



VX400s LED Display Controller User Manual

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Xi'an NovaStar Tech Co., Ltd.

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1 Safety Instructions

To avoid any possible dangers, please use the device according to instructions. There are no user serviceable parts inside. Please refer all servicing to qualified personnel.

Danger High Voltage

High voltage is present inside the device. To avoid the electric shock, do not remove the rear cover yourself. Only qualified technicians should open the device.

Warnings

- 1) Do not place vessels containing water on the device to avoid water spill or water splash.
- 2) Do not place the device in a position near fire and heat.
- 3) If there are any unusual sounds, smoke or smells coming from the device, unplug the device immediately.

Important Safety Instructions

- 1) Read these operating instructions carefully before using the unit. Keep these operating instructions handy for future reference.
- 2) Unplug the device in a thunderstorm or when you intend to leave it unused for long periods of time.
- 3) Only trained professionals may operate the device.
- 4) Do not cram any objects into the device through ventilation holes to avoid device damage or electric shock.
- 5) Do not use the device near water or in a position with high humidity.

- 6) Do not use the device in a position with high temperature.
- 7) Please keep the power cord properly to avoid damage.
- 8) If any of the following occurs, unplug the device immediately and contact for servicing.
 - a) Liquid splashes into the device.
 - b) The device damages due to falling.
 - c) The device does not function normally or its performance changes.

Please read these operating instructions carefully. We assume no responsibility for any personal injuries or device damage caused by misoperations that do not conform to the safety instructions above.

2 Overview

The VX400s is a NovaStar professional LED display controller, featuring excellent display control and powerful front-end video processing capabilities. With outstanding image quality and flexible image control functions, the VX400s can greatly satisfy the user needs in media industry.

Features:

- Provides a variety of video input connectors, including 2 × CVBS, 2 × VGA, 1 × DVI, 1 × HDMI and 1 × YPbPr.

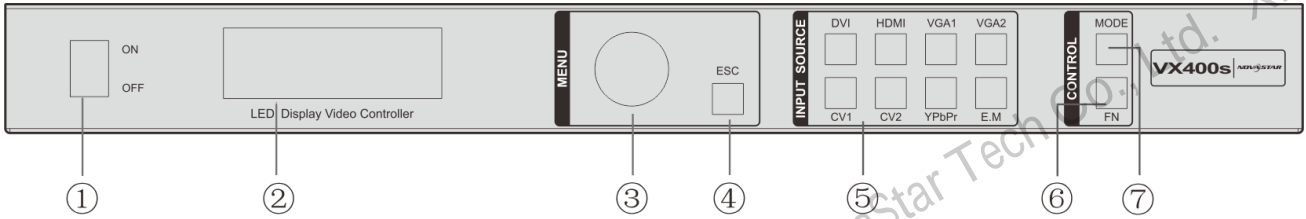
Input resolutions of some connectors can be up to 1080p@60Hz.

You can freely scale the image based on the screen resolution.

- Computer software for system configuration is not necessary. The system can be configured using one knob and one button. All can be done just by fingers. That's what we called Touch Track.

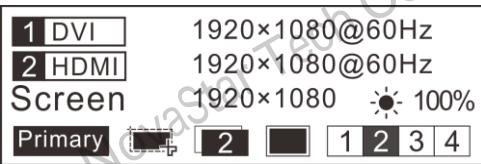
- Powerful image processing, professional image control and user-friendly UI design, allowing for an easy and convenient display control experience.
- Adopts an innovative architecture to implement smart configuration, allowing for the screen debugging to be completed within several minutes, which greatly shorten the preparation time on the stage.
- Provides seamless high-speed switch and fade-in/fade-out effect so as to strengthen and display picture demonstration of professional quality.
- The position and size of PIP can both be adjusted, which can be controlled at will.
- Visualized LCD screen and distinct button indicators simplifies system control operations.
- Adopts NovaStar G4 engine to realize a perfect display image with no flickering or scanning lines, as well as fine quality and good sense of depth.
- Adopts NovaStar new-generation calibration technology, allowing for a fast and efficient calibration process.
- Implements white balance calibration and color gamut mapping based on different features of the LEDs used by different screens to ensure colors are faithfully reproduced.
- Supports HDMI/DVI video input and HDMI audio input.
- Supports high bit depth video input: 10bit/8bit.
- Video output loading capacity is 2.3 million pixels and supported video formats are RGB, YCbCr4:2:2 and YCbCr4:4:4.

2.1 Front Panel



①: Power button

②: Operation screen



- Row 1: Main layer1, signal source and resolution
- Row 2: PIP 2, signal source and resolution
- Row 3: Screen width, height and brightness
- Row 4: Status bar
 - The icon descriptions are as below.

Primary: The device is set as primary.

Backup: The device is set as backup.

: Pixel to pixel


: Scale down

: Scale up

: PIP off

: PIP on

: Image mosaic off

: Image mosaic on

1 2 3 4: Output port (Ethernet port 2 is used for output)



: All the buttons and knob are locked.

③: Knob

Press the knob to enter the operation menu screen.

Rotate the knob to select a menu item or adjust a parameter.

④: ESC button

Press the button to exit the current menu or cancel the operation.

⑤: 8 input source buttons

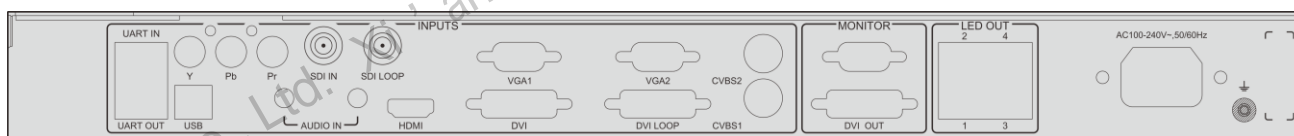
Press the button to set the input source of main layer. Hold down the button to set the input source of PIP. The setting result can be viewed on the operation screen.

In the above figure, the input source of main layer is VGA1 and the input source of PIP is HDMI.

⑥: Fn button for entering the related menu screen

⑦: Shortcut button for loading preset

2.2 Rear Panel



Note: To improve user experience, the connector layout may be adjusted. Product images in this document are for reference only.

Input

Audio In	1 × Audio input connector
HDMI	HDMI input connector
YPbPr	YPbPr input connector
SDI	3G-SDI input connector De-interlacing supported
DVI	DVI input connector
VGA1-VGA2	VGA input connector
CVBS1	PAL/NTSC-compliant composite video input
CVBS2	PAL/NTSC-compliant composite video input
Output	
SDI LOOP	SDI loop output connector
DVI LOOP	DVI loop output connector
Monitor -VGA OUT	VGA monitoring connector
Monitor -DVI OUT	DVI monitoring connector
LED Out 1, 2, 3, 4	4 Gigabit Ethernet output connectors. Only Ethernet port 1 supports audio output. When the multifunction card is connected for audio decoding, the multifunction card must be connected to the Ethernet port 1.
Control	

UART IN	Used as input for device cascading
UART OUT	Used as output for device cascading
USB	For communication with PC
Power	
AC100-240V~, 50/60Hz	AC power connector

3 Button Descriptions

Knob:

- ✧ On the home screen, press the knob to enter the operation menu screen.
- ✧ On the operation menu screen, rotate the knob to select a menu item, and press the knob to confirm the selection or enter the submenu.
- ✧ When a menu item with parameters is selected, you can rotate the knob to adjust the parameters. Please note that after adjustment, you need to press the knob again to confirm the adjustment.

