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Colour Meter PCE-TCR 200

Instruction Manual

PCE Instruments

CONTENTS

1. Using Information

Precise color meter PCE-TCR 200 is made in accordance with National Standards and CIE Standards.

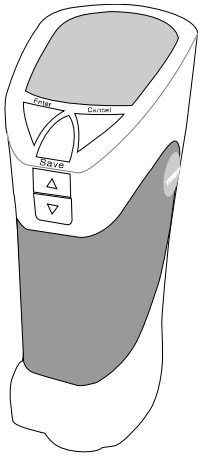
Important information on how to use the instrument effectively, please read the instruction manual carefully before using the instruments. Any unauthorized changes may damage or affect the instrument's precision, which damages users' legal right to use the instrument.

2. Introduction

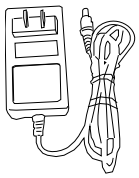
The color meter is brand-new line product for color difference measurement. It is characterized by stable performance, high precision, portable and can also measure with batteries and AC-DC external power supply. The instrument can measure color difference between two different colors for the same material rapidly and accurately, adopting the TFT display technology which can be used in apheliotropic display.

The instrument can be used to measure color difference between different colors for the same material accurately, i.e ,L,a,b,Lab and Lch value. There are three kinds of light source for analyzing the measured surface and it can do the metamerism analysis itself or by PC software.

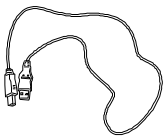
The instrument is mainly applied to color matching of costume、fitment 、building and indoor decoration and the people who involved in plastic、painting、design、plating ang chinaware industries.



