

Monitor_ AutoWhiteAdjustment

USER'S GUIDE

Version 1.9

Table of Contents

Overview	3
Features	3
Supported Devices	3
Computer Environment	3
Preparation	4
Installing the Middleware and the Device Driver for the Probe	4
Installing Monitor_AutoWhiteAdjustment	4
Connecting the Monitor to the Computer	5
Connecting the Probe to the Computer	5
Operations	6
Starting Monitor_AutoWhiteAdjustment	6
Setting Network	6
Selecting the Monitor	6
Setting Probe	10
Measuring Color Temperature	11
Adjusting Color Temperature Automatically	12
To Equalize Colors on Different Types of Displays	14
Appendix	15
Error Messages	15
Troubleshooting	18
Adjusting Bias (OLED Monitor, BVM-HX, PVM-Xxx00)	18
For Further Information of the Technical Background on the Sony Video Monitor Calibration	18
Color matching between BVM-HX310, BVM-HX series and BVM-X300	19

Overview

Features

Monitor_AutoWhiteAdjustment is the software for measuring and automatically adjusting the color temperature and luminance of the monitor.

The following features are built into this software:

- Measurement of color temperature and luminance of the monitor
- Automatic adjustment of color temperature and luminance using the probe

Supported Devices

This software is compatible with the following equipment (as of September 2025):

Monitors

BVM-E/-F series

- BVM-E251
- BVM-E250
- BVM-E250A
- BVM-E171
- BVM-E170
- BVM-E170A
- BVM-F250
- BVM-F250A
- BVM-F170
- BVM-F170A

BVM-X/-HX series

- BVM-X300
- BVM-HX3110
- BVM-HX310 (software version 1.1 or later)
- BVM-HX1710
- BVM-HX1710N

PVM series

- PVM-2541
- PVM-2541A
- PVM-1741
- PVM-1741A
- PVM-741
- PVM-740

PVM-A series

- PVM-A250
- PVM-A170

PVM-X series

- PVM-X550 (software version 2.0 or later)

PVM-Xxx00 series

- PVM-X1800 (software version 3.0 or later)
- PVM-X2400 (software version 3.0 or later)
- PVM-X3200 (software version 3.0 or later)

LMD series

- LMD-941W

LMD-A series

- LMD-A240
- LMD-A220
- LMD-A180
- LMD-A170

Probes

i1Pro, i1Pro2 manufactured by X-Rite

CA-410 (Probes: CA-VP427A, CA-VP427, CA-P427,

CA-P410) manufactured by Konica Minolta

PR-655 and PR670 manufactured by Photo Research

K10-A manufactured by Klein Optical Instruments

Specbos 1211, spectraval 1501, and spectraval 1511

manufactured by JETI

CR-250 manufactured by Colorimetry Research

Computer Environment

A computer with the following specification is needed.

Operating system (OS)

Windows 11 Pro (Version 24H2 or later)

CPU

Intel Celeron 1 GHz or higher, 64-bit compatible multi-core processor

Memory

4 GB or more

Display

1,920 × 1,080 or more

USB port

USB 2.0 or higher

Storage

100 MB free space or more

(for the stable operation of the OS, it is recommended to have free space of at least 10% of the whole C drive)

Network

Internet connection

Middleware

.NET Framework 4.8.1 (Available from the Microsoft website)

Note

The above computer environment does not guarantee correct operation on all computers or operating systems.

Screen shots of windows shown in this USER'S GUIDE are samples. Their appearance may differ depending on the operating system you use.

NOTICE TO USERS

© 2012-2025 Sony Corporation All rights reserved. This manual or the software described herein, in whole or in part, may not be reproduced, translated or reduced to any machine readable form without prior written approval from Sony Corporation.

SONY CORPORATION PROVIDES NO WARRANTY WITH REGARD TO THIS MANUAL, THE SOFTWARE OR OTHER INFORMATION CONTAINED HEREIN AND HEREBY EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE WITH REGARD TO THIS MANUAL, THE SOFTWARE OR SUCH OTHER INFORMATION. IN NO EVENT SHALL SONY CORPORATION BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES, WHETHER BASED ON TORT, CONTRACT, OR OTHERWISE, ARISING OUT OF OR IN CONNECTION WITH THIS MANUAL, THE SOFTWARE OR OTHER INFORMATION CONTAINED HEREIN OR THE USE THEREOF.

Sony Corporation reserves the right to make any modification to this manual or the information contained herein at any time without notice. The software described herein may also be governed by the terms of a separate user license agreement. Sony Corporation is not responsible for the suspension or discontinuation of this software service for any reasons.

- The Microsoft, Windows, Windows 11, and Windows logos are either trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries/regions.
- Intel is the trademark or registered trademark of Intel Corporation in the United States and/or other countries/regions.
- All other company names, system names and product names mentioned here may be the trademarks or registered trademarks of their respective companies. In this manual, TM and R marks are not specified.

Preparation

Installing the Middleware and the Device Driver for the Probe

Install the .NET Framework 4.8.1 (available from the Microsoft website) to the computer. If you are using any of the following probes, additional software or drivers need to be installed.

i1Pro, i1Pro2

Application software supplied with i1Pro manufactured by X-Rite, or device driver for i1Pro, i1Pro2

CA-410

CA-S40 (software for PC) provided by Konica Minolta
Device driver for CA-410

PR-655, PR-670

Device driver provided by Photo Research

K10-A, specbos 1211, spectraval 1501, spectraval 1511, CR-250

Device driver for "USB to serial" conversion chip provided by FTDI and Microsoft Visual C++ redistributable packages for Visual Studio 2015-2022 provided by Microsoft

Note

If using a probe not compatible with Windows 11, its driver or software may not be installed properly, or this software may not operate properly.

Installing Monitor_AutoWhiteAdjustment

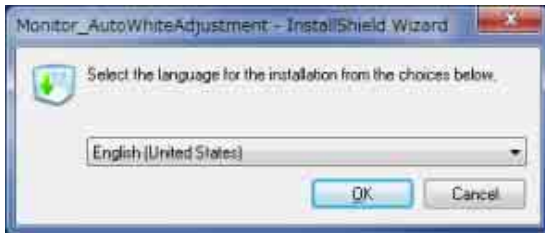
If you would like to use this software, consult your nearest Sony dealer.

Note

- Windows administrator privileges are needed to install this software. Log in with an administrator account.
- Depending on your environment, settings in Windows, antivirus software or other security systems may need to be changed while installing or using this software. Refer to the respective manuals if necessary.

- Sony does not guarantee the operation for using this software on a computer with an older version of Monitor_AutoWhiteAdjustment. If an older version of this software is installed on the computer, uninstall the older version before installing this software. If you install this software before uninstalling the older version, uninstall both software, and then reinstall this software.

- 1 Double click
“Monitor_AutoWhiteAdjustment.exe” to start the installer.
- 2 Select the language you want to use, then click
“OK”.



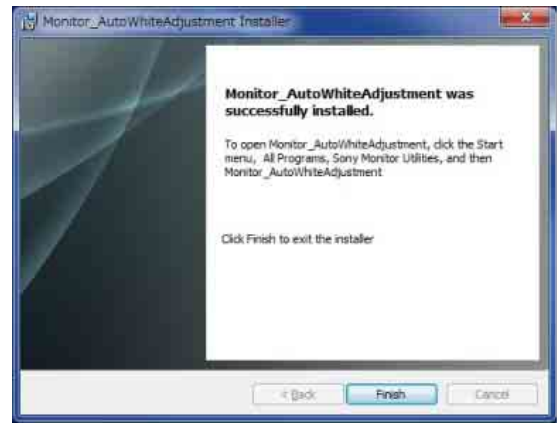
Wait for a moment until the installation window appears.

- 3 Follow the instructions displayed in the window to install the software.



Read the message about the license agreement when it appears. If you agree with the contents, select “I accept the terms of the license agreement” to continue installation.

