Data Management Software
CA-S20w

Ver.2.4

Instruction Manual

KONICA MINOLTA

Safety Precautions

Before you use the CA-S20w software, we recommend that you thoroughly read this manual as well as the instruction manuals of your PC and the instrument.

Formal designations of application software used in this manual

(Designation in this manual)	(Formal designation)
Windows, Windows XP	Microsoft® Windows® XP Professional Operating System
Windows, Windows Vista	Microsoft® Windows® Vista Business Operating System
Windows, Windows 7	Microsoft® Windows® 7 Professional Operating System
Excel	Microsoft® Excel®
Visual Basic .NET 2003	Microsoft® Visual Basic .NET 2003
Visual Basic .NET 2005	Microsoft® Visual Basic .NET 2005
Visual Basic 2010	Microsoft® Visual Basic 2010
Visual C++ .NET 2003	Microsoft® Visual C++ .NET 2003
Visual C++ .NET 2005	Microsoft® Visual C++ .NET 2005

Trademarks

- “Microsoft”, “Windows”, “Windows XP”, “Windows Vista”, “Windows 7” and “Excel” are registered trademarks of Microsoft Corporation in the U.S.A. and other countries.
- “Intel” and “Pentium” are registered trademarks of Intel Corporation in the U.S.A. and other countries.
  Other company names and product names mentioned in this manual are the registered trademarks or trademarks of their respective companies.

Notes on this manual

- No part of this manual may be reprinted or reproduced in any form or by any means without the permission of Konica Minolta, Inc.
- The contents of this manual are subject to change without notice.
- Every effort has been made to ensure the accuracy of the contents of this manual. However, should you have any questions or comments, or find an error or missing section, please contact your local sales office.
- Konica Minolta accepts no responsibility for consequences resulting from failure to follow the instructions outlined in this manual, the condition above notwithstanding.

Introduction

Software License Agreement

The terms of the license agreement of the CA-S20w software are provided in the Software License Agreement dialog box displayed on-screen during the installation process. This software can be installed only if you agree to all the terms of the agreement.

Notes on Use

- The CA-S20w application software is designed to be used with the Windows XP, Windows Vista or Windows 7 operating system. Note that neither operating system is included with this software.
- The Windows XP operating system must be installed on the PC before this software can be installed.

Notes on Instruction Manual

The Instruction Manual is also installed in PDF form with a shortcut in the start menu during the software installation.
To read the manual, go to Start Menu → All programs → KONICAMINOLTA → Data Management Software CA-S20w → Manual PDF file.

You will need Adobe Reader® from Adobe Corporation. The latest Adobe Reader® can be downloaded for free from the Adobe website.

Every effort has been made to ensure the accurate operation of this software. However, should you have any questions or comments, please contact the nearest KONICA MINOLTA authorized service facility.

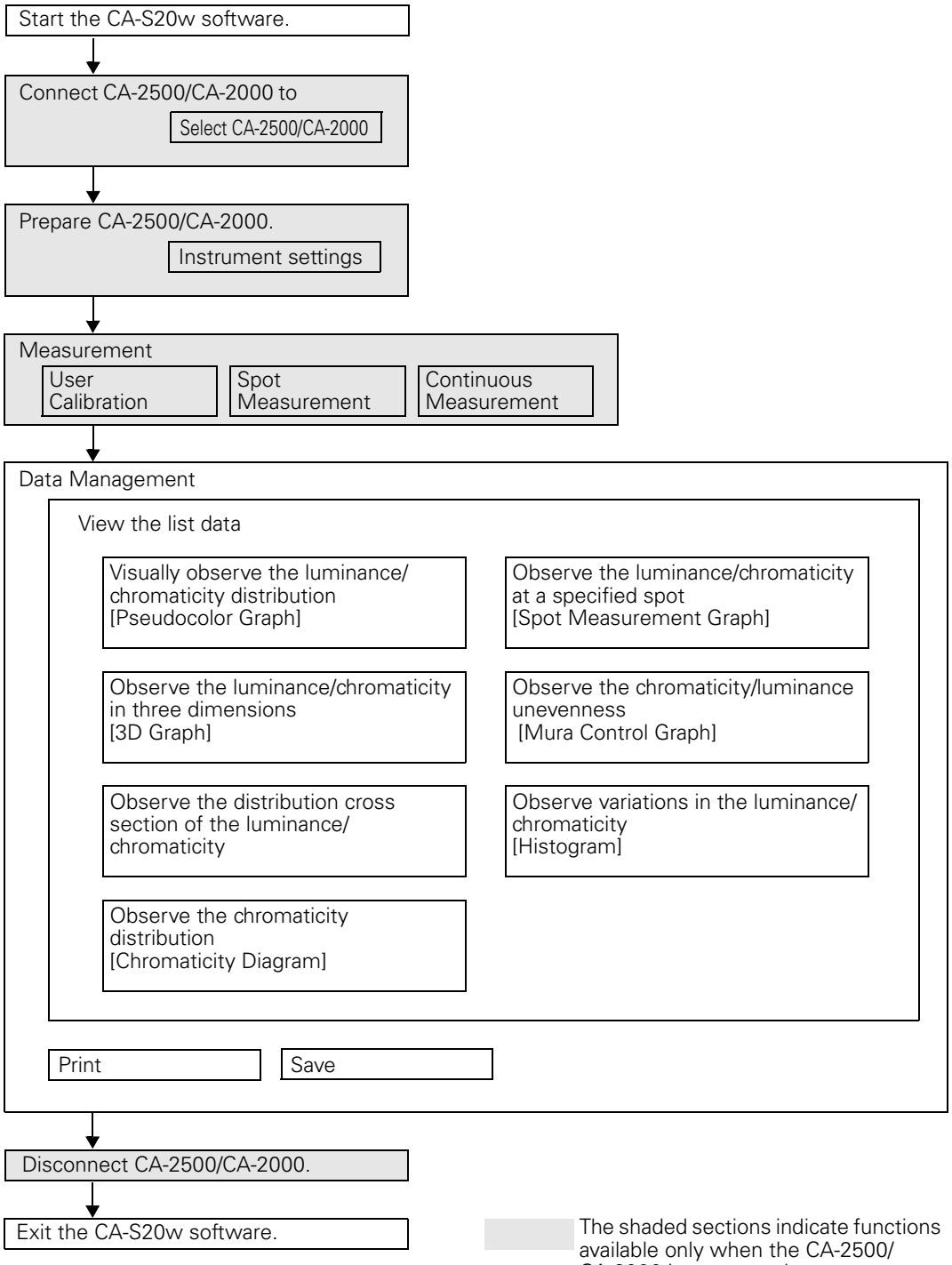
CONTENTS

Chapter 1
Overview

1.1 Major Functions

Instrument control functions	Measurement, Synchronous Measurement, Acquisition of Measurement Data, Measurement Condition (Exposure) Setting
Measurement flow	Normal Measurement, Spot Measurement
Number of measurement points	980 × 980, 490 × 490, 196 × 196
Color space mode	XYZ, Lvxy, Lvu'v', TΔuv, Dominant Wavelength, Excitation Purity, Lv (Contrast) **Note** ***When measuring colors with high color purity, the measurement data may be out of the range defined in each color space mode, due to errors resulting from numeric operations or corrective operations.***
Display	Pseudocolor Graph, Cross Section Diagram, 3D Graph, Chromaticity Diagram, Spot, Mura Control Graph, Histogram
Data management	Uploading/saving of the document (measurement data) files in the original format (with "mcl" file extension) Saving graph settings, Uploading/saving of template files in original format (with "mct" file extension) Uploading/saving of other files in the original formats (spot setting files, user calibration coefficient files and measurement condition files) The data file of the previous product (CA-1500 (Ver. 2.12 or later)) can be uploaded. File management on a folder-by-folder basis

1.2 Operation Flow



1.3 Window Configuration

1.3.1 Main Screen

The following screen is displayed when you start CA-S20w.

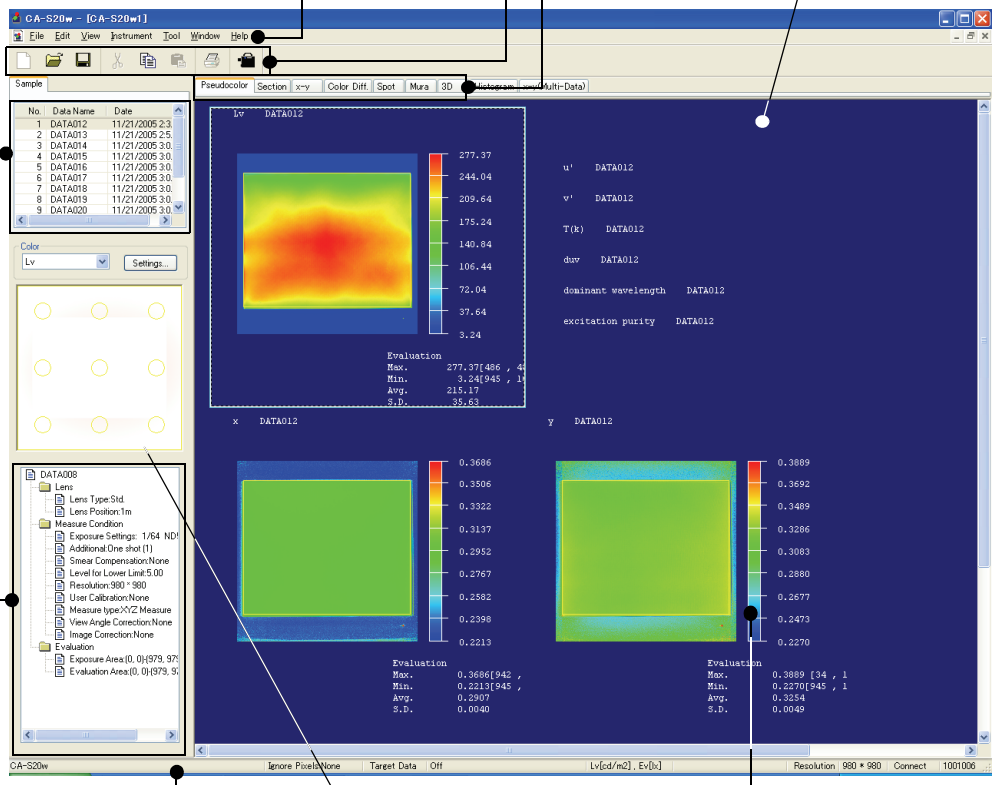
Data List
Displays the list of data names. The details of the measurement data selected on the list are displayed on the Data view, Data display box, and Condition frame.

Toolbar (p. 9)
Displays icons corresponding to frequently used functions in CA-S20w.

Page selection tabs
Basic screens that are convenient for data analysis are prepared in advance. You can customize the tabs as necessary.

Menu bar (p. 8)
Shows functions categorized among menus.

Document window (p. 18)
Manages/displays measurement data. Two or more document windows can be opened simultaneously. (P. 123)



Condition frame
Displays the conditions under which the data was measured.

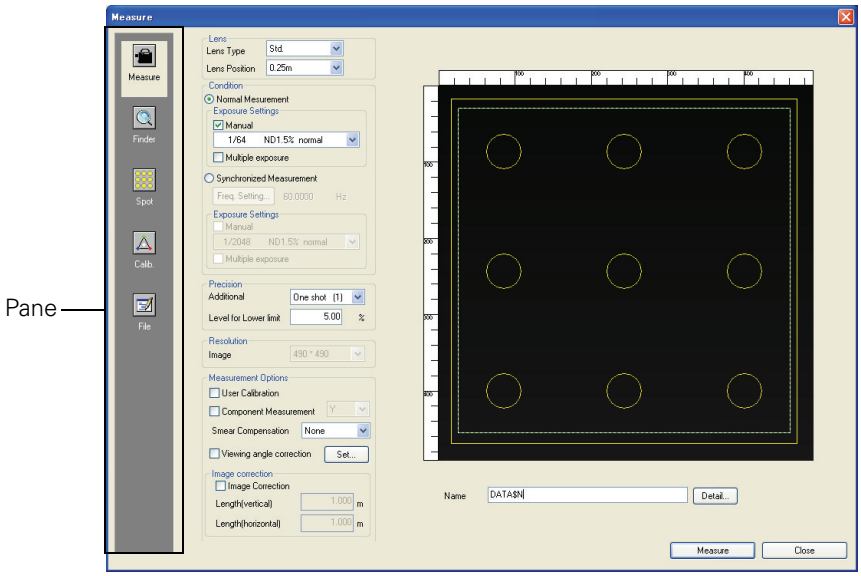
Data display box
Displays measurement data with an RGB image.
Also displays the evaluation area, spot measurement frames, and zoom area.

Data view
Displays measurement results as graphs.

Status bar (p. 9)
Displays the details or status of each function of CA-S20w.

1.3.2 Measurement Screen

The dialog box displayed when performing measurement. Check the measurement conditions before performing measurement.

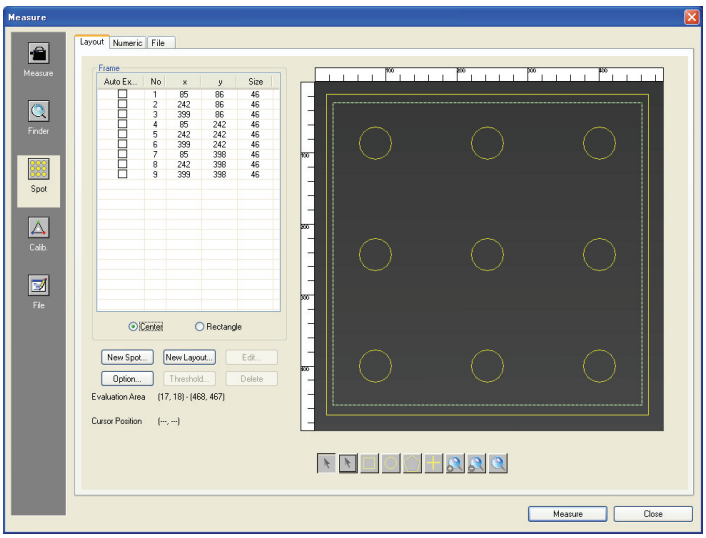


In addition to clicking the corresponding button, the pane can be switched using the following keyboard operations:

Pressing the ESC + F5 keys: button
Pressing the ESC + F6 keys: button
Pressing the ESC + F7 keys: button
Pressing the ESC + F8 keys: button
Pressing the ESC + F9 keys: button

1.3.3 Spot Measurement Setting Screen

A dialog box used to set spot frames for calculations during spot measurement. To display this screen, click the button on the pane of the Measure dialog box.



1.3.4 Menu Bar

When the CA-S20w software is started, a menu bar appears at the top of the window in a manner similar to other Windows-based software. This section lists the functions available in the menu bar and the manual pages on which these functions are described.

File

New	Ctrl+N	89
Open	Ctrl+O	86
Close		
Save	Ctrl+S	84
Save As		84
Template		
Save		86
Load		86
Import		88
Print	Ctrl+P	76
Print Preview		76
Page Setup		77
Recent File		
Exit		

Edit

Data		
Cut		
Copy		77
Paste		
Delete		88
Spot setting		35
Property		55
Add Page		92
Delete Page		92
Cut	Ctrl+X	95
Copy	Ctrl+C	95
Paste	Ctrl+V	95
Delete	Del	95
Bring to Front		
Send to Back		
Edit Mode		90-95
Property		96-121

View

Multi screen		74
xy Graph Link		75
Standard Toolbar		9
Status Bar		9

Instrument

Connect	F5	14
Disconnect	Shift+F5	15
Setting/Measure	F4	17, 19, 21
Self Diagnosis		172

Tool

File Path		89
Install calibration files		123
Measure luminance centroid distance		69
Create color region user calibration file		46
Option		122

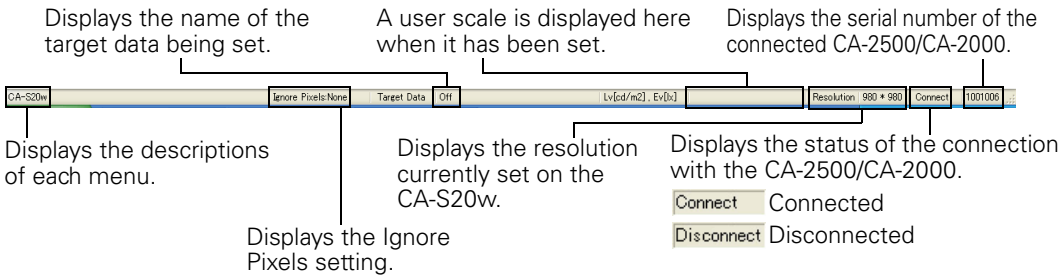
Window

Cascade		123
Tile		123
Opened File		

Help

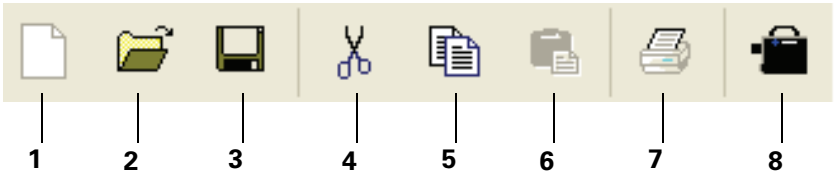
Manual		
About CA-S20w		16

1.3.5 Status Bar



1.3.6 Toolbar

When you start CA-S20w, the button icons are displayed with the factory default settings.
Select *View* - *Standard Toolbar* from the menu to show/hide the toolbar.



1) New (page 89)

2) Open (page 86)

3) Save (page 84)

4) Cut (page 95)

5) Copy (page 95)

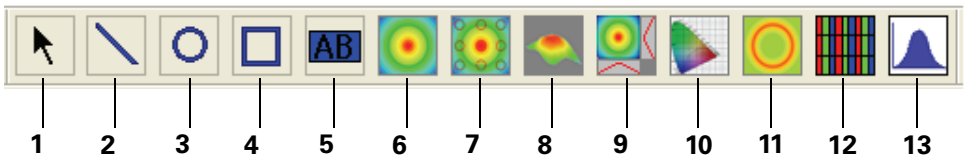
6) Paste (page 95)

7) Print (page 76)

8) Setting (pages 17, 21-29)

1.3.7 Graph Toolbar

This bar appears in the window when the CA-S20w software is in edit mode.



For details of the graph toolbar, see “2.6 Customization” (pages 90-95).

1) Selection tool

2) Line object

3) Circle object

4) Rectangle object

5) String Label object

6) Pseudocolor object

7) Pseudocolor with Multi-Spot object

8) 3D object

9) Cross section diagram object

10) xy-chromaticity diagram object

11) Mura control object

12) RGB object

13) Histogram object

CHAPTER 2
OPERATION GUIDE

2.1 Basic Operations

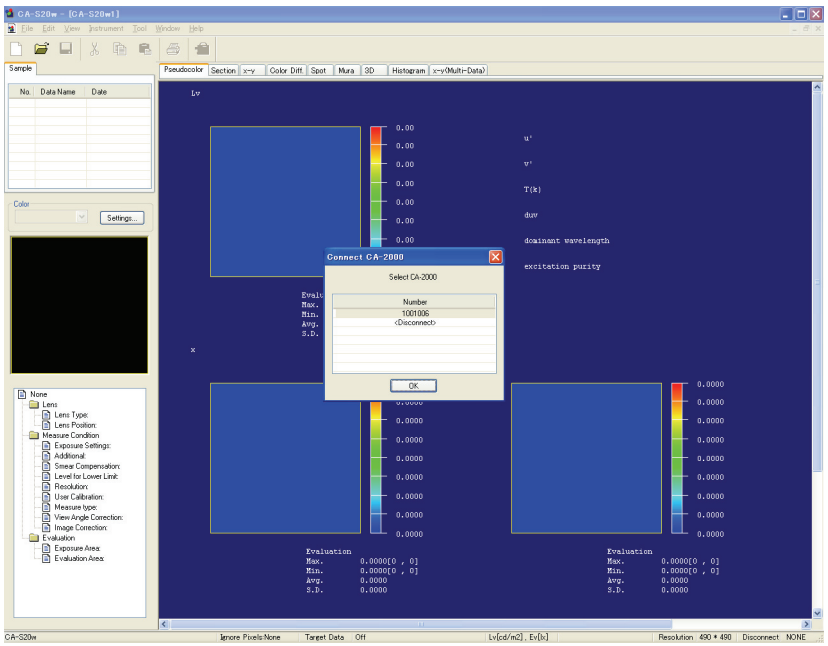
2.1.1 Before Starting Software

Before starting the software, check the following:

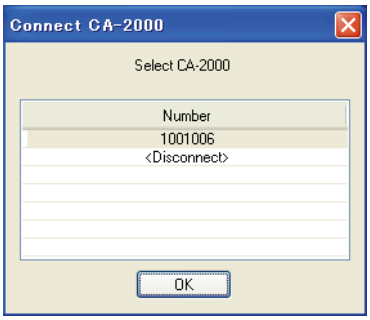
- Whether the software is properly installed (See the CA-S20w Installation Guide.)
- Whether the CA-2500/CA-2000 is properly connected to the PC (See the CA-S20w Installation Guide and the CA-2500/CA-2000 Instruction Manual.)
- Whether the calibration data for the lens to use is properly installed (See the CA-S20w Installation Guide.)

2.1.2 Starting Software

In Windows, select *Start* - *All Programs* - *KONICAMINOLTA* - *CA-S20w* - *CA-S20w.*
The software starts.
The Connect CA-2500/CA-2000 dialog box appears.



2.1.3 Connection Method



1. Select the serial number of the CA-2500/CA-2000 you want to use and click the OK button.

   Tip
   The Connect CA-2500/CA-2000 dialog box appears if you select *Instrument* - *Connect* from the menu.

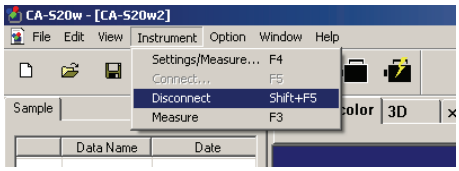
   Tip
   If you don't want to use the CA-2500/CA-2000, select 'Disconnect'.
   You can connect the CA-2500/CA-2000 at a later time.

   Tip
   If you have not installed calibration data yet, select 'Disconnect' and click the OK button. For details about the installation of calibration data, refer to the CA-S20w Installation Guide.

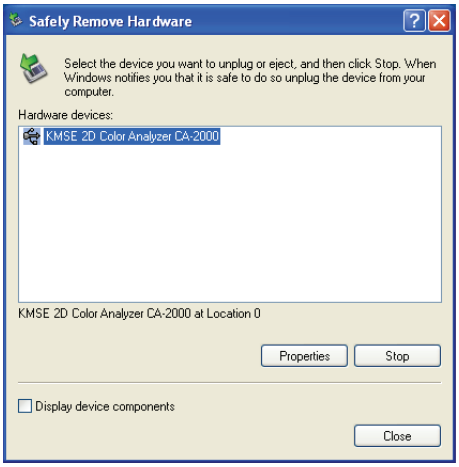
2. The Self Diagnosis dialog box appears. For details about Self Diagnosis, refer to page 172.

2.1.4 Connection Releasing Method

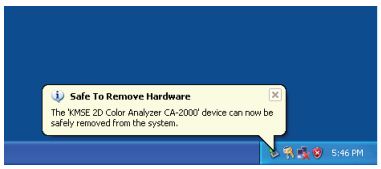
1. Select *Instrument* - *Disconnect* from the menu bar.



2. Double-click the Safe To Remove Hardware icon in the lower right corner of the PC screen.
The Safely Remove Hardware dialog box appears.



3. Stop the CA-2500/CA-2000.
CA-2500/CA-2000 is disconnected from the PC and the USB cable can be removed.



Note

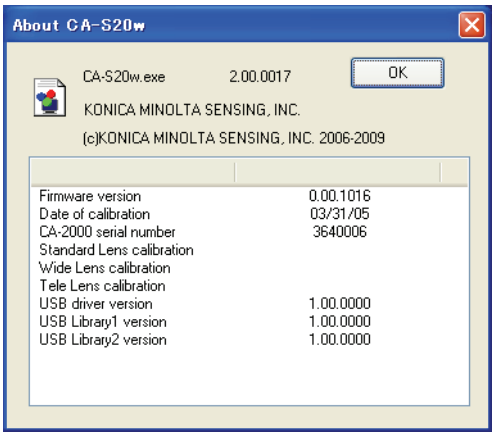
Be sure to release the connection with the operational procedures above before removing the USB cable.

Tip

- If a communication error occurs while the instrument is connected due to a communication interruption and the instrument restarts, connect the USB cable to a different USB port on the PC. (For example, switch from a port on the front of the PC to a port on the back of the PC.)
- If the error recovery function (page 123) activates, save the open file before establishing the connection. You will not be able to establish a connection until you save the file.

2.1.5 Version Information

Select *Help* - *About CA-S20w* from the menu and the About CA-S20w dialog box appears. The version information of the CA-S20w is displayed in the dialog box.



In the About CA-S20w dialog box, you can see the following information and the information on lens calibration.

Item	Information
Firmware version	Version No.
Date of calibration	Date of calibration
CA-2500 serial number or CA-2000 serial number	CA-2500/CA-2000 serial number
USB driver version	Version No.
USB Library1 version	Version No.
USB Library2 version	Version No.

2.1.6 Measuring Luminance/Chromaticity Distribution

This section describes the simplest procedure for measuring the luminance/chromaticity distribution of the measured object.

Measuring procedure

1. From the menu, select *Instrument* - *Setting/Measure*. ( )

The Measure dialog box appears.
You can also click the button on the toolbar.

2. Looking at the viewfinder view in the Measure dialog box, adjust the positions of the CA-2500/CA-2000 and the measured object, and adjust the focus.

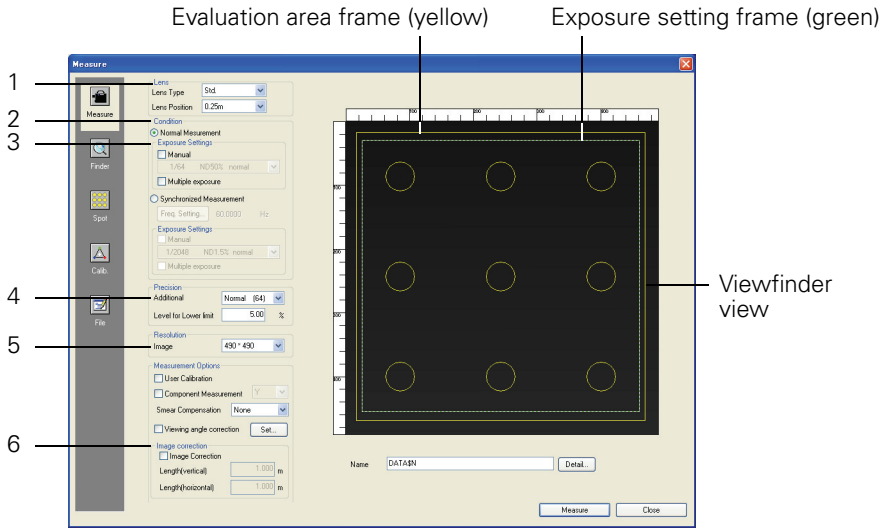
If the viewfinder image is not clear, click the 'Finder' button in the pane, and then adjust the exposure and other parameters on the displayed screen. (See page 29.)

3. In the 'Evaluation area frame' in the viewfinder view, check the position and size of the evaluation area.

If the 'Evaluation area frame' is not in the desired state, click the 'Spot' button from the pane and adjust the state in the displayed screen. (Refer to page 35.)
Use the mouse to select the 'Exposure setting frame', and to adjust its position and size.

4. In 'Measure', make the following settings.

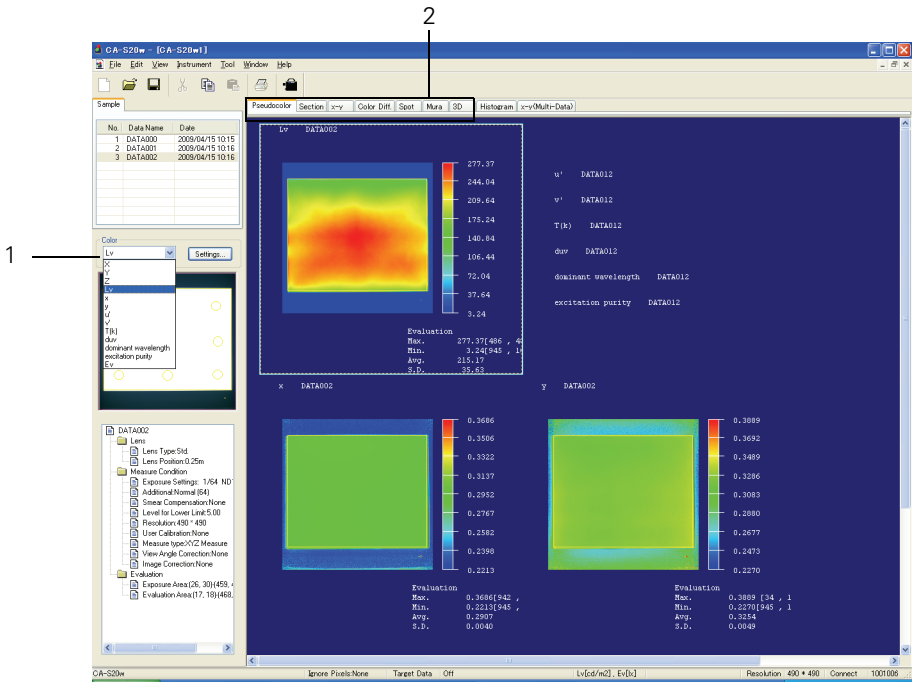
1) In 'Lens', select the type of lens mounted in the CA-2500/CA-2000 and the focus ring distance.
2) Select the 'Normal Measurement' radio button in 'Condition'.
3) Uncheck the 'Manual' and 'Multiple exposure' check boxes in the 'Exposure Settings' frame.
4) Set 'Additional' to 'Normal'.
5) Set 'Image' to '490*490'.
6) Uncheck the 'User Calibration', 'Component Measurement', 'Viewing angle correction', and 'Image Correction' check boxes in the 'Measurement Options' frame and set 'Smear Compensation' to 'None'.



5. Click the 'Measure' button.

After a dark measurement is performed, the measurement result is reflected in the document window.

1) Use the 'Color' selection combo box in the document window to select the colorimetric data to observe. When the graph in the data view screen is selected, the 'Color' selection combo box is enabled.
2) Observe the luminance/chromaticity distribution, selecting pages using the document window's page selection tabs.



2.1.7 Luminance/Chromaticity Spot Measurement

This section gives an example of the simplest procedure for performing spot measurement of the luminance/chromaticity of a measured object.

Measuring procedure

1. From the menu, select *Instrument* - *Setting/Measure*. ( )

The Measure dialog box appears.
You can also click the button on the toolbar.

2. Looking at the viewfinder view, adjust the positions of the CA-2500/CA-2000 and the measured object, and adjust the focus.

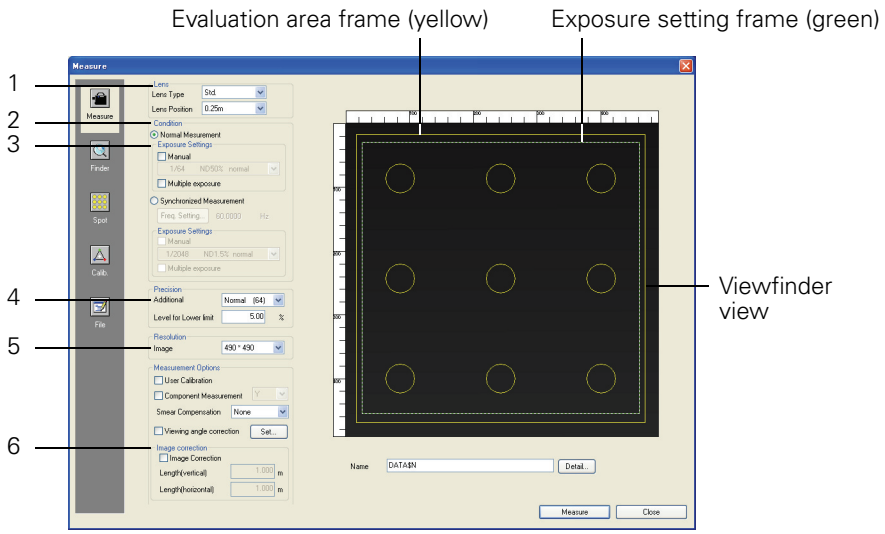
If the image of the viewfinder view is not clear, click the 'Finder' button on the pane, and then adjust the exposure and other parameters on the displayed screen. (See page 29.)

3. In the 'Evaluation area frame' in the viewfinder view, check the position and size of the evaluation area.

If the desired spot frame set is not displayed, click the 'Spot' button on the pane, and then generate a new spot frame set on the displayed screen or load a configuration file. (See page 35.)
Use the mouse to select the exposure setting frame, and adjust its position and size.

4. Click the 'Measure' button on the pane and configure the following settings on the displayed screen.

1) In 'Lens', select the type of lens mounted in the CA-2500/CA-2000 and the focus ring distance.
2) Select the 'Normal Measurement' radio button in 'Condition'.
3) Uncheck the 'Manual' and 'Multiple exposure' check boxes in the 'Exposure Settings' frame.
4) Set 'Additional' to 'Normal'.
5) Set 'Image' to '490*490'.
6) Uncheck the 'User Calibration', 'Component Measurement', 'Viewing angle correction', and 'Image Correction' check boxes in the 'Measurement Options' frame and set 'Smear Compensation' to 'None'.



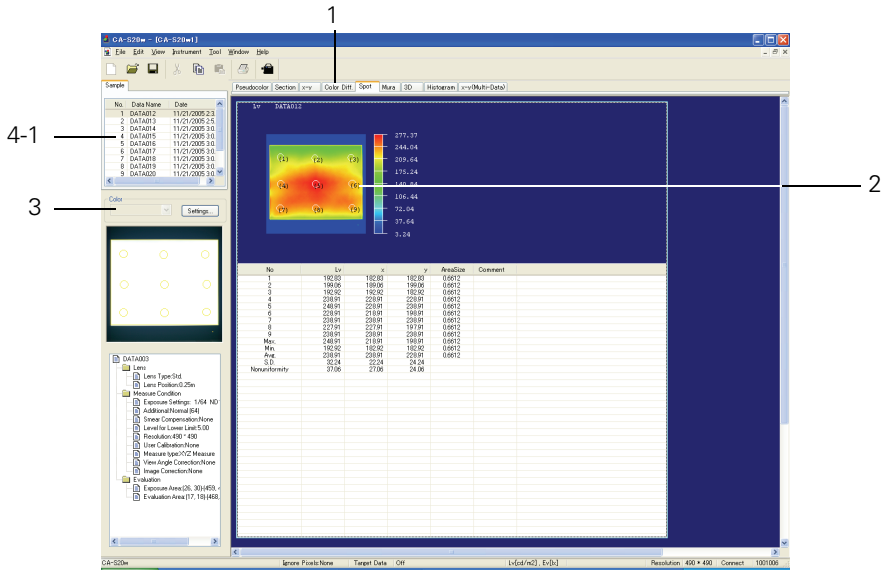
5. Click the 'Measure' button.

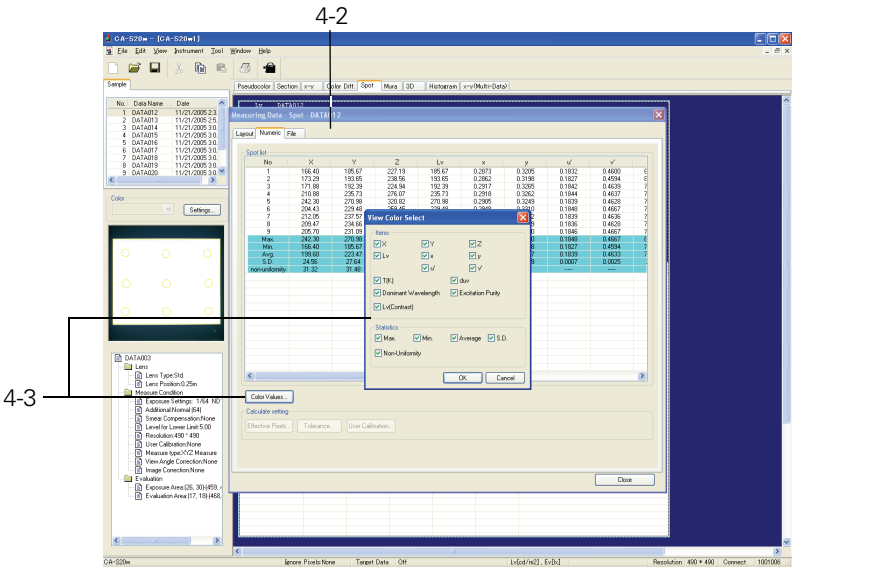
After a dark measurement is performed, the measurement result is reflected in the document window.

1) Use the page selection tabs in the document window to display the 'Spot' page.
2) Observe the spot measurement result.
3) Use the 'Color' selection combo box in the document window to select the colorimetric data to observe.
4) To change the display items for the spot measurement value:
   4)-1 Double-click on the selected measurement data on the Data list.
   4)-2 In the displayed Measureing Data-Spot-Data Name dialog box, click the 'Numeric' tab.
   4)-3 Click the 'Color' button to display the Color dialog box, and select the desired color.

Note

These changes are effective only for the selected measurement data.





2.2 Measurement (Operations)

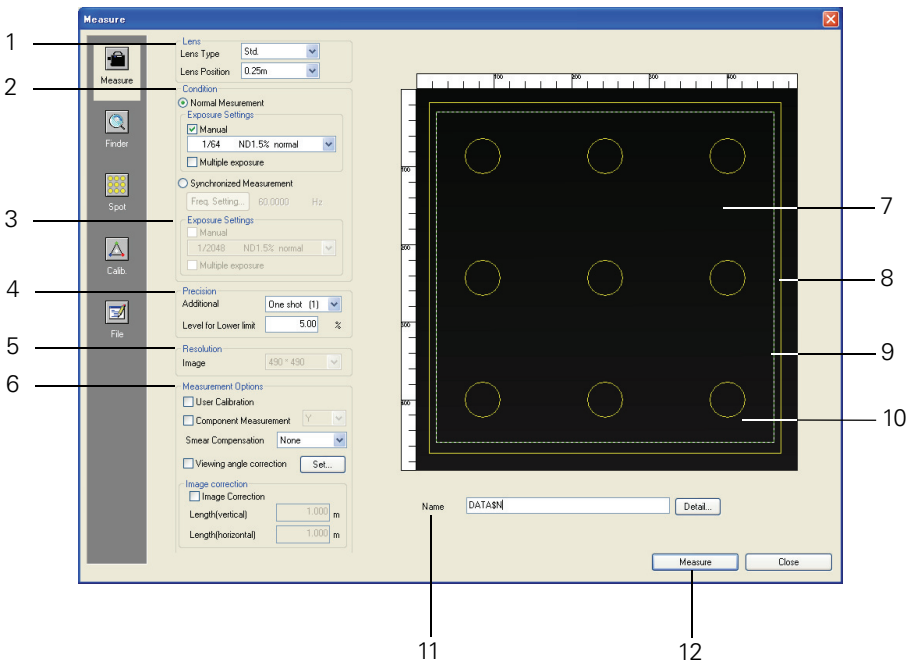
2.2.1 Measurement

To start measurement, you have to complete each setting in the Measure dialog box.

