ColorFlex® EZ
Supplemental Manual for EasyMatch® QC

The world's true measure of color
HunterLab

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A60-1017-662
Manual Version 1.2

Copyrights and Trademarks

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

Caution: There is a potential of a UV Light hazard in using this instrument. Please avoid looking directly at the light.

Contents

ColorFlex EZ Features

The ColorFlex EZ spectrophotometer is a versatile color measurement instrument that can be used for reflectance measurement of products in industries such as paint and textiles. Although the instrument is AC-powered, the small footprint of the ColorFlex EZ allows for portable operation.

Figure 1. ColorFlex EZ

The instrument uses a xenon flash lamp to illuminate the sample. The light reflected from the sample is then separated into its component wavelengths through a dispersion grating. The relative intensities of the light at different wavelengths along the visible spectrum (400-700 nm) are then analyzed to produce numeric results. This is an objective means of quantifying a sample's color.

ColorFlex EZ is available in one geometry – 45° illumination/0° viewing. The label on the back of the instrument provides information on the serial number.

The ColorFlex EZ may be operated using the keypad and display on the instrument or operated while connected to a computer running HunterLab EasyMatch QC software. Having purchased both a ColorFlex EZ and EasyMatch QC software, you have two sources of information on the instrument in addition to this User's Manual: the ColorFlex EZ User's Manual which describes stand-alone operation, and the EasyMatch QC help file, which describes operation of the ColorFlex EZ using the software. Refer to those information sources as required.

ColorFlex EZ Accessories

The following accessories are included with the ColorFlex EZ system and can be found in the provided carrying case:

- Black glass - placed at the sample port during standardization of 45°/0° instruments.
- White calibrated tile - placed at the sample port during standardization.
- Diagnostic Green tile - used to check instrument performance.
- Standards care card - gives instructions on how to clean the standards.
- Certificate of traceability for the calibrated white tile.
- USB computer interface cable.
- AC adapter, 2 A/9V.
- ColorFlex EZ User's Manual
- USB Flash disk for Datalog Export

ColorFlex EZ Installation

The ColorFlex EZ is simple to set up and attach to your computer. Before operating the ColorFlex EZ with EasyMatch QC, you need to install the batteries and connect the instrument to your computer. These steps are outlined below.

1. Unpack the carrying case and remove wrappings and cable ties. Inspect for damage and notify the carrier and HunterLab immediately if any is discovered. Save the packing materials in case it becomes necessary to return the instrument to the factory.
2. Plug the USB cable into the USB port on back left of the ColorFlex EZ.
3. Plug the flat end of the USB cable into the appropriate USB port on the computer.

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.

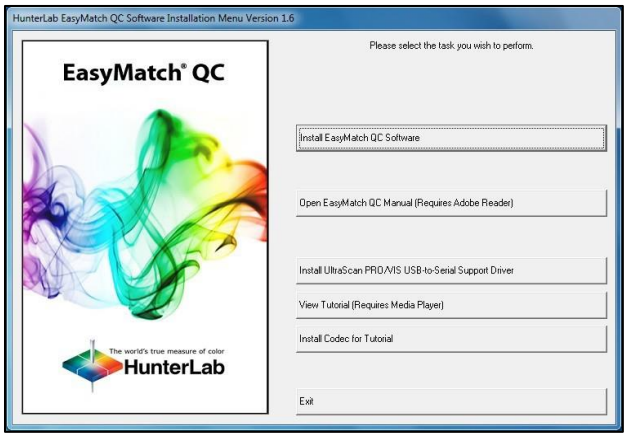


Figure 2. EasyMatch QC Installation

4. Select ***INSTALL EASYMATCH QC SOFTWARE*** and follow the screen prompts.
5. Select ***SOFTKEY LICENSE*** as the type of key to use with the software.

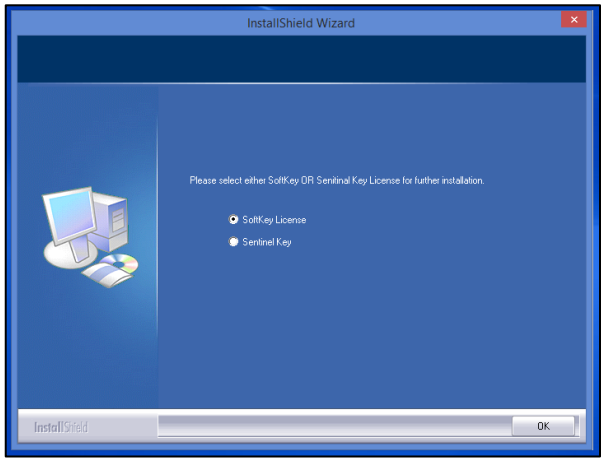


Figure 3. Software Key License

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.

