SpectraCal

CalMAN
Setup Guide

CalMAN Client 3

User Guide

Rev. 1.3

PORTRAIT
DISPLAYS

Contents / Document Navigation

Click on a section heading below to jump to that section of this document.

Introduction

CalMAN Client 3 is a calibration utility application that is used with CalMAN to help create and manage monitor calibration profiles on Windows and Mac computers. CalMAN Client 3 is always installed on the same computer as the monitor to be calibrated. Both a Windows version and a Mac version of Client 3 are available.

Client 3 Use Cases

RGB Monitor Profile Calibration

The primary use for Client 3 is calibrating RGB computer monitors that are normally driven from the standard graphics adapter on a Windows or Mac computer. The graphics adapter drives these monitors with a full range of RGB signal levels (0-255/8-bit; 0-1023/10-bit).

CalMAN Client 3 serves three main functions when calibrating these RGB computer monitors:

1. It functions as a test pattern source, producing appropriate test patterns on a monitor under test, as commanded by CalMAN.

2. It functions for display control, receiving calibration data from CalMAN and writing the data to a monitor profile in the computer operating system.

3. It functions as a monitor profile manager, running as a resident menu bar or task bar app on the target computer to manage monitor profiles that have been created, including loading the current profile at system startup/sleep awaken and allowing end users to easily switch between available monitor profiles.

CalMAN calibrates RGB computer monitors by creating a 1D LUT grayscale ramp and an ICC color profile. It writes this calibration data to a selected monitor profile in the target computer's operating system.

Non-Profile Calibration

Another use for Client 3 is calibrating RGB monitors or projectors that are normally driven from the standard graphics adapter on a Windows or Mac computer, but that aren't being calibrated by creating and saving a monitor profile to the computer operating system.

The monitor or projector may instead be calibrated by adjusting controls within the display itself. Or, the display may be calibrated by creating a 3D calibration LUT and loading the LUT data into the display or into a LUT processor in the input signal path.

In this case, Client 3 will be used only as a CalMAN-controlled test pattern source, producing test patterns on the display under test as required. The operator might then make manual adjustments to the display, or might use CalMAN to automatically create a calibration LUT.

Video Monitor Calibration

If you need to calibrate a video monitor that is driven by a computer through a video output adapter (e.g. AJA or Blackmagic Design), rather than from its standard RGB graphics adapter, see the Video Output Adapters section, below.

Client 3 Installation

Jump to Contents / Navigation

You need to install Client 3 on each computer that has a laptop screen or one or more RGB monitors that you wish to calibrate that are driven from the computer's standard graphics adapter.

Install CalMAN Client 3 by downloading the installer from the Client 3 Downloads page to the computer that is driving the monitor(s) to be tested or calibrated. Run the installer on the target computer. http://calman.spectracal.com/calman-client-3-download.html

NOTE: If you are updating from a version of Client 3 that is older than 3.0.2.73, uninstall the existing version of Client 3 before installing the new version. To check the current version of Client 3, right-click on the Client 3 shortcut icon on the menu bar or task bar, then select About (Figure 1).
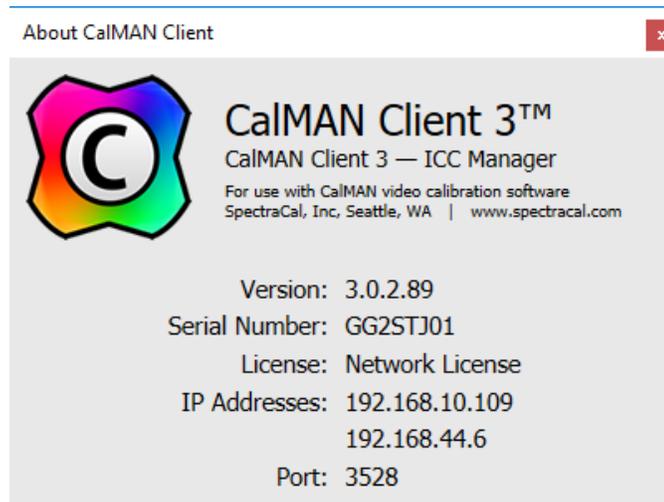

Figure 1. CalMAN Client 3 About screen.

Client 3 System Requirements:

Windows System Requirements: Windows® Vista™ or later, with latest operating system updates installed.

Mac System Requirements: Macintosh® OS X 10.8.x or later, with latest operating system updates installed.

Note 1: If you are using OS X Yosemite, version 10.10.2 or later is required.

