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**Datacolor**

# Datacolor 110™

## User's Guide



**Datacolor 110 User's Guide** (July, 2005) Part No. 4230-0394M Rev 1

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# Datacolor 110™

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## About the Datacolor 110™



The Datacolor 110™ is a member of the newest generation of Datacolor bench top color measuring instruments, 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 retail settings.

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## Electrical/Environmental Requirements

<b>Power</b>	100 – 240 VAC 47 to 63 Hz 60 VA
<b>Absolute Operating Environment</b>	5° to 40° C 20-85% RH, non-condensing

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## 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.

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

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## Feature Summary

The Datacolor 110™ 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
<b>Integrating sphere</b>	Barium coated sphere	Industry standard
<b>Measurement Geometry</b>	D/8° geometry, specular component included (SCI) or excluded (SCE).	Provides for more uniform measurement of samples with irregular surfaces.  Includes an option for the calculation of gloss.
<b>SP2000 Spectral Analyzer</b>	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.
<b>Light source</b>	Pulsed xenon flash lamp	Filtered to provide D65 illumination including UV component.
<b>Wavelength Resolution</b>	10nm	Reflectance data is measured at 10nm intervals from 400 – 700nm.
<b>Effective Bandwidth</b>	10nm	Greater precision enhances the measurement accuracy.

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## Accessories

All models come with the following standard accessories:

- Six foot power cable
- Serial cable with connectors on either end
- USB cable
- Black Trap
- White Tile
- Green Tile

In addition, an optional accessory drawer is available with the unit.

## **Calibration Tiles**

A black trap, white tile and green tile are provided with the Datacolor 110.

- 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**

The Datacolor 110 is a single aperture instrument. However, a variety of aperture sizes are available to accommodate different applications. Consult with a Datacolor representative to determine the correct aperture size for your application.

*Refer to Appendix, Instrument Specifications for the aperture sizes available with a Datacolor 110™.*

*NOTES*

# Cable Installation

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## Cables



### WARNING

BE SURE TO TURN OFF THE POWER BEFORE WORKING WITH ANY CABLES.

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The Datacolor 110™ requires the use of two cables, a power cable and either a serial cable or a USB cable, to connect the instrument to the computer.



### WARNING

Refer to "Electrical/Environmental Requirements section **before** connecting your instrument.

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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.



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



### **WARNING**

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

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## Communications Cable

The instrument is connected to a computer through either a serial port or USB port:

**Serial Cable Connections**



**USB Cable Connections**



1. 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.
2. Connect the male connector on the instrument cable to the appropriate female connector on the rear panel of the instrument.
3. Connect the female connector on the instrument cable to a communications port on the back of the computer.



4. Tighten each connection securely to ensure proper signal.



### **NOTE**

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

If you are using a **USB port**, there is additional software that must be installed. See *USB Driver Installation* in this guide for detailed instructions regarding the software installation.

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## USB Driver Installation

### *Installing the Driver*

To connect to a USB port, additional software must be installed.

1. Install the CD labeled **USB Drivers and Documentation** into the CD ROM drive.
2. Connect the USB cable to the instrument, and to the USB port on the computer. When this connection is made, the system detects a new piece of hardware, and the screen below automatically displays:



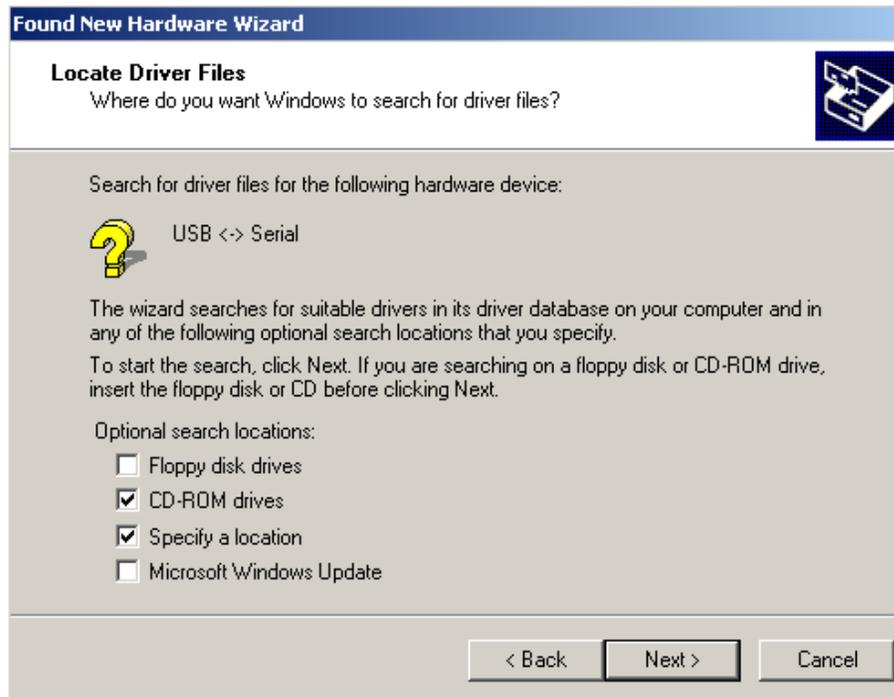
The New Hardware Wizard automatically replaces this screen.



