User's Manual

Model 329831 Light Measurement Data Management Software

YOKOGAWA
Yokogawa Electric Corporation

IM 329831-01E
1st Edition
L4036AD

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Foreword

Thank you for purchasing the Light Measurement Data Management Software (Model 329831). This user's manual contains useful information about the operating procedures of the software as well as precautions that should be observed during use. The examples used in the manual are based on the Windows 2000 operating system. To ensure proper use of the software, please read this manual thoroughly before beginning operation.
After reading the manual, keep it in a convenient location for quick reference in the event a question arises.
Please consult the manuals for the Multimedia Display Tester Model 3298 (hereafter referred to as the MDT 3298) and Windows for the cautions, functions, and operating procedures of those products.

Notes

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Revisions

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Product Overview

This software can display measurement data from the MDT 3298 in various kinds of graphs and diagrams, and save and load that data to and from files.

Setting Measurement and Display Conditions

- **Color System**
  Select xyL or u'v'L.
- **Measurement and Display Order**
  Select the measurement and display order for luminance, contrast, flicker, and chromaticity.
- **Default Window**
  Select Measurement data table (always active), Trend graph, Chroma diagram, Deviation diagram, or Surface distribution.
- **Light Source**
  Select Type A, FL3, or CRT.
- **Chroma Reference**
  - Reference Coordinates: Enter reference coordinates for the chromaticity diagrams of each reference color (R(red), G(green), B(blue), W(white), User1, and User2).
  - Display Range for the Deviation Diagram: Enter the display range for the deviation diagram that shows how measurement data differs from the reference color's reference coordinates.
  - Chromaticity Correction Coefficient: The software calculates the chromaticity correction coefficient from the chromaticity and luminance reference values and the chromaticity and luminance of a typical or representative measurement data value. The MDT 3298 calculates chromaticity and luminance by applying this chromaticity correction coefficient to the measured tristimulus values.
- **Measurement Mode**
  Select continuous or single measurement. For continuous measurement, you can also select an interval.
- **Surface Distribution Settings**
  - Number of Measurement Points: Select 4, 5, 9, or 13. You can also change the measurement location.
  - Measurement Order: Specify an order.
- **Device Settings**
  Enter backlight, averaging, and measuring range settings for the MDT 3298.
- **Saving and Loading Setup Data**
  - Save settings to or load settings from the PC's storage medium.
  - Transmit a light source correction coefficient, chromaticity reference values, and MDT 3298 settings to and from the MDT 3298.

Saving and Loading Measurement Data

- Read in measurement data while it is being acquired by the MDT 3298.
- Load data stored in the MDT 3298's memory.
- Save, send, or load data to and from the PC's storage medium or the MDT 3298.

Editing and Displaying Measurement Data

- **Measurement Data Table**
  Copy or delete measurement data to and from the clipboard.
- **Chromaticity Diagram**
  - Zoom in or zoom out.
  - Plot measurement data on a chromaticity diagram.
  - Plotting modes
    Select Refresh mode, Scatter mode, or Locus mode. Only Refresh mode is available for surface distributions.
  - Bar graph
    Display a bar graph of the luminance of reference colors.
  - Bar graph scale
    Select 400, 4000, or 40000 cd/m^2.
- **Deviation Diagram**
  - Display statistical values and the determination for chromaticity.
  - Plotting modes
    Select Refresh mode, Scatter mode, or Locus mode. Only Refresh mode is available for surface distributions.
- **Trend Graph**
  - Display the measurement data for luminance, flicker, and chromaticity in a line graph broken down by measurement order.
  - Luminance scale
    Select 400, 4000, or 40000 cd/m^2.
  - Flicker scale
    Select 5, 10, 15, or 20%.

Print

- Print the measurement data table, chromaticity diagram, deviation diagram, trend graph, or surface distribution diagram.
- You can also specify a header and footer, and select whether to print the measurement conditions, measurement numbers, measurement locations, and determinations.

Contents

1.1 System Requirements

Hardware

CPU
A personal computer with a Pentium 133 MHz or faster CPU.

Memory
32 MB or more.

Hard Disk
A hard disk with 5 MB or more of available space.

Serial Communications Port
A serial port complying with the EIA-574 (for 9–pin RS-232 connectors) or EIA-232 (RS-232) standard.

Disk Drive
A CD-ROM drive. This drive is used to install the software.

Display
A display compatible with your operating system. An analog RGB monitor capable of displaying 65,536 colors or more recommended.

Mouse or Pointing Device
A mouse or pointing device compatible with your operating system.

Printer
A printer and printer driver compatible with your operating system.

OS

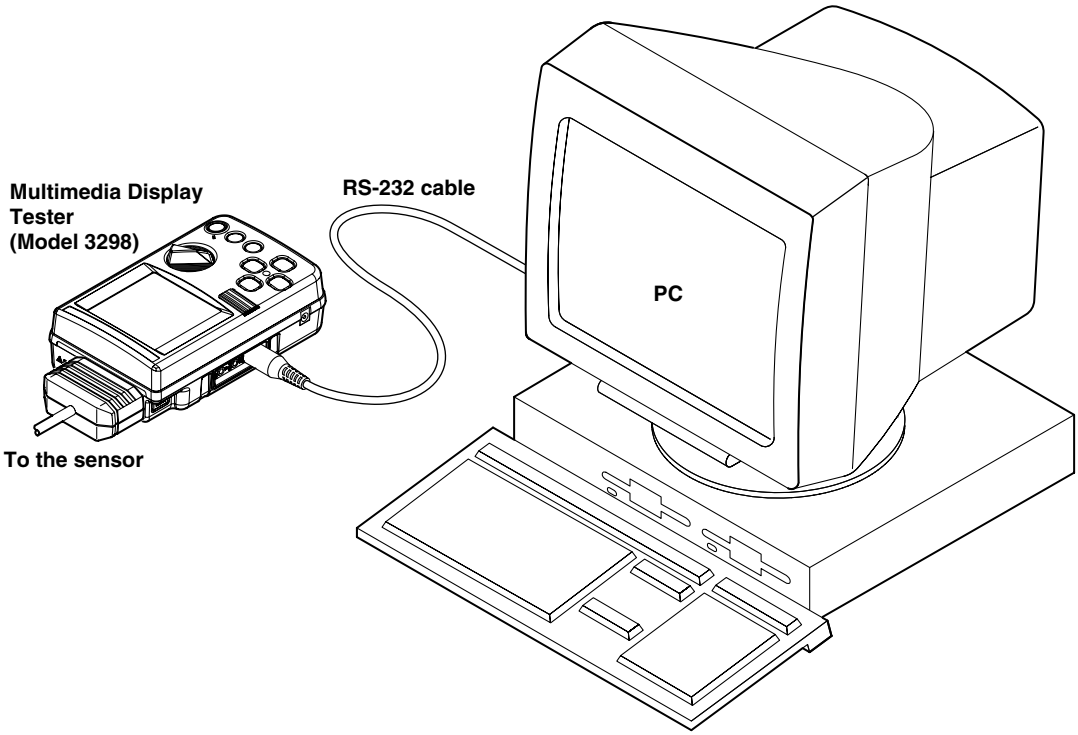
Microsoft Windows 98, Windows NT 4.0 Workstation, or Windows 2000 Professional.

Multimedia Display Tester (Model 3298)

A device operating under firmware (ROM) version 1.05 or later.

1.2 Connecting the MDT 3298 to the PC

Connect the MDT 3298 to the PC using a dedicated RS-232 cable. A D-Sub 9–pin and 25–pin connector is available. Purchase a cable that matches your PC.
For the part number of the RS-232 cables, refer to the MDT 3298's user's manual (IM 329801-01E).

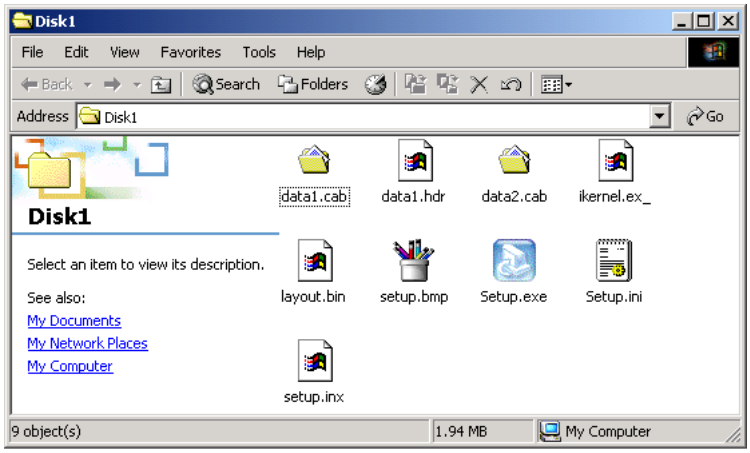


1.3 Installation

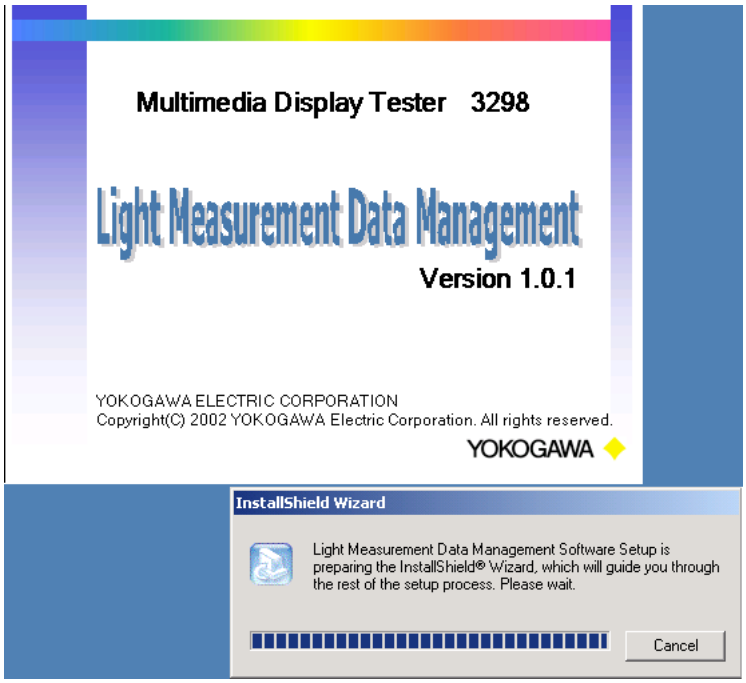
Procedure

The following is the installation procedure when using Windows 2000. The screens displayed on your monitor may differ depending on your operating system.

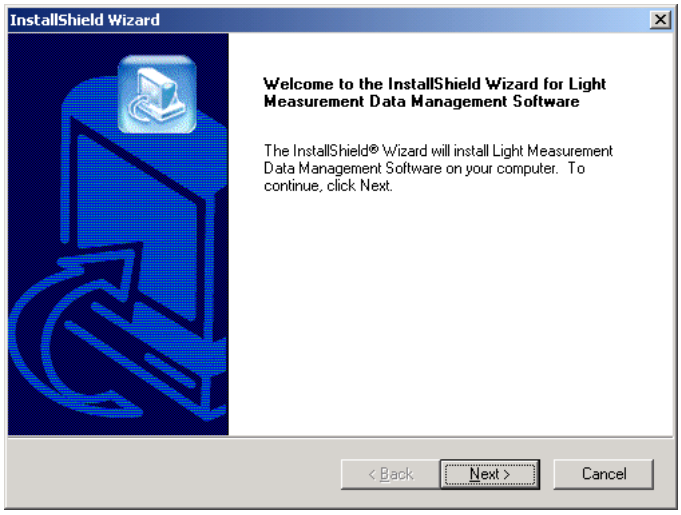
1. Turn ON the PC and start Windows.
   If you are using Windows NT 4.0 or Windows 2000, log on as the Administrator.
2. Place the CD for this software in the CD-ROM drive.
3. Double-click **Disk1** to open the Disk1 folder.
4. Double-click **Setup.exe**. The InstallShield Wizard starts.



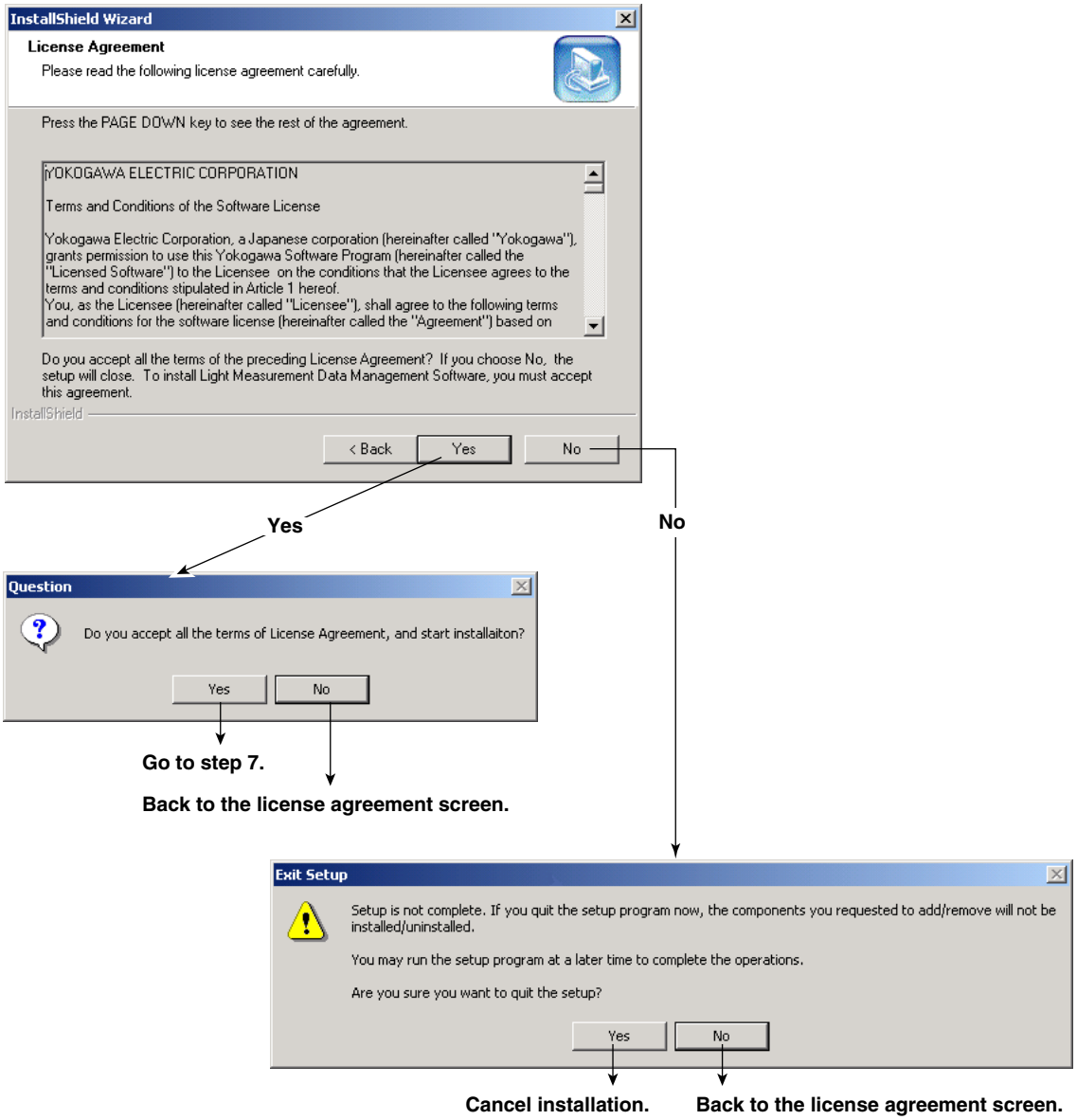
InstallShield Wizard Start Up Screen



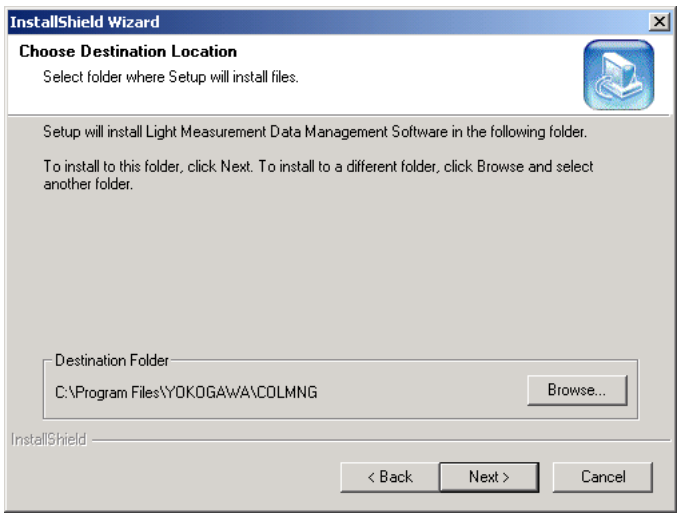
5. Click **Next**.



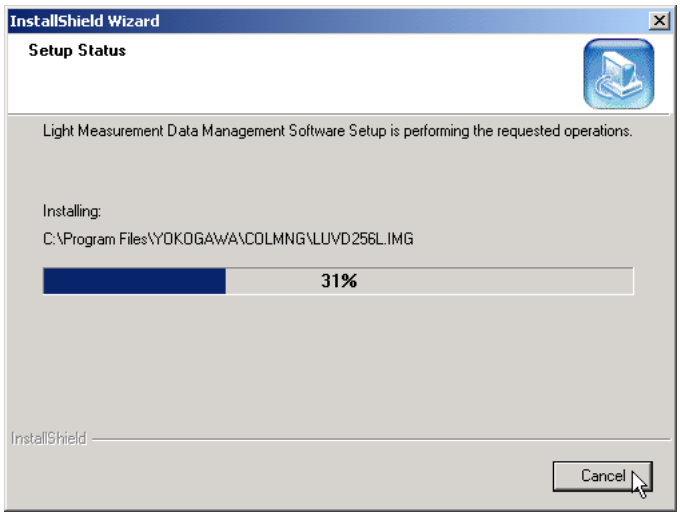
6. Click **Yes** to agree to the terms of the license agreement, or **No** to reject the terms.



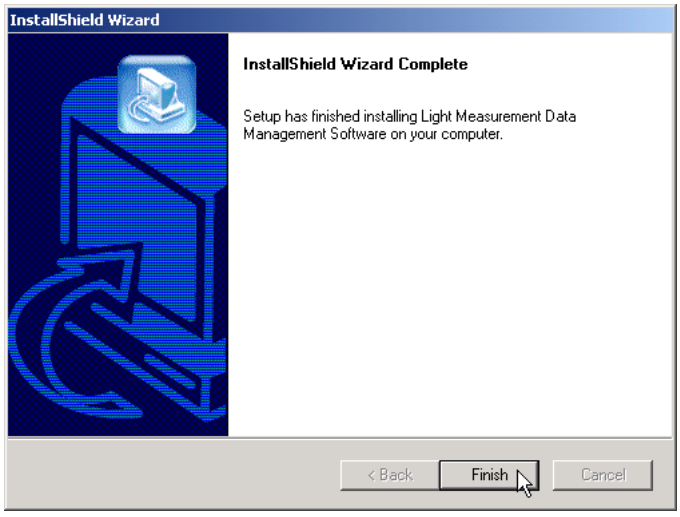
7. To accept the current installation destination click **Next**. Installation begins.
   * To change the installation destination, click **Browse**.



The Installation Progress Bar



8. If installation is successful, the Installation Complete dialog box appears. Click **Finish**.

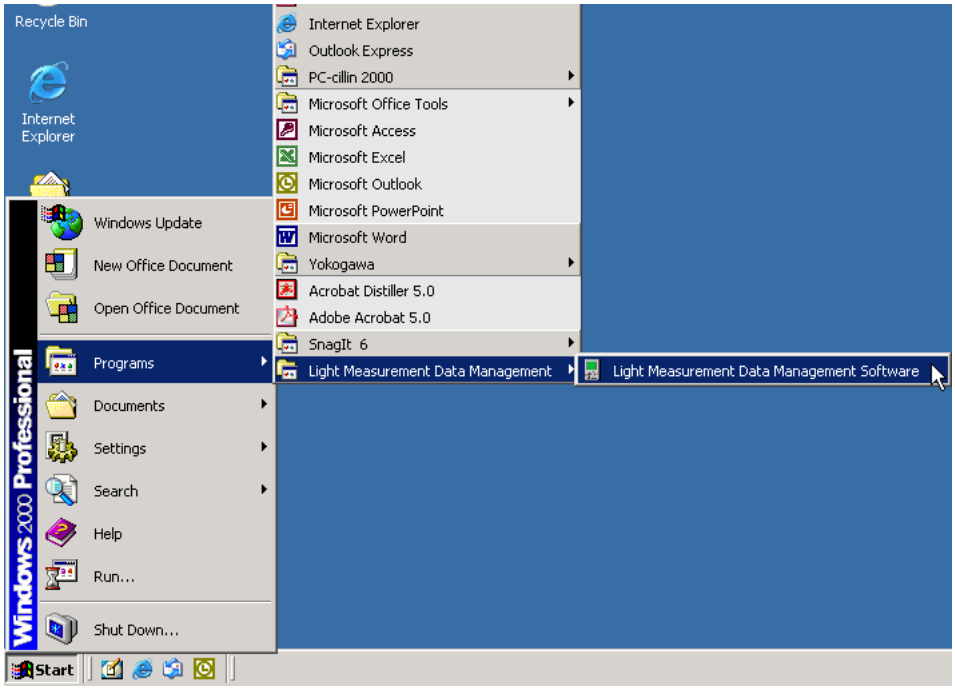


1.4 Running/Exiting the Software

Procedure

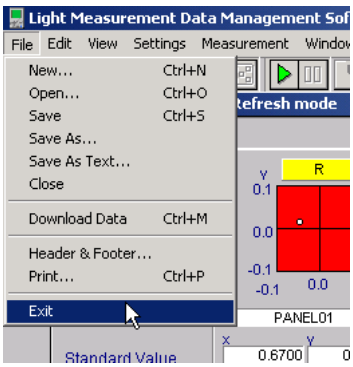
Running the Software

Choose **Start** > **Programs** > **Light Measurement Data Management** > **Light Measurement Data Management Software**. The program starts.



Exiting the Software

Choose **File** > **Exit**, or click the Close button in the upper right corner of the Light Measurement Data Management Software window. The program closes.



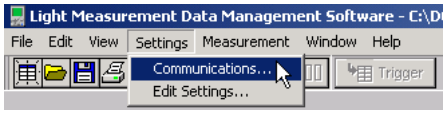
Further Details

A shortcut is created in the Programs section of the Start menu. You can start this software using that shortcut. The software is installed in the folder (installation destination) specified in the procedure above.

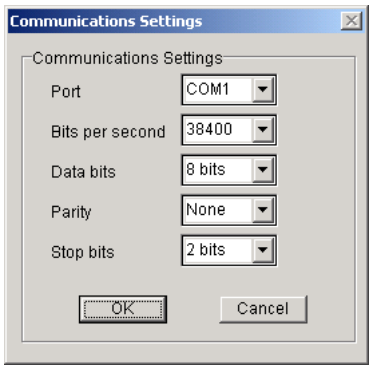
1.5 Entering Serial Communications Settings

Procedure

1. Choose **Settings** > **Communications**. The Communications Settings dialog box is displayed.



2. Enter the **Port**, **Bits per second**, **Data bits**, **Parity**, and **Stop bits**.



Further Details

Enter settings that correspond to the communications settings on the MDT 3298.

- **Communications Port**
  Use the port number set on the PC for this setting. To determine the PC's communications port number, open the Control Panel then choose System > Hardware > Device Manager > Ports (COM & LPT). Click the plus sign (+) next to Ports to display the installed ports and their numbers. Note the number of the communications port (for example, COM1). The available port numbers may differ depending on your operating system.
- **Bits per second, Data bits, Parity, and Stop bits**
  Enter the same values for these settings as are set on the MDT 3298.

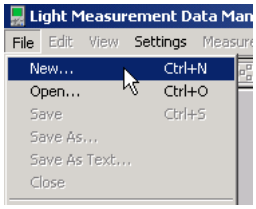
Note

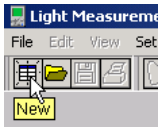
For more information on the communications settings for the PC and MDT 3298, refer to the respective user's manuals for those devices.

2.1 Entering New Measurement and Display Conditions

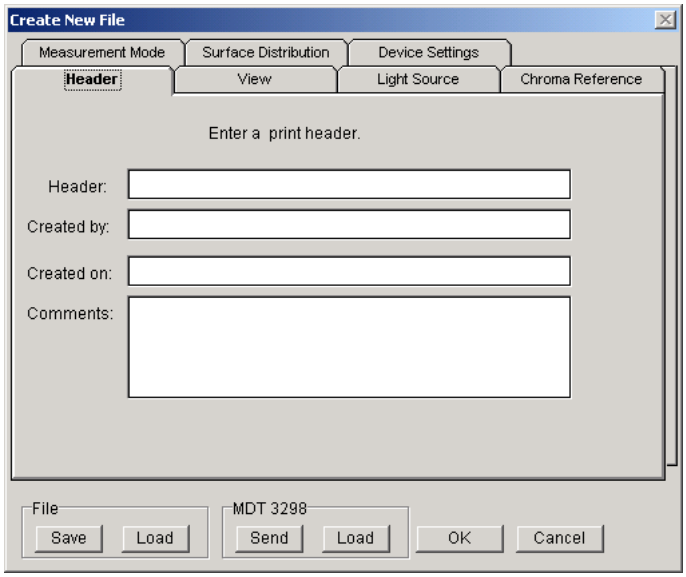
Procedure

1. Select **File** > **New**, or click the New button on the toolbar. The Create New File dialog box is displayed.

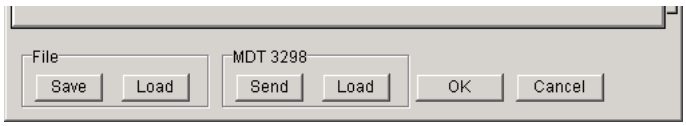




Create New File



2. Follow the procedures in sections 2.2 through 2.8 to enter the measurement and display conditions.
3. Click **OK**. Graphs and diagrams are displayed according to the settings entered.