ESC: Press the button to exit the current menu or cancel the operation.

Lock/Unlock: Hold down knob and ESC simultaneously.

4 Operations

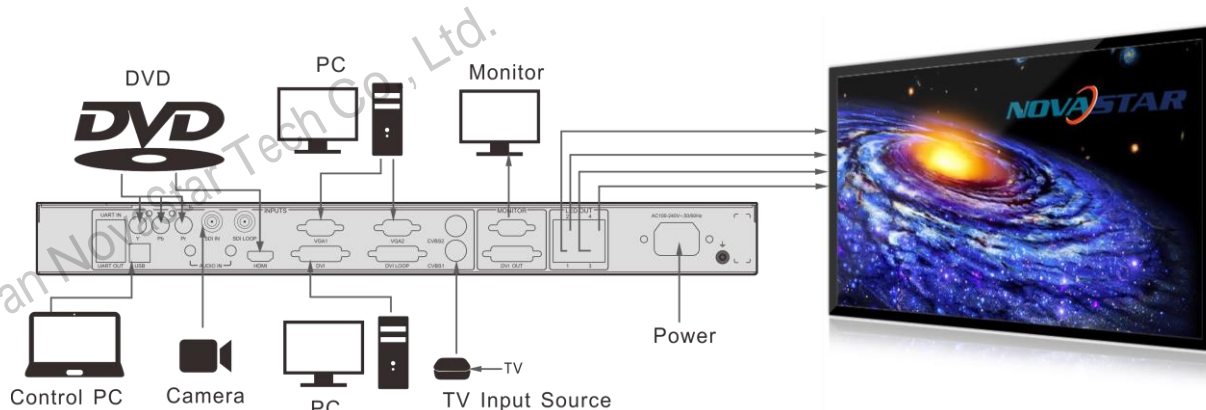
The VX400 is powerful in function and easy in operation. All the operations can be done via the knob and ESC button. Through simple 5 step operations, the LED screen can be lit and work normally.

Other advanced functions, such as display control, can help you to better control the LED display.

For detailed operations, please see the following chapters.

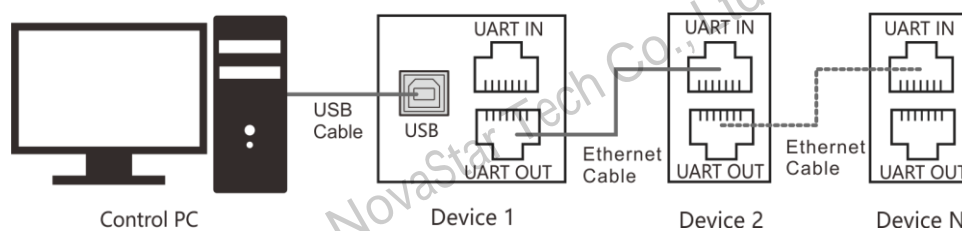
4.1 Hardware Connection

Connect the required hardware devices.



VX400s signal connection

If you need to control multiple VX400s units, please perform the below connections.



Multiple unit connection

Notes:

- The first V900 (Device 1) should be connected to the control PC via USB cable.
- Ethernet cables should be used when connecting every two V900 devices.

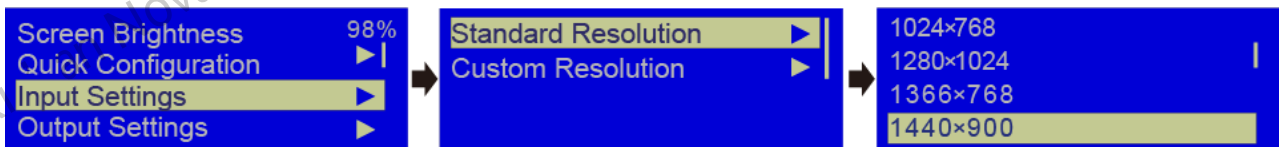
4.2 Input Settings

You can set the input resolution according to your requirements. Currently only DVI and HDMI connectors supports input resolution settings. If you need to change the input resolution of other connectors, please set it on the device providing the input source.

You can set the input resolution via the following two methods.

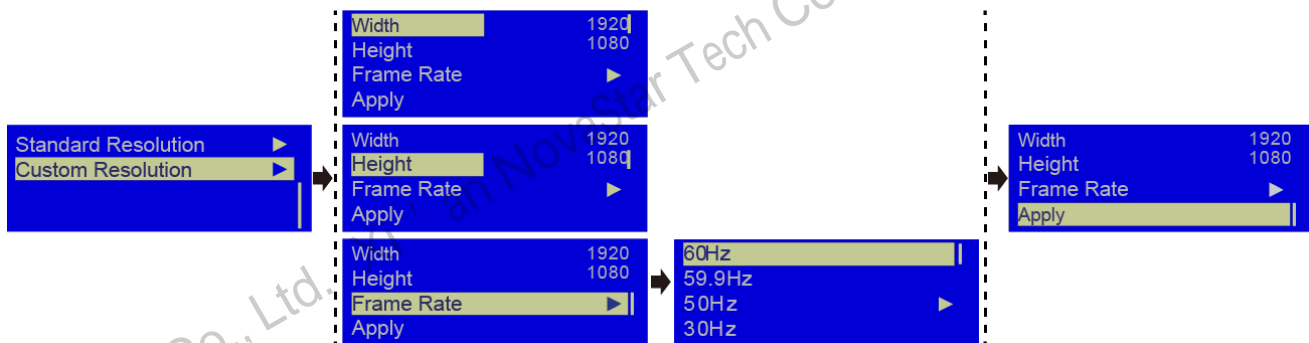
I. Standard Resolution

Select a standard resolution with a fixed frame rate of 60 Hz.



II. Custom Resolution

Rotate the knob to set a custom width (the value is increasing by even number), height and frame rate. Then select **Apply** to make the settings take effect. If you do not select **Apply**, the settings will not take effect.



4.3 Quick Configuration

Preconditions

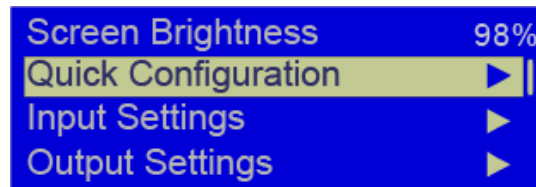
- LED screen must be a regular screen.
- Cabinets of the screen must be regular cabinets with the same resolution.