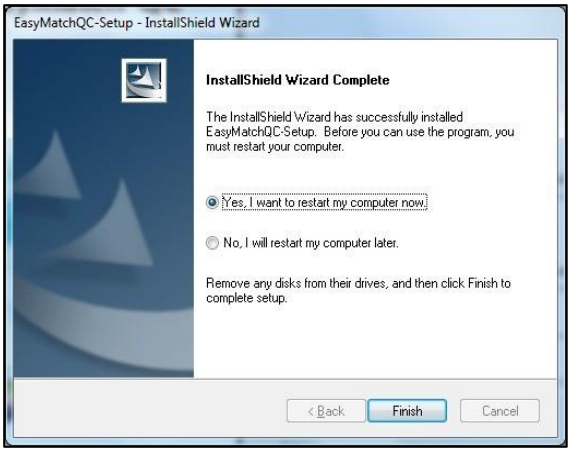


Figure 4. Completed Install

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 below.

Note: EasyMatch QC functions are unavailable before key activation.

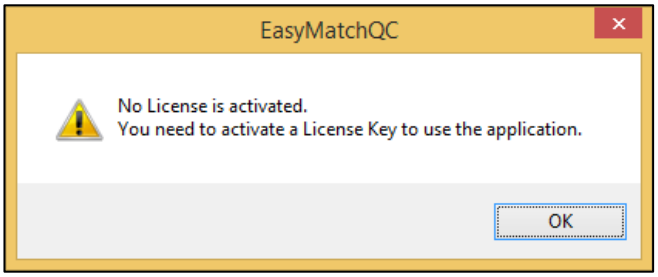


Figure 5. No License Warning

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***.

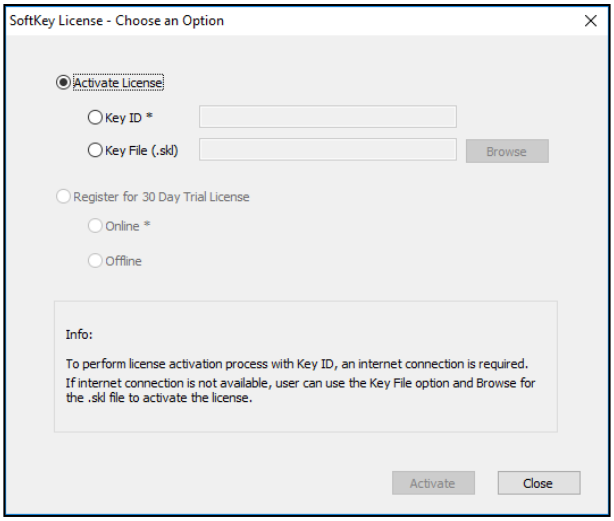


Figure 6. Activate License

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 5), 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 6), 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, Step 5 (Figure 3) and select the ***Sentinel Key*** to continue.

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

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

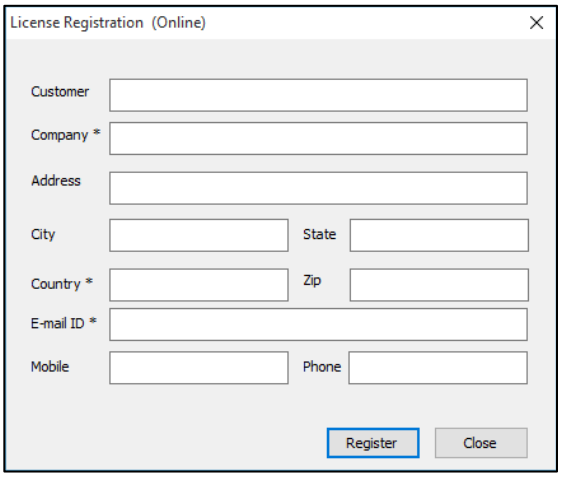


Figure 7. Request 30-day Trial

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 ***SENSOR MENU > INSTALL > CONFIGURE*** command and install a new sensor.
2. The Sensor Manager appears first:

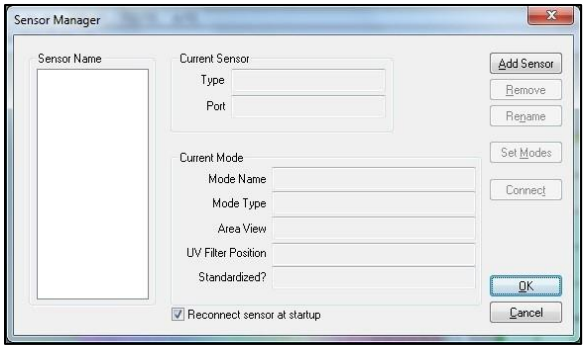


Figure 8. Sensor Manager

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.