Further Details

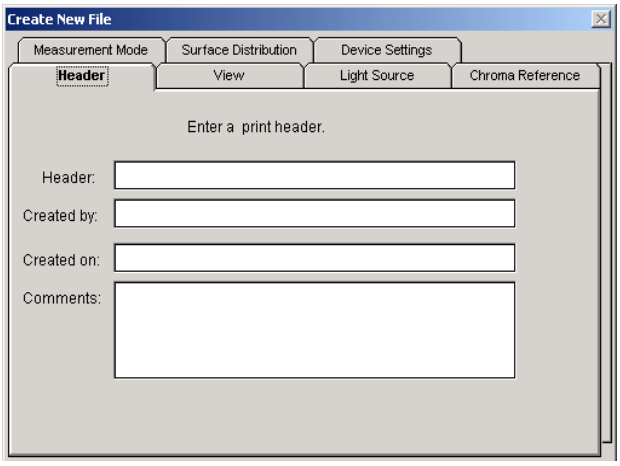
- For information about the measurement and display settings, see sections 2.2 to 2.8.
- You can save or send the settings entered in steps 2.2–2.8 to the MDT 3298 (see section 2.9).
- While measurements are being taken by the MDT 3298 (see section 3.1), graphs of the acquired data can be displayed on the PC (see chapter 4) according to the settings entered in steps 2.2–2.8.

2.2 Entering a Header

Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **Header** tab.
2. Type a header in the **Header** field, then enter the appropriate information in the **Created by**, **Created on**, and **Comments** fields.
   * When printing graphs or diagrams, you can specify whether or not to include the information entered here (see section 5.2).



Further Details

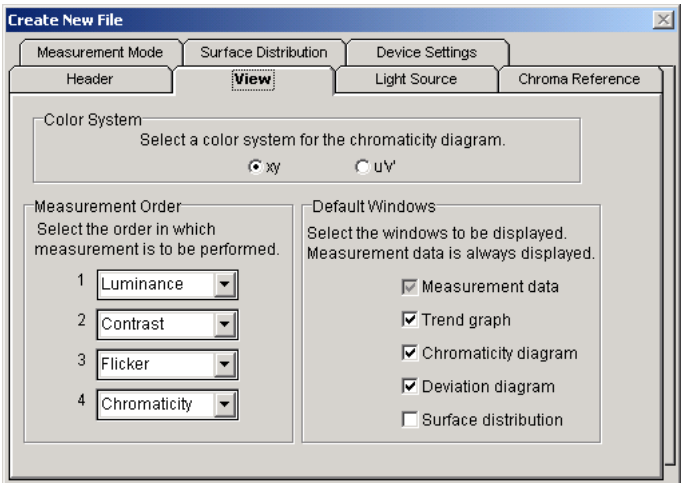
You can enter the desired header, author, date, and comments to be printed out along with the graphs or diagrams. A maximum of 255 characters can be entered in each field.

2.3 Entering Display Related Settings

Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **View** tab.
2. Select a **Color System**, the **Measurement Order** (also used as the display order), and the **Default Windows** to be displayed.



Further Details

You can specify the items to be measured and displayed.

Color System

Select the type of chromaticity coordinates from the following:

- xy: xyL color system
- u'v': u'v'L color system

Measurement Order (and Display Order)

- Specify the order in which various phenomena are measured. The item specified in list 1 is measured first, and the item list 4 is measured last. The phenomena that can be ordered are luminance, contrast, flicker, and chromaticity. The order specified here is also used as the display order.
- List 1 cannot be set to None.
- If list 2, 3, or 4 is set to None, all lists after that one are disabled.
- Only the items that are specified are measured or displayed.
- The same item cannot be selected in more than one list.

Default Windows

- Measurement data table, Trend graph, Chroma diagram, Deviation diagram, or Surface distribution can be selected for the graphs or diagrams to be displayed. The measurement data table is always displayed.
- If you select Surface distribution, Measurement data table and Chromaticity diagram are automatically selected. Select whether or not to display the chromaticity diagram.

Note

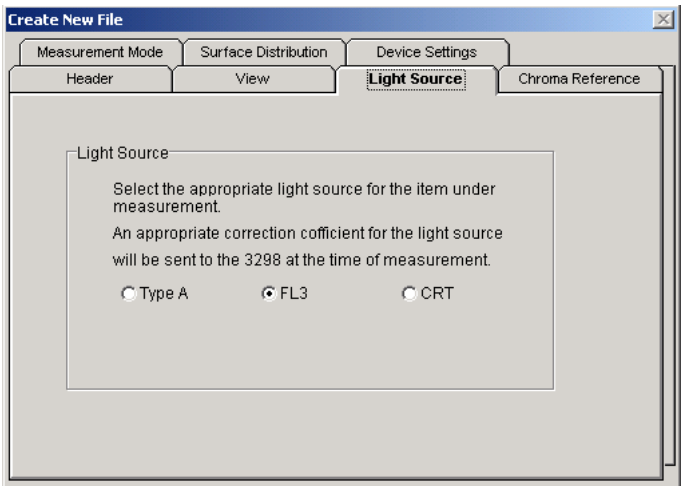
- If you select only one measurement item in the view tab, the following graphs or diagrams will be displayed regardless of that setting. If only Luminance is selected, the measurement data and trend graph are displayed. If only Contrast is selected, the measurement data table is displayed. For Flicker only, the measurement data table and trend graph. For Chromaticity only, the measurement data table, trend graph, chromaticity diagram, and deviation diagram.
- If you select Surface distribution, all measurement items except for chromaticity are disabled.

2.4 Selecting the Light Source

Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **Light Source** tab.
2. Select a light source from the three available options. The corresponding light source correction coefficient will be applied to measurements.



Further Details

Select one of the following light sources.

Type A

A type A light source. Select this for light bulbs, light bulb/color filter combinations (automobile taillights), sunlight, sunlight/color filter combinations, and any other light source that is not included in the categories below.

FL3

A three-wavelength fluorescent lamp. Select this for fluorescent lights, fluorescent light/color filter combinations, liquid crystal displays for cold-cathode tubes used on backlights, and other such lamps.

CRT

Select this for such sources as CRTs and plasma displays.

Note

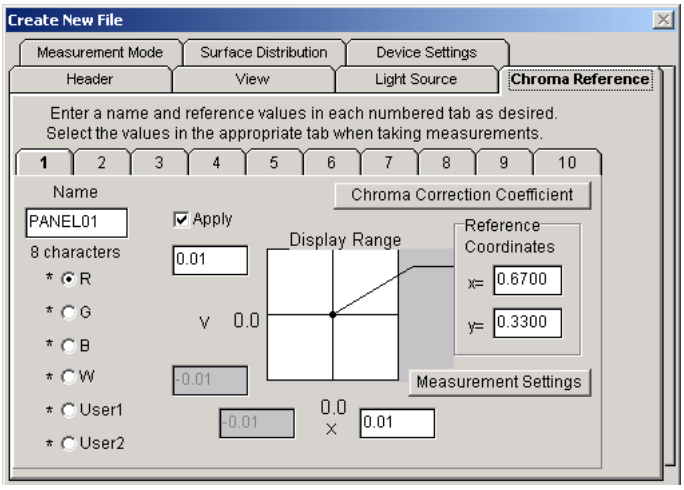
When measurement is started by this software, the correction coefficient for the selected light source is sent to the MDT 3298 (see section 3.1).

2.5 Entering Chromaticity Reference Settings

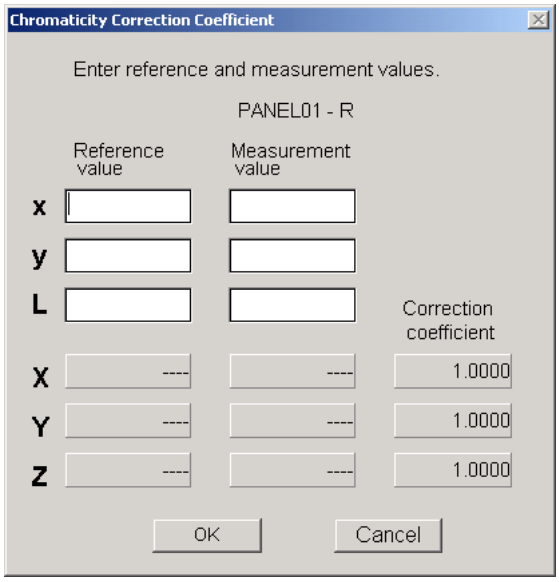
Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **Chroma Reference** tab.
2. Click a tab from **1 to 10** into which you wish to enter chromaticity reference settings.
3. Type a name in the **Name** box.
   * The default name in each tab's Name field is PANEL[tab number] (for example, PANEL03). If desired, use the keyboard to change the name.
4. Select a reference color from the choices under the Name box (**R–User2**).
5. If the **Apply** check box is cleared, select it.
   * (Measurements are taken only for those reference colors whose Apply check boxes ☑ are selected.)
6. Enter the **Reference Coordinates** and **Display Range** for the selected reference colors. Click **Measurement Settings** to use measurement data from the MDT 3298 as the reference coordinates.
7. Click the **Chroma Correction Coefficient** button. The Chromaticity Correction Coefficient dialog box is displayed.



8. To calculate the chromaticity correction coefficient, enter the **Reference Value** for the chromaticity (x, y) and luminosity (L) to be measured, and the chromaticity and luminosity actually measured on the MDT 3298.



Further Details

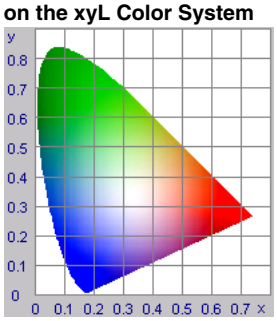
Chroma Reference

You can name and enter settings for 10 sets of reference values. This allows you to select previously entered chromaticity reference values to match the object being measured and the measurement environment. A maximum of eight characters can be used for the name of the reference value set.

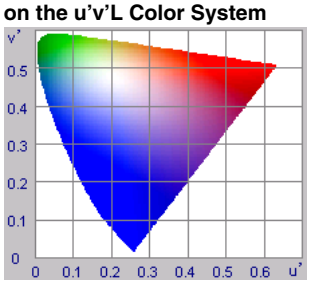
Reference Coordinates for the Reference Color and the Display Range

- For each reference color (R(red), G(green), B(blue), W(white), User1, and User2), you can enter the reference coordinates and the display range of the deviation diagram within the range used for the chromaticity diagram.
- You can download the MDT 3298's measurement data for the reference coordinates. To do this, make sure the serial communications cable is correctly connected from the MDT 3298 to the PC (see section 1.5).
- The chromaticity diagram will differ depending on the color system. See section 2.3 for the color system settings.

Chromaticity Diagram Based on the xyL Color System



Chromaticity Diagram Based on the u'v'L Color System



- You can specify reference colors as User1 and User2 that are neither R, G, B, or W, and are within the range used for the chromaticity diagram.
  * For all reference colors including R, G, B, and W, you can specify arbitrary reference coordinates, the display range, and the chromaticity correction coefficient. However to avoid confusion, it is recommended that you enter a value for R, G, B, and W that is close to their respective reference colors.
- You can select whether or not the specified reference colors are to be used for measurement.

Chromaticity Correction Coefficient

Using the chromaticity correction coefficient, data measured on the MDT 3298 can be adjusted to a standard or to measured data from an instrument you are already using. The chromaticity correction coefficient is obtained through the following procedure.

1. The reference values for the tristimulus values (X_0, Y_0, L_0) are calculated from a standard, and previously measured data (x_0, y_0, L_0).
   $X_0=x_0L_0/y_0$, $Y_0=L$, $Z_0=(1–x_0–y_0)L/y_0$
2. The measurement data (X_m, Y_m, Z_m) of the tristimulus values are calculated from the chromaticity and luminosity of the measurement data from the MDT 3298.
   $X_m=x_mL_m/y_m$, $Y_m=L$, $Z_m=(1–x_m–y_m)L/y_m$
3. The chromaticity correction coefficient is calculated from the reference values of the tristimulus values (X_0, Y_0, Z_0) and the measurement data (X_m, Y_m, Z_m).
   The chromaticity correction coefficient of the stimulus value X = X_0/X_m
   The chromaticity correction coefficient of the stimulus value Y = Y_0/Y_m
   The chromaticity correction coefficient of the stimulus value Z = Z_0/Z_m

Note

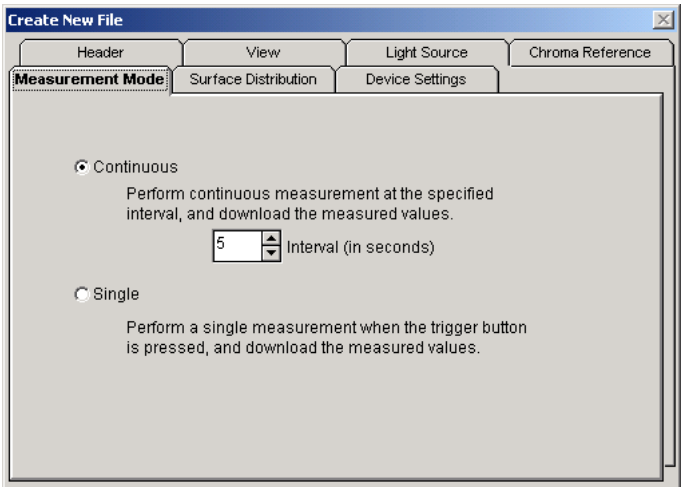
When measurement is started by this software, the chromaticity reference for the selected light source is sent to the MDT 3298 (see section 3.1).

2.6 Selecting the Measurement Mode

Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **Measurement Mode** tab.
2. Select **Continuous** or **Single**.
3. If you select Continuous , enter the **Interval** for reading in measurement data.



Further Details

You can select one of the following modes to control how data measured on the MDT 3298 is read in by the PC.

Continuous

Measurement begins when you press the Measurement Start button (see section 3.1), and ends when you press the Measurement Stop button. Measurement data is uploaded to the PC repeatedly at the specified interval. Measurement data read in by the PC can be displayed in a table (see section 4.1), and opened in a chromaticity diagram, trend graph, or deviation diagram.

- **Interval**
  - Range: 1 to 3600 seconds
  - If you selected chromaticity measurement (see section 2.3) and set the interval to 1 second, the interval setting is ignored and measurement repeats at the minimum possible interval of 2 seconds.

Single

When the trigger button on the toolbar is pressed, a single measurement is taken and the resultant data is loaded on the PC. This corresponds to Single mode on the MDT 3298. Measurement data read in by the PC can be displayed in a table, and opened in a chromaticity diagram, trend graph, or deviation diagram.

Note

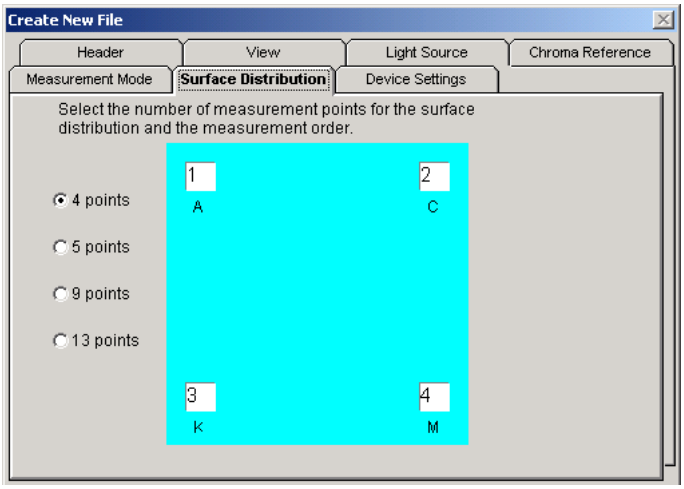
After measurement starts, it stops again once the Measurement Stop button is pressed, or when the measurement number reaches 32000 (see section 3.1).

2.7 Entering the Number of Measurement Points for the Surface Distribution, and the Measurement Order

Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **Surface Distribution** tab.
2. Select a number of measurement points from **4 to 13**.
3. Specify the order of the measurement locations (A–M).

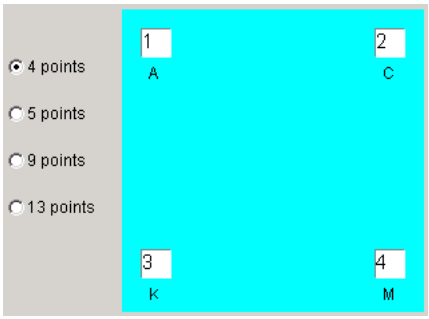


Further Details

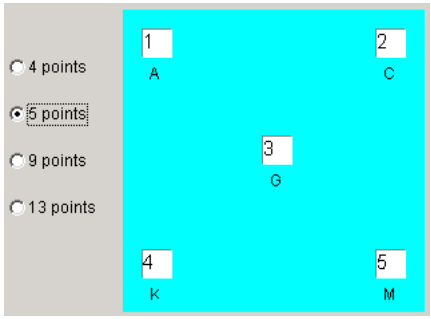
You can specify multiple measurement locations for the distribution of luminance and chromaticity over a wide area. This function interpolates between the points so that the waveform appears to be connected.

- The measurement locations are labeled using English letters.
- The order is indicated by the numerals in the lettered squares.
  - By changing the numbers you can change the measurement order. Enter integers in numerical order (1, 2, 3, etc.).
  - The same number cannot be entered for more than one location.

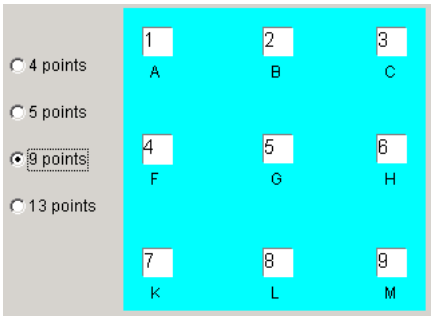
4 Points



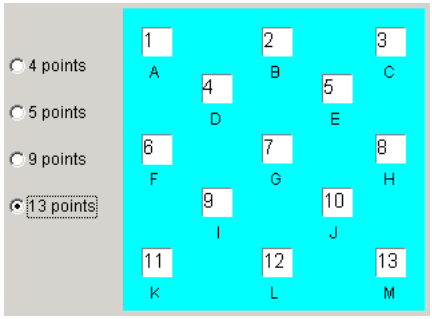
5 Points



9 Points



13 Points



Note

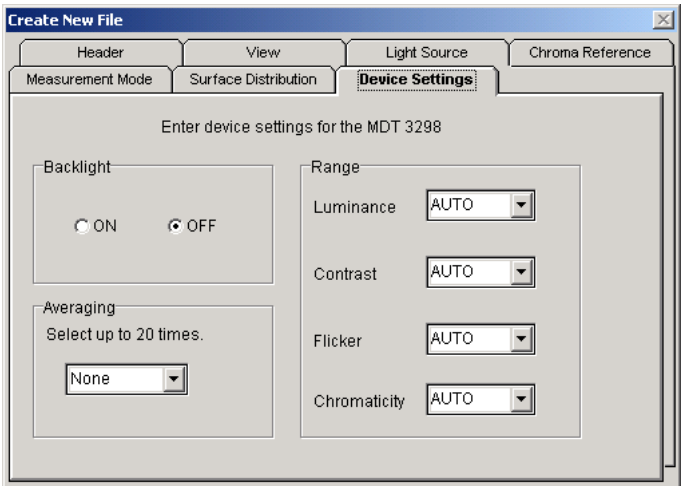
- When in Continuous measurement mode (see section 2.6), measurement is performed continuously per the specified interval. In this mode, if you select Surface distribution for the view window (see section 2.3), the first measurement is assigned to the first measurement location, the second measurement is assigned to the second measurement location, and so on.
- As explained above (in section 3.1), when in Single measurement mode, a single measurement only is taken when the Trigger button is pressed. If you select Surface distribution for the view window (see section 2.3), while in Single mode, the first time the Trigger button is pressed the measurement is assigned to the first measurement location, the second time it is pressed measurement is assigned to the second measurement location, and so on.

2.8 Entering Settings for the Backlight, Averaging, and the Measuring Range

Procedure

Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

1. Click the **Device Settings** tab.
2. Select **Backlight**, **Averaging** (number of items to be averaged), and measuring **Range** settings for the MDT 3298.



Further Details

The following settings can be entered.

Backlight

Turn the back light on the MDT 3298 ON or OFF.

Averaging

- The linear average based on the specified number of averaging items can be taken for luminance, contrast, flicker, and chromaticity. The averages are calculated according to the following equation.

$$D = \frac{M_1 + M_2 + \cdots M_{m-1} + M_m}{m}$$

D: the linear average of m individual data, m number of times

M_1: the first measurement data

M_2: the second measurement data

. . . . . .

. . . . . .

M_{m-1}: the m-1th measurement data

M_m: the mth measurement data

m: the number of items to be averaged (from 2 to 20)

- After measuring the specified number of averaging items, the average value is displayed.
- If you select None, averaging will not be performed.

Measuring Range

Select the measuring range for luminance, contrast, flicker, and chromaticity.

Note

When measurement is started by this software, the device settings are sent to the MDT 3298 (see section 3.1).

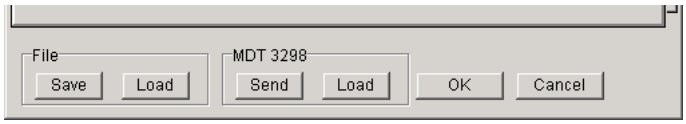
2.9 Saving the Settings

Procedure

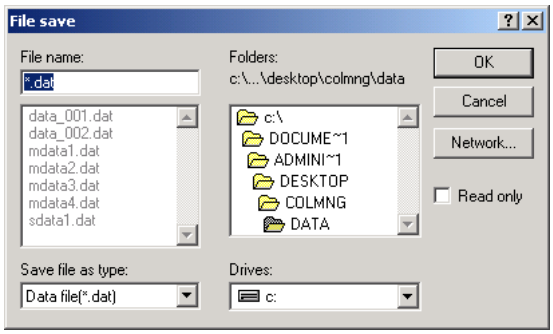
Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

Saving a Settings File

1. Under the **File** group, click **Save**. The Save dialog box is displayed.

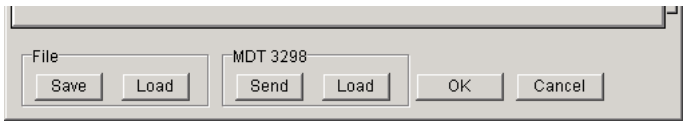


2. Type or select the save destination and file name, then click **OK**.

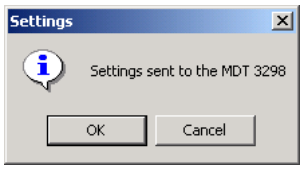


Sending Settings to the MDT 3298

1. Under the **MDT 3298** group, click **Send**. The Send Settings dialog box is displayed.



2. Click **OK**.



Further Details

Saving Settings to a File

- All settings entered in sections 2.2–2.8 can be saved to a file.
- Up to 8 characters may be used for the file name (excluding the extension).
- The file name extension is .dat.
- If a file with the same name already exists, it is overwritten.

Sending Settings to the MDT 3298

- A light source correction coefficient (section 2.4), the chromaticity reference values (section 2.5), and device settings are sent to the MDT 3298.
- The new settings overwrite the current settings on the MDT 3298 to which they sent are sent.

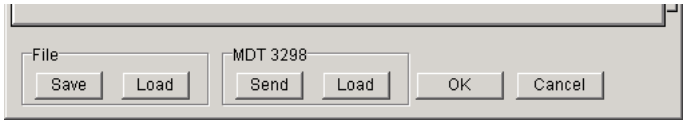
2.10 Loading the Settings

Procedure

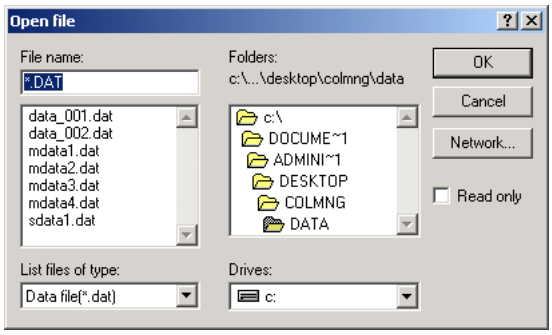
Follow the procedure in section 2.1 to open the Create New File dialog box, then continue on with the following procedure.

Loading a Settings File

1. Under the **File** group, click **Load**. The File Open dialog box is displayed.

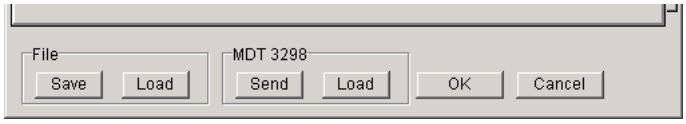


2. Select a file, then click **OK**.

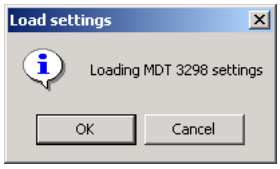


Loading Settings from the MDT 3298

1. Under the **MDT 3298** group, click **Load**. The Load MDT 3298 Settings dialog box is displayed.



2. Click **OK**.



Further Details

Loading a Settings File

- The selected previously saved settings are loaded, and any existing settings are overwritten.
- The file name extension is .dat.

