



Nova Full-Screen Calibration System

Quick Start Guide

Version: 5.1.0

1 Preparation Before the Calibration

1.1 Description of Operating Environments

Full-screen calibration, which is used for on-site large screens and features significant calibration effects, requires engineers to take calibration devices to perform the on-site pixel level calibration. It is available in following operating environments:

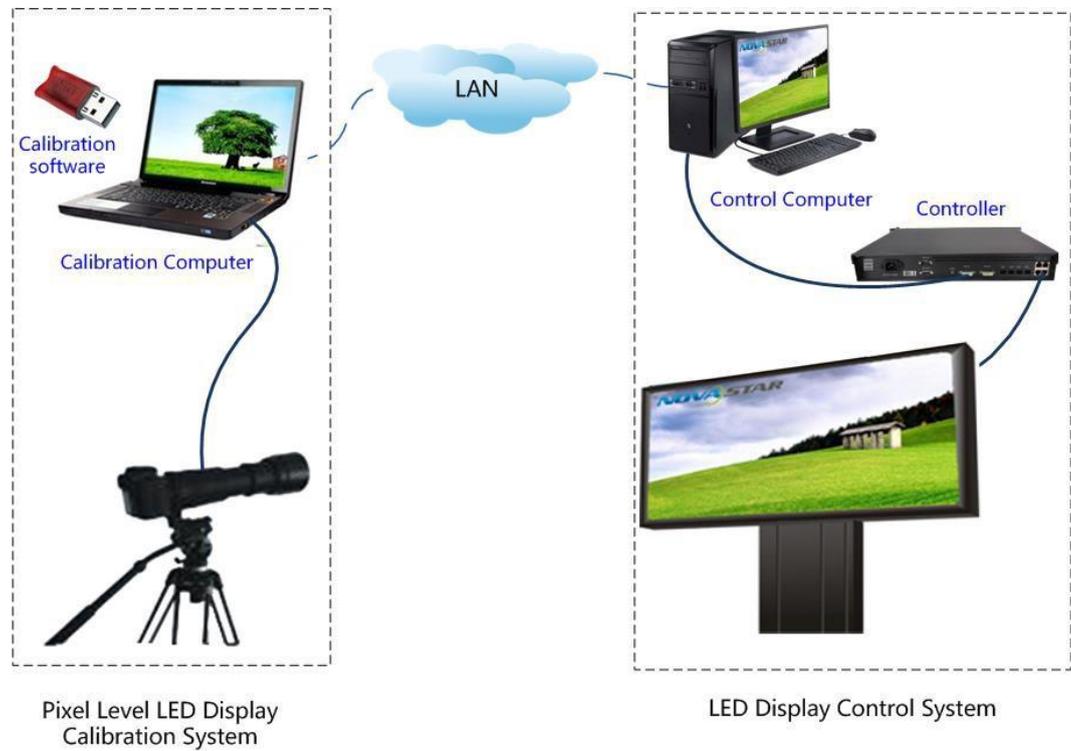
Operating Environment	Calibration has the best effects at night or in the darker environment; calibration may take effect in the indoor environment with stable light and in outdoor environment without the direct sunlight; calibration cannot be enabled in the environment with changing or strong light.
Calibration Computer System	WindowsXP, Win7, Win8, or Win10 (64-bit) operating system

1.2 Software Installation

- Installation of software NovaCLB-Screen is the same as that of the regular software. Select **All operations are allowed**. in case of the security warning from the antivirus software.
- Copy authorization file EncodeDogData in the file package, which contains camera ID and encryption ID and locates in the Nova software disk, to the root directory of NovaCLB-Screen, or add the authorization file using the software authorization function.
- Insert the encryption lock of which the indicator is left burning at the moment.

1.3 System Deployment

Figure 1-1 System Architecture



Three methods for composing the local area network by the calibration computer and control computer:

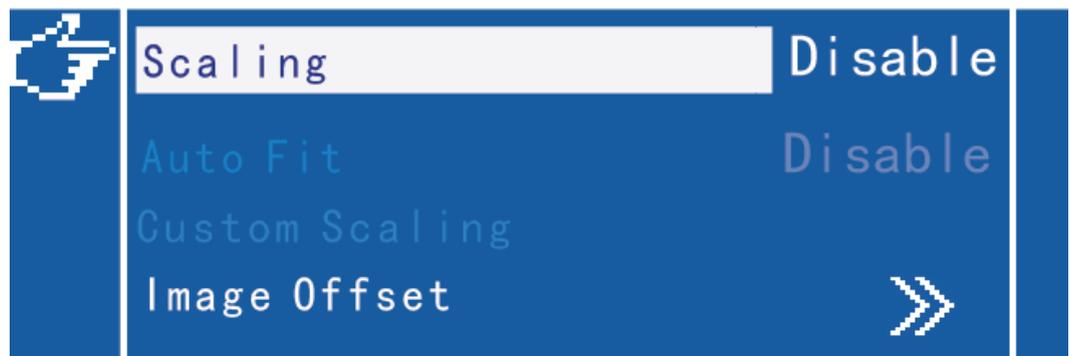
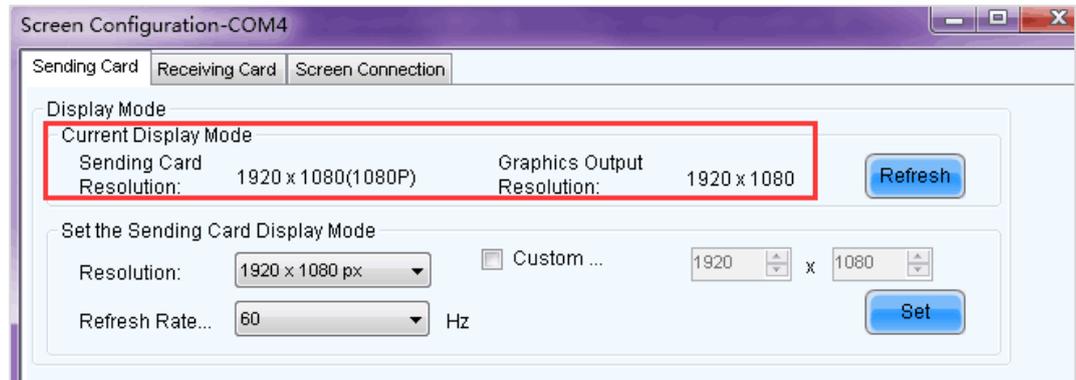
- Directly connect two computers with the network line and set IP addresses of the two computers within the same network segment. This mode is used for the close calibration;
- Wirelessly connect the calibration computer with the ordinary router and connect the control computer to the LAN of routers with the network line. This mode is used in the case that the network line cannot be extended.
- Separately connect the calibration computer and control computer with the wireless point to point remote communication device. This mode is used for the long-distance calibration.



