

# CX80 Pro

## LED Display Controller



Specifications

## Change History

Document Version	Release Date	Description
V1.1.2	2023-07-04	<ul style="list-style-type: none"> <li>Added descriptions for low latency.</li> <li>Updated the supported driver ICs for frame rate adaptive.</li> </ul>
V1.1.1	2023-01-13	Optimized some feature description.
V1.1.0	2023-01-03	<ul style="list-style-type: none"> <li>Updated the card description.</li> <li>Updated the description of the USB port on the front panel.</li> <li>Added a table of load capacity per Ethernet port.</li> <li>Added the limitations of some functions.</li> </ul>
V1.0.1	2022-09-02	Modified the parameter description of input card 1.
V1.0.0	2022-07-10	First release

## 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.

## Certifications

CCC, RoHS, CE, FCC, IC, UL, CB

**If the product does not have the relevant certifications required by the countries or regions where it is to be sold, please contact NovaStar to confirm or address the problem. Otherwise, the customer shall be responsible for the legal risks caused or NovaStar has the right to claim compensation.**

## Features

### Inputs and Outputs

- 2 types of pluggable input cards, user configurable
  - Input card 1 (Max connector capacity: 8K@60Hz)  
4x 12G-SDI+1x HDMI 2.1+1x DP 1.4
  - Input card 2 (Max connector capacity: 4K@60Hz)  
4x 12G-SDI+4x HDMI 2.0
- Input mosaic  
12G-SDI and HDMI 2.0 support input mosaic.
- 12-bit, 10-bit and 8-bit video inputs
- 3 types of outputs
  - 16x 5Gbps Ethernet ports
  - 2x 40Gbps optical ports
  - 1x SPDIF digital audio port
- 3 types of controls
  - 1x Genlock signal input (with loop through)
  - 2x Ethernet control ports
  - 1x Auxiliary port

### Advanced Functions

- Image scaling

Support 2 image scaling modes: custom and pixel to pixel.

- Color Replacement  
Support free replacement of any color on the image without affecting the performance of other colors. Replacement of highly saturated colors is recommended for better effect.
- 14Ch Color Correction  
Support precise adjustment to hue, saturation and brightness of black, white and the 12 derived standard colors of the red, green and blue primary colors.
- Curves  
Support adjustment to the image RGBW mapping curves.
- 3D LUT  
The 17x17x17 3D LUT .cube files are supported to adjust the video source colors.
- Dynamic Booster  
Real-time analysis and dynamic adjustment are made to each frame to significantly improve the display contrast and image details for better visual experience, and effectively control and lower the display power consumption, extending the service life of the LED screen.
- Full Grayscale Calibration  
Work with NovaStar's high-precision calibration system and the C3200 scientific grade camera to generate unique calibration coefficients for each grayscale, ensuring uniformity of each grayscale and dramatically improving the image quality.
- HDR
  - Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards.
  - Support HLG.
- Latency
  - Support low latency and the controller load capacity is not reduced. The latency at the controller is 0 frame (less than 1 ms) in Send-Only Controller working mode and 1 frame in All-In-One Controller working mode.
  - Support additional frame latency. Zero to four frames of latency can be added at the controller.
- No rectangle restriction  
No rectangle restriction for irregular screens. When calculating resolutions, blank pixels do not count towards the total capacity. The used load capacity of Ethernet ports is the sum of the pixels of all cabinets.
- Frame Rate Adaptive  
The controller can be adaptive to various video input frame rates, including decimal frame rates. Custom frame rates are also supported and the step size of fine tuning frame rate is as small as 0.01 Hz.
- Two working modes  
Support the All-In-One Controller and Send-Only Controller working modes.
  - In the Send-Only Controller mode, the latency can be reduced by one frame.
  - In the All-In-One Controller mode, the scaling function is available.
- Display system monitoring  
Support monitoring of the device status and screen status. Any fault and alarm information can be reported actively.

**Device Controls**

- Touch LCD  
Come with a 5.5-inch 1080p touch LCD. It is sensitive and rugged, allowing users to control the device easily by tapping on the LCD.
- VMP software control  
The device can be connected to the VMP software to provide easy and convenient operations and smart device management.
- Cascading control via Ethernet  
The Gigabit Ethernet control ports support TCP/IP protocol and star topology. 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.

