
Datacolor

Datacolor 550 User's Guide



Datacolor 550 User's Guide (Part No. 4230-0391M, April 2005)

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Datacolor 550

About the Datacolor 550

The Datacolor 550 is a member of the latest generation of bench top color measuring instruments manufactured by Datacolor, incorporating state-of-the-art CMOS integrated circuit technology in the instrument design. It is intended for use as a device for measuring, specifying and evaluating color in both laboratory and production settings.



Below is a summary of the standard and optional features included with the Datacolor 550.

Standard features include the following:

- Multiple aperture sizes to accommodate samples of different sizes
- Automated, adjustable ultra-violet filters for measuring fluorescent samples
- Transmittance Measurement
- Pulsed xenon light source
- Automated specular port
- Automated zoom lens

Electrical and Environmental Requirements

Power 85 to 264 VAC, 47 to 63 Hz, 80 VA peak, 35 VA typical

Absolute Operating Environment 5° to 40° C, 5-85% RH, non-condensing

Interfaces **Serial:** RS232
9600/115200 baud (shipped at 19200 baud)
USB: 1.1

Adjustable UV Filter Option

This option offers the ability to control the amount of UV light emitted from the light source. This is used for applications that need to identify the presence of optical brightening agents, or other types of fluorescent materials in the samples being evaluated.

The configuration of the adjustable UV filter option is handled through the software. See *the Datacolor Tools User Guide for detailed instructions to configure the option and calibrate the instrument.*

Transmission Option

The 550 can measure the “regular” transmittance of transparent solid and liquid samples.

Safety Warnings

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Caution: There are no user-serviceable parts for this equipment.

Light Source

Do not stare directly into the open port located in the front door panel when the measurement is in progress. **Staring directly into the light source can result in eye discomfort similar to that of staring at a camera flash.**

Power

CAUTION

Disconnect power before servicing.



NOTE

The power cord supplied with the unit *must* be used.

Feature Summary

The Datacolor 550 employs state-of-the-art features including the spectrometer, integrating sphere, light source, and optics. Below is a summary of those features:

FEATURE	DESCRIPTION	PURPOSE/BENEFIT
Integrating sphere	Barium coating sphere.	Industry standard.
Measurement Geometry	D/8° geometry, Specular Component Included (SCI) or excluded (SCE).	Provides for more uniform measurement of samples with irregular surfaces.
SP2000 Spectral Analyzer	Proprietary dual-channel holographic grating. 256-photodiode linear arrays used for both the reference and sample channels.	Dual channel design provides continuous monitoring of sample illumination and compensates for changes. 256-photodiode array enhances the precision of the measurement.
Light source	Pulsed xenon flash lamp	Filtered to provide D65 illumination including UV component.
Effective Bandwidth	10nm	Reporting interval.

Accessories

All models come with the following standard accessories:

- 3 Aperture Plates
- Black Trap
- White Tile
- Green Tile
- Six foot power cable
- Black Card
- Serial cable with connectors on either end
- USB Cable

Calibration Tiles

A black trap, white tile and green tile are provided with all Datacolor 550 instruments:



The black trap and white tile are used each time the instrument is calibrated. The green tile is used to perform an optional diagnostic test.

Aperture Plates

Three aperture plates are included as standard accessories with the Datacolor 550. The identification is engraved on each plate.



- Large Area View (LAV)
- Small Area View (SAV)
- Ultra-Small Area View (USAV)

Optional Aperture Plates

- Extra Ultra Small Area View (XUSAV)

Below are aperture plate specifications:

Aperture Identification	Sample Area Measured	Sample Area Illuminated
LAV	26mm	30mm
SAV	5mm	9mm
USAV	2.5mm	6.5mm
XUSAV	2.5mm	3.0mm



NOTE

The area illuminated is always 4mm greater than the diameter measured, to reduce translucency errors. The exception to this is the XUSAV plate.

Tips for Aperture Selection

- Always use the largest possible aperture size.
- The Large Area View (LAV) plate is recommended for averaging samples with irregular surfaces and textured samples.
- Small (SAV) and Ultra-Small Area View (USAV) plates should only be used for measurements of samples that do not completely cover the opening of the larger aperture plates.
- Large Area View (LAV) must be used for transmission measurements.