Precise color reader instruction



Exterual power supply

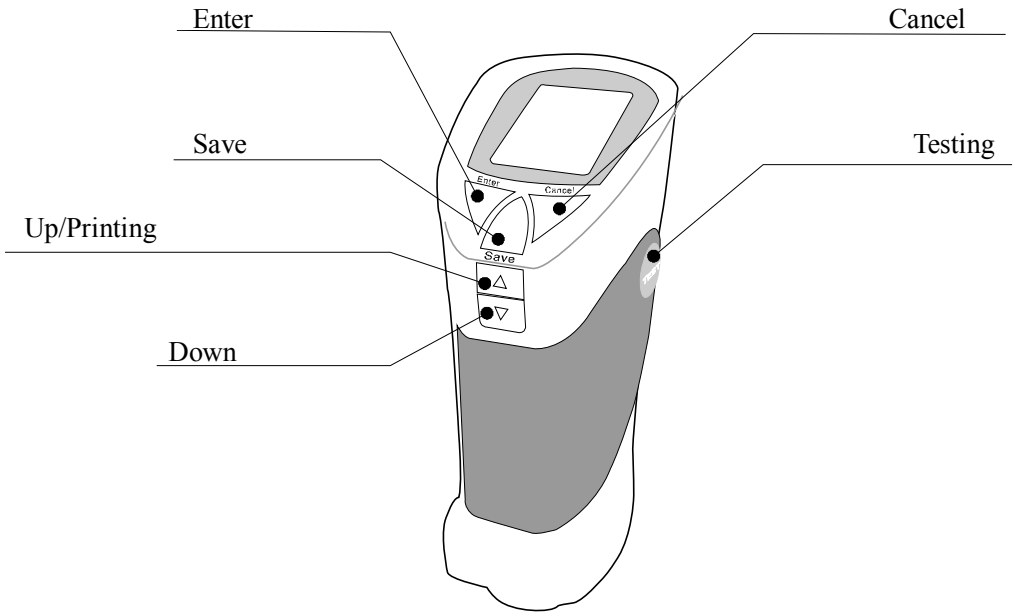


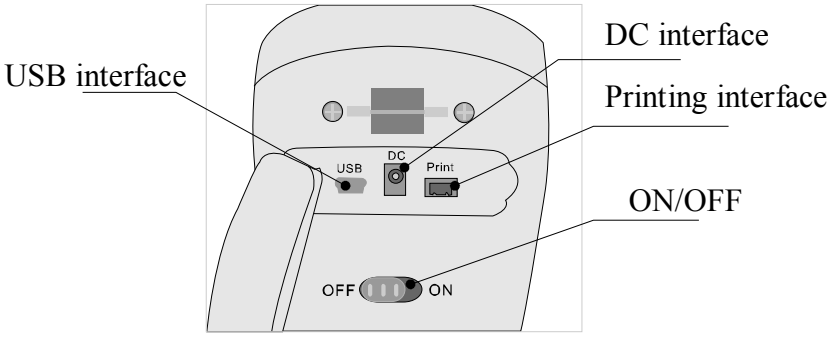
USB wire

White tabula

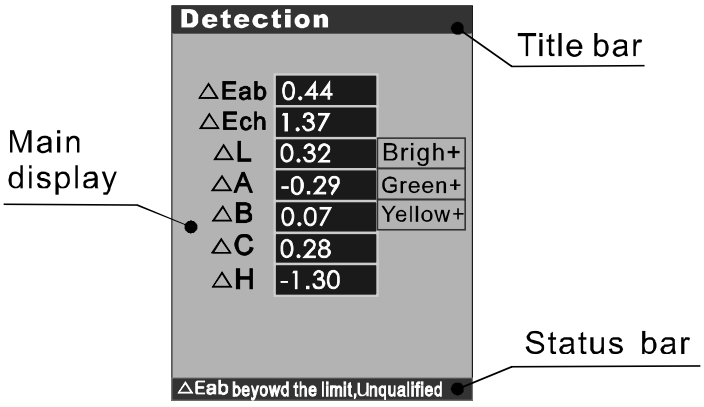
Black cavity

2.1 Nomenclature





2.2 Function Demonstration



3. Features

- Stable performance and high precision

ii Display directly thousands of color' s chromatism

iii Display color result by Lab、△E and Lch

iv Three standard optical light sources: D65、D50and F11

v Samples and groups of color difference can be saved

vi do the metamerism analysis itself or by PC software

vii 4pcs AAA(1.5v)batteries, low power consumption

viii Small volume、light weight and convenient operation

4. Technical Specification

Repeat accuracy	Within E*ab0.08 （interval measuring 30 times after calibrating white tabula）
Lighting/inspecting system	8/d（8° Falloff/diffuse reflection） SCI（include Flat Mirror Light）） SCE（eliminate Flat Mirror Light）
Light source	White light source
Measured aperture	8mm
Error of instrument	Within E*ab0.5
Field of view	10° regulated by CIE
Inspection condition	D65，D50，F11
Color space	XYZ, RGB, L*a*b, L*C*H, Chroma values and △E*ab,(△L*a*b*),(△L*c*h*) color difference values
Language	Chinese ,English
Interface	USB RS232C
Power supply	4 pcs AA 1.5v batteries, or AC-DC alternating current.
Operating temp	0-70° lower than 85% relative humidity
Dimension	77*86*210mm
Weight	550g

5. Working Theory

Compare the color difference between sample and the measured subject, then output the data of CIE_Lab , and △E,△L,△a,△b.

△E represents the total color difference.

△L+ represents partial white, △L- represents partial black

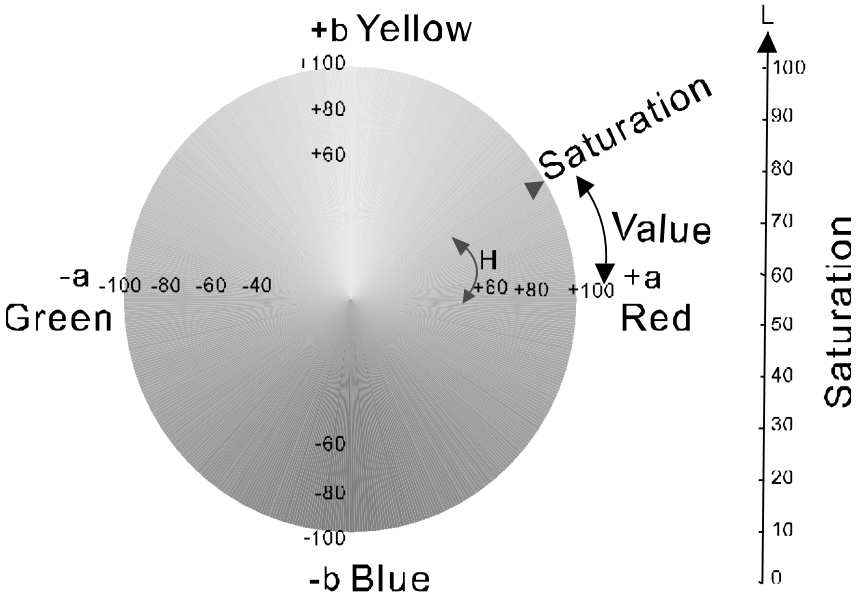
(comparing with prototype)

