CX80 Pro

LED Display Controller

User Manual

Change History

Document Version	Release Date	Description
V1.1.2	2023-07-04	Updated the descriptions for low latency.
V1.1.1	2023-01-13	Optimized some content description.
V1.1.0	2023-01-03	• Updated the card description. • Updated the description of the USB port on the front panel. • Added a table of load capacity per Ethernet port. • Added the limitations of some functions. • Updated the image scaling section.
V1.0.1	2022-09-02	Modified the parameter description of input card 1.
V1.0.0	2022-07-10	First release

Contents

1 Introduction

The CX80 Pro is a flagship 8K LED display controller in the brand-new control system COEX series of Xi'an NovaStar Tech Co., Ltd. (hereinafter referred to as NovaStar). This controller offers rich video input connectors (HDMI 2.1, HDMI 2.0, DP 1.4 and 12G-SDI) and supports 5Gbps output via Ethernet port and 40Gbps remote transmission via optical port. It can also work with the brand-new software VMP (Vision Management Platform) to provide a better operation and control experience.

Based on modular design, the CX80 Pro uses pluggable cards that can be easily replaced and maintained. Besides, the CX80 Pro comes with a 5.5-inch touch LCD, making user operation and control much easier.

This document mainly describes the menu operations on the LCD screen of the controller. For more function operations, see the *VMP Vision Management Platform User Manual*.

2 Appearance

2.1 Front Panel

Name	Description
Running Indicator	• Solid red: Standby • Solid blue: The device is being started. • Solid green: The device is running normally. • Flashing red: The device is running abnormally.
Standby Button	• Press the button to power on or power off the device. • Hold down the button for 5s or longer to restart the device.
USB 2.0	• Connect to the USB drive only to export the device diagnostic result. • Only the NTFS and FAT32 file systems are supported. Others are not supported.
IPS Hard Touchscreen	A 5.5-inch 1080p screen used to display the device status, set parameters and send control commands.
Knob	• On the home screen, press the knob to enter the main menu screen. • On the main menu screen, rotate the knob to select a menu item or adjust the parameter value. Press the knob to confirm the operation. • Hold down the knob and **BACK** button simultaneously for 5s or longer to lock or unlock the touch screen and buttons.
BACK	Go back to the previous menu or cancel the current operation.

2.2 Rear Panel

With Input Card 1 Installed

With Input Card 2 Installed

Input Cards			
Input card 1: CX_HDMI 2.1+DP 1.4+12G-SDI×4			

Type	Qty	Description	
HDMI 2.1	1	Resolutions	7680×4320@(60/50/48/30/25/24Hz) only
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions: 7680×4320@(60/50/48/30/25/24Hz). Do not support custom input resolutions.
		HDCP	HDCP 2.3 compliant, backwards compatible
		Interlaced signal inputs	Not supported
DP1.4	1	Resolutions	7680×4320@(30/25/24Hz) only
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions: 7680×4320@(30/25/24Hz). Do not support custom input resolutions.
		HDCP	HDCP 2.2 compliant, backwards compatible
		Interlaced signal inputs	Not supported
12G-SDI	4	Standards	Support ST-2082 (12G), ST-2081 (6G), ST-424 (3G) and ST-292 (HD) standard video inputs. Support 3G-Level A/Level B (DS mode).
		Resolutions	Max resolution: 4096×2160@60Hz
		Frame rates	Support frame rates up to 60 Hz.
		Mosaic	SDI input sources support input mosaic.
		Interlaced signal inputs	Not supported
		Others	Belden 12G SDI standard cables are recommended. Cables up to 50 meters are supported.

Input card 2: CX_HDMI 2.0×4+12G-SDI×4

Type	Qty	Description	
HDMI 2.0	4	Resolutions	Max resolution: 4096×2160@60Hz (Forced) Min resolution: 800×600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192×1080@60Hz) Max height: 8192 pixels (1080×8192@60Hz)
		Frame rates	23.98 / 24 / 25 / 29.97 / 30 / 47.95 / 48 / 50 / 59.94 / 60 / 71.93 / 72 / 75 / 100 / 119.88 / 120 / 143.86 / 144 / 240 Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.
		HDCP	HDCP 2.2 compliant, backwards compatible
		Interlaced signal inputs	Not supported
12G-SDI	4	They are the same as the 12G-SDI connectors of the input card 1 above.	

Output Connectors			
Type	Qty	Description	

Ethernet ports 1~16	16	5Gbps Ethernet ports
		• Max device load capacity: 35,389,440 pixels
		• Max output width and height
		  – Send-Only Controller mode: max width 32,768 pixels, max height 32,768 pixels
		  – All-In-One Controller mode: max width 16,384 pixels, max height 16,384pixels
		• The maximum load capacity per port is as follows. For details, see 11 Ethernet Port Load Capacity.
		  – 8bit@60Hz: 2,592,000 pixels
		  – 10bit@60Hz: 2,073,000 pixels
		  – 12bit@60Hz: 1,728,000 pixels	

Optical ports 1~2	2	40Gbps optical ports The maximum load capacity per optical port equals to that of 8x 5Gbps Ethernet ports. • 1 corresponds to Ethernet ports 1~8. • 2 corresponds to Ethernet ports 9~16.	
SPDIF OUT	1	A digital audio output (Reserved)	

Control Connectors		
Type	Qty	Description
ETHERNET	2	Gigabit Ethernet control ports. Support TCP/IP protocol and star topology.
		They have the same functions without priority and order, and can be connected to VMP software. No switch or router is needed to deploy multiple devices on the same LAN via device cascading as the network switching function is already built in. Up to 20 CX80 Pro devices can be cascaded.
GENLOCK	1	A pair of Genlock signal connectors. Support Bi-Level and Tri-Level.
		● IN: Accept the sync signal.
		● LOOP: Loop the sync signal.
		For standard Genlock signal generators, up to 20 CX80 Pro devices can be cascaded.
AUX	1	An auxiliary port that connects to the central control device (RS232) (Reserved)
Power		
100-240V~, 50/60Hz, 4A		An AC power input connector and switch

Note

- For input card 1, the HDMI and DP connectors support only 7680×4320 input sources. For requirements of other resolutions, frame rates and bit depths on input card 1, please contact NovaStar for customization.

- For all the input cards, the width of HDMI and DP input sources must be an integer multiple of eight. In addition, the maximum input resolution and maximum width and height of HDMI 2.0 and DP 1.4 connectors must be obtained by setting the graphics card.
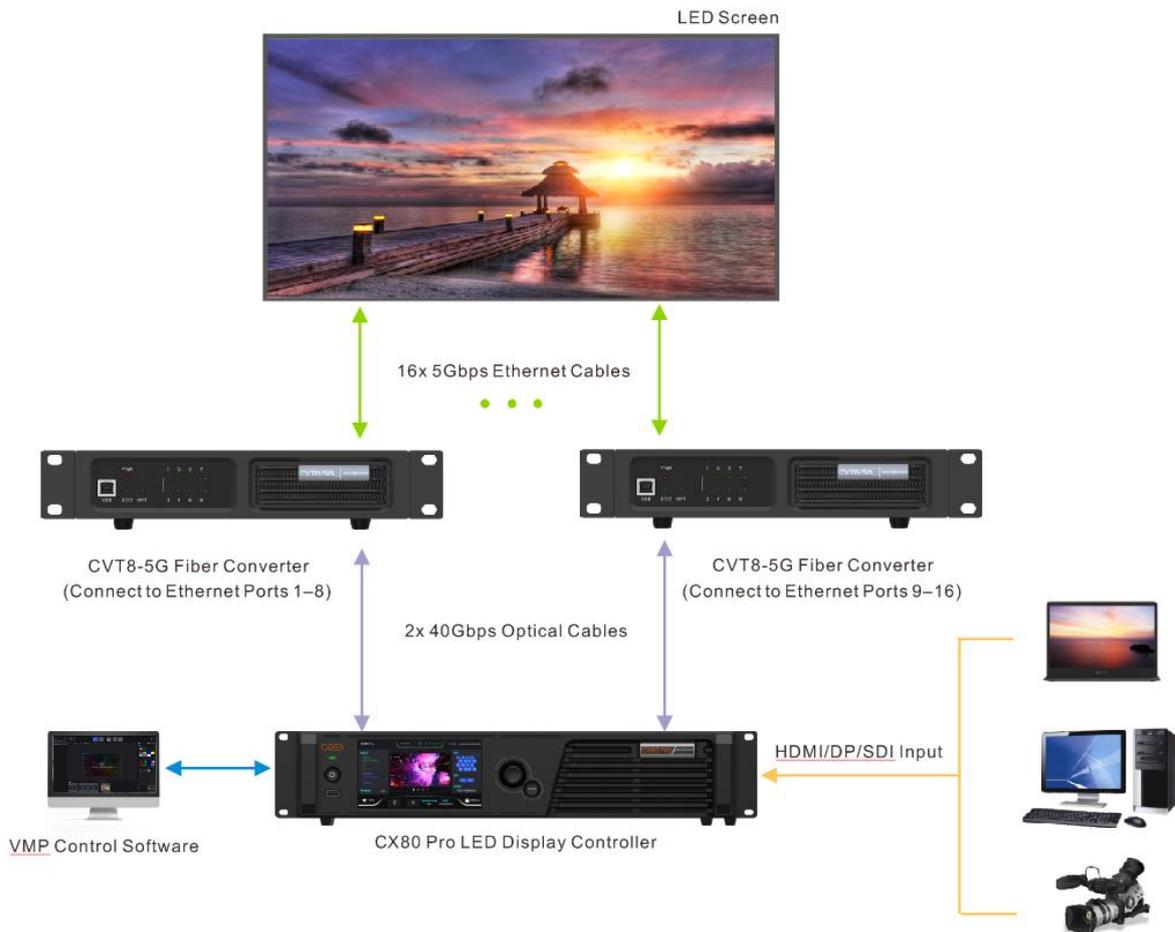
3 Applications

The CX80 Pro has two typical applications.

Application 1: Ethernet Output

Application 2: Long-Distance Transmission via OPT Ports

4 UI Introduction

4.1 Home Screen

After the device is powered on, the home screen is displayed as follows, displaying device related information. The CX80 Pro is equipped with a touch LCD on which users can tap related areas to directly enter the corresponding settings page, making operating more convenient.

