LCD Video Wall

User's Manual

Foreword

General

This manual introduces the operations and maintenance of LCD video wall (hereinafter referred to as the "Video Wall").

Models

DHI-LS650KCH-ES, DHI-LS650KCM-ES, DHI-LS650KCH-EF, and DHI-LS650KCM-EF.

Safety Instructions

The following categorized signal words with defined meaning might appear in the manual.

Signal Words	Meaning
⚠DANGER	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
⚠WARNING	Indicates a medium or low potential hazard which, if not avoided, could result in slight or moderate injury.
⚠CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, lower performance, or unpredictable result.
�™TIPS	Provides methods to help you solve a problem or save you time.
📖NOTE	Provides additional information as the emphasis and supplement to the text.

Revision History

Version	Revision Content	Release Time
V1.0.0	First release.	December 2019

Interface Declaration

This manual mainly introduces the relevant functions when you use the device. The interfaces used for manufacture, returning to the factory for inspection, and locating fault are not described in this manual. Please contact technical support if you need information about these interfaces.

About the Manual

- The Manual is for reference only. If there is inconsistency between the manual and the actual product, the actual product shall prevail.
- We are not liable for any loss caused by the operations that do not comply with the manual.
- The manual would be updated according to the latest laws and regulations of related regions. For detailed information, see the paper manual, CD-ROM, QR code or our official website. If there is inconsistency between paper manual and the electronic version, the electronic version shall prevail.
- All the designs and software are subject to change without prior written notice. The product updates might cause some differences between the actual product and the manual. Please contact the customer service for the latest program and supplementary documentation.
- There still might be deviation in technical data, functions and operations description, or errors in print. If there is any doubt or dispute, please refer to our final explanation.
- Upgrade the reader software or try other mainstream reader software if the manual (in PDF format) cannot be opened.
- All trademarks, registered trademarks and the company names in the manual are the properties of their respective owners.
- Please visit our website, contact the supplier or customer service if there is any problem occurred when using the device.
- If there is any uncertainty or controversy, please refer to our final explanation.

Important Safeguards and Warnings

This chapter introduces the contents covering proper handling of the Video Wall, hazard prevention, and prevention of property damage. Read these contents carefully before using the Video Wall, comply with them when using, and keep them well for future reference.

Operating Requirements

- Do not place or install the Video Wall in a place exposed to sunlight or near the heat source.
- Keep the Video Wall away from dampness, dust or soot.
- Keep the Video Wall installed horizontally or on a stable place to prevent it from falling.
- Do not drop or splash liquid onto the Video Wall, and make sure that there is no object filled with liquid on the Video Wall to prevent liquid from flowing into the Video Wall.
- Install the Video Wall in a well-ventilated place, and do not block the ventilation of the Video Wall.
- Operate the Video Wall within the rated range of power input and output.
- Do not dissemble the Video Wall.
- Transport, use and store the Video Wall under the allowed humidity and temperature conditions.

Electrical Safety

- Improper battery use might result in fire, explosion, or inflammation.
- When replacing battery, make sure that the same model is used.
- Use the recommended power cables in the region and use them under the rated specification.
- Use the power adapter provided with the Video Wall; otherwise, it might result in people injury and device damage.
- The power source shall conform to the requirement of the Safety Extra Low Voltage (SELV) standard, and supply power with rated voltage which conforms to Limited power Source requirement according to IEC60950-1. Note that the power supply requirement is subject to the device label.
- Connect device (type-I structure) to the power socket with protective earthing.
- The appliance coupler is a disconnection device. Keep a convenient angle when using it.

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1 Maintenance

1.1 Environment Requirements

- The Video Wall can only be installed indoors. It is recommended to install air conditioner in the room where the Video Wall is installed. Do not use the Video Wall in environments with high humidity and heavy dust.
- Do not block the vent of the Video Wall and the air circulation around the Video Wall. Otherwise, the temperature inside the Video Wall might rise and therefore cause a fire.