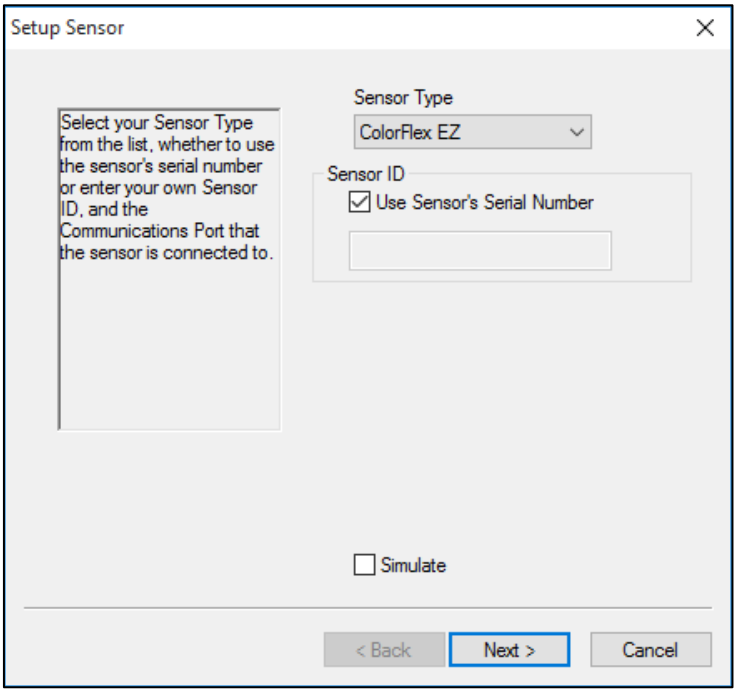


Figure 9. Setup Sensor

4. Connect the instrument using the USB communications port on the instrument to the computer with EasyMatch QC.
5. Remove the tape covering the reflectance port.
6. Place the desired port plate at the reflectance port and snap it into place.
7. Turn on the ColorFlex EZ by pressing and holding the ***READ*** Button. Allow the instrument to warm up for two hours prior to standardizing and making measurements.

Getting Started with ColorFlex EZ

Standardization

Standardization on a ColorFlex EZ model with 45°/0° geometry requires reading of the black glass and the calibrated white tile that are contained in the standards box. Standardization can be done through EasyMatch QC (by selecting ***SENSOR MENU > STANDARDIZE*** or by clicking the ***STANDARDIZE*** button on the default toolbar) or directly through the ColorFlex EZ firmware.

Standardization sets the top and bottom-of-scale for the neutral axis. During standardization, the bottom-of-scale (zero) is set first. his is done by placing the Black Glass at the sample port. The top-of-scale is then set by reading the calibrated White Tile. Messages on the display prompt through the standardization process as described below.

It is recommended that the ColorFlex EZ be standardized every four to eight hours. The instrument will automatically prompt for standardization after the Standardization Interval set in ***SENSOR > SET INTERVAL*** has elapsed, so it is a good idea to enter 4 to 8 hours as the Standardization Interval.

Also standardize the ColorFlex EZ any time there is a significant change (greater than 5°F) in ambient temperature. For example, if the ColorFlex EZ is moved an air-conditioned office to an outdoor site that is 90°F, standardization should be repeated once the instrument has had a chance to stabilize under the new temperature. Also standardize the instrument any time there is a change in the optical path, such as changing from using the standard port to the sample cup port.

Also, it is important that the standards used in standardization be treated carefully. Tiles must be kept clean and in good condition. If there is any doubt about the standards being clean, clean them as described in the **Maintaining and Testing ColorFlex EZ** chapter.

Standardization of a ColorFlex EZ is performed as follows:

1. Remove the calibration tiles from the standards box. Check that the tiles are clean and free of dust and scratches. If they are dirty (including marked with fingerprints), clean them as described in **Maintaining and Testing ColorFlex EZ**.
2. ***SELECT SENSOR > STANDARDIZE*** from the EasyMatch QC. The Standardization screen appears, prompting for the Black Glass.Place the Black Glass on the measuring port with the shiny side of the glass against the port. Check that the Black Glass is flat and in solid contact against the port and that the white dot is facing forward towards the operator.