Figure 4-1 Home screen

Table 4-1 Home screen descriptions

Item	Content	Description
Top line	CX80 Pro	The device name
	Device working mode	The current working mode of the device • All-In-One Controller: The video processing and sending functions are available. • Send-Only Controller: Only the video sending function is available. For related operations, please refer to 8.1 Switch Working Mode.
	🔒	The device buttons and touch screen are locked. This icon is not displayed when they are unlocked. Hold down the knob and **BACK** button simultaneously for 5s or longer to lock or unlock the touch screen and buttons.
	(USB icon)	The connection status of the USB drive • Blue: Connected • Not displayed: Not connected
	(temperature icon)	The temperature inside the chassis • Green: The temperature is normal. • Yellow: Temperature alarm. The temperature exceeded the threshold range. • Red: Temperature alarm. The temperature exceeded the threshold range significantly.
	(V icon)	The supply voltage of the motherboard • Green: The voltage is normal. • Yellow: Voltage alarm. The voltage exceeded the threshold range. • Red: Voltage alarm. The voltage exceeded the threshold range significantly.

Item	Content	Description
	✿	The chassis fan speed • Green: The fan speed is normal. • Yellow: Fan speed alarm. The speed exceeded the threshold range. • Yellow: Fan speed alarm. The speed exceeded the threshold range significantly.
	⛃	The connection status of the Ethernet ports • White: Connected • Gray: Not connected
	192.168.102.189	The device IP address Please refer to 7.3 Set an IP Address for related operations.
Input	HDMI, DP, SDI, Internal	The device input source type and status, and the resolution and frame rate of the currently available input source • Green: The signal is normal. • Blue: The signal is normal, but not used. • Red: The signal is abnormal. • Gray: The signal is abnormal and not used. You can touch this area to enter the input settings page. Please refer to 5.1 Set Input Source for related operations.
Genlock	60Hz	The frame rate of the currently connected sync source • When sync source not connected: "No Signal" is displayed. • When sync source connected: Display the frame rate of the current sync source.
Port	1–16	The statuses of the Ethernet output ports • Blue: The Ethernet port connection works and the port serves as primary. • Gray: The Ethernet port is not connected or the connection does not work. • Blue with a mark (not flashing) on top corner of icon: The Ethernet port is in backup status, but the backup has not taken effect. • Blue with a mark (flashing) on top corner of icon: The Ethernet port is in backup status and the backup has taken effect. You can touch this area to enter the screen settings page. Please refer to 6.4 Screen Settings for related operations.
OPT	1–2	The statuses of the OPT ports • Blue: Connected • Gray: Disconnected
Screen	1920*1080@60Hz	The screen resolution and frame rate

Item	Content	Description
Bottom line	☀	The screen brightness You can touch this area to open a pop-up window and drag the slider to adjust the screen brightness.
	⊘	Black out You can touch this area to change the current display status on the LED screen. When it is enabled, the LED screen goes black. The input source is still being played in the background.
	❄	Freeze You can touch this area to change the current display status on the LED screen. When it is enabled, the LED screen always displays the frame when frozen. The input source is still being played in the background.
	Dynamic Range	The dynamic range of the currently processed signal ● SDR: Standard Dynamic Range ● HDR10: High Dynamic Range ● HLG: High Dynamic Range For the display control settings, please refer to 6.1.3 Set HDR Parameters (HDMI and DP only).
	Sync	The sync signal currently used and the signal status ● HDMI@60Hz: Sync with the frame rate of the active source. ● Genlock: Sync with the frame rate of the Genlock signal. ● Internal: Sync with the frame rate of the internal clock of the device. Please refer to 6.4.3 Set Sync Source for related operations.
	Menu	The device main menu You can touch this area to enter the main menu page. Please refer to 4.2 Main Menu for details.

4.2 Main Menu

On the home screen, touch the icon at the bottom right or press the knob to enter the main menu page.

Figure 4-2 Main menu – Send-Only Controller and All-In-One Controller working modes
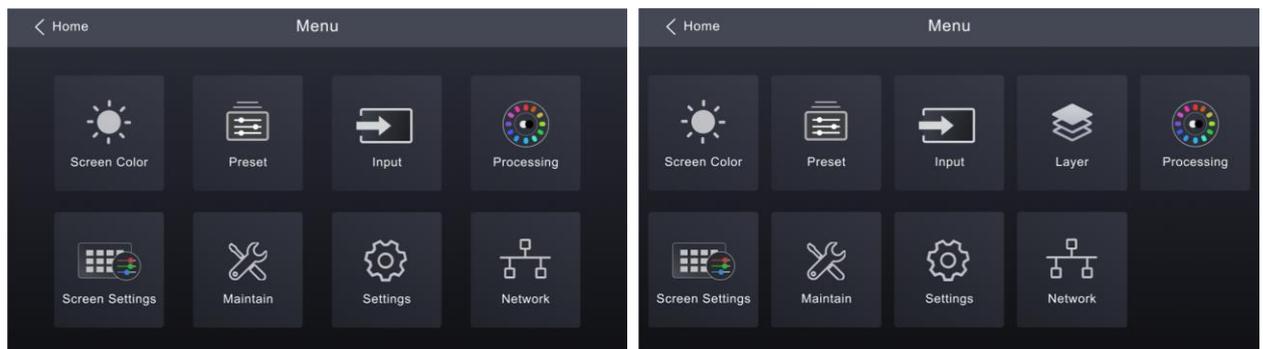

Table 4-2 Main menu description

Module	Description
Screen Color	Set the brightness, gamma value, and color temperature parameter values to adjust the screen image quality

Module	Description
Preset	Select and apply a saved preset to quickly complete settings of the parameters on the **Input**, **Layout**, **Processing** and **Screen Settings** pages.
Input	Set input parameters, including source selection, EDID management, HDR parameter settings, and input color adjustment parameters.
Layer	Turn on or off the layer and set the layer parameters. Image scaling is in this menu (supported by the All-In-One Controller working mode).
Processing	Enable or disable and set parameters of Color Replacement, 14Ch Color Correction, Curves, 3D LUT, and Dynamics Booster.
Screen Settings	Set screen settings parameters, including enabling or disabling low latency and setting additional frame latency, setting bit depth, checking load status, selecting sync source, and setting sync phase offset.
Maintain	Provide the device diagnostics function, which is convenient for users to quickly check the device status, and check and export the diagnostic results.
Settings	Do system settings, including setting factory reset, automatic LCD lock time, LCD brightness, language and temperature scale, and checking firmware version.
Network	Set the network mode, IP address, subnet mask, and default gateway to complete the network environment configuration.

# 5 Screen Configuration

5.1 Set Input Source

Select the desired input source and complete the related settings, such as resolution and frame rate. If the resolutions of the input source and screen are the same, the image can be displayed pixel to pixel. A lower frame rate may result in image flickering, while a higher frame rate helps stabilize the display image.

📄Note

Input source settings are required for screen configuration in the Send-Only Controller working mode and not required in the All-In-One Controller working mode.

Step 1   On the main menu screen, choose **Input** > **Select Source** to enter the input settings screen.

Figure 5-1 Select source
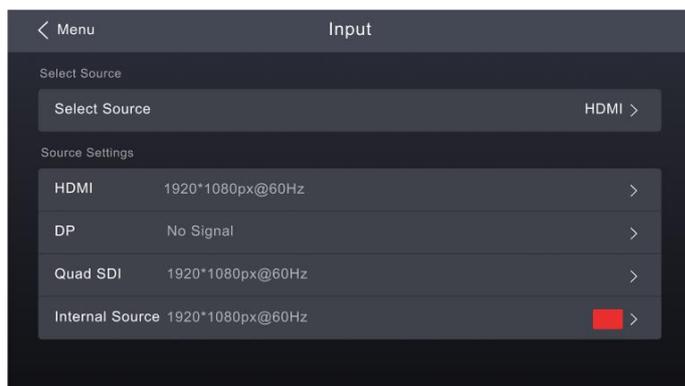
Step 2   Select an input source, and perform the corresponding operations for the input source according to the input source type. For the SDI sources, please skip this step.

● External input sources (HDMI, DP)
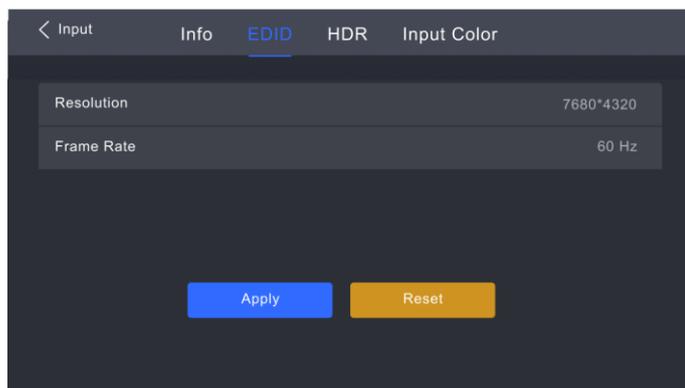
a. Choose *input source* > **EDID**. The *input source* is HDMI or DP.

b. Set the resolution and frame rate of the input source.

Custom: Set the resolution manually.

Listed standard resolutions: Select the desired resolution from the listed ones.

c. After the settings are done, tap **Apply**.

- Internal sources
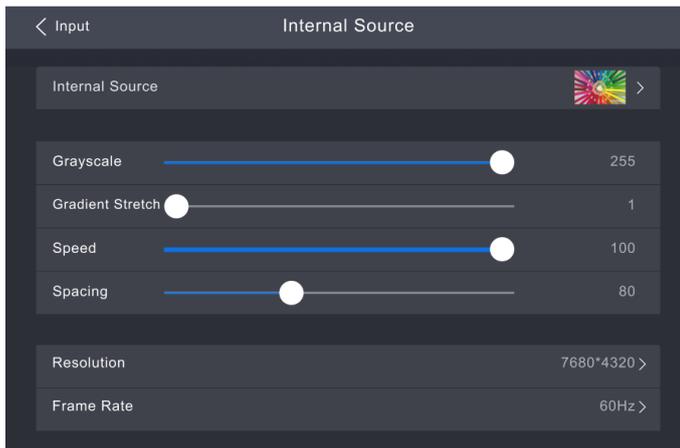
a. Choose **Internal Source** > **Internal Source**, and select a picture.

b. Set the parameters according to your actual needs; otherwise, please skip this step.

c. After the settings are done, tap **Apply**.

   The **Apply** action takes effect only for resolution and frame rate. The adjustments of other parameters take effect immediately.

5.2 Free Screen Configuration in VMP

The CX80 Pro does not support screen configuration on LCD. After input settings are completed, please configure the cabinet topology in VMP software to complete the logical connection of cabinets.

The VMP software can be used to configure either the regular screens or complex screens, and supports free wiring of the cabinets, plus the ability of calculating the used load capacity according to the cabinets that are actually loaded.

Step 1   Complete the hardware connection.

VMP supports automatic readback of the number of cabinets connected to each Ethernet port and the load capacity of each Ethernet Port. Before configuring the screen, make sure that the cabinets have been connected to the output Ethernet ports.

Step 2   Run VMP and complete network settings in the CX80 Pro.

Step 3   On the home page, select **Layout**.

