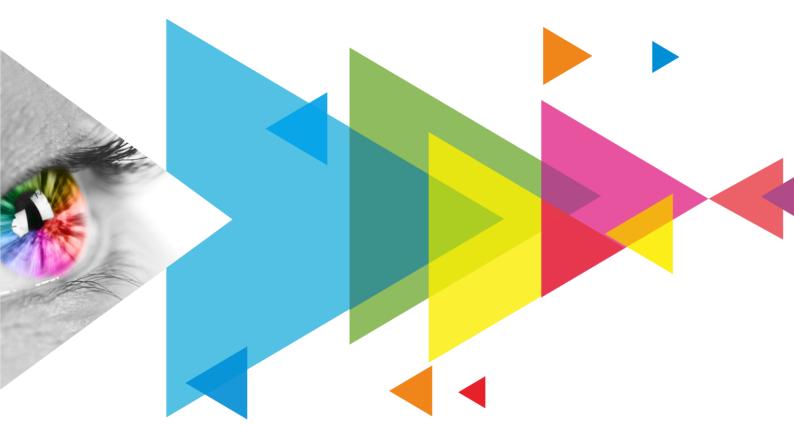


CX40 Pro

LED Display Controller



User Manual



Change History

Document Version	Release Date	Description
V1.5.0	2025-09-30	Added support for 3D feature.
		HDMI 2.0 input supports YCbCr 4:2:0 color sampling format.
		Supports Art-Net and central control protocol and viewing of device MAC address.
		Supports SPDIF audio output.
V1.4.0.B5	2024-07-26	 Supports importing 3D LUT files with an accuracy of 33x33x33 / 65x65x65. Improved document information.
V1.0.1	2023-07-04	 Added descriptions for low latency. Updated the supported driver ICs for frame rate adaptive.
V1.0.0	2023-01-12	First release



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1 Introduction

The CX40 Pro is a 4K 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 2.0, DP 1.2 and 12G-SDI) and supports 5Gbps output via Ethernet port and 40Gbps remote transmission via optical port.

The CX40 Pro can also work with the brand-new software VMP (Vision Management Platform) to provide a better operation and control experience. Featuring a 5.5-inch touch LCD, it makes user operation and control much easier.



2 Appearance

2.1 Front Panel



Name	Function
Running	Solid red: Standby.
indicator	Solid blue: The device is being powered on.
	Solid green: The device is running normally.
	Flashing red: The device is running abnormally.
Standby	Press the button to power on or power off the device.
button	Hold down the button for 5s to 10s to restart the device.
USB 2.0	Connect to a USB drive only to export the device diagnostic result.
	Only the NTFS and FAT32 file systems are supported. Others are not supported.
IPS touchscreen	A 5.5-inch screen that is for displaying the device status, settings, and sending 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 buttons and screen.
BACK	Go back to the previous menu or cancel the current operation.



2.2 Rear Panel



Inputs	Inputs			
Туре	Qty	Description		
HDMI 2.0-1	1	Resolutions	Max resolution: 4096×2160@60Hz/8192×1080@60Hz (Forced)	
			Min resolution: 800×600@60Hz	
		Max	Max width: 8192 pixels (8192×1080@60Hz)	
		width/height (Forced)	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	Support standard resolutions, up to 3840×2160@60Hz.	
		management	Support custom input resolutions.	
		HDCP	HDCP 2.2 compliant, backwards compatible with HDCP 1.4/HDCP 1.3.	
		Interlaced signal inputs	Not supported.	
HDMI 2.0-2	1	Resolutions	Max resolution: 4096×2160@60Hz/8192×1080@60Hz (Forced)	
			Min resolution: 800×600@60Hz	
		Max	Max width: 8192 pixels (8192×1080@60Hz)	
		width/height (Forced)	Max height: 7680 pixels (1080×7680@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	