Measuring procedure

1. On the pane of the Measure screen, click the button of each option and complete the setting. (See page 23 to page 29.)
2. Click the 'Measure' button.

   Measurement starts.



Tip

- If you complete each setting in 'Measure' and click the Cancel button, the Measure dialog box closes enabling the measurement settings.
- The measurement settings are valid only for the currently opened document.
- To use a previously created measurement condition, you have to save the file. See "2.5 File Management" (pages 84-89).
- During measurements and editing, the following folders are used as the temporary storage areas for measurement data.
  Windows XP:
  C:\Documents and Settings\"User Name"\Local Settings\Temp\mcl

Windows Vista and Windows 7:
C:\Users\"User Name"\AppData\Local\Temp\mcl

- Ensure that there is sufficient free space on the drive that contains this folder.
- The user account must have access rights (write permission) to the temporary save folder. If a file save error occurs during measurement, contact your nearest computer administrator.

Measure Dialog Box - Measure Button

1) Lens

Lens Type
Used to select the lens to use for measurement.

Note
- ***If you select an incorrect lens, you cannot obtain accurate measurement results.***
- ***Some of the lenses available may not be displayed if not all the calibration files have been installed, or if they are out of date.***

Lens Position
Looking at the viewfinder view, operate the lens focus ring to adjust the focus.
After you adjust the focus, check the focus ring distance and select the distance for 'Lens position' which is the closest to this distance.
Select the distance from the drop-down list.

Tip
For the setting of measurement distance and the reading of focus ring distance, see "2D Chroma Meter CA-2500 Series Instruction Manual" or "2D Chroma Meter CA-2000 Series Instruction Manual".

2) Condition

Normal Measurement
Select this option to perform measurement in normal mode.

Synchronized Measurement
Select this option to perform measurement with internal synchronization.
Use this option to measure objects such as PDP or CRT that repeat emission intermittently.
Click the 'Freq. Setting...' button and enter the frequency of vertical synchronization in the 'Freq.' field in the Frequency dialog box.
After a frequency is entered, a selectable table is newly created depending on the frequency you have entered.

Note
The brightness of the viewfinder image changes after the 'Set' button is clicked, or after Normal Measurement is changed to Synchronized Measurement or vice versa. If the viewability of the image becomes poor, set up the optimal conditions in the 'Exposure setting' combo box.

Tip
You can enter a value between 4 and 2000 Hz.
Changing the value entered in 'Freq.' changes the values displayed for shutter speed, gain, and ND filter in 'Exposure setting'.

Note
In synchronization measurement, the integer value (rounded off) obtained by the following formula is used as the actual shutter speed (sensor exposure time).

$$100000\ \mu\ sec \times 2 \div [value\ entered\ in\ 'Freq.'] \times 2\text{^}n\ (n = 0, 1, 2, 3, ...)$$

For this reason, if a large value is entered in the 'Freq.' field, changing the value of decimal places may not change the shutter speed to be used for measurement.

[e.g.] When "2000.0000" is entered in the 'Freq.' field and "1/1000.0000 ND 1.5% nomal" is selected for the shutter speed:
The shutter speed will be 100000 $\times$ (1/1000) $\cong$ 100 μ sec.
When "1999.9000" is entered in the 'Freq.' field and "1/999.9500 ND 1.5% nomal" is selected for the shutter speed:
The shutter speed will be 100000 $\times$ (1/999.95) $\cong$ 100 μ sec, which is the same shutter speed as with the setting above.

3) Exposure Settings

Used to set the shutter speed, ND filter, and amp gain during measurement.

Manual

When this checkbox is unchecked, the CA-2500/CA-2000 sets the exposure automatically depending on the object to be measured. Use this setting for normal operations.
Check this option to fix the exposure setting.

Note

Measurement results may exceed the measurement range.

Tip

- Select the shutter speed from the combo box at the bottom.
- When 'Manual' is unselected, the CA-2500/CA-2000 determines the optimum exposure within the exposure setting frame in the viewfinder screen.
  When the viewfinder image contains both a bright and dark emission area and you want to evaluate the dark emission area, set the exposure setting area to the dark emission area for measurement.

Multiple exposure

When measuring an object in which high luminance and low luminance areas are mixed like a high contrast display, the viewfinder image contains both bright and dark emission areas. When you want to evaluate them as one measurement data item, use this option.
Multiple exposure measurement determines the exposure setting (several stages) in the actual measurement based on the measurement setting obtained by preliminary measurement.

Tip

- For the setting of 'Additional', 'One Shot(1)' or 'Ultra Fast(4)' is recommended.

Note

You cannot check both 'Manual' and 'Multiple exposure' at the same time.

4) Precision

Additional

Sets the number of additions to the CA-2500/CA-2000's outputs, taking into consideration the effect of noise.
Measurement takes longer for some settings than others.
In order of least to greatest effect of noise on measurement results, the settings are: One Shot (1) $\Rightarrow$ Ultra Fast (4) $\Rightarrow$ Fast (16) $\Rightarrow$ Normal (64) $\Rightarrow$ High acc. (256).
In order of greatest to least amount of time required, the settings are: One Shot (1) $\Rightarrow$ Ultra Fast (4) $\Rightarrow$ Fast (16) $\Rightarrow$ Normal (64) $\Rightarrow$ High acc. (256).

Level for Lower limit
Areas under a fixed brightness level are processed as "Under".
For example, when measuring an object that contains both a bright and dark image, such as characters on a car speedometer, the data from areas with a small amount of light vary widely due to exposure shortage. Displaying the data may make the result difficult to see. By setting the 'Level for Lower limit', you can process areas that fall short of the amount of light in the imaging range as "Under". For an image that has been judged as "Under", the luminance and chromaticity are not calculated and the result is not displayed. However, in some cases, obtaining data takes precedence over performing the "Under" process, even if the data on areas with a small amount of light vary widely. For example, when observing characters on a car speedometer, as mentioned above, you can ascertain the clarity of the characters by observing the state of the bright area and dark area. In this case, you can obtain data on areas with a smaller amount of light by adjusting the 'Level for Lower limit' setting.
Enter a value between 0 and 100.

Note

- ***When the value is 0%, the 'Level for Lower limit' function does not work.***
- ***When the number of additions is 1 and 'Level for Lower limit' is 100%, all measurement data are judged as "Under".***
- ***100% does not represent the peak level but represents the saturation level. Consequently, under certain exposure conditions, all data may be judged as "Under" even with the setting of 70%.***

Tip

- If you increase the number of additions with the same setting value in 'Level for Lower limit', you can obtain data on areas with a smaller amount of light.
- Instead of setting a specific threshold value as a measurement condition beforehand, you can specify pixels to be ignored based on the obtained measurement data. For details, refer to "Specifying pixels to be ignored in the image inside the evaluation area" (page 52).

5) Resolution

Used to set the resolution of the instrument.

490 * 490
Measures the object with 490 × 490 measurement points.

980 * 980
Measures the object with 980 × 980 measurement points.

196 * 196
Measures the object with 196 × 196 measurement points.

Note

One document file is able to store measurement data with one resolution type.

Tip

- When the '980 * 980' setting is selected, it may take a longer software processing time to observe the measurement results.
- When saving the results obtained with the '980 * 980' setting, the file size becomes very large. Be sure to check the available memory space.

6) Measurement Options

User Calibration
Performs a measurement based on the settings configured on the screen, and it is displayed by clicking the ‘Calib.’ button on the pane of the Measure screen.
For ‘User Calibration’, see “User Calibration” in the description of the “2D Chroma Meter CA-2500 Series Instruction Manual” or “2D Chroma Meter CA-2000 Series Instruction Manual”.

Component Measurement
The CA-2500/CA-2000 normally uses three filters, X, Y and Z, for measurement. To save measurement time, select only the filter required. For example, when only luminance is to be measured, select ‘Y’.

Note

Select this option only for relative comparison because the performance of the CA-2500/CA-2000 is guaranteed only when the filter measurement is disabled.
Measured values differ depending on whether filter measurement is enabled or disabled.
If you require absolute values, disable filter measurement.

Smear Compensation
When any bright light source exists within the image capture area, vertical streaks may appear from the light source due to the CCD sensor’s characteristics. These streaks are called smears.
The CCD sensor of the CA-2500/CA-2000 includes smear correcting pixels to correct this. Using the data from these pixels to correct smears on the image, reduces the influence of the generated smears.
The performance of the CA-2500/CA-2000 is guaranteed when smear correction is disabled.

None
Smear correction is disabled.

Simple
Removes generated smears by subtracting the data from the smear correcting pixels from the data of the captured image. The entire image after the correction may have slight vertical streaks due to the noise component of the smear correcting pixels.

Linear
Smoothing is applied to the data from the smear correcting pixels before it is subtracted from the data of the captured image. This can suppress the vertical streaks generated by smear correction. If, however, there are two adjacent areas within the same screen that greatly differ in the intensity of emitted light, the smoothing error may become greater near the border of these areas, resulting in vertical streaks along the border.

Note

Smear correction is disabled for the exposure setting with a shutter speed slower than 1/64.

Viewing angle correction
When measuring a display or other objects in which a view angle is generated, all pixels can be corrected to the values obtained by measuring the measurement target from the vertical direction. Check this option when you want to perform this correction.
Clicking the ‘Set...’ button displays the ‘Viewing angle correction’ dialog box to set the correction coefficient. For details, see “Viewing Angle Correction Settings” (page 53).

Note

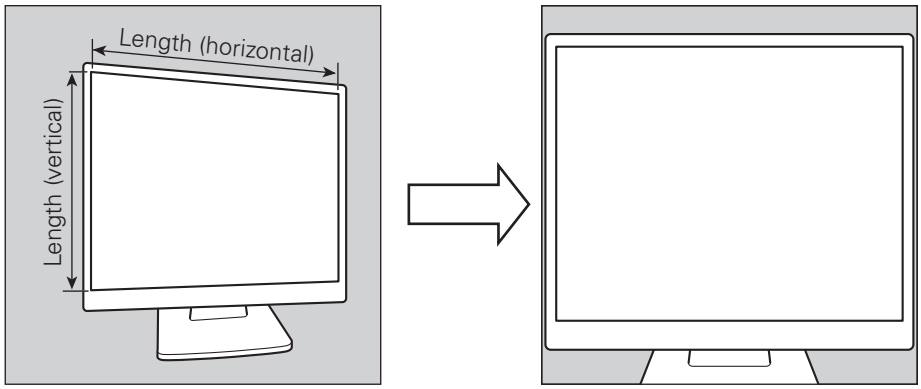
When this box is checked, the measurement result multiplied by the correction coefficient can be obtained as the measurement data.

Image Correction
Select this option to measure a rectangular measurement target with a bezel (a frame surrounding the emission area), such as a display. When evaluating the view angle characteristics of such a measurement target, a rectangular measurement target is displayed as a trapezoid because it is seen

obliquely. When this option is selected, this trapezoid image can be corrected to a rectangle image as seen from the front.

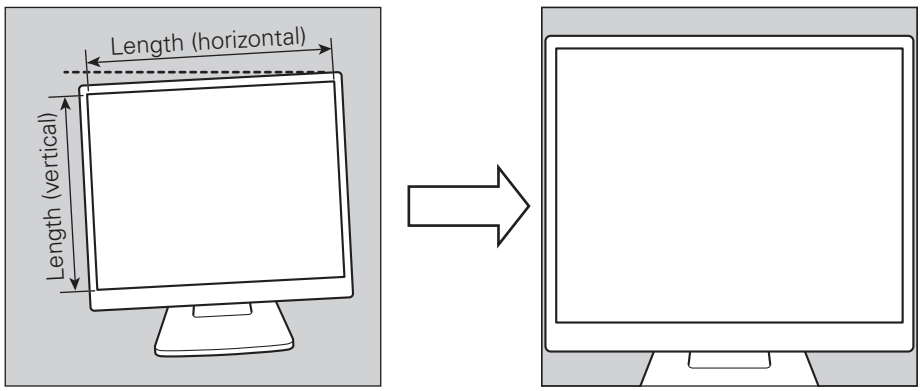
Tip

The image correction bases the calculation on the aspect ratio of the rectangle. It functions normally when the swing angle of the measurement target is within the range in which the heigt and width of the uncorrected image can be distinguished. In the case of a display with 4:3 aspect ratio, correction can be performed for a swing angle of up to approx. 40 degrees.



Actual measurement　　Effect of correction

In addition, there are cases where the measurement target is displayed in an inclined manner due to the misalignment of installation between the measurement target and the CA-2500/CA-2000. When this option is selected, the image can be corrected so that the measurement target and the display screen of the CA-2500/CA-2000 are parallel in the vertical and horizontal directions.



Actual measurement　　Effect of correction

Check the check box when you want to perform this correction.

Length (vertical)

Enter the vertical length of the measurement target between 0.001 and 100.000 (unit: m).

Length (horizontal)

Enter the horizontal length of the measurement target between 0.001 and 100.000 (unit: m).

Tip

For the ‘Length (vertical)’ and ‘Length (horizontal)’, enter the length of the emission area (inside of the bezel). The installation rotation angle of the measurement target is calculated based on the ratio of the entered ‘Length (vertical)’ to ‘Length (horizontal)’ and the corrected image is displayed.

Note

- ***To perform 'Image correction', the value of the lens position is used. Set the lens position carefully.***
- ***There are cases where 'Image correction' cannot be performed when the surroundings are bright or the bezel is a bright color such as white or is transparent.***
- ***You cannot check 'Viewing angle correction' and 'Image Correction' at the same time.***

Tip

When you check 'Image Correction', set the spot measurement frame after measurement.

7) Viewfinder View

Displays the range to be measured in real time. A black and white screen.
Check the range to be measured.

8) Evaluation Area Frame (yellow)

Used to specify the range for graph display and calculation among the measurement data sent from the CA-2500/CA-2000.
Perform position adjustment in the screen which is displayed by clicking the 'Spot' button in the pane. (Refer to page 35.)
When spot frames for multi-point measurement have been set, the spot positions will be adjusted accordingly when you adjust the frame position.

9) Exposure Setting Frame (green)

The area for calculating the optimum measurement conditions, when 'Auto' has been selected for the exposure setting. You can use the mouse to adjust the position of the frame.

Tip

When the evaluation area frame and exposure setting frame overlap each other, you cannot select a desired frame with the mouse. In this case, select the other frame with the mouse, select 'Send to Back' from the right-click menu, and click the desired frame.
Immediately after 'Measure' is started, you can select the 'Evaluation area frame' on a priority basis.

Note

If you click inside the viewfinder view several times after changing the size of the evaluation area frame or exposure setting frame, the mouse cursor may become out of control. If this happens, use the keyboard to change to a software application other than CA-S20w. This recovers control of the mouse cursor and you can return to CA-S20w.
One way to change to another software application with the keyboard is to press the Windows key.

10)Spot Frame for Multi-Point Measurement (yellow)

The range for calculation and assignment of spot measurement.
You can use the mouse to adjust the position and size of the frame.

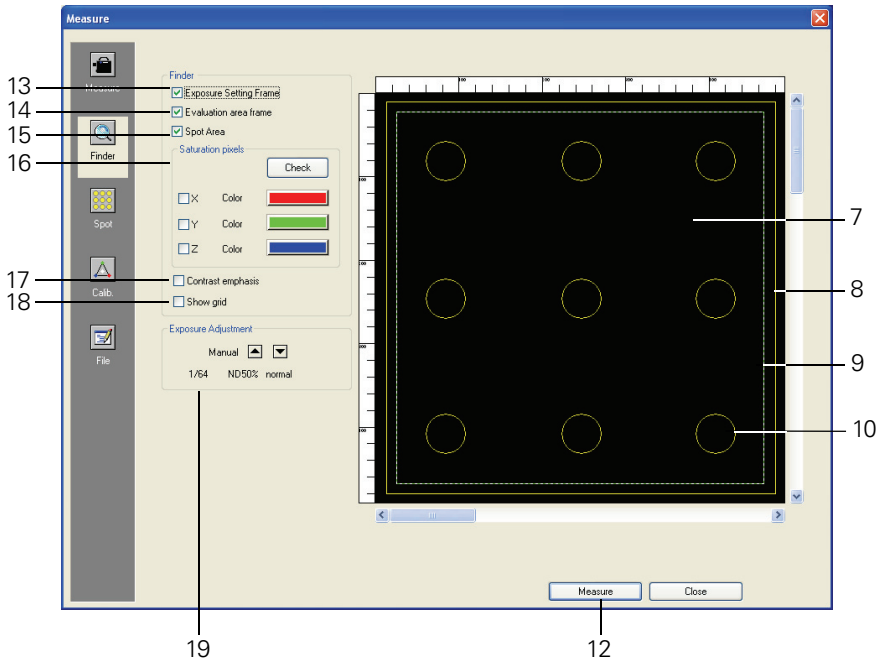
11)Name

Used to name measurement data. For more information, see "Naming Data, Entering Comments" (page 30).

12)Measure button

Starts measurement.

Measure Dialog Box - Finder Button



13)Exposure Setting Frame
When this box is checked, the optimum exposure setting frame is displayed.

14)Evaluation area frame
When this box is checked, the evaluation area frame is displayed.

15)Spot Area
When this box is checked while a viewfinder image is being loaded, the spot measurement frame is displayed.

16)Saturation pixels
When the X, Y, or Z checkbox is checked, the pixels that will be processed as being outside the measurement range are displayed in the corresponding color.
Clicking the 'Check' button will display the saturated pixels and freeze the viewfinder view image. When the 'Check' button changes to the 'Reset' button, click the 'Reset' button to restart the display of the viewfinder view image. The viewfinder view image can also be restarted by modifying the window. The display color can be changed by clicking the Color button.

17)Contrast emphasis
When this box is checked, the image is displayed with enhanced contrast.

18)Show grid
When this box is checked, grids are displayed.

19)Exposure Adjustment
Use these buttons when the image in the viewfinder view is too dark/bright.

2.2.2 Naming Data, Entering Comments

You can name measurement data and enter comments for the data.
Measurement data names are displayed in the 'Sample' list in the document window.
You can change the name and comments of measurement data after measurement. See "Measurement Data Properties" (page 55).

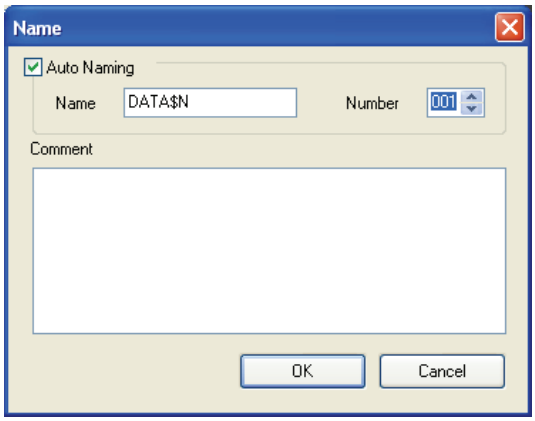
Setting procedure

1. Click the 'Measure' button on the Measure screen.

2. In the 'Name' field, enter the name you want to assign to the measurement data.

   You can enter up to 30 one-byte characters.

3. Click the 'Detail…' button and then configure the automatic numbering and comment settings.



4. Click the OK button.

Tip

- The settings are not applied until you click the OK button.
- If you click the Cancel button, the settings are canceled.

Name Dialog Box

Auto Naming

When this box is checked, data is automatically named during measurement. Specify the format of the name to be automatically assigned. The strings in the following tables are treated as special symbols. They are replaced with the string indicating the corresponding data.

String	Corresponding data
$N	Automatically created number (serial number) assigned to a sample. (The first number in the series can be specified between 0 and 999.)
$Y	Year of measurement
$M	Month of measurement
$D	Day of measurement
$h	Hour of measurement
$m	Minute of measurement
$s	Second of measurement

Enter a combination of these strings in the text box. Up to 30 one-byte alphanumeric characters can be used, including the string replaced according to the table above. If the number of characters exceeds 30, the characters are truncated from the right end.

Note

When Auto Naming is checked, 000 is added as the number that follows 999.

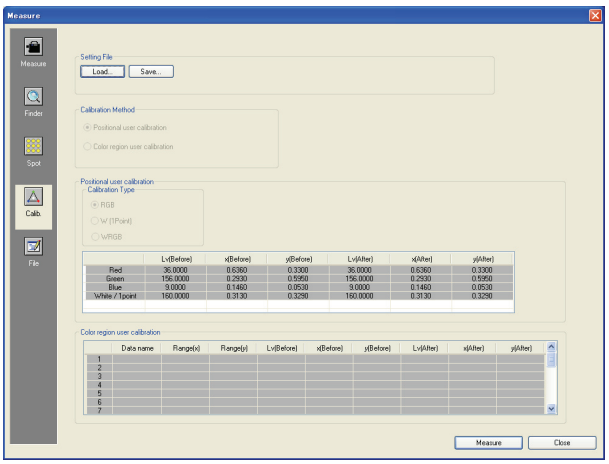
Comment

You can enter up to 256 one-byte characters.

2.2.3 User Calibration

For measurement using the user calibration function, select the calibration method and calibration information.

Setting procedure



1. Click the ‘Measure’ button on the Measure screen. Check the ‘User Calibration’ checkbox under ‘Measurement Options’.

2. Click the ‘Calib.’ button on the pane of the Measure screen.

3. When you select ‘Positional user calibration’ as the method of user calibration, set the type of user calibration.

4. Enter data for calibration calculations.

5. Click the ‘Measure’ button.

   Begins measurement and obtains the measurement results of user calibration calculations.

Measure dialog box - Calib. button

Calibration Method

Positional user calibration
The Positional user calibration is user calibration to calibrate the measurement data in the specified spot area (if the spot is not set, the entire measurement area) by using the RGBW calibration coefficient. Select it to perform this calibration.

Color region user calibration
The Color region user calibration is user calibration to calibrate the measurement data in the entire measurement area by using the calibration coefficient of the chromaticity area of the registered calibration coefficient. (For the measurement data that is outside the chromaticity area of the registered calibration coefficient, user calibration is not performed.) Select it to perform this calibration.

Positional user calibration

Calibration Type
Select the user calibration type.

RGB
Enter the data for calibration calculations in the fields under 'Red', 'Green', and 'Blue' in the list. By clicking each field twice (not double clicking), you can enter data. In the fields under '(Before)', enter measurement values before performing user calibration, and in the fields under '(After)', enter measurement values after user calibration. (The numeric values displayed in ('White/1 Point') are not used.)

W (1 Point)
Enter values only in the fields under 'White/1 Point'. (Entered values under the other fields are not used.)

WRGB
Enter values in all the fields.

Note

You can enter a value between 0.001 and 9,999,999.9999 in each 'Lv' field, and a value between 0.001 and 0.9999 (x + y < 1) in each 'x' or 'y' field.

- Click the 'Save…' button to save the settings in the file (*.uca).
- Click the 'Load…' button to read the settings of the calibration coefficients from the file.

Color region user calibration
Enter data for calibration calculations in each field of the list.
By clicking each field twice (not double clicking), you can enter data.
In the fields under '(Before)', enter measurement values before performing user calibration, and in the fields under '(After)', enter measurement values after user calibration.

Note

You can enter a value between 0.001 and 0.9999 in each Range field, between 0.001 and 9,999,999.9999 in each 'Lv' field, and between 0.001 and 0.9999 (x + y < 1) in each 'x' or 'y' field.

Tip
You can name each calibration coefficient data.

Tip

User calibration is performed within the range of (±x) and (±y) in accordance with the values entered in the Range (x) and (y) fields.

- Click the 'Save…' button to save the settings in the file (*.cuc).
- Click the 'Load…' button to read the settings of the calibration coefficients from the file.

Tip

The Color region user calibration file (*.cuc) can also be created from measurement data. For details, see "Creating a Color Region User Calibration File" (page 46).

Note

- ***'Color region user calibration' cannot be performed for measured data. Perform the setting of 'Color region user calibration' before measurement.***

Note

- ***If the entered value cannot be used for calibration calculations, a message is displayed.***
- ***When you perform measurement using "User Calibration", the measurement values are saved as values after "User Calibration" calculations.***

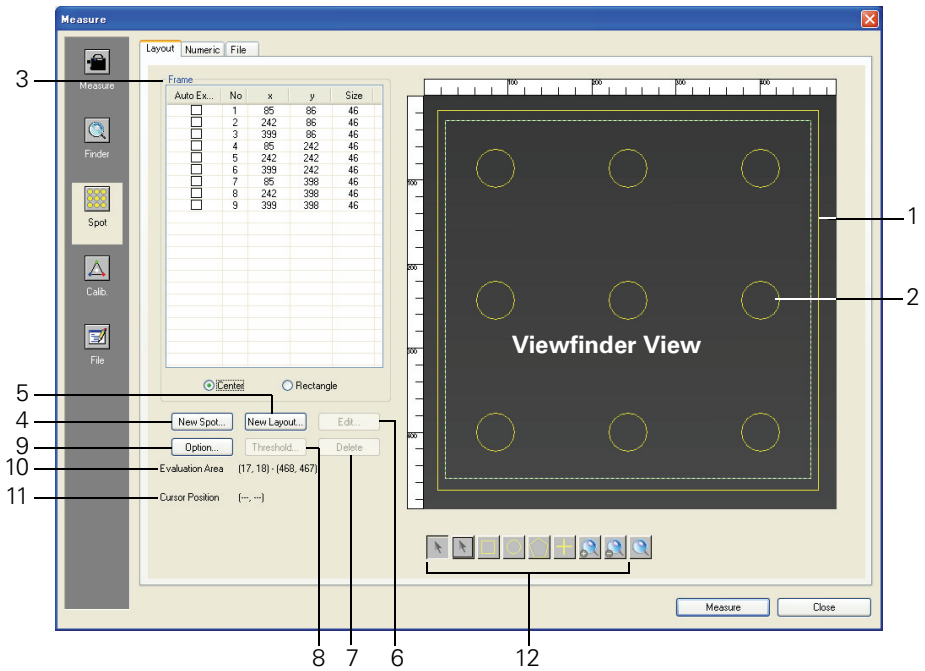
2.2.4 Spot Measurement

Used to set spot frames for calculations during spot measurement.
The spot frame settings can be changed after measurement. For details, see “Spot Measurement Settings” (pages 42 to 45).

Tip
When ‘Image Correction’ is checked, set the spot measurement frame after measurement.

Measuring procedure

1. Click the ‘Spot’ button on the Measure screen, and click the ‘Layout’ tab.
2. Make settings for ‘Spot’.



3. To save the spot settings in a file, click the ‘File’ tab and then click the ‘Save’ button.

Measure dialog box - spot button

1) Evaluation area frame (yellow)
Used to specify the range for graph display and calculation among the measurement data sent from the CA-2500/CA-2000.
Clicking the icon enables position adjustment with the mouse.
This range is used as the reference for determining the position of the spot measurement frame.
- When the frame is moved or resized, the spot positions are also adjusted accordingly.
- When new spots are aligned, they are automatically aligned within the evaluation area.

2) Spot Frame for Multi-Point Measurement (yellow)
The ranges for performing spot calculation.
You can use the mouse to move or resize the frames.

Tip
The frames can’t extend outside the evaluation area frame.

3) Frame

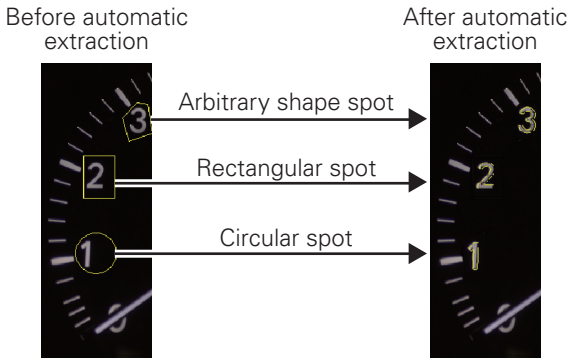
The list displaying the coordinates of the spot measurement frames.
For the spot measurement frame for which the 'Auto Extraction' check box is checked, the evaluation target is only the portion in which the amount of light exceeds a certain level within the spot measurement frame. Set the threshold value of the amount of light to be evaluated in the Set threshold dialog box displayed with the (8) 'Threshold...' button.

Tip

When you check the 'Auto Extraction' check box in the arbitrary shape spot, the shape of the spot measurement frame is extracted by the measurement data and the threshold value.

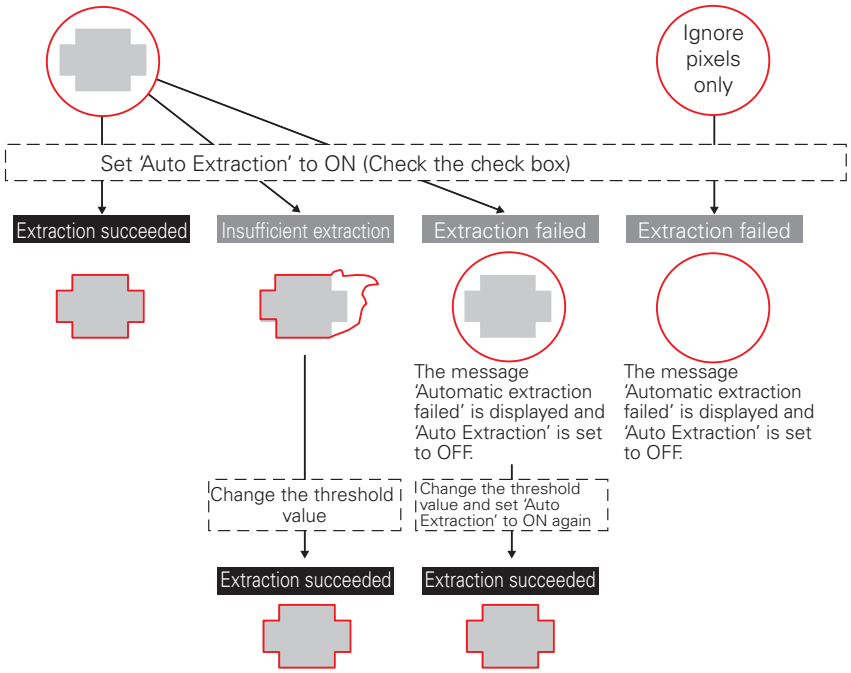
Note

- ***The spot measurement frame extracted automatically is shifted to the right on the screen by one pixel.***
- ***If there is no data in the spot measurement frame, automatic extraction cannot be performed.***



Tip

If the difference in luminance is small in the data in the spot measurement frame, there are cases where automatic extraction fails. In this case, change the threshold and try automatic extraction again.



Note

If automatic extraction is performed, it may take a long time to display the result, depending on the performance of your PC.

4) New Spot button

Displays a dialog box used to create a new circular or rectangular spot measurement frame by entering its coordinates.

5) New Layout button

Deletes all existing spot measurement frames if any, and then displays a dialog box used to create a new set of aligned circular or rectangular spot measurement frames.

6) Edit button

Displays a dialog box used to edit the selected circular or rectangular spot measurement frames. This button is enabled when a spot is selected in the positioned spot measurement frame or in the coordinates list.

7) Delete button

Deletes a spot measurement frame. This button is enabled when a spot is selected in the positioned spot measurement frame or in the coordinates list.

8) Threshold

Displays the Set threshold dialog box to set the threshold to perform 'Auto Extraction' for the selected spot measurement frame.

9) Option button

Displays the Option dialog box. By double clicking the button, you can set the size and the shape of the spot measurement frame to be added.

10) Evaluation Area Size Display

Displays the currently set evaluation area.

11) Cursor Position

Displays the coordinates of the cursor position.

12) Spot tools

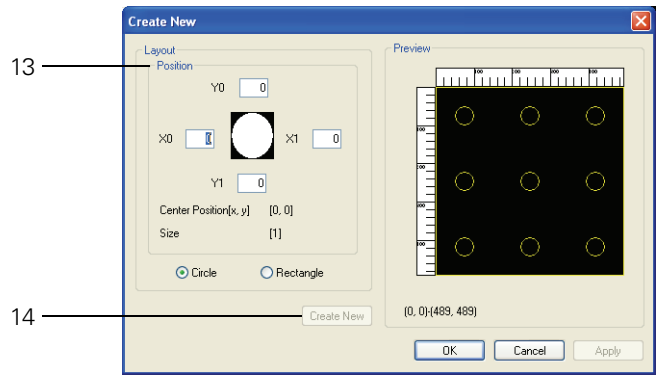
These tool icons are used for operations concerning spot measurement frames and images.

- Select a spot measurement frame.
- Select an evaluation area frame.
- Position a rectangular spot by dragging the tool icon.
- Position a circular spot by dragging the tool icon.
- Position an arbitrary shape spot by clicking the tool icon. By repeatedly clicking, you can draw a polygonal shape. At the last vertex, double click the mouse button. You can specify a shape with up to 100 vertexes.
- Place a circular or rectangular spot measurement frame created under the conditions specified with the 'Option' dialog box. The frame will be placed with its center aligned at the double-clicked position.
- Enlarge an image.
- Reduce an image.
- Restore an enlarged image to the original size.

Note

The position and size of each spot may be adjusted by the software's internal calculations.

Create New dialog box



13)Position

Enter the coordinates of a new circular or rectangular spot measurement frame.

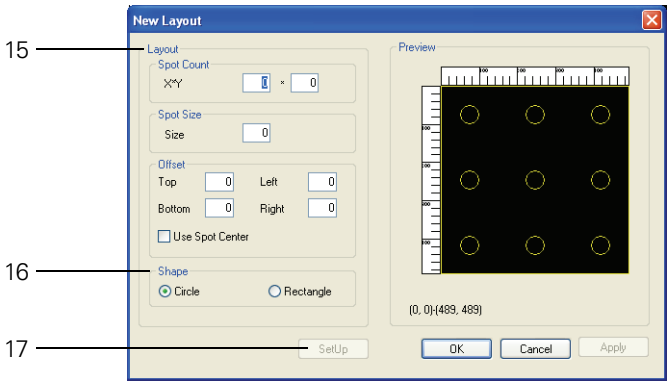
Tip

When a user scale has been set, use the scale to input the values.

14)Create New button

Displays a spot measurement frame based on the entered values.

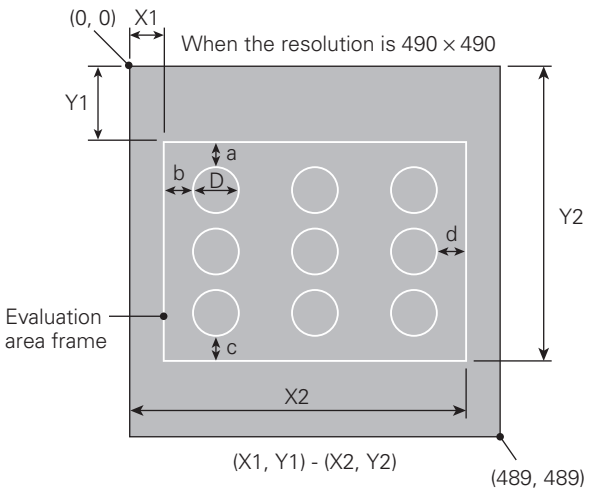
New Layout dialog box



15)Layout

Automatically generates a circular or rectangular spot measurement frame.

Spot Count
Sets the number of spots. You can set up to a total of 2500 spot frames.



Note

Measuring a large number of spots at a resolution of 980 * 980, consumes a lot of memory depending on the number of data items per file. When a file reaches 25 measurement data items, it is recommended to save the file, close it, and then create a new one.

Note

When many spots are set and they overlap, it may take some time before the result is shown depending on the performance of the PC.

Spot Size
Sets the spot frame diameter or side length. (D in the figure on the right)
The maximum size that can be set is (evaluation area size – offset) ÷ (number of spots).

Offset
Sets the amount of offset (gap size) from the evaluation area.
(Top, Left, Bottom and Right refer to a, b, c and d in the figure on the right respectively.)

Tip
The size is normally expressed in measurement pixels (dots).

Note

The positions of the spots are determined by assigning higher priority to the offset at the top and left.

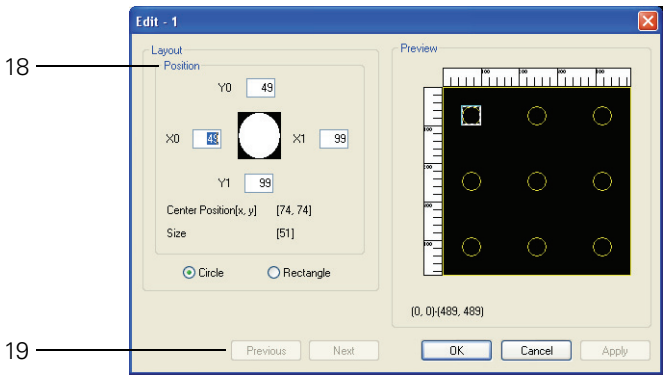
16)Shape

Circle / Rectangle
Used to select the spot shape.

17)SetUp button

The spot measurement frame is aligned and displayed according to the specified input values. Once you set the frame and then change any of the input values and click the ‘SetUp’ button, the message “OK to delete?” is displayed.

Edit dialog box



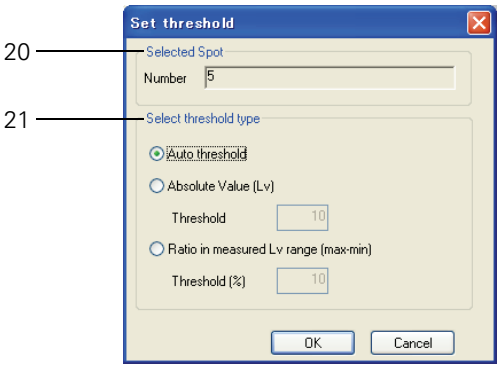
18)Position

Displays the coordinates of the selected circular or rectangular spot measurement frame.
You can change the previously specified coordinates by inputting the desired values.

19)Previous and Next buttons

This option is enabled when more than one spot measurement frame is selected. The settings for the spot measurement frames can be changed in turn.

Set threshold dialog box



20)Selected Spot

Displays the number of the selected spot measurement frame.

21)Select threshold type

Displays the number of the selected spot measurement frame.

Auto threshold

The CA-S20w calculates the threshold value at the time of automatic extraction.

Absolute Value (Lv)

The value (Lv value) entered in the ‘Threshold’ field is specified as the threshold value. Enter a numeric value between 0 and 9,999,999.9999.

Ratio in measured Lv range (max-min)

Of the measurement data in the spot measurement frame (Lv value), specify the ratio in the ‘Threshold’ field with the maximum value as 100 and the minimum value as zero. You can enter a value between 0 and 100.00.

Note

Set the evaluation area before setting spots.

- ***When 'Auto Extraction' is not performed at a circular or rectangular spot***
  If you set spots and then resize the evaluation area, the size and positions of spots may be changed as follows:

  If the evaluation area has been reduced:
  The size of spots becomes smaller, according to either the height or width of the evaluation area, whichever has been reduced with a higher ratio.

