User Manual

020-000769-01

FHD462-X LCD Panel

CHRISTIE®

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NOTICES

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GENERAL

Every effort has been made to ensure accuracy, however in some cases changes in the products or availability could occur which may not be reflected in this document. Christie reserves the right to make changes to specifications at any time without notice. Performance specifications are typical, but may vary depending on conditions beyond Christie's control such as maintenance of the product in proper working conditions. Performance specifications are based on information available at the time of printing. Christie makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of fitness for a particular purpose. Christie will not be liable for errors contained herein or for incidental or consequential damages in connection with the performance or use of this material. Canadian manufacturing facility is ISO 9001 and 14001 certified.

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Products are warranted under Christie's standard limited warranty, the complete details of which are available by contacting your Christie dealer or Christie. In addition to the other limitations that may be specified in Christie's standard limited warranty and, to the extent relevant or applicable to your product, the warranty does not cover:

a. Problems or damage occurring during shipment, in either direction.
b. Projector lamps (See Christie's separate lamp program policy).
c. Problems or damage caused by use of a projector lamp beyond the recommended lamp life, or use of a lamp other than a Christie lamp supplied by Christie or an authorized distributor of Christie lamps.
d. Problems or damage caused by combination of a product with non-Christie equipment, such as distribution systems, cameras, DVD players, etc., or use of a product with any non-Christie interface device.
e. Problems or damage caused by the use of any lamp, replacement part or component purchased or obtained from an unauthorized distributor of Christie lamps, replacement parts or components including, without limitation, any distributor offering Christie lamps, replacement parts or components through the internet (confirmation of authorized distributors may be obtained from Christie).
f. Problems or damage caused by misuse, improper power source, accident, fire, flood, lightening, earthquake or other natural disaster.
g. Problems or damage caused by improper installation/alignment, or by equipment modification, if by other than Christie service personnel or a Christie authorized repair service provider.
h. Problems or damage caused by use of a product on a motion platform or other movable device where such product has not been designed, modified or approved by Christie for such use.
i. Problems or damage caused by use of a projector in the presence of an oil-based fog machine or laser-based lighting that is unrelated to the projector.
j. For LCD projectors, the warranty period specified in the warranty applies only where the LCD projector is in "normal use" which means the LCD projector is not used more than 8 hours a day, 5 days a week.
k. Except where the product is designed for outdoor use, problems or damage caused by use of the product outdoors unless such product is protected from precipitation or other adverse weather or environmental conditions and the ambient temperature is within the recommended ambient temperature set forth in the specifications for such product.
l. Image retention on LCD flat panels.
m. Defects caused by normal wear and tear or otherwise due to normal aging of a product.

The warranty does not apply to any product where the serial number has been removed or obliterated. The warranty also does not apply to any product sold by a reseller to an end user outside of the country where the reseller is located unless (i) Christie has an office in the country where the end user is located or (ii) the required international warranty fee has been paid.

The warranty does not obligate Christie to provide any on site warranty service at the product site location.

PREVENTATIVE MAINTENANCE

Preventative maintenance is an important part of the continued and proper operation of your product. Please see the Maintenance section for specific maintenance items as they relate to your product. Failure to perform maintenance as required, and in accordance with the maintenance schedule specified by Christie, will void the warranty.

REGULATORY

The product 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 product is operated in a commercial environment. The product 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 the product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.
CAN ICES-3 (A) / NMB-3 (A)
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The product is designed and manufactured with high-quality materials and components that can be recycled and reused. This symbol  means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from regular waste. Please dispose of the product appropriately and according to local regulations. In the European Union, there are separate collection systems for used electrical and electronic products. Please help us to conserve the environment we live in!

Addendum

Translated copies of this document are provided on the CD in the back of this document. The CD may also contain additional product documentation. Read all instructions before using or servicing this product.

本文档的翻译副本在本文档背面的 CD 上提供。该 CD 中还可能包含其他产品文档。使用或维修本产品之前请务必阅读所有说明。

文件背面的光碟提供了本文件的翻譯副本。這張光碟可能另外包含其他產品文件。請先閱讀所有指示再使用或送修本產品。

Le CD au dos de ce document contient des traductions de celui-ci dans différentes langues. Ce CD peut également contenir de la documentation supplémentaire sur le produit. Lisez toutes les instructions avant d'utiliser ou d'entretenir ce produit.

Übersetzte Versionen dieses Dokuments werden auf der CD auf dem Vorsatzblatt dieses Dokuments bereitgestellt. Die CD kann auch zusätzliche Produktdokumentation enthalten. Bitte lesen Sie diese Anweisungen vor der Verwendung dieses Produkts oder vor der Ausführung von Wartungsarbeiten am Produkt.

Le copie tradotte di questo documento sono fornite sul CD, sul retro di questo documento. Il CD potrebbe anche contenere altra documentazione sul prodotto. Si prega di leggere tutte le istruzioni prima di utilizzare questo prodotto o sottoporlo a manutenzione.

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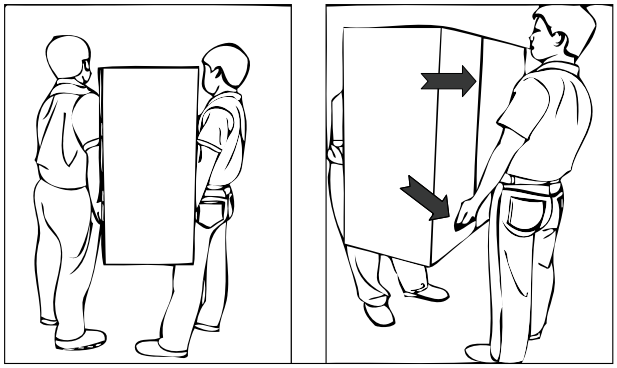
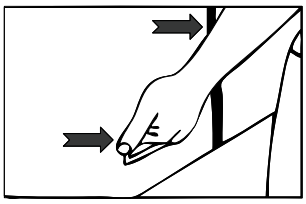
Content

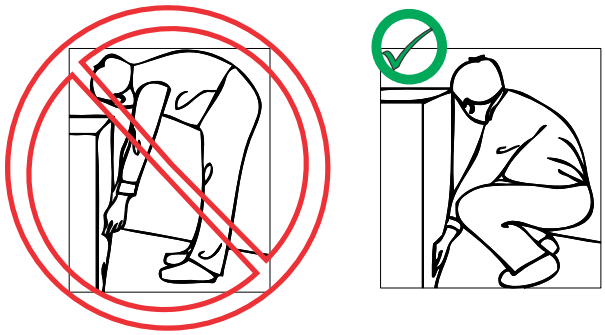
Package Handling

Danger! Failure to comply with the following results in death or serious injury.

- Do not drop the panel (even a short distance), or apply pressure to the sides of the bezel. The small size of the bezel, which enables minimal image-to-image gaps, means there is reduced protection of the LCD glass and components. Dropping the panel or applying unnecessary force to the sides of the bezel will result in permanent damage.
- To avoid serious injury and/or serious damage to the LCD panel, moving the panel requires at least two people. Hold the white handles on the shipping package when moving/ shipping.
- Extreme care must be taken when pushing the mounted display into its locked position. Always handle the display on the opposing corners of the frame to avoid direct contact with the LCD glass.







Notice. Failure to comply with the following may result in property damage.

- Due to the delicate nature of the display, we strongly recommend that you use the provided packing materials and secure the package onto a pallet during shipment.

Unpacking

Each LCD panel is packed inside a box carton. To protect the panel during transportation, additional packing material has been placed within the carton.

1. Before unpacking, prepare a stable, level and clean surface near a wall outlet for your LCD panel.
2. Set the box in an upright position and pull out the white carton locks.
3. Lift up the top cover carton.
4. Remove the ESD bag before removing the display from the bottom tray carton.

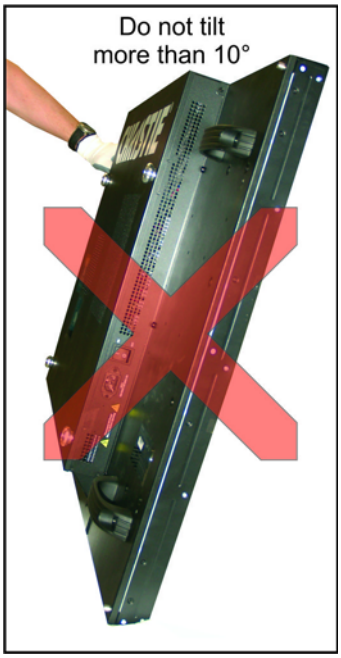
Handling and Care

Warning! Failure to comply with the following could result in death or serious injury.

- Make sure the power connector and any other cables are unplugged before moving the product. Failure to comply could result in minor or moderate injury.

To avoid damaging your LCD panel, follow these guidelines when handling or moving the panel:

- Always use the handles on the back of the LCD panel. Do not hold onto the frame when transporting.
- Two people are required when moving or raising the LCD panel. Use both hands, one positioned on the top handle and the other on the bottom handle.
- Hold and support the LCD panel at each side and keep at an even height above the ground.
- Do not twist or bend the panel.
- Use a cart to move several panels at one time.
- When the panel is sitting on a surface, do not tilt it more than 10° to avoid damaging the screen.



Cleaning

Notice. Failure to comply with the following may result in property damage.

- Unplug the power cord before cleaning the LCD panel. Do not use a liquid, spray cleaners, or any abrasive cleaners to clean the LCD panel. Failure to comply may result in equipment damage.

Use a cloth dampened with water or methyl alcohol to clean the screen surface. We recommend that you keep the protective plastic sheet shipped with the panel to replace it each time the panels are packed and shipped.

Introduction

About This Manual

This User Manual describes how to install, set up and operate the FHD462-X LCD Panel.

Target Audience

The manufacturer has prepared this manual to help end users get the most out of the display.

The manufacturer has made every effort to ensure that this manual is accurate as of the date it was printed. However, because of ongoing product improvements and customer feedback, it may require updating from time to time.

Textual and Graphic Conventions

Text Conventions

The following conventions are used in this manual, in order to clarify the information and instructions provided:

- Remote and built-in keypad button identifiers are set in upper-case bold type; for example, “Press **EXIT** to return to the previous menu.”
- Computer input (commands you type) and output (responses that appear on-screen) is shown in monospace (fixed-width) type; for example: “To change the aspect ratio to Letterbox, type `07 00 02 41 53 50 03 08` **<Enter>**.”
- All keys with functional names are initial-capped, set in bold type and enclosed in angle brackets. These keys are the following: **<Enter>**, **<Spacebar>**, **<Control>**, **<Esc>** and **<Tab>**.
- **<Enter>** indicates that you may press either the RETURN or ENTER key on your keyboard if it has both keys.

In addition to these conventions, underlining, boldface and/or italics are occasionally used to highlight important information, as in this example:

A carriage return **must** be used after each command or string.

Description, Features and Benefits

The FHD462-X LCD Panel is a cutting-edge direct-view LCD that, when tiled with multiple units, can create enormous images in multiple configurations. The display combines a simple and slim design with unparalleled image quality with configurable I/O to provide a perfect building block for large-format video walls, which are ideal in digital signage and control-room applications.

Key Features and Benefits

The display offers these key features and benefits:

- Full-HD Native Resolution: 1920 x 1080 (16:9 Native Aspect Ratio)
- High Brightness: Up to 500 nits
- 178-degree Viewing Angle
- DisplayPort 1.2a, HDMI 1.4 and DVI Inputs with High-bandwidth Digital Content Protection (HDCP)
- DisplayPort 1.2 input and output to support daisy-chaining 4 displays using Multi-Stream Transport (MST)*
- Allows 4K content on a 2x2 video wall for sources that support Multi-Stream Transport (MST)*
- Video Signal Looping
- Direct LED Backlight
- Video Wall Toolbox software [included] simplifies setting up a large video wall, with up to 100 displays, using a Windows PC
- Portrait- and Landscape-Mode Compatible

Parts List

Your display is shipped with the following items. If any items are missing or damaged, please contact your dealer.

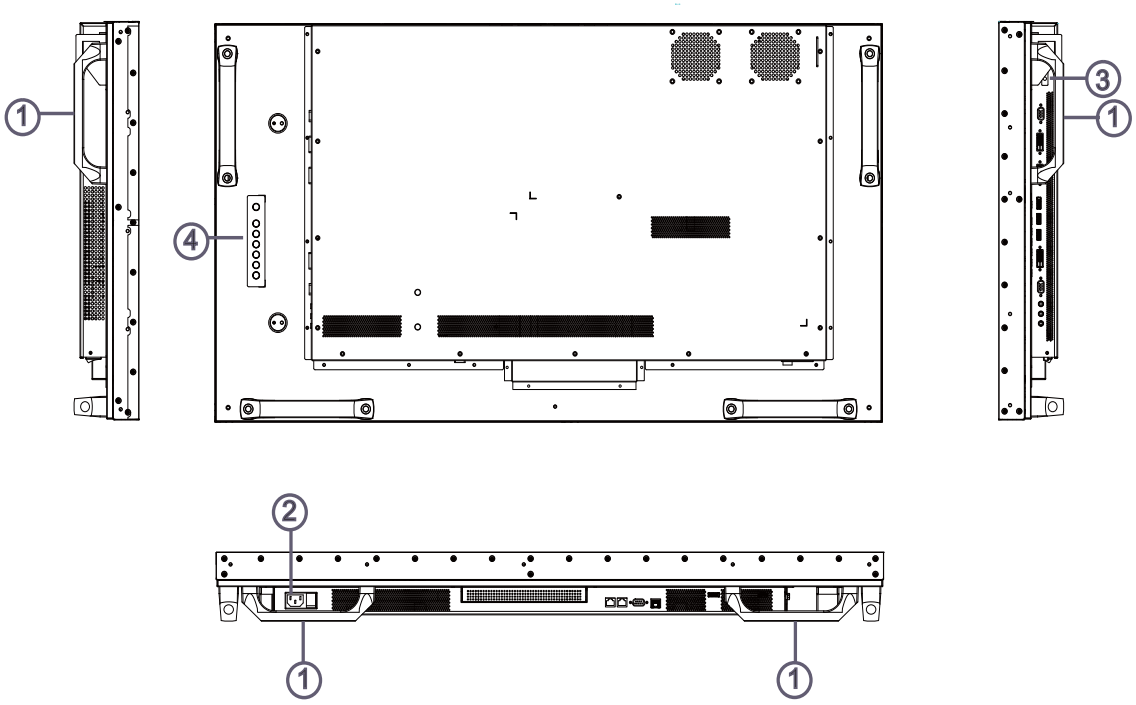
- FHD462-X LCD Panel
- Remote Control Unit and batteries
- AC Power cord
- DVI Cable
- RS232 Communications Cable
- RS485 Communications Cable
- IR Extender Cable
- Video Wall ToolBox Installation CD[1]

1. * Multi-Stream Transport (MST) requires using a video card that supports this feature and DisplayPort 1.2. Contact your dealer for more details on how to use MST.

Controls and Functions

Display at a Glance

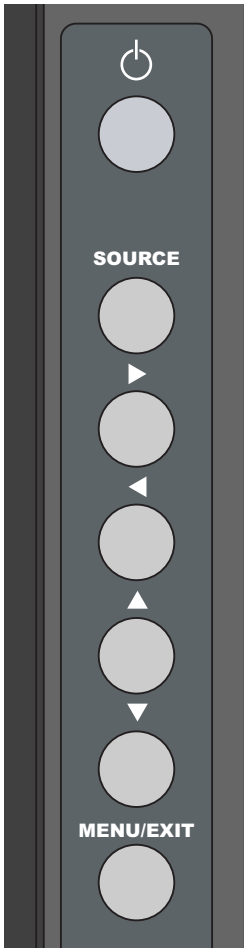
The illustration below shows the key display components, and the paragraphs that follow describe them.



1. **HANDLES**
   Always use the handles when carrying the display. DO NOT touch or hold the screen face.
2. **MAIN POWER SWITCH**
   Connects or disconnects the display panel from the AC power source.
3. **STATUS LED**
   Lights orange to indicate that the display is in standby mode; blinks orange if no input signal is present; off if the main power switch is set to off.

4. **KEYPAD**

You can use the keypad instead of the remote control unit to operate the on-screen display (OSD) controls. The keypad operates as follows:



On / Standby ( )

Press once to toggle from standby mode to on mode. Press it again to return to standby mode.

SOURCE

To select a source, press the **SOURCE** button repeatedly (with no menus visible on-screen).

▶

When a menu is visible on-screen, this button operates identically to the right-arrow (or **ENTER**) button on the display remote control unit.

◀

When a menu is visible on-screen, this button operates identically to the left-arrow button on the display remote control unit.