Loading Setup Parameters from the MDT 3298

A light source correction coefficient (section 2.4), the chromaticity reference values (section 2.5), and device settings are loaded from the MDT 3298, overwriting the current settings.

3.1 Reading In Measurement Data Being Acquired by the MDT 3298

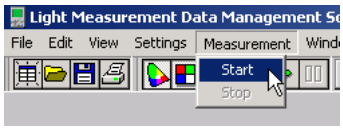
Procedure

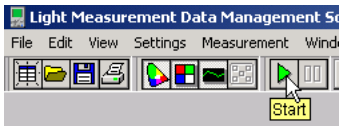
The procedure for reading in measurement data differs depending on the measurement mode. There are two measurement modes: Continuous, and Single (see the next page). Choose the appropriate mode for your measurement application. Refer to section 2.6 for information on measurement mode settings.

When in Continuous Measurement Mode

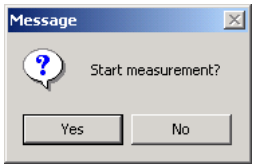
- **Starting Measurement**

1. Select **Measurement** > **Start**, or click the Measurement Start button on the toolbar. The Message dialog box is displayed.

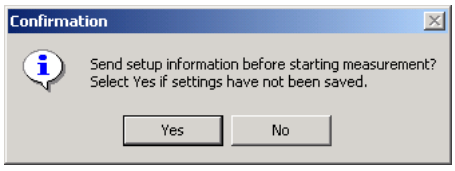




2. Click **Yes**. Measurement begins.
   Before measurement begins, if you entered new settings or changed any settings in the Create New File window or the Setting Information dialog box under the Settings menu, when you close the setting window a dialog box appears prompting you to confirm whether or not those settings should be sent the MDT 3298.
   * During measurement, the item being measured or about to be measured appears in the status bar of the Light Measurement Data Management Software window.

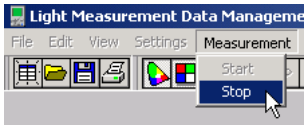


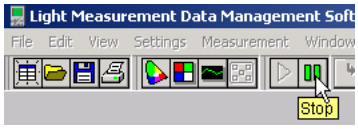
Confirmation Dialog Box



- **Stopping Measurement**

3. Select **Measurement** > **Stop**, or click the Measurement Stop button on the toolbar.

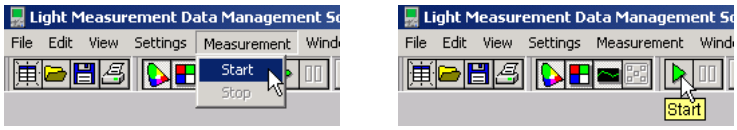




When in Single Measurement Mode

- **Starting Measurement**

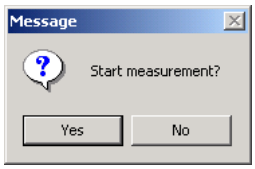
1. Select **Measurement** > **Start**, or click the Measurement Start button on the toolbar. The Message dialog box is displayed.



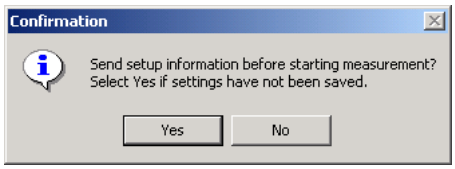
2. Click **Yes**.

   Before measurement begins, if you entered new settings or changed any settings in the Create New File window or the Setting Information dialog box under the Settings menu, when you close the window a dialog box appears prompting you to confirm whether or not those settings should be sent the MDT 3298.

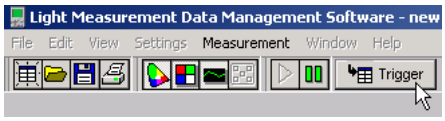
   * During measurement, the item being measured or about to be measured appears in the status bar of the Light Measurement Data Management Software window.



Confirmation Dialog Box



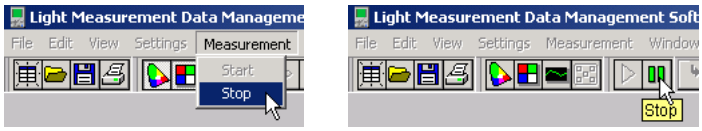
3. Click the Trigger button Trigger on the toolbar when it becomes active. A single measurement is performed.



4. Repeat step 3 as many times as necessary.

- **Stopping Measurement**

5. Select **Measurement** > **Stop**, or click the Measurement Stop button on the toolbar.



Further Details

There are two measurement modes: Continuous and Single. The procedure for loading measurement data differs depending on the mode used. Refer to section 2.6 for information on how to select the measurement mode.

- Each item is measured according to the order specified using the procedure in section 2.3.
  For example, measurement repeats in the following manner. Luminance -> Contrast ->Flicker -> Chromaticity (measured at each reference color) -> Luminance… (and so on).
- Each item of the loaded measurement data is automatically displayed in the measurement data table, and then in a chromaticity diagram, deviation diagram, or trend graph (see chapter 4) per the default window settings.
- A measurement number (see the table below) from 1 to 32000 is added to each data in the order in which they are measured. Measurement numbers cannot be changed.
- If you open a saved measurement data file and then start additional measurements, the new data is assigned measurement numbers starting from where the original numbers left off. The first item to be measured is the first item you specified using the procedure in section 2.3. This is true even if the previous data ends before the last measurement item.

Continuous Measurement

- When the Measurement Start button is pressed, measurement repeats continuously at the specified interval (see section 2.6) until the Measurement Stop button is pressed, or measurement number 32000 is reached.
- If measurement is stopped part way through, the item being measured when measurement stopped is not included in the final measurement data. For example, if measurement is stopped while the white contrast is being measured, the last white contrast measurement item will not be displayed.
- If you restart measurement after stopping measurement part way through, measurement continues on from the item being measured when the stop occurred.

Measurement Data Table during Continuous Measurement

Measurement Data

	Lumin.	Contrast			Flicker	PANEL01									
						R			G			B			
Meas. No.	L	Bright	Dark	Contr	%	x	y	L	x	y	L	x	y	L	x
1	131.0	130.9	0.5	229.3	0.38	0.6244	0.3436	25.0	0.3045	0.5864	74.1	0.1462	0.0918	13.7	0.306
2	125.9	124.7	0.6	204.8	0.45	0.6251	0.3428	25.9	0.3056	0.5862	76.8	0.1464	0.0924	14.1	0.306
3	129.3	129.5	0.5	218.0	0.48	0.6222	0.3466	25.3	0.3002	0.5922	75.7	0.1455	0.0935	13.9	0.303
4	128.4	128.0	0.5	224.1	0.40	0.6223	0.3464	26.0	0.3008	0.5919	77.4	0.1454	0.0936	14.3	0.304

Measure : Luminance

Status Bar

The currently measured item or the item to be measured next is displayed.

Single Measurement

- When the Trigger button on the toolbar is pressed, measurement is performed one time. This corresponds to Single mode on the MDT 3298.
- In the example below when you press the Trigger button, at first only Luminance is measured. The second time the Trigger button is pressed, white contrast is measured. In this manner, the next item in sequence is measured each time the button is pressed.
- Once measurement number 32000 has been reached, measurement will not continue even if you press the Trigger button.

Measurement Data Table during Single Measurement (after Single Measurement of Luminance and Contrast)

Measurement Data

	Lumin.	Contrast			Flicker	PANEL01											
						R			G			B			W		
Meas. No.	L	Bright	Dark	Contr	%	x	y	L	x	y	L	x	y	L	x	y	L
1	131.0	130.9	0.5	229.3													
2																	
3																	
4																	

Measure : Flicker

Status Bar

The currently measured item or the item to be measured next is displayed.

For Surface Distribution

- You can perform surface distribution measurements by selecting Surface distribution in the View tab (see section 2.3).
- For details on the measurement data table for surface distribution, see section 4.5.
- When in Continuous measurement mode (see section 2.6), measurement is performed continuously per the specified interval. The first measurement is taken at the first measurement location, the second measurement is taken at the second measurement location, and so on.
- When in Single measurement mode, a single measurement is taken each time the Trigger button is pressed. The first time the Trigger button is pressed, measurement is taken at the first measurement location, the second time the button is pressed, measurement is taken at the second measurement location, and so on.

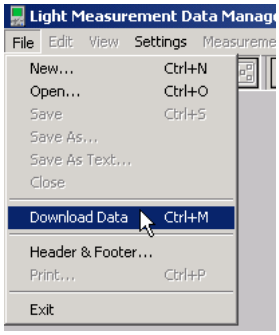
Note

- Measurement stops when the measurement number reaches 32000. After that, measurement cannot be restarted. If you want to take additional measurements, save the current measurement data (see section 3.3), then follow the procedure in section 2.1 to create a new file. Measurement can then be started.
- Do not perform operating procedures on the MDT 3298 during measurement (other than measurement itself). This may hinder accurate measurement.
- During continuous measurement, no procedures can be performed other than stopping measurement. During single measurement, no procedures can be performed other than pressing the Trigger button or stopping measurement.

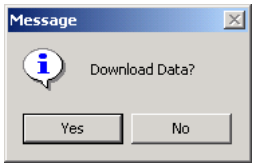
3.2 Downloading All Data from the MDT 3298

Procedure

1. Choose **File** > **Download Data**. The Message dialog box is displayed.



2. Click **Yes**.
   All data in the MDT 3298's memory numbers 001–200 will be downloaded to the PC.



Further Details

You can download all data (all measurement items) in the MDT 3298's memory to the PC. All data in memory numbers 001–200 will be downloaded to the PC at once.

- Memory No. 001 corresponds to measurement number 1 of the measurement data, No. 002 corresponds to measurement number 2, and so on, up to No. 200.
- If no data were saved to a certain memory number, the corresponding row in the measurement data table will be blank.

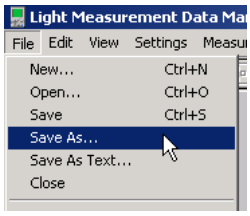
3.3 Saving Measurement Data and Closing Files

Procedure

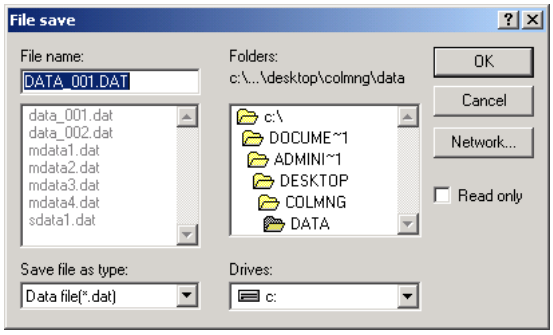
Four file operations are discussed in this section: saving to a file name, saving (overwriting), saving to a text file, and closing.

Saving to a Specified File Name

1. Choose **File** > **Save As**. The Save As dialog box is displayed.

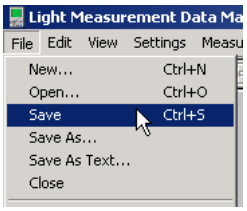


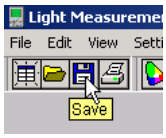
2. Type or select the save destination and file name, then click **OK**. The measurement data is saved.



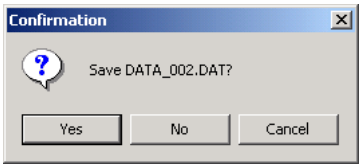
Saving (Overwriting)

Select **File** > **Save**, or click the Save button on the toolbar.
If the data being saved is new, the Save As dialog box mentioned above appears.
If you open a preexisting measurement data file and make changes to it, when you close the window a dialog box appears prompting you to confirm whether or not to save the file.



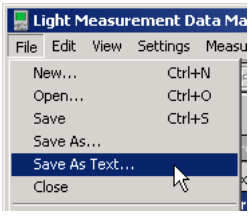


Confirmation Dialog Box

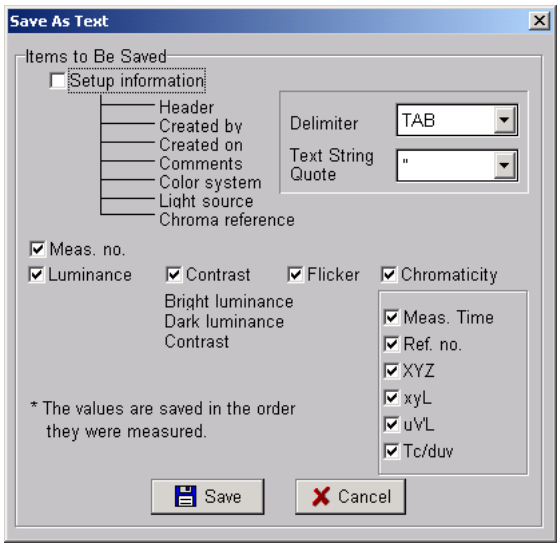


Saving As a Text File

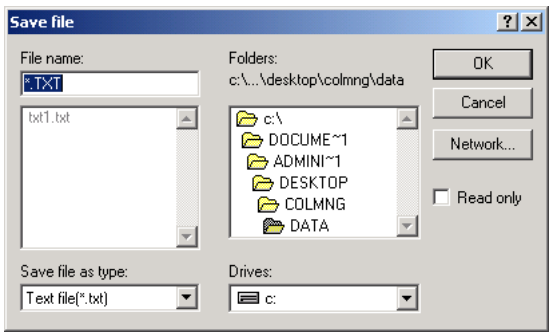
1. Choose **File** > **Save As Text**. The Save As Text dialog box is displayed.



2. Choose whether to save settings by selecting the corresponding check boxes. Select a delimiter and quote character from the lists.
3. Select the check boxes next to Measurement no., Luminance, Contrast, Flicker, and Chromaticity check boxes for the items you wish to save.
4. Click **Save**. The Save As dialog box is displayed.



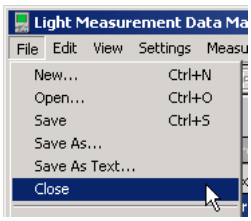
5. Type or select the save destination and file name, then click **OK**. The measurement data is saved.



Closing

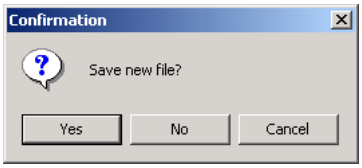
Choose **File** > **Close**. The measurement data file closes.

If you open a new or preexisting measurement data file and make changes to it, when you close the window a dialog box appears prompting you to confirm whether or not to save the file.



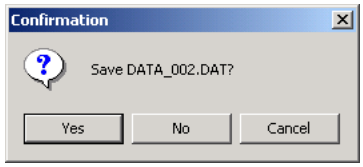
Confirmation Dialog Box

(For new measurement data files)



(For preexisting measurement data files)

or



Further Details

There are two available file formats for measurement data saving: a dedicated format for this software, and text format.

Saving to the Dedicated Format Used by This Software

- You can choose either the Save or Save As command when saving to this format.
- Up to 8 English letters may be used for the file name (excluding the extension).
- The file name extension is .dat.
- If a file with the same name already exists, it is overwritten.

Saving in Text Format

- You can select whether or not to save settings, and enter such settings as the delimiter and the quote character.
- You can select the Measurement no., Luminance, Contrast, Flicker, and Chromaticity check boxes for the items to be saved.
- Up to 8 English letters may be used for the file name (excluding the extension).
- You can select a file name extension of .txt or .csv. Note that both TXT and CSV are text formats, so the data will be saved as a text file regardless of which extension you choose.
- If a file with the same name already exists, it is overwritten.

An Example of Data Saved As Text

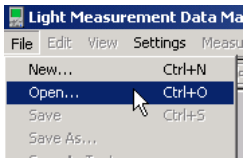
(Given that the settings is to be saved, tab is to be used as the delimiter for the measurement data, and [“] is to be used as the quote character.)

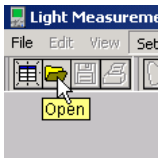
```
"Header:Monitor Measurement"
"Cleate by:Yokogawa"
"Create on:2002/01/17"
"Comments:Luminance, Contrast, Flicker, Chroma measurement"
"Measurement order:Luminance,Contrast,Flicker,Chromaticity,"

"Color system:xyL"
"Light source:FL3"
"Refernce panel:PANEL01"
"Reference R:x=0.6700+/-0.1,y=0.3300+/-0.1"
"Coefficient R:X=1.0000,Y=1.0000,Z=1.0000"
"Reference G:x=0.2100+/-0.1,y=0.7100+/-0.1"
"Coefficient G:X=1.0000,Y=1.0000,Z=1.0000"
"Reference B:x=0.1400+/-0.1,y=0.0800+/-0.1"
"Coefficient B:X=1.0000,Y=1.0000,Z=1.0000"
"Reference W:x=0.3100+/-0.1,y=0.3100+/-0.1"
"Coefficient W:X=1.0000,Y=1.0000,Z=1.0000"
"Reference User1:x=0.3000+/-0.1,y=0.3000+/-0.1"
"Coefficient User1:X=1.0000,Y=1.0000,Z=1.0000"
"Reference User2:x=0.3000+/-0.1,y=0.3000+/-0.1"
"Coefficient User2:X=1.0000,Y=1.0000,Z=1.0000"

"Measurement no."       "L"     "Bright"        "Dark"  "Contrast"      "Flicker"       "Ref
1       131.0   130.9   0.5     229.3   0.38    "R"     13:33:11        45.4    25.0    2.3
2       125.9   124.7   0.6     204.8   0.45    "R"     13:34:30        47.2    25.9    2.4
3       129.3   129.5   0.5     218.0   0.48    "R"     14:35:39        45.4    25.3    2.3
4       128.4   128.0   0.5     224.1   0.40    "R"     14:36:28        46.7    26.0    2.3
```

3.4 Opening Saved Measurement Data Files

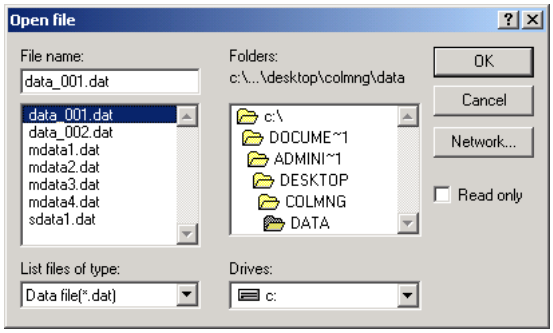
Procedure

1. Select **File** > **Open**, or click the Open button on the toolbar. The File Open dialog box is displayed.



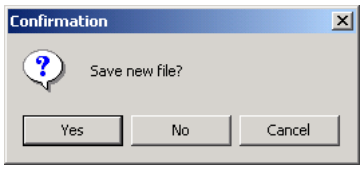


2. Select a file to open, then click **OK**. The measurement data file is loaded. If you open a new or preexisting measurement data file and make changes to it, when you close the file a dialog box appears prompting you to confirm whether or not to save the changes.



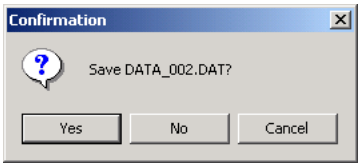
Confirmation Dialog Box

(For new measurement data files)



(For changed, preexisting measurement data files)

or



Further Details

You can open measurement data files saved in this software's dedicated file format.

- The file name extension is .dat.
- This software only allows you to edit, view, or add measurements to one measurement data file at a time. Multiple files cannot be processed at the same time.

4.1 Editing the Measurement Data Table

Procedure

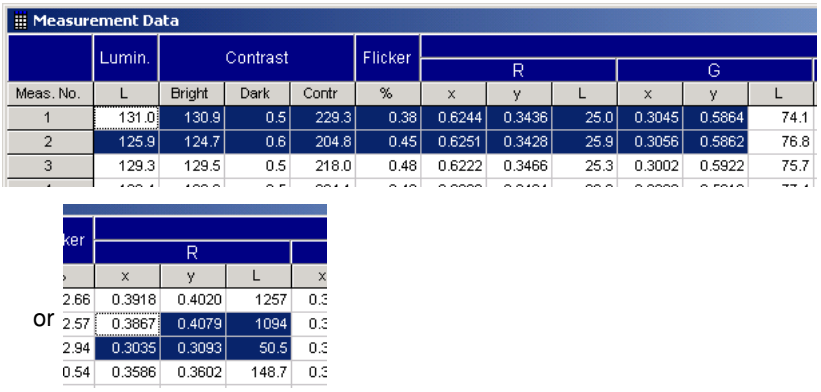
Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the measurement data table displayed, you can perform the following procedures to edit the data. If you selected surface distribution as a default window using the procedure in section 2.3, refer to section 4.5.

- Copy the data in the measurement data table to the clipboard: see below.
- Delete all data: see page 4-2.
- Delete the last data: see page 4-3.
- Display details: see page 4-4.
- Plot data: see sections 4.2–4.4.

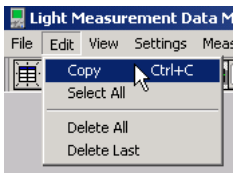
Copying Data from the Measurement Data Table to the Clipboard

Copying a Portion of the Data

1. Drag the mouse to select the range of cells to be copied.

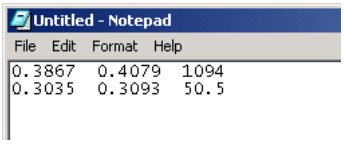


2. Choose **Edit** > **Copy**. The selected range is copied to the clipboard.
   * You can also right click on the selected area and select Copy from the shortcut menu.



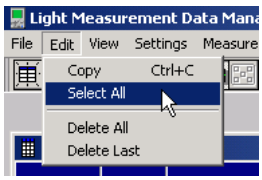
3. Paste the contents of the clipboard onto a new file in a text editor.

Pasting the Contents of the Clipboard into Notepad

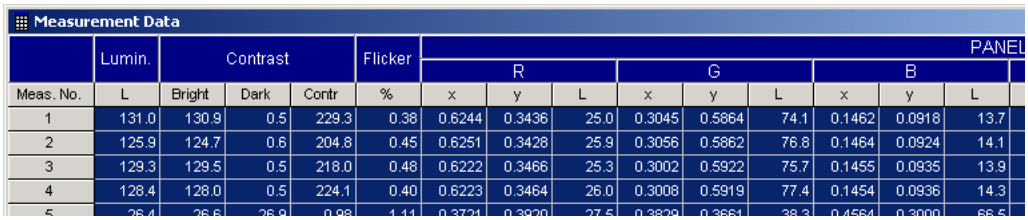


Copying All Data

1. Choose **Edit** > **Select All**. All measurement data in the measurement data table is selected.
   * You can also right click on the selected area to display the shortcut menu. Choose Select All.



The Measurement Data Table with All Data Selected



2. Perform steps 2 and 3 in “Copying a Portion of the Data” above.

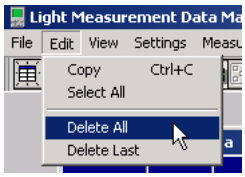
Deleting All Data

Note

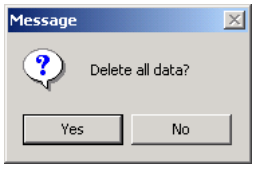
Deleted measurement data cannot be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.

Choose **Edit** > **Delete All**. All measurement data is deleted. Before the deletion is carried out, a dialog box appears prompting you to confirm deletion.

* You can also right click on the selected area to display the shortcut menu. Choose Delete All from the menu.



Confirmation Dialog Box



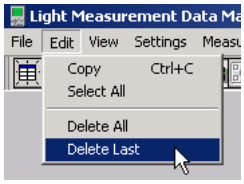
Deleting the Last data

Note

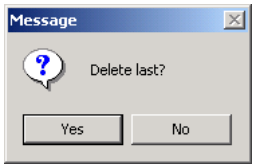
Deleted measurement data cannot be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.

Choose **Edit** > **Delete Last**. The last data in the measurement data table is deleted. Before the deletion is carried out, a dialog box appears prompting you to confirm deletion.

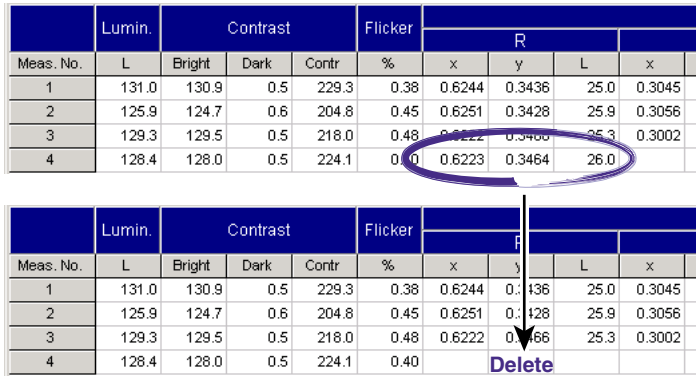
* You can also right click on the selected area to display the shortcut menu. Choose Delete Last from the menu.



