KRAMER

VW-16 USER MANUAL

MODEL:

VW-16 4X4 Video Wall Driver

Contents

Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment.

- Review the contents of this user manual.

ⓘ Go to www.kramerav.com/downloads/VW-16 to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

Achieving Best Performance

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).

- Do not secure the cables in tight bundles or roll the slack into tight coils.

- Avoid interference from neighboring electrical appliances that may adversely influence signal quality.

- Position your Kramer **VW-16** away from moisture, excessive sunlight, and dust.

Safety Instructions

⚠ **Caution:**
- This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

- For products with relay terminals and GPI\O ports, please refer to the permitted rating for an external connection, located next to the terminal or in the User Manual.

- There are no operator serviceable parts inside the unit.

⚠ **Warning:**
- Use only the power cord that is supplied with the unit.

- Disconnect the power and unplug the unit from the wall before installing.

- Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only.

- To ensure continuous risk protection, replace fuses only according to the rating specified on the product label which is located on the bottom of the unit.

Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at www.kramerav.com/support/recycling.

Overview

The **VW-16** 4x4 Video Wall Processor is an all-in-one video-wall processor system with multi-view, scaling, customizing screen layouts, and audio management functions. Its user-friendly web interface, RS-232, RS-485, RS-422, and telnet modular design allows you to effectively control the video wall both locally and remotely.

Its compact and robust design, reliability, multi-task features, and flexibility for either simple digital signage display or large-scale control room video wall, and up to 4K resolution video wall ability, represent a perfect partner for system integrators.

Exceptional Quality

- Input resolution up to 4K@60Hz, 4:4:4 color sampling.
- Output resolution up to 4K@60Hz, 4:4:4 color sampling.
- Upscaling up to 4K@60Hz, 4:4:4 color sampling and can downscale as well.
- Build various video wall array systems: 4x4, 2x8, 8x2, 5x3, and more by 16 output model.

Advanced and User-friendly Operation

- Fast switching between input channels and combined multiple source images on video wall.
- PiP, PoP, quad-view, and multiple customized screen layout configurations for video wall.
- Clockwise and anti-clockwise 90° rotation in full screen layout.
- Controlled by web interface, RS-232, RS-485, RS-422, and telnet.
- Firmware upgrade via USB port with a USB flash drive.
- Display modes including video wall and multi-view window.
- Multiple windows display across multiple screen arrays without screen boundary.

Flexible Connectivity

- Processes HDMI™® signals with Deep Color and HDCP 1.4/2.2 sources.
- Stereo audio output.
- Dual built-in power supply.

Typical Applications

VW-16 is ideal for the following typical applications:

- Signage in hotel lobbies, hospitals, and government offices.
- Conference room presentations.
- Advertising in shopping malls, supermarket, and restaurants.
- Airports, buses, and train stations.
- Rental and staging events.
- Monitoring in control rooms, banks, and stock markets.
- Security and surveillance systems.

Controlling your VW-16

Control your **VW-16** directly via the front panel push buttons with on-screen menus, or:

- By RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller.
- Through the Ethernet using a built-in user-friendly web interface.

Defining VW-16 4X4 Video Wall Driver
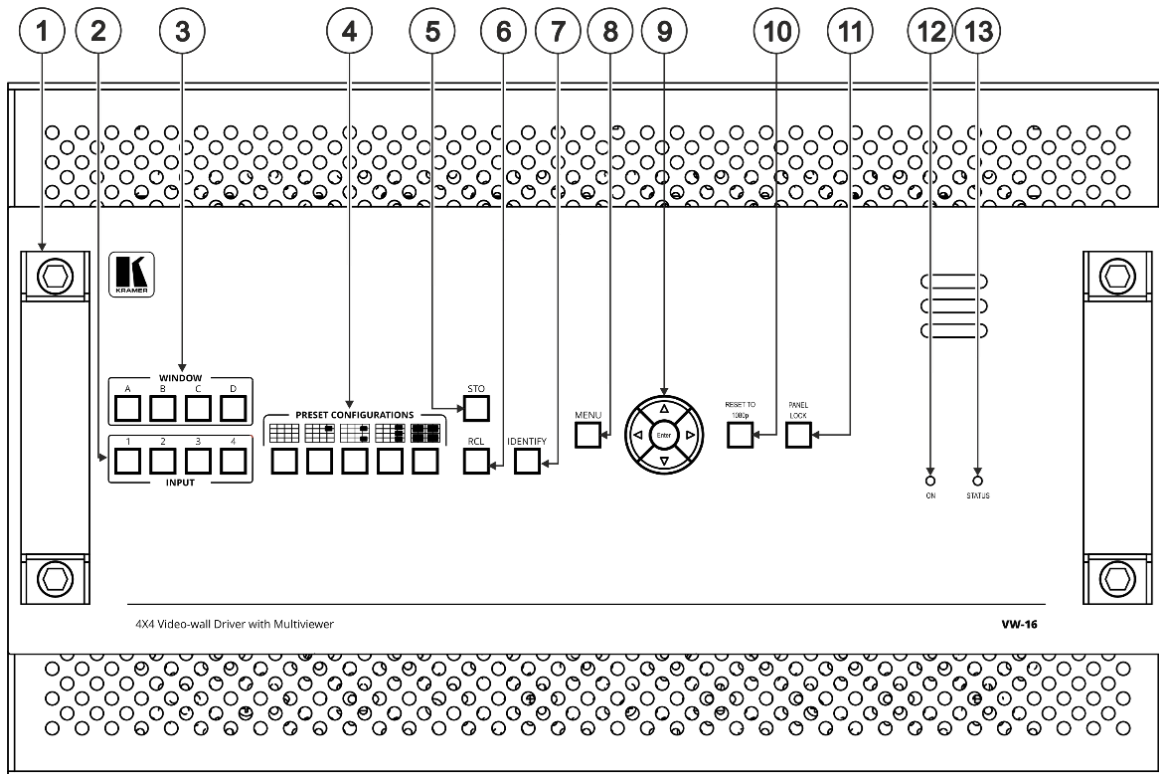
This section defines **VW-16**.

Figure 1: VW-16 4x4 Video Wall Driver Front Panel

#	Feature	Function
1	Metal handles (x2)	Rigid metal handles for easy lifting.
2	INPUT Buttons (1 to 4)	After pressing a Window button (above), press an input button to select this input for that window. If the wall configuration has only one window, then pressing an input button will select that input for the wall.
3	WINDOW Buttons (A to D)	Press to select window A, B, C or D. After pressing, a border shows around the selected window.
4	PRESET CONFIGURATION Buttons	Press a configuration button to set one of the following presets (each window in the Multiview mode can be resized and repositioned via the embedded webpages):

		Video wall mode – the video of one source only is presented over the video wall.
		Multiview mode, presenting 1 PiP window over a parent picture in the video wall.
		Multiview mode, presenting 2 PiP windows over a parent picture in the video wall.
		Multiview mode, presenting 3 PiP windows over a parent picture in the video wall.
		Multiview mode, presenting 4 windows over the video wall.

| 5 | STO Button | Press, followed by an Input button (1 to 4), to save the current video wall configuration. |

#	Feature		Function
6	RCL Button		Press, followed by an Input button (1 to 4), to recall a pre-saved video wall configuration.
7	IDENTIFY Button		When pressed, identifies each window by displaying A, B, C or D in it.
8	MENU Button		Displays the OSD menu.
9	Navigation Buttons	◄	Press to decrease numerical values or select from several definitions. When not in the OSD menu, press to reduce the output volume.
		▲	Press to move up the menu list values.
		►	Press to increase numerical values or select from several definitions. When not in the OSD menu, press to increase the output volume.
		▼	Press to move down the menu list.
		ENTER	Press to accept changes and change the SETUP parameters.
10	RESET TO 1080p Button		Press and hold for about 5 seconds to set the output resolutions to 1080p.
11	PANEL LOCK Button		Press and hold to toggle locking and unlocking the front panel buttons.
12	ON LED		Lights green when power is on and the machine is working normally.
13	STATUS LED		Lights green when fan operates properly. Flashes in case of fan malfunction.
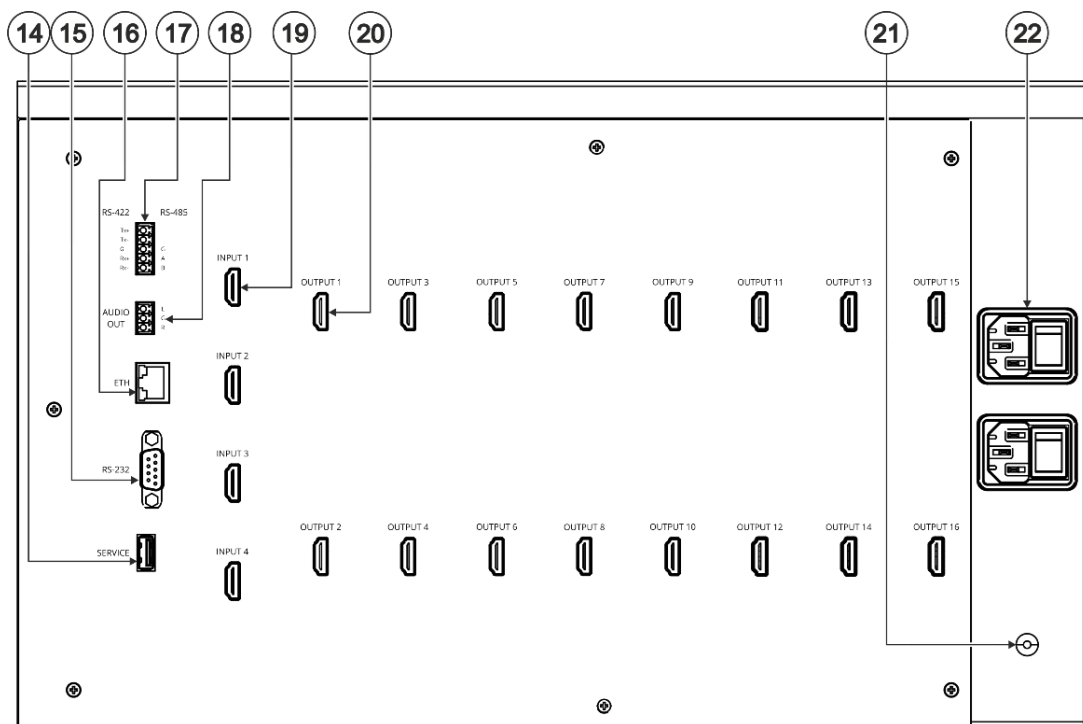
Figure 2: VW-16 4x4 Video Wall Driver Rear Panel

#	Feature		Function
14	SERVICE USB Port		Connect a USB flash drive to perform firmware upgrade.
15	RS-232 9-pin D-sub Serial Port Connector		Connect to a PC/serial controller.
16	ETHERNET RJ-45 Connector		Connect to a PC or other serial controller via a LAN.
17	5-pin Terminal Block Connector	RS-422 (Tx+, Tx-, G, Rx+, Rx-)	Connect to a PC/serial controller.
		RS-485 (G, A, B)	
18	AUDIO OUTPUT 3-pin Terminal Block Connector (L, G, R)		Connect to an unbalanced stereo audio acceptor (for example, powered speakers).
19	INPUT HDMI Connectors (1 to 4)		Connect up to 4 HDMI sources.
20	OUTPUT HDMI Connectors (1 to 16)		Connect up to 16 HDMI displays.
21	Grounding Opening		If necessary, use a M3 screw to lock the ground wire and connect to ground.
22	Mains Power Connector and Power Switch		Plug in the power cord and use the switch to power the unit on or off.

