Flanders Scientific Inc.

FSI Calibration Guide for AM/BM/CM/DM Series Monitors

Using CR100 / Calman / Resolve

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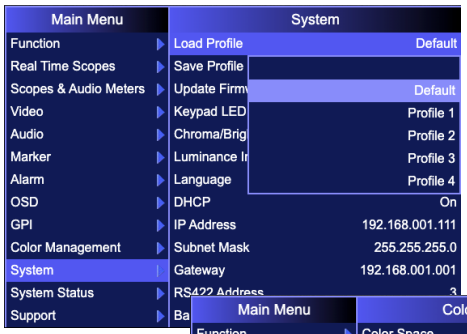
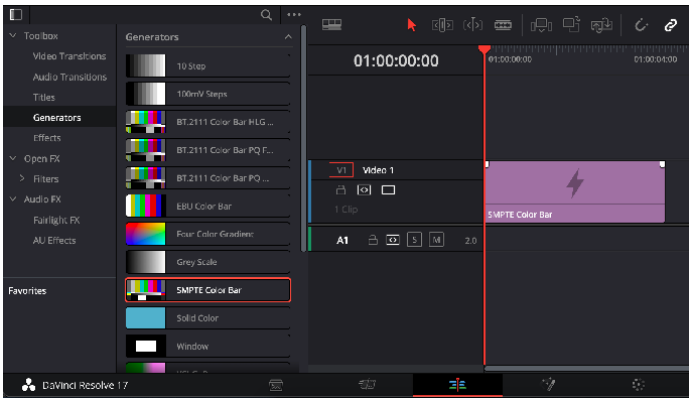
Begin by setting your FSI monitor to the default profile.
Menu > System > Load Profile > Default.
When prompted, confirm by selecting Yes.



Bypass the 3D LUT in the monitor's Color Management menu.
Color Management > LUT Bypass > 3D LUT.

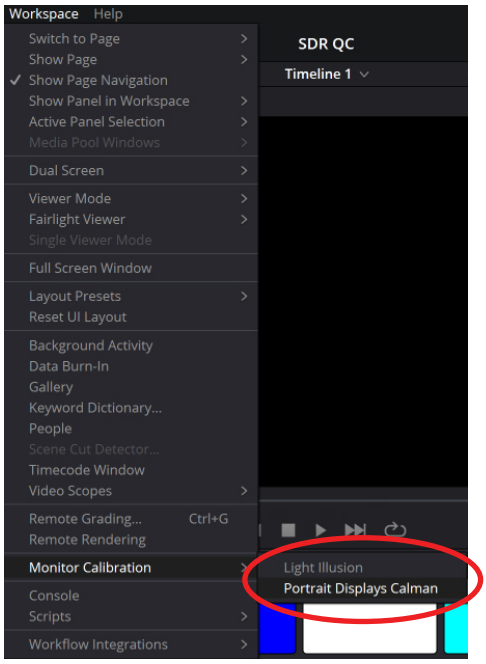
Start DaVinci Resolve and create a new timeline.

There **must** be content in your timeline for calibration. If no content is available, simply go to the Edit Tab and drag the SMPTE Color Bar effect from the Generators area of the Toolbox into the timeline, right click on it and select New Compound Clip, then press create.

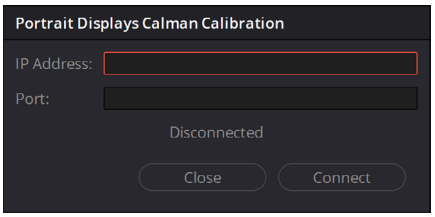


Verify that the monitor is receiving a signal from Resolve, then click on the Color Tab in Resolve.