Step 4   In the device list on the left, select the desired controller.

Figure 5-2 Layout
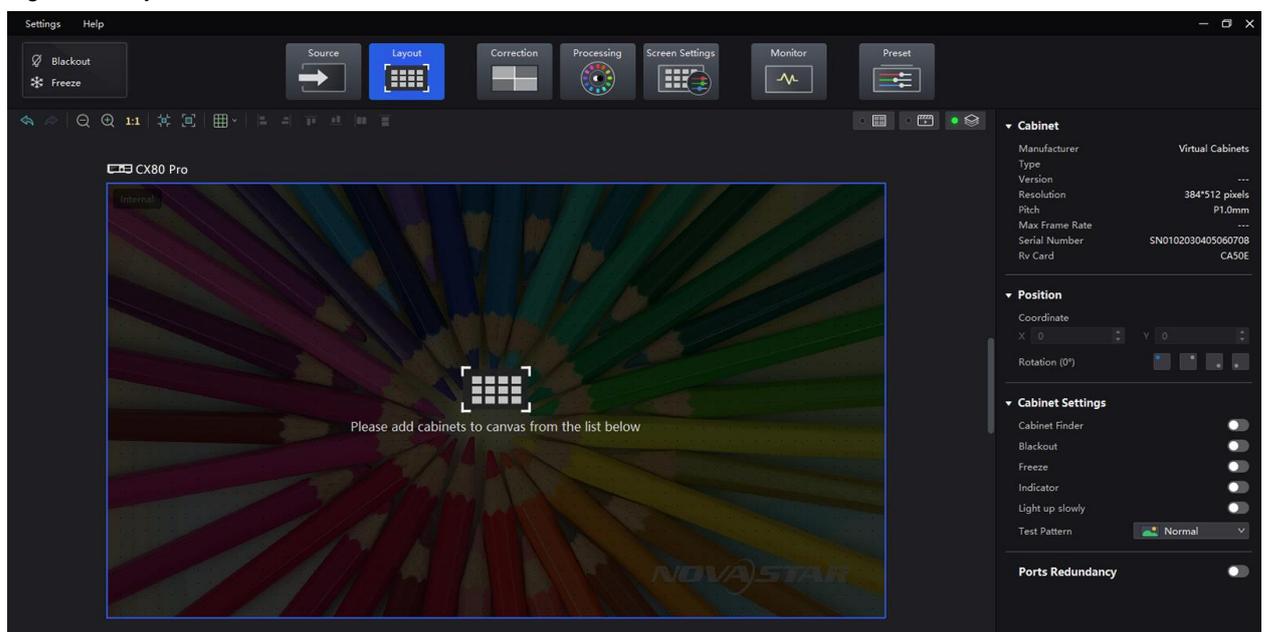
Step 5   From the menu bar, choose **View** > **Display**, select a view for the topology area, and select the content to be displayed.

You can also select a view by clicking one of the following icons at top right of the topology area. The selected view will have a green spot near it.

- ⬛: Show the cabinets only.

- ⬛: Show the preview image of the input source only.

- ⬛: Show the cabinets and preview image of the input source at the same time.

In addition, you can choose to show the cabinet topology, cabinet status, group names, source tags, and overlapping cabinets.

Step 6   In the bottom area of the page, select an Ethernet output port and click the canvas multiple times to add the corresponding number of cabinets.

The cabinets will be automatically connected when you are adding them, as shown in Figure 5-3. The Ethernet port's load capacity information will be displayed, as shown in Figure 5-4. The properties area will display the cabinet information, as shown Figure 5-5.

Figure 5-3 Cabinets connected automatically
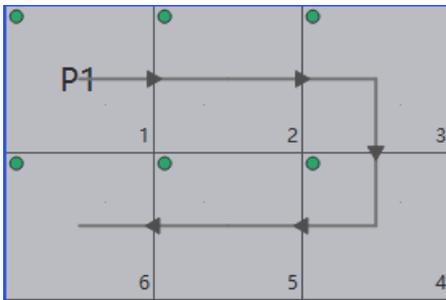
Figure 5-4 Ethernet port load capacity
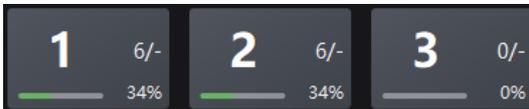
- 6/-: Indicates that 6 cabinets are connected to the controller's Ethernet port 1.

- 34%: Indicates these 6 cabinets have used 34% of the Ethernet port's capacity.

Figure 5-5 Cabinet information

📄**Note**

- If all the cabinets loaded by the Ethernet ports have the same size, you can use the swift layout function to quickly add and connect the cabinets for all the Ethernet ports. The operations are as follows:

- At the top right of the Ethernet port list, click ⚡ Swift Layout. Then, drag the mouse on the canvas to add cabinets that match the actual requirements. In the properties area, select a layout and click **Done**.

Step 7   Select another Ethernet port and continue to add cabinets until all cabinets are connected.

Figure 5-6 Cabinet connection
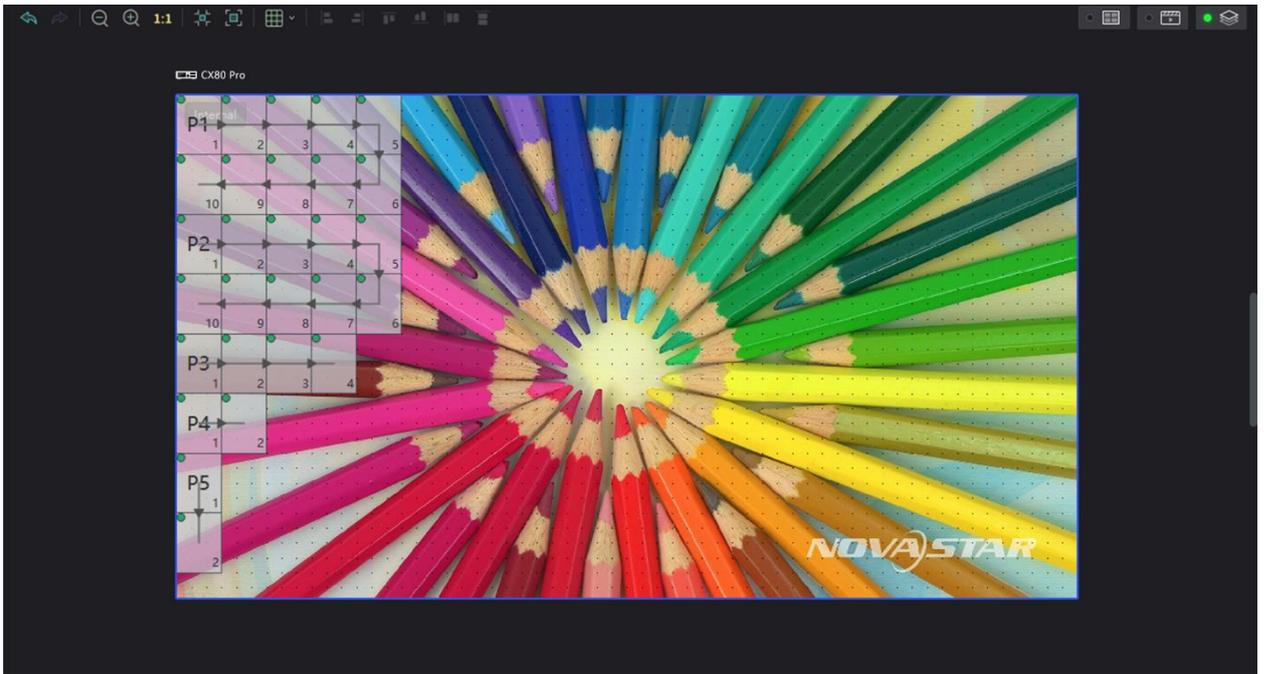
Step 8   For cabinets that have the same size and consecutive serial numbers, if you want to change the cabinet connection topology, select the cabinets and then select a quick topology under **Quick topo** in the properties area, as shown in Figure 5-7. For other cabinets, skep this step.

Figure 5-7 Quick topology

Step 9   Do any of the following to arrange and align the cabinets to let the cabinet positions meet the display requirements.

✥   **Use the function buttons**
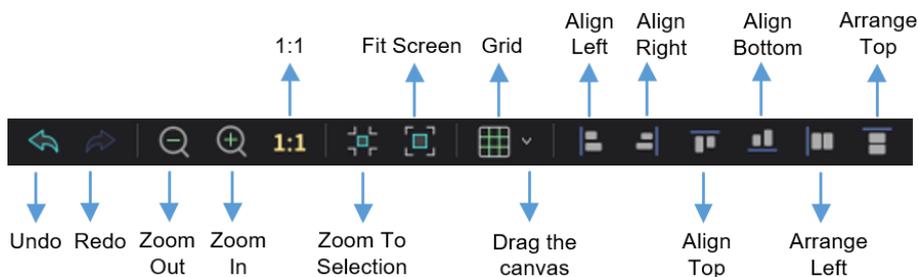
−   1:1: The canvas size equals to the input source resolution.

−   Zoom To Selection: The selected element is zoomed and displayed in the center of the canvas.

−   Fit Screen: The canvas size is automatically adjusted to fit the topology area size.

The drop-down menu of ▦ is shown in the figure below. The menu can be used to set the canvas grid.
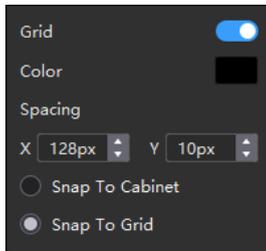
- Grid: When the switch is , a grid is displayed on the canvas. If you do not need to display the grid, click to change it to , or set the switch to .

- Color: Set the grid color.

- Spacing: Set the spacing of horizontal and vertical lines of the grid.

- Snap To Cabinet: When you move a cabinet close to another cabinet, the moved cabinet will be snapped to the edge of the other cabinet to avoid gaps.

- Snap To Grid: The cabinet will be snapped to the grid.

✤ **Use the function menus on the menu bar**
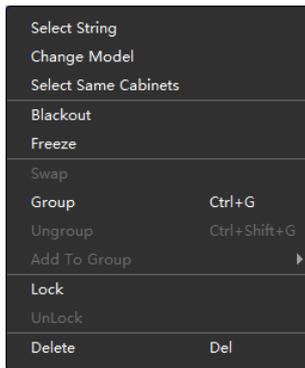
- **Edit** menu
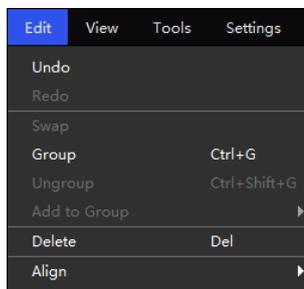
- **View** menu
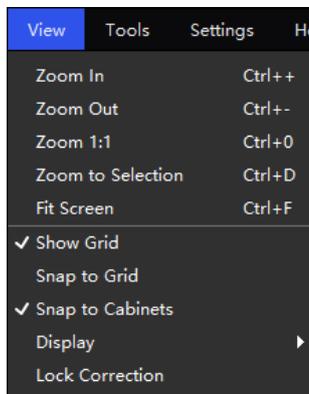
✤ **Use the right-click function menus**

- Right click the canvas

Zoom To Controller: The selected controller is zoomed and displayed in the middle of the topology area.