Mounting VW-16

This section provides instructions for mounting **VW-16**. Before you start the installation, make sure that the environment is within the recommended range:

- Operation temperature – 0° to 40°C (32 to 104°F).
- Storage temperature – -20° to +60°C (-4 to +140°F).
- Humidity – 0% to 80%, RH.

Caution:
- Mount **VW-16** before connecting any cables or power.

Warning:
- Ensure that the environment, such as maximum ambient temperature & air flow, is compatible for the device.
- Prevent uneven mechanical loading.
- Appropriate consideration of equipment nameplate ratings must be used to prevent circuit overload.
- Reliable earthing of rack-mounted equipment must be maintained.

Mount VW-16 in a rack:

- Use the recommended rack adapter (see www.kramerav.com/product/VW-16).

Mount VW-16 on a surface using one of these methods:

- Attach the rubber feet and place the unit on a flat surface.
- Attach both rack ears (remove the screws from each side of the machine and replace those screws through the rack ears). For more information, go to www.kramerav.com/downloads/VW-16.
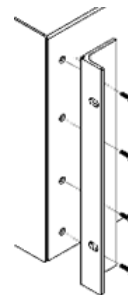
Connecting VW-16

ⓘ Always switch off the power to each device before you connect it to your **VW-16**. After connecting your **VW-16**, connect its power and then turn on the power to each device.
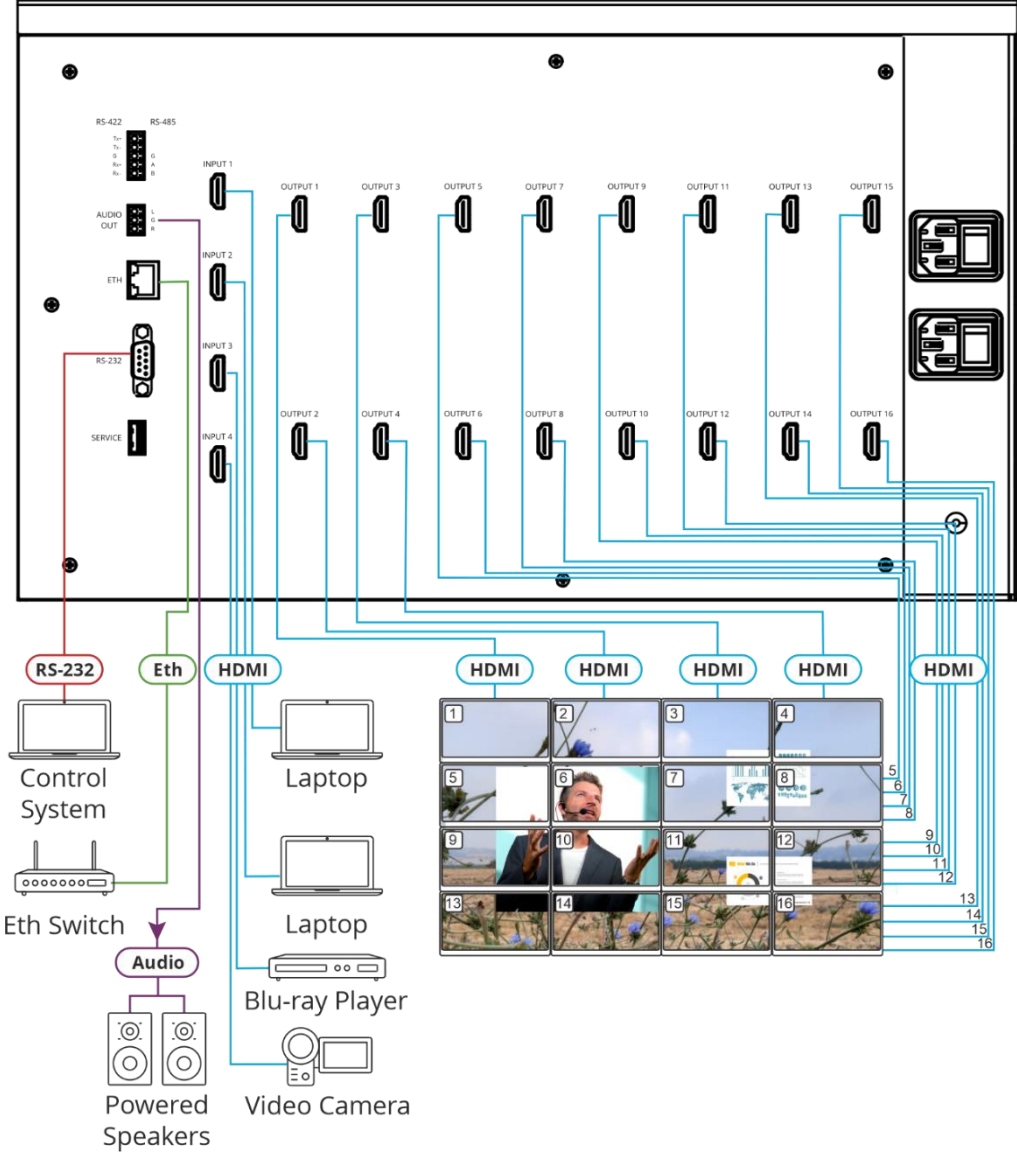
Figure 3: Connecting to the **VW-16** Rear Panel

To connect VW-16 as illustrated in the example in Figure 3:

1. Connect up to four HDMI sources to the **VW-16**'s HDMI input ports via HDMI cables.

2. Connect up to 16 HDMI displays to the **VW-16**'s output ports via HDMI cables.

3. Connect a powered speaker or amplifier to the **VW-16**'s stereo audio terminal block connectors.

4. Connect the power cord to the power socket.

Connecting the Output to an Unbalanced/Balanced Stereo Audio Acceptor

The following are the pinouts for connecting the output to a balanced stereo audio acceptor:
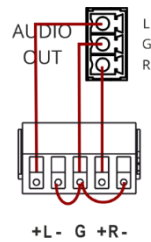
Figure 4: Connecting to a Balanced Stereo Audio Acceptor

Connecting to VW-16 via RS-232

You can connect to **VW-16** via an RS-232 connection ⑮ using, for example, a PC.

VW-16 features an RS-232 3-pin terminal block connector allowing the RS-232 to control **VW-16**.

Connect the RS-232 terminal block on the rear panel of **VW-16** to a PC/controller, as follows:

From the RS-232 9-pin D-sub serial port connect:

- Pin 2 to the TX pin on the **VW-16** RS-232 terminal block

- Pin 3 to the RX pin on the **VW-16** RS-232 terminal block

- Pin 5 to the G pin on the **VW-16** RS-232 terminal block
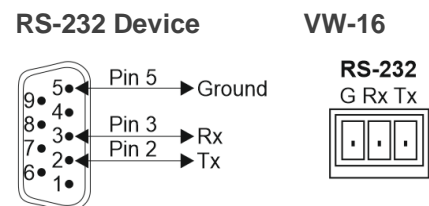
Operating and Controlling VW-16

Using Front Panel Buttons

Press the **VW-16** front panel buttons to:

- Select the required INPUTs.

- Set the Multi-viewer screen setup.

- Use a pre-set configuration.

- Lock or Unlock the front panel buttons (see Locking and Unlocking Front Panel Buttons on page 9).

- Reset the resolution to 1080p.

- Control the device via the OSD menu with the use of the MENU and navigation buttons (see Controlling Device via OSD Menu on page 10).

- Store the current wall configuration.

- Recall a pre-saved video wall configuration.

- Identify each screen by displaying A, B, C, or D on the screen.

Locking and Unlocking Front Panel Buttons

The front panel buttons can be locked (disabled) to prevent unintentional pressing of the buttons.

Locking Procedure

The locking procedure is the same for all locking modes.

To lock the front panel buttons:

- Press and hold **PANEL LOCK** ⑪ for about five seconds.
  The PANEL LOCK button lights red and the front panel buttons are locked.

Unlocking Procedure

Unlocking procedure is specific for locking modes.

To unlock the front panel buttons:

- For All or Menu Only Lock modes – Press and hold **PANEL LOCK** ⑪ for about seconds.

- For All & Save or Menu Only & Save Lock modes – Press and hold **PANEL LOCK** ⑪ and RESET TO 1080P ⑩ simultaneously for about five seconds.

The PANEL LOCK button light turns off and the front panel buttons are unlocked.

Controlling Device via OSD Menu

Use the OSD buttons to control the **VW-16** via the OSD menu.

ⓘ The default OSD timeout is set to 30 seconds.

Navigating OSD Buttons

VW-16 enables you to control and define the device parameters via the OSD with the use of the front panel MENU buttons.

To enter and use the OSD menu buttons:

1. Press MENU.
2. Press:
   - **ENTER** to accept changes and to change the menu settings.
   - **Arrow buttons** to move through the OSD menu, which is displayed on the video output.
   - To exit the menu, select **EXIT**.

To return to the previous menu level, press the front panel MENU button. All settings and adjustments are automatically saved in non-volatile memory for each of the inputs.

ⓘ The values defined in the different menus may change according to the firmware version (you can download the up-to-date firmware version from our Web site at www.kramerav.com/support/product_downloads.asp).

Configuring Screen Setting Parameters

VW-16 enables you to set the display settings, output resolution, and EDID.

To set the OSD display parameters:

1. On the front panel press **MENU**. The menu shows.

2. Select **SCREEN SETTING** > **DISPLAY SETTING** press **Enter** and define the image parameters based on the information in the following table:

Menu Item	Function
Display Column	Set the horizontal position of the OSD.
Display Row	Set the vertical position of the OSD.
H.Bezel Correction	Set the horizontal Bezel correction.
V.Bezel Correction	Set the vertical Bezel correction.
Rotation	Select the rotation angle R90° (clockwise), L90° (anti-clockwise), or Off (the default is Off).

OSD Display parameters are set.

To select the output resolution parameters:

1. On the front panel press **MENU**. The menu shows.

2. Select **SCREEN SETTING** > **OUTPUT RESOLUTION** press **Enter** and set the output resolution parameters based on the information in the following table:

Menu Item	Function
Output Resolution	4096x2160@60Hz, 4096x2160@50Hz, 3840x2160@60Hz, 3840x2160@50Hz, 3840x2160@30Hz, 1920x1200@60Hz, 1920x1080@50Hz,1920x1080@30Hz, 1280x720@60Hz, 1280x720@30Hz, 1600x1200@60Hz, 1920x1200@60Hz, 2048x2048@57Hz

Output resolution parameters are set.

To manage the EDID:

1. On the front panel press **MENU**. The menu shows.

2. Select **SCREEN SETTING** > **EDID** and define the EDID parameters based on the information in the following table:

Menu Item	Function
EDID	Default EDID: 1080p.
EDID on INPUT 1	Select the EDID for INPUT 1 which is applied to all outputs.

EDID is defined.

Configuring the Video Wall

To set the audio source:

1. On the front panel press **MENU**. The menu shows.

2. Select **VIDEO WALL** > **AUDIO SOURCE** press **Enter** and define the audio source parameters based on the information in the following table:

Menu Item	Function
MUTE	Mutes the audio.
INPUT 1 – INPUT 4	Select source to output audio: Inputs 1-4.