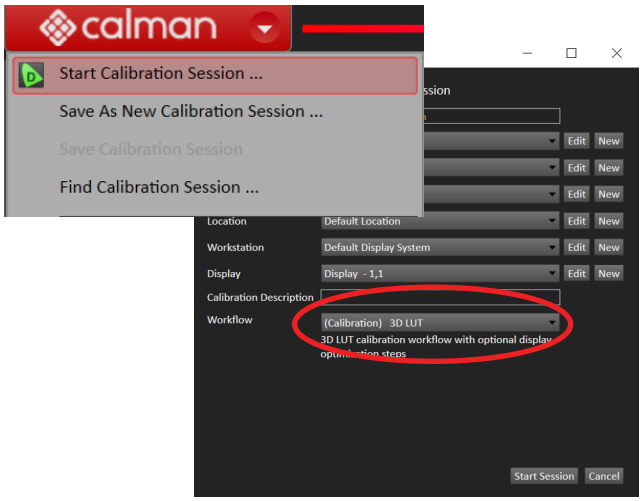
Click on the Workspace menu in Resolve. Select Monitor Calibration, then select Portrait Displays Calman.

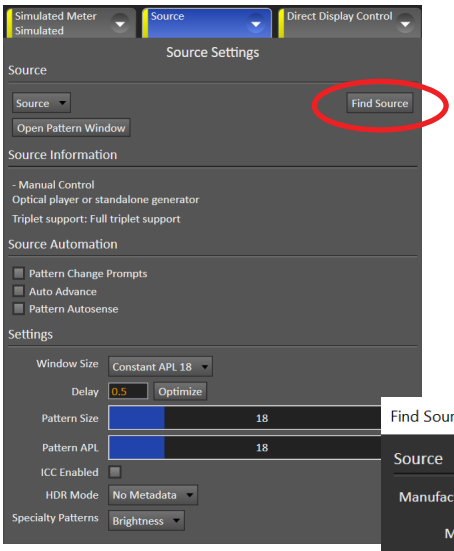


A popup dialog in Resolve will request an IP address, which can be found once you start Calman.



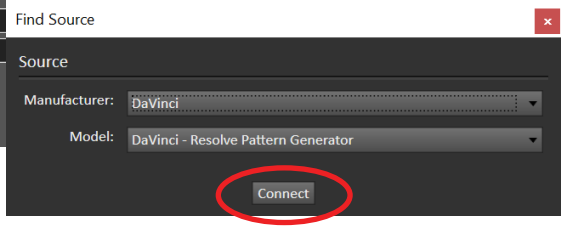
Start Calman. In the upper lefthand menu select Start Calibration Session, then select (Calibration) 3D LUT as your workflow.



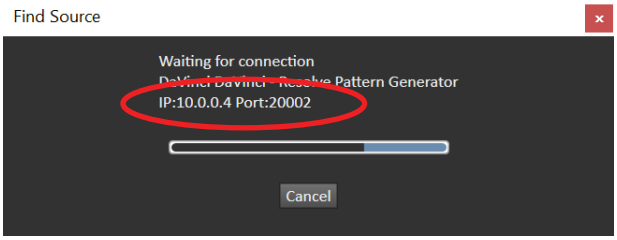


From the Source Tab in Calman click Find Source.

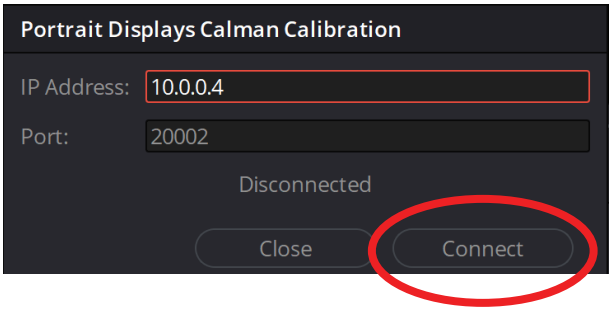
In the pop-up menu select DaVinci and DaVinci-Resolve Pattern Generator, then click connect.



