## UltraScan VIS Features

The UltraScan VIS is a dual beam xenon flash spectrophotometer with a wavelength range from 360 to 780 nanometers (nm). All tristimulus integrations are based on a triangular bandpass of ten nm and a wavelength interval of ten nm. The instrument can measure both reflected and transmitted color of a product.

The sensor uses a plastic integrating sphere that is six inches (152.4 mm) in diameter and coated with Spectrafect™, which diffuses the light from the lamp. The light illuminates the sample and is either reflected from it or transmitted through it. A lens is located at an angle of 8° from the perpendicular to the sample surface. The lens collects the reflected or transmitted light and directs it to a diffraction grating which separates the light into its component wavelengths. These components are then measured by dual diode arrays and converted into usable data.



Figure 1. UltraScan VIS

**Note:** Use of this equipment in a manner not specified by the manufacturer may impair the protection afforded by the equipment.

**Note:** Danger of electric shock if liquids are spilled and fire if volatile or flammable liquids are spilled. Use care when measuring liquid samples.

The UltraScan VIS possesses the following default features:

## 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 also present to aid in placement of the white tile and light trap at the reflectance port. When the small area view lens is in use, the small area or the large area port plate can be used at the reflectance port.



The reflectance port with the large area view port plate installed

*Figure 2. Reflectance Port*

## Small Area View

The small area view feature includes a small area view lens and port plate. To use the small area of view:

1. Remove the original port plate from the reflectance port and replace it with the small area port plate.



*Figure 3. Small Area of View*

2. Standardize the instrument. Be sure to select 0.375 inch (9.525 mm) 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. Be sure that the sample completely covers the reflectance port. (Use the retroviewer to confirm.) Adjust the position of the sample if necessary.

## 5. Read the sample.

**Note:** The instrument flashes multiple times per measurement when the small area view option is employed.

## Retro-viewer

The retro-viewer is a lamp in the sphere that allows you to view the sample that is currently at the reflectance port on a screen. This helps you to determine when the sample is properly placed for measurement. Turn the lamp on as described below. The sample at the reflectance port is then illuminated and an image of it appears on the retro-viewer screen. If necessary, adjust the door above the screen to see a mirror image of the screen display. The retro-viewer lamp must be installed at the factory.

The retro-viewer lamp has two modes of operation. Select the desired mode of operation using the retroviewer button as follows:

- **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.
- **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 one minute of inactivity, regardless of the mode selected.

## Sample Clamp

The UltraScan VIS includes a spring-loaded sample clamp that can be used to hold samples flat and secure 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.



Figure 4. Sample 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 included 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.

### **Transmittance Compartment**

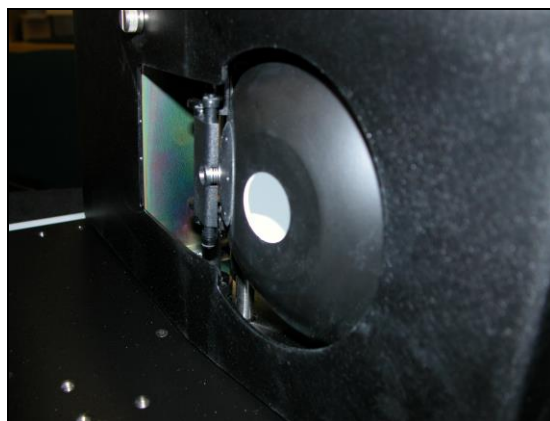
The transmittance compartment located in the middle of the sensor is used for measuring the transmitted color of transparent solids or liquids. The transmission compartment door should be closed while standardizing and taking measurements<sup>1</sup>.



*Figure 5. Open Transmittance Compartment*

### **Specular Included/Excluded Port**

The UltraScan VIS 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 EasyMatch QC. See the UltraScan VIS Standardization section for more information on the various measurement modes.



*Figure 6. Specular Exclusion Port Closed*

---

<sup>1</sup> Closing the transmittance 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 VIS Standardization section.





*Figure 7. Specular Exclusion Port Open*

## Automated UV Control

The UltraScan VIS can perform a Ganz-Griesser calibration, by using a 400-nm UV filter. This filter maintains the proper ratio of the electromagnetic energy in the UV region to that of the visible region. 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.

*Note: It is important to know what type of fluorescence is involved for the samples being measured. Some materials fluoresce due to excitation by visible rather than ultraviolet wavelengths. The UV-absorbing filter does not eliminate this type of fluorescence.*

## Indicator Lights

The UltraScan VIS's indicator light feature lets 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 area view is in use, and the bottom light indicates that the UV cut-off filter is 100% inserted.

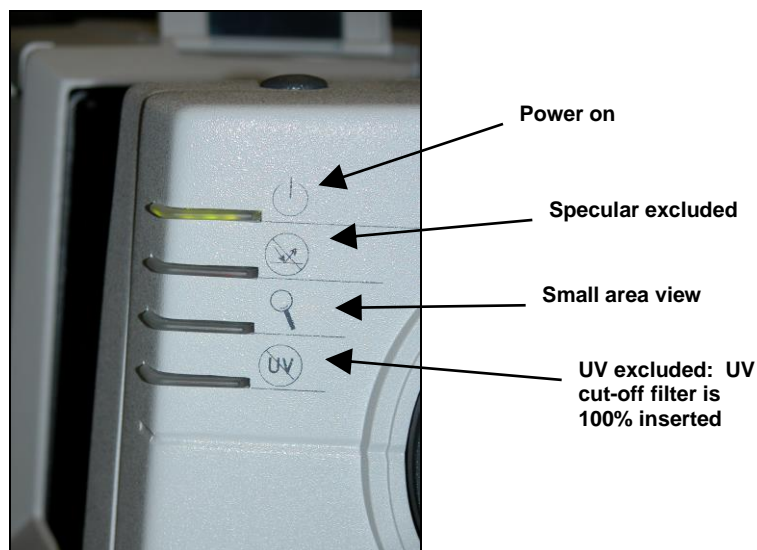


Figure 8. Indicator Lights

## Macro Button

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

## UltraScan VIS Accessories

The following accessories are provided in the standards case:

- **White calibrated tile** - placed at the reflectance port (with pegs in the guidance holes) during standardization. This tile is traceable to National Institute of Standards & 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 transmittance modes.
- **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 black backing.
- **Standards care card** - gives instructions on how to clean the standards.
- **Fuses** - two 3-amp fuses (3A, SB 250 V, T ) 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.

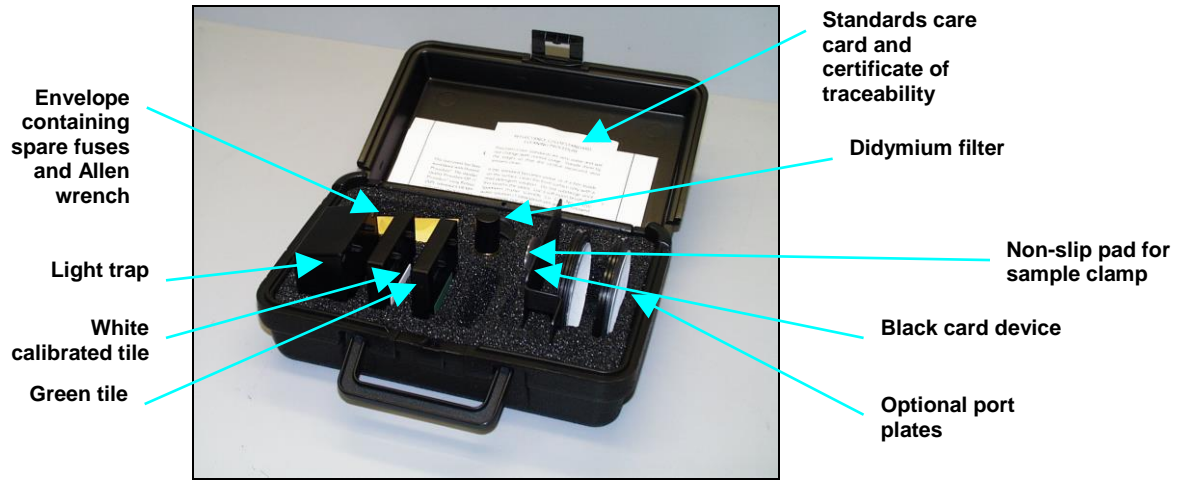


Figure 9. Accessory Case

## UltraScan VIS Options and Sample Devices

There are many options and devices available for positioning samples at the measurement ports of the UltraScan VIS 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 VIS Installation

The UltraScan VIS is simple to set up and attach to your computer. The following instructions guide you through the initial installation of your UltraScan VIS 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 VIS 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 plug it into a power outlet.

*Note: Refer to the UltraScan VIS Specifications section for recommendations concerning the power line 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 VIS 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 VIS Specifications section.*

5. If you are using **serial communications**, connect the female end of the 9-pin communications cable to the appropriate communications port of the computer. Connect the male end of the 9-pin cable to the sensor. If you are using **USB communications**, connect the computer via a USB cable to the serial adapter and then to the serial cable connected to serial port on the UltraScan VIS. It does not matter if the instrument is turned on or off.

*Note: The UltraScan VIS 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.*

## 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 Step3.
3. Select the Easy Match QC Icon or from Windows, go to **Start > Run >EZMQC\_Menu** and **Open**. The following screen will be shown.

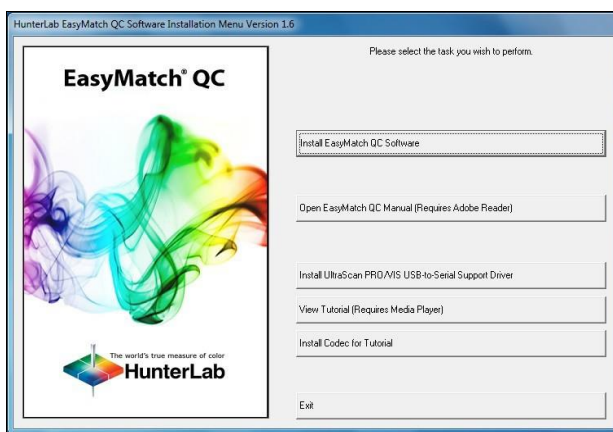


Figure 10. EasyMatch Installation

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.

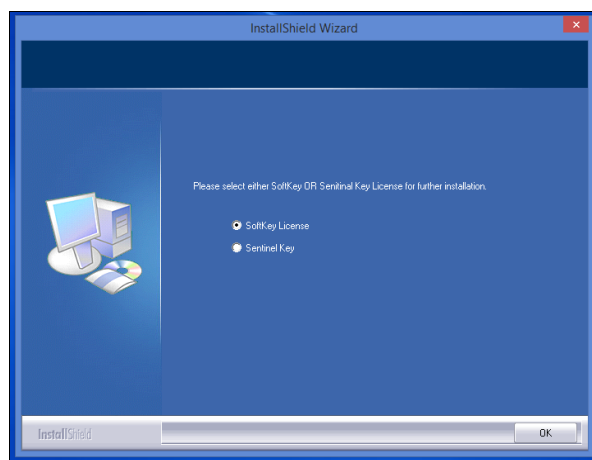


Figure 11. Software Key License

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.