Inputs	Inputs			
Туре	Qty	Description		
		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 with HDCP 1.4/HDCP 1.3.	
		Interlaced signal inputs	Not supported.	
DP 1.2	1	Resolutions	Max resolution: 4096×2160@60Hz/8192×1080@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	
		EDID management	Support standard resolutions, up to 3840×2160@60Hz. Support custom input resolutions.	
		HDCP	HDCP 1.3 compliant.	
		Interlaced signal inputs	Not supported.	
12G-SDI IN	2	Standards	Support ST-2082 (12G), ST-2081 (6G), ST-424 (3G) and ST-292 (HD) standard video inputs. Support 3G-Level A.	
		Resolution	Max resolution: 4096×2160@60Hz Min resolution: 720×480i@59.94Hz	
		Frame rates	23.98/24/25/29.97/30/47.95/48/50/59.94/60 Hz	
		Interlaced signal inputs	Support interlaced signal inputs, including 1080i/576i/480i.	
		Cables	Recommend using the CANARE-12G SDI coaxial cable. Cables up to 50 meters are supported.	



Inputs			
Туре	Qty	Description	
Outputs			
Туре	Qty	Description	
5GBASE-	6	5Gbps Ethernet ports.	
T×6		Max device load capacity: 9 million pixels	
		Max output width/height: 16,384 pixels	
		The maximum load capacity per port is as follows. For details, please refer to Ethernet Port Load Capacity	
		- 8bit@60Hz: 2,951,200 pixels	
		- 10bit@60Hz: 2,213,200 pixels	
		- 12bit@60Hz: 1,475,600 pixels	
		Note	
		The load capacity of a single Ethernet port can only achieve its maximum when the load width is 128 pixels or more. If the load width is less than that, the load capacity will be reduced accordingly, calculated as (128 - load width) × load height.	
40G QSFP+	1	40Gbps optical port with a transmission rate of 41.25Gbps.	
		Note	
		The product doesn't include an optical module by default. If you need one, it's recommended to choose a compatible NovaStar product.	
HDMI 2.0 LOOP	2	HDMI loop through. Up to 8 devices can be cabled in one loop.	
12G-SDI LOOP	2	SDI loop through. Up to 8 devices can be cabled in one loop.	
SPDIF OUT	1	Digital audio output connector allows for using the HDMI 2.0_2 input source as the audio output.	
Controls			
Туре	Qty	Description	
ETHERNET	2	Gigabit Ethernet control ports. Support TCP/IP protocol and star connection.	
		They have the same functions without priority and order, and can be	
		connected to VMP software and central control devices. 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 CX40 Pro can be	



Inputs		
Туре	Qty	Description
		cascaded.
GENLOCK	1	A pair of Genlock signal connectors. Support Bi-Level, Tri-Level, and Blackburst. IN: Accept the sync signal LOOP: Loop the sync signal The Genlock input signal supports a frame rate range from 23.98 Hz to 60 Hz.
		For standard Genlock signal generators, up to 20 CX40 Pro can be cascaded.
AUX	1	An auxiliary connector for connecting to central control devices (RS232).
Power	_	
100-240V~, 50/60Hz	1	An AC power input connector and switch.



The maximum input resolution and maximum width and height of HDMI and DP connectors must be obtained by setting the graphics card.



3 Applications

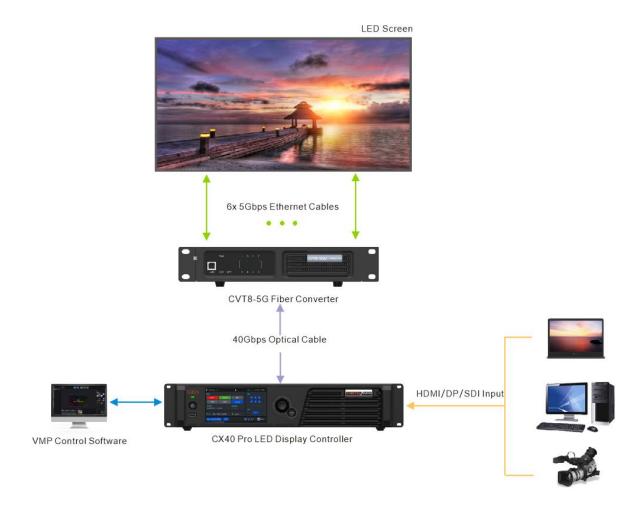
The CX40 Pro has two typical applications.