Confirmation Dialog Box



Deletion of the Last data

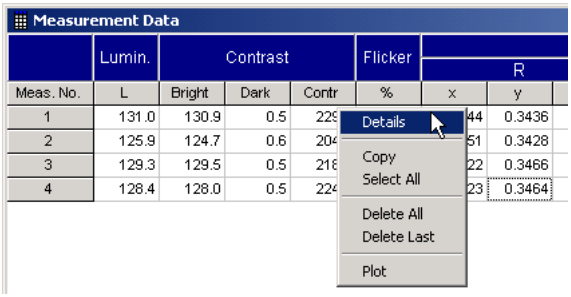


Displaying and Copying Details

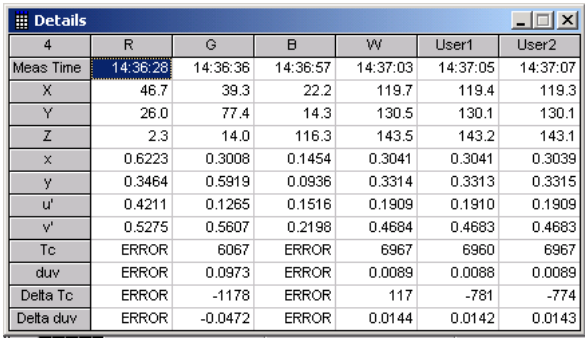
Displaying Details

1. Click any cell in the row corresponding to the measurement number of the data whose details you wish to view.
2. Right click the selected cell. A shortcut menu appears.
3. Select **Details**. The details table appears.

   If you select Details while the details table is open, it will close.

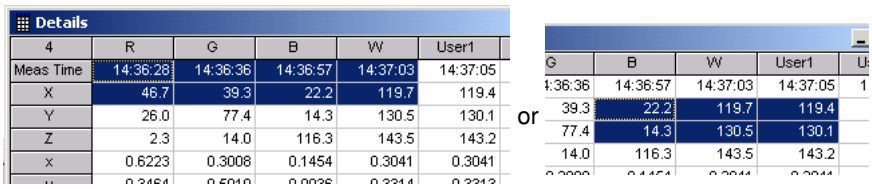


Details Table

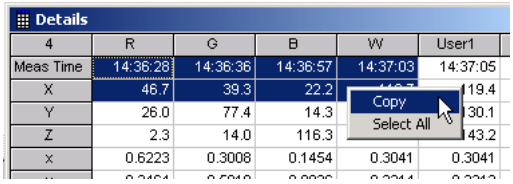


Copying a Portion of the Details

4. Drag the mouse to select the range of cells to be copied.

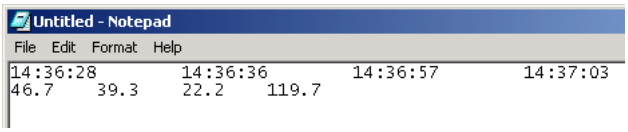


5. Using the mouse, right click in the details table. A shortcut menu appears.
6. Select **Copy**. The selected range is copied to the clipboard.



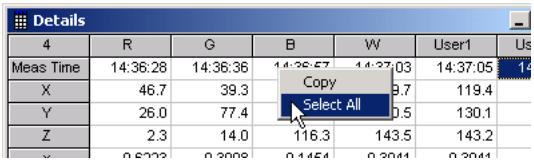
7. Paste the contents of the clipboard onto a new file in a text editor.

Pasting the Contents of the Clipboard into Notepad

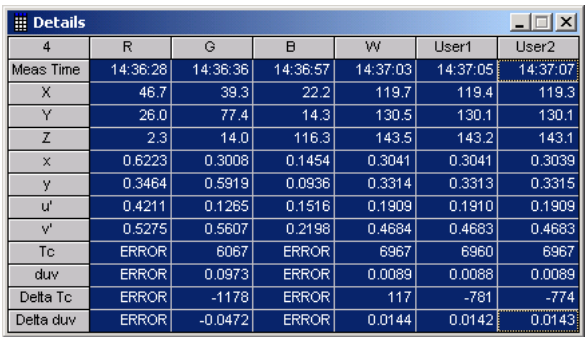


Copying All Details

4. Using the mouse, right click in the details table. A shortcut menu appears.
5. Choose **Select All**. All data in the details table is selected.



The Details Table with All Data Selected



4	R	G	B	W	User1	User2
Meas Time	14:36:28	14:36:36	14:36:57	14:37:03	14:37:05	14:37:07
X	46.7	39.3	22.2	119.7	119.4	119.3
Y	26.0	77.4	14.3	130.5	130.1	130.1
Z	2.3	14.0	116.3	143.5	143.2	143.1
x	0.6223	0.3008	0.1454	0.3041	0.3041	0.3039
y	0.3464	0.5919	0.0936	0.3314	0.3313	0.3315
u'	0.4211	0.1265	0.1516	0.1909	0.1910	0.1909
v'	0.5275	0.5607	0.2198	0.4684	0.4683	0.4683
Tc	ERROR	6067	ERROR	6967	6960	6967
duv	ERROR	0.0973	ERROR	0.0089	0.0088	0.0089
Delta Tc	ERROR	-1178	ERROR	117	-781	-774
Delta duv	ERROR	-0.0472	ERROR	0.0144	0.0142	0.0143

6. Perform steps 5–7 in “Copying a Portion of the Details” above.

Plotting Data

You can click (or drag a selection) measurement data in the measurement data table, and then plot that data in a chromaticity diagram, deviation diagram, or trend graph. For the operating procedure, see sections 4.2–4.4.

Further Details

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the measurement data table displayed, you can perform edits on the data. If you selected surface distribution as a default window using the procedure in section 2.3, refer to section 4.5.

Measurement Data Table

Data measured by the MDT 3298 is read into the measurement data table. The items below are displayed in the order specified using the procedure in section 2.3.

- **Measurement Number**
  The number from 1 to 32000 that is assigned to each data in order as they are measured. The number cannot be changed.
- **Luminance**
  The brightness of the light source as detected from a certain direction. The units of luminance are cd/m^2.
- **Contrast**
  The ratio of the luminance when white is displayed to that when black is displayed.
- **Flicker Ratio**
  The ratio of the variation in the brightness. Flicker occurs when the brightness of the screen changes at an interval longer than that for the decay of the afterimage in the human eye. Flicker is expressed as a percentage.
- **x, y, and L, or u', v', and L**
  Either x, y, and L, or u', v', and L columns are displayed per the color system you chose in section 2.3.
  The chromaticity and luminance of the measurement data for each reference color (R, G, B, W, User1, and User2) as expressed by the xyL or u'v'L color system. x, y or u', v' have no units, but the units of L are cd/m^2.

Measurement Data Table

Measurement Data

	Lumin.	Contrast			Flicker	PANEL01											
						R			G			B			W		
Meas. No.	L	Bright	Dark	Contr	%	x	y	L	x	y	L	x	y	L	x	y	L
1	131.0	130.9	0.5	229.3	0.38	0.6244	0.3436	25.0	0.3045	0.5864	74.1	0.1462	0.0918	13.7	0.3062	0.3268	12
2	125.9	124.7	0.6	204.8	0.45	0.6251	0.3428	25.9	0.3056	0.5862	76.8	0.1464	0.0924	14.1	0.3069	0.3276	12
3	129.3	129.5	0.5	218.0	0.48	0.6222	0.3466	25.3	0.3002	0.5922	75.7	0.1455	0.0935	13.9	0.3036	0.3314	12
4	128.4	128.0	0.5	224.1	0.40	0.6223	0.3464	26.0	0.3008	0.5919	77.4	0.1454	0.0936	14.3	0.3041	0.3314	13
5	26.4	26.6	26.9	0.98	1.11	0.3721	0.3920	27.5	0.3829	0.3661	38.3	0.4564	0.3000	66.5	0.2868	0.4142	
6	56.0	66.7	88.0	0.75	1.12	0.3514	0.3601	680	0.3518	0.3597	687	0.3479	0.3472	651	0.3486	0.3474	6
7	700	684	92.4	7.40	0.32	0.3456	0.4141	91.4	0.3457	0.4138	91.5	0.3458	0.4141	91.7	0.3459	0.4139	9
8	89.4	90.4	89.9	1.00	0.34	0.3417	0.4145	79.1	0.3404	0.4149	76.4	0.3398	0.4142	73.8	0.3366	0.4130	7
9	80.1	87.1	91.8	0.94	0.28	0.3397	0.4066	103.7	0.3400	0.4065	103.9	0.3413	0.4061	106.6	0.3415	0.4062	10
10	109.2	109.9	110.1	0.99	0.26	0.3419	0.4066	110.0	0.3417	0.4068	109.7	0.3407	0.4026	117.0	0.3411	0.3998	12

Details Table

The following items are displayed in each row of the Details table for the data in the R, G, B, W, User1, and User2 column groups.

- **Measurement Time**
  The time the data was measured on the MDT 3298. This time reflects the time on the PC's internal clock during measurement.
- **X, Y, and Z**
  The tristimulus values. The symbols X, Y, and Z, indicate the three primary colors as perceived by the human eye. They are assigned values that are measured on the MDT 3298.
- **x, y or u', v'**
  Same as those in "Measurement Data Table" above.

- **Tc**
  The color temperature as calculated from the measurement data. The color temperature is the absolute temperature of a blackbody radiator having a chromaticity equal to that of the light source. The units of Tc are K (Kelvin).
- **duv**
  The divergence between the position of the color temperature calculated from the measurement data, and the same color temperature position on the blackbody locus (locus of the color temperature of the blackbody).
- **Delta Tc**
  The difference between Tc (color temperature of the measurement data) and the color temperature of the reference color.
- **Delta duv**
  The difference between the duv of the measurement data and the duv of the reference color.

Details Table

Measurement number

Details

4	R	G	B	W	User1	User2
Meas Time	14:36:28	14:36:36	14:36:57	14:37:03	14:37:05	14:37:07
X	46.7	39.3	22.2	119.7	119.4	119.3
Y	26.0	77.4	14.3	130.5	130.1	130.1
Z	2.3	14.0	116.3	143.5	143.2	143.1
x	0.6223	0.3008	0.1454	0.3041	0.3041	0.3039
y	0.3464	0.5919	0.0936	0.3314	0.3313	0.3315
u'	0.4211	0.1265	0.1516	0.1909	0.1910	0.1909
v'	0.5275	0.5607	0.2198	0.4684	0.4683	0.4683
Tc	ERROR	6067	ERROR	6967	6960	6967
duv	ERROR	0.0973	ERROR	0.0089	0.0088	0.0089
Delta Tc	ERROR	-1178	ERROR	117	-781	-774
Delta duv	ERROR	-0.0472	ERROR	0.0144	0.0142	0.0143

* When the color temperature can not be calculated from the measurement data or the chromaticity coordinates of the reference color, ERROR appears in the Tc, duv, Delta Tc, and Delta duv rows.

Copying to the Clipboard

You can copy the data from the measurement data table and the details table to the PC's clipboard. You can paste the data from the clipboard to a text editor and create a new document.

- **Partial Copy**
  Copy only the selection made by dragging the cursor with the mouse.
- **Copy All Data**
  You can copy all the data from the measurement data table and the details table.

Deleting All Data

- All the data from the measurement data table and the details table is deleted.
- If all data is deleted, it can not be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.

Deleting the Last data

- All the last data from the measurement data table and the details table are deleted.
- Deleted measurement data cannot be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.
- The data measured by the MDT 3298 is deleted one item at a time. For example, if the final measurement data is in column R of measurement number 4, then the row 4 cells in column group R are deleted when you perform the last data deletion procedure.

Plotting Data

You can click (or drag to select) measurement data in the measurement data table, and then plot that data in a chromaticity diagram, deviation diagram, or trend diagram. See sections 4.2–4.4.

Note

During measurement, all menu commands (other than measurement stop), as well as the select measurement data, copy, and delete functions are disabled.

4.2 Displaying the Chromaticity Diagram

Procedure

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the measurement data table and chromaticity diagram displayed, you can perform the following procedures. If you selected surface distribution as a default window using the procedure in section 2.3, refer to section 4.6.

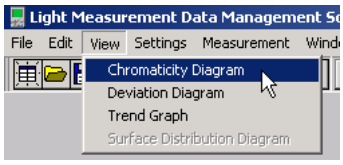
- Display, and zoom in and out on the chromaticity diagram: see below. If the chromaticity diagram is not displayed, perform the procedure below to display it.
- Plot in Refresh mode: see page 4-10.
- Plot in Scatter mode: see page 4-11.
- Plot in Locus mode: see page 4-13.
- Select the bar graph scale: see page 4-15.
- Delete plotted points and locus lines: see page 4-15.

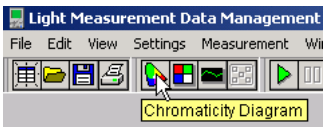
Displaying and Zooming In and Out on the Chromaticity Diagram

Note

Perform step one if the chromaticity diagram is not displayed. Note that if you perform this step when the diagram is already open, it will close.

1. Choose **View** > **Chromaticity Diagram**, or click the Chromaticity Diagram button on the toolbar. The chromaticity diagram is displayed.

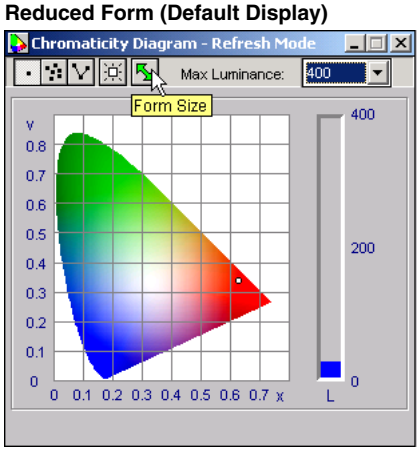




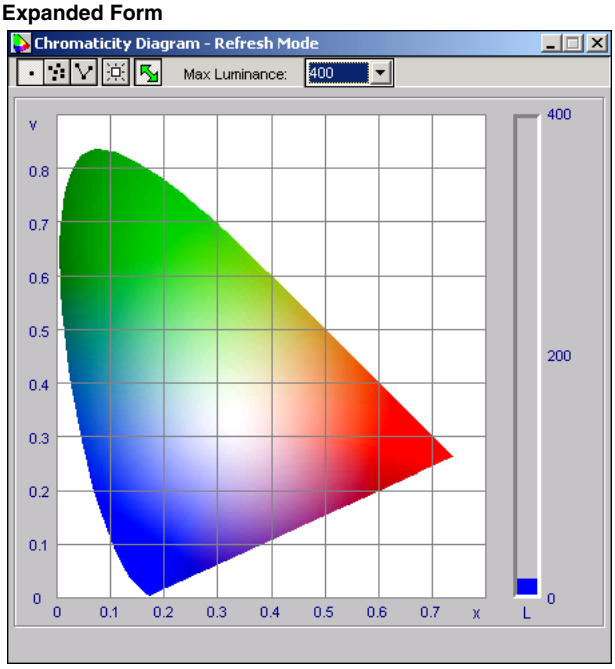
2. Click the Form Size button in the diagram to zoom in and out.

Chromaticity Diagram

Reduced Form (Default Display)



Expanded Form



Plotting in Refresh Mode

1. Click the Refresh Mode button in the chromaticity diagram. The diagram enters Refresh mode (in which a single point is plotted at a time).

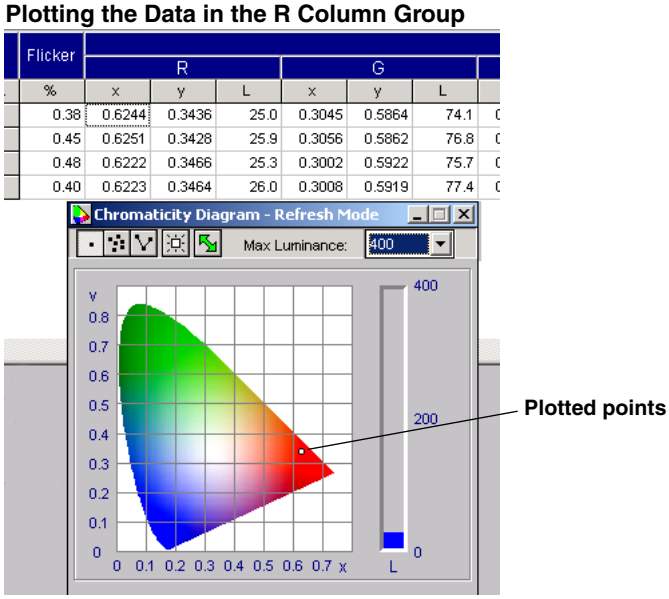
Plot Measurement Data as It Is Being Read In

2. Follow the steps in section 3.1 to start measurement. The data from the R, G, B, W, User1, and User2 column groups is plotted in the chromaticity diagram.
   The plotted points from the previous data are erased.

Use the Current Data (Stop Reading In Data), or Open and Plot Data from a Measurement Data File

2. Click the mouse on a cell in the R, G, B, W, User1, or User2 column group of the measurement data table. Data from each column within the group you click is plotted in the chromaticity diagram.
   The plotted points from the previous data are erased.

Plotting the Data in the R Column Group



Plotting in Scatter Mode

1. Click the Scatter Mode button in the chromaticity diagram. The diagram enters Scatter mode (in which multiple points can be plotted).

Plot Measurement Data as It Is Being Read In

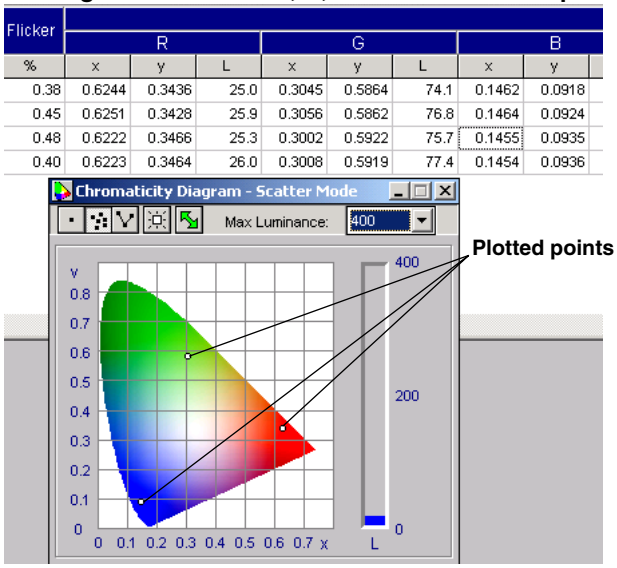
2. Follow the steps in section 3.1 to start measurement. The data from the R, G, B, W, User1, and User2 column groups is plotted in the chromaticity diagram.
   The plotted points from previous data are not erased.

Use the Current Data (Stop Reading In Data), or Open and Plot the Data from a Measurement Data File

- **Plotting Data One at a Time**

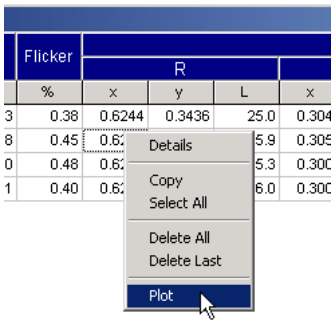
2. Click the mouse on a cell in the R, G, B, W, User1, or User2 column group of the measurement data table. Data from each column within the group you click is plotted in the chromaticity diagram.
   The plotted points from previous data are not erased.

Plotting the Data in the R, G, and B Column Groups

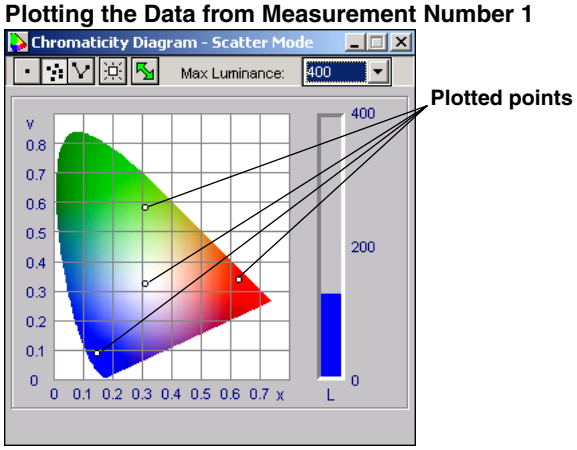


- **Plotting by Measurement Number**

2. Click a cell in the row corresponding to the measurement number whose data you wish to plot. The data from the R, G, B, W, User1, and User2 column groups of the selected measurement number is selected to be plotted in the chromaticity diagram.
3. Right click the selected cell. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured.
   The plotted points of any previous data are erased, and the data for the selected measurement number is plotted.

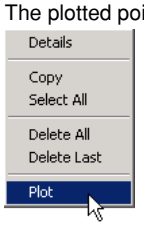


Plotting the Data from Measurement Number 1



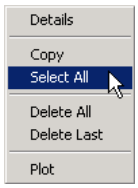
- **Plotting a Selection**

2. Drag the mouse to select a range of rows to be plotted. Data in the R, G, B, W, User1, and User2 column groups for the measurement numbers in the selected range are selected for plotting.
3. Right click the selection. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured.
   The plotted points of any previous data are erased, and the selected data is plotted.



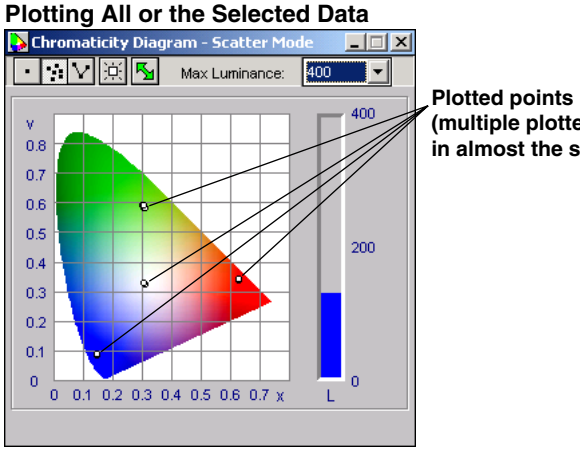
- **Plotting All Data at Once**

2. Right click any cell. A shortcut menu appears.
3. Choose **Select All**. All the data from the R, G, B, W, User1, and User2 column groups in the measurement data table are selected for plotting.



4. Perform steps 3 and 4 in “Plotting a Selection” above.

Plotting All or the Selected Data



Plotting in Locus Mode

1. Click the Locus Mode button in the chromaticity diagram. The diagram enters Locus mode (in which locus lines are drawn between plotted points).

Plot Measurement Data as It Is Being Read In

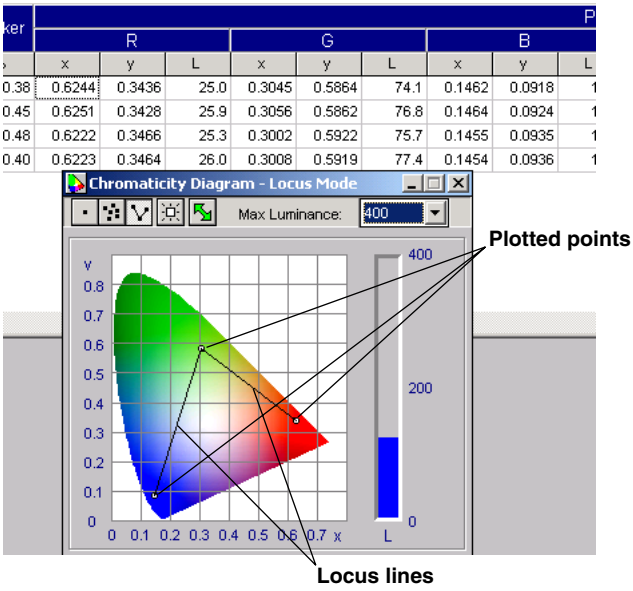
2. Follow the steps in section 3.1 to start measurement. The data from the R, G, B, W, User1, and User2 column groups is plotted in the chromaticity diagram.
   A locus line is drawn between this data and the plotted points from the previous data.

Use the Current Data (Stop Reading In Data), or Open and Plot Data from a Measurement Data File

- **Plotting One Data at a Time**

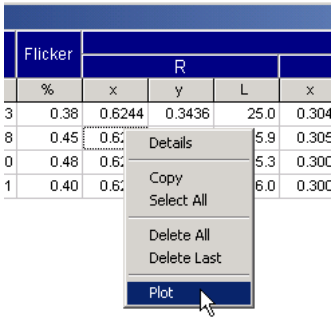
2. Click the mouse on a cell in the R, G, B, W, User1, or User2 column group of the measurement data table. Data from each column within the group you click is plotted in the chromaticity diagram.
   Locus lines are plotted between this data and the plotted points from any previous data.

Plotting the Data in the R, G, and B Column Groups

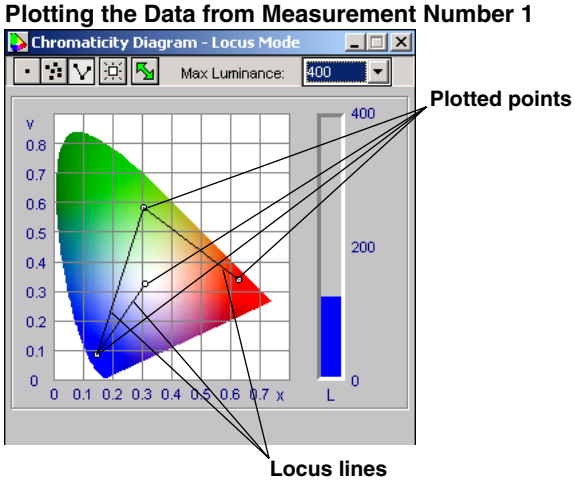


- **Plotting By Measurement Number**

2. Click a cell in the row corresponding to the measurement number whose data you wish to plot. The data from the R, G, B, W, User1, and User2 column groups of the corresponding measurement number is selected for plotting.
3. Right click the selected cell. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured.
   The plotted points and locus lines of any previous data are erased, and points and locus lines for the data of the selected measurement numbers are plotted and drawn.