Cable Installation

You must install a power cable, and either a USB cable **or** a serial cable to connect the instrument to a computer.

⚠ WARNING

Read the "Electrical and Environmental Requirements" section **BEFORE** connecting your Datacolor 550 instrument.

The connections for these cables are found on the back of the instrument.

Power Cable

A six-foot power cable is provided with the instrument.



📄 NOTE

The power cord supplied with the unit ***must*** be used.

Power is supplied to the back of the unit via a 3-prong male connector.



Power cable

Plug the female end of the power cord into the power receptacle on the rear panel of the instrument. Insert the plug into a standard AC outlet.

Serial Cable Installation

The serial cable is shown below:



1. Connect the 9-pin male connector on the serial cable to the RS-232C female connector on the rear panel of the instrument.
2. Connect the female connector on the serial cable to a serial communications port on the back of the computer.



3. If there is more than one serial port on the computer, make a note of the port being used. You may need to enter this information into the program.
4. Tighten each connection securely to ensure proper signal.

See the Appendix for a description of the RS-232C connector pin assignments.

USB Cable Installation

The 550 can be connected to a USB port on a desktop system. *See Appendix, System Requirements for USB Cable Installation before you attempt to connect to a USB port.*

Before You Begin

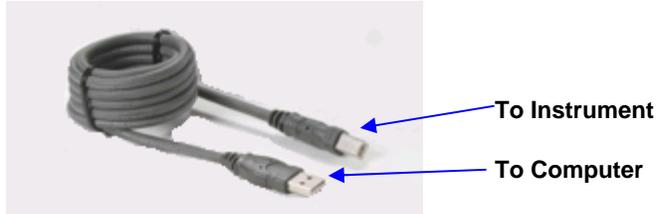
- Close all programs currently running on the system.
- You will need the accessories listed below to complete the installation:
 - USB cable (provided by Datacolor)
 - Datacolor CD ROM disk labeled, “*USB Drivers and Documentation*” (Datacolor part number 2052-0330).
 - Calibration diskette included with the instrument (this is required only when installing new instruments)

Three steps must be completed to enable the USB port for use with the instrument:

- Install the USB Driver.
- Identify the system assignment for the USB port. This is accessed through the **Control Panel** included with the Windows operating system.
- Change the com port assignment in the Datacolor applications software.

Cable Installation

The USB cable provided with the system is shown below:



One end of the cable connects to a USB port on the instrument. The other connects to a USB port on the computer.

- Connect the USB cable to the instrument and to the USB port on the back of the computer.

Driver Installation

To prepare your computer and the Datacolor programs to communicate with your instrument using a USB port, you must install software files onto the computer. This is done by following a Wizard that will appear on your computer screen when you connect the USB cable to the instrument, and to the USB port on the back of the computer.

1. Place the **USB Drivers and Documentation CD** into the CD-Rom drive.
2. Connect the USB cable to both the instrument and the computer. The window below will automatically appear:



The **New Hardware Wizard** window will follow immediately:



3. Click on the **Next** button at the bottom of the window. The wizard will step you through the installation of the USB software files. For most installations, you can accept the defaults selected by the Wizard.
4. Continue to click the **Finish** button at the bottom of each window in the Wizard. The program will notify you that the procedure is completed.



5. Click **Finish**. **Do not remove the USB Driver CD from the system.** The “Found New Hardware Wizard” will automatically appear again, and the process must be repeated a second time to complete the software installation.

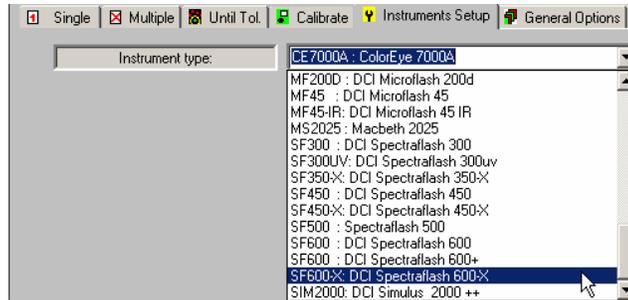
 **NOTE**

During the file installation, the USB port is given a com port assignment. You will need to know the port assignment to configure the Datacolor applications software to recognize the USB port. The port assignment can be viewed and changed using the Systems option included on the Control Panel.

