

# **BVM\_AutoWhiteBalance**

## **Operation Manual**

# Table of Contents

<b>1. INTRODUCTION</b>	<b>5</b>
<b>2. MAIN SCREEN</b>	<b>8</b>
<b>3. MONITOR SELECTION</b>	<b>9</b>
3.1. Setting up the network adapter	9
3.2. Selecting the monitor to be adjusted	10
3.2.1. Selecting from monitor list (Recommended)	10
3.2.2. Selecting from Monitor ID	11
3.2.3. Peer-to-peer connection	12
3.2.4. Connection with the monitor	12
<b>4. PROBE SETTING</b>	<b>15</b>
4.1. Selection of Probes	15
4.2. Calibration of Probes	16
<b>5. COLOR TEMPERATURE MEASUREMENT</b>	<b>18</b>
5.1. Before measuring	18
5.2. Measuring color temperature and luminance	18
5.3. Copy of target value	19
<b>6. AUTOMATIC COLOR TEMPERATURE ADJUSTMENT OF MONITOR</b>	<b>20</b>
6.1. Outline	20
6.2. Operation Procedure	20
6.2.1. Connecting this tool and a monitor with network	20
6.2.2. Setting a probe	20
6.2.3. Setting the color temperature and luminance values to the adjusting target	20

6.2.4. Setting probe to the adjusting target.....	21
6.2.5. Start adjustment.....	21
6.3. Adjustment in progress .....	22
6.4. Adjustment completion .....	22
6.5. Calibration of monitor's internal luminance sensor .....	23
<b>7. ERROR MESSAGES .....</b>	<b>24</b>
7.1. Probe disconnection.....	24
7.1.1. Message .....	24
7.1.2. Troubleshooting.....	24
7.1.3. Remarks.....	24
7.2. Calibration error .....	24
7.2.1. Message .....	24
7.2.2. Troubleshooting.....	25
7.2.3. Remarks.....	25
7.3. Network disconnection.....	25
7.3.1. Message .....	25
7.3.2. Troubleshooting.....	25
7.3.3. Remarks.....	25
7.4. Monitor connection error.....	25
7.4.1. Message .....	25
7.4.2. Troubleshooting.....	25
7.4.3. Remarks.....	26
7.5. Probe value error.....	26
7.5.1. Messages.....	26
7.5.2. Troubleshooting.....	26
7.5.3. Remarks.....	26
7.6. Internal luminance sensor calibration error .....	26
7.6.1. Messages.....	26
7.6.2. Troubleshooting.....	27

7.6.3. Remarks.....	27
<b>7.7. Adjustment start error .....</b>	<b>27</b>
7.7.1. Messages.....	27
7.7.2. Troubleshooting.....	27
7.7.3. Remarks.....	27
<b>7.8. CA-210/CA-310 Not Connected.....</b>	<b>27</b>
7.8.1. Message .....	27
7.8.2. Troubleshooting.....	27
7.8.3. Remarks.....	28
<b>8. CAUTIONS.....</b>	<b>29</b>
8.1. Conditions where automatic color temperature adjustment cannot be executed.....	29
8.2. Unusable USB chipset .....	29
8.3. Automatic color temperature adjustment of Peer-to-Peer configured monitor .....	29
8.4. PC sleep mode .....	29
8.5. PC connection for PM5639/06 by DK-Technologies.....	30
<b>9. NOTE – CAUTION OF COLOR MATCHING BETWEEN DIFFERENT DISPLAY DEVICES – .....</b>	<b>31</b>

## 1. INTRODUCTION

This software tool (BVM\_AutoWhiteBalance) is a program for

- measuring/adjusting the color temperature and luminance of a monitor
- calibrating the monitor's internal luminance sensor (mounted in models "BVM-E170 and BVM-F170" only).

Compatible models are as follows:

- Monitors
  - BVM-E170(Firmware Version 1.1 or later)
  - BVM-E250(Firmware Version 1.1 or later)
  - BVM-F170(Firmware Version 1.1 or later)
  - BVM-F250(Firmware Version 1.1 or later)
- Probes
  - X-Rite                    i1 Pro
  - Konica Minolta        CA-210, CA-310, CS-200
  - DK-Technologies    PM5639/06

The system requirements are as follows:

- OS
  - Microsoft Windows XP SP3 or its later Professional Edition
  - Microsoft Windows Vista SP1 or its later Ultimate Edition and Business Edition
  - Microsoft Windows7 SP1 Professional Edition and Ultimate Edition
- PC
  - CPU : Intel Celeron 1GHz or better
  - Memory : 512MB or over(Windows XP), 1 GB or over (Window Vista, Windows 7)

- Display : 1024x768 or higher (Hi Color 16 bit or higher)
- USB Port : USB 2.0 or over
- HDD : Usable memory with 100MB or over
- Network
  - 10BASE-T/100BASE-TX
  - Connectable in the internet
- Middleware
  - .NET Framework 3.5 SP1  
(Can be downloaded from Microsoft Corporation website.)

※Note

The BVM\_AutoWhiteBalance may not work with some computers and OS even though they satisfy the above requirements.

Names of the following items in this manual may be shortened as follows:

Microsoft Windows XP Professional is mentioned as Windows XP.

Microsoft Windows Vista Ultimate, Microsoft Windows Vista Business are mentioned as Windows Vista.

Microsoft Windows 7 Professional, Microsoft Windows 7 Business are mentioned as Windows 7.

It is necessary to install the specified driver or software when using the probes below.

- i1 Pro
  - Application software supplied with X-Rite i1 Pro or device driver for i1 Pro
- CA-210 or CA-310
  - CA-SDK provided by Konica Minolta
  - Device driver for CA-210 and CA-310
- CS-200
  - Device driver for CS-200 provided by Konica Minolta

A monitor and PC should be connected according to the three types of methods below.

- Wireless LAN
- Wired LAN
- Peer to Peer

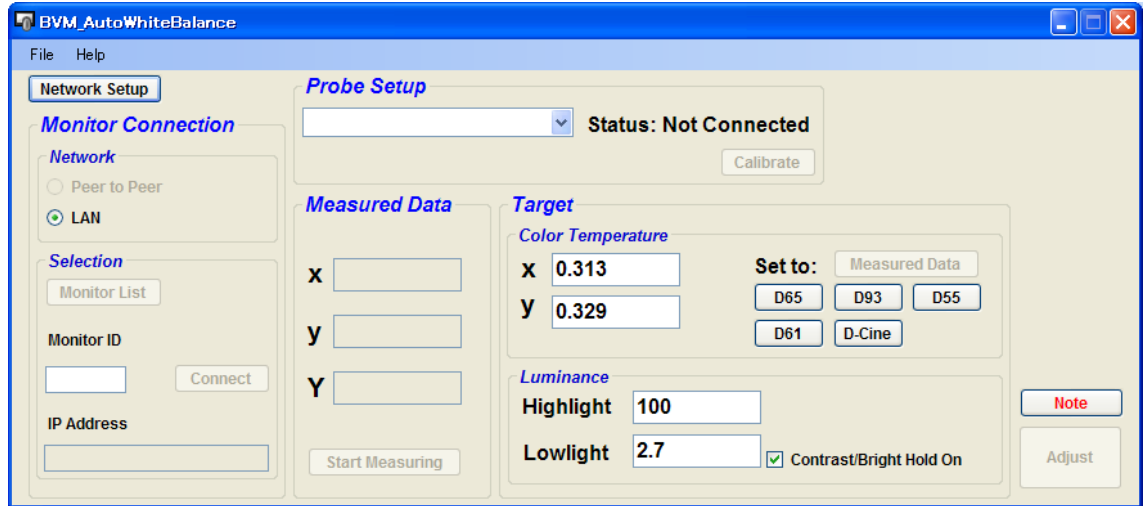
Please refer to monitor's operation manual "Setting for the LAN to Connect the Multiple Units" for further details before connecting the monitor to a PC

※NOTE:

- The authority of a Windows administrator is required for installing this software tool. Log on using an administrator account.
- Depending on your operating environment, a Windows fire wall or antivirus software settings may be required to be modified during installation. When the warning message of a Windows fire wall appears, select "Unblock" according to the message, or set "BVM\_AutoWhiteBalance" as an exception using the Windows fire wall in the control panel. Take proper measures according to the relevant manual when using antivirus software.
- The described product name, system name, and company name are trademarks or registered trademarks of each company.