3. Click **Next** to continue with the USB driver installation.



4. Accept the default selection and click **Next**.



A check displays in the box for a selection. There should be a check in both the *CD-ROM drives* box and the *Specify a location* box.

- To add a check, place the cursor in a blank box and click the mouse. A check will appear.
- To remove a check, place the cursor over a check, and click the mouse. The check will disappear.

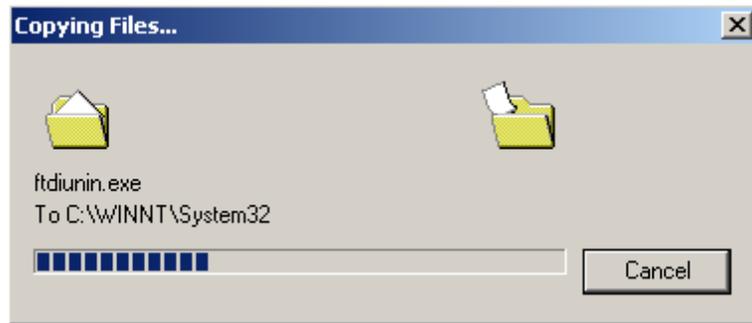
- When you have completed your selections, click **Next**.



5. A default location displays in the *Copy manufacturer's files from* field.
  - If the driver software is in a different location click **Browse**, and identify the correct location.
  - If the correct location is identified, click **OK**. The program will search for the driver file. When the correct file is found, the window below displays:



6. Click **Next**. The Wizard will begin copying the files to the computer.



When the copy is complete, the window below displays:



7. Click **Finish**.

---

**⚠ CAUTION**

***Do not remove the USB Driver CD from the drive.*** The Wizard will close and then immediately reopen. You will have to repeat the procedure a second time to successfully copy the file.

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8. When you once again see the "Welcome" screen, click the **Next** button.
9. Repeat the steps above a second time.
10. When you reach the final wizard screen, click **Finish**. At this time, the Wizard closes and the installation is complete.

## Viewing/Changing System Port Assignment

As part of this installation process, a port number is assigned to the USB port. The default selection is the next available com port. Depending on the application you are running, you may need to know this port assignment to configure the Datacolor applications program(s) to recognize the USB port.



### NOTES

Some Datacolor programs automatically configure the USB port assignment. Others require that you manually assign the port number. Refer to the program User's Guide for information to assign/edit the instrument port number.

If the computer has more than one USB port, the program will default to the first one available. If you want to connect the instrument to a different USB port, you must assign the port manually in the applications software.

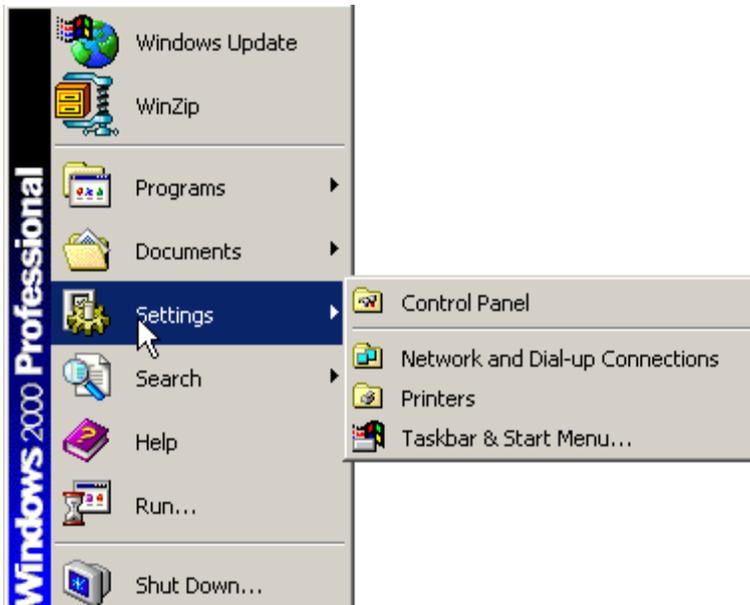
---

The com port assignment is accessed through the Windows Control Panel as follows:

