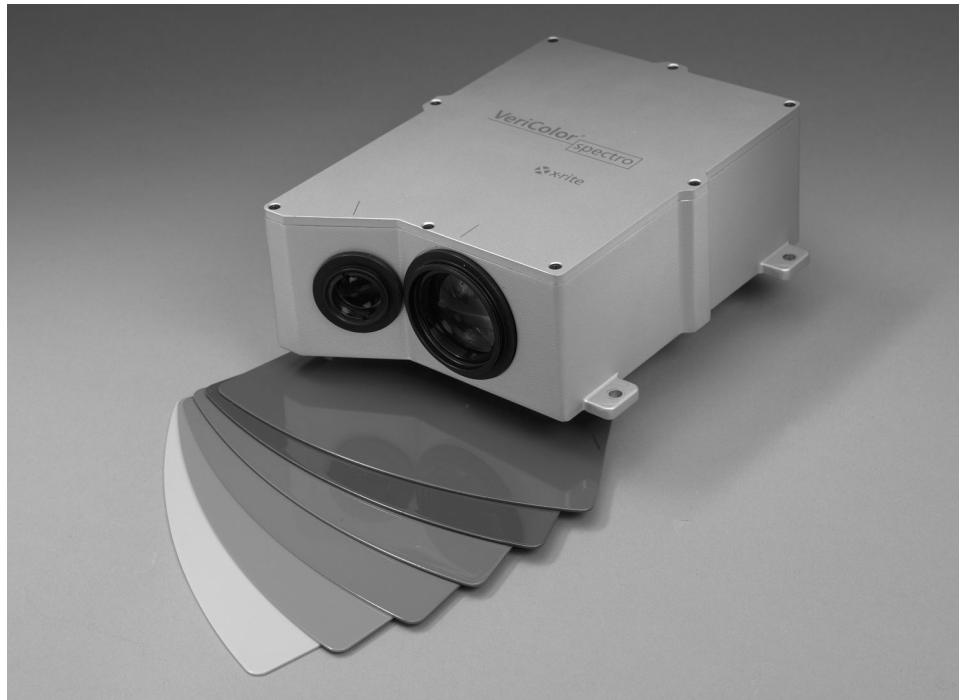


VeriColor® Spectro

Non-Contact Spectrophotometer



Setup and Operator Manual



CE Declaration



Hereby, X-Rite, Incorporated, declares that this VS410 is in compliance with the essential requirements and other relevant provisions of Directive(s) EMC 2004/108/EC, LVD 2006/95/EC, and RoHS 2011/65/EU.

Federal Communications Commission Notice

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Equipment Information



Use of this equipment in a manner other than that specified by X-Rite, Incorporated may compromise design integrity and become unsafe.

WARNING: This instrument is not for use in explosive environments.

ADVERTENCIA - NO use este aparato en los ambientes explosivos.

AVVERTIMENTO - NON usare questo apparecchio in ambienti esplosivi.

WARNUNG: Das Gerät darf in einer explosiven Umgebung NICHT verwendet werden.

AVERTISSEMENT: Cet instrument ne doit pas être utilisé dans un environnement explosif.



Instructions for disposal: Please dispose of Waste Electrical and Electronic Equipment (WEEE) at designated collection points for the recycling of such equipment.

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This product may be covered by one or more patents. Refer to the instrument for actual patent numbers.

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Table of Contents

Overview	7
VeriColor Spectro Description	7
Unpacking and Inspection	7
VeriColor Spectro Installation	8
Mounting and Height Setup	8
Height Insensitivity	10
Measurement Angle	10
VeriColor Spectro Dimension Drawing	11
Cable Connection and Wiring	12
Hardware Interface Description	14
Discrete Input Lines	14
Power/Comm/Control Cable (p/n: VCS50-EUR8-DB5)	14
Discrete Output Lines	15
Discrete Interface Cable (p/n: SE108-EUR8-5M)	17
Computer Interface	17
Status LED Indicator	18
Software Installation and Overview	19
Basic System Requirements	19
Installing the Software	19
Starting the Application	19
Application Overview	20
VeriColor Spectro System Operation	21
Configuring the Software Options	21
Administrative (Admin) Setup	21
Language Tool	28
Targeting a Part	29
Calibration/Verification of the VeriColor Spectro	30
Attaching the Calibration Tool	30
Performing Calibration (first time, out of box)	31
Performing Verification	32
Performing Calibration (after verification failure)	33
Calibration Configuration	34
Color Standards and Projects	36
Creating Palettes and Color Standards	36
Verify Mode	41
Project Mode	42
Configuration PLC Values	44
Monitor Mode	46
Selecting a Single Standard (no auto target)	46
Selecting a Project for Auto Targeting	47
Measuring a Standard	47
Setting Tolerances	48
Creating a Standard from a Series of Measurements	49
Manual Sample Measurement	49
Interval Sample Measurements	50
Viewing Sample Data	51
Lookup Mode	54
Compare Mode	56
Selecting a Standard from File	56
Measuring a Standard	57
Setting Tolerances	57
Selecting a Trial from file	58
Measuring a Trial	58
Deleting Trials	58

General Maintenance	60
Repair Information	60
Cleaning the Spectro Instrument Lenses	60
Cleaning the Calibration Tool	60
Hardware Troubleshooting	61
Appendices	63
Specifications	63
Accessories	64
Electrical Interface Details	65

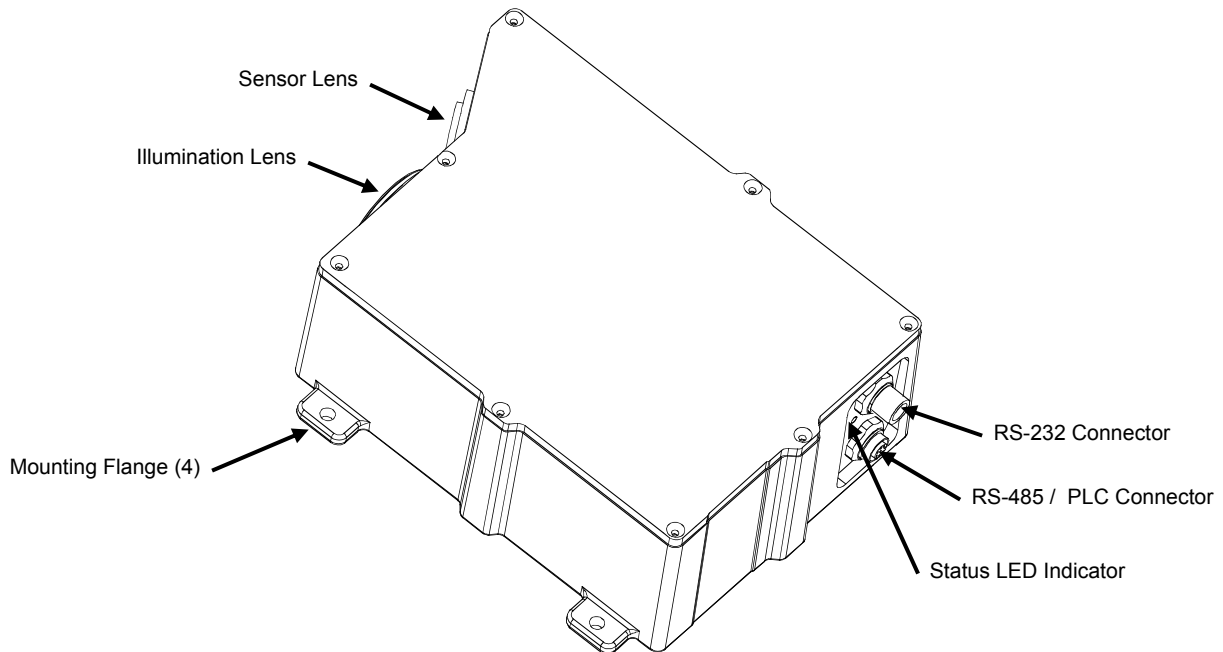
Overview

VeriColor Spectro Description

The *VeriColor® Spectro* is used to evaluate and identify colors in industrial applications. The VeriColor Spectro is a spectrophotometer that delivers 100% in-line, non-contact, absolute ($L^*a^*b^*$) color measurement and identification.

Like other color sensors, the VeriColor Spectro allows you to “learn” (measure) standard colors and measure samples for comparison. The system uses these comparisons to determine the closest standard or pass/fail a sample based on a tolerance.

The system is composed of two main components: the VeriColor Spectro which stores standard colors and captures sample color, and the software application.



Unpacking and Inspection

After removing the VeriColor Spectro from the shipping carton, inspect it for damage. If any damage has occurred during shipping, immediately contact the transportation company. Do not proceed with installation until the carrier's agent has inspected the damage.

Your VeriColor Spectro was packaged in a specially designed carton to assure against damage. If shipment is necessary, the VeriColor Spectro should be packaged in the original carton along with all the accessories. If the original carton is not available, contact X-Rite to have a replacement shipped to you.

Packaging Contents:

• VeriColor Spectro	P/N VS410-00-01
• 5 Meter Male 8-Circuit Open Ended Cable	P/N SE108-EUR8-5M
• 5 Meter Female 8-Circuit Open Ended	P/N VCS50-EUR8-5DB
• Calibration Tool	P/N VS410-63
• Height Gauge	P/N VS410-47
• VeriColor Spectro Application Software CD	P/N VS410-500-CD
• Setup and Operation Manual	P/N VS410-500
• Registration Form (multi-language)	P/N SD01-99

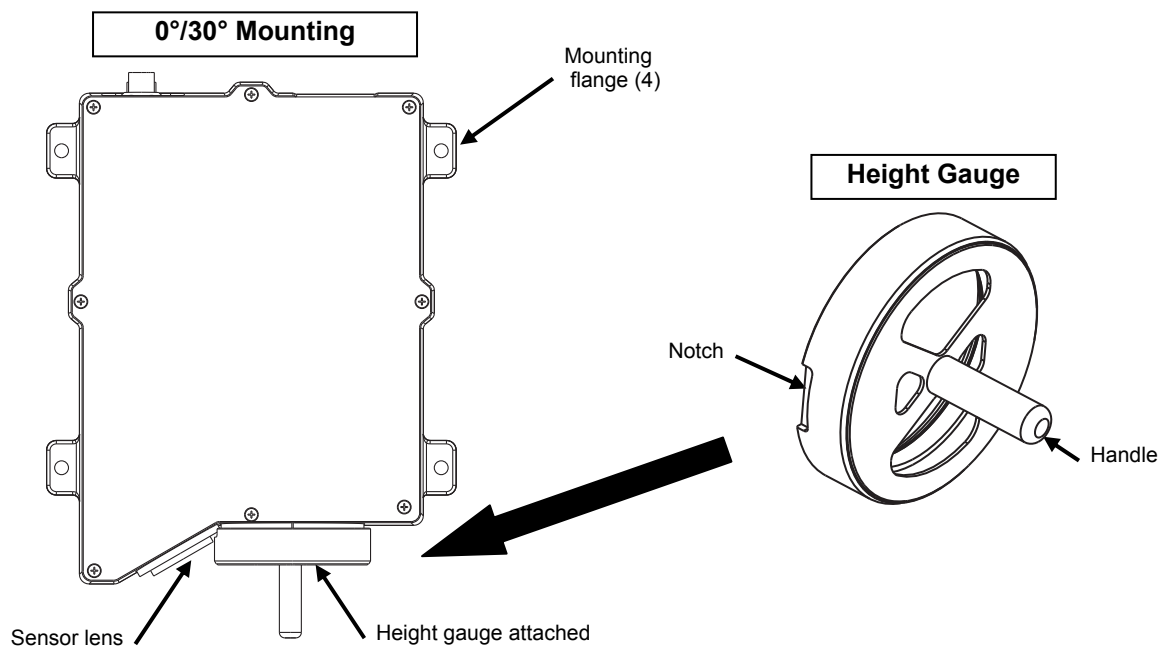
VeriColor Spectro Installation

Mounting and Height Setup

VeriColor Spectro must be set to measure at a distance of 4" nominal to the measurement surface. The distance is that from the center of the illumination lens to the sample. The height gauge can be used to easily obtain the required height.

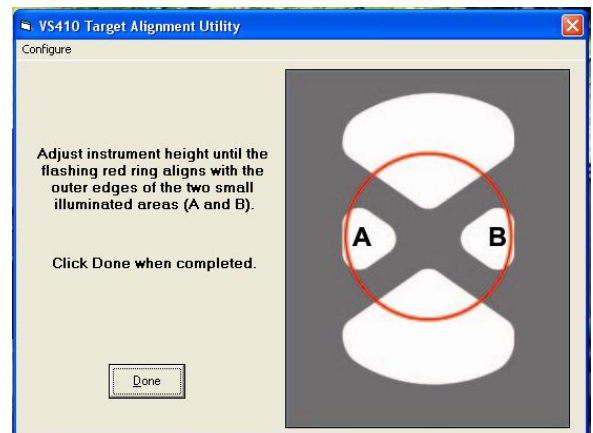
CAUTION: Keep the sensor lens and illumination lens free from dust, smudge marks, and finger prints.

1. Mount the VeriColor Spectro in a 0°/30° geometry direction to the fixture using the holes provided at each flange.
2. Make sure the notch in the height gauge is facing the sensor lens and attach the height gauge to the illumination lens using of the handle. A magnetic strip along the top edge of the gauge holds it in place.

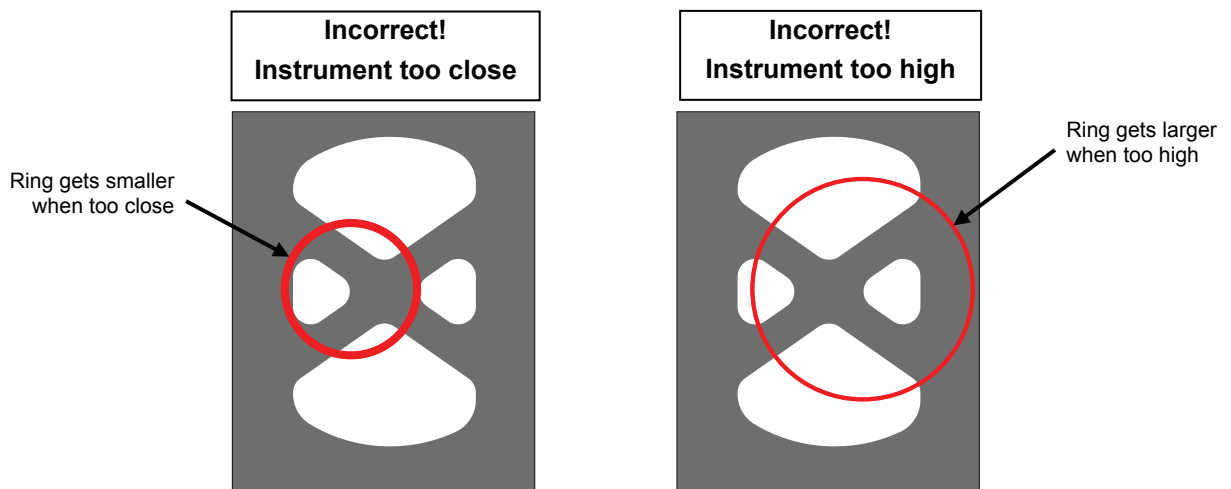
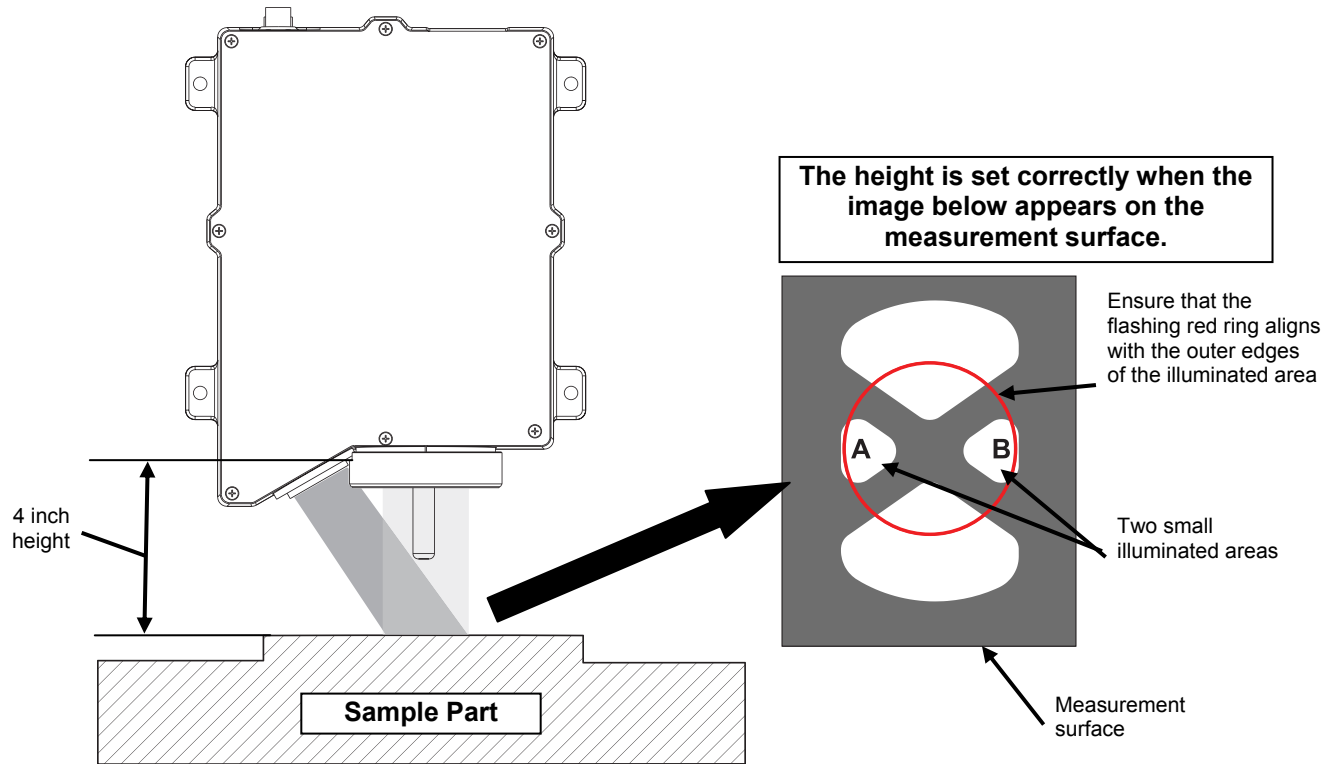


3. Insert the software CD into your computer's CD-ROM drive. Browse to the TargetUtility folder and double-click the **Setup.exe** file to install the utility to your computer. Remove the CD.
4. Install cabling to the instrument as explained in the Cable Connection and Wiring section if it has not already been done.
5. Make sure that you exit any application that may be communicating with the VS410. Launch the utility at **Programs > X-Rite > VS410 Target Alignment Utility**. The VS410 Target Alignment Utility window appears on the screen.

Note: If the red ring and white light do not illuminate from the VS410, you will need to configure the RS232. Click the **Configure** menu item and set/check the port selection and baud rate (115200).



6. Adjust the height of the instrument until the flashing red targeting ring aligns with the outer edges of the two small illuminated areas (A & B) projected from the height gauge. When the ring is positioned properly, the correct instrument height (4") from the measurement surface is obtained.

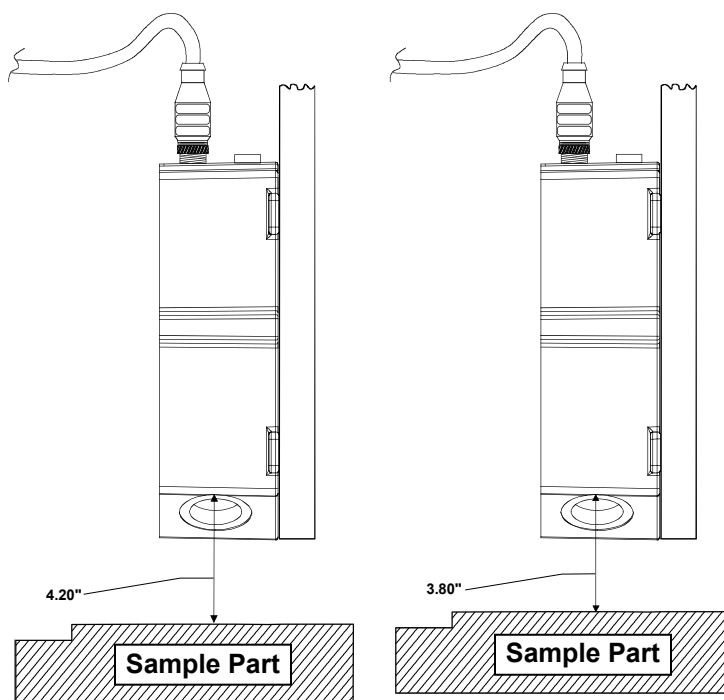


7. After the proper instrument height is set, click **Done** to close the utility window and remove the height gauge from the illumination lens.

NOTE: The instrument can also be mounted in a 30°/0° geometry if desired. However, you will need to manually measure the distance to the part surface. The distance is measured from the center of the sensor lens to the measurement surface. The height gauge cannot be used for this type of configuration.

Height Insensitivity

Vericolor Spectro must be set 4" nominal to measurement surface and can tolerate a fluctuation of ± 0.20 ". This means that if the sample being measured fluctuates up or down by no more than ± 0.20 ", the measurement will not be affected beyond specified tolerances (refer to the Specifications in the Appendix). Any more than ± 0.20 " it is suggested that the sample being measured be stabilized to prevent the variation in the measurement distance.