The video wall audio source is set.

To configure the color settings:

1. On the front panel press **MENU**. The menu shows.

2. Select **VIDEO WALL** > **COLOR SETTING** press **Enter** and define the color setting parameters based on the information in the following table:

Menu Item	Function
Brightness	Adjust Brightness value between 0-100.
Contrast	Adjust Contrast value between 0-100.
Hue	Adjust Hue value between 0-100.
Saturation	Adjust Saturation value between 0-100.

The video wall color settings are set.

To set the aspect ratio:

1. On the front panel press **MENU**. The menu shows.

2. Select **VIDEO WALL** > **ASPECT RATIO** press **Enter** and define the aspect ratio parameters based on the information in the following table:

Menu Item	Function
Full	Enlarge to full screen size.
Best Fit	Keep the original aspect ratio and enlarge to fit the screen automatically either horizontal or vertical dimension.
Follow Input	Keep the original aspect ratio.

The video wall aspect ratio is set.

To set the video source:

1. On the front panel press **MENU**. The menu shows.

2. Select **VIDEO WALL** > **VIDEO SOURCE** press **Enter** and define the video source parameters based on the information in the following table:

Menu Item	Function
INPUT 1 – INPUT 4	Select a source to input vide: Inputs 1-4.

The video wall's video source is set.

Configuring the Multi-Viewer

To set the audio source:

1. On the front panel press **MENU**. The menu shows.

2. Select **MULTI-VIEWER** > **AUDIO SOURCE** press **Enter** and define the audio source parameters based on the information in the following table:

Menu Item	Function
INPUT 1 – INPUT 4	Connect the speaker or amplifier to the stereo audio terminal block connectors to **VW-16** via the stereo audio cable.

The multi-viewer aspect ratio is set.

To configure the color settings:

1. On the front panel press **MENU**. The menu shows.

2. Select **MULTI-VIEWER** > **COLOR SETTING** press **Enter** and define the color setting parameters based on the information in the following table:

Menu Item	Function
Brightness	Adjust Brightness value between 0 ~ 100.
Contrast	Adjust Contract value between 0 ~ 100.
Hue	Adjust Hue value between 0 ~ 100.
Saturation	Adjust Saturation value between 0 ~ 100.

The multi-viewer color setting is configured.

To configure the layout settings:

1. On the front panel press **MENU**. The menu shows.

2. Select **MULTI-VIEWER** > **LAYOUT SETTING** press **Enter** and define the layout setting parameters based on the information in the following table:

Menu Item	Function
1-3 x PiP	Sets the multi-viewer mode to present 1, 2, or, 3 PiP windows over a parent picture in the video all.
Quad Split	Sets the source to output for each monitor. Set up each monitor 1, 2, 3, 4 individually.
Custom 1-7	Set the position and size of the windows of each custom screen layout from Custom1 to Custom 7.
Single Picture	The video of one source is only presented over the video wall.

The multi-viewer layout settings are configured.

To set the video source:

1. On the front panel press **MENU**. The menu shows.

2. Select **MULTI-VIEWER** > **VIDEO SOURCE** press **Enter** and define the video source parameters based on the information in the following table:

Menu Item	Function
WIN A	INPUT 1-4.
WIN B	INPUT 1-4.
WIN C	INPUT 1-4.
WIN D	INPUT 1-4.

The multi-viewer video source is set.

Configuring the System

To set the Unit ID source:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **UNIT ID** press **Enter** and set the unit's ID parameters based on the information in the following table:

Menu Item	Function
Unit ID	Indicate the ID of the unit. ID ranges between 0-100.

The Unit's ID is set.

To view the MAC address:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **MAC ADDRESS** press **Enter**.
    The MAC address shows.

To configure the RCL/STO:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **RECALL/STORE** press **Enter** and set the unit's ID parameters based on the information in the following table:

Menu Item	Function
STO (Store)	Press, followed by an Input button (1 to 4), to save the current wall configuration.
RCL (Recall)	Press, followed by an Input button (1 to 4), to recall a pre-saved wall configuration.

The RCL and STO are configured.

To configure the HDCP setting:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **HDCP SETTING** press **Enter** and set the HDCP setting parameters based on the information in the following table:

Menu Item	Function	
Input 1	ON/OFF	Set HDCP support on HDMI 1 to HDMI 4 inputs to ON (default) or OFF. Note that: 1. HDCP must be enabled (ON) to support HDCP encrypted sources. 2. Sources such as Mac computers always encrypt their outputs when detecting that the sink supports HDCP. If the content does not require HDCP, you can prevent these sources from encrypting by disabling (OFF) HDCP on the input.
Input 2	ON/OFF	
Input 3	ON/OFF	
Input 4	ON/OFF	

The HDCP settings are configured.

To configure the network settings:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **NETWORK SETTING** press **Enter** and set the network setting parameters based on the information in the following table:

Menu Item	Function
Ethernet Type	Select Ethernet type STATIC or DHCP.
IP Address	Indicates the systems current IP address. For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39. Default: 192:168:001:039.
Mask	255:255:255:000
Gateway	000:000:000:000

The network settings are configured.

To configure the OSD setting:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **OSD SETTING** press **Enter** and set the OSD setting parameters based on the information in the following table:

Menu Item	Function
H Offset	0-100
V Offset	0-100
Transparency	0-4
IDENT. Timeout	OFF/5-50
MENU. Timeout	OFF/5-50
INFO. Timeout	OFF/5-50
INFO. Display	ON/OFF

The OSD settings are configured.

To use the factory default:

1. On the front panel press **MENU**. The menu shows.

2. Select **SYSTEM** > **FACTORY DEFAULT** press **Enter** and set the factory default parameters based on the information in the following table:

Menu Item	Function
ON	Use the factory default settings.
OFF	Do not use the factory default settings.

If "on" is selected, the device is reset to its factory default settings.

Viewing Device Information

To view the input resolution:

1. On the front panel press **MENU**. The menu shows.

2. Select **INFORMATION** > **INPUT RESOLUTION** press **Enter**.
   The input resolution for INPUT 1-4 show.

To view the output resolution:

1. On the front panel press **MENU**. The menu shows.

2. Select **INFORMATION** > **OUTPUT RESOLUTION** press **Enter**.
   The output resolution shows.

To view the firmware version:

1. On the front panel press **MENU**. The menu shows.

2. Select **INFORMATION** > **FIRWARE VERSION** press **Enter**.
   The output resolution shows.

To view the fan speed version:

1. On the front panel press **MENU**. The menu shows.

2. Select **INFORMATION** > **FAN SPEED** press **Enter**.
   The fan speed shows.

Operating via Ethernet

You can connect to the **VW-16** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Connecting Ethernet Port Directly to a PC on page 17).

- Via a network hub, switch, or router, using a straight-through cable (see Connecting Ethernet Port via a Network Hub or Switch on page 19).

ⓘ If you want to connect via a router and your IT system is based on IPv6, speak to your IT department for specific installation instructions.

For info on configuring the Ethernet, see Defining System Settings on page 32.

Connecting Ethernet Port Directly to a PC

You can connect the Ethernet port of **VW-16** directly to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.

This type of connection is recommended to identify the **VW-16** with the factory configured default IP address.

After you connect the **VW-16** to the Ethernet port, configure your PC as follows:

1. Click **Start** > **Control Panel** > **Network and Sharing Center**.

2. Click **Change Adapter Settings**.

3. Highlight the network adapter you want to use to connect to the device and click **Change settings of this connection**.
The Local Area Connection Properties window for the selected network adapter shows as shown in Figure 5.
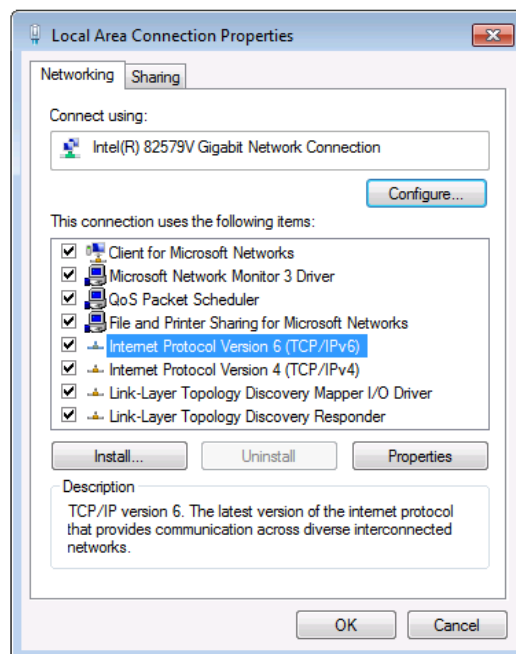
Figure 5: Local Area Connection Properties Window

4. Highlight either **Internet Protocol Version 6 (TCP/IPv6)** or **Internet Protocol Version 4 (TCP/IPv4)**, which is based on the requirements of your IT system.

5. Click **Properties**.
The Internet Protocol Properties window (specific to your IT system) shows as in Figure 6 or Figure 7.
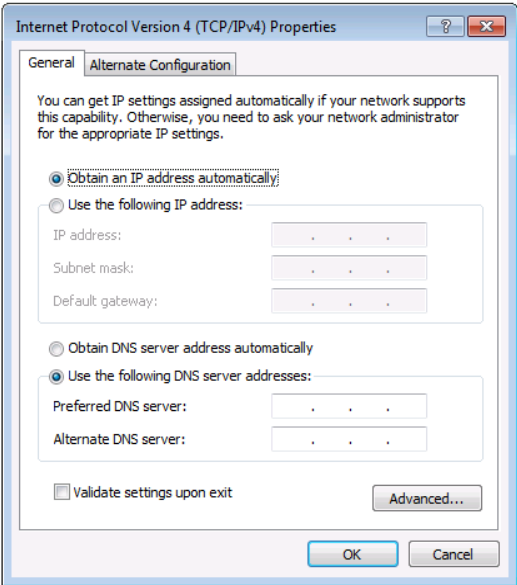
Figure 6: Internet Protocol Version 4 Properties Window
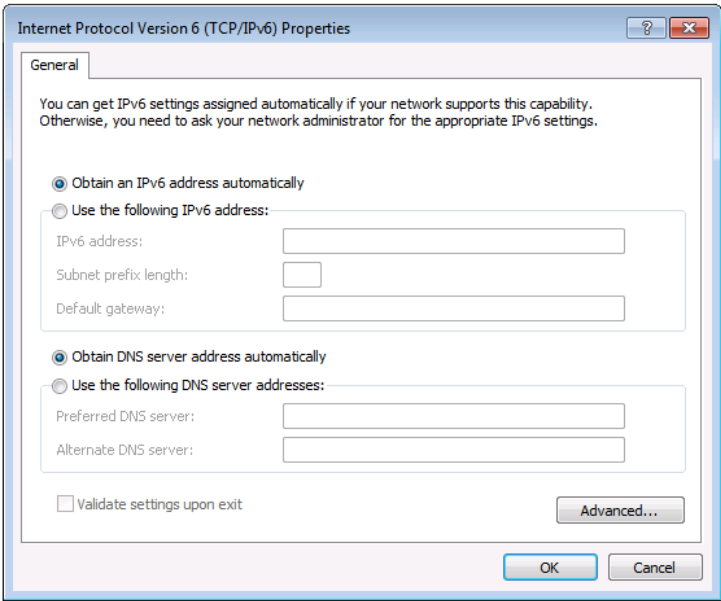
Figure 7: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and enter the details as shown in Figure 8.
   For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) provided by your IT department.
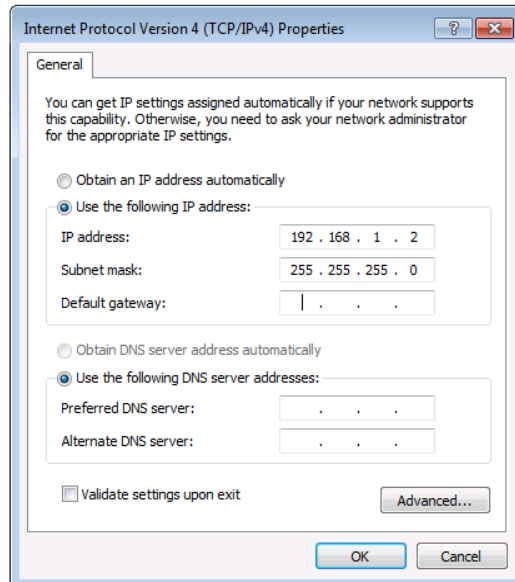
Figure 8: Internet Protocol Properties Window

