



Lumagen Radiance Pro 424x series, 444x series CalMAN Setup Guide

The Lumagen Radiance™ Pro 424x and 444x series video processors provide controls to calibrate a 1D LUT for grayscale, calibrate a 3D LUT for SMPTE video level signals, or calibrate standard CMS primary and secondary color points. The Radiance Pro processors provide a 4913 point (17x17x17) 3D LUT.

NOTE: The Radiance Pro models are not suitable for creating a 3D LUT for use with full range/PC levels.

The Lumagen Radiance™ Pro processors support Rec. 2020 color space and the BT.2084 HDR EOTF.

Note: The Radiance Pro is suitable for use as an HDR test pattern generator. We do not yet recommend HDR AutoCal with the Radiance Pro.

CalMAN can calibrate a display by automatically adjusting the Radiance Pro 1D LUT grayscale/gamma controls, automatically profile the display performance, create a 3D color calibration LUT, and then load the 3D LUT data into the Radiance Pro processor.

Or, CalMAN can automatically adjust the Radiance Pro 1D LUT grayscale/gamma controls and then adjust its CMS primary and secondary color controls.

Recommended CalMAN Workflows:

- Color Cube (3D LUT) to calibrate Radiance Pro grayscale/gamma controls and create a 3D color calibration LUT, or
- HT Advanced or SI Advanced to calibrate Radiance Pro grayscale/gamma controls and CMS color controls.

Required Radiance Pro Firmware:

- Version 092316, or newer. Updates available at:
http://www.lumagen.com/testindex.php?module=radiancepro_updates

Radiance Pro Control Connection:

- USB cable (serial cable can be used, at slower speed)
- Serial cable: DB-9 female to DB-9 female null-modem RS-232 cable (pin2 to pin3, pin3 to pin2)

Note: Radiance RS-232 Echo must be On for either USB or serial control.

- Menu > Other > I/O Setup > RS-232 Setup > Echo: On

Device Driver Pack download:

SpectraCal provides a compiled pack of device drivers for most of the hardware devices supported by CalMAN, including the Lumagen Radiance Pro.

This Device Driver Pack is available on the SpectraCal Downloads page, or with the following download link: <http://www.spectracal.com/download.php?id=3>

Select the desired type of calibration:

[Radiance Pro Setup for 1D LUT and 3D LUT Calibration](#)

[Radiance Pro Setup for Grayscale and Primary/Secondary CMS Calibration](#)

Radiance Pro Setup for 1D LUT and 3D LUT Calibration:

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CalMAN can calibrate the 1D LUT and the 3D LUT in the Radiance Pro and automatically load the LUT data into the Radiance Pro. To do so, in the Radiance Pro menu, set the Color Gamut Options to Enabled and select the number of 3D LUT Points:

- Menu > Output > CMS's > [CMS] > Color Gamut > Options > Enabled; Yes
- Menu > Output > CMS's > [CMS] > Color Gamut > Options > Points; [per model]

CalMAN Color Cube (3D LUT) Workflow

The Color Cube workflow in CalMAN is used to create display calibration 3D cube LUTs. In the CalMAN main menu, select Open Workflow Template / Color Cube (3D LUT). Proceed through each step of the Color Cube workflow in a normal fashion, using the following notes for Radiance Pro specifics.