Procedure:

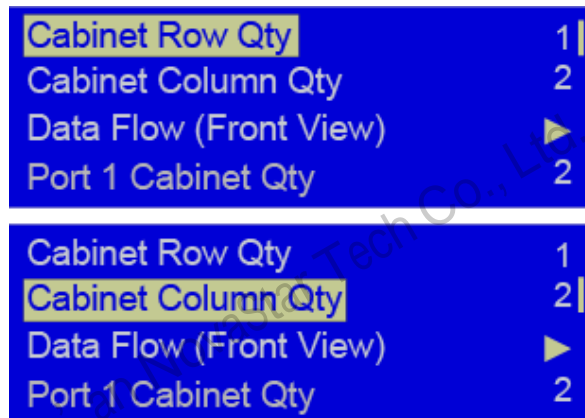
Step 1 Power on the LED screen. If the screen displays normally, go to Step 2. If not, please load the configuration files and save them to the receiving card.

For details, please see **Advanced Settings**.

Step 2 On the main menu screen, rotate the knob to select **Quick Configuration** to enter the quick configuration screen.



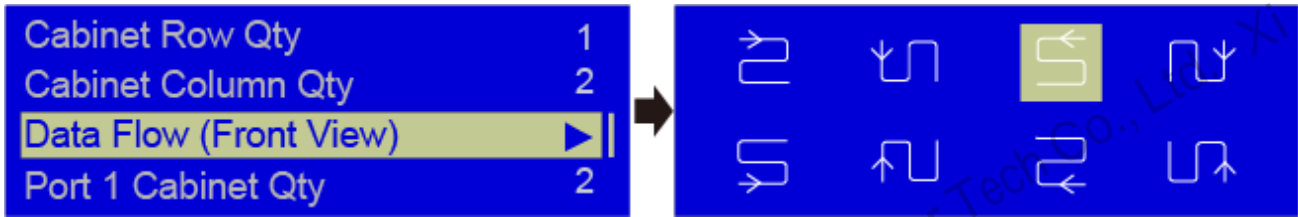
Step 3 Set **Cabinet Row Qty** and **Cabinet Column Qty** according to the actual row and column quantities of the cabinets.



Step 4 Rotate the knob to select **Port 1 Cabinet Qty** to set the quantity of the cabinets loaded by Ethernet port 1. The device has restrictions on the quantity of cabinets loaded by Ethernet port 1. For details, please see Note a).

Step 5 Rotate the knob to select **Data Flow (Front View)** and press it, then select an appropriate physical connection mode of the cabinets. For notes, please

see Note c), d) and e).

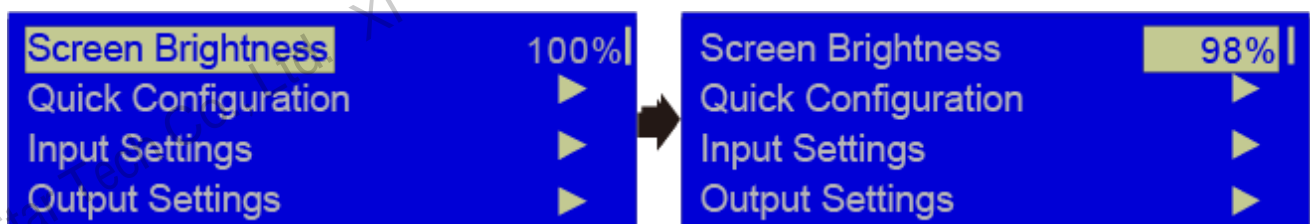


Note:	
<p>a) If the Ethernet port quantity is n ($n \leq 4$), the number of cabinets loaded by $n-1$ Ethernet ports must be the same. The number of cabinets loaded by Ethernet port n must be less than or equal to that of Ethernet port 1. The number of cabinets loaded by each Ethernet port must be the integral multiple of the number of cabinet rows or columns in the LED screen.</p>	<p>Example: If the Ethernet ports 1, 2 and 3 are used to load the screen, the number of cabinets loaded by Ethernet port 1 and 2 individually must be the same. The number of cabinets loaded by each Ethernet port must be the integral multiple of the number of cabinet rows or columns in the LED screen. During screen settings, you only need to set the number of cabinets loaded by Ethernet port 1, and the number of cabinets loaded by Ethernet port 3 must be less than or equal to that of Ethernet port 1.</p>
<p>b) If the LED screen is an irregular one and the cabinets are irregular ones of different sizes, you need to connect NovaLCT-Mars for screen configuration.</p>	

- c) When setting the data flow, you can view the results of different data flow patterns in real time on LED display by rotating the knob. When you are satisfied with the LED display image, press the knob to apply and save the selected data flow. If you press the ESC button, you will exit current operation and the data flow in preview will not be saved.
- d) During data flow settings, you must ensure that the physical connection of each port is along the same direction and downward to next one.
- e) During data flow settings, you must ensure that the Ethernet Port 1 is at the beginning position of the whole physical connection.
- f) The maximum loading capacity of the VX400s is 2.3 million pixels (2048x1152@60Hz). The horizontal width can be up to 3840 pixels, then the screen resolution will be 3840x600@60Hz. The vertical height can be up to 1920 pixels, then the screen resolution will be 1200x1920@60Hz.

4.4 Screen Brightness

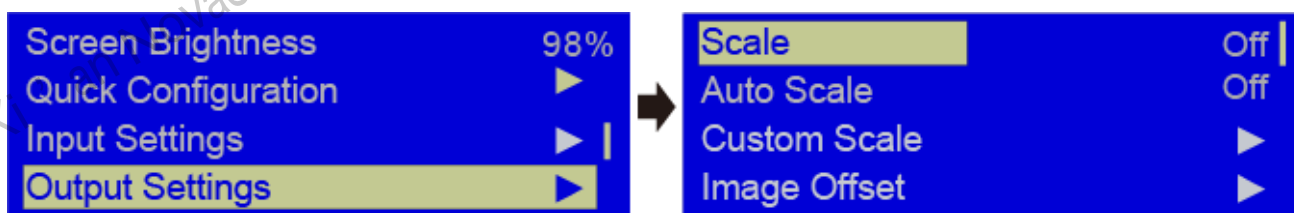
On the main menu screen, rotate the knob to select Screen Brightness and press the knob. Then rotate the knob to adjust the brightness value.







4.5 Output Settings

I. Scaling turning off

The output image size is the same as the input image size. If the input resolution is smaller than the screen resolution, some part of the screen will not be lit. If the input resolution is larger than the screen resolution, the input source image will not be fully displayed. Turning off the scaling is applicable to the pixel-to-pixel application scenario. You can set the image H offset and V offset to make the input source image move horizontally or vertically as required.