Close the firewall of both the calibration computer and the control computer, to prevent such two computers from poor communication.

1.4 Pixel Level Display

Figure 1-2 Configuration of the Pixel Level Display



Note:

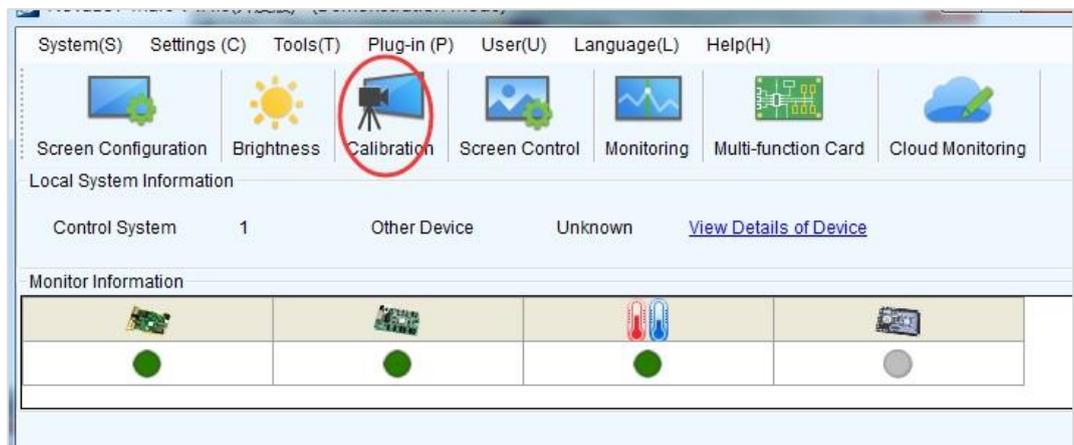
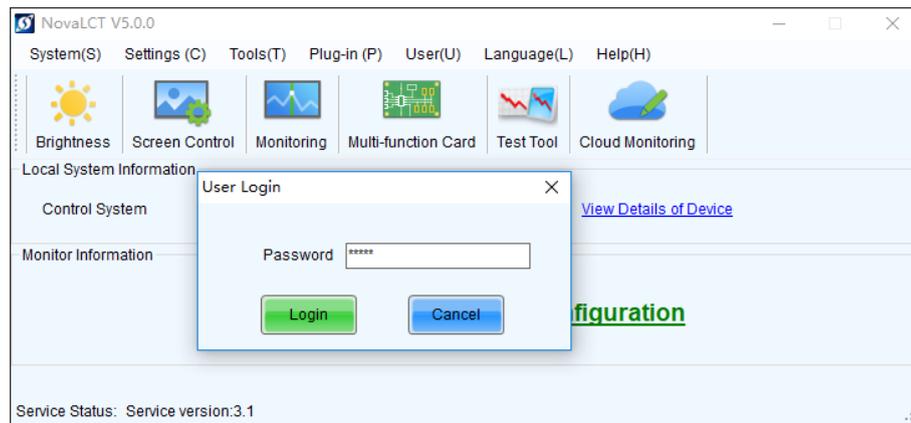
Ensure that the scaling function is disabled for the pixel level display between the LED screen and video card. Remove the middleware such as video processors. Set the video card and sending card to the same resolution. Disable the Nova controller with the scaling function.

1.5 Start the Monitoring Function for NovaLCT

Click **User** to log in the advance level user with password, and then enter the calibration page;

If the communication information prompts that the network monitoring function is started successfully, the monitoring setting of the LCT is completed; if it prompts that the network monitoring function is not started, the port number is required to be changed to start the function again.