1. Initial Setup section

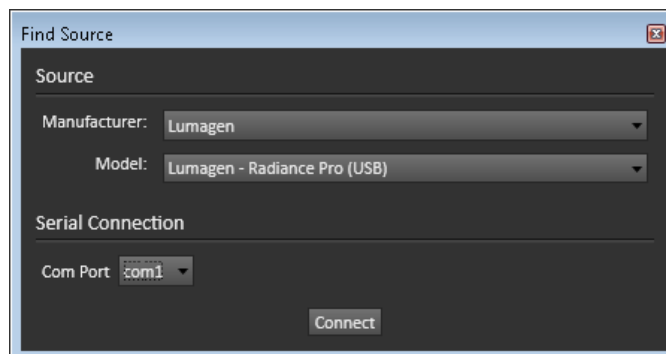
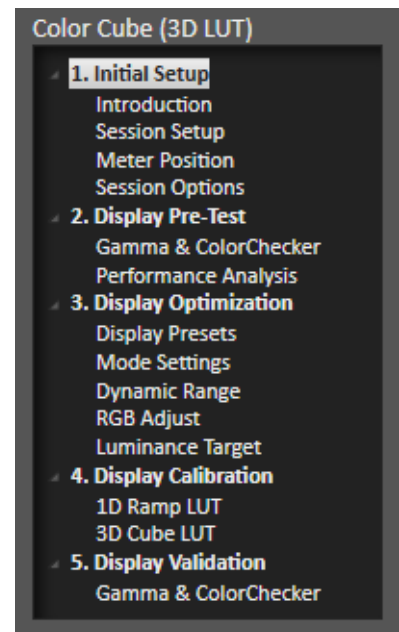
In the Initial Setup section of the Color Cube workflow, step through the following pages:

1. Session Setup - Meter Connect

- Connect your color meter to the CalMAN computer.
- On the *Session Setup* page, click the *Find Meter* button to connect your meter.
- On the *Find Meters* dialog, select your meter if it is listed, then click Search. If your meter is not listed on the *Find Meters* dialog, just click *Search*.
- Under the Target Display Type drop down, for a colorimeter, select the setting that corresponds to the display's backlight technology. For a spectrophotometer, no special selection is required.