- 4 When the message
“Monitor_AutoWhiteAdjustment was successfully installed.” appears, click “Finish”.



The installation is complete.

Connecting the Monitor to the Computer

Two types of connections are available: LAN, which connects your computer and monitor via a network, and peer to peer, which connects your computer directly to the monitor with a LAN cable.

For details, refer to the instruction manual of the monitor.

Connecting the Probe to the Computer

Connect the probe to your computer by a USB cable, referring to the instruction manual of the probe.

Note

- When you use a CA-410 probe, connect it directly to your computer, instead of using data processor CA-DP40. Any connection method other than direct connection is not supported.
- When you use the PR-670 by connecting a computer, you need to set the aperture setting of the PR-670 to “1” in advance.

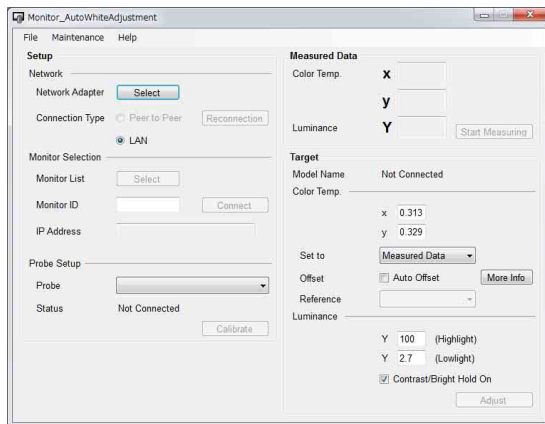
Operations

Note

This software cannot be used if the computer is in sleep mode. Before using this software, make sure automatic sleep mode is disabled. If the computer goes into sleep mode while using this software, restart the software and probe.

Starting Monitor_AutoWhiteAdjustment

When you start the installed software from your computer, the start-up window is displayed.



Note

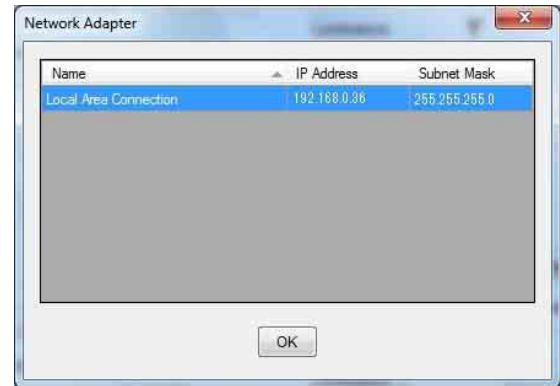
- For the BVM-X300, BVM-HX310 and PVM-X550, when the [Color Temp.] of the monitor is set to [D65], [D93], [D55], [D61], [DCI], or [DCI XYZ], the adjustment does not start. Select a user preset between [User1] to [User5] in [Color Temp.] of [User Preset Setting].
- For the BVM-X300, BVM-HX310 and PVM-X550, when the password lock in the menu is set to [User Preset1] or to [User1] of [Color Temp.], set [Password Lock] of [Security] to [Off].
- For the PVM-Xxx00 series, when the [Color Temp.] of the monitor is set to [D65], [D93], [D60], or [DCI], the adjustment does not start. Select a user preset between [User1] to [User10] for [Color Temp.] in [Ch. Setting] of [User Preset Setting].
- For the PVM-A and LMD-A series, when starting adjustment, [User2] is selected automatically and an adjustment result is stored. When setting the adjustment value to [User1], input the value manually into the monitor after adjustment.

Setting Network

Select the network adapter according to the connection environment of the monitor.

- 1 Click “Select” for “Network Adapter”.

The “Network Adapter” window is displayed.



Note

The displayed network adapter varies depending on your environment.

- 2 Select the network adapter of the monitor’s network.

Detection of the monitor starts.

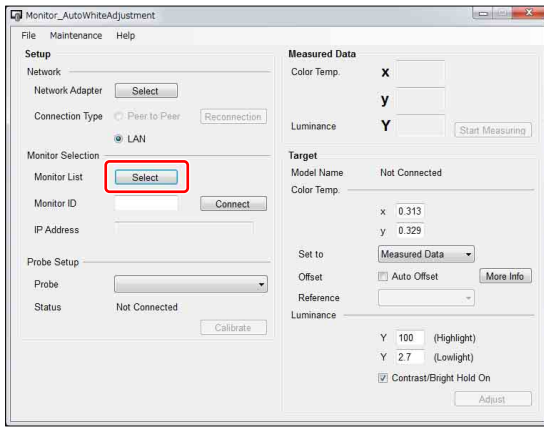
Note

- Only the network adapter that shows the IP address and subnet mask after typing “ipconfig /all” in the command prompt is displayed. If the network adapter that you want to use is not displayed, check the network setting/connection.
- After configuring the network settings, if you change the settings of the selected network adapter, such as the IP address, select the Network Adapter again.

Selecting the Monitor

Selecting from the Monitor List (recommended)

When you set the Network Adapter settings, the software starts searching for a monitor that is connected to the selected network, and “Select” in the “Monitor List” becomes active.



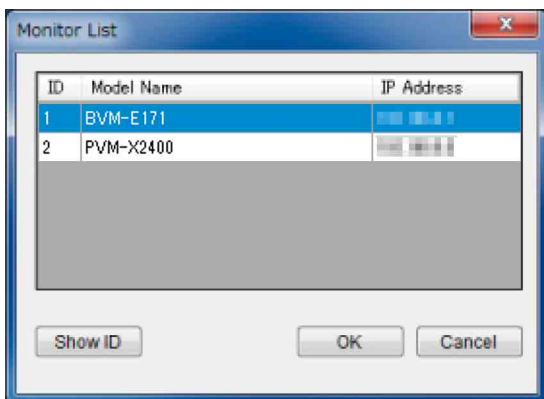
1 Click "Select".

The "Monitor List" window appears, and detected monitors are displayed in the monitor ID number order.

Before monitor detection



After monitor detection
(Example: When PVM-X2400 is connected)



If new monitors are detected while displaying the "Monitor List" window, they are added to the window in the order detected.

2 Select the monitor you want to adjust from the list, then click "OK".

Connection with the selected monitor starts. If you click "Show ID" in the "Monitor List" window, the monitor ID is displayed on the screen of the monitor connected to the selected network.

Note

Monitors connected to the network may not be detected due to the effect of security software depending on your network environment. Monitors cannot be detected when the communication between the monitor and computer is shut off. In this case, change the settings of the software which is interrupting the communication, or use Peer to Peer connection. (page 8)

- For this operation, the monitor needs to be set as follows:

BVM-E/-F series

Set the NETWORK switch on the rear of the monitor to "LAN".

BVM-X300, BVM-HX310 and PVM-X550

Set the [Serial Remote] menu as follows:

Connection: LAN

BVM-HX3110 and PVM-Xxx00 series

Set [Remote] of the [Monitor Network] menu as follows:

Connection: LAN

BVM-HX1710/-HX1710N

Set the NETWORK switch on the rear of the monitor to "LAN", and set [Monitor Network] of the [Remote] menu as follows:

Connection: On

PVM and LMD series

Set the [REMOTE] menu as follows:

SERIAL REMOTE: ETHERNET

CONNECTION: LAN

PVM-A and LMD-A series

Set the [Remote] menu as follows:

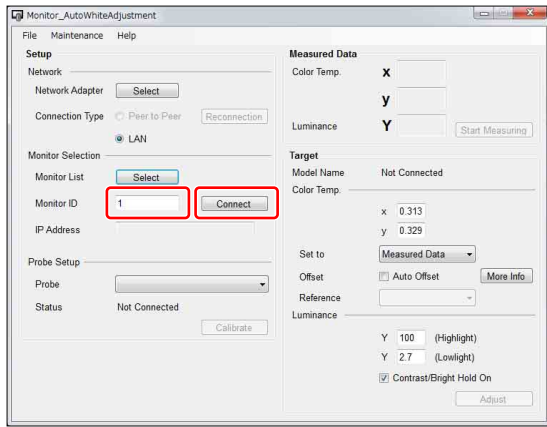
Serial Remote: On

Connection: LAN

- If the existence of a monitor cannot be confirmed for a certain period of time, it will be deleted from the "Monitor List" window. In this case, the monitor list will be re-sorted in the monitor ID number order.