1.2 Daily Maintenance Requirements

Strictly comply with the daily maintenance requirements of the Video Wall to prolong its service life and reduce emission for energy saving.

Operating Time

Because of high temperature, electronic products will accelerate aging after running for a long time and working overloaded, resulting in a significant reduction in its theoretical service life. The relationship between operating time and performance is shown in Figure 1-1.

Figure 1-1 Performance
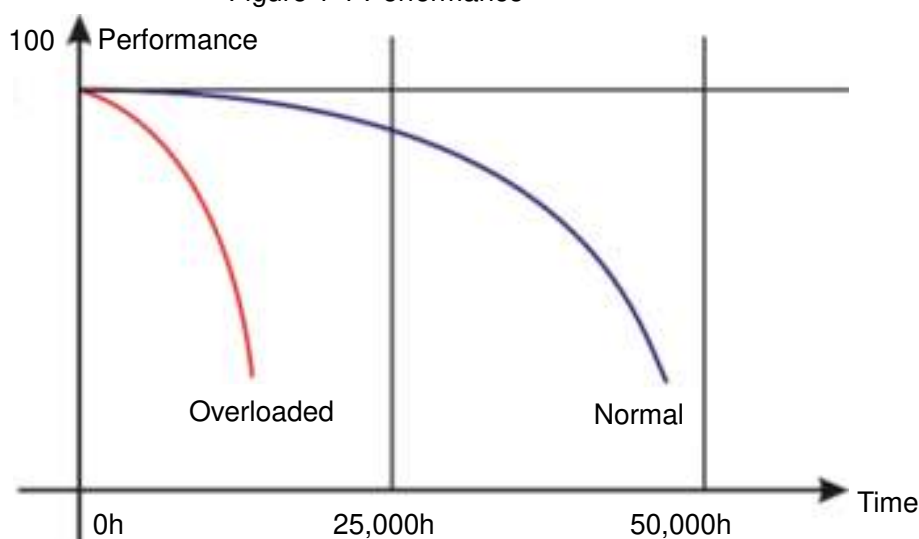
Follow the recommendations below to extend device service life and save maintenance costs.
- After 10 hours of continuous operation, turn off the Video Wall for 15–30 minutes.
- After 7/24 continuous operation, turn off the Video Wall for 2 hours.

Temperature, Humidity, and Ventilation

The ideal working temperature of the Video Wall is 22°C ± 4°C (71.6°F ± 39.2°F), and the ideal relative humidity is 30%–70% (no condensation). Make sure that there is no significant

temperature difference and sudden change of humidity, and if necessary, gradual temperature and humidity change is recommended.

If the Video Wall is used for a long time in environments with high humidity, water vapor and droplets will be generated on the surface and the frame of the LCD, and then gradually penetrate into the LCD, slowly corrode and destroy its internal structure, causing liquid leakage. See Figure 1-2.

Figure 1-2 Liquid leakage

During daily operation, pay attention that:

● Before turning off the Video Wall, make sure that the temperatures of the air conditioners in the server room and the room where the Video Wall is installed are the same, and turn on or off these air conditioners at the same time.

● If the Video Wall has been turned off for a long time, check whether there are water drops on the surface. If yes, do not power on the Video Wall, and do not dry the surface with wet cloth. Use absorbent paper to dry the surface, and contact our after-sales service.

⚠️

Free warranty service is not applicable to damages (include but not limited to damages to the Video Wall, user or any third party) arising from incorrect use and maintenance of the Video Wall.

Cleaning

Use degreasing cotton or soft cloth to clean the screen.

● The ideal detergent is isopropanol or n-hexane. Do not use ketone (like acetone) to clean the screen. Before cleaning the screen, pull the plug out of the socket.