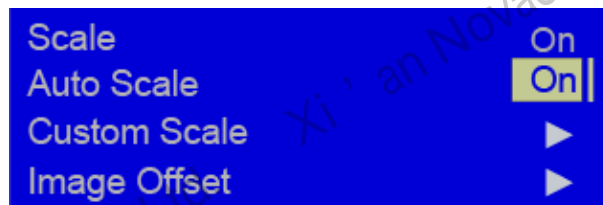
<p>Input Source 2000x1000</p> 	<p>LED Display 2000x1000</p> 	<p>The size of LED display is suitable : The contents can be completely displayed and the LED display will become bright completely</p>
	<p>1000x1000</p> 	<p>The LED display is smaller than the input source : Only some parts will be displayed</p>
	<p>2500x1500</p> 	<p>The LED display is greater than the input source : Some LED displays will not become bright</p>

Scaling turning off

II. Auto scaling

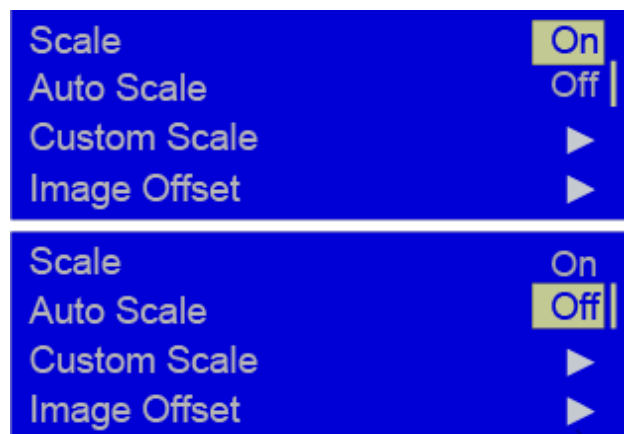
Scale is turned on and **Auto Scale** is turned on.

The input source image fills the LED screen.



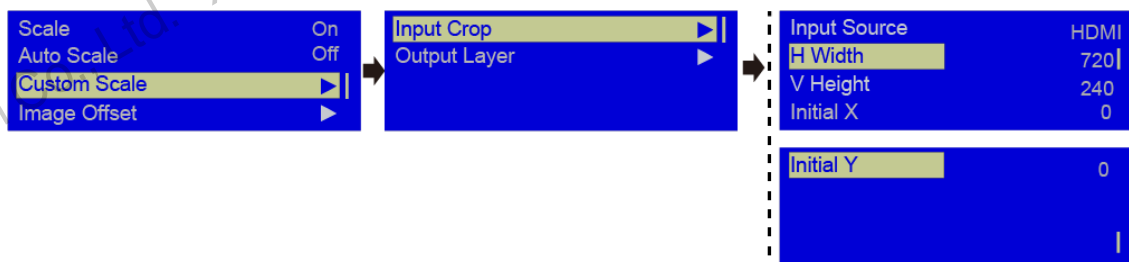
III. Custom scaling

Scale is turned on and **Auto Scale** is turned off.



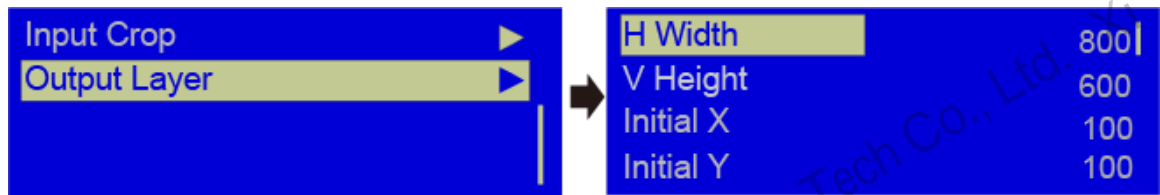
Procedure:

- Step 1 Rotate the knob to select **Input Crop** and press the knob to enter the input crop settings screen. Set **H Width** (no greater than input source width), **V Height** (no greater than input source height), **Initial X** and **Initial Y**.



- Step 2 Rotate the knob to select **Output Layer**. The output layer size is the

same as the screen size. After the settings, the image will auto fill the layer.

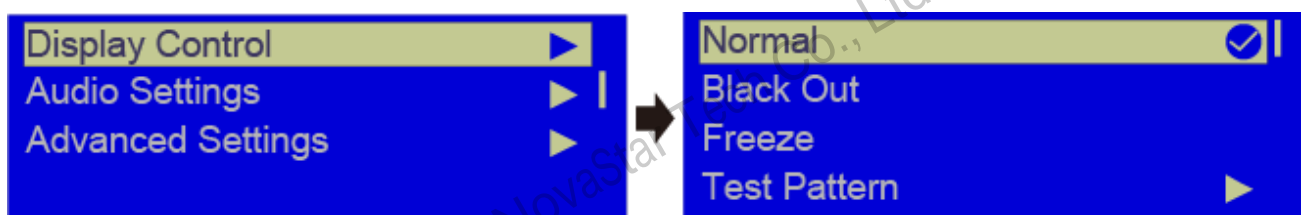


After the above settings, the LED screen will display the cropped image at the specified position as shown in the below.

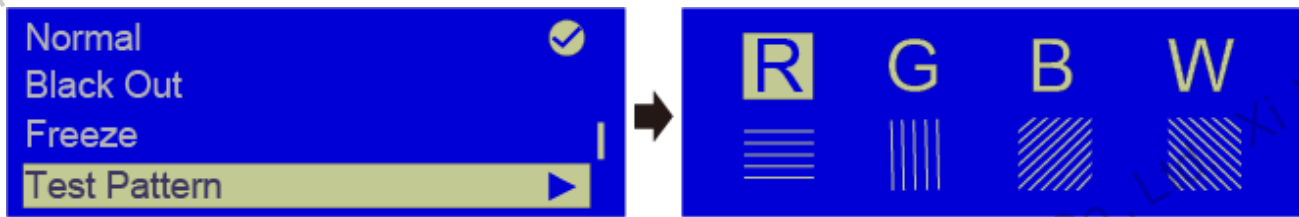


Custom scaling

4.6 Display Control

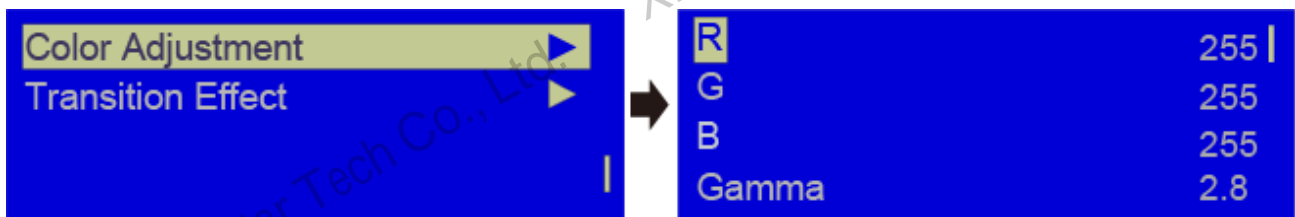


- Normal: Display the content of current input source normally.
- Freeze: Freeze the current frame of the output image. If the current signal source is lost, the screen will go black.
- Black Out: Make the screen go black.
- Test Pattern: Up to 8 test patterns are supported.