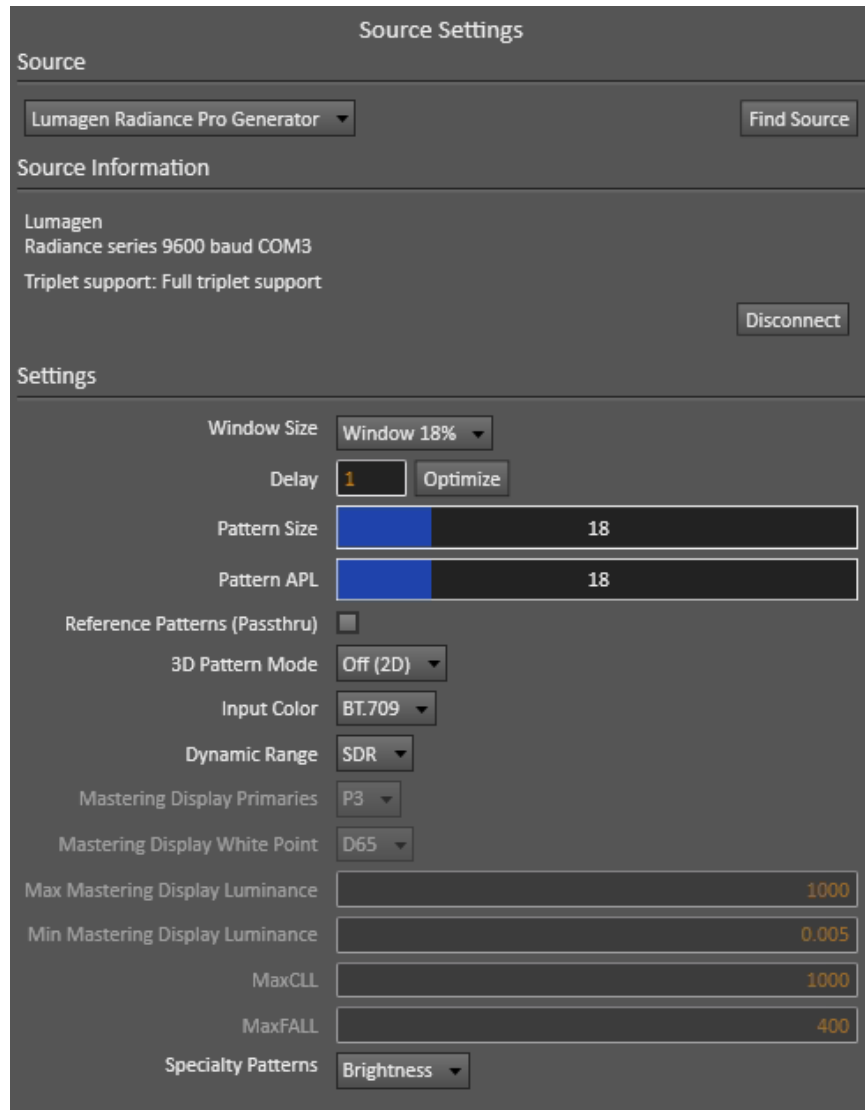
2. Session Setup - Source Connect

- On the *Session Setup* page, click the *Find Source* button.
- "On the *Find Source* dialog (shown below), under *Manufacturer*, select "Lumagen."
- Under *Model*, select "Lumagen – Radiance Pro (USB)."
- Click *Connect*.



To calibrate a standard dynamic range (SDR) HDTV display:

- On the *Source Settings* screen (shown below), for *Dynamic Range*, select “SDR.”