● Do not use wet cloth to clean the Video Wall because water vapor and droplets will be generated on the surface and the frame of the LCD, and then gradually penetrate into the LCD, slowly corrode and destroy its internal structure, causing liquid leakage.

● The panel is fragile. As a result, do not press or scratch the surface of the screen with great force.

Power Supply

Stable 100V–240V single phase power supply is needed; otherwise the Video Wall cannot work normally. To get stable voltage and prevent damage caused by electrical surge, use stabilized voltage supply.

Storage

- If the Video Wall will not be used for a long time, cover it with dustproof cover.
- If the Video Wall has not been used for over six months before you start to use it again, do dust removal first, or contact professionals to do the maintenance.

If the Video Wall is not in use for a long time, it will gather dust and heat dissipation will be influenced.

Dust-proof Requirements

During debugging and operation, the dust concentration of the working area should not exceed $10mg/m^3$.

If the Video Wall must be used in environments with high temperature and high humidity, or the Video Wall must be in single display mode for a long time, we strongly recommend you to contact our engineers to get suggestions. Otherwise the reliability and performance might be greatly influenced.

2 Unpacking the Box

Check against Table 2-1 to see whether the components are complete.

The appearance, items, or quantity might be different, and the actual packing list shall prevail.

Table 2-1 Unpacking the box

Item	Quantity
Liquid crystal video wall	1
AC power cable	1
HDMI cable	1
Network cable	1
Remote control	1
Battery	1 pair

3 Introduction

3.1 Appearance

The figure is for reference, and the actual product shall prevail.

Figure 3-1 Appearance

3.2 Ports

Figure 3-2 Ports
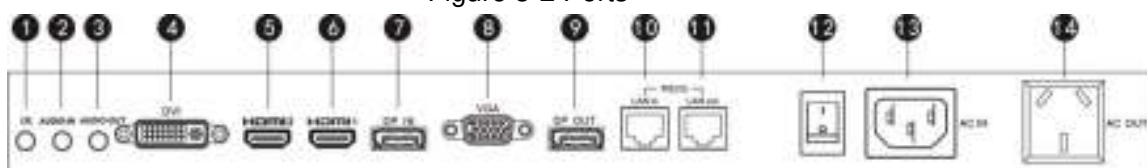
Table 3-1 Ports description

No.	Port	Description
1	IR	Connects to the IR extension cable.
2	AUDIO-IN	Inputs audio signals.
3	AUDIO-OUT	Outputs audio signals.
4	DVI	Inputs DVI signal. Supports maximum 4K@30Hz.
5	HDMI 2	Inputs HDMI signal. Supports maximum 1080P@60Hz.
6	HDMI 1	Inputs HDMI signal. Supports maximum 4K@60Hz.
7	DP IN	Inputs DP signal. Supports maximum 4K@60Hz.
8	VGA	Inputs VGA signal. Supports maximum 1080P@60Hz.
9	DP OUT	Outputs DP signal. Supports maximum 4K@30Hz.
10	LAN in	RJ45 port, inputs RS-232 signals for controlling the screen.

No.	Port	Description
11	LAN out	RJ45 port, outputs RS-232 signals for controlling signal loop output.
12	Power switch	AC power switch.
13	AC IN	AC power input port
14	AC OUT	AC power output port for power loop output of maximum 2 devices.