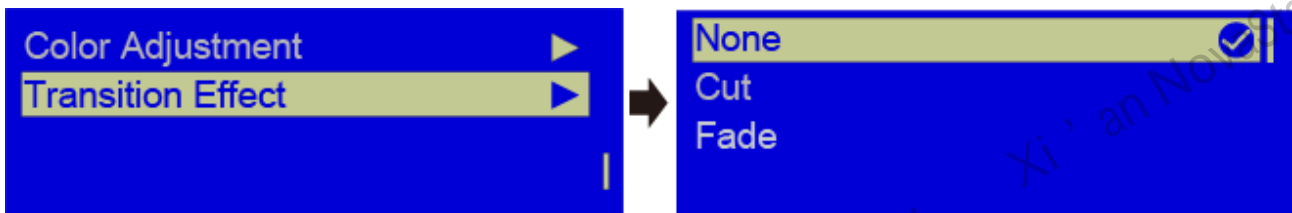


➤ Color Adjustment

Set the R, G and B values, Gamma value of the image, and save the settings to the receiving card when you are satisfied with the image quality.



- Transition Effect: Set the transition effect when switching the input source. Rotate the knob to select **Cut**, **Fade** or **None** and press the knob to make the settings take effect.



Note: The transition effect is available when PIP is turned off.

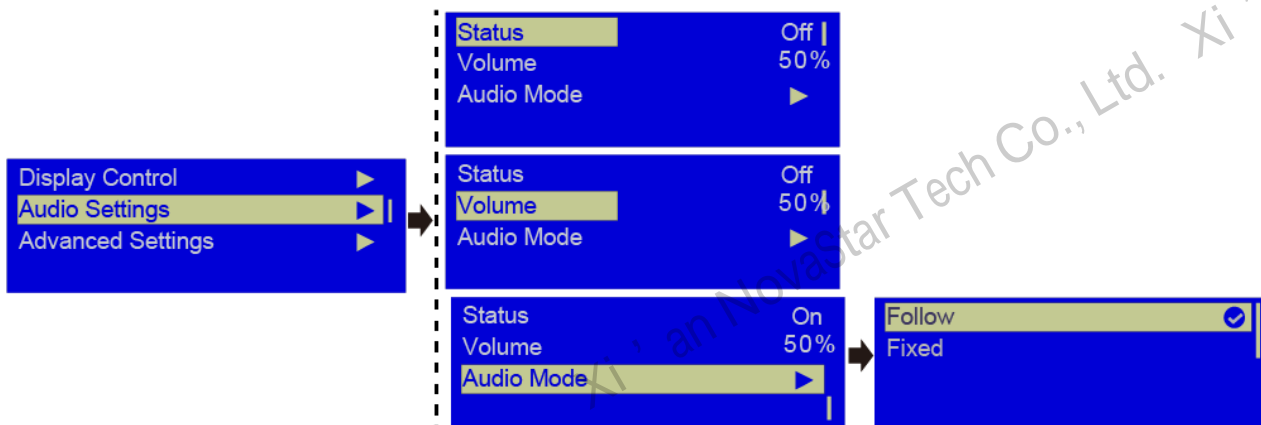
4.7 Audio Settings

Set to enable the audio function and set the volume and audio mode.

For example, if you want to use the audio from Audio In connector, you need to turn on the audio function and select **Fixed** for **Audio Mode**. If you want to use the audio from HDMI connector, you need to select **Follow** for **Audio Mode**.

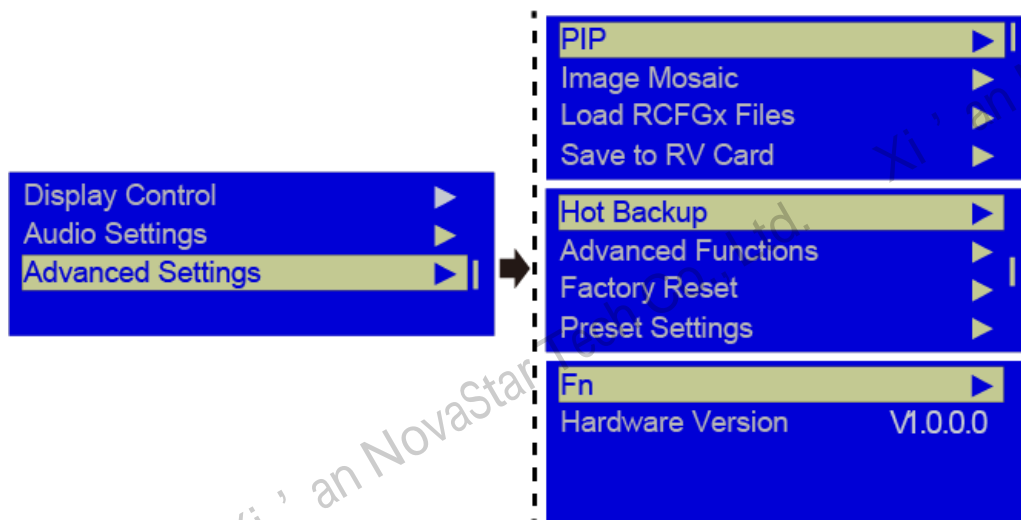
Then switch the input source to HDMI and you can use the audio from HDMI

connector.



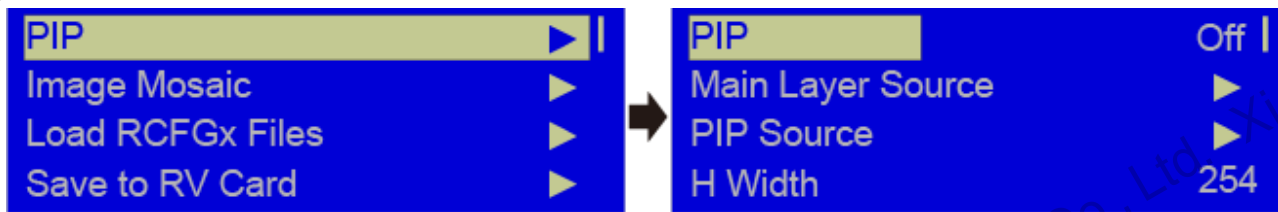
4.8 Advanced Settings

Advanced settings include the settings for **PIP**, **Image Mosaic**, **Load RCFGx Files**, **Save to RV Card**, **Hot Backup**, **Advanced Functions**, **Factory Reset**, **Preset Settings**, **Fn** and **Hardware Version**.