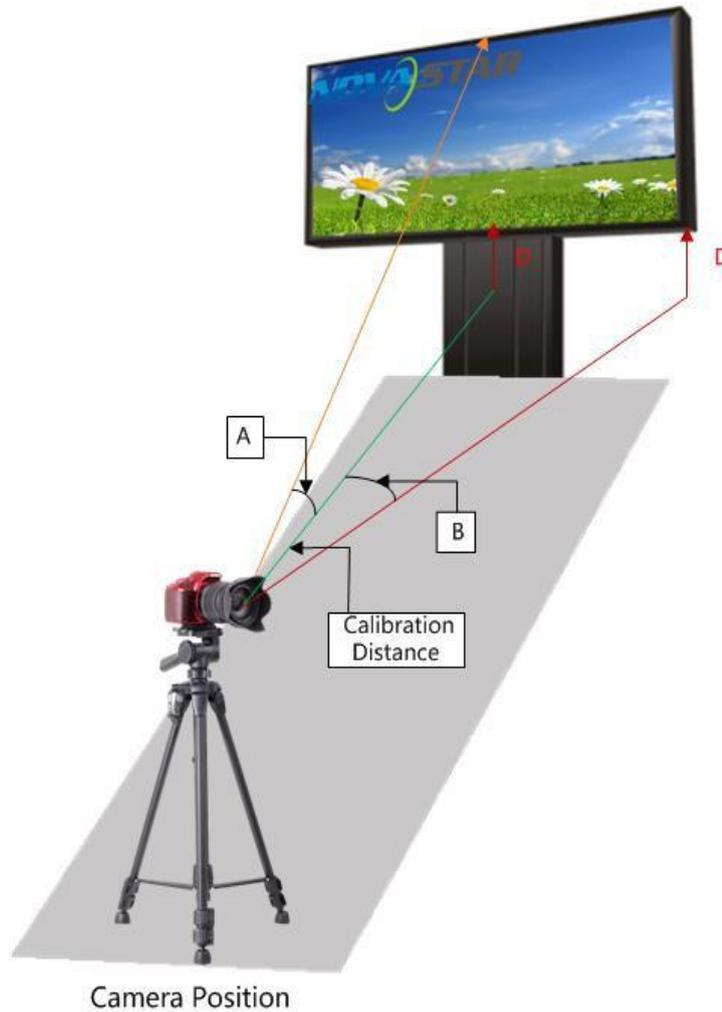
Figure 1-3 Monitoring



1.6 Selection of the Calibration Distance

The calibration camera locates at the screen's L&R middle line and is directly opposite the screen. The angles between the four sides of the screen and the vertical line from the calibration camera to the L&R middle line of the LED screen are less than 30 degrees.

Figure 1-4 Diagram of the Calibration Angle of View

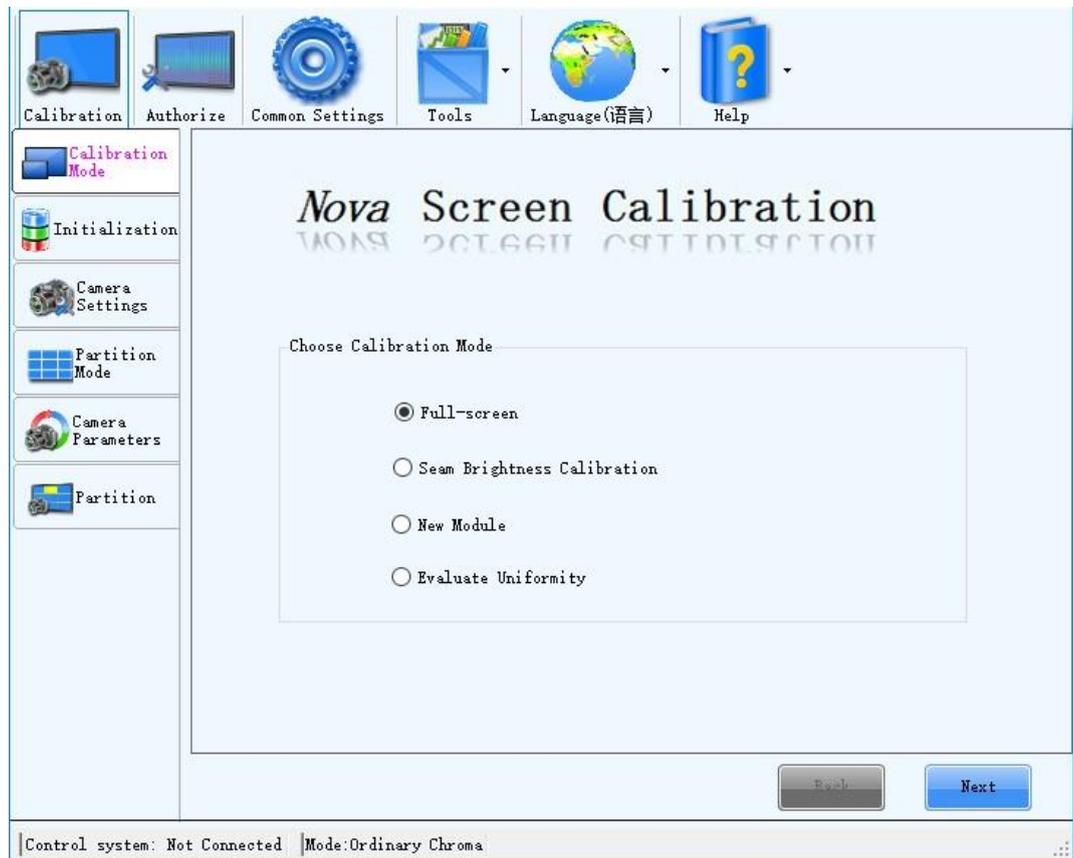


	<p>Extra-large calibration angle makes partition images collected by the camera deformed seriously, easily causing abnormal calibration effects.</p> <p>Angle A: refers to the angle between the horizontal line and the line from the camera location point to the highest point of the screen's L&R middle line, and is used to make sure of the maximum calibration height of the screen.</p> <p>Angle B: refers to the angle between the horizontal line and the side line of the screen, and is used to make sure of the maximum calibration length.</p>
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2 Full-Screen Calibration Procedures