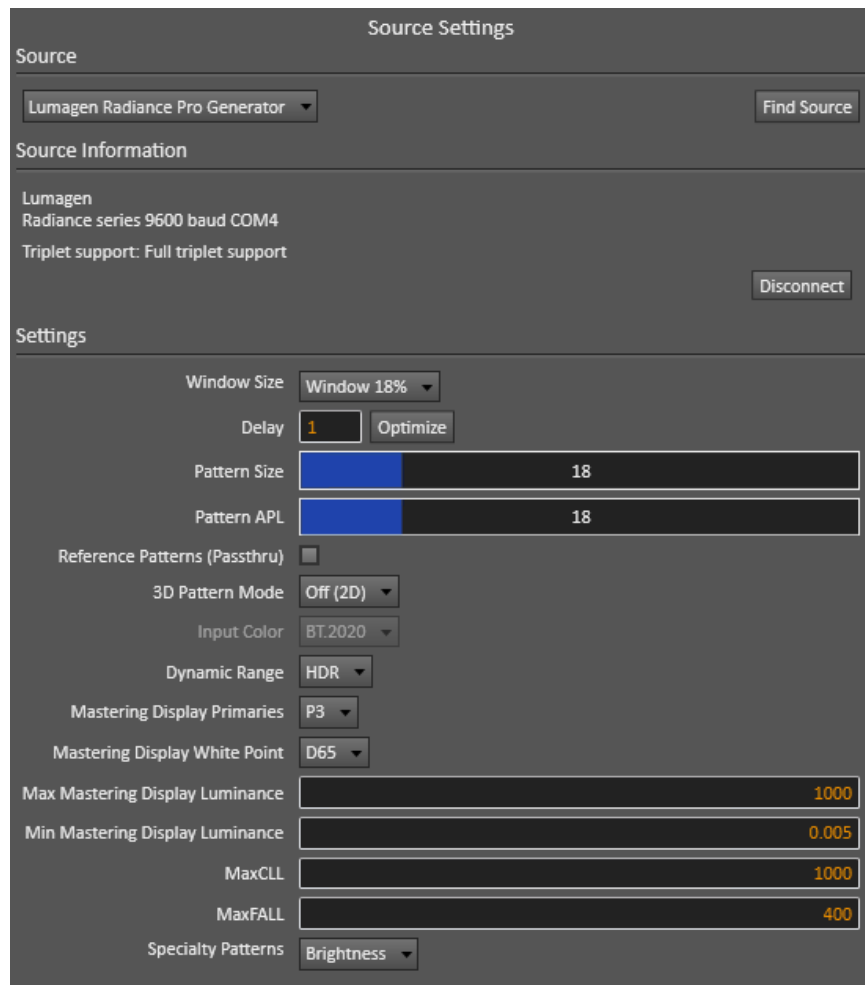


The screenshot shows the 'Source Settings' interface. At the top, the 'Source' is set to 'Lumagen Radiance Pro Generator'. Below this, 'Source Information' includes 'Lumagen Radiance series 9600 baud COM3' and 'Triplet support: Full triplet support'. The 'Settings' section contains several controls: 'Window Size' is 'Window 18%', 'Delay' is '1' with an 'Optimize' button, 'Pattern Size' and 'Pattern APL' are both '18', 'Reference Patterns (Passthru)' is unchecked, '3D Pattern Mode' is 'Off (2D)', 'Input Color' is 'BT.709', 'Dynamic Range' is 'SDR', 'Mastering Display Primaries' is 'P3', 'Mastering Display White Point' is 'D65', 'Max Mastering Display Luminance' is '1000', 'Min Mastering Display Luminance' is '0.005', 'MaxCLL' is '1000', 'MaxFALL' is '400', and 'Specialty Patterns' is 'Brightness'.

To measure or manually adjust a high dynamic range (HDR) display:

Note: The Radiance Pro is suitable for use as an HDR test pattern generator. We do not yet recommend HDR AutoCal with the Radiance Pro.

- On the *Source Settings* screen (shown below), for *Dynamic Range*, select “HDR.”
- If the display’s peak luminance is known, enter the display’s peak luminance in cd/m^2 (nits) in the *Max Mastering Display Luminance* field and in the *MaxCLL* field.

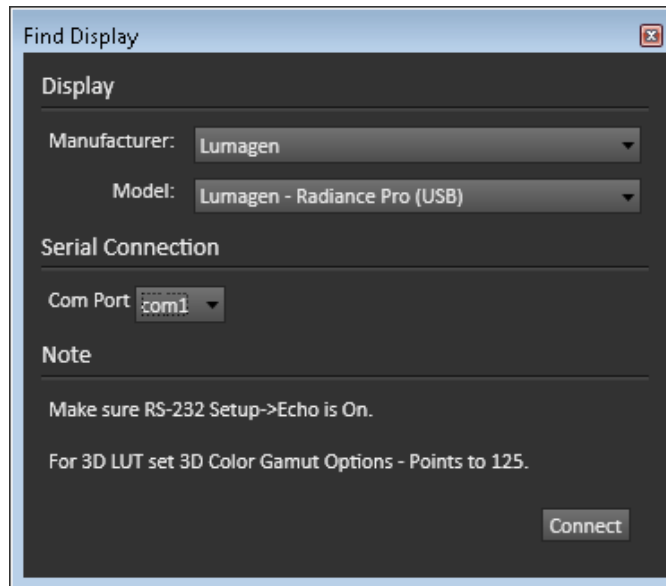


The screenshot shows the 'Source Settings' window with the following configuration:

- Source:** Lumagen Radiance Pro Generator (with a 'Find Source' button)
- Source Information:** Lumagen Radiance series 9600 baud COM4, Triplet support: Full triplet support (with a 'Disconnect' button)
- Settings:**
 - Window Size: Window 18%
 - Delay: 1 (with an 'Optimize' button)
 - Pattern Size: 18
 - Pattern APL: 18
 - Reference Patterns (Passthru):
 - 3D Pattern Mode: Off (2D)
 - Input Color: BT.2020
 - Dynamic Range: HDR
 - Mastering Display Primaries: P3
 - Mastering Display White Point: D65
 - Max Mastering Display Luminance: 1000
 - Min Mastering Display Luminance: 0.005
 - MaxCLL: 1000
 - MaxFALL: 400
 - Specialty Patterns: Brightness

3. Session Setup - LUT Device Setup

- On the *Session Setup* page, click the *Find 3D LUT Device* button.
- On the *Find Display* dialog (shown below), under *Manufacturer*, select “Lumagen.”
- Under *Model*, select “Lumagen – Radiance Pro (USB).”
- Click *Connect*.



Note: There is now a new 709 CMS Mode drop down option for the Lumagen Radiance in the DDC controls on the CalMAN Display Control panel. This option allows you to select how the Radiance applies a 3D LUT: Linear or Source (perceptual space). Linear is the default; this is how the Radiance has always worked prior to this new option.