▲ / ▼

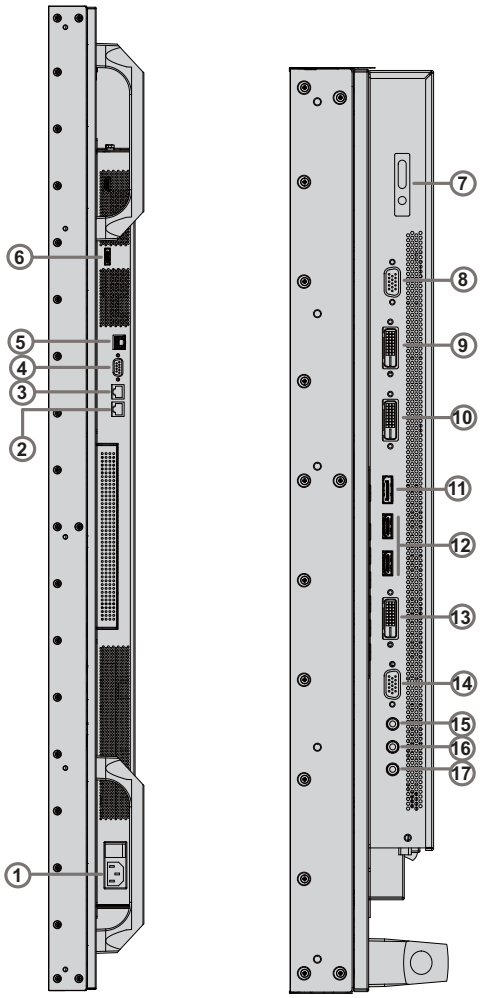
When a menu is visible on-screen, these buttons operate identically to the up- and down-arrow buttons on the display remote control unit.

MENU / EXIT

Press this button to access the on-screen display (OSD) controls, or to exit the current menu and return to the previous one.

Input Panel

The illustration below shows the display input panel.

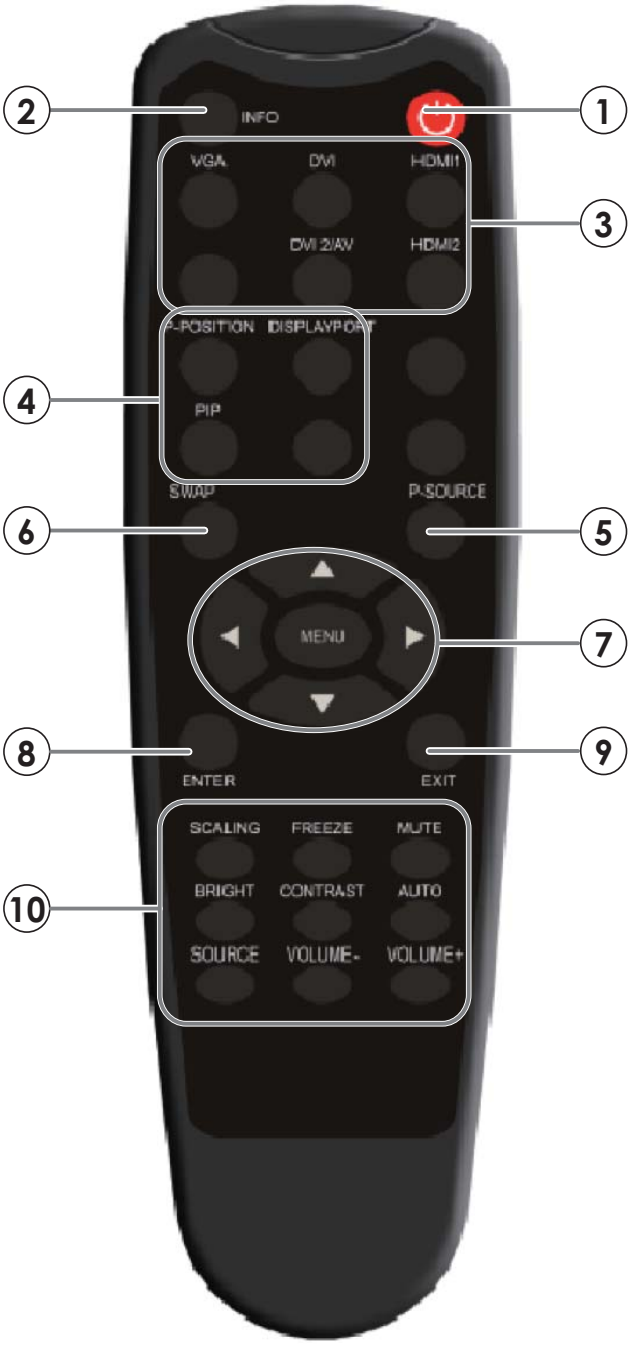


1. **Power Input (100 to 240 VAC)**
   Connect the display to power here.
2. **RS485 Out**
   A female, 8-pin RJ-45 connector that connects to the next display in a video wall.
3. **RS485 In**
   A female, 8-pin RJ-45 connector that connects to the next video source.
4. **RS232 In**
   A female, 9-pin D-sub connector for interfacing with a PC or home theater automation/control system.
5. **LAN**
   An RJ-45 connector for connecting to Ethernet via a Cat 5 cable.

6. **DisplayPort Out**
   DisplayPort 1.2 and HDCP-compliant digital video output for connecting the display to the next display in a video wall.
7. **IR Receiver**
   An IR sensor that sends information of an infrared remote control to another device by receiving and decoding signals.
8. **VGA Out (15-pin D-sub)**
   VESA-standard analog video output for connecting the display to the next display in a video wall.
9. **DVI 1 In (HDCP-compliant)**
   VESA-standard digital video input for connecting DVI sources.
10. **DVI 1 Out (HDCP-compliant)**
    VESA-standard digital video output for connecting the display to the next display in a video wall.
11. **DisplayPort In**
    DisplayPort 1.2 and HDCP-compliant digital video input for connecting DisplayPort sources.
12. **HDMI 1, 2**
    Two (2) HDCP-compliant digital video inputs for connecting HDMI or DVI sources.
13. **DVI 2 In (HDCP-compliant)**
    VESA-standard digital video input from a personal computer, or digital video from a DVD player or HD set-top box.
14. **VGA In (15-pin D-sub)**
    VESA-standard analog video input for connecting a personal computer or other analog video source.
15. **Audio In**
    For connecting an external audio device, such as a player, audio mixer or microphone.
16. **IR Extender**
    Connect the IR Extender cable provided with the display to this input.
17. **Audio Out**
    For connecting external, powered speakers or an external audio receiver/amplifier.

Remote Control Unit

The illustration below shows the display remote control, and the table that follows describes its functionality.



	Label	Description
1	⏻	Turns the monitor on and off
2	INFO	Provides source and resolution information
3	VGA	Selects the VGA source
	DVI	Selects the DVI source 1
	HDMI1	Selects the HDMI source 1
	DVI-2/AV	Selects the DVI source 2
	HDMI2	Selects the HDMI source 2
4	P-POSITION	Selects the PIP position
	DISPLAYPORT	Select the DisplayPort source
	PIP	Turns the PIP feature on and off
5	P-SOURCE	Selects the secondary sub-source
6	SWAP	Swaps the main and PIP source
7	MENU	Opens the monitor's on-screen menu system. When the menu system is already open, pressing this button will select the previous submenu
	▶, ◀, ▲, ▼	Navigates through submenus and settings
8	ENTER	Selects highlighted menu choices
9	EXIT	Closes the menu system
10	SCALING	Selects each aspect ratio, in sequence: Full Screen, Native, Letter Box and Pillar Box
	FREEZE	Freezes the current source image
	MUTE	Turns off the sound
	BRIGHT	Adjusts the brightness
	CONTRAST	Adjusts the contrast
	AUTO	Auto adjustment of VGA source
	SOURCE	Selects each source, in sequence
	VOLUME-	Decreases the sound volume
	VOLUME+	Increases the sound volume

Installation

Notice. Failure to comply with the following may result in property damage.

- Installation **must** be performed by a qualified custom video installation specialist.

Remote Control

To install batteries in the remote control:

1. Press down the tab on the cover and pull the cover up.
2. Insert the included batteries. Ensure that the polarities correctly match the ⊕ and ⊖ markings inside the battery compartment.
3. Insert the lower tab of the cover into the opening, and press down the cover until it clicks in place.

Notes on Batteries

- Make sure that the battery polarities are correct when installing the batteries.
- Do not mix an old battery with a new one or different types of batteries.
- If you will not use the remote control for a long time, remove the batteries to avoid damage from battery leakage.
- Do not expose batteries to excessive heat such as from sunshine, fire or the like.

Notes on Remote Control Operation

- Make sure that there is nothing obstructing the infrared beam between the remote control and the IR receiver on the display.
- If the effective range of the remote control decreases, or it stops working, replace the batteries with new ones.
- The remote control may fail to operate if the infrared remote sensor is exposed to bright sunlight or fluorescent lighting.
- Ambient conditions may possibly impede the operation of the remote control. If this happens, point the remote control at the display, and repeat the operation.

Locking and Unlocking the Remote Control

You can lock the remote control buttons to prevent unauthorized persons from changing settings on the display. To do this, press **ENTER**, **ENTER**, **EXIT**, **EXIT**, **ENTER** and **EXIT**, in sequence. To unlock a locked remote control unit, use the same sequence of button presses.

Quick Setup

Here is a quick overview of the display installation process. The sections following this one provide detailed instructions.

Step	Procedure	For Details, Refer to page...
1	Mount the display(s) on a wall (optional)	22
2	Connect other external equipment to the display (optional): • Automation/control system (RS232 or Ethernet) • IR extender	 23 23
3	Connect signal sources to the display	25
4	For video wall installations, connect video cables and control cables to each display in a series (optional)	
5	Apply power to the display	28
6	Change the OSD language (optional)	30
7	Display calibration: adjust the following ***for each input***: • Aspect ratio • Brightness • Contrast • Color temperature and white balance • Color level • Tint • Input position	34

Installation Considerations

Proper installation of your display will ensure a satisfying viewing experience. Whether you are installing a display temporarily or permanently, you should take the following into account to ensure your display performs optimally.

Handling Guidelines

Narrow bezel displays such as the FHD462-X are inherently very fragile devices. To avoid damaging your LCD panel, follow these guidelines when handling or moving the panel. Please note that damage due to improper handling is not covered under warranty.

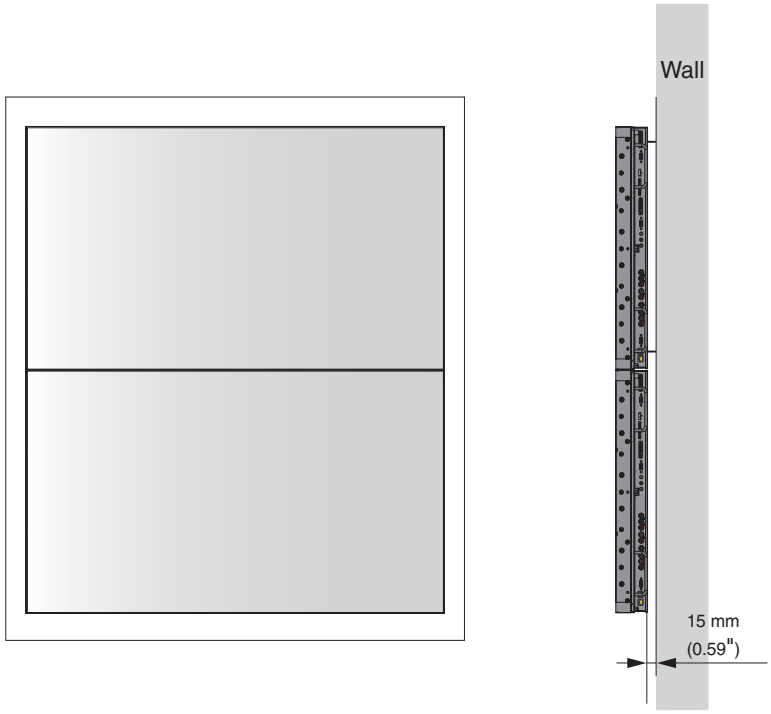
- Always use the handles on the back of the LCD panel. Do not hold the display by its edges (outer bezel).
- Two people are required when moving or raising the LCD panel. Use both hands, one positioned on the top handle and the other on the bottom handle.
- Do not twist or bend the panel.
- Hold and support the LCD panel at each side and keep at an even height above the ground.
- Use a cart to move multiple panels at one time.
- When the panel is sitting on a surface, do not tilt it more than 10° to avoid damaging the screen.

Ambient Heat

Keep the ambient temperature constant and below 40°C (104°F). Keep the display away from heating and/or air conditioning vents.

Ventilation

If you are mounting the display in an enclosure, leave sufficient space on all sides between it and surrounding objects, as shown below. This allows heat to disperse, maintaining the proper operating temperature. For very thin installations, to mount the display close to a wall it may be necessary to remove the handles prior to installation.



Mounting the Display

You can mount the display on a wall.

If you do decide to wall-mount the display, ensure that the wall-mount bracket is installed according to the instructions included with it. The wall must be capable of supporting a redundant weight factor three (3) times the weight of the display, or be reinforced.

We recommend that this be done by a custom installation specialist.

Notice. Failure to comply with the following may result in property damage.

- Use only the approved wall-mount kit designed for your display.

Connections to the Display

Proceed as follows to connect the display to your video sources, external controller(s) – if present – and AC power.

When connecting your equipment:

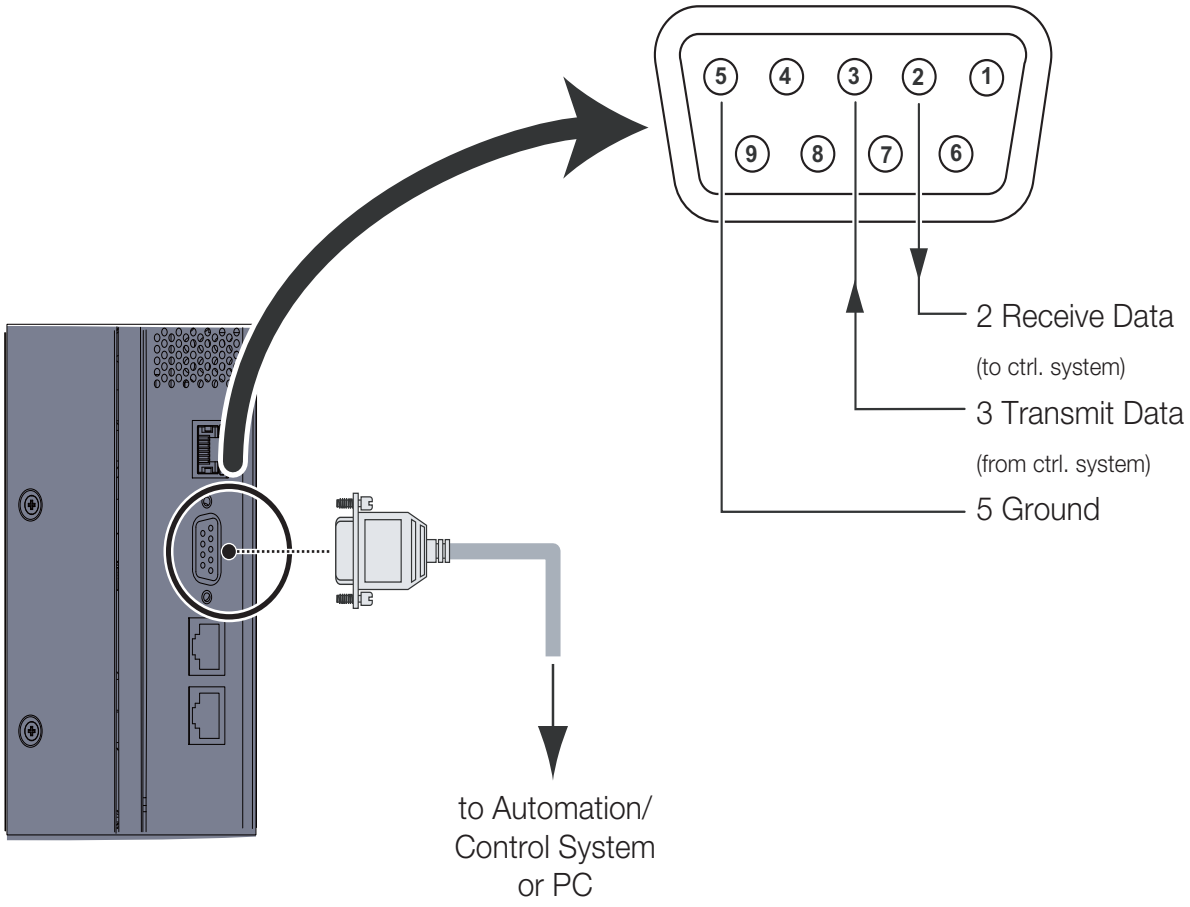
- Turn off all equipment before making any connections.
- Use the correct signal cables for each source.
- For best performance and to minimize cable clutter, use high-quality cables that are only as long as necessary to connect two devices. (Don’t use a 20-foot cable when a 6-foot cable will suffice.)
- Ensure that the cables are securely connected. Tighten the thumbscrews on connectors that have them.

Connecting a Control System or PC

RS232 Connection

Use a straight-through RS232 cable with a 9-pin male connector to connect a PC or control/ automation system (if present) to the RS232 port on the display.