△a+ represents partial red, △a- represents partial green

(comparing with prototype)

△b+ represents partial yellow, △b- represents partial blue

(comparing with prototype)



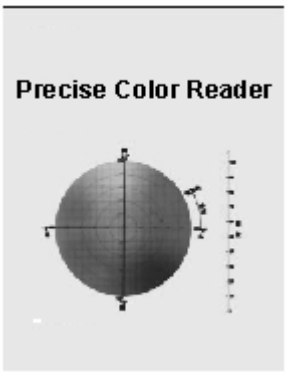
CIE color reference system

Range of color difference	Color difference analysis
0-0.25△E	very small or no; very perfect matching
0.25-0.5△E	small; acceptable matching
0.5-1.0△E	small to medium; acceptable in some areas.
1.0-2.0△E	Medium; acceptable in some areas.
2.0-4.0△E	has distance; acceptable in special application
4.0△E	very big; not acceptable in most applications

6. Operation

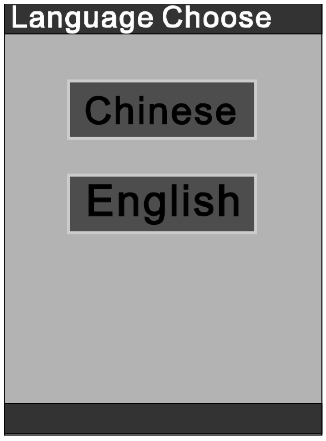
6.1 Switch on the instrument

Move the button to “ON” on the base side, the LCD screen will display “Precise Color Reader” after short buzzer, then it will get into the “language selection” screen automatically.



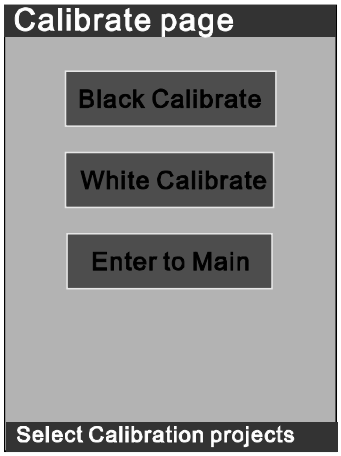
6.2 Language selection

There are two languages installed in the instrument: Chinese and English. Language can be selected by pressing “up” or “down”. Then press the ”ENTER” to confirm. It will enter the calibration screen after the buzzing.



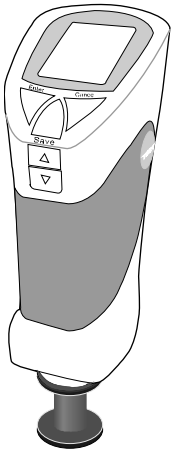
6.3 Calibration

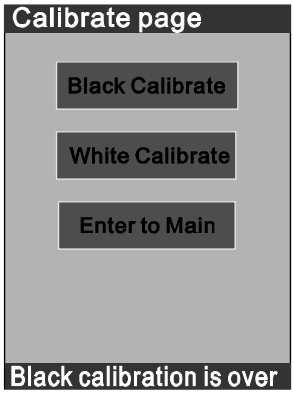
There are two parts for calibration: Black calibration、White calibration. In order to guarantee the precision of the test, “Black calibration” and “White calibration” are constrained to be operated before entering the main program. Do the “Black calibration” and “White calibration” orderly by using black cavity and white tabula.