2. Display Pre-Test section

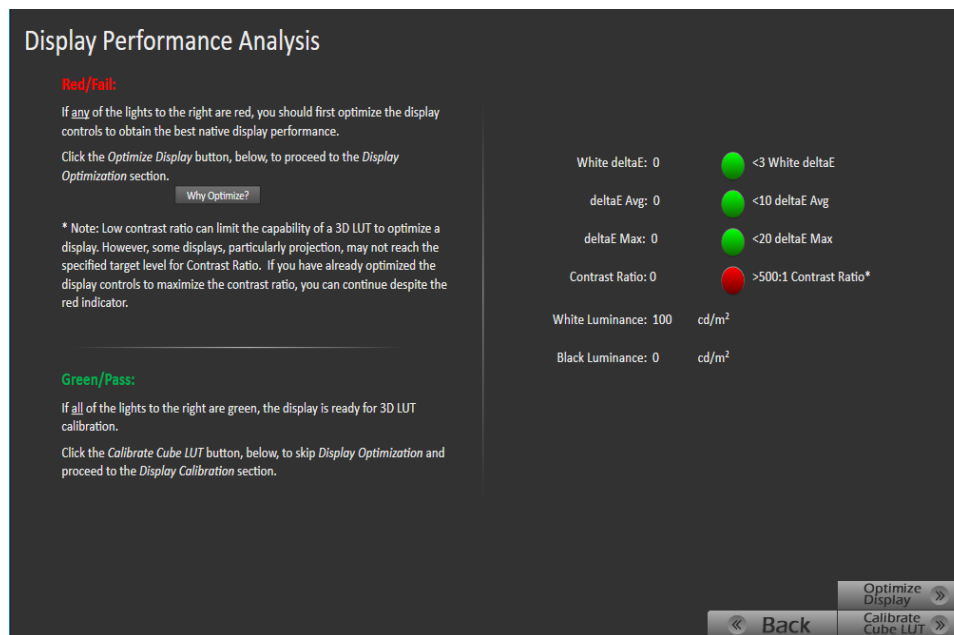
You can measure the performance of a display before you calibrate it, on the pre-test *Gamma & ColorChecker* page.

If the *Performance Analysis* page (shown below) then indicates any red pass/fail lights for the display's native performance, you can proceed to the *Display Optimization* section of the workflow to optimize the display's internal picture controls before performing the 3D LUT calibration. A few minutes spent optimizing the display's native performance typically yields a more accurate 3D LUT calibration. The degree of improvement depends greatly on the individual display.

If you skip display optimization at this time and the final calibration validation indicates less than the desired improvement, you can easily return to the *Display Optimization* section to optimize the internal display controls and then repeat the 3D LUT calibration by clicking the *Optimize Display* button on the final calibration validation page.

On the *Performance Analysis* page:

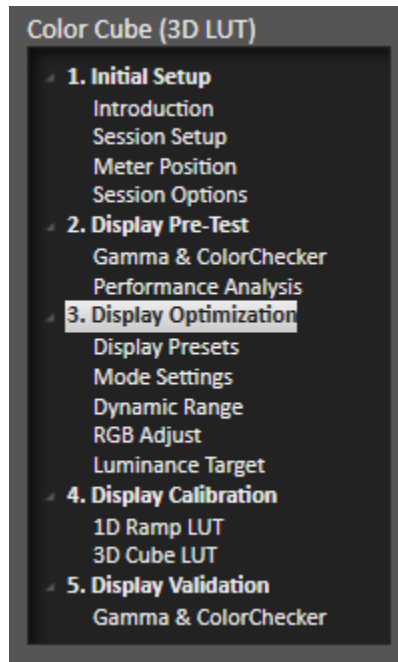
- To proceed first to the *Display Optimization* section, click the *Optimize Display* button.
- To skip directly to the *Display Calibration* section, click the *Calibrate Cube LUT* button.