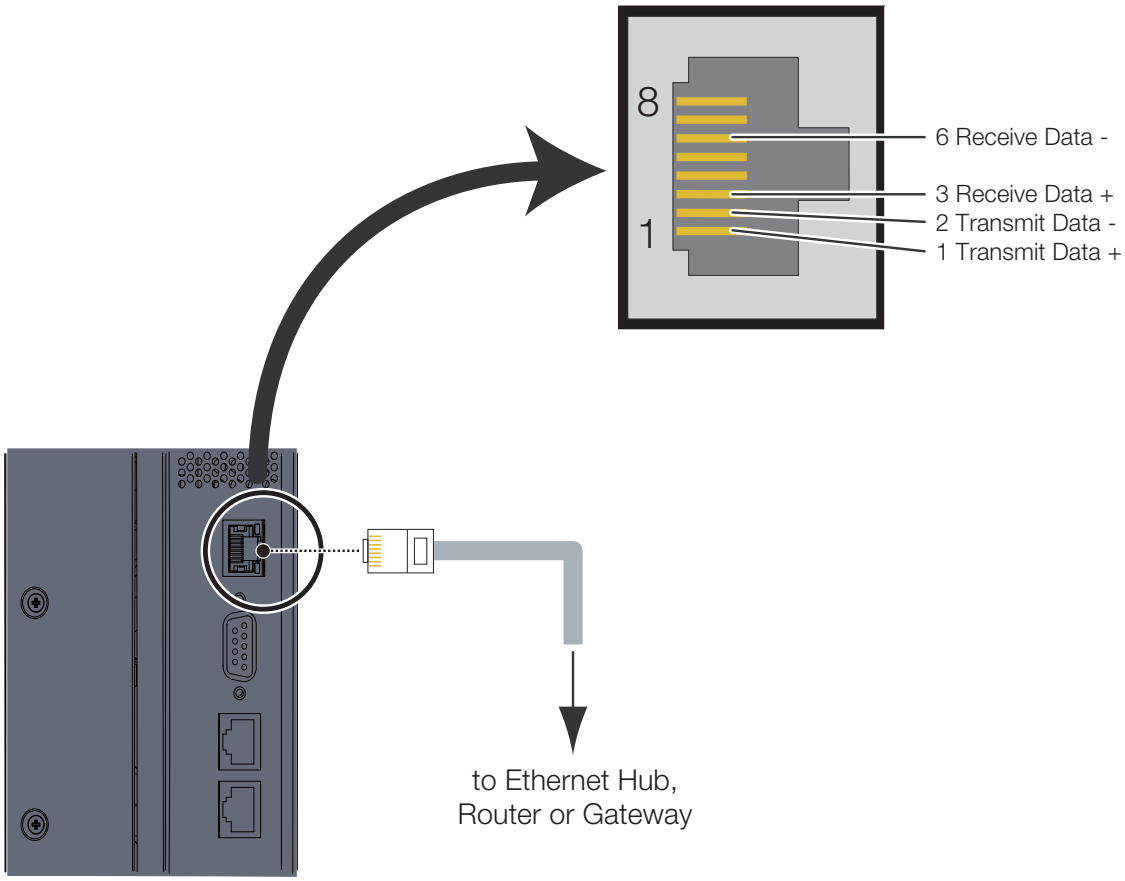
For more information about using this connection, refer to *External Control* on page 52.



Ethernet Connection

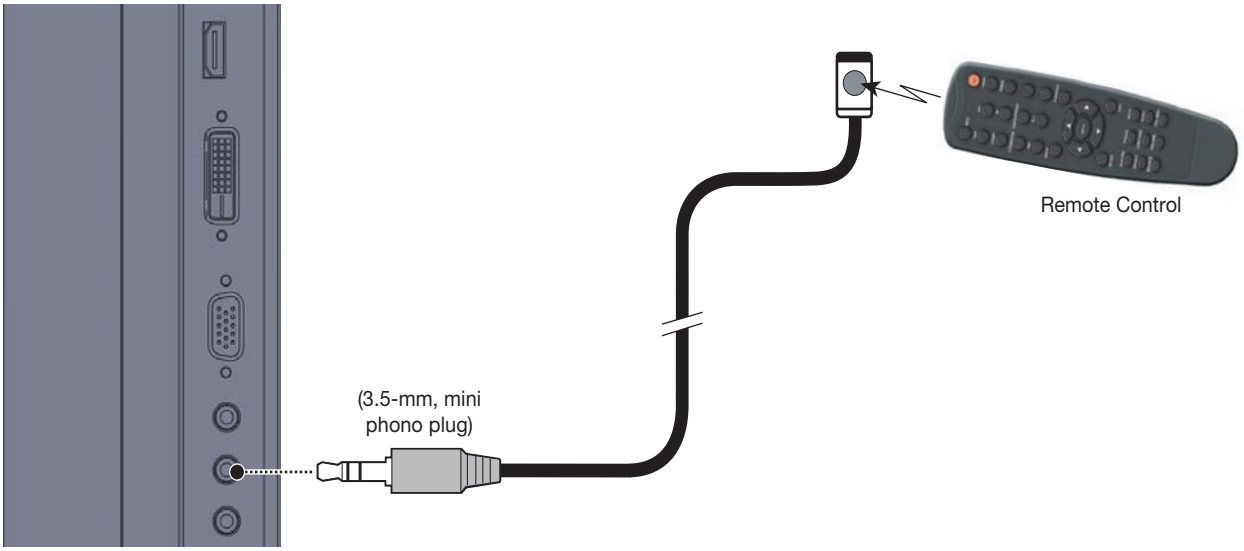
Use a standard Ethernet cable with an RJ45 male connector to connect a PC or control/automation system (if present) to the Ethernet port on the display.

For more information about using this connection, refer to *External Control* on page 52



IR Extender Connection

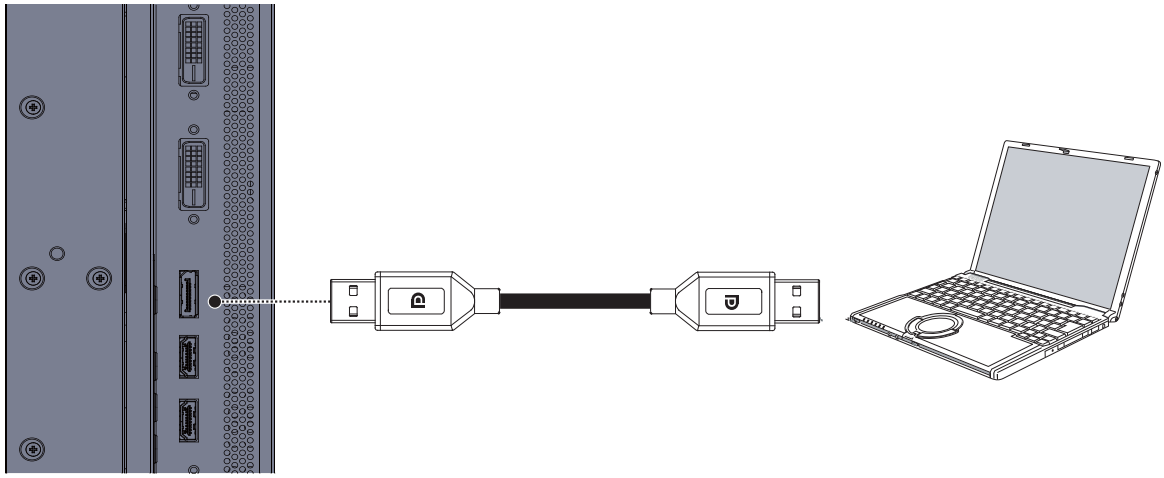
Connect the provided IR extender cable to the IR Extender input as shown below.



Connecting Source Components to the Display

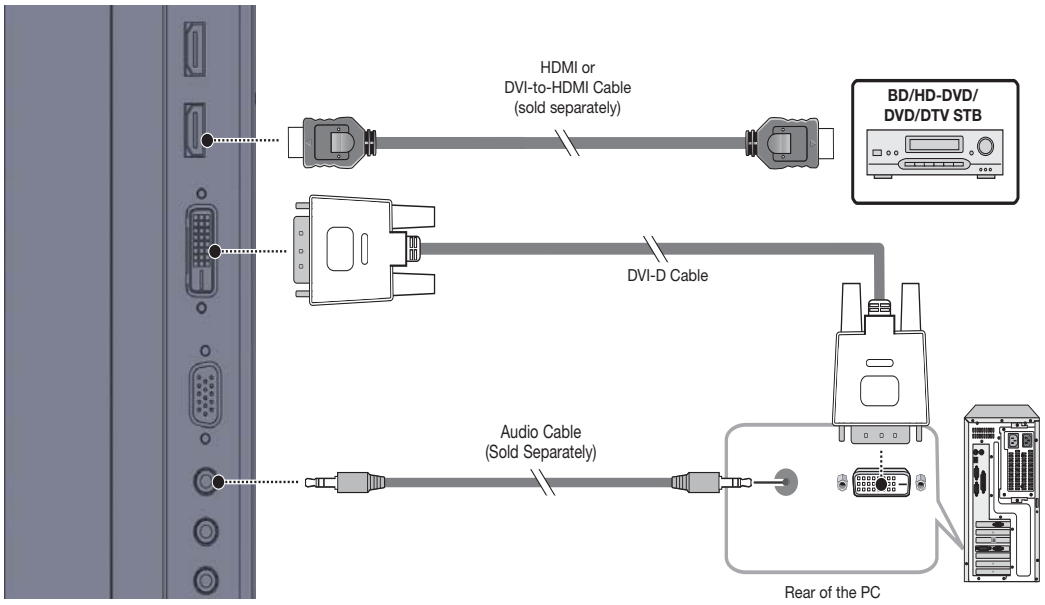
Connect your video sources to the display as shown and described in the sections that follow.

DisplayPort Source Connection



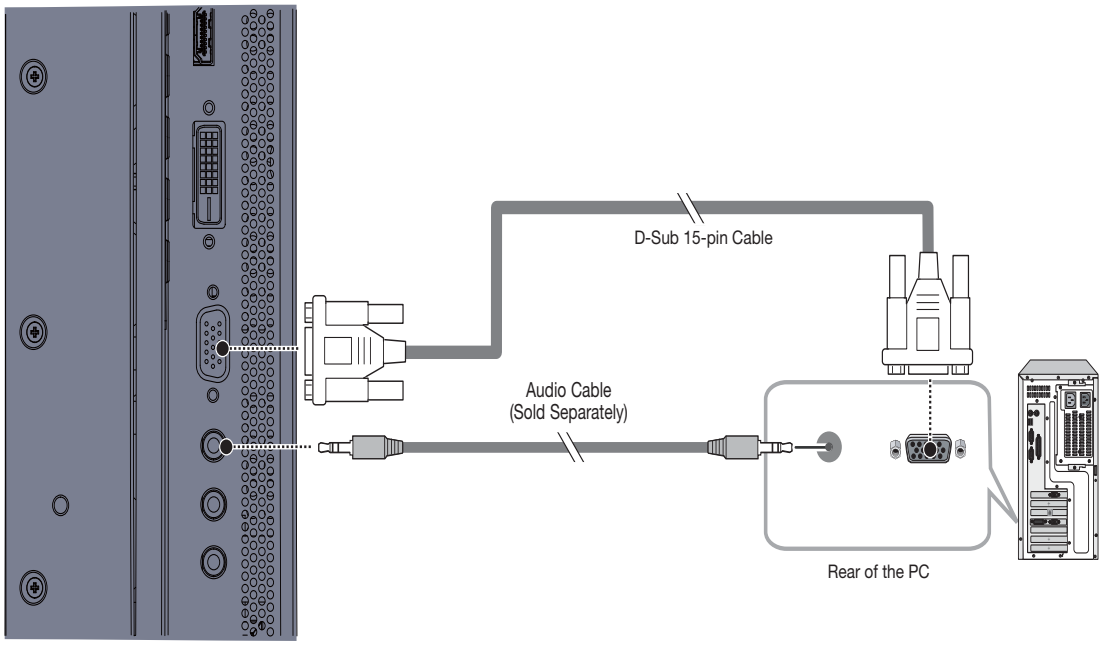
Note: DisplayPort 1.2 input and output support daisy-chaining 4 displays using Multi-Stream Transport (MST).

HDMI and DVI-D Source Connections



VGA Source Connection

Connect a personal computer or other RGB source to the VGA input as shown below. Refer to *Supported Timings* on page 70 for a list of compatible input signals.

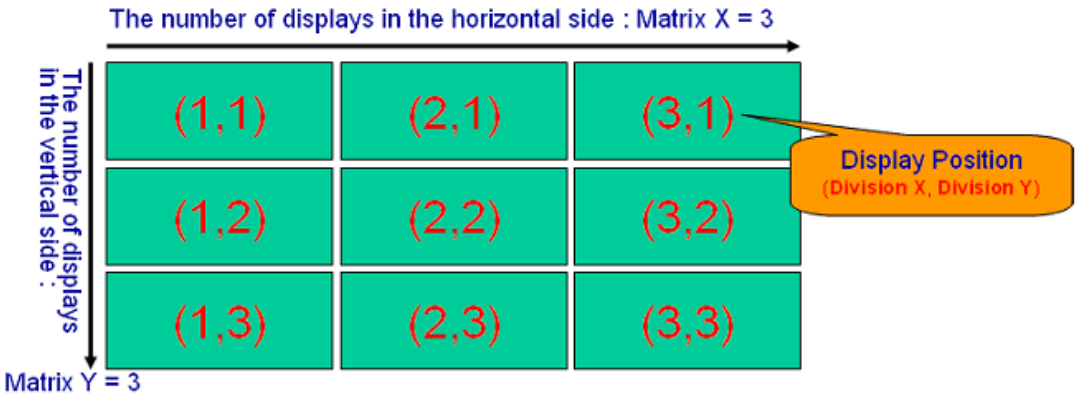


Setting Up a Video Wall

The maximum supported video wall size depends on the type of video source, as follows:

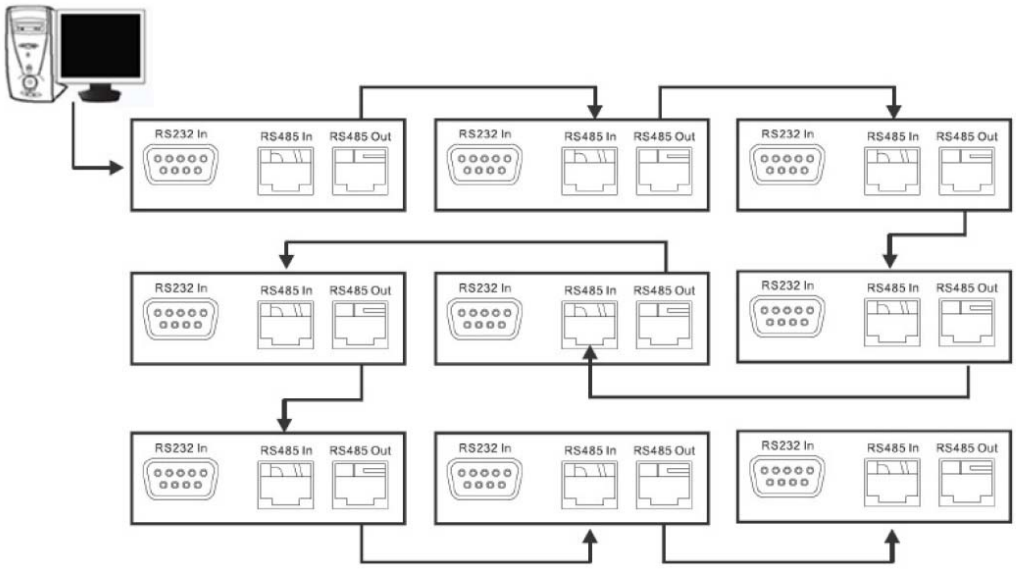
- Maximum video wall size using a single digital source and DisplayPort pass through connectors: 4x4
- Maximum video wall size using a single digital source and DVI pass through connectors: 2x3
- Maximum video wall size using a single analog source and VGA pass through connectors: 2x2
- Maximum video wall size using multiple source signals from an external splitter or distribution amplifier: 10x10
- Maximum video wall size using Multi-Stream Transport (MST) and DisplayPort pass through connectors: 2x2

The example below shows a 3x3 matrix (9 displays):



RS232 Routing

The external controller should be connected via RS232 or Ethernet to the upper leftmost display, as shown in the illustration below. The remaining monitors should be connected via their RS485 connectors in the sequence shown below, using the RJ45 cables provided.



Operation

Turning on the Power

1. Turn on your source components.
2. Plug the female end of the supplied power cord into the AC receptacle on the side of the display (AC 100V ~ 240V).
3. Connect the other end to your AC power source.
4. Turn on the main power switch at the side of the display. The power indicator lights orange to indicate that the display is in “standby” mode.
5. Press the power button ( ) on the remote control to turn on the display (or press the power button ( ) on the keypad). After a brief warm-up period, the display will display an image.

Changing the OSD Language

The display OSD language is initially set to English, but can also display the menus in Simplified Chinese, French, German, Italian, Portuguese, Russian, Spanish, Korean or Japanese. To change the OSD language:

1. Press **MENU**.
2. Select Basic Settings from the Main Menu.
3. Select **OSD Language** from the Basic Settings Menu.
4. Press ◀ or ▶ to select the desired language and press **ENTER**. The change takes effect immediately.