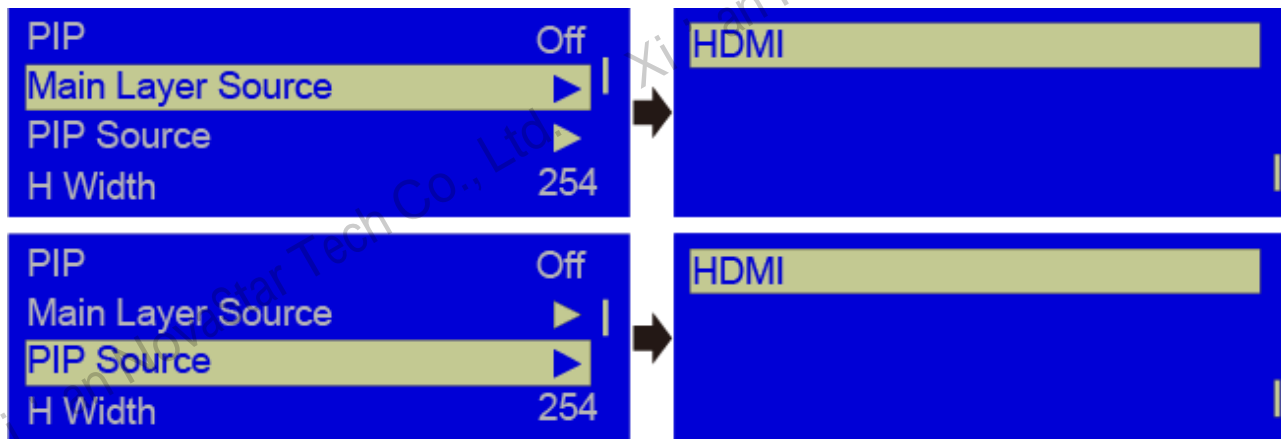
4.8.1 PIP

Set to turn on or turn off the PIP function. Rotate the knob to set the main layer source, PIP source, PIP size and position, as well as PIP cropping.



Main Layer Source/PIP Source: Select the input sources for main layer and PIP.

The function is the same as the function of front panel input source buttons.

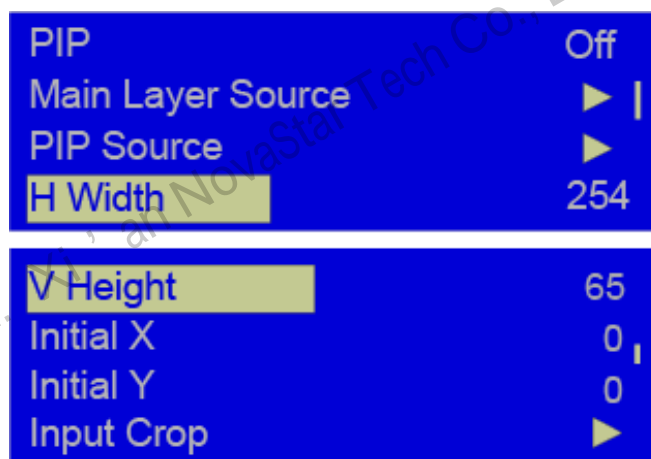


H Width: Set the PIP width.

V Height: Set the PIP height.

Initial X: Set the horizontal initial coordinate of the PIP.

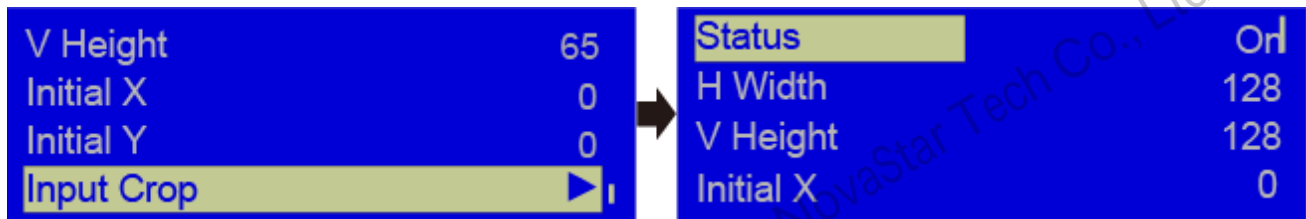
Initial Y: Set the vertical initial coordinate of the PIP.



Input Crop:

Crop the input source image and make it display on the PIP. Rotate the knob to

set the width and height of the cropped part. You need to turn on the input crop function, and then set **H Width**, **V Height**, **Initial X** and **Initial Y**.



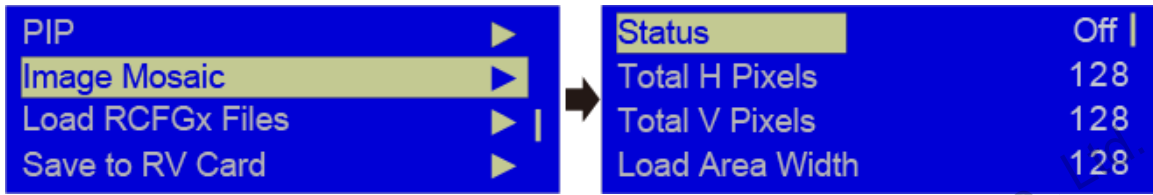
Conflict List for PIP Input Source

		Input Source of Main Layer							
		HDMI	DVI	SDI	VGA1	VGA2	CVBS1	CVBS2	YPbPr
PIP Input Source	HDMI	-	×	√	√	√	√	√	√
	DVI	×	-	√	√	√	√	√	√
	SDI	√	√	-	√	√	√	√	√
	VGA1	√	√	√	-	×	√	√	√
	VGA2	√	√	√	×	-	√	√	√
	CVBS1	√	√	√	√	√	-	×	√
	CVBS2	√	√	√	√	√	×	-	√
	YPbPr	√	√	√	√	√	√	√	-

- √: Main layer and PIP can use the input source simultaneously.
- ×: Main layer and PIP cannot use the input source simultaneously.
- -: Main layer and PIP use the same input source.

4.8.2 Image Mosaic

When the pixel count of the LED screen is larger than the loading capacity of a single VX400s unit, the image mosaic function is required.



Firstly you need to turn on the image mosaic function, then set the total H pixels and V pixels of the LED screen, lastly set the size and initial position of the area loaded by each VX400s unit. The total loading capacity of all cascaded VX400s units equals to the total pixel count of the LED screen.

Example: The total pixel count of the LED screen is 3000×1000, which exceeds the loading capacity of a single VX400s unit. You need to use two VX400s units for image mosaic. For connections, please see the figure below. For detailed parameter settings, please see the table below.