－ Right click the cabinet

Select String: Select all the cabinets on the connection line of the current cabinet.

Switch: Switch the display areas of two cabinets.

Group: Group the selected cabinets. To set the group name and color, please select the group and set them in the properties area.

Ungroup: Ungroup the cabinets.

Add to Group: Add the selected cabinets to a group.

✤ **Set cabinet coordinates and rotation**

Select a cabinet and set its coordinates and rotation angle in the properties area. After the cabinet is rotated, the input source will be rotated by the set angle and displayed.
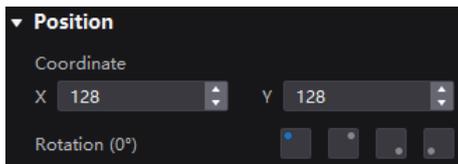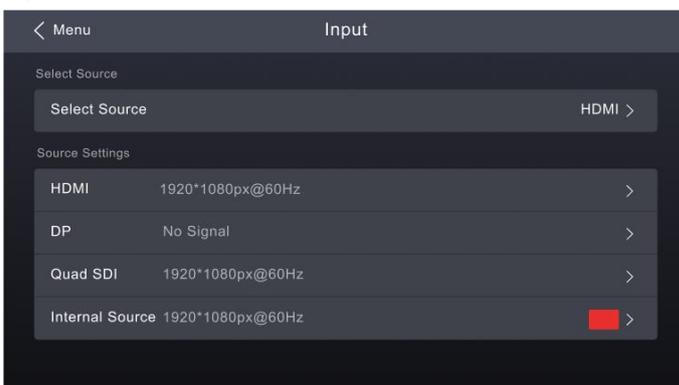
6 Display Effect Adjustment

6.1 Set External Input Source Parameters

6.1.1 Check Input Source Information

Check the attribute values of the input source, including the resolution, frame rate, bit depth, color gamut, etc.
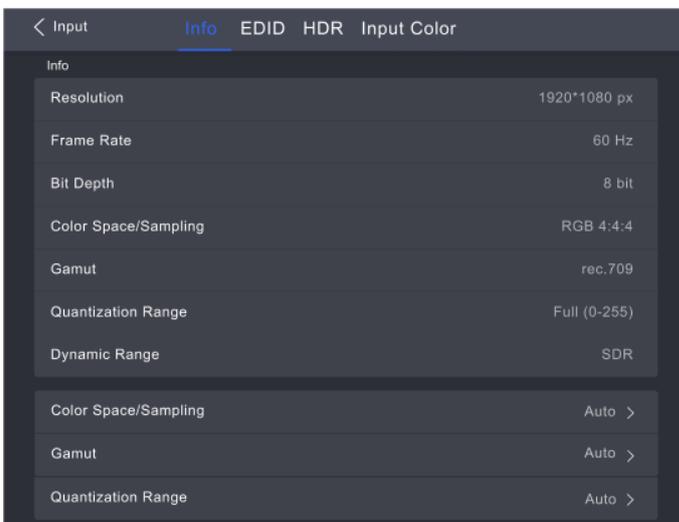
Step 1   On the main menu screen, choose **Input** > **Select Source** to select an external video source (HDMI, DP or SDI).

Figure 6-1 Select source

Step 2   Choose *input source* > **Info**. The *input source* is the video source you selected in the previous step.
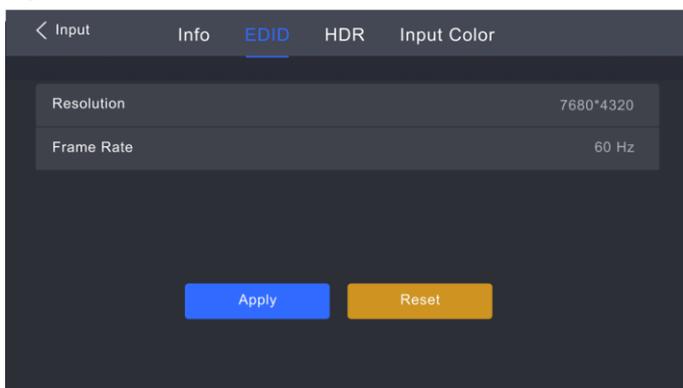
Figure 6-2 Input info

Step 3   Check the input source information.

6.1.2 Set Resolution and Frame Rate (HDMI and DP only)

Set the resolution and frame rate of the input source. If the resolutions of the input source and screen are the same, the image can be displayed pixel to pixel. A lower frame rate may result in image flickering, while a higher frame rate helps stabilize the display image.

Step 1   On the main menu screen, choose **Input** > **Select Source** to select an external video source (HDMI, DP).

Figure 6-3 EDID

Step 2   Select **EDID** and set the resolution and frame rate of the input source.

- **Custom**: Set the resolution manually.
- Listed standard resolutions: Select the desired resolution from the drop-down options.
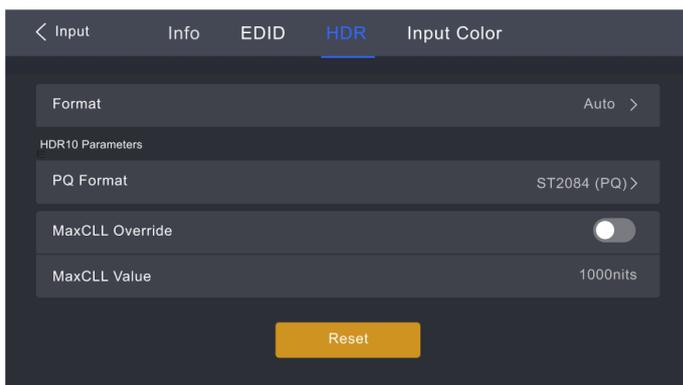
Step 3   After the settings are done, tap **Apply**.

6.1.3 Set HDR Parameters (HDMI and DP only)

Set the parameters used during the process of parsing HDR video sources.

Step 1   On the main menu screen, choose **Input** > **Select Source** to select the HDMI or DP video source.

Figure 6-4 HDR

Step 2   Select **Format** and select the HDR format from the listed options.

If **Auto** is selected, the device will read the attribute value that comes with the input source and the format will be switched automatically.

Step 3   Set **HDR10 Parameters**. If the HDR format is HLG or SDR here, no parameters need to be set.

- PQ Format: The mapping method of video source brightness.
  - ST2084 (PQ): This mode 1:1 maps the brightness of the video source. The part that exceeds the maximum screen brightness will still be adjusted to the maximum screen brightness.
  - ST2086 (Linear mapping): This mode linearly maps the brightness of the video source. It globally adjusts the video source brightness according to the maximum screen brightness to ensure that the ratio of the brightness of the entire source content remains unchanged.
- MaxCLL Override: Enable this parameter and you can set the MaxCLL value.
- MaxCLL Value: Max Content Light Level. It defaults to1000 nits. This value can be changed only when the **MaxCLL Override** switch is set to 🔵.

To restore the parameters to the defaults, select **Reset**.

📄**Note**

Using the HDR function reduces the CX80 Pro load capacity by less than half if the CX80 Pro works with the CA50E, CA50C and XA50 receiving cards. For details, see chapter 11 Ethernet Port Load Capacity.

6.1.4 Adjust Color

Set the input source color adjustment parameters.

Step 1 On the main menu screen, choose **Input** > **Select Source** to select an external video source (HDMI, DP or SDI).

Figure 6-5 Color adjustment
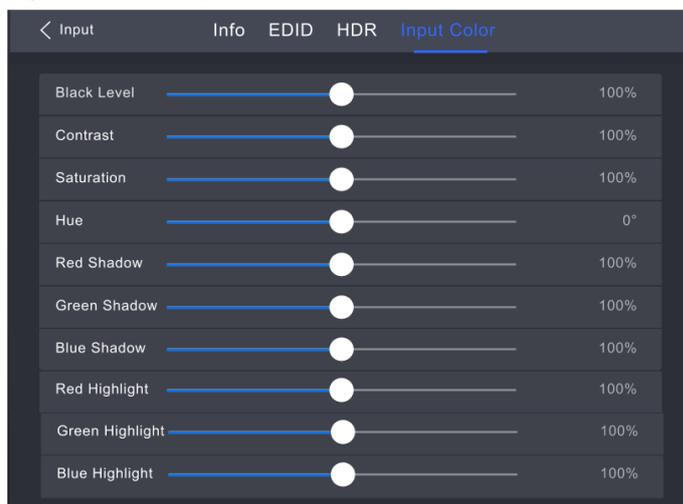
Step 2 Select **Input Color**.

Step 3 Set relevant parameters based on the on-site situation.

Parameter	Description
Black Level	It is used to adjust the brightness of the dark areas of the image. The smaller the value, the darker the dark part of the screen.
Contrast	It is used to adjust the brightness of the highlight areas of the image. The greater the value, the brighter the highlight part of the screen. Contrast and black level together affect the overall contrast of the image.
Saturation	It is used to adjust the color purity of the image. The greater the value, the more vivid the color.
Hue	It is used to adjust the color effect of the displayed image color.
Red Shadow/Green Shadow/Blue Shadow	It is used to adjust the brightness of the dark areas of the image. The principle is the same as that of black level, but only the RGB components are adjusted.
Red Highlight/Green Highlight/Blue Highlight	It is used to adjust the brightness of the highlight areas of the image. The principle is the same as that of contrast, but only the RGB components are adjusted.

6.2 Set Internal Input Source Parameters

Select the internal source stored in the device and set the related parameters for screen testing and troubleshooting.