Table 1-1 Function Limitations

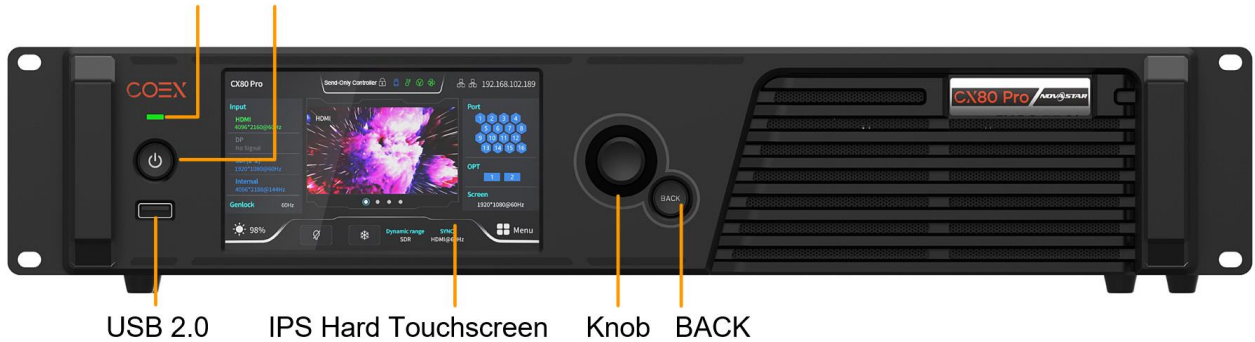
Function	Limitation
Frame Rate Adaptive	This function can be achieved when the CX80 Pro works with the CA50E, CA50C, or XA50 receiving card. Currently supported driver ICs include ICND2055, ICND2065, ICND2069, ICND2076, MBI5264, MBI5264B, and MBI5264C. In addition, the .ncp file generated by the Cabinet Tool from NovaStar must be used.
Dynamic Booster	This function can be achieved when the CX80 Pro works with the CA50E, CA50C, or XA50 receiving card. Before operation, brightness and color gamut correction using

	the CA410-VP427, CA410-P427 or EYE2-400 color analyzer must be completed.
Full Grayscale Calibration	This function can be achieved when the CX80 Pro works with the CA50E, CA50C, or XA50 receiving card. A C3200 camera is required to perform full-grayscale calibration.
Low Latency	The Low Latency and Genlock functions are mutually exclusive. To enable low latency, please make sure all Ethernet ports load the cabinets vertically and share the same Y coordinate.
HDR	The HDR function supports automatic parsing and manual setting. The properties of 12G-SDI sources, DP1.2 sources and non-standard HDR sources can be manually set to HDR properties. 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 the <a href="#">Ethernet Port Load Capacity</a> section.

## Appearance

### Front Panel

Running Indicator      Standby Button



USB 2.0      IPS Hard Touchscreen      Knob      BACK

Name	Description
Running Indicator	<ul style="list-style-type: none"> <li>• Solid red: Standby</li> <li>• Solid blue: The device is being started.</li> <li>• Solid green: The device is running normally.</li> <li>• Flashing red: The device is running abnormally.</li> </ul>
Standby Button	<ul style="list-style-type: none"> <li>• Press the button to power on or power off the device.</li> <li>• Hold down the button for 5s or longer to restart the device.</li> </ul>
USB 2.0	<ul style="list-style-type: none"> <li>• Connect to the USB drive only to export the device diagnostic result.</li> <li>• Only the NTFS and FAT32 file systems are supported. Others are not supported.</li> </ul>
IPS Hard Touchscreen	A 5.5-inch 1080p screen used to display the device status, set parameters and send control commands.
Knob	<ul style="list-style-type: none"> <li>• On the home screen, press the knob to enter the main menu screen.</li> <li>• 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.</li> <li>• Hold down the knob and <b>BACK</b> button simultaneously for 5s or longer to lock or unlock the touch screen and buttons.</li> </ul>
BACK	Go back to the previous menu or cancel the current operation.