Changing the Instrument Port Setting in Datacolor Programs

To enable the USB port for color measurements, you must change the com port assignment in the applications program. While this procedure varies depending on the particular program, it is typically accessed through an **Instruments Menu**, or **Instrument Setup** icon. Below is an example of the screens that appear in most of the Datacolor programs. If they do not match your program, refer to the program documentation for the individual application program you are running for configuration instructions.

Instrument Type



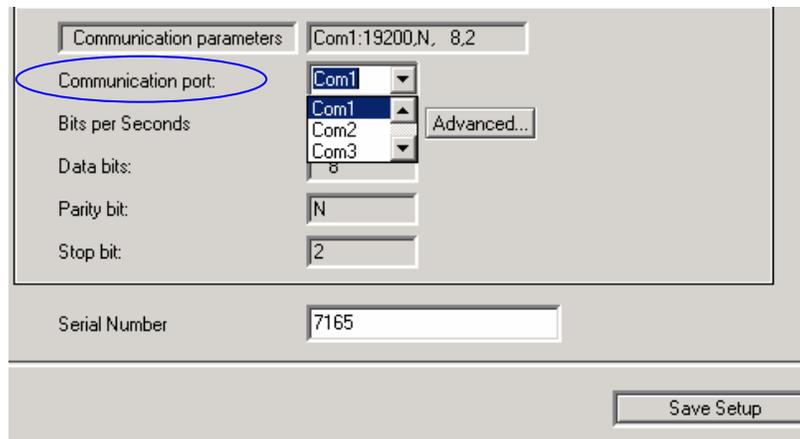
- If you are installing a new instrument, you need to select the correct instrument type. Click on the down arrow, and scroll through the instrument listing to find the instrument you are using.
- If you are connecting an existing instrument to a USB port, this selection does **not** need to be changed.

Com Port Setting

To complete the USB configuration for the instrument, you must assign the correct communications port (com port) setting to the instrument. While this procedure varies depending on the particular Datacolor applications program, it is typically accessed through an **Instruments Menu**, or **Instrument Setup** icon.

NOTE

Below is an example of an *Instrument Setup* screen you may see in the Datacolor program you are running. However, you should also refer to the program documentation specific to the Datacolor program you are running for instructions regarding this port assignment.

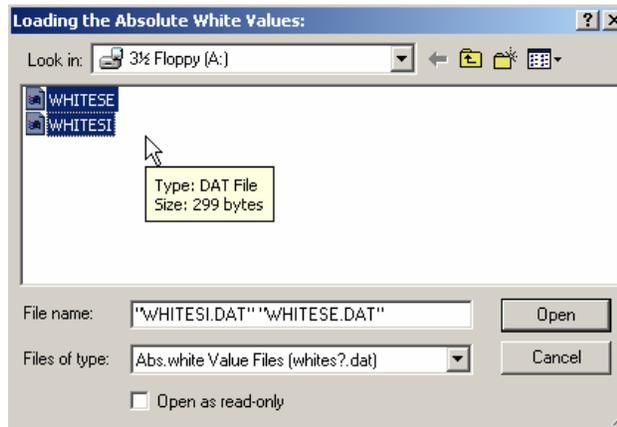


1. In the **Communication port** field, select the COM port assigned to the USB port. (This port assignment must match the assignment in the Windows Control Panel.)
2. Click on the down arrow, and highlight the COM port that has been assigned to the USB port.
3. When the changes are completed, click **Save Setup**.