1. Click the **Start** button at the bottom left of the screen.

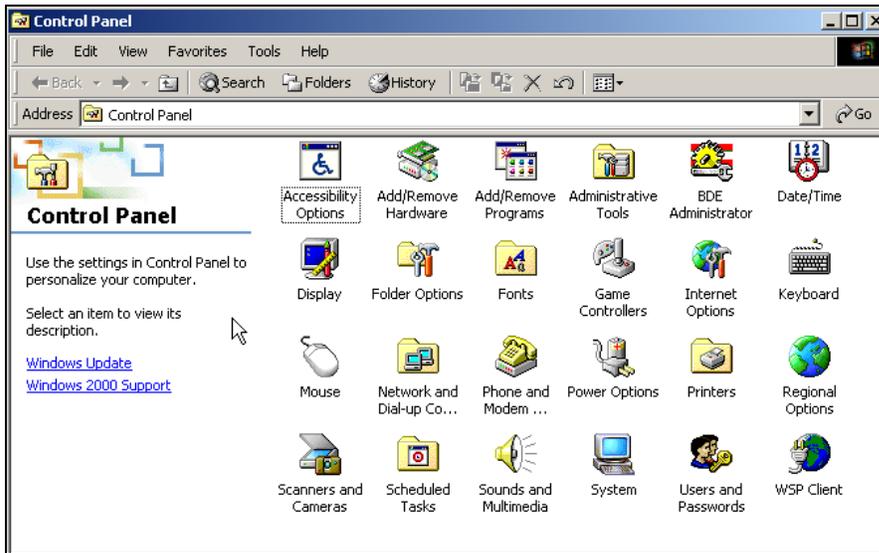


The Start menu displays.

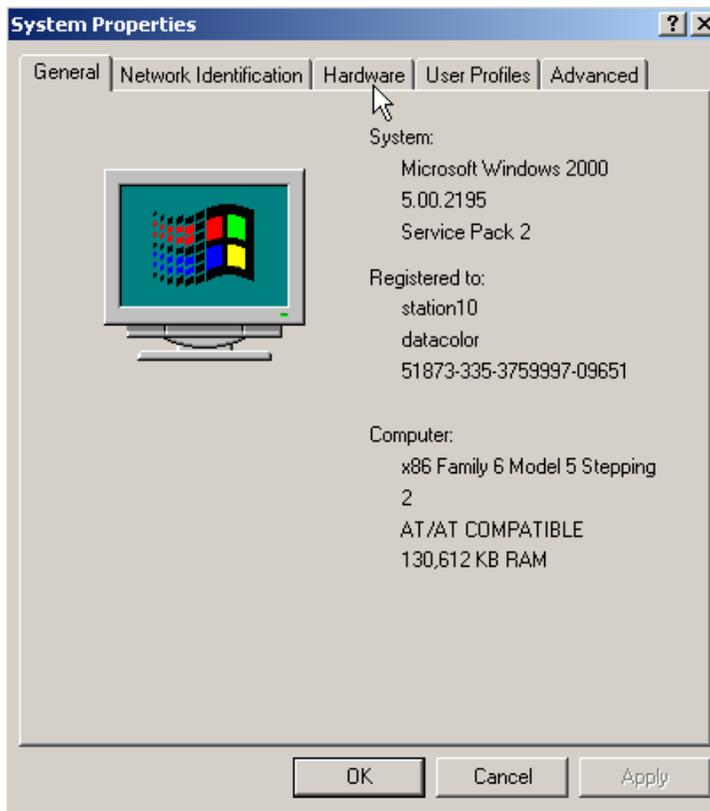


2. Place the cursor on *Settings* so that the program submenu displays, and click **Control Panel**.

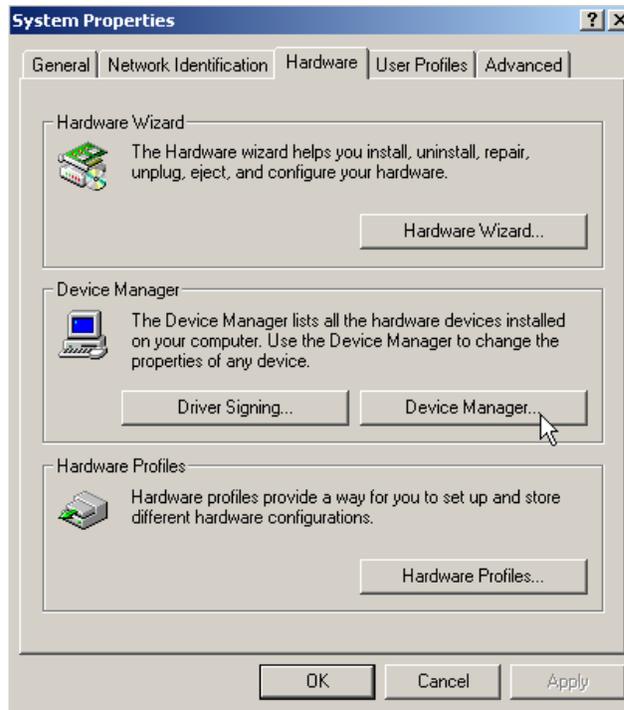
3. When the Control Panel window displays, double-click on **System**.