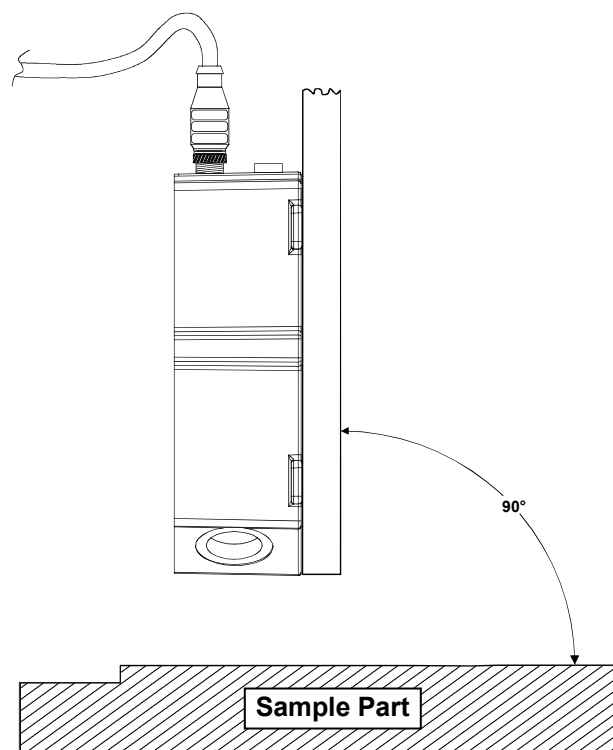


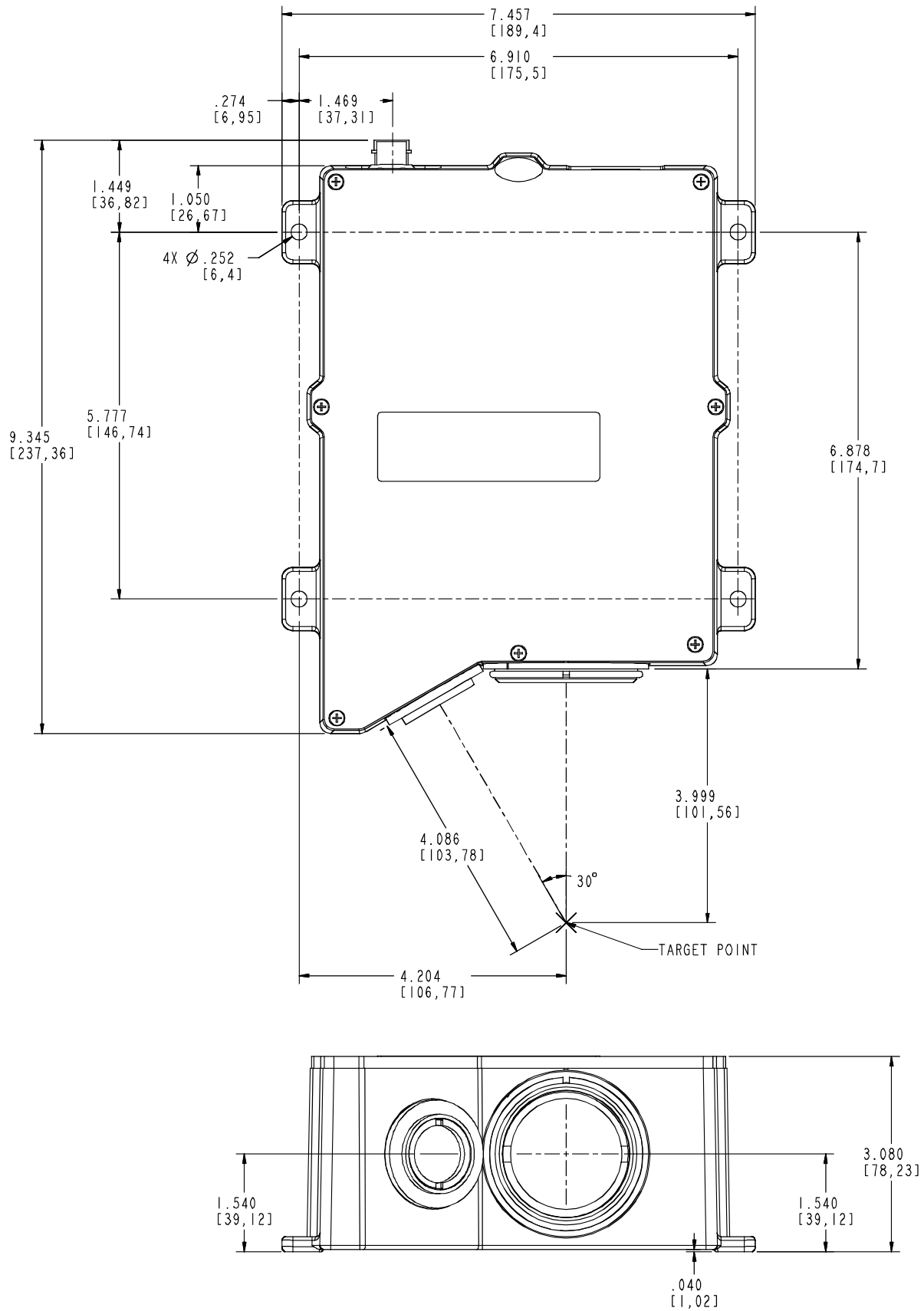
Measurement Angle

It is important when installing the instrument in-line that the geometry and axis angle be set appropriately. The $0^\circ/30^\circ$ position is preferred for best repeatability and correlation to an X-Rite 964 or similar hand held spectrophotometer. Other angles may be used (example $7.5/37.5$) but care must be taken to avoid sensing specular reflections from the illuminator. Once the instrument has been trained on a sample in the preferred position, it is critical that future samples be measured for comparison against the standard at the same measurement angle. Any deviation in the measurement angle (called off axis measurement) will affect the color reading and indicate a fail condition, when in fact the sample might be completely within the specified tolerance range.

It is preferred that the instruments mounting plane be as close to 90° to sample plane as possible.


It is recommended that once the mounting angle of measurement is determined, the instrument fixed position should be marked or documented. This will allow you to more easily reposition the instrument to the original and correct position when measuring that sample profile and color.

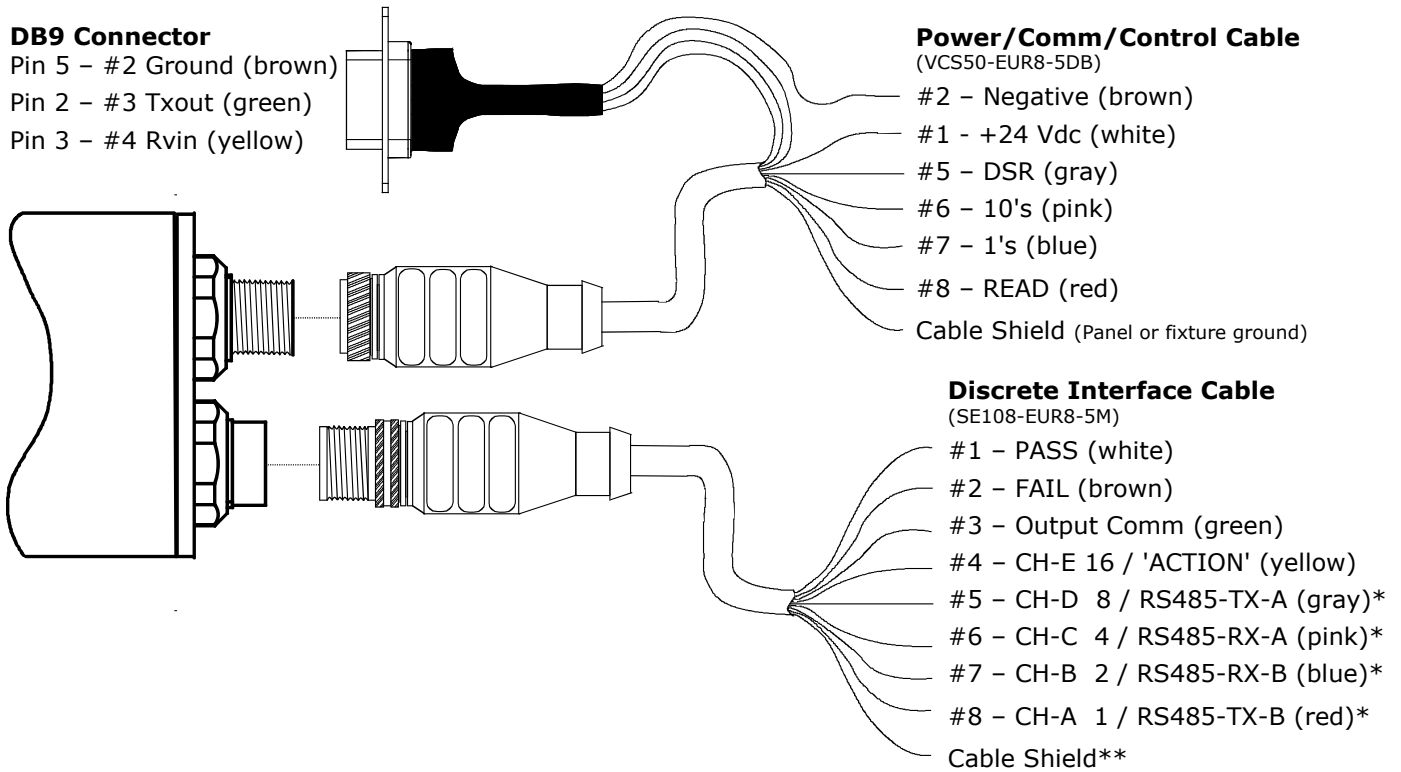


VeriColor Spectro Dimension Drawing

Cable Connection and Wiring

The VeriColor Spectro is designed to utilize the same cable configuration as the VeriColor Solo; however, due to the increased power requirements of the VeriColor Spectro, RS232 communication should be limited to cable lengths of less than 15 meters. For cable distances longer than 15 meters it is recommended that the RS485 communication scheme be utilized. The VeriColor Spectro RS485 communications wiring may be configured as either half or full duplex on a single drop RS485 line. Usage of the RS485 communication requires proper ground termination for both the power supply cable and the RS485 cable; any notable differences in potential between the cable grounds may result in intermittent communication, communication failure and possible damage to the instrument.

1. After the instrument has been mounted, attach the female connector of the 'Power/Comm/Control' cable (p/n: VCS50-EUR8-5DB) to the male connector (longer, threaded), located on the back end of the VeriColor Spectro, and tighten.
2. The other end of this cable has a DB9 connector and several stripped and tined wires. This end interface to power, computer and discrete devices.
 - a. Instrument power is applied via the **white** (+) and **brown** (-) wires (+24 Vdc \pm 2 Vdc)  **IMPORTANT:** A limited current source must be used. The applied operational power shall be a filtered +24 Vdc, \pm 2 Vdc tolerance, having a 3-Amp capacity.
 - b. RS232 communications is obtained via the pre-wired DB9 connector.
 - c. If manual or discrete operation is needed, attach the appropriate wires to controlling device (relay, PLC terminal, etc.). These lines are the READ, 10's, 1's, and DSR inputs and are low-power, active high inputs. Refer to next section for details.
3. If discrete output, PLC feedback or RS485 interfacing is needed, attach and tighten the male connector of the 'Discrete Interface' cable (p/n: SE108-EUR8-5M) to the female connector (short, non-threaded). The connector is located on the back of the VeriColor Spectro instrument.
4. The other end of this cable has several stripped and tined wires allowing low power interface to discrete devices and/or attachment to an RS485 port (4-wire).
 - a. 'Pass', 'Fail', 'Action' and 4 discrete channels are the default output signal set-up.
 - b. Optional RS485 control (communications) is set-up by changing the 4 discrete channels.
 - c. Attach the appropriate wires to the controlling device (relay, PLC terminal, etc.). These outputs all use a common feed or return line. Refer to next section for details.
5. See the diagrams on the next several pages and appendices for electrical interface details plus examples.



*Connect the "#5 - CH-D 8 / RS485-TX-A (gray)" and "#6 - CH-C 4 / RS485-RX-A (pink)" wires together for Half Duplex. Also, connect the "#7 - CH-B 2 / RS485-RX-B (blue)" and "#8 - CH-A 1 / RS485-TX-B (red)" wires together for Half Duplex.

**Use as common return to controller ground (insert a 10Ω resistor if voltage potential between the controller and VeriColor Spectro is significant).

Hardware Interface Description

The VeriColor Spectro interconnects externally using serial communications and/or discrete signals to a computer or programmable device; detailed as follows. Additionally, there is a visual indicator which provides system status during set-up or local maintenance monitoring. Refer to the appendices for electrical interface details and examples.

Discrete Input Lines

These control lines are part of the 'Power/Comm/Control' cable and are low power, active high inputs, as referenced to the ground return power supply input. Each input has an on/off timing cycle which creates the signal that the VeriColor Spectro recognizes and then takes a responsive action.

The active high condition means to initiate an action utilizing a positive voltage signal (+12Vdc to +24Vdc) for a specific time period. The time period is typically 65 milli-seconds, ± 15 milli-seconds in duration. The 'Discrete Select Request' (DSR) has longer special conditions that are explained later.

Power/Comm/Control Cable (p/n: VCS50-EUR8-DB5)

Discrete Select Request (DSR) – gray wire

This input is used to prompt the selection of a different color standard before the next measurement is taken. It is the control input (request) that allows the toggling of the 1's and 10's input, so it must be activated first.

During the activation of DSR, new measurement triggers are locked out (ignored) until DSR is completed. Each time DSR is enabled, the color number selection starts at 0 (zero) and increments according to the 1's and 10's toggling. After the new color number has been selected, when DSR is completed, the new color number is stored. If the DSR input is released without changing the color number (toggling the 1's or 10's), the color number remains at the previous stored value.

There is a maximum of **250** colors that can be stored and therefore selected.

Due to the requirement that this input remain on (active) while the 1's and 10's are toggled, the time duration or period is dependent on the number of those 1 and 10 activations combined.

1's Select – blue wire

This input can only be used while DSR is active.

Each time this input is toggled the color number will increment by 1.

This input can be used at the same time as the 10's input, so it should only toggle a maximum of 9 times to prevent selection errors.

10's Select – pink wire

This input can only be used while DSR is active.

Each time this input is toggled the color number will increment by 10.

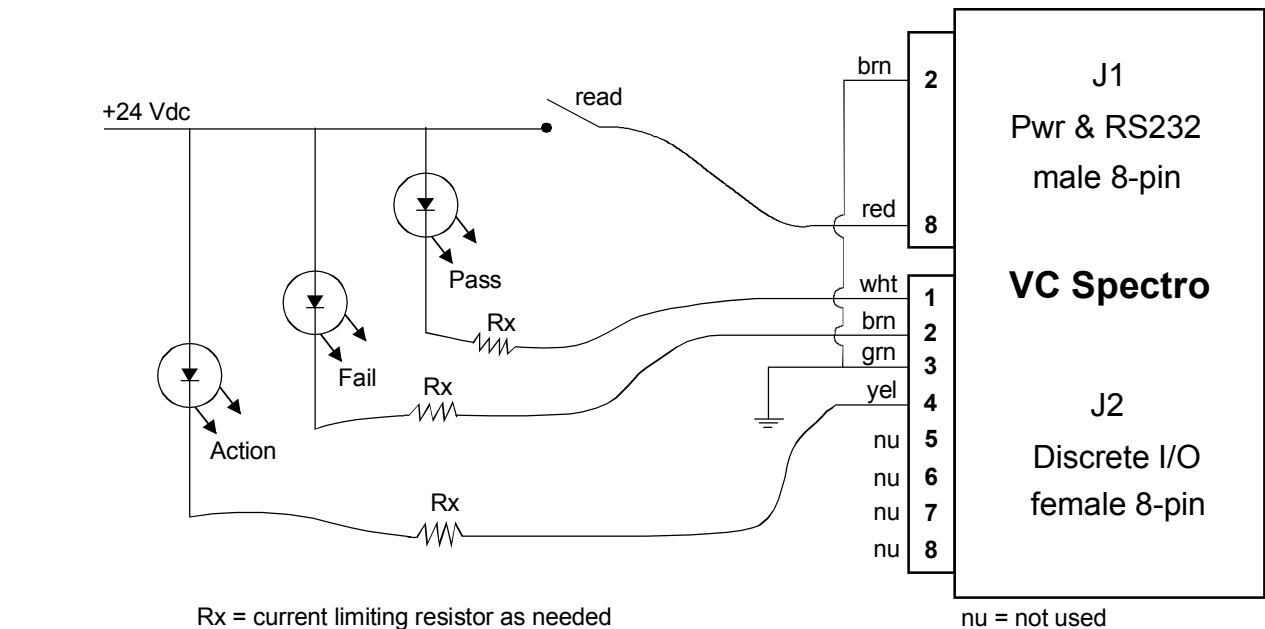
This input can be used at the same time as the 1's input, so it should only toggle a maximum of 24 times to prevent selection errors (i.e. 24 toggles times 10 is 240 and added with 9 ones is 249).

Discrete Output Lines

These individual signal lines are part of the 'Discrete Interface' cable and all are low power outputs which use a common control line referenced ("ComO"; the green wire). This common line is either a supply or ground return connection for these outputs.

- Low power means these outputs are intended for +9Vdc min to +24Vdc max @ 120 mA. Refer to Electrical Interface Details in the Appendix for additional information.
- All outputs default as normally open contacts, but can be configured as to normally closed contacts. Note they still all use a common control line.
- If the common control line is connected to ground, then all outputs are in low-side or return path configuration. This means when VeriColor Spectro activates the 'pass' output, it is providing a ground return for an external light or relay coil to turn on. See Figure 1.

Discrete I/O Connections (Example: Low-side output enable)

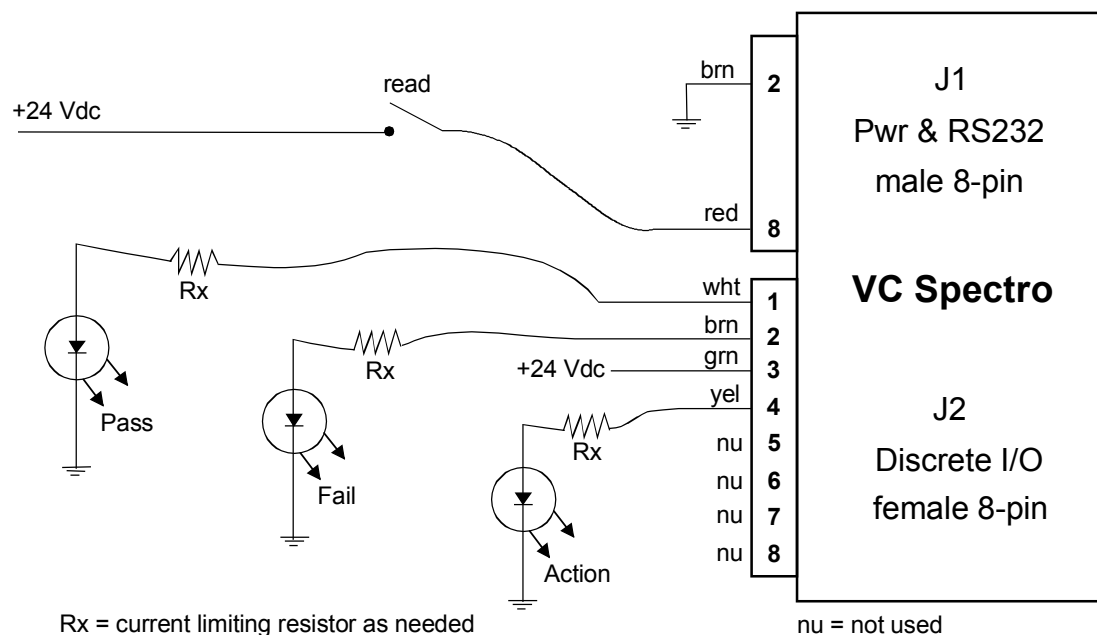


Connector J2	Color	Description		
Pin 1	White	PASS = pass result		Output
Pin 2	Brown	FAIL = fail result		Output
Pin 3	Green	ComO = common discrete outputs		Output
Pin 4	Yellow	CH-E = 'ACTION' result		Output
		Instrument	Outside Control	
Pin 5	Gray	TXD A	RXD A	Output
Pin 6	Pink	RXD A	TXD A	Output
Pin 7	Blue	RXD B	TXD B	Output
Pin 8	Red	TXD B	RXD B	Output

A (-) B (+)

Figure 1

- If the common is connected to power (voltage ranging from +9Vdc to +24Vdc), then all outputs are in high-side or supply path configuration. This means when VeriColor Spectro activates the 'pass' output it is providing a positive voltage signal for an external light or relay coil to turn on. See figure 2 on the next page.

Discrete I/O Connections (Example: High-side output enable)

Connector J2	Color	Description		
Pin 1	White	PASS = pass result		Output
Pin 2	Brown	FAIL = fail result		Output
Pin 3	Green	ComO = common discrete outputs		Output
Pin 4	Yellow	CH-E = 'ACTION' result		Output
		Instrument	Outside Control	
Pin 5	Gray	TXD A	RXD A	Output
Pin 6	Pink	RXD A	TXD A	Output
Pin 7	Blue	RXD B	TXD B	Output
Pin 8	Red	TXD B	RXD B	Output

A (-) B (+)

Figure 2

In the default project set-up these wires are all discrete lines. Pass, Fail and ComO are always the same, while CH-A through CH-D and Action can have an alternate configuration.

- Action is the default but can be configured as CH-E (channel-E).
- CH-A through CH-D are the defaults but can be configured into a 4-wire RS485 port. Once these lines are set as RS485, they cannot also be used as discrete outputs.