2.1 Calibration Mode

Figure 2-1 Selection of the Calibration Mode



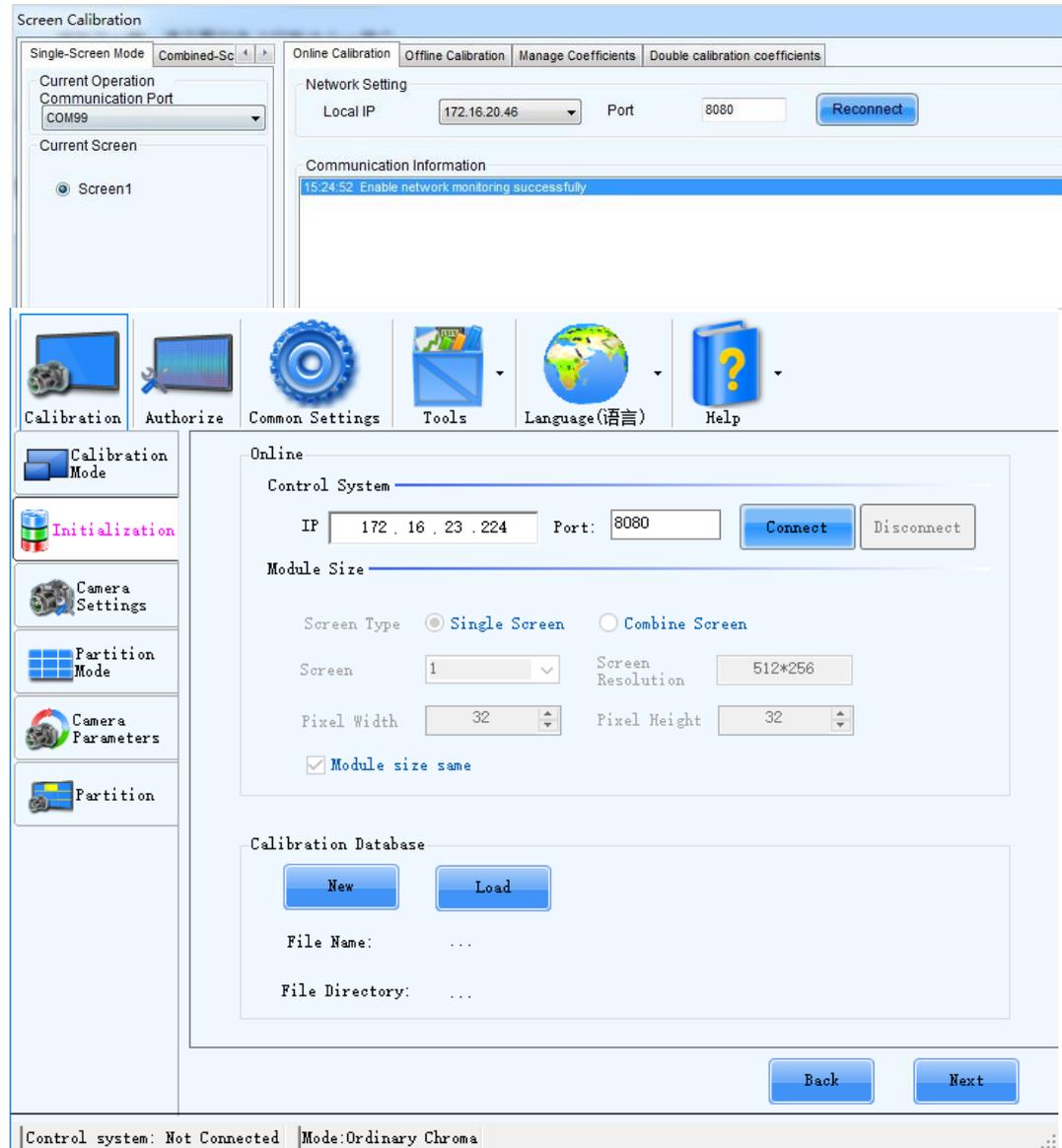
This file describe the most popular pixel level calibration. Click **Next** to enter the initialization page.

	<p>Differences among the four calibration modes:</p> <p>Full-screen pixel level calibration: Upon this calibration, the uniformity and seam brightness are greatly improved;</p> <p>Seam brightness calibration is mainly used in the following cases:</p>
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	<ul style="list-style-type: none">• The seam brightness of the screen, which has not been calibrated, requires rapid calibration, with the uniformity being left alone;• The seam brightness, which is generated during the screen on-site splicing based on the factory order after the delivery, requires one more calibration, and the screen has undergone pixel level calibration in the factory before the delivery;• The seam brightness, which is generated during the screen on-site splicing based on the factory order after the delivery, requires one more calibration, and the screen has undergone calibration in the factory before the delivery. <p>New module calibration: is only used for the seam brightness, which is generated during screen on-site splicing. (This mode is applied when a new module is used to replace the failed one, and it also can be used to calibrate the modules with poor calibration effects, for example, bright spots generated after the calibration due to dirty spots on the camera lens.)</p> <p>Uniformity evaluation: is used to designate the evaluation area, collect the brightness information before and after the calibration, and compare the uniformity and brightness distribution situation before and after the calibration.</p>
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2.2 Initialization