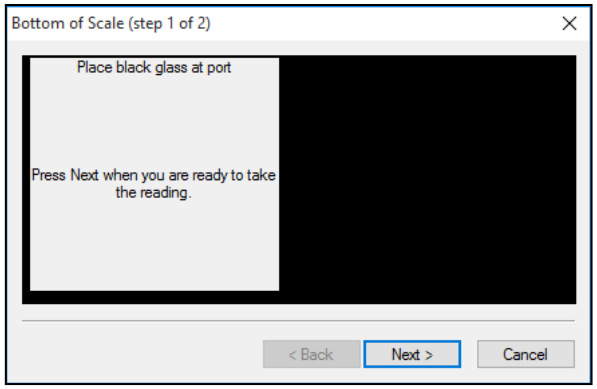


Figure 10. Place Black Glass at Port

3. The ColorFlex EZ reads the **BLACK GLASS** and sets the bottom-of-scale. When it is finished, the screen prompts for the calibrated **WHITE TILE**. Replace the Black Glass with the calibrated White Tile, which is contained in the standards box.

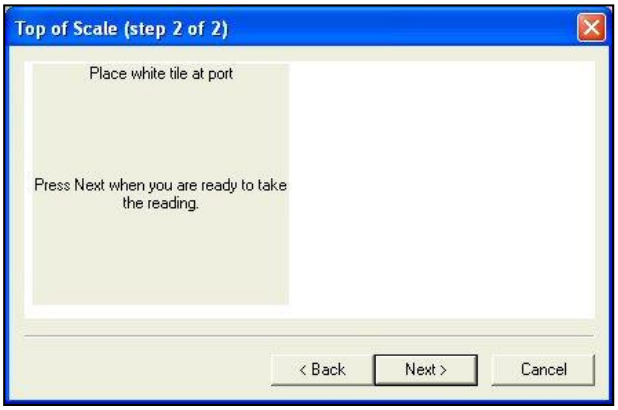


Figure 11. White Tile Reading

4. The ColorFlex EZ reads the White Tile and sets the top of scale. When it is finished, the screen indicates that the instrument has been successfully standardized.

Sensor > Configure Setups

For Product Measurements, the Setup Groups window appears to create, edit, or delete setup groups and upload, modify, and download individual setups.

Figure 12. Configure Setups

Upload

When you click **UPLOAD**, the setups stored in the instrument are brought into EasyMatch QC. These setups can then be edited, if desired. The setups can also be saved as a setup group by typing a name into the white box or selecting a name from the drop-down list and clicking ***SAVE***. Later, you can select the desired group and click ***GET*** to retrieve that saved group of setups or ***DELETE*** to delete the group of setups.

Download

When you click ***DOWNLOAD***, the setups in the current EasyMatch QC setup group are sent back to the instrument.

Edit

When you click ***EDIT***, the Product Setup Configuration screen appears.

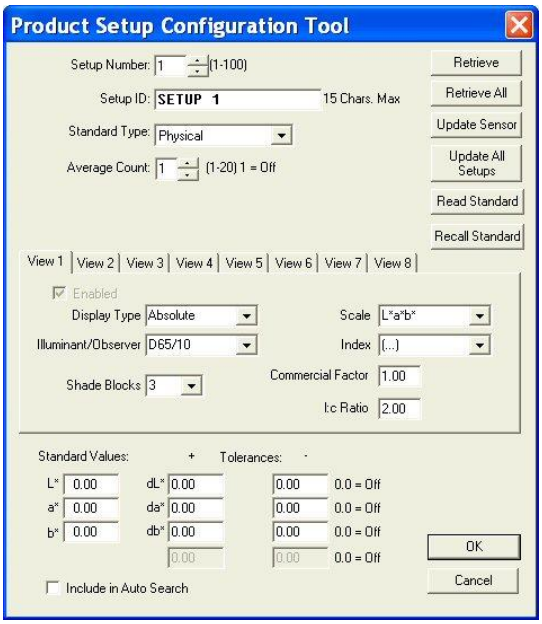


Figure 13. Product Setup

Use the scroll bar next to Setup Number or type a setup number into the box to choose a setup with which to work. If you wish to begin working with the version of the setup that is already resident in your instrument, click ***RETRIEVE***. If you wish to work with the version of the setup that is shown on-screen, do not click ***RETRIEVE***.

Alter the setup parameters as desired. The parameters and selections available are the same as those configured through your instrument firmware. If you are using a physical standard, you may click the ***READ STANDARD*** button to read the standard to be saved with the setup using your instrument or ***RECALL STANDARD*** to recall a standard from your EasyMatch QC database to be saved with the setup.

When all parameters are as desired for this setup, click ***UPDATE SENSOR*** to send the setup to your instrument. You may retrieve all the setups from the instrument at once using the ***RETRIEVE ALL*** button or send all the setups back to the instrument at once using the ***UPDATE ALL SETUPS*** button. Complete the following steps to take individual readings using the ColorFlex EZ:

Note: These instructions apply when Average in the product setup is set to OFF.

Reading Samples and Standards

From the ***MEASUREMENTS MENU***, you may read either a standard or a sample. You may also average data. The functions available through the ***MEASUREMENTS MENU*** are described in the EasyMatch QC Reference Manual.