3.3 Remote Control

Remote control is required. For its appearance and operations, see Figure 3-3 and Table 3-2.
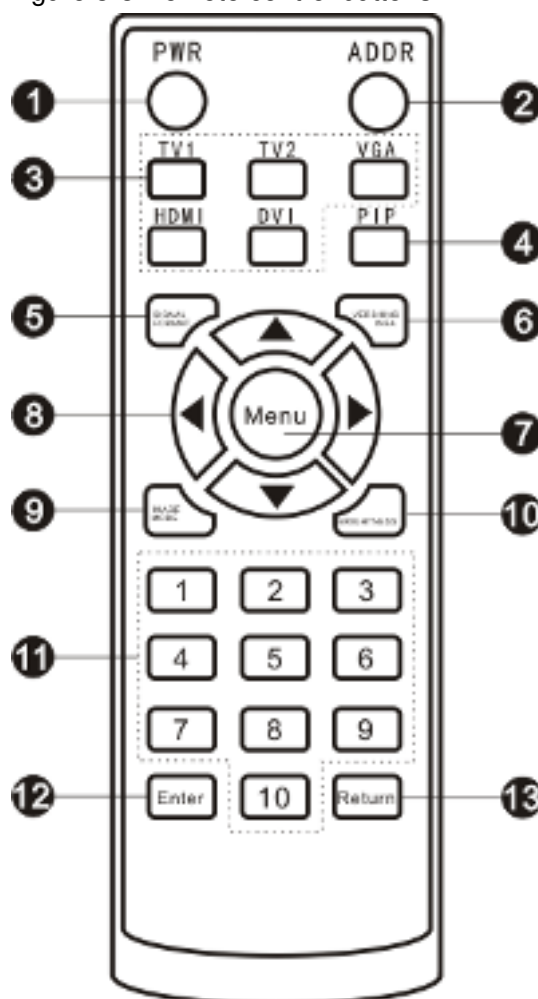
Figure 3-3 Remote control buttons

Table 3-2 Remote control buttons description

No.	Name	Function
1	Power	Power on/standby.
2	Address	Shortcut keyboard for address setting (dedicated to monitors).

No.	Name	Function
3	Signal source	Shortcut keyboard for selecting signal source. ● TV1: Pause button, used to stop playing videos. ● TV2: Switch signals to CVBS signals. ● VGA: Switch signals to VGA signals. ● HDMI: Switch signals to HDMI signals. ● DVI: Switch signals to DVI signals.
4	Picture-in-picture (PIP)	Press PIP to start playing multimedia.
5	Signal format	Shortcut keyboard for displaying the current input signals.
6	Version info	Shortcut keyboard for displaying version of the system.
7	Menu	● Press Menu to display or exit the menu interface. ● Press Menu to confirm the operation that you have done.
8	Direction buttons	● Left and right direction buttons: Press ◀ or ▶ (left or right) to select the item at the left or right of the current item that you have selected on the screen (if you have selected voice, you can use these buttons to adjust the volume). ● Up and down direction buttons: Press ▲ or ▼ (up or down) to select items above or below the current item that you have selected on the screen.
9	Image mode	Shortcut keyboard for selecting image mode.
10	Brightness (backlight)	Shortcut keyboard for selecting backlight mode.
11	Number buttons	Press number buttons to enter numbers.
12	Enter	Press Enter to confirm and enter the multimedia interface.
13	Return	Press Return to exit the multimedia interface.

4 Local Configuration

Use the remote control to configure parameters for the Video Wall. Press the Menu button of the remote control, and then the menu of the Video Wall is displayed. See Figure 4-1 and Table 4-1.

Figure 4-1 Main menu

Table 4-1 Icon description

Icon	Main menu description
Picture	Set imaging effect for the Video Wall.
Geometry	Set picture positions and ADC auto adjustment when VGA signal source is connected.
PIP	Set PIP (picture-in-picture) mode, position, and the signal source for each PIP mode.
Advance	Set advanced parameters of images. 📖 Advanced options must be set by professional personnel.
OSD	Set system parameters.
Source	Set input source.

Operations

Step 1 Press Menu on the remote control, and then the menu bar is displayed on the Video Wall.

You can start adjusting the corresponding parameters.

Step 2 Press Enter or ◀ / ▶ to adjust the corresponding submenu.

Step 3 Press Exit to exit the current menu.

4.1 Picture

You can set the brightness, contrast, sharpness, saturation, and more to get the ideal image.