Note 2: A legacy install of Client 3 for Mac is available for OS X Lion 10.7.x

Client 3 Monitor Profiles

Jump to Contents / Navigation

Each time Client 3 starts, it automatically detects which monitors and/or laptop screen are currently being driven from the computer's standard graphics adapter. For each newly detected monitor, Client 3 creates one or more default, uncalibrated monitor profiles (different default profiles for CalMAN Business, Medical, GEO, etc.). You can view the profiles for each monitor in two different ways.

When you right-click the Client 3 icon in the computer menu bar or task bar, then hover your mouse over one of the listed monitors, you will see a menu similar to figure 2, below. From this popup menu, you can select either a default monitor profile or a custom profile that you have created for each listed monitor (more on this below). Any of these profiles can also be selected within CalMAN when you are ready to test or calibrate a monitor profile.

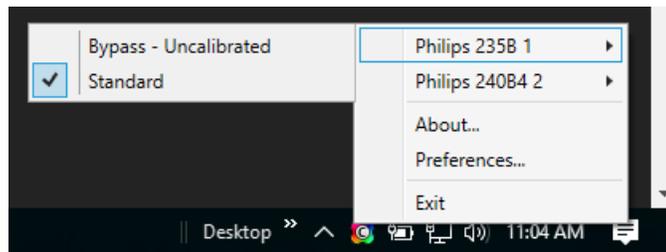*Note: Laptop screens will usually be listed as a type of generic device.*

Figure 2. Client 3 monitor profile selection popup.

To view information for each of the monitors, and to manage the monitor profiles for each of the monitors, select *Preferences* from the Client 3 popup menu. The following Client 3 *Preferences* dialog then appears (Figure 3).
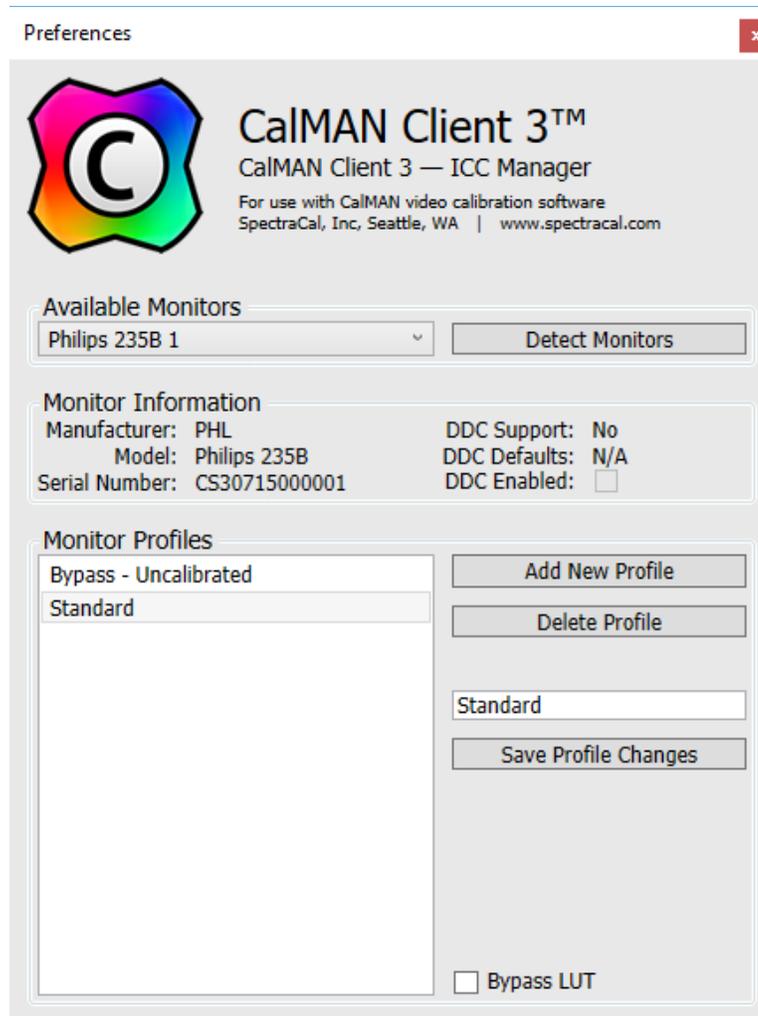
Figure 3. Client 3 Preferences screen.