Discrete Interface Cable (p/n: SE108-EUR8-5M)

Pass – white wire

This output is a VeriColor Spectro measurement response. It is activated when the last sample was determined to be within the set tolerance for the selected color.

Fail – brown wire

This output is a VeriColor Spectro measurement response. It is activated when the last sample was determined to NOT be within the set tolerance for the selected color, or had a greater difference than allowed for the selected color.

Action – yellow wire

In the default set-up state 'Action', this output activates to a VeriColor Spectro measurement response. It is activated when the last sample was determined to be within the set tolerance for the selected color, but is either very close to being out of tolerance or is statistically trending toward the limits.

However, if configured as a discrete channel output 'CH-E', then its activation will depend on how the user has determined what this output is used as (project set-up conditions).

CH-A through CH-D / RS485

In the default set-up state 'CH-A through CH-D', these outputs activate to a VeriColor Spectro measurement response. Their activation will depend on how the user has determined what this output is used as (project set-up). They can be individual control lines or a group output (binary/HEX).

However, if configured as an RS485, 4-wire port, then only RS485 operation is allowed.

- CH-A / RS-485-Tx-A - red wire
- CH-B / RS-485-Rv-A - blue wire
- CH-C / RS-485-Rv-B - pink wire
- CH-D / RS-485-Tx-B - gray wire

NOTE: Connect the "CH-A / RS-485-Tx-A - red wire" and "CH-B / RS-485-Rv-A - blue wire" together for Half Duplex. Also, connect the "CH-C / RS-485-Rv-B - pink wire" and "CH-D / RS-485-Tx-B - gray wire" together for Half Duplex.

Computer Interface

Normal computer communications between the user and the VeriColor Spectro is by the serial RS232 interface. This interface is part of the 'Power/Comm/Control' cable, which has a DB9 connector pre-wired for this feature. The VeriColor Spectro can also be configured to communicate using RS485, if the appropriate discrete outputs are project set-up to operate in this mode. Other communication schemes can be utilized if an external adapter is attached (see note on RS232 to RS485 Adaptors below).

Note: On the Use of RS232 to RS485 Adaptors

While RS232 to RS485 adaptors are common and relatively inexpensive, the use of such adaptors can be problematic in half duplex operation. For example, many such adaptors do not have adequate power resources to generate currents for the longer periods of time necessary when operating at low baud rates into terminated lines. Furthermore, until recently, adaptors did not have the intelligence to know when to hold or release the transmit condition. Often, a delay was inserted to hold the transmit condition until it was thought that no more characters were coming through the RS232 interface. This delay was accomplished with a simple timer that required the user to change a resistor in the adaptor to select the right delay for the right baud rate. This meant that any requirements that differed from the adaptor's default state would require the operator to "tweak" hardware or configuration jumpers until things began to work properly.

X-Rite recommends the use of PCI to RS485 adaptors for installations where a PC is the controlling device. These adaptors are usually free from the limitations previously mentioned, may provide features that simply are not available in other adaptor designs, and are cost effective. Ethernet to RS485 and USB to RS485 adaptors are also available, and while these types may be ideal for a given installation, they usually have fewer configuration options.

Important: The VeriColorSpectro does NOT support simultaneous communication over RS232 and RS485. Response should be finished before attempting to use the other port.

RS232 Interface

The default computer communications is by way of the serial RS232 interface which is part of the 'Power/Comm/Control' cable, via a DB9 connector.

The communications protocol is serial using X-Rite's RCI command set. See appropriate documentation for this command set.

Status LED Indicator

On the back plate of the VeriColor Spectro, located between the 2 rear mounted connectors, is a LED indicator which visually provides system status. This LED indicator is capable of displaying three colors: green, amber and red. A description of each color status is listed below.

Off (no color) – This generally indicates the VeriColor Spectro has no power.

Solid Green – indicates the VeriColor Spectro is ready and waiting for further input (discrete input or serial port).

Solid Amber – indicates the VeriColor Spectro is busy and performing a requested task. Whenever a PLC input or serial command is being processed, the status light should remain amber until it is ready for the next request.

Solid Red – indicates system error/failure. If this occurs then the VeriColor Spectro is not functioning and cannot be used until the problem is resolved.

Flashing Amber – When the VeriColor Spectro is first powered up, it will slowly flash while undergoing system test, and waiting for the illumination LED pack to warm up to temperature.

Flashing Red – Indicates that the VeriColor Spectro is above operating temperature and will shut down shortly.

Flashing Green – Indicates that the red LED has burned out and the yellow light is non operable.

Software Installation and Overview

The VeriColor Spectro system includes a software application that provides an interface for the VeriColor Spectro. The application is used to configure the VeriColor Spectro, store projects which consist of color standards, and provide visual feedback of sample measurements.

Before installing the software, make sure the VeriColor Spectro is set up as explained earlier and the cable is connected to appropriate communication port.

Basic System Requirements

- Windows 2000 or XP Pro
- Minimum Screen resolution (1024 x 768)

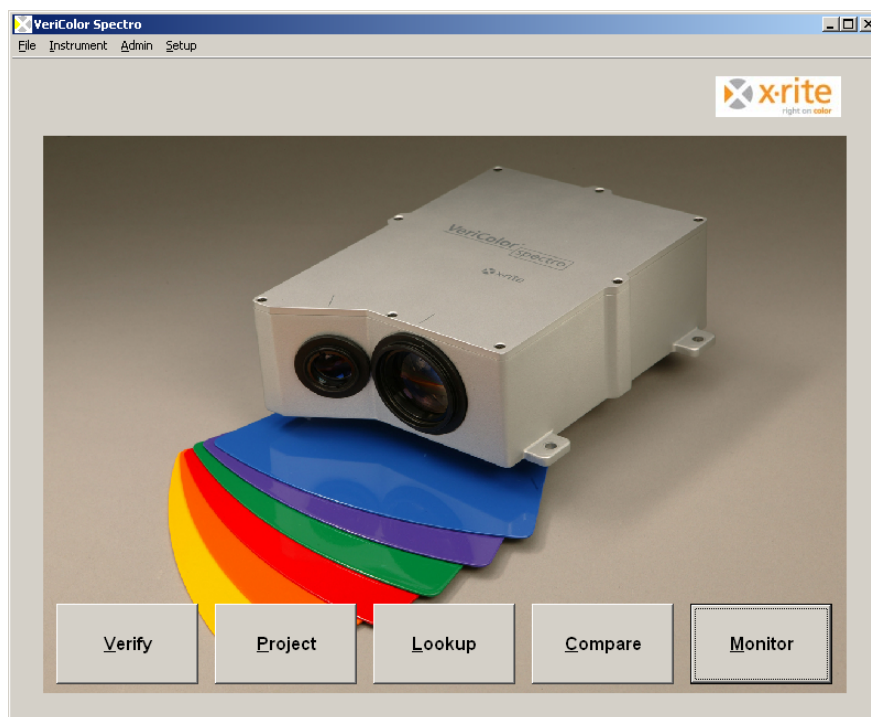
Installing the Software

The software uses a standard Windows installation procedure.

1. Insert the software CD into your computer's CD-ROM drive. Browse to the Application folder and double-click the **setup.exe** file on the CD.
2. The setup program guides you through the rest of the installation process. Follow the instructions on each setup screen to complete the installation.

Starting the Application

The software application can be launched using the "VeriColor Spectro" short-cut on the desktop or from within the Programs> VeriColor Spectro application group.



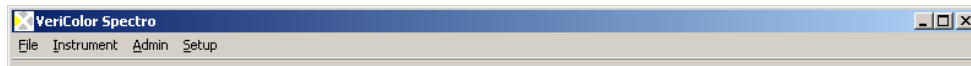
NOTE: If the VeriColor Spectro is not connected to COM 1, you will need to select the correct communications port after launching the application for the first time. Click **Admin** and select the **General** page to set correct COM port. Refer to Configuring the Software Options later in this section for additional information. After the correct port is selected, you will need to perform a calibration. Please refer to the Calibration procedure in the System Operation section for additional information.

Application Overview

The VeriColor Spectro application consists of four menus and five application modes. The menus are located at the top and the mode bottoms are at the bottom of the application.

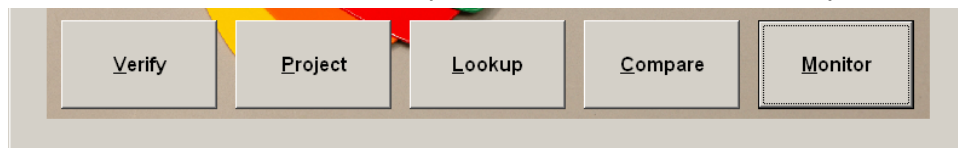
Menus

- **File** – used to exit the application and launch a language translation tool (if activated in Admin)
- **Instrument** – used for testing, calibrating and targeting of the VeriColor Spectro
- **Admin** – used to configure the default settings for the application
- **Setup** – used to create palettes and standards



Application Modes

- **Verify** – used to find the closest stored standard to a measured sample
- **Project** – used to create projects
- **Lookup** – used to auto select a standard from a palette
- **Compare** – used to compare stored or measured trial and standard data
- **Monitor** – used to monitor sample measurements after the system is set up



Refer to the VeriColor System Operation section that follows for detailed information on setting up the software and using the VeriColor Spectro with the software application.

VeriColor Spectro System Operation

Configuring the Software Options

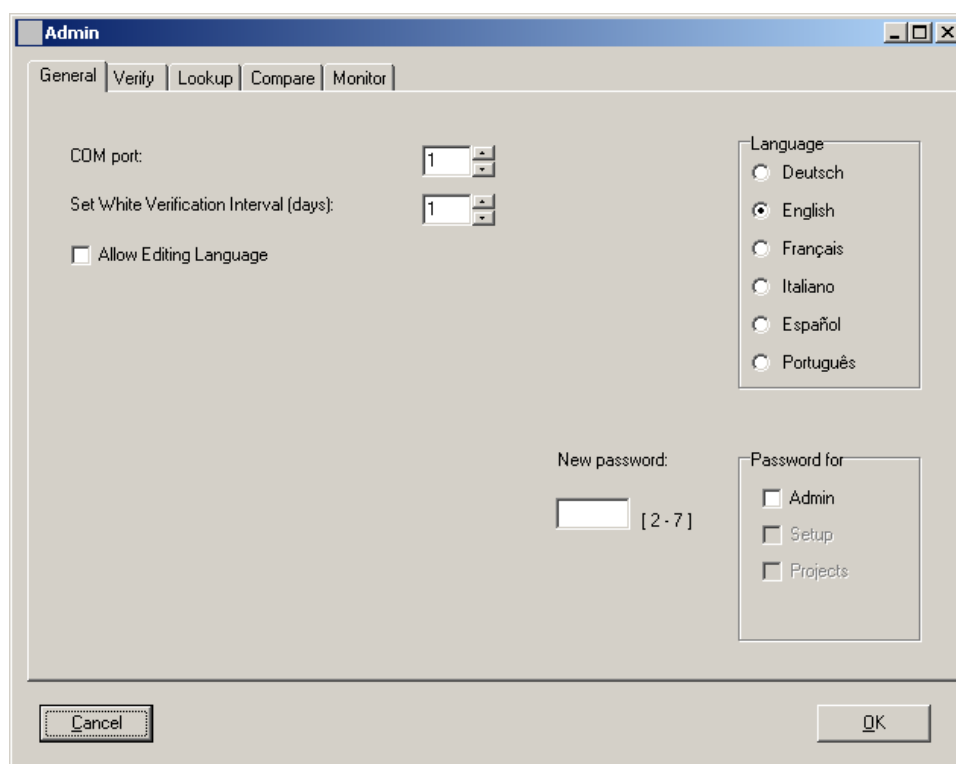
The software should be configured before proceeding with the color standards setup and sample measurements.

Administrative (Admin) Setup

Administrative setup is used to configure the General, Verify, Lookup, Compare, and Monitor options. The Admin dialog is accessed by clicking **Admin** menu at the top of the application.

General Screen Page

The general screen is used to establish serial communications, select the language the application will run in, and setup password protection.



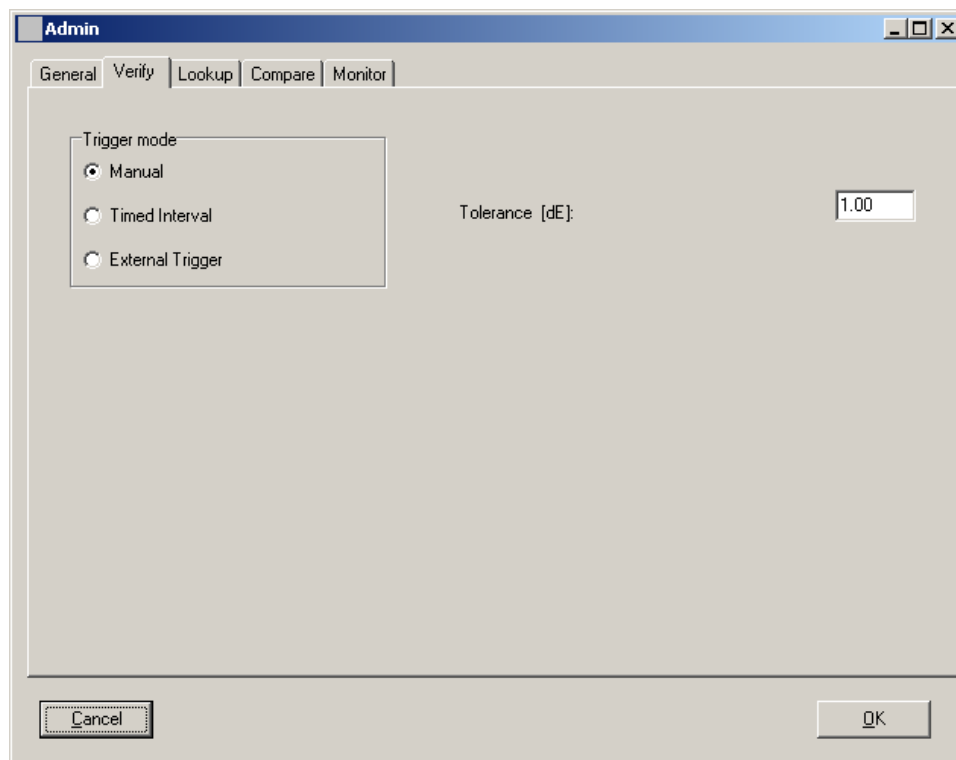
1. Click in the **COM port** field and enter an appropriate port number, or use the up/down arrows to select the connection port. The default port is 1.
2. Click in the **Set White Verification ...** field and select the number of days that pass before you would like to be reminded to perform a verification. Use the up/down arrows to select the number of days, ranging from 1 to 30. The default number is 1.
3. Select the **Language** that you would like that application to run in by clicking the appropriate option. The default language is set to English. If the desired language is not available, you can use the Language Tool option located in the File menu to localize the application to a different language. Refer to the Language Tool later in this section.
NOTE: The **Allow Editing Language** option must be checked before the Language Tool item appears in the File menu. The default is un-checked.
4. You can password protect the Admin menu, Setup menu, and Project mode from unauthorized access by checking the desired **Password for** option and entering a password in the New password field. The password must be between 2 and 7 characters

to be acceptable. You will then be asked to enter this password before you can access the mode selected.

5. Click the **OK** button to save your setting and exit Admin; or select the Verify, Lookup, Compare, or Monitor page to continue with option settings.

Verify Screen Page

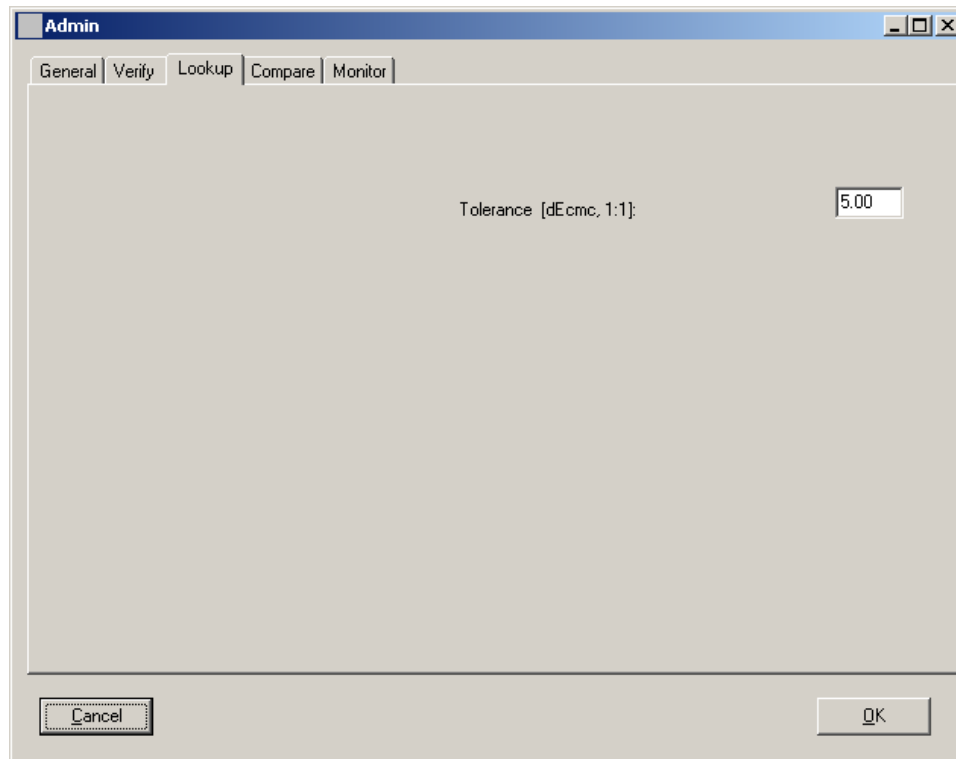
The verify screen is used to choose how the measurement will be triggered and the Tolerance dE value used for Verify mode.



1. Select **Manual**, **Timed interval**, or **External Trigger** as the trigger mode. This determines the measurement method that is used in Verify mode. The default mode is Timed interval. Manual selection requires a Measure button click for each measurement. Timed interval allows automatic interval measurements to take place. External triggering requires an external device (PLC) to activate a measurement.
2. Click in the **Tolerance dE** field and enter desired tolerance value. This determines the dE value used in the Verify mode.
3. Click the **OK** button to save your setting and exit Admin; or select the General, Lookup, Compare, or Monitor page to continue with option settings.

Lookup Screen Page

The lookup screen is used to enter the Tolerance dE cmc value used for Lookup mode.



1. Click in the **Tolerance dE cmc** field and enter desired tolerance value. This determines the dE cmc value used in the Lookup mode.
2. Click the **OK** button to save your setting and exit Admin; or select the General, Verify, Compare, or Monitor page to continue with option settings.

Compare Screen Page

The compare screen is used to enter sample/operator information for the Compare mode screen and print outs.

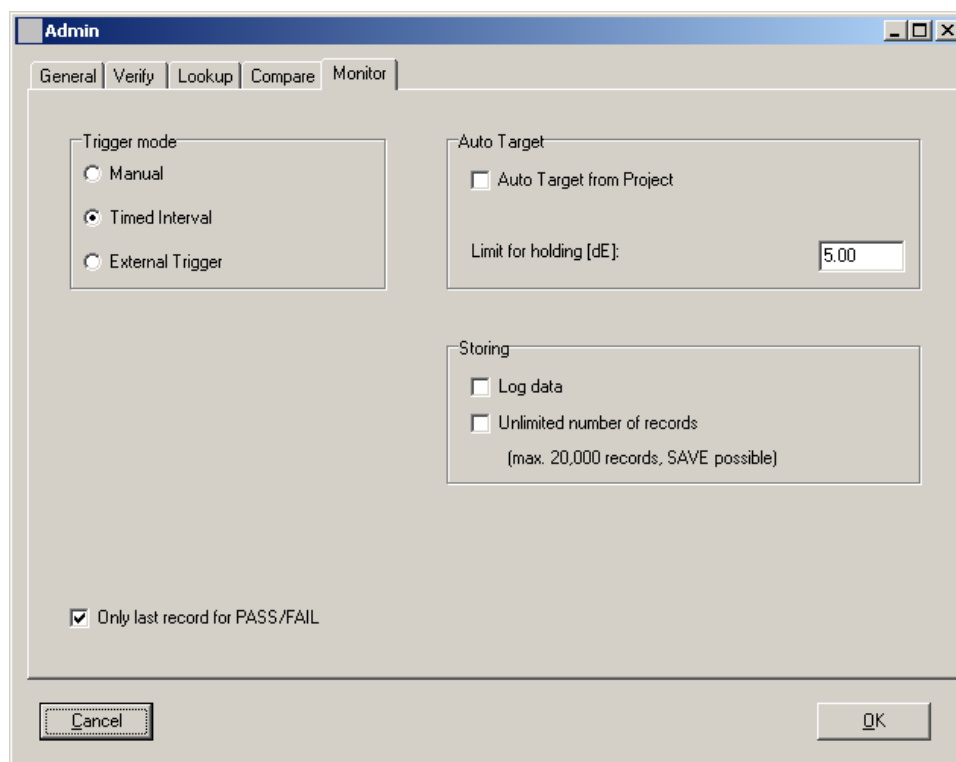
The screenshot shows the 'Admin' window with the 'Compare' tab selected. The window contains the following elements:

- Term 1:** Text box containing 'Lot ID'.
- Term 2:** Text box containing 'Serial ID'.
- Operator:** A list box with 'Smith/QC' selected.
- Print Section:**
 - Title:** Text box containing 'Protocol'.
 - Company:** Text box containing 'Color Corp.'
 - Street:** Text box containing 'Paintstreet 1'.
 - Town:** Text box containing '4711 Pigmenthill'.
 - ☐ with mean value:
- Buttons:** 'Cancel' and 'OK' buttons at the bottom.