Application 1: Ethernet Output





Application 2: Long-Distance Transmission via OPT Ports





4 Front Screen Panel

4.1 UI Introduction

4.1.1 Home Screen

After the device is powered on, the home screen is displayed as follows, displaying device related information. The CX40 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

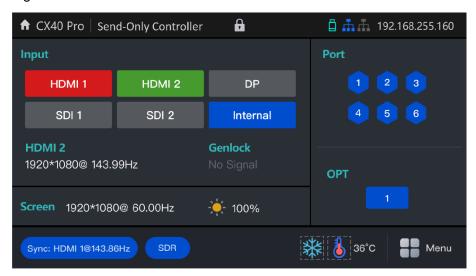


Table 4-1 Home screen descriptions

Item	Content	Description
Top Line	CX40 Pro	The device name. The name can be changed in VMP.
	Send-Only Controller	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.
		The device button and touchscreen lock status. • When the icon is displayed: The buttons are locked.



Item	Content	Description
		When the icon is not displayed: The buttons are unlocked.
		Hold down the knob and BACK button simultaneously for 5s or longer to lock or unlock the buttons and screen.
	Th.	The connection status of the Ethernet ports.
		Blue: Connected
		Gray: Disconnected
	192.168.255.160	The device IP address.
Input	HDMI 1, HDMI 2, DP, SDI,	The device input source type and status.
	Internal	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.
	HDMI 2	The resolution and frame rate of the currently available input
	1920*1080@143.99Hz	source.
		If multiple input sources are available, the resolution and frame
		rate of each input source will be displayed one by one. If the
		input is used by the layer, the layer number will be displayed below.
Screen	1920*1080@60Hz	The screen resolution and frame rate.
		The screen brightness.
Port	1-6	The statuses of the Ethernet output ports.
		Blue: Connected
		Gray: Disconnected
OPT	1	The statuses of the OPT port
		Blue: Connected
		Gray: Disconnected
Bottom	Sync: HDMI1@143.86HZ	The sync signal currently used and the signal status.
Line		Sync: Active Input: Sync with the frame rate of the current
		input source.
		Sync: Genlock: Sync with the frame rate of the Genlock signal.
		Sync: Internal: Sync with the frame rate of the internal clock of the device.
		Color code:
	1	



Item	Content	Description
		Blue: The signal is normal.
		Red: The signal is abnormal.
	SDR	The dynamic range of the currently processed signal.
		SDR: Standard dynamic range.
		HDR10: High dynamic range.
		HLG: High dynamic range.
	3D	The 3D function status.
		Icon displayed: The 3D function is turned on.
		Icon not displayed: The 3D function is turned off.
	*	The output display status.
		• **: The display is frozen.
		• 🗹 : The display is blacked out
		Icon not displayed: The display is normal.
	8	The temperature inside the chassis.

4.1.2 Main Menu

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

Figure 4-2 Main menu

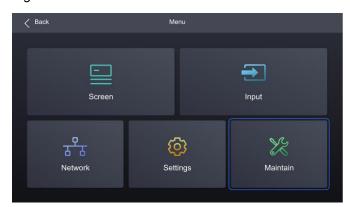


Table 4-2 Main menu description

Module	Description
=	Show screen name, sync signal source, and brightness. Set brightness, color temperature, gamma, as well as enable black screen or freeze screen.



Module	Description
→	Set internal source, check external input source information, and configure EDID and HDR parameters for external input sources.
 	Configure network parameters and third party protocol.
©	Set LCD screen timeout and brightness, set system language and temperature scale, check firmware information, and restore factory settings.
X	Perform device diagnostics, view and export logs, and check device status.

4.2 Screen

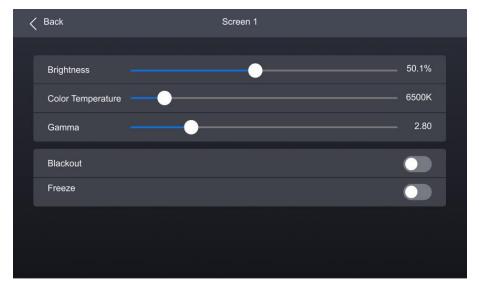
4.2.1 Set Brightness, Color Temperature and Gamma

Step 1 Select Screen from the main menu to access the screen list.