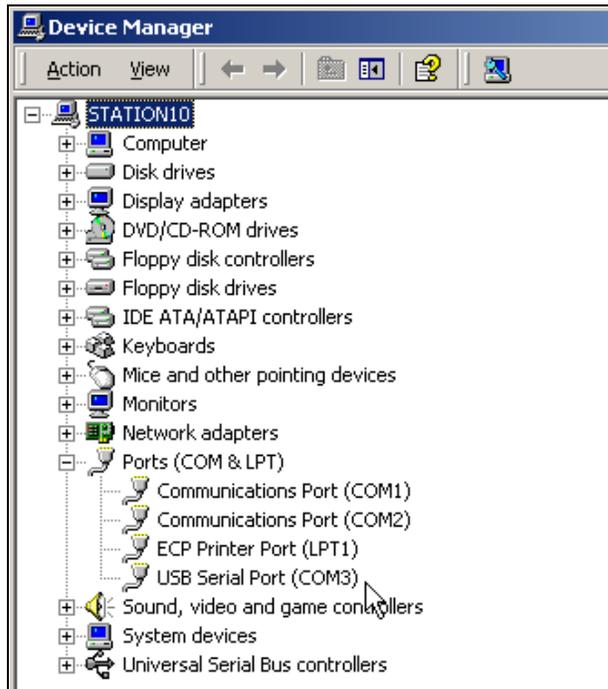
The Systems Properties dialog box displays.