Black calibration:

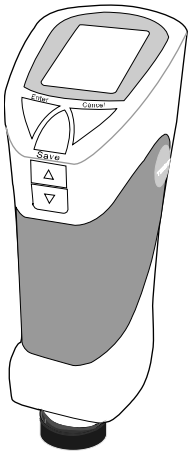
Put the instrument testing aperture aim at the aperture of black cavity correctly and press “Enter” , then “black calibration is over” will be displayed in status bar after the buzzing.

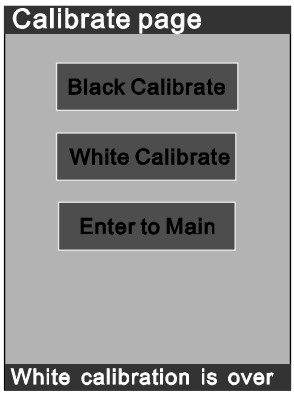




White calibration:

Put the testing aperture on the white tabula completely and press button “enter”, then “whole white calibration is over” will be displayed in status bar after the buzzing.



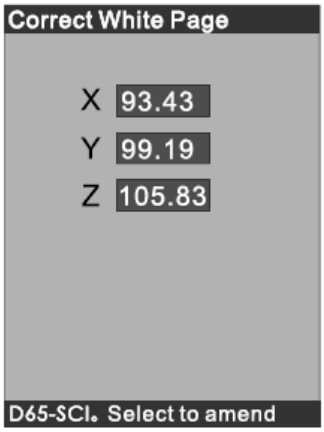


Please select “Enter to Main” to get to the sampling screen After above steps.

6.4 Correct white

ⅰ.Correcting white calibrate of XYZ in lower machine (PCE-TCR 200)

Put the testing aperture on the white tabula while selecting “Correct white” and press “enter”, then “correct white page” will be shown as follows:

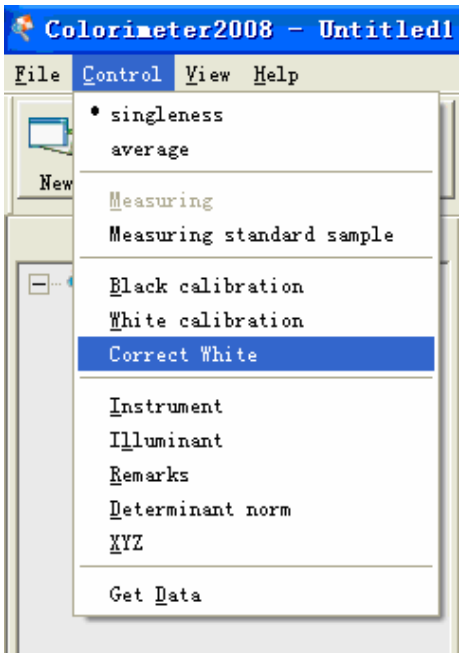


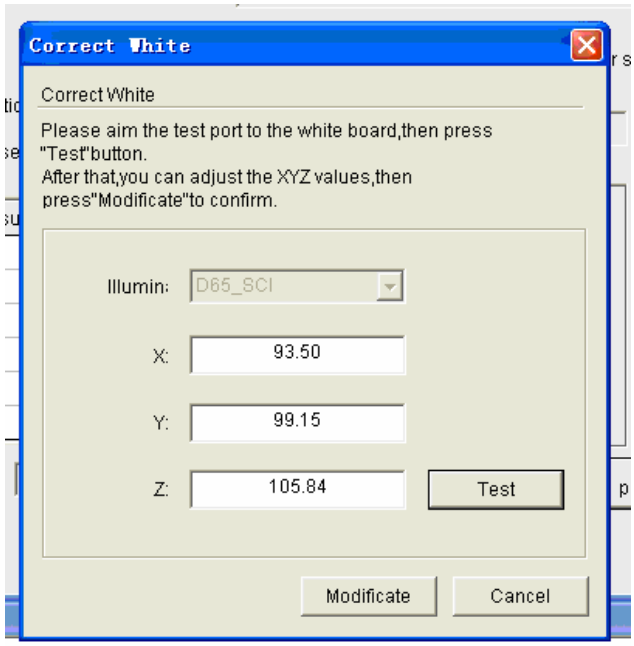
The displayed values are real XYZ values of the white tabula. For changing XYZ values, please press “enter” and change the value by “up” and “down”. Then press “YES” to confirm the change.