Avoiding Image Retention

- Do not display static (non-moving) content on the display for long periods of time. This may cause image “burn-in” or image retention, which is not covered under warranty.

Follow the recommendations below to prolong the life of the display.

Operate the Display Within Its Rated Ambient Environment

- Operating temperature: 5°C to 40°C (41°F to 104°F)
- Relative humidity: 75%, maximum.

Avoid Static Content

- Display dynamic (moving) images whenever possible
- Consider using a screen saver to avoid displaying static (fixed) video content continuously.
- Turn off the display when not in use, or use the Real Time Clock feature (refer to *Real Time Clock* on page 41) to automatically turn off the display at preset times of the day.

Set IRFM to ON

To help prevent image retention, set IRFM (refer to *Advanced Settings* on page 42) to **On**.

Using the On-Screen Menus

To display the on-screen menus, press **MENU** on the remote control or built-in keypad.

To select a sub-menu, use the ▲ and ▼ buttons to highlight it. Then, press ▶ to enter that sub-menu.

To select a menu item, use the ▲ and ▼ buttons to highlight it. Then, press ◀ or ▶ to adjust that setting and press **ENTER**.

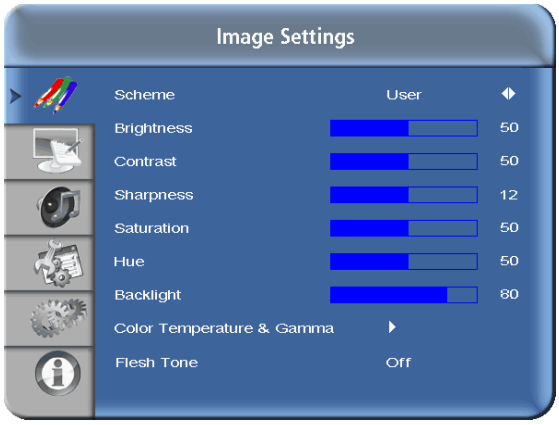
The OSD menus are arranged hierarchically, as shown here and on the next page. Depending on the selected input source and signal characteristics, some menu options may not be available.

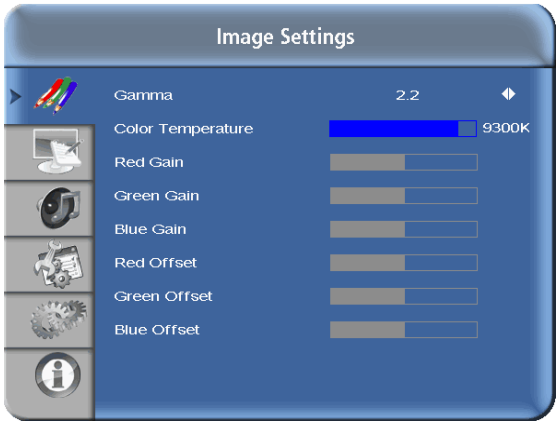
Image Settings	Scheme (Video mode)	**User**, Vivid, Cinema, Game or Sport	
	Brightness	0, 1, 2 ... **50** ... 99, 100	
	Contrast		
	Sharpness	0, 1, 2 ... **12** ... 24	
	Saturation (Video mode)	0, 1, 2 ... **50** ... 99, 100	
	Hue (Video mode)		
	Backlight	0, 1, 2 ... **60** ... 99, 100	
	Color Temperature & Gamma	Gamma	Off or **2.2**
		Color Temperature	3200K, 3300K, ...**9300K** ... 9600 or User
		Red / Green / Blue Gain	128, 129, 130 .. **256** ... 382, 383
		Red / Green / Blue Offset	-50, -49, -48 ... **0** ... 48, 49, 50
	Flesh Tone (Video mode)		Off, High, Medium, Low
Display Settings	Main	Aspect Ratio	**Full Screen**, 4:3, Letterbox, Pillarbox or Native
		Zoom	▶◀
		Auto Scan	**On** or Off
		Select Source	**VGA**, HDMI1, HDMI2, DVI, DisplayPort, DVI2
	PIP	PIP Mode	**Off**, Large PIP, Medium PIP, Small PIP or Side-by-Side
		PIP Position	**Bottom Right**, Top Left, Top Right or Bottom Left
		Aspect Ratio	**Full Screen**, 4:3, Letterbox or Pillarbox
		Side-by-Side Scale	▶: PIP ◀: Main ▲: Zoom In ▼: Zoom Out Enter: Default Menu: Return
		Auto Scan	**On** or Off
		Select Source	VGA, HDMI1, HDMI2, DVI, DisplayPort, DVI2
Audio Settings	Volume	0, 1, 2 ... **50** ... 99, 100	
	Bass	-6, 1, 2 ... **0** ... 6	
	Treble		
	Balance		
	HDMI Audio Input	**HDMI** or PC Audio	
	DP Audio Input	**DisplayPort** or PC Audio	
Basic Settings	OSD Transparent	**0**, 1, 2 ... 99, 100	
	OSD Location	Up, Down, Left, Right	
	OSD Zoom	**Off** or On	
	OSD Rotation	**Landscape** or Portrait	
	OSD Language	**English**, 简体中文 (Simplified Chinese), Français, Deutsch, Italiano, Português, Русский (Russian), Español, 한국어 (Korean) or 日本語 (Japanese)	
	OSD Timeout	5, 6, 7 ... **30** ... 119, 120 seconds	
	Power LED	**On** or Off	
	Real Time Clock	Current Date and Time	Year/Month/Day; Hour:Minutes,Weekday
		Timer Mode	User, Same Settings on All or Same Settings on Work Days (Monday ... Friday)

Advanced Settings	Auto Adjustment	**Off** or On	
	Image Position (VGA mode)	Up, Down, Left, Right	
	Phase (VGA mode)	0, 1, 2 … 63	
	Clocks (VGA mode)	0, 1, 2 … 100	
	VGA ADC Settings	User ADC Calibration (Yes or No), Restore ADC to Default (Yes or No)	
	IRFM	**Off** or Standard or Video Wall	
	Baud Rate	**115200**, 38400, 19200 or 9600	
	Smart Light Control	Off, DCR, or Light Sensor	
	Wake Up from Sleep	**VGA Only**, VGA, Digital, RS232 or Never Sleep	
	Temperature & Fan Status	Temperature (°C, °F)	
		Fan 1 Speed / Fan 2 Speed	
	Ethernet Setup	Enable Network	Yes or No
		Dynamic IP	Disable or Enable
		Static IP Address	0.0.0.0 ~ 255.255.255.255
		Subnet Mask	0.0.0.0 ~ 255.255.255.255
		Gateway	0.0.0.0 ~ 255.255.255.255
		DNS Address	0.0.0.0 ~ 255.255.255.255
		Save Network Settings	Yes or No
		Email Alert	
		Load Default Settings	Yes or No
		Refresh	
		Device MAC	
	Multi Display Control	Monitor ID	1, 2,3 … 24, 25… 100
		Video Wall	Yes or **No**
		DVI Amplification	On or **Off**
		Power On Delay	**0**, 0.05, 0.10, 0.15, 0.20 … 29.90, 29.95 or 30 sec.
		Frame	**Yes** or No
		Fast Motion	**Yes** or No
		Matrix X	1~10
		Matrix Y	1~10
		Division X	1~Matrix X
		Division Y	1~Matrix Y
		IR Mode	Off or Target or All
		Recipient ID	1~100
		Auto Video Wall Setup	Bottom-Left or Top-Left
	Factory Reset	Yes or **No**	
System Status	Channel Information	Source	
		Resolution	
		Serial Number	
		Total Hours	
		Firmware Version	

Note: Default settings appear in **bold type**.

Image Settings





Use the controls in the Image Settings Menu to calibrate each display input to achieve optimum picture quality.

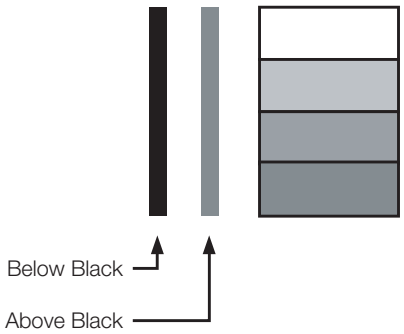
Connect your test pattern source to the input that you are calibrating and proceed as follows. **Perform the adjustments in the order listed here.**

Scheme

Select Scheme from the Image Settings menu, then press ◀ or ▶ to select one of four image quality presets (Vivid, Cinema, Game or Sport) depending on the type of program material you are viewing. These presets automatically adjust the other image settings for optimal image quality. Or, select **User** to adjust Brightness, Contrast and other settings manually.

Brightness

On your external test pattern source, select a PLUGE pattern. (PLUGE is an acronym for “Picture Line-Up Generation Equipment.”)



PLUGE patterns vary but generally consist of some combination of black, white and gray areas against a black background. The example above includes two vertical bars and four shaded boxes.

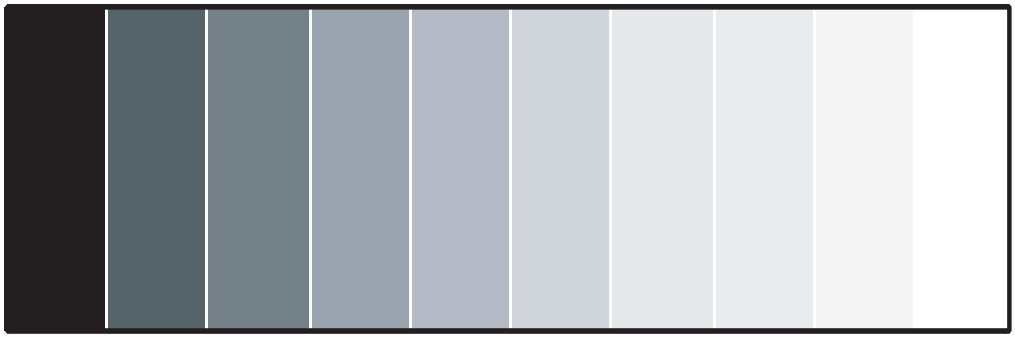
Select Brightness from the Image Settings menu and press ◀ or ▶ to adjust the brightness so that:

- The darkest black bars disappear into the background.
- The dark gray areas are barely visible.
- The lighter gray areas are clearly visible.

- The white areas are a comfortable level of true white.
- The image contains only black, gray and white (no color).

Contrast

On your external test pattern source, select a stepped, gray-bar pattern like the one shown below.

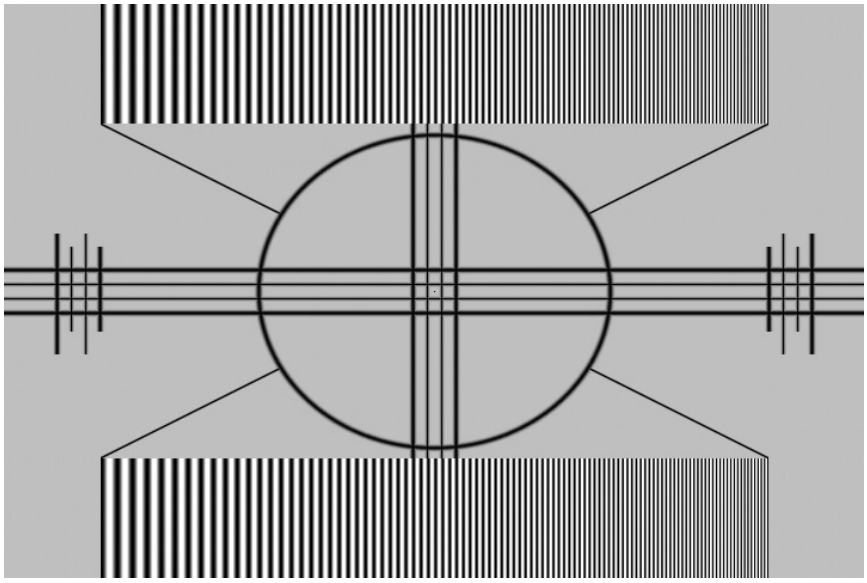


Select Contrast and press ◀ or ▶ to adjust the contrast to a point just below which the white rectangle starts to increase in size.

Brightness and contrast controls are interactive. A change to one may require a subtle change to the other in order to achieve the optimum setting.

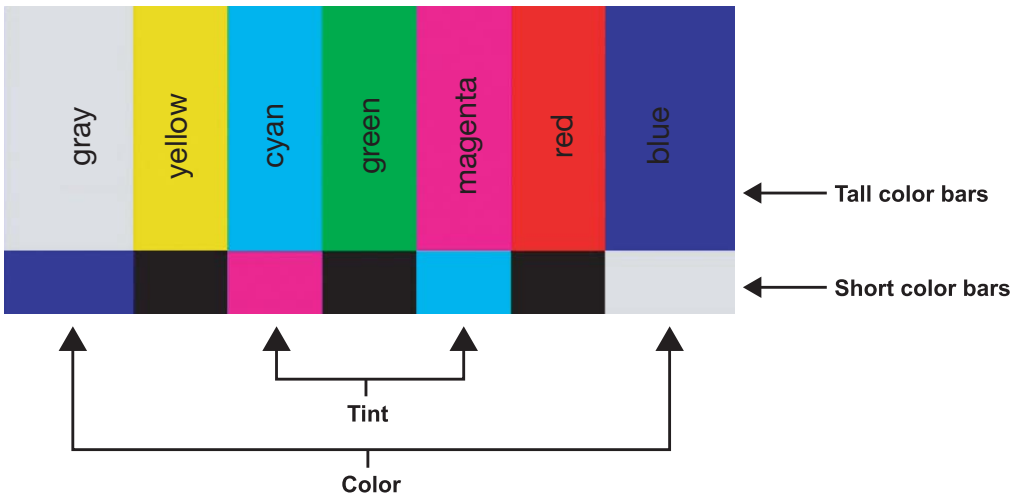
Sharpness

“Sharpness” is the amount of high-frequency detail in the image. To adjust sharpness, select Sharpness from the Image Settings menu. On your external test pattern source, select a pattern like the one shown below. Adjust as needed, looking for white edges around the transitions from black to gray and differently-sized lines in the “sweep” patterns at the top and bottom. Lower the sharpness setting to eliminate them.

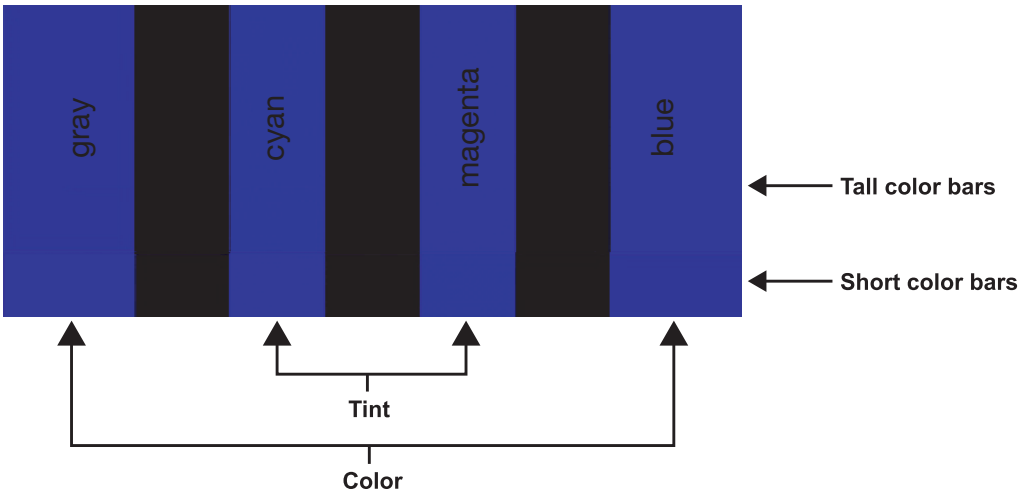


Saturation

On your external test pattern source, select a color bar pattern like the one shown here.



1. Press **MENU** on the remote control or keypad.
2. Select Saturation (Video mode) from the Image Settings menu.
3. While looking at the color bar pattern through a blue filter, adjust the color saturation level until the outermost (gray and blue) color bars appear to be a single shade of blue:



Hue

"Hue" (or "tint") is essentially the ratio of red to green in the color portion of the image. When hue is decreased, the image appears redder; when it is increased the image appears greener.

To adjust the hue, use a blue filter when viewing the color bar pattern, as you would for adjusting color saturation (refer to the previous section, *Saturation* on page 36).

Select Hue from the Image Settings menu and press ◀ or ▶ to adjust it until the cyan and magenta color bars (on either side of the green bar) appear to be a single shade of blue.

Like the brightness and contrast controls, the color and tint controls are interactive. A change to one may require a subtle change to the other in order to achieve the optimum setting.

Backlight

The Backlight control changes the apparent brightness of the displayed image. Its effect is similar to that of a lamp intensity control on a projector.