It is recommended that the instrument be standardized at least once every four hours. Then you may proceed with sample measurement.

Product Standard

A product standard is an object that represents the ideal target color for the product. This object is the one to which others will be compared and deemed acceptable or unacceptable. The product standard may either be a physical item that is measured using the ColorFlex EZ or a set of color values that is entered into EasyMatch QC. .

Sample

A sample is an object that will be measured with the ColorFlex EZ and compared to the product standard. The color of the sample is generally like the color of the product standard.

Sensor > Import Logged Reads

The ***SENSOR > IMPORT LOGGED READS*** command appears when the connected instrument is a ColorFlex EZ. There must be items saved to the instrument datalog in order to use this command.

The Data log screen appears first.

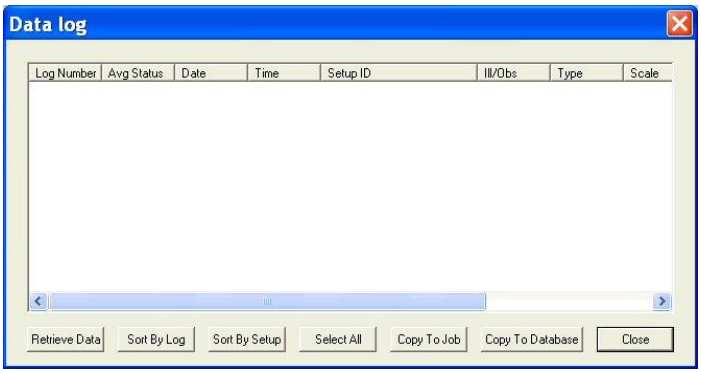


Figure 14. Data Log Screen

Retrieve Data

Copies of the measurements stored in the instrument's datalog can be retrieved to the Data log screen.

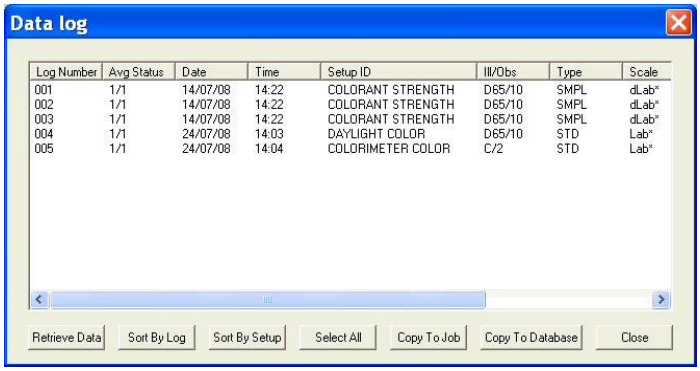


Figure 15. Retrieve Data

Once the measurements are shown, the remainder of the buttons at the bottom of the screen become active and serve the following functions:

Sort By Log

Causes the measurements shown in the Data log window to be sorted by their instrument datalog ID numbers for easier viewing.

Sort by Setup

Causes the measurements shown in the Data log window to be sorted by their instrument setup numbers for easier viewing.

Select All

Selects (highlights) all the measurements shown on the Data log screen so that the **COPY TO JOB** or **COPY TO DATABASE** command may be applied to all of them at once. (The alternative to **SELECT ALL** is to use the Windows convention of clicking on a single item to select it, **CTRL +** clicking on multiple items to select them, or **SHIFT +** clicking on the first and last of a list of items to select all the items between.)

Copy to Job

Places the measurements that are currently selected into the active job. Standards are automatically placed in the job as standards. You are prompted to indicate the standard under which samples should be saved.

Copy to Database

Places the measurements that are currently selected into the database. Standards are saved as standards and samples as samples, and the datalog ID number is used as the item ID.

The measurements copied to the job or EasyMatch QC database are NOT deleted from the instrument's datalog. If you wish to delete them, you must do so manually though the instrument firmware.

ColorFlex EZ Maintenance and Testing

The ColorFlex EZ requires minimal maintenance. This chapter describes cleaning of the instrument and tiles and running diagnostic tests as part of normal instrument maintenance.

Cleaning of the ColorFlex EZ

Clean the outside surfaces of the ColorFlex EZ using a soft cloth. Do not spray liquids directly on the instrument.

Diagnostic Test #1: Running Short Term Repeatability

Short Term Repeatability of your instrument may be tested using the calibrated white tile as follows:

1. Turn the ColorFlex EZ on and allow it to warm up for 2 hours. Meanwhile, clean the calibrated white tile as described and allow the tile to return to room temperature.
2. Follow the instructions given in the ***SENSOR MENU > DIAGNOSTICS*** section to run the short repeatability test that is built into EasyMatch QC.