## 2. MAIN SCREEN

The main screen below appears when you start the program.



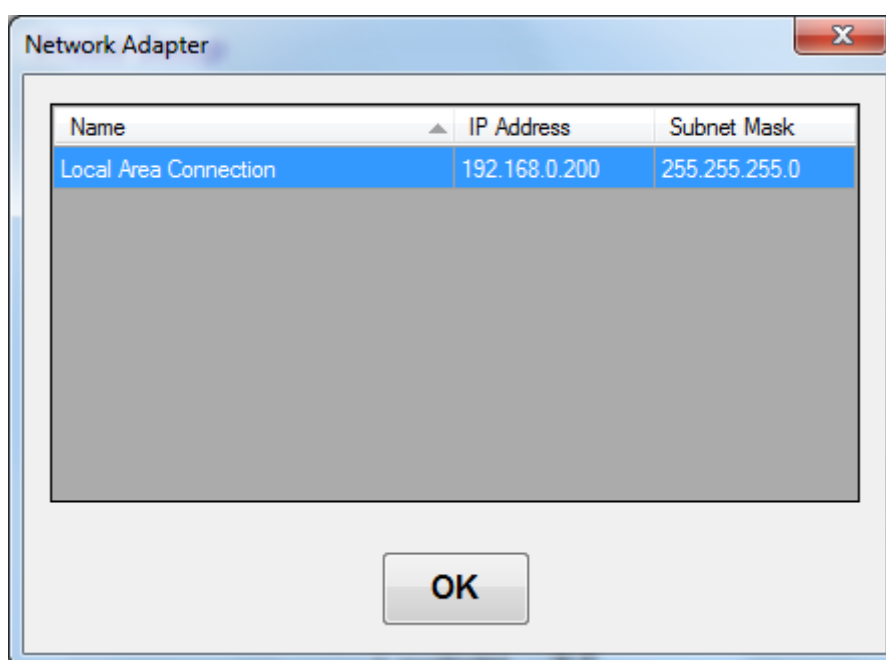


### 3. MONITOR SELECTION

#### 3.1. Setting up the network adapter

PC network environment varies by wired LAN, wireless LAN, or a network used in a subsystem, etc.. Select the proper network adapter for your PC connection to the monitor.

The screen below appears when you click the “Network Setup” button.\*



\*Note: Network adapter appearance above varies depending on your PC network environment.

Select the network adapter to which the monitor is connected. This software tool will detect all the monitors from the selected network.

All the monitors belonging to the network selected here will be detected.

※NOTE:

The network adapters displayed on this screen are the ones that shows the IP address and subnet mask when using “ipconfig/all” command prompt. Check the network configurations on your PC when the network adapter that you want to use is not displayed.

※NOTE:

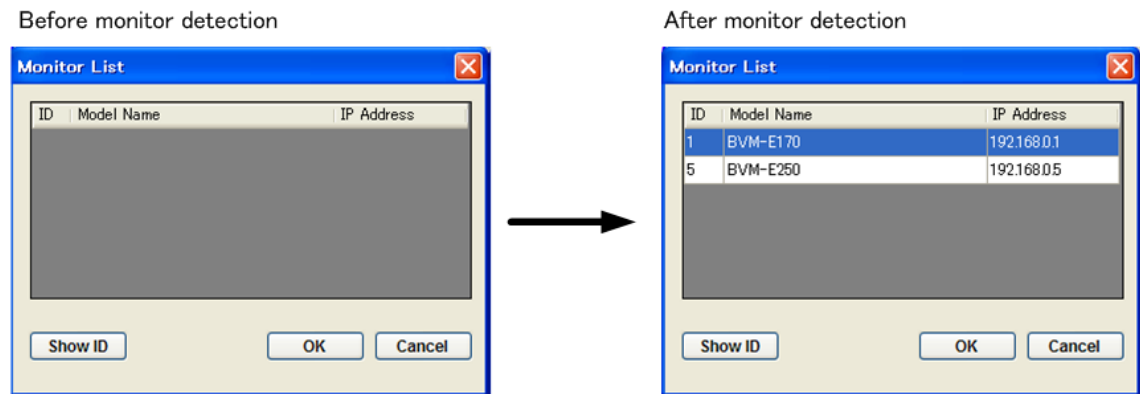
The network adapter will be invalidated if you change the IP address or subnet mask .

Configure the network adapter again.

### 3.2. Selecting the monitor to be adjusted

#### 3.2.1. Selecting from monitor list (Recommended)

After the network adapter is set, this software tool will automatically start detecting all the monitors that can be connected from the current network setting. Also, the “Monitor list” button will be enabled after the network adapter is set. The Monitor List screen below will appear when you click this button.



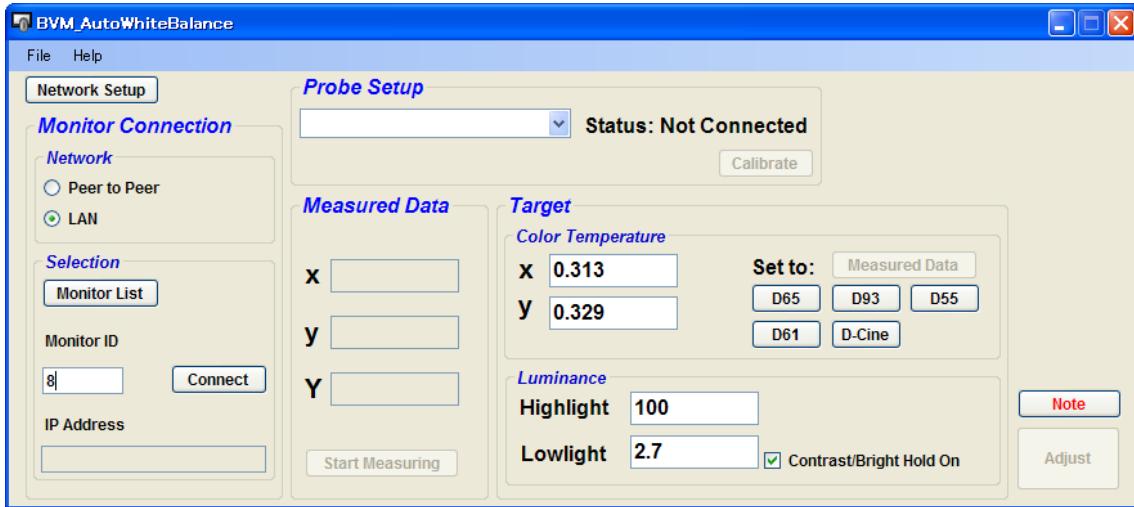
When you open the Monitor List, it will show all the monitors that has been detected. The monitors can be sorted according to the ID numbers.