1. Click in the **Term 1 and/or Term 2** fields and enter desired text. This determines the default attributes that appear in the Compare mode.
2. Click in the **Operator** field(s) and enter the desired name(s). This establishes a list of operators that can be selected from in the Compare mode.
3. Click in the **Title, Company, Street** and **Town** fields and enter appropriate information. This determines the information that will be printed in a Compare report. Checking **with mean value** causes the average values to also print on the report.
4. Click the **OK** button to save your setting and exit Admin, or select the General, Verify, Lookup, or Monitor page to continue with option settings.

Monitor Screen Page

The monitor screen is used to set the triggered mode, auto target options, and storing options.



1. Select **Manual**, **Timed interval**, or **External Trigger** as the trigger mode. This determines the measurement method that is used in Monitor mode. The default mode is Timed interval. Manual selection requires a Measure button click for each measurement. Timed interval allows automatic interval measurements to take place. The interval amount is set in the Monitor mode. External triggering requires an external device (PLC) to activate a measurement.
2. Check **Only last record for PASS/FAIL** to display only the last failed (red), warning (yellow), or pass (green) measurement status in the traffic light after a measurement. When the option is unchecked (default setting), the traffic light will continue to display a failed or warning status until the single measurement or measurement average that caused the condition scrolls from the screen in the trend graph. Note: When unchecked, the alert level will also increase if applicable (warning to fail). Refer to Viewing Sample Data in the Monitor Mode section for additional information.
3. Check **Auto Target from Project** to automatically search the selected database for a standard that more closely matches the sample measurement. Search criteria is set by entering the delta E value in the **Limit for holding** field. Limit for holding value causes VeriColor Spectro to compare the sample against the selected standard until the set dE value is exceeded. Once exceeded, VeriColor Spectro searches the database for a closer standard match.
4. Check the **Log data** option to automatically save measurement data in the Monitor mode to a .txt file. The default setting is not checked. Refer to the next page for additional information and to view sample log data reports. Check **Unlimited number of records** if you do not want to save the trend data to a file. The default setting is not checked.
5. Click the **OK** button to save your setting and exit Admin, or select the General, Verify, Lookup, or Compare pages to continue with option settings.

Real-time Log Data Access

Data can be accessed during a monitoring process without interruption to the active job.

1. Enable "Log Data" in Admin/Monitor Mode.
2. During a run, open the LogData folder.
3. Open the most recent .txt file. This is the current file being logged.
4. Once open, you can review the historical data, or copy and save the contents into a .csv file for future review.
5. Close the .txt file.

All measurements that were taken while the file was open will now auto populate into the .txt file so no measurements will be lost.

The file should not be left open for an extended period of time to avoid any potential buffer overrun issues that may cause the data to be lost. If an extended review of the data is desired, it is best to copy and paste into a .csv file and close the .txt (log) file.

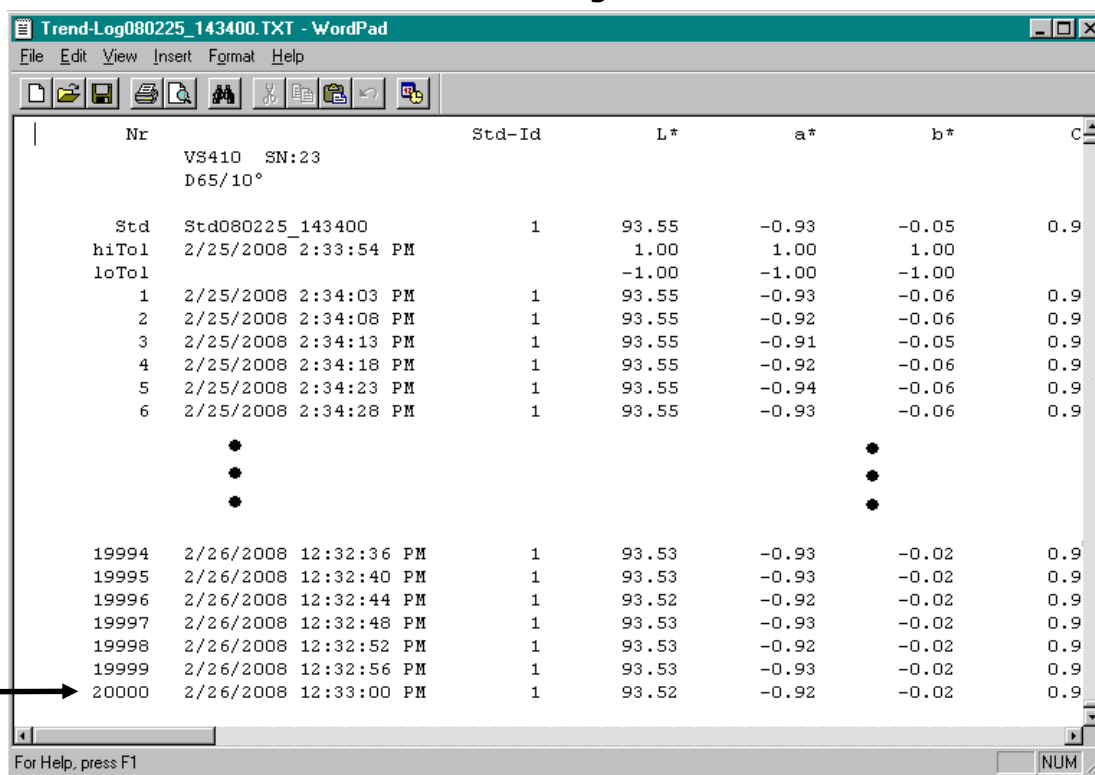
[Max 20,000 records, SAVE possible] What this means:

When only checking the Log Data option, the application will automatically log each measurement during a run and save this data to a .txt file. The .txt file will save 20,000 records or measurements, and then auto save and close. A new .txt file will automatically open and continue logging data for the run. During the time the first file closes and the second file opens, one measurement will be lost. The first file will end at 20,000 and the second file will begin at 20,002.

This will continue as long as the run lasts and end when the instrument is stopped from measuring.

The following are sample reports:

1st Log File



Nr	Std	Std-Id	L*	a*	b*	C
VS410 SN:23 D65/10°						
Std	Std080225_143400	1	93.55	-0.93	-0.05	0.9
hiTol	2/25/2008 2:33:54 PM		1.00	1.00	1.00	
loTol			-1.00	-1.00	-1.00	
1	2/25/2008 2:34:03 PM	1	93.55	-0.93	-0.06	0.9
2	2/25/2008 2:34:08 PM	1	93.55	-0.92	-0.06	0.9
3	2/25/2008 2:34:13 PM	1	93.55	-0.91	-0.05	0.9
4	2/25/2008 2:34:18 PM	1	93.55	-0.92	-0.06	0.9
5	2/25/2008 2:34:23 PM	1	93.55	-0.94	-0.06	0.9
6	2/25/2008 2:34:28 PM	1	93.55	-0.93	-0.06	0.9
•••						
19994	2/26/2008 12:32:36 PM	1	93.53	-0.93	-0.02	0.9
19995	2/26/2008 12:32:40 PM	1	93.53	-0.93	-0.02	0.9
19996	2/26/2008 12:32:44 PM	1	93.52	-0.92	-0.02	0.9
19997	2/26/2008 12:32:48 PM	1	93.53	-0.93	-0.02	0.9
19998	2/26/2008 12:32:52 PM	1	93.53	-0.92	-0.02	0.9
19999	2/26/2008 12:32:56 PM	1	93.53	-0.93	-0.02	0.9
20000	2/26/2008 12:33:00 PM	1	93.52	-0.92	-0.02	0.9

2nd Log File

Trend-Log080226_123304.TXT - WordPad

File Edit View Insert Format Help

Nr		Std-Id	L*	a*	b*	C
	VS410 SN:23 D65/10°					
Std	Std080226_123304	1	93.55	-0.93	-0.05	0.9
hiTol	2/25/2008 2:33:54 PM		1.00	1.00	1.00	
loTol			-1.00	-1.00	-1.00	
20002	2/26/2008 12:33:08 PM	1	93.53	-0.92	-0.02	0.9
20003	2/26/2008 12:33:12 PM	1	93.53	-0.93	-0.02	0.9
20004	2/26/2008 12:33:16 PM	1	93.53	-0.92	-0.02	0.9
20005	2/26/2008 12:33:20 PM	1	93.53	-0.92	-0.02	0.9
20006	2/26/2008 12:33:24 PM	1	93.53	-0.93	-0.02	0.9
20007	2/26/2008 12:33:28 PM	1	93.53	-0.91	-0.02	0.9
	•			•		
	•			•		
	•			•		
24039	2/26/2008 5:01:00 PM	1	93.52	-0.92	-0.01	0.9
24040	2/26/2008 5:01:04 PM	1	93.52	-0.91	-0.01	0.9
24041	2/26/2008 5:01:08 PM	1	93.52	-0.91	-0.01	0.9
24042	2/26/2008 5:01:12 PM	1	93.52	-0.91	-0.01	0.9
24043	2/26/2008 5:01:16 PM	1	93.52	-0.91	-0.01	0.9
24044	2/26/2008 5:01:20 PM	1	93.53	-0.92	0.00	0.9
24045	2/26/2008 5:01:24 PM	1	93.52	-0.91	-0.01	0.9
24046	2/26/2008 5:01:28 PM	1	93.52	-0.92	-0.01	0.9
24047	2/26/2008 5:01:32 PM	1	93.52	-0.92	-0.01	0.9
24048	2/26/2008 5:01:36 PM	1	93.52	-0.92	-0.01	0.9
24049	2/26/2008 5:01:40 PM	1	93.52	-0.91	-0.02	0.9
24050	2/26/2008 5:01:44 PM	1	93.53	-0.93	0.00	0.9

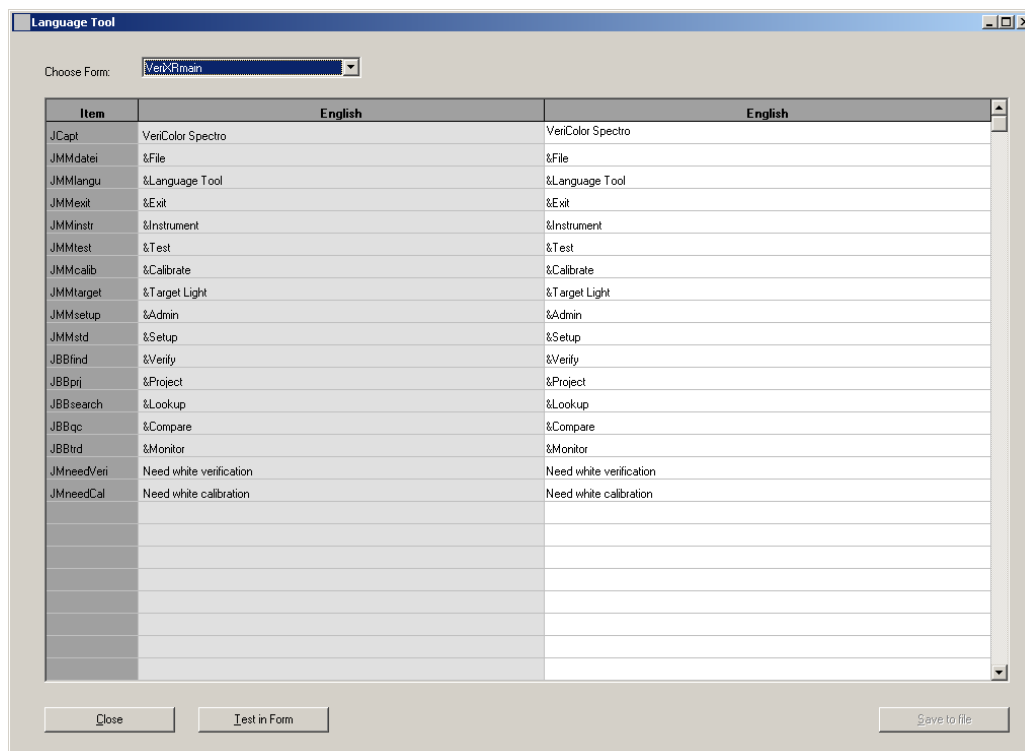
For Help, press F1

NUM

Language Tool

The language tool is used to localize or update the application string text to a language of choice if the desired language is not available in the Admin dialog. The Language Tool dialog is accessed by selecting the **File** menu and then **Language Tool**.

NOTE: The Language Tool option will not appear if it is not activated in the Admin/General page.



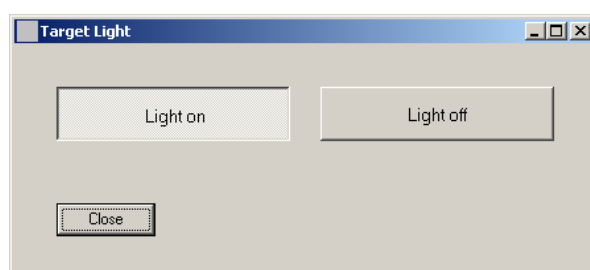
1. Select a form to translate from the **Choose Form** dropdown list. The list contains all the forms (screens) present in the application. When you select a form, the text for that form appears in the columns below. The column on the left is the reference column and cannot be edited. The column on the right is the column that is used to localize the text strings.
2. Translate the text in the column on the right and then select another form.
3. Click the **Test in Form** button to view the translation made to the application without saving them.
4. Click the **Save to file** button to save the localized text strings to the application. You will need to restart the application for the changes to take affect.

Targeting a Part

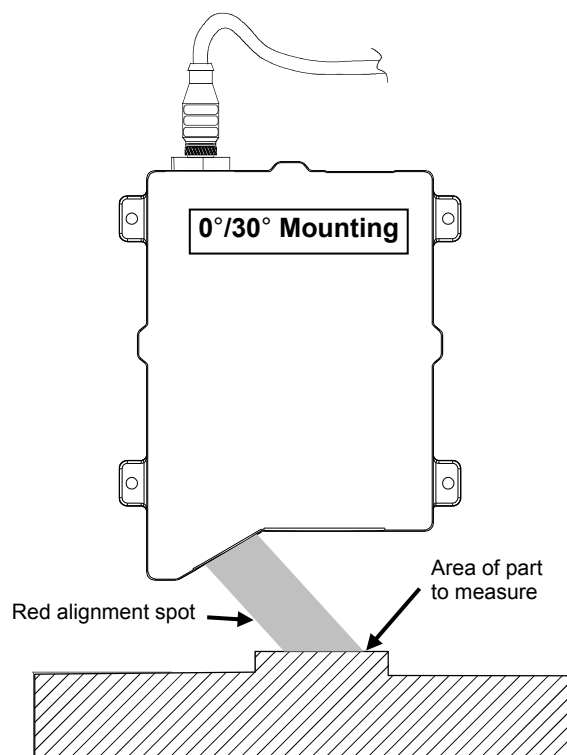
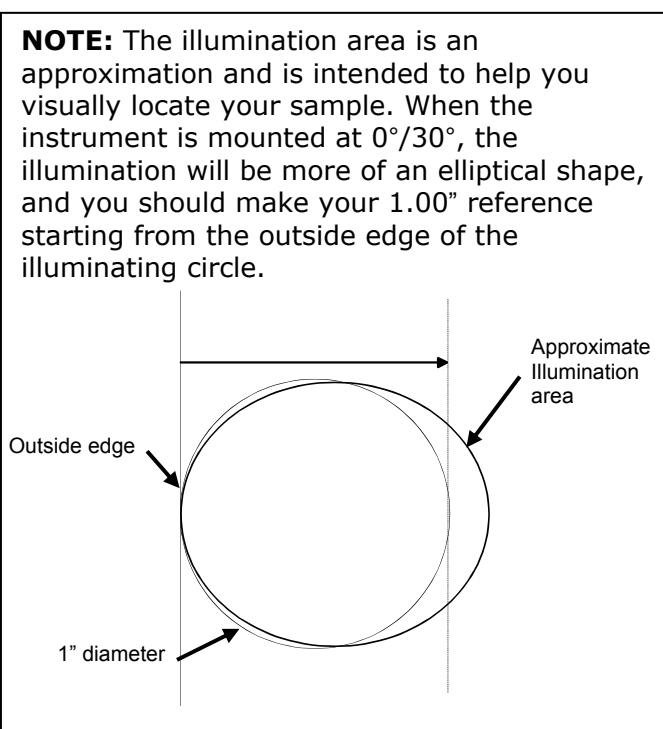
Because the VeriColor Spectro instrument over illuminates, it is sometime difficult to tell exactly where the instrument is viewing to determine color. This is particular true for small part measurements.

Targeting a part is the method of adjusting the VeriColor Spectro to the required position for part measurements. Performing the targeting procedure is only needed if the location of the part to be measured is critical. For example, the measurement area is small or very close to the spot size of the VeriColor Spectro.

1. Targeting is started by selecting **Target Light** from the Instrument menu, Setup menu, Verify mode, Lookup mode, Compare mode, or Monitor mode.
2. Target Light dialog and a red ring (elliptical at 0°/30° and circle at 30°/0°) approximately 1.00" in diameter begins flashing. This is the VeriColor Spectro's measurement viewing area. You can turn the targeting light off or on by clicking the appropriate button.



3. Without disturbing the pre-aligned height and position of the VeriColor Spectro, carefully adjust the VeriColor Spectro (x and y coordinates) so the red circle is centered on the area of the part you wish to measure.



4. After the desired positioning is achieved, secure the VeriColor Spectro.
5. Click the **Close** button to turn off the light and close the Target Light dialog.

Calibration/Verification of the VeriColor Spectro

The VeriColor Spectro comes with a calibration tool that is used to verify measurement performance and for calibrating the instrument.

Calibration should be performed the very first time you turn on the system, and anytime thereafter that the user defined white verification tolerance is exceeded.

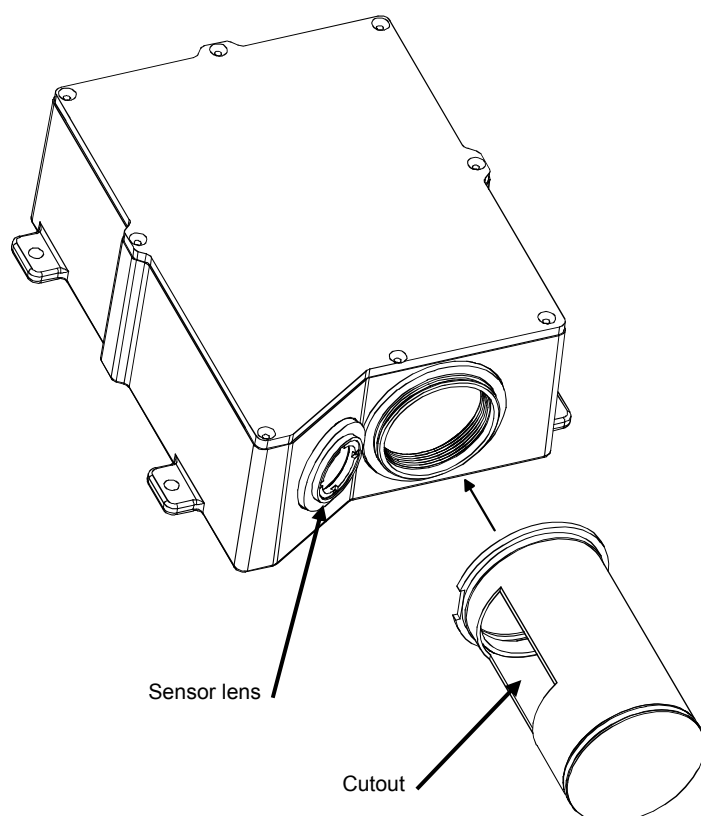
Verification is performed whenever a verification is requested by the software (user definable from 1 to 30 days), or anytime that measurement performance is in question. Poor measurement performance can be caused by dust or dirt on the sensor lens and illumination lens. Refer to the Cleaning section later in this document for procedure on cleaning the VeriColor Spectro instrument.

NOTE: The calibration tool supplied with your VeriColor Spectro is configured for that specific instrument. If a replacement calibration tool is used, you will need to reconfigure the instrument for that replacement tool. Refer to Calibration Configuration later in this section for details on reconfiguring for a new calibration tool.

Attaching the Calibration Tool

IMPORTANT: Do not touch the white reference in the bottom of the calibration tool. It must be kept clean to ensure accurate measurements. Always store the calibration tool in its bag when not in use. If the calibration tool requires cleaning, refer to the General Maintenance section later in this manual.

1. Locate the calibration tool that is shipped with your VeriColor Spectro instrument.
2. Make sure the cutout side of the calibration tool is facing the sensor lens side. Attach the tool onto the illumination lens of the VeriColor Spectro instrument. A magnetic ring along the top edge of the tool holds it place.



NOTICE: Caution should be used not to touch the white reference in the bottom of the calibration tool.