Selecting a monitor by its monitor ID

You can connect with a monitor by specifying the monitor ID, after the Network Adapter settings are completed and "LAN" is selected in "Connection Type" of "Network".



- 1 Input a valid value (1 - 99) for “Monitor ID”.
The “Connect” become active.

- 2 Click “Connect”.
Searching for a monitor that has the specified monitor ID starts. The message “Searching for monitor. Please wait.” appears while searching. When the monitor has been detected, connection starts.

Note

Set a different monitor ID for each monitor on a network.

Selecting Peer to Peer connection

You can select Peer to Peer connection, if a monitor and a computer are connected by Peer to Peer and the selected network adapter meet the following conditions:

- Only one connected monitor is on the network.
- The IP address is “192.168.0.X” (where X is between 2 - 254).
- The subnet mask is “255.255.255.0”.

Note

- When BVMK-R10 or BKM-17R/-16R is connected at the same time, the IP address of BVMK-R10 or BKM-17R/-16R (“192.168.0.100” is default) cannot be used.
- For this operation, the monitor needs to be set as follows:

BVM-E/-F series

Set the NETWORK switch on the rear of the monitor to “PEER TO PEER”.

BVM-X300, BVM-HX310 and PVM-X550

Set the [Serial Remote] menu as follows:

Connection: Peer to Peer

BVM-HX3110 and PVM-Xxx00 series

Set [Remote] of the [Monitor Network] menu as follows:

Connection: Peer to Peer

BVM-HX1710/-HX1710N

Set the NETWORK switch on the rear of the monitor to “PEER TO PEER”, and set [Monitor Network] of the [Remote] menu as follows:

Connection: On

PVM and LMD series

Set the [REMOTE] menu as follows:

SERIAL REMOTE: ETHERNET

CONNECTION: PEER TO PEER

PVM-A and LMD-A series

Set the [Remote] menu as follows:

Serial Remote: On

Connection: Peer to Peer

When you select “Peer to Peer” in “Connection Type”, the Peer to Peer connection is started.

Note

If the LAN connection fails, use the Peer to Peer connection. If the Peer to Peer connection fails, click “Reconnection” for reconnection.

Checking the connection with the monitor

When connection with the monitor is established, the connection window appears. Click “OK”.

On-screen messages in the connection window

- LAN connection (When “Monitor ID” is set to X)
“Connected to Monitor ID: X”
- Peer to Peer connection
“Connected to Monitor: Peer to Peer”

Monitor selection is complete.

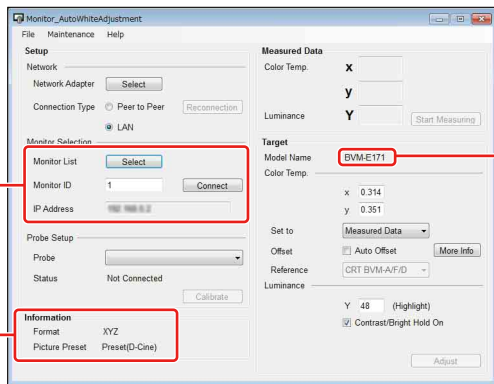
About the differences of the setting window

The setting window differs depending on the connection type, monitor types, and setting status.

When connected to a BVM-E/-F series monitor Example

Connection Type: LAN

Setting of the monitor: Input setting for XYZ signal,
Picture Preset: Preset (D-Cine) or Preset (DCI)



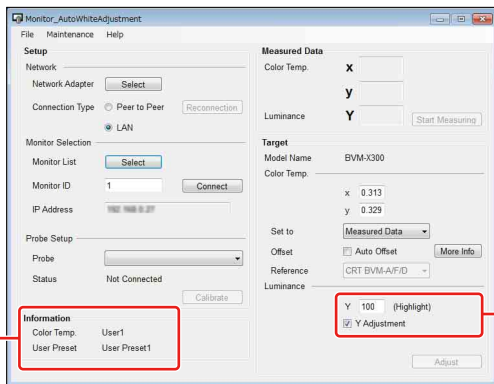
- ❶ Model Name: Displays the model name of the connected monitor.
- ❷ Monitor Selection: During Peer to Peer connection, this area is not displayed.
- ❸ Information: “Format” is displayed when the XYZ signal is input.
“Picture Preset” is displayed when [Picture Preset] of the monitor is set to [Preset (D-Cine)] or [Preset (DCI)].

When connected to BVM-X300, BVM-HX310 or PVM-X550 monitor

Example

Connection Type: LAN

Monitor setting: Color Temp.: User1, User Preset: User Preset1



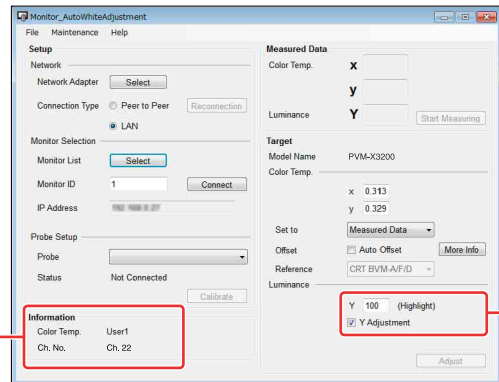
- ❹ Information: The [Color Temp.] setting of the connected monitor is displayed in “Color Temp.”
The [User Preset] setting of the connected monitor is displayed in “User Preset”.
- ❺ Display of the luminance setting is different from the BVM-E/-F series.

When connected to a BVM-HXxx10 series or PVM-Xxx00 series monitor

Example

Connection Type: LAN

Monitor setting: Color Temp.: User1, Ch. No: Ch.22

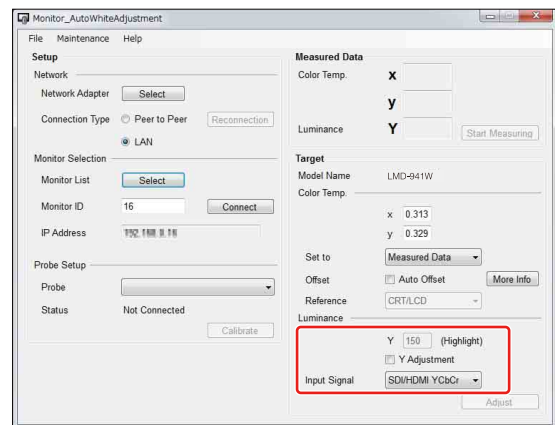


- ❻ Information: The [Color Temp.] setting of the connected monitor is displayed in “Color Temp.”
The [Ch.No.] setting set in [Ch.Setting] under [User Preset Settings] of the connected monitor is displayed in “Ch.No.”.
- ❼ Display of the luminance setting is different from the BVM-E/-F series.

When connected to a PVM or LMD series monitor

Example

Connection Type: LAN

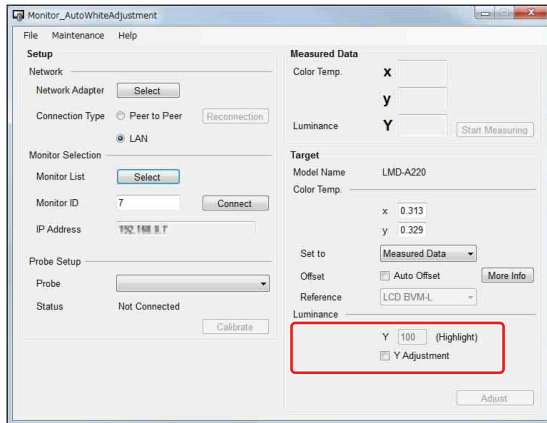


Display of the luminance setting is different from the BVM-E/-F series. Select the correct input signal from the “Input Signal”.