The list displays screen names, sync signal sources, and brightness.

Step 2 Select a screen to open the parameter settings.

Figure 4-3 Set brightness, color temperature and gamma



Step 3 Adjust the values for brightness, color temperature and gamma.

4.2.2 Set Screen Status

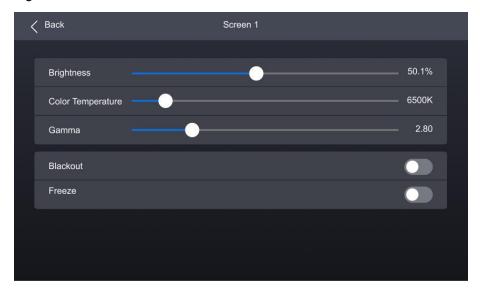
Step 1 Select Screen from the main menu to access the screen list.



The list displays screen names, sync signal sources, and brightness.

Step 2 Select a screen to open the parameter settings.

Figure 4-4 Set screen status



- Step 3 Select **Blackout** or **Freeze** and then press the knob to toggle on or off the switch.
 - C: Enabled. The screen display will turn black or freeze, but the playback will not be interrupted.
 - Disabled.

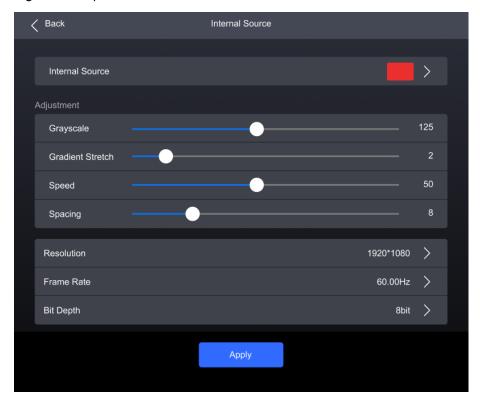
4.3 Input

4.3.1 Set Internal Source

- Step 1 Select **Input** from the main menu to access the input source list.
- Step 2 Select Internal Source to open the parameter settings.



Figure 4-5 Input source



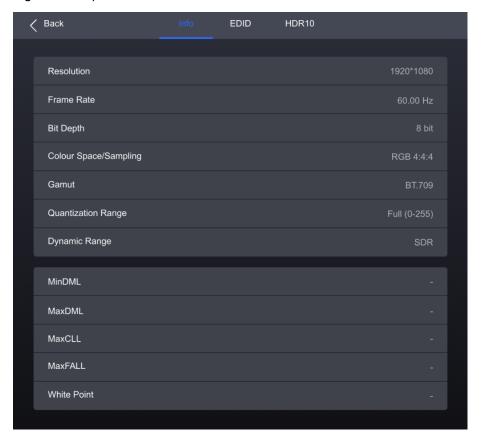
- Step 3 Select Internal Source, navigate to the sub-interface, and then select an image.
- Step 4 Press **BACK** to return to the parameter settings.
- Step 5 Set the **Grayscale**, **Gradient Stretch**, **Speed**, and **Space**. The adjustable parameters for each image may vary based on the interface.
- Step 6 Select **Resolution**, **Frame Rate**, and **Bit Depth** in sequence and set a value for each in the popup dialog box.
- Step 7 After the settings are done, click Apply.

4.3.2 Check Input Source Information

- Step 1 Select Input from the main menu to access the input source list.
- Step 2 Select an input source to access the **Information** tab.



Figure 4-6 Input source information



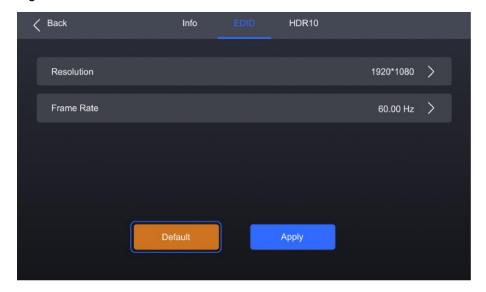
Step 3 Check the input source information.