Gamma

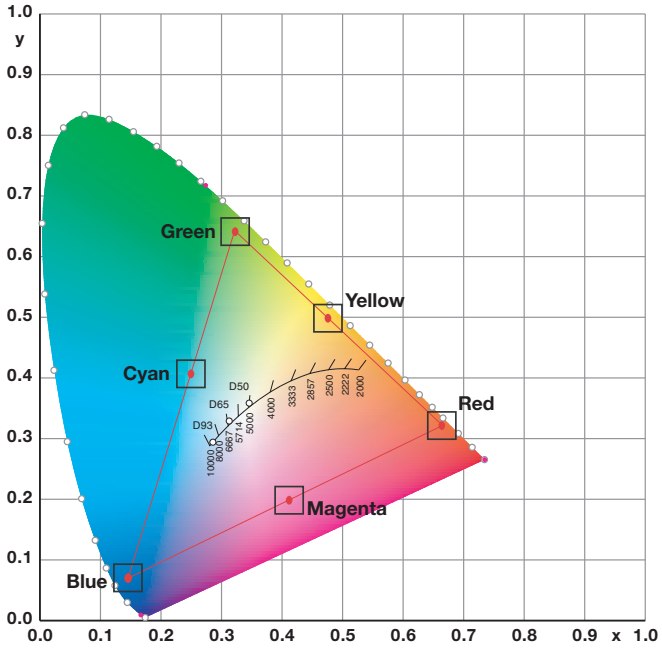
Select Gamma from the Image Settings menu and choose either **2.2** (default) or **Off**.

Color Temperature

Select Color Temperature from the Image Settings menu to adjust the color temperature. Color temperature establishes the “color of gray” by adjusting the 75% white point to various color points.

What are “color points?”

A “color point” is an x/y coordinate pair that defines a color’s location on the standard CIE chromaticity graph, shown below. (CIE stands for “Commission Internationale de l’Éclairage” (International Commission on Illumination), the organization responsible for color measurement and management standards.)



Select a value of from 3200K to 9600K. Higher settings produce a “bluer” picture; lower ones impart a reddish hue to the image. To select a custom color temperature, select User and set the Gain and Offset as described below.

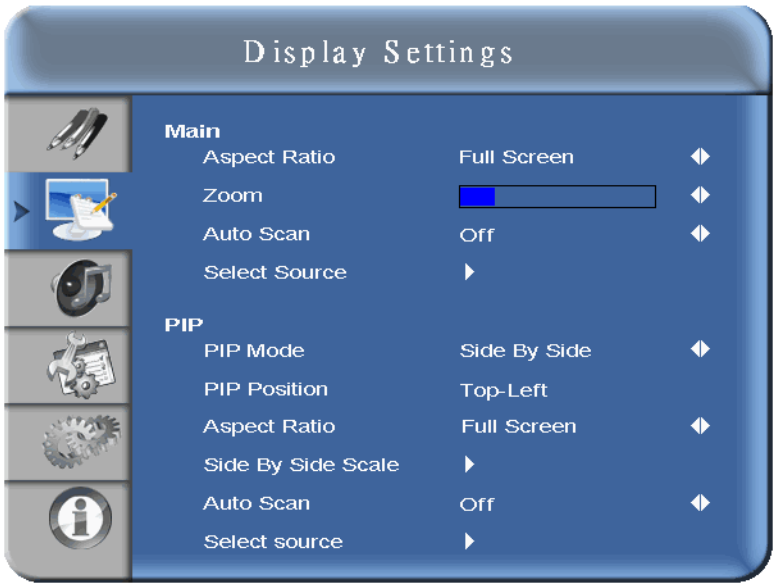
Gain

Use the Gain controls to correct color imbalances in the bright areas of the image. A good way to do this is to use a test pattern consisting mostly of solid white areas, such as an 80 IRE “window” pattern. If the white areas contain traces of red, green or blue, decrease the Gain for that color.

Offset

Use the Offset controls to correct color imbalances in the dark areas of the image. A good way to do this is to use a test pattern consisting mostly of dark gray areas, such as a 30 IRE “window” pattern. If the gray areas contain traces of red, green or blue, decrease the Offset for that color.

Display Settings



Aspect Ratio

To change the aspect ratio (size and shape) of the displayed image, select Aspect Ratio from the Display Settings menu and press **ENTER**. Select the appropriate aspect ratio for the type of program material being viewed.

Note that some aspect ratios are unavailable and/or not useful with certain types of source material. The optimal setting depends on a number of factors, such as:

- The aspect ratio of the source material, as broadcast or encoded on the playback medium.
- The “display type” (16:9 or 4:3) and output resolution settings at the source component. Most modern DVD/BD players and set-top boxes have such controls.
- Viewer preference (original aspect ratio with “black bars,” or a full-screen presentation with some distortion or cropping).

Zoom

Choose Zoom from the Display Settings menu and press ◀ or ▶ to choose one of 10 zoom levels.

Auto Scan

Select Auto Scan from the Display Settings menu and press ◀ or ▶ to turn this feature on or off. When set to **On**, Auto Scan causes the Main or PIP input select functions (using the **SOURCE** button on the remote control unit or keypad, or the **P-Source** button on the remote control unit) to skip over unused inputs, saving time.

Select Source

Choose Select Source from the Display Settings menu and press ◀ or ▶ to select the video source.

PIP Mode

Choose PIP Mode from the Display Settings menu and press ◀ or ▶ to enable Picture-in-Picture mode and set the size of the PIP window.

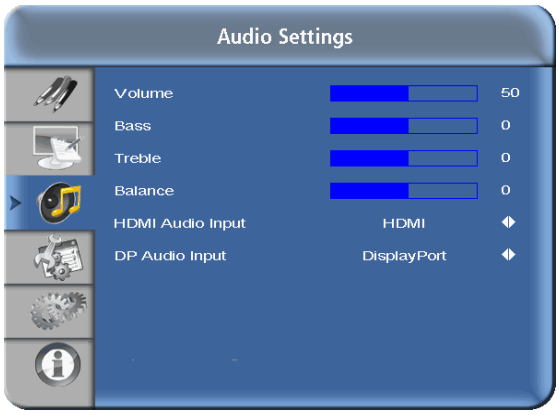
PIP Position

Choose PIP Mode from the Display Settings menu and press ◀ or ▶ to set the location of the PIP menu.

Side By Side Scale

Choose Side By Side Scale from the Display Settings menu and press ◀ or ▶ to select PIP, Main, Zoom In or Zoom Out.

Audio Settings



Volume

Select Volume from the Audio Settings menu and press ◀ or ▶ to change the audio volume.

Bass

Select Bass from the Audio Settings menu and press ◀ or ▶ to cut or boost the low audio frequencies.

Treble

Select Treble from the Audio Settings menu and press ◀ or ▶ to cut or boost the high audio frequencies.

Balance

To adjust the left/right speaker balance, select Balance from the Audio Settings menu and press ◀ or ▶ to make one channel louder than the other.

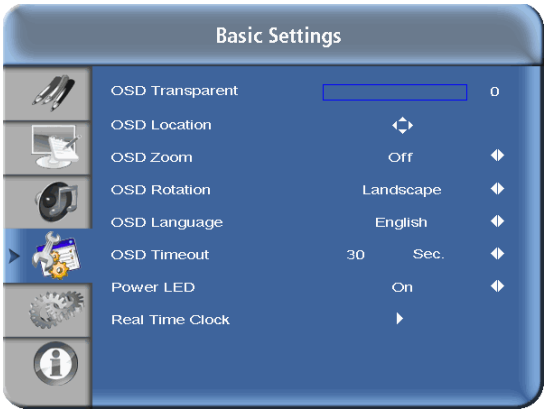
HDMI Audio Input

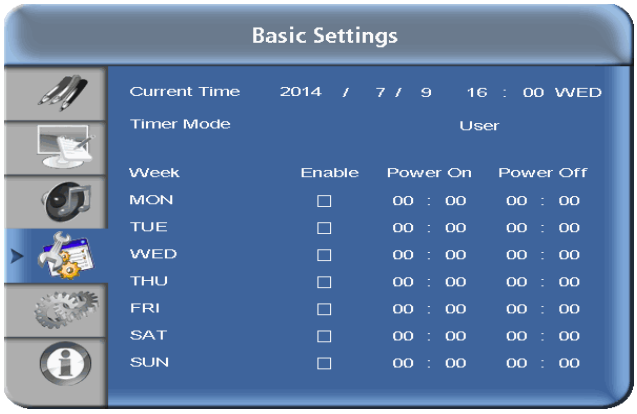
If you are using one of the HDMI inputs with a PC or other device that does not support audio output via HDMI, set HDMI Audio Input to **PC** for that input. (Also connect the audio output from your source.) This setting associates the **PC Audio In** input with that HDMI input.

DP Audio Input

If you are using the DisplayPort input with a PC or other device that does not support audio output via DisplayPort, set DP Audio Input to **PC** for that input. (Also connect the audio output from your source.) This setting associates the **PC Audio In** input with the DisplayPort input.

Basic Settings





OSD Transparent

Select OSD Transparent from the Basic Settings menu and press ◀ or ▶ to adjust the degree of translucence (show-through) in the menus and message boxes. Zero (0) means that the menus are opaque.

OSD Location

Select OSD Location from the Basic Settings menu and press ◀ or ▶ to move the OSD menu to the desired location.

OSD Zoom

Select OSD Zoom from the Basic Settings menu and press ◀ or ▶ to choose either a normal-sized or enlarged OSD menu.

OSD Rotation

Select OSD Rotation from the Basic Settings menu and press ◀ or ▶ to change the orientation of the OSD menu to match that of the display.

OSD Language

Select OSD Language from the Basic Settings menu and press ◀ or ▶ to select the OSD Language (English, 簡体中文 (Simplified Chinese), Français, Deutsch, Italiano, Español, Português, Русский (Russian), 한국어 (Korean) or 日本語 (Japanese)).

OSD Timeout

Select OSD Timeout from the Basic Settings menu to specify how long the menus remain on-screen after selecting them. Select from 5 to 120 seconds, in five-second increments.

Sleep Timer

Select Sleep Timer from the Basic Settings menu to turn off the display after a specified interval. Press ◀ or ▶ to select Off, 15 Minutes, 30 Minutes, 60 Minutes, 90 Minutes or 2 Hours.

Power LED

Select Power LED from the Basic Settings menu to change the behavior of the status indicator LED during standby mode. When set to **On**, the LED lights orange to indicate that the display is in standby mode. When set to **Off**, the LED is always off, regardless of the operational state of the display.

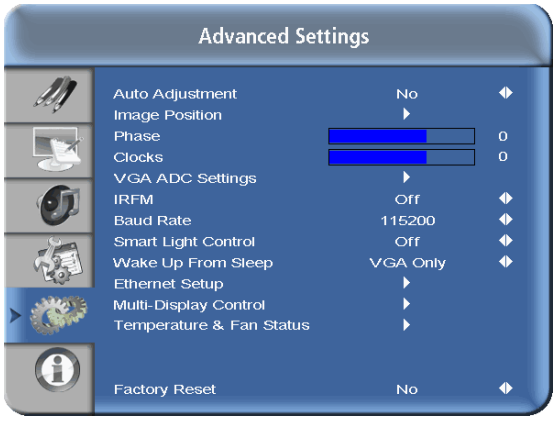
Real Time Clock

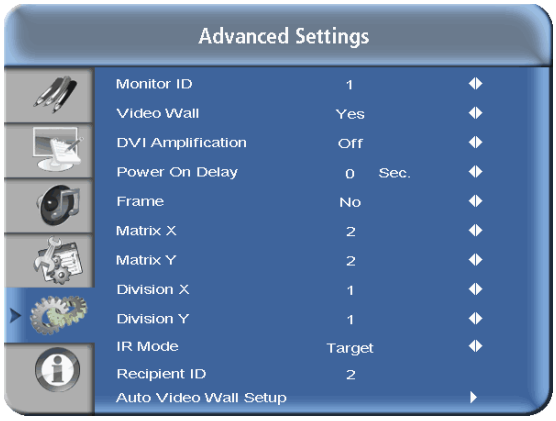
Select Real Time Clock from the Basic Settings menu to set the display's internal real-time clock.

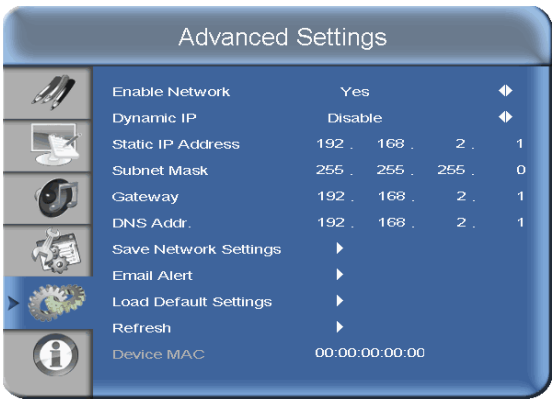
From this menu, you can also program the display to turn on and off at specified times of day and days of the week:

- To set power-on and power-off times for each day of the week independently, set the Timer Mode to **User**.
- To set the same power-on and power-off times for every day of the week, set the Timer Mode to **All Days**.
- To set the same power-on and power-off times for Monday through Friday, set the Timer Mode to **Work Days**.

Advanced Settings







Auto Adjustment

Select Auto Adjustment from the Advanced Settings menu to force the display to reacquire and lock to the input signal. This is useful when the signal quality is marginal.

Image Position (VGA sources)

Use the controls in the Image Position (VGA sources) Menu to fine-tune the image position.

- **Left / Right:** Select Left/Right from the Input Position menu to shift the projected image horizontally. Press ▶ to shift the image to the right; press ◀ to shift it to the left.
- **Up / Down:** Select Up/Down from the Input Position menu to shift the projected image vertically. Press ▶ to shift the image upward; press ◀ to shift it downward.

Phase (VGA sources)

This control adjusts the phase of the pixel sampling clock relative to the incoming signal. Adjust the phase when an image still shows shimmer or “noise” after the Clock setting has been optimized.

Adjust the Phase after adjusting Clock (see below).

For best results, use a good test pattern such as a smooth gray consisting of a clear pattern of black and white pixels, or a similar “half on, half off” graphic image. Adjust the slidebar until the image stabilizes and each pixel is clearly defined. You may notice that you can stabilize the image at more than one point. Use either setting in such cases.

Clocks (VGA sources)

This control sets the frequency of the pixel sampling clock, indicated by the number of incoming pixels per line, so that all pixels generated by a particular source are sampled.

Steady flickering or several soft vertical stripes or bands across the entire image indicates poor pixel tracking. Proper pixel tracking helps ensure that the image quality is consistent across the screen, that aspect ratio is maintained and that pixel phase (see above) can be optimized.

VGA ADC Settings

Select VGA ADC Settings from the Advanced Settings menu to calibrate the display’s analog-to-digital converter (ADC) for VGA sources.

Flesh Tone

Select Flesh Tone from the Advanced Settings menu to lighten or darken the flesh-colored areas of the image. (This setting is only available with Video sources.)

IRFM

Select IRFM from the Advanced Settings menu and press ◀ or ▶ to enable or disable this feature, which creates slight frame motion to help avoid image retention.

Baud Rate

Select Baud Rate from the Advanced Settings menu and press ◀ or ▶ to set the data rate of the RS232 communication link.

Smart Light Control

Select **ON** to enable the dimming feature of the display. Local dimming improves the black level and contrast of the display by adjusting the backlight to match the image, but is not ideal for all content.

Wake Up From Sleep

Select Wake Up From Sleep from the Advanced Settings menu and press ◀ or ▶ to control this feature, which operates as follows:

- **VGA Only:** The display wakes up from power-saving mode when it receives an active video signal on its VGA (analog) input.
- **VGA, Digital, RS232:** The display wakes up when it receives an active signal from its VGA, HDMI, Display Port or DVI inputs, or receives a valid RS232 command.
- **Never Sleep:** The display never enters power-saving mode.

Temperature & Fan Status

Select Temperature & Fan Status from the Advanced Settings menu and press ◀ or ▶ to display information about the health of the display: the internal operating temperature and the cooling fan speeds.

Multi-Display Control

Select Multi-Display Control from the Advanced Settings menu and press ▶ to configure your video wall. This sub-menu provides the following controls:

- **Monitor ID:** This control lets you manually set the Monitor ID of each display in the video wall.
- **Video Wall:** Use this control to enable or disable video wall mode.
- **DVI Amplication:** For large matrixes using a single digital source and a DVI pass-thru cable, setting this to **On** may enhance the video quality and reliability of the pass-thru signals.
- **Power On Delay:** When powering on a video wall, this control staggers the power-on sequence so that all monitors will not turn on at once, reducing current requirements. Select a value of from 0 to 30 seconds (inclusive) per monitor.