When connected to a PVM-A or LMD-A series monitor

Example

Connection Type: LAN




Display of the luminance setting is different from the PVM and LMD series.

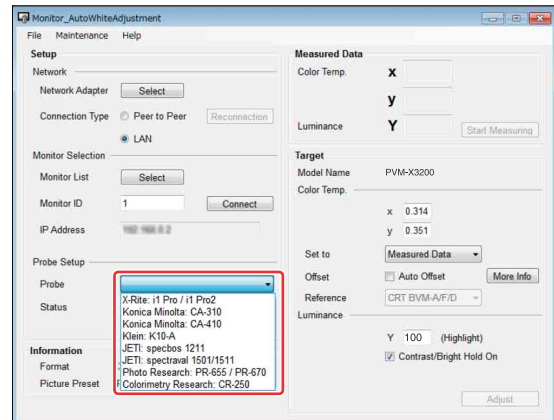
Setting Probe

If you use a probe to perform the color temperature adjustments or color temperature measurement, you will need to select a probe, and perform calibration of the probe if necessary.

For details about available probes, see page 3.

Selecting a probe

When you click the  to the right of “Probe”, a list of probes appears.



Select a probe from the list.

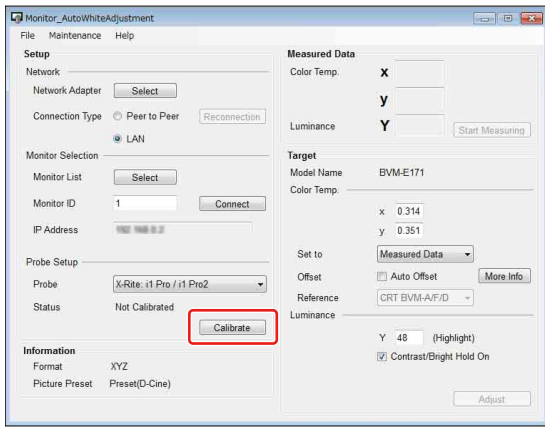
Note

- Do not disconnect the probe or communication cable before quitting this software.
- Do not connect two probes at the same time.
- When measuring and adjusting the OLED monitor using a probe that has a synchronous mode, set the synchronous mode correctly, referring the instruction manual of the probe.
- If you select CA-410, you need to connect the computer and probe by USB beforehand. The error message “CA-410 not found.” appears if you select CA-410 while it is not connected.
- If you select K10-A, a window is displayed to show the COM port to which the probe is assumed to be connected. Reselect the COM port if necessary.
- If an error occurs because CA-410 is disconnected, or the COM port is not selected in the COM port selection window of K10-A, the Probe Setup returns to the default (blank).

Calibration of Probe

If i1Pro, i1Pro2, or CA-410 is selected, it must be calibrated prior to use.

When you select the probe and the computer detects the probe connection, the “Calibrate” becomes active.



1 Click “Calibrate”.

A message appears if preparation for calibration is necessary.
Prepare for calibration according to the displayed message.

When calibration is successful, the status becomes “Calibrated” on “Status” and the color temperature measurement becomes enabled. Also, when the network setting is completed, “Adjust” becomes active and the color temperature adjustments are enabled.

Measuring Color Temperature

You can measure the color temperature using this software.
Set the probe before you start measuring (page 10).
After setting the probe, “Start Measuring” becomes active.

Measuring color temperature and luminance

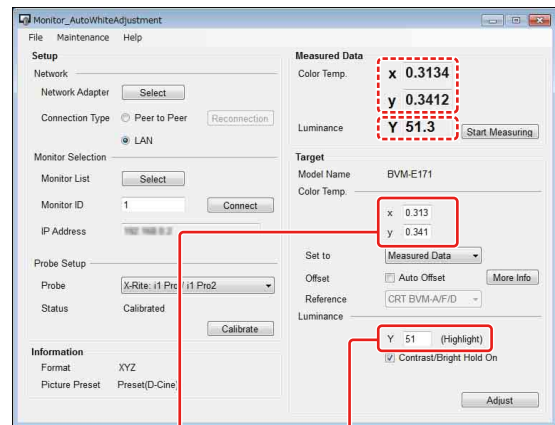
When you click “Start Measuring”, color temperature measurement starts.

During measurement, the measured values will be updated every time data is received from the probe. Therefore, the measurement intervals depend on the performance of the probe.
When measurement starts, “Start Measuring” changes to “Stop Measuring”. You can stop the color temperature measurement by clicking “Stop Measuring”.
During the color temperature measurement, you cannot change or calibrate the probe.

Setting the measured value as the target value

After measuring the color temperature, the measured values are displayed in the text box. These values can be used as the target values.

If “Measured Data” is selected from the “Set to”, the measured values are set as the target values. When you set this again, reselect “Measured Data.”

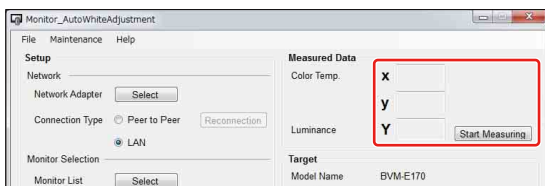


Color Temp x y: the measured value, rounded to the fourth decimal

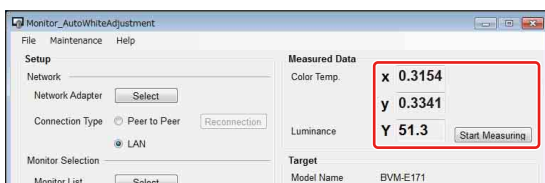
Luminance Y: the measured value, rounded to the first decimal place, is displayed for the target value of “Highlight”^{*1}.

^{*1} For a BVM-X, BVM-HX, PVM, PVM-A, PVM-X, PVM-Xxx00, LMD, and LMD-A series monitor, if “Y Adjustment” is checked, the measured value, rounded to the first decimal place, is displayed as the target value of Luminance “Y”.

Before measurement



After measurement



Adjusting Color Temperature Automatically

You can adjust the color temperature and luminance.

Note

- Before adjustment, make sure that all functions of the Function buttons are disabled.
- To enable the color temperature adjustments for a PVM and LMD series monitor, the monitor needs to receive a video signal.
- For a PVM-X series monitor, it is recommended to perform the panel calibration of the monitor before adjustments.
- The accuracy of adjustment depends on the performance of the probe or surrounding brightness. After performing the adjustments, visually check the black level and white level, and, if needed, adjust the brightness and contrast manually.

Setting the target value of color temperature and luminance for the automatic adjustments

The target values of color temperature need to be set.

Setting the target value

You can set target values in three ways.

- Using the default target values
When the target values are selected from “Set to”, the default values are copied and set as the target values.
- Using the measured values of color temperature
When color temperature has been measured, the measured values can be set as the target values. See “Setting the measured value as the target value” (page 11).
- Inputting values directly
Input the values as the text box.

Note

For a BVM-E/-F series monitor, if “Contrast/Bright Hold On” has been checked, the values of contrast and brightness set before the adjustment will be restored. In this case, there may be a difference in the measurement of targeted color temperature and luminance after the adjustment.

Acceptable target value

The acceptable target value varies depending on the monitor and setting.