Step 1 On the main menu screen, choose **Input** > **Select Source** to select an internal source.
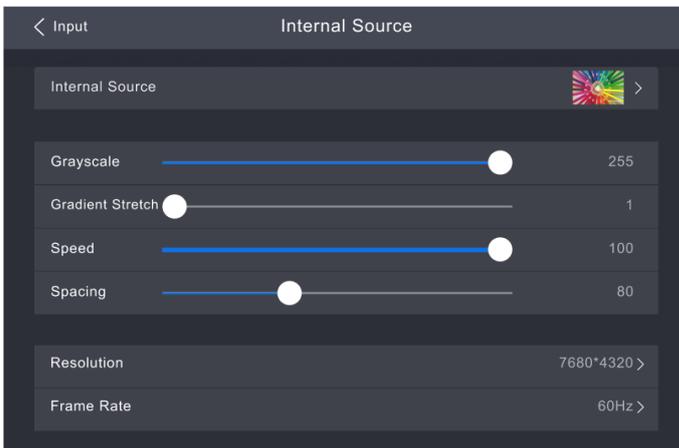
Figure 6-6 Internal source
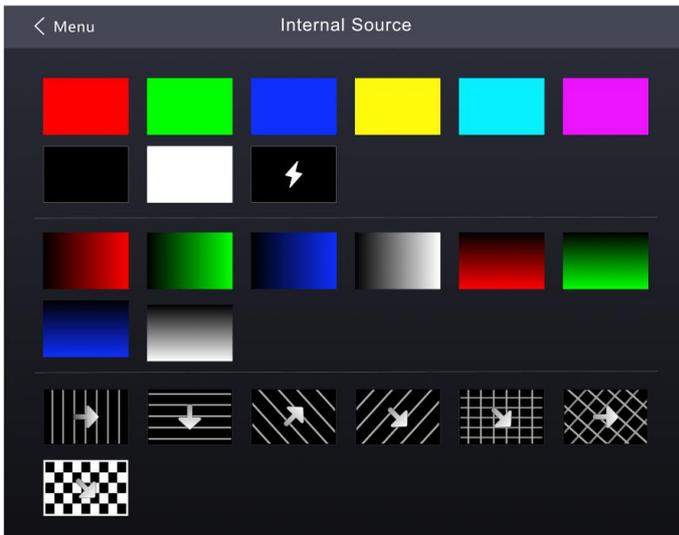
Step 2 Select a static picture or a motion picture.

Step 3 Set the parameters according to your actual needs; otherwise, please skip this step.
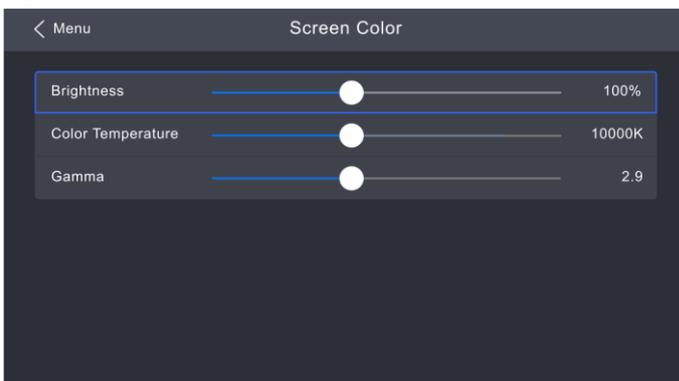
Figure 6-7 Screen parameters

Step 4 After the settings are done, tap **Apply**.

6.3 Set Screen Color

Adjust the screen output color. The adjustment is automatically saved.

Step 1 On the main menu screen, select **Screen Color** to enter the screen color adjustment page.

Figure 6-8 Screen color

Step 2 Adjust the parameters to the target values, respectively.

6.4 Screen Settings

6.4.1 Set Low Latency

The low latency function is used to reduce the latency at the controller, or increase the latency when the controller works with high-latency equipment. The latency value varies according to the selected input card and device working mode, as described in the table below.

Table 6-1 Latency at the CX80 Pro controller

| Input Card	Input Card 1 HDMI 2.1/DP 1.4		Input Card 2 in Mosaic Mode HDMI 2.0/SDI-Quad (1×4, 2×2, 4×1)		Input Card 2 in Common Mode HDMI 2.0/SDI-Quad (1×1)	
Working Mode	Non-low latency	Low latency	Non-low latency	Low latency	Non-low latency	Low latency
Send-Only Controller Mode	2 ~ 3	1 ~ 2	2	1	1	0
All-In-One Controller Mode	3 ~ 4	1 ~ 3	2	1	2	1

Note

- The table above describes only the latency values at the controller. When the controller works with the receiving cards, extra latency at the receiving card and chip ends will be added in the control system.
- When low latency is enabled, the sync source cannot be set to Genlock.
- To do screen configuration when low latency is enabled, ensure that the values of Y coordinates of all the cabinets loaded by each Ethernet port must be the same, as illustrated in the figure below.
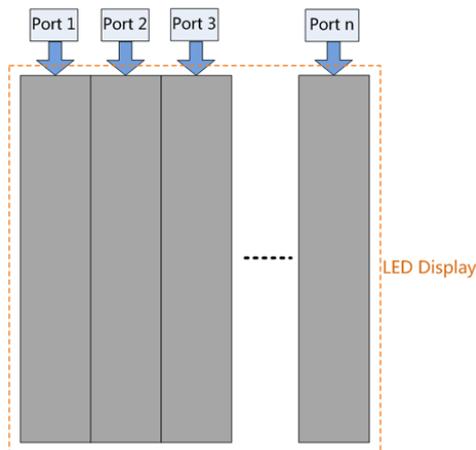
Step 1   On the main menu screen, choose **Screen Settings** > **Low latency**.

Figure 6-9 Low latency
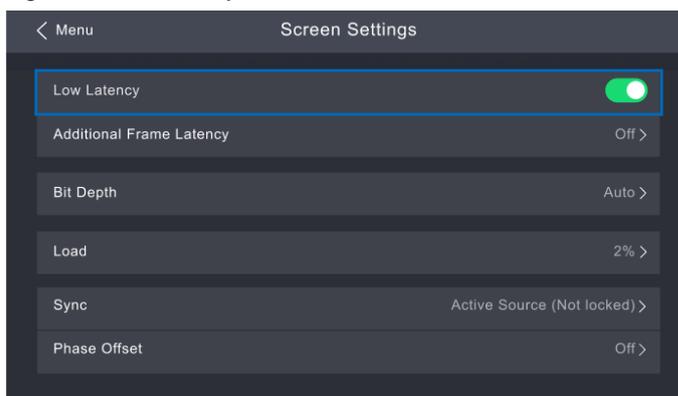
Step 2 Perform any of the following operations as required.

- Enable low latency

    Set the **Low Latency** switch to .

- Set additional frame latency

    a. Select **Additional Frame Latency**.

    b. Tap and select a value from the drop-down list.

6.4.2 Set Ouput Bit Depth

Set the output bit depth of the input source.

Step 1 On the main menu screen, choose **Screen Settings** > **Bit Depth**.

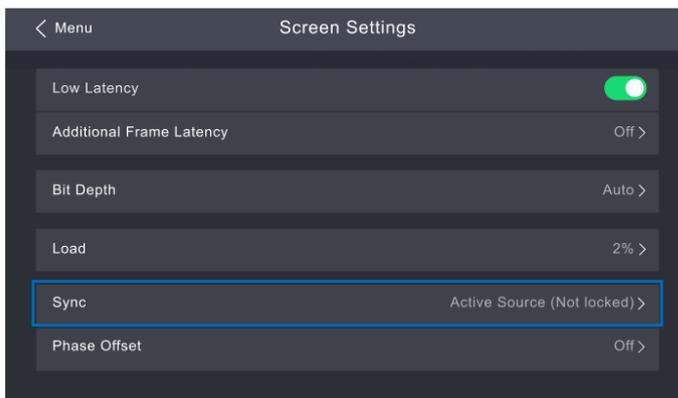Step 2 Select the desired bit depth value from the listed ones.

If **Auto** is selected, the output bit depth is the same as the input bit depth.

6.4.3 Set Sync Source

Select a synchronization signal for the display frame rate and set the phase offset.

Step 1 On the main menu screen, choose **Screen Settings** > **Sync**.

Figure 6-10 Sync

Step 2 Select the desired sync source from the listed ones.

- Active Source: Sync with the frame rate of the active source.
- Genlock: Sync with the frame rate of the Genlock signal.
- Internal: Sync with the frame rate of the controller's internal clock.

Step 3 Select **Phase Offset**.

Step 4 Select an adjustment method from the listed options and press the knob.

- Off: Turn off the phase offset function.
- Angle: The related parameter **Angle** can be set.
- Fraction: The related parameter **Fraction** can be set.
- Absolute: The related parameters **Lines** and **Pixels** can be set when the sync source is **Active Source**.
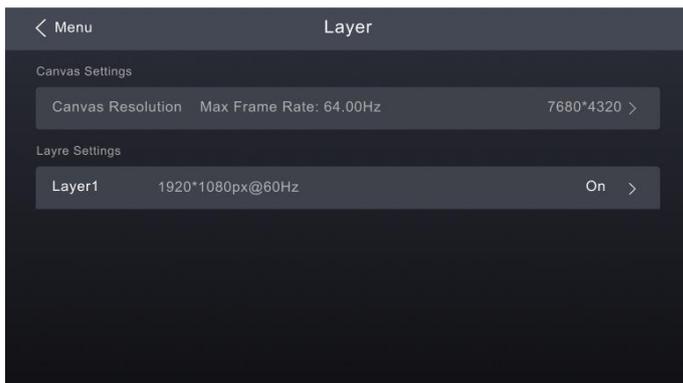
📄**Note**

- When the sync source is set to Genlock, low latency cannot be enabled.

6.5 Set Image Scaling (All-In-One Controller Mode)

When the working mode is All-In-One Controller, the canvas size and the layer (currently only 1 layer supported) on the canvas can be set.

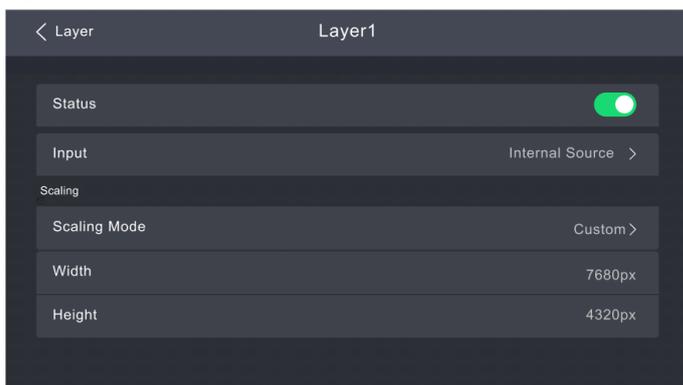Step 1   Select the **Layer** menu from the main menu.

Figure 6-11 Layer settings

Step 2   Select **Canvas Resolution**, enable the value editing status, rotate the knob to adjust the value and press the knob to confirm it.

Step 3   Select **Layer 1**, press the knob to open the editing page, and set the related parameters.

Figure 6-12 Editing layer 1

- Status: Turn on or off the layer.
- Input: Select an input source.
- Scaling Mode: Set the scaling mode.
    - Custom: Customize the width and height.
    - Pixel to Pixel: The layer width and height are the same as the input source.
- Width: Set the layer width.
- Height: Set the layer height.

6.6 Color Processing

This chapter describes color processing with one device selected. You can perform any of the following operations as required.