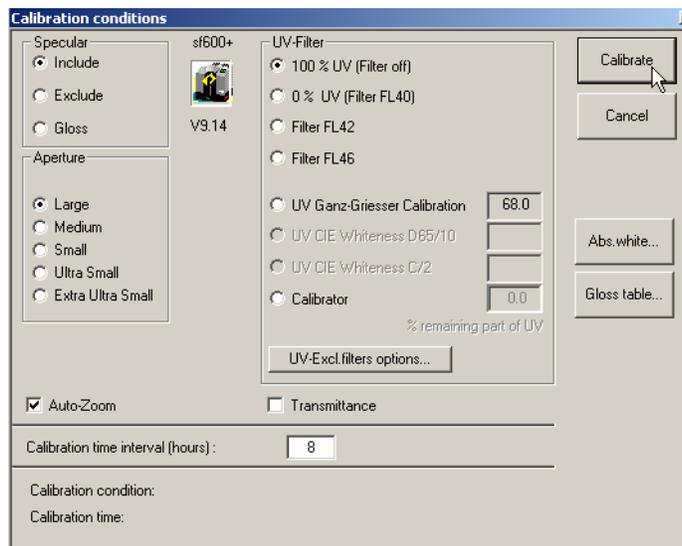
Installing Calibration Data

If this is a new instrument, you will need to load the calibration data.

1. When you complete the instrument configuration and select **Save Setup**, the program prompts you to place the diskette containing the calibration data into the diskette drive. When you do this, a screen similar to the one below will appear:



2. You must load **both** files. Highlight both file names, and click **Open**. The files will be transferred to the desktop system. When the transfer is completed, the calibration screen will appear.



3. Click **Calibrate** to start the instrument calibration or **Cancel** to close the window.

See the program documentation for instructions to calibrate the instrument.

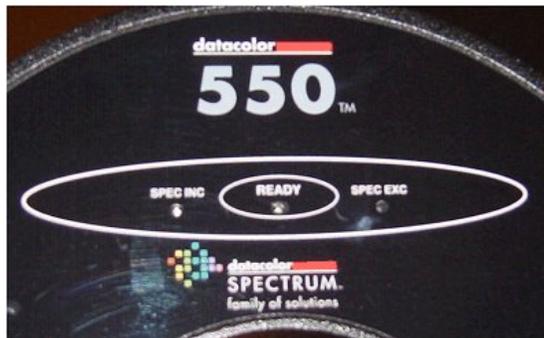
Controls and Indicators

Controls and Indicators Panel

A status panel is located on the top of the instrument. It identifies the current instrument settings being used.



Below is the status panel for the Datacolor 550:



Ready. Instrument is ready for use.

Spec Exc. The specular port is open and all measurements exclude the specular reflection from the sample.

Spec Inc. The specular port is closed, and all measurements include the specular reflection from the sample.

Powering Up

Use this simple procedure to start using your Datacolor 550.

1. Verify all cable connections. The AC power cord should be plugged into an outlet. The communications cable (serial or USB) should be attached to the instrument and host computer.
2. Turn on the host computer.
3. Turn on the instrument power switch. This is located on the lower right side of your instrument toward the front.



- When power is applied, all mechanisms are automatically reset.
- The red lights on the status panel will flash briefly.



NOTE

If the instrument power is not turned on before a Datacolor program is launched, you may receive an error message.

When the **Ready** light remains on, your instrument is ready to use.

4. Launch a Datacolor program.
5. Prepare to calibrate the instrument. You will need the black trap, the white calibration tile and the green diagnostic tile.



NOTE

We recommend that you calibrate the instrument every 8 hours. *Please refer to your software documentation for specific calibration instructions.*

Instrument Calibration

Reflectance Calibration

The instrument should be calibrated every 8 hours to compensate for changes in the environment. A black trap, white tile and green tile are provided with all Datacolor instruments to complete the calibration:



The black trap and white tile are used each time the instrument is calibrated. The green tile is used to perform an optional diagnostic test. If you are using an instrument with an adjustable UV filter, a fluorescent calibration standard will also be included.

The software prompts for calibration vary from one program to another. All of the procedures include a measurement of:

- The black trap
- The white tile

The Datacolor Tools User Guide provides step-by-step instructions regarding the software setup and instrument calibration procedure for reflectance measurements.



NOTES

The Datacolor Tools User Guide contains step-by-step instructions for calibrating the adjustable UV filter.