7. Click **OK**.

8. Click **Close**.

Connecting Ethernet Port via a Network Hub or Switch

You can connect the **VW-16** Ethernet port to the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

Acquiring and Setting Current EDID Using RS-232 Serial Commands

1. Connect a PC, or other serial controller to **VW-16** RS-232.

2. Use Protocol 3000 commands, see .

Using VW-16 Embedded Webpages

VW-16 can be operated remotely using the embedded webpages. The webpages are accessed using a Web browser and an Ethernet connection.

ⓘ You can also configure **VW-16** with the use of Protocol 3000 commands (see Protocol 3000 Commands on page 41).

Before attempting to connect:

- Do the procedures in (see Operating via Ethernet on page 16).

- Ensure that your browser is supported.

The following operating systems and Web browsers are supported:

Operating Systems	Versions
Windows 7	IE
	Firefox
	Chrome
	Safari
Windows 10	IE
	Edge
	Firefox
	Chrome
Mac	Safari
iOS	Safari

ⓘ Some features might not be supported by some cellphone operating systems.

Browsing VW-16 Webpages

1. In a browser, enter the device's IP address (default = 192.168.1.39).

   The default webpage shows.
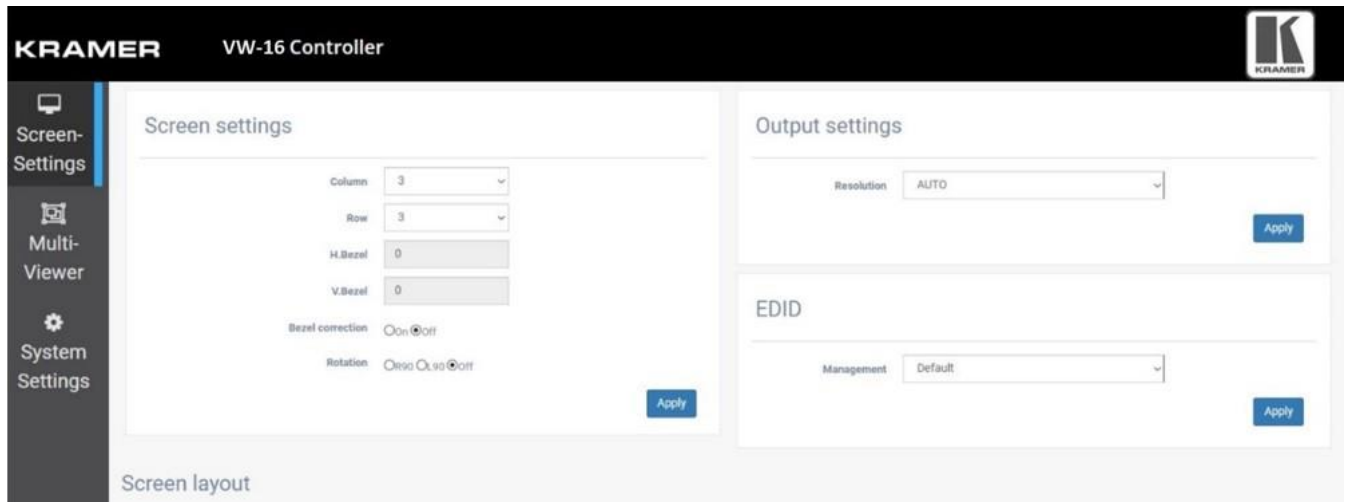
Figure 9: Default Webpage

2. To access the relevant webpage, select from the Navigation List on the left side of the screen.

ⓘ   If a webpage does not update correctly, clear your eb browser's cache.

VW-16 webpages enable to do the following:

- [Configuring the Screen Setting](#) on page [22](#).
- [Configuring the Output Resolution Settings](#) on page [24](#).
- [Managing EDID](#) on page [24](#).
- [Configuring the Screen Layout](#) on page [25](#).
- [Audio Settings:](#) on page [26](#).
- [Color Settings](#) on page [27](#).
- [Layout Settings](#) on page [27](#).
- [Resetting Device](#) on page [34](#).

Configuring the Screen Settings

VW-16 enables you to configure a video wall array system as 4x4, 2x8, 8x2, 5x3, 16x1, and more.
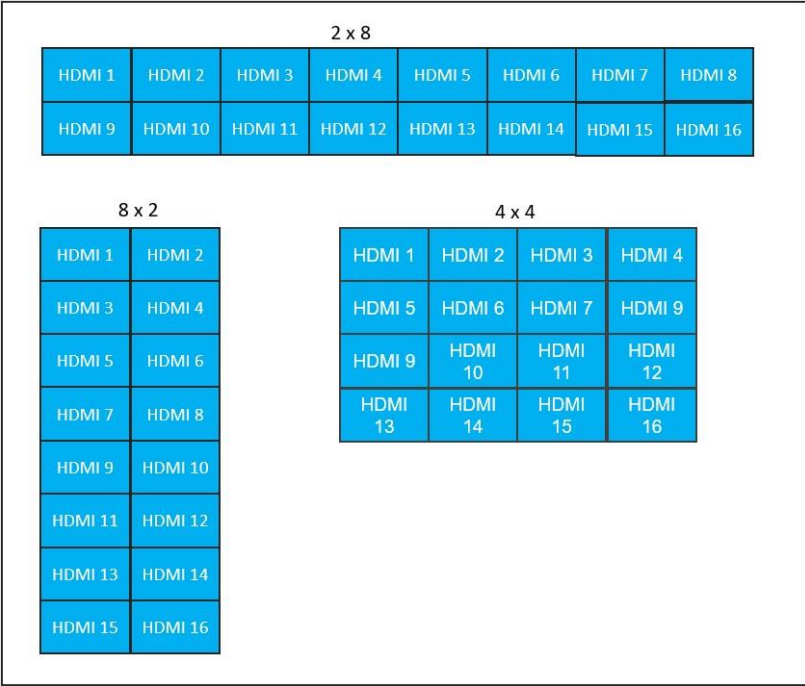
Figure 10: Optional View Wall Array Systems

ⓘ Bezel and Gap Compensation – To avoid video display twisted, setting up the dimension of connected displays for bezel and gap compensation. Input the screen's outside screen width and length (which includes the bezel) and inside visual width and length (excluding bezel) for auto compensation.
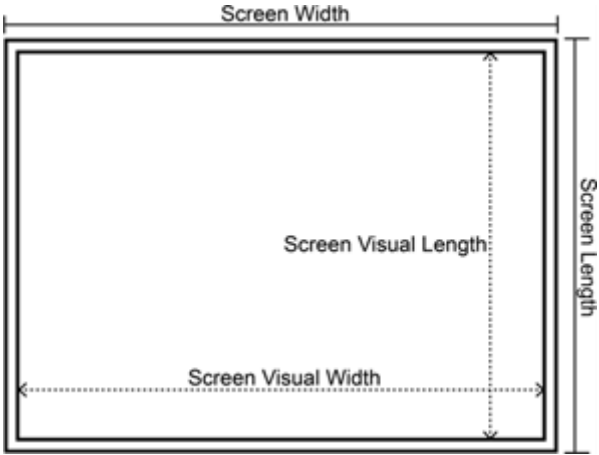
Figure 11: Bezel and Gap Compensation

To configure screen settings:

1. From the Navigation List, select **Screen Settings**.

   The Screen settings page shows.
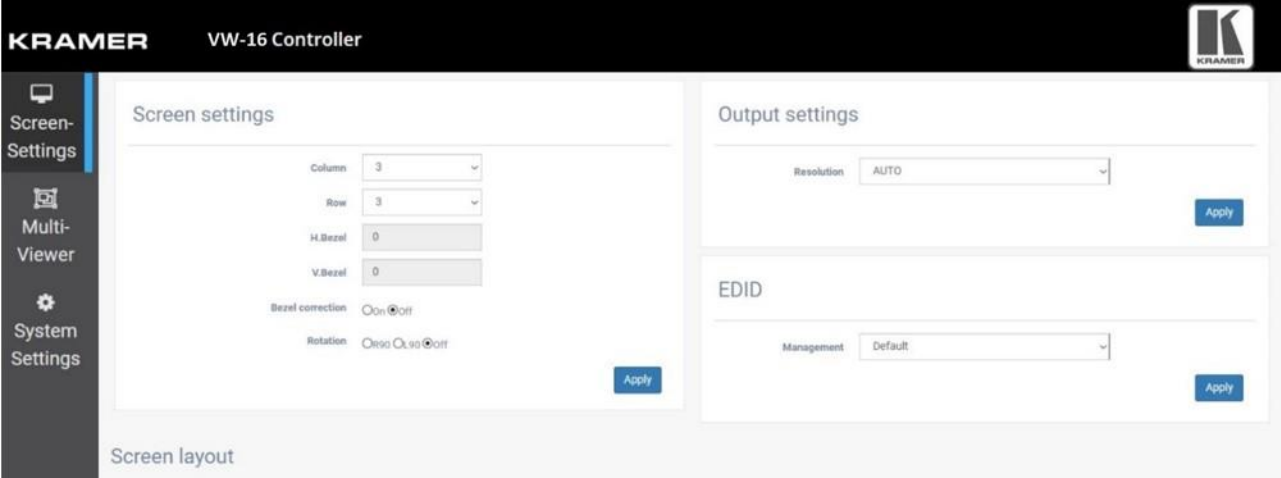
Figure 12: Embedded Webpages – Screen-Settings Page

2. Set the Screen settings based on the table below.

Option	Description
Column	Input display number in column from the table (see Figure 16).
Row	Input display number in row from the table (see Figure 16).
Screen Width	Input the width (horizontal) of the display(including the bezel of display).
Screen Length	Input the length (vertical) of the display (including the bezel of display).
Screen Visual Width	Input the visual width (horizontal) of the display (excluding the bezel of display).
Screen Visual Length	Input the visual length (vertical) of the display (excluding the bezel of display).
Rotation	Select the rotation angle R90° (clockwise), L90° (anti-clockwise) or Off. The default is Off.
Apply	Click "Apply" to confirm the setting.

The screen settings are set.