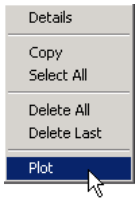


Plotting the Data from Measurement Number 1



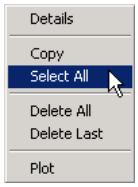
- **Plotting a Selection**

2. Drag the mouse to select a range of rows to be plotted. Data in the R, G, B, W, User1, and User2 column groups for the measurement numbers in the selected range are selected for plotting.
3. Right click the selection. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured.
   The plotted points and locus lines of any previous data are erased, and points and locus lines for the data of the selected range are plotted and drawn.



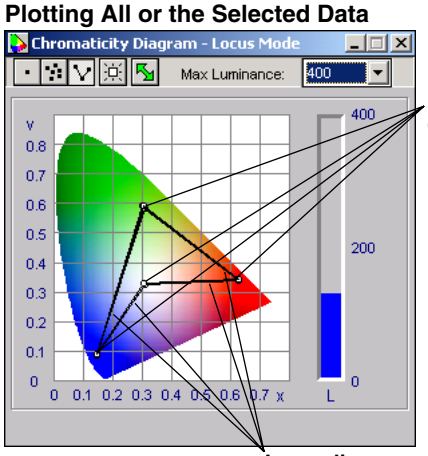
- **Plotting All Data at Once**

2. Right click any cell. A shortcut menu appears.
3. Choose **Select All**. All the data from the R, G, B, W, User1, and User2 column groups in the measurement data table are selected for plotting.



4. Perform steps 3 and 4 in “Plotting a Selection” above.

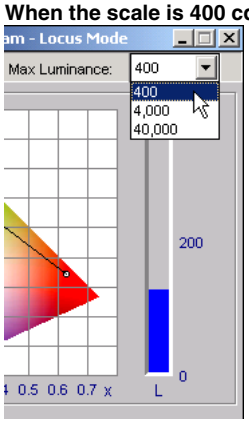
Plotting All or the Selected Data



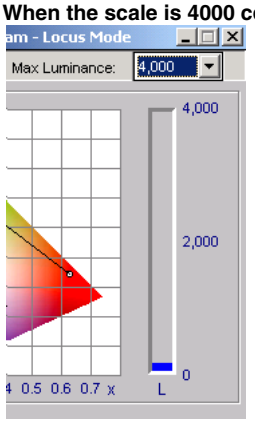
Selecting Bar Graph Scale

Select a bar graph scale from the **Max Luminance** list in the chromaticity diagram.

When the scale is 400 cd/m²



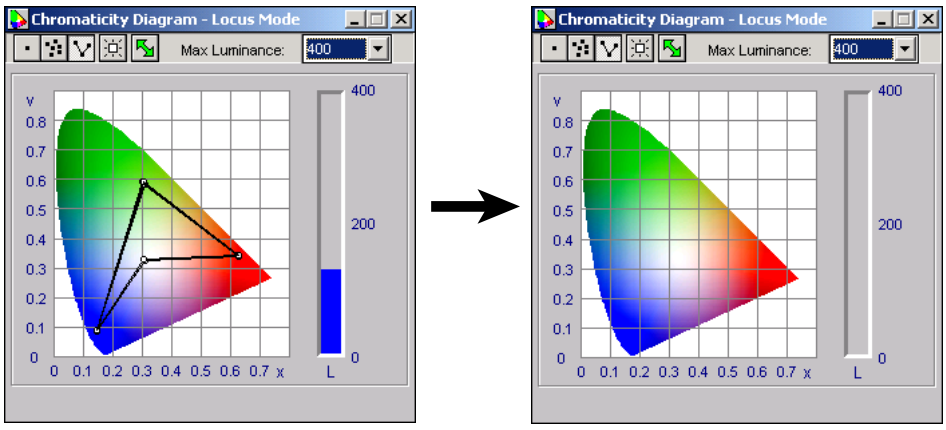
When the scale is 4000 cd/m²



Deleting Plotted Points and Locus Lines

Click the Clear button in the chromaticity diagram. All plotted points and locus lines in the chromaticity diagram are deleted.

Deleting Plotted Points and Locus Lines



Further Details

If you selected Chromaticity diagram as one of the default windows (see section 2.3), when you read in data from the MDT 3298 or open a saved measurement data file, a chromaticity diagram of the loaded data is displayed on the screen.

- If the chromaticity diagram is not displayed, you can display it using the View menu.
- If you selected Surface distribution as a default window using the procedure in section 2.3, refer to section 4.6.

Chromaticity Diagram

The data from the R, G, B, W, User1, and User2 column groups in the measurement data table can be selected for the chromaticity diagram.

- Chromaticity Coordinates
  Chromaticity coordinates are displayed per the color system selected in section 2.3.
- Bar graph
  You can display the luminance from the R, G, B, W, User1, and User2 column groups in a bar graph. You can change the scale for the bar graph (see below).

Zooming In and Out on the Chromaticity Diagram

- Reduced form (size) is the default zoom level.
- To more easily view the data plotted in the chromaticity diagram, you can zoom the diagram.

The Chromaticity Diagram's Plotting Modes

There are three modes for plotting the data from the R, G, B, W, User1, and User2 column groups in the chromaticity diagram.

- **Refresh Mode**
  - Plot only a single selected data point (after, not during measurement) in the chromaticity diagram.
  - If you select all data for plotting while in this mode, only the last data in the measurement data table is plotted.
- **Scatter Mode**
  - Plot multiple points from the selected data (after, not during measurement) in the chromaticity diagram.
  - If you select all data for plotting, all data in the measurement data table is plotted in the order in which it was measured.
- **Locus Mode**
  - If you plot the selected data (after, not during measurement) in the chromaticity diagram, locus lines are drawn between the current data and the previous data.
  - If you select all data for plotting, all data in the measurement data table and locus lines for that data are plotted and drawn in the order in which the data was measured.

Selecting Bar Graph Scale

- The default value for the scale is 400 cd/m^2.
- Select a scale from the following choices. The units of luminance are cd/m^2.
  400, 4000, 40000

Deleting Plotted Points and Locus Lines

All plotted points and locus lines in the chromaticity diagram are deleted at once.

Note

During measurement all menu commands (other than Measurement stop), as well as the functions that allow you to zoom the chromaticity diagram in/out, change the plotting mode, select the bar graph scale, and delete plotted points and locus lines are disabled.

4.3 Displaying the Deviation Diagram

Procedure

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the measurement data table and deviation diagram displayed, you can perform the following procedures.

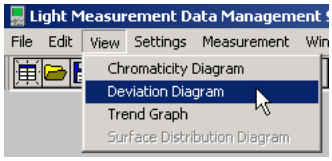
- Display the deviation diagram: see below. If the deviation diagram is not displayed, perform this procedure to display it.
- Plot in Refresh mode: see page 4-18.
- Plot in Scatter mode: see page 4-19.
- Plot in Locus mode: see page 4-21.
- Delete plotted points and locus lines: see page 4-23.
- Display statistical values: see page 4-23.

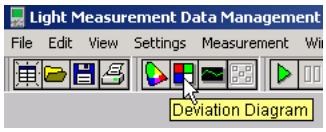
Displaying the Deviation Diagram

Note

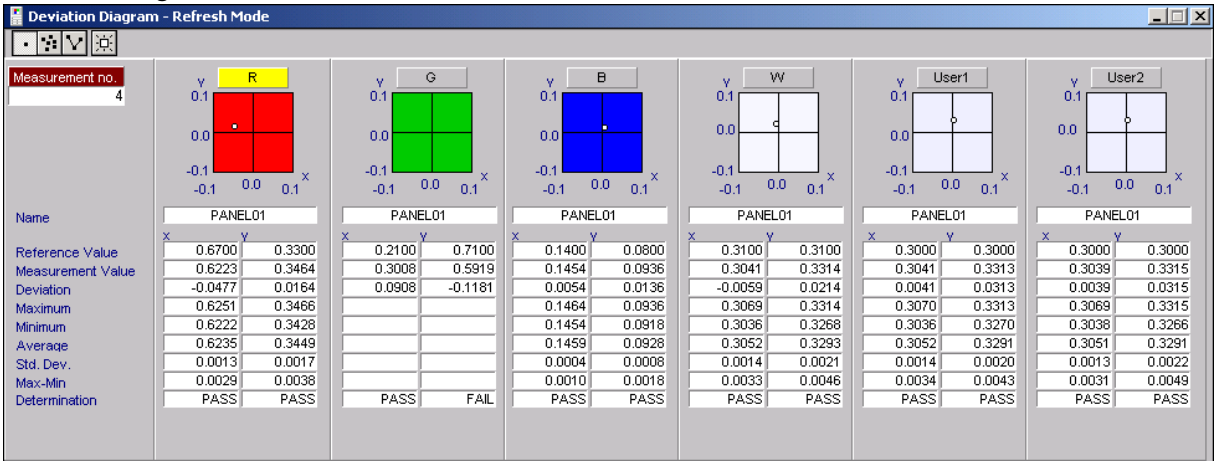
Perform this procedure if the deviation diagram is not displayed. Note that if you perform this step when the diagram is already open, it will close.

Choose **View** > **Deviation Diagram**, or click the Deviation Diagram button on the toolbar. The deviation diagram is displayed.





Deviation Diagram



Plotting in Refresh Mode (Displaying Reference and Measurement Values, and the Deviation)

Regardless of the plotting mode, statistical values may be displayed simultaneously. For information on displaying statistical values, see page 4-23.

1. Click the Refresh Mode button in the deviation diagram. The diagram enters Refresh mode (in which a single point is plotted at a time).

Plot Measurement Data as It Is Being Read In

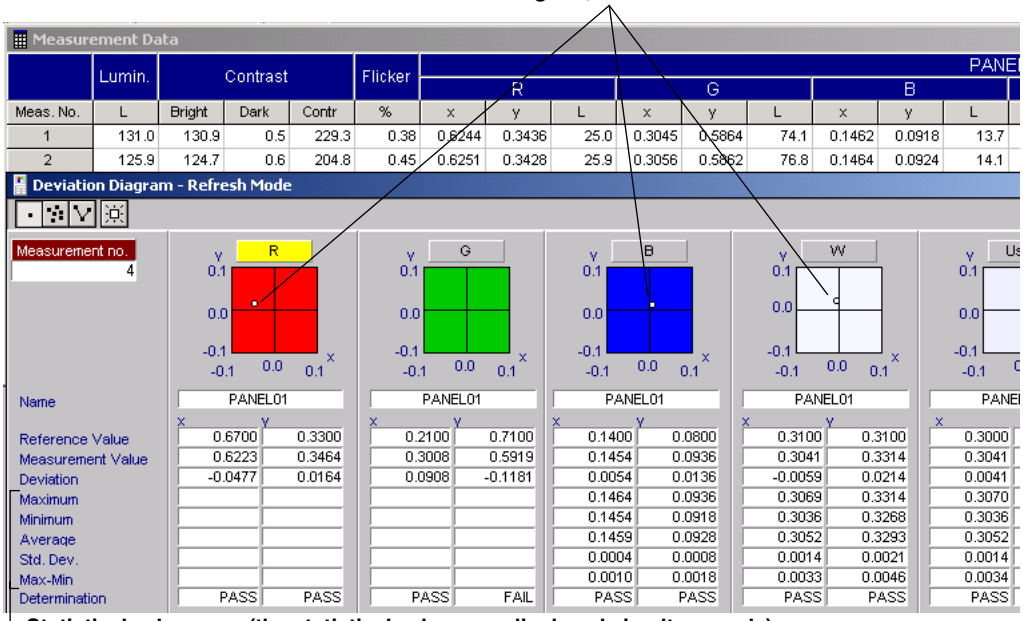
2. Follow the steps in section 3.1 to start measurement. The data from the R, G, B, W, User1, and User2 column groups is plotted in the deviation diagram. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points of any previous data are erased, and the data in the Reference Value, Measurement Value, and Deviation rows is updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

Use the Current Data (Stop Reading In Data), or Open and Plot the Data from a Measurement Data File

2. Click the mouse on a cell in the R, G, B, W, User1, or User2 column group of the measurement data table. Data from each column within the group you click is plotted in the deviation diagram. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points of any previous data are erased, and the data in the Reference Value, Measurement Value, and Deviation rows is updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

Plotting the Data from Measurement Number 1

Plotted points (data in the G column group is not plotted in the deviation diagram, because the G data falls outside of the display range.)



Statistical value rows (the statistical values are displayed simultaneously).
For information on displaying statistical values, see page 4-23.

Plotting in Scatter Mode (Displaying Reference and Measurement Values, and the Deviation)

Regardless of the plotting mode, statistical values may be displayed simultaneously. For information on displaying statistical values, see page 4-23.

1. Click the Scatter Mode button in the deviation diagram. The diagram enters Scatter mode (in which multiple points can be plotted).

Plot Measurement Data as It Is Being Read In

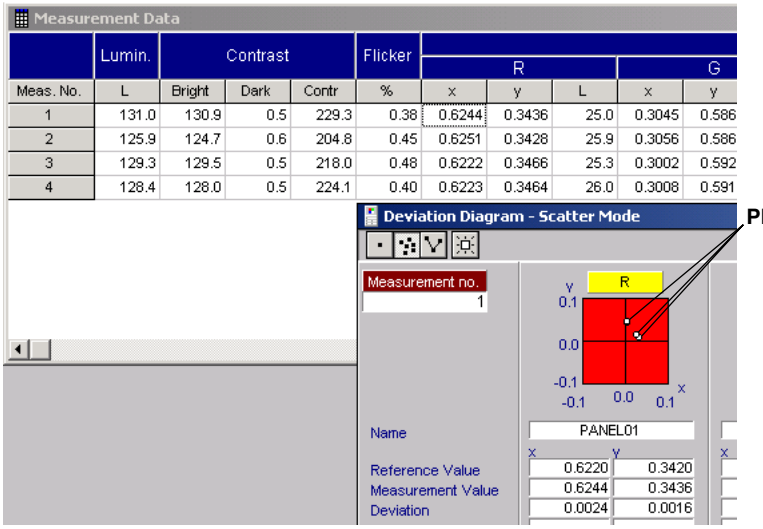
2. Follow the steps in section 3.1 to start measurement. The data from the R, G, B, W, User1, and User2 column groups is plotted in the deviation diagram. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points of any previous data are not erased, and the data in the Reference Value, Measurement Value, and Deviation rows is updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

Use the Current Data (Stop Reading In Data), or Open and Plot a Measurement Data File

- **Plotting Data One at a Time**

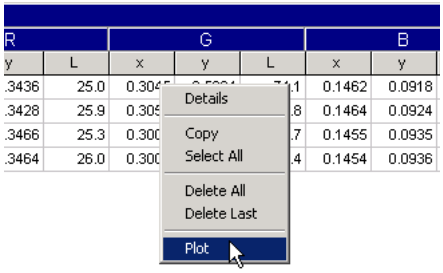
2. Click the mouse on a cell in the R, G, B, W, User1, or User2 column group of the measurement data table. Data from each column within the group you click is plotted in the deviation diagram. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points of any previous data are not erased, and the data in the Reference Value, Measurement Value, and Deviation rows is updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

Plotting the Data from the R Column Group in 3, 2, 1 Order by Measurement Number



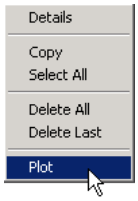
- **Plotting By Measurement Number**

2. Click a cell in the row corresponding to the measurement number whose data you wish to plot. The data from the R, G, B, W, User1, and User2 column groups of the selected measurement number is selected to be plotted in the deviation diagram.
3. Right click the selected cell. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points of any previous data are erased, and the data for the selected measurement number is plotted. The Reference Values, Measurement Values, and Deviation rows are updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.



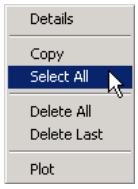
- **Plotting a Selection**

2. Drag the mouse to select a range of rows to be plotted. Data in the R, G, B, W, User1, and User2 column groups for the measurement numbers in the selected range are selected for plotting.
3. Right click the selection. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points of any previous data are erased, and the selected data is plotted. The Reference Values, Measurement Values, and Deviation rows are updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.



- **Plotting All Data at Once**

2. Right click any cell. A shortcut menu appears.
3. Choose **Select All**. All the data from the R, G, B, W, User1, and User2 column groups in the measurement data table are selected for plotting.



4. Perform steps 3 and 4 in “Plotting a Selection” above.

Plotting in Locus Mode (Displaying Reference and Measurement Values, and the Deviation)

Regardless of the plotting mode, statistical values may be displayed simultaneously. For information on displaying statistical values, see page 4-23.

1. Click the Locus Mode button in the deviation diagram. The diagram enters Locus mode (in which locus lines are drawn between plotted points).

Plot Measurement Data as It Is Being Read In

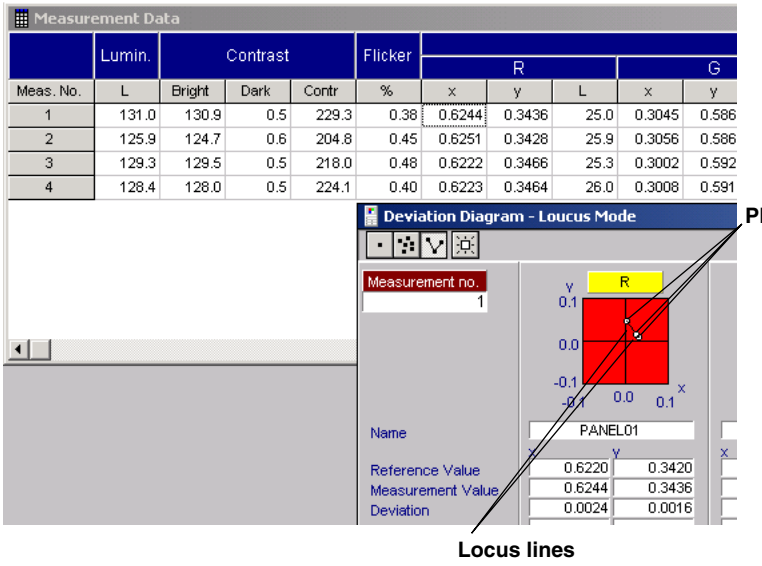
2. Follow the steps in section 3.1 to start measurement. The data from the R, G, B, W, User1, and User2 column groups is plotted in the deviation diagram. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   Locus lines are drawn between the current and previous data, and the data in the Reference Value, Measurement Value, and Deviation rows is updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

Use the Current Data (Stop Reading In Data), or Open and Plot a Measurement Data File

- **Plotting Data One at a Time**

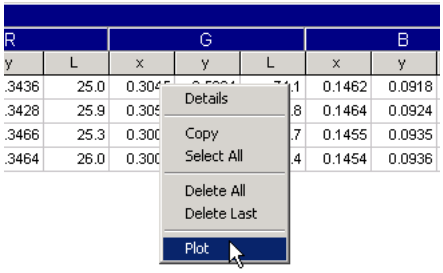
2. Click the mouse on a cell in the R, G, B, W, User1, or User2 column group of the measurement data table. Data from each column within the group you click is plotted in the deviation diagram. Values are displayed in the reference value, measurement value, and deviation rows of the deviation diagram.
   Locus lines are drawn between the current and previous data, and the data in the Reference Value, Measurement Value, and Deviation rows is updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

Plotting the Data from the R Column Group in 3, 2, 1 Order by Measurement Number



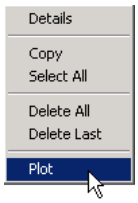
- **Plotting By Measurement Number**

2. Click a cell in the row corresponding to the measurement number whose data you wish to plot. The data from the R, G, B, W, User1, and User2 column groups of the selected measurement number is selected to be plotted in the deviation diagram.
3. Right click the selection. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points and locus lines of any previous data are erased, and points and locus lines for the data of the selected measurement numbers are plotted and drawn. The Reference Values, Measurement Values, and Deviation rows are updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.



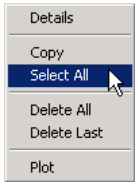
- **Plotting a Selection**

2. Drag the mouse to select a range of rows to be plotted. Data in the R, G, B, W, User1, and User2 column groups for the measurement numbers in the selected range are selected for plotting.
3. Right click the selection. A shortcut menu appears.
4. Select **Plot**. The data is plotted in the order in which it was measured. Values are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
   The plotted points and locus lines of any previous data are erased, and points and locus lines for the data of the selected range are plotted and drawn. The Reference Values, Measurement Values, and Deviation rows are updated. If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.



- **Plotting All Data at Once**

2. Right click any cell. A shortcut menu appears.
3. Choose **Select All**. All the data from the R, G, B, W, User1, and User2 column groups in the measurement data table are selected for plotting.

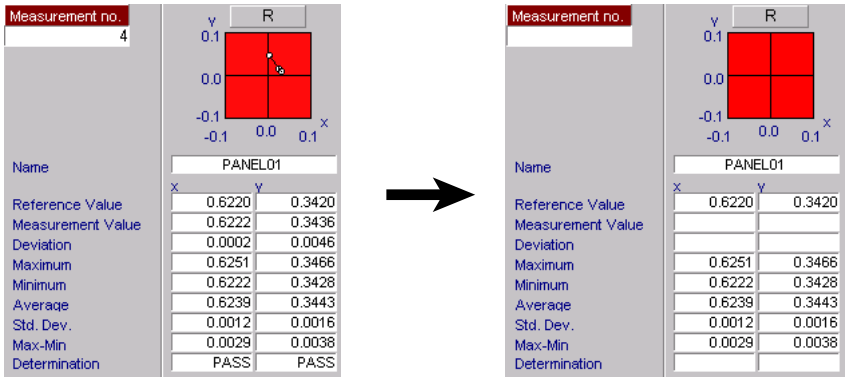


4. Perform steps 3 and 4 in “Plotting a Selection” above.

Deleting Plotted Points and Locus Lines (Deleting Measurement Values, Deviation, and Determination)

Click the Clear button in the deviation diagram. All plotted points and locus lines in the deviation diagram are deleted. The Measurement Values, Deviation, and Determination rows become blank. Statistics are not erased.

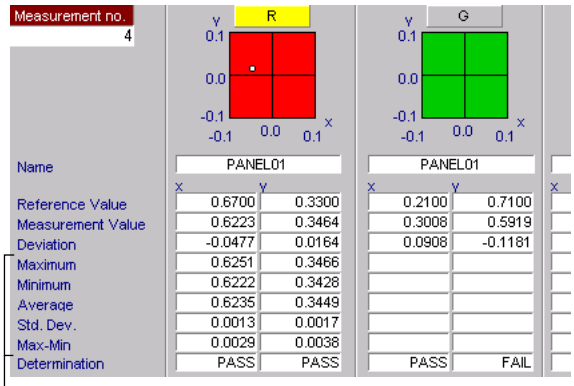
Deleting Plotted Points and Locus Lines (Deleting Measurement Values, Deviation, and Determination)



Displaying the Statistical Values

Displaying Statistics as Measurement Data Is Being Read In

1. Follow the steps in section 3.1 to start measurement. Statistical values are calculated from the data in the R, G, B, W, User1, and User2 column groups, and then displayed. Since statistical values are calculated every time measurements are taken, the amount of sampling data increases.
   If the values in the Measurement Values row fall outside of the deviation diagram display range, FAIL is displayed in the Determination field and statistical values are not displayed.



Statistical value rows (plotting in the deviation diagram and displaying of the statistical values occurs simultaneously)

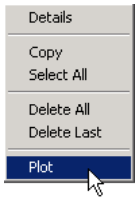
Stop Reading In Data, or Open a Measurement Data File and Display Statistical Values

- **Opening a Measurement Data File**

  Follow the steps in section 3.4 to open a measurement data file. Statistical values are calculated from the data in the R, G, B, W, User1, and User2 column groups in the measurement data table, and then displayed.

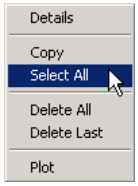
- **Calculating and Displaying Statistical Values for the Selected Range**

1. Drag the mouse to select a range of rows to be plotted. The R, G, B, W, User1, and User2 column groups of the measurement numbers in the selected range are selected for calculation.
2. Right click the selection. A shortcut menu appears.
3. Select **Plot**. The statistical values in the Max Value, Min Value, Average Value, Std. Deviation, and Max-Min rows of the deviation diagram are displayed.
   If the values in the Measurement Values row fall outside of the deviation diagram display range, FAIL is displayed in the Determination field and statistical values are not displayed.



- **Calculating and Displaying Statistical Values for All Data**

1. Right click any cell. A shortcut menu appears.
2. Choose **Select All**. All the data from the R, G, B, W, User1, and User2 column groups in the measurement data table are selected for calculation.
3. Perform steps 2 and 3 in “Calculating and Displaying Statistical Values for the Selected Range” above.



Further Details

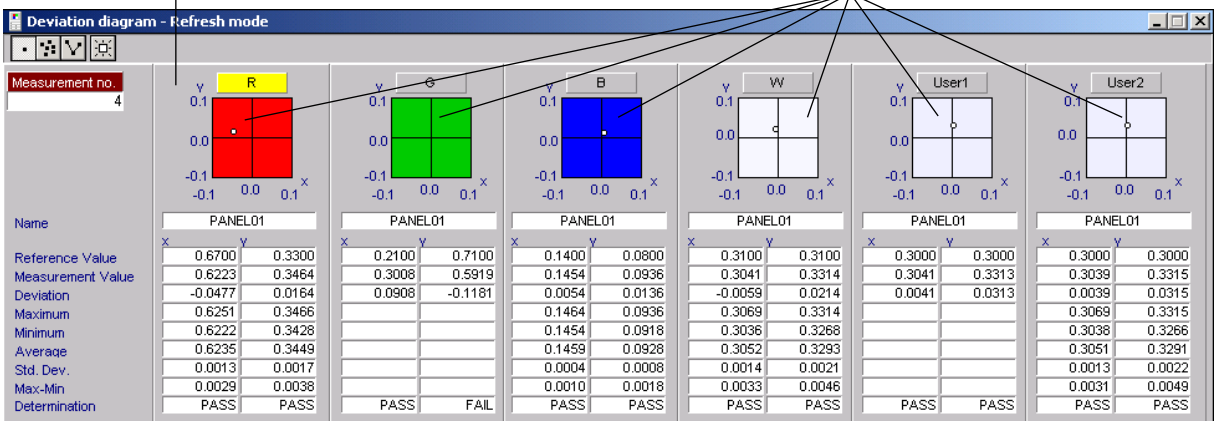
If you selected Deviation diagram as one of the default windows (see section 2.3), when you read in data from the MDT 3298 or open a saved measurement data file, a deviation diagram of the loaded data is displayed on the screen. If the deviation diagram is not displayed, you can display it using the View menu.