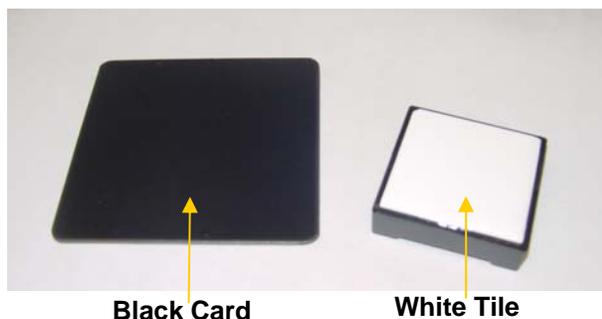
Transmittance Calibration

The Datacolor 550 includes an option to measure the *regular* transmittance of samples. When working with samples that are completely transparent (such as dyes in solution or transparent plastics) you are measuring *regular* transmittance. The transmission compartment of the Datacolor 550 is large enough so that the colorist can easily insert and remove samples.

Transmission Accessories

The following accessories are used for transmission measurements:

- **Black Calibration Card.** Included with the standard instrument accessories. It is used to perform the zero (black) calibration when calibrating the instrument for transmission.
- **White Tile.** Placed at the sample port for calibration and measurement.



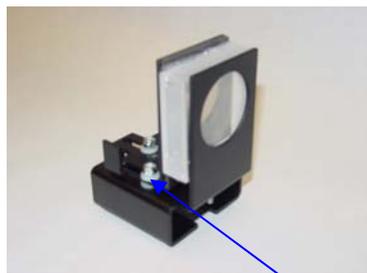
- **Transmission Sample Holder.** This is an optional accessory that can be ordered from Datacolor. It is designed for measuring the transmittance of either solid or liquid samples.



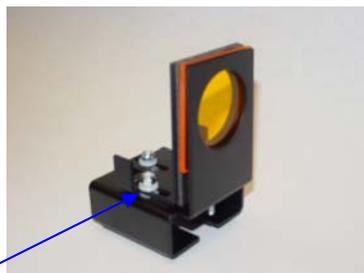
NOTE

The transmission sample holder is designed to hold a cuvette 50mm X 10mm (Datacolor Part No. 2950-0004).

**Sample Holder
with liquid cuvette**



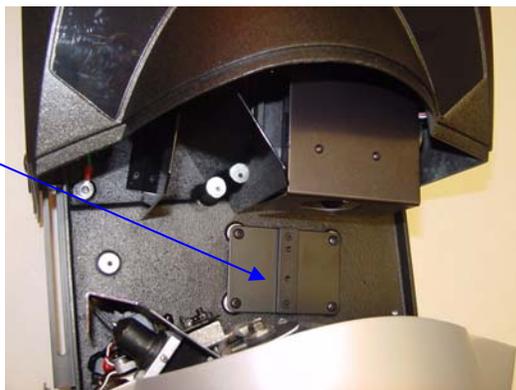
**Sample Holder
with molded plastic sample**



- Thumb screws provide the ability to adapt the holder to samples of varying thickness.

- The sample holder is mounted onto the transmission sample holder base

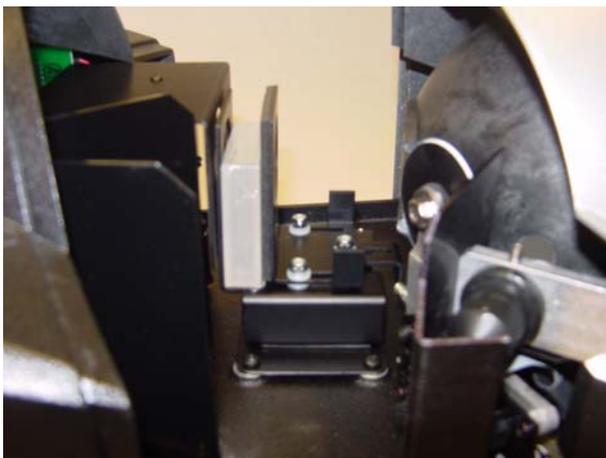
**Transmission
Sample
Holder
Base**



It is held in place by a magnet in the base of the holder.