	VX400s (1)	VX400s (2)
Total H Pixels	3000	
Total V Pixels	1000	
Load Area Width	1500	1500
Load Area Height	1000	1000
Load Area Initial X	0	1500
Load Area Initial Y	0	0

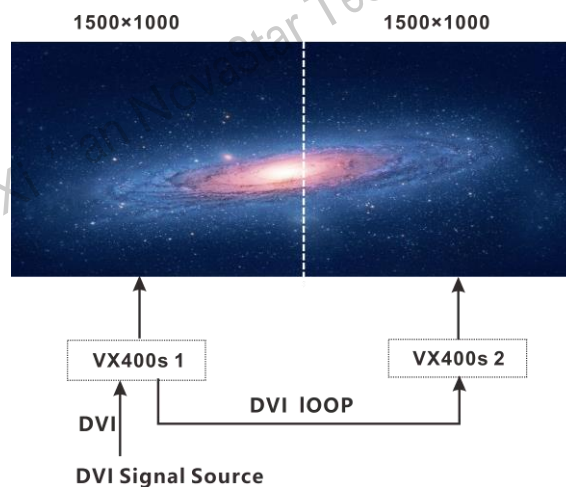


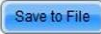
Image mosaic

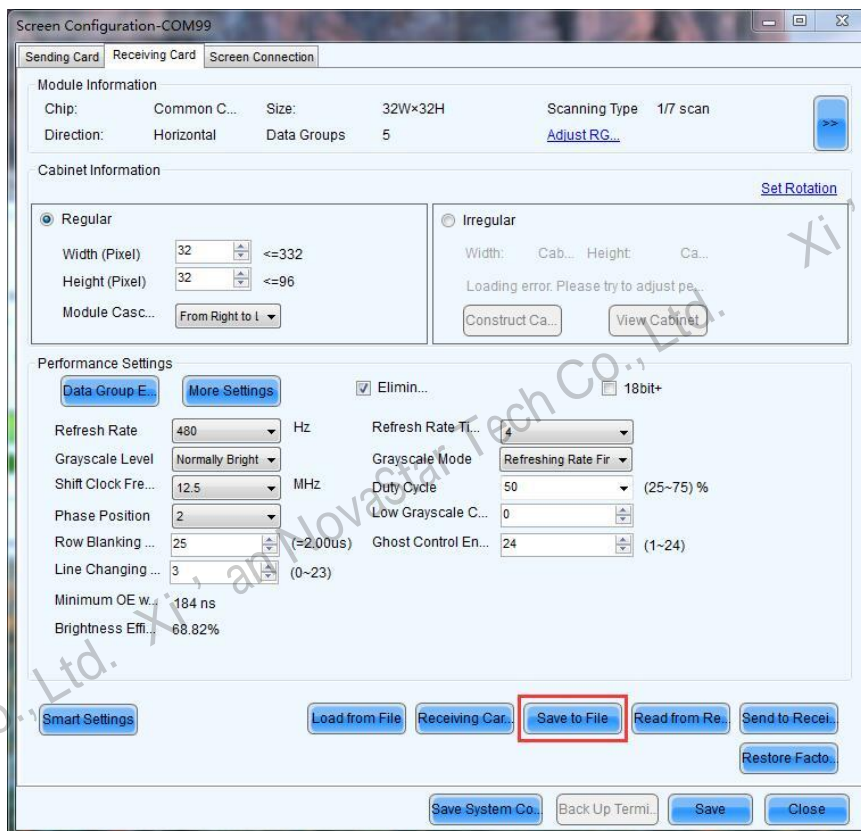
Note: Please select **Custom Scale** in **Output Settings** before you enable the image mosaic function. Please make sure **Scale** is set to **On** and **Auto Scale** is set to **Off**.

4.8.3 Load RCFGx Files

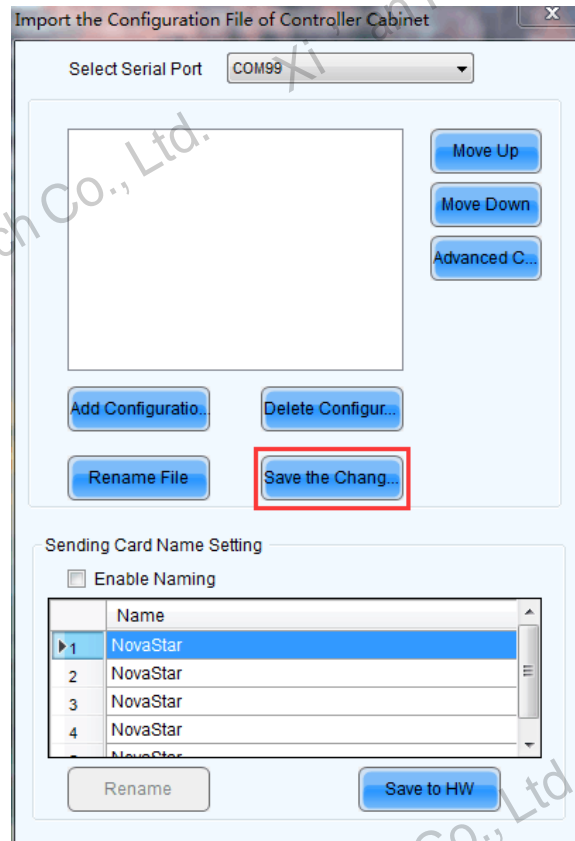
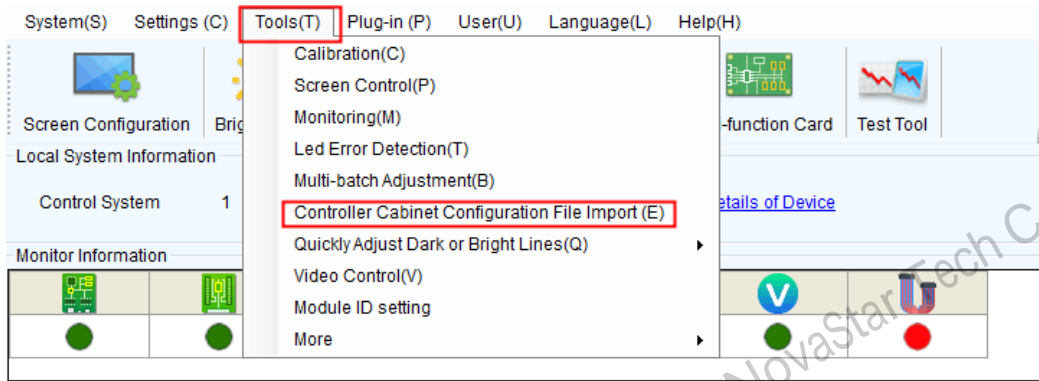
Connect the VX400s to PC where NovaLCT-Mars is running, and import the configuration files to the controller.