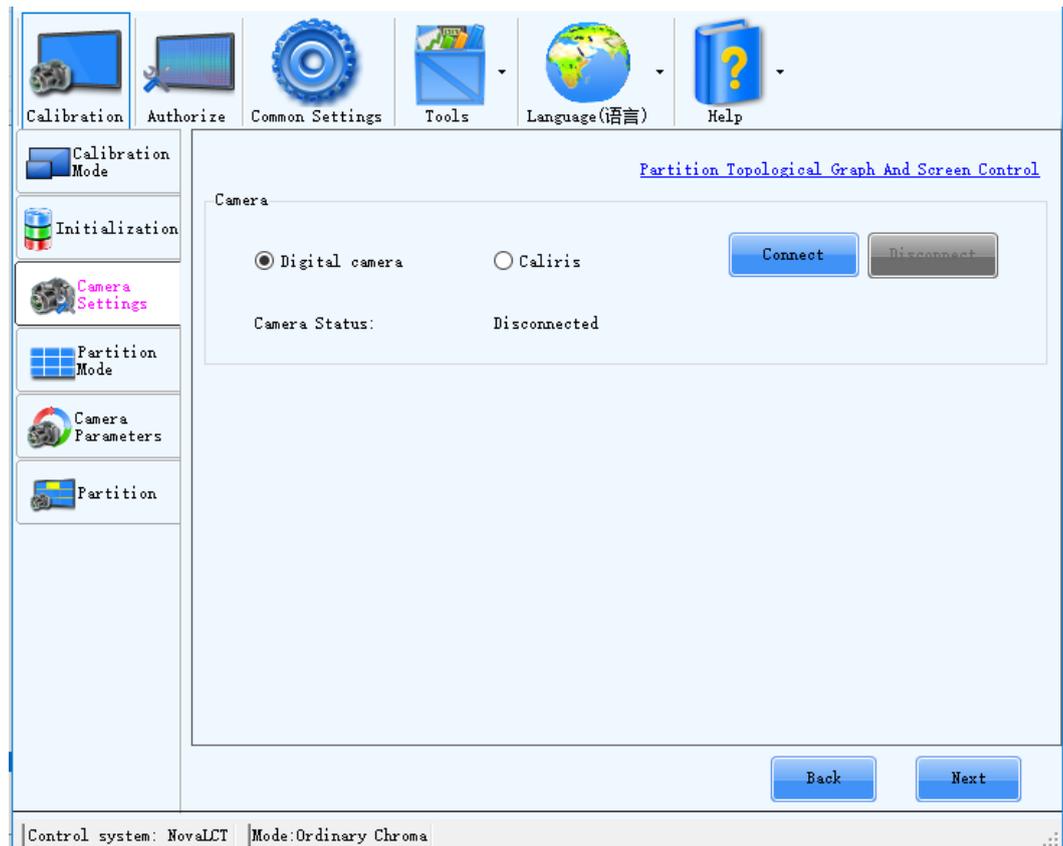
Figure 2-2 Initialization



1. **Control System:** Refer to **Start the Monitoring Function for NovaLCT**. Enter the IP address and port number on the initialization page, then click **Connect**. After the connection with NovaLCT is successful, **NovaLCT**, current number of the loading screen, and the resolution of each screen are automatically displayed at the bottom of the page.
2. **Module Resolution:** After the connection with NovaLCT is successful, the series number of loading screens and resolution of each screen are automatically displayed at the bottom of the page. Users can select the series number as required, and the first one is used as the default.
3. **Module Size:** The module width (spot number) and height (spot number) are displayed after LCT is connected. Manually enter the actual width (spot number) and height (spot number) in case of failed data acquirement or data inconsistent with the actual one. Do not select **Module size same** in case of inconsistent module specifications.

4. **Calibration Information File:** can be gained by pressing  or , and is used to save information such as calibration coefficients of the screen. Keep the file well.
5. Click **Next** to enter the partition setting page.

2.3 Camera Settings



Step 1 Preparation of the camera (digital camera)

1. Connect the camera to the computer via USB, and turn on the camera. Click **Connect**, and the camera is automatically controlled after **Connected** is displayed.
2. Set the mode dial  to **M** (manual mode) and the focus to **M** (manual mode) . Turn off  when image stabilizer is available (OS for the Sigma camera).
3. Switch between the eyepiece framing and liquid crystal display (LCD) framing: Start the real-time shooting display function in the camera menu, and press  to switch between the eyepiece framing and LCD framing.

Step 2 Camera connection

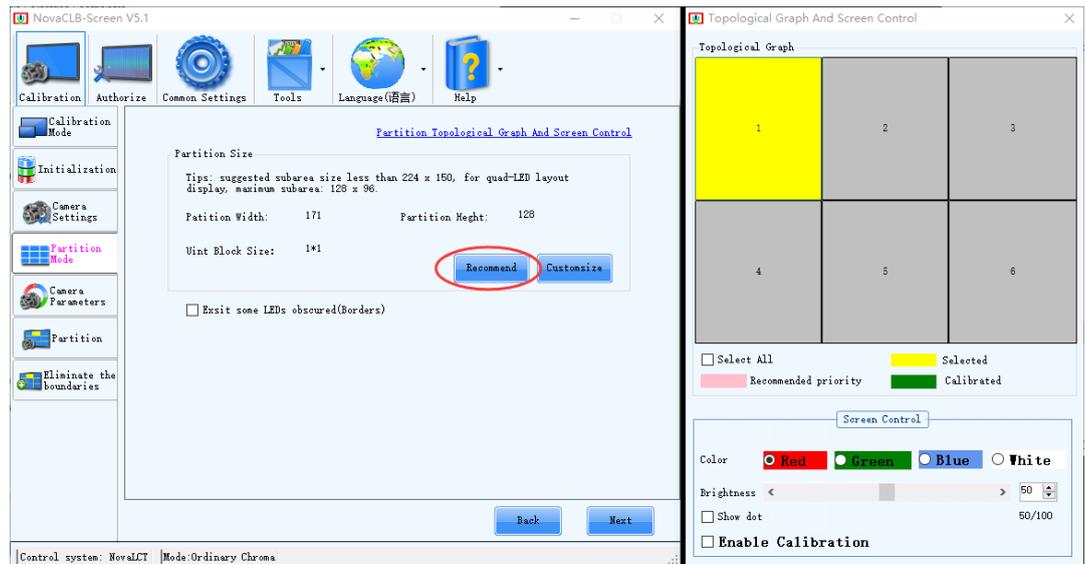
During the calibration, the camera must be normally connected to the calibration computer, locate directly opposite the partition, and can take image normally. Confirm the camera type (digital camera is Canon camera or HS1000) before the camera

connection. Click **Next** to enter the partition mode page after the camera has been connected successfully.

2.4 Partition Mode

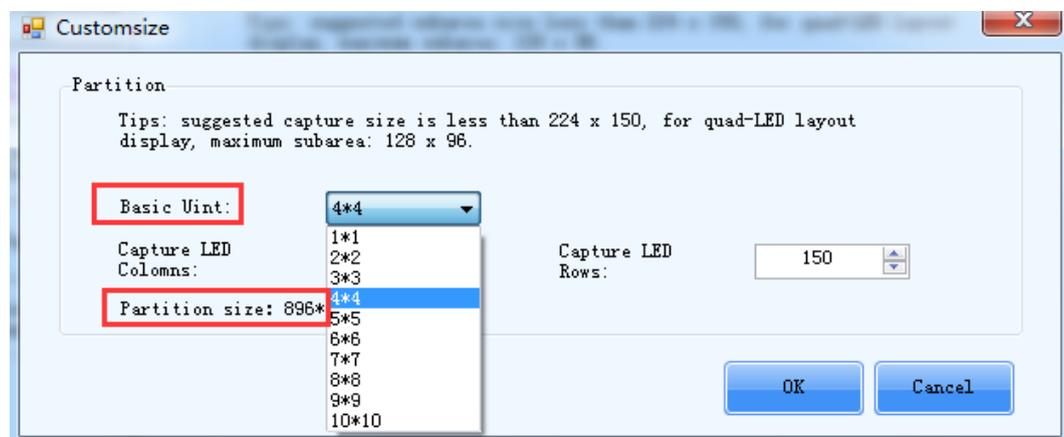
The screen is required to be split into many areas with proper sizes for calibration because of the camera resolution limitation. Click **Recommend** to split the screen.