Configuring the Output Resolution Settings

VW-16 allows users to select an output resolution.

To set the Output:

1. From the Navigation List, select **Screen Settings**.

2. Below Output Settings, in **Resolution**, click the down arrow and choose an output resolution.
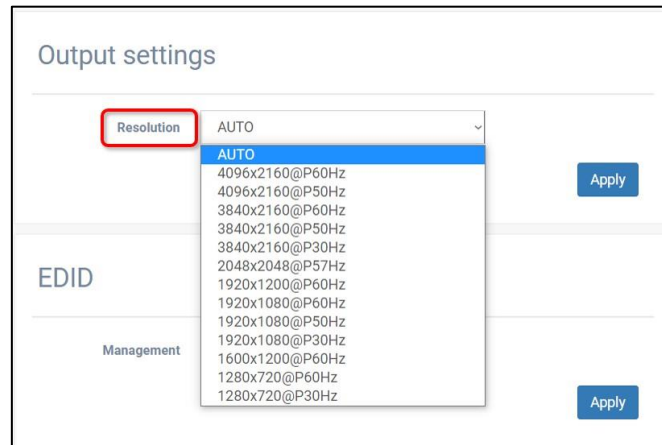
Figure 13: Embedded Webpages – Setting the Output Resolution

3. Click **Apply**.

The output resolution is set.

Managing EDID

The EDID Management page lets you read the EDID from:

- Any of the outputs.
- The default EDID.

The EDID can be copied to selected input(s).

To copy the EDID for INPUT 1 to all connected inputs:

1. From the Navigation List, select **Screen Settings**.

2. Below **EDID**, in **Management**, click the down arrow and choose **Copy**.

Figure 14: EDID Page – Selecting an EDID Source

3. Click **Apply**.

The EDID for Input 1 is now copied to all connected outputs.

To read the EDID from the Default:

1. From the Navigation List, click **Screen Settings**.

2. Below **EDID**, in **Management**, click the down arrow and choose **Delete**.

The EDID details show.

Figure 15: EDID Details

3. Click **Apply**.

The EDID is now set to use the Default.

Configuring the Screen Layout

The **VW-16** can build video wall array systems 4X4, 2x8, 8x2, 5x3 as illustrated below.

To configure the screen layout:

1. From the Navigation List, select **Screen Settings**.

2. Below Screen settings, use **Column** and **Row** to configure the screen layout.

    In this example, Column is set to 4 columns and Row is set to 4 rows:

Figure 16: Example Screen Layout

3. To save the changes, click **Apply**.

4. Reload the webpage.

The Screen layout is now configured.

Setting Up the Multi-Viewer Video Wall Page

The Multi-Viewer mode is multi-view video wall which presents multiple windows simultaneously from a maximum of four sources on the video wall system. User can configure the windows to display across the multi-screen arrays, resized, and repositioned.

Various screen layouts are available in Multi-Viewer mode:

- 5 sets of pre-defined layout mode.
- 7 sets of custom multi-view layout modes.

Audio Settings:

To set the audio:

1. From the Navigation List, select **Multi-Viewer**.

2. In **Audio source**, click the down arrow and select a source to output the audio: INPUT 1, INPUT 2, INPUT 3, or INPUT 4.
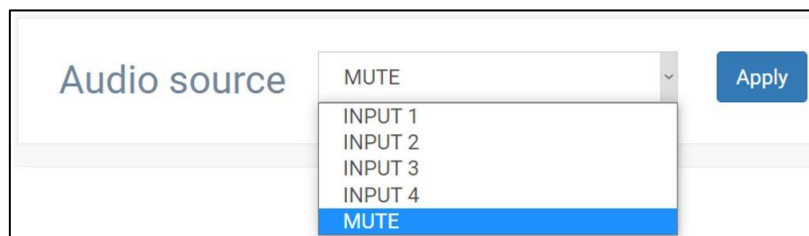
Figure 17: Embedded Webpages – Setting the Source to Output Audio

Note - To mute the source audio, select **MUTE** and click **Apply**.

3. Click **Apply**.

The audio source to output is set.

Color Settings

VW-16 allows users to adjust the color settings: brightness, contrast, hue, and saturation.

To adjust the color settings:

1. From the Navigation List, select **Multi-Viewer**.

2. Adjust the **Color settings**, move the slider right or left to adjust color (RGB).

    a. **Brightness** – adjusts brightness values between 0-100.

    b. **Contrast** – adjusts contrast values between -100.

    c. **Hue** – adjust hue values between 0-100.

    d. **Saturation** – Adjust saturation values between 0-100.

3. Click **Apply**.

The color settings are adjusted.

Layout Settings

There are two mode options to set up the screen layout settings.

Option 1: Pre-Defined Layout Settings

When the screen layout is in **Pre-defined** mode, the settings for Aspect Ratio and Border Color show for the user to configure.

To use a Pre-defined layout setting:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In Pre-defined, select a Layout. See the table below for a description of each layout option:

Pre-Defined		
	Layout A	Video wall mode is the video of one source only is presented over the video wall.
	Layout B	Multiview mode presents 1 PiP window over a parent picture in the video wall.
	Layout C	Multiview mode presents 2 PiP windows over a parent picture in the video wall.
	Layout D	Multiview mode presents 3 PiP windows over a parent picture in the video wall.
	Layout E	Multiview mode presents 4 windows over the video wall.
Note – In this setting, input sources are fixed to the corresponding window.		

3. In **Aspect ratio**, select the down arrow and choose from one the following aspect ratios:

Option	Description
Full	Enlarge to full screen size.
Best Fit	Keep the original aspect ratio.
Follow input	Keep the original aspect ratio and enlarge to the screen automatically either horizontal or vertical dimension.

4. Click **Apply**.

The layout setting is configured.

To change a Pre-defined layout setting:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Pre-defined**, select a **Layout**.

3. In the graphic layout area, click the monitor icon. The Quadview input window opens.

4. Select the **Channel** down arrow and choose an input (INPUT 1-4).
   Note – The input is the video source for output when in single source video wall display mode.

5. To save the changes, click **Apply**.

The source input channel is changed.

To return to the original **Pre-defined** layout settings, click **Reset**.

Option 2: Configure the Custom Layout Settings

VW-16 has a maximum of 7 sets of custom screen layouts that users can define and store. Users can reset and restore the custom screen layout at any time.

There are two ways to define the custom layout:

- Move the slider to set the size and position of the window.
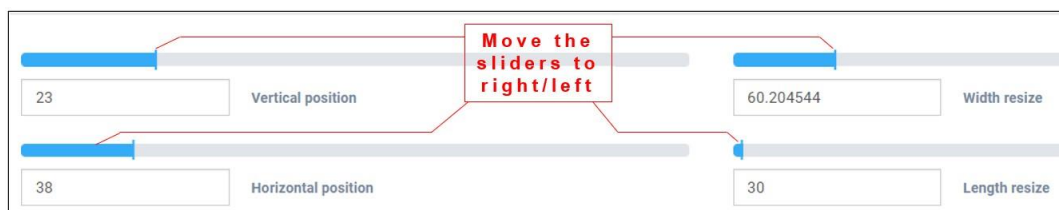
Figure 18: Webpages – Adjusting the Slider in Custom Layout

- Drag the windows shown in the graphic layout area to set the size and position of each window.
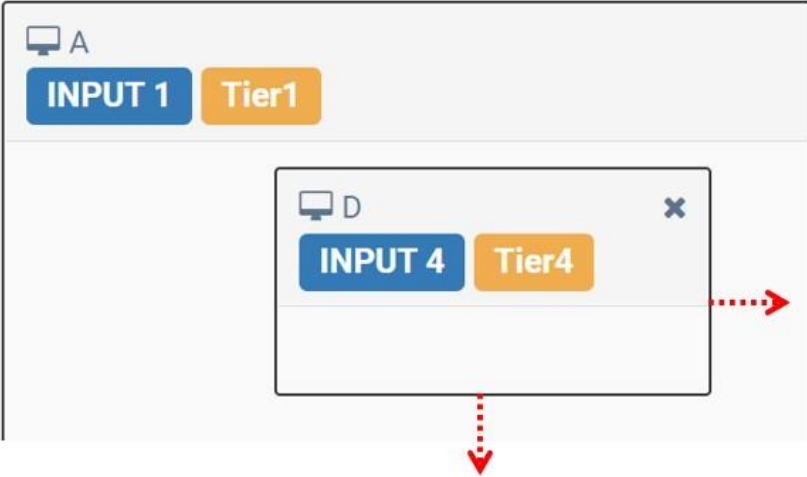
Figure 19: Webpages – Adjusting the Window in Custom Layout

(i) Settings for Aspect ratio are not available in custom screen layout mode.

To configure the Custom Layout:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

   The graphic layout window shows the selected custom layout. In this example, Custom 2 is selected:
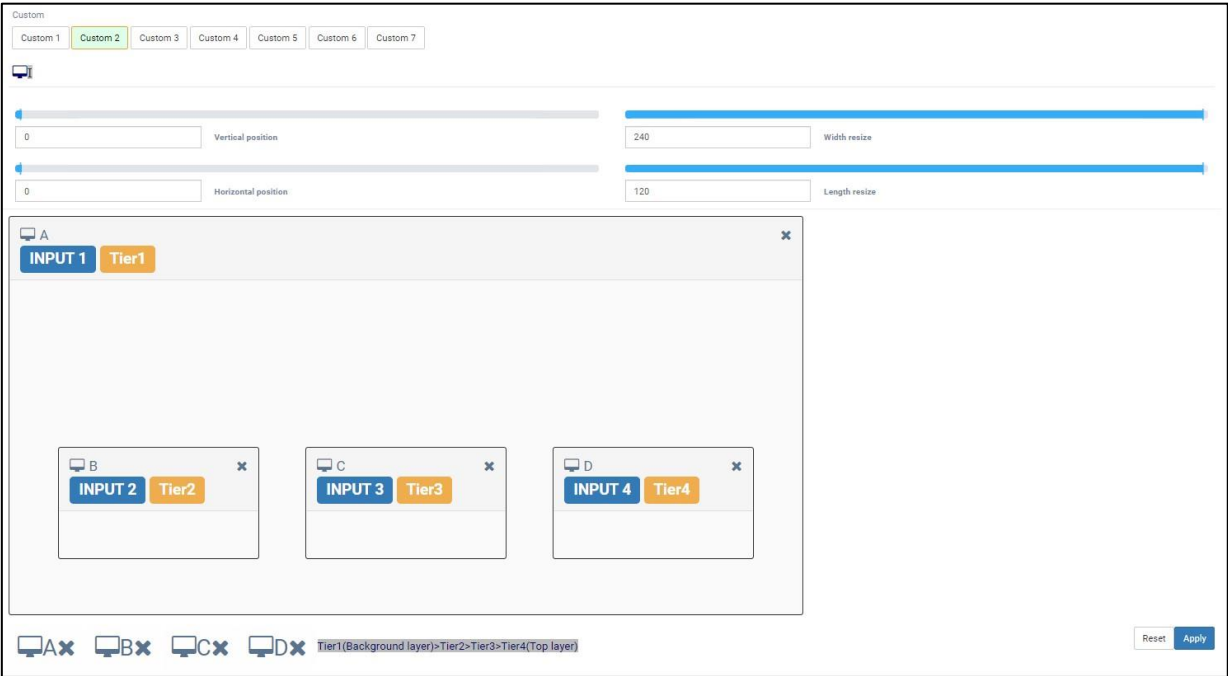
Figure 20: Example Webpage with Custom Multi-Viewer

3. Click **Apply**.

The Custom layout is set.