  If the evaluation area has been enlarged:
  The size of spots becomes larger, according to either the height or width of the evaluation area, whichever has been enlarged with a smaller ratio.

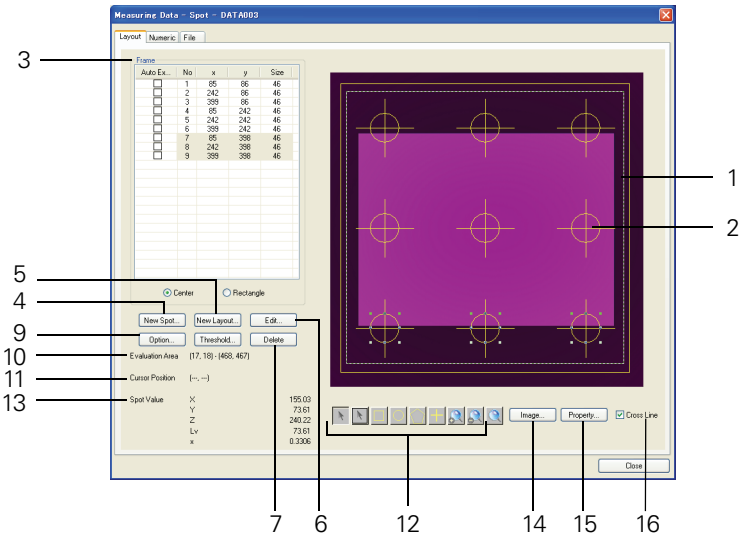
- ***When 'Auto Extraction' is performed and when an arbitrary shape spot is used***
  If an automatic extraction spot or an arbitrary shape spot exists, the evaluation area is fixed and it cannot be changed.

2.2.5 Spot Measurement Settings

When you select measurement data from the measurement data list and select 'Spot Setting' in the right-click menu, the Measuring Data-Spot-Data Name dialog box is displayed.
If you select two pieces of measurement data while holding down the Shift key, you will select all the measurement data between the two. In this case, the Measuring Data-Spot-Data Name dialog box will show the details of the last measurement data in the list.
The Measuring Data-Spot-Data Name dialog box allows you to choose various settings for observing the measurement data with spot objects.
The settings specified in this dialog box are saved individually for each piece of measurement data.

Layout tab

Specify the settings to observe measurement data with spot objects.



13)Spot Value

Displays the measurement data for the selected spot measurement frame. Five items from the left of the list on the Numeric tab are displayed.

14)Image... button

Displays the Option dialog box. You can select whether to display the viewfinder view in 'RGB' or 'PseudoColor'. You can also specify the size and color of the cross which indicates the center of the spot measurement frame.

15)Property... button

Displays a dialog box that allow you to set the properties of the viewfinder image.
When the viewfinder image is displayed with 'RGB', the contents of the 'View' tab are the same as those shown in the 'Image' frame of the pseudocolor object's properties (except that 'Display Only Evaluation Area' is not displayed). See page 100. The contents of the 'Setting RGB View' tab are the same as the properties of the RGB object. See page 120.
When the viewfinder image is displayed with 'PseudoColor', the contents of the 'Setting Image' tab are the same as the properties of the pseudocolor object. See page 100. The contents of the 'View' tab are the same as those shown in the 'Image' frame of the pseudocolor object's properties. See page 100.

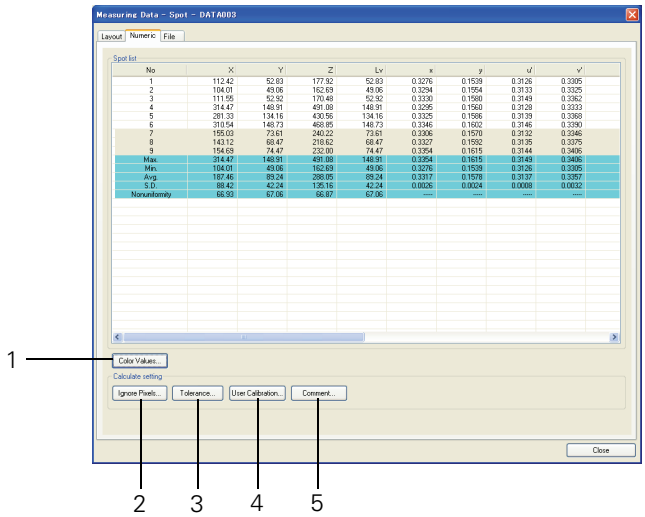
16)Cross Line

When this option is checked, a cross is displayed to indicate the center of a circular or rectangular spot measurement frame.

Options 1 to 12 are the same as the options displayed on the screen when the 'Spot' button in the Measure dialog box is clicked. See page 35.

Numeric tab

Displays measurement data for each spot measurement frame. This tab is used to set the display items and the calculation for individual spot measurement frames.



1) Color Values... button

Displays the View Color Select dialog box which is used to specify items displayed below the spot objects.

Note

The Area (cm^2) is an approximate value obtained by using the value of the lens position. If the lens position is 'inf', the area is displayed as '– – – –'.

Tip

The standard deviation is calculated using the following formula where n is the number of spots, xi (i = 1, 2, ..., n) is the displayed value for the spot, and $\overline{X}$ is the average.

$$\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(Xi-\bar{X})^2}$$

Calculate setting

Used to configure various settings for the spot measurement data selected in the list. You can perform user calibration or set the tolerance for individual spot frames for multi-point measurement. By selecting two pieces of spot measurement data while holding down the Shift key, you will select all the measurement data between the two. You can add selected data by selecting spot measurement data while holding down the Ctrl key.

2) Ignore Pixels... button

This button is enabled when spot measurement data is selected in the list. Clicking this button displays a dialog box to specify pixels to be ignored for spot calculation.
After the setting is made, the pixels with an amount of light lower than or equal to the threshold value (%) are treated as ignored pixels for the measurement data inside the spot measurement frame. The threshold value is set as a percentage with the assumption of the maximum amount being 100 and the minimum amount being 0.
When the threshold value is 100%, all pixels inside the spot measurement frame are ignored. When the value is 0%, the pixels with the minimum amount of light inside the frame are ignored.

3) Tolerance... button

This button is enabled when spot measurement data is selected in the list, and displays a dialog box that allows you to set the tolerance.
Once set, the selected measurement data is judged. When the result is NG, the cells of the measurement data of the spot frame and the spot object are shown in red.

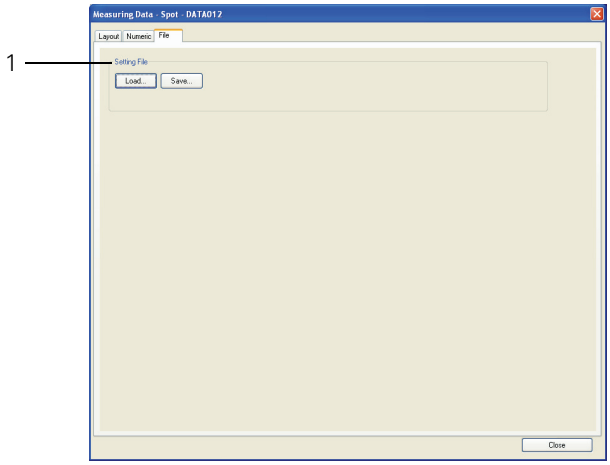
4) User Calibration... button

This button is enabled when spot measurement data is selected in the list, and displays a dialog box that allow you to set the user calibration. The setting procedure is the same as that for the user calibration of an entire screen. See page 32.

5) Comment... button

This button is enabled when spot measurement data is selected in the list. Clicking this button displays a dialog box to specify a comment for the spot measurement data. The comment can be entered with up to 10 one-byte characters.

File tab



1) Setting file

- Click the ‘Save...’ button to save the setup data in a file.
  This allows you to share the setup data or use the predefined setup information for other measurement data.

Tip

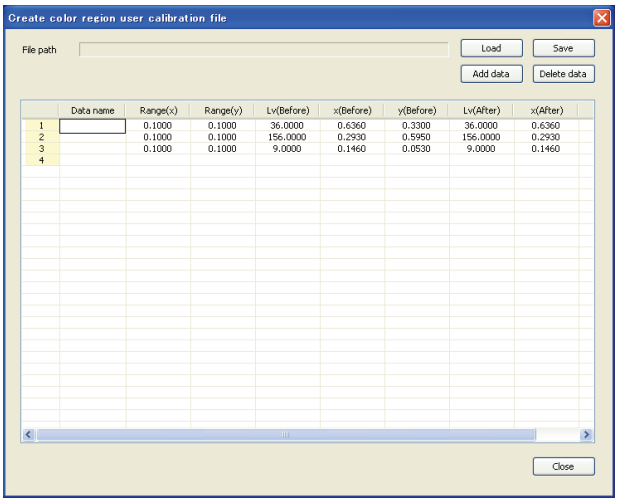
When saving spot settings, save them in a file with a name related to the measurement data. Note that a file saved with a different resolution cannot be read.

- Click the ‘Load…’ button to read out the setup data from a file.

2.2.6 Creating a Color Region User Calibration File

The calibration coefficient used for the Color region user calibration can be created and saved as a user calibration file. To do this, click 'Create color region user calibration file' from 'Tool' on the menu bar on the main screen.

Create color region user calibration file dialog box



Enter data for calibration calculations in each field of the list.
In the fields under '(Before)', enter measurement values before performing user calibration, and in the fields under '(After)', enter measurement values after user calibration.
When you click the 'Add data' button, the Add color region user calibration data dialog box appears. From this dialog box, the currently displayed measurement data can be added as data (Before calibration).
By selecting data (row) in the list and clicking each field, you can enter and edit data.
In the field '(After)', you can enter measurement data measured with a spectrophotometer such as the CS-2000. When you copy a character string consisting of three data items from Excel or other applications and paste it in the 'Lv (After)' field, they are entered in the fields 'Lv (After)', 'x (After)', and 'y (After)'.

Note

- ***You can enter a value between 0.001 and 0.9999 in each Range field, between 0.001 and 9,999,999.9999 in each 'Lv' field, and between 0.001 and 0.9999 (x + y < 1) in each 'x' or 'y' field.***
- ***If the entered value cannot be used for calibration calculations, a message is displayed.***

Tip

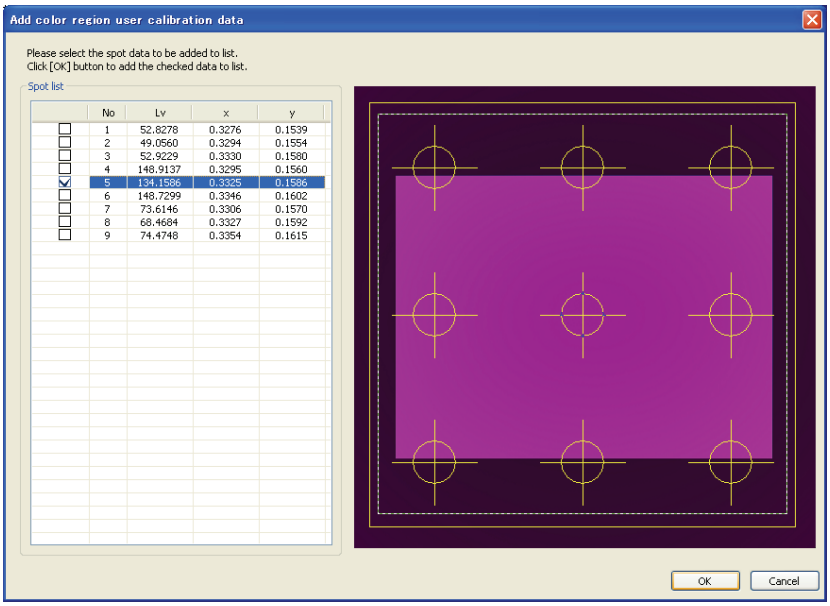
- You can name each calibration coefficient data.
- User calibration is performed within the range of (±x) and (±y) in accordance with the values entered in the Range (x) and (y) fields.

- When you select data (row) in the list and click the 'Delete data' button, the selected data is deleted.
- Click the 'Save' button to save the settings as the Color region user calibration file (*.cuc).
- Click the 'Load' button to read the settings of the calibration coefficients from the file.

Tip

When performing user calibration before performing measurement, the color region user calibration file (*.cue) can be read out by clicking the 'Calib.' button on the pane of the Measure screen and then clicking the 'Load…' button. See 'User Calibration' (page 32).

Add color region user calibration data dialog box



When you select spot data used for calibration data from the list and click the OK button, calibration data is added to the list of the Create color region user calibration file dialog box.

2.2.7 Performing Continuous Measurement

Measurements are automatically repeated at specified intervals, and the measurement data for each spot frame is displayed in a trend graph.
This is done with the automation function using Excel's macro program.

Note

For Excel 2010, this function operates on the 32-bit version of the software. This function does not operate on the 64-bit version of Excel 2010.

Preparation 1

Select 'Regional and Language Options' in the Control Panel of your OS, and specify the time format to 24-hour indication.

Preparation 2

Set the macro security level of Excel installed on the PC to 'Medium'.

1. Start Excel.
2. Select *Tool* - *Option* from the menu.
   The Option dialog box appears.
3. Click the 'Security' tab and click the 'Macro Security' button.
   The Security dialog box appears.
4. On the 'Security Level' tab, select 'Medium' and click the OK button.
5. In the Option dialog box, click the OK button.

Note

The macro security setting is retained in Excel. If you select the Medium level only when you use the automation function of CA-S20w, reset the setting to the required level after the operation.

Preparation 3

Open the document file of CA-S20w and connect the PC to the instrument. The document file should not contain any measurement data.

Measurement procedure

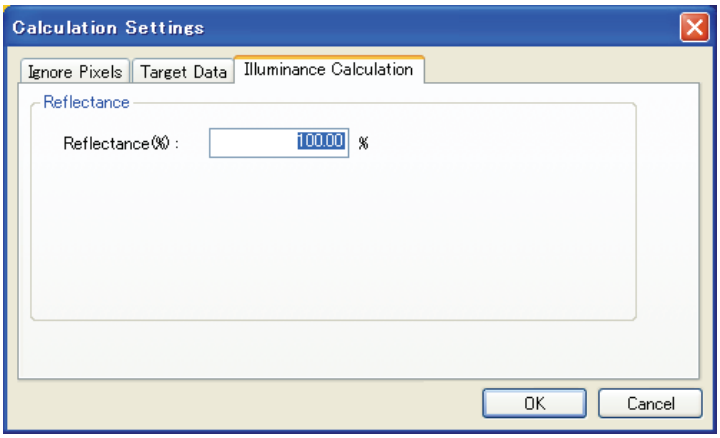
1. In the start menu, select All Programs and then select KONICAMINOLTA - CA-S20w - Continuous.
   Excel starts and the Security Warning dialog box appears.
2. Click the 'Enable Macros' button.
   Excel's continuous measurement program starts.
3. On the Excel worksheet, click the 'Continuous Measurement' button.
   The Continuous Measurement dialog box appears.
4. Click the 'New' button.
   The New dialog box appears.
5. Specify the start time, the measurement interval and the number of measurements, and then click the OK button.
6. In the Continuous Measurement dialog box, click the 'Start' button.

The instrument waits until the specified start time arrives. When the time arrives, it starts continuous measurement.
When continuous measurement finishes, the data is displayed on the worksheet. The data is also shown in the document file of CA-S20w.
When spot frames have been set, their data is retrieved and the trend graph is updated on each occasion.
You can register the continuous measurement settings with the Work List or save them in a file.

2.2.8 Performing Illumination Measurement

By converting the luminance value into the illumination value, the luminance of the measurement target can be measured from the measurement value (luminance) with the CA-2500/CA-2000.
Select 'Illumination' from the 'Color' selection combo box on the main screen and select the 'Illuminance Calculation' tab in the 'Calculation Settings' dialog box that can be displayed by clicking the 'Settings' button to the right of the 'Color' selection combo box.
This setting is saved for the whole document instead of being saved for each measurement data.
The settings saved here are saved for the whole document instead of being saved for each measurement data.

Calculation Settings dialog box - Illuminance Calculation tab



Reflectance (%)
Set the data of the reflectance used for conversion into the illumination. Enter the reflectance of the measurement surface of the measurement target between 0.01 and 100.00.

Tip
The illumination is calculated using the following formula.

$$\text{Illumination (Ev)} = \frac{\text{Luminance (Lv)} \times \pi}{\text{Reflectance}}$$

2.2.9 Calculation Using Measurement Data as Target Data

You can use one measurement data saved in the document as target data to calculate other measurement data (contrast calculation and backlight cancel calculation).
To do this, click the 'Settings' button to the right of the 'Color' selection combo box on the main screen and select the Target Data tab in the displayed Calculation Settings dialog box.
This setting is saved for the whole document instead of being saved for each measurement data.

Contrast calculation

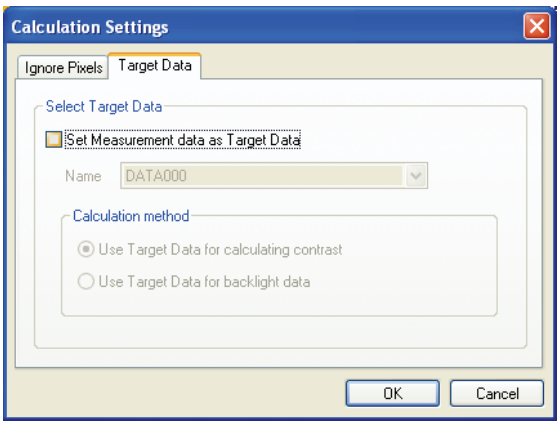
After target data is saved, Lv(Contrast) is enabled in the 'Color' selection combo box. When you select it, the contrast between the target data and selected measurement data is calculated and displayed.
Lv (Contrast) is calculated by the following formula:

$$\frac{\text{Lv of the measurement data}}{\text{Lv of the target data}} \times 100$$

Backlight cancel calculation

After target data is saved, backlight cancel calculation is applied to all colorimetric data when you select measurement data.
You need to save backlight data as the target data.
For backlight cancel, see "Backlight Cancel" in the description of the "2D Chroma Meter CA-2000 Series Instruction Manual".

Calculation Settings dialog box - Target Data tab



Set Measurement data as Target Data

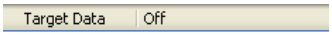
When this option is checked, the measurement data specified in the Name combo box can be used as target data. When the option is not checked, target data is regarded as unregistered and calculation is disabled.
When this option is checked, you can select one of the two calculation types. You cannot use both calculations at the same time.

Note

When 'Set Measurement data as Target Data' is checked, 'Ignore Pixels' cannot be set.

After target data is saved, the name of the target data and the calculation type are displayed on the status bar. A red mark appears on the bar to indicate that the function is enabled.

To cancel the registration of the target data, uncheck the check box and click the OK button. Off appears next to Target Data on the status bar.

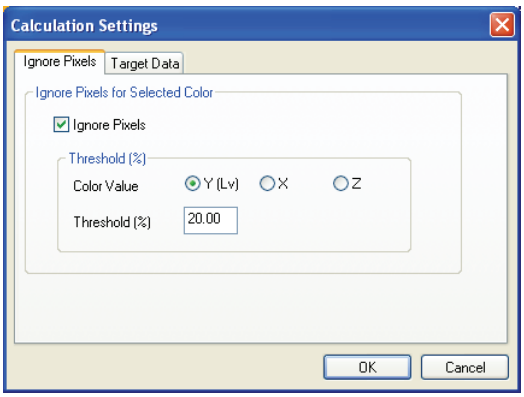


2.2.10 Specifying pixels to be ignored in the image inside the evaluation area

When measuring a target in which both bright and dark images are mixed in the evaluation area, such as characters on a car speedometer, the data from areas with a small amount of light vary widely due to exposure shortage and displaying such data may make the result difficult to see. By setting "ignored pixels", you can process areas with an amount of light less than specified as "Under". For the pixels that have been judged as "Under", the luminance or chromaticity are not calculated and the result is not displayed. These pixels are also excluded from the statistics calculation.

In the main screen, click the 'Settings' button to the right of the 'Color' selection combo box, and select the Ignore Pixels tab from the displayed Calculation Settings dialog box.
The settings in this dialog box are stored for the document, not for the measurement data.

Calculation Settings dialog box - Ignore Pixels tab



Ignore Pixels

When this option is checked, the items for 'Threshold' are enabled and the settings are reflected in the document.

Color Value

Select one of the tristimulus values of Y (Lv), X, and Z.

Threshold (%)

Specify the percentage with the assumption of the maximum amount of light of the measurement data inside the evaluation area being 100 and the minimum amount being 0.
The pixels with an amount of light lower than or equal to the specified threshold value are treated as ignored pixels.
When the threshold value is 100%, all pixels inside the evaluation area are ignored. When the value is 0%, the pixels with the minimum amount of light inside the area are ignored.

Note

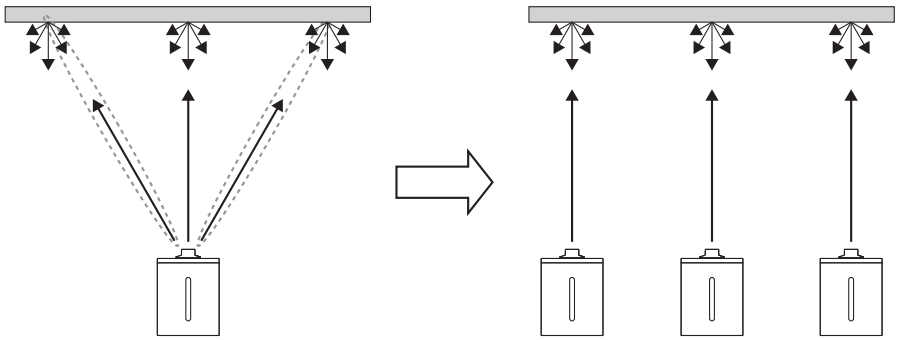
When 'Ignore Pixels' is checked, 'Target Data' cannot be set.

After the Ignore Pixels setting is made, the color value and threshold value are highlighted in red on the status bar.

When the Ignored Pixels setting is not used, Off is displayed in the corresponding space on the status bar.

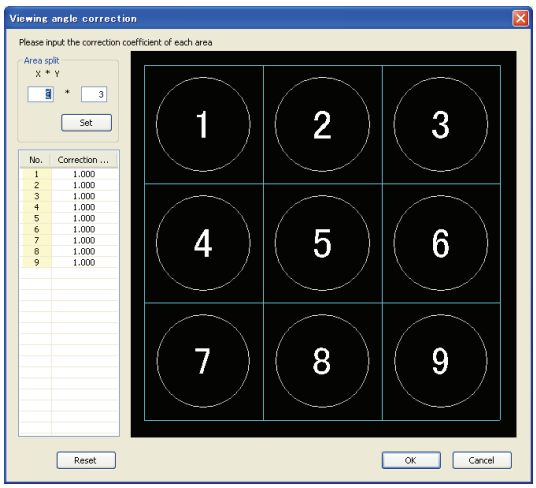
2.2.11 Viewing Angle Correction Settings

When measuring a display or other objects in which a view angle is generated, all pixels in the evaluation area can be corrected to the values obtained by measuring the measurement target from the vertical direction.



Click the 'Set' button to the right of the 'Viewing Angle correction' check box in the 'Measure' dialog box. This setting is saved for the whole document instead of being saved for each measurement data.

Viewing angle correction dialog box



Area split

Set the number of areas into which the evaluation area is divided.
Enter a numeric value between 2×2 and 25×25.
Clicking the 'Set' button sets a number for each area and displays the list for entering the correction coefficient.

Correction Coefficient

Set the correction coefficient for each area.
For the correction coefficient, enter the ratio obtained using the following formula.
By clicking each field twice (not double clicking), you can enter data.

$$\frac{\text{Measurement value by the CA-2500/CA-2000 (Lv)}}{\text{Measurement value (Lv) measured from the vertical direction with a luminance meter such as the CS-100}}$$

Enter a numeric value between 0.001 and 2.000.

Tip

By performing linear interpolation based on the correction coefficient set for each area, the correction coefficients for all pixels are obtained.

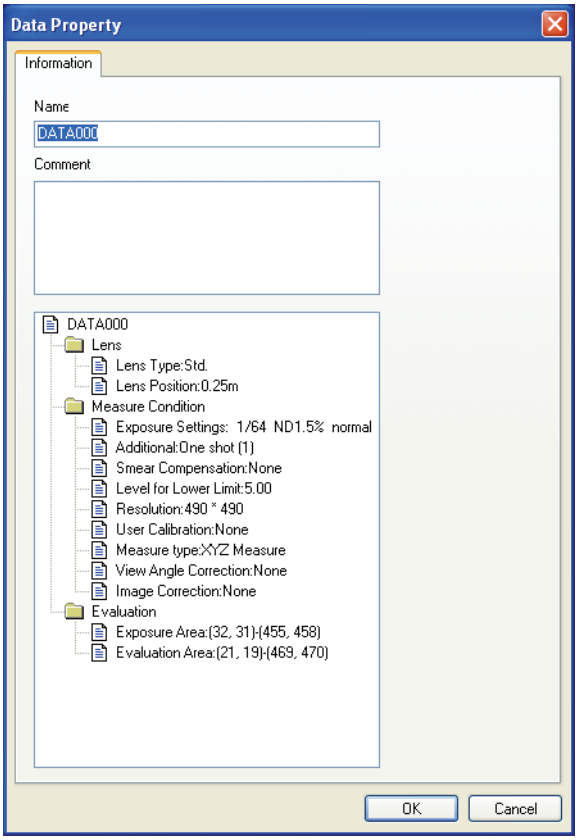
Reset

All the correction coefficients are reset to 1.000.

2.2.12 Measurement Data Properties

When you select measurement data from the measurement data list and then select 'Property' from the right-click menu, the Data Property dialog box appears.
In the Data Property dialog box, you can set information about the selected measurement data. The settings in this dialog box are saved for each measurement data.

Data Property dialog box



Name

Displays the name of the data specified at the time of measurement. This name can be edited.

Comment

Displays the comment about the data specified at the time of measurement. This comment can be edited.

Condition Frame

Displays the measurement conditions of the data specified at the time of measurement. This frame is the same as the condition frame on the main screen.

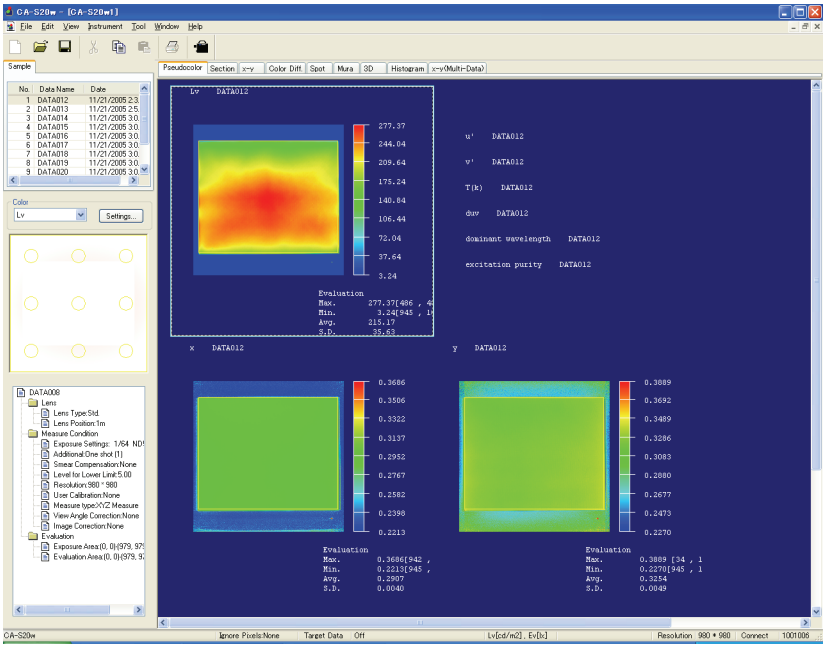
2.3 Observation

2.3.1 Displaying Measurement Data

Use the document window to observe measurement results.

2.3.2 Observing Luminance/Chromaticity Distribution [Pseudocolor Graph]

The pseudocolor graph displays measurement results.
The graph lets you observe the luminance/chromaticity distribution.



Selecting measurement data to display

1. Select ‘PseudoColor’ in the page selection tabs.
2. Select the measurement data to observe from the Sample list.

   The selected measurement data is displayed.

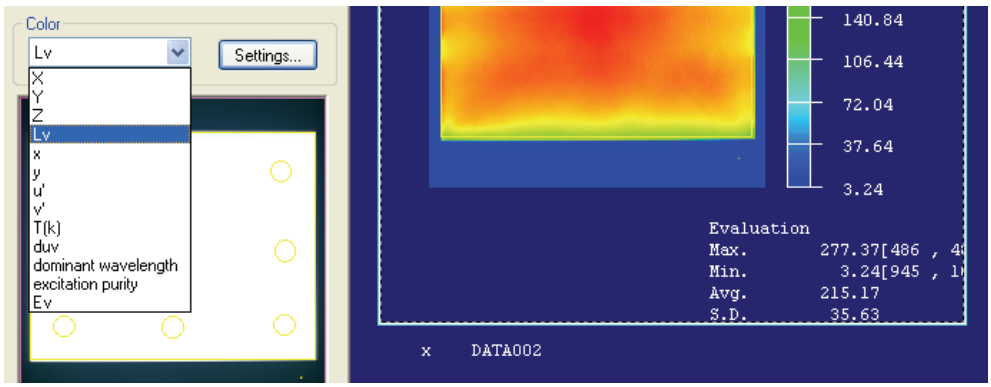
Note

When switching between measurement data, the vertical and horizontal axes of the pseudocolor graph are set to the “automatic” settings.

Selecting colorimetric data

1. Select the pseudocolor graph for which you want to change the Color setting.

2. Select the desired colorimetric data from the ‘Color’ selection combo box.



Checking value of specified location

1. Place the mouse cursor on the pseudocolor graph and left-click the mouse button while holding down the Shift key.

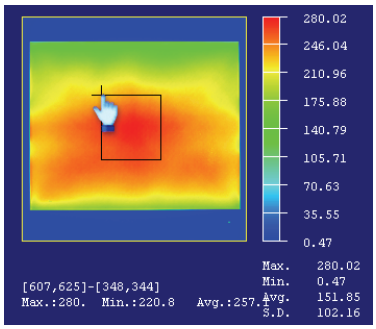
2. A ‘Mark’ is displayed at the cursor position and the coordinates and measurement values of the ‘Mark’ position are displayed under the pseudo color.

   • Up to 20 ‘Mark’ can be displayed.

Setting a temporary evaluation area

1. Place the mouse cursor on the pseudocolor graph and drag the mouse while holding down the Shift key to specify the area.

2. The coordinates of the specified area and the statistical data for the specified area are displayed below the pseudocolor graph.



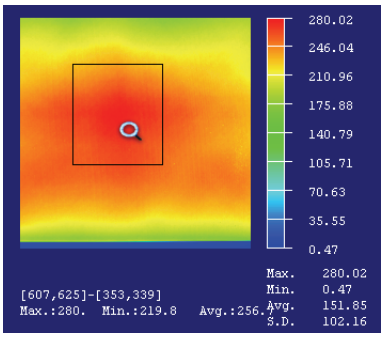
Note

When you set a ‘Mark’ after a temporary evaluation area is set, the temporary evaluation area is reset. Set the temporary evaluation area after setting ‘Marks’.

Limiting display range (Zoom In)

1. Place the mouse cursor on the pseudocolor graph and left-click the mouse button while holding down the Shift key and Ctrl key.
   You can also scroll the mouse wheel upward while holding down the Shift key and Ctrl key.

   The zoomed area is shown in pink in the data display box of the main screen. The area may not be shown when the scaling factor is large. In such a case, decrease the size of the pseudocolor object in edit mode (page 90).
   To reduce the display size after zooming in the image, place the mouse cursor on the pseudocolor graph and right-click the mouse button while holding the Shift key and Ctrl key. You can also scroll the mouse wheel downward while holding down the Shift key and Ctrl key.



Moving the display range after zooming in

1. Place the mouse cursor on the pseudocolor graph and drag it while holding down the Space bar.

   The changed position is displayed in pink in the data display box on the main screen.

Note

- ***When the graph size is small on the screen, the position of an area may be specified by the unit of several pixel pitches.***
- ***When zooming in an image, the position determined with the mouse may be deviated by approx. one pixel.***

Making graph settings

1. Move the mouse cursor into the pseudocolor graph.

2. Right-click on the pseudocolor graph, and select ‘Property’ from the pop-up menu that appears.

   For more information, see “Pseudocolor Object” (page 100).

Sending data

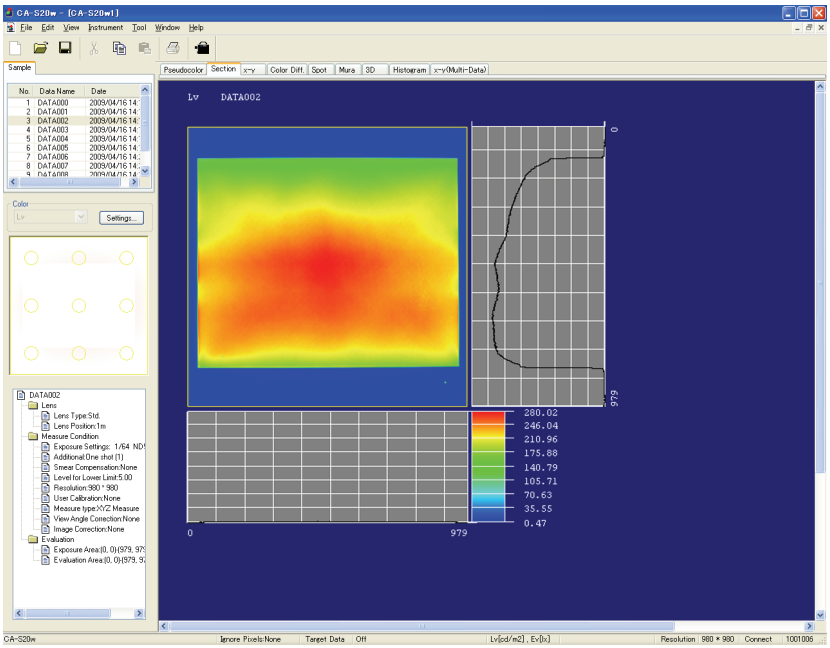
1. Move the mouse cursor into the pseudocolor graph, or use the mouse to specify an area in it.

2. Right-click on the pseudocolor graph, and select ‘Data Send’ from the pop-up menu that appears.

   For more information, see “Sending Data” (page 78).

2.3.3 Viewing the Distribution Cross Section of Luminance/ Chromaticity [Section]

This option allows you to observe the cross section of luminance and chromaticity distributions.



Selecting measurement data to display

1. Select ‘Section’ in the page selection tabs.
2. Select the measurement data to observe from the Sample list.

   The selected measurement data is displayed.

Note

When switching measurement data, the vertical and horizontal axes of pseudocolor graph and the horizontal axis of Section graph are set to the “automatic” settings.

Selecting colorimetric data

1. Select the Section for which you want to change the Color setting.

2. Select the desired colorimetric data from the 'Color' selection combo box.

Checking the horizontal and vertical cross sections that pass through the specified location

1. Place the mouse cursor on the pseudocolor graph and left-click the mouse button while holding down the Shift key.

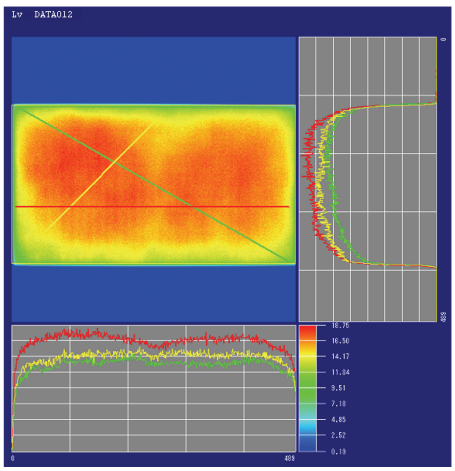
2. A 'Mark' is displayed at the cursor position and the cross section is displayed below and on the right of the pseudocolor graph.
   - Up to 20 'Mark' can be displayed.

Checking the cross section in an arbitrary direction

1. Place the mouse cursor on the pseudocolor graph and left-click the mouse button while holding down the Ctrl key.

2. Place the mouse cursor on another area on the pseudocolor graph and left-click the mouse button while holding down the Ctrl key.

3. An 'Arbitrary Line' that passes through two points is displayed on the pseudocolor graph and the cross section is displayed below and on the right of the pseudocolor graph.
   - Up to 20 'Arbitrary Line' can be displayed.



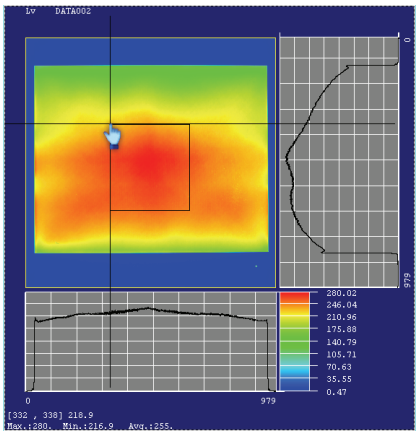
Setting a temporary evaluation area

1. Place the mouse cursor on the pseudocolor graph and drag the mouse while holding down the Shift key to specify the area.

2. The coordinates of the specified area are displayed below the pseudocolor graph.

Note

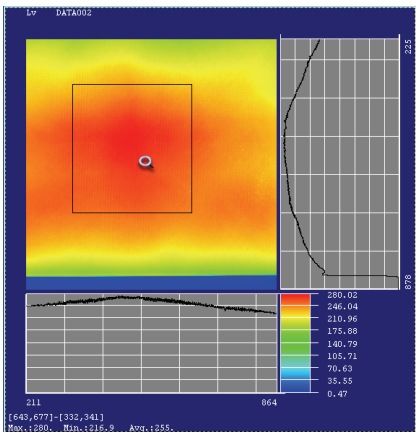
When you set a 'Mark' or 'Arbitrary Line' after setting a temporary evaluation area, the temporary evaluation area is reset. Set the temporary evaluation area after setting a 'Mark' or 'Arbitrary Line'.



Limiting display range (Zoom In)

1. Place the mouse cursor on the pseudocolor graph and left-click the mouse button while holding down the Shift key and Ctrl key.
You can also scroll the mouse wheel upward while holding down the Shift key and Ctrl key.

To reduce the display size after zooming in the image, place the mouse cursor on the pseudocolor graph and right-click the mouse button while holding the Shift key and Ctrl key. You can also scroll the mouse wheel downward while holding down the Shift key and Ctrl key.



Moving the display range after zooming in

1. Place the mouse cursor on the pseudocolor graph and drag it while holding down the Space bar.
   The changed position is displayed in pink in the data display box on the main screen.