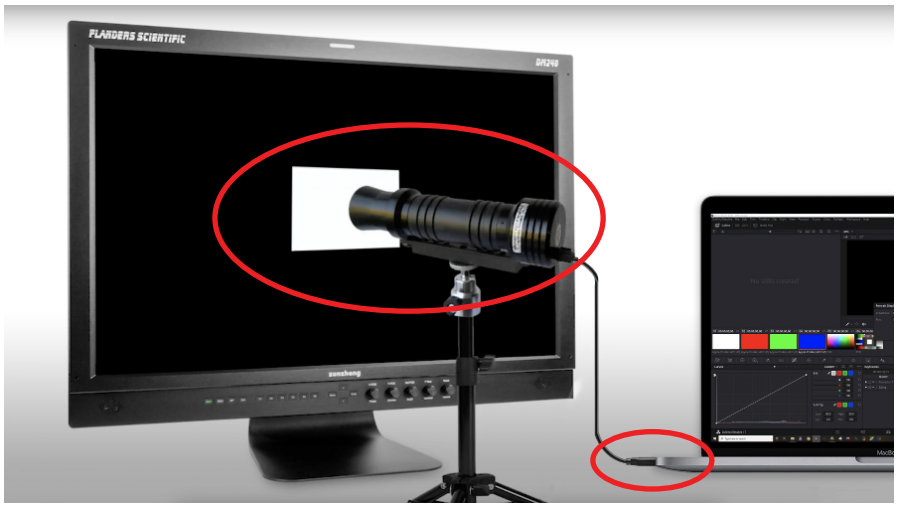
The window will now change to display the IP Address. Take note of the IP address and Port shown, as you will need to enter it in Resolve for the next step.



Return to Resolve and enter the information mentioned above into the IP address and Port dialog box, then press connect. Once connected, **do not close** the connection dialog window in Resolve.