4. Click the **Hardware Tab**.

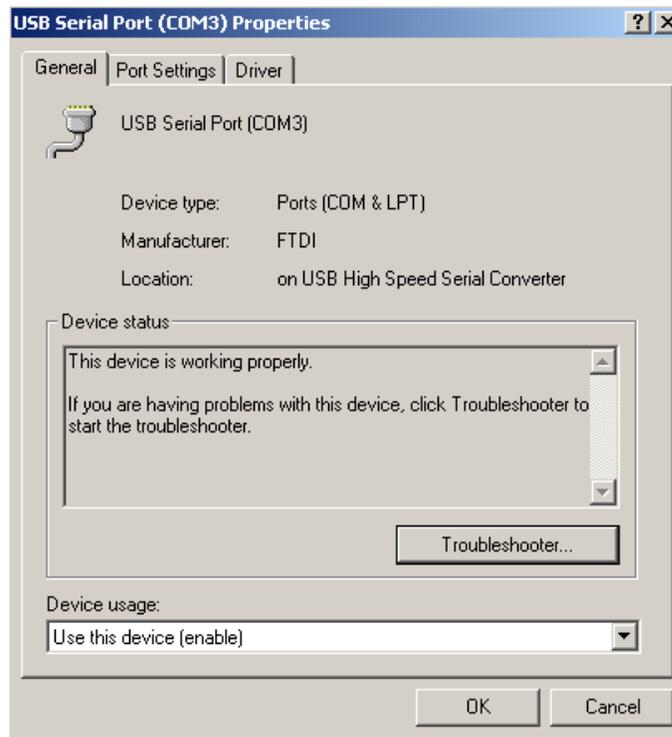


5. Click the **Device Manager** button. The Device Manager window displays.

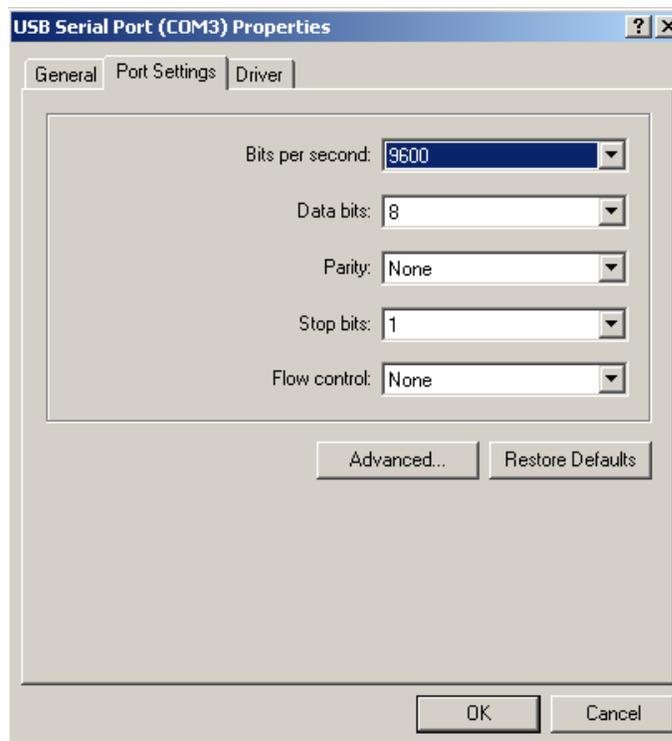


6. Go to the **Ports** heading. Click on the plus (+) to display the port selections.

7. Click **USB Serial Port**. The USB Serial Port (COM3) Properties dialog box displays.

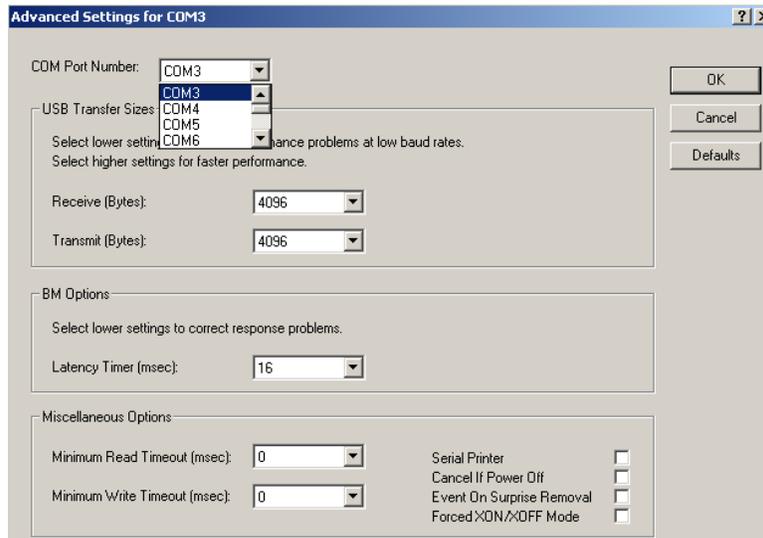


8. Click **Port Settings**. The dialog box below displays:



9. Click the **Advanced** button.

10. The Advanced Settings for COM3 dialog box displays.



The field labeled *COM Port Number* displays the current assignment for the USB port. To change the port setting, click the drop-down list arrow. The list of COM ports is displayed.

11. Click on the port assignment to be used for the USB port.
12. When you have completed the changes, click **OK**.

### ***Changing the COM Port Assignment in Datacolor Programs***

To enable the USB port for color measurements, you may need to change the com port assignment in the applications program. *Refer to the program documentation for the specific Datacolor applications program you are running for instructions to configure the instrument.*

### ***Instrument Calibration Data***

For new instruments, you will need to install the white tile calibration data. *See also **Instrument Calibration** in this guide for instructions to install the data.*

*NOTES*

# Controls and Indicators

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## Status Panel

The status panel indicates the current instrument settings being used. The indicators on the status panel vary, depending on the instrument you are operating. Below is the status panel for the Datacolor 110:



OPTION	DESCRIPTION
<b>Spec Inc.</b>	The specular port is closed, and all measurements include the specular component. If the <i>Ready</i> indicator is lighted, but the <i>Spec Inc.</i> indicator is not, the specular port is open, and you are making a “specular excluded” measurement.
<b>Ready</b>	Instrument is ready for use.

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## Powering Up

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 **WARNING**

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

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Use this simple procedure to start using your Datacolor 110™.

1. Verify all cable connections. The AC power cord should be plugged into an outlet. The instrument cable should be attached to the instrument and host computer.



2. Turn on the host computer.
3. Turn on the power switch. It is the red switch on the back of the instrument.
  - When power is applied, all mechanisms are automatically reset.
  - The red lights on the status panel will flash. They should stop flashing within 30 seconds.

---

 **NOTE**

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

---

4. When the *Ready* light remains on, your instrument is ready to use.
5. Launch a Datacolor program.

# Instrument Calibration

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## Overview

The instrument must be calibrated regularly to ensure that the measurements are accurate. This section provides instructions for installing the calibration data and performing the calibration.

### *Installing Calibration Data*

You will need to install the calibration data if this is a new system, or if you have received a new white tile. The calibration data can be found on a diskette and a CD, both of which are included with the calibration tiles.



#### **NOTE**

The data is provided on both diskette and CD to accommodate all system types. You will only load it from one of the media.

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### *Installing Data for Paintmaker Program*



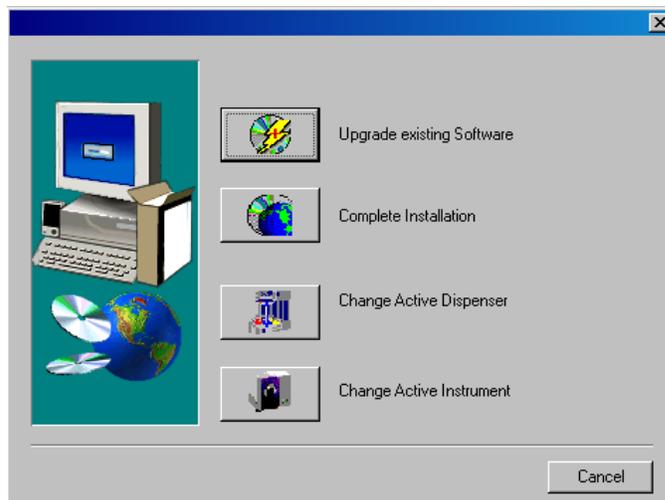
#### **NOTE**

White Tile Data Updates: Start from #1 below.  
First time Installation: Go to step #3 below.