Making graph settings

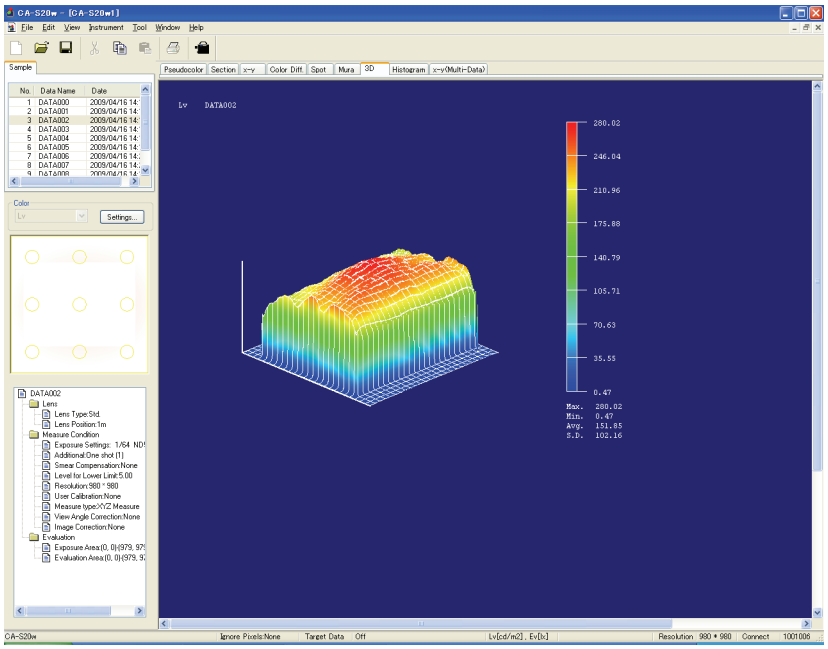
1. Move the mouse cursor into the pseudocolor graph.
2. Right-click on the pseudocolor graph, and select 'Property' from the pop-up menu that appears.
   For more information, see "Cross Section Diagram Object" (page 112).

Sending data

1. Move the mouse cursor into the pseudocolor graph, or use the mouse to specify an area in it.
2. Right-click on the pseudocolor graph, and select 'Data Send' from the pop-up menu that appears.
   For more information, see "Sending Data" (page 78).

2.3.4 Observing the Luminance/Chromaticity in Three Dimensions [3D Graph]

The 3D graph displays the luminance/chromaticity distribution.



Selecting measurement data to display

1. Select '3D' from the page selection tabs.
2. Select the measurement data to observe from the Sample list.

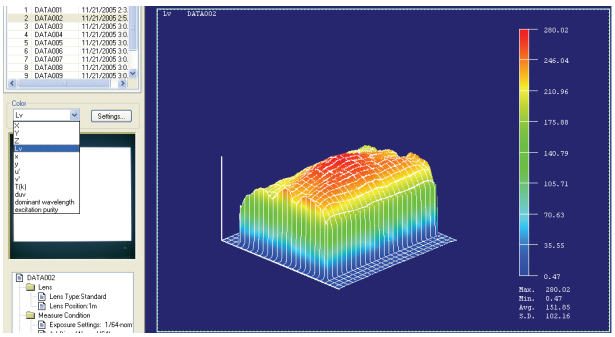
   The selected measurement data are displayed.

Note

When switching measurement data, the vertical and horizontal axes of pseudocolor graph is set to the "automatic" settings.

Selecting colorimetric data

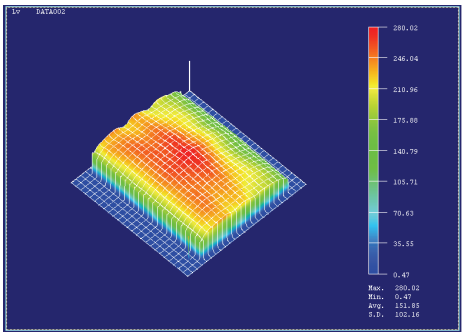
1. Select the 3D graph.
2. Use the 'Color' selection combo box to select the desired colorimetric data.



Changing orientation

1. Move the mouse cursor onto the 3D graph.
2. Drag the mouse cursor while holding down the Space key or the Shift key.

   Moving left/right rotates the graph.
   Moving up/down changes the angle of elevation.



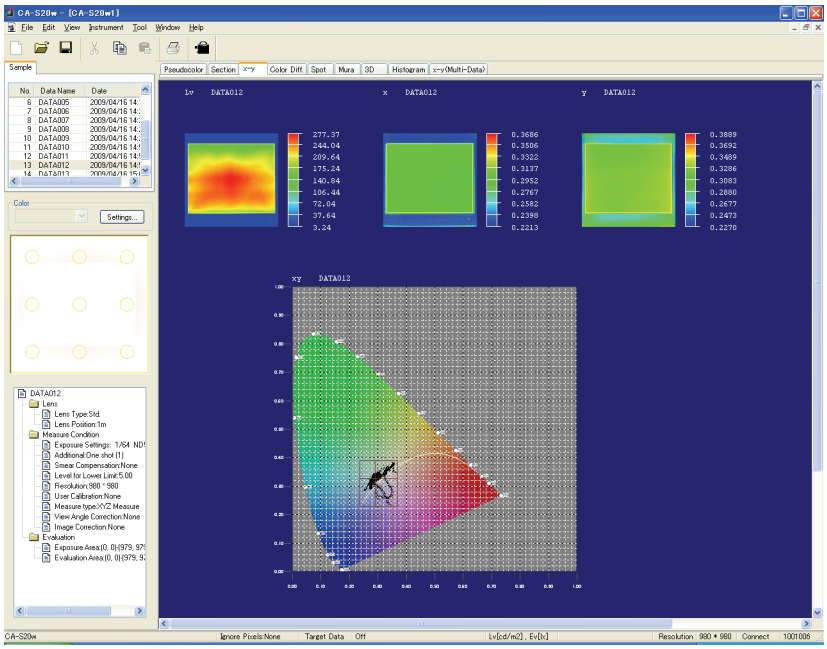
Making graph settings

1. Move the mouse cursor into the 3D graph.
2. Right-click on the 3D graph, and select ‘Property’ from the pop-up menu that appears.

   For more information, see “3D Object” (page 111).

2.3.5 Observing Chromaticity Distribution [Chromaticity Diagram]

The chromaticity dispersion of the measurement data is displayed in the chromaticity diagram. The pseudocolor graph and chromaticity distribution graph are displayed in the same page, letting you observe their correlation.



Selecting measurement data to display

1. Select ‘x-y’ from the page selection tabs.

2. Select the measurement data to observe from the Sample list.

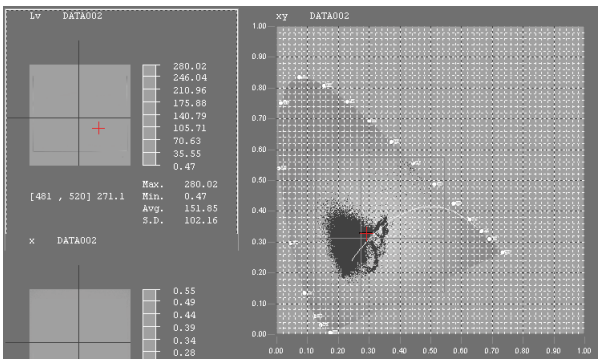
   - The selected measurement data are displayed.
   - By selecting two pieces of measurement data while holding down the Shift key, you will select all the measurement data between the two. If ‘Draw Multi Data’ has been checked in the pop-up menu displayed by right-clicking the chromaticity diagram, all the selected measurement data will be displayed on the chromaticity diagram.

Checking chromaticity of specified location in chromaticity coordinates

1. On the pseudocolor graph, place the mouse cursor on a desired point while holding down the Shift key.

   The coordinates and measurement value at the mouse cursor position are displayed below the pseudocolor graph. The chromaticity at the mouse cursor position is displayed by a cursor in the chromaticity diagram.

2. Clicking the mouse button on the pseudocolor graph while holding down the Shift key retains the cursor display on the pseudocolor graph and chromaticity diagram.



Making graph settings

1. Move the mouse cursor into the chromaticity diagram.
2. Right-click on the chromaticity diagram, and select ‘Property’ from the pop-up menu that appears.

   For more information, see “xy-Chromaticity Diagram Object” (page 115).

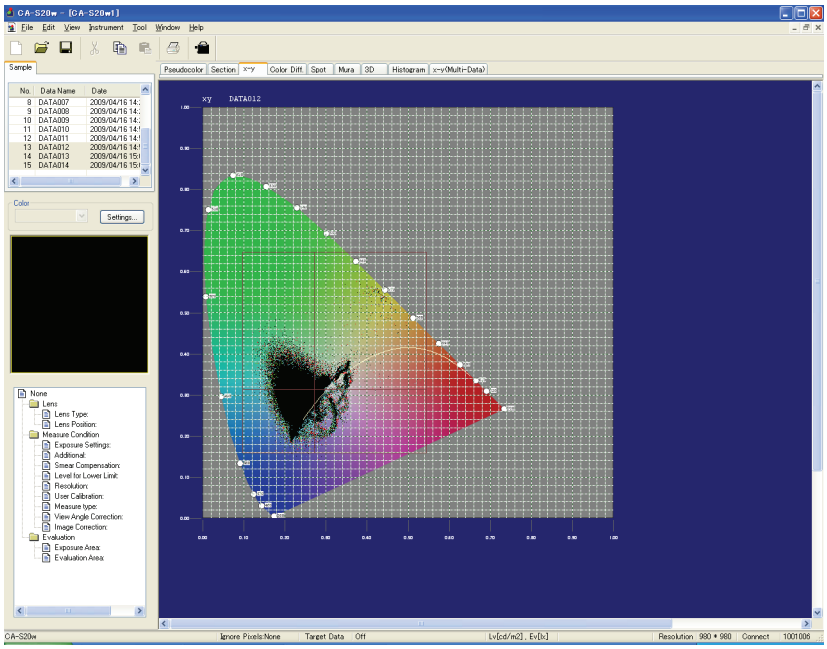
Limiting display range (Zoom In)

1. Place the mouse cursor on the chromaticity diagram and left-click the mouse button while holding down the Shift key and Ctrl key.

   To reduce the display size after zooming in the image, place the mouse cursor on the chromaticity diagram and right-click the mouse button while holding the Shift key and Ctrl key.

2.3.6 Observing Several Pieces of Measurement Data [Chromaticity Diagram (Multiple Selection)]

The chromaticity distribution data of multiple measurements can be displayed on one chromaticity diagram.



Selecting measurement data to display

1. Select ‘x-y (Multi-Data)’ from the page selection tabs.

   In the pop-up menu displayed by right-clicking on the chromaticity diagram, ‘Draw Multi Data’ has been checked.

2. While holding down the Shift key, select two pieces of measurement data from the Sample list.

   All pieces of measurement data between the selected two pieces of data are displayed on the chromaticity diagram.

Making graph settings

1. Move the mouse cursor into the chromaticity diagram.

2. Right-click on the chromaticity diagram and select ‘Property’ from the pop-up menu that appears.

   For more information, refer to “xy-Chromaticity Diagram Object” (page 115).

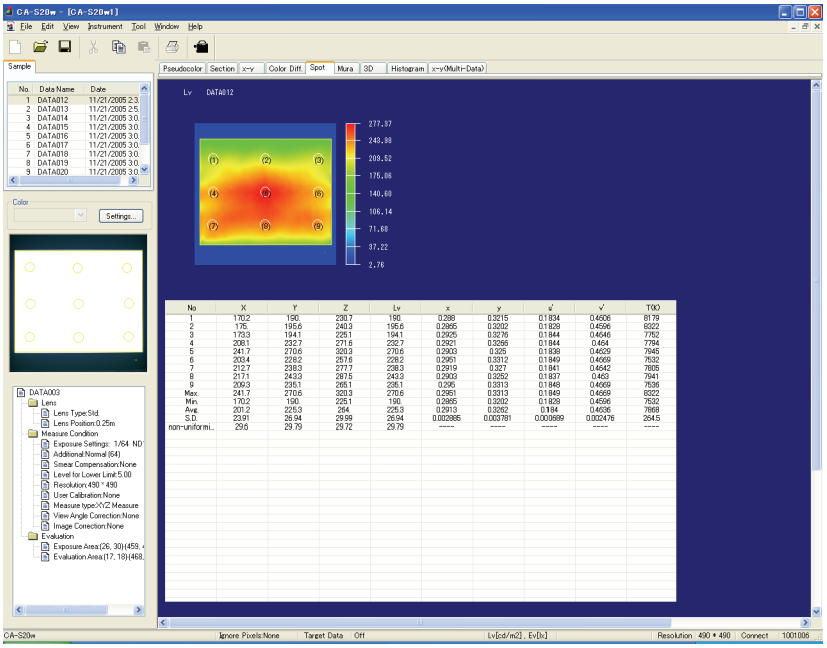
Limiting the display range (Zoom In)

1. Place the mouse cursor on the chromaticity diagram and left-click the mouse button while holding down the Shift and Ctrl keys.

   To reduce the display size after zooming in the image, place the mouse cursor on the chromaticity diagram and right-click the mouse button while holding down the Shift and Ctrl keys.

2.3.7 Observing Luminance/Chromaticity for Spots [Spot Measurement Graph]

The multiple-point measurement graph outputs the average value for multiple specified areas.



Display procedure

1. Select ‘Spot’ from the page selection tabs.
2. Select the desired measurement data from the Sample list.

   The measurement data are displayed.

Selecting the colorimetric data displayed in the pseudocolor graph

1. Use the ‘Color’ selection combo box to select the desired colorimetric data.

Making graph settings

1. Move the mouse cursor into a graph.
2. Right-click on the graph, and select ‘Property’ from the pop-up menu that appears.

   For more information, see “Pseudocolor with Spot Object” (page 107).

Changing the settings of the spot measurement frame

1. Double-click the measurement data selected in the data list.
   The Measuring Data-Spot-Data Name dialog box appears.
2. Click the 'Layout' tab and specify the appropriate settings.
   For details about the setting, see "Spot Measurement" (page 35).

Note

In spot measurement, the position and size of each spot is adjusted according to the measurement data's evaluation area displaying the set spot frames. The average value in the spot area is calculated after adjustment.
When the size of the specified spot setting is different from the size of the measurement data's evaluation area, the area for calculating the average value changes.
The position and size after adjustment are applied to the spot frames displayed in the pseudocolor graph.

Changing the items displayed for the spot measurement

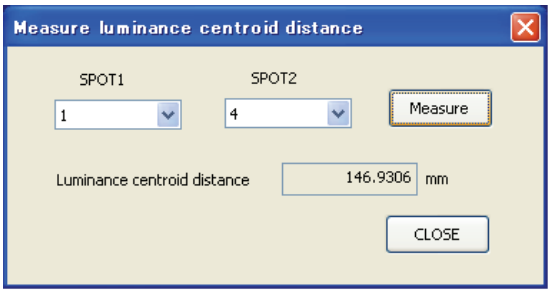
1. Double-click the measurement data selected in the data list.
   The Measuring Data-Spot-Data Name dialog box appears.
2. Click the Numeric tab and select the colorimetric data you want to display in the View Color Select dialog box which is displayed by clicking the 'Color Values...' button.

Note

These changes are effective only for the selected measurement data.

Measuring the distance between luminance centroids of two spot measurement frames

1. Place the mouse cursor on the graph.
2. Right-click the mouse button on the graph and select 'Measure luminance centroid distance' from the pop-up menu. Or, select 'Measure luminance centroid distance' from 'Tool' on the menu bar.
   - The Measure luminance centroid distance dialog box is displayed.



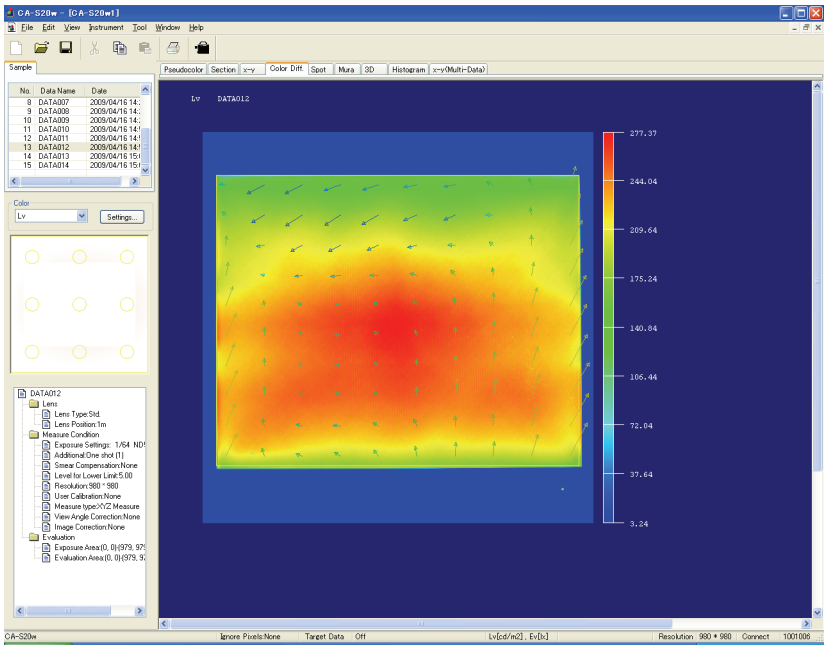
3. Select two spot measurement frames for which the distance between the luminance centroids are to be measured and click 'Measure' button.
   - The distance between the two luminance centroids is displayed.

Note

The luminance centroid distance is an approximate value obtained by using the value of the lens position. If the lens position is 'inf', the luminance centroid distance is displayed as '– – – –'.

2.3.8 Observing Color Difference for Spots [Color Difference]

Displays color difference from the target data in each spot measurement frame. The direction and amount of the difference on the chromaticity diagram is displayed. You can use the median value of the screen or can specify a desired value as the reference for the difference amount.



Display procedure

1. Select ‘Color Diff.’ from the page selection tabs.
2. Select the desired measurement data from the Sample list.

   The measurement data is displayed.

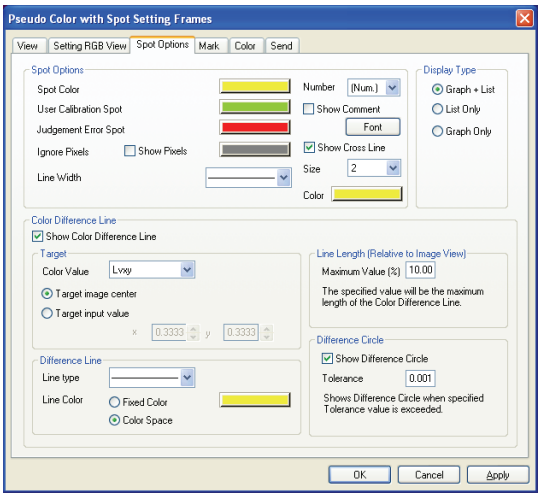
Changing the colorimetric data displayed as an RGB image (or on a pseudocolor graph)

1. Use the ‘Color’ selection combo box to select the desired colorimetric data.

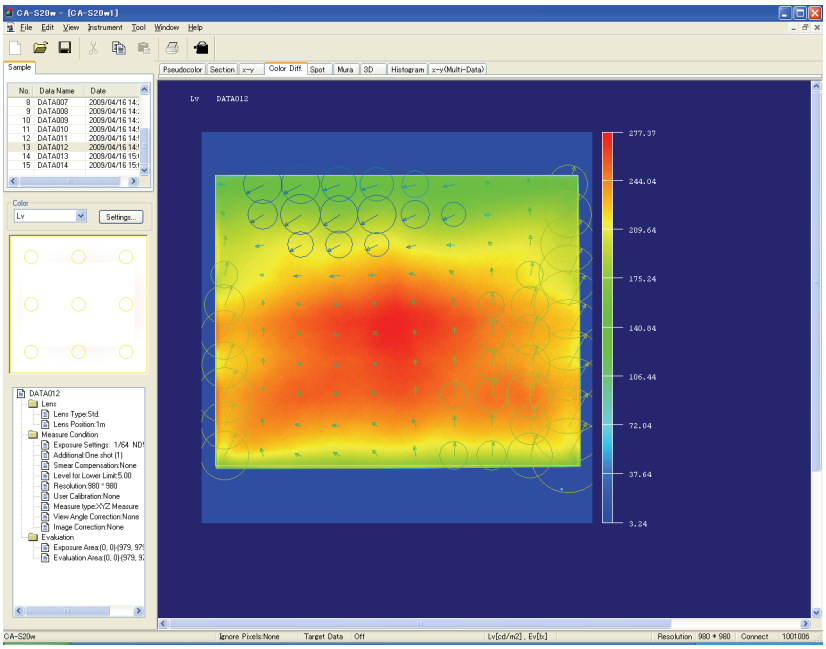
Making graph settings

1. Move the mouse cursor into a graph.
2. Right-click on the graph and select ‘Property’ from the pop-up menu that appears.
3. Select the ‘Spot Options’ tab for ‘Pseudo Color with Spot Setting Frames’.

   For more information, refer to “Pseudocolor with Spot Object” (page 107).



When ‘Show Difference Circle’ is checked, a circle will be displayed when the color difference exceeds the chromaticity limit.

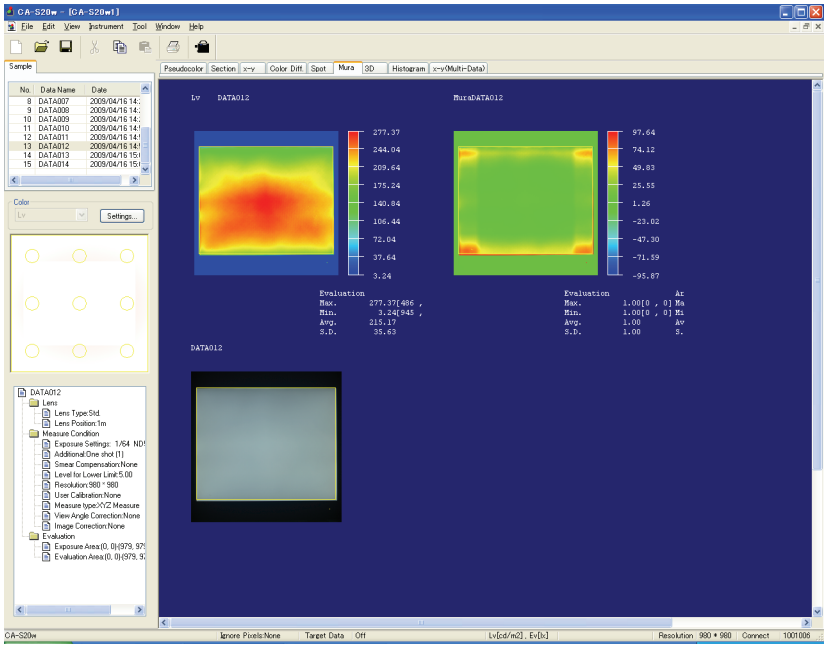


2.3.9 Observing Chromaticity/Luminance Unevenness [Mura Control Graph]

The Mura control graph highlights partial unevenness in the display, such as points or streaks, while reducing the influence of moderate unevenness in the entire display such as shading.
The operations for this graph are the same as in “Observing Luminance/Chromaticity Distribution [Pseudocolor Graph]”.

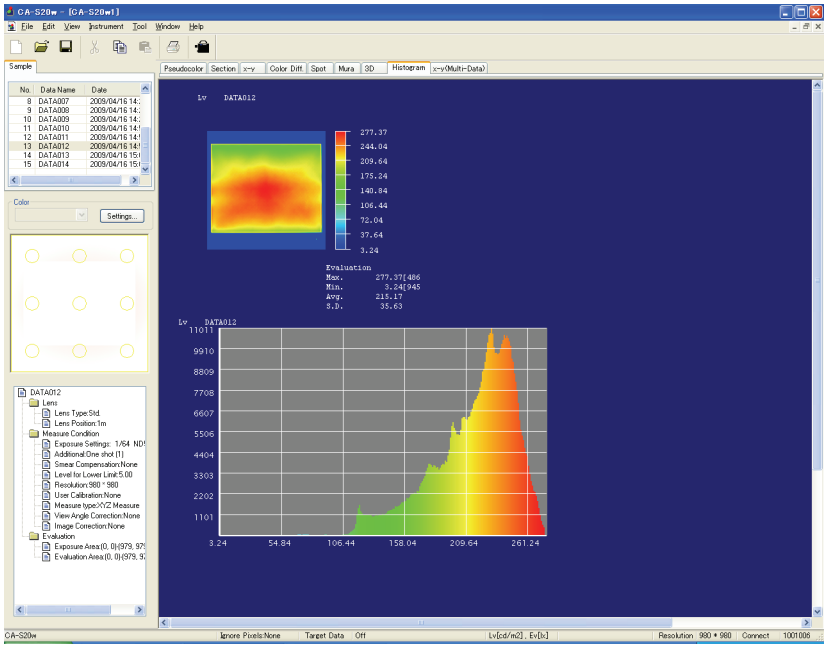
Note

With the value of ‘Pixel’ on the Setting Mura tab in the Mura-Graph Property dialog box, it may take some time before the result is displayed depending on the performance of your PC.



2.3.10 Observing the Variation of Luminance/Chromaticity [Histogram]

The Histogram displays the degree of fluctuation of luminance and chromaticity distribution.
The object can be observed with the combination of a pseudocolor graph and histogram graph.



Selecting measurement data to display

1. Select ‘Histogram’ in the page selection tabs.
2. Select the measurement data to observe from the Sample list.

   The selected measurement data is displayed.

Note

When switching measurement data, the vertical and horizontal axes of histogram graph are set to the “automatic” settings.

Selecting colorimetric data

1. Select the histogram for which you want to change the Color setting.
2. Select the desired colorimetric data from the ‘Color’ selection combo box.

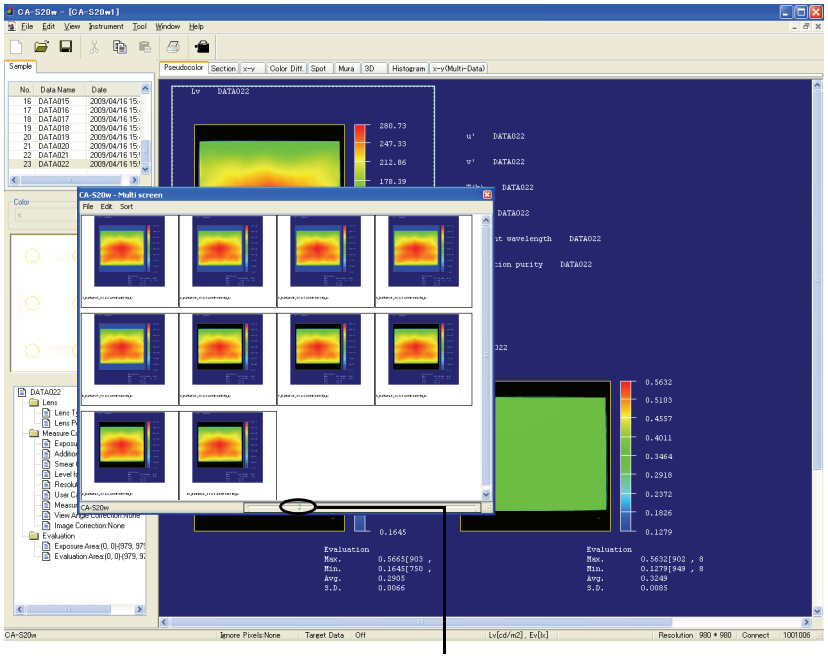
Making graph settings

1. Move the mouse cursor into a graph.
2. Right-click on the graph, and select ‘Property’ from the pop-up menu that appears.

   For more information, see “Histogram Object” (page 121).

2.3.11 Displaying Multiple Graphs Simultaneously [Multi Screen]

Multiple measurement data and graphs can be displayed side by side on one screen.
This is useful for the observation of secular changes by displaying pseudocolor images of continuous measurement data, or for various analysis by displaying different graphs for one measurement result.



Display procedure

1. Select *View* - 'Multi screen' from the menu.

   The 'Multi screen' window appears.

2. On the document window, right-click the graph that you want to display on the Multi-Screen. When the pop-up menu appears, select 'Multi screen'.
   Or, drag the graph to the 'Multi screen' window and drop it.

   The graph is displayed on the 'Multi screen' window.

3. Repeat step 2 to add graphs to the Multi Screen as much as you want.

Tip
The 'Multi screen' window can be moved by dragging it with the mouse. You can change the measurement data or tab on the document window and select the desired graph to be displayed on the Multi-Screen.

Changing the display size

You can change the display size inside the 'Multi screen' window by moving the slider at the bottom of the screen.

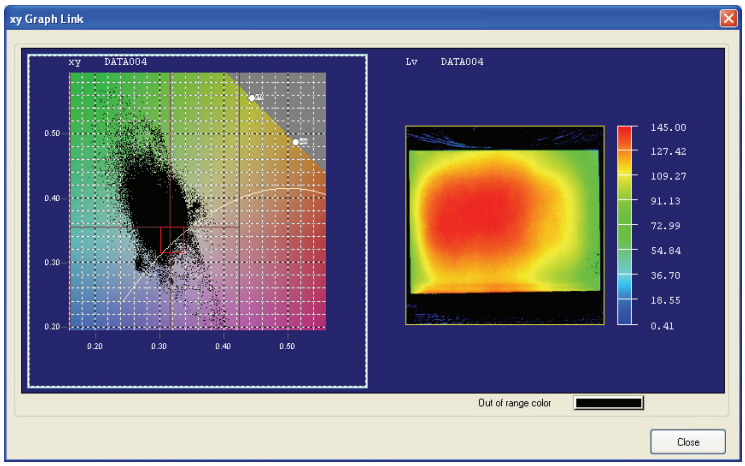
Saving the Multi Screen

1. Select *File* - *Save* from the menu of the 'Multi screen' window.

   The Save As dialog box appears.
   In the Save As dialog box, select the destination folder.
   For the file type, select either 'Multi screen (24bit).mcb' or 'Multi screen (8bit).mcb'.

2.3.12 Linking the Chromaticity Diagram and Pseudocolor Images [xy Graph Link]

A specified range of points distributed in the chromaticity diagram space can be displayed in a different color on the pseudocolor graph.
This is useful for checking where the points which are away from or which aggregate on the chromaticity distribution are located on the pseudocolor image.



Display procedure

1. Select *View* - *xy Graph Link* from the menu.

   The 'xy Graph Link' window appears.

2. Select the chromaticity diagram on the left, and specify the range by dragging the mouse on the chromaticity diagram while holding down the Shift key.

   The measurement points of the chromaticity that is not within the specified range are displayed in "Out of range color" (pink by default) on the pseudocolor image on the right.

   Tip
   The "Out of range color" can be changed as desired.

2.4 Creating Reports (Printing and Sending Data)

2.4.1 Printing

Prints the data view screen image.

Printing procedure

1. Select *File* - *Print* from the menu. ( )

   The Print dialog box appears.
   Make print settings in 'Property' as with other Windows software.

2. Click the OK button.

   The data view screen image is printed. To check the print image in the print preview and then print it, see " Print Preview" below.

Print Preview

1. Select *File* - *Print Preview* from the menu.

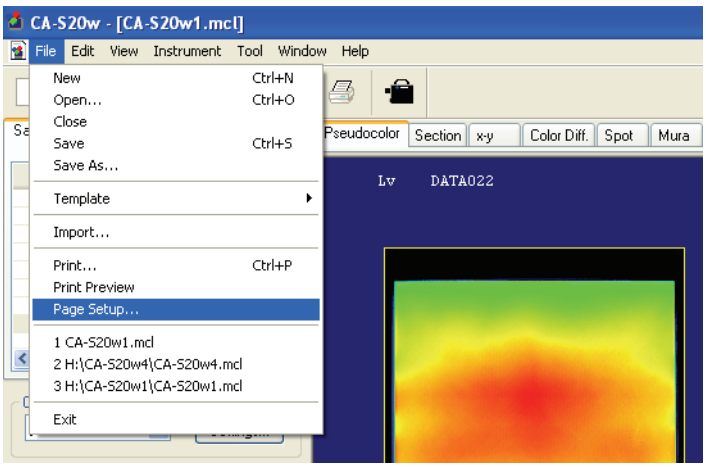
   The print image is previewed.

Note

If the object appears out of the printing range, change the printing orientation (portrait or landscape) or adjust the position of the object.
For the procedure for adjusting the position, see "Customization".

2. To print the previewed image, click the Print button.

   To change each setting for the printer, select *File* - *Page Setup* from the menu in the preview window and make print settings.



Page Setup

1. Select *File* - *Page Setup* from the menu.

   The Printer Settings dialog box appears.
   Set the paper for printing, scaling ratio, margin, etc.
   (For 'Printer Settings', see the printer instruction manual.)

2. Click the OK button.

Tip
When the data view is set to the edit mode, the printing range frame appears. For the procedure to set the edit mode, see "Edit Mode" (page 90).

Note
After changing paper settings, an object exceeding the printing range is displayed as "separated" for display and printing. Adjust the position of the object.
For a way of adjusting the position, see Pages 93 - 95.

Note
The page setup data is not saved in the document.

2.4.2 Pasting Graphs into Other Software

You can paste selected graphs into Word or Excel via the clipboard. Graphs are pasted in bitmap format.

Procedure

1. Select *Edit* from the menu and make sure 'Edit Mode' has no check mark next to it.

2. Click in the desired graph to select it.

3. Select *Edit* - *Copy* from the menu.

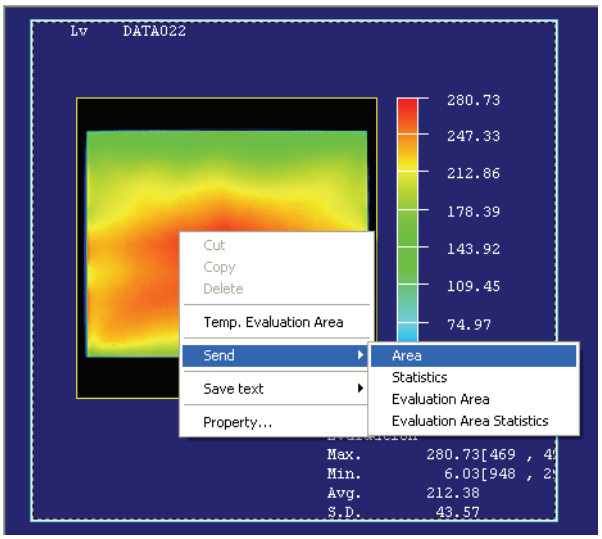
4. Open the application to paste to, and use its paste function to paste the graph.

2.4.3 Sending Data

The colorimetric data displayed on the pseudocolor graph can be sent to the external software via the clipboard.
To send data, place the mouse cursor on the pseudocolor graph or specify the area using the mouse. Then, right-click the mouse on the pseudocolor graph to display a pop-up menu which lists the items that can be sent with the Data Send option. Select the item you want to send and execute the Data Send command.

Procedure

1. Select *Edit* from the menu and make sure 'Edit Mode' has no check mark next to it.



2. Click in the desired graph to select it.

3. Right-click on a graph and select one of the 'Send: Evaluation Area' menu items from the pop-up menu that appears.

   The data is placed on the clipboard.

4. In the destination software, select Paste.

Menu	Displayed Object	Data
Send: Area	Pseudocolor Spot Section Mura	Transmits the surface data. The table below shows the relationship between the image size and the number of data pieces to be sent:
Send: Statistics	Pseudocolor Spot Section Mura	Transmits the statistics of the entire surface data. The statistics are displayed on the lower right of each object.

Image size	No. of data pieces
980 × 980	196 x 196 after averaging (binning) of data within each area of 5 x 5 pixels
490 × 490	245 x 245 after averaging (binning) of data within each area of 2 x 2 pixels
196 × 196	196 × 196

Menu	Displayed Object	Data
Send: Evaluation Area	Pseudocolor Spot Section Mura	Transmits the surface data within the evaluation area shown with a yellow frame.
Send: Evaluation Area Statistics	Pseudocolor Spot Section Mura	Transmits the statistics of the surface data within the evaluation area shown with a yellow frame. The statistics are displayed on the lower right of each object.
Send: Temp. Evaluation Area	Pseudocolor Spot Section Mura	Displayed when a temporary evaluation area has been set up. Transmits the surface data within the temporary evaluation area.
Send: Temp. Evaluation Area Statistics	Pseudocolor Spot Section Mura	Displayed when a temporary evaluation area has been set up. Transmits the statistics of the surface data within the temporary evaluation area. The statistics are displayed on the lower right of each object.
Send: Point	Pseudocolor Spot Section Mura	Displayed only when the cursor is visible. The value at the point specified by the cursor will be sent.
Send: Mark	Pseudocolor Spot Section Mura	Displayed when Mark has been set up. Transmits all coordinate values of the marked positions. For cross section diagram objects, the cross section line data will be sent.
Spot	Spot	Transmits the Spot data.

• Example of Send: Area

The surface data is sent.

	0	1	2	3	4	5	~	190	191	192	193	194	195
0	38.04	37.96	39.05	39.58	38.3	37.46	~	38.77	35.79	36.07	38.65	34.64	38.58
1	38.25	37.91	38.73	39.63	38.66	37.59	~	37.49	37.45	34.8	39.05	35.16	37.2
2	38.56	37.88	38.13	39.41	38.91	37.68	~	35.71	38.76	34.56	38.13	36.53	35.51
3	38.75	37.9	37.73	38.71	39.35	37.84	~	34.53	38.95	35.51	36.85	38	34.55
4	39.01	38	37.3	38.31	39.05	38.09	~	34.59	37.74	36.98	35.3	39.1	34.63
5	39.23	38.28	37.25	37.78	38.93	38.61	~	35.49	36.31	38.44	34.63	38.88	35.95
:	:	:	:	:	:	:		:	:	:	:	:	:
191	42.28	42.92	42.01	41.68	42.49	42.77	~	36.99	36.43	36.91	37.04	36.74	37.75
192	42.23	42.88	42.64	41.93	42.07	42.59	~	36.82	36.64	36.89	37.19	36.39	37.95
193	42.11	42.17	42.74	42.45	42.02	42.2	~	36.89	36.51	36.89	37.55	36.36	38.12
194	42.2	41.64	42.16	42.41	42.12	41.7	~	36.97	36.91	36.76	37.91	36.62	38.06
195	42.32	41.44	41.31	42.12	42.3	41.37	~	36.88	37.02	36.7	37.91	36.47	38.18

• Example of Send: Evaluation Area

The coordinates of the specified area and the data within the area are sent.

	392	393	394	395	~	591	592	593	594
43	6.91	7.2	7.56	7.96	~	4.4	4.64	4.9	5.35
44	7.08	7.29	7.53	7.91	~	4.44	4.56	4.78	5.18
45	7.15	7.32	7.55	7.92	~	4.85	4.71	4.75	5.09
46	7.13	7.32	7.68	8.07	~	5.34	4.93	4.81	4.89
:	:	:	:	:		:	:	:	:
163	4.4	4.32	4.3	4.21	~	3.72	3.72	3.77	3.87
164	4.4	4.32	4.35	4.21	~	3.71	3.7	3.77	3.87
165	4.47	4.39	4.33	4.21	~	3.69	3.7	3.79	3.85
166	4.45	4.41	4.27	4.2	~	3.7	3.7	3.73	3.86

• Example of Send: Statistics

Transmits the range specified to obtain statistics and the resulting statistic values.