ⅱ. Correcting white calibrate of XYZ in upper monitor (Computer)

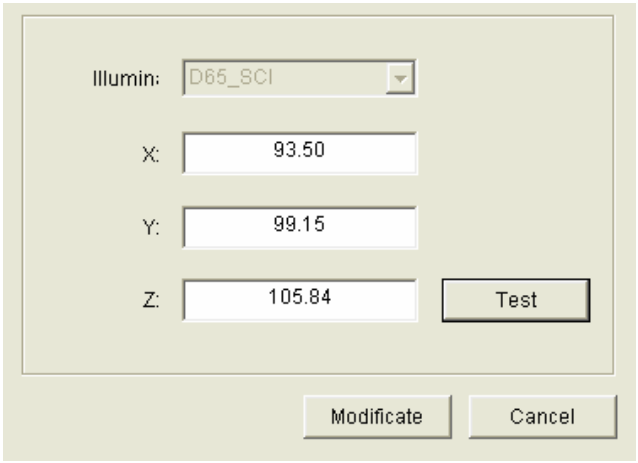
(a) Connect instrument with pc by USB communication, then open software of upper monitor of PCE-TCR 200.

(b) The window “correct white” will pop up by Clicking “control” in status bar.





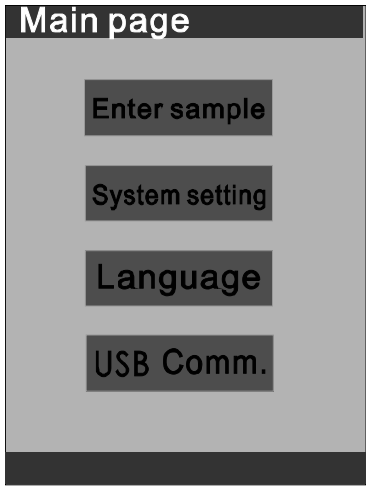
Select “correct white” in control of the window and Put the testing aperture on the white tabula, press “test”. Then the value of XYZ will appear in the dialog window as follows:



If the value needs to be amended, fill the needed values in the dialog window. Click “modificate” for saving the amending or “cancel” for deleting the amending.

Note: When doing correct white calibration. Please follow the above steps strictly. If the absolute values of X、Y、Z are bigger than 0.1, correct white is necessary to be done.

6.5 Enter sampling



Enter sampling: testing function of the instrument.

System setting: For classifying the system function.

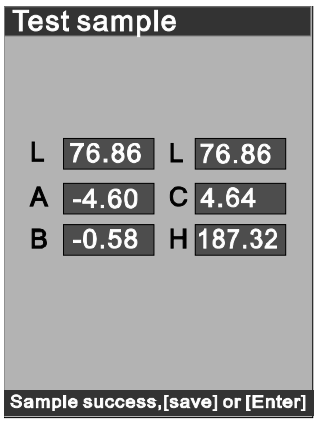
Language: “Simplified Chinese” and “English” two selections.

USB Comm.: connect the instrument with PC.

Select “Enter sampling” to do the sample test. If there is nothing to be set in system, the testing data will be acquiesced in the light source D65. “D50” and and“F11” can be selected before testing in system setting.

6.6 Testing

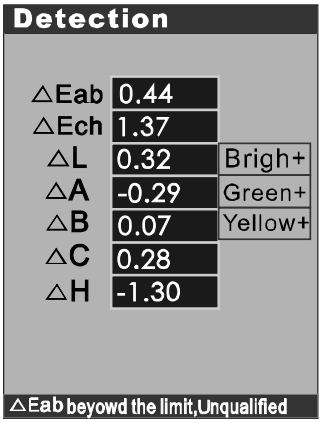
Press “testing” to start sampling , press “save” to keep the sampling data after testing , there will be a save number for the sample in the Status Bar. In the latter testing, all values of measured surface will be compared with current sample result, unless change another sample. press “Enter” to get into testing screen after sampling.