You can select your desired monitor from the *Available Monitors* drop down list (Figure 4). The current information for your selected monitor will be displayed in the *Monitor Information* and *Monitor Profiles* sections. You can click the *Detect Monitors* button to refresh the *Available Monitors* list if a monitor has just been connected or disconnected on the computer. Only those monitors connected through the computer's standard graphics adapter can be detected.
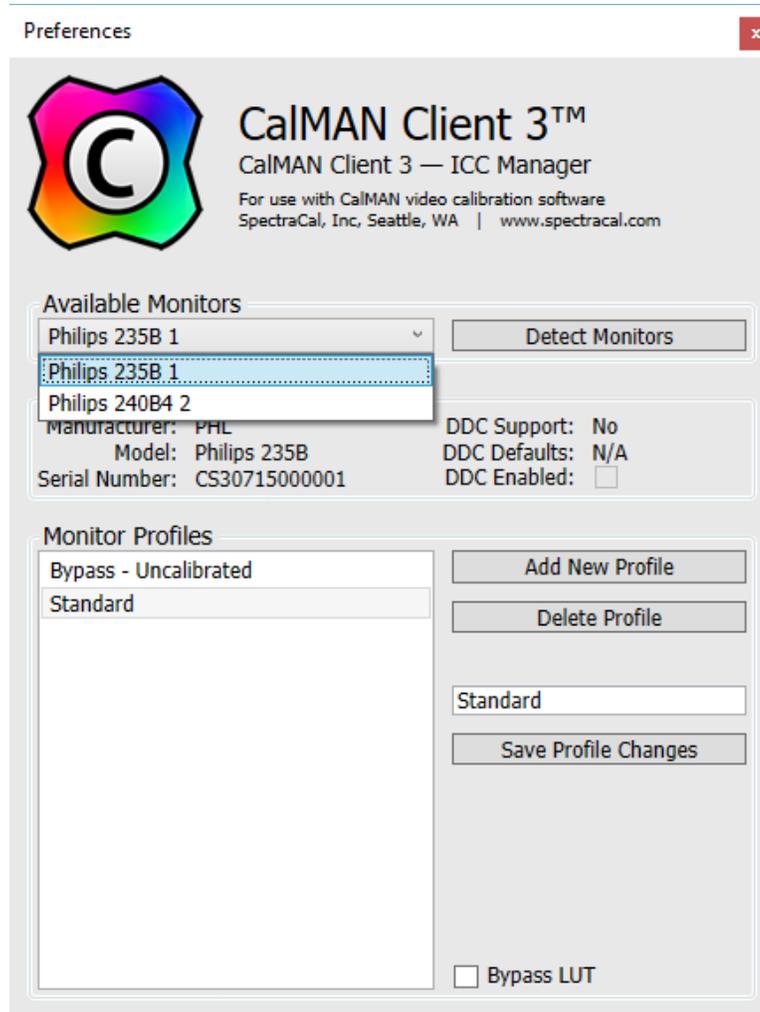
Figure 4. Client 3 Available Monitors drop down selection.

In the *Monitor Information* section of the dialog (Figure 5), there is also information about the monitor's support for DDC and a check box to enable DDC for the currently selected monitor. For more information on monitor DDC, see Appendix A – Monitor DDC, below.

The *Monitor Profiles* section of the *Preferences* dialog (Figure 4) lists the current profiles for the selected monitor. You can add a profile, delete a profile, or rename a profile using the buttons and text field on the right side of the *Monitor Profiles* section.
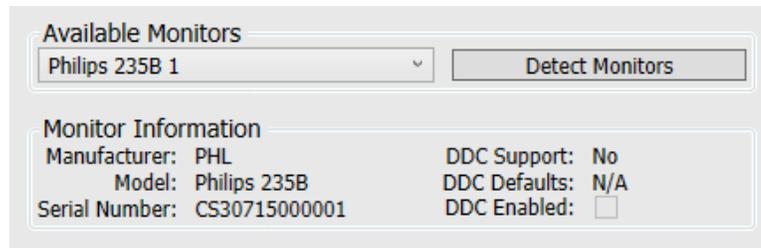
Figure 5. Client 3 Available Monitors section.

Each of the monitor profiles can be calibrated separately by CalMAN. You might want to create multiple profiles to meet your different monitor performance needs. For example, you might need individual Rec. 709, sRGB, and Adobe RGB monitor profiles. You can create and name those profiles in the Client 3 *Preferences* dialog and then individually select and calibrate each profile with CalMAN, with the appropriate calibration targets selected in CalMAN.

CalMAN Installation

Jump to

If you are going to calibrate monitors on only one computer, you will install both Client 3 and CalMAN on the computer to be calibrated.

If you are going to calibrate monitors on more than one computer, CalMAN should be installed and licensed either on one of the computers to be calibrated, or on a separate, roaming "CalMAN calibration laptop." In this case, CalMAN will connect remotely to the Client 3 install on the computer currently under test, over the local Wi-Fi network.

Client 3 is available both as a Windows version and as a Mac version. CalMAN, however, runs only under Windows. If you need to run CalMAN on a Mac computer, see the Virtual Machines and Boot Camp section, below.