6.6.1 Color Replacement

Replace one color with another color according to the specified settings.

This function only has an on/off switch on the CX80 Pro. You need to follow the steps below to set the specific parameters in VMP.

Note

Replacement of highly saturated colors is recommended for better effect.
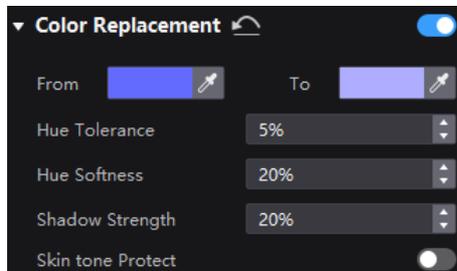
Step 1   Run VMP and connect devices.

Step 2   Select **Processing**.

Step 3   Set the **Color Replacement** switch to [toggle].

Step 4   Set the colors before and after replacement.

- Method 1: Click the color area in [icon] to open the color palette and set a color.
- Method 2: Click the eyedropper in [icon] and select a color in the topology area.

Figure 6-13 Color Replacement

Step 5   Set **Hue Tolerance**, **Hue Softness**, **Shadow Strength** and **Skin tone Protect**.

- Hue Tolerance: Indicates the hue range of the color to be replaced. The larger the value, the larger the replacement area.
- Hue Softness: Indicates the hue softness of the transition area.
- Shadow Strength: Indicates the gradient parameter of the highlight or shadow area. The larger the value, the smoother the gradient.
- Skin tone Protect: Keeps the skin tone as original as possible.

Step 6   After the parameter setting is complete, you can select **Processing** on the device main menu screen and select **Color Replacement** to perform the on/off operation.

Figure 6-14 Color Replacement
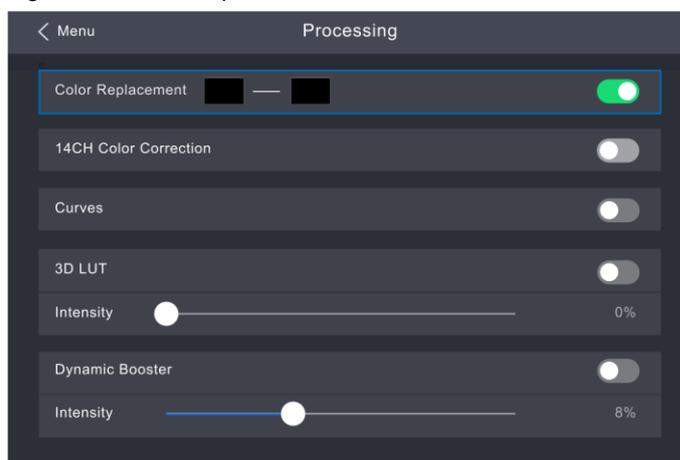
6.6.2 14Ch Color Correction

This function only has an on/off switch on the CX80 Pro. You need to follow the steps below to set the specific parameters in VMP.

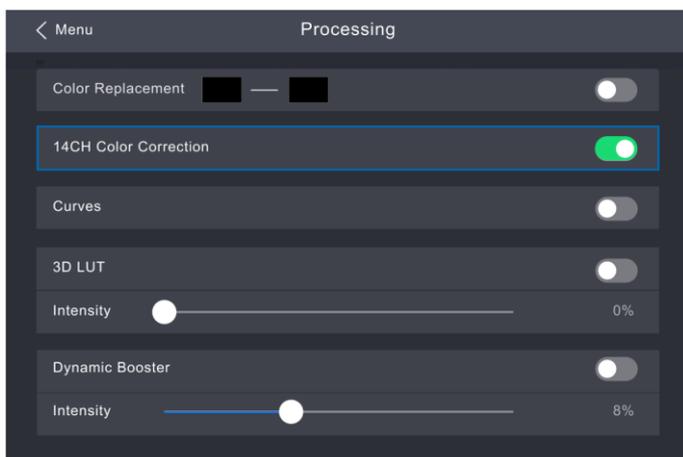Step 1   Run VMP and connect devices.

Step 2   Select **Processing** and set the **14Ch Color Correction** switch to [toggle].

Step 3   Click a value of a color to enable the editing status and change the value, [icon], for example.

Figure 6-15 14CH Color Correction

Step 4   After the parameter setting is complete, you can select **Processing** on the device main menu screen and select **14CH Color Correction** to perform the on/off operation.

6.6.3 Curves Adjustment

Adjust color curves.

This function only has an on/off switch on the CX80 Pro. You need to follow the steps below to set the specific parameters in VMP.

Step 1   Run VMP and connect devices.

Step 2   Select **Processing** and set the **Curves** switch to .

Figure 6-16 Curves Adjustment

Step 3   Select the white, red, green or blue channel.

Step 4   Drag the slider under the curve diagram to set the curve adjustment range.

Step 5   Click on any position of the curve to add an adjustment point and drag the point to adjust the curve.

Input and Output indicate the absolute coordinates of the adjustment point in the curve diagram.

To delete the adjustment point, drag the point outside the curve diagram, or select the point and press Delete.

Step 6   After the parameter setting is complete, you can select Processing on the device main menu screen and select Curves to perform the on/off operation.

Figure 6-17 Curves
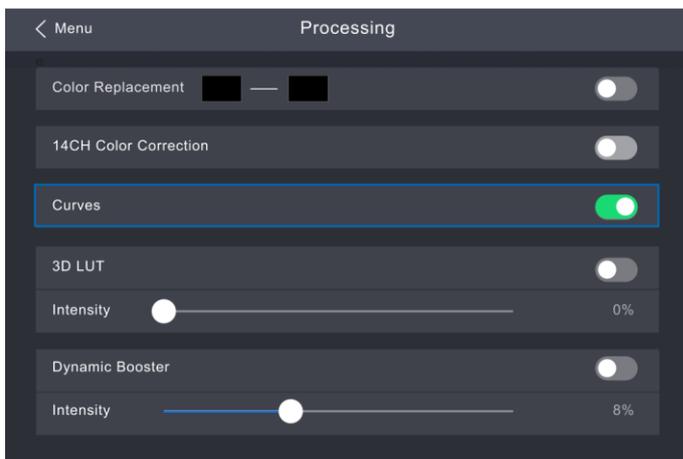
6.6.4 Enable 3D LUT

A set of mapping relationships are defined in the 3D LUT file (.cube) to adjust the colors of the video source. Before the operation, you need to upload a 17×17×17 3D LUT .cube file in VMP.

Step 1   Run VMP and connect devices.

Step 2   Select Processing.

Step 3   Click anywhere in the Load 3DLUT file area, select a file and open it.
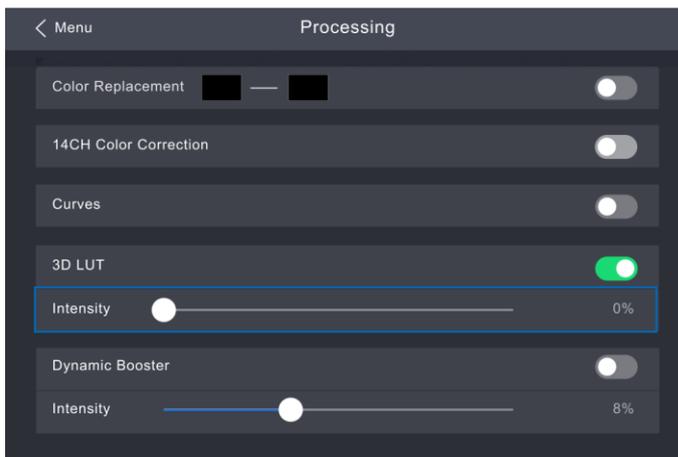
Figure 6-18 Loading 3D LUT file
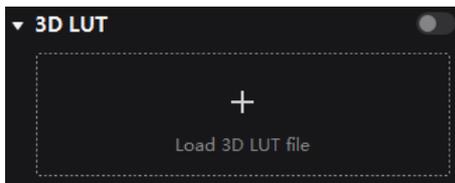
To delete the file, click .

Step 4 After the file is loaded, select **Processing** on the device main menu screen.

Step 5 Set the **3D LUT** switch to .

Step 6 Drag the slider to adjust the intensity of applying the 3D LUT.

Figure 6-19 3D LUT

6.6.5 Dynamic Booster

> **Note**
>
> The Dynamic Booster function can be achieved when the CX80 Pro works with the CA50E, CA50C and XA50 receiving cards. Before operation, brightness correction by using the CA410-VP427, CA410-P427 or EYE2-400 color analyzer is recommended.

Dynamic Booster can significantly improve the display contrast and image details for better visual experience and effectively control and lower the display power consumption.

Step 1 On the main menu screen, select **Processing**.

Step 2 Set the **Dynamic Booster** switch to .

Step 3 Drag the slider to adjust the intensity of applying the Dynamic Booster.
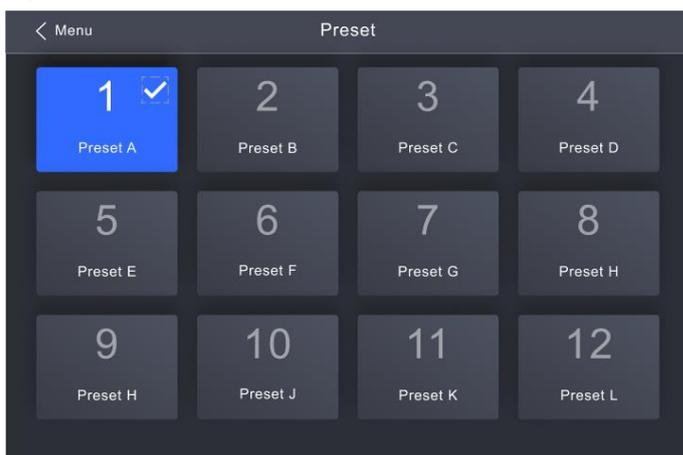
Figure 6-20 Dynamic Booster
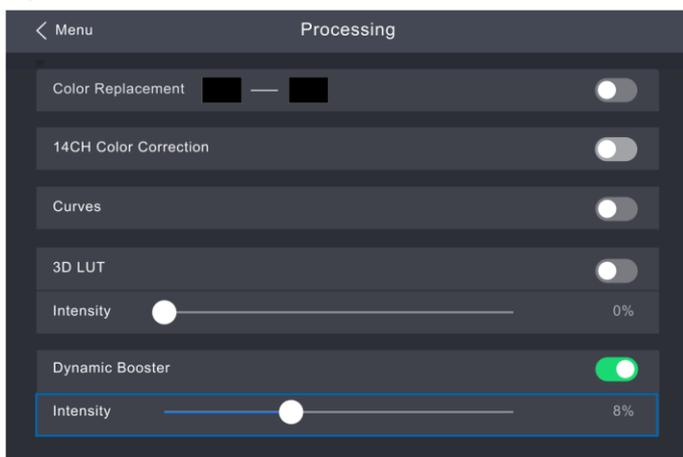
6.7 Apply Presets

Apply a saved preset to complete screen configuration and display effect adjustment with one key, allowing you to quickly start using the CX80 Pro.