Operation method of re-sampling: Press “CANCEL”, back to “Entering sampling” screen. Press “Enter” to sample. Then press “Testing”, the data will be for new sample surface.

6.7 Testing interface

Let the instrument aim at tested sample, press “Testing”, the difference between tested surface and standard sample will be displayed in main screen.



The instrument can make a primary estimation for testing data and show estimated result for reference. the test data△E、△L、△a and △b respectively are displayed and the state of the tested data will be shown.

The result of △Eab is judged by tolerance setting of system setting will be shown in status bar. Please note the proper judging range while setting the tolerance.

Under default, the tolerance range of color difference △Eab is “1”

Tolerance range can be set if required. Please refer to function setting of Tolerance setting.

After accepted tolerance setting, it will give judge automatically for each test. There will be one buzzing if the result is within the accepted tolerance, or twice buzzing will be happened.

6.8 Save data

Under default, the instrument does not save testing data. Press “save” to save it, then it will save the data in the current sample.

The instrument can save 12 kinds of samples and for every sample, it can save 30 groups of data of color differences. The instrument can save sampling time automatically as well. Please keep the saving number data when checking the testing data.

In system setting, “inquire records” is for checking the testing data as well.

When records of samples exceed 12, the instrument will cover the front records circularly. Similarly, when the number of saving data of every sample exceed 30 , the front records will be covered by latter ones circularly.

6.9 USB Communication

PCE-TCR 200 has function of communication. All operations can be done by instrument itself or connecting to computer after installing application.

Please note: Before operating online, please read the information of software carefully and install application. The introduction is provided in CD.

After connecting to PC successfully, do the relative operations according the introduction of the application software to complete the testing.

6.10 Printing

The mini special printer is the optional accessory.

PCE-TCR 200 has the function for instant print current samples and color difference data only connect with the special mini printer.

Software to connect with PC is available for output data.

There is an interface in the back of the instrument. Connecting with the mini printer

like the diagram as following.

Print Sample: Press “UP/Printing” key to print the current test value after sampling test.

Print the color difference result: Press “Testing” key, the current values for color difference would be displayed, then print the values by “UP/Printing” key.

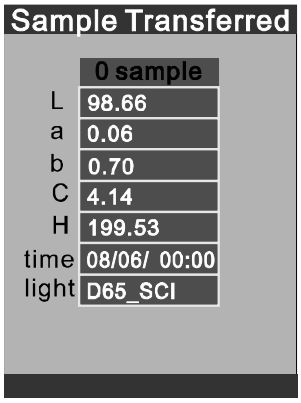
7. System Function

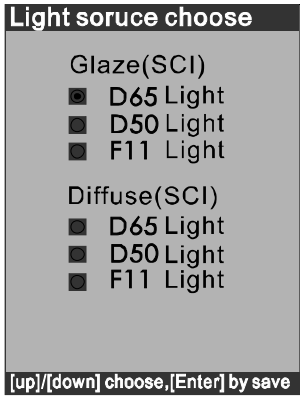
There are eight functions in “System setting” mode.

7.1 Light source

There are three light sources for difference testing environment, which are D65、D50 and F11. Generally, it is defaulted as D65.

Select the needed light source by “up/dowm”

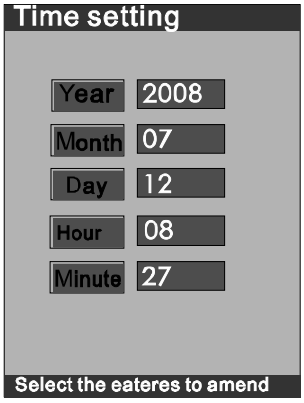




7.2 Time setting

Set “year/month/day/hour/minute” in “Time setting”, select the content need to be amended first and press “enter” to amend the time.