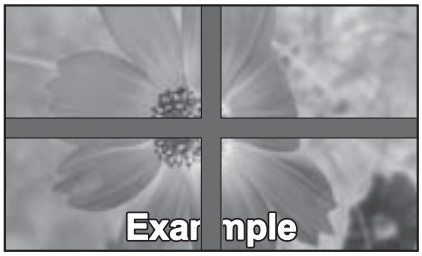
When video wall is set to **Yes**, these additional settings are available:

- **Frame:** This control enables or disables frame compensation, which joins the edges of adjacent displays in a video wall together in such a way as to compensate for the gap between them. This causes moving objects to appear to move “behind” the gap, for better continuity of motion across the wall:

ON hides joints between displays:

(suitable for moving image display)

OFF shows joints between displays:



(suitable for still image display)

- **Matrix X:** This control lets you specify the number of columns in the video wall.
- **Matrix Y:** This control lets you specify the number of rows in the video wall.
- **Division X:** This control lets you specify a display’s horizontal position (column) in a video wall.
- **Division Y:** This control lets you specify a display’s vertical position (row) in a video wall.
- **IR Mode:** Selects whether the remote control controls all displays in a video wall (**All**), none of the video displays in the video wall (**Off**), or one display at a time (**Target**).
- **Recipient ID:** Selects which display in a video wall is controlled by the remote control. This feature is only active when **IR Mode** is set to **Target**.
- **Auto Video Wall Setup:** This control automatically sets the monitor IDs or all displays in a video wall if the RS485 cables are connected in the recommended manner. See *RS232 Routing* on page 29.

Notice.

- To change a display’s position in a video wall, first select that display’s Monitor ID using the pull-down menu.

Ethernet Setup

Select Ethernet Setup from the Advanced Settings menu and press ▶ to configure network settings.

- **Enable Network:** Enables the network feature.
  Options: No, Yes.
- **Dynamic IP:** Enables DHCP for dynamic IP address assignment.
  Options: Disable, Enable.
- **Static IP Address:** Sets the static IP address when the DYNAMIC IP line is disabled or views it when the DYNAMIC IP line is enabled.
  Range: 255.255.255.255 (0.0.0.0)
- **Subnet Mask:** Sets the subnet mask when the DYNAMIC IP line is disabled or views it when the DYNAMIC IP line is enabled.
  Range: 255.255.255.255 (0.0.0.0)
- **Gateway:** Sets the gateway address when the DYNAMIC IP line is disabled or views it when the DYNAMIC IP line is enabled.
  Range: 255.255.255.255 (0.0.0.0)
- **DNS Address:** Sets the DNS address when the DYNAMIC IP line is disabled or views it when the DYNAMIC IP line is enabled.
  Range: 255.255.255.255 (0.0.0.0)
- **Save Network Settings:** Saves the network configuration when the DYNAMIC IP line is disabled.
  Options: No, Yes.
- **Email Alert:** You can enable/disable the following email alerts.
  - Power Status Alert: sent when the unit is turned on or off.
  - Source Status Alert: sent when a different source is selected.
  - Signal Lost Alert: sent when the input sync is lost.
- **Load Default Settings:** Loads default network settings.
  Options: No, Yes.
- **Refresh:** Refreshes the configuration of Static IP Address, Subnet Mask, Gateway and DNS Address.
- **Device MAC:** Shows the unique address assigned to network interfaces.

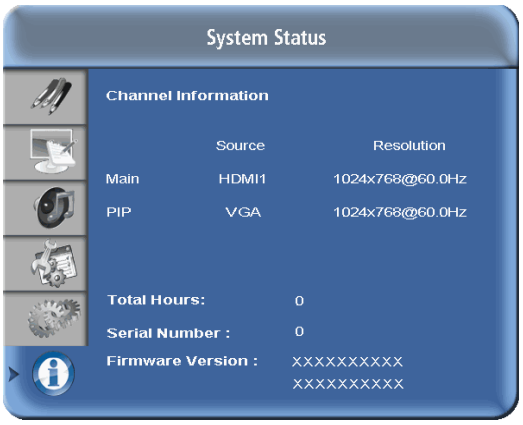
Factory Reset

To reset ALL display settings (including image settings) back to their factory defaults, choose Select Ethernet Setup from the Advanced Settings menu and press to configure network settings. from the Advanced Settings menu.

Caution! Failure to comply with the following could result in minor or moderate injury.

- This action is not reversible. Proceed with caution!

System Status

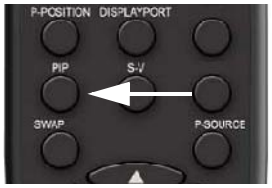


The read-only System Status menu provides the following status information about the display:

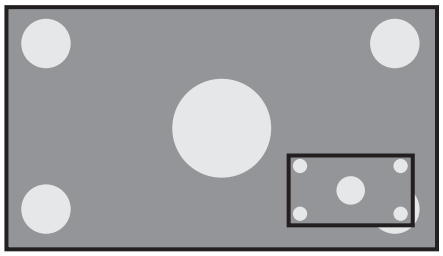
- The resolution and refresh rate of the Main and PIP sources;
- The number of hours the display has been in operation; and
- The currently-installed firmware version.

Using the Picture-in-Picture (PIP)

To use PIP, press the **PIP** button.



The PIP window appears inside the main image window.



Press **PIP** again to turn PIP off.

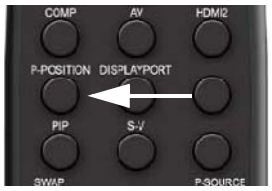
Press the P-Source button to select a PIP signal source. For each source, the table below shows which of the other sources are available as a PIP source.

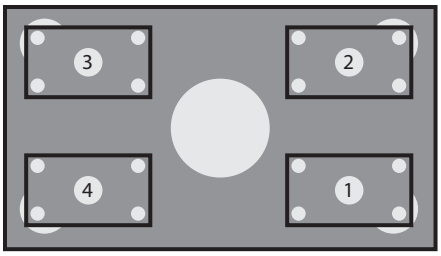
		Main Input Source				
		VGA	HDMI 1	HDMI 2	DVI	DisplayPort
PIP Input Source	VGA	–	√	√	√	√
	HDMI 1	√	–	–	–	√
	HDMI 2	√	–	–	–	√
	DVI	√	–	–	–	√
	DisplayPort	√	√	√	√	–

Note: "√" means that source is available as a PIP source when that input is selected; "–" means that it is not.

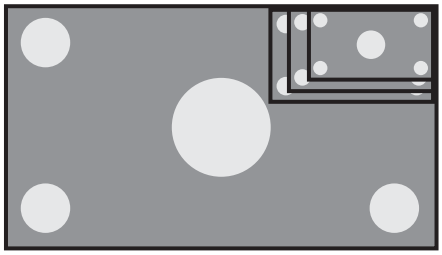
Changing the PIP Position

To change the PIP window position, press the P-POSITION button on the remote control repeatedly until the window is in the desired position.





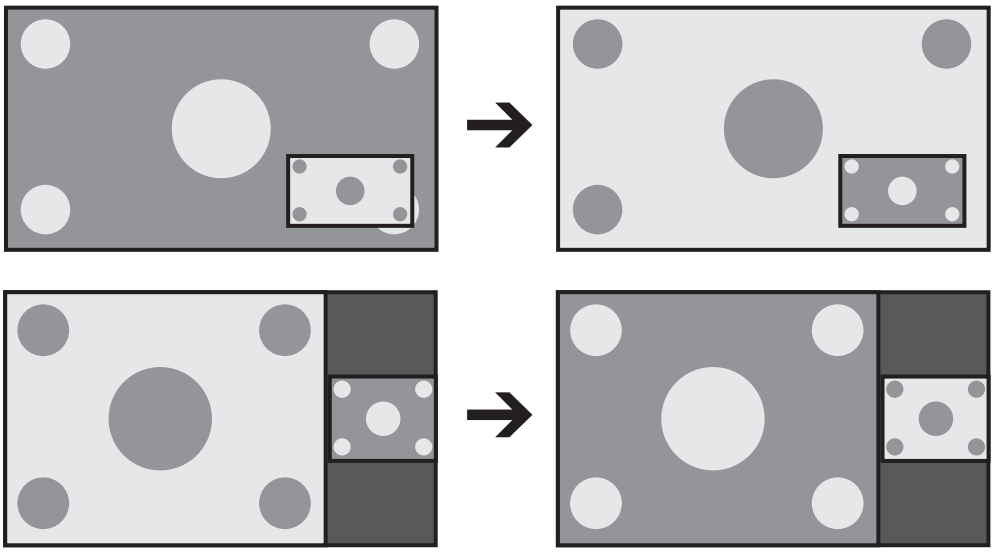
Changing the PIP Size or Selecting Side-by-Side PIP Mode



Select PIP Mode from the Display Settings menu and press ◀ or ▶ to change the PIP window size or to enable "side-by-side" PIP.

Swapping the Main and PIP Images

To swap the main and PIP images, press the SWAP button on the remote control.



Using the Display in Low Light Environments

Some installations, such as broadcast studios or museums, have very low ambient light levels and require that the LCD panel be set to a low luminance to blend in well with the environment or match the color temperature of studio lighting. For these situations, we recommend keeping image settings within the ranges described below to obtain the highest quality image.

Caution! Settings the image settings outside their recommended operating range may result in an unsatisfactory image.

Image Setting	Recommended Range	Explanation
Backlight	25% or higher	Below 25% backlight, the LCD panel may look non-uniform with some content

Image Setting	Recommended Range	Explanation
Contrast	40% or higher	Below 40% contrast, the LCD panel may look non-uniform with some content. To reduce the luminance of the display, it is normally better to lower the backlight setting than lower the contrast setting. Lowering backlight has a similar effect as lowering contrast.
Color Temperature	5000K or higher	Below 5000K color temperature, the LCD panel may look non-uniform with some content.

Maintenance and Troubleshooting

Maintenance

The FHD462-X LCD Panel does not require any routine maintenance. There are no user-serviceable or -replaceable parts. Unless you are a qualified, factory-trained technician, ***do not attempt to repair or replace any system component yourself.*** You will void the product warranty if you do so.

Troubleshooting

The table below provides some general guidelines for troubleshooting problems you may encounter with your display. If the suggested solutions fail to resolve the problem or if you encounter an issue not described here, please contact your dealer.

Symptom	Possible Cause(s)	Solution
The display does not turn on.	• The display is not plugged in or the AC outlet is not active. • The main power switch is off. • The remote control batteries have run out.	• Ensure that the display is plugged in and that the AC outlet is active. • Set the main power switch (see *Display at a Glance* on page 12) to the on position. • Replace the batteries.
The display is on and menus appear, but there is no picture.	• Incorrect source selection. • Source component is not turned on. • Source component is connected incorrectly or not at all.	• Select the correct source. • Turn on the source component. • Check connections from the source component to the display.
The remote control does not work.	• The remote control batteries have run out. • The buttons are locked. • IR extender is not connected.	• Replace the batteries. • Unlock the buttons by pressing **ENTER**, **ENTER**, **EXIT**, **EXIT**, **ENTER** and **EXIT**, in sequence. • Verify that the IR extender cable is correctly connected (see *External Control* on page 52).

Symptom	Possible Cause(s)	Solution
Image geometry is incorrect.	• Incorrect aspect ratio selection.	• Select a different aspect ratio.
The display is jittery or unstable.	• Poor-quality or improperly connected source. • The horizontal or vertical scan frequency of the input signal may be out of range for the display.	• Ensure that the source is properly connected and of adequate quality for detection. • Correct at the source.
Image is too bright and/or lacks definition in the bright areas of the image.	• Contrast is set too high.	• Decrease the contrast setting.
Image appears “washed out” and/or dark areas appear too bright.	• Brightness is set too high.	• Decrease the brightness setting.
Image is too dark.	• Brightness and/or Backlight are set too low.	• Increase the brightness and/or backlight settings.
Images from an HDMI source do not display.	• The resolution and frequency of the video card in the computer are not compatible with the display. • HDMI cable from source to display is either defective or too long.	• Select a compatible resolution and vertical frequency (refer to *Supported Timings* on page 70). • Try a known-good and/or shorter HDMI cable.
Computer images do not display correctly.	• The resolution and frequency of the video card in the computer are not compatible with the display. • Clock and Phase settings need adjustment.	• Select a compatible resolution and vertical frequency (refer to *Supported Timings* on page 70). • Adjust Clock and Phase settings (refer to *Clocks (VGA sources)* on page 43 and *Phase (VGA sources)* on page 42).
Images from A Composite video source do not display.	• Both the Composite and S-Video inputs are connected to sources	• Disconnect the S-Video source.

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External Control

In addition to using the display keypad or remote control unit, you can control the display using a serial (RS232/RS485) link to send ASCII commands and receive responses to those commands.

You also use discrete infrared (IR) control codes to program a third-party remote control unit. For more information, refer to *Using Discrete IR Codes* on page 66.

Serial Communications

The display uses a simple text-based control protocol to take requests from control devices and to provide responses to such devices. This section describes how to send control messages over a serial link between the display and an automation/control system or a PC running either of the following:

- A terminal emulation program such as Windows® HyperTerminal or TeraTerm; or
- The Video Wall Toolbox, a Windows application that provides a graphical user interface that mimics the remote control buttons, as well as the ability to send serial commands and receive responses to those commands.

RS232 Connection and Port Configuration

Connect your control system or PC to the RS232 input of the display; refer to *Connecting a Control System or PC* on page 23.

Configure the RS232 controller or PC serial port as follows: no parity, 8 data bits, 1 stop bit and no flow control. Set the baud rate to 115200, to match that of the display RS232 port.

Command and Response Format

Commands sent from an automation/control system or PC to the display must have this format:

`[STX] [IDT] [TYPE] [CMD] ([VALUE] or [REPLY]) [ETX] [CR]`

Where:

- `[STX]` indicates the start of the command data (always 07).
- `[IDT]` is the display ID Use hexadecimal values 01 to 19 inclusive to address a single display. Use 00 to broadcast a command to all panels in a video wall.
- `[TYPE]` is the command type:
  - `00` = return to host (response from the LCD panel)
  - `01` = read/action

- 02 = write

- [VALUE] is the parameter setting for the command.
- [REPLY] is the parameter setting for the command, acknowledged by the display in its response to a command.
- [ETX] indicates the end of the command data (always 08).
- [CR] is the ASCII carriage return key (0x0D).

Command and Response Examples

Here are some examples of serial commands and their responses:

Description	Command Sent to LCD Panel	Response Received from LCD Panel
Turn LCD panel power off.	07 01 02 50 4F 57 00 08	07 01 00 50 4F 57 00 08
Turn LCD panel power on.	07 01 02 50 4F 57 01 08	07 01 00 50 4F 57 01 08
Request LCD panel power status.	07 01 01 50 4F 57 08	07 01 00 50 4F 57 XX 08 (XX = 0 when off or 1 when on)
Set the LCD panel contrast to 30 (1E hex).	07 02 02 43 4F 4E 1E 08	07 02 00 43 4F 4E 1E 08
Request the LCD panel to use large PIP	07 19 02 50 53 43 03 08	07 19 00 50 53 43 03 08
Reset the LCD panel display settings.	07 02 02 41 4C 4C 00 08	07 02 00 41 4C 4C 00 08
Request LCD panel serial number.	07 01 01 53 45 52 08	07 01 00 53 45 52 S(0)…S(12) 08 S(0) …S(12) = the serial number in ASCII
Request LCD panel firmware version.	07 01 01 47 56 45 08	07 01 00 47 56 45 S(0)…S(5) 08 S(0) …S(5) = the firmware version in ASCII

Serial Command List

Power control and input sources

Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Power Control	POW	W/R	00	00	Off (soft power)	50 4F 57
			01	01	On (soft power)	
Input Source	MIN	W/R	00	00	VGA	4D 49 4E
			01	01	Digital DVI	
			09	09	HDMI 1	
			10	10	HDMI 2	
			13	13	DisplayPort	
			15	15	DVI 2	

Display adjustment

Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Display Adjustment	BRI	W/R	0~100	Current value	Back Light	42 52 49
	BRL	W/R	0~100	Current value	Brightness	42 52 4C
	BLC	W/R	00	00	Off (Back Light)	42 4C 43
			01	01	On (Back Light)	
	CON	W/R	0~100	Current value	Contrast	43 4F 4E
	HUE	W/R	0~100	Current value	Hue	48 55 45
	SAT	W/R	0~100	Current value	Saturation	53 41 54
	CCT	W/R	0~64	Current value	Color temperature (3200K~9600K)	43 43 54
	GAC	W/R	00	00	Off (Gamma)	47 41 43
			01	01	2.2 (Gamma)	
	USR	W/R	0~255	Current value	Red Gain (128~383)	55 53 52
	USG	W/R	0~255	Current value	Green Gain (128~383)	55 53 47
	USB	W/R	0~255	Current value	Blue Gain (128~383)	55 53 42
	UOR	W/R	0~100	Current value	Red Offset (-50~50)	55 4F 52
	UOG	W/R	0~100	Current value	Green Offset (-50~50)	55 4F 47
	UOB	W/R	0~100	Current value	Blue Offset (-50~50)	55 4F 42
	RXY	R		25 bytes	Read Luminance & Color Chromaticity for 9300K	52 58 59
	PHA	W/R	0~63	Current value	Phase	50 48 41
	CLO	W/R	0~100	Current value	Clock	43 4C 4F
	HOR	R		Current value	Horizontal Position	48 4F 52
	VER	R		Current value	Vertical Position	56 45 52
	ADJ	W	00	00	Auto Adjust	41 44 4A
Video Mode	SHA	W/R	0~24	Current value	Sharpness	53 48 41

Note 1:

The 25 Reply Bytes are defined: bD1, bD2, bD3, …, bD25

Where:

- bD1=High byte of RY*16, bD2=Low byte of RY*16.
- bD3=High byte of Rx*10000, bD4=Low byte of Rx*10000.