Step 1   On the main menu screen, choose **Preset**.

The saved presets in VMP will be listed on the screen.

Figure 6-21 Preset

Step 2   Select the preset to be applied and wait for the loading to complete.

📄**Note:**

- To complete screen configuration by applying a preset, ensure the cabinet specifications and screen topology must be the same as those in the preset.
- The CX80 Pro supports applying the presets only. To save a preset, follow the steps below in VMP.

Save Presets

After completing the screen configuration and display effect adjustment, you can save the data on the **Source**, **Layout**, **Processing** and **Screen Settings** pages as a preset so that these data can be directly applied in the future.

Step 1   Choose **Preset**.

Step 2   On the preset management page, click [+] to enter the page shown in Figure 6-22.

To go back to the preset management page, click a blank area in the properties area.

Figure 6-22 Saving presets

Step 3 Click a preset icon. In the properties area, set a name for the preset and select the data you need to save.

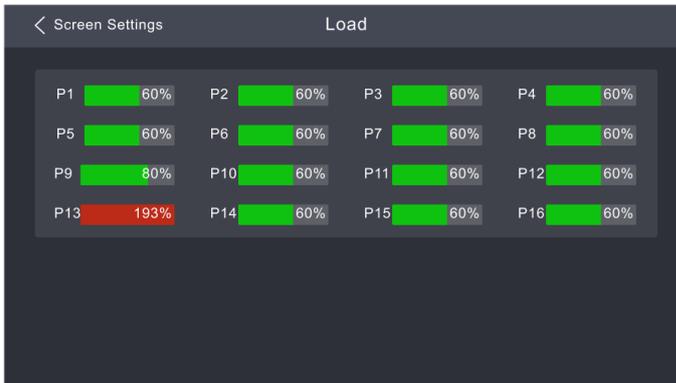If the preset you selected is not a blank one, the original data will be overwritten.

Step 4 Click **Save**.

7 Device Management

7.1 Check the Port Load

Step 1   On the main menu screen, choose **Screen Settings** > **Load**.

Figure 7-1 Port load

Step 2   Check the current load status of each Ethernet port of the device.

7.2 Diagnostics

7.2.1 Power-on Self-Test

When the device is powered on, a self-test is performed automatically.

- Startup OK: You can start using the full functionality of the CX80 Pro.
- Startup error: The following error information is displayed. If you select **Close**, you will use the device in the function restricted state. If you select **Export**, you can obtain the power-on self-test (POST) result.
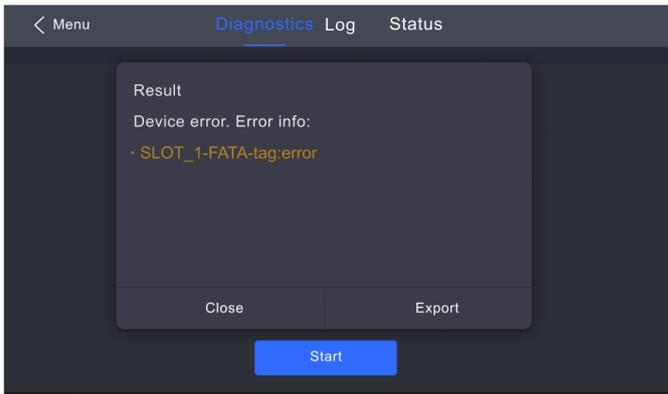
Figure 7-2 POST - Error
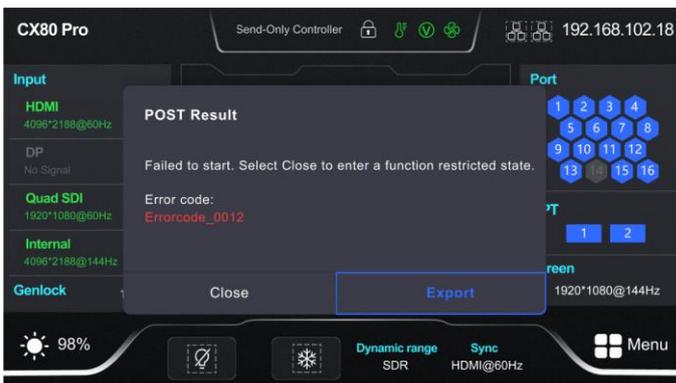
7.2.2 Maintenance Self-Test

When the device has a fault, perform self-test manually, check and export the result.

Step 1   On the main menu screen, select **Maintain**.

Step 2   Select **Start** in the displayed dialog box.

Figure 7-3 Diagnostics

Step 3 After successful diagnostics, do any of the following as required.

- Check the diagnostic result

  Check the diagnostic result report, including the supply voltages of the MCU, FPGA and motherboard, the temperature inside the chassis, and other information.

- Export the diagnostic result to a USB drive

  a. Insert the USB drive to the USB port on the front panel of the device.

  b. Select **Export**.

     A prompt will be displayed after the operation is successful.

7.3 Set an IP Address

Manually set a static IP address for the device or set up the device to automatically obtain an IP address.

Step 1 On the main menu screen, select **Network**.

Figure 7-4 Network settings
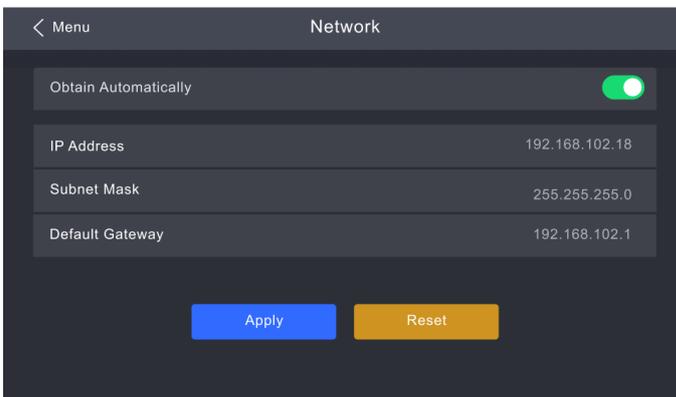
Step 2 Choose whether to enable **Obtain Automatically**.

- Enable: The device automatically obtains the IP address.
- Disable: Manually set a static IP address for the device.

Step 3 If **Obtain Automatically** is disabled, set an **IP Address**, **Subnet Mask** and **Default Gateway** and select **Apply**. If **Obtain Automatically** is enabled, this step is not required.
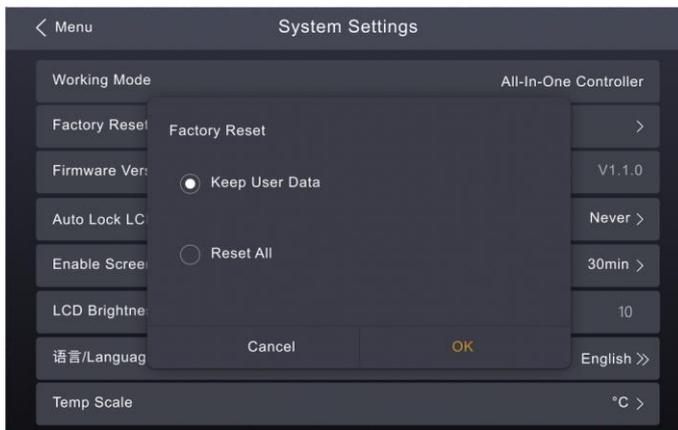
If you want to reset the IP address to the default, select **Default**.

7.4 Factory Reset

Reset part or all of the device data to the factory settings.

Step 1 On the main menu screen, choose **Settings** > **Factory Reset**.

Figure 7-5 Factory reset

Step 2   Do any of the following according to the data you want to reset.

- Reset part of the data

  Reset all the data except the imported files, network parameters, language settings, and device name.

  a. Select **Keep User Data**.

  b. Select **Yes** in the displayed dialog box.

     The device restarts automatically while the data is being reset.

- Reset all the data (This action cannot be undone.)

  Reset all the data to factory settings.

  a. Select **Reset All**.

  b. Select **Yes** in the displayed dialog box.

     The device restarts automatically while the data is being reset.

7.5 Check the Firmware Version

Check the current firmware program version of the device.

Step 1   On the main menu screen, choose **Settings**.

Figure 7-6 Firmware version
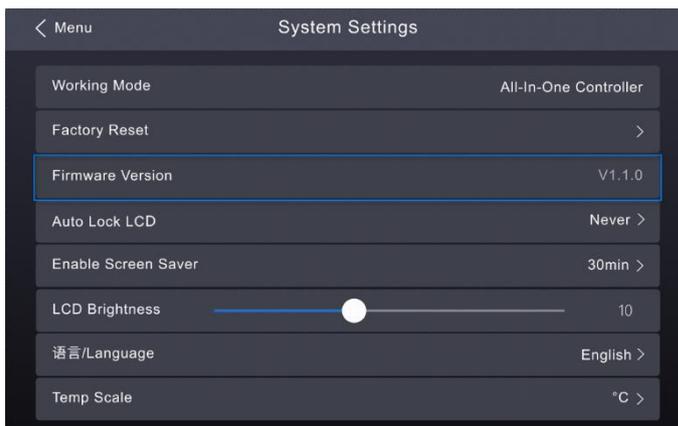
Step 2   Check the current firmware program version next to **Firmware Version**.
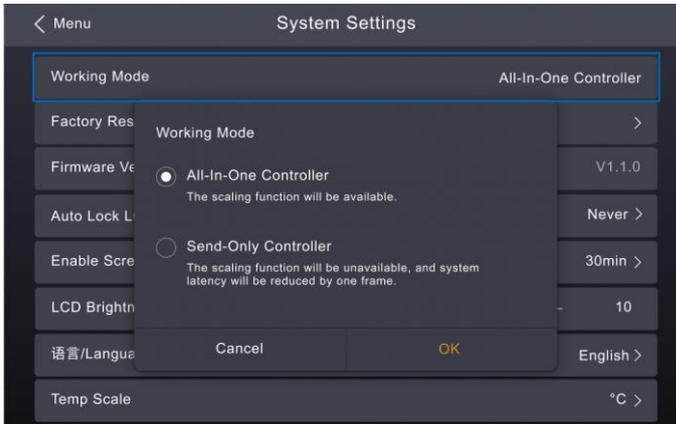
8 System Settings

8.1 Switch Working Mode

Switch the device working mode to All-In-One Controller or Send-Only Controller.

Step 1 On the main menu screen, choose **Settings** > **Working Mode**.