After saving the time setting, the time will be applied to the succedent operation automatically.



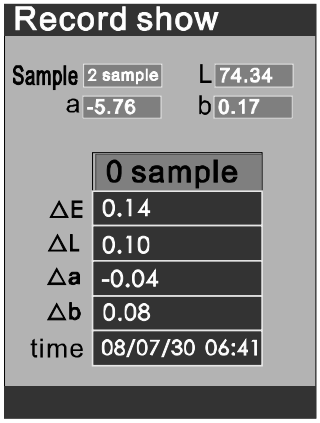
7.3 Sample entering

The “sample entering” means that the instrument will make the saved sample as current testing sample. Choose the needed sample in “sample display” by “up/down”, the sampled time will be displayed as well. The test result will be the color difference between the current sample and the selected saved sample.

7.4 Check record

The “check records” means that the saved sample and testing records can be checked.

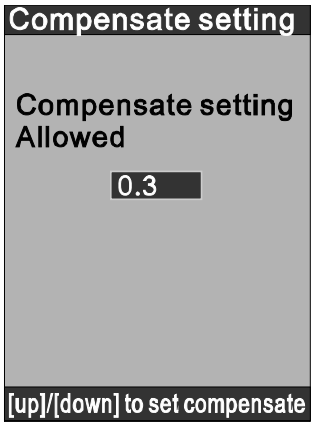
Only one sample can be displayed when checking. check the record of the sample by “up/down”.



7.5 Tolerance setting

Tolerance setting is for setting maximal accepted error. The instrument will judge the color difference according to the tolerance and display the result.

Tolerance setting affects the judging result directly. So the tolerance should be set based on the acceptable range of test surface. The tolerance is defaulted as 0.1.

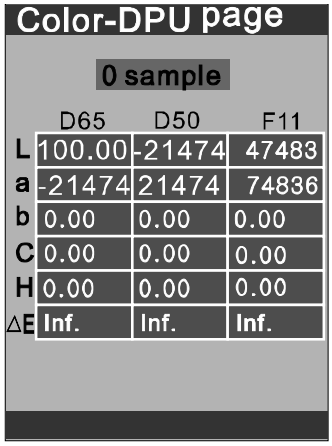


7.6 Metamerism

Metamerism is the three stimulation values are the same but the distribution of the spectrum is different.

The difference of spectrum distribution can judge roughly the degree of metamerism for the same color samples. If the shape of spectrum reflectivity curve between copy and standard sample is almost same and has lots of the cross points and superposition, which means low degree of metamerism and small color difference, and vice versa. This is an effective and qualitative way to judge the degree of metamerism according to the spectrum distributing difference.

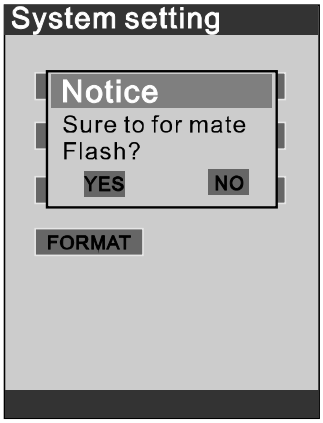
Check the records of metamerism by “up/down”.



7.7 Formatting

This function is to manage the memory of the instrument. Format the instrument before the firs use in the system setting

Warning: All the saved data in the instrument will lose after formatting.