When a new monitor is detected, it will be added in the detected order.

The monitors are identifiable by clicking the “Show ID” button. The Monitor IDs will appear on each screen of the monitors.

The connection with the monitor is established by selecting the target monitor from the Monitor List and clicking the “OK” button.

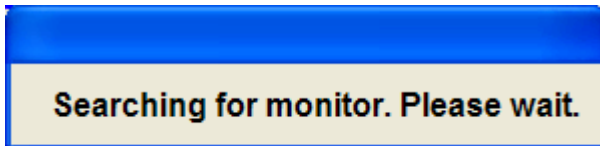
### 3.2.2. Selecting from Monitor ID



Monitor can be connected from a Monitor ID when LAN radio button is selected and network adapter is set properly.

The “Connect” button is enabled when valid number (1 to 99) is set to the Monitor ID. After clicking the “Connect” button, the software tool will start searching the monitor.

The following message appears when searching.

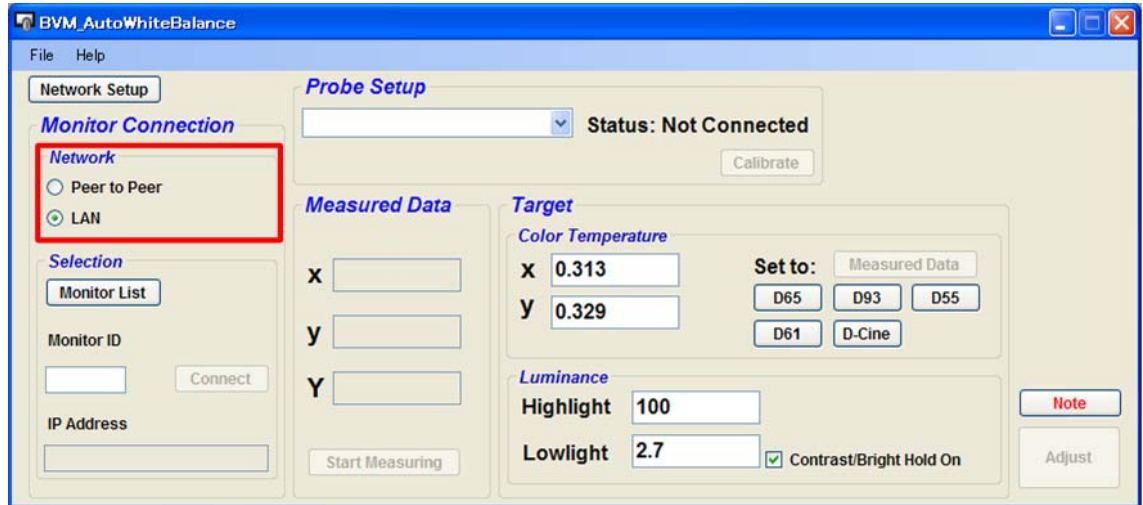


A connection is attempted when the target Monitor ID is found.

※NOTE:

When the same Monitor ID is found in the same network, the connection is established with the monitor that was detected first. To avoid confusion, set a unique Monitor ID for each monitors in the same network.

### 3.2.3. Peer-to-peer connection



Peer-to-peer connection can be selected as shown in the figure above when the selected network adapter satisfies the conditions below.

- IP address is [192.168.0.X]. (X is 2 to 254.)
- Subnet Mask is 255.255.255.0.

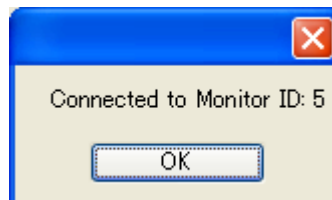
Peer-to-peer connection is attempted when the “Peer to Peer” radio button is selected in the Network setting.

※NOTE:

When peer-to-peer connection fails, select LAN radio button once and re-select peer-to-peer radio button again for retrieval.

### 3.2.4. Connection with the monitor

The following pop-up message appears when connection with the monitor is established.

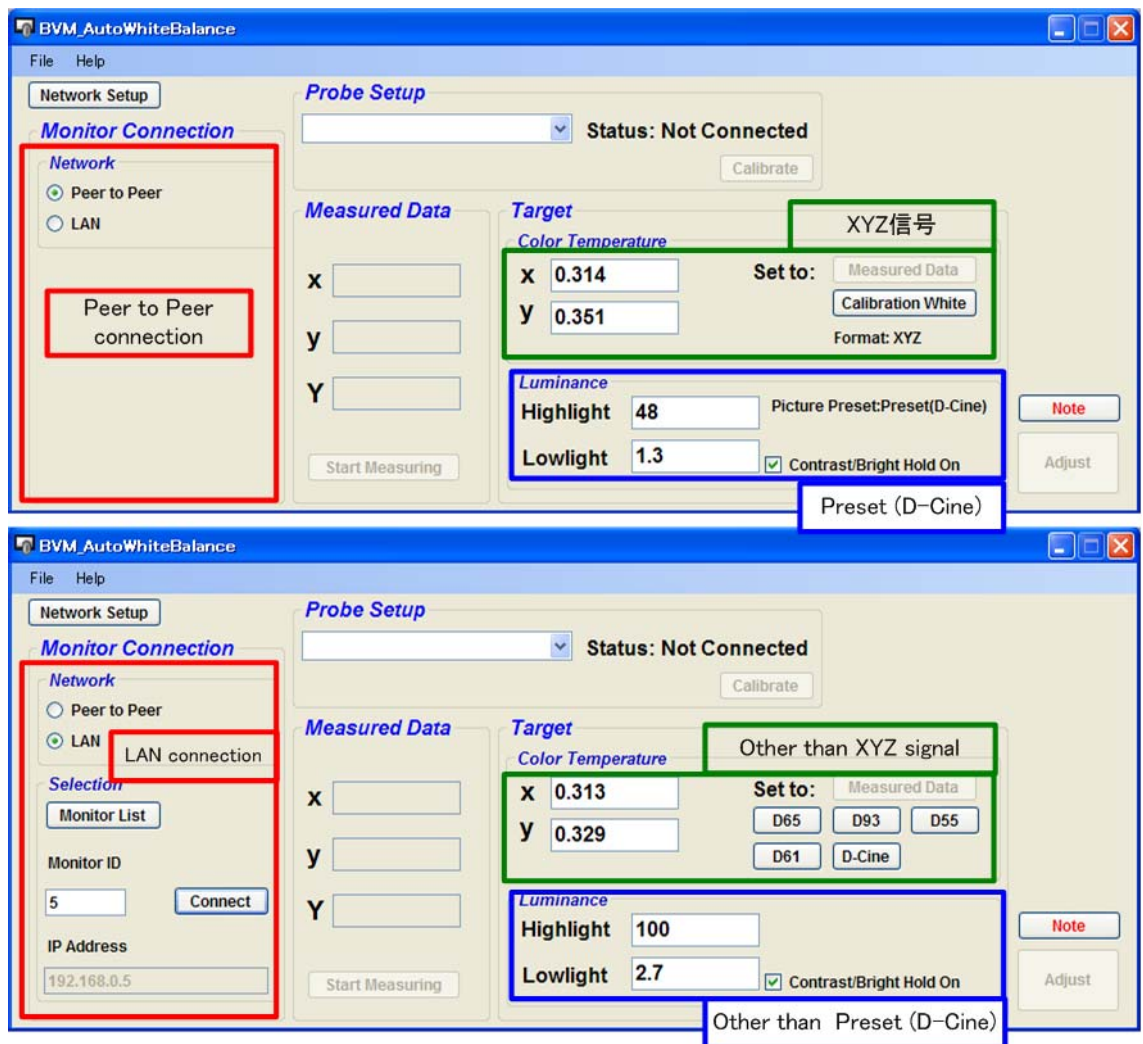


The message in the pop-up is as follows:

- For LAN connection [when monitor ID is X]

- Connected to Monitor ID: X
- For peer-to-peer connection
  - Connected to Monitor: Peer to Peer

The main screen is updated as shown below according to Network connection method and the configuration of the connected monitor.