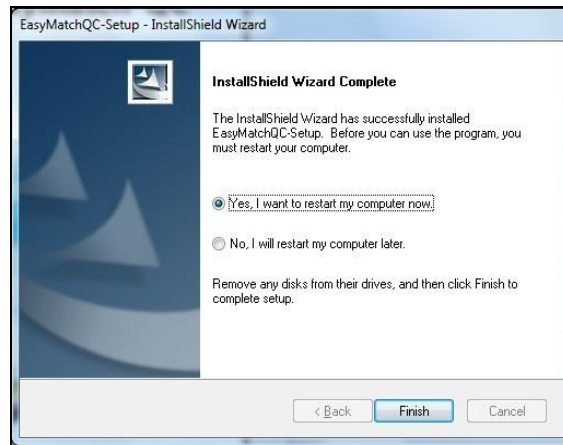


Figure 12. Completed Install

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.**

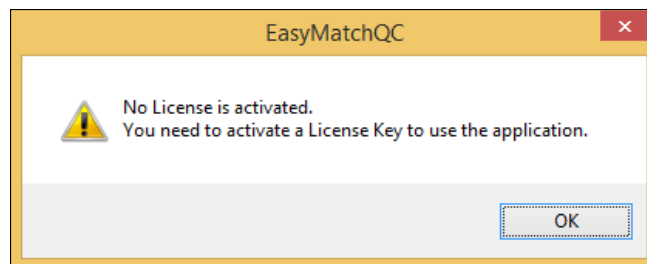


Figure 13. No License Warning

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**.

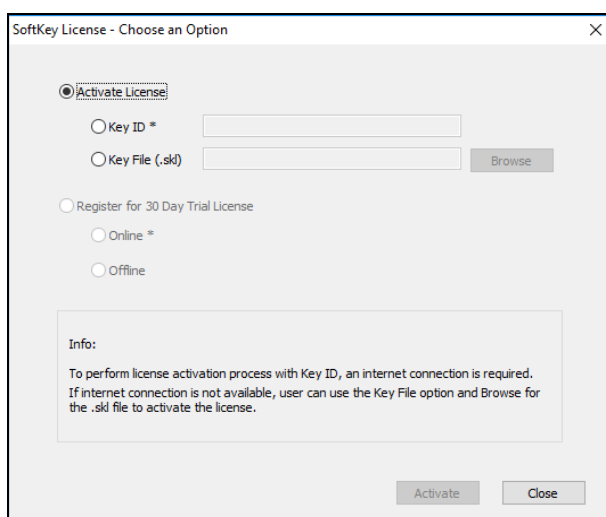


Figure 14. Activate License

### 1. 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 14), 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.

### 2. 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 14), 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.

### 3. 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.

### 4. 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.



The image shows a 'License Registration (Online)' dialog box. It contains the following fields: Customer, Company \*, Address, City, State, Country \*, Zip, E-mail ID \*, Mobile, and Phone. At the bottom right, there are two buttons: 'Register' and 'Close'.

Figure 15. 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:

The image shows the 'Sensor Manager' dialog box. It features a 'Sensor Name' list on the left. The 'Current Sensor' section includes 'Type' and 'Port' fields. The 'Current Mode' section includes 'Mode Name', 'Mode Type', 'Area View', 'UV Filter Position', and 'Standardized?' fields. On the right side, there are buttons for 'Add Sensor', 'Remove', 'Rename', 'Set Modes', and 'Connect'. At the bottom, there is a checked checkbox for 'Reconnect sensor at startup' and 'OK' and 'Cancel' buttons.

Figure 16. 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.