BVM-E/-F series

Setting item	Acceptable target value
Color Temp. x	When the input signal or the input signal setting is other than XYZ signal: 0.265 to 0.350
	When the input signal or the input signal setting is XYZ signal: 0.300 to 0.350
Color Temp. y	When the input signal or the input signal setting is other than XYZ signal: 0.270 to 0.360
	When the input signal or the input signal setting is XYZ signal: 0.310 to 0.360
Luminance (Highlight)	When [Picture Preset] of the monitor is set to something other than [Preset (D-Cine)]: 40 to 150
	When [Picture Preset] of the monitor is set to [Preset (D-Cine)]: 20 to 72

BVM-X/-HX, PVM-X, and PVM-Xxx00 series

Setting item	Acceptable target value
Color Temp. x	0.265 to 0.350
Color Temp. y	0.270 to 0.360
Luminance (Highlight)	40 to 150
Luminance (Lowlight)	0.5 to 5.0

PVM, PVM-A, LMD, and LMD-A series

Setting item	Acceptable target value			
	PVM series	LMD series	PVM-A series	LMD-A series
Color Temp. x	0.001 to 0.999		0.265 to 0.350	
Color Temp. y	0.001 to 0.999		0.270 to 0.360	
Luminance	40 to 150	20 to 300	40 to 150	20 to 300

Note

- For the BVM-X/-HX310, PVM-X, and PVM-Xxx00 series, of user presets [User1] to [User5] ([User1] to [User10] for the PVM-Xxx00 series, and all the options under color temperature for BVM-HXxx10 series), the Gain/Bias adjustment values for the [Color Temp.] and the adjustment values for contrast and brightness set on the monitors are adjusted.
- The “Y Adjustment” works as follows for the BVM-X/-HX, PVM, PVM-A, PVM-X, PVM-Xxx00, LMD, and LMD-A series.
 - When “Y Adjustment” is checked:
Color temperature and luminance are adjusted.
Color temperature and luminance are adjusted to the specified target value.
 - When “Y Adjustment” is not checked:
Only color temperature is adjusted.
Color temperature is adjusted to the specified target

value.

Luminance retains the values before adjustment.

- When adjusting luminance for a PVM and LMD series monitor, check “Y Adjustment”. Also, set [CONTRAST] and [BRIGHTNESS] of [SUBCONTROL] on the monitor back to the default [0].
- For the PVM-A series monitor, the Gain/Bias adjustment value and contrast/brightness adjustment value for [User2] of [Color Temp.] are adjusted.
- For the LMD-A series monitor, the adjustment value of [Adjust Gain/Bias], contrast/brightness adjustment value, and backlight adjustment value for [User2] of [Color Temp.] are adjusted.

Setting offset values

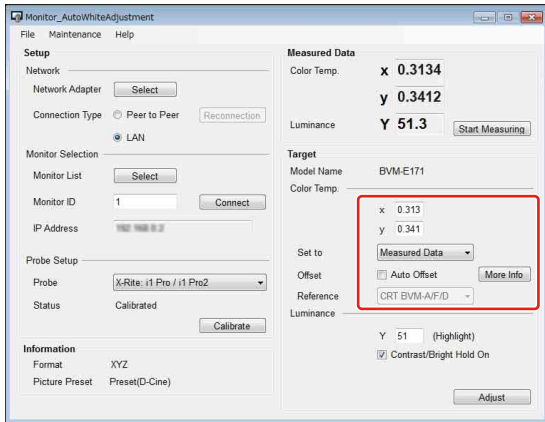
You can set an offset for the target values. Setting offset values enables you to compensate for the difference between the displays. For details, see “To Equalize Colors on Different Types of Displays” (page 14).

When a preset item such as “D65”, etc. (other than “Measured Data”) is selected from “Set to”, the optimal setting is selected automatically depending on the monitor being adjusted. The offset values are set for guidance, but you can change them. Any changed values are saved automatically.

The offset values can be reset to the default from “Maintenance” in the menu bar.

When not setting offset values

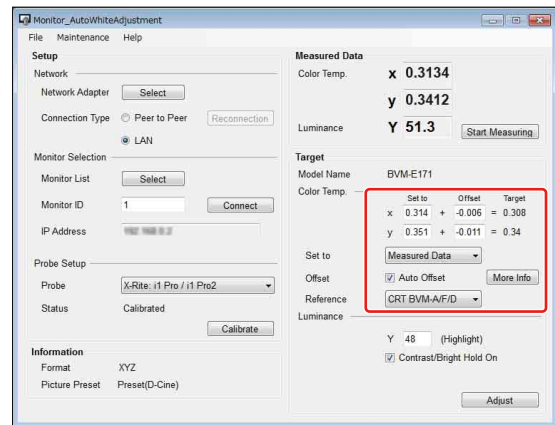
The target values will be displayed as shown below.



The target values of the color temperature are the values displayed in the text box.

When setting offset values

When “Auto Offset” is checked, you can set offset values.



To change the offset values, input the values in the text box under “Offset”, shown in the red frame of the above picture. The calculated results of “Set to” and “Offset” are displayed under “Target” and they are used as the target values for adjustments. When “Measured Data” is selected from the “Set to” drop-down list, “Reference” can be selected. Selecting the target device from “Reference” automatically sets an offset value appropriate for equalizing colors on the device.

Limitation on the target values for automatic adjustments when setting offset values

The target values for adjustments need to be limited even if the offset value is set. In this case, the values displayed under “Target” are limited. (When the offset values are not set, the value in the text box “Set to” is set as the target value.)

Setting the probe

Place the probe in front of the monitor to be adjusted or measured.

Starting automatic adjustment

When you click “Adjust”, adjustment starts and the target values are checked. If they are unacceptable, a warning message appears. Modify the target values according to the displayed message.

During adjustment, the following window appears.



Note

- It may take about 10 minutes for the adjustment depending on the combination of the type of probe and monitor.
- Until adjustment completes, all operations other than the cancel operation are invalid. If “Cancel” is clicked, the “Adjusting Cancelled” window appears and the adjustment is canceled.

When the color temperature adjustment is complete, the “Adjusting done” window appears.

This software does not adjust the bias on OLED monitors and the BVM-HX/PVM-Xxx00 series monitors. To improve the accuracy, see “Adjusting Bias (OLED Monitor, BVM-HX, PVM-Xxx00)” (page 18) in Appendix.

To Equalize Colors on Different Types of Displays

If you measure the color temperatures of different types of display, such as CRT, LCD, or OLED, by using a probe and adjust the xy chroma to the same value, the appearance may be different. This may be caused by the different emission spectrum of each display device.

When you adjust the target xy chroma value by adding an offset, you can set to almost the same appearance for different types of display. The following offset values are standard.

When equalizing to BVM (CRT), LMD (LCD), LMD-A220/-A170 (LCD)

BVM (CRT), LMD (LCD), LMD-A220/-A170 (LCD)	(xref, yref)
BVM-L (LCD)	(xref, yref - 0.004)
BVM-E/-F, BVM-X, PVM, PVM-A (OLED), BVM-HX, LMD-A240/- A180, PVM-Xxx00 (LCD)	(xref - 0.006, yref - 0.011)
PVM-X (OLED)	(xref - 0.008, yref - 0.012)

When equalizing to BVM-E/-F, BVM-X, PVM, PVM-A (OLED), BVM-HX, LMD-A240/-A180, PVM-Xxx00 (LCD)

BVM (CRT), LMD (LCD), LMD-A220/-A170 (LCD)	(xref + 0.006, yref + 0.011)
BVM-L (LCD)	(xref + 0.006, yref + 0.007)
BVM-E/-F, BVM-X, PVM, PVM-A (OLED), BVM-HX, LMD-A240/- A180, PVM-Xxx00 (LCD)	(xref, yref)
PVM-X (OLED)	(xref - 0.002, yref - 0.001)

When equalizing to PVM-X (OLED)

BVM (CRT), LMD (LCD), LMD-A220/-A170 (LCD)	(xref + 0.008, yref + 0.012)
BVM-L (LCD)	(xref + 0.008, yref + 0.008)
BVM-E/-F, BVM-X, PVM, PVM-A (OLED), BVM-HX, LMD-A240/- A180, PVM-Xxx00 (LCD)	(xref + 0.002, yref + 0.001)
PVM-X (OLED)	(xref, yref)

Note

The offset value is set to 0 when “D-Cine” or “DCI” is selected in “Set to” of “Target”.