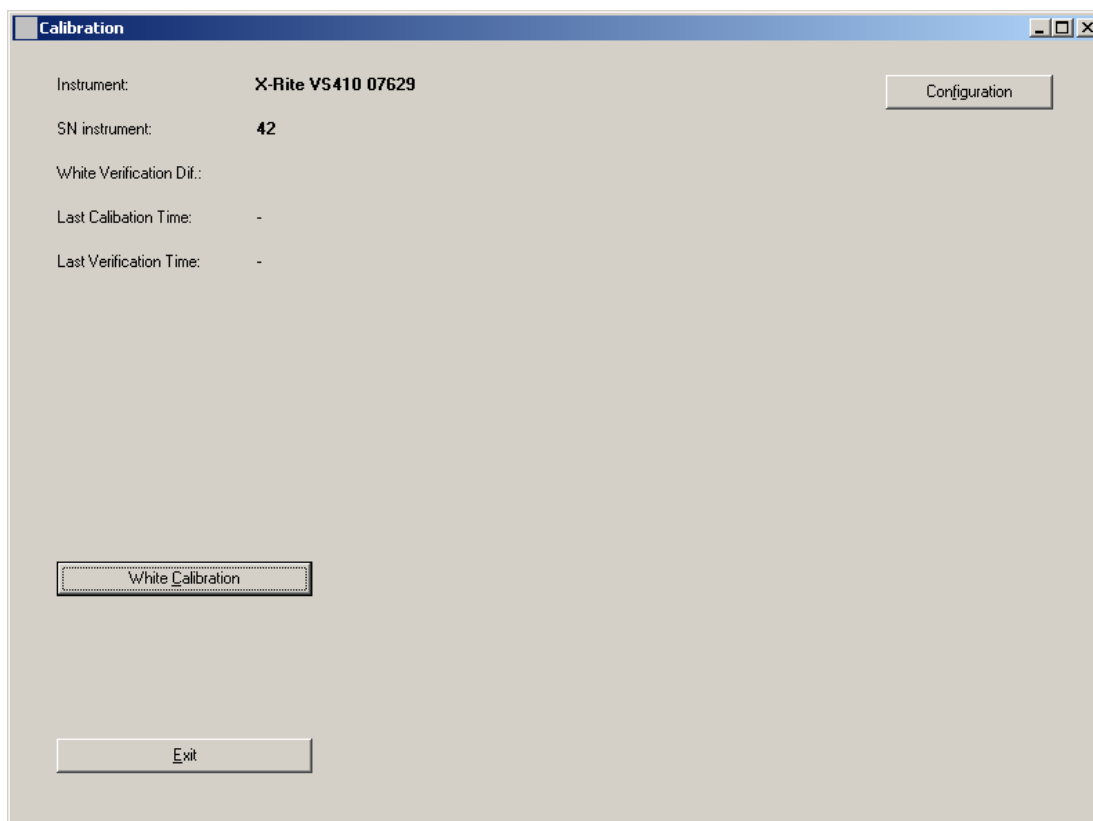
Performing Calibration (first time, out of box)

1. Make sure the VeriColor Spectro is connected and setup according to procedures shown in the Installation section and then launch the application. A "Need white calibration" screen appears. Click the **OK** button.
2. The Calibration dialog appears. Click the **White Calibration** button.
3. Make sure that the lenses on the VeriColor Spectro are clean (refer to the Cleaning section later in this document) and then click **OK** on the "Insure lenses are ..." screen.
4. Attach the calibration tool as requested. Refer to Attaching the Calibration Tool as previously explained. When tool is properly attached, click the **OK** button on the "attach calibration tube" screen.

The instrument takes five calibration measurements.

NOTE: If an error message appears after calibration, make sure the calibration tool is located correctly over the illumination lens and is clean. You may also want to clean the illumination lens and sensor lens on the VeriColor Spectro. Refer to the General Maintenance section for cleaning procedures. After checking the calibration tool and cleaning the instrument, click the **White Calibration** button again and repeat the procedure.

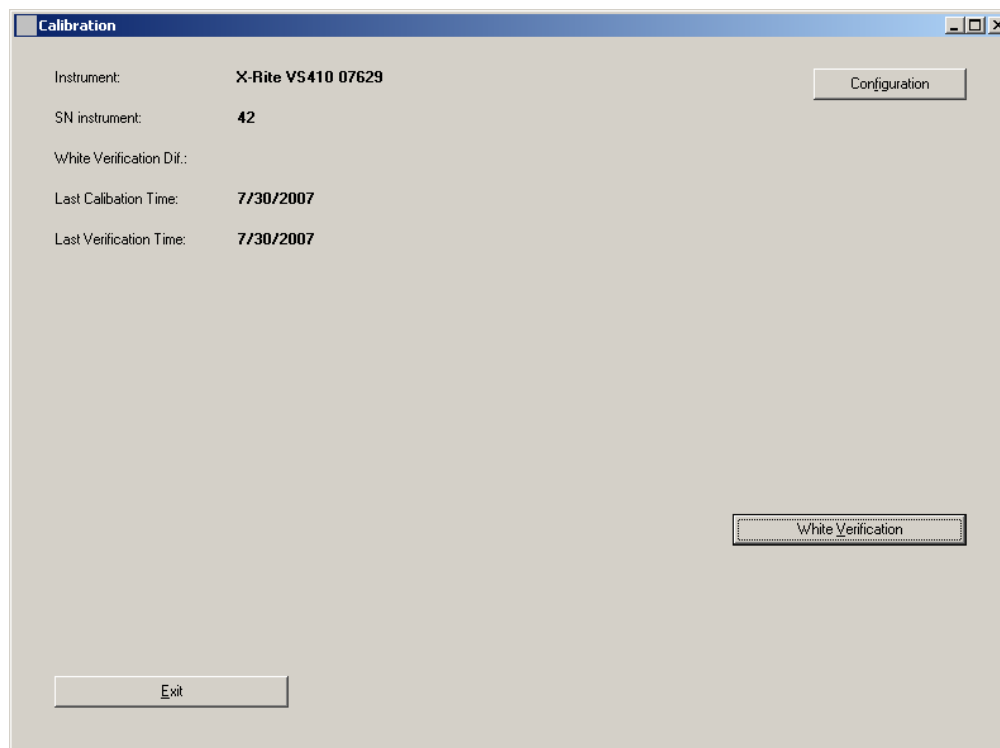
If an error still appears after calibration, contact X-Rite Customer Support at the number listed on the back cover of this manual.



5. Click **Exit** on the Calibration dialog.
6. Close the application.
7. Restart the application and perform a White Verification as explained on the following page.

Performing Verification

1. Start the application; if verification is not automatically required, select the **Instrument** menu and then the **Calibrate** item to display the Calibration dialog. The screen lists information on when the last verification and calibration were performed on the VeriColor Spectro instrument.



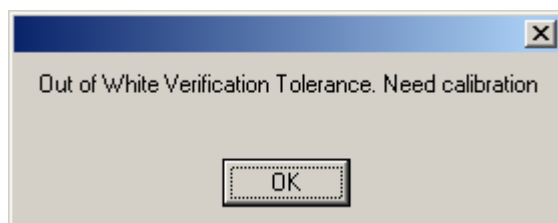
2. You should perform a white verification if time has expired since your last defined verification time period. (The white verification time interval is set in the Admin/General page.) Click **White Verification**.
3. Make sure that the lenses on the VeriColor Spectro are clean (refer to the Cleaning section later in this document) and then click **OK** on the "Insure lenses are ..." screen.
4. Attach the calibration tool as requested. Refer to Attaching the Calibration Tool as previously explained. When the tool is properly attached, click the **OK** button on the "attach calibration tube" screen.
The instrument takes one measurement, updates the White Verification Difference value and the Last Verification Time stamp date. The value listed is the White Verification Dif field is the difference between the cal values stored in the instrument and the measured values.
5. Click **OK** on the Verification Ok screen.
6. Click the **Exit** button and remove the calibration tool and place in its storage bag.

NOTE: If an "Out of white verification tolerance" appears, you will need to perform a calibration procedure. Refer to the next page.

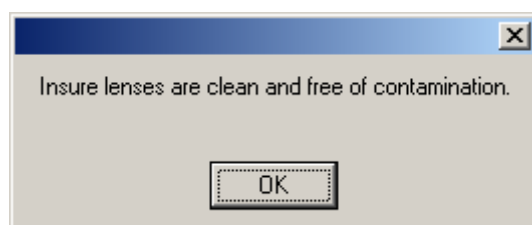
Performing Calibration (after verification failure)

Instrument calibration is required when the white verification measurement fails. The verification measurement fails when the user defined white verification tolerance value is exceeded. This tolerance is set on the Configuration Calibration dialog.

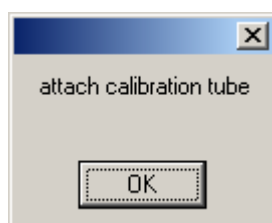
1. Click **OK** on the "Out of White Verification Tolerance screen".



2. Make sure that the lenses on the VeriColor Spectro are clean (refer to the Cleaning section later in this document) and then click **OK** on the "Insure lenses are ..." screen.



3. Attach the calibration tool as requested. Refer to Attaching the Calibration Tool as previously explained. When the tool is properly attached, click the **OK** button on the "attach calibration tube" screen.



4. The instrument takes five calibration measurements and updates the Last Calibration Time stamp.
5. Click **OK** on the "Calibration Ok" screen.
6. Remove the calibration tool and place in its storage bag.

NOTE: If an error message appears after calibration, make sure the calibration tool is located correctly over the illumination lens and is clean. You may also want to clean the illumination lens and sensor lens on the VeriColor Spectro. Refer to the General Maintenance section for cleaning procedures. After checking the calibration tool and cleaning the instrument, click the **White Calibration** button again and repeat the procedure.

If a failure still occurs, contact X-Rite Customer Support at the number listed on the back cover of this manual.

Calibration Configuration

The configuration dialog is used to enter the white verification tolerance value and select the mounting geometry. The other options are only edited if a replacement cal tube or reference is used.

To access the Configuration dialog, click the **Configuration** button on the Calibration dialog.

	old	new
390	99.99	99.99
400	101.42	101.42
410	102.84	102.84
420	102.52	102.52
430	102.06	102.06
440	102.27	102.27
450	102.41	102.41
460	102.38	102.38
470	102.34	102.34
480	102.37	102.37
490	102.49	102.49
500	102.54	102.54

Entering a White Verification Tolerance

The tolerance value entered is used to determine the verification difference tolerance. The default value is set to 1.00.

1. Click in the **White Verification Tol** field and edit the value.
2. Click the **Load New Values** button to download to the instrument.
3. Click the **Close** button to close the Configuration Calibration Values dialog.

Selecting the Mounting Geometry

This option is used to select the mounting geometry of the VeriColor Spectro.

1. Select **0°/30°** or **30°/0°** option.
2. Click the **Close** button to close the Configuration Calibration Values dialog.

Editing the Calibration Tool Plaque Value (for X-Rite calibration tool replacement)

Each calibration tool has unique calibration values assigned to it that are specific to the instrument that it is used with. If the calibration tool is replaced with another, values assigned to the replacement tool must be entered into VeriColor Spectro via the software application. The White Cal Plaque Values fields in the software list all wavelength values for the current (old) plaque. The "old" values are also mirrored in the new column until edited. Refer below for the procedure.

NOTE: Please write down and retain the current serial number listed in the "old" column before making any changes. The factory wavelength values for that column will need to be reentered if the "old" X-Rite calibration tool is ever reused.

1. Locate the serial number that is assigned to the calibration tool you are using. The serial number is located on the end cap of the tool.
2. Click in the **Calibration Plaque SN** field and enter the serial number.
3. Click in the 390 wavelength field in the **New** column and edit the value to match the value of the "new" calibration tool.
4. Continue until all wavelength values match the values listed on the "new" calibration tool you are using.
5. Click the **Load New Values** button to download to the instrument.
6. Click the **Close** button to close the Configuration Calibration Values dialog.
7. Perform a calibration procedure with the replacement calibration tool.

Editing the White Calibration Plaque Values (for non X-Rite calibration reference)

If desired, you can use a non X-Rite calibration reference with the VeriColor Spectro. Values assigned to the reference must be entered into VeriColor Spectro via the software application. The White Cal Plaque Values fields in the software list all wavelength values for the current (old) plaque. The "old" values are also mirrored in the new column until edited. Refer below for the procedure.

NOTE: Please write down and retain the current serial number listed in the "old" column before making any changes. The factory wavelength values for that column will need to be reentered if the "old" X-Rite calibration tool is ever reused.

1. Click in the **Calibration Plaque Value** field and enter the value 100.
2. Click in the 390 wavelength field in the **New** column and edit the value to match the value of your white reference.
3. Continue until all wavelength values match the values listed on the calibration reference you are using.
4. Click the **Load New Values** button to download to the instrument.
5. Click the **Close** button to close the Configuration Calibration Values dialog.
6. Perform a calibration procedure with your calibration reference.

Color Standards and Projects

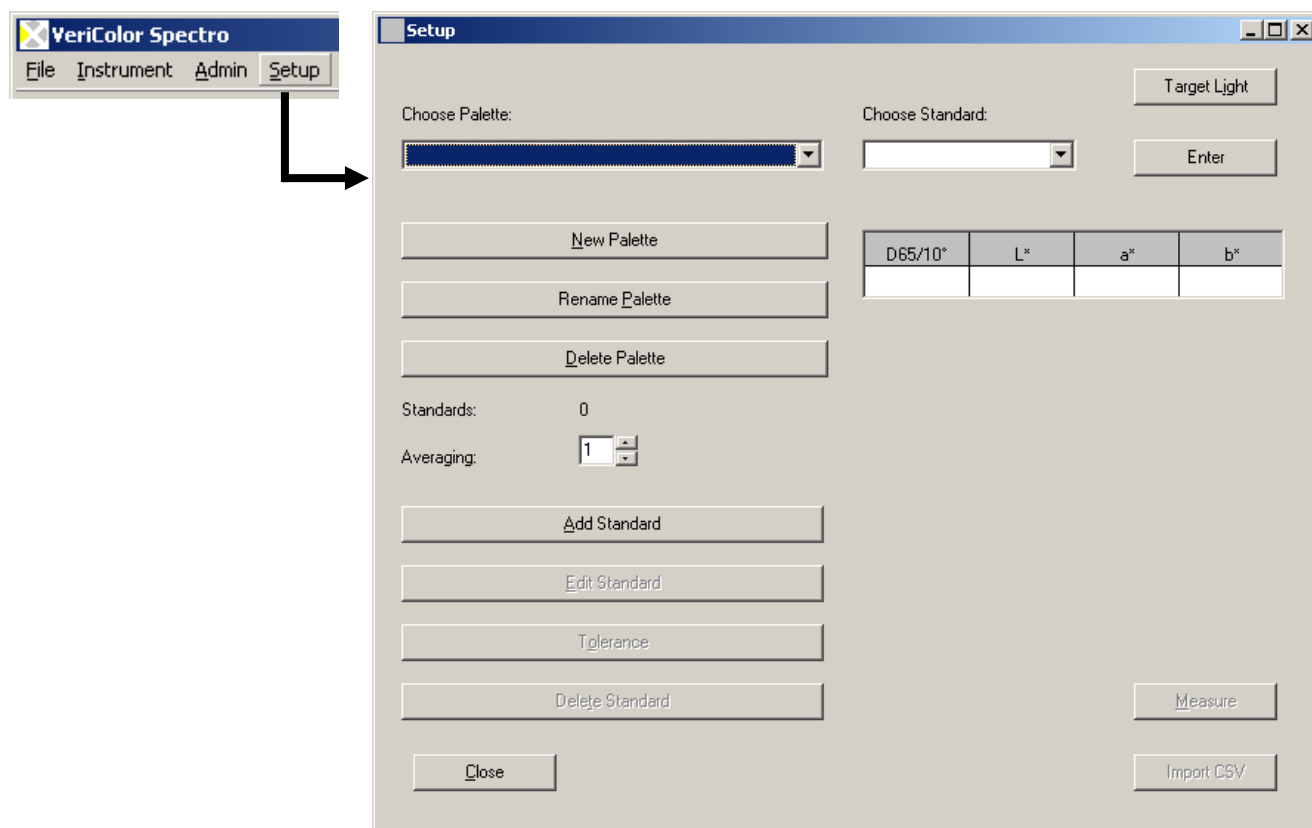
Color Standards and Projects are created using the Setup menu and Project mode functions. Up to 250 color standards can be created and saved in a project for transferring to the VeriColor Spectro instrument.

When creating a standard in Setup Mode, it is best to create the standard in the way in which the instrument will be reading the sample for comparison. If the instrument is mounted in-line and the sample will be moving, it is best to create the standard in this dynamic environment. It is recommended that the standard be created based on the average of a series of multiple measurements (5 – 10).

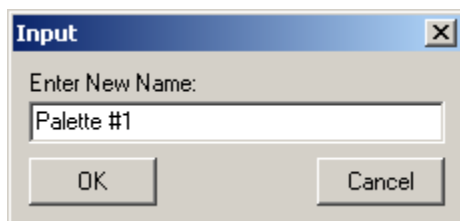
Creating Palettes and Color Standards

The Setup mode is used to create and edit standards and palettes. A palette is used for grouping color standards.

The Setup dialog is accessed by clicking the **Setup** menu item at the top of the application.



1. Click the **New Palette** button, enter a palette name and click **OK**. Color standards are grouped in palettes.



2. If desired, set the **Averaging** from 1 (no average) to a maximum of 20, using the up/down arrows. The average number must be selected before a standard name is entered.

- Click the **Add Standard** button. The Choose Standard field changes to **Name of new standard**. Enter a standard name in the field and click **Enter** or press the Enter key on the keyboard.

Setup

Choose Palette: Palette #1

Name of new standard [ENTER]:

Target Light

Enter

- Position the color standard under the VeriColor Spectro as specified earlier, or click **Import CSV** to import the standard data. Refer to Importing a CSV File later in this section for more detailed information on using this feature.
- Perform targeting if required (refer to Targeting a Part earlier in this section) and then click the **Measure** button on the Setup dialog to take the measurement.
- Take additional measurement if averaging is used for the color standard.
- Click the **Save** button to save the standard to the database and return to the main Setup dialog. The color standard number, measurement time stamp, simulated color, and data values are displayed below the name.

Setup

Choose Palette: Palette #1

Choose Standard: Yellow #300

Target Light

Enter

1. standard of: 7/30/2007 2:25:14 PM

D65/10°	L*	a*	b*
	85.18	11.52	50.53

New Palette

Rename Palette

- If required, enter specific tolerance values other than the default values for the standard. Refer to the next page for information on adjusting tolerances.
- Continue with additional color standards by clicking the **Add Standard** button.
- When you have finished creating color standards, click the **Close** button to return to the main application screen. Continue on to the Creating Project section.
- Refer to the following pages for information on additional Setup dialog controls.

Tolerancing

Whenever a new standard is created and saved, it is stored with the default tolerances. If you need to use specific tolerances for individual standards, you would use the tolerancing option.

1. Click the **Tolerance** button on the Setup dialog to open the Tolerances dialog. Within the Tolerance dialog, you have the ability to enter individual tolerances and an action limit.

2. Select **Type of Tolerance** dropdown list select the tolerance type. Available types are: dLab+-, DLCH+-, dEcmc, and dEab, or None at all.
3. Click in the **Tolerance** fields and edit the default tolerance limits for the selected standard.
4. Click in the **Action limit [%]** and edit the percentage value. This option is used to establish the percentage amount required to trigger a yellow “warning” display in the traffic light. This signifies that a sample is trending toward a fail condition, but still is within the defined tolerance. You can select between 25 and 99 as a action limit percentage. This percentage is applied to the upper and lower user defined tolerances in $L^* a^* b^*$, $L^* c^* h^*$, $dEcmc$, and dE^* .
EXAMPLE: If the tolerance for a standard is 1.00 dE on L^* , a^* and b^* , setting the action limit to 75% will activate the yellow warning light if the standard drifts to or above 0.75 DE on one or more of the $L^* a^* b^*$ values. The same is true for $L^* c^* h^*$ and dE^* if these tolerancing modes are selected.
The default setting is no value entered.
5. If you want only the current standard to use the edited tolerances, click the **OK** button to save the tolerances and exit the dialog. If you want all of the new standards stored to use these tolerances, click the **save as default** button. You will be asked to confirm that you want to overwrite the default tolerances. Click **OK** to continue and then click **OK** again to exit the Tolerance dialog.

Clicking the **Use Default** button will set the tolerance type and limits to the current system default settings.

Additional Setup Dialog Controls

The Setup dialog box contains the following controls and information:

- Choose Palette:** A dropdown menu showing "Palette #1" (callout 1).
- Choose Standard:** A dropdown menu showing "Yellow #300" (callout 4).
- Buttons:** "New Palette" (callout 2), "Rename Palette" (callout 3), "Delete Palette" (callout 5), "Add Standard" (callout 6), "Edit Standard" (callout 7), "Tolerance" (callout 8), "Delete Standard" (callout 9), "Close" (callout 10), "Measure" (callout 11), and "Import CSV" (callout 12).
- Standards:** A field showing "1" (callout 5).
- Averaging:** A spinner control showing "1" (callout 6).
- Table:**

D65/10°	L*	a*	b*
Yellow #300	85.18	11.52	50.53
- Text:** "1. standard of: 7/30/2007 2:25:14 PM", "dL=-1.00/1.00 da=-1.00/1.00 db=-1.00/1.00", and "75.00%".

- (1) **Choose Palette** list displays the current palette (if available) selected. The same control can be used to select a different palette if more than one exists.
- (2) **Rename Palette** button is used to rename the selected palette.
- (3) **Delete Palette** button is used to delete the selected palette. All associated color standards will also be deleted.
- (4) **Choose Standard** list displays the current standard in the field. The same control can be used to select a different standard if more than one exists.
- (5) **Standards field** lists the number of standards that exist in the selected palette.
- (6) **Edit Standard** button is used to edit the name or measured data of a standard. You would first select the standard from the Choose Standards list to edit and then click the Edit Standards button.
- (7) **Delete Standard** button is used to access the Delete Standards dialog where standards are deleted.
- (8) **Import CSV** button is used to import reflectance data for use as a new standard or existing standard. Refer to the next page for details.