CalMAN Workflows

The following CalMAN workflows are used when calibrating RGB computer monitors with CalMAN and Client 3.

- Monitor Standard

- Monitor Advanced

- Monitor Direct (EIZO/HP)

The Monitor Standard and Monitor Advanced workflows are used to calibrate standard RGB monitors with a 1D LUT grayscale ramp and an ICC Profile saved to the monitor profile. Monitor Standard is a simple 4-click workflow with default sRGB industry standard targets. Monitor Advanced provides additional flexibility in monitor configuration and calibration targets.

The Monitor Direct workflow is used to calibrate EIZO and HP RGB monitors that accept 1D LUT grayscale ramp and color matrix calibration data to be automatically loaded directly into the monitor. An ICC Profile is then saved to the monitor profile.

Connecting CalMAN to Client 3

When using CalMAN to calibrate RGB computer monitors that are driven from the standard graphics adapter on a Windows or Mac computer, CalMAN connects to Client 3 in two modes.

PORTRAIT
DISPLAYS

- Using Client 3 as a test pattern source.

- Using Client 3 for display control.

CalMAN connects to Client 3 over a socket communication link, using an IP address and a port number. The computer running CalMAN and the computer to be calibrated, which is running Client 3 (if they are not the same computer), need to be on the same local network, on the same subnet.

To connect CalMAN to use Client 3 as a test pattern source:

1. On the CalMAN *Source Settings* tab, click the *Find Source* button.

2. On the popup *Find Source* dialog (Figure 6), under *Manufacturer*, select "SpectraCal." Under *Model*, select "SpectraCal – CalMAN Client 3 Pattern Generator (Ethernet @3528)."

3. In the search box at the bottom of the dialog, select the computer name that corresponds to your current computer under test. If there are two IP addresses listed for your desired computer (as seen below), select either IP address.
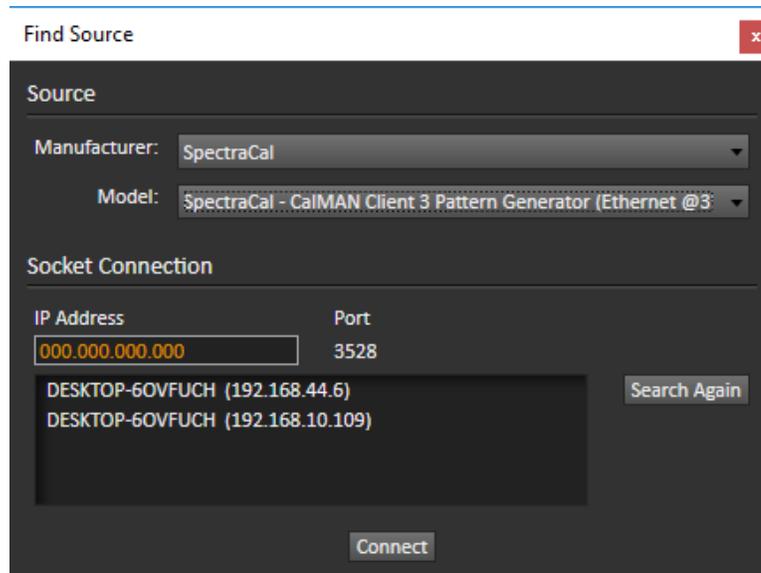
4. Click *Connect*.

Figure 6. CalMAN Find Source dialog.

Note: If you are connecting CalMAN to Client 3 on the same computer, you can use the IP address 127.0.0.1. This is the localhost IPv4 loop back address for internal connection and does not require a local network.

To connect CalMAN to use Client 3 for display control:

1. On the CalMAN *Display Control* tab, click the *Find Display* button.

2. On the popup *Find Display* dialog (Figure 7), under *Manufacturer*, select "SpectraCal." Under *Model*, select "SpectraCal – CalMAN Client 3 Display Profiler (Ethernet @3528)."