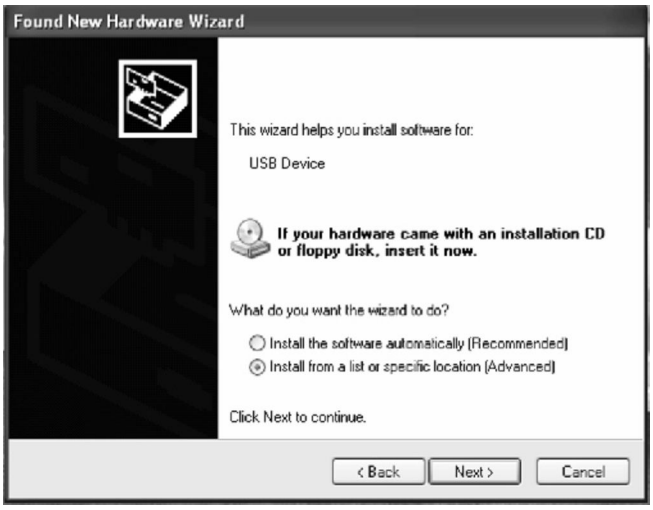


8. USB drive installation

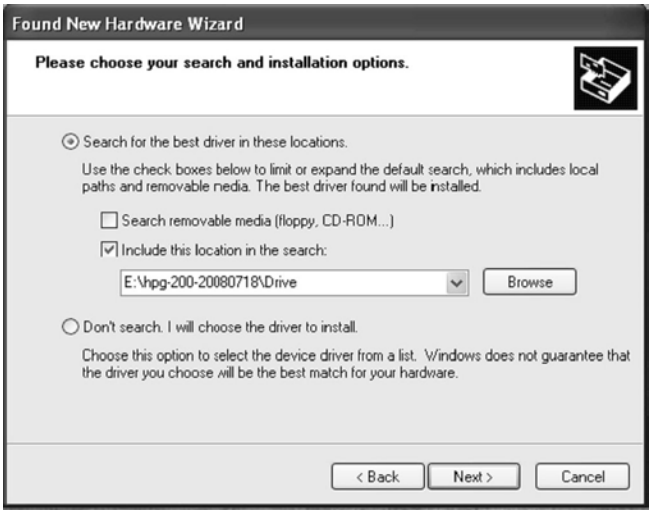
After doing black and white calibration, enter sampling page, select “USB communication”.

Connect PCE-TCR 200 to the computer, “find new hard ware” will be displayed.

Select “Yes, this time only”, then click “Next”.



Select “install from a lost or specific location [Advanced]”，then click “Next.



Click “Browse” to find “Drive” under CD Catalogue, click “next” and then drive software will be automatically yet up.

Click “finished”, the installation of USB drive is complete and dialog box will appear as follows, indicated on TCD200 USB in upper monitor (computer) drive to install successfully.

Click “cancel”. Open the software of upper monitor, connecting operation to PC can be finished according to the introduction of upper monitor.

9. Other Functions

1. Sleep and wake up

In order to keep the battery power, PCE-TCR 200 will get into sleep mode automatically if no operation for 5 minutes, black screen will be shown to save power. Press any key to wake up the instrument.

2. Power testing function:

In order to ensure the accuracy of the instruments, PCE-TCR 200 has a supervising function for power. Battery status is shown on the right top display.

Warning: when the battery is low, the testing results will be affected. In order to ensure the testing accuracy, please change the battery when the power is under

40%)

3. Safe operation

Do not use external power supply while using battery. Vice versa.

10. Notice

1. In order to ensure accuracy, please check battery power before testing.
2. Color reader is precise instrument, please avoid the electromagnetic interference.
3. Avoid testing in non-horizontal surface
4. Keep the instrument balance and no shaking when testing.
5. Keep the proper strength during testing, do not press the testing surface hardly.
6. Put the instrument into the soft bag after using.
7. Keep the instrument at the dry place.

11. Q&A

Common faults	Analysis	Solutions
1、Unable to turned on	1、Check if the machine is connected to power supply 2、check if battery power is sufficient	Install or change batteries
2、Unable to enter main program after turning on	1、Check if you have done the black and white calibration 2、Check if the black and white calibration is correct	Do the black and white calibration again, then enter.

3.Testing result is wrong	1. Check if tolerance setting is reasonable	Reset the tolerance setting according to requests in system setting
4. Testing value is wrong	1. Check if the tested product is stable, if the testing aperture and tested surface is connected closely, 2. Check if the tested product is too thin that the light will leak. 3.Check if tested object is mixed color	1. Keep testing product stable. 2. Put a thick plastic sheet or white paper under the measured object. 3. Avoid the mixed color area and test the single color part.
5. Too large color difference between twice tests	1. Check if batteries power is under 40%	Replace with new battery