Figure 2-3 Partition Mode



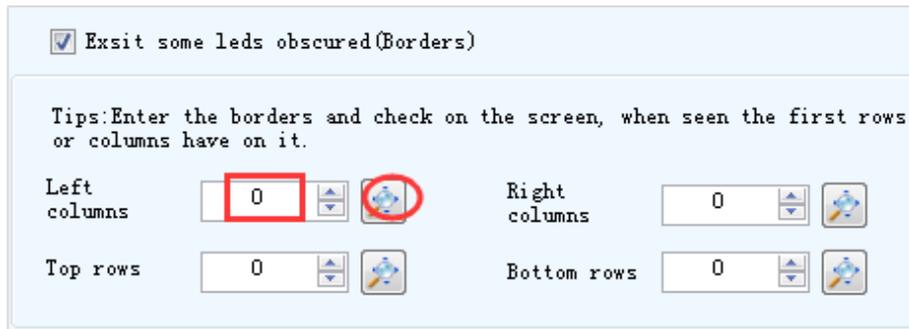
Custom partition is also available. It only requires to change the basic unit size, then the software can automatically calculate the partition size, and finally click **OK**. The custom partition is mainly used to enlarge (make the partition size larger) or reduce (when brightness of the screen is dim and the saturation of the screen cannot be analyzed normally) the unit block size.

Figure 2-4 Custom Partition



In addition, set screen borders if some obscured LEDs or borders exist.

Figure 2-5 Border Settings



2.5 Camera Parameters

Digital camera: Start the real-time shooting display function in the camera menu, and press  to switch to the LCD framing, as shown in the following figure.

Figure 2-6 LCD Framing



Select a partition in the partition topology, and the partition locating at the center of the whole screen is recommended. Align the camera lens with the partition, and adjust the focusing ring and tripod to make the partition within the camera's view. Focal length control is to make the partition locate in the middle of the image, with the length and width half of these of the image. This means that 1/5 of the four sides of the image are reserved.



Figure 2-7 Diagram of Partition Image Size Adjustment



(a) Standard image (b) Extra small image (c) Extra large image

Camera parameters adjustment includes **automatic mode** and **manual mode**.

Automatic mode:

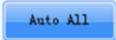
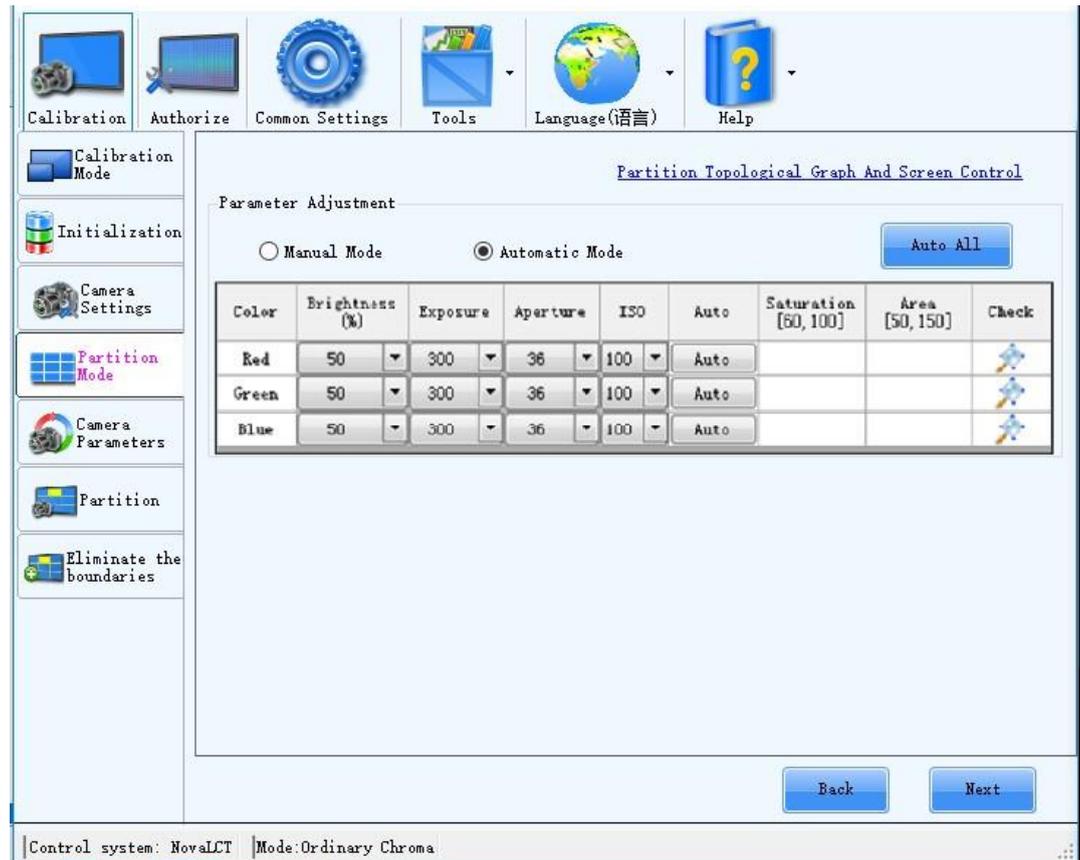
Start the LCD framing, set the micro focus to **AF** , and click  to make software automatically analyze and adjust camera parameters and screen brightness. When the saturation is not proper, the image size is 0; when the image size is extra large or small, adjust the micro focus to make LED turn clear or blurry and make the saturation and image size reach **Normal**.

Figure 2-8 Camera Parameters



Click **Next** to enter the partition calibration page.

Manual Mode

Relationship between the saturation value and adjustment parameters: The saturation value is positively related with the display brightness, exposure time, and ISO value, while negatively related with the aperture value. The adjustment order is from the brightness to the exposure time, aperture value and ISO value one by one.