Press Menu on the remote control, and then the menu interface is displayed on the Video Wall. The **Picture** menu bar is displayed by default. See Figure 4-2 and Table 4-2.

Figure 4-2 Picture

Table 4-2 Picture parameter description

Parameter	Description
Brightness	Brightness of images. Brightness range is 0 to 100. The higher the value, the brighter the image.
Contrast	Difference of the darkest and brightest parts of the image. Contrast range is 0 to 100. The higher the value, the darker the shadows and the brighter the highlights.
Sharpness	Edge contrast. Sharpness range is 0 to 4. The higher the value, the larger the contrast along or near the edges in the image.
Saturation	Color saturation of images. Saturation range is 0 to 100. The higher the value, the deeper the color.
Aspect Ratio	Display ratio of images. You can select from **Full** (full screen), **16:9**, **5:4**, and **4:3**.
Color Effect	Overall effect of the image. You can select from **Standard**, **Game**, **Movie**, **Photo**, and **Vivid**.
3D Noise	Enable 3D noise reduction to reduce image noise and improve image quality. You can select from **Off**, **Low**, **Middle**, and **High**.

Temperature	Color temperature of the image. You can select from **User** (user defined), **9300**, **7500**, **6500**, **5800**, and **SRGB**. 📖 You can adjust **R**, **G**, and **B** values in **User** mode.

Operations

The steps of setting the picture parameters are similar, and here takes adjusting **Brightness** as the example.

Step 1 Press Menu on the remote control, and then the menu interface is displayed on the Video Wall.

Step 2 Press ▲ or ▼ on the remote control to select the **Brightness** bar, and then press Enter to confirm your selection.

Step 3 Press ◀ or ▶ to adjust the brightness.

4.2 Geometry

Adjust image and screen positions. You can only set geometry parameters when VGA source is connected.

Press Menu on the remote control and then the menu interface is displayed on the Video Wall.

Press ◀ or ▶ to go to the **Geometry** interface, see Figure 4-3 and 0.

Figure 4-3 Geometry (VGA)

Table 4-3 Geometry (VGA) parameter description

Parameter	Description
Auto Adjust	Automatically adjust the position of image.
H Position	Adjust the horizontal position of screen. Horizontal position range is 0 to 100.
V Position	Adjust the vertical position of screen. Vertical position range is 0 to 100.
Clock	Improper clock and phase values might make the images get blurry. We recommend you to keep the default values.
Phase	
ADC Auto Adjust	When the color of the VGA image is abnormal, the system automatically restores to normal image color through ADC auto adjust.

Operations

The steps of setting the geometry parameters are similar, and here takes **Auto Adjust** as the example.

Step 1　Press Menu on the remote control, and then the menu interface is displayed on the Video Wall.

Step 2　Press ◀ or ▶ on the remote control to go to the **Geometry** interface.

Step 3　Press ▲ or ▼ to select **Auto Adjust**, and then press Enter to start auto adjustment.

Step 4　(Applicable to adjusting **H Position**, **V Position**, **Clock**, or **Phase**) Press ◀ or ▶ to adjust the value.

4.3 PIP

PIP (picture-in-picture) allows you to set how many split windows can be displayed on the screen.

Press Menu on the remote control and then the menu interface is displayed on the Video Wall.