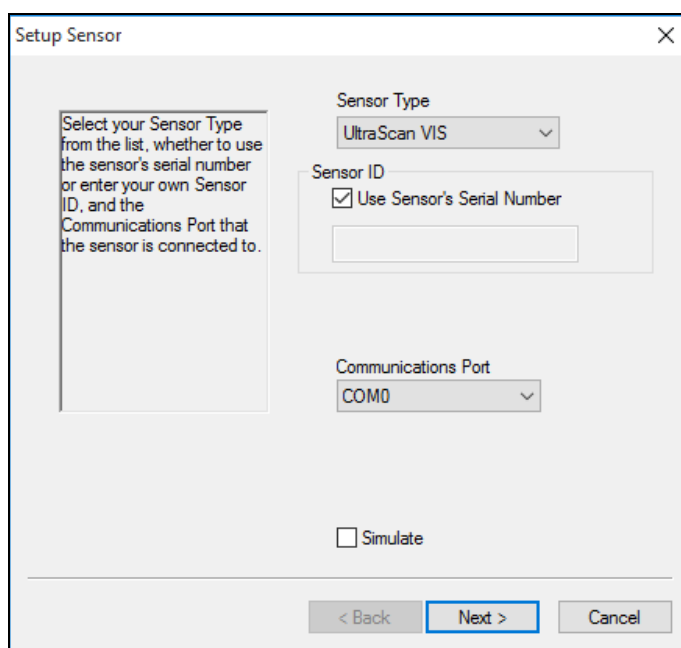
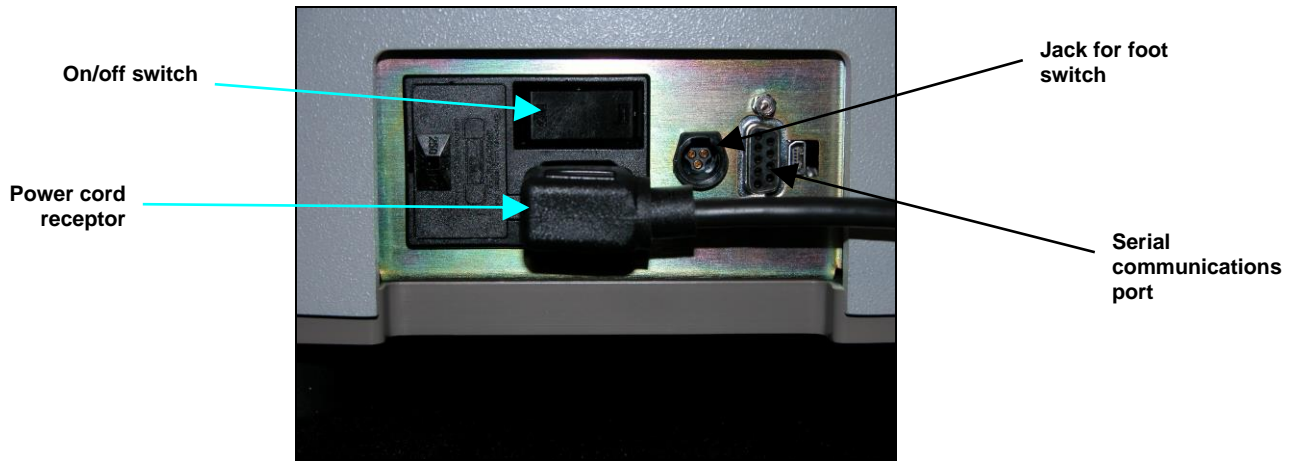


Figure 17. Setup Sensor

**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.**

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 VIS 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.

**Note: Do not block the vents in the top cover of the UltraScan VIS or the instrument may overheat.**



*Figure 18. Rear View of UltraScan VIS*



## UltraScan VIS Standardization

The UltraScan VIS must be standardized on a regular basis to keep it operating properly.

### General

Standardization sets the top and bottom of the scale for the photometric scale. During standardization, the bottom of the scale is set first. For this, you simulate the case where all the light is absorbed by the sample. For UltraScan VIS, the bottom of the scale is set with the light trap for reflectance modes. The light blocker (a.k.a. black card) device is used to set the bottom of the scale for transmittance measurements.



*Figure 19. Setting Zero for TTRAN*



*Figure 20. Setting Zero for RTRAN*

The top of the 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 and air or a solvent-filled cell for transmittance measurements. On-screen messages prompt you through the standardization procedure.



*Figure 21. Standardizing with the Light Trap*



*Figure 22. Standardizing on the White Tile*

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 environmental, such as temperature, changes. Then you may proceed with sample measurement.

### **Standardization Modes**

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

- RSIN: Reflectance - Specular Included
- RSEX: Reflectance - Specular Excluded
- TTRAN: Total Transmittance
- RTRAN: Regular Transmittance

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

When standardizing in transmittance modes you are prompted to place the white calibrated standard at the reflectance port. Alternatively, a plug of barium sulfate ( $\text{BaSO}_4$ ) or magnesium oxide ( $\text{MgO}$ ) 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.

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



*Figure 23. Top of Scale for 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).

In order 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.

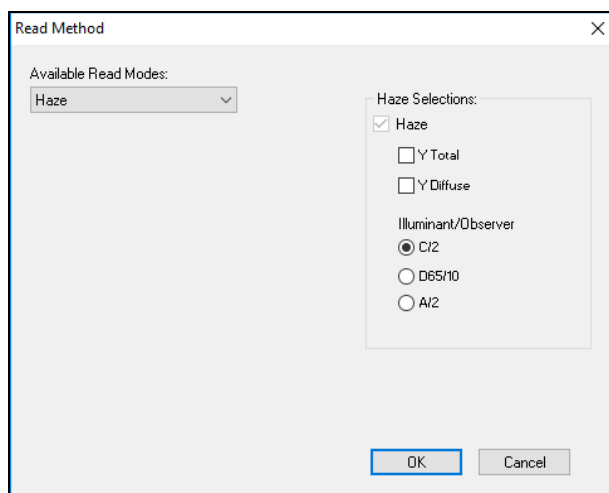


Figure 24. Read method: Haze

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.