Area
0 0 979 979
Max. 45.37
Min. 3.19
Avg. 23.36
S.D. 10.61

• Example of Send: Mark

Transmits the colorimetric data followed by the coordinates.

904 144 38.19
798 166 38.52
252 189 20.07
569 303 24.05
627 465 20.97
: : :
121 27 13.87
126 144 20.87
111 258 17.46
736 465 12.46
832 412 39.16

Example of a section object when its center is 200,150 (X,Y) and the resolution is 980*980.

200 150
0 50.23 51.33
1 51.22 53.11
2 54.84 54.21
3 54.32 54.87
4 53.52 53.70
: : :
976 53.22 51.56
977 52.76 52.69
978 51.23 51.97
979 53.12 53.21

• Example of Send: Multi-Spot

No	X	Y	Z	~	Dominant wavelength	Excitation purity	Lv(Contrast)
1	33.35	29.94	31.83	~	506.7	10.48	—
2	22.78	20.02	14.22	~	593.8	25.21	—
3	22.66	18.95	12.03	~	595.5	32.78	—
:	:	:	:	:	:	:	—
23	32.46	29.87	25.83	~	598.8	12.11	—
24	19.2	17.13	13.67	~	597.6	18	—
25	39.38	37.07	36.46	~	496	4.79	—
Max.	43.62	40.55	43.82	~	618.2	62.98	—
Min.	12.87	10.95	4.422	~	495.7	4.22	—
Avg.	28.8	25.65	22.59	~	561	22.2	—
S.D.	9.73	10.2	13.78	~	45.29	16.54	—
non-uniformity	70.48	72.99	89.91	~	—	—	—

* The measurement conditions are sent using the following format:

DATA006 2005/9/17 10:45
Lens type : Standard
Lens position : 0.25 m
Exposure : 1/32-normal-100%
Number of additions : 64
Level for lower limit : 5.00
Resolution : 980*980
User calibration : Not used
Exposure area : 980*980
Evaluation area : 980*980

2.4.4 Saving Data in a Text Format

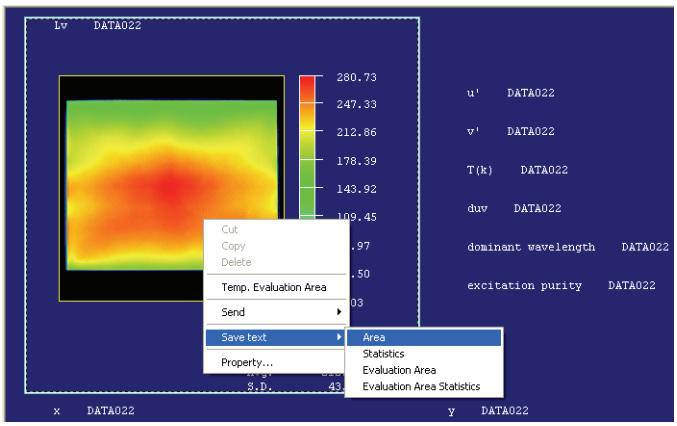
The colorimetric data displayed on the pseudocolor graph can be saved in a text format.
To save data in a text format, place the mouse cursor on the pseudocolor graph or specify the area using the mouse. Then, right-click the mouse on the pseudocolor graph to display a pop-up menu which lists the items that can be saved in a text format. Select the item you want to save and execute the save command.

Note

When you open data saved in a text format (*.txt, *.csv) with Notepad, the text may not be displayed properly. When this occurs, select File - Open from the Notepad menu bar, specify ANSI Encoding in the Open dialog box, and then open the file.

Procedure

1. Select *Edit* from the menu and make sure 'Edit Mode' has no check mark next to it.



2. Click on the graph to save in a text format and highlight it.
3. Right-click on a graph and select one of the 'Save text' menu items from the pop-up menu that appears.
   The Save As dialog box appears.
4. Specify a file name and save the data.

Menu	Displayed Object	Data
Saving data in text format: Area	Pseudocolor Spot Section Mura	Saves the surface data. The number of data pieces to be saved is determined to cover all pixels of the current image size.
Saving data in text format: Statistics	Pseudocolor Spot Section Mura	Saves the statistics of the entire surface data. The statistics are displayed on the lower right of each object.
Saving data in text format: Evaluation Area	Pseudocolor Spot Section Mura	Saves the surface data within the evaluation area shown with a yellow frame.
Saving data in text format: Evaluation Area Statistics	Pseudocolor Spot Section Mura	Saves the statistics of the surface data within the evaluation area shown with a yellow frame. The statistics are displayed on the lower right of each object.

Menu	Displayed Object	Data
Saving data in text format: Temp. Evaluation Area	Pseudocolor Spot Section Mura	Displayed when a temporary evaluation area has been set up. Saves the surface data within the temporary evaluation area.
Saving data in text format: Temp. Evaluation Area Statistics	Pseudocolor Spot Section Mura	Displayed when a temporary evaluation area has been set up. Saves the statistics of the surface data within the temporary evaluation area. The statistics are displayed on the lower right of each object.
Saving data in text format: Point	Pseudocolor Spot Section Mura	Displayed when a cursor is displayed. Saves the data at the point specified with the cursor.
Saving data in text format: Mark	Pseudocolor Spot Section Mura	Displayed when marks have been set. Saves all coordinate values at the positions of the marks. For cross section diagram objects, the cross section line data will be saved.
Saving data in text format: Spot	Spot	Saves the spot data.

• Example of Saving data in text format: Forward: Area

The surface data is saved in text format.

	0	1	2	3	4	5	~	190	191	192	193	194	195
0	38.04	37.96	39.05	39.58	38.3	37.46	~	38.77	35.79	36.07	38.65	34.64	38.58
1	38.25	37.91	38.73	39.63	38.66	37.59	~	37.49	37.45	34.8	39.05	35.16	37.2
2	38.56	37.88	38.13	39.41	38.91	37.68	~	35.71	38.76	34.56	38.13	36.53	35.51
3	38.75	37.9	37.73	38.71	39.35	37.84	~	34.53	38.95	35.51	36.85	38	34.55
4	39.01	38	37.3	38.31	39.05	38.09	~	34.59	37.74	36.98	35.3	39.1	34.63
5	39.23	38.28	37.25	37.78	38.93	38.61	~	35.49	36.31	38.44	34.63	38.88	35.95
:	:	:	:	:	:	:		:	:	:	:	:	:
191	42.28	42.92	42.01	41.68	42.49	42.77	~	36.99	36.43	36.91	37.04	36.74	37.75
192	42.23	42.88	42.64	41.93	42.07	42.59	~	36.82	36.64	36.89	37.19	36.39	37.95
193	42.11	42.17	42.74	42.45	42.02	42.2	~	36.89	36.51	36.89	37.55	36.36	38.12
194	42.2	41.64	42.16	42.41	42.12	41.7	~	36.97	36.91	36.76	37.91	36.62	38.06
195	42.32	41.44	41.31	42.12	42.3	41.37	~	36.88	37.02	36.7	37.91	36.47	38.18

• Example of Saving data in text format: Forward: Evaluation Area

The coordinates of the specified area and the data within the area are saved in text format.

	392	393	394	395	~	591	592	593	594
43	6.91	7.2	7.56	7.96	~	4.4	4.64	4.9	5.35
44	7.08	7.29	7.53	7.91	~	4.44	4.56	4.78	5.18
45	7.15	7.32	7.55	7.92	~	4.85	4.71	4.75	5.09
46	7.13	7.32	7.68	8.07	~	5.34	4.93	4.81	4.89
:	:	:	:	:		:	:	:	:
163	4.4	4.32	4.3	4.21	~	3.72	3.72	3.77	3.87
164	4.4	4.32	4.35	4.21	~	3.71	3.7	3.77	3.87
165	4.47	4.39	4.33	4.21	~	3.69	3.7	3.79	3.85
166	4.45	4.41	4.27	4.2	~	3.7	3.7	3.73	3.86

• Example of Saving data in text format: Forward: Statistics

The range of the statistics and the statistic values are saved in text format.

Area			
0	0	979	979
Max.	45.37		
Min.	3.19		
Avg.	23.36		
S.D.	10.61		

• Example of Saving data in text format: Forward: Mark

The coordinates followed by the colorimetric data are saved in text format.

904	144	38.19
798	166	38.52
252	189	20.07
569	303	24.05
627	465	20.97
:	:	:
121	27	13.87
126	144	20.87
111	258	17.46
736	465	12.46
832	412	39.16

Example of a section object when its center is 200,150 (X,Y) and the resolution is 980*980.

200	150	
0	50.23	51.33
1	51.22	53.11
2	54.84	54.21
3	54.32	54.87
4	53.52	53.70
:	:	:
976	53.22	51.56
977	52.76	52.69
978	51.23	51.97
979	53.12	53.21

• Example of Saving data in text format: Multi-Spot

No	X	Y	Z	~	Dominant wavelength	Excitation purity	Lv(Contrast)
1	33.35	29.94	31.83	~	506.7	10.48	—
2	22.78	20.02	14.22	~	593.8	25.21	—
3	22.66	18.95	12.03	~	595.5	32.78	—
:	:	:	:	:	:	:	—
23	32.46	29.87	25.83	~	598.8	12.11	—
24	19.2	17.13	13.67	~	597.6	18	—
25	39.38	37.07	36.46	~	496	4.79	—
Max.	43.62	40.55	43.82	~	618.2	62.98	—
Min.	12.87	10.95	4.422	~	495.7	4.22	—
Avg.	28.8	25.65	22.59	~	561	22.2	—
S.D.	9.73	10.2	13.78	~	45.29	16.54	—
non-uniformity	70.48	72.99	89.91	~	—	—	—

* The measurement conditions are saved in the following format:

DATA006 2005/9/17 10:45
Lens type : Standard
Lens position : 0.25 m
Exposure : 1/32-normal-100%
Number of additions : 64
Level for lower limit : 5.00
Resolution : 980*980
User calibration : Not used
Exposure area : 980*980
Evaluation area : 980*980

2.5 File Management

2.5.1 File Types

This software supports the following folder/file formats:

- Document folders
  Folders containing document files/template files
- Document files (∗.mcl)
- Template files (∗.mct)
- User calibration (positional) coefficient file (*.uca)
- User calibration (color region) coefficient file (*.cuc)
- Multi screen file (*.mcb)
- Spot setting file (*.spt)
- Measurement condition file (*.cas)
- CA-S15w file (*.lst) (Ver. 2.12 or later)

In a document folder, internal files (∗.mcp, ∗.dat) are also generated.

Note

The document folder and document file (*.mcl) are saved as a pair with the same name. Do not change the name. If you change the name, file saving will not be performed correctly. To save the file such as when making a backup, be sure to save the entire folder.

2.5.2 Saving and Loading Documents

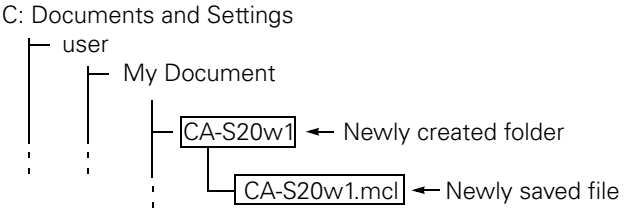
Saving Documents

1. Select *File* - *Save* or *File* - *Save As* from the menu.

When you select *File* - *Save As*, or when you select *File* - *Save* for a document which has not yet been saved, you need to select the folder where the file is to be saved in the Save As dialog box.
The default folder is “C:\Documents and Settings\user\My Documents”.
To change the default folder, select *Tool* - *File Path* from the menu.
Select ‘CAS20W Files (∗.mcl)’ as the file type.

Tip

A folder with the same name as the file name you specified in the Save As dialog box is created under the selected folder. The document file is saved in the folder.
The following example shows the case where “CA-S20w1.mcl” is specified as the file name.



Files will be saved in a different format from previous versions (versions older than ver.2.0).

INote

Files saved in ver.2.0 cannot be opened in older versions (versions older than ver.2.0) of CA-S20w. To open a document that was saved in an older version in CA-S20w ver.2.0 or later and retain the original file format, do not select File - Save As.

Calling Documents

1. Select *File* - *Open* from the menu.

In the File dialog box, specify the desired file.
Select 'CAS20W Files (∗.mcl)' as the file type.

Note

- ***You can open up to 5 documents at once.***
- ***Do not directly open a document by double-clicking the document folder icon. CA-S20w will not start normally.***

Saving Document Formats Only

Save the page settings, graph layouts, and graph settings without measurement data.

1. Select *File* - *Template* - *Save* from the menu.

In the File dialog box, select the folder to save the format in.
Select 'Template (∗.mct)' as the file type.

Applying Formats to Current Document

Apply a set of saved page settings, graph layouts and graph settings to the current document.

1. Select *File* - *Template* - *Load* from the menu.

Select 'Template (∗.mct)' as the file type.
In the File dialog box, click the file to open.
The page settings, graph layouts and graph settings are updated.

Note

When the software fails to read the selected template file, it reads "Default.mct", a template file loaded when the CA-S20w starts, as an alternative. When this happens, save the data and restart the CA-S20w. For details about "Default.mct", refer to page 89.

Transferring Saved Measurement Data Files to Other Disk

1. Copy each folder containing saved measurement data files.

Note

After deleting the files in a folder, you will no longer be able to open them.

Note

Store the document folder and document file (*.mcl) with the same name. Do not change these names.

Deleting Saved Measurement Data Files

1. Delete each folder containing saved measurement data files.

INote

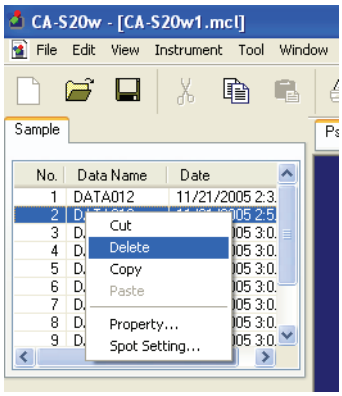
After deleting the files in a folder, you will no longer be able to open them.

Deleting Document Measurement Data

1. From the Sample list, select measurement data to delete.

2. Right-click on the list and select 'Delete' from the pop-up menu that appears.

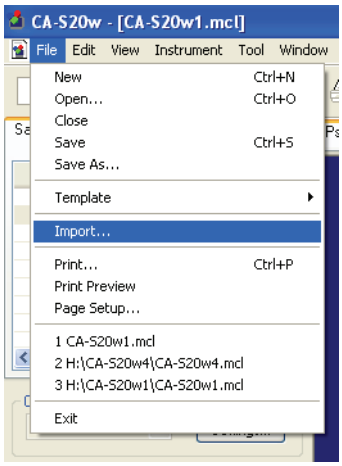
   When the "OK to delete?" dialog box appears, click the OK button.



2.5.3 Uploading the Measurement Data from the CA-1500

1. Select *File* - *Import* from the menu bar.

   Specify 'CA-S20w Files (*.lst)' for 'File of type' in the File dialog box.
   Note that only the measurement data is uploaded. Measurement conditions or other data cannot be uploaded.

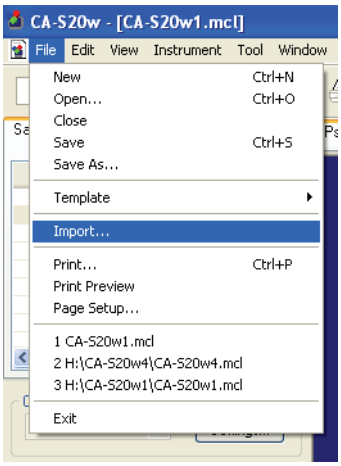


2.5.4 Creating a New Document

You can create new document files (data files ∗.mcl) to store measurement data.

1. Select *File* - *New* from the menu.

   A new document opens.



2.5.5 Template File Loaded when CA-S20w Starts

When the application starts, it automatically calls the template file “Default.mct”, which is saved in the installation folder.
The “Default.mct” file to be installed is contained in the “JP” folder on the application CD.
The template that is automatically uploaded at startup can be replaced by a template customized by the user. This user customized template will automatically upload at the next startup.

1. Select *File Path* - *Tool* from the menu bar.

   The File Path dialog box is displayed.

2. Click the ‘Browse’ button for ‘Template’.

   The Open dialog box is displayed.

3. Select the template file you wish to use, and click the ‘Open’ button.

   The name of the selected file is displayed at ‘Default template Folder’ with its full path.

4. Click the OK button.

2.6 Customization

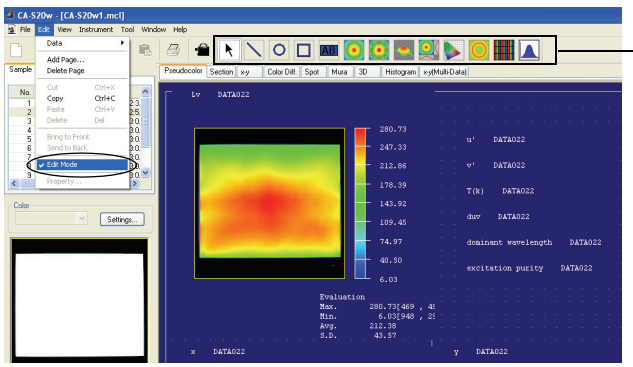
2.6.1 Overview

Various graph displays and data, which are convenient for data analysis, can be freely laid out and saved as templates. Several types of basic templates are prepared and can be used to customize the screen. To customize the screen, CA-S20w must be in edit mode.

2.6.2 Edit Mode

Checking this menu item lets you add/delete pages and edit items in pages (move, resize, add or delete graphs).

1. Select *Edit* - *Edit Mode* from the menu and make sure 'Edit Mode' has a check mark next to it.



In edit mode, the graph toolbar is displayed.

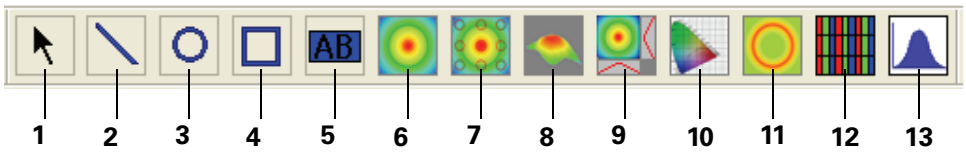
2. To release the edit mode, select *Edit* - *Edit Mode* from the menu again and uncheck 'Edit Mode'.

Note

In some rare cases, you can move a display object in a mode other than the edit mode. If this happens, select the edit mode once and place the display object back into the original position, and then exit the edit mode.

2.6.3 Graph Toolbar

This bar appears in the window when the CA-S20w software is in edit mode.



1)		Selection tool	Used to select an object.
2)		Line object	Displays lines (page 96).
3)		Circle object	Displays circles or ovals of a desired size (page 97).
4)		Rectangle object	Displays squares or rectangles of a desired size (page 97).
5)		String Label object	Displays text (page 98).
6)		Pseudocolor object	Displays images according to the colorimetric data and pseudocolor settings specified in the object property (pages 100-106).
7)		Pseudocolor with Spot object	Pseudocolor display with spot calculation function. Displays spot frames and spot results in a pseudocolor graph, and spot calculation results (average value, standard deviation, etc.) in the lower part (pages 107-110).
8)		3D object	Displays 3D images according to the colorimetric data and pseudocolor settings specified in the object property (page 111).
9)		Cross section diagram object	Displays the cross section diagram of desired coordinates together with pseudocolor (page 112).
10)		xy-chromaticity diagram object	Displays the xy or u'v' chromaticity diagram. Displays the whole distribution, average line, etc. in a chromaticity diagram (page 115).
11)		Mura control object	Highlights partial unevenness in luminance or chromaticity such as points or streaks (pages 118-119).
12)		RGB object	Displays measurement data as an RGB image (page 120).
13)		Histogram object	Displays the histogram of measurement data (page 121).

2.6.4 Add/Delete/Rename Page

You can add/delete/rename tab pages in the document window.

Add page

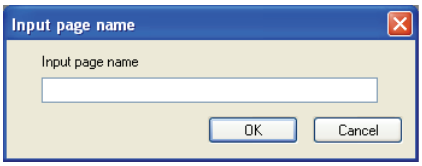
1. Move the mouse cursor onto a page selection tab in the document window, right-click on the tab, and select 'Add page' from the pop-up menu that appears.

   The Input page name dialog box appears.
   If you select *Edit - Add page* from the menu, a page is created next to the currently displayed document window.

   Note
   One document consists of 20 pages at maximum.

2. Input a page name and click the OK button.

   A new page is added to the right of the page selection tab selected in 1.



Delete page

1. Move the mouse cursor onto a page selection tab to delete in the document window, right-click on the tab, and select 'Delete page' from the pop-up menu that appears.

   If the page has objects, you will see a confirming message that the page will be deleted.
   If you select *Edit - Delete page* from the menu, a tab page is deleted in the currently displayed document window.

Rename page

1. Move the mouse cursor onto a page selection tab to rename in the document window, right-click on the tab, and select 'Rename page' from the pop-up menu that appears.

   The Input page name dialog box appears. Enter a page name to change to and click the OK button. The page is renamed.

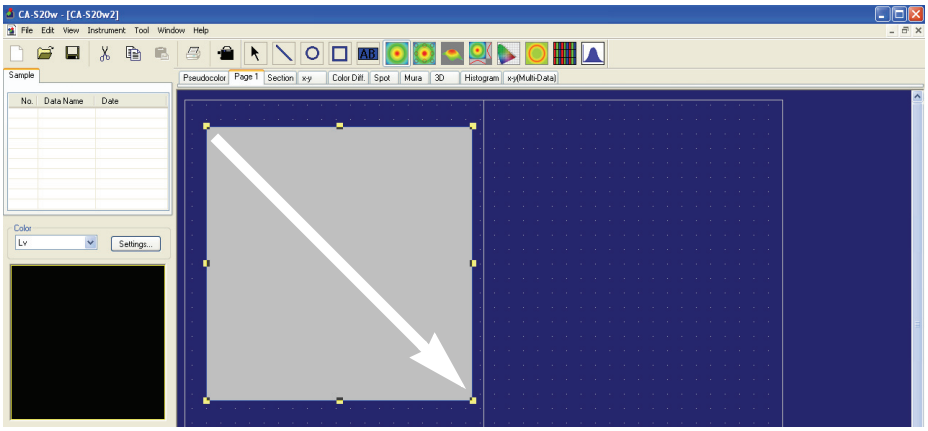
2.6.5 Editing Display Object

You can place new display objects using the graph toolbar displayed in edit mode.
This section describes pasting and settings of pseudocolor objects as an example. Use the same procedure for other display objects.
For the property of each display object, see “2.7 Display Object Properties” on pages 96-121.

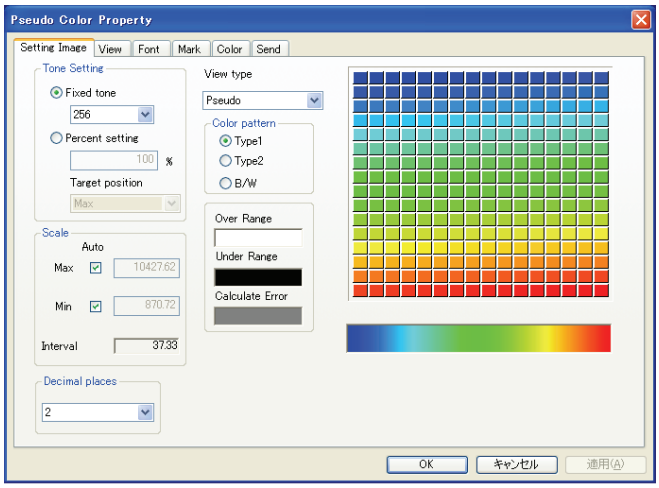
Placing display objects

1. Put CA-S20w into edit mode and add a new page.
   See page 92 to add a new page.

2. Select the icon from the graph tool bar and drag the pseudocolor object to the desired position.
   A pseudocolor object is placed.
   You can change an object to a desired size by dragging □ with the mouse, even after placing the object. You can also copy/delete/move it.



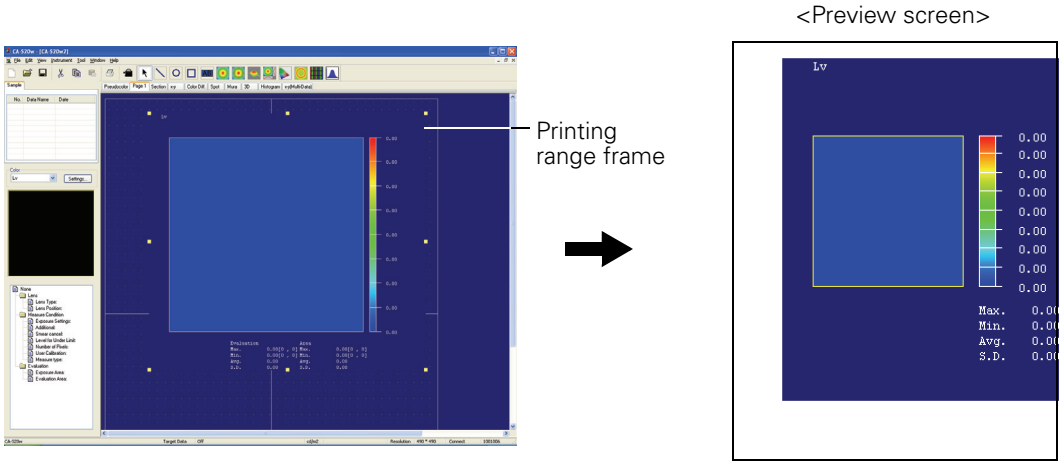
3. Select the placed object, right-click on the tab, and select ‘Property’ from the pop-up menu that appears.
   The PseudoColor Graph Property dialog box appears.



4. Make property settings and click the OK button.

Placement range of display objects

Display objects outside of the printing range frame will not be printed.



Selecting display objects

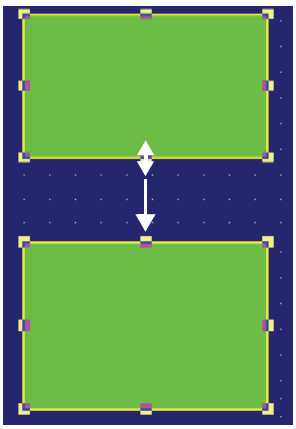
Click in the ruled line frame of a display object that has been pasted to a document window to select the display object. You can select multiple objects by clicking on a frame while pressing the Shift key. When multiple document files are opened, you cannot select multiple drawing objects from different document files.

Releasing the selected state of display objects

Click in a view screen other than the screen where display objects are pasted.

Resizing display objects

Click in a display object to select it and move the mouse cursor to a ruled line frame handle. When the shape of the icon changes, drag the handle.



Moving display objects

Click in a display object to select it and move the mouse cursor into a ruled line frame. Drag the drawing object.

Copying display objects

Click in a display object to select it, right-click on the object and select 'Copy' from the pop-up menu that appears. This function can be used by selecting *Edit* - *Copy* from the menu or by pressing the C key while pressing the Ctrl key.

Cutting display objects

Click in a display object to select it, right-click on the object and select 'Cut' from the pop-up menu that appears. This function can be used by selecting *Edit* - *Cut* from the menu or by pressing the X key while pressing the Ctrl key.

Pasting display objects

Select *Edit* - *Paste* from the menu, or by press the V key while pressing the Ctrl key.
When multiple document files are opened, you can paste the copy to the document window of other document files than the copy-from file.

Tip
If you copy or cut a display object showing data and then paste it, the data is also pasted.
Note, however, that the cursor position subject to temporary evaluation and the temporary evaluation area are not pasted.

Deleting display objects

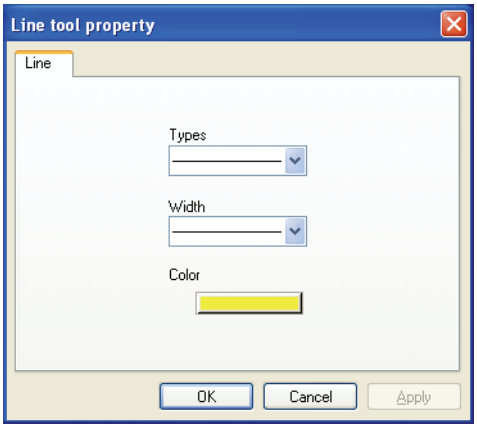
Click in a display object to select it and select *Edit* - *Delete* from the menu, or press the Delete key.
When multiple objects are selected, all the selected objects will be deleted.

2.7 Display Object Properties

2.7.1 Line Object

Displays lines.
Double-click on a display object and the following property dialog box appears.

Line



Type
Set the line type. Select Solid Line, Dashed Line or Dotted Line.

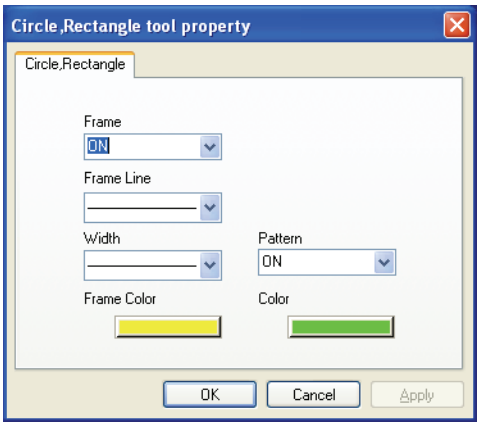
Width
Set the width of the line. Select from the 5 choices between 1 and 5. The width can be changed for Solid Line only. For Dashed Line and Dotted Line, the width is 1.

Color
Set the color of the line.

2.7.2 □ Rectangle Object/ ○ Circle Object

Displays squares or rectangles/circles or ovals.
Double-click on a display object and the following property dialog box appears.

Circle, Rectangle



Frame
Specify whether to show or hide the frame.

Frame Line
Set the line type of the frame. Select Solid Line, Dashed Line or Dotted Line.

Width
Set the width of the frame line. Select from the 5 stages between 1 and 5. The width can be changed for Solid Line only. For Dashed Line and Dotted Line, the width is 1.

Frame Color
Set the color of the frame.

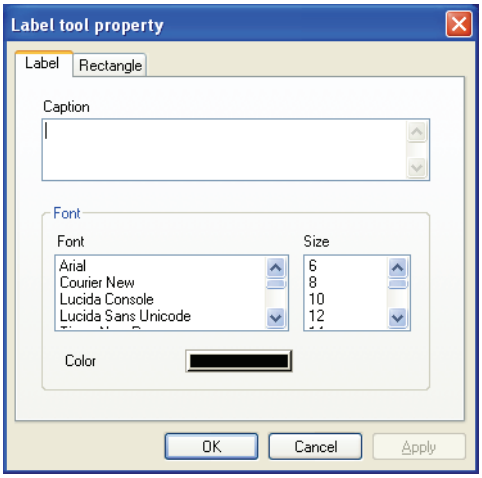
Pattern
Select ON or OFF.

Color
Click the button to set the color as with the frame color.

2.7.3 Label Object

Displays text.
Double-click on a display object and the following property dialog box appears.

Label



Caption
Input text.

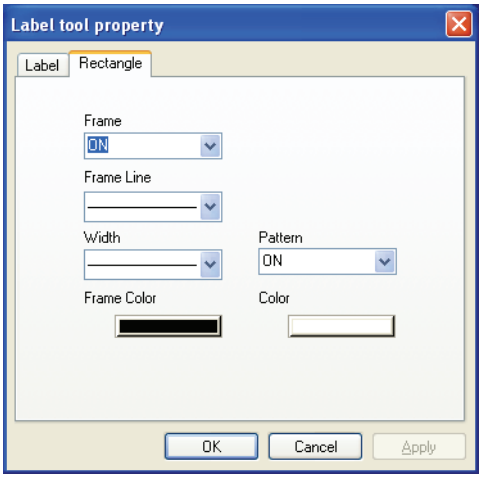
Font

Font
Set the character font.

Size
Set the character size.

Color
Set the color of the text.

Circle, Rectangle



Frame

Specify whether to show or hide the frame.

Frame Line

Set the line type of the frame. Select Solid Line, Dashed Line or Dotted Line.

Width

Set the width of the frame line. Select from the 5 stages between 1 and 5. The width can be changed for Solid Line only. For Dashed Line and Dotted Line, the width is 1.

Frame Color

Set the color of the frame.

Pattern

Select ON or OFF.

Color

Click the button to set the color as with the frame color.

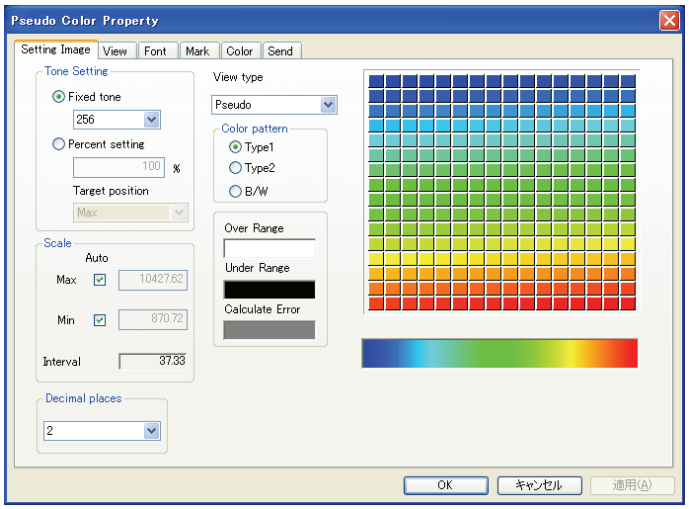
2.7.4 Pseudocolor Object

This display object forms the nucleus of CA-S20w. Displays measurement data in the CA-2500/ CA-2000 series according to the specified colorimeter values and pseudocolor settings.
Right-click on a display object and select 'Property', and the following property dialog box appears.

Setting Image

Used to set the pseudocolor graph's display range.

Tip
This option is displayed on the Properties of each object of Pseudocolor, Spot, 3D, Section, and Mura.



When 'Auto' is checked, the measurement data's maximum and minimum values are used.

Tone Setting
Sets the method of setting the gradation of the pseudo color and the number of steps of the gradation.

Fixed tone
Select from the eight fixed types of gradation.

Percent setting
Set the gradation as a percentage. With the selected target position (maximum or minimum value) as reference, the gradation divided by the entered percent value is set. For example, if the value 5% is entered, 20 steps of gradation are set.

Scale

Max

Min
Value range: smaller than the maximum value

Interval
Displays the interval of the gradation.

Auto
Specify whether or not to enable automatic settings.

Decimal places
Sets the number of "decimal places" for values displayed on axes with scales. (Select 0, 1, 2, 3, or 4).

View type
Select from Pseudo or Contour lines.

Color pattern
Select the color spectrum for the pseudocolor graph from 3 patterns.
Depending on the selection, the colors of Over Range, Under Range, and Calculate Error are different.

Over Range
Sets the color specified for instances when the measured image is too bright for color representation.

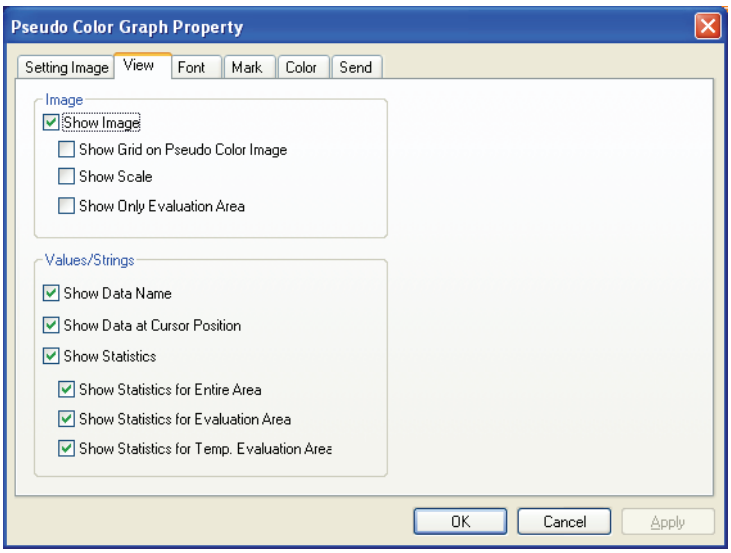
Under Range
Sets the color specified for instances when the measured image is too dark for color representation.

Calculate Error
Sets the color specified for instances when the colors cannot be calculated for the measured image. These colors differ depending on the selection of 'Type 1', 'Type 2', or 'B/W'. You cannot specify them freely.

View

Used to set up the items to be displayed on the Pseudocolor graph.

Tip
This option is displayed on the Properties of each object of Pseudocolor, Spot, Section, and Mura.



Image

Show Image
When this option is checked, images are displayed and the following three options become enabled.

Show Grid on Pseudo Color Image
When this checkbox is checked, grid lines are displayed on the pseudocolor graph.

Show Scale
When this checkbox is checked, scales are displayed at the top and on the left of the pseudocolor graph.

Show Only Evaluation Area
Check this checkbox to display only the area specified with the Evaluation area frame onto the Pseudocolor graph.

Values, Strings

Show Data Name
When this option is checked, the name of the data is displayed.

Show Data at Cursor Position
When this option is checked, the colorimetric value at the cursor position is displayed along with the position of the cursor.

Show Statistics
When this option is checked, statistics are displayed and the following three options become enabled.

Show Statistics for Entire Area
When this option is checked, the statistics of the entire screen are displayed.

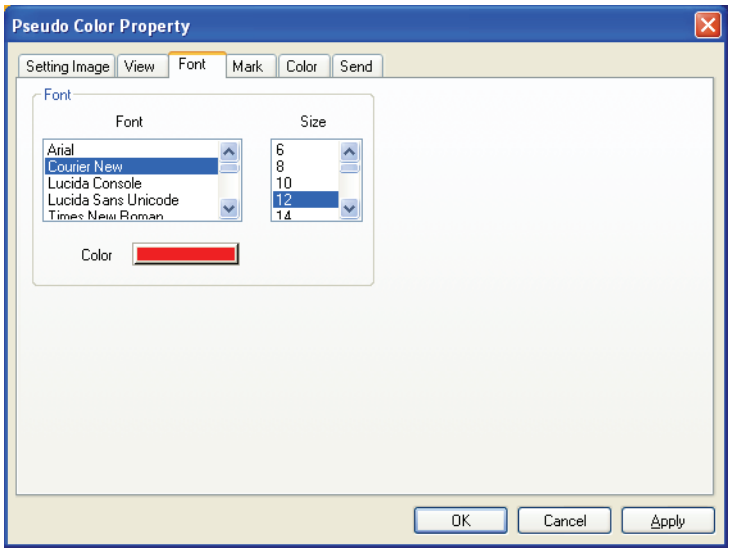
Show Statistics for Evaluation Area
When this option is checked, the statistics of the evaluation area are displayed.

Show Statistics for Temp. Evaluation Area
When this option is checked, the statistics of the temporary evaluation area are displayed.

Font

Set the font, size, and color of text used in objects.

Tip
This option is displayed on the Properties of each object of Pseudocolor, Spot, 3D, Section, Mura, and Histogram.



Font

Font
Set the font of text used in graphs.