Relationship between the image size and adjustment parameters: Effects of the aperture value and focusing ring on the image size are great, and focusing ring is preferred for adjusting the image size. If the image size is 0, it indicates that the saturation is extra low or extra high and must be adjusted to a certain range to correctly calculate the image size. Effects of the display brightness, exposure time, and ISO value on the image size are relatively small and can be ignored. In general, fix the aperture value first, adjust the saturation to a certain range to display the image size, and adjust the focusing ring to make the image size normal; then adjust the calibration brightness, exposure time, and ISO to make the saturation normal.

Figure 2-9 Manual Camera Parameter Adjustment of Camera Settings



Terms

- **Saturation:** specifies the brightness of the camera image which may be distorted if the saturation is extra high causing the image exposure, or extra low making the image darker.
- **Image size:** specifies the area of the LED pixel point on the image. Extra large or small image causes poor calibration effects, and therefore focusing ring adjustment is required to make the image size standard.
- **Display brightness:** specifies the percentage of the screen display brightness, which is positively related with the image brightness.
- **Exposure time:** specifies the shutter duration with the unit of ms, and is positively related with the image brightness.
- **Aperture value:** specifies the size of the light-entering hole. The smaller the aperture value is, the bigger the aperture is, and the brighter the image is. In this way, the image is slightly blurry, and therefore the image size is significantly larger than before.
- **ISO:** specifies light sensitivity of the camera. The bigger the ISO value is, the brighter the image is, and the less the image noise is. ISO values range from 100 to 400.

2.6 Partition

Click **Start** to enable the automatic calibration mode, and enter the next partition calibration page afterwards, and so on.

Figure 2-10 Automatic Partition Calibration

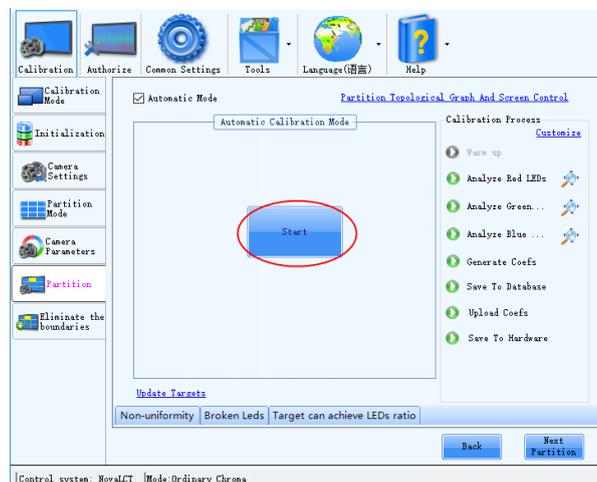
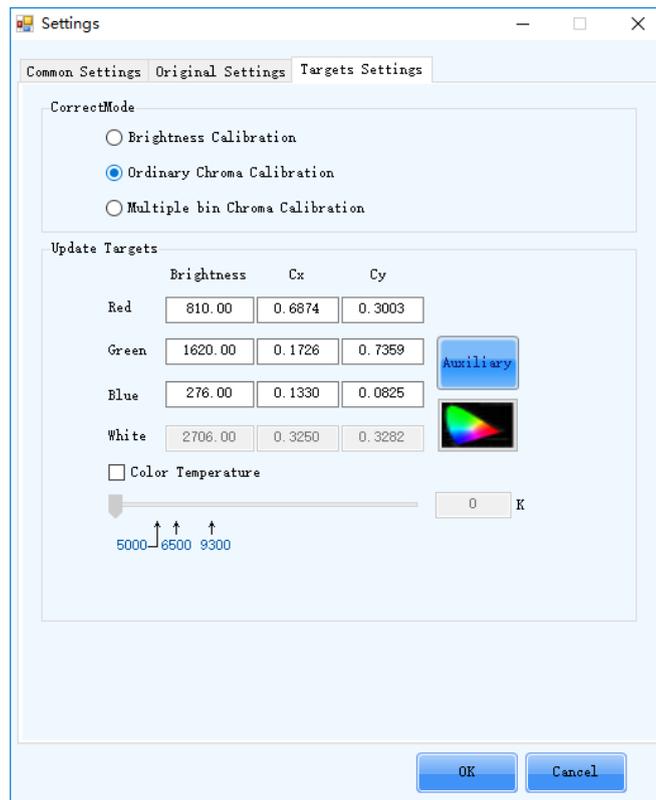