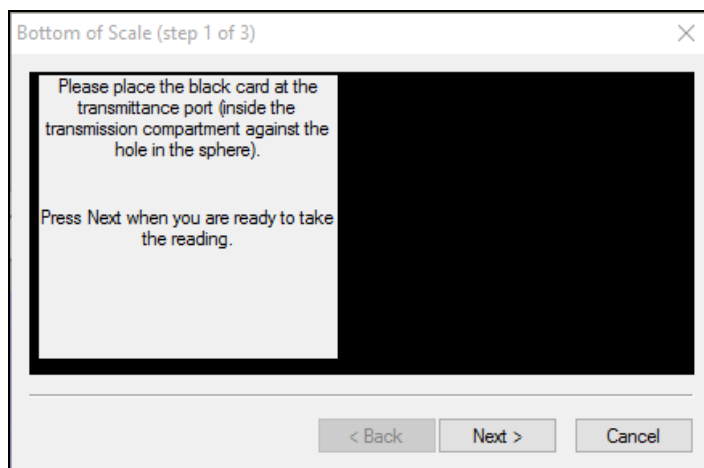


Figure 25. Haze Standardization: Black Card

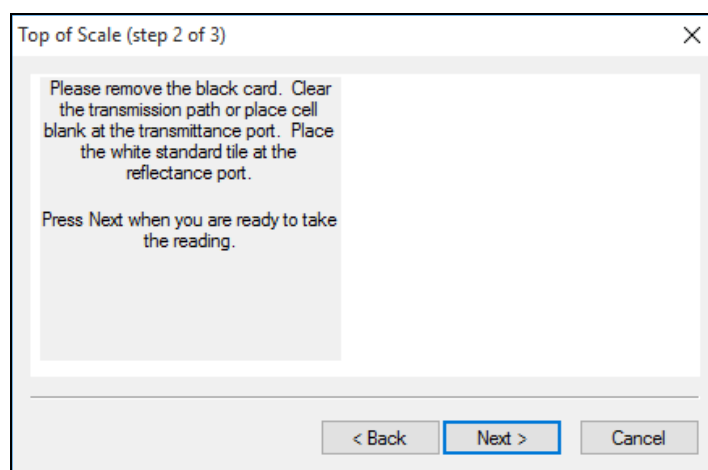


Figure 26. Haze Standardization: White Tile

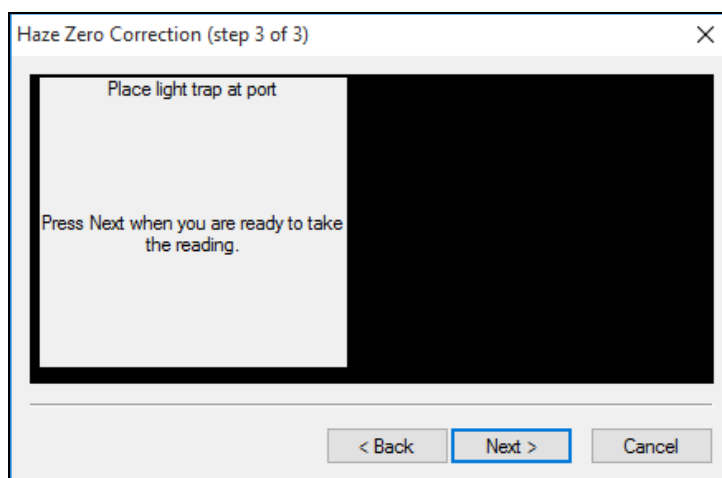


Figure 27. Haze Standardization: Light Trap

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.

- 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.

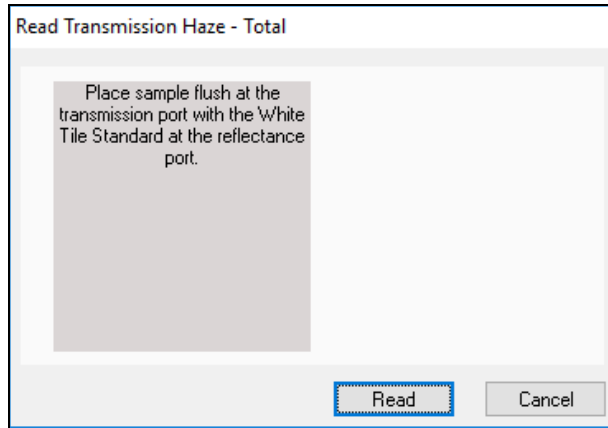


Figure 28. Read Sample with White Tile

- Leave your sample at the transmission port and replace the white calibration tile with the light trap. Click **Read**.

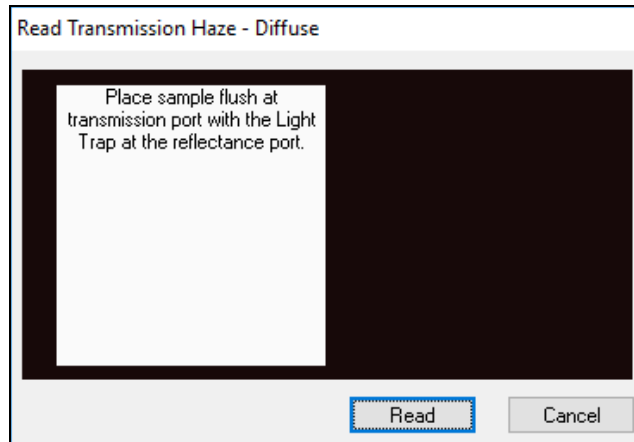


Figure 29. Read Sample with Light Trap

- When the instrument takes a 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 30. Haze Readings Reported

## UltraScan VIS Maintenance and Testing

This section outlines the parts of the UltraScan VIS you must maintain for the instrument to function properly and tests that 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 VIS on and allow it to warm it up for 2 hours. Meanwhile, clean the white tile in the User's Manual for EasyMatch QC and allow the tile 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 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 VIS should be in its standard configuration, RSIN mode with the large area view (1.000-inch/25.400 mm) 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 Job will configure these settings.