4.3.3 Set EDID

- Step 1 Select Input from the main menu to access the input source list.
- Step 2 Select an input source to open the parameter settings.
- Step 3 Navigate to the **EDID** tab.



Figure 4-7 EDID

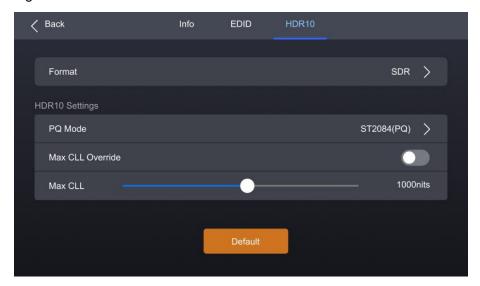


- Step 4 Select **Resolution** and **Frame Rate** in sequence and set a value for each in the pop-up dialog box.
- Step 5 After the settings are done, click **Apply**.

4.3.4 Set HDR

- Step 1 Select Input from the main menu to access the input source list.
- Step 2 Select an input source to open the parameter settings.
- Step 3 Navigate to the **HDR10** tab.

Figure 4-8 HDR10



Step 4 Select Format and then select Auto, HDR10, HLG, or Close from the pop-up dialog box.



Step 5 For HDR10, please set the relevant parameters.

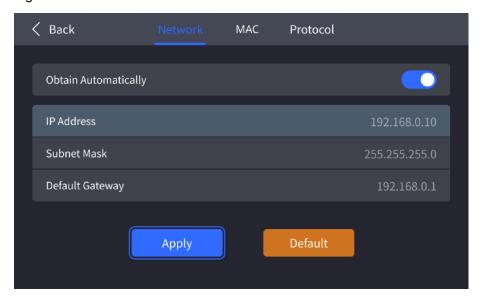
- PQ Mode: The mapping method of video source brightness.
 - ST2084 (PQ): This mode 1:1 maps the brightness of the video source. The part that
 exceeds the maximum screen brightness will still be displayed as the maximum
 brightness.
 - ST2086 (Linear mapping): This mode linearly maps the brightness of the video source. It
 globally adjust 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.
- Max CLL Override: Enable or disable Max CLL override.
- Max CLL: The max content light level.

4.4 Communication

4.4.1 Network

Step 1 Select **Communication > Network** from the main menu to access the network settings interface.

Figure 4-9 Network



Step 2 Toggle on or off Obtain Automatically.

- C: The device automatically obtain an IP address.
- On: You need to manually set an IP address for the device.

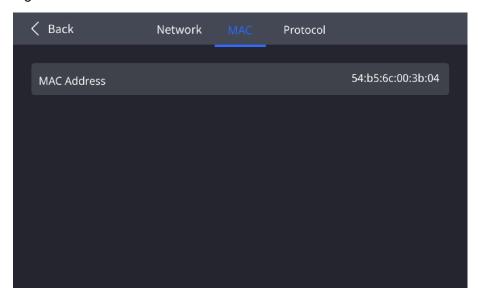


- Step 3 If **Obtain Automatically** is disabled, you need to set an **IP Address**, **Subnet Mask** and **Default Gateway**. If it is enabled, this step is not required.
- Step 4 After the settings are done, click Apply.

4.4.2 MAC Address

Step 1 Select Communication > MAC from the main menu to access the MAC address interface.

Figure 4-10 MAC address



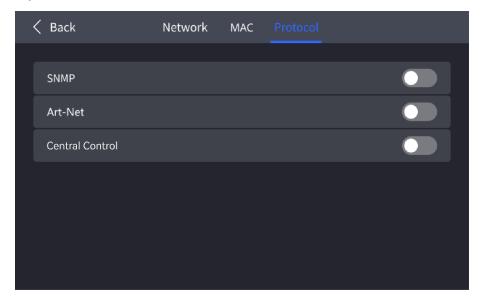
Step 2 You can view the device MAC address here. It can serve as a unique identifier to locate each device in situations like network communication, device management, and security control.

4.4.3 Protocol

Step 1 Select **Communication > Protocol** from the main menu to access the protocol settings interface.



Figure 4-11 Protocol



Step 2 Toggle on or off SNMP, Art-Net, or Central Control.