- bD5=High byte of Ry*10000, bD6=Low byte of Ry*10000.
- bD7=High byte of GY*16, bD8=Low byte of GY*16.
- bD9=High byte of Gx*10000, bD10=Low byte of Gx*10000.
- bD11=High byte of Gy*10000, bD12=Low byte of Gy*10000.
- bD13=High byte of BY*16, bD14=Low byte of BY*16.
- bD15=High byte of Bx*10000, bD16=Low byte of Bx*10000.
- bD17=High byte of By*10000, bD18=Low byte of By*10000.
- bD19=High byte of WY*16, bD20=Low byte of WY*16.
- bD21=High byte of Wx*10000, bD22=Low byte of Wx*10000.
- bD23=High byte of Wy*10000, bD24=Low byte of Wy*10000.
- bD25 : checksum (bD1+bD2+…+bD25=0x00).

RY, GY, BY, and WY are the Luminance (cd/m2) of all pixel red, green, blue, and white respectively. (Rx, Ry), (Gx, Gy), (Bx, By), and (Wx, Wy) are the Color Chromaticity of all pixel red, green, blue, and white respectively.

Other controls

Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Pip Adjust	PSC	W/R	00	00	PIP OFF	50 53 43
			01	01	PIP Small	
			02	02	PIP Medium	
			03	03	PIP Large	
			04	04	PIP Side-by-Side	
PIP Source Selection	PIN	W/R	00	00	VGA	50 49 4E
			01	01	Digital DVI	
			09	09	HDMI 1	
			10	10	HDMI 2	
			13	13	DisplayPort	
			15	15	DVI 2	
PIP Position	PPO	W/R	00	00	PIP Position Bottom-Left	50 50 4F
			01	01	PIP Position Bottom-Right	
			02	02	PIP Position Top-Left	
			03	03	PIP Position Top-Right	
PIP/Main Swap	SWA	W	00	00	Swap Main and PIP	53 57 41
Scaling	ASP	W/R	00	00	Native	41 53 50
			01	01	Full Screen	
			02	02	Pillar Box	
			03	03	Letter Box	
	ZOM	W	00	00	Zoom In	5A 4F 4D
			01	01	Zoom Out	
Baud Rate Adjustment	BRA	W/R	00	00	115200	42 52 41
			01	01	38400	
			02	02	19200	
			03	03	9600	

Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Other Control	RCU	W	00	00	MENU Key	52 43 55
			01	01	INFO Key	
			02	02	UP Key	
			03	03	DOWN Key	
			04	04	LEFT Key	
			05	05	RIGHT Key	
			06	06	ENTER Key	
			07	07	EXIT Key	
			08	08	VGA Key	
			09	09	DVI Key	
			10	10	HDMI1 Key	
			11	11	HDMI2 Key	
			12	12	DISPLAYPORT Key	
			15	15	DVI2 Key	
			18	18	SOURCE Key	
			19	19	P-SOURCE Key	
			20	20	PIP Key	
			21	21	P-POSITION Key	
			22	22	SWAP Key	
			23	23	SCALING Key	
			24	24	FREEZE Key	
			25	25	MUTE Key	
			26	26	BRIGHT Key	
			27	27	CONTRAST Key	
			28	28	AUTO Key	
			29	29	VOLUME+ Key	
			30	30	VOLUME- Key	

Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Other Control	All	W	00	00	Reset All	41 4C 4C
	KLC	W/R	00	00	Un-Lock Keys	4B 4C 43
			01	01	Lock Keys	
	SER	R		13 bytes	Read Serial Number	53 45 52
	MNA	R		13 bytes	Read Model Name	4D 4E 41
	GVE	R		6 bytes	Read Firmware Version	47 56 45
	RTV	R		Current Value	Read RS232 Table Version	52 54 56
	RTT	R		Current Value	Read the temperature of the internal thermal sensor (-128~+127°C)	52 54 54
	RSF	R			Read speed of fan 1 (RPM = 30 x Reply Value)	52 53 46
		W	00	0~255	Read speed of fan 1 (RPM = 30 x Reply Value)	
			01	0~255	Read speed from fan 2 (RPM = 30 x Reply Value)	
Wake Up from Sleep Selection	WFS	W/R	00	00	VGA Only	57 46 53
			01	01	VGA, Digital, RS232	
			02	02	Never Sleep	
Audio	VOL	W/R	0~100	Current Value	Volume	56 4F 4C
	MUT	W/R	00	00	Mute Off	4D 55 54
			01	01	Mute On	
Scheme Selection	SCM	W/R	00	00	User	53 43 4D
			01	01	Sport	
			02	02	Game	
			03	03	Cinema	
			04	04	Vivid	

Control Item	CMD	Type	Value (DEC)	Reply (DEC)	Content	CMD (HEX)
Multi-Display	SID	W	00	00	Show Monitor ID	53 49 44
	CID	W	1~100	00	Change Monitor ID See Note 2.	43 49 44
	VWS	W/R	00	00	Video Wall Switch Off	56 57 53
			01	01	Video Wall Switch On	
	VWF	W/R	00	00	Video Wall Frameless Off	56 57 46
			01	01	Video Wall Frameless On	
	MAT	W/R	X: 1~10 Y: 1~10	Current value	Matrix X, Y value High quarter is X: 7 ~ 4 bit Low quarter is Y: 3 ~ 0 bit	4D 41 54
	DIV	W/R	X: 1~10 Y: 1~10	Current value	Divisions X, Y value High quarter is X: 7 ~ 4 bit Low quarter is Y: 3 ~ 0 bit See Note 3.	44 49 56
	DID	W/R	00	00	DVI Amplification Off	44 49 44
			01	01	DVI Amplification On	
	POD	W/R	0~30	Current value	Integral part of Power On Delay (0, 1, 2, …, 30 sec)	50 4F 44
	POE	W/R	0~19	Current value	Fractional part of Power On Delay (0, 0.05, 0.10, …, 0.95 sec)	50 4F 45
Self Diagnosis	OTT	R		4 bytes	Accumulated Operation Time (mins)	4F 54 54
	OTS	R		4 bytes	Operation Time (mins)	4F 54 53
	ERR	R		4 bytes	Error Code	45 52 52

Note 2:

In broadcast setting mode, this command is used to auto sort the Monitor ID sequentially. (The Value Byte need to be 0x01.)

Note 3:

In broadcast setting mode, this command is used to auto arrange the Division X/Y. (The Value Byte need to be 0x11.)

Using Video Wall Toolbox

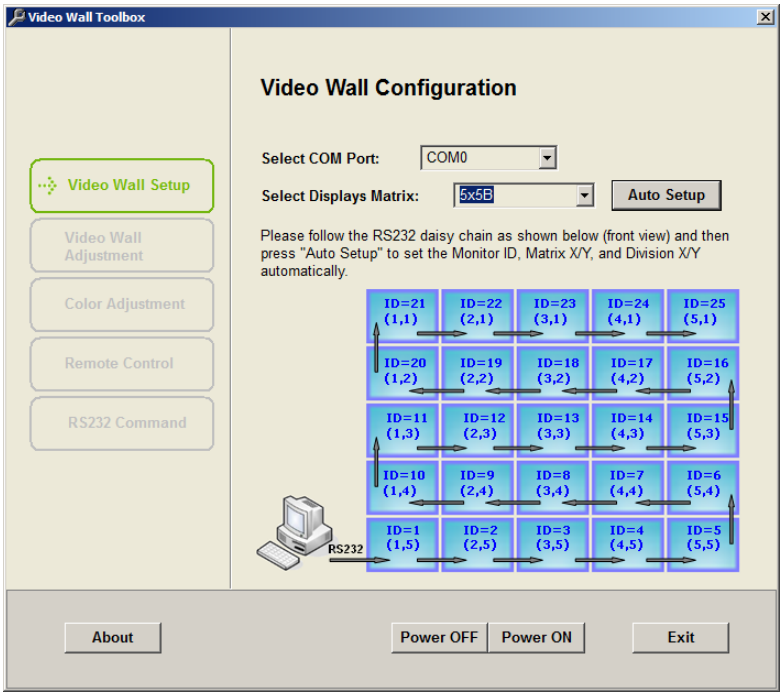
The Video Wall Toolbox software (included with the display) simplifies setting up a video wall using a PC running Windows XP, Vista or Windows 7/8. It can also be used to configure and control a single display.

Video Wall Toolbox provides an alternative to using the remote control unit or built-in keypad to control the display, presenting all of the controls in the OSD menus within an attractive, intuitive graphical user interface.

Installation and Initial Setup

To use the Video Wall Toolbox, proceed as follows:

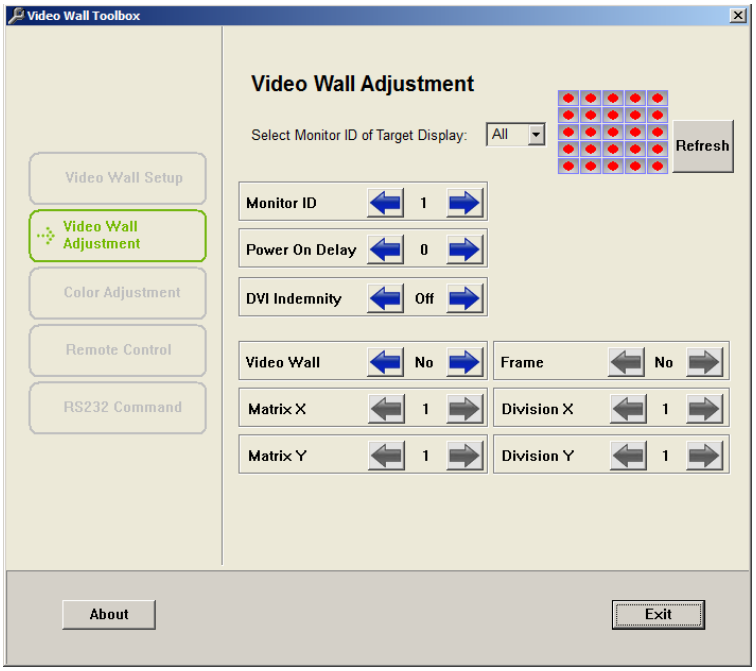
1. Install the software on a Windows PC using the CD provided.
2. Connect the PC to the video wall as described in the section *RS232 Routing* on page 29.
3. Ensure the baud rate of the PC RS232 connection matches the baud rate of the monitor. The default baud rate is 115200.
4. Launch the Video Wall Toolbox software to display the Video Wall Configuration screen, shown below.



5. Select the COM port you are using to connect to the video wall from the **SELECT COM Port:** pull-down menu.
6. Select your video wall size from the **Select Displays Matrix:** pull-down menu.
7. Press Auto Setup and the Video Wall Toolbox software automatically assigns the proper Monitor IDs to all displays in the video wall.

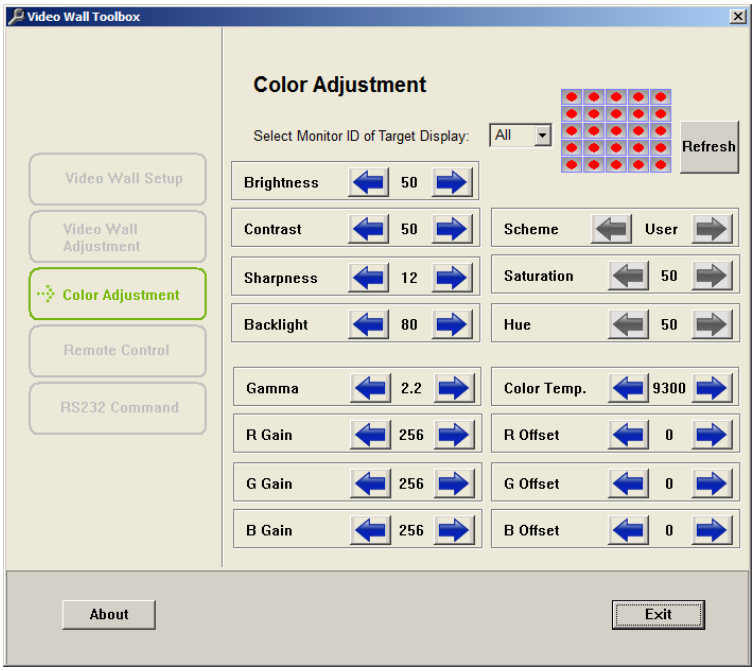
Video Wall Adjust Screen

The Video Wall Adjust screen, shown below, provides the same controls as the Multi-Display Control OSD menu (refer to *Multi-Display Control* on page 44).



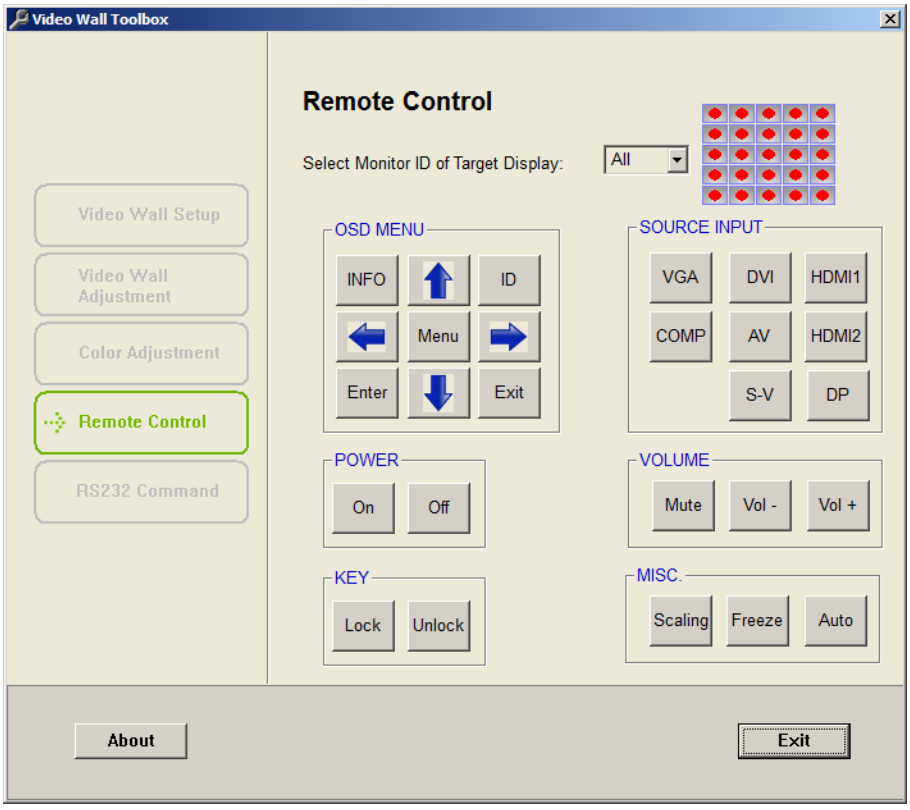
Color Adjustment Screen

The Color Adjustment screen, shown below, provides the same image quality controls as the Image Settings OSD menus (refer to *Image Settings* on page 34).