3. In the search box at the bottom of the dialog, select the computer name that corresponds to your current computer under test.
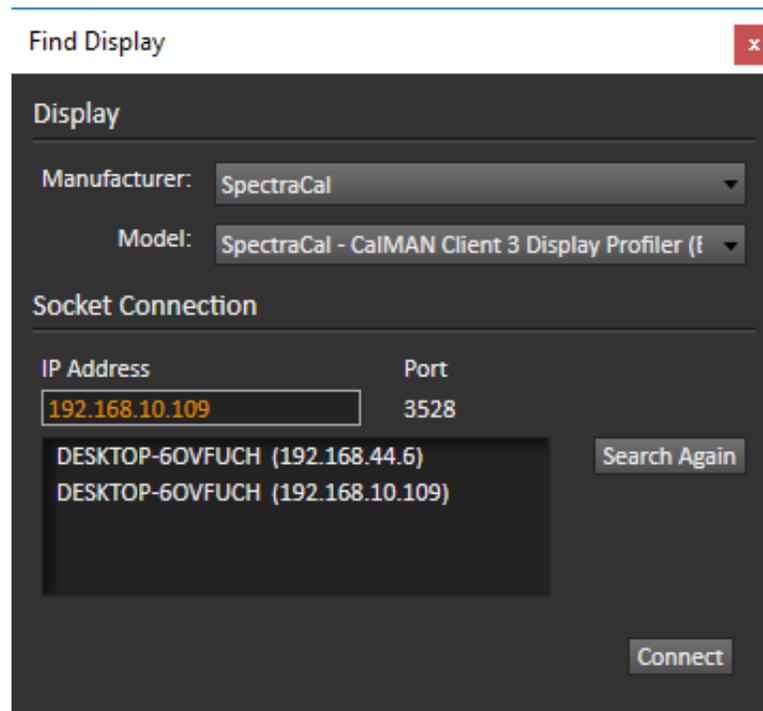
4. Click *Connect*.

Figure 7. CalMAN Find Display dialog.

Client 3 Licensing

Each Client 3 installation needs to be licensed to be able to connect to CalMAN for display control. The first time that CalMAN connects to an unlicensed Client 3 installation for display control, a Client 3 license is authorized and dispensed through CalMAN.

No client license is required to use Client 3 only as a test pattern source.

When CalMAN connects to a Client 3 installation for display control, it first checks whether that Client 3 installation has been previously licensed. If not, a Client License dialog (Figure 8) will inform you that the client is not yet licensed. The dialog will also indicate how many client licenses remain available in CalMAN. If you wish to use one of your available client licenses to license the new client, click the Authorize button.
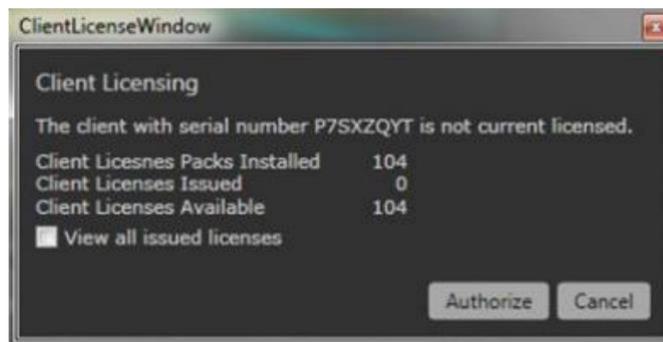

Figure 8. CalMAN Client License Window.

Only one license is required for each Client 3 installation, regardless of the number of monitors controlled.

Your number of available Client licenses is also available in CalMAN. On the main CalMAN menu, select "Licensing." On the popup *Licensing* dialog (Figure 9), look under *Client Licenses Available*.
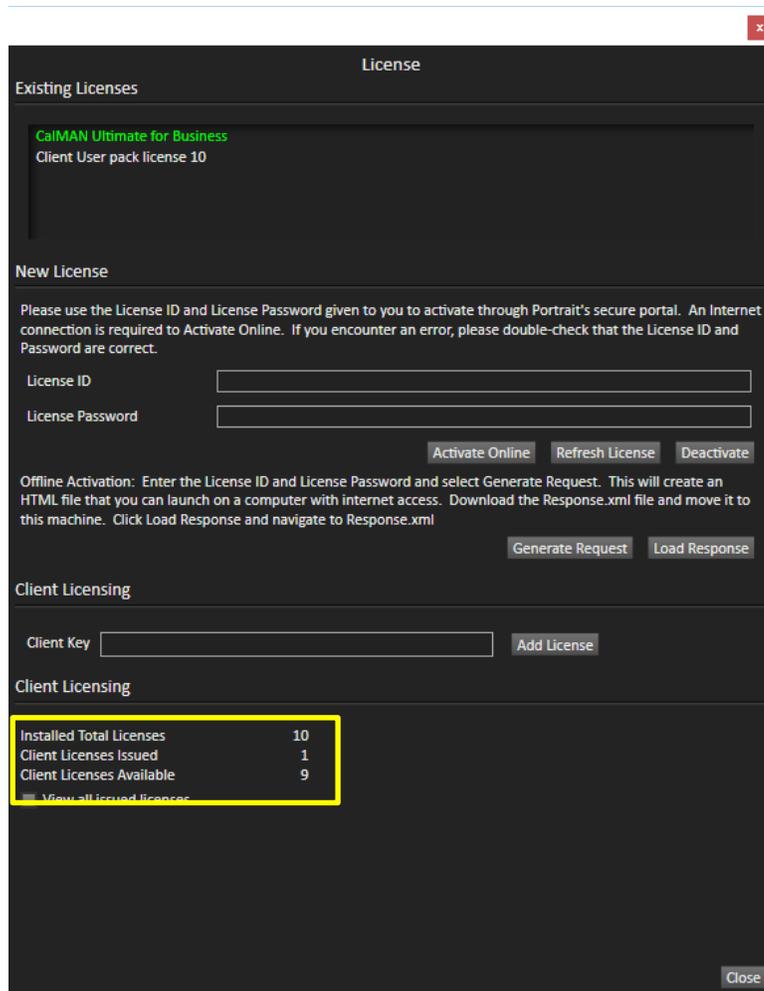
Figure 9. CalMAN License dialog.