- C: Enable the protocol.
- Disable the protocol.



For more details, please refer to *SNMP Instructions*, *Art-Net Instructions*, and *Central Control Instructions*.

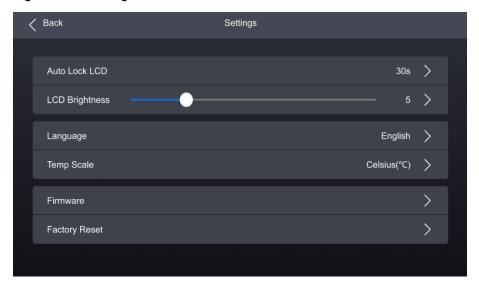
4.5 Settings

4.5.1 Configure LCD Screen

Step 1 Select **Settings** from the main menu to access the system settings interface.



Figure 4-12 Configure LCD screen

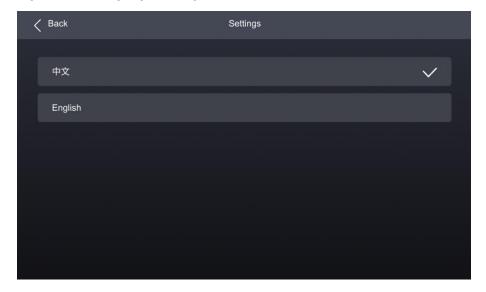


- Step 2 Select Auto Lock LCD and set a value in the pop-up dialog box.
- Step 3 Select LCD Brightness and adjust the value.

4.5.2 Setting Language

- Step 1 Select **Settings** from the main menu to access the system settings interface.
- Step 2 Select 语言/Language to open the sub-interface.

Figure 4-13 Language settings



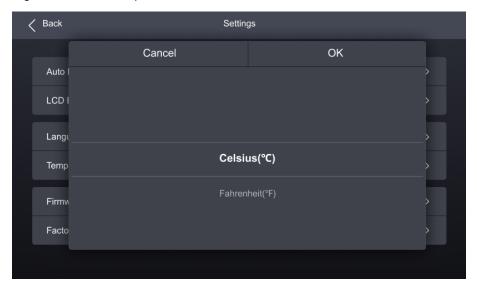
Step 3 Select 中文 or English.



4.5.3 Set Temperature Scale

- Step 1 Select **Settings** from the main menu to access the system settings interface.
- Step 2 Select Temp Scale and then select Celsius (°C) or Fahrenheit (°F) from the pop-up dialog box.

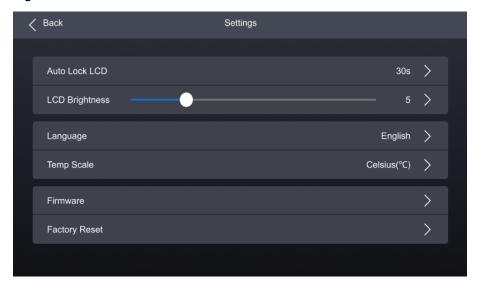
Figure 4-14 Set temperature scale



4.5.4 Check Firmware Information

Step 1 Select **Settings** from the main menu to access the system settings interface.

Figure 4-15 Check firmware information



Step 2 Select Firmware to open the sub-interface.

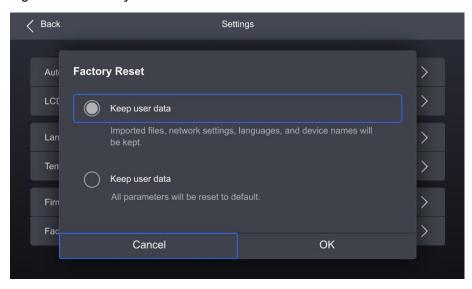
Step 3 Select Controller, Input Card, and Output Card to check the related information.



4.5.5 Factory Reset

- Step 1 Select **Settings** from the main menu to access the system settings interface.
- Step 2 Select **Factory Reset** and then select **Keep user data** or **Reset All** from the pop-up dialog box. Finally, select **OK**.