Figure 8-1 Working Mode

Step 2 Select All-In-One Controller or Send-Only Controller.

- In All-In-One Controller mode, the layer and scaling functions will be available.

- In Send-Only Controller mode, the layer and scaling functions will be unavailable, and system latency will be reduced by one frame.
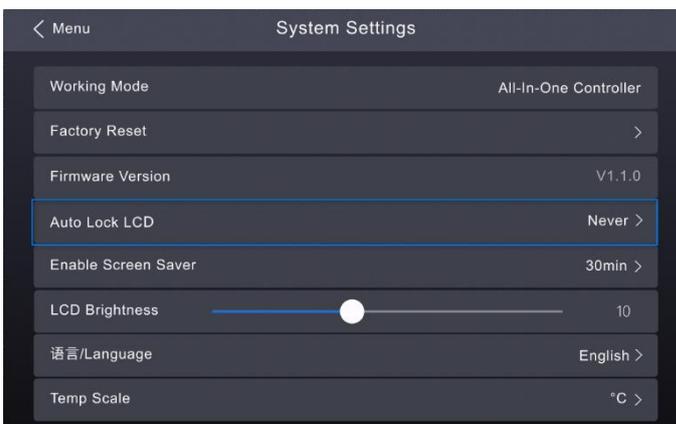
Step 3 Click **OK**.

8.2 Set the Auto Lock LCD Time

Set the operation timeout period for other user interface. The LCD will return to the home screen automatically after the specified amount of time if no action is performed during the time specified.

Step 1 On the main menu screen, choose **Settings** > **Auto Lock LCD**.
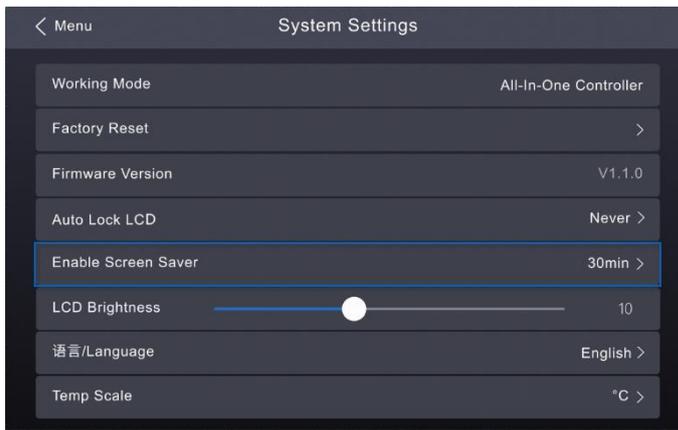
Figure 8-2 Auto Lock LCD

Step 2 Select **30s**, **1min**, **5min** or **Never** from the drop-down options as needed.

8.3 Enable Screen Saver

Set the time when the screen saver will be enabled.

Step 1 On the main menu screen, choose **Settings** > **Enable Screen Saver**.

Figure 8-3 Enable Screen Saver

Step 2   Select **1min**, **5min**, **30min**, **1hour** or **Never** from the drop-down options as needed.

8.4 Set LCD Brightness

Set the LCD brightness of the device according to the on-site conditions.

Step 1   On the main menu screen, choose **Settings**.

Figure 8-4 LCD Brightness
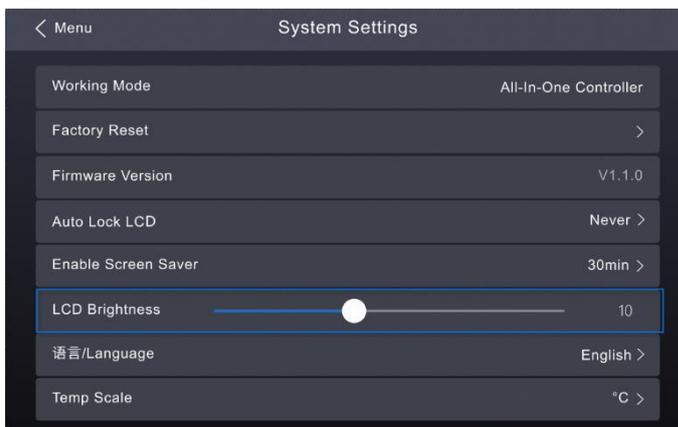
Step 2   Next to **LCD Brightness**, drag the slider or rotate the knob to adjust the LCD brightness.

8.5 Set Language

Change the system language of the device.

Step 1   On the main menu screen, choose **Settings** > **语言/Language**.

Figure 8-5 Language
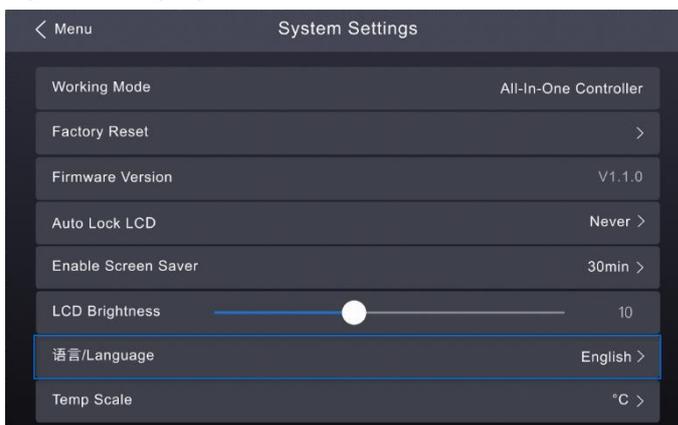
Step 2   Choose 中文 or **English** as required.

8.6 Set Temperature Scale

Change the temperature scale of the device.

Step 1   On the main menu screen, choose **Settings** > **Temp Scale**.

Figure 8-6 Temperature scale

Step 2   Choose **°C** or **°F** as required.

9 Product Specifications

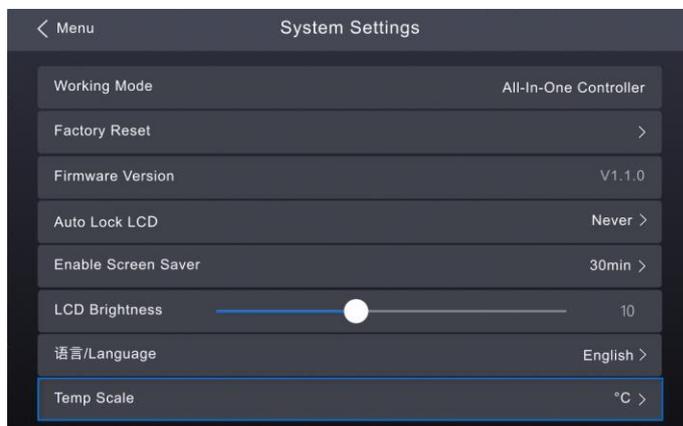| Electrical Specifications	Power supply	AC 100-240V~, 50/60Hz, 4A	
	Power consumption	170 W	
Operating Environment	Temperature	−10ºC to +45ºC	
	Humidity	0% RH to 80% RH, non-condensing	
Storage Environment	Temperature	−30ºC to +80ºC	
	Humidity	0% RH to 90% RH, non-condensing	
Physical Specifications	Dimensions	482.6 mm × 95.1 mm × 528 mm	
	Net weight	10.5 kg	
	Gross weight	12.5 kg Note: It is the total weight of the product, accessories, and packing materials packed according to the packing specifications.	
Packing Information	Packing box	660.0 mm × 570.0 mm × 210.0 mm, kraft paper box	
	Accessory box	408.0 mm × 290.0 mm × 50.0 mm, white cardboard box	
	Accessories	Input card 1	• 1x Power cord • 1x Ethernet cable • 1x HDMI 2.1 cable • 1x DP 1.4 cable • 1x Certificate of Approval
		Input card 2	• 1x Power cord • 1x Ethernet cable • 1x HDMI 2.0 cable • 1x Certificate of Approval
IP Rating	IP20 Please prevent the product from water intrusion and do not wet or wash the product.		
Noise Level (typical at 25°C/77°F)	45 dB (A)		

The amount of power consumption may vary depending on various factors such as product settings, usage, and environment.

10 Video Source Specifications

Input		Features		
		Bit Depth	Color Space/Sampling	All Input Resolutions
Input card 1	HDMI 2.1	8bit	RGB4:4:4	7680×4320＠(60/50/48/30/25/24Hz)
			YCbCr4:4:4	
			YCbCr4:2:2	
		10bit/12bit	RGB4:4:4	7680×4320＠(30/25/24Hz)
			YCbCr4:4:4	
			YCbCr4:2:2	7680×4320＠(60/50/48/30/25/24Hz)
	DP 1.4	8bit/10bit	RGB4:4:4	7680×4320＠(30/25/24Hz)
			YCbCr4:4:4	
			YCbCr4:2:2	
		12bit	YCbCr4:2:2	7680×4320＠(30/25/24Hz)
	12G-SDI	10bit	YCbCr4:2:2	Max connector capacity 4096×2160 @60Hz Max mosaic capacity 8192×4320@60Hz
	Note	• For input card 1, the HDMI and DP connectors support only 7680×4320 inputs. • For requirements of other resolutions, frame rates and bit depths on input card 1, please contact NovaStar for customization.		
Input		Features		
		Bit Depth	Color Space/Sampling	Max Input Resolution
Input card 2	HDMI 2.0	8bit	RGB4:4:4	Max connector capacity 4096×2160 @60Hz Max mosaic capacity 8192×4320@60Hz
			YCbCr4:4:4	
			YCbCr4:2:2	
		10bit/12bit	RGB4:4:4	Max connector capacity 4096×1080@60Hz Max mosaic capacity 8192×2160@60Hz
			YCbCr4:4:4	
	12G-SDI	10bit	YCbCr4:2:2	Max connector capacity 4096×2160 @60Hz Max mosaic capacity 8192×4320@60Hz

11 Ethernet Port Load Capacity

When the CX80 Pro works with CA50E, CA50C and XA50 receiving cards, the formula of calculating the load capacity per Ethernet port and the detailed parameters are as follows.

- 8bit: Load capacity × 24 × Frame rate < 5G × 0.75
- 10bit: Load capacity × 30 × Frame rate < 5G × 0.75
- 12bit: Load capacity × 36 × Frame rate < 5G × 0.75

Max Load Capacity per Ethernet Port (Pixels)			
Frame Rate / Bit Depth	8bit	10bit	12bit
24 Hz	6,480,000	5,182,500	4,320,000
25 Hz	6,220,800	4,975,200	4,147,200
30 Hz	5,184,000	4,146,000	3,456,000
50 Hz	3,110,400	2,487,600	2,073,600
60 Hz	2,592,000	2,073,000	1,728,000
120 Hz	1,296,000	1,036,500	864,000
144 Hz	1,080,864	864,441	720,576
240 Hz	648,000	518,250	432,000

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