The “Adjust” button is enabled when the configuration of probe is completed. The color temperature can be automatically adjusted.

### 3.2.4.1. Difference by connection method

The red frame in the figure above will differ by connection method.

As for peer-to-peer connection, “Selection” of “Monitor Connection” will not appear. As for LAN connection, the IP address of the connected monitor is displayed.

#### **3.2.4.2. Difference by input signal or input signal setting**

The green frame in the figure above will differ by input signal or input signal settings.

When the configuration of the connected monitor is set to XYZ input, the target of the chromaticity will be set to  $x = 0.314$ ,  $y = 0.351$ . "Measured Data" and "Calibration White" is selectable for target color temperature, and "Format: XYZ" will be displayed in order to notify the monitor's configuration.

When the configuration of the connected monitor is set to other than XYZ input, the target of the chromaticity will be set to  $x = 0.313$ ,  $y = 0.329$ . "Measured Data", "D65", "D93", "D55", "D61" and "D-Cine" is selectable for target color temperature.

#### **3.2.4.3. Difference by Picture Preset setting**

The blue frame in the figure above will differ by Picture Preset..

When Picture Preset in the Channel Configuration menu is set to Preset(D-Cine), the target of the highlight and lowlight will be set to "48" and "1.3" respectively, and "Picture Preset(D-Cine)" will be displayed in order to notify the monitor's configuration.

When Picture Preset in the Channel Configuration menu is set to other than "Preset(D-Cine)", the target of the highlight and lowlight will be set to "100" and "2.7" respectively.

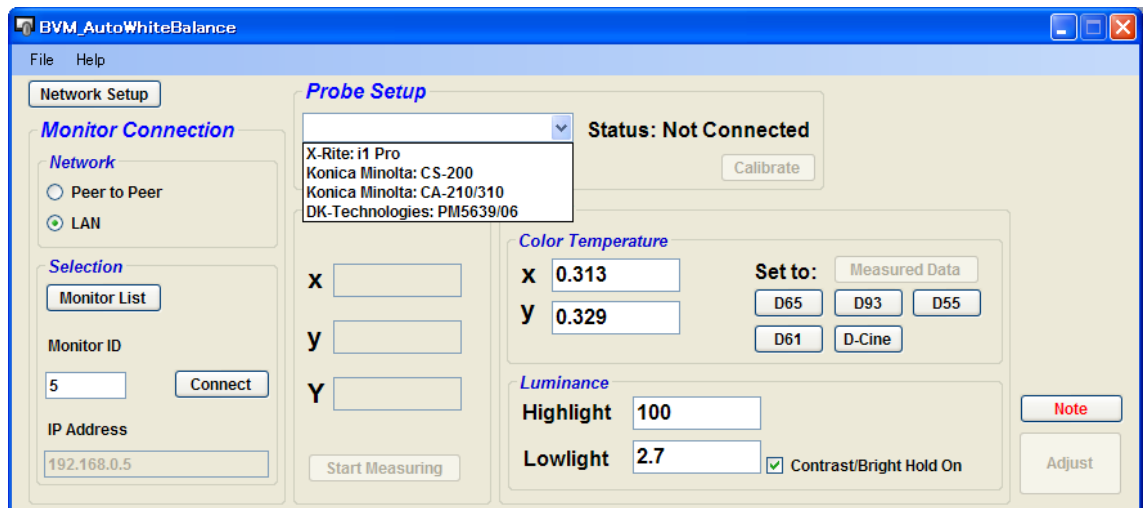
## 4. Probe Setting

Probes that can be used are shown in the table below.

Software version	Usable probe
Ver1.0.0.0	i1 Pro, CA-210, CA-310, CS-200, and PM5639

Perform 4.1 Probe selection and 4.2 Probe calibration before using the probe in order to adjust the color temperature automatically or measure the color temperature.

### 4.1. Selection of Probes

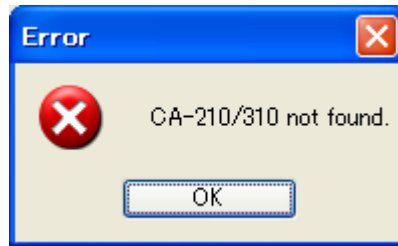


As shown in the figure above, the selectable probes appear as a list.

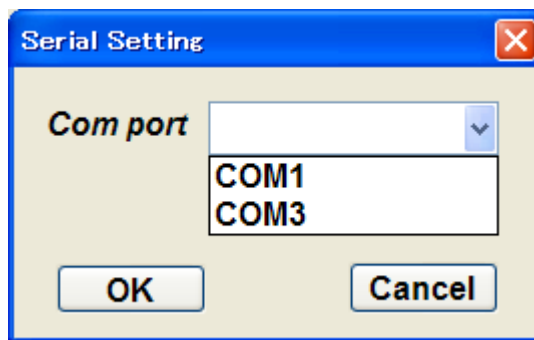
Select the probe from this list.

※NOTE:

- ① Before selecting CA-210/CA-310 from the list, connection between PC and probe should be established through USB interface. Warning message below appears when CA-210/CA-310 is selected without the establishment of a connection.