⚠ WARNING

Keep the transmission sample holder away from any magnetic media. The magnet in the base of the holder can corrupt data stored on diskettes and other types of magnetic media.



Calibration Procedure

Before you begin, you should verify the current aperture selection. The setting should be Large Area View (LAV) and the LAV plate should be placed at the instrument port.



NOTE

All transmission calibration and measurements can only be made using the Large Area View aperture selection.

The instrument can be calibrated with the transmission sample holder in the chamber. To calibrate the instrument for transmittance measurements, do the following:

1. Open the transmission compartment and make sure the optical path between the sphere and the lens is clear.
2. Access the calibration procedure in the program you are running.
3. When you are prompted by the program, block the lens using the black card:



4. When the measurement is completed, remove the black card from the transmission compartment.
5. Place the white tile at the sample port, and make the next calibration measurement.



NOTES

The white tile remains at the port for all subsequent measurements.

Make sure the sphere opening/lens opening is completely covered by the sample you are going to measure.

Sample Presentation and Measurement

Sample Presentation and Measurement Overview

You must pay close attention to the positioning of the sample to insure an accurate measurement. When positioned correctly, the sample rests between the sample holder and the front panel door. The sample must completely cover the aperture opening.

Reflectance Measurements

1. Grasp the sample holder and pull forward.
2. Position the sample, then carefully bring arm back up to normal operating position.



⚠ WARNING

Do not allow sample arm to spring back.

Sample Viewing Port

When measuring the reflectance of small samples, you may need to check that the sample is properly positioned at the port. To verify that the correct area of the sample is being measured:

1. Grasp the black tab above the aperture plate.



2. Pull top of door down to its full horizontal position.



3. The backside of this door reveals the area of the sample covering the port opening. If necessary, adjust the placement of the sample to target the portion of the sample to be measured.



4. Push the door back to its normal position.

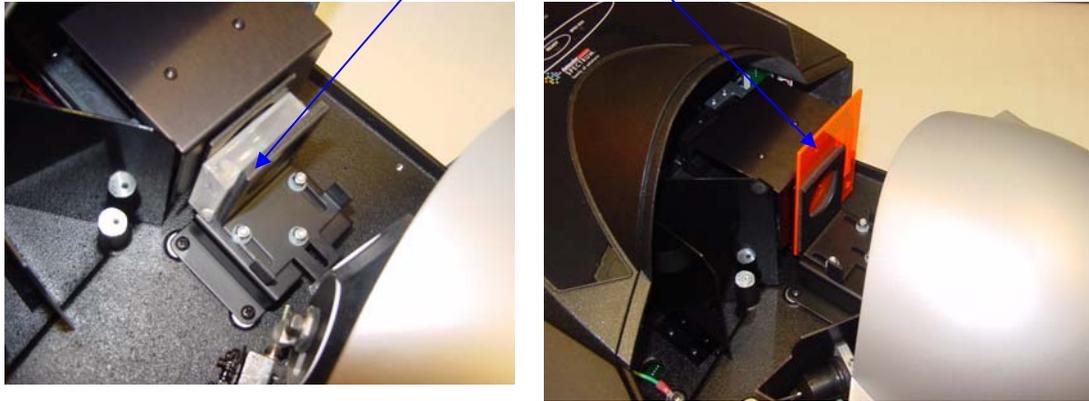
Transmittance Measurements

When working with samples that are completely transparent (such as dyes in solution or transparent plastics) you are measuring “regular” transmittance. These samples need to be positioned close to the lens opening at the back of the transmission compartment:

To measure the regular transmittance of a transparent sample, do the following:

1. Verify that the instrument setup selected in the program is transmission.
2. Calibrate the instrument for transmission. When the calibration is completed, leave the white tile at the port.
3. Open the chamber and position the sample as close to the lens as possible:

Lens Opening



Regular transmittance measurements are made with the white plaque at the port.



4. Start the measurement. When completed, remove the sample from the chamber.

NOTES

Maintenance

About Instrument Maintenance

The sections that follow provide detailed instructions for maintaining the instrument and calibration tiles. These instructions and tips will help to insure that the instrument continues to perform properly over its life.