Figure 31. Green Tile at Reflectance Port

The green tile reading should vary by no more than  $\pm 0.15$  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

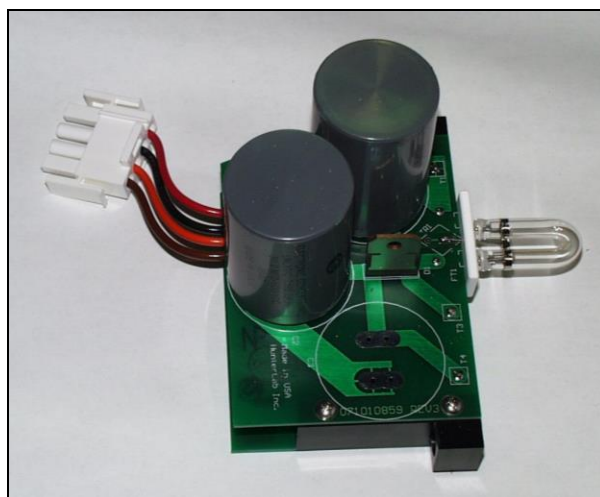
The didymium filter can be used to check the wavelength accuracy of your UltraScan VIS. This check should be done on a regular basis (i.e., weekly or bi-weekly) as part of your routine instrument performance check.

To perform the wavelength check, follow the steps described in the **Sensor Menu > Diagnostics** section of 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 module, HL#D02-1010-930.**

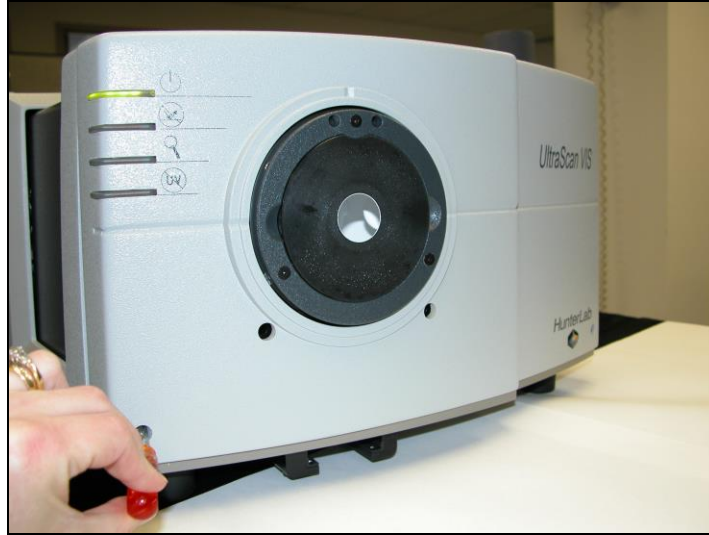


*Figure 32. Photo of Xenon Flash Lamp Assembly*

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

To change the source lamp:

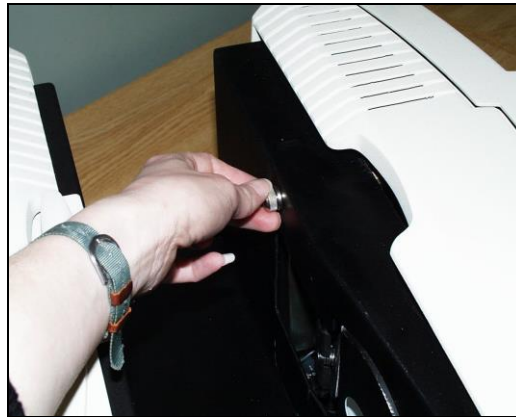
1. Disconnect the UltraScan VIS from its power source.
2. Wait two minutes for complete discharge of the capacitors.
3. Disengage and remove the sample clamp.
4. Loosen the two screws on the front cover with a flat screwdriver.



*Figure 33. Front Cover Screws*

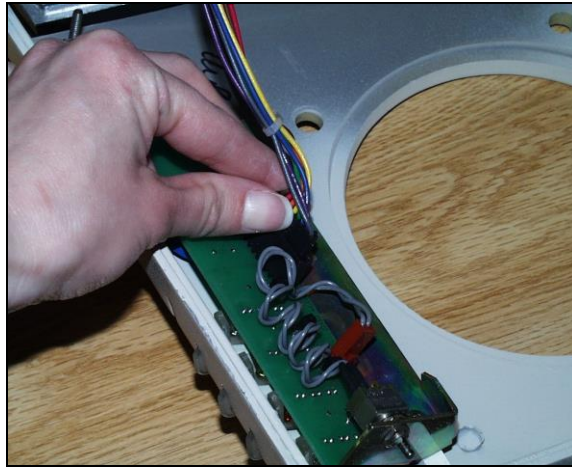
**Note: These screws are captive within the instrument cover housing and cannot be removed.**

5. Loosen the thumb screw on the inner panel bezel.



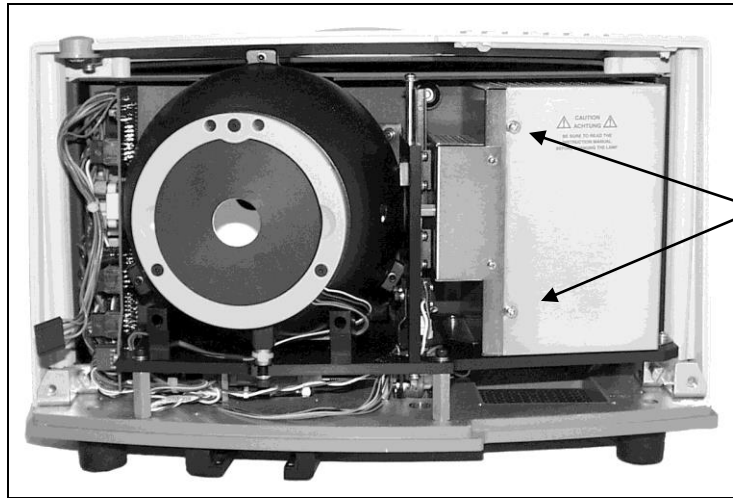
*Figure 34. Inside Panel Screws*

6. Remove the front cover from the instrument by sliding it forward and unplug the harness which connects the indicator lights of the front cover to the instrument.