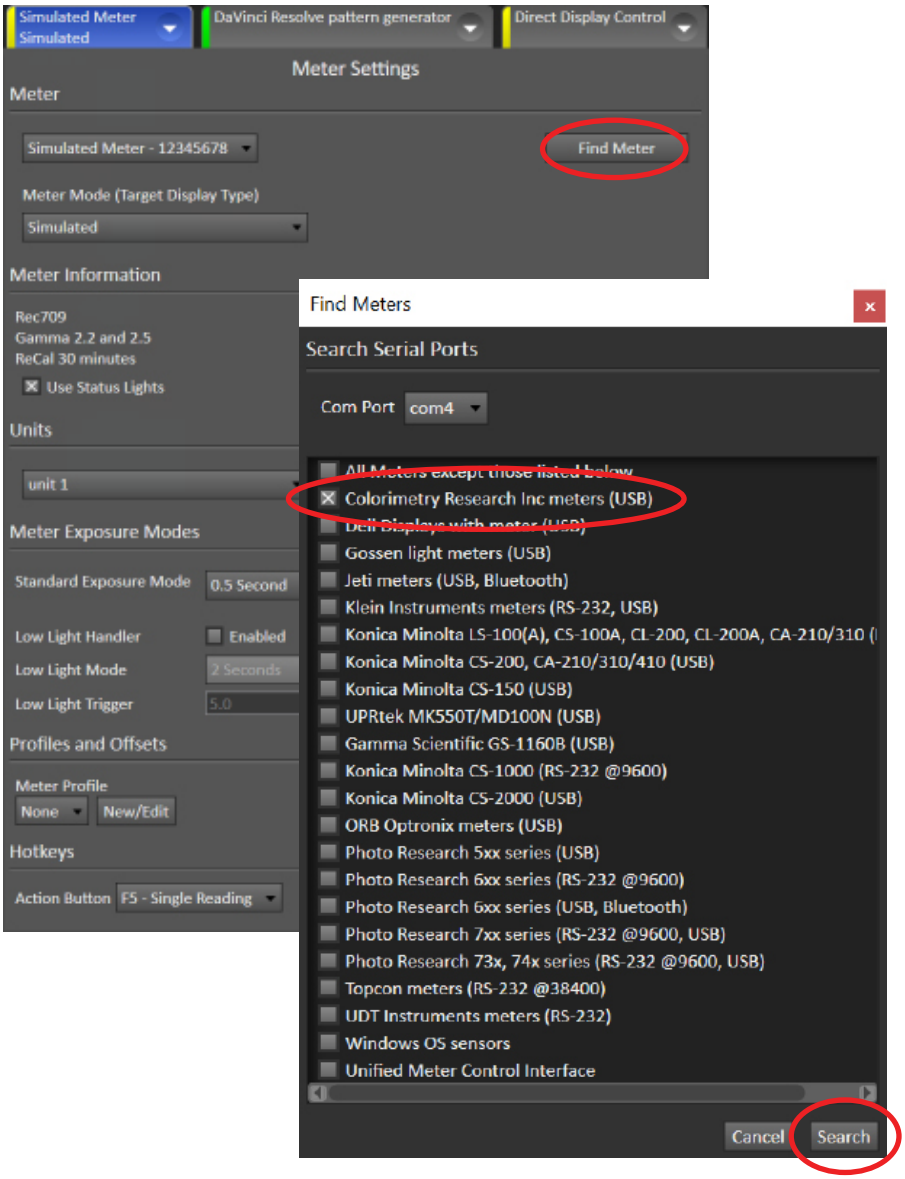


Connect the CR100 probe to the computer and aim towards the center of the monitor.



Return to Calman

Click on the Meters tab. Press Find Meter, then select the “Colorimetry Research Inc meters (USB)” checkbox and click search.



Select the CR100.

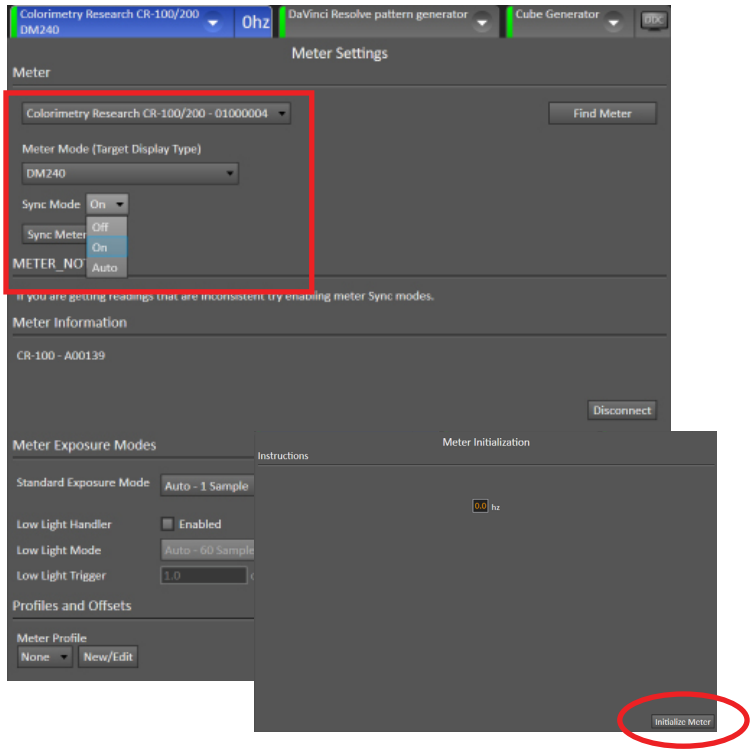
Select the correct Meter Mode Matrix from the Meter Mode (Target Display Type) dropdown selection.

Set Sync Mode to On.