Importing a CSV File

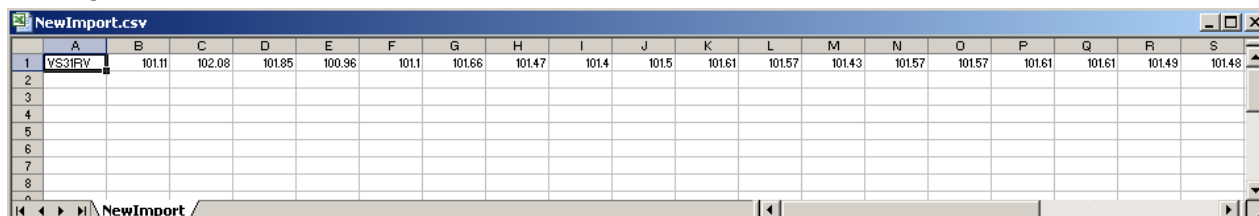
The CSV import function allows you to create a new standard or edit a previously created standard in Setup. This is accomplished by measuring a sample in monitor mode and then saving the data using the process below to import as a new standard.

NOTE: When importing .csv data using Import CSV, the data is not added to the existing standard when editing. The existing standard data is replaced with the new data.

Creating a .csv file for a standard

1. Take a series of measurements in monitor mode and save the data to an Excel "master" .csv file. Any new measurements that you want to add to the master file should be saved in a new file. The data is then selected from the new file and then copied into the master .csv.
2. Delete any data not needed in the "master file" and then average the R values.
3. Once averaged, copy the reflectance values into fields "B1" through "AF1" of the NewImport.csv file located on the VeriColor Spectro CD. Field "A1" is reserved for import code VS31RV required by the software.
4. Save the NewImport.csv file to a location on your computer where it can be accessed for importing.
5. Use the **Import CSV** function in Standard Setup to import the newly created NewImport.csv file from the stored location on your computer.

Example .csv file

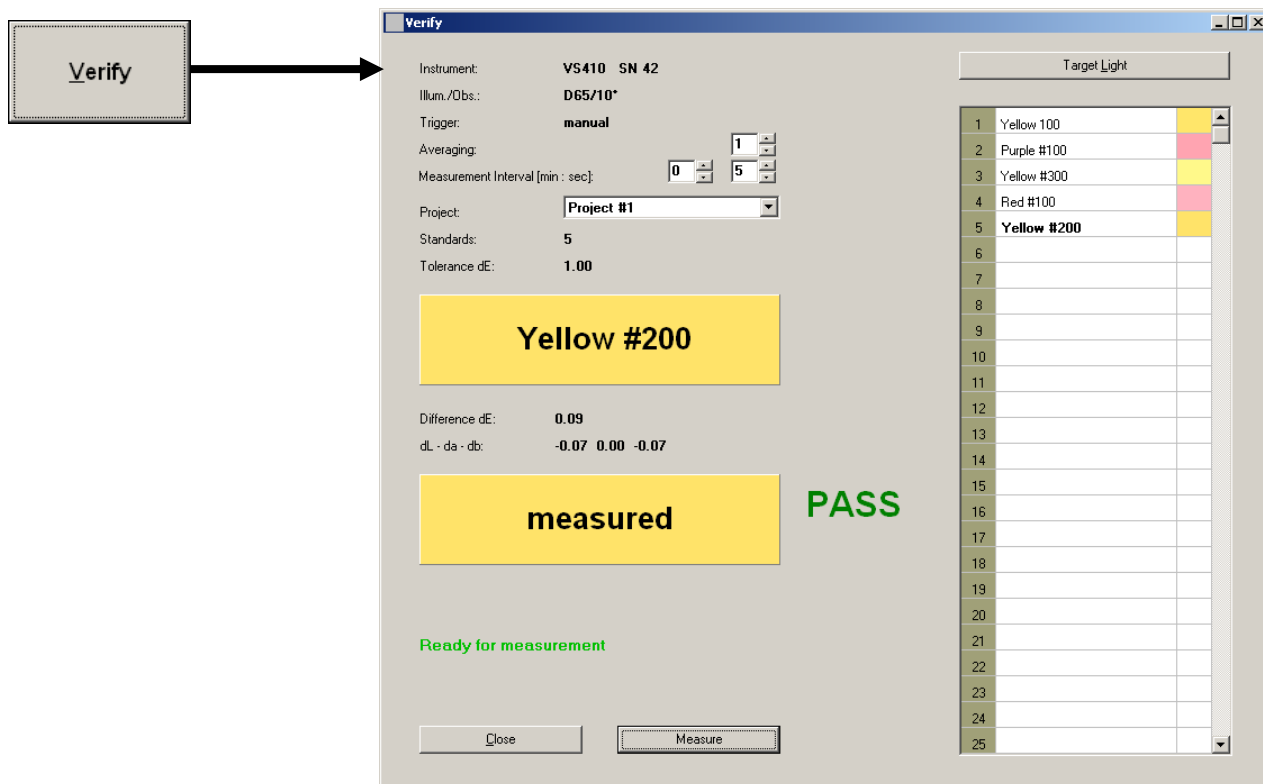


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	VS31RV	101.11	102.08	101.85	100.96	101.1	101.66	101.47	101.4	101.5	101.61	101.57	101.43	101.57	101.57	101.61	101.61	101.49	101.48
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			

Verify Mode

The Verify mode is used to locate a standard color that closely matches a measured sample. The standard found is based on the project selected and the tolerance dE entered in the Admin/Verify page.

The Verify dialog is accessed by clicking the **Verify** button at the bottom of the application.



1. Select the project where your color standards are stored from the **Project** drop down list. Color standards from the selected project appear in the numbered list on the right side of the screen.
2. If desired, set the **Averaging** from 1 (no average) to a maximum of 20, using the up/down arrows.
3. Determines the amount of time that needs to elapse between timed interval sample measurements. Set the amount of time in the **Interval** fields using up/down arrows. Time intervals can range from 4 second up to 60 minutes.
CAUTION: Do not set the time interval to anything less than 4 seconds. This can result in a software error loop requiring a possible re-boot of the PC.
4. Position the color standard under the VeriColor Spectro as specified earlier.
5. Perform targeting if required (refer to Targeting a Part earlier in this section) and then click the **Measure** button on the Verify dialog to take the measurement.

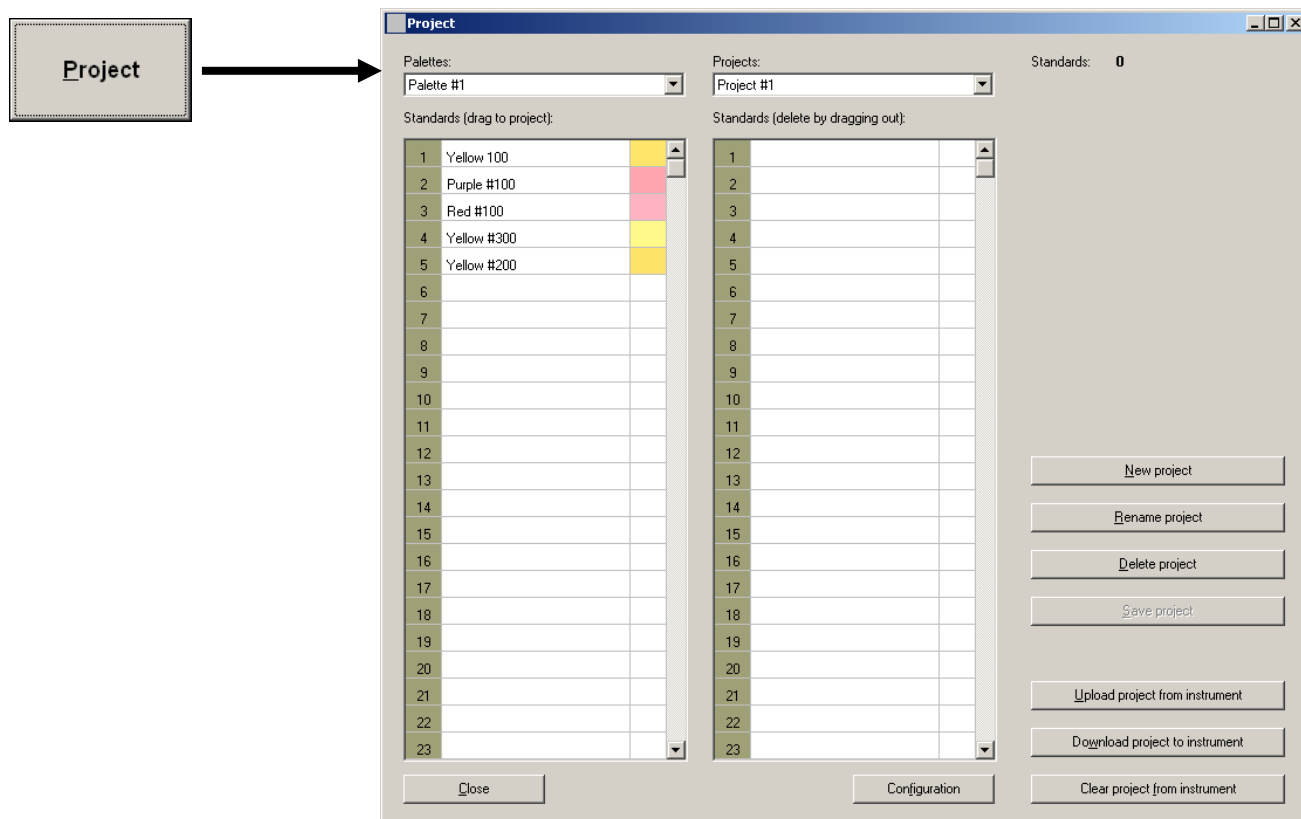
The closest color standard name and simulated color appears in the first rectangle, with the color name highlighted in the list. The simulated measured color appears in the second rectangle. If the standard found is within the specified tolerance, PASS appears next to the measured color rectangle. If the standard found is not within the specified tolerance, FAIL appears next to the measured color rectangle.

6. When you have finished with the Verify mode, click the **Close** button to return to the main application screen.

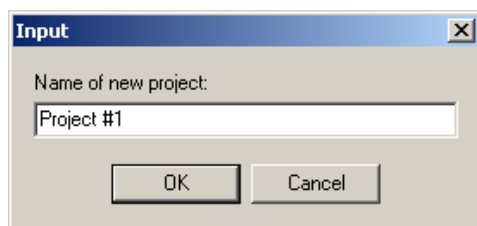
Project Mode

The Project mode is used for project maintenance (create, delete and edit), perform uploads/downloads to the instrument, and setup PLC configurations. A single project can consist of up to 250 color standards and configuration settings. After creating a project, it would be downloaded and stored in the VeriColor Spectro instrument. Once the VeriColor Spectro instrument is programmed with a project, it can execute independent of the software application.

The Project dialog is accessed by clicking the **Project** button at the bottom of the application.



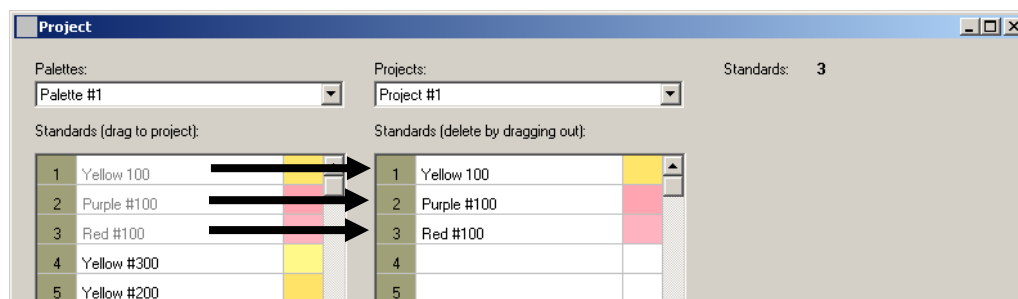
1. Select the palette where your color standards are stored from the **Palette** pull down list. Color standards from the selected palette appear in the **Standards** numbered list on the left side of the screen.
2. Click the **New project** button, enter a project name and click **OK**. The new name will appear in the Project list.



The Projects list is used to select the project from the database that you would like to download to the instrument. The selected project shows all associated standards in the Standards number list on the left.

- Using your mouse, drag and drop the color standards from the left **Standards** list to the right **Standards** list. This will save the color standards under the newly created project.

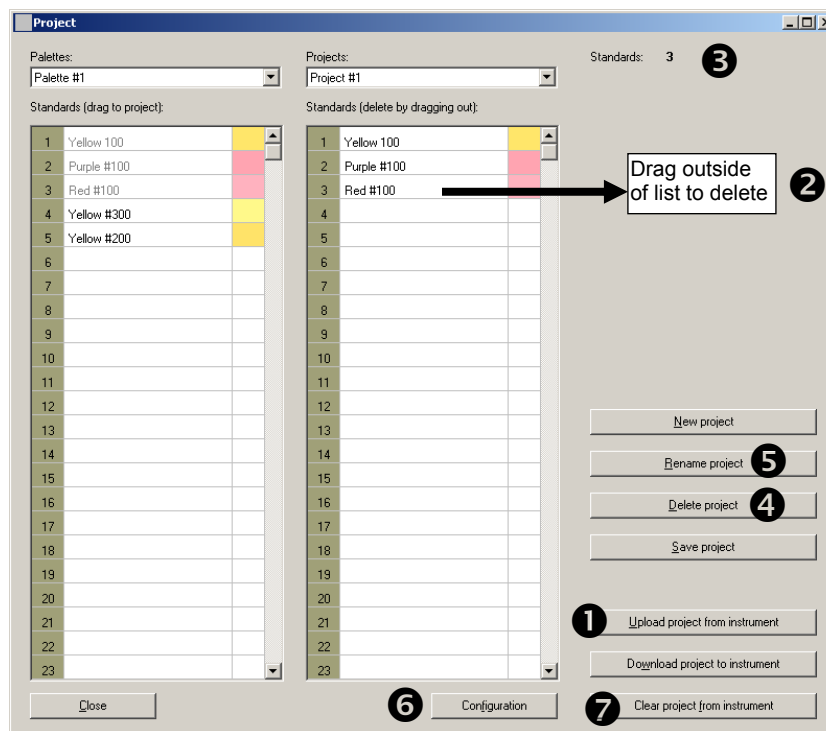
IMPORTANT: When using a mouse with a scroll wheel, be careful not to use the scroll wheel when the focus is in either of the two Standards lists (Palettes or Projects). The standard that is selected can accidentally be reordered or possibly deleted from the list.



Color standards that are moved to the right column will be "grayed out" in the left column.

- Click the **Save Project** button to save the project to the database.
- To download the Project to the VeriColor Spectro, click the **Download project to instrument** button. You will be prompted that the existing project in the instrument will be deleted. Click **Yes** to continue.
- When you have finished creating project, click the **Close** button to return to the main application screen.

Additional Project Dialog Controls



- (1) Upload project from instrument** button is used to retrieve the project currently stored in VeriColor Spectro. The retrieved project name and standards will appear in the list on the right side of the screen.

- (2) **Delete color standards from project list** is performed by clicking on the standard in right side list and dragging it outside of the list.
- (3) **Standards field** lists the number of standards that exist in the selected project.
- (4) **Delete Project** button is used to delete the selected project.
- (5) **Rename Project** button is used to rename the selected project.
- (6) **Configuration** button is used to access the Configuration PLC Values dialog. Refer below for detailed information.
- (7) **Clear project from instrument** button is used to clear the current project stored in the instrument.

Configuration PLC Values

The Configuration PLC Values dialog is used to configure the instrument for use with external PLC control.

The Configuration PLC Values dialog is accessed by clicking the **Configuration** button at the bottom of the Project dialog.

The screenshot shows the 'Configuration PLC Values' dialog box. It contains the following sections and controls:

- Auto Transmit:** Radio buttons for OFF (selected) and ON.
- Searching:** Radio buttons for Searching disabled (selected) and Searching enabled.
- Averaging:** Radio buttons for Normal (selected) and Digitally Filtered.
- Output:** Radio buttons for Discret Outputs (selected) and RS485 Port.
- PLC:**
 - Radio buttons for Action Indicator and Bit 5 of binary output.
 - Numeric input fields for:
 - Number of readings to be averaged or weight factor when digital filtering (set to 0).
 - Time between auto average readings (30 = 3.0 sec) (set to 0).
 - Time between external trigger and reading (30 = 3.0 sec) (set to 0).
 - Time output port remains active (30 = 3.0 sec; 0=infinite) (set to 0).
 - Radio buttons for Output polarity normally open (selected) and Output polarity normally closed.

Buttons at the bottom: Use Defaults, Load Settings, and Close.

Auto Transmit – Determines if measurement data is automatically transmitted after a measurement. When set to **OFF** (default setting), no data is automatically transmitted after a measurement. When set to **ON**, you would choose what data is transmitted. Select **Status only**, **LabCh (Smp)**, **LabCh (Std, Dif)**, **Refl (Smp)**, or **Refl (Smp, Std)** option for the type of data to transmit.

Output – Allows you to select an instrument configuration that dedicates the outputs of channels A-E to support your setup requirements.

- Discrete Outputs – Channels A-D provide Binary outputs indicating the number (max. 15) of the closest matching standard within the downloaded project.
- RS485 Port – Channels A-D are used to support communications for an RS485 connection.

- Action Indicator – Configures the output of channel E to function as a Warn indicator in correlation to the assigned action limit applied to the active standard.
- Bit 5 of Binary Output - Configures the output of channel E to function as Bit 5 in the Binary output configuration indicating the number (max. 31) of the closest matching standard within the downloaded project.

Searching – Determines the standard search method. When set to **Searching disabled** (default setting), no standard search is used. The active standard is used for sample comparison. When set to **Searching enabled**, the instrument is searched for the closest standard match to the measured sample.

Averaging - Determines the method used to derive an average, along with the number of measurement taken to obtain a normal or weighted value digitally filtered average, and how much time elapses between measurements. The Digital Filtering option is an alternative to simply averaging a set of readings. This method applies a weighting factor across multiple readings selected. The averaging control can be turned off by setting it to (0) zero (default setting), or adjusted from 2 to 10 measurements to average. Time delayed between measurements can be set from 0 to 10 seconds. When the control is set to 0, the Measure button must be clicked to take the measurement. When set to a time increment (10 = 1 sec, 20 = 2 sec., etc.), the instrument will pause the defined amount between measurements.

PLC - Determines the amount of time the instrument will “pause” after seeing the Read input go activate (discrete input only), and how long the instrument holds its outputs active after a measurement occurs. The **Time between external trigger and reading** control occurs before an actual measurement is taken and can be adjusted from 0 to 10 seconds, in tenths of a second increments (11 = 1.1 sec, 22 = 2.2 sec., etc.). The **Time output control remains active** control can be set from 0 to 100 seconds, in tenths of a second increments (11 = 1.1 sec, 22 = 2.2 sec., etc.).

Use Defaults button

Clicking the **Use Defaults** button will set all options in the Configuration PLC dialog to the factory default settings.

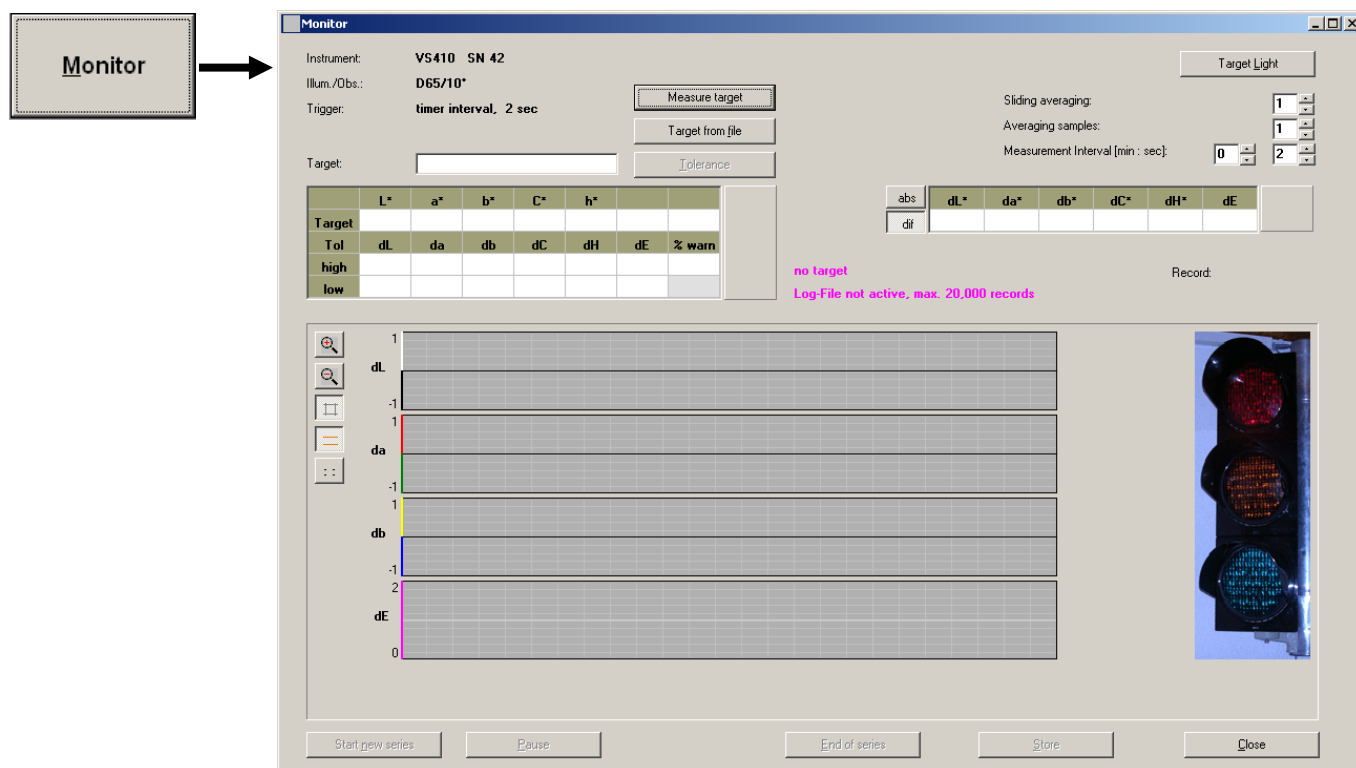
Load Settings button

Clicking the **Load Setting** button will download the current settings in the Configuration PLC dialog to the Vericolor Spectro instrument.