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1. Insert the Paintmaker CD into the drive. The window below appears:



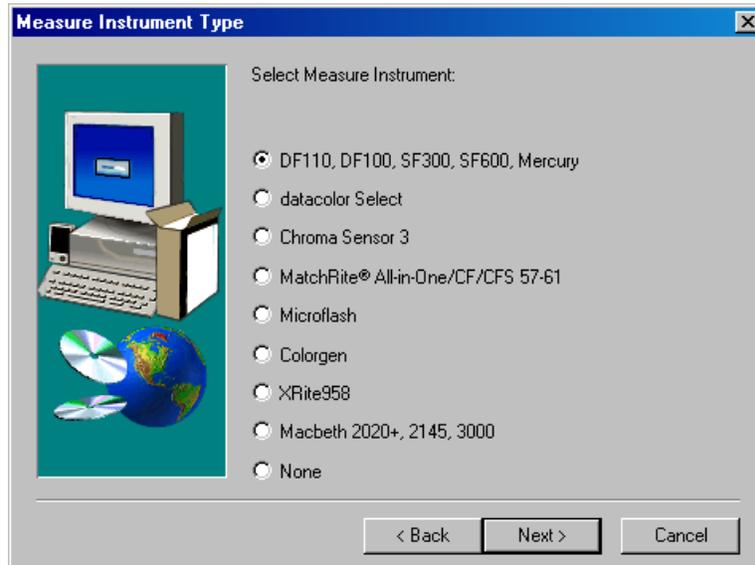
2. Select **Complete Installation**.



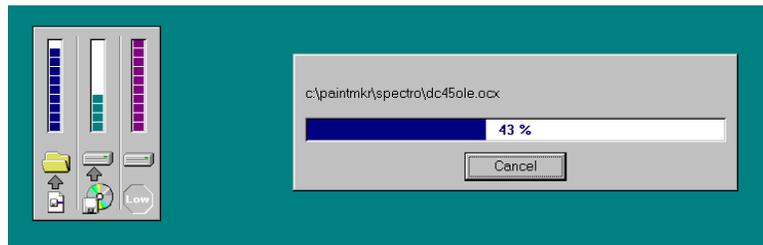
**NOTE**

If you are currently running Paintmaker, you may need to change the instrument selection. Place the Paintmaker CD into the drive, and select **Change Active Instrument**.

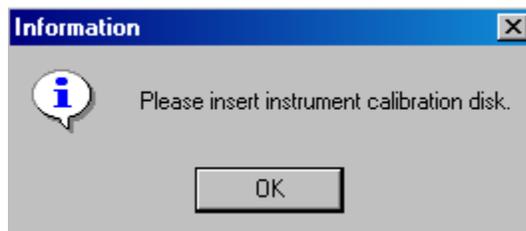
The installation procedure prompts for identification of the instrument you are using as part of the procedure:



3. Select the instrument type you are using, and click **Next**. A progress bar will appear during the installation process:



The program will prompt you to place the calibration data diskette into the drive:



4. Insert the diskette into the drive, and click **OK**. When the installation is completed, the wizard automatically closes.

**NOTE**

The calibration data is provided on a diskette and a CD. If you use the CD, you may have to direct the system to the CD drive to find the file data.

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## Installing Data for Other Datacolor Programs

When installing a Datacolor 110 for use with other Datacolor programs, the calibration data is installed after the program is installed. Typically it is done as part of the software configuration for the instrument. Below is an example of the installation procedure.

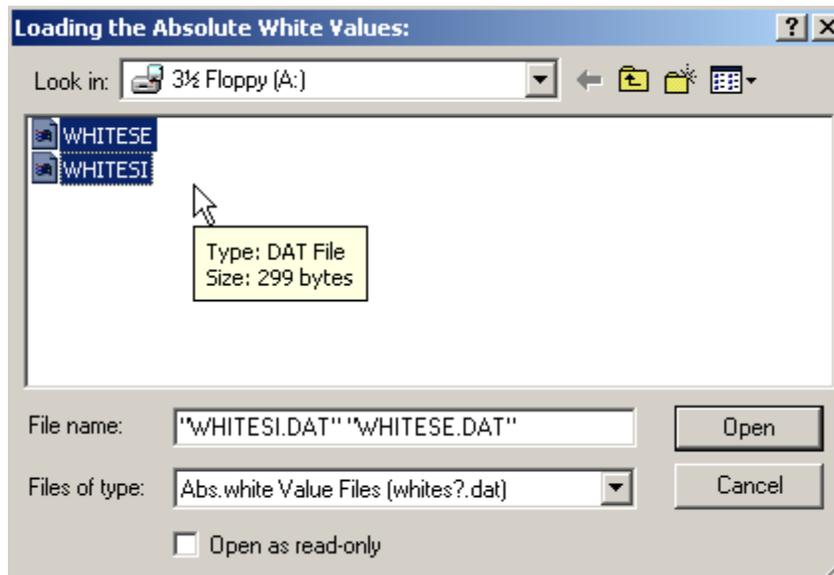
**NOTE**

Depending on the program you are running, the screens shown below may not match those in your program. See also the *User's Guide for the program you are running to obtain detailed information on the instrument configuration options you will use to set up the instrument.*