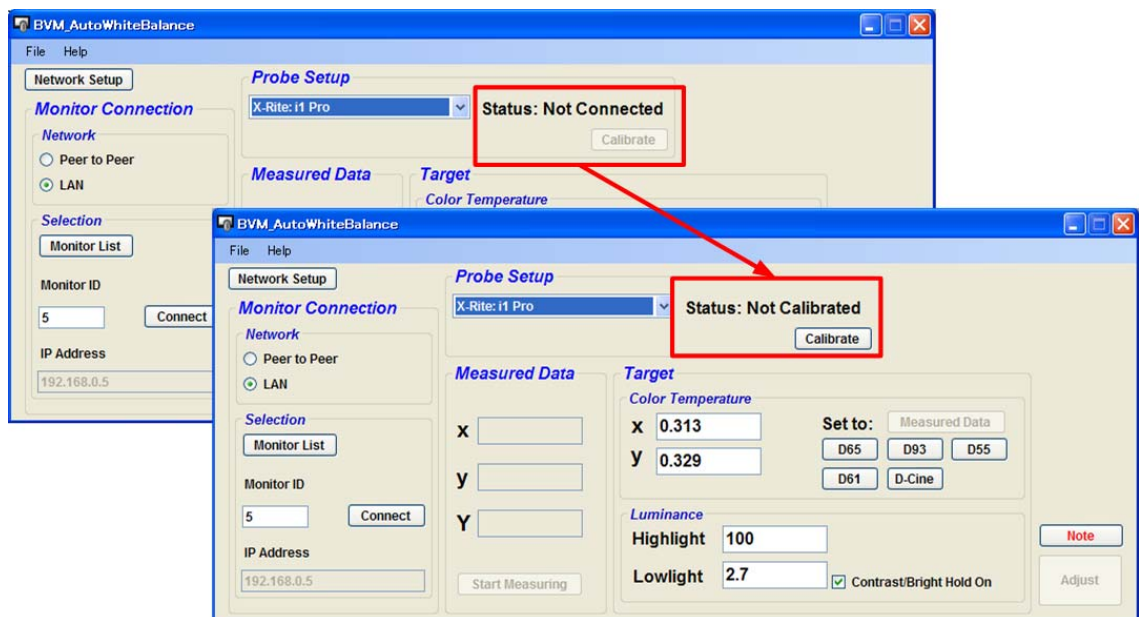


- ② When selecting PM5639, connection between PC and probe needs to be established through COM port interface. When PM5639 is selected, the following window will appear. Select the serial port to which PM5639 is connected.



When an error message that CA-210/CA-310 is not connected appears or when the proper COM port is not selected on “Serial Setting” window of PM5639, the state goes back to the starting point “Probe not connected”.

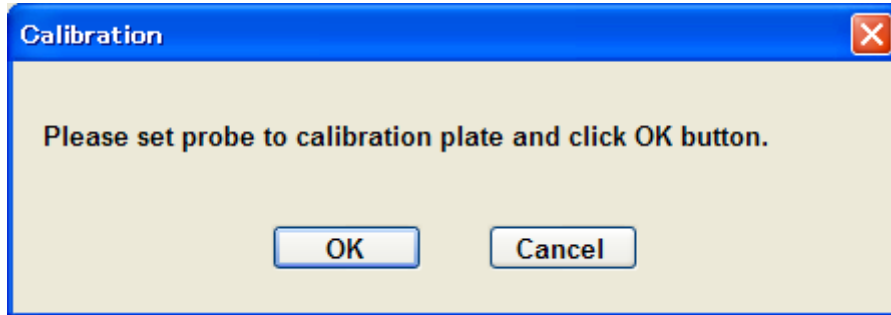
#### 4.2. Calibration of Probes





When the PC recognizes the connection of the probe after a probe is selected, “Calibrate” button, becomes enabled as shown in the red frame of the figure above.

When you click the “Calibrate” button, a message that prompts you to make preparation appears when calibration is required.



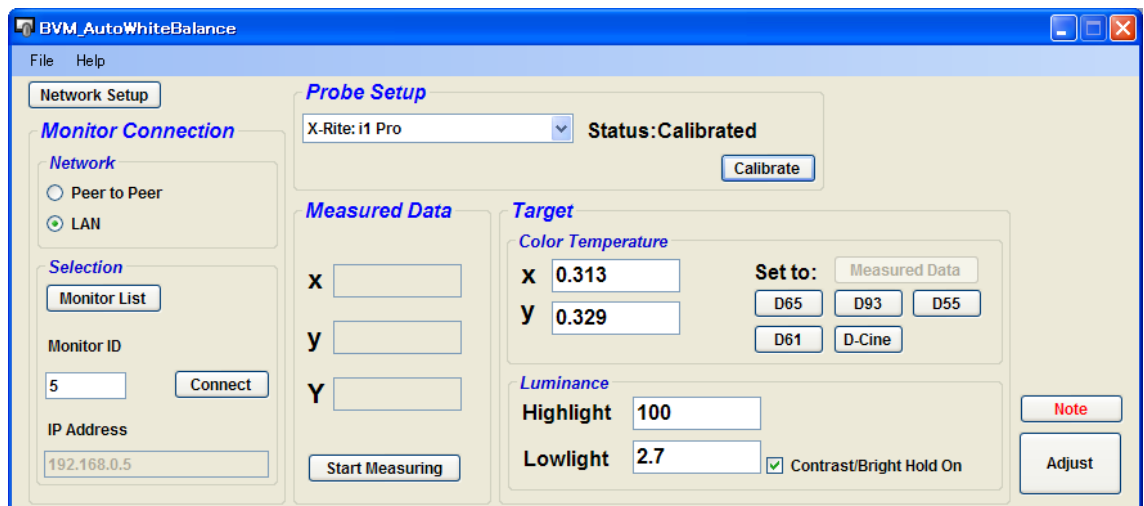
The probes for which the message above appears are the followings:

- i1 Pro
- CA-210, CA-310

Make necessary preparation according to the prompt message.

When calibration succeeds, the “Status” becomes “Calibrated” like the figure below. This enables the measurement of color temperature.

The “Adjust” button is also enabled if network configuration is completed. The color temperature can then be automatically adjusted.



## 5. Color Temperature Measurement

Color temperature can be measured using this tool.

### 5.1. Before measuring

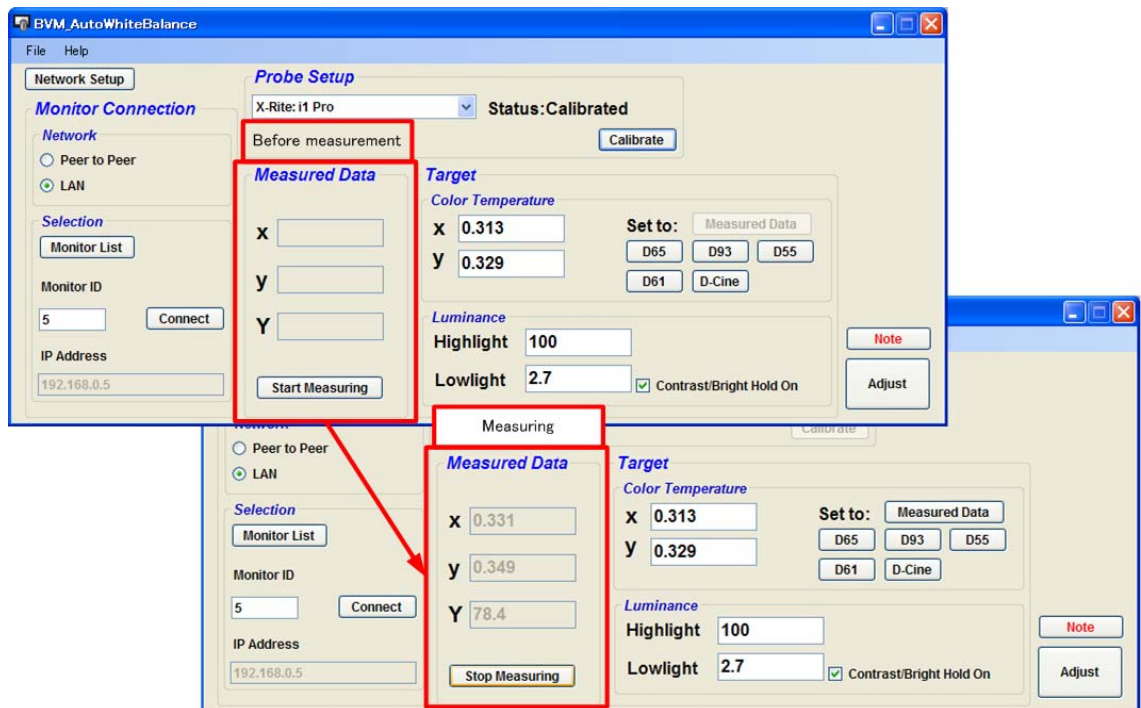
Execute “4. Probe Setting” procedure.