Diagnostic Test #2: Running Long Term Repeatability

Long Term Repeatability is measured using the Green Tile as follows:

1. If needed, clean the diagnostic green tile and allow the tile to return to room temperature.
2. Follow the instructions given in the ***SENSOR MENU > DIAGNOSTICS*** section to run the long-term repeatability test that is built into EasyMatch QC.

Replacing the Lamp

Lamp replacement requires a trained technician. Contact HunterLab Technical Support to arrange for lamp replacement. Please read “When You Need Assistance” prior to contacting HunterLab.

ColorFlex EZ 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. The operating conditions (temperature and humidity ranges) are given in the Operating Conditions section below.

Operating Conditions

ColorFlex EZ can be stored in an area with a temperature range of -20°C to 65°C (-5°F to 150°F) for up to 3 weeks and can be operated under temperature conditions of 10°C to 40°C (50°F to 104°F). For specification-level performance, the recommended temperature range is 21-28°C (70-82°F). It may be operated under relative noncondensing humidity conditions of 10% to 90%. Do not leave ColorFlex EZ in an area where temperature or humidity extremes are possible.

Physical Characteristics

Weight	4.5 kg (9.9 lb.)
Dimensions	Height: 16 cm (6.3 in) Width: 13 cm (5.1 in) Depth: 36 cm (14.2 in)
Communications Interface	3 USB 2.0 ports
RFI Compliance	FCC Class A (Commercial), IEC, or equivalent
Safety Compliance	UL, CSA, IEC, or equivalent
System Power	100 to 240 VAC, 47 to 63 Hz

Conditions of Illumination and Viewing

Light Source	Pulsed xenon
Source UV content	Match to D65 with CIE rating of CC or better
Lamp Life	>1 million flashes
Geometry	Directional annular 45° Illumination/0° Viewing
Detector	Sealed optics; 256-element scanned array & high-resolution concave holographic grating
Port Diameters/Sample View Diameters	31.8 mm (1.25 in)/25 mm (1.0 in)

Instrument Performance

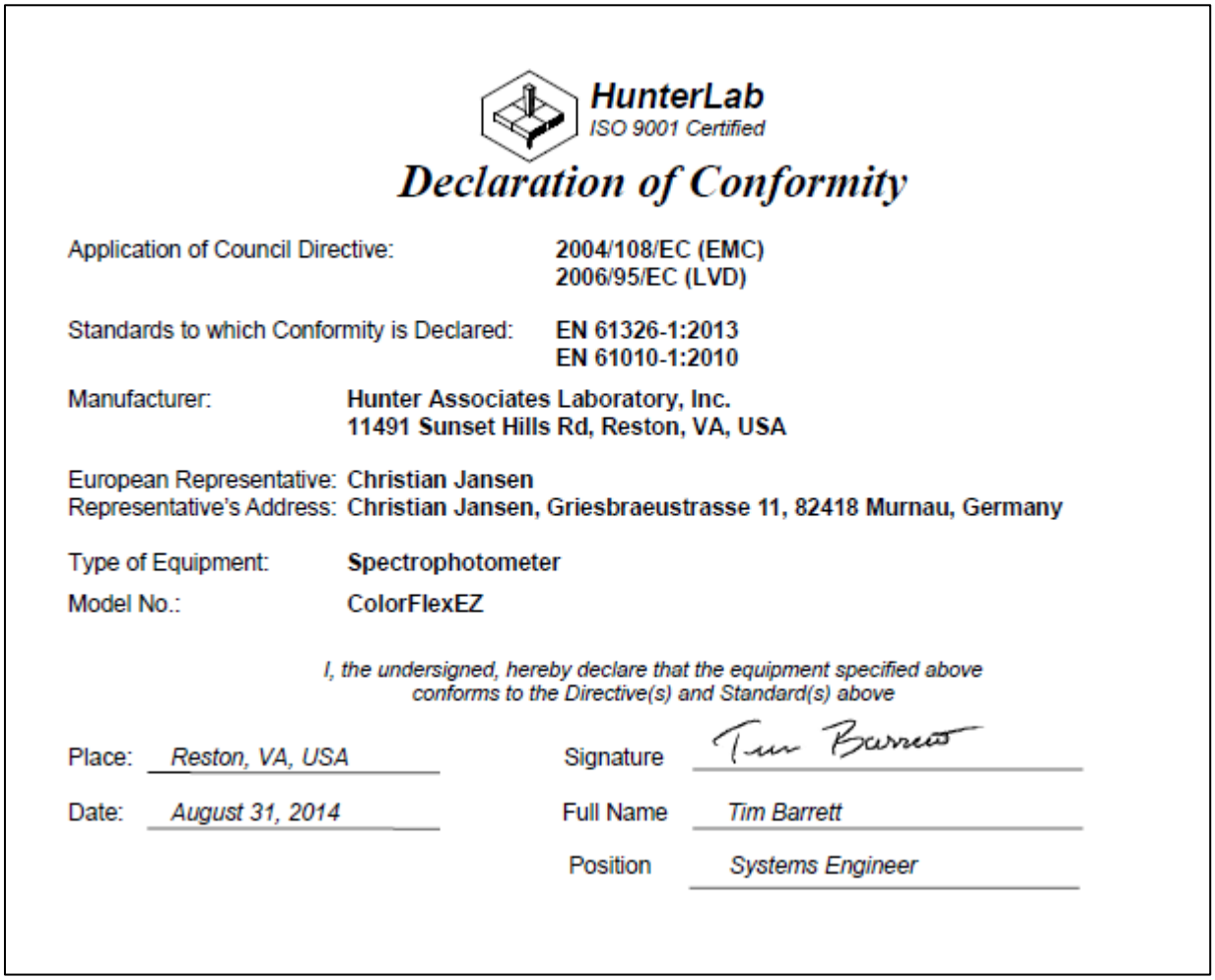
Spectral Data	Range: 400-700 nm Reporting Interval: 10 nm
Bandwidth at Half-height	10 nm
Photometric Range	0-150% reflectance
Measurement Speed (at 23°C)	≤1.5 seconds
Measurement Storage Capacity	2000 spectral readings as sample 250 spectral or tristimulus standards with Pass/Fail Tolerances 100 product setups