Monitor Mode

The Monitor mode is the “main” mode of the application. The Monitor mode is used to view sample measurement performance once the color standards are set up.

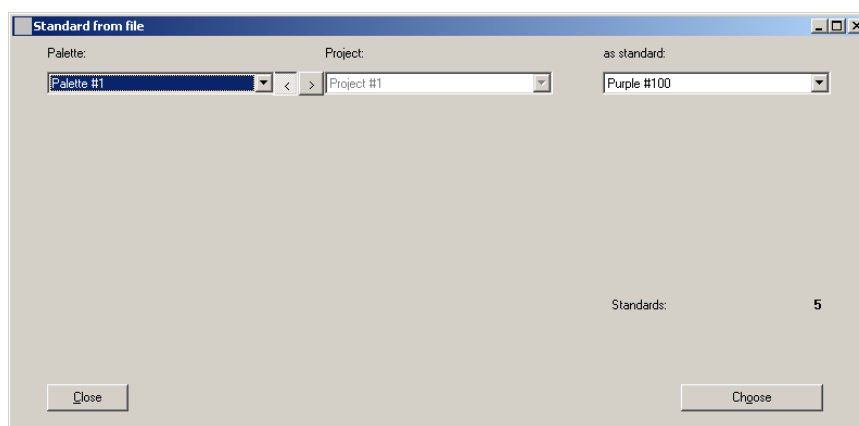
The Monitor dialog is accessed by clicking the **Monitor** button at the bottom of the application.



The first step is to select a target (standard) or measure a target (standard). If Auto Target was setup in the Admin/Monitor page, you would select the project where the standards are located. If auto targeting is not used, you would select a specific target.

Selecting a Single Standard (no auto target)

1. Click the **Target from file** button to open a dialog where a stored standard is selected as the target color.



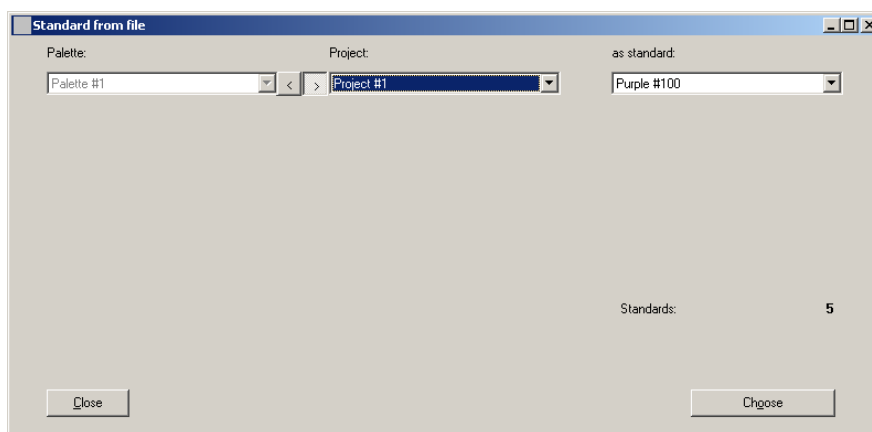
2. Click the left arrow button (**<**) located between the Palette and Project lists to active the Palette list.

3. Select the palette from the **Palette** list where the standard is stored.
4. Click the right arrow button (**>**) located between the Palette and Project lists to active the Project list.
5. Select the project from the **Project** list that the standard is associated with.
6. Select the standard from the **as standard** list.
7. Click **Choose** to select the standard and close the Standard from file dialog. The standard name appears in the Target field, and the data values and tolerances appear below that.

Selecting a Project for Auto Targeting

NOTE: Auto targeting is setup in the Admin/Monitor page and cannot be selected in the Monitor mode. You can select a specific standard here; however the standard may change to a closer standard based on the sample measurement taken.

1. Click the **Target from file** button to open the Standard from file dialog.



2. Note that the Palette list and Project list are disabled on this dialog. Select the standard from the **as standard** list.
3. Click **Choose** to select the standard and close the Standard from file dialog. The standard name appears in the Target field, and the data values and tolerances appear below that. Auto Target appears to the left of the Target from file button to let you know auto targeting is activated.

Measuring a Standard

NOTE: Auto targeting must be disabled (unchecked) in the Admin/Monitor page to allow a target measurement.

1. Prepare the sample for measurement.
2. Perform targeting if required (refer to Targeting a Part earlier in this section) and then click the **Measure target** button. If a previous target exists, you will be asked if you want to overwrite the current standard. Click **Yes** to continue. The sample is measured and the data, default tolerances, and simulated color appear in the target area.

	L*	a*	b*	C*	h*		
Target	70.94	31.09	4.59	31.43	8.39		
Tol	dL	da	db	dC	dH	dE	% warn
high	1.00	1.00	1.00				75.00
low	-1.00	-1.00	-1.00				

- If you would like to name the target, click in the **Target** field and enter a name.

Instrument: VS410 SN 17

Illum./Obs.: D65/10°

Trigger: timer interval

Target: Red #300

Buttons: Measure target, Target from file, Tolerance

Setting Tolerances

The Tolerance button is used to open the Tolerance dialog. Here the tolerance type, tolerance limits, and action limit for the standard used in Monitor mode are set or adjusted. Tolerances that were created for a standard opened from the file will be carried over. You can edit these tolerances without overwriting the stored tolerance values.

- Click in the **Tolerance** button to open the dialog where the tolerances are edited.

Name of Standard: Red #300

Type of Tolerance: dLab+

Tolerances:

	dL*	da*	db*
high	1.00	1.00	1.00
low	-1.00	-1.00	-1.00

Action limit [%]: 75.00

Buttons: use default, save as default, Cancel, OK

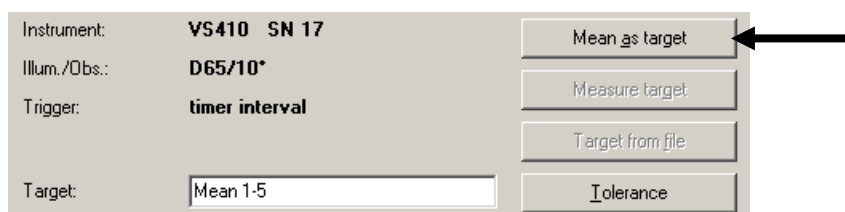
- Select the desired tolerance from the **Type of Tolerance** list.
- Enter tolerance values in the available fields and adjust the **Action limit** if required.
- Click **OK** when finished. Adjusted values or new values now appear in the tolerance fields below the standard data.

	L*	a*	b*	C*	h*	dC	dH	dE	% warn
Target	70.94	31.09	4.59	31.43	8.39				
Tol	dL	da	db	dC	dH	dE			
high	1.00	1.00	1.00						75.00
low	-1.00	-1.00	-1.00						

Creating a Standard from a Series of Measurements

NOTE: Auto targeting must be disabled (unchecked) in the Admin/Monitor page to create a standard from a series of measurements.

1. Prepare the sample(s) for measurement that will be used for that standard.
2. Click the **Measure target** button to obtain the first standard measurement.
3. Set the amount of time that elapses between measurements in the **Interval** fields using up/down arrows. Time intervals can range from 2 second up to 60 minutes.
4. Click the **Start new series** button at the bottom of the Monitor dialog to start the measurement sequence.
5. After the required amount of samples are measured for the average, click the **Pause** button.
6. Click the **Mean as Target** button that appears at the top of the dialog after the Pause button was clicked. You will be asked to confirm that you want to overwrite the existing standard. Click **Yes** to continue.



The screenshot shows the Monitor dialog box with the following fields and buttons:

- Instrument:** VS410 SN 17
- Illum./Obs.:** D65/10°
- Trigger:** timer interval
- Target:** Mean 1-5
- Buttons:** Mean as target, Measure target, Target from file, Tolerance

An arrow points to the **Mean as target** button.

Clicking the Mean as Target button will change the standard to the mean average of the series of measurements taken. The target name changes to "Mean" and indicates the number of samples measured to obtain an average.

IMPORTANT

If you choose your standard from file, and then change the standard to the mean average of the series of measurements, the tolerances that carried over from the standard from file will no longer apply. You will need to manually adjust the tolerance to compensate for the difference in the current mean average vs. the standard from file.

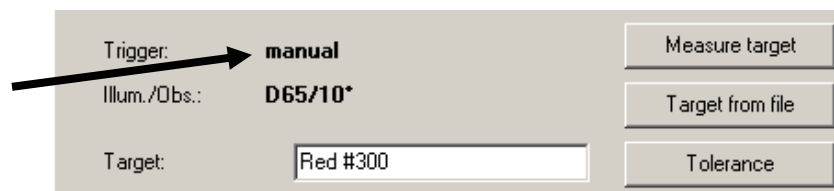
Example: My tolerance is 1.0 DE on L*, a*, and b*. My sample has been running at 0.50 DE to the standard. I choose to change the standard to the mean average of this series. My new standard is now 0.5 DE beyond the original standard tolerance. A tolerance of 1.0 means that I can be running at a DE of 1.5 to the original standard and the instrument will give a pass indication.

In order to avoid this, the tolerance for the new Standard should be adjusted from 1.0 DE to 0.5 DE.

Also, the new standard created from the mean average cannot be saved or replace the current standard in file.

Manual Sample Measurement

Manual measurement mode is used to take single sample measurements. Manual should appear as the trigger method. If not, the option will need to be set as the trigger mode in the Monitor options page of the Admin dialog.



Trigger: **manual** Measure target

Illum./Obs.: **D65/10°** Target from file

Target: Red #300 Tolerance

1. Select the standard as previously explained and prepare a sample for measurement.
2. If desired, set the **Averaging Samples** from 1 (no average) to a maximum of 20, using the up/down arrows.
3. Click the **Start new series** button at the bottom of the Monitor dialog.
4. Click the **Measure** button at the bottom of the Monitor dialog. A single measurement is taken and results displayed on the screen.
5. Each time the button is clicked, a measurement is taken and results displayed.
6. Click **End of Series** button at the bottom of the Monitor dialog to end the manual measurement mode.
7. Click the **Store** button (if activated) to save the measurement data as a .txt, .csv, or .mif file.

Interval Sample Measurements

Interval measurement mode causes the VeriColor Spectro to take continuous measurements at specified intervals. Timed interval should appear as the trigger method and an interval time amount should be set. If not, the option will need to be set as the trigger mode in the Monitor options page of the Admin dialog.



Trigger: **timer interval** Measure target

Illum./Obs.: **D65/10°** Target from file

Target: Red #300 Tolerance

1. Select the standard as previously explained and prepare the samples for measurement.
2. Determines the amount of time that needs to elapse between timed interval sample measurements. Set the amount of time in the **Interval** fields using up/down arrows. Time intervals can range from 2 second up to 60 minutes.
3. If desired, set the **Averaging Samples** or **Sliding Averaging** from 1 (no averaging) to a maximum of 20, using the up/down arrows. Sliding average reports the average across the number of measurements defined as they are measured. For example, if 5 is selected as the sliding average, then the last 5 measurements taken are continually averaged.

NOTE: It is possible for the traffic light to display as red (failed) even if the last sample measured in the sliding average group were in tolerance. Refer to the Traffic Light explanation later in this section for additional details.

4. Perform targeting if required (refer to Targeting a Part earlier in this section), and then click the **Start new series** button at the bottom of the Monitor dialog to start the measurement sequence.

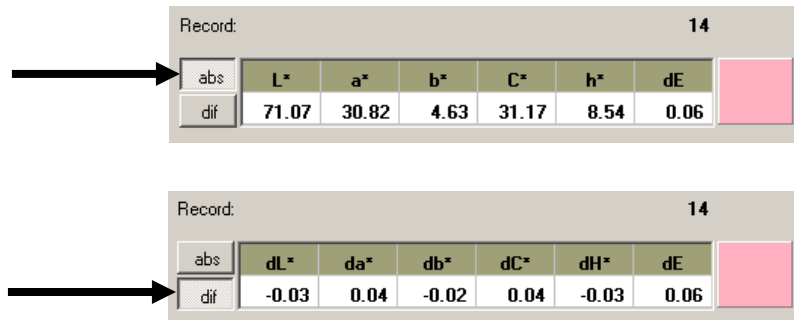
NOTE: You can click the **Pause** button at the bottom of the dialog to temporarily stop a measurement sequence. Once a measurement sequence is paused, the button's name changes to **Run**, allowing you to restart the measurement sequence.

- Click **End of Series** button at the bottom of the Monitor dialog to end the interval measurement sequence.
- Click the **Store** button (if activated) to save the measurement data as a .txt, .csv, or .mif file.

Viewing Sample Data

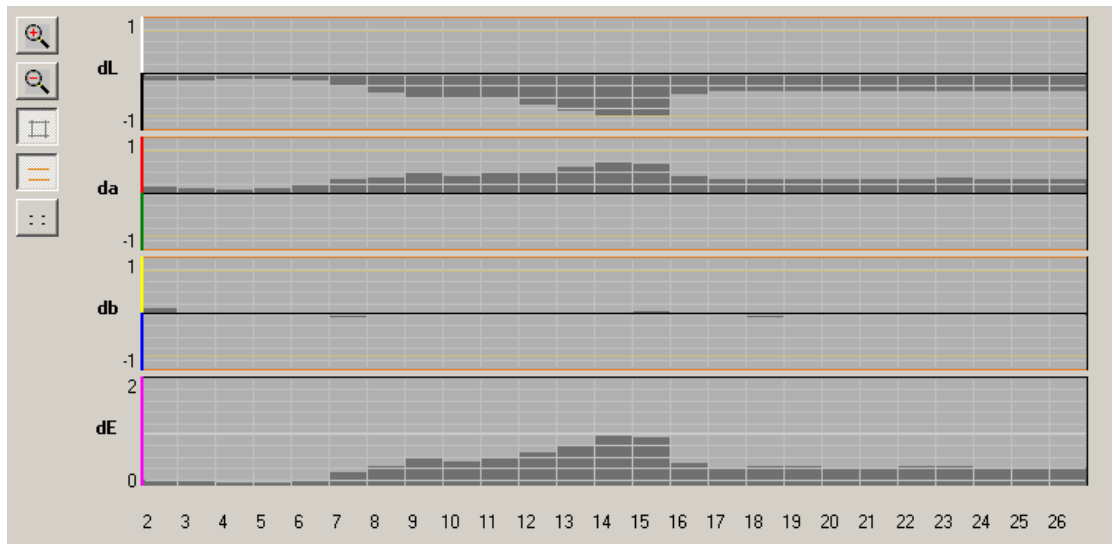
Trial Data

The table on the right of the Monitor dialog displays the data for the current measurement. A color patch that simulates the trial color is displayed to the right of sample data. You can switch between absolute and difference data by clicking between the **abs** and **dif** buttons.



Trend Graph and Controls

The trend graph displays the pass/warning/fail status of the last 25 sample measurements. Graph bars represents individual measurements or averaged measurements if sliding averaging is used. Upper and lower "Action" and "Fail" limit lines display as yellow and red respectively only on applicable tolerance options correlating to the active standard. You can also enable/disable controls line in the trend by using the control lines button on the left. See next page for details.



The graph controls are located on the left side of the screen.



(zoom in) – The zoom in button increasing the trend graph viewing scale.



(zoom out) – The zoom out button decreasing the trend graph viewing scale.



(grid) – The grid button is used to turn the grid pattern off and on in the trend graph.



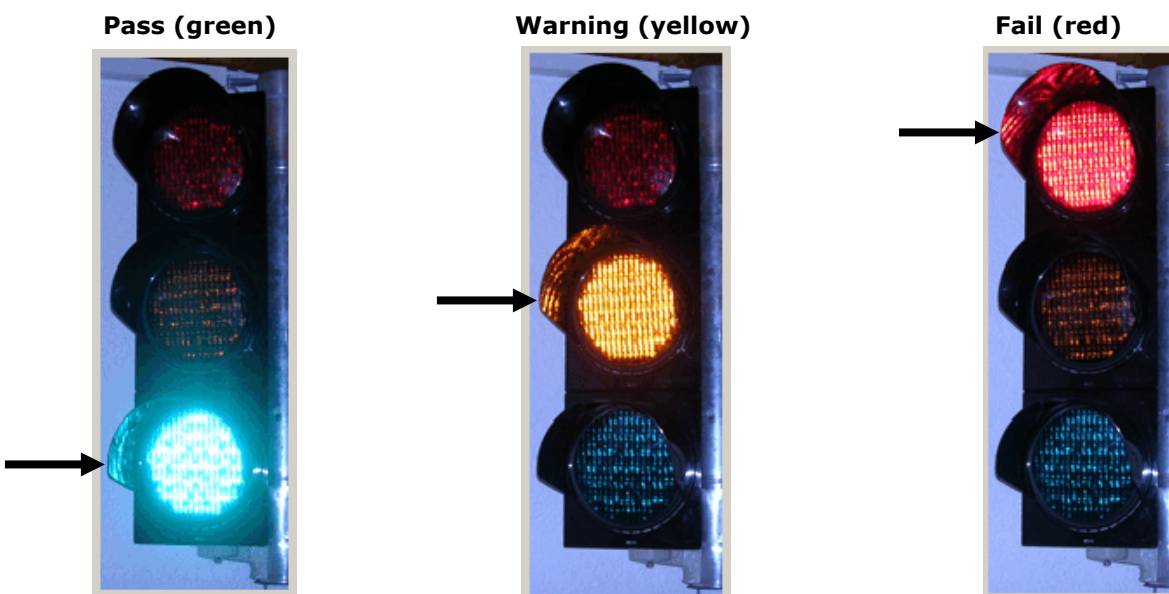
(upper/lower control lines) – The upper/lower control lines button is used to turn the control lines off and on for the trend graph. The “red” lines are the fail limits and the “yellow” lines are the warning or action limits.



(date/number stamp) – The date/number stamp button toggles between date-time and number for each measurement. When the button is down, the date and time display. When the button is up, the measurement number appears.

Traffic Light

The traffic light on the right of the screen provides pass/warning/fail status of sample measurements. The green light indicates the measurement is within tolerance and is a pass. The yellow light indicates that the measurement is trending toward a fail condition, but is still within tolerance. And the red light indicates the measurement is outside of tolerance and is in a fail condition. Any pre-set attribute that is out of tolerance will cause a fail condition.



The traffic light reacts differently based on the “sliding averaging” setting and the “Only Last Record for PASS/FAIL” option setting in the Admin/Monitor page. Refer below for an explanation of the setting conditions.

No Averaging (sliding average = 1) and Only Last Record for PASS/FAIL enabled (checked)

- Green light = current measurement is a pass.
- Yellow light = current measurement is ok but trending toward fail.
- Red light = current measurement is a fail.

No Averaging (sliding average = 1) and Only Last Record for PASS/FAIL disabled (unchecked)

- Green light = all measurements displaying within the active trend graph window are passing.

- Yellow light = One or more of the measurements displaying within the active trend graph window has triggered the (warn condition) action limit. Yellow will continue to display until the single measurement that caused the condition scrolls from the screen in the trend graph (after 25 measurements), or a fail (red) condition occurs. In this case, the light will change to red.
- Red light = One or more of the measurements displaying within the active trend graph window has failed. Red will continue to display until the single measurement that caused the fail condition scrolls from the screen in the trend graph (after 25 measurements). At that point, the light could change to green or yellow if the current measurement is in passing or warning condition.

Averaging (sliding average = 2 or more) and Only Last Record for PASS/FAIL enabled (checked)

- Green light = current grouped measurement average is a pass.
- Yellow light = current grouped measurement average has triggered the (warn condition) action limit.
- Red light = current grouped measurement average is a fail.

Averaging (sliding average = 2 or more) and Only Last Record for PASS/FAIL disabled (unchecked)

- Green light = all of the grouped measurement averages displaying within the active trend graph window are passing.
- Yellow light = one or more of the grouped measurement averages displaying within the active trend graph window has triggered the (warn condition) action limit. Yellow will continue to display until the measurement group average that caused the condition scrolls from the screen in the trend graph, or a failed (red) average condition occurs. In this case, the light will change to red.
- Red light = one or more of the grouped measurement averages displaying within the active trend graph window has failed. Red will continue to display until the measurement group average that caused the fail condition scrolls from the screen in the trend graph. At that point, the light could change to green or yellow if the current measurements average is in passing or a warning condition.

Additional Monitor Dialog Controls

- **Store** button is used to save the standard and sample measurement data in a .txt, .csv, or .mif file format. For a .csv file format, refer to Importing a CSV File in the Color Standards and Projects section for more detailed information on using this feature.
- **Close** button closes the Monitor dialog returns you to the main application screen.

Lookup Mode

The Lookup mode is used to quickly locate color standards from the database that closely match the sample being measured. Up to 10 color standards and associated palettes are displayed starting with the closest match listed in the first position. Matches are based on the delta E cmc value set in the Admin/Lookup page.

The Lookup dialog is accessed by clicking the **Lookup** button at the bottom of the application.