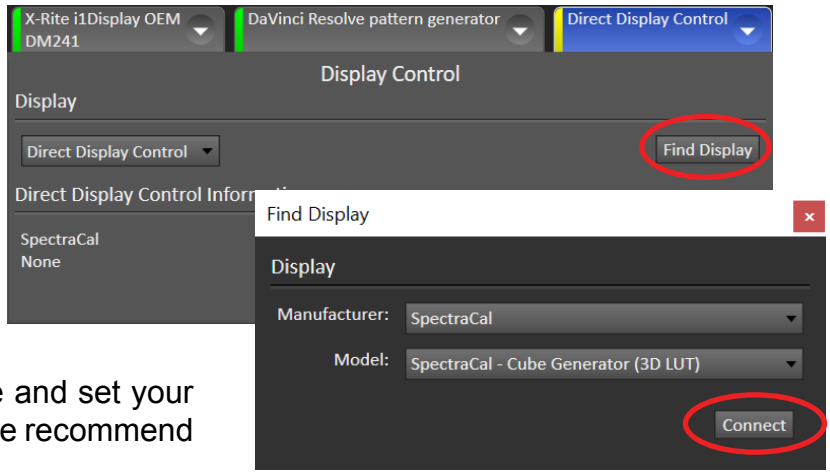
To sync, press the Sync Meter button.

With the CR100 aimed at the middle of the screen, select Initialize Meter.

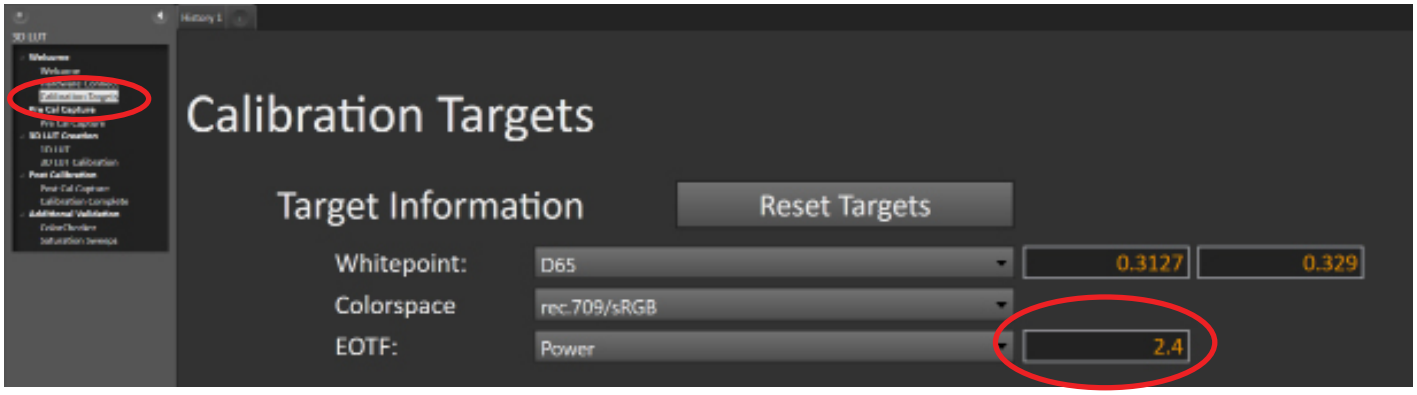
Note: on some display devices using manual sync, for example matching the source frame rate, may yield better results.

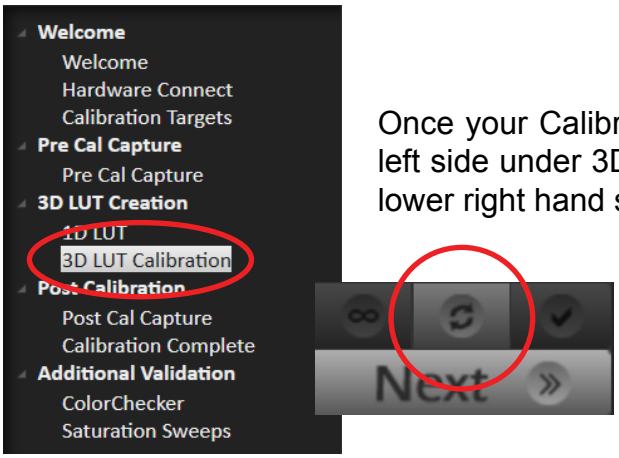


Once the meter is synched, select the Direct Display Control Tab. Press Find Display and select SpectraCal and SpectraCal - Cube Generator (3D LUT). Then, press Connect.



Click on Calibration Targets on the left side and set your Calibration Standard, or create your own. We recommend changing EOTF to Power 2.4.