Different versions and license levels of CalMAN are originally supplied with different numbers of Client 3 licenses. When you have used all the originally-supplied Client 3 licenses and need to license additional Client 3 installations, you will then need to purchase additional Client 3 licenses and load them into CalMAN. You can purchase client licenses here.

http://calman.spectracal.com/store/p17/CalMAN_Client_3_Add-On_License.html

Client 3 Profile Management

Jump to

After CalMAN testing or calibration is complete, Client 3 remains as an active tray application on the installed computer. Each time the computer is booted, Client 3 automatically loads the last selected CalMAN profile for each of the connected monitors.

To select a different calibration profile for one of the monitors, right-click on the Client 3 icon, hover the mouse over the desired monitor listing, and the current list of profiles for that monitor will be displayed, with the currently active profile checked (Figure 10). To select one of the other monitor profiles, click on the desired profile.
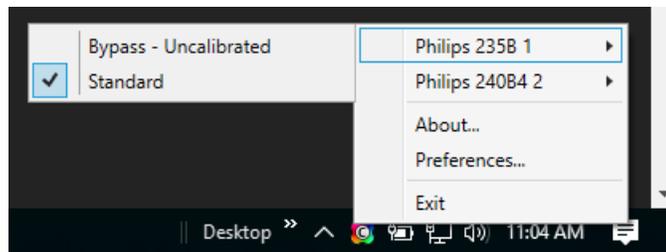

Figure 10. Client 3 monitor profile selection popup.

Virtual Machines and Boot Camp

Jump to Contents / Navigation

Client 3 needs to be installed on the same computer/OS that is driving the monitor under test. If that is a Mac computer, Client 3 for Mac needs to be installed on the Mac OS.

If you wish to also install CalMAN on the Mac computer, you can do so, but CalMAN would need to be installed on a virtual machine on the Mac, running under Windows OS. In this case, Client 3 should not be installed on the virtual Windows OS, as that OS will not be driving any monitors.

Or, CalMAN can be installed on Windows on a separate, remote computer (i.e. a dedicated calibration laptop). That separate computer could be a Windows PC, a Mac computer running Windows on a virtual machine, or a Mac computer running Windows in a Boot Camp partition.

For more information on running CalMAN under VMware Fusion, see the following guide:

http://www.spectracal.com/Documents/QSGs/VMware%20Fusion%20CalMAN%20Setup%20Guide.pdf

Client 3 Video Tutorials

Jump to Contents / Navigation

Here are some video tutorials on calibrating RGB monitors on Mac or Windows computers with CalMAN and Client 3.

How to Connect to CalMAN Client 3 (Windows): https://www.youtube.com/watch?v=9UyMjtEynpc

How to Connect to CalMAN Client 3 (Mac): https://www.youtube.com/watch?v=63wPqf5Qr9Y

Calibrating Computer Monitors Over the Network: https://www.youtube.com/watch?v=LuLOlqwfN1Q

Windows Computer Monitor Calibration Over the Network: https://www.youtube.com/watch?v=mkRlCfIC7UM

Mac Computer Monitor Calibration Over the Network: https://www.youtube.com/watch?v=dkxx_5psgik

Studio Monitor Calibration Software: https://www.youtube.com/watch?v=eFev_TR8kGI

Studio Lite Monitor Calibration Software: https://www.youtube.com/watch?v=KdmIKFU4D88

Studio Express Monitor Calibration with ASSIMILATE SCRATCH and DaVinci Resolve: https://www.youtube.com/watch?v=eOAB3QvwlN8

Mobile Devices

Jump to Contents / Navigation

Client 3 is not available to run on iOS or Android mobile devices.

However, the SpectraCal MobileForge app is a test pattern generator that runs on iOS, Android, and Fire TV devices under remote control from CalMAN. MobileForge is available on the Apple App Store and on the Android Play Store. MobileForge runs on Apple and Android devices to provide test patterns on the mobile device for screen measurements, however, there is currently no provision to store screen calibration data in any mobile device.