Lookup

Instrument: VS410 SN 42

Illum./Obs.: D65/10°

Criteria: dEcmc <5.00

Averaging Target: 1

Target Light

Target	[Name]			
	Standard	Palette	dEcmc	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Ready for measurement

Close Print Measure

1. Click in the **Target** field and enter a name for the sample to be measured.

Target White #200

2. If desired, set the **Averaging Target** from 1 (no averaging) to a maximum of 20, using the up/down arrows. This determines the amount of measurements required to obtain an average in Lookup mode.
3. Prepare the sample for measurement.
4. Perform targeting if required (refer to Targeting a Part earlier in this section) and then click the **Measure** button. Color standards are listed in ascending order based on delta DEcmc criteria along with their palette location.

Target	White #200			
	Standard	Palette	dEcmc	
1	White #100	Palette #2	0.02	
2	Purple #100	Palette #2	24.27	
3	Red #200	Palette #1	36.82	
4	Red#100	Palette #1	40.76	
5	Red #300	Palette #1	41.05	
6	Yellow #100	Palette #1	41.20	
7	Yellow #200	Palette #1	49.28	

5. If you would like to receive a report of the search results, click the **Print** button. A report that includes the measurement data for the measured target and all the standards will be sent to your default printer.

Sample Lookup Report

Instrument:		VS410 SN 10							
Geometry:		0°/30°							
Illum./Obs.:		D65/10°							
Criteria:		dEcmc							
Target, measured		White #200							
		L	a	b	C	h			
		95.00	-1.03	3.80	3.94	105.16			
No	Color	Palette							
		dL	da	db	dC	dH	dE	dEcmc	M-DA
1	White #100	Palette #2							
		0.01	-0.01	-0.01	0.00	0.23	0.02	0.02	0.02
2	Purple #100	Palette #2							
		-18.91	7.90	-14.44	8.73	-162.28	25.07	24.27	1.85
3	Red #200	Palette #1							
		-19.24	25.03	15.57	26.91	-66.25	35.20	36.82	5.18
4	Red#100	Palette #1							
		-23.69	31.63	0.88	27.02	-96.47	39.53	40.76	3.73
5	Red #300	Palette #1							
		-23.89	31.85	0.87	27.24	-96.55	39.83	41.05	3.75
6	Yellow #100	Palette #1							
		-16.87	20.71	27.34	32.90	-47.46	38.22	41.20	7.01
7	Yellow #200	Palette #1							
		-12.93	16.37	39.00	41.53	-34.88	44.23	49.28	8.82

6. When you have finished with the Lookup mode, click the **Close** button to return to the main application screen.

Compare Mode

The Compare mode is useful for quickly determining the color difference between a standard and trial. A standard and trial can be measured or retrieved from a file. Up to 10 trial measurements can be taken for a standard.

Printed reports can be configured to include the Mean values if enabled in the Admin/Compare page.

Measurements taken on this screen do not affect the current setup, log file, or require the VeriColor Spectro instrument to be setup with a project.

The Compare dialog is accessed by clicking the **Compare** button at the bottom of the application.

Compare

Instrument: VS410 SN 42 Operator: Smith/QC Target Light

Illum./Obs.: D65/10° Lot ID: LOT 4711-007

Averaging Standard: 1 Serial ID: AE10001 2006

abs dif

	L*	a*	b*	C*	h*
Std					
high lim					
low lim					
Trial	dL*	da*	db*	dC*	dH*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Mean					

Comment:

Ready for measurement

Measure standard Measure trial

Print Save Standard from file Trial from file

Close Delete trial

1. Select the operator that will be running the compare from the **Operator** drop down list. The operator names listed are entered in Compare options page of the Admin dialog.
2. Enter required information in the two fields below the operator's name. In the dialog above, they are **Lot ID:** and **Serial ID:**. The text to the left of the two fields is specified in the Compare options page in the Admin dialog.
3. Enter additional information/comments in the **Comment** field.

Selecting a Standard from File

1. Click the **Standard from file** button to open a dialog where a stored standard can be selected as the target color.

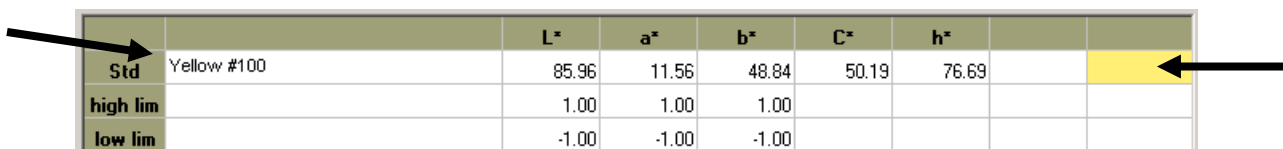
Standard from file

Palette: Palette #1 Project: Project #1 as standard: Yellow 100

- Click the left arrow button (<) located between the Palette and Project lists to active the Palette list.
- Select the palette from the **Palette** list where the standard is stored.
- Click the right arrow button (>) located between the Palette and Project lists to active the Project list.
- Select the project from the **Project** list that the standard is associated with.
- Select the standard from the **as standard** list.
- Click **Choose** to select the standard and close the Standard from file dialog. The standard name appears in the standard field.

Measuring a Standard

- Prepare the standard for measurement.
- If desired, set the **Averaging Standard** from 1 (no averaging) to a maximum of 20, using the up/down arrows. This determines the amount of measurements required to obtain an average.
- Perform targeting if required (refer to Targeting a Part earlier in this section) and click the **Measure standard** button. If a previous standard exists, you will be asked if you want to overwrite the current standard. Click **Yes** to continue. The standard is measure and the data and simulated color appear in the target area.
- Enter a name for the standard in the **Std** field.

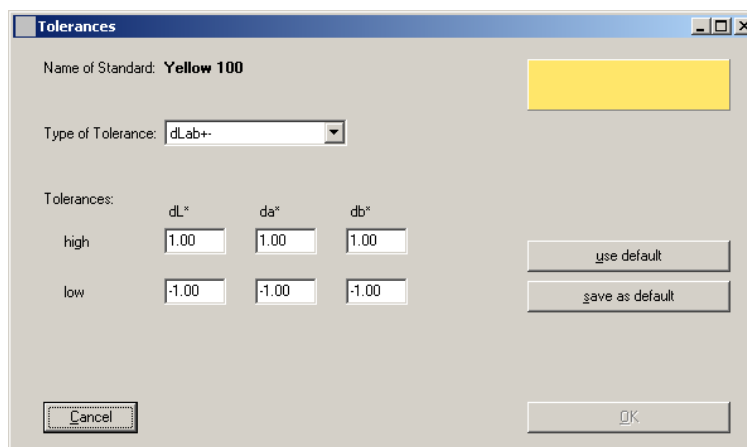


Std	L*	a*	b*	C*	h*	
Yellow #100	85.96	11.56	48.84	50.19	76.69	
high lim	1.00	1.00	1.00			
low lim	-1.00	-1.00	-1.00			

Setting Tolerances

The Tolerance button is used to open the Tolerance for the Compare dialog. Here the tolerance type and tolerance limits for the standard used in Compare mode are set or adjusted. Tolerances that were created for a standard opened from the file will be carried over. You can edit these tolerances without overwriting the stored tolerance values.

- Click in the **Tolerance** button to open a dialog where the tolerances are edited.



Tolerances

Name of Standard: **Yellow 100**

Type of Tolerance: dLab+

Tolerances:

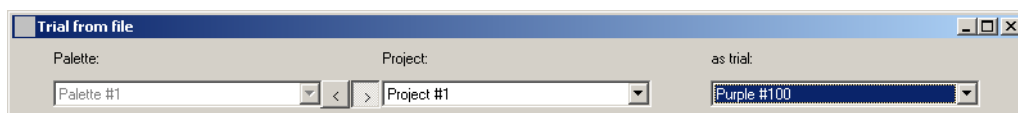
	dL*	da*	db*
high	1.00	1.00	1.00
low	-1.00	-1.00	-1.00

Buttons: use default, save as default, Cancel, OK

- Select the tolerance type and edit tolerance values in the fields and click **OK** when finished. Adjusted values now appear in the tolerance fields below the standard data.

Selecting a Trial from file

1. Click the **Trial from file** button to open a dialog where a stored standard can be selected as the trial color.



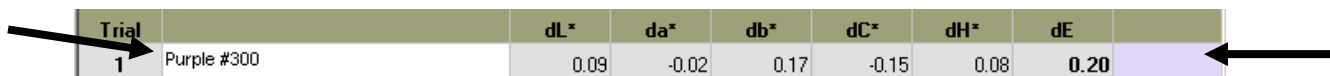
2. Click the left arrow button (<) located between the Palette and Project lists to active the Palette list.
3. Select the palette from the **Palette** list where the standard is stored.
4. Click the right arrow button (>) located between the Palette and Project lists to active the Project list.
5. Select the project from the **Project** list that the standard is associated with.
6. Select the standard from the **as trial** list.
7. Click **Choose** to select the standard as a trial and close the Trial from file dialog. The name appears in the first Trial field along with the data values and simulated color patch.

Trial		dL*	da*	db*	dC*	dH*	dE	
1	Purple #100	-0.08	0.01	-0.09	0.08	-0.04	0.12	

8. Select additional trials from file up to a total of 10. The bottom row of the data fields displays the mean values of all the selected trials.

Measuring a Trial

1. Prepare the trial for measurement and perform targeting if required (refer to Targeting a Part earlier in this section).
2. Click the **Measure trial** button. The trial is measured and the data and simulated color appear in the target area.
3. Enter a name for the trial in the **Trial** field.



Trial		dL*	da*	db*	dC*	dH*	dE	
1	Purple #300	0.09	-0.02	0.17	-0.15	0.08	0.20	

4. Click the **abs** or **dif** buttons to display trial data as either absolute data or difference data to the standard.
5. Measure additional trials up to a total of 10. The bottom row of the data fields displays the mean values of all the measured trials.

Deleting Trials

1. Click the **Delete trial** button to open the Delete trial dialog.



2. Click **Delete last**, **Delete all**, or delete a range of trials. To delete a range of trial, enter the range and click the **Delete range** button. For example, to delete trials 3 through 6, you would enter **3:6** in the field. You can also delete a group of selected trials by entering individual numbers in the field separated by commas (i.e., 1,3,8).
3. Click the **Close** button when you are finished.

Additional Compare Dialog Controls

- **Print** button prints the standards and trial data to the default printer. Refer to the next page for a sample print out.
- **Save** button is used to save the standard and sample measurement data in a .txt, .csv, or .mif file format.
- **Close** button closes the Compare dialog and returns you to the main application screen.

Sample Compare Report

Color Corp.
Paintstreet 1
4711 Pigmenthill

12/6/2006

Compare Report

Instrument: VS410 SN 10
Color space: CIE L*a*b*
Illum./Obs.: D65/10°
Lot ID: LOT 4711-007
Serial ID: AE10001 2006

Target	L*	a*	b*	C*	h*	
	95.32	-0.99	3.84	3.97	104.40	
High limit	1.00	1.00	1.00			
Low limit	-1.00	-1.00	-1.00			
Trial	dL*	da*	db*	dC*	dH*	dE
	0.00	0.01	-0.01	-0.01	0.00	0.01
	-0.01	0.04	-0.02	-0.03	-0.04	0.05
	0.00	0.02	0.02	0.01	-0.02	0.02
	-0.01	0.04	-0.02	-0.03	-0.03	0.05
	0.00	-0.01	0.01	0.01	0.00	0.01
	0.00	0.00	0.00	0.00	0.00	0.01
	0.00	0.01	-0.01	-0.01	-0.01	0.02

Comment:

Operator: Smith/QC

[° out of tolerance]

General Maintenance

Repair Information

The VeriColor Spectro is covered by a one-year limited warranty and should be referred to the factory or an authorized service center for repairs within the warranty period. Attempts to make repairs within this time frame may void the warranty.

X-Rite provides a factory repair service to their customers. Because of the complexity of the circuitry, all repairs should be referred to the factory or an authorized service center (call: 1-888-826-3042 or 1-616-803-2100).

X-Rite will repair any VeriColor Spectro past warranty. Shipping cost to the factory or authorized service center shall be paid by the customer.

Cleaning the Spectro Instrument Lenses

Normally, use low-pressure air to blow away any dust or debris on the lenses (or use a soft lens brush).

To remove dirt or finger prints, clean with a soft cotton cloth rubbing in a circular motion. Use of a coarse cloth or unnecessary rubbing may scratch the lens surface and eventually cause permanent damage.

For a more thorough cleaning, photographic lens tissue and photographic-type lens cleaning fluid or isopropyl alcohol may be used. Always apply the fluid to the cleaning cloth – never directly on the lens.

Cleaning the Calibration Tool

Caution should be used not to touch the white reference in the bottom of the calibration tool. ONLY use clean, dry low-pressure air to remove any contaminants from the white reference in the calibration tool.

Store the calibration tool in the bag provided when not in use.

Hardware Troubleshooting

This section deals primarily with troubleshooting problems with the PLC discrete inputs.

Problem	Topic	Explanation/Solution
VeriColor Spectro will not power up.	Improper power connection.	Terminal screws not tightened firmly on wires.
		Terminal not plugged in properly.
		Loose or broken power wires.
		Contamination has entered the terminal and is preventing a reliable connection.
	Over-current situation caused by a short or overload. Re-settable fuse opens.	Fix the short or overload problem, wait a little bit and re-apply power.
	Over-voltage situation (exceeds 30VDC). Re-settable fuse opens.	Voltage spec is 24V +/- 10%. Correct voltage supplied to VeriColor Spectro and then re-apply power.
	Power supply does not provide enough current at power-up.	Make sure power supply can provide at least 3 Amps at start up.
"Read" input does not work, system does not measure.	LED indicator light does not work (solid amber) with input.	Instrument may have just powered up and is still trying to initialize (flashing amber). Wait until the VeriColor Spectro indicates a solid "green" before attempting to measure.
Problems getting discrete inputs to work.	Most often the problem would be wiring/electrical problems.	Terminal screws not tightened firmly on wires, or loose or broken wires.
		Supplying too much voltage can cause damage to the circuitry. Instrument will need service.

Problem	Topic	Explanation/Solution
Problems with discrete Outputs.	Wiring/Electrical problems. See Cable Connection and Wiring section for electrical wiring diagram.	Terminal screws not tightened firmly on wires.
		Terminal not plugged in properly.
		Loose or broken power wires.
		Contamination has entered the terminal and is preventing a reliable connection.
Instrument will not communicate.	Check cables first. It might be a quick fix and are the cheapest parts to replace.	Go over the entire system looking for loose or obviously damaged cables.
		A cable that is shorted out can cease all communications.
		A cable that is loose might cause intermittent communications and constant resetting of the head. Ensure a proper connection.

Appendices

Specifications

NOTE: Performance specifications based on an operating temperature of 10° - 50°C (50° - 122°F)

General

Instrument Type:	Spectrophotometer
Geometry:	0°/30° or 30°/0° (results below based on 0°/30°)
Monochromator:	Dual beam, 31 channel
Light Source:.....	Full System LED
Measurement Size:.....	25.4 mm (1 in.) for 30°/0° geometry 25.4 mm x 29.21 mm (1 in. x 1.15 in.) for 0°/30° geometry
Measuring Distance:	101.6 mm (4 in.) nominal to measuring surface
Acceptability to Variation in Depth of Measuring Field:	±5.08 mm (±.20 in.) with 0.2 ΔE max
Operating Temp:.....	0° - 50°C (32° - 122°F) performance based on 10° - 50°C (50° - 122°F)
Operational Humidity:.....	0 - 85% relative, non-condensing
Storage Temp:	-20° - 70°C (-4° - 158°F)
Operating Voltage:	24VDC ±2VDC @ 2.45A Max.
Communication I/O:	RS-232, RS-485, PLC discreet
Functional Size	L: 22.86 cm (9 in.), W: 15.3 cm (6 in.), H: 7.62 cm (3 in.)
Weight	2.81 kg (6.2 lbs)
Mounting Requirements:	Manual Fixture
Enclosure:.....	Designed to meet NEMA 4 / IP56

Performance

Warm up Time:.....	2 - 3 min. typical at 23°C (73.4°F)
Measurement Time:.....	750 ms
Cycle Time:	(1 sec. time interval between measurements)
Ambient Light Rejection:	3000 Lux
Short Term Repeatability:	0.02 avg. ΔEab (20 measurements at 3 sec. intervals on a white ceramic tile)
Long Term Repeatability:	0.15 avg. ΔEab (over the calibration interval)
Inter-Instrument Agreement:	0.20 avg. ΔEab based on 12 BCRA Series II tiles
Calibration Interval:	Validation recommended - 30 days / 50,000 measurements (whichever comes first) More frequent verifications may be required if cleanliness of the system is not maintained.
Measurement Range:.....	0 to 150% Reflectance
Spectral Range:	400 nm to 700 nm
Spectral Interval:	10 nm measured, 10 nm output
Product Life:.....	5 years minimum
LED Life:.....	> 10 million measurements (20 million typical)
Operational Random Vibration:	IEC 60068-2-64 - 1 g rms 20-2000 Hz
Operational Shock.....	IEC 60068-2-27 - 30 g amplitude 11 ms duration any axis

Environmental

Usage: Indoor Only

Altitude: 2000 m

Pollution Degree: 2

Overvoltage: Category II

Safety Compliance

Underwriters Laboratories: UL 61010-1

Canadian Standards Assn.: CSA 22.2 No. 1010.1

International Electrotechnical

Committee: IEC (EN) 61010-1

Design and specifications subject to change without notice.

Accessories

The following accessory items can be purchased from X-Rite by calling 1-888-826-3042 or by visiting our website at: www.xrite.com.

5 Meter Female – Open Ended Cable (8 circuit)/DB9	P/N VCS50-EUR8-5DB
5 Meter Male – Open Ended Cable (8 circuit)	P/N SE108-EUR8-5M
1 Meter – Interconnect Cable (8 circuit)	P/N SE108-EUR8-1
3 Meter – Interconnect Cable (8 circuit)	P/N SE108-EUR8-3
10 Meter – Interconnect Cable (8 circuit)	P/N SE108-EUR8-10
1 Meter – Right-angle Interconnect Cable (8 circuit)	P/N SE108-EUR8-1RA
VeriColor Spectro Instrument	P/N VS410

Electrical Interface Details

Power/Comm/Control Cable					
Item	Pin	Name	Description	Active State	Comments
1	J1 -1	Power	+24 Vdc	-	2.45 Amp max. 1.40 Amp Typ.
2	J1 -2	Negative	Power Return	-	Negative side of 24Vdc power supply
3	J1 -3	Tx out	RS232 Transmit Out	-	RS232-TX
4	J1 -4	RV in	RS232 Receive In	-	RS232-RV
5	J1 -5	DSR	Discrete Select Request	High See Note 1	Input +24V max, +12V min. rating, 100mA max.
6	J1 -6	10's	Ten's Digit	High (50 msec. pulse)	DSR must be active to work Input +24V max, +12V min rating, 100mA max.
7	J1 -7	1's	One's Digit	High (50 msec. pulse)	DSR must be active to work Input +24V max, +12V min rating, 100mA max.
8	J1 -8	Read	Take a Measurement	High (50 msec. pulse)	DSR must be active to work Input +24V max, +12V min rating, 100mA max.
Cable Shield	-	Shield	-	-	Connect to the panel or fixture ground

Discrete Interface Cable						
Item	Pin	Name		Description	Active State	Comments
		Default	Option (see Note 2)			
1	J2 -1	Pass	Pass	Pass output	See Note 3	
2	J2 -2	Fail	Fail	Fail output	See Note 3	
3	J2 -3	Output Common	Output Common	Output Common (see Note 3)	See Note 3	
4	J2 -4	ACTION	CH-E 16	ACTION and/or Channel-E	See Note 3	
5	J2 -5	CH-D 8	RS485TX-A	Channel-D or RS485-TX-A	See Note 3	
6	J2 -6	CH-C 4	RS485RX-A	Channel-C or RS485-RX-A	See Note 3	
7	J2 -7	CH-B 2	RS485RX-B	Channel-B or RS485-RX-B	See Note 3	
8	J2 -8	CH-A 1	RS485TX-B	Channel-A or RS485-TX-B	See Note 3	
Cable Shield	-	Shield		-	-	Connect to the panel or fixture ground

NOTE 1

Due to the requirement that this input remains on (active) while the 1's and 10's input are toggled, the on time duration (or period) is dependent on the number of 1 and 10 activations that transpire.

NOTE 2

In the default project set-up these wires are all discrete lines. Pass, Fail and ComO are always the same, while CH-A through CH-D and Action can have an alternate configuration.

- a. Action is the default but can be configured as CH-E (channel-E).
- b. CH_A through CH-D are the defaults but can be configured into a 4-wire RS485 port. Once these lines are set as RS485, they cannot also be used as discrete outputs.

NOTE 3

These individual signal lines are part of the 'Discrete Interface' cable and all are low power outputs which use a common control line referenced ("ComO"; the green wire). This common line is either a supply or ground return connection for these outputs.

- a. Low power means these outputs can only handle up to +24Vdc at 80-milliamps max.
- b. All outputs default as normally open contacts, but can be configured as to normally closed contacts. Note they still all use a common control line.
- c. If the common control line is connected to ground, then all outputs are in low-side or return path configuration. This means when VeriColor Spectro activates the 'pass' output, it is providing a ground signal for an external light or relay coil to turn on.
- d. If the common is connected to power (voltage ranging from +9Vdc to +24Vdc), then all outputs are in high-side or supply path configuration. This means when VeriColor Spectro activates the 'pass' output it is providing a positive voltage signal for an external light or relay coil to turn on.

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