To change the source input channel:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

3. In the graphic layout area, click the monitor icon. The Quadview input window opens.
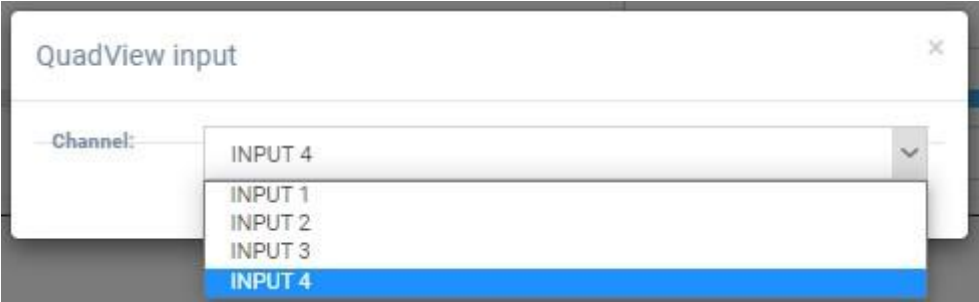
Figure 21: Webpages – Changing a Custom Input Channel

4. Select the Channel down arrow and choose an input (INPUT 1-4).

The source input channel is changed.

To reset a Custom setting to its default configuration:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

3. Click **Reset**.

The Custom layout setting is reset.

To adjust the window's position manually:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

3. In the graphic layout area, use these options:

   ▪ Click and drag the input to the necessary position.

   ▪ Click an input's border line and stretch it the correct position.

     Note – Only the right and bottom lines are adjustable.

   ▪ Above the graphic layout area, use the positional slide bars.

Slide bar Name:	Description:
Vertical position	Sets the vertical position of the selected window.
Horizontal position	Sets the horizontal position of the selected window.
Width resize	Sets the width of the selected window.
Length resize	Sets the length of the selected window.

To adjust the tier setup:

Tier 1, Tier 2, Tier 3, and Tier 4 indicate the tier of the overlapped window. For example, the bottom tier, Tier 1, is the background layer.

(i) The tier adjustment option is only available in Custom layout mode.

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

   Notes - Tier 1 is always the background layer.

3. Click a window's tier number to change its tier. For illustration, in window C, click Tier2 to change its number.

Figure 22: Webpages – Adjusting the Tier Number

4. To save the changes, click **Apply**.

The tier is setup.

To disable a window(s):

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

3. To disable a window, do one of the following:

   • Click the "X" icon of each window in the graphic layout area.

     Or,

   • Click the "X" icon of each window that shows at the bottom of the webpage.
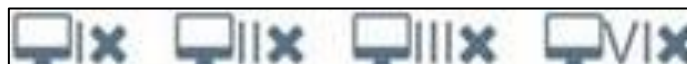
Figure 23: Webpages – Disable a Window in Graphic Layout

4. To save the changes, click **Apply**.

The selected window(s) are disabled.

To enable a window:

1. From the Navigation List, select **Multi-Viewer** > **Layout settings**.

2. In **Custom**, select a custom layout (1-7).

3. To enable a window, do one of the following:

4. Click the "X" icon of each window that shows at the bottom of the webpage.

5. To save the changes, click **Apply**.

The selected window is enabled.

Defining System Settings

To change the IP address and device (Unit) ID or view other important device information such as network settings, navigate to System Settings > System, which also enables:

-

-

-

-

-

-

-

Viewing the Ethernet Type (Static or HDCP)

To view the Ethernet type (Static or HDCP):

1. From the Navigation List, click **System Settings**.

2. Below **System** > **Ethernet type**.

ⓘ To change the Ethernet type to HDCP, (see).

Viewing the MAC Address

1. From the Navigation List, click **System Settings**.

2. Below **System** > **MAC address**.

Changing the IP Address

Note – The **VW-16** default IP address is 192.168.1.39.

1. From the Navigation List, click **System Settings**.

2. Below **System** > **IP Address**.

3. Click the current IP address, the Network settings window opens.

4. In the IP address field, enter the new IP address.

Figure 24: Webpage – Changing the IP address

5. To save the changes, click **Confirm**.

6. In a web browser, access the webpages via the new IP address.

The new IP address is configured.

Setting the Unit's ID

1. From the Navigation List, click **System Settings**.

2. Below **System**, select the number after **Unit ID**.
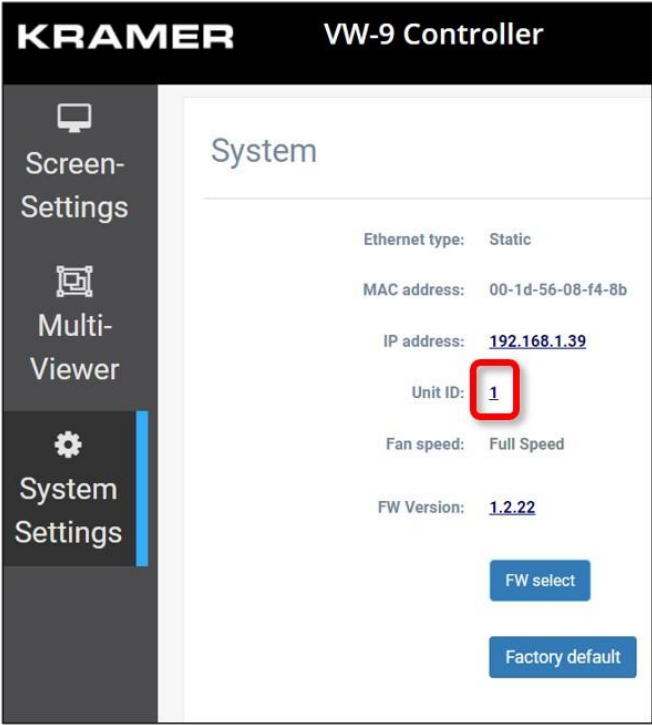
Figure 25: Setting the Unit ID

3. In the Unit ID window, enter the Unit ID for the device.

Figure 26: Unit ID Number Set to "5"

4. To save the changes, click **Confirm**.

The Unit ID is set.

Viewing the Fan Speed

Indicates the operating fan speed. There are two speed modes "Full Speed" and "Low Speed". The fan speed is adjusted automatically based on the operating environment.

To view fan speed:

1. From the Navigation List, click **System Settings**.

2. Below **System** > **Fan speed**.

Fan speed is viewed.

Resting the VW-16 to its Factory Default

To reset to factory default:

1. From the Navigation List, click **System Settings**.

2. Below **System**, select **Factory default**.

3. In the Apply window that opens, click **Apply**.

The **VW-16** is reset to the factory default.

Resetting Device

Factory reset – Reboots your device and restores all factory settings including input/output definitions, and IP address.

Resetting the device can be accomplished by using:

- Protocol 3000 FACTORY command (see Protocol 3000 Commands on page 41).

- Webpages (see Defining System Settings on page 32).

Upgrading Firmware

ⓘ Before you begin the firmware update, copy these files to a USB flash drive:

- Image.S19

- min.x.x.x.x.bin

- mout.x.x.x.x.bin

- sinx.x.x.bin

To upgrade the firmware:

1. Turn **VW-16** on.

2. Check the current firmware version via the OSD or webpages.

3. Insert the USB flash drive into the **VW-16** USB port.

4. Go to the OSD and select **FW Upgrade**.

   a. The FW upgrade status shows this message in the terminal "Updating Firmware".

   b. After the firmware update is complete, the front panel lights turn off and the system reboots.

   c. The FW upgrade status shows this message in the terminal "Updating Firmware".

   d. The front panel button lights turn on.

The firmware upgrade is complete.

Technical Specifications

Inputs	HDMI	4 x HDMI 2.0
Outputs	HMDI	16 x HDMI 2.0
	Audio Output	Stereo unbalanced on a 3-pin terminal block
Image Processing	Input Resolutions	4096 x 2160p (60Hz, 50Hz, 24Hz), 3840 x 2160p (60Hz, 50Hz, 30Hz, 25Hz, 24Hz), 2560 x 1080p (60Hz), 1920 x 1080p (60Hz, 50Hz, 30Hz, 25Hz, 24Hz), 1920 x 1080i (60Hz, 50Hz), 1280 x 720p (60Hz), 720 x 480p (60Hz, 50Hz), 720 x 576p (50Hz), 640 x 480p (60Hz, 50Hz)
	Input & Output Chroma Sampling	4:4:4
	Output Color Depth	24 bpp
	Video Bandwidth	Up to 18 Gbps
	Output Resolutions	4096 x 2160p (60Hz ,50Hz), 3840 x 2160p (60Hz, 50Hz, 30Hz), 2048 x 2048p (57Hz), 1920 x 1200p (60Hz), 1920 x 1080p (60Hz, 50Hz, 30Hz), 1600 x 1200p (60Hz), 1280 x 720p (60Hz, 30Hz)
	HDMI Compliance	HDMI 1.4 And HDMI 2.0
	HDCP Compliance	HDCP 1.4 And HDCP 2.2
Controls	RS-232 / Telnet	1 x D9 female connector
	RS-485 / RS-422	5-pole terminal block
	Ethernet Port	1 x RJ45 /
	Web Interface	Embedded Web UI
Firmware	Possible: Upgrade	1 x USB 2.0
Power	Dual (Redundant) Power Supplies	Built-in power modules 100–240 VAC / 50/60 Hz
	Power Consumption	300W
	Heat Dissipation	260W (885BTU/hr)
Noise Level	Ambient Noise	For rack max = 46db, for desktop max = 40db
Environmental Conditions	Operating Temperature	0°C ~ 40°C (32°F - 104°F)
	Operating Humidity	0% ~ 80% RH
	Storage Temperature	-20°C ~ 60°C (-4°F - 140°F)
Regulatory Compliance	Safety, Environmental	CE, FCC
Enclosure	Size	19" 5RU
	Type	Aluminum
	Cooling	Convection ventilation (8 ceiling mounted fans)
General	Net Dimensions (W, D, H)	44cm x 26.4cm x 42.1cm (1.4' x 0.8" x 1.3') W,D,H
	Shipping Dimensions (W, D, H)	49cm x 35.5cm x 49cm (1.6' x 1.1' x 1.6') W,D,H
	Net Weight	16.3kg (36lbs) approx.
	Shipping Weight	17.2kg (38lbs) approx.
Accessories	Included	OEM Power Cord EU & US C-14 L-180CM

Specifications are subject to change without notice at www.kramerav.com

Default Communication Parameters

RS-232	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Example: (mute video on output 1): #VMUTE 1,1	Y 0 92 1<CR>
Ethernet	
To reset the IP settings to the factory reset values go to: Menu->Setup -> Factory Reset-> press Enter to confirm	
IP Address:	192.168.1.39
Subnet mask:	255.255.255.0
Default gateway:	192.168.1.254
TCP Port #:	80
Maximum TCP Ports:	1
Full Factory Reset	
OSD	Go to: Menu-> SYSTEM -> FACTORY DEFAULT -> YES press Enter to confirm.