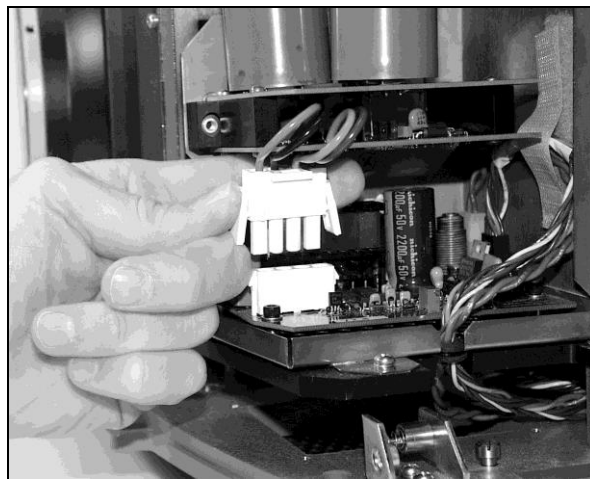
*Figure 35. Disconnect Indicator Lights*

7. Remove the screws and cover from the lamp housing using a Phillips-head screwdriver.



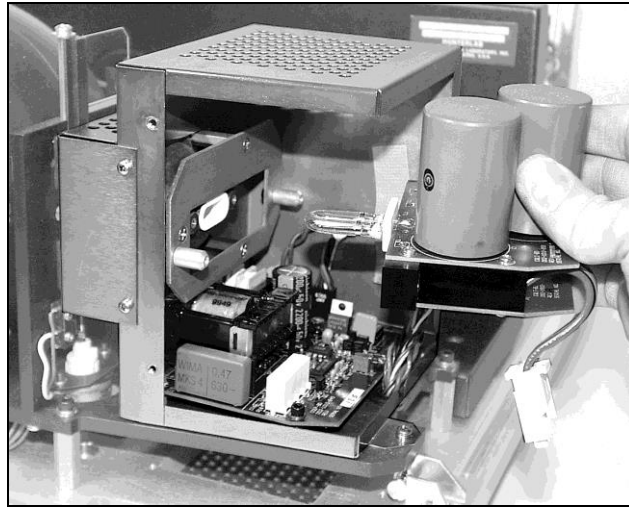
*Figure 36. Screws on Outside of Lamp Housing*

8. Unplug the white connector of the lamp assembly by squeezing the latches on the sides of the connector.



*Figure 37. Lamp Assembly Connector*

9. Remove the lamp assembly and replace with a new assembly. Be sure not to touch the bulb of the lamp, as fingerprints reduce lamp efficiency and weaken the glass. If a fingerprint is deposited, remove it using a clean wipe and isopropyl alcohol.



*Figure 38. Replace Lamp Assembly*

10. Plug in the white connector of the new lamp.
11. Replace the cover and screws on the lamp housing.
12. Plug the harness from the instrument into the indicator lights of the front panel.
13. Line the cover up with the guides on the bottom of the instrument.
14. Replace the front cover on the instrument and tighten the two front screws as well as the inner bezel thumb screw.
15. Turn the power on.
16. Standardize the instrument.

## Replacing the Fuses

The fuses (3A, SB (250 V), T) are located on the back panel of the instrument. Follow the instructions below to replace the fuses.

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

1. Disconnect the UltraScan VIS 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 39. Fuse Holder*

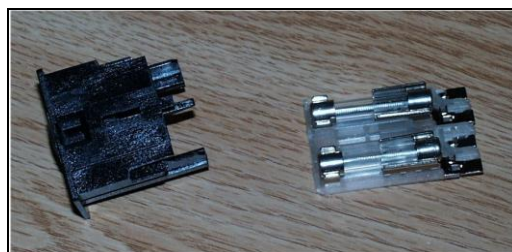
3. Pull back the tab to release the fuse holder.



*Figure 40. Replace Fuses*

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 41. Fuse Holder with Fuses*

5. Replace the fuse holder in the cartridge.
6. Replace the cartridge in the back panel of the instrument.
7. Turn the power on.



## Replacing the Optional View Lamp

The view lamp is used to illuminate the sample when using the retroviewer option.

**Note:** Replace with a specified lamp, HL#A13-1004-022.



Figure 42. View Lamp Assembly

To change the view lamp:

1. Disconnect the UltraScan VIS 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 screwdriver.



Figure 43. Front Cover Screws

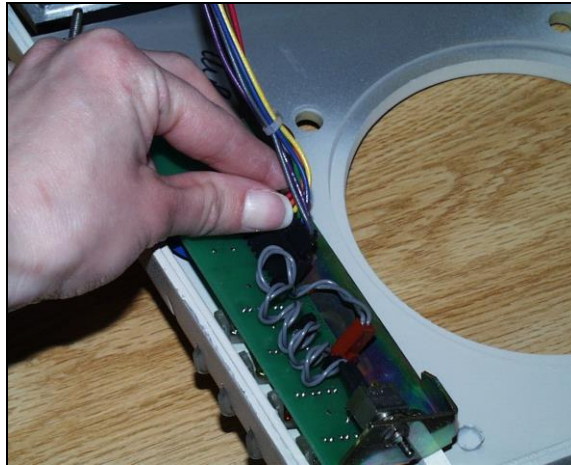
**Note:** These screws are captive within the instrument cover housing and cannot be removed.