Once your Calibration Standard is set, click on 3D LUT Calibration on the left side under 3D LUT Calibration, then click on the AutoCal button on the lower right hand side.

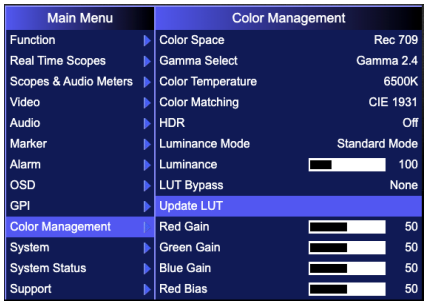
In the AutoCal Setup Window set the File Format to FlandersScientific (.cfe CFE2) and then select your monitor model from the drop-down list.

Select the LUT position name (user1, user2 or user3 LUT positions) and location to save your LUT under the File Path option. Please note on monitors running firmware 2.0.0-2282 or later the user positions are the only valid selections. Saving to other memory slots is not supported.

Select your calibration type. All selections are valid, but generally speaking larger profiles will yield better results. If you are short on time we suggest you use Calman's Lightning LUT capability instead of a smaller display characterization. See the appendix for more details.

Verify your CR100 probe is centered in front of the screen and select OK from the AutoCal Setup window in Calman to begin the profiling process. Once the profile is complete your LUT file will be stored in the location previously selected.

Copy this LUT file and plug the provided update cable into your computer and monitor. The monitor may take several moments to connect and will appear as a mass storage device. Paste the file onto the monitor, and Select Update LUT (or Update CFE) from the Color Management (or Display Alignment menu) on your monitor.

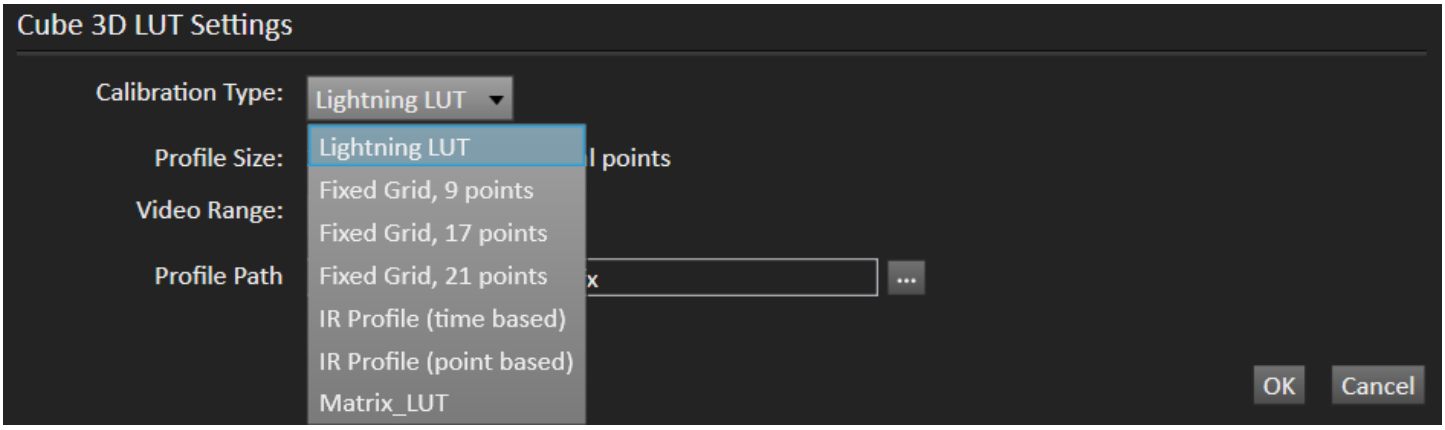


When the LUT update is complete set LUT Bypass back to None on the monitor. Then, select your corresponding LUT position (User1, User2, User3) from the Color Space Selection in the Color Management / Display Alignment menu to activate your LUT.

Appendix 1: Tips and Tricks

Short on Time?