The MobileForge test patterns can also be streamed or direct connected to a television with many iOS and Android phones or tablets. Or the test patterns can be mirrored to a television with an Apple TV or an Amazon Fire Device (limited to US, Canada, and UK availability from Amazon). This allows the MobileForge test patterns to be used for CalMAN automated television measurements.

For more information on MobileForge, see the following guide:

http://www.spectracal.com/Documents/QSGs/SpectraCal%20MobileForge%20QuickStart.pdf

Video Output Adapters

A video monitor may be driven by a computer through a video output adapter (e.g. AJA or Blackmagic Design). The video output adapter converts the computer RGB output signal to a YCC video signal with a limited (SMPTE) range of signal levels (16-235, 8-bit; 64-940, 10-bit).

CalMAN Client 3 cannot address monitors that are driven by a computer through a video output adapter. To calibrate one of these computer-driven video monitors, you will need an alternate test pattern source.

One alternate test pattern source could be SpectraCal VirtualForge software. VirtualForge runs on the target computer (Windows or Mac) and controls the AJA or Blackmagic video output adapter to produce reference level test patterns. CalMAN connects to VirtualForge over the local network to automatically switch test patterns as required.

Another test pattern source could be a hardware pattern generator, such as the SpectraCal VideoForge PRO. During a calibration, the video monitor would be disconnected from the video output adapter and instead connected to the signal output of the pattern generator. CalMAN would then connect to the generator to automatically switch test patterns as required.

Another test pattern source could be DaVinci Resolve software, from Blackmagic Design, in a case where DaVinci Resolve is already being used on the computer for editing or color correction. CalMAN Studio can control DaVinci Resolve over the local network to produce and automatically switch reference level test patterns as required.

Windows® Display Scaling

Microsoft Windows provides a capability of scaling the size of all text and graphics on the desktop. This is especially helpful on high resolution displays that otherwise produce very small desktop icons and text.

However, when Client 3 renders test patterns to a scaled display, the Client 3 test pattern is larger than the screen and offset to the lower-right, so pattern measurement points aren't in their expected location and can possibly be entirely off the screen.

Workarounds

There are two possible workarounds to the Client 3 test patterns being scaled improperly.

1. Disable Windows scaling during calibration and then re-enable scaling after calibration.

   A display's calibration results will be the same whether measurements are taken from a scaled or non-scaled screen. The Windows scaling controls are located in the following locations.

   Windows 7, 8.1 - Control Panel\Display
   Windows 10 - Settings\Display

2. Select Full Field 100% test patterns for Client 3.

   The display screen will be filled with the desired color or grayscale level, even though part of the pattern is actually off screen. This works for electronic measurement patterns, but not for visual evaluation patterns.

Appendix A – Monitor DDC

Jump to

What is DDC?

For certain computer monitors, CalMAN RGB and the computer monitor calibration workflows included in CalMAN Enthusiast, CalMAN Studio Lite, CalMAN Studio and all of the CalMAN for Business products have the capability of automatically controlling your monitor's internal settings from within the CalMAN application. In other words, if your computer monitor includes picture settings such as contrast, color temperature or RGB cuts/gains, CalMAN may be able to adjust those settings automatically and save those presets within your Client 3 profiles. This feature is called DDC, or Display Data Channel (actually, DDC/CI; Display Data Channel/Command Interface).

DDC support is not the same as CalMAN's ability to automatically calibrate computer monitors with 1D LUTs and ICC profiles. DDC is in no way required for a successful computer monitor calibration. If your monitor does not support DDC, you can still adjust its settings manually with each calibration.

Why use DDC?

DDC provides a level of convenience for those monitors that support DDC and include adjustable picture settings. If DDC works for your monitor, it enables on-screen manual software controls for the monitor picture controls (brightness, contrast, RGB gain, etc.). This allows you to make monitor picture control adjustments on the CalMAN workflow page, rather than having to open the monitor OSD menu.

You can also adjust some of the monitor's settings automatically within CalMAN, as opposed to making adjustments manually. Additionally, any adjustments made with DDC are saved to Client 3 with your calibration profiles, so you can have different internal picture settings for each profile.

Is using DDC more accurate than making manual adjustments?

The short answer is no, DDC is simply more convenient. Manual adjustments can be perfectly accurate in the case of computer monitor calibrations, and making these manual adjustments when DDC is unavailable in no way

compromises the quality of the final results. Because CalMAN still creates a 1D LUT and ICC profile for *every* computer monitor regardless of whether DDC is enabled or not, internal picture settings adjustments of computer monitors do not have to be as detailed as with HDTV calibrations, and in many cases do not even need to be touched.