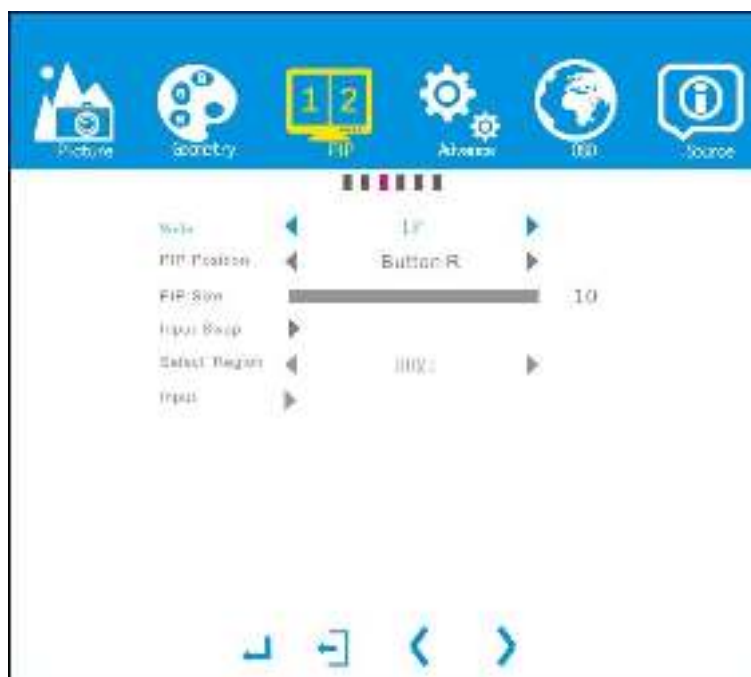Press ◀ or ▶ to go to the **PIP** interface, see Figure 4-4 and Table 4-4.

Figure 4-4 PIP

Table 4-4 PIP parameter description

Parameter	Description
Mode	You can select PIP modes from **1P** (1 window), **2P TB** (2 horizontal split windows), **2P PIP** (1 smaller window inside 1 bigger window), **4P** (4 split windows), and **PIP** (2 vertical split windows).
PIP Position	You can adjust PIP position only in **PIP** mode. PIP positions available: **Centre**, **Top L** (upper left), **Top R** (upper right), **Button L** (lower left), and **Button R** (lower right).
PIP Size	You can set PIP size only in **PIP** mode. The size value ranges from 1 to 10. The larger the value, the larger the size.
Input Swap	You can switch the input source of each window in **2P TB**, **2P PIP**, **4P**, and **PIP** modes.
Select Region	Select the region that you want to adjust picture settings.
Input	Select the input source signal for each window. You can select from **VGA**, **DVI**, **HDMI1**, **HDMI2**, **OPS**, **DP**, and **Auto**.

Operations

The steps of setting PIP parameters are similar, and here takes setting **Mode** as the example.

Step 1 Press Menu on the remote control, and then the menu interface is displayed on the Video Wall.

Step 2 Press ◀ or ▶ on the remote control to go to the **PIP** interface.

Step 3 Press ▲ or ▼ to select the **Mode** bar, and then press Enter to confirm your selection.

Step 4 Press ◀ or ▶ to select the mode that you want, and then press Enter to confirm your

selection.

4.4 Advance

WARNING

Non-professionals are prohibited from modifying the advanced parameters. We are not responsible for any product problems arising from modifications by non-professionals.

4.5 OSD

Press Menu on the remote control and then the menu interface is displayed on the Video Wall.

Press or on the remote control to go to the **OSD** interface. See Figure 4-5 and Table 4-5.

Figure 4-5 OSD

Table 4-5 OSD parameter description

Parameter	Description
Backlight	Set the backlight mode of the screen. You can select from **Standard**, **Energy**, and **Highlight**.
Language	You can select the menu language from Chinese and English.
Menu Time	Set the time that the menu displays on the screen. The time ranges from 10 s to 60 s.
OSD H Position	Adjust the horizontal or vertical position of the menu. You can set the

Parameter	Description
OSD V Position	value of horizontal or vertical position from 0 to 100. 0 refers to the leftmost or uppermost side, and 100 refers to the rightmost or lowermost side.
Transparency	Adjust the transparency of the menu. The value ranges from 0 to 100. The larger the value, the more transparent the menu.
OSD Rotate	Adjust the angle of the menu. You can rotate the menu by **0**, **90**, or **270** degrees.
Reset	You can reset the settings to default value except advanced parameters and **R**, **B**, **G** values from **Picture**.
Mosaic Setting	Set mosaic options of screens. See Figure 4-6 and Table 4-6.
Volume	Set the volume of external speaker. The value ranges from 0 to 100. The larger the value, the higher the volume. You can adjust the volume by directly pressing ◀ or ▶ on the remote control when no menu is displayed.
Mute	Turn on or off volume.