Deviation Diagram and Statistical Values

- **Measurement Number**
  The measurement number of the last measurement data selected is displayed. The measurement data for the current measurement number is displayed in the deviation diagram and the Measurement Value row in each R, G, B, W, User1, and User2 column.
- **Deviation Diagram**
  - The reference coordinates specified in section 2.5 are set as the origin (zero) of the deviation diagram, and the display range specified in section 2.5 becomes the display range for the deviation diagram.
  - The colors in the deviation diagram reflect the colors corresponding to the reference coordinates specified in section 2.5.
  - The measurement data containing the chromaticity of the display range (x, y or u'v') is plotted in the deviation diagram.
- **Name**
  The name of the chromaticity standard specified in section 2.5 is displayed.
- **Reference Values**
  The reference coordinates for each of the R, G, B, W, User1, and User2 column groups are displayed.
- **Measurement Values**
  The last measurement data selected is displayed.
- **Deviation**
  The value, measurement value - reference value is calculated and displayed.
- **Statistical Values**
  The following statistical values are calculated using the currently selected measurement data (sampling data). In the following equations, n is the number of sampling data, and Xi is the value of each sampling data.
  - Maximum Value
    The largest values from the sampling data are displayed. **Maximum Value=$[X_i]_{max}$**
  - Minimum Value
    The smallest values from the sampling data are displayed. **Minimum Value=$[X_i]_{min}$**
  - Average Value
    The average value of the sampling data is displayed. **Average Value=$\frac{1}{n}\sum_{i=1}^{n} Xi$**
  - Standard Deviation
    The standard deviation of the sampling data is displayed.
    Standard Deviation=$\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(Xi-\text{Average Value})^2}$
  - Max-Min
    The value calculated as the Maximum Value - Minimum Value is displayed.
- **Determination**
  If the value in the Measurement Values row lies within the display range on the deviation diagram, PASS is displayed in the Determination row, and if it falls outside the range, FAIL is displayed.

During measurement, or for the last selected data for viewing from the R, G, B, W, User1, and User2 column groups, the background color is yellow.

Deviation Diagram



The Deviation Diagram's Plotting Modes

There are three modes for plotting the data from the R, G, B, W, User1, and User2 column groups in the deviation diagram.

- **Refresh Mode**
  - Plot only a single selected data point (after, not during measurement) in the deviation diagram.
  - If you select all data for plotting while in this mode, only the last data in the measurement data table is plotted.
- **Scatter Mode**
  - Plot multiple selected data points (after, not during measurement) in the deviation diagram.
  - When plotting by measurement number or by dragging a selection, the R, G, B, W, User1, and User2 column groups of the measurement numbers in the selected range will be plotted. The values from the final measurement numbers of the specified range are displayed in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram.
  - If there is no data in a particular column group for the specified range, the measurement data from the previous measurement number is displayed in the Measurement Values and Deviation rows of the deviation diagram. For example, if there is no data in the User2 column group, the data in the User2 column group of the previous measurement number is displayed instead.
  - If you select all data for plotting, all data in the measurement data table is plotted in the order in which it was measured.
- **Locus Mode**

  The procedure for plotting, and displaying data in the Reference Value, Measurement Value, and Deviation rows of the deviation diagram is the same as in Scatter mode. The only difference is that locus lines are drawn between the current data and the previous data.

Deleting Plotted Points and Locus Lines

All plotted points and locus lines in the deviation diagram are deleted at once. Data in the Measurement Values, Deviation, and Determination rows are also deleted.

Note

During measurement, all menu commands (other than Measurement stop) as well as the functions that allow you to change the plotting mode, display statistical values, and delete plotted points and locus lines in the deviation diagram are disabled.

4.4 Displaying a Trend Graph

Procedure

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the measurement data table and trend graph displayed, you can perform the following procedures.

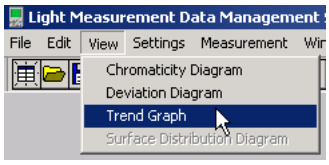
- Display the trend graph: see below. If the trend graph is not displayed, perform this procedure to display it.
- Plot the trends: see page 4-28.
- Select the horizontal scale: see page 4-29.
- Select the vertical scale: see page 4-29.

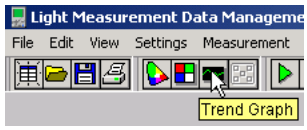
Displaying a Trend Graph

Note

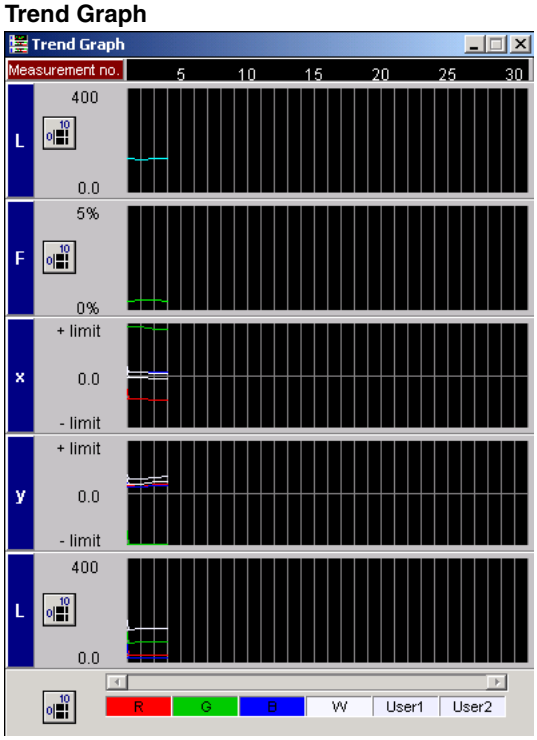
Perform this procedure if the trend graph is not displayed. Note that if you perform this step when the graph is already open, it will close.

Choose **View** > **Trend Graph**, or click the Trend Graph button on the toolbar. The trend graph is displayed.





Trend Graph



Plotting Trends

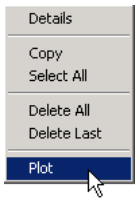
Plot Measurement Data as It Is Being Read In

Follow the steps in section 3.1 to start measurement. The data from the Luminance, Flicker, R, G, B, W, User1, and User2 column groups is plotted.

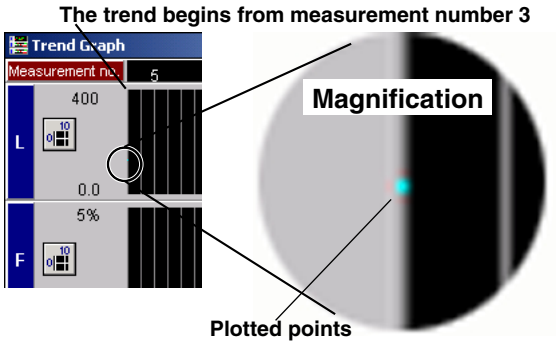
Use the Current Data (Stop Reading In Data), or Open and Plot Data from a Measurement Data File

- **Plotting By Measurement Number**

1. Click a cell in the row corresponding to the measurement number whose data you wish to plot. The data from the R, G, B, W, User1, and User2 column groups of the selected measurement numbers are selected for plotting.
2. Right click the selection. A shortcut menu appears.
3. Select **Plot**. The data is plotted in the order in which it was measured. The trends from the previous data are erased.

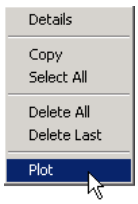


Plotting the Data from Measurement Number 3



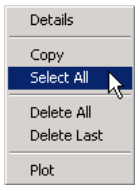
- **Plotting a Selection**

1. Drag the mouse to select a range of rows to be plotted. All data from the Luminance, Flicker, R, G, B, W, User1, and User2 column groups of the selected measurement numbers are selected for plotting.
2. Right click the selected cell. A shortcut menu appears.
3. Select **Plot**. The data is plotted in the order in which it was measured. The trends from the previous data are erased.



- **Plotting All Data at Once**

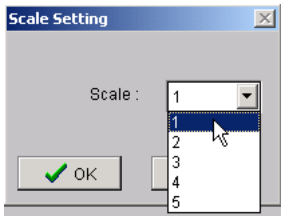
1. Right click any cell. A shortcut menu appears.
2. Choose **Select All**. All the data from the Luminance, Flicker, R, G, B, W, User1, and User2 column groups in the measurement data table are selected for plotting.



3. Perform steps 2 and 3 in “Plotting a Selection” above.

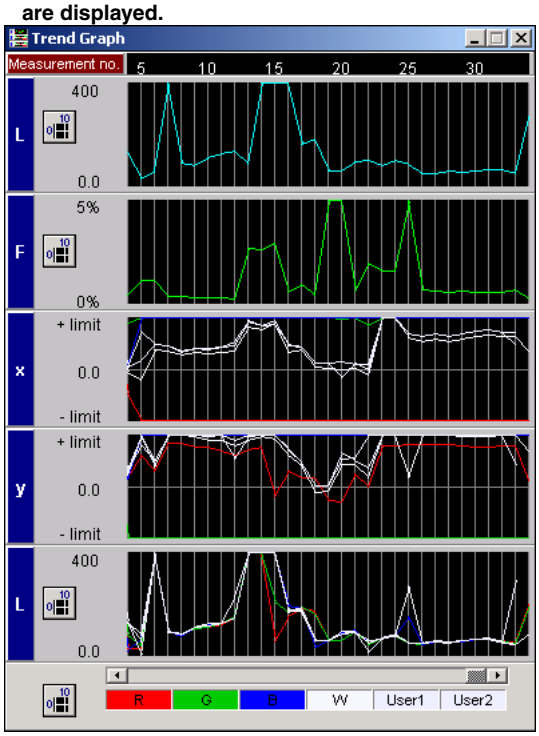
Selecting the Horizontal Scale

1. Click the Setting button at the bottom of the trend graph. The Scale Setting dialog box is displayed.
2. Select the horizontal scale from the **Scale** list.
3. Click **OK**.

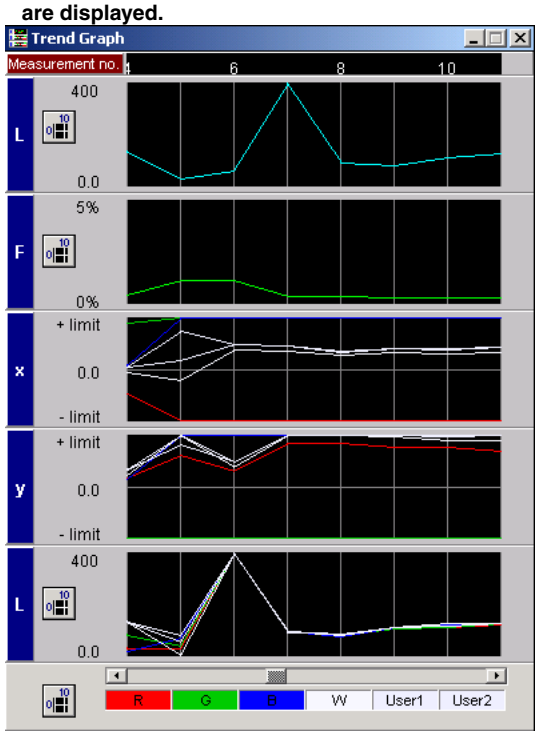


Displaying the Trend from Measurement Number 34

• For a Horizontal Scale of 1
The trends from measurement numbers 4–34 are displayed.



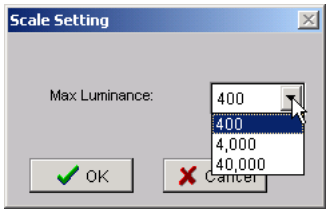
• For a Horizontal Scale of 4
The trends from measurement numbers 4–11 are displayed.

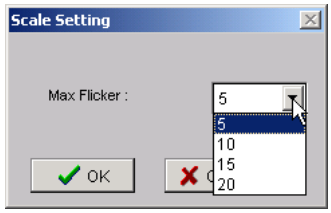


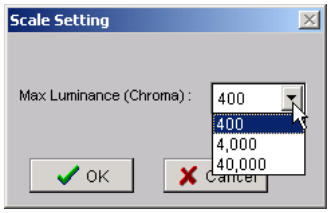
Selecting the Vertical Scale

Selecting the Scale of Luminance and Flicker

1. Click the button in the Luminance, Flicker, or Reference Color Luminance rows of the trend graph. The scale settings dialog box is displayed.
2. Select the scale for the **Max Luminance**, **Max Flicker**, or **Max Liminance (Chroma)** from the list.
3. Click **OK**.







Further Details

If you selected Trend graph as one of the default windows (see section 2.3), when you read in data from the MDT 3298 or open a saved measurement data file, a Trend graph of the loaded data is displayed on the screen. If the Trend graph is not displayed, you can display it using the View menu.

Trend Graph

The items below are displayed in the order specified using the procedure in section 2.3.

- **Measurement Number**
  The measurement number is the horizontal axis of the trend graph. The last measurement number, 32000, is the maximum value along the trend graph's horizontal axis.
- **L**
  The trend in luminance (see section 4.1) from the measurement data table is plotted.
- **F**
  The trend in flicker is plotted.
- **x, y, and L, or u', v', and L**
  - x, y, and L or u', v', and L
    The trend in chromaticity as expressed by the xyL or u'v'L color systems from the R, G, B, W, User1, and User2 column groups is plotted. The locus lines of the trend reflect the colors corresponding to the reference coordinates specified in section 2.5.
  - limit
    The display range limit for the trend in chromaticity xy or u'v' is the same as the display range specified in section 2.5.

Plotting Trends

- You can plot the selected data (after, not during measurement) from the Luminance, Flicker, R, G, B, W, User1, and User2 column groups in a trend graph.
- If you select all data for plotting, all data in the measurement data table is plotted in the order in which it was measured.
- When plotting trends while measuring, if measurement data exceeding the specified scale of the horizontal axis and the display range is acquired, the trend locus lines appear horizontally in the upper and lower edges of each trend graph. After stopping measurement, you can specify a scale greater than the largest measurement data, to make the lines be displayed correctly.

Horizontal Scale

- The default value for the horizontal scale is 1.
- You can select a scale from 1–5.
- For a scale of 1, the displayed number of points along the horizontal axis goes up to the 29th measurement number. If the scale is 2, 15 points are displayed, if the scale is 3, 10 points, for 4, 8 points, and 5, 6 points.

The Vertical Scale of Luminance and Flicker

- The default value for the luminance scale is 400 cd/m^2, and 5% for the flicker scale.
- Select a luminance scale of 400, 4000, or 40000. The units of luminance are cd/m^2.
- Select a flicker scale of 5, 10, 15, or 20. Flicker is expressed as a percentage.

Note

During measurement, the menu and trend graph scale selection commands (but not measurement stop) are disabled.

4.5 Editing the Surface Distribution Measurement Data Table

Procedure

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the surface distribution measurement data table displayed, you can perform the following procedures to edit the data. If you did not select surface distribution as a default window using the procedure in section 2.3, refer to section 4.1.

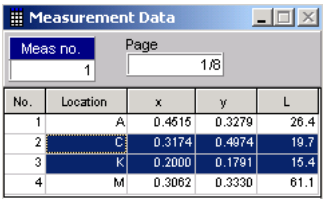
- Copy the data in the measurement data table to the clipboard: see below.
- Delete all data: see page 4-32.
- Delete the last data: see page 4-33.
- Display details: see page 4-34.
- Plot data: see sections 4.6 and 4.7.

Copying Data from the Measurement Data Table to the Clipboard

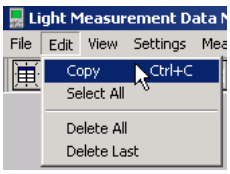
1. Select the measurement number on the measurement data table of the data you wish to copy using the following buttons.
   Click ▷ to display the measurement data of the next measurement number.
   Click ◁ to display the measurement data of the previous measurement number.
   Click ▷▷ to display the measurement data of the measurement number 5 after the current number.
   Click ◁◁ to display the measurement data of the measurement number 5 before the current number.
   Click ▷| to display the last measurement data in the measurement data table.
   Click |◁ to display the first (measurement number 1) measurement data in the measurement data table.

Copying a Portion of the Data

2. Drag the mouse to select the range of cells to be copied.

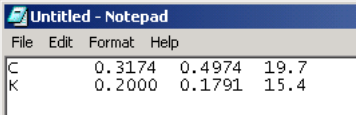


3. Choose **Edit** > **Copy**. The range selected in step 2 is copied to the clipboard.
   * You can also right click on the selected area to display the shortcut menu. Or, you can choose Copy from the menu.



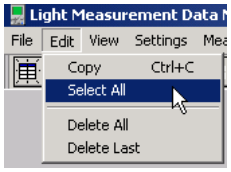
4. Paste the contents of the clipboard onto a new file in a text editor.

Pasting the Contents of the Clipboard into Notepad

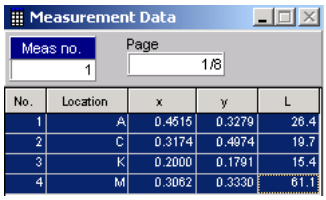


Copying All Data

2. Choose **Edit** > **Select All**. All measurement data for the selected measurement number is selected for copying.
   * You can also right click on the selected area to display the shortcut menu. Choose Select All.



All measurement data for the selected measurement number is selected.



3. Perform steps 3 and 4 in “Copying a Portion of the Data” above.

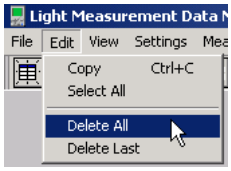
Deleting All Data

Note

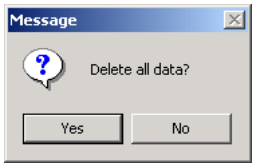
Deleted measurement data cannot be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.

Choose **Edit** > **Delete All**. All measurement data for the displayed measurement numbers is deleted. Before the deletion is carried out, a dialog box appears prompting you to confirm deletion.

* You can also right click on the selected area to display the shortcut menu. Choose Delete All from the menu.



Confirmation Dialog Box

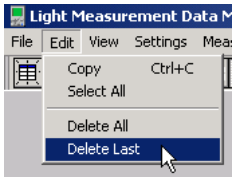


Deleting the Last data

Note

Deleted measurement data cannot be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.

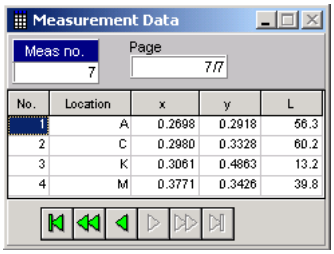
Choose **Edit** > **Delete Last**. All data from the last measurement number is deleted. Before the deletion is carried out, a dialog box appears prompting you to confirm deletion.



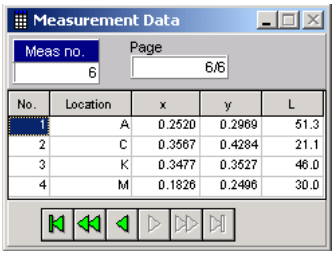
Confirmation Dialog Box

Deletion of the Last data

The Last data before Executing Delete Last Data



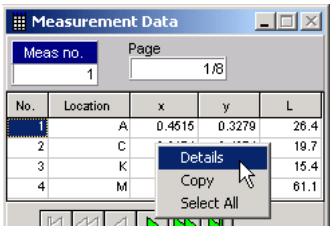
The Last data after Executing Delete Last Data



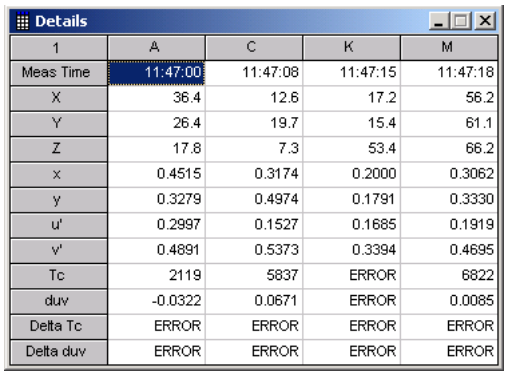
Displaying and Copying Details

Displaying Details

1. Select a cell in the row corresponding to the measurement number on the measurement data table of the data you wish to copy.
   For details about making selections, see step 1 on page 4-31.
2. Right click the selected cell. A shortcut menu appears.
3. Select **Details**. The details table appears.
   If you select Details while the details table is open, it will close.

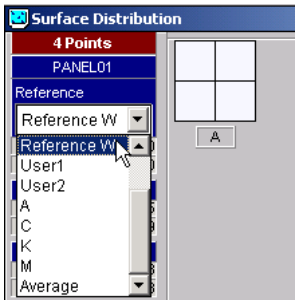


Details Table



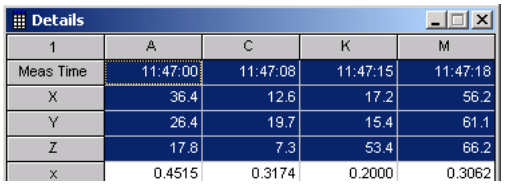
1	A	C	K	M
Meas Time	11:47:00	11:47:08	11:47:15	11:47:18
X	36.4	12.6	17.2	56.2
Y	26.4	19.7	15.4	61.1
Z	17.8	7.3	53.4	66.2
x	0.4515	0.3174	0.2000	0.3062
y	0.3279	0.4974	0.1791	0.3330
u'	0.2997	0.1527	0.1685	0.1919
v'	0.4891	0.5373	0.3394	0.4695
Tc	2119	5837	ERROR	6822
duv	-0.0322	0.0671	ERROR	0.0085
Delta Tc	ERROR	ERROR	ERROR	ERROR
Delta duv	ERROR	ERROR	ERROR	ERROR

4. Select a reference color from the **Reference** list in the surface distribution diagram.
   The Delta Tc and Delta duv values (the difference from the reference color) in the Details table change.



Copying a Portion of the Details

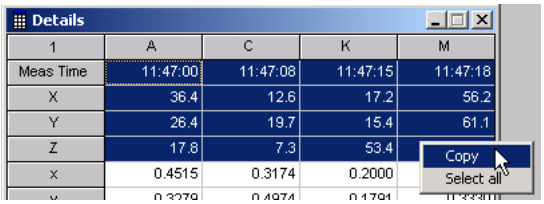
5. Drag the mouse to select the range of cells to be copied.



1	A	C	K	M
Meas Time	11:47:00	11:47:08	11:47:15	11:47:18
X	36.4	12.6	17.2	56.2
Y	26.4	19.7	15.4	61.1
Z	17.8	7.3	53.4	66.2
x	0.4515	0.3174	0.2000	0.3062

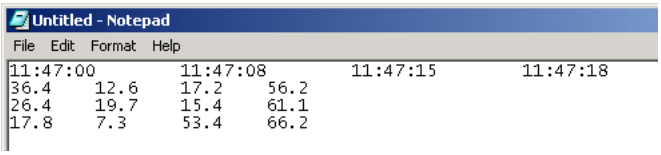
6. Using the mouse, right click in the details table. A shortcut menu appears.

7. Select **Copy**. The selected range is copied to the clipboard.



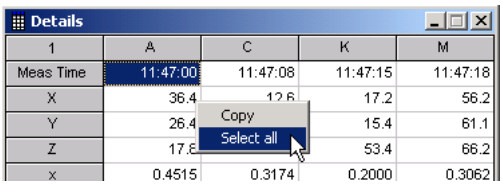
8. Paste the contents of the clipboard onto a new file in a text editor.

Pasting the Contents of the Clipboard into Notepad

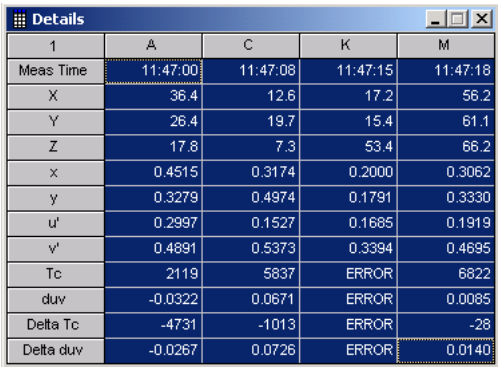


Copying All Details

5. Using the mouse, right click in the details table. A shortcut menu appears.
6. Choose **Select All**. All data in the details table is selected.



The Details Table with All Data Selected



7. Perform steps 6–8 in “Copying a Portion of the Details” above.

Plotting Data

You can click measurement data in the measurement data table for plotting the chromaticity diagram, and select the data for specific measurement numbers for plotting in the surface distribution diagram. For those operating procedures, see sections 4.6 and 4.7.

Further Details

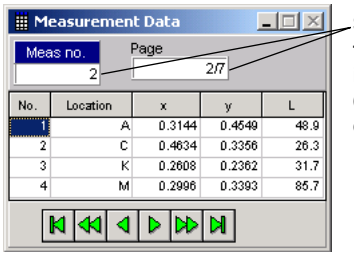
Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the surface distribution measurement data table displayed, you can perform the following procedures to edit the data. If you did not select surface distribution as a default window using the procedure in section 2.3, refer to section 4.1.