How do I know if my computer monitor supports DDC?

CalMAN's ability to directly control monitor settings varies on a case-by-case basis by monitor, so the only way to tell if your monitor supports DDC is to test it in CalMAN's computer monitor calibration workflows. With the release of CalMAN 5.4.1, DDC is disabled by default, so the first step will be to enable it in CalMAN Client 3.

How to Enable DDC in CalMAN Client 3

1. Right click on the Client 3 icon in your system tray (for Mac OS X, top right; for Windows, bottom right) and select *Preferences*.

2. Check the box labeled "DDC Enabled."

3. Close the Preferences window.

4. Proceed to the steps below to check for DDC operation in CalMAN's computer monitor workflows.

How to Check for DDC Support in CalMAN RGB

1. Open the *Monitor - Advanced* workflow in CalMAN RGB or one of the other CalMAN products with support for computer monitor calibrations.

2. Follow the setup instructions until you reach the *Client Connect* workflow page. Use the instructions on this page to connect to CalMAN Client 3 as your calibration client. If you are already connected to Client 3, disconnect and reconnect using the *Display Control* tab to ensure CalMAN reflects the changes made to the Client 3 preferences.

3. Click *Next* until you reach the *Dynamic Range* page.

Adjusting Dynamic Range

On the Dynamic Range page in the *Monitor - Advanced* workflow, DDC controls appear only if a.) your computer monitor includes internal contrast controls *and* b.) those controls can be adjusted from within CalMAN RGB.

The process for properly setting Dynamic Range is outlined on the left-hand side of the workflow page. If your computer monitor supports DDC adjustments for Contrast, the controls will appear in the bottom right-hand corner of the screen, and you can make your adjustments there.

If DDC controls are not available, continue to use the same set of instructions but adjust Contrast manually.

There is currently no AutoCal feature for Contrast settings.

Adjusting White Point

On the *Monitor Optimization* workflow page, the instructions on the left-hand side of the page will change, depending on whether you have DDC enabled or not. When DDC is not enabled, the instructions will direct you on how to adjust your monitor's RGB cuts/gains or color temperature settings manually. When DDC is enabled in Client 3 and recognized by CalMAN for your computer monitor, the instructions will direct you to adjust your monitor's settings with the *AutoCal* button.

If using *AutoCal* to adjust these settings provides undesirable results, simply follow the instructions on the left-hand side of the workflow page for disabling DDC in Client 3 and adjusting your monitor's settings manually.

Adjusting Luminance

The *Luminance Adjust* page of the *Monitor - Advanced* workflow provides instructions for adjusting your monitor's brightness/backlight control.

By default, all laptop monitors include DDC capabilities for the brightness/backlight settings. Therefore, if you are connected to a laptop monitor with Client 3, DDC controls will always be enabled for backlight and you will be able to use *AutoCal* to automatically adjust your monitor's settings.

If you are not calibrating a laptop monitor, DDC may or may not be supported for your monitor's backlight settings. If it is not, follow the instructions on the

left-hand side of the workflow page for adjusting your monitor's brightness/backlight manually.

When should DDC be Disabled?

A disadvantage of enabling DDC support is that, even when DDC support is indicated, monitors often don't fully conform to the DDC/CI specifications. This often leads to unpredictable or seemingly intermittent monitor operation during calibration. This is the reason that SpectraCal decided to disable DDC support in Client 3 by default.

If you find that the behavior of the DDC controls in CalMAN produce adverse effects, then we recommend disabling DDC in Client 3 and adjusting your monitor's internal picture settings manually. No other CalMAN functions are affected by disabling the DDC support.

How to Disable DDC

1. Right click on the Client 3 icon in your system tray (for Mac OS X, top right; for Windows, bottom right) and select *Preferences*.

2. Uncheck the box labeled "DDC Enabled."

3. Close the *Preferences* window.

4. Disconnect from and re-connect to CalMAN Client 3 in the *Advanced - Monitor* workflow to ensure CalMAN recognizes the changes made to Client 3's preferences.

About / Contact

About Portrait Displays

Portrait Displays, Inc., since 1993, is a leading application software provider (ASP) for PC, smartphone, and tablet displays. The Portrait Displays team now includes **SpectraCal**, the world's leading provider of video display calibration software. The combined companies offer value-added, feature-rich solutions to both OEM display manufacturers and end users seeking improved accuracy and manageability of their displays.

Portrait Displays, an Intel Capital Portfolio company, is a private corporation with headquarters in Pleasanton, California, USA with representatives in Europe, Taiwan, China, Japan, and Korea.

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PORTRAIT
DISPLAYS

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