Sphere Cleaning

The sphere should be examined visually for the presence of dust, sample particles, fibers, and excessive yellowing due to environmental influences. *This inspection should be performed frequently, especially if you measure loose materials.*

If you discover loose materials in the sphere, they should be removed. An optional accessory, the Minivac portable cleaning system is a useful tool for cleaning the sphere.



Operating the Minivac Portable Cleaning System

1. Configure the instrument so that the specular port is closed (**Specular Component Included**).
2. Remove the aperture plate from the front of the unit.



3. Look inside the sphere.

- Using the Minivac portable cleaning system, carefully vacuum away any loose materials in the sphere.



⚠ WARNING

Do not touch the inside of the sphere. The coating is very fragile.

- When finished, replace the aperture plate.

Tile Handling and Cleaning

Handling Tiles

- Handle calibration tiles with **extreme care**. Do not drop them, or scratch the glazed surface.
- Always grasp the tile using its edges.

Cleaning Tiles

- The calibration tiles should be cleaned before each use. Wiping clean with a soft, lint-free cloth can do this.



- A detergent, free of optical brighteners, fluorescent materials or photoactive dyes should be used as needed to clear any oils, fingerprints, or other deposits. Liquid dish detergent is a suitable detergent. The detergent/water solution should be prepared as follows: **1 part detergent : 250 parts water**. Use a few drops of the detergent solution to moisten a soft, lint-free cloth, and gently wipe the tile surface. Rinse the detergent from the tile by wiping it with a cloth, moistened with clean water.
- NEVER** use abrasive cleansers, razor blades, or other metal objects to remove dirt or foreign substances from the calibration tiles. This will damage the tile surface.
- NEVER** immerse the tiles in water.
- Tiles that have scratches, chips, abrasions or cracks must be replaced. Signs of wear on the tile surface will affect the accuracy of the calibration.

Storage

- Large temperature variations will affect the accuracy of your calibration, requiring more frequent calibration. The calibration tiles should be stored in an environment that simulates the temperature of the samples to be measured.
- Prolonged exposure to sunlight or other sources of ultra-violet radiation will cause the color of the tiles to change. The tiles should always be stored in a protective case or container away from direct sunlight and environmental contaminants.

Cleaning the Black Trap

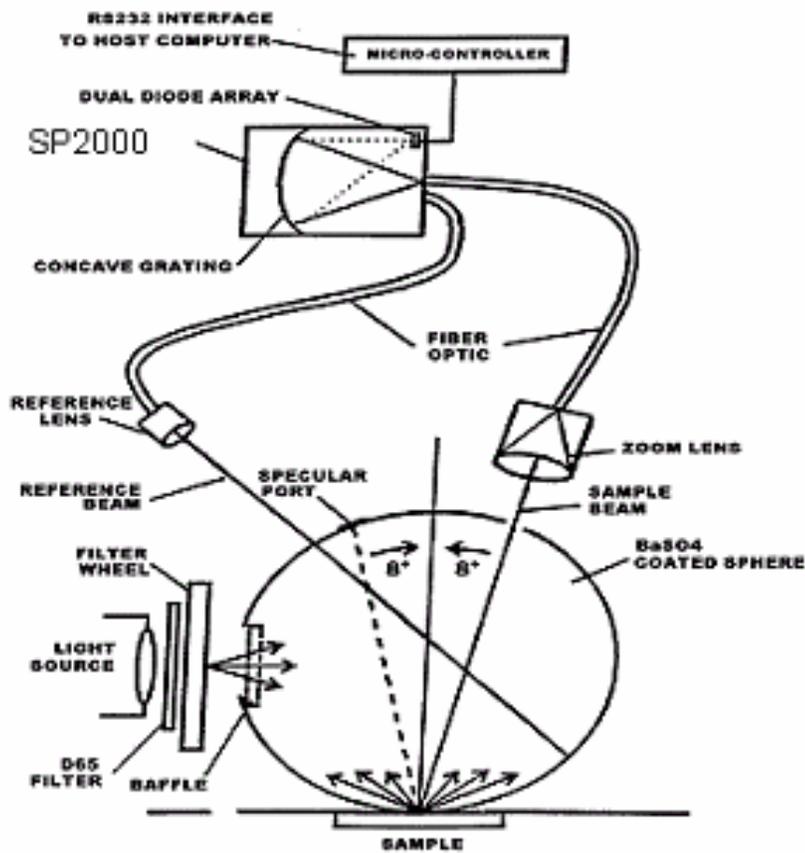
The black trap should be kept dust-free. Dust accumulating in the black trap should be blown out with compressed air.