Color temperature can be measured ([Start Measuring] is enabled) when the setting of a probe is completed.

### 5.2. Measuring color temperature and luminance

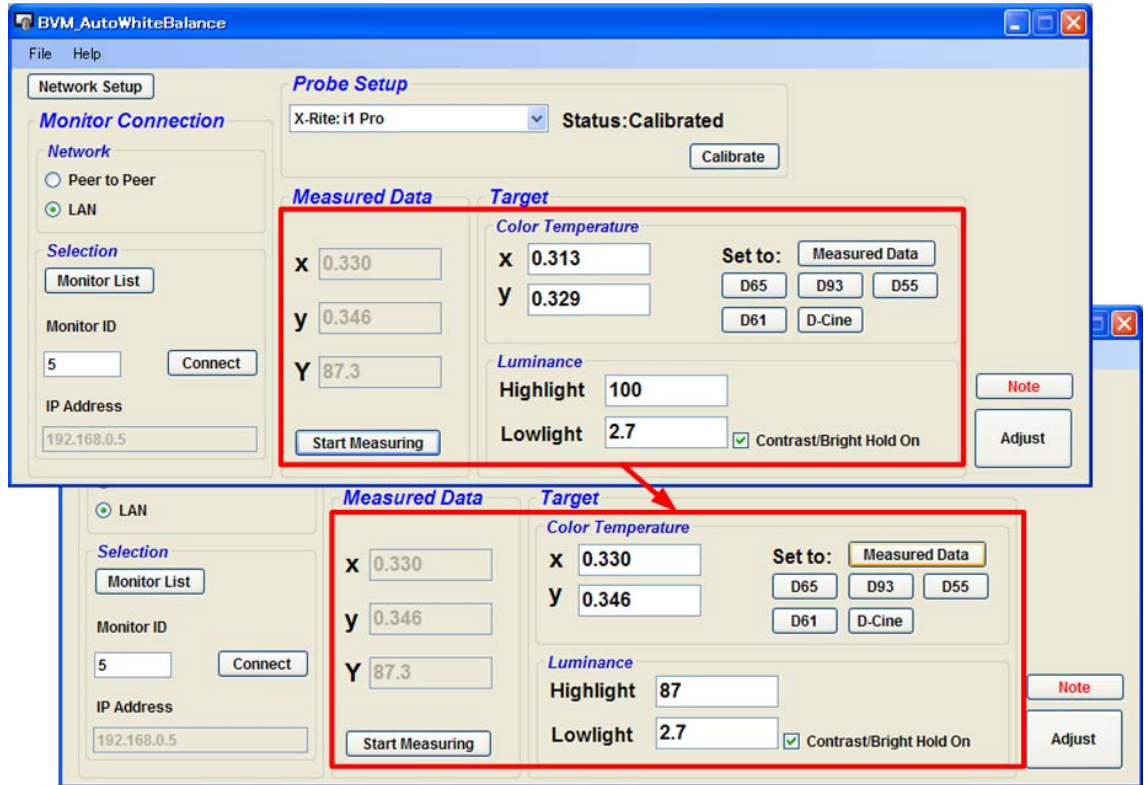
The software tool will start measuring color temperature is when [Start Measuring] button is clicked.

During the measurement, the measured values are constantly updated from the selected probe. Therefore, the interval of color temperature measurement depends on the performance of the selected probe. During color temperature measurement, [Start Measuring] button will change to [Stop Measuring]. The measuring of color temperature will stop when you click the [Stop Measuring] button.



### 5.3. Copy of target value

The measured values can be set as target values by clicking the [Measured Data] button when the measured values are in the text box.



For chromaticity xy, the measured values will be directly copied. For luminance Y, the measured value will be copied to the target value of Highlight rounded to the nearest whole number.

## 6. Automatic color temperature adjustment of monitor

This software tool can adjust the color temperature and luminance of the BVM-E and BVM-F series.

### 6.1. Outline

Adjust the color temperature and luminance according to the following procedures after opening this software tool.

- ① Connect this software tool and the monitor through network.
- ② Set up the probe.
- ③ Set the color temperature and luminance values to the adjusting target.
- ④ Set the probe to a proper condition where color temperature of the monitor can be adjusted.
- ⑤ Start adjusting

### 6.2. Operation Procedure

#### 6.2.1. Connecting this tool and a monitor with network

Refer to "3.MONITOR SELECTION"

#### 6.2.2. Setting a probe

Refer to "4.Probe Setting"

#### 6.2.3. Setting the color temperature and luminance values to the adjusting target

The target of color temperature can be set.

The applicable range of target values that can be set are as follows:

- When an input signal is other than XYZ signal;
  - Chromaticity x : 0.265~0.350
  - Chromaticity y : 0.270~0.360
- When an input signal is an XYZ signal;
  - Chromaticity x : 0.300~0.350
  - Chromaticity y : 0.310~0.360
- Luminance Highlight

- Other than Preset (D-Cine) : 40~150
- Preset (D-Cine) : 20~72
- Luminance Lowlight
  - Other than Preset (D-Cine) : 0.5~9.9
  - Preset (D-Cine) : 0.3~4.8

There are three ways to set target values:

- Use of the default target value
  - By clicking the “Set to” button, the default values will be copied and used as the target.
- Use of the measured color temperature
  - The measured color temperature can be used as the target. Refer to "5.3. Copy of target value" for details.
- Direct entry
  - Values can be directly entered in the text box.

※NOTE:

Target values are not verified during entering of text. Therefore, values that are out of range can be entered but will be invalid.

※NOTE:

When the check box for “Contrast/Bright Hold On” has been selected, the Contrast and Bright values set before adjustment are carried over after adjustment is completed. Therefore, the values of Contrast/Bright before and after measurement differs in this case. This may cause significant difference in the color temperature from the target values when measuring the adjusted monitor.

#### **6.2.4. Setting probe to the adjusting target**

Set the probe to the monitor so that color temperature can be adjusted.

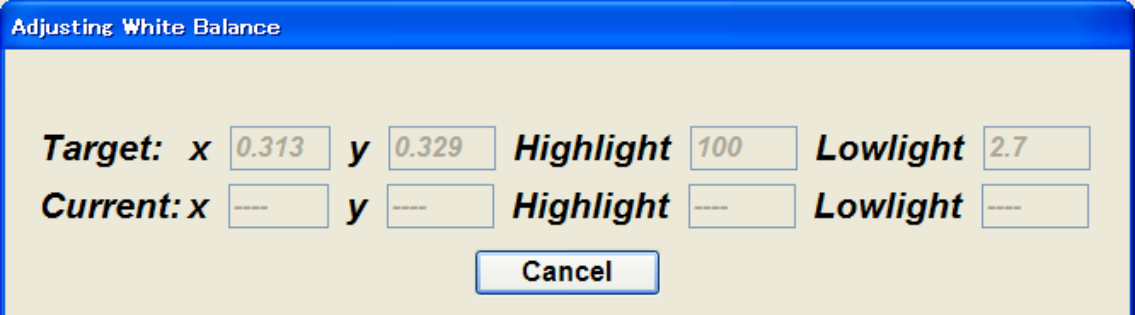
#### **6.2.5. Start adjustment**

Press the “Adjust” button.