Surface Distribution Measurement Data Table

Data measured by the MDT 3298 is read into the measurement data table.

- **Measurement Number**
  Among all the displays being measured, indicates the measurement number from 1 to 32000 of the current display shown in the surface distribution. The number cannot be changed.
- **Number**
  Within a single display being measured, indicates the measurement order in which each location was measured. It matches the surface distribution measurement order specified in section 2.7.
- **Location**
  Indicates the measurement locations as specified for the display currently being measured. It is displayed using a letter from A to M, and matches the number of measurement points for the surface distribution specified in section 2.7.
- **x, y, and L, or u', v', and L**
  This is the chromaticity and luminance per the xyL or u'v'L color systems for the measurement location. x, y, u', and v' have no units, but the units of L are cd/m_.

Measurement Data Table



Shows which measurement number from 1 to 32000 is currently displayed in the surface distribution. (In this example, number 2 of 7 surface distribution measurement data is displayed.)

Surface Distribution Details Table

The following items are displayed for the measurement locations (A–M) of each measurement number.

- **Measurement Time**
  The time the data was measured on the MDT 3298. This time reflects the time on the PC's internal clock during measurement.
- **X, Y, and Z**
  The tristimulus values. These are displayed using the symbols X, Y, and Z, indicating the three primary colors as perceived by the human eye. They are assigned values that are measured on the MDT 3298.
- **x, y or u', v'**
  Same as those in "Surface Distribution Measurement Data Table" above.
- **Tc**
  The color temperature as calculated from the measurement data. The color temperature is the absolute temperature of a blackbody radiator having a chromaticity equal to that of the light source. The units of Tc are K (Kelvin).

- **duv**
  The difference between the position of the color temperature calculated from the measurement data, and the same color temperature position on the blackbody locus (locus of the color temperature of the blackbody).
- **Delta Tc**
  The difference between Tc (color temperature of the measurement data) and the color temperature of the reference color. You can select the reference color in the surface distribution.
- **Delta duv**
  The difference between the duv of the measurement data and the duv of the reference color. You can select the reference color in the surface distribution.

Details Table

Measurement number

Details

2	A	C	K	M
Meas Time	11:49:38	11:49:44	11:49:48	11:49:51
X	33.8	36.3	35.0	75.7
Y	48.9	26.3	31.7	85.7
Z	24.8	15.8	67.5	91.2
x	0.3144	0.4634	0.2608	0.2996
y	0.4549	0.3356	0.2362	0.3393
u'	0.1606	0.3036	0.1964	0.1852
v'	0.5229	0.4950	0.4001	0.4718
Tc	5983	2055	34769	7116
duv	0.0549	-0.0288	-0.0150	0.0149
Delta Tc	-867	-4795	27919	266
Delta duv	0.0604	-0.0233	-0.0095	0.0204

* When the color temperature can not be calculated from the measurement data or the chromaticity coordinates of the reference color, ERROR appears in the Tc, duv, Delta Tc, and Delta duv rows.

Copying to the Clipboard

You can copy the data from the measurement data table and the details table to the PC's clipboard. You can paste the data from the clipboard to a text editor and create a new document.

- **Copying a Portion of the Data**
  Copy only the selection made by dragging the cursor with the mouse.
- **Copying All Data**
  You can copy all the data from the measurement data table and the details table.

Deleting All Data

- All the data from the measurement data table and the details table is deleted.
- If all data is deleted, it can not be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.

Deleting the Last data

- The last data from the measurement data table and the details table are deleted.
- Deleted measurement data cannot be restored. It is recommended that you save measurement data to a file (see section 3.3) before deleting it.
- The data measured by the MDT 3298 is deleted one measurement number at a time.

Plotting Data

You can click measurement data in the measurement data table for plotting on the chromaticity diagram, and select the data of specific measurement numbers for plotting in the surface distribution diagram. See sections 4.6 and 4.7.

Note

During measurement, all menu commands (other than measurement stop), as well as the select measurement data, copy, and delete functions are disabled.

4.6 Displaying the Surface Distribution Chromaticity Diagram

Procedure

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the surface distribution measurement data table and chromaticity diagram displayed, you can perform the following procedures. If you did not select surface distribution as a default window using the procedure in section 2.3, refer to section 4.2.

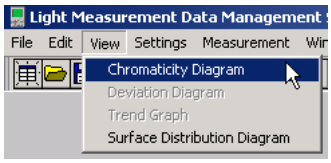
- Display, and zoom in and out on the chromaticity diagram: see below. If the chromaticity diagram is not displayed, perform the procedure below to display it.
- Plot in Refresh mode: see below.
- Select the bar graph scale: see page 4-40.
- Delete plotted points: see page 4-40.

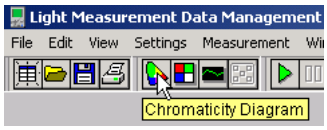
Displaying and Zooming In and Out on the Chromaticity Diagram

Note

Perform step one if the chromaticity diagram is not displayed. Note that if you perform this step when the diagram is already open, it will close.

1. Choose **View** > **Chromaticity Diagram**, or click the Chromaticity diagram button on the toolbar. The chromaticity diagram is displayed.





2. Click the Form Size button in the diagram to zoom in and out.
   For an example of zooming in and out on a chromaticity diagram, see section 4.2.

Plotting in Refresh Mode

(In the surface distribution chromaticity diagram, you can only plot measurement data in Refresh mode.)

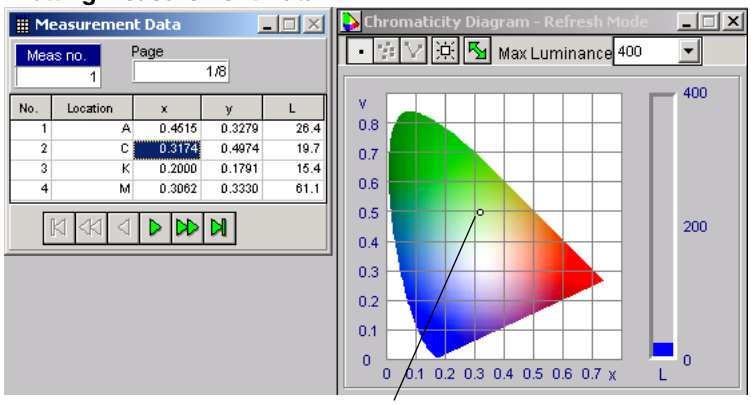
Plot Measurement Data as It Is Being Read In

1. Follow the steps in section 3.1 to start measurement. Every time measurements are taken, the data is plotted in the chromaticity diagram. The plotted points from the previous data are erased.

Use the Current Data (Stop Reading In Data), or Open and Plot Data from a Measurement Data File

1. Select the measurement numbers on the measurement data table of the data you wish to plot using one of the following procedures.
   Click  to display the measurement data of the measurement number 1 after the current number.
   Click  to display the measurement data of the measurement number 1 before the current number.
   Click  to display the measurement data of the measurement number 5 after the current number.
   Click  to display the measurement data of the measurement number 5 before the current number.
   Click  to display the last measurement data in the measurement data table.
   Click  to display the first (measurement number 1) measurement data in the measurement data table.
2. Click the mouse on the data in the measurement data table. The measurement data for the location corresponding to the cell you click is plotted in the chromaticity diagram. The plotted points from the previous data are erased.

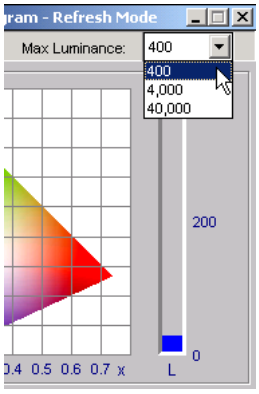
Plotting Measurement Data



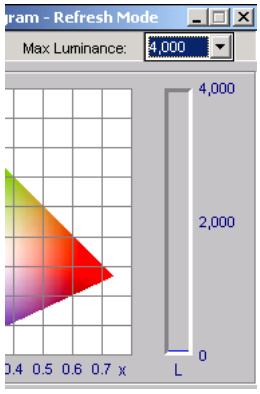
Selecting a Bar Graph Scale

Select a bar graph scale from the **Max Luminance** list in the chromaticity diagram.

When the scale is 400 cd/m²



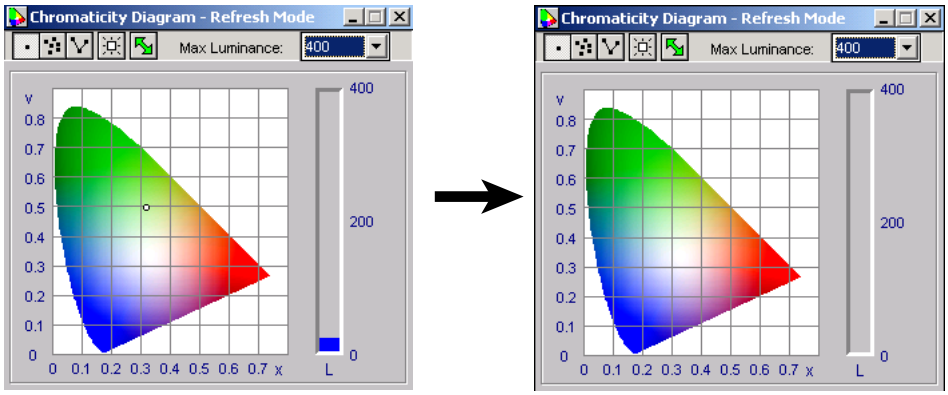
When the scale is 4000 cd/m²



Deleting Plotted Points

Click the Clear button in the chromaticity diagram. All plotted points and locus lines in the chromaticity diagram are deleted.

Deleting Plotted Points



Further Details

If you selected Chromaticity diagram as one of the default windows (see section 2.3), when you read in data from the MDT 3298 or open a saved measurement data file, a chromaticity diagram of the loaded data is displayed on the screen.

- If the chromaticity diagram is not displayed, you can display it using the View menu.
- To select surface distribution as a default window, refer to section 4.2.

Chromaticity Diagram

See Further Details in section 4.2, “Chromaticity Diagram.”

Zooming In and Out on the Chromaticity Diagram

- Reduced form (size) is the default zoom level.
- Zoom the diagram to more easily view the data plotted in it.

Plotting Modes

Refresh mode is the only mode available for plotting data in the chromaticity diagram.

Refresh Mode

- Erase the plotted points from the previous data, and plot only the selected data (after, not during measurement) in the chromaticity diagram.
- If you select all data for plotting, only the last data of the selected measurement numbers in the measurement data table is plotted.

Selecting the Bar Graph Scale

See Further Details in section 4.2, “Selecting the Bar Graph Scale.”

Deleting Plotted Points

All plotted points in the chromaticity diagram are deleted at once.

Note

During measurement, all menu commands (other than Measurement stop), as well as the functions that allow you to zoom the chromaticity diagram in/out, select the bar graph scale, and delete plotted points are disabled.

4.7 Displaying the Surface Distribution Diagram

Procedure

Read in measurement data from the MDT 3298, or open a previously saved measurement data file. With at least the surface distribution measurement data table and the surface distribution diagram displayed, you can perform the following procedures.

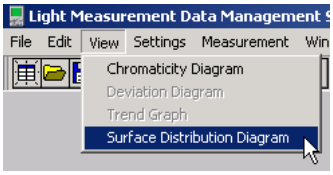
- Display the surface distribution diagram: see below. If the surface distribution diagram is not displayed, perform the procedure below to display it.
- Plot data: see page 4-43.

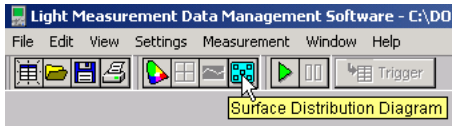
Displaying the Surface Distribution Diagram

Note

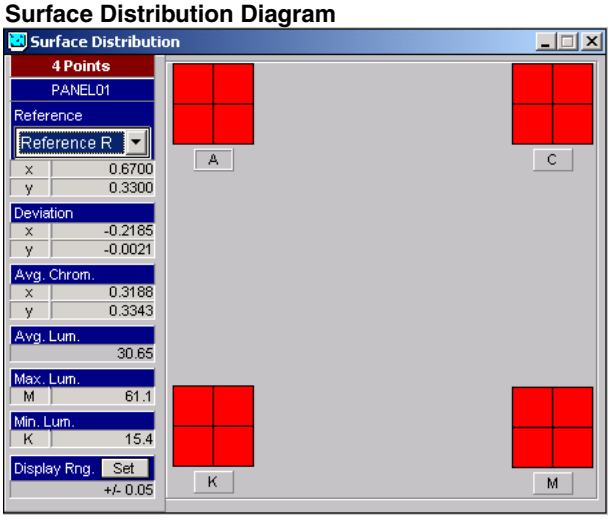
Perform this procedure if the surface distribution diagram is not displayed. Note that if you perform this step when the graph is already open, it will close.

Choose **View** > **Surface Distribution Diagram**, or click the Surface Distribution Diagram button on the toolbar. The surface distribution diagram appears.





Surface Distribution Diagram



Plotting Data

1. Select the reference color from the **Reference** list in the surface distribution diagram to be the origin (zero) of the deviation diagram in each measurement location (A–M) of the surface distribution .

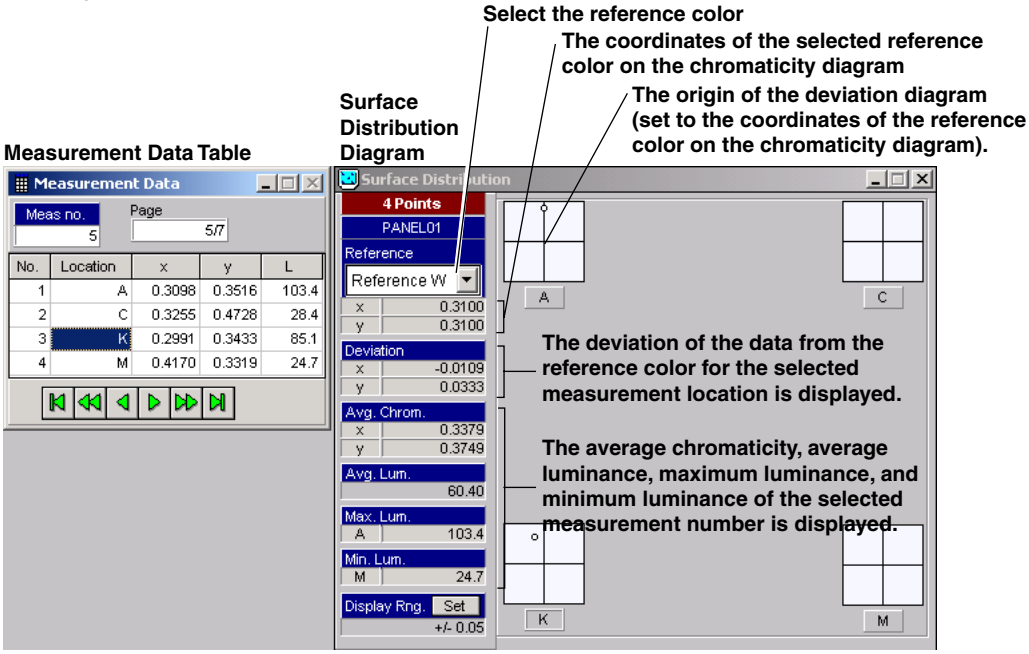
Plot Measurement Data as It Is Being Read In

2. Follow the steps in section 3.1 to start measurement. Every time the data for each measurement location of the surface distribution diagram is measured, the data is plotted in the corresponding deviation diagram on the surface distribution diagram.
   - The data in measurement locations A–M represent one measurement number. After performing measurement, if you continue on with additional measurement, the measurement number increases by 1, and surface distribution measurement updates.
   - When you plot the data from each measurement location in the deviation diagram, the values from each measurement number are simultaneously displayed in the Average Chromaticity, Average Luminance, Maximum Luminance, and Minimum Luminance rows on the left of the surface distribution diagram. Data for measurement location M is displayed in the Deviation row. When you continue measurement and the measurement number increases by 1, the plotted points and the values in each row (excluding the reference color) are erased.
   - Set the display range for the deviation diagram. For the procedure, see the next page.

Use the Current Data (Stop Reading In Data), or Open and Plot Data from a Measurement Data File
(The measurement data is plotted on the surface distribution deviation diagram one at a time. You cannot select a range and plot at them all at once.

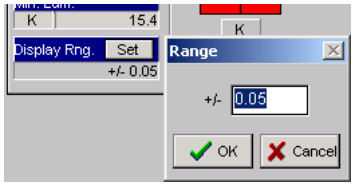
2. Select the measurement number on the measurement data table of the data you wish to plot using one of the procedures below. Data in each measurement location for the selected measurement numbers is plotted in the deviation diagram. At the same time, the values for each measurement number are displayed in the Average Chromaticity, Average Luminance, Maximum Luminance, and Minimum Luminance rows on the left of the surface distribution diagram. The data from measurement location A is displayed in the Deviation row.
   Click  to display the measurement data of the measurement number 1 after the current number.
   Click  to display the measurement data of the measurement number 1 before the current number.
   Click  to display the measurement data of the measurement number 5 after the current number.
   Click  to display the measurement data of the measurement number 5 before the current number.
   Click  to display the last measurement data in the measurement data table.
   Click  to display the first (measurement number 1) measurement data in the measurement data table.
3. Click the measurement location of the data you wish to plot from the selected measurement numbers. The data from measurement location you clicked is displayed in the Deviation row.

Plotting the Data from Measurement Number 2



Setting the Display Range

2. Click **Set** in the surface distribution diagram. The Display Range Settings dialog box is displayed.
3. Set the display range for the deviation diagram.
4. Click **OK**.



Further Details

If you selected Surface distribution as one of the default windows (see section 2.3), when you read in data from the MDT 3298 or open a saved measurement data file, a surface distribution diagram of the loaded data is displayed on the screen. If the surface distribution diagram is not displayed, you can display it using the View menu.

Surface Distribution Diagram

You can display the distribution of luminance and chromaticity over a wide area.

- **Reference, x and y, or u' and v' (x and y or u' and v' displayed according to the color system selected in section 2.3).**
  - Select the reference color from the choices below. The selected reference color becomes the origin (zero) of the deviation diagrams in the measurement locations (A–M) on the surface distribution diagram.
    Reference R, Reference G, Reference B, Reference W, User1, User2, A–M, Average Value.
  - For Reference R–User 2, the origin is set to the reference coordinates of the chromaticity reference selected using the procedure in section 2.5.
  - If you select A–M, the origin is set to the chromaticity measured at each measurement location.
  - If you select Average Value, the origin is set to the average value of the chromaticity measured at each measurement location.
  - The chromaticity of the selected reference color is displayed in the x and y or u' and v' rows.
  - The same reference color is applied to all measurement locations.
- **Deviation, x and y, or u' and v'**
  The difference between each measurement data and the reference color is displayed in the x and y or u' and v' rows.
- **Average Chromaticity, x and y, or u' and v'**
  The average value of the chromaticity for each measurement number is displayed in the x and y or u' and v' rows.
- **Average Luminance**
  The average luminance of each measurement number is displayed.
- **Maximum Luminance**
  The maximum luminance of each measurement number and their locations are displayed.
- **Minimum Luminance**
  The minimum luminance of each measurement number and their locations are displayed.
- **Display Range**
  You can specify in which range to display the deviation diagrams at each measurement location (A–M) of the surface distribution diagram. Set the range within that of the chromaticity diagram.

Moving the Measurement Location

You can drag the deviation diagram within in the surface distribution diagram to move the measurement locations.

Note

During measurement, all menu commands (other than measurement stop), as well as the functions that allow you to select the reference color and display range are disabled.

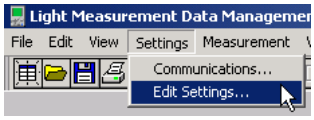
4.8 Viewing and Changing Settings

Procedure

When you create a new file, read in data from the MDT 3298, or open a saved measurement data file, the data is displayed on the screen in various formats. You can view and modify the settings for the different display formats.

Displaying the Settings

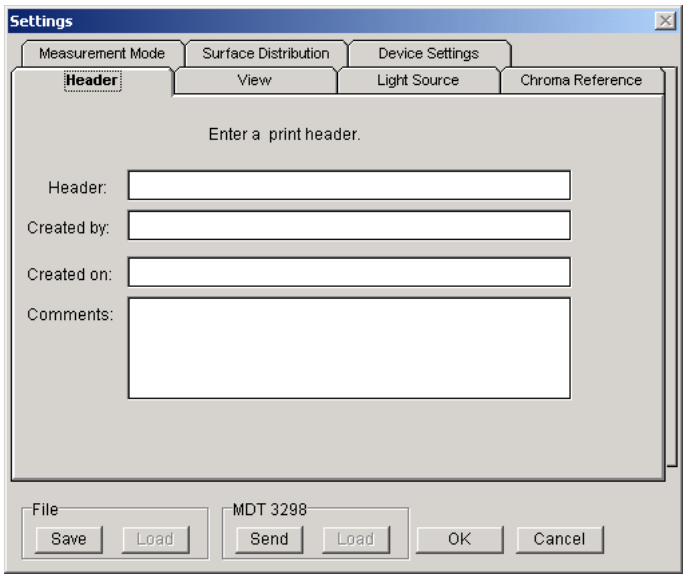
1. Choose **Settings** > **Edit Settings**. The Settings dialog box is displayed.



Changing the Settings

2. In the Settings dialog box, select the tab of the item whose settings you wish to change. For details on making changes, see sections 2.2–2.8.

Settings Dialog Box



Saving the Changed Settings to a File

This procedure is the same as the one in section 2.9, “Saving Settings to a File.”

Sending the Changed Settings to the MDT 3298

This procedure is the same as the one in section 2.9, “Sending Settings to the MDT 3298.”

Further Details

When you create a new file, read in data from the MDT 3298, or open a saved measurement data file, the data is displayed on the screen in various formats. You can view and modify the settings for the different display formats. The following items can be changed.

Items That Can Be Changed

- **Header**
  Information in the Header, Created by, Created on, and Comments fields can be changed.
- **View**
  For surface distributions, you can change whether chromaticity diagrams are displayed. For normal views (those other than surface distributions), you can change whether a trend graph, chromaticity diagram, or deviation diagram are displayed.
- **Chroma Reference**
  You can change the set of chromaticity reference values, the set's name, the chromaticity correction coefficient, the reference coordinates of the reference color, and the display range of the deviation diagram.
- **Measurement Mode**
  You can change the measurement mode and the interval.
- **Surface Distribution**
  You can change the measurement order.
- **Device Settings**
  You can change the settings for the backlight, averaging, and the measuring range.

Saving the Changed Settings to a File

This procedure is the same as the one in the Further Details subsection "Saving File" in section 2.9.

Sending the Changed Settings to the MDT 3298

This procedure is the same as the one in the Further Details subsection, "Sending Settings to the MDT 3298" in section 2.9.

Note

During measurement, all menu commands (other than measurement stop), as well as the view/change Settings functions are disabled.

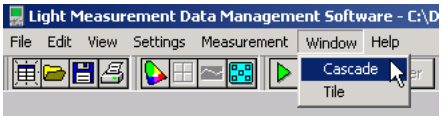
4.9 Choosing Cascade or Tile View

Procedure

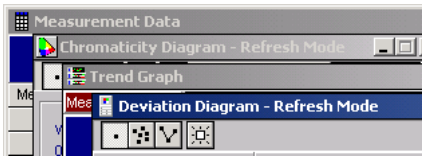
When you create a new file, read in data from the MDT 3298, or open a saved measurement data file, the data is displayed on the screen in various formats. You can choose to display the graphs and diagrams in Cascade or Tile view.

Cascade

Choose **Window** > **Cascade**. The sub windows within the Light Measurement Data Management Software window are overlaid so that you can see their title bars.