Default EDID

```
Monitor
  Model name............... VW-16
  Manufacturer............ KMR
  Plug and Play ID......... KMR060D
  Serial number............ 49
  Manufacture date........ 2014, ISO week 6
  Filter driver............ None
  ------------------------
  EDID revision............ 1.3
  Input signal type........ Digital
  Color bit depth.......... Undefined
  Display type............. Monochrome/grayscale
  Screen size.............. 310 x 170 mm (13.9 in)
  Power management........ Standby, Suspend
  Extension blocs.......... 1 (CEA/CTA-EXT)
  ------------------------
  DDC/CI................... n/a

Color characteristics
  Default color space...... Non-sRGB
  Display gamma............ 2.40
  Red chromaticity......... Rx 0.611 - Ry 0.329
  Green chromaticity....... Gx 0.313 - Gy 0.559
  Blue chromaticity........ Bx 0.148 - By 0.131
  White point (default).... Wx 0.320 - Wy 0.336
  Additional descriptors... None

Timing characteristics
  Horizontal scan range.... 15-136kHz
  Vertical scan range...... 23-61Hz
  Video bandwidth.......... 600MHz
  CVT standard............. Not supported
  GTF standard............. Not supported
  Additional descriptors... None
  Preferred timing......... Yes
  Native/preferred timing.. 3840x2160p at 60Hz (16:9)
    Modeline.............. "3840x2160" 594.000 3840 4016 4104 4400 2160 2168 2178 2250 +hsync +vsync
  Detailed timing #1....... 1920x1080p at 60Hz (16:9)
    Modeline.............. "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync

Standard timings supported
  640 x  480p at  60Hz - IBM VGA
  640 x  480p at  72Hz - VESA
  640 x  480p at  75Hz - VESA
```

```
    800 x  600p at  56Hz - VESA
    800 x  600p at  60Hz - VESA
    800 x  600p at  72Hz - VESA
    800 x  600p at  75Hz - VESA
   1024 x  768p at  60Hz - VESA
   1024 x  768p at  70Hz - VESA
   1024 x  768p at  75Hz - VESA
   1280 x 1024p at  75Hz - VESA
   1600 x 1200p at  60Hz - VESA STD
   1280 x 1024p at  60Hz - VESA STD
   1400 x 1050p at  60Hz - VESA STD
   1920 x 1080p at  60Hz - VESA STD
    640 x  480p at  85Hz - VESA STD
    800 x  600p at  85Hz - VESA STD
   1024 x  768p at  85Hz - VESA STD
   1280 x 1024p at  85Hz - VESA STD
```

EIA/CEA/CTA-861 Information
  Revision number.......... 3
  IT underscan............. Supported
  Basic audio.............. Supported
  YCbCr 4:4:4.............. Supported
  YCbCr 4:2:2.............. Supported
  Native formats........... 0
  Detailed timing #1....... 1440x900p at 60Hz (16:10)
    Modeline.............. "1440x900" 106.500 1440 1520 1672 1904 900 903 909 934 -hsync +vsync
  Detailed timing #2....... 1366x768p at 60Hz (16:9)
    Modeline.............. "1366x768" 85.500 1366 1436 1579 1792 768 771 774 798 +hsync +vsync
  Detailed timing #3....... 1920x1200p at 60Hz (16:10)
    Modeline.............. "1920x1200" 154.000 1920 1968 2000 2080 1200 1203 1209 1235 +hsync -vsync

CE video identifiers (VICs) - timing/formats supported
   1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
   1280 x 720p at 60Hz - HDTV (16:9, 1:1)
   1280 x 720p at 50Hz - HDTV (16:9, 1:1)
   1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
   1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
    720 x 480p at 60Hz - EDTV (4:3, 8:9)
    720 x 576p at 50Hz - EDTV (4:3, 16:15)
    720 x 480i at 60Hz - Doublescan (4:3, 8:9)
    720 x 576i at 50Hz - Doublescan (4:3, 16:15)
   1920 x 1080p at 30Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 25Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 24Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 24Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 24Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 24Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 24Hz - HDTV (16:9, 1:1)
   1920 x 1080p at 24Hz - HDTV (16:9, 1:1)
   NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
  LPCM   2-channel, 16/20/24 bit depths at 32/44/48 kHz

CE speaker allocation data
  Channel configuration.... 2.0
  Front left/right......... Yes
  Front LFE................ No
  Front center............. No
  Rear left/right.......... No
  Rear center.............. No
  Front left/right center.. No
  Rear left/right center... No
  Rear LFE................. No

CE vendor specific data (VSDB)
  IEEE registration number. 0x000C03
  CEC physical address..... 1.0.0.0
  Supports AI (ACP, ISRC).. No
  Supports 48bpp........... Yes
  Supports 36bpp........... Yes
  Supports 30bpp........... Yes
  Supports YCbCr 4:4:4..... Yes
  Supports dual-link DVI... No
  Maximum TMDS clock....... 300MHz
  Audio/video latency (p).. n/a
  Audio/video latency (i).. n/a
  HDMI video capabilities.. Yes
  EDID screen size......... No additional info
  3D formats supported..... Not supported
  Data payload............. 030C001000783C20008001020304

CE vendor specific data (VSDB)
  IEEE registration number. 0xC45DD8
  CEC physical address..... 0.1.7.8
  Supports AI (ACP, ISRC).. Yes
  Supports 48bpp........... No
  Supports 36bpp........... No
  Supports 30bpp........... No
  Supports YCbCr 4:4:4..... No
  Supports dual-link DVI... No
  Maximum TMDS clock....... 0MHz

YCbCr 4:2:0 capability map data
  Data payload............. 0F000003

Report information
  Date generated........... 3/9/2022
  Software revision........ 2.91.0.1043
  Data source.............. File - NB: improperly installed
  Operating system......... 10.0.19044.2

Raw data
  00,FF,FF,FF,FF,FF,FF,00,2D,B2,0D,06,31,00,00,00,06,18,01,03,80,1F,11,8C,C2,90,20,9C,54,50,8F,26,
  21,52,56,2F,CF,00,A9,40,81,80,90,40,D1,C0,31,59,45,59,61,59,81,99,08,E8,00,30,F2,70,5A,80,B0,58,
  8A,00,BA,88,21,00,00,1E,02,3A,80,18,71,38,2D,40,58,2C,45,00,BA,88,21,00,00,1E,00,00,00,FC,00,56,
  57,2D,31,36,0A,20,20,20,20,20,20,00,00,00,FD,00,17,3D,0F,88,3C,00,0A,20,20,20,20,20,20,01,57,
  02,03,3B,F0,52,10,1F,04,13,05,14,02,11,06,15,22,21,20,5D,5E,5F,60,61,23,09,07,07,83,01,00,00,6E,
  03,0C,00,10,00,78,3C,20,00,80,01,02,03,04,67,D8,5D,C4,01,78,80,00,E4,0F,00,00,03,9A,29,A0,D0,51,
  84,22,30,50,98,36,00,10,0A,00,00,00,00,1C,66,21,56,AA,51,00,1E,30,46,8F,33,00,10,09,00,00,00,1E,28,
  3C,80,A0,70,B0,23,40,30,20,36,00,10,0A,00,00,00,1A,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,E7

Protocol 3000

Kramer devices can be operated using Kramer Protocol 3000 commands sent via serial or Ethernet ports.

Understanding Protocol 3000

Protocol 3000 commands are a sequence of ASCII letters, structured according to the following.

- **Command format**:

Prefix	Command Name	Constant (Space)	Parameter(s)	Suffix
#	Command	␣	Parameter	**<CR>**

- **Feedback format**:

Prefix	Device ID	Constant	Command Name	Parameter(s)	Suffix
~	nn	@	Command	Parameter	**<CR><LF>**

- **Command parameters** – Multiple parameters must be separated by a comma (,). In addition, multiple parameters can be grouped as a single parameter using brackets ([and]).

- **Command chain separator character** – Multiple commands can be chained in the same string. Each command is delimited by a pipe character (|).

- **Parameters attributes** – Parameters may contain multiple attributes. Attributes are indicated with pointy brackets (<…>) and must be separated by a period (.).

The command framing varies according to how you interface with **VW-16**. The following figure displays how the # command is framed using terminal communication software (such as Hercules):
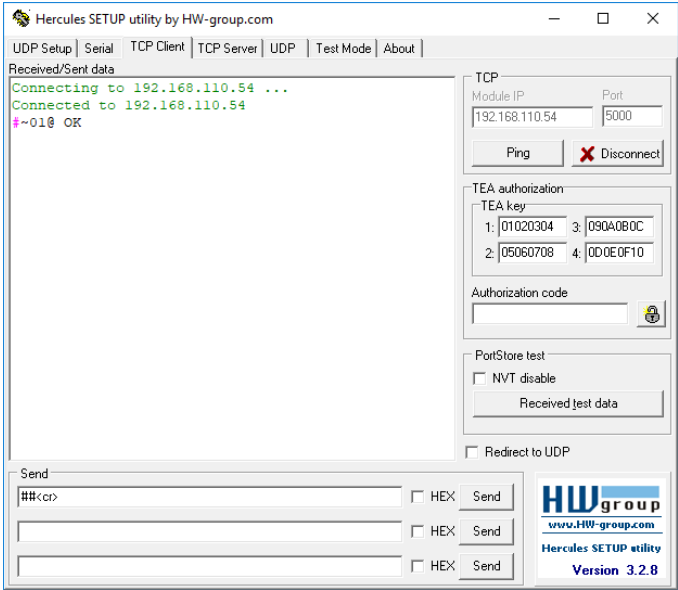
Protocol 3000 Commands

Function	Description	Syntax	Parameters/ Attributes	Example

#	Protocol handshaking.
	
	ⓘ Validates the Protocol 3000 connection and gets the machine number.
	
	Step-in master products use this command to identify the availability of a device.
		COMMAND
		`#<CR>`
		FEEDBACK
		`~nn@␣ok<CR><LF>`
				`#<CR>`

BACKUP	Use to backup data to a USB flash drive.	**COMMAND**
		`#BACKUP␣<CR>`
		FEEDBACK
		`~nn@BACKUP␣OK<CR><LF>`
				Backup data to USB flash drive
				`#BACKUP␣ <CR>`

BEZEL	Set bezel On/Off, H/V correction.	**COMMAND**
		`#BEZEL␣out_index,hv_value,switch,h_value,v_value<CR>`
		FEEDBACK
		`~nn@BEZEL␣out_index,hv_value,switch,h_value,v_value<CR><LF>`
			out_index – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			hv_value –
			  0– current H/V value
			  1– max. H/V value
			switch – Enable/Disable bezel correction
			  0– Off
			  1– On
			h_value – Horizonta correction values
			v_value – Vertical correction values
				Set bezel On with H/V correction:
				`#BEZEL␣1,0,1,12,24<CR>`

BEZEL?	Get bezel switch, H/V correction status.	**COMMAND**
		`#BEZEL?␣out_index<CR>`
		FEEDBACK
		`~nn@BEZEL␣out_index,hv_value,switch,h_value,v_value<CR><LF>`
			out_index – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			hv_value –
			  0– current H/V value
			  1– max. H/V value
			switch – Enable/Disable bezel correction
			  0– Off
			  1– On
			h_value – Horizonta correction values
			v_value – Vertical correction values
				Get bezel switch, H/V correction status:
				`#BEZEL?␣1<CR>`

BUILD-DATE?	Get device build date.	**COMMAND**
		`#BUILD-DATE?␣<CR>`
		FEEDBACK
		`~nn@BUILD-DATE␣date,time<CR><LF>`
			date – Format: YYYY/MM/DD where
			  YYYY = Year
			  MM = Month
			  DD = Day
			time – Format: hh:mm:ss where
			  hh = hours
			  mm = minutes
			  ss = seconds
				Get the device build date:
				`#BUILD-DATE?<CR>`

BRIGHTNESS	Set image brightness for each output.
	