Figure 4-16 Factory reset



4.6 Maintenance

4.6.1 Diagnostics

Upon Powering UP

When the device is powered on, it automatically conducts a diagnostic process:

- Normal startup: All functions of the CX40 Pro are available for use.
- Abnormal startup: Depending on the displayed error message, you can choose to export the diagnostic results or continue to operate in a limited functionality state.

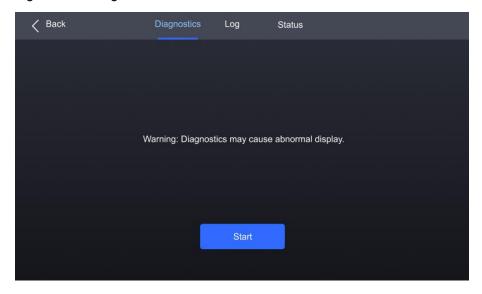
Maintenance

To export the diagnostics log, insert a USB drive to the USB port on the front panel of the device.

Step 1 Select **Maintain** from the main menu to access the settings interface.



Figure 4-17 Diagnostics



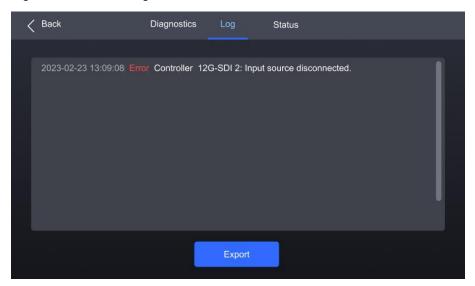
- Step 2 Navigate to the **Diagnostics** tab and select **Start**.
- Step 3 Once the diagnostic process is completed, select **Details** to check the diagnostic result. You can also select **Export** to export the result into a USB drive.

4.6.2 View and Export Logs

To export the logs, insert a USB drive to the USB port on the front panel of the device.

- Step 1 Select Maintain from the main menu to access the settings interface.
- Step 2 Navigate to the **Log** tab to check the device logs.

Figure 4-18 Device log



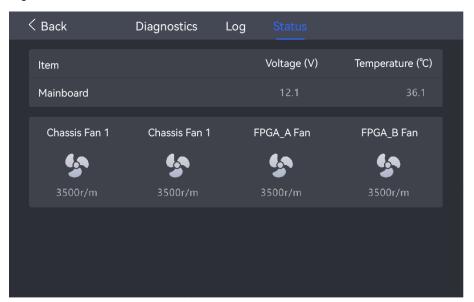
Step 3 Select **Export** to export the logs into a USB drive.



4.6.3 Check Device Status

- Step 1 Select **Maintain** from the main menu to access the settings interface.
- Step 2 Navigate to the **Status** tab to check the device status.

Figure 4-19 Check device status





5 VMP Operations

Users can only perform some basic operations on the CX40 Pro LCD screen. To perform more operations such as project management, input source configuration, screen configuration, screen calibration, color processing, screen adjustment, screen monitoring, preset management, and screen maintenance, please install Vision Management Platform (VMP) on the control PC and refer to the *Vision Management Platform User Manual*.



6

Product Specifications

Electrical	Power supply	100-240V~, 50/60Hz		
Specifications	Power consumption	105 W		
Operating	Temperature	-20°C to +45°C		
Environment	Humidity	0% RH to 80% RH, non-condensing		
Storage	Temperature	-30°C to +80°C		
Environment	Humidity	0% RH to 95% RH, non-condensing		
Physical	Dimensions	482.6 mm × 94.4 mm × 472.0 mm		
Specifications	Net weight	8.1 kg		
	Gross weight	11.1 kg		
		Note: It is the total weight of the product, accessories, and packing materials packed according to the packing specifications.		
Packing	Packing box	595.0 mm × 575.0 mm × 215.0 mm, kraft paper box		
Information	Accessory box	408.0 mm × 294.0 mm × 51.0 mm, white cardboard box		
	Accessories	 1x Power cord 1x Ethernet cable 1x HDMI cable 1x DP 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.