The Performance Analysis page provides pass/fail analysis of the display pre-test measurements that were performed on the preceding workflow page.

3. Display Optimization section

To optimize the display's internal picture controls before creating a 3D calibration LUT, advance through the control adjustment pages in the *Display Optimization* section of the workflow (shown below).



The Display Optimization section of the workflow helps you optimize the display's picture controls if there were any display performance failures, or if you have previously created a 3D LUT for the display with less than the desired improvement.

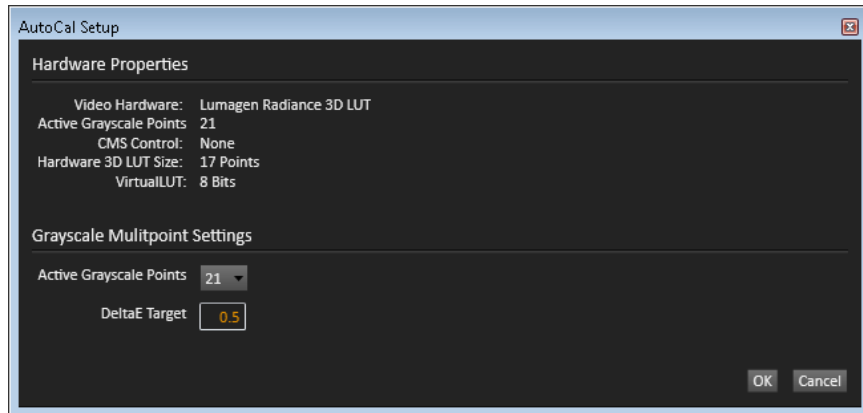
On the *RGB Adjust* page, under the *RGB Adjust Levels* selection, select "2 Point 30, 100%." Click *Read Continuous* and adjust the display's RGB Gain controls for RGB balance at 100%. If the display provides RGB Offset/Bias controls, adjust them for RGB balance at 30%.

4. Display Calibration section

In the *Display Calibration* section of the Color Cube workflow, there are provisions for calibrating both a 1D RGB LUT (*1D Ramp LUT* page) and a 3D cube LUT (*3D Cube LUT* page).

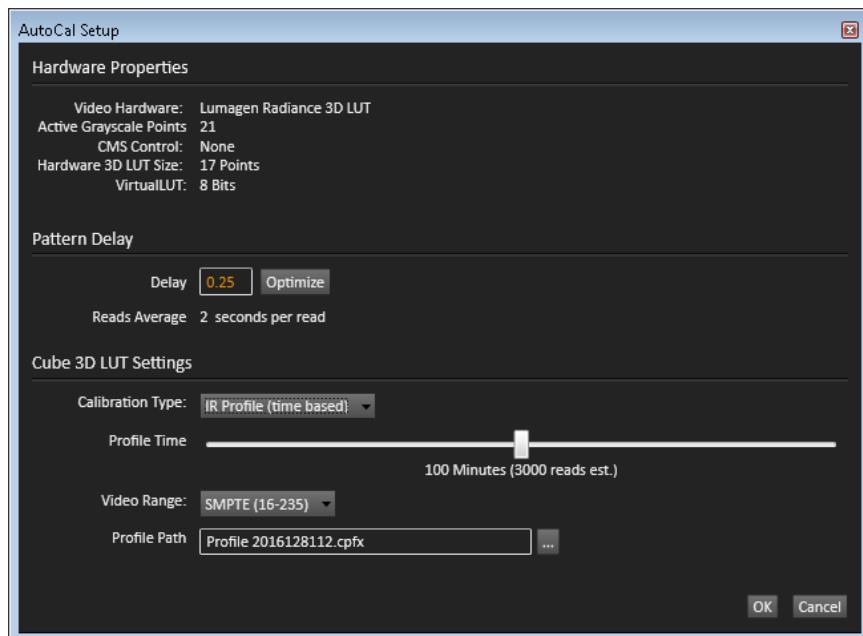
a. 1D Ramp LUT page

1. On the *1D Ramp LUT* page, click the *AutoCal* action button in the lower right.
2. On the *AutoCal Setup* dialog (shown below), click *OK*.