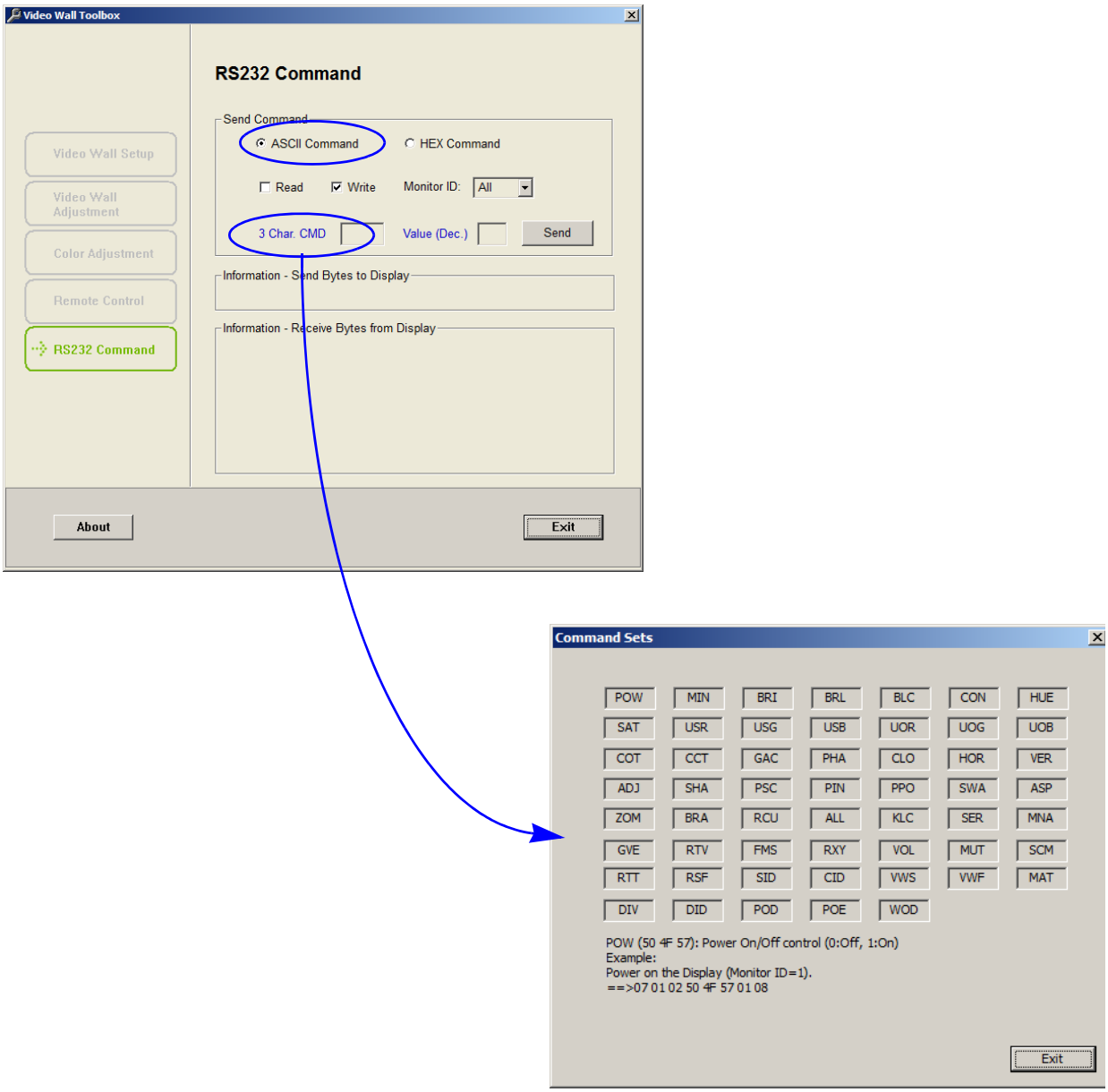
Remote Control Screen

The Remote Control Screen, shown below, provides the same functionality as the hand-held remote control unit.



RS232 Command Screen

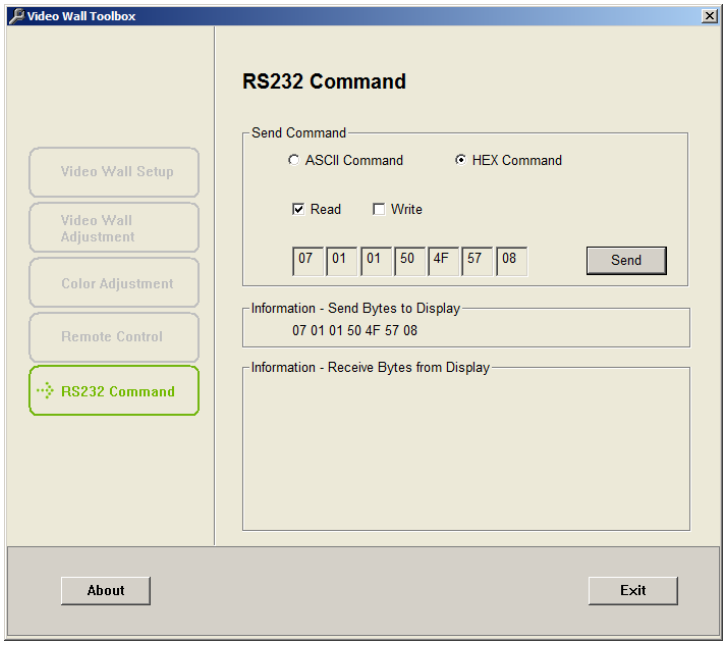
The RS232 Command screen, shown below, enables you to manually enter supported RS232 commands in either ASCII or hexadecimal format (Refer to *Serial Command List* on page 54 for all supported commands).



To send a command in ASCII format:

1. Click the **ASCII Command** radio button.
2. Check **Read** or **Write** to select that command type.
3. Use the **Monitor ID:** pull-down menu to select the command destination.

4. Click the text box labeled **3 Char. CMD** and enter a valid three-character command from those in the *Serial Command List* on page 54.
   –OR–
   Click 3 **Char. CMD** to display the command selection window. When you move the mouse pointer over a command, a brief description of the command and an example (in hexadecimal format) appear at the bottom of the window. Click on a command to select it.
5. For Write commands, click the text box labeled **Value (Dec.)** and enter a decimal parameter value to send with the command. Or, click **Value (Dec.)** to change the parameter entry mode to **Value (Hex)** and enter a hexadecimal value.
6. Click **Send**. If the command executes successfully, the sent command and the response from the target display appear in the window.



To send a command in hexadecimal format:

1. Click the **HEX command** radio button.
2. Check **Read** or **Write** to select that command type.
3. Click the left-most text box and enter 07.
4. Enter the Monitor ID in the second text box.
5. Enter 01(read) or 02(write) in the third text box.
6. Enter the command in the next three text boxes.
7. For Write commands, enter a parameter value to send with the command.
8. Enter 08 in the right-most text box.
9. Click **Send**. If the command executes successfully, the sent command and the response from the target display appear in the window.

Using Discrete IR Codes

The display accepts commands in the form of infrared (IR) signals that conform to the NEC protocol. Each display remote control button has an IR control code associated with it.

You can use these codes to program a third-party, “universal” remote control unit to work with the display. These third-party products usually come with a computer software application for this purpose. For more information, consult the documentation provided with the remote control unit.

IR Command Protocol

The IR control codes have the following characteristics:

- Each code consists of the following:
  - A leader pulse (a modulated pulse of 9 ms followed by a non-modulated pulse of 4.5 ms);
  - 16 address bits (also called a “custom code”): eight (8) bits for the address followed by the logical inverse of the address. The custom code for the display is 16559 decimal (0x40AF, binary 01000000 10101111).
  - 16 data bits: eight (8) bits for the command followed by the logical inverse of the command; and
  - An end pulse (a modulated pulse of 0.56 ms, similar to the modulated pulse in the ‘0’ and ‘1’ bits). The end of the modulated pulse constitutes the end of the data transmission.
- The carrier frequency is 38 kHz, with the modulated pulses having a 33% duty cycle.
- Commands are sent at a maximum rate of 9 Hz.

For example, here is the NEC control code for the **POWER** button on the display remote control unit:

Hex	**40**	**AF**	**1C**	**E3**
Binary	01000000	10101111	00011100	11100011
Function	**Cust. Code Byte 1**	**Cust. Code Byte 2**	**Command**	**Command (Logical Inverse)**

IR Control Code List

Customer Code	Data Code	Function
40AF	04FB	INFO
40AF	1CE3	POWER
40AF	07F8	VGA
40AF	08F7	DVI
40AF	09F6	HDMI1
40AF	0AF5	COMP
40AF	0BF4	AV
40AF	0CF3	HDMI2
40AF	1AE5	PIP POSITION
40AF	15EA	DISPLAY PORT
40AF	11EE	PIP
40AF	0DF2	S-V
40AF	06F9	SWAP
40AF	13EC	PIP SOURCE
40AF	0EF1	MENU
40AF	12ED	ENTER
40AF	05FA	EXIT
40AF	14EB	SCALING
40AF	43BC	FREEZE
40AF	00FF	MUTE
40AF	17E8	BRIGHTNESS
40AF	18E7 s	CONTRAST
40AF	1EE1	AUTO
40AF	0FF0	SOURCE
40AF	1BE4	VOLUME -
40AF	1DE2	VOLUME +

Specifications

Display Specifications

LCD PANEL	
Brightness	500 cd/m^2
Contrast Ratio	3500:1
Viewing Angle	H:178° / V:178°
Response Time	8 ms (GTG)
Supported Colors	16.7 million colors
Display Resolution	1920 x 1080 (16:9)
Display Frame Rate	60 Hz
SIGNAL COMPATIBILITY / CONNECTIVITY	
Horizontal / Vertical Frequency	31 ~ 91 KHz / 56 ~ 85 Hz
Input Resolution	1920 x 1080 @ 60 Hz (Analog); 1920 x 1080 @ 60 Hz (Digital)
Connectors	DisplayPort / HDMI x 2 / DVI-D (In/Out) / VGA (In/Out) / PC Audio In / IR Extender / Audio Out / LAN
Communication Ports	RS232C In, RS485 In/Out
MECHANICAL	
Dimensions	See *Overall Dimensions* on page 72
Weight	Net: 22.3 kg (w/o stand) / 49 lbs; Gross: 29.8 kg / 65.7 lbs
Wall Mount	600mm x 200mm VESA
OSD FUNCTIONS	
Control	RS232C, Built-in Keypad, IR Remote Controller
Language	English, 簡体中文 (Simplified Chinese), Français, Deutsch, Italiano, Português, Русский (Russian), Español, 한국어 (Korean) or 日本語 (Japanese)
Picture Options	PIP, PBP (Side-by-Side)
Source Auto Detect	Yes
Key Lock	Yes
ELECTRICAL	

Power Supply	AC 100V ~ 240V (50/60 Hz), 3.0 Amps, maximum
Power Consumption (normal operation)	130 W (typical), 195 W (max)
Power Consumption (standby mode)	0.5 W
ENVIRONMENTAL	
Operating Temperature	5°C ~ 40°C, 75% RH
Storage Temperature	-20°C ~ 50°C, 75% RH
SOFTWARE	
Video Wall Toolbox	Requires Windows operating system
DIMENSIONS	
Bezel Width	2.3 mm / 0.09 inch (Top/Left) 1.4 mm / 0.06 inch (Bottom/Right)
Image to Image	3.7 mm (typical)
Specifications are subject to change without notice.	

Supported Timings

	Timing		fH (kHz)	fV (Hz)	Dot clock (MHz)	HDMI	VGA	DVI	DisplayPort
VESA	VGA 640x480		31.469	59.94	25.175	O O	O	O	O
			37.861	72.809	31.5	O	O	O	O
			37.5	75	31.5	O	O	O	O
			43.269	85.008	36	O	O	O	O
	SVGA 800x600		35.156	56.25	36	O	O	O	O
			37.879	60.317	40	O	O ●	O ●	O ●
			48.077	72.188	50	O	O	O	O
			46.875	75	49.5	O	O	O	O
			53.674	85.06	56.25	O	O	O	O
	XGA 1024x768		48.363	60.004	65	O	O ●	O ●	O ●
			56.476	70.069	75	O	O	O	O
			60.023	75.029	78.75	O	O	O	O
			68.677	84.997	94.5	O	O	O	O
	WXGA1360x768		47.712	60.015	85.5	O	O ●	O ●	O ●
	1280 x 720		44.444	59.98	64	O	O ●	O ●	O ●
			44.772	59.86	74.5	O	O ●	O ●	O ●
			56.456	74.78	95.75	O	O	O	O
	1280 x 768		47.776	59.87	79.5	O	O ●	O ●	O ●
			47.396	59.995	68.25	O	O ●	O ●	O ●
			68.633	84.837	117.5	O	O	O	O
	1280 x 800		49.306	59.91	71	O	O ●	O ●	O ●
			49.702	59.81	83	O	O ●	O ●	O ●
	SXGA	1152x864	67.5	75	108	O	O	O	O
		1280x1024	63.981	60.02	108	O	O	O	O
			79.976	75.025	135	O	O	O	O
			91.146	85.024	157.5	O	O	O	O

O = Compliant timing. ● = *Compliant timing for video wall.*

480i means supported 480i@60Hz (YPbPr). 576i means supported 576i@50Hz (YPbPr).

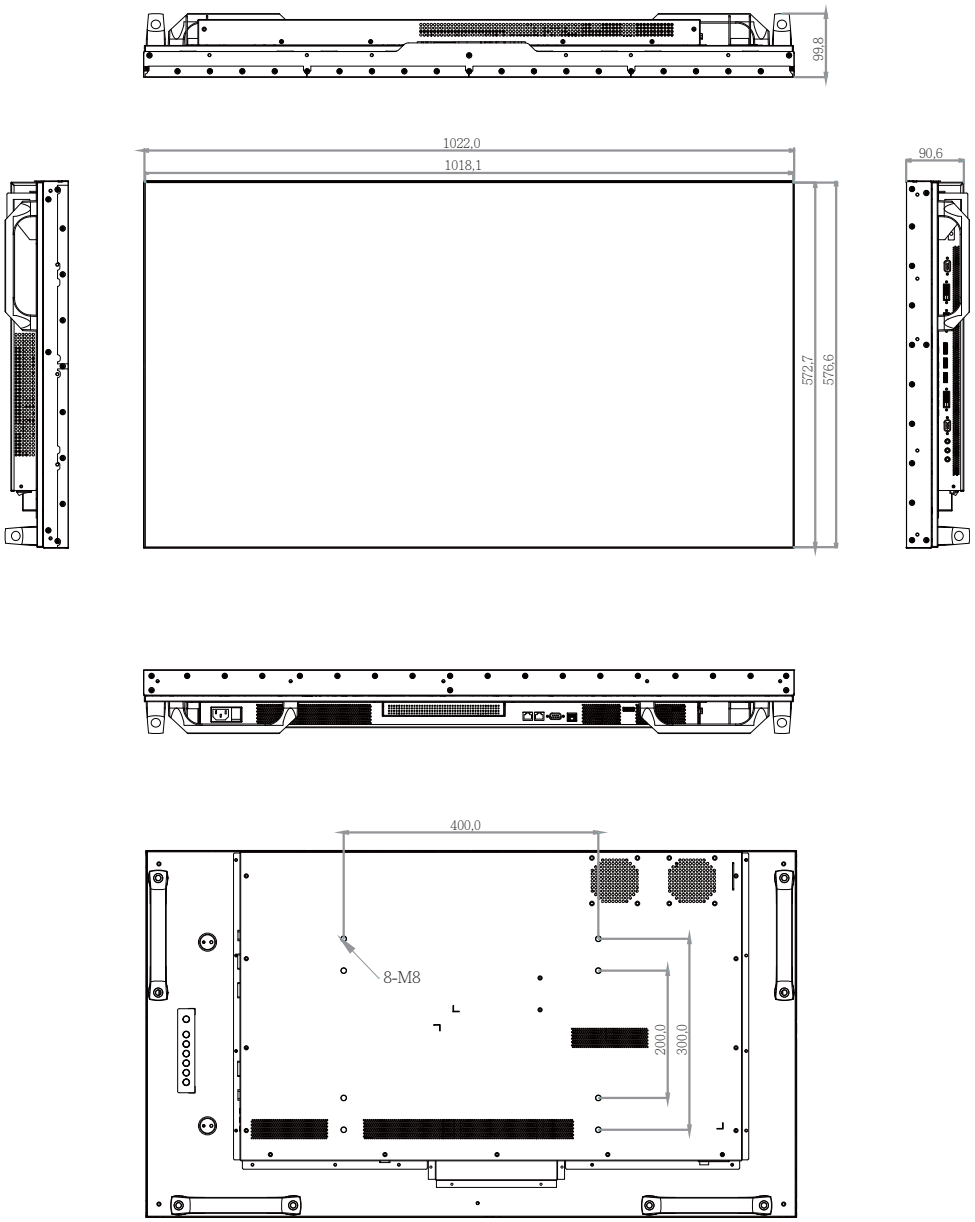
	Timing	fH (kHz)	fV (Hz)	Dot clock (MHz)	HDMI	VGA	DVI	DisplayPort
VESA (cont.)	1440 x 900	55.469	59.901	88.75	O	O	O	O
		55.935	59.88	106.5	O	O	O	O
	WSXGA+ 1680 x1050	64.674	59.883	119	O	O ●	O ●	O ●
		65.29	59.954	146.25	O	O ●	O ●	O ●
	UXGA 1600 x 1200	75	60	162	O	O	O	O
	1920 x 1080	66.587	59.93	138.5	O	O ●	O ●	O ●
	WUXA 1920 x 1200	74.038	59.95	154	O	O	O	O ●
EDTV	480p	31.5	60	27.03	O	-	O	O
	576p	31.25	50	27	O	-	O	O
HDTV	720p 1280x720	37.5	50	74.25	O	-	O	O
		44.995	59.94	74.176	O	-	O ●	O ●
		45	60	74.25	O	-	O ●	O ●
	1080i 1920x1080	28.13	50	74.25	O	-	O	O
		33.716	59.94	74.176	O	-	O	O
		33.75	60	74.25	O	-	O	O
	1080p 1920x1080	27	24	74.25	O	-	O	O
		56.25	50	148.5	O	-	O ●	O ●
		67.433	59.94	148.352	O	-	O ●	O ●
		67.5	60	148.5	O	O	O ●	O ●
4K2K	3840x2160	54	24	297	O			O
		56.25	25	297	O			O
		67.5	30	297	O			O

O = Compliant timing. ● = *Compliant timing for video wall.*

480i means supported 480i@60Hz (YPbPr). 576i means supported 576i@50Hz (YPbPr).

Overall Dimensions

All dimensions are in millimeters.



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