Figure 4-6 Mosaic setting

Table 4-6 Description of mosaic setting

Parameter	Description
Mosaic Mode	You can select from **On** and **Off**. If mosaic mode is off, only one window will be displayed.
Row	Set the row that the screen locates.
Line	Set the line (column) that the screen locates.
Row Start	Set the start row of mosaic.
Row End	Set the end row of mosaic.

Parameter	Description
Line Start	Set the start line (column) of mosaic.
Enter	Confirm your selection.

Operations

The steps of setting OSD parameters are similar, and here takes setting **Backlight** as the example.

Step 1 Press Menu on the remote control, and then the menu interface is displayed on the Video Wall.

Step 2 Press ◀ or ▶ on the remote control to go to the **OSD** interface.

Step 3 Press ▲ or ▼ to select the **Backlight** bar, and then press Enter to confirm your selection.

Step 4 Press ◀ or ▶ to select the backlight mode that you want, and then press Enter to confirm your selection.

Step 4 is not required for **Reset** and **Mosaic Setting**.

4.6 Source

Select the input source, which includes **VGA**, **DP**, **HDMI1**, **HDMI2**, **DVI**, **OPS**, and **Auto**. See Figure 4-7.

Step 1 Press Menu on the remote control, and then the menu interface is displayed on the Video Wall.

Step 2 Press ◀ or ▶ on the remote control to go to the **Source** interface.

Step 3 Press ▲ or ▼ to select the source that is connected, and then press Enter to confirm your selection.

You can select signal source by pressing the corresponding buttons on the remote control when no menu is displayed.

Figure 4-7 Source

5 System Upgrade

⚠️

System upgrade involves complicated operations. Please contact us for any upgrade and other related operations. Do not disassemble the Video Wall or upgrade it by yourself. We are not responsible for any malfunctions and damages caused by arbitrary disassembly or upgrade.

6 FAQ

Most problems can be solved by the following solutions. For any other problem, contact after-sales service.

Problem	Possible Reasons
No images on the screen after turning on the Video Wall.	● Power source (220V AC) is not connected to mains electricity. ● The power cable is broken. ● The power switch is off or broken. ● The indicator light is off.
No signal.	● Poor contact of signal wires. ● Signal source has no output. ● The signal wires are broken. ● The input signal type does not belong to the types supported by the Video Wall.
LCD lost color.	● Poor contact of signal wires. ● The signal wires are broken.
Remote control does not work.	No batteries are installed, or batteries are not installed properly.
Device temperature is too high.	Device ventilation is not good.

Appendix 1 Cybersecurity Recommendations

Cybersecurity is more than just a buzzword: it's something that pertains to every device that is connected to the internet. IP video surveillance is not immune to cyber risks, but taking basic steps toward protecting and strengthening networks and networked appliances will make them less susceptible to attacks. Below are some tips and recommendations from Dahua on how to create a more secured security system.

Mandatory actions to be taken for basic equipment network security:

1. **Use Strong Passwords**

   Please refer to the following suggestions to set passwords:
   ● The length should not be less than 8 characters;
   ● Include at least two types of characters; character types include upper and lower case letters, numbers and symbols;
   ● Do not contain the account name or the account name in reverse order;
   ● Do not use continuous characters, such as 123, abc, etc.;
   ● Do not use overlapped characters, such as 111, aaa, etc.;

2. **Update Firmware and Client Software in Time**

   ● According to the standard procedure in Tech-industry, we recommend to keep your equipment (such as NVR, DVR, IP camera, etc.) firmware up-to-date to ensure the system is equipped with the latest security patches and fixes. When the equipment is connected to the public network, it is recommended to enable the "auto-check for updates" function to obtain timely information of firmware updates released by the manufacturer.
   ● We suggest that you download and use the latest version of client software.