Appendix

Error Messages

Conditions to be displayed	Message	Causes and remedies
Probe disconnection	Probe disconnected.	<p>Communication with the probe becomes unavailable while performing the color temperature adjustments.</p> <p>Reconfirm the connection with the probe, recalibrate the probe, then perform the color temperature adjustments again.</p> <p>Hint</p> <p>This alert is displayed while performing the color temperature adjustments. If you cannot communicate with the probe while measuring the color temperature, the measurement stops and the probe is disconnected.</p> <p>If the probe is disconnected during luminance sensor calibration, this alert is also displayed and luminance sensor calibration stops.</p>
Calibration failure	Calibration error.	<p>The calibration was not performed correctly.</p> <p>Confirm a power supply to the probe and that it can be calibrated, then perform calibration again.</p>
Network disconnection	Network disconnected.	<p>You cannot confirm the connection between this software and the monitor via a network.</p> <p>Set the connection with the monitor again.</p> <p>Hint</p> <p>This alert is displayed while performing the color temperature adjustments or calibrating the luminance sensor.</p> <p>Normally you should be able to recognize network disconnection by an invalid “Adjust” or non-display of the IP address.</p>
Monitor connection failure	Cannot find the monitor.	<p>Possible causes include the following:</p> <ul style="list-style-type: none">• There is no monitor with the desired monitor ID on the network. → Confirm the desired monitor ID by clicking the “Show ID”. For a BVM-E/-F series monitor, you can also check the monitor ID by pressing and holding the SINGLE button of BKM-16R or BKM-17R.• The monitor is not found during the connecting process. (Connection timeout) → For the BVM-E/-F series, confirm that the following setting of SDAP is default. (MENU > System Configuration > Network > Protocol Setting) ① SDAP port number is 53862 ② SDAP broadcast is permitted. ③ SDAP publication interval is fifteen seconds.• Firewall setting on your computer → Confirm that this software’s communication is permitted in the firewall setting.• Network connection is not correct. → Check the network connection.
Probe reading value error	Invalid value error. Please check the probe.	<p>The value of color temperature or luminance obtained via a probe is out of the acceptable range.</p> <ul style="list-style-type: none">• Confirm that the probe is set correctly with the monitor to be adjusted.• Perform the calibration again.

Conditions to be displayed	Message	Causes and remedies
Adjustment does not start	Monitor not ready. Please check monitor status.	<p>Possible causes include the following:</p> <ul style="list-style-type: none"> • The monitor setting was changed just before starting adjustment. → This error occurs when the input signal or [Picture Preset] is changed just before starting adjustment. Do not switch channel, change the setting or input signal just before starting adjustment. • The monitor does not receive commands. → Cancel the monitor's standby mode. → Turn the Menu display off if Menu is displayed, then perform adjustment again. <p>Examples of the monitor's state which prevent the color temperature adjustments starting (BVM-E/-F series only)</p> <ul style="list-style-type: none"> • While displaying the [Select Area] window • While displaying two windows • During adjustment of [Picture Adj] (both Auto and Manual Adjust) • During adjustment of [Color Temp Adj] (both Auto and Manual Adjust) • During capture saving and capture loading <p>Examples of the monitor's state which prevent the color temperature adjustments starting (BVM-HX310 and PVM-X550 only)</p> <ul style="list-style-type: none"> • During Quad View • During adjustment of [Adjust Gain/Bias] in [Color Temp.] <p>Examples of the monitor's state which prevent the color temperature adjustments starting (BVM-HXxx10 series and PVM-Xxx00 series only)</p> <ul style="list-style-type: none"> • During Quad View • While displaying two windows • During adjustment of [R/G/B Gain] and [R/G/B Bias] in [User Color Temp.]
Probe unconnected (CA-410 only)	CA-410 not found.	<p>This error occurs when CA-410 is selected as the probe to be used while the computer does not recognize it.</p> <p>Confirm the following, then select the probe again.</p> <ul style="list-style-type: none"> • The driver for CA-410 is installed. • CA-410 is connected to your computer.
Target value is not acceptable	Target Color Temperature x is invalid value. Target Color Temperature y is invalid value. Target Luminance Highlight is invalid value. Target Luminance Lowlight is invalid value. Target Luminance is invalid value.	<p>Target value that is not acceptable is set (page 12). Please set the acceptable target value.</p>
Default file of offset value is lost	Cannot read SYSTEM file. Boot failed. Please read the operation manual. Cannot read SYSTEM file. Initialization failed. Please read the operation manual.	<p>Default file of offset value has been lost for some reason. Reinstall Monitor_AutoWhiteAdjustment.</p>
More than one application is active at the same time	Not allow several application activity.	More than one application may be active. If so, quit one application.
Mismatch of the monitor's state (BVM-E/-F series monitor only)	Change monitor setting	<p>Possible causes include the following:</p> <ul style="list-style-type: none"> • Adjustments were performed before the application could update changes of information after channel switching. → Do not start adjustments immediately after the channel switching. After the switching, please wait about a second or two, and then start adjustments. • Input signal changed and changes occurred to update the "Information", but the adjustments started before the application updates the changes of information. → Do not change the input signal during adjustment.

Conditions to be displayed	Message	Causes and remedies
Cannot adjust the luminance/color temperature target value.	Target adjustment is out of range. Please try from the followings. - [increase/decrease] backlight* - [decrease/increase] Y - change (x, y)	Color temperature adjustment cannot be performed because the gain/bias value used when adjusting is out of the acceptable range. Try one or more of the following: <ul style="list-style-type: none"> • Increase or decrease the backlight setting value (LMD and LMD-A series only) • Decrease or increase the luminance target value • Adjust the color temperature target value If it is not improved, perform the calibration again.
	Adjustment failed. Please try again.	The color temperature adjustment was attempted, but failed. Confirm monitor settings or the probe position and status.
Cannot adjust because the target luminance is too high.	Target luminance is too high. Change the target luminance to a lower value. Luminance should be targeted to less than xxx cd/m ² .	The target luminance is too high. To avoid this error, change the target luminance to lower value. For details about the target luminance, see page 12.
Cannot adjust because the target luminance is too low.	Target luminance is too low. Change the target luminance to a higher value. Luminance should be targeted to more than xxx cd/m ² .	The target luminance is too low. To avoid this error, change the target luminance to higher value. For details about the target luminance, see page 12.
Cannot adjust because the current luminance is out of range.	Current luminance is out of range. Current luminance is xxx cd/m ² . Refer to the chart "Acceptable target value" in User's Guide. This can be accessed from "Help". Click "start measuring" and change the current luminance to within these values.	The current luminance is too high or low. To avoid this error, increase/decrease the contrast or brightness adjustment value until the measured luminance value is in proper range while measuring luminance by using the probe. Set the luminance manually to within the target luminance range in advance (page 12).
Setting status for black before adjusting is in a range of values that cannot be adjusted.	Contrast/Bright is invalid value.	Adjustment cannot be performed because the adjustment status for black has defects. To avoid this error, perform the following settings. For PVM-A series, Brightness = 50, R Bias = 0, G Bias = 0, B Bias = 0 For BVM-X/-HX, PVM-X, and PVM-Xxx00 series, Brightness = 0, R Bias = 0, G Bias = 0, B Bias = 0
Changing the monitor setting is required. (BVM-X300, BVM-HX310, PVM-X550 and PVM-Xxx00 series monitor only)	Monitor "Color Temp." setting is password-protected. Please enter the password and unlock "Color Temp./User Pre." from "Password Lock" of "Security" in the menu of the target monitor.	BVM-X300, BVM-HX310 and PVM-X550 only: When the color temperature of the selected user preset on the monitor is set to [User1] and the password lock setting is set to [User1] of [Color Temp.], the adjustment does not start. Set [Color Temp./User Pre.] in [Password Lock] of [Security] to [Off] and press "Adjust" to start the adjustment.
	Monitor "User preset" setting is password-protected. Please enter the password and unlock "Color Temp./User Pre." from "Password Lock" of "Security" in the menu of the target monitor.	BVM-X300, BVM-HX310 and PVM-X550 only: When the selected user preset on the monitor is set to [User Preset1] and the password lock setting is set to [User Preset1], the adjustment does not start. Set [Color Temp./User Pre.] in [Password Lock] of [Security] to [Off] and press "Adjust" to start the adjustment.
	Dxx setting cannot be overwritten. Please select one of "User1-User5" from "Color Temp." setting.	BVM-X300, BVM-HX310 and PVM-X550: When the color temperature of the selected user preset on the monitor is set to [D65], [D93], [D55], [D61], [DCI], or [DCI XYZ], the adjustment does not start. Set from [User1] to [User5] in [Color Temp.] of [User Preset Setting] and press "Adjust" to start the adjustment.
	Dxx setting cannot be overwritten. Please select one of "User1-User10" from "Color Temp." setting.	PVM-Xxx00 series: When the color temperature of the selected user preset on the monitor is set to [D65], [D93], [D60], or [DCI], the adjustment does not start. Set from [User1] to [User10] for [Color Temp.] in [Ch.Setting] of [User Preset Setting] and press "Adjust" to start the adjustment.