## 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-SDIx4



Type	Qty	Description	
HDMI 2.1	1	Resolutions	7680x4320@(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: 7680x4320@(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	7680x4320@(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: 7680x4320@(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: 4096x2160@60Hz
		HDR	Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards. Support HLG.
		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 2.0x4+12G-SDIx4



Type	Qty	Description	
HDMI 2.0	4	Resolutions	Max resolution: 4096x2160@60Hz (Forced) Min resolution: 800x600@60Hz
		Max width/height (Forced)	Max width: 8192 pixels (8192x1080@60Hz) Max height: 8192 pixels (1080x8192@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 3840x2160@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

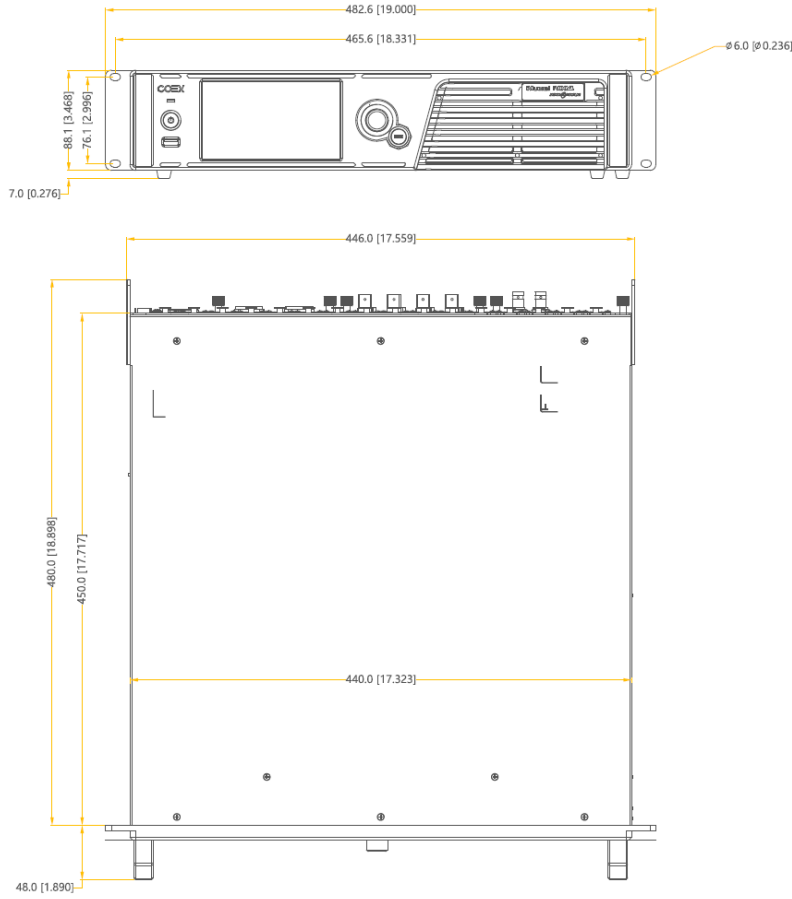
Type	Qty	Description
Ethernet ports 1~16	16	5Gbps Ethernet ports <ul style="list-style-type: none"> <li>• Max device load capacity: 35,389,440 pixels</li> <li>• Max output width and height                             <ul style="list-style-type: none"> <li>– Send-Only Controller mode: max width 32,768 pixels, max height 32,768 pixels</li> <li>– All-In-One Controller mode: max width 16,384 pixels, max height 16,384pixels</li> </ul> </li> <li>• The maximum load capacity per port is as follows. For details, see the <a href="#">Ethernet Port Load Capacity</a> section.                             <ul style="list-style-type: none"> <li>– 8bit@60Hz: 2,592,000 pixels</li> <li>– 10bit@60Hz: 2,073,000 pixels</li> </ul> </li> </ul>

		- 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. <ul style="list-style-type: none"> <li>• 1 corresponds to Ethernet ports 1~8.</li> <li>• 2 corresponds to Ethernet ports 9~16.</li> </ul>
SPDIF OUT	1	A digital audio output (Reserved)
<b>Control Connectors</b>		
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. <ul style="list-style-type: none"> <li>• IN: Accept the sync signal.</li> <li>• LOOP: Loop the sync signal.</li> </ul> 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)
<b>Power</b>		
100-240V~, 50/60Hz, 4A		An AC power input connector and switch

 **Note**

- For input card 1, the HDMI and DP connectors support only 7680x4320 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.