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 according to ISO/IEC Guide 22 and EN 45014 follows:



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.:	ColorFlexEZ

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

Place: *Reston, VA, USA*

Date: *August 31, 2014*

Signature: Tim Barrett

Full Name: *Tim Barrett*

Position: *Systems Engineer*

ColorFlex Options and Sample Devices

There are many options and devices available for positioning samples at the measurement ports of the ColorFlex 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**.

Sample Clamp and Port-Forward Stand (D02-1010-459)

The port-forward stand holds the instrument securely in the port-forward position and the sample clamp holds samples flat at the sample port.

Installation:

To attach the stand to the ColorFlex EZ lay the instrument on its side and install the two screws through the stand into the bottom of the instrument using the Allen wrench provided. To use the sample clamp, pull the spring-loaded clamp away from the sample port, insert the sample and gently release the clamp.

Figure 16. Sample Clamp and Stand

Skein Holder Option (02-7396-00)

This is a device for measuring yarn skeins. Wind the yarn around the skein holder in multiple taut layers until it is effectively opaque and is as flat as possible.

Place the skein holder at the sample port and back it with the sample clamp or a white backing tile to provide a consistent background and pressure. Make several measurements of the skein, rotating the holder 90° between measurements and averaging the readings for the result.

Figure 17. Skein Holder

Port Inserts

Special port plate inserts with various-sized openings are available for use with samples of differing sizes. Some inserts are also available with glass covers to protect the inside of the instrument from sample and airborne particles.

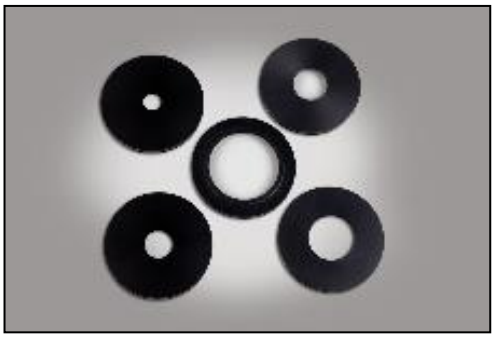


Figure 18. Port Inserts

Installation:

Remove the standard port insert by twisting it until it pops up. Replace it with the desired port insert. Make sure that the flat portion of the insert is facing outward with the magnetized portion toward the interior of the sensor.

Sample Measurements:

Standardize the instrument. Any change in port size must be followed by standardization on both the Black Glass and the Instrument White tile. When using a glass port insert, standardize the instrument with the glass insert in place. However, you should check measurements of the green and white tile and perform other diagnostics *without* the glass insert. Difference measurements using a glass port insert will be more accurate than absolute measurements.

Glass Port Insert

This option provides a snap-in port plate with an opening one inch in diameter that is covered with glass. The glass insert protects the inside of the instrument from sample and airborne particles.

Installation:

Remove the standard port insert by pulling it out of the port insert retainer. Replace it with the glass port insert. Make sure that the flat portion of the insert is facing outward with the beveled portion toward the interior of the sensor.

Sample Measurements:

Standardize the instrument with the glass in place. Check the measurements of the green and white tiles before performing any other diagnostics without the glass cover. Difference measurements using a glass cover will be more accurate than absolute measurements.