Troubleshooting

The automatic color temperature adjustments do not start

If the color temperature adjustments cannot start because of the state of the monitor, the error message “Monitor not ready. Please check monitor status.” is displayed (page 16). Change the monitor’s state so that it is possible to start color temperature adjustments using BKM-16R/-17R or BVMK-R10 (for models without a control panel such as the BVM-E/-F series and BVM-HX1710/-HX1710N) or Control Panel (for other models).

Reinstall of Monitor_AutoWhiteAdjustment

If one of the following error messages is displayed, this software cannot be automatically restored. Please reinstall the software.

- Cannot read SYSTEM file. Boot failed. Please read User’s Guide.
- Cannot read SYSTEM file. Initialization failed. Please read User’s Guide.

Adjusting Bias (OLED Monitor, BVM-HX, PVM-Xxx00)

This software does not adjust the bias on OLED monitors and the BVM-HX/PVM-Xxx00 series monitors. This is because when the gain is adjusted on Sony OLED monitors and the BVM-HX/PVM-Xxx00 series monitors, the monitors automatically correct the internal digital data to correspond with the white balance of the gain based on gamma tracking, even in the dark regions.

When the bias is adjusted to improve the accuracy, adjust manually using the following recommended color analyzer which calibrated the matrix.

Recommended color analyzer

Konica Minolta CA-410 (Probe: CA-VP427A, CA-VP427)

The adjustment procedure is as follows;

- 1 Perform zero calibration of the probe as required.
- 2 Input the black signal from the external device to the monitor.
- 3 Set the probe to the screen center of the monitor.

- 4 Checking the brightness display of the color analyzer, set the brightness of the monitor lower than 0.05 cd/m^2 as possible.
- 5 Set the bias adjustment value of the monitor to the same color temperature with the gain adjustment value.
- 6 Set the brightness of the monitor to the original value which was changed in Step 4.
- 7 Confirm that there is no change in the chromaticity and the luminance compared to before the adjustment.

Note

- Performing the manual adjustment in a darkroom is recommended.
- When measuring or adjusting the monitor, set the measurement speeds, synchronization modes, and other settings correctly following the operating instructions of each color analyzer. EXT synchronization mode is recommended. In this case, measure inputting the vertical sync signal of the external device in Step 2 above to the sync input terminal of the probe.
- For details of operating the color analyzer, the matrix calibration, or zero calibration, refer to the operating instructions of each color analyzer.
- Referring to the operating instructions of each monitor, adjust the monitor’s bias following the procedure when adjusting with an external input signal.
- When adjusted with other than the recommended color analyzer, the dark part of the image may get colors or the image may float.
- When the matrix calibration is not performed on the recommended color analyzer, the absolute value of the chromaticity points is not displayed correctly. Before using the recommended color analyzer, measure the target monitor using the high accuracy spectroradiometer, and perform the matrix calibration of the analyzer using the measured value.

For Further Information of the Technical Background on the Sony Video Monitor Calibration

For Sony video monitor calibration, see:

<https://pro.sony/product-resources/knowledge-panel/white-paper-about-calibration>

Color matching between BVM-HX310, BVM-HX series and BVM-X300

Ver1.04
September, 2025

1. Introduction

After the launch of Sony's first OLED (Organic Light Emitting Diode) professional master monitor in 2011, it was found that the colors between CRT and OLED displays, even though they were calibrated to have the same xy chromaticity values, did not match based on human visual perception.

At that time, an investigation was conducted following research documented in various academic papers on color science and the Sony display group carried out several experiments on color matching in cooperation with color probe providers. It was found that a Judd modified Color Matching Function improved the color matching between CRT and OLED for human visual perception. As a result, Sony has been applying an xy offset calculated by the Judd modified color matching function to Sony professional OLED monitors in order to match the display characteristics of CRT monitors (Refer to Sony Technical Paper: "Color Matching OLED and CRT").

In 2019, more recent market-driven requirements led Sony to release BVM-HX310, a new master monitor compatible with 4K HDR, this time using a new type of LCD technology. This model has been positioned as the improved successor to BVM-X300, our 4K HDR compatible OLED master monitor released in 2015, that achieves 1000 cd/m^2 ^{*1} in full screen and includes new 12G-SDI interface, Quad View display mode, and User 3D LUTs support.

In 2023, BVM-HX3110, the 4K HDR-compatible master monitor, was released. This monitor has a high peak brightness of up to 4000 cd/m^2 ^{*1} and high-speed video response capability, and it is also the first Sony monitor for professional use that supports the standard IP interface for SMPTE ST 2110 standard signals. The monitor also has new functions such as WF/VS, HDR/SDR conversion, and User-LUT signal output, and it has been established as the flagship 4K master monitor model.

In 2025, BVM-HX1710/-HX1710N, the 4K HDR-compatible master monitors, were released. These monitors have a high peak brightness of up to 3000 cd/m^2 ^{*1} and the capability equivalent to BVM-HX3110. These models have no operation panels and support the 19-inch rack mounting (6U). BVM-HX1710N has an IP interface as a standard, but BVM-HX1710 has no IP interface.

BVM-HX3110/-HX1710/-HX1710N also achieve the same color gamut and spectrum as BVM-HX310 monitors, allowing for seamless coordination between these monitor series.

<4K HDR-compatible master monitor releases>

- 2015: BVM-X300 OLED panel (peak 1000 cd/m^2 ^{*1})
- 2019: BVM-HX310 new LCD panel (full-screen white 1000 cd/m^2 ^{*1}, QV display, LUT)
- 2023: BVM-HX3110 new LCD panel (peak 4000 cd/m^2 ^{*1}, IP, new functions)
- 2025: BVM-HX1710 new LCD panel (peak 3000 cd/m^2 ^{*1}, rack mounting supported)

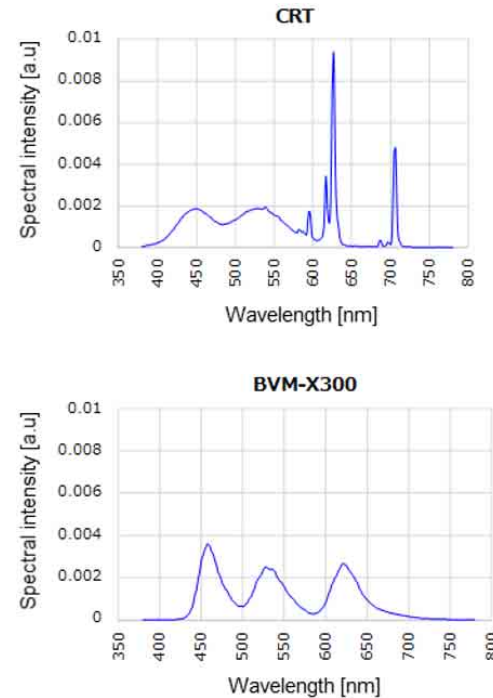
BVM-HX1710N new LCD panel (peak 3000 cd/m^2 ^{*1}, rack mounting supported, IP)

^{*1} Luminance value is the standard value measured at D65 (x, y = 0.3127, 0.329) and not a guaranteed value.