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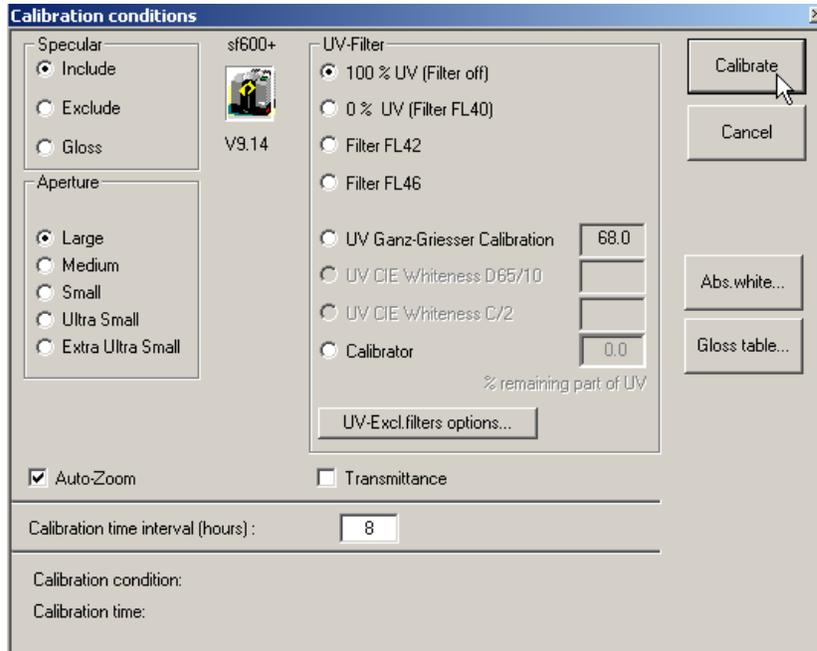
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1. When you complete the software instrument configuration and select **Save Setup**, the program prompts you to place the diskette or CD containing the calibration data into the appropriate drive. When you do this, a screen similar to the one below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



2. Two files containing calibration data are displayed. You must load **both** files. Highlight both file names, and click **Open**. The files will be transferred to the system.

When the transfer is completed, the program will prompt you to calibrate the instrument. A calibration screen similar to the one below will appear:



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

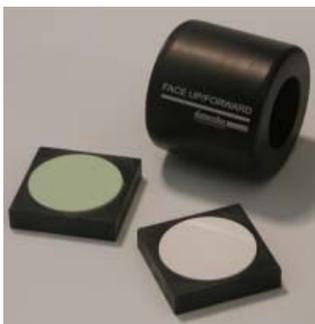


#### NOTE

Instrument calibration can also be accessed through a separate menu option or function button in the program window. The User's Guide for the program you are running contains detailed instructions for accessing the calibration options.

## 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 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.

## Calibration Procedure

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

- The black trap
- The white tile

Before you begin, verify that the aperture plate at the port matches the aperture selection in the program you are running.

1. Access the calibration procedure in the program you are running.
2. When you are prompted by the program, place the black trap at the instrument port and start the measurement.
3. When you are prompted by the program, place the white tile at the instrument port and start the measurement.
4. The program may prompt you for a diagnostic tile. If prompted, place the green tile at the instrument port and start the measurement.
5. After these measurements are completed, the program will display a message that the calibration is successful. You can now start measuring samples.

*The Datacolor Users Guide for the program you are running (e.g., Datacolor Tools, etc.) provides step-by-step instructions regarding the (instrument) software setup and calibration procedure.*

*NOTES*

# Sample Presentation/Measurement

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## About Sample Presentation/Measurement

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.

1. Grasp the sample holder and pull forward.



2. Position the sample at the port.



3. Return the sample holder to the upright position.



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**⚠ WARNING**

Do not allow sample arm to spring back.

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### ***Sample Viewing Port***

When measuring 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 tab above the aperture plate.



2. Pull top of door down to its full horizontal position. The backside of this door reveals the area of the sample covering the port opening.



3. If necessary, adjust the placement of the sample to target the portion of the sample to be measured. The sample must completely cover the port opening.
4. Push the door back to its normal position, and start the measurement.



*NOTES*

# Maintenance

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## 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.



### CAUTION

There are no user-serviceable parts for this equipment.

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## 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 (Datacolor Part No. 5400-0036)*, is a useful tool for cleaning the sphere.

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## 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. Wipe each tile clean with a soft, lint-free cloth.