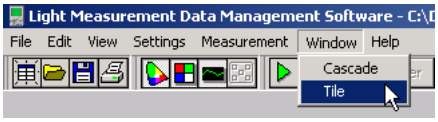
Normal View (Other Than Surface Distribution)



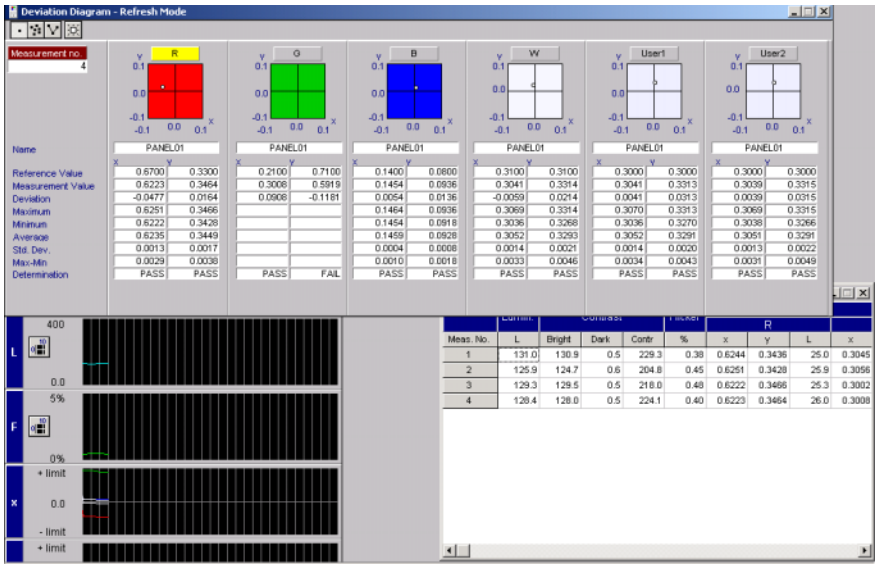
Surface Distribution View

Tile

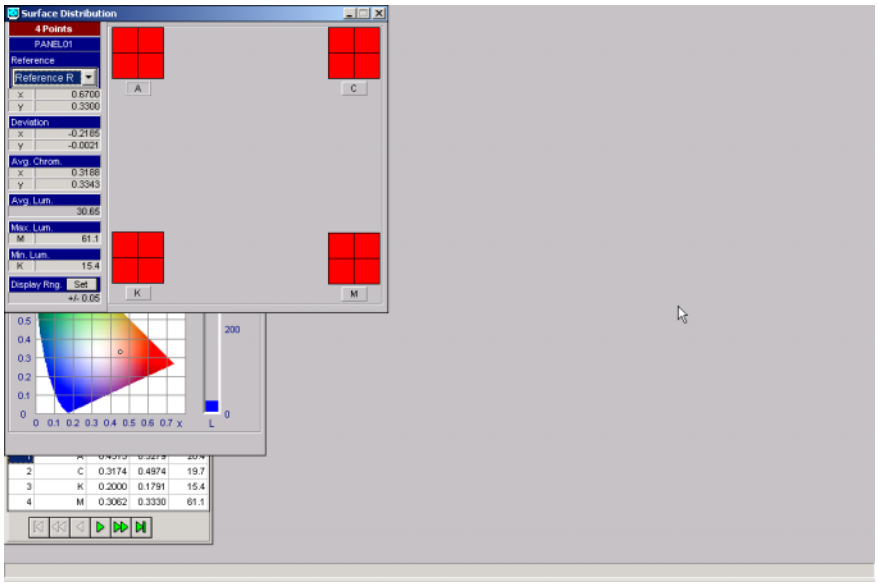
Choose **Window** > **Tile**. The sub windows within the Light Measurement Data Management Software window are resized and arranged so that most of their frames are visible.



Normal View (Other Than Surface Distribution)



Surface Distribution View



Further Details

When you create a new file, read in data from the MDT 3298, or open a saved measurement data file, the data is displayed on the screen in various formats. You can choose to display the graphs and diagrams in Cascade or Tile view.

Cascade View

- The sub windows within the Light Measurement Data Management Software window are overlaid so that you can see their title bars.
- The graph or diagram displayed during procedure is that which is in the foreground after Cascade is selected.
- The order in which the windows are cascaded depends on the types of graphs and diagrams being displayed.

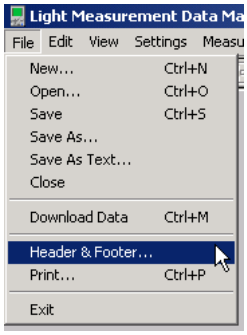
Tile View

- The sub windows within the Light Measurement Data Management Software window are resized and arranged so that most of their frames are visible.
- The graph or diagram displayed during procedure is that which is in the foreground after Tile is selected.
- The order in which the windows are tiled depends on the types of graphs and diagrams being displayed.

5.1 Entering a Header and Footer

Procedure

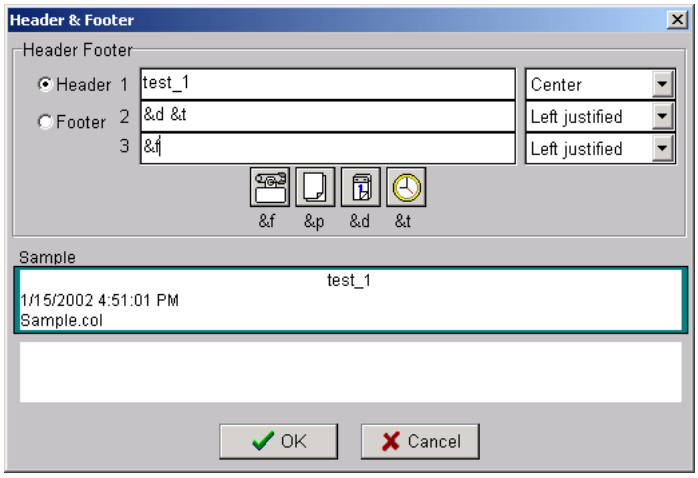
1. Choose **File** > **Header & Footer**. The Header & Footer dialog box is displayed.



Entering a Header

2. Select the **Header** option.
3. Type headers in boxes **1, 2, and 3**, or click the File Name, Page Number, Print Date, or Print Time buttons to have the corresponding information automatically included in the header.
4. Select Left justification, Right justification, or Center for each header from the list to the right of its box.

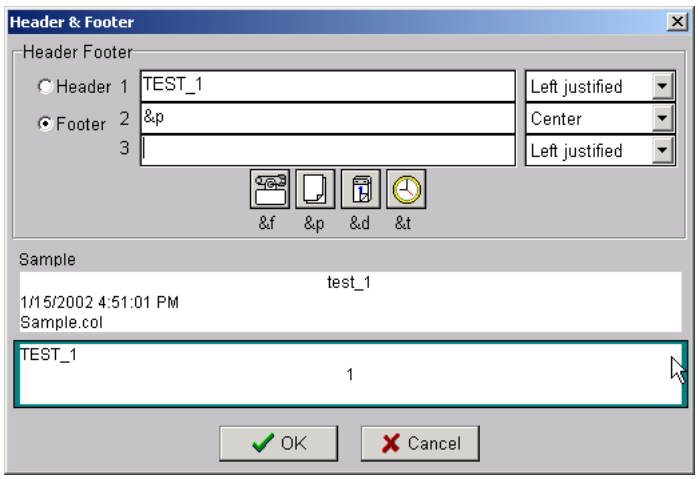
   The Sample box displays a sample header based on your selections.



Entering a Footer

5. Select the **Footer** option.
6. Same as steps 3 and 4.

   The Sample box displays a sample footer based on your selections.



7. Click **OK**.

Further Details

You can specify headers and footers to be used when printing the measurement data table, chromaticity diagram, deviation diagram, trend graph, or surface distribution.

Header/Footer Character Strings

- A maximum of 200 characters can be entered in each box.
- The information in the boxes is printed in order by box number.
- Click  ,  ,  , or  to display a code in the box. When printing, the following information is printed according to the codes you include.
- &f: directory and file name
- &p: page number during printing
- &d: date of printing
- &t: time of printing (based on the PC's internal clock)

Header/Footer Justification

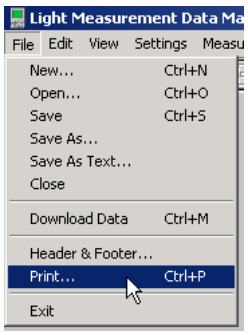
You can select Left justification, Right justification, or Center in the lists to the right of each header/footer box.

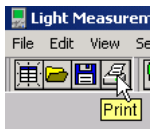
5.2 Printing

Procedure

Create a new file, read in data from the MDT 3298, or open a saved measurement data file. Various graphs and diagrams are displayed on the screen. Perform the following steps.

1. Select **File** > **Print**, or click the Print button on the toolbar. The Print dialog box is displayed.

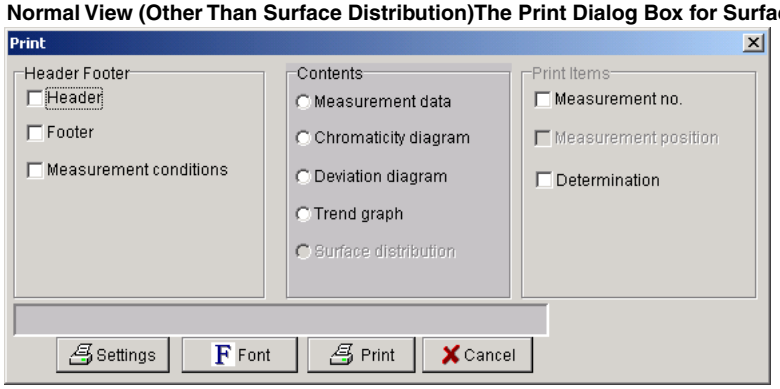




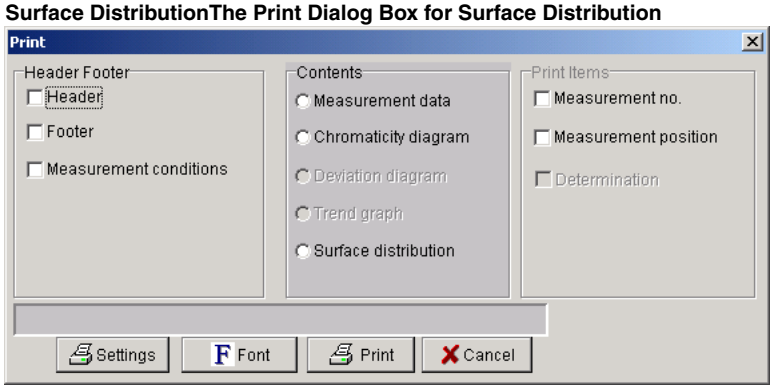
Selecting the Items to Be Printed

2. Select items to be printed in the **Header**, **Footer** group of the Print dialog box.
3. Select the **print contents**.
   Depending on the contents you select, the message, “Print Width Exceeded” may appear. This message indicates that the width of the items you selected is greater than the width of the paper you are using. Follow the procedures below in “Selecting Printer Settings” or “Selecting a Font” to ensure that the print contents (graphs and diagrams) match the printing width.
4. Select the desired Print Items.

Normal View (Other Than Surface Distribution)The Print Dialog Box for Surface Distribution

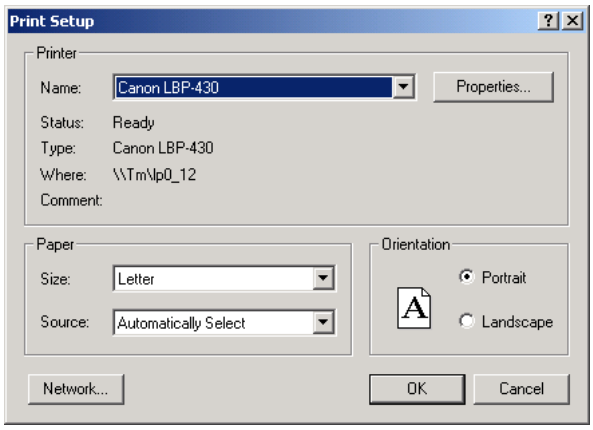


Surface DistributionThe Print Dialog Box for Surface Distribution



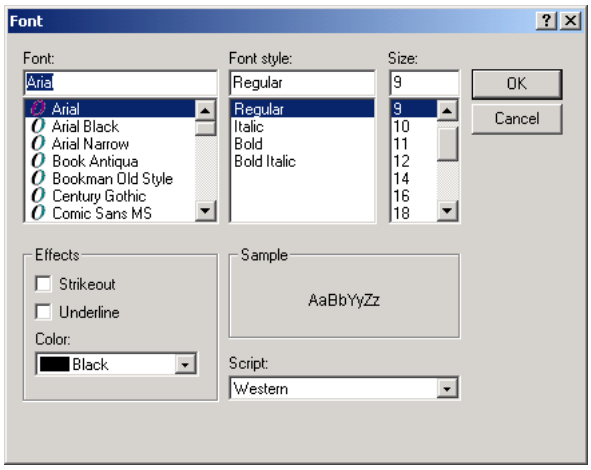
Selecting Printer Settings

5. Click **Settings** in the Print dialog box. The Print Settings dialog box is displayed.
6. Select the printer name, paper size, and orientation, and click Properties if necessary to specify printer properties.



Selecting a Font

7. Click **Font** in the Print dialog box. The Font dialog box is displayed.
8. Select a font name, style, size, and underline style if necessary.



Printing

9. Click **Print** in the Print dialog box. Printing is executed.

Further Details

When you create a new file, read in data from the MDT 3298, or open a saved measurement data file, the data is displayed on the screen in various formats. These graphs and diagrams can be printed.

Printable Items

The items below can be selected for printing. Depending on the contents you select, the message, "Print Width Exceeded" may appear. This message indicates that the width of the items you selected is greater than the width of the paper you are using. Follow the procedures below in "Selecting Printer Settings" or "Selecting a Font" to ensure that the print contents (graphs and diagrams) match the printing width.

- **Header**
  The header specified by following the steps in section 5.1.
- **Footer**
  The footer specified by following the steps in section 5.1.
- **Measurement Conditions**
  - The information you entered in the Header, Created by, Created on, and Comments fields when following the steps in section 2.2.
  - The light source selected by following the steps in section 2.4.
  - The name of the chromaticity reference specified by following the steps in section 2.5.
- **Measurement Data**
  Measurement Data Table
  When in a normal view (one other than that when displaying a surface distribution), you can print the measurement data table on A4 size paper.
  - Select Landscape for the paper orientation.
  - Select a font size of 4.
- **Chromaticity Diagram**
  Chromaticity Diagram. If you zoom an item before printing it (see section 4.2), a zoomed chromaticity diagram is printed.
- **Deviation Diagram**
  Deviation Diagram. This can only be printed when in a normal view.
- **Trend Graph**
  Trend Graph. This can only be printed when in a normal view.
- **Surface Distribution**
  Surface Distribution Diagram. This can only be printed when in a surface distribution view.
- **Measurement Number**
  When printing items in a measurement data table, you can select whether or not to print the measurement numbers.
- **Measurement Location**
  When printing a surface distribution measurement data table, you can select whether or not to print the measurement locations.
- **Determination**
  When printing a measurement data table in normal view, you can select whether or not to print the determination.

Printer

Select the destination printer, orientation, and paper size, and click Properties if necessary to specify printer properties. Enter settings as called for by the settings dialog boxes of the PC to which the printer is connected.

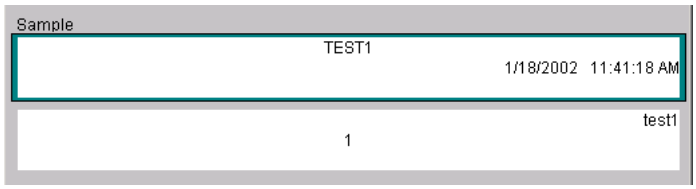
Font

Select a font name, style, size, and underline style if necessary. Enter settings as called for by the font dialog box of the PC which you are using.

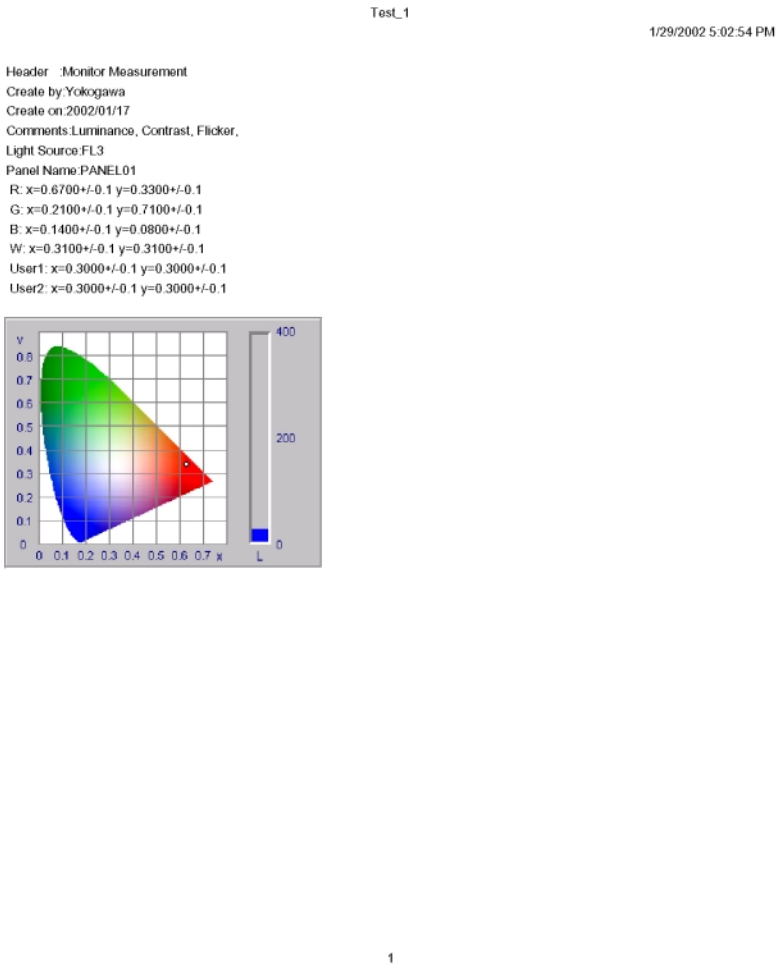
A Printing Example

The following is an example of header/footer and chromaticity diagram output.

- **Example of a Header/Footer (See Section 5.1)**



- **Example of a Printed Chromaticity Diagram**

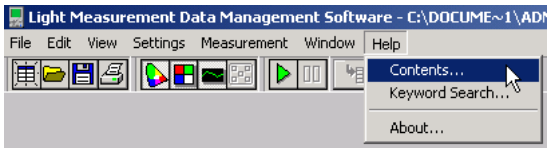


6.1 Using the Help Function

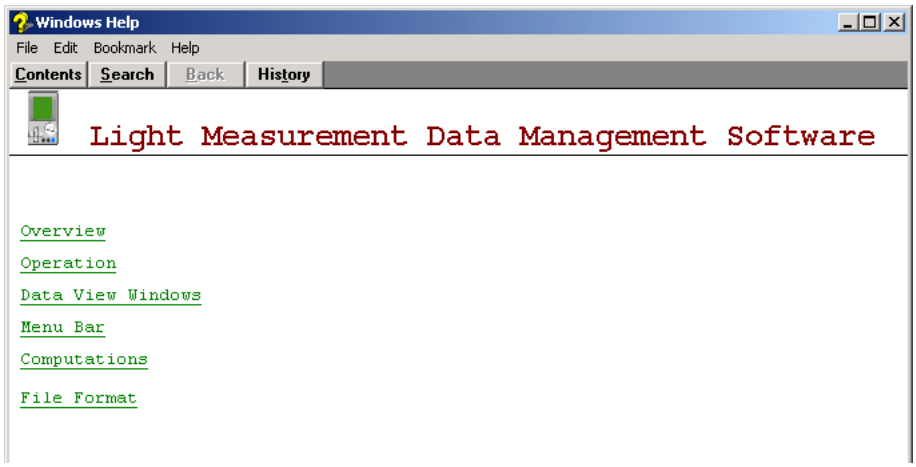
Procedure

Using the Help Contents

1. Choose **Help** > **Contents**. The Light Measurement Data Management Software help dialog box is displayed.

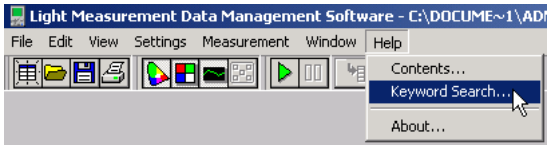


2. Select links to browse for the desired information.

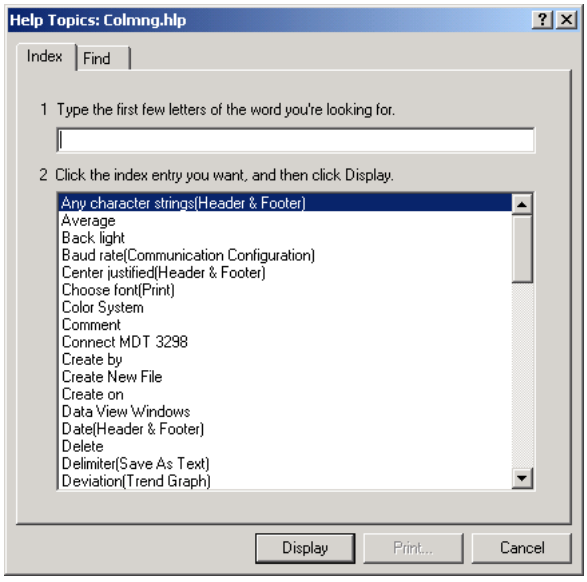


Using Keyword Search

1. Choose **Help** > **Keyword Search**. The Keyword Search dialog box is displayed.



2. Enter or select a keyword to find specific information.



Further Details

During operation, you can search for helpful information about this software's operating procedures and display that information on screen.

Using the Help Contents

- You can search for operating procedures and terminology by selecting index items that match the procedural flow of the item you are searching for.
- By pressing the Search button you can call up a keyword search.

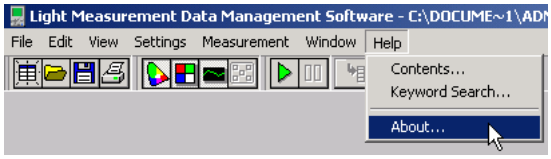
Keyword Search

- You can search for operational procedures or terminology using a keyword.
- Type the keyword into the search box, or select one from the list.

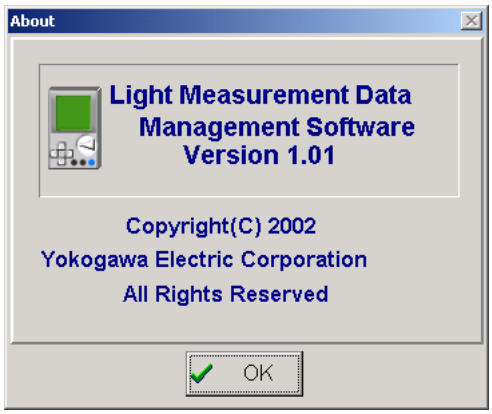
6.2 Viewing Version Information

Procedure

Choose **Help** > **About**. The About dialog box is displayed.



About Dialog Box



Further Details

The current version number and other information is displayed.

Specifications

Software

This software can display measurement data from the MDT 3298 in various kinds of graphs and diagrams, and save and load that data to and from files.
The name of the executable file is COLMNG.EXE.

Function

Setting Measurement and Display Conditions

- **Color System**
  Select xyL or u'v'L.
- **Measurement and Display Order**
  Select the order for luminance, contrast, flicker, and chromaticity.
- **Default Windows**
  Select Measurement data view (always active), Trend graph, Chromaticity diagram, Deviation diagram, or Surface distribution.
- **Light Source**
  Select Type A, FL3, or CRT.
- **Chromaticity Reference**
  - Reference Coordinates: Enter reference coordinates for the chromaticity diagrams of each reference color (R(red), G(green), B(blue), W(white), User1, and User2).
  - Display Range for the Deviation Diagram: Enter the display range for the graph that shows the deviation from the reference color's reference coordinates.
  - Chromaticity Correction Coefficient: Click to calculate the chromaticity correction coefficient from the chromaticity and luminance reference values and the chromaticity and luminance of representative measurement data. The MDT 3298 calculates chromaticity and luminance by applying this chromaticity correction coefficient to the actual measured tristimulus values.
- **Measurement Mode**
  Select Continuous or Single. For continuous measurement, you can also select an interval.
- **Surface Distribution Settings**
  - Number of Measurement Points: Select 4, 5, 9, or 13. You can change the measurement location.
  - Measurement Order: Enter the order.
- **Device Settings**
  Enter backlight, averaging, and measuring range settings for the MDT 3298.
- **Saving and Loading Setup Data**
  - Save settings to or load settings from the PC's storage medium.
  - Transmit the light source correction coefficient, chromaticity reference, and MDT 3298 settings to and from the MDT 3298.

Saving and Loading Measurement Data

- Read in measurement data while being acquired by the MDT 3298.
- Load data stored in the MDT 3298's memory.
- Save and load data to and from the PC's storage medium or the MDT 3298.

Editing and Displaying Measurement Data

- **Measurement Data Table**
  Copy or delete measurement data to and from the clipboard.
- **Chromaticity Diagram**
  - Zoom in or zoom out.
  - Plot measurement data on the chromaticity diagram.
  - Plotting modes
    Select Refresh mode, Scatter mode, or Locus mode. Only Refresh mode is available for surface distribution.
  - Bar graph
    Display a bar graph of the luminance of the reference color.
  - Bar graph scale
    Select 400, 4000, or 40000 cd/m^2.
- **Deviation Diagram**
  - Display the statistical calculation and determination of luminance.
  - Plotting modes
    Select Refresh mode, Scatter mode, or Locus mode. Only Refresh mode is available for surface distribution.
- **Trend Graph**
  - Display the measurement data for luminance, flicker, and chromaticity in a line graph broken down by measurement order.
  - Luminance scale
    Select 400, 4000, or 40000 cd/m^2.
  - Flicker scale
    Select 5, 10, 15, or 20%.

Print

- Print the measurement data table, chromaticity diagram, deviation diagram, trend graph, or surface distribution diagram.
- You can also specify a header and footer, and select whether to print the measurement conditions, measurement numbers, measurement locations, and determinations.

System Requirements

Hardware

- **CPU**
  A personal computer with a Pentium 133 MHz or faster CPU.
- **Memory**
  32 MB or more.
- **Hard Disk**
  A hard disk with 5 MB or more of available space.
- **Serial Communications Port**
  A serial port complying with the EIA-574 (for 9–pin RS-232 connectors) or EIA-232 (RS-232) standard.
- **Disk Drive**
  A CD-ROM drive. This drive is used to install the software.
- **Display**
  A display compatible with your operating system. An analog RGB monitor capable of displaying 65,536 colors or more recommended.
- **Mouse or Pointing Device**
  A mouse or pointing device compatible with your operating system.
- **Printer**
  A printer and printer driver compatible with your operating system. A printer driver compatible with your operating system.

OS

Microsoft Windows 98, Windows NT 4.0 Workstation, or Windows 2000 Professional.

Multimedia Display Tester (Model 3298)

A device operating under firmware (ROM) version 1.05 or later.

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