1) Save cabinet configuration file

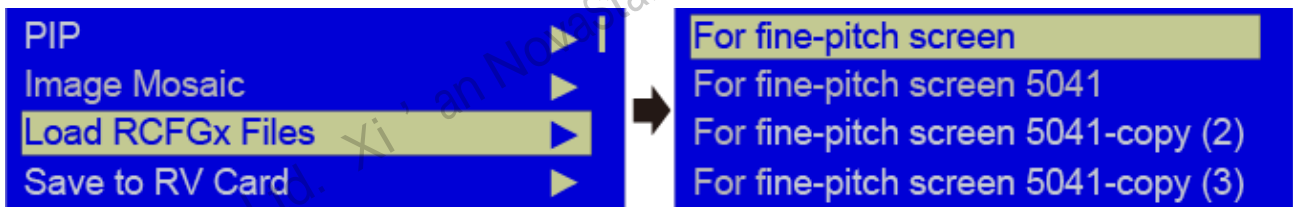
On NovaLCT, after you have configured the screen, click  to save the configuration file (.rcfg) to PC.



2) Import the cabinet configuration file to the VX400s.

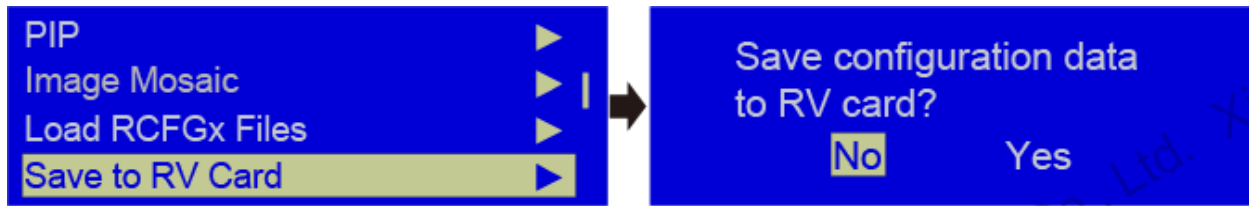


3) Load the configuration file.



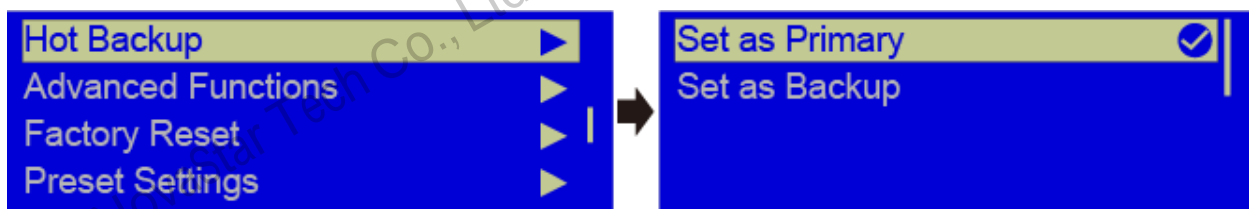
4.8.4 Save to RV Card

You can send and save the screen configuration to the receiving card. The configuration data will not be lost after the device is powered off.



4.8.5 Hot Backup

You can set the device as primary or backup device. The backup status will be shown on the device home screen.



4.9 Advanced Functions



Advanced functions include the following functions:

VGA Auto Adjustment: You can adjust the sampling parameters of the VGA input signal to make the VGA image clear and complete. Rotate the knob to select **VGA Auto Adjustment** and press the knob to perform the adjustment.

ADC Calibration: The problems of color cast or darker images may occur on the controller without ADC calibration. Rotate the knob to select **ADC Calibration** and press the knob to perform the ADC calibration for the input analog signals, including CVBS, VGA and YPBPR.

4.10 Factory Reset

You can reset all user data on the device to factory settings.

4.11 Preset Settings

The VX400s supports 10 user presets. User can save, load and clear the configured presets.



4.12 Fn

The Fn button on the device front panel can be customized to an **Auto Scale**, **Test Pattern**, **PIP** or **Image Mosaic** shortcut button. After the settings, press the **Fn** button on the device front panel to enter the corresponding screen.



1) Fn: Auto Scale

Press the Fn button to switch between full screen and pixel-to-pixel modes.

Button indicator descriptions:

On: Full screen

Off: Pixel-to-pixel

2) Fn: PIP

Press the Fn button to turn on or turn off the PIP.

Button indicator descriptions:

On: PIP is turned on.

Off: PIP is turned off.

3) Fn: Other functions

Press the **Fn** button to enter the submenu of the corresponding function.

4.13 Hardware Version

You can view the hardware version. If a newer version is released, you can connect the device to LCT-Mars to update the firmware of the VX400s.

5 Specifications

Input		
Connector	Qty	Description
CVBS	2	PAL/NTSC
SDI	1	480i, 576i, 720P, 1080i/P
VGA	2	VESA standard Resolution up to 1080p@60Hz
DVI	1	VESA standard (1080i input supported) HDCP compliant
HDMI	1	EIA/CEA-861 standard, HDMI 1.3 standard compliant HDCP compliant
YPbPr	1	Resolution up to 1080p@60Hz
Overall		
Power connector	AC 100-240V-50/60Hz	
Overall consumption	35 W	
Operating temperature	-20°C-60°C	
Dimensions	482.5 mm × 273.8 mm × 44.7 mm	
Weight	3.09 kg	

6 Troubleshooting

Problem	Solution
LED screen is not lit	<p>Make sure the power is properly connected and switched on.</p> <p>Make the LED screen is connected properly and works normally.</p> <p>Make sure the VX400s has input signal and check whether the screen is black because of extended mode, PIP shielding or other problems.</p> <p>Make sure the configuration mode and parameters are correct.</p>
Monitoring connector outputs abnormally	<p>Make sure the input connector has signal input and can display the image normally.</p> <p>Make sure the PIP is turned on. Make sure the PP has signal input and can display the image normally.</p> <p>Make sure the monitoring connector is well connected.</p> <p>If a monitor is connected, make sure the monitor supports the output resolution of the VX400s.</p> <p>Power off and restart the device, and then redo the operation.</p>

<p>VGA input phase shift occurs</p>	<p>Turn on the VGA auto phase adjustment function.</p>
<p>PIP displays abnormally</p>	<p>Make sure the PP has signal input and can display the image normally.</p> <p>Check whether the PIP settings are appropriate.</p>
<p>Fade effect is abnormal</p>	<p>Make sure the transition effect function is turned on.</p>
<p>Image mosaic is abnormal</p>	<p>Make sure the image mosaic function is turned on and the mosaic parameters are set correctly.</p> <p>Make sure the input signal is normal.</p>
<p>Audio is abnormal</p>	<p>Make sure the audio settings are appropriate.</p> <p>Make sure the audio mode is correct.</p> <p>Make sure the connection between the VX400s and multifunctional card is in good condition, and the output Ethernet port icon on the home screen is highlighted.</p> <p>Make sure the audio output mode of the multifunctional card is set to HDMI, which should be confirmed by connecting to and setting in NovaLCT.</p>

If problems are still unsolved, please contact your local distributor or our customer service.

For your safety, please do not repair the device yourself because there are high voltage components inside the device.