7 Video Source Specifications

Input	Resolution		Color Space	Sampling	Bit Depth	epth Integer Frame Rate (Hz)	
HDMI 4K		4096×2160	RGB /	4:4:4	12bit	24/25/30	
2.0		(Forced)	YCbCr		10bit	24/25/30/48/50	
					8bit	24/25/30/48/50/60	
			YCbCr	4:2:2	8/10/12bit		
				4:2:0	8/10/12bit	30/48/50/60	
		3840×2160	RGB / YCbCr	4:4:4	12bit	24/25/30	
					10bit	24/25/30/48/50	
					8bit	24/25/30/48/50/60	
			YCbCr	4:2:2	8/10/12bit		
				4:2:0	8/10/12bit	48/50/60	
	2K1K	2560×1440	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/75	
					10bit	24/25/30/48/50/60/75/100	
					8bit	24/25/30/48/50/60/75/100/120	
			YCbCr	4:2:2	8/10/12bit		
				4:2:0	8/10/12bit	75/100/120	
		1920×1080	RGB / YCbCr	4:4:4	12bit	24/25/30/48/50/60/72/75/100/120/144	
					10bit		
					8bit	24/25/30/48/50/60/72/75/100/120/144/240	
			YCbCr	4:2:2	8/10/12bit		
				4:2:0	8/10/12bit	120/144/240	
DP 1.2	4K	4096×2160 RGB / YCbCr YCbCr		4:4:4	12bit	24/25/30/48/50	
			YCbCr		10bit	24/25/30/48/50/60	
					8bit	24/25/30/48/50/60/75	
			YCbCr	4:2:2	8/10/12bit		
		3840×2160	RGB /	4:4:4	12bit	24/25/30/48/50	



Input	Resolution		Color Space	Sampling	Bit Depth	Integer Frame Rate (Hz)
			YCbCr		10bit	24/25/30/48/50/60
					8bit	24/25/30/48/50/60/75
			YCbCr	4:2:2	8/10/12bit	(75 Hz needs to be forced)
	2K1K	2560×1440	RGB /	4:4:4	12bit	24/25/30/48/50/60/75/100
			YCbCr		10bit	24/25/30/48/50/60/75/100/120
					8bit	24/25/30/48/50/60/75/100/120/144 (144
			YCbCr	4:2:2	8/10/12bit	Hz needs to be forced)
		1920×1080	RGB /	4:4:4	12bit	24/25/30/48/50/60/75/100/120/144 (144
			YCbCr		10bit	Hz needs to be forced)
					8bit	24/25/30/48/50/60/75/100/120/144/240
			YCbCr	4:2:2	8/10/12bit	(240 Hz needs to be forced)
12G-	4K	4096×2160	YCbCr	4:2:2	10bit	24/25/30/48/50/60
SDI		3840×2160				
	2K1K	2048×1080				
		1920×1080				

Note

- The table above only displays a selection of common resolutions and integer frame rates. Decimal frame rates are also supported, allowing for automatic frame rate adaptation from the highest frame rate of each resolution down to 23.98/29.97/47.95/59.94/71.93/119.88/143.86 Hz.
- When using YCbCr 4:2:0 input, all frame rates need to be forced. Standard graphics cards only support a 4K resolution at 50/60 Hz. Other resolutions and frame rates require a source device that supports this color space and sampling to be forced.



Ethernet Port Load Capacity

When working with the XA50 Pro and CA50E 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 × 0.85
- 10bit: Load capacity × 32 × Frame rate < 5G × 0.88
- 12bit: Load capacity × 48 × Frame rate < 5G × 0.85

Max Load Capacity per Ethernet Port (Pixels)					
Frame Rate / Bit Depth	8bit	10bit	12bit		
24 Hz	7,378,000	5,728,280	3,689,000		
25 Hz	7,082,800	5,499,149	3,541,440		
30 Hz	5,902,400	4,582,624	2,951,200		
50 Hz	3,541,440	2,749,574	1,770,720		
60 Hz	2,951,200	2,291,312	1,475,600		
120 Hz	1,475,600	1,145,656	737,800		
144 Hz	1,229,600	954,713	612,374		
240 Hz	737,800	572,828	368,900		



The load capacity of a single Ethernet port can only achieve its maximum when the load width is 128 pixels or more. If the load width is less than that, the load capacity will be reduced accordingly, calculated as (128 - load width) × load height.



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