Target values are verified after the “Adjust” button is pressed. Warning is displayed when the target values are out of range that can be set. Modify the target value according to the displayed warning.

### 6.3. Adjustment in progress

The following pop-up appears during adjustment.



The dialog box titled "Adjusting White Balance" has a blue header. It contains two rows of input fields. The first row is labeled "Target:" and includes four fields: "x" with value "0.313", "y" with value "0.329", "Highlight" with value "100", and "Lowlight" with value "2.7". The second row is labeled "Current:" and includes four empty fields: "x", "y", "Highlight", and "Lowlight". A "Cancel" button is centered at the bottom.

During adjustment, the measured color temperature of the monitor appears on “Current”.

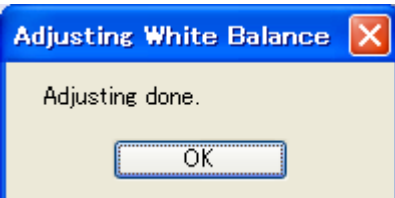
Only cancellation is accepted until adjustment is completed. When the “Cancel” button is clicked, the figure below appears and automatic adjustment will be cancelled.



The dialog box titled "Adjusting White Balance" has a blue header with a red close button. The main area contains the text "Adjusting cancelled." and an "OK" button at the bottom.

### 6.4. Adjustment completion

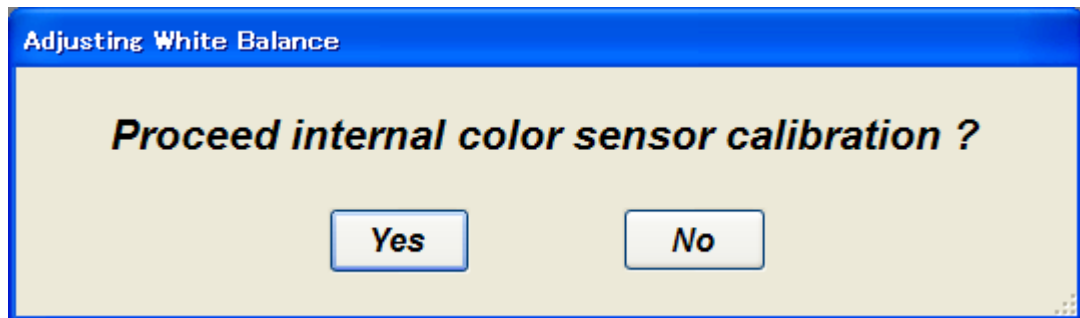
The figure below appears when automatic color temperature adjustment is completed.



The dialog box titled "Adjusting White Balance" has a blue header with a red close button. The main area contains the text "Adjusting done." and an "OK" button at the bottom.

### 6.5. Calibration of monitor's internal luminance sensor

After automatic color temperature adjustment is completed, the pop-up display below appears if an internal luminance sensor is installed in the monitor. Select whether or not to calibrate the internal luminance sensor.



The internal luminance sensor is calibrated when you click the "Yes" button. During calibration, only cancellation is accepted.

The pop-up of automatic color temperature adjustment disappears when you click "No" button or when calibration is completed.

## 7. Error Messages

Pop-up error message will appear under the following conditions:

- ① Probe disconnection
- ② Calibration error
- ③ Network disconnection
- ④ Monitor connection error
- ⑤ Probe value error
- ⑥ Internal color sensor calibration error
- ⑦ Adjustment start error
- ⑧ CA-210/CA-310 not connected

### 7.1. Probe disconnection

#### 7.1.1. Message

**Probe disconnected.**

#### 7.1.2. Troubleshooting

Communication has been lost with the probe during automatic color temperature adjustment.

Reconfirm the connection with the probe and start again from calibration.

#### 7.1.3. Remarks

This message appears during automatic color temperature adjustment. When communication is lost with the probe during color temperature measurement, the measurement is forced to stop and switches back to probe disconnected state.

When the probe is disconnected during calibration of the monitor's internal luminance sensor, this warning will appear as well and terminate the calibration.

### 7.2. Calibration error

#### 7.2.1. Message

**Calibration error.**



## 7.2.2. Troubleshooting

Calibration failed.

Reconfirm that the probe is in calibrating condition and start again the calibration.

## 7.2.3. Remarks

None in particular

## 7.3. Network disconnection

### 7.3.1. Message

**Network disconnected.**

### 7.3.2. Troubleshooting

This software tool and the monitor has lost connection through the network.

Start again from configuring the connection with the monitor.

### 7.3.3. Remarks

This error message appears during automatic color temperature adjustment or luminance sensor calibration.

This disconnection can also be recognized as the “Adjust” button will be disabled or an IP address will not be displayed.

## 7.4. Monitor connection error

### 7.4.1. Message

**Cannot find the monitor.**

### 7.4.2. Troubleshooting

The possible cause of this error is as follows:

- ① The monitor with the target Monitor ID does not exist in the configured network.
  - Check the target Monitor ID using Show ID.
- ② Connection process time-out
  - The target monitor could not be found during connection process.
    - Check the SDAP setting and see that the followings are set to default values.

(MENU > System Configuration > Network > Protocol Setting)

- The port number of SDAP should be 53862.
- SDAP should be permitted for broadcast.
- The issuing interval of SDAP should be 15 seconds.

③ Configuration of PC fire wall

- Confirm that this software tool is permitted to communication.

### 7.4.3. Remarks

There are several possible causes of this error. Determine the cause by the procedure below.

- ① Check the configuration of the fire wall.
- ② Check the Monitor ID either by using Show ID of this software tool or pressing the SINGLE button of BKM-16R for a few seconds.

## 7.5. Probe value error

### 7.5.1. Messages

**Invalid value error.**

**Please check the probe.**

### 7.5.2. Troubleshooting

The color temperature or luminance value acquired from the probe is out of the assumed range.

Check the following items when this error occurs.

- Check that the probe is properly set to the target monitor.
- Re-execute calibration.

### 7.5.3. Remarks

None in particular

## 7.6. Internal luminance sensor calibration error

### 7.6.1. Messages

- **Luminance sensor error:**            **Luminance sensor NG**
- **Temperature sensor error:**        **Temperature sensor NG**
- **Other errors:**                        **Return code NG**

## **7.6.2. Troubleshooting**

Check the operating environment when this error occurs.

Contact the service or sales representative if you cannot find any problem.

## **7.6.3. Remarks**

None in particular

## **7.7. Adjustment start error**

### **7.7.1. Messages**

**Monitor not ready.**

**Please check monitor status.**

### **7.7.2. Troubleshooting**

The possible cause of this error is as follows:

- When the configuration of the monitor was changed just before starting the adjustment.
  - This error occurs when an input signal or Picture Preset was changed just before starting the adjustment. Do not perform operation such as switching the channel, changing the configuration, or changing the input signal just before starting the adjustment.
- When the monitor is not accepting commands:
  - Power on the monitor when a monitor is in a standby mode.
  - When menu is displayed on the monitor, escape from the menu and perform adjustment again.