b. 3D Cube LUT page

1. On the *3D Cube LUT* page, click the *AutoCal* button in the lower right.



2. On the *AutoCal Setup* dialog (shown above), under *Calibration Type*, select the desired type of 3D LUT calibration process.
 - **IR Profile (time based):** Creates the best quality display calibration 3D LUT possible in the selected period of time. You select how much display quality you have time for, from 30 minutes to maximum display quality (6,000 points max). Uses Intelligent Resolution Profiling to search out the most nonlinear color space areas and correct those first.
 - **IR Profile (point based):** Creates the best quality display calibration 3D LUT possible with the selected number of measurement points (1,000 - 10,000 points). Uses Intelligent Resolution Profiling to search out the most nonlinear color space areas and correct those first.



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- **Lightning LUT:** Creates a display calibration 3D LUT in five minutes or less. Produces a very high quality result on professional displays with moderate linearity. Displays with significant nonlinearity may produce marginal results.
3. Under *Video Range*, select “SMPTE (16-235)” if you are calibrating a video display that clips or compresses signals above reference white, as tested on the CalMAN *Dynamic Range* page.
 4. Click *OK*.

Upon completion of the AutoCal 3D hardware LUT calibration process, CalMAN automatically loads the optimized 3D LUT calibration data into the Radiance Pro.

DONE – Radiance Pro 1D LUT and 3D LUT calibration is complete.

Radiance Pro Setup for Grayscale and CMS Calibration:

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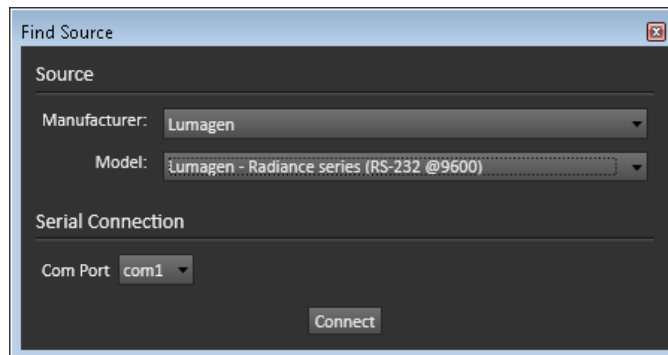
CalMAN can calibrate the multipoint grayscale and standard CMS primary/secondary colors in the Radiance Pro. To do so, in the Radiance Pro menu, set the Color Gamut Options to Disabled and 8 Points:

- Menu > Output > CMS's > [CMS] > Color Gamut > Options > Enabled; No
- Menu > Output > CMS's > [CMS] > Color Gamut > Options > Points; 8

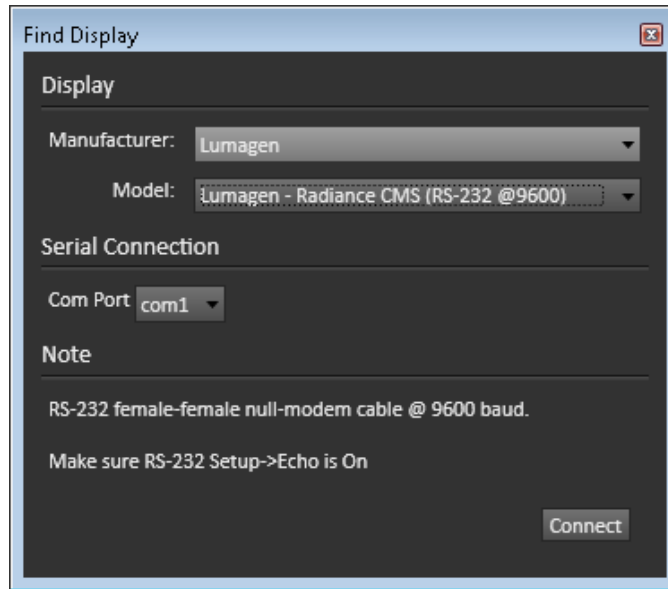
CalMAN Video Calibration Workflows

The Home Advanced and SI Advanced workflows in CalMAN are used to create perform standard grayscale and CMS calibration for video displays. In the CalMAN main menu, select Open Workflow Template / Home Advanced or SI Advanced. Proceed through each step of the selected workflow in a normal fashion, using the following notes for Radiance Pro specifics.