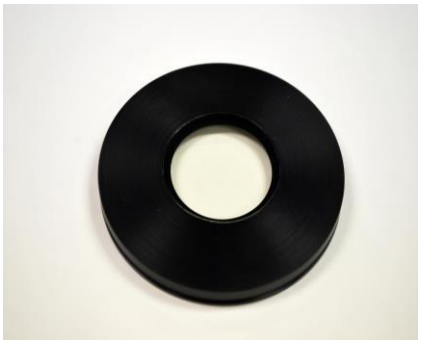


Figure 19. Glass Sample Port

UV Port Insert 420nm

This port insert contains a 420-nm filter to prevent light below 420 nm from hitting the sample. This is important when samples have been treated with UV enhancing chemicals.

Installation:

Remove the standard port insert by pulling it out of the port insert retainer. Replace it with the UV port insert. Make sure that the flat portion of the insert is facing outward with the beveled portion toward the interior of the sensor.

Sample Measurement:

Then standardize the instrument with the UV filter in place. Check the measurements of the green and white tiles before performing any other diagnostics without the UV filter.

Sample Cup with Ring and Disk Set for Translucent Liquids (CFLX-SC ASSY & LSXE-SC-ASSY)

This set provides a device for holding powders, pellets, granules, and translucent liquids at the sample port. It includes a 64mm (2.5-inch) glass sample cup, plastic ring and ceramic disk set, special port plate and sample cup cover. The ring and disk set are provided for translucent liquids, transparent liquids, and semi-solids where the path length is related to color concentration and must be fixed.

Figure 20. Ring & Disk Set

Installation:

First, the sample cup port plate should be installed to hold the sample cup in the proper position. Place the ring inside the sample cup and fill the cup with sample to a level above the ring. Then place the ceramic disk on top of the sample (until it rests on top of the ring) with the white portion facing the sample. Cover with the sample cup cover to exclude external light.

Sample Measurement:

Measure the sample at the sample port through the glass bottom of the sample cup with the instrument in the port-up orientation.

Parts:

Accessory Parts	ColorFlex EZ	LabScan
Sample Cup Port Plate	04-6622-00	02-1010-316
64mm Glass Sample Cup	04-7209-00	04-7209-00
Sample Cup Opaque Cover	04-4000-00	04-4000-00
Ring and Disk Set	02-7579-00	02-7579-00

Sample Cup Port Plate

This port insert is specially designed to accommodate the 64mm (2.5-inch) glass sample cup and to hold it in the proper position at the measurement port. Remove the standard port insert by pulling it out of the port insert retainer. Replace it with the sample cup port insert, then standardize the instrument.

64mm (2.5in) Glass Sample Cup

The sample cup is ideal for the analysis of powders, granules, pellets, and translucent samples. It is recommended for use with the instrument in the port-up orientation. The cup can be filled with the desired sample and placed at the measurement port so that the sample is measured through the glass bottom of the cup.

Sample Cup Opaque Cover

The opaque cover provides a light trap to exclude the interference of external light on a sample contained in the 2.5-inch sample cup. It is placed over the filled cup at the sample port as shown below.

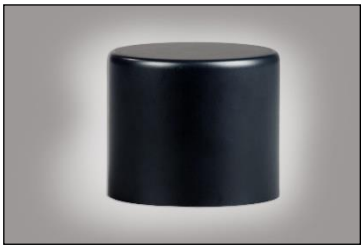


Figure 21. Opaque Cover

Ring and Disk Set

The ring and disk set includes a plastic ring and ceramic disk designed for use inside the 2.5-inch glass sample cup (sold separately). The ring and disk set are recommended for use when measuring translucent liquids, transparent liquids, and semi-solids to exclude external light and provide a consistent white background and sample path length.

Place the ring inside the sample cup and fill the cup with the sample to a level above the ring. Then place the ceramic disk on top of the sample (until it rests on top of the ring) with the white portion facing the sample. If desired, cover the entire assembly with the opaque cover (sold separately). Measure the sample at the sample port through the glass bottom of the sample cup with the instrument in the port-up orientation.

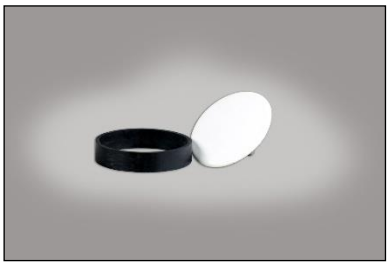


Figure 22. Ring and Disk Set

When You Need Assistance

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

For the Americas, Support@hunterlab.com

For Asia, AsiaSupport@hunterlab.com

For Europe, EuropeSupport@hunterlab.com

For India, Middle East and Africa, IMEASupport@hunterlab.com

For all other regions, Support@hunterlab.com

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

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

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