If you have time and want to generate optimal results a large test patch sequence is ideal (3000+ patches). However, Calman's Lightning LUT can generate extremely good calibration results very quickly. Keep in mind that the more linear the display is the better the results will be. You can start the Lightning LUT by following the steps above. On the AutoCAL Setup page select Lightning LUT from the Calibration Type drop down and complete the remaining steps.



DCI P3 Calibration (applies to firmware 1.0.04-2252 and older only)

If calibrating to a P3 target please note that the P3 setting on the monitor activates a unique gamma and white balance response separate from the standard settings. One of the two methods below may be used for accurate P3 calibration:

1. You can follow the standard procedure outlined above and save your custom P3 calibration to one of the USER positions on the monitor (e.g. user1, user2, or user3). If using this method do not save to the P3 position on the monitor as you will get a poor result.

2. The monitor may be placed in P3 mode and a unity LUT can be loaded to the P3 position. Then you will profile without bypassing the 3D LUT (bypass LUT set to none). When complete you will override the unity LUT loaded into the P3 position with your new 3D LUT.

OLED Black Level Setup and BT.1886 Calibration

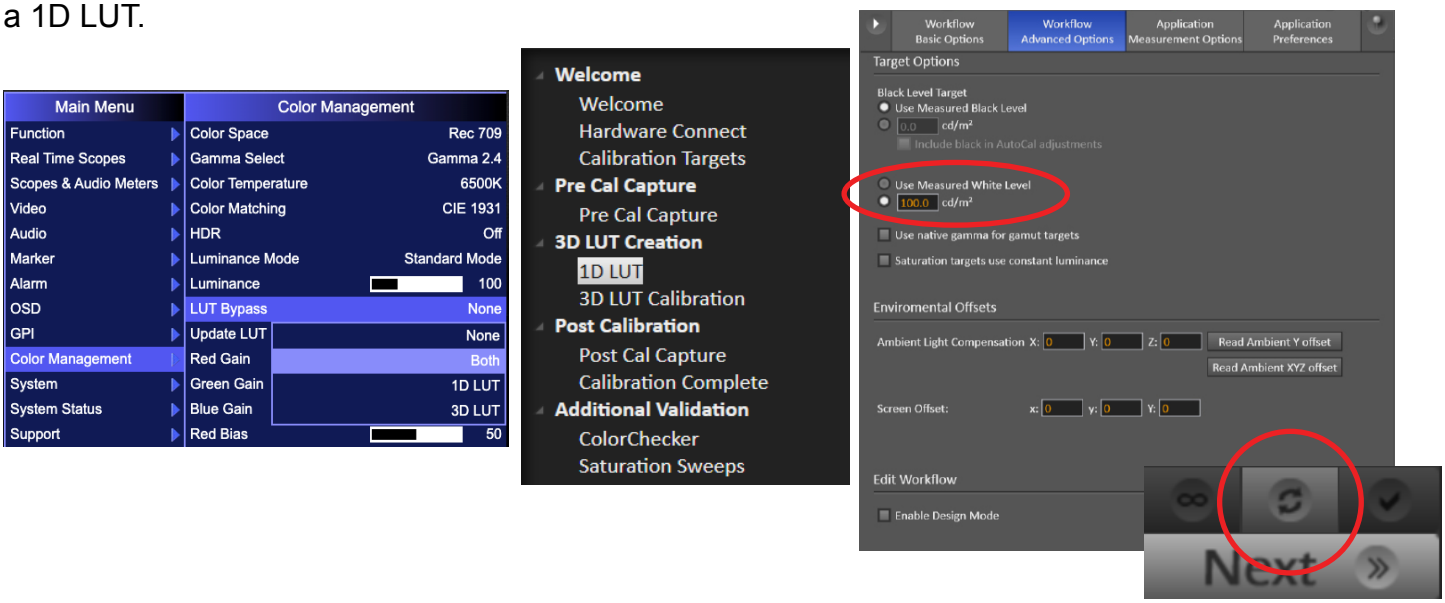
The default black level of OLED monitors is effectively 0 nits (cd/m2), which is well below the accurate or repeatable thresholds of most measuring devices. A BT.1886 EOTF on a display with a black level of 0 nits is actually equal to a 2.4 gamma response. For both of these reasons it is advisable to calibrate to a target of 2.4 gamma when calibrating an OLED with black at 0 nits so that noise or junk readings are not being factored into your calibration's EOTF. Once calibration is complete you can use the "bright" knob/key on the monitor to adjust your black level higher if desired. When calibrated to a target of 2.4 with black at 0 the brightness rotary knob control maintains a BT.1886 response for any given black level. The appropriate black level is a function of both viewing environment and personal preference, but a range of 0 nits to no more than 0.05 nits is generally advisable.