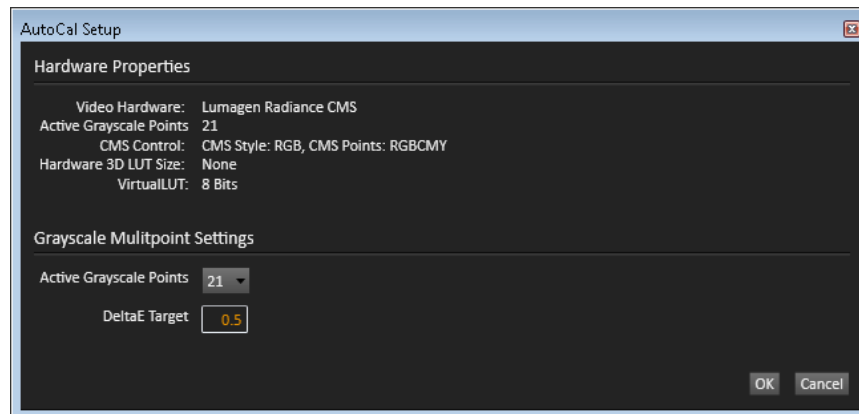
1. On the CalMAN Settings tab (gear icon), under Workflow Basic Options, select *Video (16-235)* [SMPTE legal].
2. Proceed through each step of the workflow in the normal fashion, using the following notes for guidance on the indicated workflow pages.
3. On the *Hardware Connect* page, click the *Find Source* button, select “Lumagen – Radiance series” on the *Find Source* dialog (shown below), then click *Connect*.



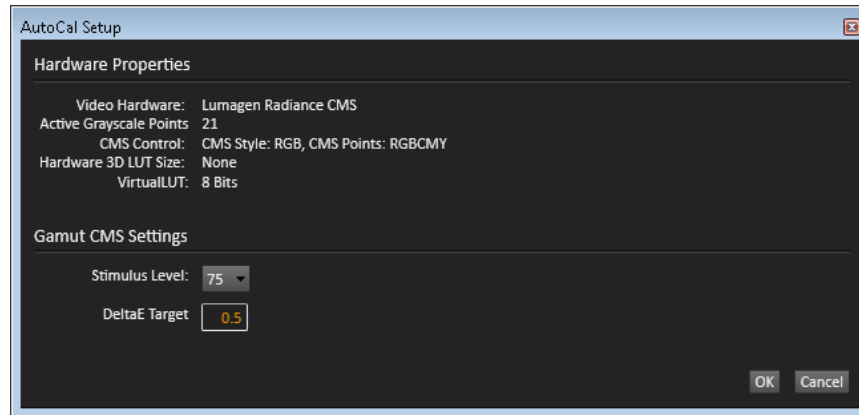
4. On the *Hardware Connect* page, click the *Find Processor/Display* button. Select "Lumagen – Radiance CMS" on the *Find Display* dialog (shown below), then click *Connect*.



5. On the *Dynamic Range* page, adjust the display's black level/Brightness control to 16.
6. Skip the *Grayscale - 2pt* page (no advantage to doing 2pt calibration before doing the following multipoint AutoCal).
7. On the *Grayscale/Gamma* page, click the AutoCal button, then click *OK* on the *AutoCal Setup* dialog (shown below) and wait for the AutoCal process to complete.



8. On the *CMS Calibration* page, click the AutoCal button, then click *OK* on the *AutoCal Setup* dialog (shown below) and wait for the AutoCal process to complete.



DONE – Radiance Pro Grayscale and CMS calibration is complete.