Size
Set the size of text used in graphs.

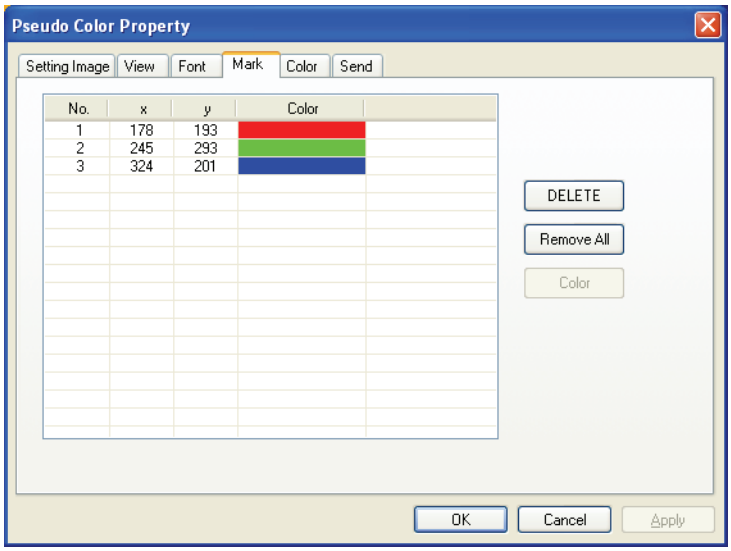
Color
Set the color of text used in graphs.

Mark

Place the mouse cursor on the pseudocolor graph and click the mouse while holding down the Shift key. A ‘mark’ is displayed on that point. You can set the position and color of the mark.

Tip

- This option is displayed on the Properties of each object of Pseudocolor, Spot, Section, X-Y Chromaticity Diagram, Mura, and RGB.
- Up to 20 ‘Marks’ can be displayed.
- You can change the position and color of each mark by clicking on a list frame of ‘x’/‘y’/‘Color’.



No.
Mark number in the graph.

x
The x coordinate of the mark shown in the graph. By clicking on a list frame twice (not double-clicking), you can enter a numerical value.

y
The y coordinate of the mark shown in the graph. By clicking on a list frame twice (not double-clicking), you can enter a numerical value.

Color
Color of a mark in the graph. The ‘Color’ button is enabled when one row is selected from the list. Click the ‘Color’ button to display the Color dialog box and specify the color.

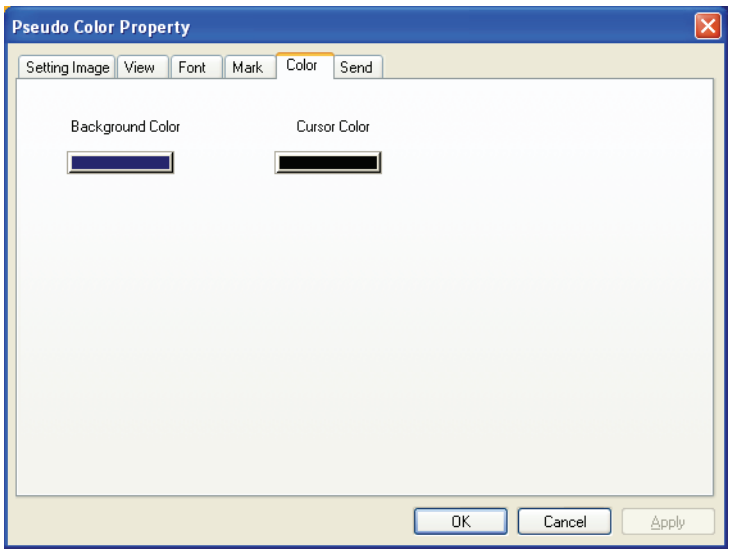
DELETE
Deletes the selected mark. The numbers are automatically changed.

Remove All
Deletes all the marks.

Color

Set graph area colors.

Tip
This option is displayed on the Properties of each object of Pseudocolor, Spot, 3D, Section, X-Y Chromaticity Diagram, Mura, and Histogram.



Background Color
Set the color of the background.

Cursor Color
Set the color of the cursor.

Tip
This option is not displayed on the Properties of each object of 3D and Histogram.

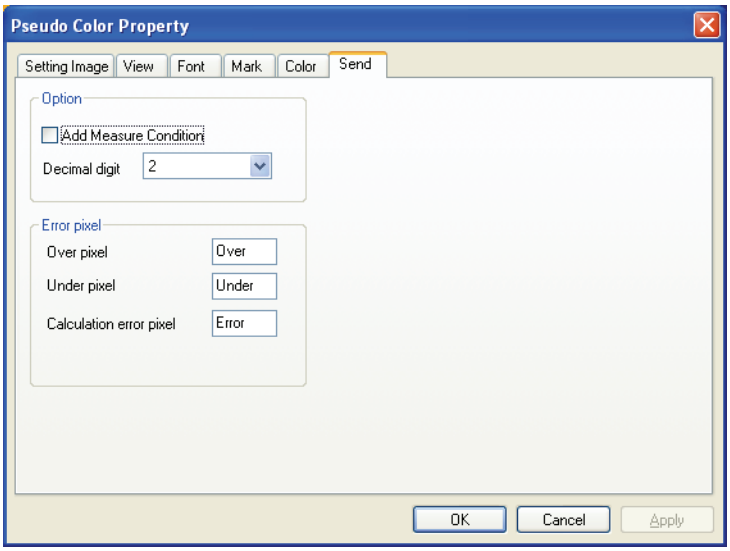
Graph Area
Used to set the color of the graph area.

Tip
This option is not displayed on the Properties of each object of Pseudocolor, Spot, 3D, and Mura.

Send

Used to configure the setting to output data to the clipboard.

Tip
This option is displayed on the Properties of each object of Pseudocolor, Spot, Section, and Mura.



Option

Add Measure Condition
Check this checkbox to output the measurement condition displayed on the Condition frame in text format.

Decimal digit
Specify the number of decimal digits of the output data. (Select from 0, 1, 2, 3, and 4.)

Error pixel

Over pixel
Enter a character string or a numerical value to be assigned to the Over pixels. The default string is “Over”.

Under pixel
Enter a character string or a numerical value to be assigned to the Under pixels. The default string is “Under”.

Calculation error pixel
Enter a character string or a numerical value to be assigned to the calculation error pixels. The default string is “Error”.

2.7.5 Pseudocolor with Spot Object

Right-click on a display object and select ‘Property’, and the following property dialog box appears.

Setting Image

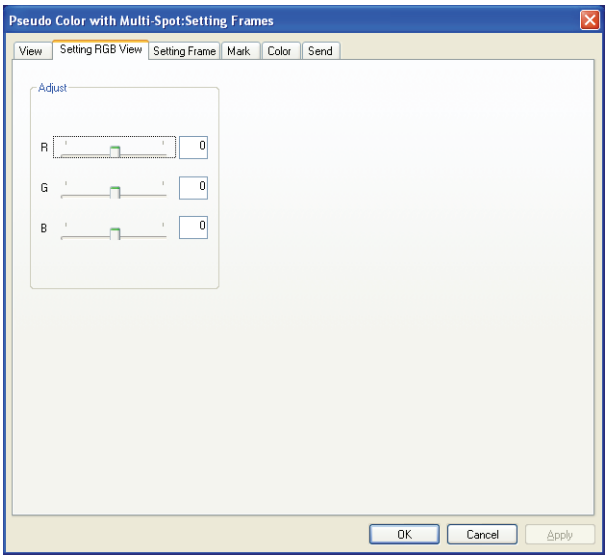
Used to set the pseudocolor graph’s display range. Not displayed when the viewfinder image is displayed with RGB images instead of pseudocolor (When ‘View RGB’ is checked in the right-click menu).
The options are the same as those on the Properties of the Pseudocolor graph object. See page 100.

View

Used to set up the items to be displayed on the Pseudocolor graph area.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 101.
The options ‘Show Only Evaluation Area’, ‘Show Statistics’, ‘Show Statistics for Entire Area’, ‘Show Statistics for Evaluation Area’ and ‘Show Statistics for Temp. Evaluation Area’ are not displayed when the viewfinder image is displayed with RGB images instead of pseudocolor (When ‘View RGB’ is checked in the right-click menu).

Setting RGB View

Used when color adjustment is necessary for the RGB images shown on the monitor. This option is displayed only when the viewfinder image is displayed with RGB images instead of pseudocolor (When ‘View RGB’ is checked in the right-click menu).



Adjust

Move the slide bar to the right or left and adjust the color. A reference value is displayed in the box.

Note

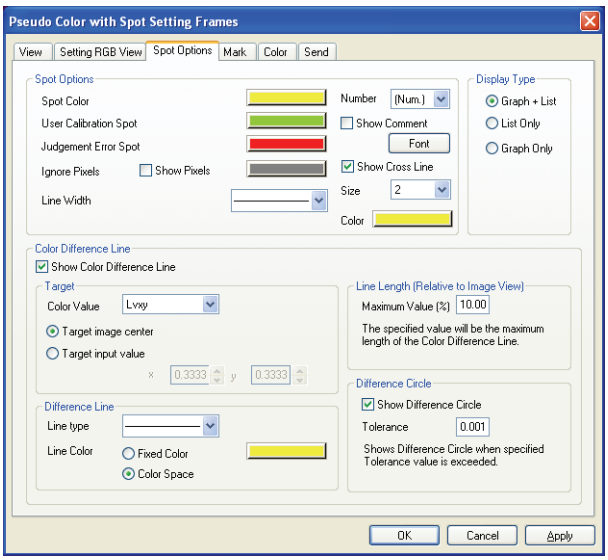
Depending on the resolution of your PC, you may not be able to reset the value to the initial value (0) with the slide bar. In such a case, enter “0” directly in the box next to the slide bar.

Font

Set the font, size, and color of text used in objects. Not displayed when the viewfinder image is displayed with RGB images instead of pseudocolor (When 'View RGB' is checked in the right-click menu).
The options are the same as those on the Properties of the Pseudocolor graph object. See page 103.

Spot Options

Set the line type, line color, and color deviation lines for spot areas.



Spot Options

Spot Color
Specify the color of a normal spot.

User Calibration Spot
You can specify your own original color for the spots to which the user calibration has been applied.

Judgement Error Spot
You can specify your own original color for the spots that failed the tolerance judgement.

Ignore Pixels
You can specify a color for the pixels that are judged as errors when the ignore pixel has been set. Checking 'Show Pixels' enables this option.

Line Width
Select the thickness of the spot line.

Number
Specify the notation of the spot measurement frame number.

Show Comment
When this option is checked, the comment specified for spot measurement data is displayed after the number.

Font
Specify the font used for the number and comment.

Show Cross Line
When this option is checked, a cross is displayed to indicate the center of the spot measurement frame.

Size
Select the size of the cross.

Color
Specify the color of the cross.

Display Type

Graph + List
The data is displayed in graph and list forms.

List Only
The data is displayed in list form only.

Graph Only
The data is displayed in graph form only.

Color Difference Line

Show Color Difference Line
When this option is checked, color deviation lines are displayed instead of spots. The following options become enabled.

Target

Color Value
Set the color space used as the criteria for color deviation (selectable from Lvxy or Lvu'v').
- When 'Target image center' is selected, the median of the color space is used as the reference value.
- When 'Target input value' is selected, the value entered in the text box below is used as the reference value

Difference Line

Line type
Select the type of the line.

Line Color
Set the color of the line.
- When 'Fixed Color' is selected, the line is displayed in the color selected in the box on the right.
- When 'Color Space' is selected, the line is displayed in the same color as the space in the chromaticity diagram.

Line Length (Relative to Image View)
Enter the size of the color deviation line by assuming that the size of the image being displayed is 100.

Difference Circle

Show Difference Circle
When this option is checked, the color difference judgment for tolerance is emphasized with a circle.

Mark

Clicking the mouse button on the Pseudocolor graph will display a ‘mark’ on that point. This option is used to set the position and color of the ‘mark’.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 104.

Color

Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

Send

Used to configure the setting to output data to the clipboard.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 106.

2.7.6 3D Object

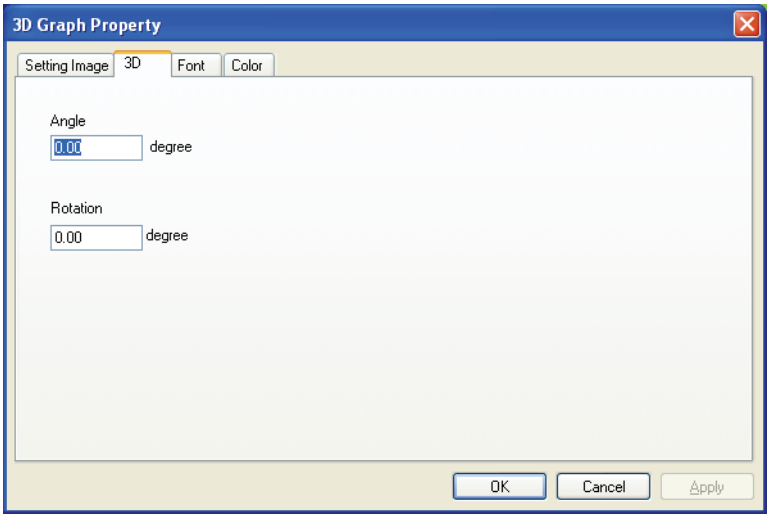
Right-click on a display object and select 'Property', and the following property dialog appears.

Setting Image

Used to set the pseudocolor graph's display range.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 100.

3D

Used to set angles in a 3D graph. You can enter a value within the range of –180 degree to 180 degree.



Angle
Enter a value within the range of –180 degree to 180 degree.

Rotation
Enter a value within the range of –180 degree to 180 degree.

Font

Set the font, size, and color of text used in graphs.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 103.

Color

Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

2.7.7 Cross Section Diagram Object

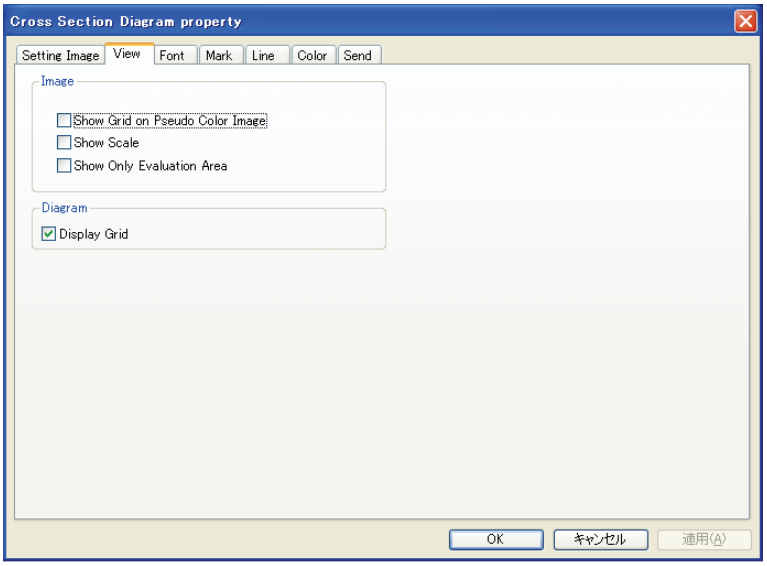
Right-click on a display object and select ‘Property’, and the following property dialog box appears.

Setting Image

Used to set up the display area on the Pseudocolor graph area.
The options are the same as those on the Properties of the Pseudocolor graph object. Refer to page 100.

View

Used to set up the items to be displayed on the Pseudocolor graph area.



Image

Display Grid on Pseudocolor Image
Check this checkbox to display grid lines on the Pseudocolor graph.

Show Scale
Check this checkbox to display scales on the top and left sides of the Pseudocolor graph.

Display Only Evaluation Area
Check this checkbox to display only the area specified with the Evaluation area frame onto the Pseudocolor graph.

Diagram

Display Grid
When this option is checked, the grids located at the same position as the pseudocolor are displayed.

Font

Set the font, size, and color of text used in graphs.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 103.

Mark

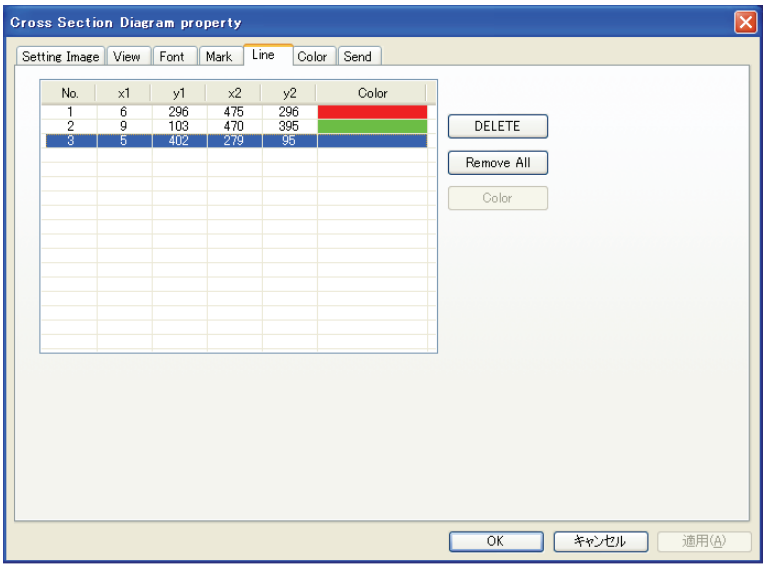
Clicking the mouse button on the Pseudocolor graph will display a ‘mark’ on that point. This option is used to set the position and color of the ‘mark’.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 104.

Line

When you place the mouse cursor on the pseudocolor graph and left-click the mouse button while holding down the Ctrl key at two points, an ‘arbitrary line’ that passes through the two points are displayed. Set the positions of the two points and the color of the ‘arbitrary line’.

Tip

- You can change the position and color of each arbitrary line by clicking on a list frame of x1/y1/x2/y2/ ‘Color’.
- Up to 20 ‘Arbitrary Lines’ can be displayed.



No.
The number of the arbitrary line on the graph

x1
The x coordinate of the initially clicked position for the arbitrary line. You can also enter a numeric value by clicking the mouse button twice (not double clicking).

y1
The y coordinate of the initially clicked position for the arbitrary line. You can also enter a numeric value by clicking the mouse button twice (not double clicking).

x2
The x coordinate of the second clicked position for the arbitrary line. You can also enter a numeric value by clicking the mouse button twice (not double clicking).

y2
The y coordinate of the second clicked position for the arbitrary line. You can also enter a numeric value by clicking the mouse button twice (not double clicking).

Color
Color of an arbitrary line in the graph. The 'Color' button is enabled when one row is selected from the list. Click the 'Color' button to display the Color dialog box and specify the color.

DELETE
Deletes the selected arbitrary line. The numbers are automatically changed.

Remove All
Deletes all the arbitrary lines.

Color

Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

Send

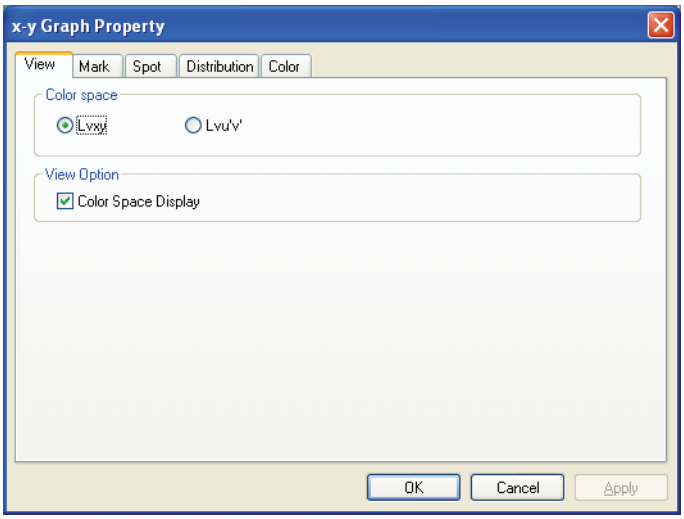
Used to configure the setting to output data to the clipboard.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 106.

2.7.8 xy-Chromaticity Diagram Object

Used to calculate the chromaticity diagram from an image, and used to plot the chromaticity value in the area specified with the Evaluation area frame onto the chromaticity diagram.
Right-click on a display object and select 'Property', and the following property dialog box appears.

View

Specify the type of chromaticity diagram to be displayed.



Color space

Lvxy
Select this option to display an xy-chromaticity diagram.

Lvu'v'
Select this option to display a u'v'-chromaticity diagram.

View Option

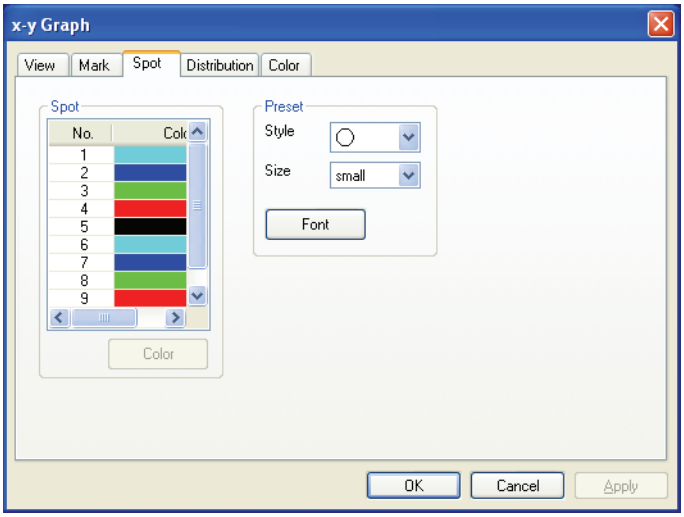
Color Space Display
When this option is checked, the color space within the chromaticity diagram is displayed in color.

Mark

When a pseudocolor graph object exists in the same document window, clicking the mouse button on the pseudocolor graph while holding down the Shift key will display a 'mark' at that point. Then, the 'mark' showing the data for the position is displayed on the xy-chromaticity diagram. This option is used to set the position and color of the 'mark' on the pseudocolor graph.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 104.

Spot

Configure the required settings when you wish to plot the spot values on the chromaticity diagram (when 'Draw Spot' is checked in the right-click menu.).



Spot

No.
Display the spot number assigned to the measurement data.

Color
Set the color of the spot values plotted on the chromaticity diagram.
When you select the 'No'. or 'Color' sections of the list, the 'Color' button is enabled. Click the 'Color' button to display the Color dialog box, and then specify a color.

Preset

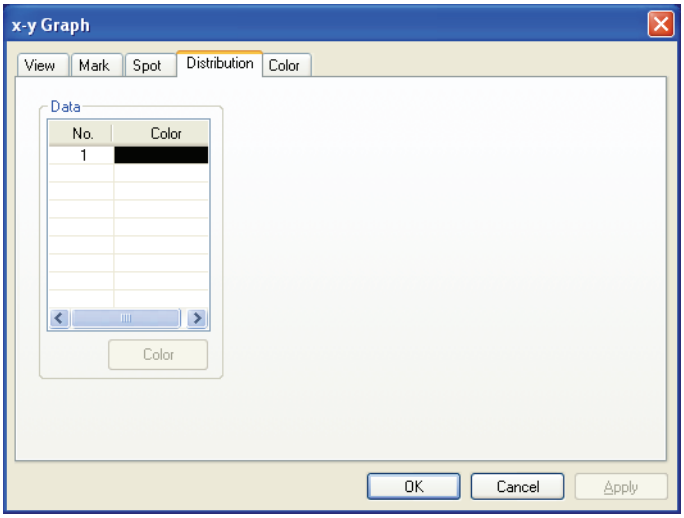
Style
Set the shape of the points representing the spot values plotted on the chromaticity diagram.

Size
Set the size of the points representing the spot values plotted on the chromaticity diagram.

Font
Set the font used for the spot values plotted on the chromaticity diagram.

Distribution

Sets the color of each piece of data when multiple pieces of measurement data are displayed on the chromaticity diagram (when 'Draw Multi Data' is checked in the right-click menu).



Data

No.
Display the value of the measurement data.

Color
Set the color of the measurement data displayed on the chromaticity diagram.
When you select the 'No'. or 'Color' sections of the list, the 'Color' button is enabled. Click the 'Color' button to display the Color dialog box, and then specify a color.

Color

Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

2.7.9 Mura Control Object

The Mura control object uses the following calculations:

Calculate the average of the data in the area of a specified size around individual measurement points (smoothed data).

Calculate the difference or ratio between the data of each measurement point and the smoothed data.

Double-click on a display object, or right-click it and select 'Property', and the following property dialog box appears.

Setting Image

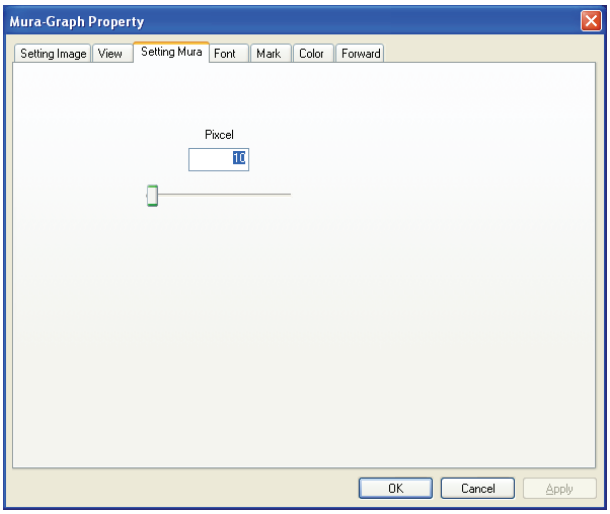
Used to set the pseudocolor graph's display range.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 100.

View

Used to set up the items to be displayed on the Pseudocolor graph area.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 101.

Setting Mura

Used to specify the size of the area to calculate "the smoothed data which is used as a reference".



Pixel

The smoothed data is calculated in a square area whose length on one side is the specified number of pixels. The larger the value is, the slower the calculation speed becomes.

When 'Pixel' is set to 50, for example, the smoothed data at the measurement point for coordinates (100,100) is calculated as follows:

$$\frac{\text{Data at coordinates (100,100) - Average value in the area between coordinates (75,75) and coordinates (124,124)}}{\text{Average value in the area between coordinates (75,75) and coordinates (124,124)}} \times 100$$

The above formula cannot be used for coordinates (0,0) because they indicate the end of the evaluation area. In this case, the smoothed data is calculated using the following formula:

$$\frac{\text{Data at coordinates (0,0) - Average value in the area between coordinates (0,0) and coordinates (24,24)}}{\text{Average value in the area between coordinates (0,0) and coordinates (24,24)}} \times 100$$

Font

Set the font, size, and color of text used in graphs.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 103.

Mark

Clicking the mouse button on the pseudocolor graph will display a ‘mark’ on that point. This option is used to set the position and color of the ‘mark’.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 104.

Color

Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

Forward

Used to configure the setting to output data to the clipboard.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 106.

2.7.10 RGB Object

An RGB image is displayed based on the measurement data.

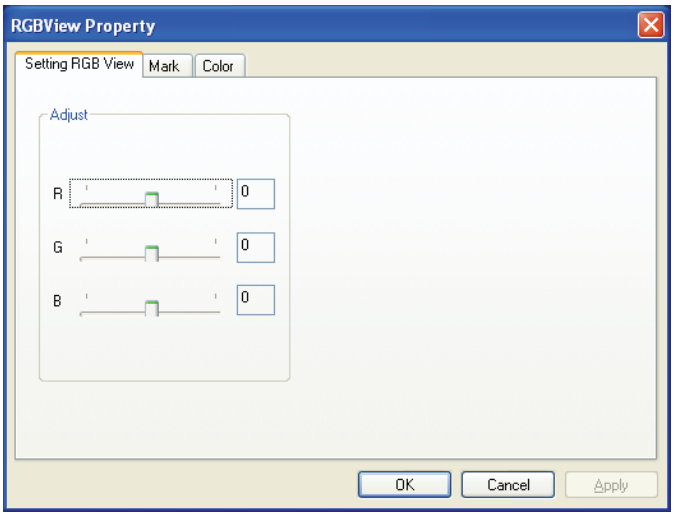
Note

The RGB values are obtained by conversion from the XYZ values.
If any correction is applied to the XYZ values, such as the user calibration or backlight cancel calculation, the resulting RGB image may have different colors from the actual colors.

Double-click on a display object, or right-click it and select 'Property', and the following property dialog box appears.

Setting RGB View

Used when an RGB image to display on the monitor requires color adjustment.
The options are the same as those on the Properties of the Spot Object. See page 107.



Adjust

Move the slide bar to the right or left and adjust the color. A reference value is displayed in the box.

Note

Depending on the resolution of your PC, you may not be able to reset the value to the initial value (0) with the slide bar. In such a case, enter "0" directly in the box next to the slide bar.

Mark

Clicking the mouse button on the Pseudocolor graph will display a 'mark' on that point. This option is used to set the position and color of the 'mark'.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 104.

Color

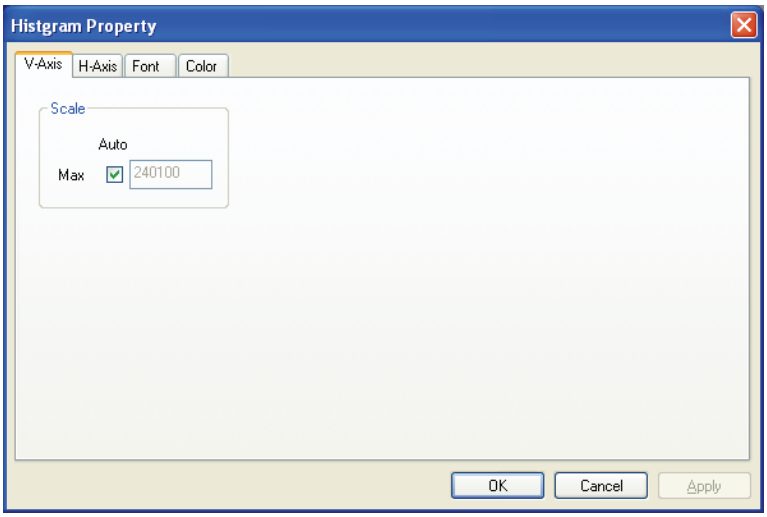
Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

2.7.11 Histogram Object

Double-click on a display object, or right-click it and select ‘Property’, and the following property dialog box appears.

V-Axis

Used to configure the settings of the vertical axis of the graph.



Scale

When the Auto checkbox is checked, the maximum value of measurement data will be used.

Max

Range of numerical input: The data is displayed within the range of the specified maximum value.

H-Axis

Used to configure the settings of the horizontal axis of the graph.
The items are the same as those on the ‘Setting Image’ tab on the Pseudocolor graph object. See page 100.

Tip
When the Auto check box is checked, the scale is automatically adjusted according to the size of the histogram object being displayed. If you always want to observe objects with the same scale, uncheck the check box.

Font

Set the font, size, and color of text used in graphs.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 103.

Color

Set graph area colors.
The options are the same as those on the Properties of the Pseudocolor graph object. See page 105.

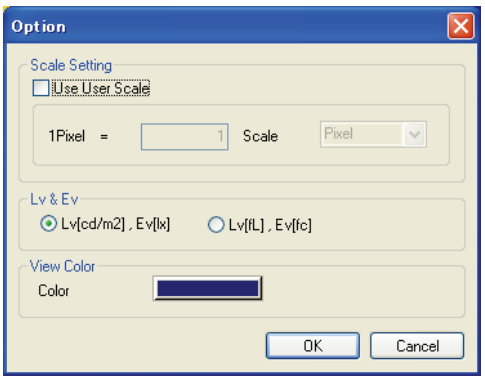
2.8 Other Functions

2.8.1 Option

There are options which set various items such as the screen background color.

1. Select *Tool* - *Option* from the menu.

The Option dialog box appears.



Scale Setting

Use User Scale
Check this checkbox to set up an original user scale. The coordinate scales for the viewfinder view and spot measurement frames in the 'Create New,' 'New Layout,' and 'Edit' dialog boxes in the 'Measure' dialog box are changed in accordance with the setting.

1 Pixel
Specify a value to be treated as one pixel.

Scale
Specify a unit. Select one from the combo box or type an original unit.

Lv & Ev
Specify the item to be set as the unit of luminance.

Note

For 'luminance centroid distance' and 'Area' in the spot measurement frame, actual values are calculated regardless of the setting of the user scale.

View Color

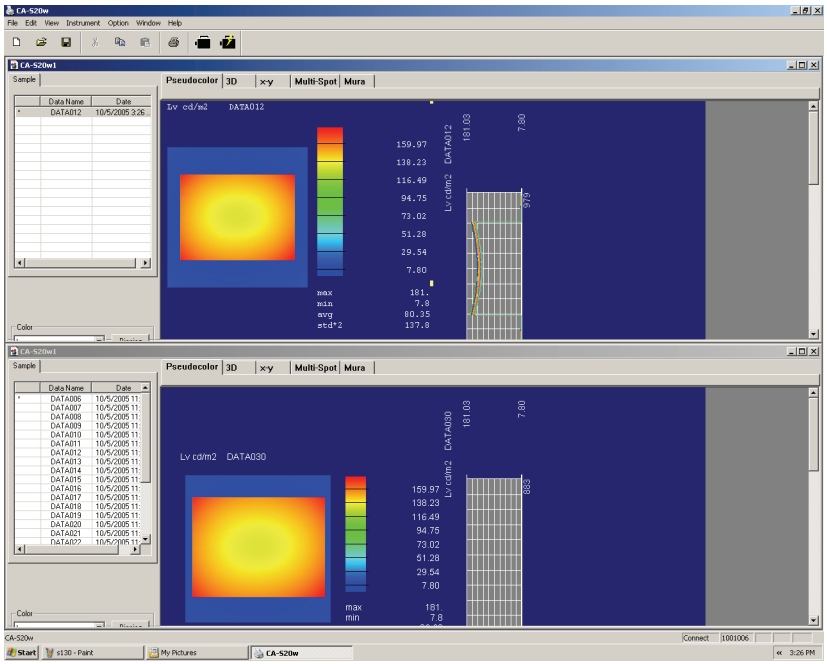
Color
Specify a color to be set as a background color. This setting affects all pages.

2.8.2 Cascade/Tile

When two or more windows are opened, select whether to cascade or tile them.

1. Select *Window* - *Cascade* or *Tile* from the menu.

   The windows are cascaded or tiled.



2.8.3 Error Recovery Function

When starting the application after abnormal termination, the application automatically calls the measurement data and format used just before the abnormal termination.
Save the called measurement data/format to a file and then move to the next task.

Note

Due to the error recovery function, you cannot perform measurement with the data/format called until they are saved to a file.

2.8.4 Management of Calibration Files

The software automatically checks the content of calibration files when it is connected to the CA-2500/CA-2000. If no calibration files exist for the lens or if the installed calibration files are older than the calibration information stored in the CA-2500/CA-2000, you will not be able to connect the software to the CA-2500/CA-2000, or you will not be able to select the lens in the *Measure* window - *Measure* tab - *Lens* combo boxes.
Install the calibration files for the lens and reconnect the CA-2500/CA-2000 and you will be able to select the lens.

2.8.5 Self Diagnosis

When you start measurement with the CA-2500/CA-2000 using the automatic exposure to measure a target with low luminance, the measurement may fail in some rare cases because the optimal exposure posi-

tion cannot be detected. When this phenomenon occurs, you can perform Self Diagnosis and prevent the measurement failure. For the procedure for performing Self Diagnosis, refer to page 172.

2.9 Error Messages

When the software does not work normally during operation, an error message is displayed. The following list shows the type and meaning (content) of error messages and the solutions.

	Error Message	Cause (Content)	Solution
1	CA-2500/CA-2000 Error Instrument has been disconnected (CODE = %d)	An error has occurred in the CA-2500/CA-2000. The CA-2500/CA-2000 is automatically disconnected.	• Select *Instrument* - *Connect* from the menu to connect the CA-2500/CA-2000.
2	CA-2500/CA-2000 Error Restart CA-2500/CA-2000 (CODE = %d)	An error has occurred in the CA-2500/CA-2000. The CA-2500/CA-2000 is automatically disconnected.	• Turn the measuring instrument OFF/ON, then select *Instrument* - *Connect* from the menu to connect the CA-2500/CA-2000.
3	CA-2500/CA-2000 Communication Error Instrument has been disconnected (CODE = %d)	A communication error between the CA-2500/CA-2000 and the software has occurred. The CA-2500/CA-2000 is automatically disconnected.	• Select *Instrument* - *Connect* from the menu to connect CA-2500/CA-2000.
4	Memory Error Restart softwear (CODE = %d)	Connection between the software and the CA-2500/CA-2000 failed due to insufficient memory.	• Save the document, close other application software, then restart the software.
5	CA-2500/CA-2000 Error Fail connect CA-2500/CA-2000 (CODE = %d)	A communication error between the CA-2500/CA-2000 and the software has occurred. The CA-2500/CA-2000 is automatically disconnected.	• Select *Instrument* - *Connect* from the menu to connect CA-2500/CA-2000.
6	CA-2500/CA-2000 Fail command (CODE = %d)	A command could not be executed in the CA-2500/CA-2000 for some reason (such as current execution of another command).	• Re-execute the operation executed last. • If the error persists: - Select *Instrument* - *Disconnect* from the menu. - Turn the measuring instrument OFF/ON. - Select *Instrument* - *Connect* from the menu to connect the CA-2500/CA-2000.
7	Incorrect Input Value (CODE = %d)	A setting value for user-specified calibration is expected to be invalid.	• Change the setting value to an appropriate value.
8	Auto exposure failed.	There is intermittent light on the measurement target.	• Select 'Synchronized Measurement' for 'Condition' and try the measurement again. • If this message appears again, use manual exposure for the measurement.
		Self Diagnosis has not been performed.	• Perform Self Diagnosis. (Refer to page 172)
9	No calibration files Install calibration files. (CODE = %d)	The calibration coefficient files have not been installed in the specified folder.	Install the files again, or change the folder by selecting *Option* - *File Path* from the menu.

	Error Message	Cause (Content)	Solution
10	Some calibration files are old. Cannot use some lenses. (CODE = %d)	Some calibration coefficient files are older than the calibration date of the CA-2500/CA-2000.	• Some lenses can't be used (can't be selected). You can still use the software in this condition. • To use the lenses that can't be used, install new calibration coefficient files for them and reconnect the measuring instrument.
11	User Abort	Measurement was interrupted by clicking the Cancel button.	• You can continue to use the software.
12	Lv is out of range.	The Lv value exceeds the calculation range in user calibration.	• Change Lv to 1,000,000 or less, or change the value after calibration to 100 times or less the value before calibration.
13	x is out of range.	The x value exceeds the calculation range in user calibration.	• Change x to a value to between 0 and 0.9999 (exclusive of 0).
14	y is out of range.	The y value exceeds the calculation range in user calibration.	• Change y to a value to between 0 and 0.9999 (exclusive of 0).
15	x and y are out of range.	The x and y values exceed the calculation range in user calibration.	• Change the values to equal not more than 1 when they are totaled.
16	Calibration value is inappropriate.	The setting value can't be calculated in user calibration.	• Change the Lv, x, and y values.