NOTES

Appendix

Datacolor 550 Optical Block Diagram



Instrument Specifications

Specifications are subject to change without notice.

ITEM	DESCRIPTION	
Instrument Type	Dual beam integrating sphere with xenon flash lamp.	
Measuring Geometry	Diffuse illumination, 8° viewing in conformance with CIE publication No. 15.2 Colorimetry.	
Illumination Source	Pulsed xenon, filtered to approximate D65.	
Spectral Analyzer	Proprietary SP 2000 analyzer with dual 256-diode array and high-resolution holographic grating.	
Wavelength Range	360 – 700nm	
Effective Bandwidth	10nm	
Photometric Range	0 to 200%	
Aperture Configuration	Large Area View. 30mm illuminated/ 26mm viewed Small Area View. 9mm illuminated/ 5mm viewed Ultra-Small Area View. 6.5mm illuminated/ 2.5mm viewed X-Ultra Small Area View*. 3mm illuminated/ 2.5mm viewed	
Power Requirements	85 to 264 VAC, 47 to 63 Hz, 80 VA peak, 35 VA typical	
Absolute Operating Environment	5° to 40° C, 5-85% RH, non-condensing	
Interface	Serial: RS232, 9600/115200 baud (shipped as 19200) USB: 1.1	
Dimensions**	English	Metric
Height	12.8"	32.5cm
Width	12.3"	31.2cm
Depth	18.6"	47.1cm
Weight	31 lbs.	14.06 kg

* Sample translucency may affect inter-lens agreement

Optional Accessories

Below is a list of the optional accessories:

Name	Datacolor Part #	Description
Minivac Portable Cleaning System	5400-0036	Used to clean dirt and dust from the integrating sphere of the instrument.
Compression Sample Holder	1035-0191	Sample presentation device used to measure loose powder, granulated materials, etc.
Textile Skein Holder	1035-0004	Used to achieve consistent measurements of yarn skeins.
Textile Sample Holder-LAV	1035-0188	Used to achieve consistent measurement of textile samples
Textile Sample Holder-SAV	1035-0189	Used to achieve consistent measurement of textile samples.
Textile Sample Holder --USAV	1035-0190	Used to achieve consistent measurement of textile samples.
Carpet Tube Holder—LAV	1035-0185	Used to achieve consistent measurement of carpet samples.
Transmission Cell Holder	1035-0183	Used to measure the transmission of transparent samples, both liquids and solids.
Transmission Cell (10mm)	2950-0004	Cell used with transmission sample holder to measure liquid samples.
Transmission Flow Cell Package	1035-0184	Device used to measure the transmission of liquid materials in-process.

Miscellaneous Technical Information

System Requirements for USB Connection

Below are the software and firmware versions required to successfully connect a Datacolor instrument to a USB port.

Operating Systems	Windows 2000, Windows XP Pro
USB Firmware	1.0, 2.0
Datacolor Applications Programs	All support USB. However, if you have purchased a Datacolor 550 to replace an instrument on an existing system, you may need to update the instrument driver. Contact Datacolor to obtain this software update.

RS-232C Connector Pin Assignments

<u>Pin #</u>	<u>Purpose</u>	<u>Direction</u>
2	Transmit data	Out (to host)
3	Receive data	In (from host)
7	Signal ground	

CAUTION

- (1) *DO NOT WIRE* to pins other than 2, 3, and 7.
 - (2) For all unused inputs, the default is active high.
-
-

Compliance Statements

FCC Compliance Statement

 **WARNING**

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 this User's 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/her own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Compliance Statement

English

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Francais

El present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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