### **7.7.3. Remarks**

None in particular

## **7.8. CA-210/CA-310 Not Connected**

### **7.8.1. Message**

**CA-210/310 not found.**

### **7.8.2. Troubleshooting**

This error appears when the PC does not recognize CA-210/CA-310 but is selected for the probe from the list.

Select the probe again after confirming the following items.

- Check that the driver for CA-210/CA-310 is installed.
- Check that CA-210/CA-310 is connected to the PC.

### **7.8.3. Remarks**

None in particular

## **8. Cautions**

### **8.1. Conditions where automatic color temperature adjustment cannot be executed**

Automatic color temperature adjustment cannot be performed in certain conditions. “7.7 Adjustment start error” message appears in this case. Change the monitor status to where the adjustment can be performed using BKM-16R. Example of these status are shown below.

- “Select Area” menu in display
- “Picture and Picture” display in progress
- “Picture Adj” in progress (both Auto/Manual Adjust)
- “Color Temp Adj” in progress (both Auto/Manual Adjust)
- “HD Frame Capture” and “Capture Load” in progress

### **8.2. Unusable USB chipset**

CS-200 may not be recognized from this software tool with the following USB chipset of the PC.

- Intel(R)Series/3400 Series Chipset Family USB

### **8.3. Automatic color temperature adjustment of Peer-to-Peer configured monitor**

Check the following status when adjusting a peer-to-peer configured monitor.

- Only one monitor is connected to the same network.
- When selecting a network adapter, the IP address of the PC should be “192.168.0.X” (X is 2 to 254) and the subnet mask should be “255.255.255.0”.

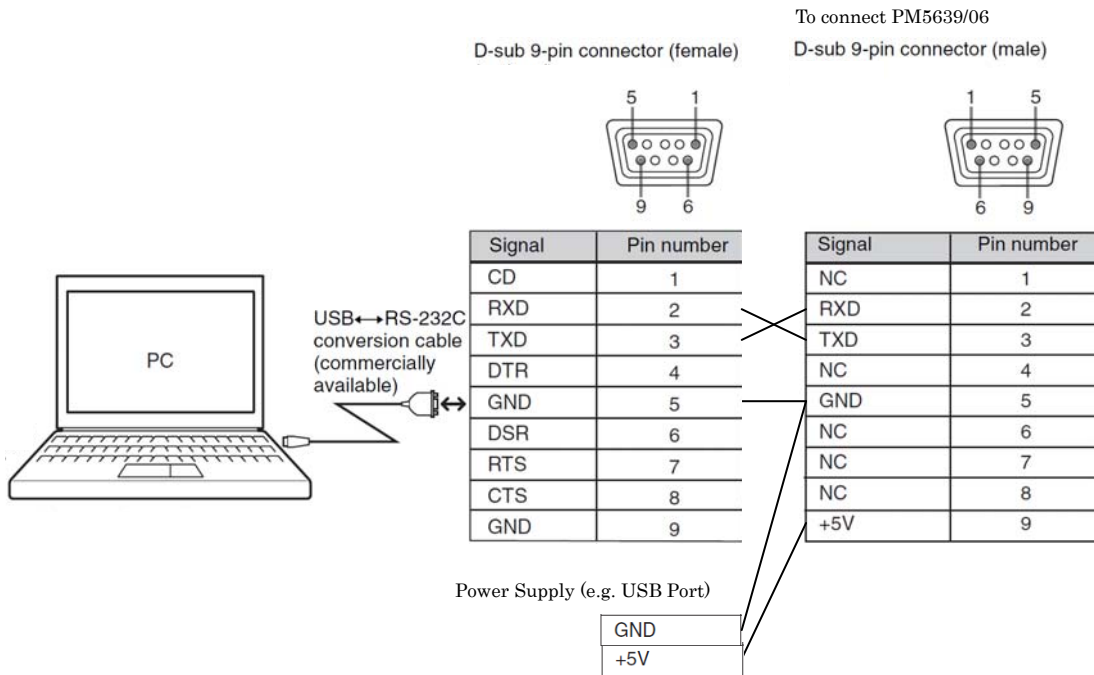
Note: The IP address of BKM-16R (“192.168.0.100” during default setting) cannot be used when BKM-16R is also connected simultaneously.

### **8.4. PC sleep mode**

This software tool cannot be used in a PC sleep mode. Take precaution not to enter into sleep mode when using this software tool. Restart this software tool and the probe if the PC enters into sleep mode.

### 8.5. PC connection for PM5639/06 by DK-Technologies

To connect PM5639/06 and PC, the power supply box made by DK-Technologies or a special serial communication cable with power supply will be required. Please refer to the connecting diagram below.



## 9. NOTE – Caution of color matching between different display devices –

Colors may appear different between display devices such as CRT, LCD and OLED, even when the probe is showing the same x y value. The cause of this is considered to be related to the difference in the light source spectrum of each display device.

Color matching between different display devices is known to be obtained by adjusting the target display device with offset values added to the xy chromaticity. The typical offset values <sup>\*1</sup> are described below.

When BVM (CRT) is used as the reference:

		Device to be measured		
		BVM (CRT)	BVM-E/F (OLED)	BVM-L (LCD)
Probe to be used	i1Pro	$(x_{ref}, y_{ref})$	$(x_{ref}-0.004, y_{ref}-0.013)$	$(x_{ref}, y_{ref}-0.004)$
	CA310 <sup>*2</sup>		$(x_{ref}-0.004, y_{ref}-0.013)$	$(x_{ref}, y_{ref}-0.004)$
	CA210 <sup>*2</sup>		$(x_{ref}-0.004, y_{ref}-0.013)$	$(x_{ref}, y_{ref}+0.005)$
	CS200 <sup>*3</sup>		$(x_{ref}-0.004, y_{ref}-0.013)$	$(x_{ref}, y_{ref}-0.004)$
	PM5639/06		$(x_{ref}+0.001, y_{ref}-0.013)$	$(x_{ref}, y_{ref}-0.004)$

When BVM-L (LCD) is used as the reference:

		Device to be measured		
		BVM (CRT)	BVM-E/F (OLED)	BVM-L (LCD)
Probe to be used	i1Pro	$(x_{ref}, y_{ref}+0.004)$	$(x_{ref}-0.004, y_{ref}-0.009)$	$(x_{ref}, y_{ref})$
	CA310 <sup>*2</sup>	$(x_{ref}, y_{ref}+0.004)$	$(x_{ref}-0.004, y_{ref}-0.009)$	
	CA210 <sup>*2</sup>	$(x_{ref}, y_{ref}-0.005)$	$(x_{ref}-0.004, y_{ref}-0.018)$	
	CS200 <sup>*3</sup>	$(x_{ref}, y_{ref}+0.004)$	$(x_{ref}-0.004, y_{ref}-0.009)$	
	PM5639/06	$(x_{ref}, y_{ref}+0.004)$	$(x_{ref}+0.001, y_{ref}-0.009)$	

<sup>\*1</sup> The perception of color may still vary depending on the type and individual difference of the probe, or the individual difference of the observer's eyes. The values described above are typical values. Refer to "BVM (CRT)" in the case of LCD with CCFL backlight.

<sup>\*2</sup> CH00(Konica Minolta's calibration standard), D65, and Univ. Sync

<sup>\*3</sup> CH00(Konica Minolta's calibration standard), Univ. Sync