CHAPTER 3
AUTOMATION

3.1 Supported Software

The following application software supports automated operation of the CA-S20w.

When the OS is Windows XP:
- Visual Basic .NET 2003
- Visual C++ .NET 2003
- Excel 2003

When the OS is Windows Vista:
- Visual Basic.Net 2005
- Visual C++.Net 2005
- Excel 2007

When the OS is Windows 7:
- Visual Basic 2010 (Only 32-bit applications operate.)
- Excel 2007, 2010 (For Excel 2010, only the 32-bit version of the software operates.)

This document describes how to use CA-S20w with VB or VBA (Excel 2003). To use it from Visual C++, contact your place of purchase or an authorized Konica Minolta service facility.

3.2 Basic Operation Flow

The following describes the basic flow of operation when controlling the CA-S20w by automation.

- Starting the CA-S20w
- Starting the automation program
- Opening a new or existing measurement file
- Executing connection, measurement, data retrieval and other commands
- Ending the automation program
- Shutting down the CA-S20w

Note

- ***Start automation programs after starting CA-S20w, and end them before ending CA-S20w. If you end CA-S20w before ending an automation program, you may not be able to restart CA-S20w because the CAS20W.exe process is still running.***

3.3 Configuring the Development Environment

Setup Procedure for Microsoft Excel

1. In the Macro edit screen, (a screen of Microsoft Visual Basic), click ‘Tools’-‘References’ from the menu.

2. In ‘Available References’ in the References dialog box, find ‘CAS20w’ and check the checkbox.

Setup Procedure for Visual Basic .NET 2003

1. Select ‘Projects’ from the development environment menu and click ‘Add Reference’.

2. From the Add Reference dialog box, open the ‘COM’ tab page. Select ‘CAS20W’ from the list and then click the ‘Select’ button.

3. Check that ‘CAS20W’ is displayed in the ‘Selected Components’ field at the bottom of the page, and then click the OK button.

3.4 Procedure for Establishing and Terminating Connection with the CA-S20w

When Using Visual Basic

1. Before starting the program, declare the variable representing CA-S20w.

   [Example] `Dim CA20App As Object`

2. Assign CA-S20w to an object.

   ```
   CA20App = CreateObject("CAS20W.Application")
   ```

3. When ending the program, execute the following statement:

   ```
   CA20App = Nothing
   ```

When Using Excel

1. Before starting the program, declare the variable representing CA-S20w.

   [Example] `Dim CA20App As Object`

2. Assign CA-S20w to an object.

   ```
   Set CA20App = CreateObject("CAS20W.Application")
   ```

3. Execute the following statement when terminating the program.

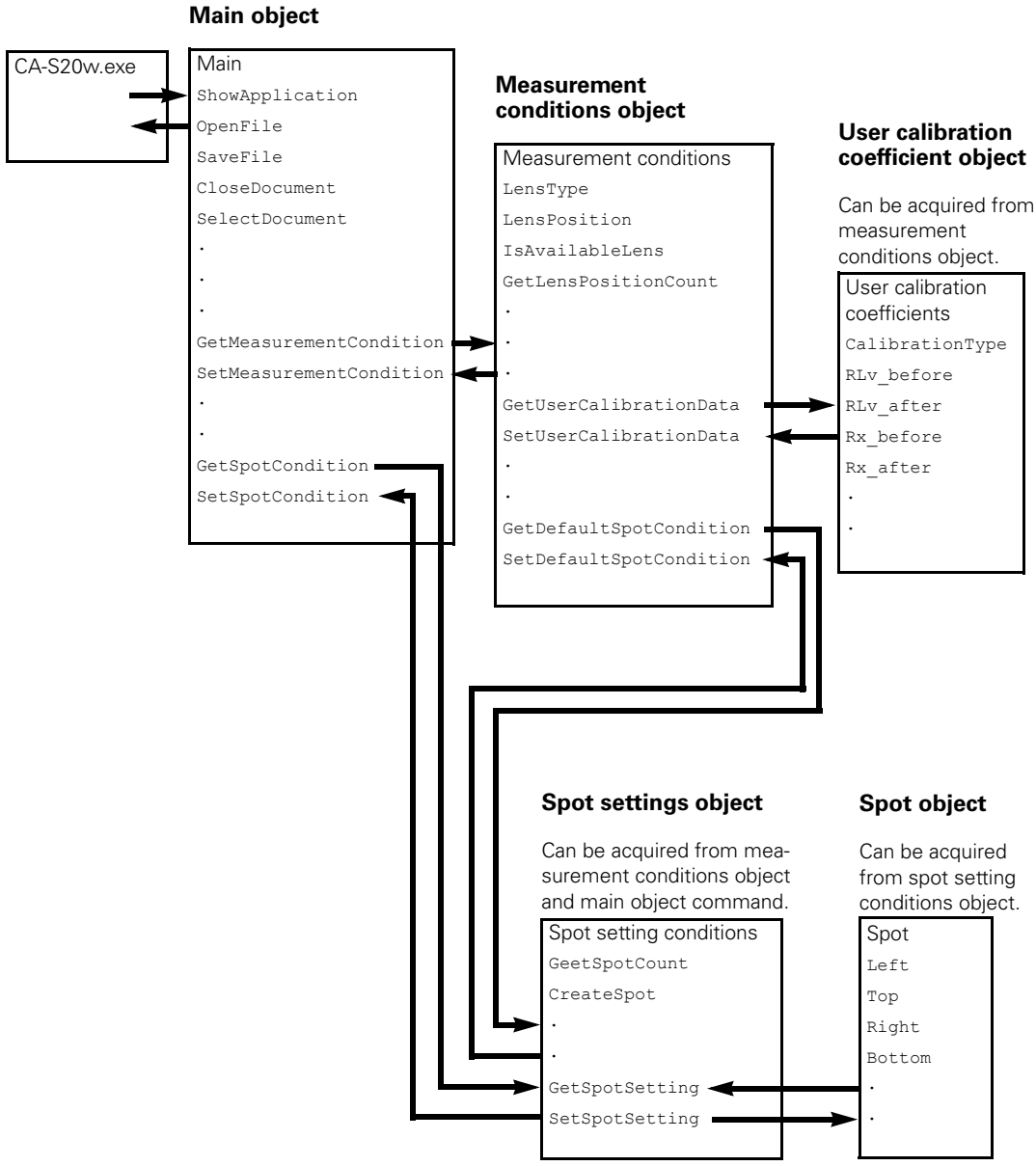
   ```
   Set CA20App = Nothing
   ```

Note

When using Visual Basic. NET, the garbage collection process automatically releases defined objects when the .NET program is ended, even if you don't call the 'Set CAS20wAPP = Nothing' command. When running a program that uses automation, execute it after starting CA-S20w, and end it before ending CA-S20w. If you end CA-S20w before ending an automation program, you may not be able to restart CA-S20w because the CAS20W.exe process is still running.

3.5 Command Configuration

CA-S20w automation functions have the configuration shown below.



Main objects

The target objects when performing CA-S20w operations. Enable operations such as measurement, and opening or saving files.

Measurement conditions objects

The target objects when performing CA-S20w measurement conditions operations. Can be acquired from main objects. Enable detailed measurement conditions settings.

User calibration coefficient objects

Objects that sets the user calibration coefficients. Can be acquired from measurement conditions objects. Let you set a user calibration, when one is desired.

Spot setting conditions objects

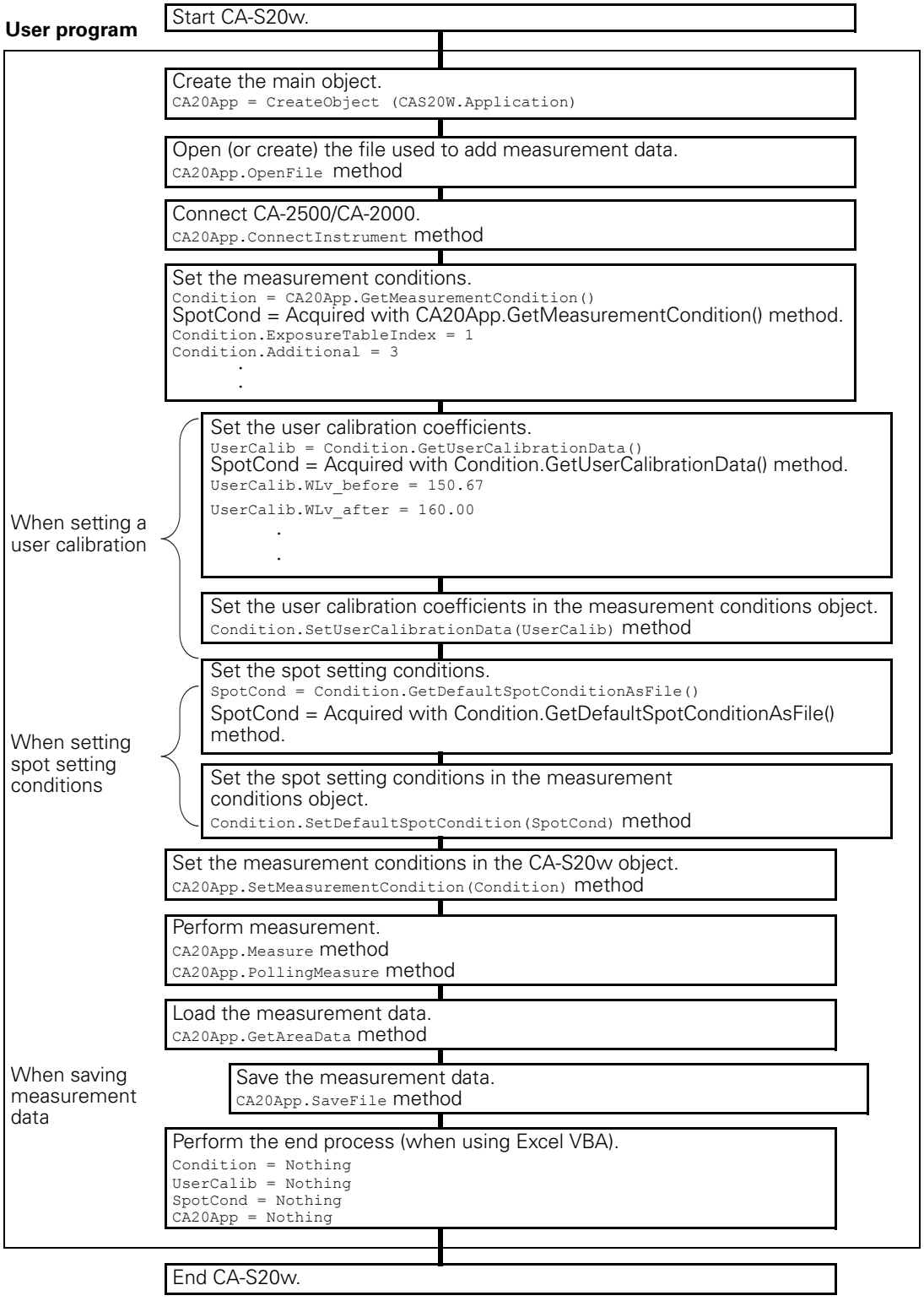
Objects that set spots. Can be acquired from main objects or measurement conditions objects. Can be used to copy spot setting conditions from one set of measurement data to another, or to set the default spot setting conditions for the next measurement.

Spot objects

Objects that set the placement of individual spots. Can be acquired from spot setting conditions objects.

3.6 Program Control Flow

The basic flow of operations used for the CA-S20w control is shown below.



3.7 Main Object Commands

3.7.1 Document Commands

3.7.1.1 Showing/Hiding the CA-S20w

Method name on the VB	ShowApplication(Index As Long) As Long
Argument on the VB	Index 0 : Shows the CA-S20w 1 : Hides the CA-S20w
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Executes Show/Hide of the CA-S20w.
Sample scripts on the VB	CA20App.ShowApplication (1) 'Shows the CA-S20w CA20App.ShowApplication (0) 'Hides the CA-S20w

3.7.1.2 Opening a Specified File/Opening a New Document

Method name on the VB	OpenFile(Filename As String) As Long
Argument on the VB	Filename Specifies the full-path name of the folder to open. If the folder name is a null string, opens a new document.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Opens a measurement data file or opens a new document. When a character “\” for indicating the directory is required, repeat it twice.
Sample scripts on the VB	Dim strName As String strName = "C:\\Documents and Settings\\CAS20w\\test" CA20App.OpenFile(strName)

3.7.1.3 Saving a File

Method name on the VB	SaveFile(FileName As String) As Long
Argument on the VB	FileName Specifies the full-path name of the folder to save. If the folder name is a null string, opens the ‘Save File’ dialog.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Saves a measurement data file into a folder specified by an argument. When there is an existing file with the same file name, the file is saved by overwriting the existing file. When a folder name is not assigned, the Save File dialog box opens. When a character “\” for indicating the directory is required, repeat it twice.
Sample scripts on the VB	Dim strName As String strName = "C:\\Documents and Settings\\CAS20w\\test" CA20App.SaveFile(strName)

3.7.1.4 Closing a Document

Method name on the VB	CloseDocument(Index As Long, Flag As Boolean) As Long
Argument on the VB	Index Document Number (A number starting from 1 is assigned in the open sequence.) Flag True : Hide message False : Show message
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Closes a document with the Document number specified by an argument. When a document with the specified number does not exist, the command fails. You can use an argument to display a message box which asks whether to save the document if the document has been changed but not saved. Document numbers are assigned in the order in which the documents were opened. Document numbers are not fixed values-when a document is closed, the numbers of the documents still open are reassigned to reflect the order in which they were opened.
Sample scripts on the VB	Dim Ret As Long Dim Index As Long Dim Flag As Boolean Index = 1 'Specifying the first document Flag = True 'Hiding the message Ret = CA20App.CloseDocument(Index, Flag)

3.7.1.5 Activating a Document

Method name on the VB	SelectDocment(Index As Long) As Long
Argument on the VB	Index Document Number (A number starting from 1 is assigned in the open sequence.)
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Activates a document with the Document number specified by an argument. When a document with the specified number does not exist, the command fails. When retrieving data, execute this command first. Also execute this command when specifying a document for saving measurement results. Document numbers are assigned in the order in which the documents were opened. Document numbers are not fixed values-when a document is closed, the numbers of the documents still open are reassigned to reflect the order in which they were opened.
Sample scripts on the VB	Dim Ret As Long Dim Index As Long Index = 1 'Specifying the first document Ret = CA20App.SelectDocment(Index)

3.7.2 Measurement Data Commands

3.7.2.1 Switching Displayed Measurement Data

Method name on the VB	SelectData(Num As Long) As Long
Argument on the VB	Num Number of measurement data to be selected (a number starting from 1)
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Selects measurement data in the active document that will be used for show/data retrieval operation. The data number starting from 1 is assigned on the list of measurement data in descending order. Data can be selected from the currently displayed list of measurement data. The command fails when the number exceeds the total number of data items, when measurement data does not exist, or when 0 or a smaller number is used. The command also fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim Num As Long Num = 1 'Selects the first measurement data. Ret = CA20App.SelectData(Num)

3.7.2.2 Deleting Displayed Measurement Data

Method name on the VB	DeleteData(Num As Long, Flag As Boolean) As Long
Argument on the VB	Num Number of measurement data to be deleted (a number starting from 1) Flag True : Hide message Flag : Show message
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Deletes a specified measurement data in the document currently active. A data number starting from 1 is assigned on the list of measurement data in descending order. Data is deleted from the measurement data list currently displayed. The command fails when the number exceeds the total number of data items, when measurement data does not exist, or when 0 or a smaller number is used. The command also fails when no active document exists or no document is opened. You can use an argument to specify a message box which asks whether to delete the data.
Sample scripts on the VB	Dim Ret As Long Dim Num As Long Dim Flag As Boolean Num = 1 'Deletes the first measurement data. Flag = True 'Hiding the message Ret = CA20App.DeleteData(Num, Mode)

3.7.2.3 Acquiring the Measurement Data Image Size

Method name on the VB	GetAreaSize(Width As Long, Height As Long) As Long
Argument on the VB	Width The maximum width that can be acquired. Height The maximum height that can be acquired.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Acquires the image size of measurement data in the document currently active. The command fails when no measurement data exists. The command also fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim Width As Long Dim Height As Long Ret = CA20App.GetAreaSize(Width, Height)

3.7.2.4 Acquiring the Measurement Data List Count

Method name on the VB	GetDataCount() As Long
Argument on the VB	None
Return value on the VB	Number of measurement data items in current measurement list
Description	Acquires the number of measurement data items in the 'Measurement Data List' currently displayed in the active document.
Sample scripts on the VB	Dim Ret As Long Ret = CA20App. GetDataCount()

3.7.3 Measurement Commands

3.7.3.1 Connecting with an Instrument

Method name on the VB	ConnectInstrument() As Long
Argument on the VB	None
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Connects to an instrument. Executing this command displays the Connect Instrument dialog box. Select an instrument and click the OK button. When establishing a connection fails, the measurement failure occurs.
Sample scripts on the VB	Dim Ret As Long Ret = CA20App.ConnectInstrument()

Note

Even when the day specified in 'Interval (number of days) at which to show this dialog' in the Self Diagnosis starting dialog box (refer to page 172) is reached, this dialog box is not displayed when the CA-2500/CA-2000 is controlled automatically by the CA-S20w.
To perform Self Diagnosis because the automatic exposure fails or for any other reason, select Instrument - Self Diagnosis from the menu bar of the CA-S20w.

3.7.3.2 Checking Whether the Instrument Is Connected

Method name on the VB	InConnectInstrument() As Long
Argument on the VB	None
Return value on the VB	When the command was executed successfully : Connected: Body number Disconnected: 0 When command execution failed : -1
Description	Checks whether the instrument is connected.
Sample scripts on the VB	Dim Count As Long Count = CA20App.GetInstrumentCount()

3.7.3.3 Acquiring the Connectable Measuring Instrument Count

Method name on the VB	GetInstrumentCount() As Long
Argument on the VB	None
Return value on the VB	When the command was executed successfully : Returns the number of connectable measuring instruments. When command execution failed : -1
Description	Returns the number of connectable measuring instruments. If the command fails, check that CA-2500/CA-2000's power is ON and that the USB cable is connected to the PC.
Sample scripts on the VB	Dim Count As Long Count = CA20App.GetInstrumentCount()

3.7.3.4 Acquiring the Measuring Instrument Body Number

Method name on the VB	GetInstrumentNumber() As Long
Argument on the VB	Index Specifies the number acquired by GetInstrumentCount.
Return value on the VB	When the command was executed successfully : Returns the body number. When command execution failed : -1
Description	Returns the body number for the specified index number. If the command fails, check that CA-2500/CA-2000's power is ON and that the USB cable is connected to the PC.
Sample scripts on the VB	Dim Count As Long Dim Number As Long Dim i As Long Count = CA20App.GetInstrumentCount() For i = 1 to Count Number = CA20App.GetInstrumentNumber(i) Next i

3.7.3.5 Connecting the Measuring Instrument With the Specified Body Number

Method name on the VB	ConnectInstrumentEx(BodyNo As Long, Flag1 As Variant, Flag2 As Variant) As Long
Argument on the VB	BodyNo Body number of measuring instrument to connect Flag1 Parameter for future use (always specifies 0) Flag2 Parameter for future use (always specifies 0)
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Connects the measuring instrument that has the specified body number. If connection fails, restart CA-2500/CA-2000 and CA-S20w. When a measuring instrument is already connected and this command is executed, the command succeeds if the number of the connected measuring instrument was specified, and fails if a different number was specified.
Sample scripts on the VB	Dim Ret As Long Ret = CA20App.ConnectInstrument(1001005, 0, 0)

Note

Even when the day specified in 'Interval (number of days) at which to show this dialog' in the Self Diagnosis starting dialog box (refer to page 172) is reached, this dialog box is not displayed when the CA-2500/CA-2000 is controlled automatically by the CA-S20w.
To perform Self Diagnosis because the automatic exposure fails or for any other reason, select Instrument - Self Diagnosis from the menu bar of the CA-S20w.

3.7.3.6 Disconnecting From the Instrument

Method name on the VB	DisconnectInstrument()
Argument on the VB	None
Return value on the VB	None
Description	Disconnects from the instrument. When no instrument is connected, nothing occurs. If an instrument is connected, the connection with the instrument is cut regardless of the body number.
Sample scripts on the VB	CA20App.DisconnectInstrument()

3.7.3.7 Disconnecting From the Instrument By Specifying the Body Number.

Method name on the VB	DisconnectInstrumentEx(BodyNo As Long, Flag1 As Variant, Flag2 As Variant) As Long
Argument on the VB	BodyNo Body number of the instrument to be disconnected Flag1 Parameter for future use (always specifies 0) Flag2 Parameter for future use (always specifies 0)
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Disconnects from the instrument by specifying the body number. Be sure to specify the body number of the connected instrument. The operation fails when an instrument is connected but the specified measurement number is different from that of the instrument.
Sample scripts on the VB	Dim BodyNo As Long BodyNo = 1001005 Ret = CA20App.ConnectInstrument(BodyNo, 0, 0) Ret = CA20App.DisconnectInstrument(BodyNo, 0, 0)

3.7.3.8 Measuring an Object

Method name on the VB	Measure() As Long
Argument on the VB	None
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Starts a measurement. The return value is returned immediately after the command is executed. Even if the measurement is not completed successfully due to some cause such as excessive light quantity, this command returns a success value (0) as long as the measurement started properly. If you want to check whether the measurement was completed, or if a light quantity error occurred, you need to use PollingMeasure. The measurement result is stored in the document currently active. The command fails when no active document exists or no document is opened.

Sample scripts on the VB	Dim Ret As Long
	Ret = CA20App.Measure() 'Measures an object.
	Do
	  Ret = MsgBox("Cancel ?", MsgBoxStyle.OKCancel, "")
	  If Ret = MsgBoxResult.OK Then
	  If CA20App.MeasureCancel() = 0 Then
	  'Was the Cancel button pressed?
	  Exit Do
	  End If
	  Else
	  If CA20App.PollingMeasure() = 0 Then
	  'Is a measurement completed?
	  Exit Do
	  End If
	  End If
	Loop Until Ret = MsgBoxResult.OK

Note

Measurement data is temporarily retained in the temporary work area until it is saved by the user. The temporary data is stored in the following location:

```
C:\Document and Settings\<login user name>\Local Settings\Temp\mcl
```

If measurement is continued without saving the measurement data, such as long-time continuous measurement on a production line or for checking the deterioration effects of time, the backup data is retained until the data save operation is performed. Consequently, you need to follow the steps below to use automation commands to perform measurements continuously.

1) Use the SetMode(1) function in order not to retain backup data.
2) Use the SetMode(2) and DeleteData functions to delete data after each measurement. (Executing SetMode(2) automatically deletes the backup data.)
3) Save data manually for every measurement.

For details of the SetMode function, see page 152.

Example of step 1 (VB)

```
Dim Ret As Long
Dim Mode As Long
Mode = 1
Ret = CA20App.SetMode(Mode)  'Set Mode 1.
Ret = CA20App.SetMode()  'Performs a measurement.
if Ret <> -1 Then
    Do
         Ret = CA20App.PollingMeasure()
    Loop Until Ret = 0 Or Ret = -1
End If
```

Example of step 2 (VB)

```
Dim Ret As Long
Dim Mode As Long
Mode = 2
Ret = CA20App.SetMode(Mode)  'Set Mode 2.
Ret = CA20App.SetMode()  'Performs a measurement.
if Ret <> -1 Then
    Do
         Ret = CA20App.PollingMeasure()
    Loop Until Ret = 0 Or Ret = -1
    CA20App.DeleteData(1,True)  'Deletes the first data.
End If
```

Example of step 3 (VB)

```
Dim Ret As Long
Ret = CA20App.SetMode()  'Performs a measurement.
if Ret <> -1 Then
    Do
         Ret = CA20App.PollingMeasure()
    Loop Until Ret = 0 Or Ret = -1
    CA20App.DeleteData(1,True)  'Deletes the first data.
    CA20App.SaveFile("C:\\Document And Settings\\CAS20w\\Temp")
    'Saves empty data in the Temp folder.
End If
```

3.7.3.9 Checking the Completion of a Measurement

Method name on the VB	PollingMeasure() As Long
Argument on the VB	None
Return value on the VB	Measurement is in progress : 99 Measurement is completed or in standby mode : 0 When command execution failed : -1
Description	Checks whether the measurement is in progress or standby mode. If the measurement operation finishes but the measurement is not completed successfully due to some cause such as excessive light quantity, this command returns a failed value (-1). This command fails when the PC is not connected to an instrument. The command fails when no active document exists or no document is opened.

Sample scripts on the VB	Dim Ret As Long
	Ret = CA20App.Measure() 'Performs a measurement.
	Do
	  Ret = MsgBox("Cancel ?", MsgBoxStyle.OKCancel, "")
	  If Ret = MsgBoxResult.OK Then
	  If CA20App.MeasureCancel() = 0 Then
	  'Was the Cancel button pressed?
	  Exit Do
	  End If
	  Else
	  If CA20App.PollingMeasure() = 0 Then
	  'Is a measurement completed?
	  Exit Do
	  End If
	  End If
	Loop Until Ret = MsgBoxResult.OK

3.7.3.10 Canceling a Measurement

Method name on the VB	MeasureCancel() As Long
Argument on the VB	None
Return value on the VB	When a cancellation is completed : 0 When command execution failed : -1
Description	Cancels a measurement. The command execution fails in the following cases: When the PC is not connected to an instrument. When no active document exists. When no document is opened.

Sample scripts on the VB	Dim Ret As Long
	Ret = CA20App.Measure() 'Performs a measurement.
	Do
	  Ret = MsgBox("Cancel ?", MsgBoxStyle.OKCancel, "")
	  If Ret = MsgBoxResult.OK Then
	  If CA20App.MeasureCancel() = 0 Then
	  'Was the Cancel button pressed?
	  Exit Do
	  End If
	  Else
	  If CA20App.PollingMeasure() = 0 Then
	  'Is a measurement completed?
	  Exit Do
	  End If
	  End If
	Loop Until Ret = MsgBoxResult.OK

3.7.3.11 Acquiring Measurement Data

<table>
<tr><td>Method name on the VB</td><td>GetAreaData(Element As Long, Left As Long, Top As Long, Right As Long, Bottom As Long, MesData As Long) As Long</td></tr>
<tr><td>Argument on the VB</td><td>Element
Number of Color type to be acquired.
0:X, 1:Y, 2:Z, 3:Lv, 4:x, 5:y, 6:u', 7:v', 8:T, 9: duv,
10:Dominant wavelength, 11:Excitation purity
Left
Left coordinate of the image data
Top
Upper coordinate of the image data
Right
Right coordinate of the image data
Bottom
Lower coordinate of the image data
MesData
Dim MesData ([Number of measurement data items]) As Single)
Sequence for storing the acquired measurement data
The image data is stored in raster format starting from the top-left in the rightward direction.</td></tr>
<tr><td>Return value on the VB</td><td>When the command was executed successfully : 0
When command execution failed : -1</td></tr>
<tr><td>Description</td><td>Acquires the specified colorimetric value and measured value of the currently selected measurement data.
When you specify a color value number other than the value specified for ‘Element’, the command fails if no measurement data exists.
The command also fails when no active document exists or no document is opened.
You must set the values so that ‘Left’ < ‘Right’ and ‘Top’ < ‘Bottom’. Set the coordinates carefully, since the supported coordinate range varies according to the set resolution.

<table>
<tr><td rowspan="2">Resolution</td><td colspan="2">Supported coordinate range</td></tr>
<tr><td>Left, Top</td><td>Right, Bottom</td></tr>
<tr><td>490*490</td><td>0 to 488</td><td>1 to 489</td></tr>
<tr><td>980*980</td><td>0 to 978</td><td>1 to 979</td></tr>
<tr><td>196*196</td><td>0 to 194</td><td>1 to 195</td></tr>
</table>
The command fails if an unsupported number is specified.

<Note>
The measured image may contain values that indicate errors. The following value is assigned to a pixel with an error such as a calculation error.
• Over-error pixel : Assigned when an extremely bright image was measured.
-3.3028231e + 38
• Under-error pixel : Assigned when an extremely dark image was measured.
-2.4028230e + 38
• Calculation error pixel : Assigned when colorimetric data is calculated.
-1.4028230e + 38
When any of these values is contained in an image, the pixels are erroneous. Do not use them for evaluation such as calculation. To judge these values, use the following procedure because they may include some errors:
Example)
VB
If Value < -3.0E+38 Then
'Over-error pixel
ElseIf Value < -2.0E+38 And Value >= -3.0E+38 Then
'Under-error pixel
ElseIf Value < -1.0E+38 Then
'Calculation error pixel
Else
'Normal pixel
End If</td></tr>
</table>

Sample scripts on the VB	' Acquires the image size. Dim Ret As Long Dim Left As Long Dim Top As Long Dim Right As Long Dim Bottom As Long Dim Element As Long Dim Width As Long Dim Height As Long Ret = CA20App.GetAreaSize(Width,Height) 'Acquires the size of measurement data. Dim MesData(Width * Height) As Single 'Reserves an array with the size 'of the image. Element = 3 ' Acquires the Lv data. Left = 0 Top = 0 Right = Width -1 Bottom = Height -1 Ret = CA20App.GetAreaData(Element, Left, Top, Right, Bottom, MesData)

3.7.3.12 Acquiring Spot Data

Method name on the VB	GetSpotData(Element As Long, SpotData As Single) As Long
Argument on the VB	Element Number of Color type to be acquired. 0:X, 1:Y, 2:Z, 3:Lv, 4:x, 5:y, 6:u', 7:v', 8:T, 9: duv, 10:Dominant wavelength, 11:Excitation purity SpotsData Dim SpotData ([Spot Count]) As single) Specify an array to contain the acquired spot data. The data is contained sequentially from spot number 1.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1

Description	Acquires the spot data set to the currently selected measurement data.
	This command fails if the number specifying colorimetric data exceeds the number of factors of the colorimetric system, if the measurement data does not exist, or if a value smaller than 0 is used.
	The command also fails when no active document exists or no document is opened.
	To acquire the number of spots, refer to "3.7.4.1 Acquiring Spot Setting Conditions Set in Specified Measurement Data" and "3.7.4.2 Acquiring Spot Setting Conditions From Files".
	
	<Note>
	The measured image may contain values that indicate errors. The following values are assigned to a pixel with an error such as a calculation error.
	• Over-error pixel : Assigned when an extremely bright image was measured.
	-3.3028231e + 38
	• Under-error pixel : Assigned when an extremely dark image was measured.
	-2.4028230e + 38
	• Calculation error pixel : Assigned when colorimetric data is calculated.
	-1.4028230e + 38
	When any of these values is contained in an image, the pixels are erroneous. Do not use them for evaluations such as calculation. To judge these values, use the following procedure because they may include some errors:
	Example)
	VB
	If Value < -3.0E+38 Then
	'Over-error pixel
	ElseIf Value < -2.0E+38 And Value >= -3.0E+38 Then
	'Under-error pixel
	ElseIf Value < -1.0E+38 Then
	'Calculation error pixel
	Else
	'Normal pixel
	End If

Sample scripts on the VB	' Acquires the image size. Dim Ret As Long Dim Element As Long Dim SpotCond As Object Dim SpotCond As Long SpotCond = CA20App.GetSpotCondition() 'Acquires the spot setting condition object. SpotCount = SpotCond.GetSpotCount() 'Acquires the number of spots. Dim SpotData(Spot) As Single 'Reserves an array which can contain the acquired spots. Element = 3 'Acquires the spot value of Lv data. Ret = CA20App.GetAreaData(Element, SpotData)

3.7.3.13 Acquiring the Information of Measurement Data

Method name on the VB	GetDataProperty(Name As String, Comment As String, Date As String) As Long
Argument on the VB	Name Name assigned to the measurement data Comment Comment assigned to the measurement data Date Date of measurement The following is the format of an acquired string. "YY,MM,DD,hh,mm,ss"
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	The command fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim sName As String Dim sComment As String Dim sDate As String Ret = CA20App.GetDataProperty(sName, sComment, sDate)

3.7.3.14 Showing/Hiding a Measure Dialog Box

Method name on the VB	ShowSettingDialog(Index As Long) As Long
Argument on the VB	Index 1 : Display measurement conditions dialog. 0 : Hide measurement conditions dialog.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Displays the Measure dialog box. The command execution fails in the following cases: When the PC is not connected to an instrument. When no active document exists. When no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim Index As Long Index = 1 'Displays the Measure dialog box. Ret = CA20App.ShowSettingDialog (Index)

3.7.3.15 Acquiring Measurement Conditions

Method name on the VB	GetMeasurementCondition() As Object
Argument on the VB	None
Return value on the VB	Returns a measurement conditions object. For more information on measurement conditions objects, see “4.8 Measurement Conditions Object Commands”.
Description	Acquires a measurement conditions object. This command fails when the PC is not connected to an instrument. The command fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Condition As Object Condition = CA20App.GetMeasurementCondition()

3.7.3.16 Acquiring Measurement Conditions From Files

Method name on the VB	GetMeasurementConditionAsFile(FileName As String) As Object
Argument on the VB	FileName Specifies the file name. You must specify full-path file names.
Return value on the VB	Returns the measurement conditions object to which the settings read from the file have been applied. For more information on measurement conditions objects, see “4.8 Measurement Conditions Object Commands”. This command fails when the PC is not connected to an instrument. The command fails when no active document exists or no document is opened.
Description	Acquires a measurement conditions object from a file. Just executing this method does not apply the measurement conditions to CA-S20w. To set the measurement conditions read from the file in CA-S20w, you must execute the SetMeasurementCondition method to set the measurement conditions object. When a folder name is not assigned, the Save File dialog box opens. When a character “\” for indicating the directory is required, repeat it twice.
Sample scripts on the VB	Dim Condition As Object Dim strName As String strName = “C:\\Documents and Setting\\CAS20w\\Codition1.cas” Condition = CA20App.GetMeasurementConditionAsFile(strName)

3.7.3.17 Setting Measurement Conditions

Method name on the VB	SetMeasurementCondition(Condition As Object) As Long
Argument on the VB	Condition Specifies the object that will set the measurement conditions. You must specify a measurement conditions object acquired by the GetMeasurementCondition method or GetMeasurementConditionAsFile method. For more information on Condition objects, see “4.8 Measurement Conditions Object Commands”.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Sets the measurement conditions. This command fails when the PC is not connected to an instrument. The command fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim Condition As Object Condition = CA20App.GetMeasurementCondition() Ret = CA20App.SetMeasurementCondition(Condition)

3.7.4 Spot Commands

3.7.4.1 Acquiring Spot Setting Conditions Set in Specified Measurement Data

Method name on the VB	GetSpotCondition() As Object
Argument on the VB	None
Return value on the VB	Returns a spot setting conditions object. For more information on spot setting conditions objects, see “4.10 Spot Setting Conditions Object Commands”.
Description	Acquires the spot setting condition object set to the currently selected measurement data. This command fails if there is no active document, or if no documents are opened.
Sample scripts on the VB	Dim SpotCond As Object Dim Ret As Long SpotCond = CA20App.GetSpotCondition()

3.7.4.2 Acquiring Spot Setting Conditions From Files

Method name on the VB	GetSpotConditionAsFile(FileName As String) As Object
Argument on the VB	FileName Specifies the file name. You must specify full-path file names.
Return value on the VB	Returns the spot setting conditions object to which the settings read from the file have been applied. For more information on spot setting conditions objects, see “4.10 Spot Setting Conditions Object Commands”.
Description	Acquires a spot setting conditions object from a file. Just executing this method does not apply the spot setting conditions to the measurement data. To set the spot setting conditions read from the file in the measurement data, you must execute the SetSpotCondition method, which sets the spot setting conditions in the specified measurement data. When a character “\” for indicating the directory is required, repeat it twice.
Sample scripts on the VB	Dim SpotCond As Object Dim StrName As String StrName = “C:\\Documents and Setting\\CAS20w\\Spot1.spt” SpotCond = CA20App.GetSpotConditionAsFile(strName)

3.7.4.3 Setting Spot Setting Conditions in Specified Measurement Data

Method name on the VB	SetSpotCondition(SpotCond As Object) As Long
Argument on the VB	SpotCond Specifies the object that will set the spot setting conditions. You must specify a spot setting conditions object acquired by the GetSpotCondition method or GetSpotConditionAsFile method. For more information on SpotCond objects, see “4.10 Spot Setting Conditions Object Commands”.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Sets the spot data in the currently selected measurement data. The Command fails when no active document exists or no document is opend.
Sample scripts on the VB	Dim Ret As Long Dim SpotCond As Object Dim Num As Long 'Selects the first measurement data item Num = 1 'Acquires the spot setting conditions set in the first measurement data item SpotCond = CA20App.GetSpotCondition(Num) Ret = CA20App.SetSpotCondition(SpotCond)

3.7.5 Other

3.7.5.1 Setting CA-S20w's Operation Mode

Method name on the VB	SetMode(Index As Long) As Long
Argument on the VB	Index The following modes can be set: Measurement method No. / Measurement method 0 / Create a backup file for each measurement and add data to the list. Deletion of a backup file: Invalid 1 / Overwrite a backup file and overwrite the data at the end of the list. 2 / Create a backup file for each measurement and add data to the list. Deletion of a backup file: Valid 4 / Reserved
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	When "Do not create backup files" is selected, only the first piece of data will be the backup data created during measurement. When "Delete backup data" is selected, the backup data will be deleted when DeleteData deletes the measurement data.
Sample scripts on the VB	Dim Ret As Long Dim Index As Long Index = 1 Ret = CA20App.SetMode(Index)

3.7.5.2 Saving View Screen Graphs or Images in Bitmap Format

Method name on the VB	SaveObjectAsBMPFile(FileName As String, TabIndex As Long, ObjectIndex As Long) As Long
Argument on the VB	FileName Specifies the file name. You must specify full-path file names. Opens the 'Save File' dialog when the file name is a null string. TabIndex Specifies the view screen tab number. ObjectIndex Specifies the number of the object pasted in the tab window.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Saves the graph or image pasted in the tab window in bitmap format, under the file name specified by the argument. When there is an existing file with the same file name, the file is saved by overwriting the existing file. If the file name is not specified, an error is reported. When a character "\" for indicating the directory is required, repeat it twice. Tab window numbers are assigned sequentially from right to left. The leftmost item is number 1. The command fails if a nonexistent tab number is specified. Object numbers are assigned in the order in which the objects are pasted. The first object pasted is object number 1. The command fails if a nonexistent object number is specified. Bitmap files are saved in 24-bit format.
Sample scripts on the VB	Dim Ret As Long Dim strName As String Dim TabIndex As Long Dim ObjectIndex As Long TabIndex = 1 'Specifies the rightmost tab ObjectIndex = 1 'Specifies the first object pasted strName = "C:\\Documents and Setting\\CAS20w\\test.bmp" Ret = CA20App.SaveObjectAsBMPFile(strName, TabIndex, ObjectIndex)

3.7.5.3 Acquiring Detailed Error Values

Method name on the VB	GetLastError() As Long
Argument on the VB	None
Return value on the VB	The following detailed error values are returned:

Error No.	Description
0	Succeeded.
1	A window frame has not been created.
2	Measurement dialog is open.
4	Document is not open.
5	Measuring instrument is not connected.
6	Measurement is in progress, so can't execute.
7	Already connected, so can't connect.
8	Failed to connect with the instrument.
9	Failed to execute because an instrument is now being connected.
10	File read/write failed.
20	Error in parameters.
21	Error in document selection.
22	Error in measurement data selection.
23	Measurement data is not selected
24	The spot setting dialog box is open.
30	Measurement failed.
100	Error in exposure range setting.
110	Error in frequency setting.
120	Error in lens type setting.
121	Error in lens position setting.
122	Error in exposure table setting.
130	Error in additional setting.
140	Error in user calibration coefficients.
150	Error in level for lower limit setting.
151	The setting value of the X/Y/Z individual measurement is incorrect.
152	The smear correction setting is incorrect.
160	Error in selected spot number.
170	The measurement method is not correct.
171	Error in spot coordinates.
172	Error in spot's effective pixels setting.
173	Error in spot's user calibration value.
180	Error in eff ective pixels for measurement. Please contact the nearest KONICA MINOLTA authorized service facility.
181	The number of defective pixels has reached the warning level. Please contact the nearest KONICA MINOLTA authorized service facility.