Figure 2-11 Target Value Modification

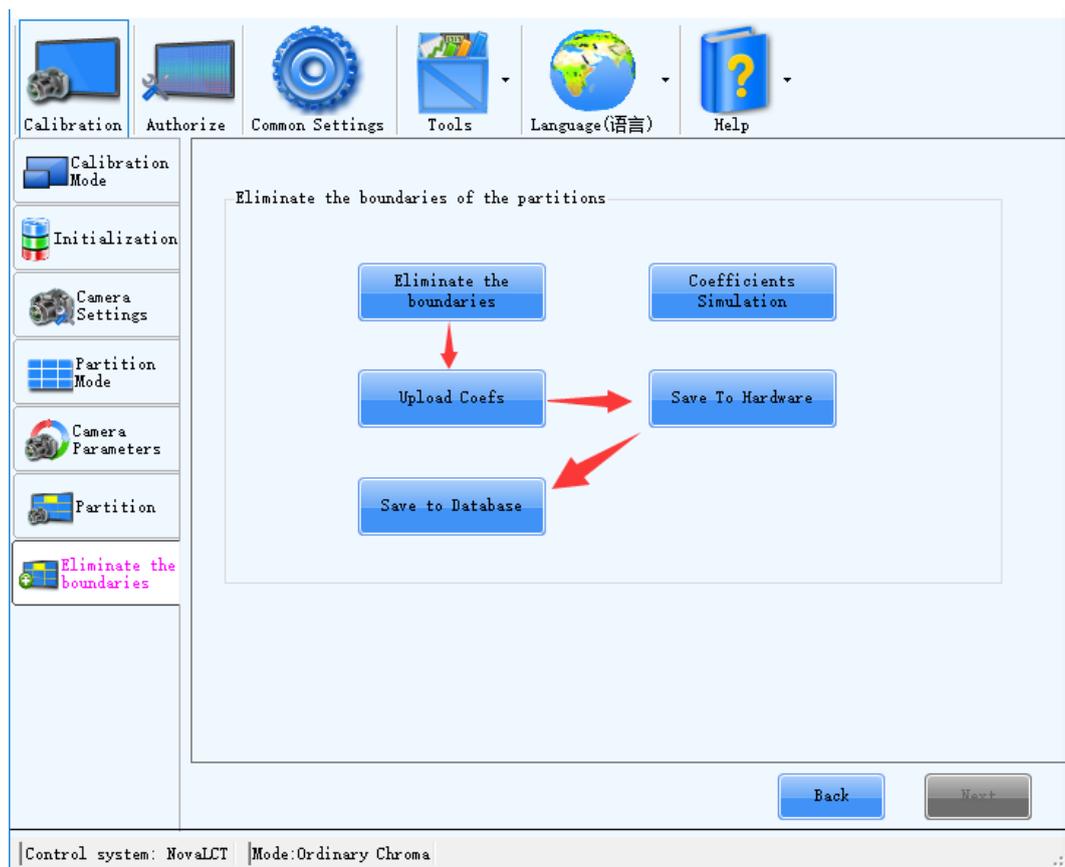


Default brightness loss for the target value is 8%, with low tonal range. Modify the target value to increase the brightness loss or tonal range loss in case of the blurry screen (refers to the case with great difference in the display brightness such as mosaics). You can also perform the calibration first, modify the target value based on the calibration results, click **Preview** to confirm the effects, and then click **Apply**.

2.7 Eliminate Partition Borders

- Skip this step if no border exists between partitions;
- If borders are found between partitions, click **Eliminate Borders**, **Upload Coefficients**, **Save to Hardware**, **Save to Database**.

Figure 2-12 Eliminate Partition Borders

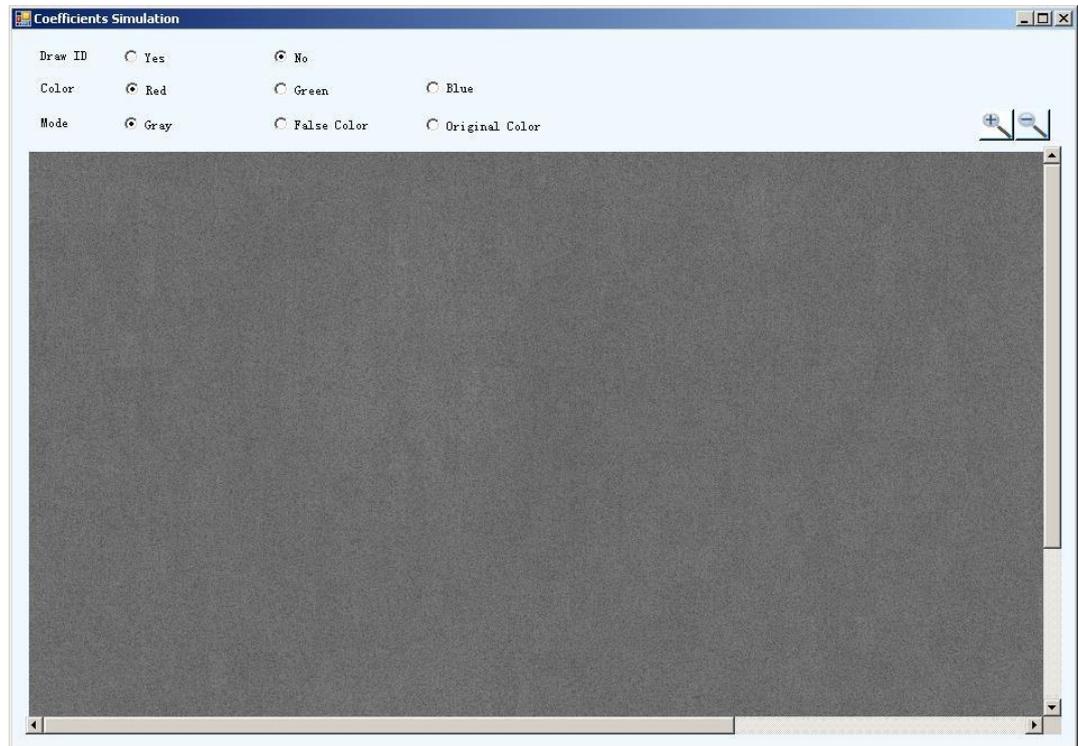


- Coefficient simulation

The software can restore the display effect to the state before calibration according to the calibration coefficients. The image displayed after restoration is a simulation image, as shown in Figure 2-13. Calibration engineers can compare the simulation image with the actual display effect before calibration to see whether the result of calibration is correct. If the effect of the simulation image and the display effect before calibration are not consistent, the calibration is abnormal. The engineers need to analyze the reason of inconsistency.

Click **Coefficient Simulation** to enter the coefficient simulation page, as shown in Figure 2-13.

Figure 2-13 Coefficient simulation



- **Draw ID:** Paint partition ID on the simulation image.
- **Color:** Refers to the color corresponding to the display effect of the simulation image.
- **Mode:** The simulation image has three modes: original color, gray and false color. Original color means that the color of the simulation image is the same as the selected screen color. Gray image is a grayscale image generated by the software according to the calibration coefficients. No matter what the screen color is, the simulation image is always a grayscale image. False color image is a colored image generated by the software according to the calibration coefficients.

If the LED display is evenly blurred before calibration, the calibration coefficients are distributed very evenly and the simulation image also looks very even. If a partition on the simulation image appears brighter or darker, and is not consistent with the display effect before calibration, the calibration result of this partition is abnormal.