Appendix 2: Calibration of DM250 & DM220 running Firmware 2.0.0-2282 or later

Starting with firmware version 2.0.0-2282 it is necessary to use the 1D LUT + 3D LUT workflow in Calman so that the 1D LUT can be used to set desired peak luminance on the DM250 and DM220. **This is only necessary with the DM250 and DM220 OLED and does not apply to any other models.**

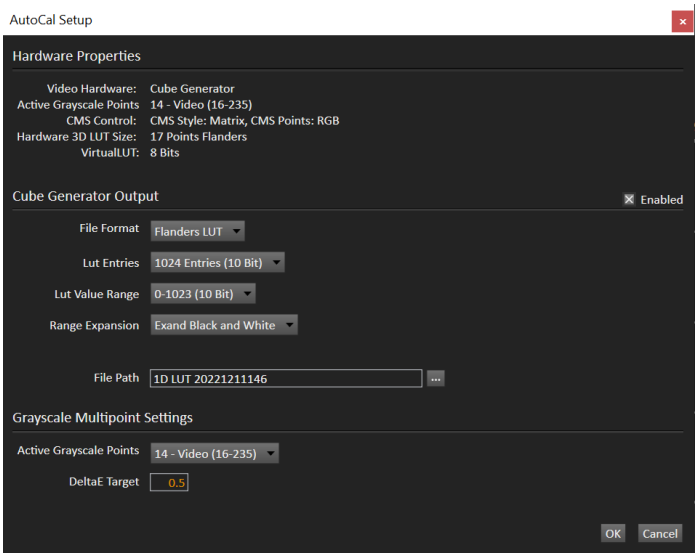
The calibration process remains largely the same as the standard 3D LUT only procedure, with these important additional steps:

You will start by going to the Monitor's Color Management Menu, select LUT Bypass, then Both. Next, from the 3D LUT calibration workflow in Calman you will select the 1D LUT option in the left column. Next click on the Workflow Advanced Options in Calman and instead of "Use Measured White Level" you will type in 100cd/m2 (or any other desired peak) as your target white luminance level. Then click on the AutoCal button in the 1D LUT workflow tab to allow Calman to measure for and then generate a 1D LUT.



When selecting the 1D LUT format you want to select File Format: Flanders LUT, LUT Entries: 1024 Entries, LUT Value Range: 0-1023, Range Expansion: Expand Black and White.

In the file path dialog enter user1 as the 1D LUT name. After the 1D LUT calibration is complete a 1D LUT file will be saved to the file path set in the cube generator output prompt. Copy and past this 1D LUT to the monitor's memory and then select Update LUT from the monitor's Color Management Menu.



The 1D LUT is now saved on the monitor

Appendix 2: Calibration of DM250 & DM220 running Firmware 2.0.0-2282 or later (continued)

Next change the LUT Bypass option on the monitor's Color Management Menu from Both to 3D LUT. Then scroll down to the Custom Gamma selection and change this from Off to User1 to activate the custom 1D LUT you just created.

The rest of the calibration procedure then continues per the standard 3D LUT calibration instructions.

Note: We suggest using an L32 (10%) patch size when calibrating OLED monitors to minimize the influence of loading behavior inherent to most OLED monitors.