"Nice to have" recommendations to improve your equipment network security:

1. **Physical Protection**

   We suggest that you perform physical protection to equipment, especially storage devices. For example, place the equipment in a special computer room and cabinet, and implement well-done access control permission and key management to prevent unauthorized personnel from carrying out physical contacts such as damaging hardware, unauthorized connection of removable equipment (such as USB flash disk, serial port), etc.

2. **Change Passwords Regularly**

   We suggest that you change passwords regularly to reduce the risk of being guessed or cracked.

3. **Set and Update Passwords Reset Information Timely**

   The equipment supports password reset function. Please set up related information for password reset in time, including the end user's mailbox and password protection questions. If the information changes, please modify it in time. When setting password protection questions, it is suggested not to use those that can be easily guessed.

4. **Enable Account Lock**

   The account lock feature is enabled by default, and we recommend you to keep it on to guarantee the account security. If an attacker attempts to log in with the wrong password several times, the corresponding account and the source IP address will be locked.

5. **Change Default HTTP and Other Service Ports**

We suggest you to change default HTTP and other service ports into any set of numbers between 1024~65535, reducing the risk of outsiders being able to guess which ports you are using.

6. **Enable HTTPS**

We suggest you to enable HTTPS, so that you visit Web service through a secure communication channel.

7. **Enable Whitelist**

We suggest you to enable whitelist function to prevent everyone, except those with specified IP addresses, from accessing the system. Therefore, please be sure to add your computer's IP address and the accompanying equipment's IP address to the whitelist.

8. **MAC Address Binding**

We recommend you to bind the IP and MAC address of the gateway to the equipment, thus reducing the risk of ARP spoofing.

9. **Assign Accounts and Privileges Reasonably**

According to business and management requirements, reasonably add users and assign a minimum set of permissions to them.

10. **Disable Unnecessary Services and Choose Secure Modes**

If not needed, it is recommended to turn off some services such as SNMP, SMTP, UPnP, etc., to reduce risks.

If necessary, it is highly recommended that you use safe modes, including but not limited to the following services:

- SNMP: Choose SNMP v3, and set up strong encryption passwords and authentication passwords.
- SMTP: Choose TLS to access mailbox server.
- FTP: Choose SFTP, and set up strong passwords.
- AP hotspot: Choose WPA2-PSK encryption mode, and set up strong passwords.

11. **Audio and Video Encrypted Transmission**

If your audio and video data contents are very important or sensitive, we recommend that you use encrypted transmission function, to reduce the risk of audio and video data being stolen during transmission.

Reminder: encrypted transmission will cause some loss in transmission efficiency.

12. **Secure Auditing**

- Check online users: we suggest that you check online users regularly to see if the device is logged in without authorization.
- Check equipment log: By viewing the logs, you can know the IP addresses that were used to log in to your devices and their key operations.

13. **Network Log**

Due to the limited storage capacity of the equipment, the stored log is limited. If you need to save the log for a long time, it is recommended that you enable the network log function to ensure that the critical logs are synchronized to the network log server for tracing.

14. **Construct a Safe Network Environment**

In order to better ensure the safety of equipment and reduce potential cyber risks, we recommend:

- Disable the port mapping function of the router to avoid direct access to the intranet devices from external network.

- The network should be partitioned and isolated according to the actual network needs. If there are no communication requirements between two sub networks, it is suggested to use VLAN, network GAP and other technologies to partition the network, so as to achieve the network isolation effect.
- Establish the 802.1x access authentication system to reduce the risk of unauthorized access to private networks.

ENABLING A SAFER SOCIETY AND SMARTER LIVING