The techniques for color matching with the OLED equipped BVM-X300 was focused on in this section after BVM-HX310 was released. But now, color matching with BVM-X300 including the models released after BVM-HX310 is described.

2. Offset value calculated by a Judd modified color matching function for the BVM-HX310

The BVM-HX310 employs a newly developed LCD panel. The LCD panel has high power color-rendering LEDs to realize a wider color gamut resulting in a spectrum characteristic different from that of OLED (Figure 1).



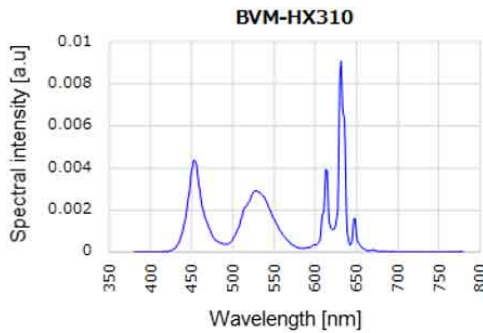


Figure 1. Spectrum of CRT, BVM-X300 and BVM-HX310

Based on the technical background for the development of the Judd offset for the BVM-X300 to match to CRT, Sony also tried to use the offset values calculated by the Judd modified color matching function with the BVM-HX310. However, the result was that the colors between BVM-HX310 and BVM-X300 did not match human visual perception. The CIE-170 color matching function was also tried, but the result was not acceptable. The results of these experiments indicated that the use of Judd offsets and CIE-170 do not work well when implemented with the BVM-HX310.

The most important factor leading to unmatched colors is the variations in individual eye characteristics. It is difficult to assume the use of a single color matching function as a typical value of spectral sensitivity for the human visual system (As described in the Technical Paper “Color Matching Between OLED and CRT”).

3. Recommended offset values for color matching BVM-HX310 and BVM-X300

The white point of D65 for the BVM-HX310, at factory shipment, is adjusted to be the same xy target as used in the BVM-X300. Please, see chart below.

Model number	White point at factory shipment (offset value)	
	x	y
BVM-X300	0.3067 (-0.006)	0.318 (-0.011)
BVM-HX310	0.3067 (-0.006)	0.318 (-0.011)

This offset value was determined by color matching experiments between BVM-HX310 and BVM-X300 display devices carried out by Sony’s display group. These experiments showed variations of the best offset value as experienced by each person participating in the tests. Hence, it was decided, at the time, to select and average value of the various results. However, since the release of the BVM-HX310 Sony has received feedback from many customers indicating that the BVM-HX310 appears more reddish than the BVM-X300.

It was recently decided to conduct a new series of experiments for evaluation of the color matching between BVM-HX310 and BVM-X300.

<Experiment>

- Testers: 13 persons
- Method:
 - Use a BVM-X300 with factory settings as a reference
 - Adjust the white balance of BVM-HX310 by utilizing critical images to match the reference BVM-X300 as closely as possible
- Environment: Dark room (approx. 100 lux), Viewing distance 1.5 m
- Test images: 18 scenes (Human, Sky, Grass, etc)

<Result>

- Variations in individual perceptions was found to be around ± 0.005 xy
- The current white point of BVM-HX310 as set during factory shipment was not found to be at the average value in the range of variations (Figure 2).
- The average white point in this experiment was found to be (x, y)= (0.307, 0.320)

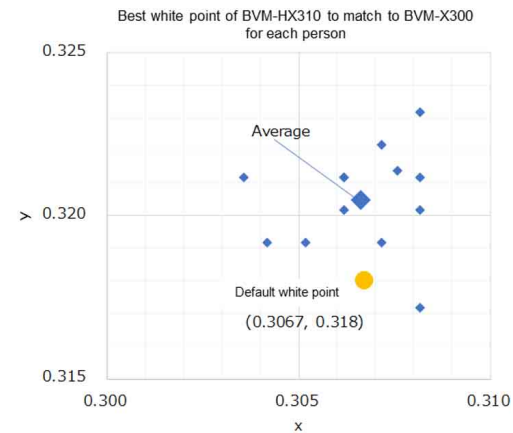


Figure 2. Result of a color matching experiment

According to the results of this latest experiment, Sony is proposing a better offset value for BVM-HX310 to color match to BVM-X300 as described below.

Model number	White point (offset value)	
	x	y
BVM-X300	0.3067 (-0.006)	0.318 (-0.011)
BVM-HX310/ BVM-HX3110	0.3067 (-0.006)	0.3205 (-0.0085)

This offset value can be applied for all EOTFs and color spaces.

However, these values do not guarantee perfect color matching because there is a wide range of variation in the characteristics of the human visual system. Please note that these values are just reference values.

4. Color matching BVM-HX3110/-HX1710/-HX1710N and BVM-X300

BVM-HX3110/-HX1710/-HX1710N have the same color gamut and spectrum as BVM-HX310, and therefore, the color matching results for BVM-HX310 from the Sony in-house color matching comparisons in Section 3 can also be used.

However, because there are also differences in how each person's eyes perceive color, it is not necessarily possible to achieve a perfect color match using these recommended values. Therefore, regard these values as merely reference values when color matching monitors.

Model	Recommended white point (offset value)	
	x	y
BVM-X300	0.3067 (-0.006)	0.318 (-0.011)
BVM-HX310/ BVM-HX3110/ BVM-HX1710/ BVM-HX1710N	0.3067 (-0.006)	0.3205 (-0.0085)

5. Color matching BVM-HX310/-HX3110/-HX1710/-HX1710N and PVM-X3200/-X2400/-X1800, LMD-A240/-A180

Sony released the Grade 2 4K HDR-compatible picture monitors PVM-X2400 and PVM-X1800 on 9/4/2020 and PVM-X3200 with the same characteristics on 10/4/2021. Like LMD-A240, which had already been released, these products feature the same color gamut as BVM-HX310. BVM-HX3110 and LMD-A180 (released in 2023) and BVM-HX1710/-HX1710N (released in 2025) also have the same feature (see Figure 3).

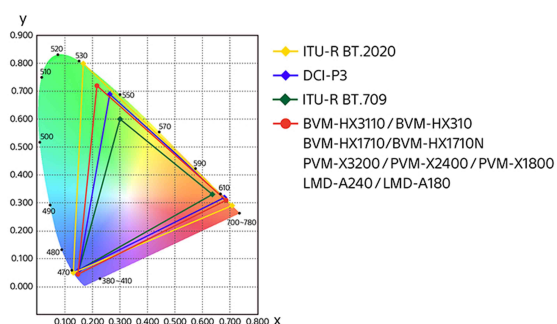


Figure 3. xy color chart

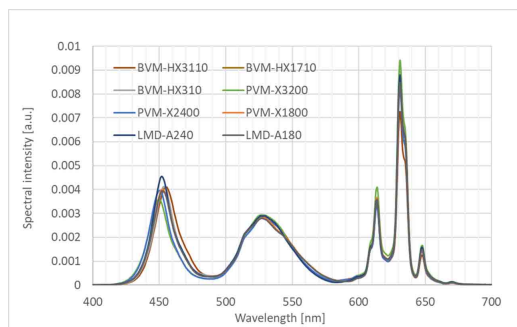


Figure 4. Comparison of spectrum

In addition, with the spectrums of these nine models almost being in the same shape, monitor series can be easily color matched by adjusting the monitors to the same white chromaticity point as the master monitor, BVM-HX series, providing seamless synchronization and consistent color reproduction.

The white chromaticity point at the time of shipment is as follows. If you change the white chromaticity point on one of the models, change the setting on the other models as well.

Model	White point at time of factory shipment (offset value)	
	x	y
BVM-X310/ BVM-HX3110/ BVM-HX1710/ BVM-HX1710N/ PVM-X3200/ -X2400/-X1800	0.3067 (-0.006)	0.318 (-0.011)