## Dimensions



Tolerance:  $\pm 0.3$  [ $\pm 0.012$ ] Unit: mm [inch]

## Product Specifications

Electrical Specifications	Power supply	AC 100-240V~, 50/60Hz, 4A	
	Power consumption	170 W	
Operating Environment	Temperature	-10°C to +45°C	
	Humidity	0% RH to 80% RH, non-condensing	
Storage Environment	Temperature	-30°C to +80°C	
	Humidity	0% RH to 90% RH, non-condensing	
Physical Specifications	Dimensions	482.6 mm x 95.1 mm x 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 x 570.0 mm x 210.0 mm, kraft paper box	
	Accessory box	408.0 mm x 290.0 mm x 50.0 mm, white cardboard box	
	Accessories	Input card 1	<ul style="list-style-type: none"> <li>• 1x Power cord</li> <li>• 1x Ethernet cable</li> </ul>

			<ul style="list-style-type: none"> <li>• 1x HDMI 2.1 cable</li> <li>• 1x DP 1.4 cable</li> <li>• 1x Certificate of Approval</li> </ul>
		Input card 2	<ul style="list-style-type: none"> <li>• 1x Power cord</li> <li>• 1x Ethernet cable</li> <li>• 1x HDMI 2.0 cable</li> <li>• 1x Certificate of Approval</li> </ul>
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.

## Video Source Specifications

Input		Features			
		Bit Depth	Color Space/Sampling	All Input Resolutions	
Input card 1	HDMI 2.1	8bit	RGB4:4:4	7680x4320@(60/50/48/30/25/24Hz)	
			YCbCr4:4:4		
			YCbCr4:2:2		
		10bit/12bit	RGB4:4:4		7680x4320@(30/25/24Hz)
			YCbCr4:4:4		
			YCbCr4:2:2		
	DP 1.4	8bit/10bit	RGB4:4:4	7680x4320@(30/25/24Hz)	
			YCbCr4:4:4		
			YCbCr4:2:2		
		12bit	YCbCr4:2:2	7680x4320@(30/25/24Hz)	
12G-SDI	10bit	YCbCr4:2:2	Max connector capacity 4096x2160 @60Hz Max mosaic capacity 8192x4320@60Hz		
Note	<ul style="list-style-type: none"> <li>For input card 1, the HDMI and DP connectors support only 7680x4320 inputs.</li> <li>For requirements of other resolutions, frame rates and bit depths on input card 1, please contact NovaStar for customization.</li> </ul>				
Input		Features			
		Bit Depth	Color Space/Sampling	Max Input Resolution	
Input card 2	HDMI 2.0	8bit	RGB4:4:4	Max connector capacity 4096x2160 @60Hz Max mosaic capacity 8192x4320@60Hz	
			YCbCr4:4:4		
			YCbCr4:2:2		
		10bit/12bit	RGB4:4:4	Max connector capacity 4096x1080@60Hz Max mosaic capacity 8192x2160@60Hz	
			YCbCr4:4:4		
		12G-SDI	10bit	YCbCr4:2:2	Max connector capacity 4096x2160 @60Hz Max mosaic capacity 8192x4320@60Hz

### Note

The width of HDMI and DP input sources must be an integer multiple of eight. In addition, the maximum input resolution of HDMI 2.0 and DP 1.4 connectors must be obtained by setting the graphics card.

## Ethernet Port Load Capacity

When the CX80 Pro works with the 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  $\times 36 \times$  Frame rate  $< 5G \times 0.75$

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

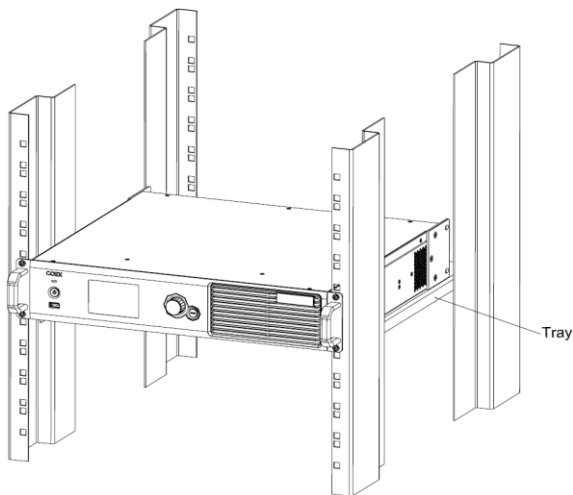
## Notes and Cautions

### Notes for Battery

- The battery is not intended to be replaced.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- Leaving a battery in an extremely high temperature surrounding environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure may result in an explosion or the leakage of flammable liquid or gas.

### Notes for Installation

When the product needs to be installed on the rack, 4 screws at least M5\*12 should be used to fix it. The rack for installation shall bear at least 42kg weight.



- Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T<sub>ma</sub>) specified by the manufacturer.

- Reduced Air Flow – Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Mechanical Loading – Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit Overloading – Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Earthing – Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

### FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### Others

This product can only be placed horizontally. Do not mount vertically or upside-down.

This is Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.