Sample scripts on the VB	Dim Ret As Long Ret = CA20App.GetLastError()

3.8 Measurement Conditions Object Commands

The GetMeasurementCondition() main object command returns a measurement conditions object. Measurement conditions objects set detailed measurement conditions.

When Using Excel or Visual Basic

1. Declare the variable representing the measurement conditions.

```
Dim Condition As Object
```

2. Assign the measurement conditions object to 'Condition'.

```
Condition = CA20App.GetMeasurementCondition( )
```

3. Set the measurement conditions properties.

```
Condition.AutoExporsure = False
          .
          .
```

4. Pass the set measurement conditions to CA-S20w.

```
CA20App.SetMeasurementCondition(Condition)
```

5. After making the settings, execute the following statement:

```
Condition = Nothing
```

Note

Attempts to acquire or set measurement conditions objects fail when the measurement conditions dialog is open in CA-S20w. To set measurement conditions, you must close the CA-S20w's measurement conditions dialog.

3.8.1 Measurement Conditions Commands

3.8.1.1 Setting/Acquiring Lens Types

Method name on the VB	LensType As Long
Description	Sets or acquires the lens type. The types that can be set are: Lens No. / Lens type 0 / Standard 1 / Wide-angle 2 / Telephoto 3 / Macro 1 (low magnification) 4 / Macro 2 (high magnification) To check whether a particular lens type is supported, call the IsAvailableLens method and check the return value. The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.LensType = 1

3.8.1.2 Setting/Acquiring Lens Positions

Method name on the VB	LensPosition As Long
Description	Sets or acquires the lens position. The supported lens positions vary according to the set lens type. To check whether a particular lens position number is supported, call the GetLensPositionCount method, and check the supported lens position count. The SetMeasurementCondition method fails if you specify an unsupported lens position number. The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.LensPosition = 1

3.8.1.3 Checking Whether a Lens is Supported

Method name on the VB	IsAvailableLens(Type As Long) As Boolean
Argument on the VB	Type Specifies the lens number.
Return value on the VB	True Supported False Unsupported
Description	Checks whether the specified lens number is supported. Lens numbers can be checked using the numbers set in “4.8.1.1 Setting/Acquiring Lens Types”.

Sample scripts on the VB	Dim Ret As Boolean
	Dim i As Interger
	For i = 0 to 5
	Ret = Condition.IsAvailableLens(i)
	If (Ret = false) Then
	Msgbox (‘Can not use this Lens number”+ CStr(i))
	End If
	Next i

3.8.1.4 Acquiring Supported Lens Position Count

Method name on the VB	GetLensPositionCount() As Long
Argument on the VB	None
Return value on the VB	Returns the number of supported lens positions.
Description	Acquires the number of lens positions set in the measuring instrument. The supported position numbers for each lens type are shown below.

Lens position No.	Lens No.				
	Standard	Wide-angle	Telephoto	Macro 1 (low magnification)	Macro 2 (high magnification)
0	0.25m	0.2m	0.9m	0.5m	0.3m
1	0.25m + 1/2	0.24m	0.9m + 1/2	-	-
2	0.3m	0.3m	1m	-	-
3	0.3m + 1/2	0.5m	1m + 1/3	-	-
4	0.5m	1m	1m + 2/3	-	-
5	0.5m + 1/2	Inf	1.5m	-	-
6	1m	-	1.5m + 1/3	-	-
7	1m + 1/2	-	1.5m + 2/3	-	-
8	Inf	-	3m	-	-
9	-	-	3m + 1/3	-	-
10	-	-	3m + 2/3	-	-
11	-	-	Inf	-	-

Sample scripts on the VB	Dim LensPositionCount As Long LensPositionCount = Condition.GetLensPotionCount( )

3.8.1.5 Setting/Acquiring Auto Exposure ON/OFF Setting

Method name on the VB	AutoExposure As Boolean
Description	Sets or acquires the auto exposure ON/OFF setting. When set to 'True', the exposure positions enabling measurement are automatically adjusted to the optimum exposure amount. When set to 'False', the shutter speed table position set in the ShutterTableIndex properties is used.
Sample scripts on the VB	Condition.AutoExposure = True

3.8.1.6 Setting/Acquiring Measurement Method

Method name on the VB	MeasurmentType As Long
Description	Sets or acquires the measurement method. The supported parameters are shown below.

Measurement method No.	Measurement method
0	Standard measurement
1	Synchronized measurement

	The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.MeasurmentType = 1

3.8.1.7 Setting/Acquiring Synchronized Measurement Frequency

Method name on the VB	SyncValue As Double
Description	Sets or acquires the frequency used during synchronized measurement. When setting a frequency, specify a value between 4.0000 and 2000.0000. You can set values with up to 4 decimal places. The 5th decimal place is discarded. The SetMeasurementCondition method fails if you specify an unsupported lens value.
Sample scripts on the VB	Condition.SyncValue = 60.0000

3.8.1.8 Setting/Acquiring Exposure Table Positions

Method name on the VB	ExposureTableIndex As Long
Description	Sets or acquires the exposure table position. The exposure table varies according to the synchronization frequency when synchronized measurement has been turned ON. To check whether a particular number. can be set as an exposure table position, call the GetExposureTableCount method and check the supported exposure table position count. The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.ExposureTableIndex = 1

3.8.1.9 Acquiring Supported Exposure Table Position Count

Method name on the VB	GetExposureTableCount() As Long
Argument on the VB	None
Return value on the VB	Returns the number of supported exposure table positions.
Description	Acquires the number of supported exposure table positions. The table below shows the exposure table count for each supported table position number. under standard measurement conditions.

Exposure table position No.	Standard measurement	Synchronized measurement (60 Hz)
0	1/2048 ND1.5% nomal	1/30.0000 ND1.5% nomal
1	1/1024 ND1.5% nomal	1/30.0000 ND3% nomal
2	1/512 ND1.5% nomal	1/30.0000 ND6% nomal
3	1/256 ND1.5% nomal	1/30.0000 ND12.5% nomal
4	1/128 ND1.5% nomal	1/30.0000 ND25% nomal
5	1/64 ND1.5% nomal	1/30.0000 ND50% nomal
6	1/64 ND3% nomal	1/30.0000 ND100% nomal
7	1/64 ND6% nomal	2/30.0000 ND100% nomal
8	1/64 ND12.5% nomal	4/30.0000 ND100% nomal
9	1/64 ND25% nomal	8/30.0000 ND100% nomal
10	1/64 ND50% nomal	16/30.0000 ND100% nomal
11	1/64 ND100% nomal	16/30.0000 ND100% mid
12	1/32 ND100% nomal	16/30.0000 ND100% high
13	1/16 ND100% nomal	
14	1/8 ND100% nomal	
15	1/4 ND100% nomal	
16	1/2 ND100% nomal	
17	1/1 ND100% nomal	
18	1/1 ND100% mid	
19	1/1 ND100% high	

<CAUTION>
The exposure table position numbers. supported for synchronized measurement vary according to the synchronization frequency. Check actual CA-S20w operation and write down the displayed exposure table values before setting exposure table position numbers.

Sample scripts on the VB	Dim LensTypeCount As Long LensTypeCount = Condition.GetLensTypeCount()

3.8.1.10 Setting/Acquiring 'Additional' Values

Method name on the VB	Additional As Long
Argument on the VB	None
Return value on the VB	Returns the number of supported exposure table positions.
Description	Sets the 'Additional' value. The supported parameters are shown below. 'Additional' No. / 'Additional' value 0 / One shot (1) 1 / Ultra Fast (4) 2 / Fast (16) 3 / Nomal (64) 4 / High acc (256) The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.Additional = 1

3.8.1.11 Setting/Acquiring 'Level for Lower Limit' Values

Method name on the VB	LowerLevel As Single
Description	Sets or acquires the 'Level for Lower Limit' value. When setting a value, specify a value between 0.00 and 100.00. You can set values with up to 2 decimal places. The 3rd decimal place is discarded. For some settings, the second decimal digit may vary by 1 digit. The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.LowerLevel = 0.500

3.8.1.12 Setting/Acquiring Resolution

Method name on the VB	Resolution As Long
Description	Sets or acquires the resolution. The parameters are shown below. Resolution No. / Resolution 0 / 490*490 1 / 980*980 2 / 196*196 The SetMeasurementCondition method fails if you specify an unsupported lens number. <CAUTION> The resolution can only be set when creating a new document. If the document contains data, the resolution can't be changed.
Sample scripts on the VB	Condition.Resolution = 2

3.8.1.13 Setting/Acquiring Auto Exposure Range

Method name on the VB	X0 As Long, Y0 As Long, X1 aAs Long, Y1 As Long
Description	Sets or acquires the auto exposure range. X0: Left coordinate Y0: Top coordinate X1: Right coordinate Y1: Bottom coordinate You must set the coordinates so that X0 < X1, and Y0 < Y1. Set the coordinates carefully, since the supported coordinate range varies according to the set resolution.

Resolution ('Resolution' parameter value)	Supported coordinate range	
	X0, Y0	X1, Y1
490*490 (0)	0 to 488	1 to 489
980*980 (1)	0 to 978	1 to 979
196*196 (2)	0 to 194	1 to 195

The SetMeasurementCondition method fails if you specify an unsupported lens number.
The SetMeasurementCondition method fails if X1 - X0 or Y1 - Y0 is less than 3 (minimum size is less than 3).
When the resolution is set to 980 and the show measurement window command is executed after the execution of SetMeasurementCondition, the automatic exposure range displayed by CA-S20w may change by one dot.

Sample scripts on the VB

```
Condition.X0 = 0
Condition.Y0 = 0
If Condition.Resolution = 1 Then          Resolution: 490 × 490
   Condition.X1 = 489
   Condition.Y1 = 489
Else if Condition.Resolution = 2 Then     Resolution: 980 × 980
   Condition.X1 = 979
   Condition.Y1 = 979
Else                                      Resolution: 196 × 196
   Condition.X1 = 195
   Condition.Y1 = 195
End if
```

3.8.1.14 Setting/Acquiring the X/Y/Z Individual Measurement Options

Method name on the VB	FilterMeasure as Boolean
Description	Sets or acquires the ON/OFF status of the X/Y/Z individual measurement. When True is set, the X/Y/Z individual measurement is performed. The filter number to be measured is specified with FilterIndex. When False is set, the normal X/Y/Z measurement is performed.
Sample scripts on the VB	Condition.FilterMeasure = True

3.8.1.15 Setting/Acquiring the X/Y/Z Filter Number.

Method name on the VB	FilterIndex As Long
Description	Sets or acquires the X/Y/Z filter number. When the FilterMeasure property is set to True, this filter number is enabled. The parameters which can be set/acquired are as follows:

No.	Filter
0	Y
1	X
2	Z

The SetMeasurementCondition method fails if you specify an unsupported lens number.

Sample scripts on the VB	Condition.FilterIndex = 0 'Performs Y measurement.

3.8.1.16 Setting/Acquiring the Smear Correction

Method name on the VB	SmearIndex As Long
Description	Sets or acquires the smear correction number. The parameters which can be set/acquired are as follows: No. / Description 0 / None 1 / Simple 2 / Linear The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	Condition.mearIndex = 2 'Performs approximate correction.

3.8.1.17 Setting/Acquiring Auto Naming Function ON/OFF Setting

Method name on the VB	AutoNaming As Boolean
Description	Sets or acquires the auto naming function's ON/OFF setting. If 'True' is set, auto naming is applied to the measurement data name. If 'False' is set, auto naming is not applied to the measurement data name.
Sample scripts on the VB	Condition.AutoNaming = True

Note

The AutoNumber function used with the CA-S20w Ver.1.1 or earlier has been renamed to the AutoNaming function described above. The operation is the same and the AutoNumber function can still be used with this version.

3.8.1.18 Setting Names

Method name on the VB	SetName(strName As String, strComment) As Long
Argument on the VB	SetName Specifies the name to set for the measurement data. You must specify a name. strComment Specifies the comment to set for the measurement data. A null string can be specified.
Return value on the VB	The command fails when no name is specified or a character string longer than the effective length is specified.
Description	When this function is called, the auto number function is turned OFF, and the set character string is carried over to the next measurement data. To set a different name for each set of measurement data, you must set the names before measurement. If the name is not changed, the same character string will be set as the data name of each set of data.
Sample scripts on the VB	Dim strName As String Dim strComment As String strName = "Display1" strComment = " " Ret = Condition.SetName(strName, strComment)

3.8.2 User Calibration Commands

3.8.2.1 Acquiring the User Calibration Coefficient

Method name on the VB	GetUserCalibrationData() As Object
Argument on the VB	None
Return value on the VB	Returns a user calibration coefficient object. For more information on user calibration coefficient objects, see “4.9 User Calibration Coefficient Object Commands”.
Description	Acquires a user calibration coefficient object.
Sample scripts on the VB	Dim UserCalibData As Object UserCalibData = Condition.GetUserCalibData ()

3.8.2.2 Acquiring User Calibration Coefficients From Files

Method name on the VB	GetUserCalibrationDataAsFile(FileName As String) As Object
Argument on the VB	FileName Specifies the user calibration coefficient file. You must specify a full-path file name.
Return value on the VB	Returns the user calibration coefficient object to which the settings read from the file have been applied. For more information on user calibration coefficient objects, see “4.9 User Calibration Coefficient Object Commands”.
Description	Acquires a user calibration coefficient object from a file. Just executing this method does not apply the user calibration coefficients to CA-S20w. To set the user calibration coefficients read from the file in CA-S20w, you must execute the SetUserCalibrationData method, which sets the user calibration coefficient object. When a character “\” for indicating the directory is required, repeat it twice.
Sample scripts on the VB	Dim UserCalibData As Object Dim strName As String strName = “C:\\Documents and Setting\\CAS20w\UserCalib1.uca” UserCalibData = Condition.GetUserCalibrationDataAsFile (strName)

3.8.2.3 Setting User Calibration Coefficients

Method name on the VB	SetUserCalibrationData(UserCalibrationData As Object) As Long
Argument on the VB	UserCalibData Specifies the object that will set the user calibration coefficients. You must specify a measurement conditions object acquired by the GetUserCalibrationData method or GetUserCalibrationDataAsFile method. For more information on UserCalibration objects, see “4.9 User Calibration Coefficient Object Commands”.
Return value on the VB	When the command was executed successfully: 0 When command execution failed: -1
Description	Sets the user calibration coefficients. This command fails when the PC is not connected to an instrumant. The command fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim UserCalibData As Object UserCalibData = Condition.GetUserCalibrationData() Ret = Condition.SetUserCalibrationData(UserCalibData)

3.8.3 Spot Commands

3.8.3.1 Acquiring Default Spot Setting Conditions

Method name on the VB	GetDefaultSpotCondition() As Object
Argument on the VB	None
Return value on the VB	Returns a spot setting conditions object. For more information on spot setting conditions objects, see “4.10 Spot Setting Conditions Object Commands”.
Description	Acquires the spot setting conditions object set in the specified measurement data in the currently active document. The command fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim SpotCond As Object SpotCond = Condition.GetDefaultSpotCondition()

3.8.3.2 Acquiring Default Spot Setting Conditions From Files

Method name on the VB	GetDefaultSpotConditionAsFile (FileName As String) As Object
Argument on the VB	FileName Specifies the file name. You must specify a file name.
Return value on the VB	Returns the spot setting conditions object that applies the settings read from the file. For more information on spot setting conditions objects, see “4.10 Spot Setting Conditions Object Commands”.
Description	Acquires a spot setting conditions object from a file. Just executing this method does not apply the spot setting conditions to CA-S20w. To set spot setting conditions read from a file to CA-S20w, you must execute the SetSpotCondition method, which sets the spot settings conditions object. When character “\” for indicating the directory is required, repeat it twice.
Sample scripts on the VB	Dim SpotCond As Object Dim strName As String strName = “C:\\Documents and Setting\\CAS20w\Spot1.spt” SpotCond = Condition.GetDefaultSpotConditionAsFile (strName)

3.8.3.3 Setting Default Spot Setting Conditions

Method name on the VB	SetDefaultSpotCondition (SpotCond As Object) As Long
Argument on the VB	SpotCond Specifies the object that will set the spot setting conditions. You must specify a spot setting conditions object acquired by the GetSpotCondition method or GetSpotConditionAsFile method. For more information on SpotCond objects, see “4.10 Spot Setting Conditions Object Commands”.
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Sets the spot setting conditions. This command fails when the PC is not connected to an instrumant. The command fails when no active document exists or no document is opened.
Sample scripts on the VB	Dim Ret As Long Dim SpotCond As Object SpotCond = Condition.GetSpotCondition() Ret = Condition.SetDefaultSpotCondition(SpotCond)

3.9 User Calibration Coefficient Object Commands

GetMeasurementConditions() returns a user calibration coefficient object from an acquired measurement conditions object. User calibration coefficient objects set detailed user calibration coefficient settings.

When Using Excel or Visual Basic

1. Declare the variable representing the measurement conditions.

```
Dim Condition As Object
```

2. Declare the variable representing the user calibration coefficients.

```
Dim UserCalibData As Object
```

3. Assign the measurement conditions object to its value.

```
Condition = CA20App.GetMeasurementCondition( )
```

4. Assign the user calibration coefficient object to its value.

```
UserCalibData = Condition.GetUserCalibrationData( )
```

5. Set the calibration coefficient type.

```
UserCalibData.CalibrationType = 2
```

6. Perform user calibration on the white luminance.

```
UserCalibData.WLv_before = 50.32
UserCalibData.WLv_after = 60.28
          .
          .
```

7. Pass the set user calibration coefficients to CA-S20w.

```
Condition.SetUserCalibrationData(UserCalibData)
```

8. After making the settings, execute the following statement:

```
UserCalibData = Nothing
Condition = Nothing
```

3.9.1.1 Setting/Acquiring User Calibration Coefficient Types

Method name on the VB	CalibrationType as Long
Description	Sets or acquires the user calibration type. The parameters are shown below.. Calibration No. / Calibration type 0 / None 1 / RGB matrix calibration 2 / One-point calibration 3 / WRGB matrix calibration The SetUserCalibrationData method fails if an unsupported number is specified.
Sample scripts on the VB	UserCalibData.CalibrationType = 1

3.9.1.2 Setting/Acquiring User Calibration Coefficients

Method name on the VB	RLv_before As Double - Wy_after As Double
Description	Sets or acquires the user calibration coefficients. List of supported properties Property name / Meaning RLv_before / Red Lv value before calibration RLv_after / Red Lv value after calibration Rx_before / Red x value before calibration Rx_after / Red x value after calibration Ry_before / Red y value before calibration Ry_after / Red y value after calibration GLv_before / Green Lv value before calibration GLv_after / Green Lv value after calibration Gx_before / Green x value before calibration Gx_after / Green x value after calibration Gy_before / Green y value before calibration Gy_after / Green y value after calibration BLv_before / Blue Lv value before calibration BLv_after / Blue Lv value after calibration Bx_before / Blue x value before calibration Bx_after / Blue x value after calibration By_before / Blue y value before calibration By_after / Blue y value after calibration WLv_before / White Lv value before calibration WLv_after / White Lv value after calibration Wx_before / White x value before calibration Wx_after / White x value after calibration Wy_before / White y value before calibration Wy_after / White y value after calibration The SetUserCalibrationData method fails if an unsupported value is specified.
Sample scripts on the VB	UserCalibData.RLv_after = 1.00

3.10 Spot Setting Conditions Object Commands

GetSpotCondition() returns a spot object. Spot objects can be acquired from main object commands and measurement conditions object commands.
When a spot object is acquired from a main object command, the command returns the spot object set in the current data. When a spot object is acquired from a measurement conditions object command, the command returns the spot object set in the measurement conditions.

When Using Excel or Visual Basic

1. Declare the variable representing the spot object.

```
Dim SpotCond As Object
```

2. Select the first measurement data.

```
CA20App.SelectData(1)
```

3. Acquire the spot setting conditions object set in the first measurement data.

```
SpotCond = CA20App.GetSpotCondition( )
```

4. After making the settings, execute the following statement:

```
SpotCond = Nothing
```

3.10.1.1 Acquiring Spot Count

Method name on the VB	GetSpotListCount() As Long
Argument on the VB	None
Return value on the VB	Returns the number of spots set.
Description	Returns the number of spots set in the currently active measurement data, when an object has been acquired from a main object command. Returns 0 when no spot has been set. The command fails if no measurement data exists. The command fails when no active document exists or no document is opened. Returns the number of spots set in the measurement conditions, when an object has been acquired from a measurement conditions object command. Returns 0 when no spot has been set.
Sample scripts on the VB	Dim Count As Long Count = SpotCond.GetSpotCount()

3.10.1.2 Creating Spots

Method name on the VB	CreateSpot(Left As Long, Top As Long, Right As Long, Bottom As Long, Type As Long, Flag1 As Variant, Flag2 As Varian) As Long
Argument on the VB	Left Spot left coordinate Top Spot top coordinate Right Spot right coordinate Bottom Spot bottom coordinate Type Spot shape: 0 = Circle; 1 = Rectangle Flag1 Flag2 'Flag1' and 'Flag2' are arguments for future use (always specify 0).
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Adds a new spot. Spots are numbered starting from 1, in the order added. When new spots are added to a spot setting conditions object with spots already set, the new spots are numbered starting from the last number. Be sure to set the values so that the relationships of Left < Right and Top < Bottom will hold. Determine the values carefully because available coordinates vary depending on the specified resolution.

Resolution ('Resolution' parameter value)	Supported coordinate range	
	Left, Top	Right, Bottom
490*490 (0)	0 to 486	3 to 489
980*980 (1)	0 to 976	3 to 979
196*196 (2)	0 to 192	3 to 195

- If an invalid number is specified, CreateSpot fails.
- If the subtraction result of Right - Left or Bottom - Top is less than 3 (i.e. if the smallest size is less than 3), the CreateSpot method fails.
- When the show measurement window command is executed after the execution of CreateSpot, the spot size to be displayed may change by one dot.

You can set overlapping coordinates.
If you specify a circular spot with different row (Right-Left) and column (Bottom-Top) dimensions, the spot is automatically set again using the shorter of the two dimensions (starting from the top-left).

Sample scripts on the VB	Dim Ret As Long Dim Left As Long Dim Top As Long Dim Right As Long Dim Bottom As Long Dim Type As Long Left = 10 Top = 10 Right = 10 Bottom = 10 Type = 10 Ret = SpotCond.CreateSpot(Left, Top, Right, Bottom, Type, 0, 0)

3.10.1.3 Deleting Spots

Method name on the VB	DeleteSpot(SpotNum As Long) As Long
Argument on the VB	SpotNum Number of spot to delete
Return value on the VB	When the command was executed successfully : 0 When command execution failed : -1
Description	Deletes the spot with the specified number. When a spot is deleted, the numbers of the remaining spots are reassigned. The method fails if the specified number is nonexistent.
Sample scripts on the VB	Dim Ret As Long Dim SpotNum As Long SpotNum = 1 'Specifies the first spot number. Ret = SpotCond.DeleteSpot(SpotNum) 'Deletes the first spot.

3.10.1.4 Acquiring Spot Settings

Method name on the VB	GetSpotSetting(SpotNum As Long) As Long
Argument on the VB	SpotNum Number of spot to acquire
Return value on the VB	Returns a spot object. For more information on spot objects, see “4.8 Measurement Conditions Object Commands”. There must be a spot in the spot list for the specified spot number. ‘Nothing’ is returned as the spot object if a nonexistent number is specified.
Description	Acquires the element data for an individual spot. There must be a spot in the spot list for the specified spot number ‘Nothing’ is returned as the spot object if a nonexistent number is specified.
Sample scripts on the VB	Dim Ret As Long Dim SpotNum As Long Dim SpotSetting As Object SpotNum = 1 'Specifies the first spot number. SpotSetting = SpotCond.GetSpotSetting(SpotNum) Acquires the information of the first spot.

3.10.1.5 Setting Spot Settings

Method name on the VB	SetSpotSetting(SpotNum As Long, SpotSetting As Object) As Long
Argument on the VB	SpotNum Number of spot to set SpotSetting Specifies the object that will set the spot settings. You must specify a spot object acquired by the GetSpotSetting method. For more information on SpotSetting objects, see “4.11 Spot Object Commands”.
Return value on the VB	Returns a spot object. For more information on spot objects, see “4.11 Spot Object Commands”. There must be a spot in the spot list for the specified spot number ‘Nothing’ is returned as the spot object if a nonexistent number is specified.
Description	Sets the spot setting. There must be a spot in the spot list for the specified spot number ‘Nothing’ is returned as the spot object if a nonexistent number is specified.
Sample scripts on the VB	Dim Ret As Long Dim SpotNum As Long Dim SpotSetting As Object SpotNum = 1 'Specifies the first spot number. SpotSetting = SpotCond.GetSpotSetting(SpotNum) 'Acquires the information of the first spot. Ret = SpotCond.GetSpotSetting(SpotNum, SpotSetting) 'Sets the information of the first spot.

3.11 Spot Object Commands

GetSpotSetting(SpotNum As Long) returns spot information from an acquired spot object.
Spot objects set detailed spot settings.

When Using Excel or Visual Basic

1. Declare the variable representing the spot setting conditions.

```
Dim SpotCond As Object
```

2. Declare variables representing each spot setting.

```
Dim SpotSetting As Object
```

3. Assign the spot setting conditions object to its value.

```
SpotCond = CA20App.GetSpotCondition( )
```

4. Assign the spot object to its value.

```
SpotSetting = SpotCond.GetSpotSetting( )
```

5. Change the spot range.

```
SpotSetting.X0 = 150
SpotSetting.Y0 = 150
SpotSetting.X1 = 200
SpotSetting.Y1 = 200
          .
          .
```

6. Pass the set spot object to CA-S20w.

```
SpotCond.SetSpotSetting(SpotSetting)
```

7. After making the settings, execute the following statement:

```
SpotSetting = Nothing
SpotCond = Nothing
```

3.11.1.1 Setting/Acquiring Spot Sizes

Method name on the VB	Left As Long, Top As Long, Right As Long, Bottom As Long
Description	Sets or acquires the auto exposure range. Left: Left coordinate Top: Top coordinate Right: Right coordinate Bottom: Bottom coordinate You must set the coordinates so that Left < Right, and Top < Bottom. Set the coordinates carefully, since the supported coordinate range varies according to the set resolution.

Resolution ('Resolution' parameter value)	Supported coordinate range	
	Left, Top	Right, Bottom
490*490 (0)	0 to 488	1 to 489
980*980 (1)	0 to 978	1 to 979
196*196 (2)	0 to 194	1 to 195

The SetSpotSetting method fails when an unsupported number is specified.
The SetSpotSetting method fails if Right - Left or Bottom - Top is less than 3 (minimum size is less than 3).
Executing the measurement window display command after executing SetSpotSetting may change the displayed spot size by one dot.

3.11.1.2 Setting/Acquiring the spot type

Method name on the VB	Type As Long
Description	Sets or acquires whether the spot is a circle or a rectangle.

No.	Meaning
0	Circle
1	Rectangle

The SetSpotSetting method fails when an unsupported number is specified.

3.11.1.3 Setting/Acquiring Ignore Number of Pixels For Spot Calculation

Method name on the VB	IgnorePixelLevel As Double
Description	Sets or acquires the ratio to set for the ignore number of pixels. When setting this parameter, set a value between 0.00 and 100.00. The SetSpotSetting method fails if an unsupported value is specified.
Sample scripts on the VB	SpotSetting.IgnorePixelLevel = 100.0

Note

The EffectivePixelLevel function used with the CA-S20w Ver.1.1 or earlier has been changed to the IgnorePixelLevel function described above. Although the EffectivePixelLevel function can still be used with this version, you must use it carefully because the operation is different. If you specified 75, for example, for the EffectivePixelLevel function with the CA-S20w Ver.1.1 or earlier, you must specify 25 (a value obtained by subtracting 75 from 100) for the IgnorePixelLevel function or EffectivePixelLevel function with this version.

3.11.1.4 Setting/Acquiring Color Used to Calculate Ignore Number of Spot Pixels

Method name on the VB	IgnorePixelColor As Long
Description	Sets or acquires the color value to set for the ignore number of pixels. Color value No. / Color 0 / Lv (Y) 1 / X 2 / Z The SetMeasurementCondition method fails if you specify an unsupported lens number.
Sample scripts on the VB	SpotSetting.IgnorePixelColor = 0

Note

The EffectivePixelColor function used with the CA-S20w Ver.1.1 or earlier has been renamed to the IgnorePixelColor function described above. The operation is the same and the EffectivePixelColor function can still be used with this version.

3.11.1.5 Setting/Acquiring User Calibration Coefficient Type Set in Spots

Method name on the VB	CalibrationType As Long
Description	Sets or acquires the user calibration type. The parameters are shown below. Calibration No. / Calibration type 0 / None 1 / RGB matrix calibration 2 / One-point calibration 3 / WRGB matrix calibration The SetSpotSetting method fails if an unsupported number is specified.
Sample scripts on the VB	SpotSetting.CalibrationType = 1

3.11.1.6 Setting/Acquiring User Calibration Coefficients Set in Spots

<table>
<tr><td>Method name on the VB</td><td>RLv_before As Double - Wy_after As Double</td></tr>
<tr><td>Description</td><td>Sets or acquires the user calibration coefficients.
List of supported properties

<table><tr><th>Property name</th><th>Meaning</th></tr><tr><td>RLv_before</td><td>Red Lv value before calibration</td></tr><tr><td>RLv_after</td><td>Red Lv value after calibration</td></tr><tr><td>Rx_before</td><td>Red x value before calibration</td></tr><tr><td>Rx_after</td><td>Red x value after calibration</td></tr><tr><td>Ry_before</td><td>Red y value before calibration</td></tr><tr><td>Ry_after</td><td>Red y value after calibration</td></tr><tr><td>GLv_before</td><td>Green Lv value before calibration</td></tr><tr><td>GLv_after</td><td>Green Lv value after calibration</td></tr><tr><td>Gx_before</td><td>Green x value before calibration</td></tr><tr><td>Gx_after</td><td>Green x value after calibration</td></tr><tr><td>Gy_before</td><td>Green y value before calibration</td></tr><tr><td>Gy_after</td><td>Green y value after calibration</td></tr><tr><td>BLv_before</td><td>Blue Lv value before calibration</td></tr><tr><td>BLv_after</td><td>Blue Lv value after calibration</td></tr><tr><td>Bx_before</td><td>Blue x value before calibration</td></tr><tr><td>Bx_after</td><td>Blue x value after calibration</td></tr><tr><td>By_before</td><td>Blue y value before calibration</td></tr><tr><td>By_after</td><td>Blue y value after calibration</td></tr><tr><td>WLv_before</td><td>White Lv value before calibration</td></tr><tr><td>WLv_after</td><td>White Lv value after calibration</td></tr><tr><td>Wx_before</td><td>White x value before calibration</td></tr><tr><td>Wx_after</td><td>White x value after calibration</td></tr><tr><td>Wy_before</td><td>White y value before calibration</td></tr><tr><td>Wy_after</td><td>White y value after calibration</td></tr></table>The SetUserCalibrationData method fails if an unsupported value is specified.</td></tr>
<tr><td>Sample scripts on the VB</td><td>UserCalibData.RLv_after = 1.00</td></tr>
</table>

Chapter 4
Appendix

4.1 Self Diagnosis

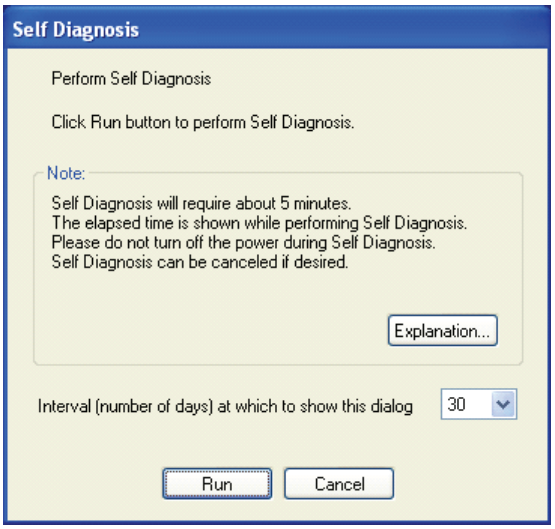
When you start measurement with the CA-2500/CA-2000 using the automatic exposure to measure a target with low luminance, the measurement may fail in some rare cases because the optimal exposure position cannot be detected. When this phenomenon occurs, you can perform Self Diagnosis and prevent the measurement failure.

4.1.1 Performing Self Diagnosis

The Self Diagnosis dialog box appears when you start the CA-S20w for the first time after installation and connect it to the CA-2500/CA-2000.

Procedure

1. To start Self Diagnosis, click the 'Run' button.

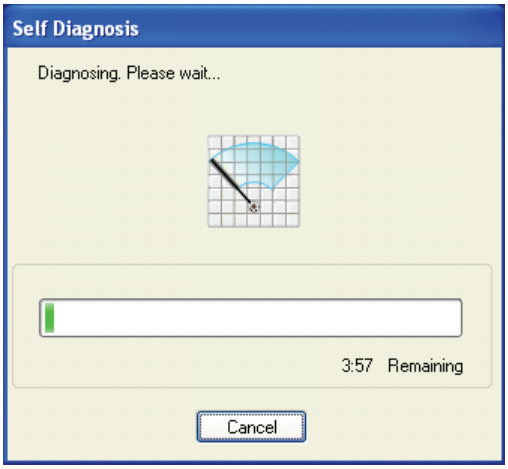


Then the following dialog box appears.

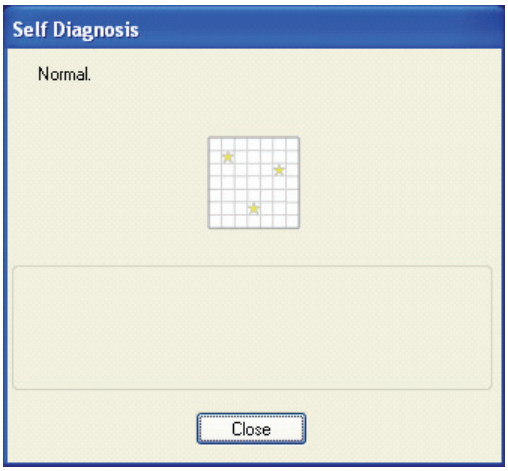
2. To perform Self Diagnosis, attach the hood cap as shown in the picture.

Click the OK button.

Self Diagnosis will be performed. This Self Diagnosis will take about 5 minutes. During Self Diagnosis, the following dialog box appears to indicate the progress.



To stop the diagnosis, click the Cancel button.
When Self Diagnosis finishes, the following dialog box appears.



3. This shows that Self Diagnosis was completed successfully. Click the Close button to finish the diagnosis.

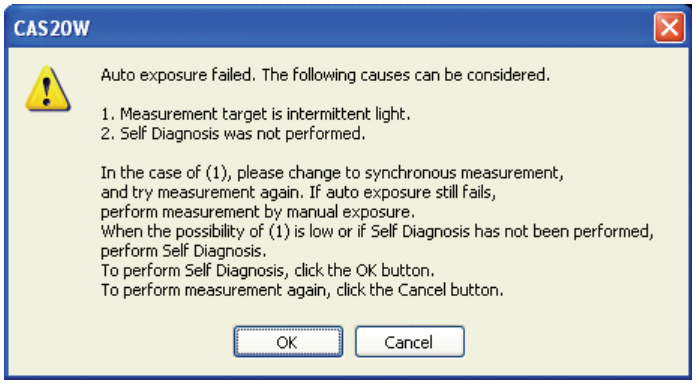
4.1.2 Performing Self Diagnosis at a later time

Procedure

1. Select *Instrument* - *Self Diagnosis* from the menu bar of the CA-S20w.

   The Self Diagnosis dialog box appears.

   In addition to the operation above, a message to go to the Self Diagnosis dialog box appears automatically when the automatic exposure fails.



Tip

The automatic exposure may fail due to various causes. Since performing Self Diagnosis may prevent the failure, it is recommended to click OK to start Self Diagnosis.
If the automatic exposure still fails even after the diagnosis, the measurement target may not be stable. In such a case, use the manual exposure for the measurement.

4.1.3 When the CA-2500/CA-2000 is used from several PCs

When the CA-2500/CA-2000 is controlled from two or more PCs, the automatic exposure may fail during a measurement with a PC for which Self Diagnosis has not been performed. Be sure to check that Self Diagnosis has been performed for all connected PCs.
There are the following two ways to perform Self Diagnosis when the CA-2500/CA-2000 is used from two or more PCs. Use one of these methods.

By sharing the self diagnosis file among the PCs

A self diagnosis file is created by Self Diagnosis and stored in the following location:

Windows XP:
Shared
Documents\KONICAMINOLTA\CA-S20w\CalibrationFiles
Windows Vista and Windows 7:
Public
Documents\KONICAMINOLTA\CA-S20w\CalibrationFiles

Tip

The user account must have access rights (write permission) to this folder. If an error stating that data cannot be written to the shared folder occurs after Self Diagnosis, contact your nearest computer administrator.

Copy this file to the same folders in all the PCs which control the CA-2500/CA-2000 so that the self diagnosis file is shared among the PCs.

By performing Self Diagnosis for each PC before measurement

A self diagnosis file is stored in the PC for which Self Diagnosis was performed. You must then perform Self Diagnosis for every PC to create the remaining self diagnosis files.

4.1.4 When the CA-2500/CA-2000 is controlled by the automatic function

Even when the day specified in 'Interval (number of days) at which to show this dialog' in the Self Diagnosis starting dialog box is reached, this dialog box is not displayed when the CA-2500/CA-2000 is controlled automatically by the CA-S20w.
To perform Self Diagnosis because the automatic exposure fails or for any other reason, select *Instrument* - *Self Diagnosis* from the menu bar of the CA-S20w.

4.2 Index

Numerics

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

W

X

Y

Z

4.3 Automation Commands List

9222-1735-24

BDFADA