5. Loosen the thumbscrew on the inner panel bezel.



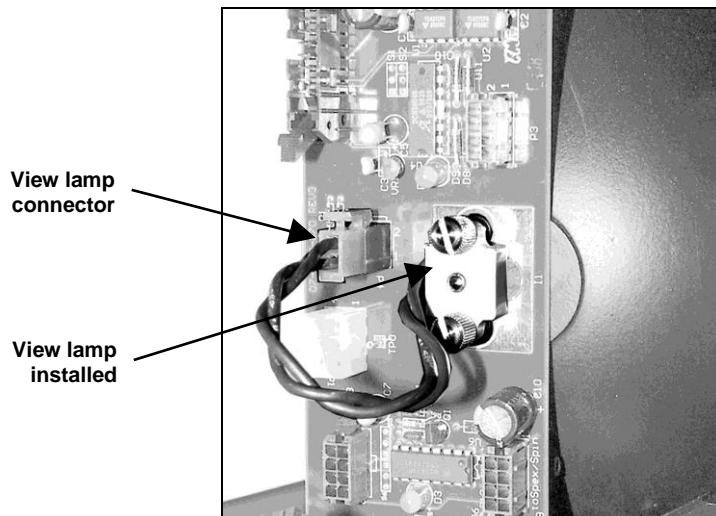
*Figure 44. Inside Cover Screws*

6. Remove the front cover from the instrument by sliding it forward and unplug the harness which connects the indicator lights on the front cover to the instrument.

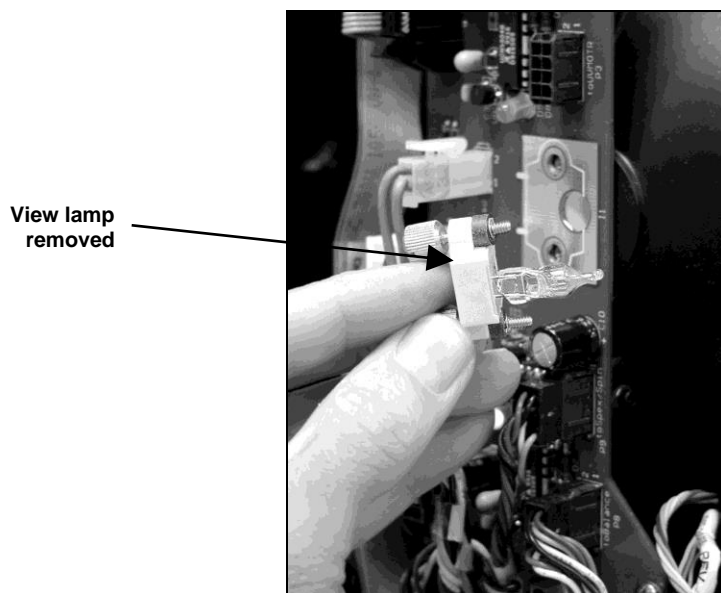


*Figure 45. Disconnect the Indicator Lights*

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 46. View Lamp*



*Figure 47. View Lamp Disconnected*

8. Plug the harness from the instrument into the indicator lights of 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.
11. Turn the power on.

### **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 Spectrafect™, 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.

4. When shipping the UltraScan VIS, 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 VIS 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% [10-90% for sensor only] and relatively constant temperature not exceeding 90°F (32°C) [104°F (40°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: 27.9 cm (11 in) Depth: 49.8 cm (19.6 in), Weight: 20.4 kg (45 lbs) not including the sample clamp
Communications interface:	RS-232C serial DB-9 or USB.

### Environmental Requirements

Operating Temperature	10°C - 40°C (50°F - 104°F)
Operating Humidity	Up to 90% relative, non-condensing
Storage Temperature	-21°C - 66°C (-5°F - 150°F) for up to three weeks

### Power Required

Voltage	100-240VAC, 47/63 Hz.
Single Phase	100 VA maximum
Fuse	3A, SB (250 V), T

**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 152.44 mm (6 in) plastic integrating sphere coated with Spectrafect™
Illumination	Xenon lamp with 1,000,000 flashes minimum life UV-absorbing filter for 400-nm cutoff and control
Monochromator	Diffraction grating, dual channel
Detector	Dual diode array detectors
Interface Mode	Serial RS-232, USB
Area of View	Large area view port size: 25.4 mm (1 in) diameter Large area view measured area: 19.0 mm (0.75 in) diameter Small area view port size: 9.5 mm (0.375 in) diameter Small area view measured area: 6 mm (0.25 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
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## Instrument Performance

Wavelength Range	360-780 nm
Wavelength Resolution	<2 nm
Wavelength Bandpass	10 nm equivalent triangular
Wavelength Interval	10 nm
Wavelength Accuracy	0.75 nm
Photometric Range	0-150% reflectance or transmittance
Photometric Resolution	0.01% reflectance
Spectral Repeatability	Standard deviation within 0.1% in LAV and SAV modes

**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 Declaration of Conformity per ISO/IEC Guide 22 and EN 45014 follows on the next page.





## Instrument Replacement, Repair, Problems, and Questions

The following HunterLab policies are described:

- 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 installed, operated, or subjected the instrument to conditions outside of the specifications 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](mailto: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's Service Department](#) 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 the HunterLab Service Department 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 the HunterLab Service Department. 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 with regard to 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 Inc.  
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](http://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 corresponding with HunterLab.

1. The type of sensor that 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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