- 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***

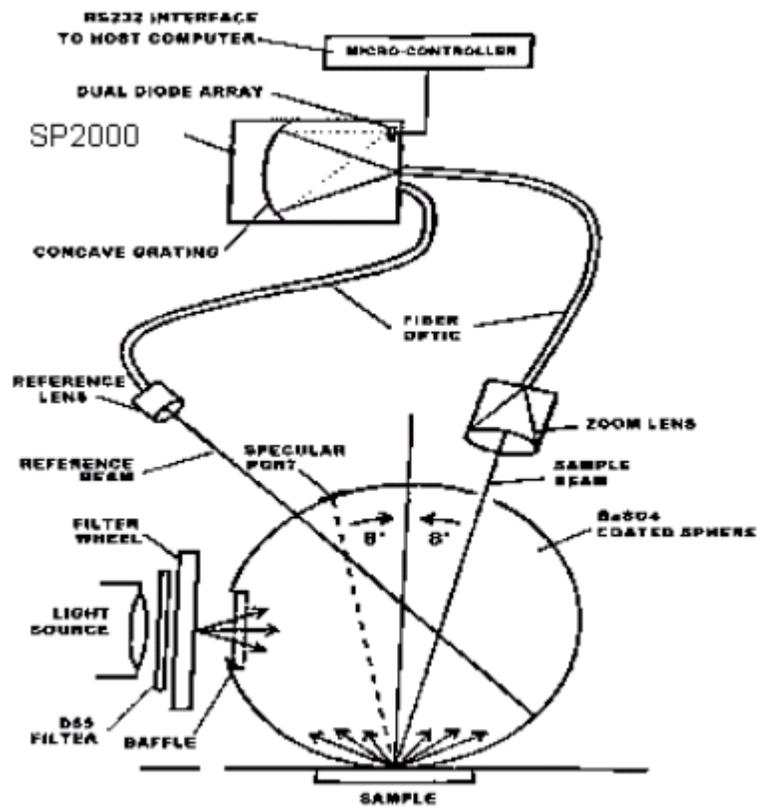
- The black trap should be kept dust-free. Dust accumulating in the black trap should be blown out with compressed air.



# Appendix

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## Optical Block Diagram



## Instrument Specifications

*Specifications are subject to change without notice.*

ITEM	DESCRIPTION
<b>Instrument Type</b>	Dual beam integrating sphere with xenon flash lamp.
<b>Measuring Geometry</b>	Diffuse illumination, 8° viewing in conformance with CIE publication No. 15.2 Colorimetry.
<b>Illumination Source</b>	Pulsed xenon, filtered to approximate D65.
<b>Spectral Analyzer</b>	Proprietary SP 2000 analyzer with dual 256-diode array and high-resolution holographic grating.
<b>Wavelength Range</b>	400 – 700nm
<b>Effective Bandwidth</b>	10nm
<b>Wavelength Resolution</b>	2nm
<b>Photometric Range</b>	0 to 200%
<b>Photometric Resolution</b>	0.003%
<b>Aperture Configuration</b>	Large Area View. 22 mm Small Area View. 9mm Ultra-Small Area View. 6.5mm
<b>Power</b>	100 to 240 VAC, 47 to 63 Hz, 60 VA
<b>Performance— Repeatability*</b>	0.05 CIELAB Max on white ceramic
<b>Performance— Reproducibility*</b>	0.2 CIELAB $\Delta E$ average of 12 BCRA tiles
<b>Absolute Operating Environment</b>	5° to 40° C, 20-85% RH, non-condensing
<b>Interface</b>	RS232 9600/19200 baud ~or~ USB v1.1 or higher
<b>Warranty</b>	1-year parts and labor. Extended warranty available.
<b>Dimensions <i>without</i> Drawer</b>	<b>English</b> <span style="float: right;"><b>Metric</b></span>
<i>Height</i>	6.5 inches <span style="float: right;">16.51 cm</span>
<i>Width</i>	6.75 inches <span style="float: right;">17.15 cm</span>
<i>Depth</i>	12.375 inches <span style="float: right;">31.4 cm</span>
<i>Weight</i>	11 lbs. <span style="float: right;">4.95 kg</span>
<b>Dimensions <i>with</i> Drawer</b>	<b>English</b> <span style="float: right;"><b>Metric</b></span>
<i>Height</i>	9.25 inches <span style="float: right;">23.5 cm</span>
<i>Width</i>	6.75 inches <span style="float: right;">17.15 cm</span>
<i>Depth</i>	12.375 inches <span style="float: right;">31.4 cm</span>
<i>Weight</i>	14 lbs. <span style="float: right;">6.3 kg</span>

\* Specification based on following environmental conditions: 20°C; 50% RH; 2 sigma

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## Miscellaneous Technical Information

### *RS-232C Connector Pin Assignments*

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

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 **WARNINGS**

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

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## 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 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.

*NOTES*

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