	ⓘ Value limits can vary for different devices.
	
	Value is a property of input connected to current output. Changing input source might cause changes in this value (refer to device definitions).
	
	In devices that enable showing multiple outputs on one display – each in a separate window – this command relates only to the window associated with the output indicated in the out-index parameter.
		COMMAND
		`#BRIGHTNESS␣out_index,value<CR>`
		FEEDBACK
		`~nn@BRIGHTNESS␣out_index,value<CR><LF>`
			out_index – Number that indicates the specific output: 1-N (N= the total number of outputs)
			value – Brightness value
				Set the brightness for output 1 to 50:
				`#BRIGHTNESS␣1,50<CR>`

Function	Description	Syntax	Parameters/ Attributes	Example

BRIGHTNESS?	Get image brightness for each output.
	
	ⓘ Value limits can vary for different devices.
	
	Value is a property of input connected to current output. Changing input source might cause changes in this value (refer to device definitions).
	
	In devices that enable showing multiple outputs on one display – each in a separate window – this command relates only to the window associated with the output indicated in the out-index parameter.
		COMMAND
		`#BRIGHTNESS?␣out_index<CR>`
		FEEDBACK
		`~nn@BRIGHTNESS␣out_index,value<CR><LF>`
			`out_index` – Number that indicates the specific output: 1-N (N= the total number of outputs)
			`value` – Brightness value
				Get the brightness for output 1:
				`#BRIGHTNESS?␣1<CR>`

CONTRAST	Set image contrast per output.
	
	ⓘ Value limits can vary for different devices.
	
	Value is a property of input connected to current output. Changing the input source might cause changes in this value (refer to device definitions).
	
	In devices that enable showing multiple outputs on one display – each in a separate window – this command relates only to the window associated with the output indicated in the out-index parameter.
		COMMAND
		`#CONTRAST␣out_index,value<CR>`
		FEEDBACK
		`~nn@CONTRAST␣out_index,value<CR><LF>`
			`out_index` – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			`value` – Contrast value
				Set contrast for output 1 to 40:
				`#CONTRAST␣1,40<CR>`

CONTRAST?	Get image contrast per output.
	
	ⓘ Value limits can vary for different devices.
	
	Value is a property of input connected to current window. Changing the window input source might cause changes in this value (refer to device definitions).
	
	In devices that enable showing multiple outputs on one display – each in a separate window – this command relates only to the window associated with the output indicated in the out-index parameter.
		COMMAND
		`#CONTRAST?␣out_index<CR>`
		FEEDBACK
		`~nn@CONTRAST␣out_index,value<CR><LF>`
			`out_index` – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			`value` – Contrast value
				Get contrast for output 1:
				`#CONTRAST?␣1<CR>`

Function	Description	Syntax	Parameters/ Attributes	Example
CPEDID	Copy EDID data from the output to the input EEPROM. (i) Destination bitmap size depends on device properties (for 64 inputs it is a 64-bit word). Example: bitmap 0x0013 means inputs 1,2 and 5 are loaded with the new EDID. In certain products Safe_mode is an optional parameter. See the HELP command for its availability.	**COMMAND** **#CPEDID** edid_io,src_id,edid_io,dest_bitmap**<CR>** or **#CPEDID** edid_io,src_id,edid_io,dest_bitmap,safe_mode**<CR>** **FEEDBACK** ~nn@**CPEDID** edid_io,src_id,edid_io,dest_bitmap**<CR><LF>** ~nn@**CPEDID** edid_io,src_id,edid_io,dest_bitmap,safe_mode**<CR><LF>**	**edid_io** – *EDID* source type (usually output) 0 – Input 1 – Output 2 – Default EDID 3 – Custom EDID **src_id** – Number of chosen source stage 0 – Default EDID source 1 – Output 1 2 – Output 2 **edid_io** – *EDID destination* type (usually input) 0 – Input 1 – Output 2 – Default EDID 3 – Custom EDID **dest_bitmap** – Bitmap representing destination IDs. Format: XXXX…X, where X is hex digit. The binary form of every hex digit represents corresponding destinations. 0 – indicates that EDID data is not copied to this destination. 1 – indicates that EDID data is copied to this destination. **safe_mode** – Safe mode 0 – device accepts the EDID as is without trying to adjust 1 – device tries to adjust the EDID (default value if no parameter is sent)	Copy the EDID data from the Output 1 (EDID source) to the Input: **#CPEDID** 1,1,0,0x1**<CR>** Copy the EDID data from the default EDID source to the Input: **#CPEDID** 2,0,0,0x1**<CR>**
CRDT	Set window size and position.	**COMMAND** **#CRDT** out_index,left,top,right,bottom**<CR>** **FEEDBACK** ~nn@**CRDT** out_index,left,top,right,bottom**<CR><LF>**	**out_index** – Number that indicates the specific output: 1-N (N= the total number of outputs) **left** – Left coordinate **top** – Top coordinate **right** – Right coordinate **bottom** – Bottom coordinate	Set window 2 size and position: **#CRDT** 2,0,0,480,640**<CR>**
CRDT?	Get window size and position.	**COMMAND** **#CRDT?** out_index**<CR>** **FEEDBACK** ~nn@**CRDT** out_index,left,top,right,bottom**<CR><LF>**	**out_index** – Number that indicates the specific output: 1-N (N= the total number of outputs) **left** – Left coordinate **top** – Top coordinate **right** – Right coordinate **bottom** – Bottom coordinate	Get window 2 size and position: **#CRDT?** 2**<CR>**
DEL	Delete file.	**COMMAND** **#DEL** file_name**<CR>** **FEEDBACK** ~nn@**DEL** file_name**<CR><LF>**	**file_name** – Name of file to delete (file names are case-sensitive)	Delete the Room1Config file: **#DEL** room1config**<CR>**
DIR	List files in device.	**COMMAND** **#DIR<CR>** **FEEDBACK** Multi-line: ~nn@**DIR<CR><LF>** file_name TABfile_size **bytes**,**id:** **file_id**<CR><LF> TABfree_size **bytes**.<CR><LF>	**file_name** – Name of file **file_size** – File size in bytes. A file can take more space on device memory **file_id** – Internal ID for file in file system **free_size** – Free space in bytes in device file system	**#DIR<CR>**
DISPLAY?	Get output HPD status.	**COMMAND** **#DISPLAY?** out_index**<CR>** **FEEDBACK** ~nn@**DISPLAY** out_index,status**<CR><LF>**	**out_index** – Number that indicates the specific output: 1-N (N= the total number of outputs) **status** – HPD status according to signal validation 0 – Signal or sink is not valid 1 – Signal or sink is valid 2 – Sink and EDID is valid	Get the output HPD status of Output 1: **#DISPLAY?** 1**<CR>**
ETH-PORT	Set Ethernet port protocol. (i) If the port number you enter is already in use, an error is returned. The port number must be within the following range: 0-(2^16-1).	**COMMAND** **#ETH-PORT** port_type,port_id**<CR>** **FEEDBACK** ~nn@**ETH-PORT** port_type,port_id**<CR><LF>**	**port_type** – TCP/UDP **port_id** – TCP/UDP port number (0 – 65535)	Set the Ethernet port protocol for TCP to port 12457: **#ETH-PORT** 0,12457**<CR>**
ETH-PORT?	Get Ethernet port protocol.	**COMMAND** **#ETH-PORT?** port_type**<CR>** **FEEDBACK** ~nn@**ETH-PORT** port_type,port_id**<CR><LF>**	**port_type** – TCP/UDP 0 – TCP 1 – UDP **port_id** – TCP / UDP port number (0 – 65535)	Get the Ethernet port protocol for UDP: **#ETH-PORT?** 1**<CR>**
FACTORY	Reset device to factory default configuration. (i) This command deletes all user data from the device. The deletion can take some time. Your device may require powering off and powering on for the changes to take effect.	**COMMAND** **#FACTORY<CR>** **FEEDBACK** ~nn@**FACTORY** ok**<CR><LF>**		Reset the device to factory default configuration: **#FACTORY<CR>**

Function	Description	Syntax	Parameters/ Attributes	Example
FCT-MAC	Set MAC address. ⓘ To activate the change, reset the device.	**COMMAND** **#FCT-MAC▮**mac_address**<CR>** **FEEDBACK** **~nn@FCT-MAC▮**mac_address**<CR><LF>**	**mac_address** – Unique MAC address. Format: XX-XX-XX-XX-XX-XX where X is a hex digit	Set MAC address: **#FCT-MAC▮**00-14-22-01-23-45**<CR>**
FCT-SN	Set serial number.	**COMMAND** **#FCT-SN▮**serial_num**<CR>** **FEEDBACK** **~nn@FCT-SN▮**serial_num**<CR><LF>**	**serial_num** – 14 decimal digits	Set serial number: **#FCT-SN▮**1976384058 1123**<CR>**

HDCP-MOD	Set HDCP mode.
	
	ⓘ Set HDCP working mode on the device input:
	
	HDCP supported - HDCP_ON [default].
	
	HDCP not supported - HDCP OFF.
	
	HDCP support changes following detected sink - MIRROR OUTPUT.
	
	When you define 3 as the mode, the HDCP status is defined according to the connected output in the following priority: OUT 1, OUT 2. If the connected display on OUT 2 supports HDCP, but OUT 1 does not, then HDCP is defined as not supported. If OUT 1 is not connected, then HDCP is defined by OUT 2.
		COMMAND
		#HDCP-MOD▮in_index,mode**<CR>**
		FEEDBACK
		~nn@HDCP-MOD▮in_index,mode**<CR><LF>**
			in_index – Number that indicates the specific input:
			1-N (N= the total number of inputs)
			mode – HDCP mode:
			  0 – HDCP Off
			  1 – HDCP On
			  2 – Follow Input
			  3 – HDCP defined according to the connected output
				Set the input HDCP-MODE of IN 1 to Off:
				#HDCP-MOD▮1,0**<CR>**

HDCP-MOD?	Get HDCP mode.
	
	ⓘ Set HDCP working mode on the device input:
	
	HDCP supported - HDCP_ON [default].
	
	HDCP not supported - HDCP OFF.
	
	HDCP support changes following detected sink - MIRROR OUTPUT.
		COMMAND
		#HDCP-MOD?▮in_index**<CR>**
		FEEDBACK
		~nn@HDCP-MOD▮in_index,mode**<CR><LF>**
			in_index – Number that indicates the specific input:
			1-N (N= the total number of inputs)
			mode – HDCP mode:
			  0 – HDCP Off
			  1 – HDCP On
			  2 – Follow Input
			  3 – HDCP defined according to the connected output
				Get the input HDCP-MODE of IN 1 HDMI:
				#HDCP-MOD?▮1**<CR>**

HDCP-STAT?	Get HDCP signal status.
	
	ⓘ io_mode =1 – get the HDCP signal status of the sink device connected to the specified output.
	
	io_mode =0 – get the HDCP signal status of the source device connected to the specified input.
		COMMAND
		#HDCP-STAT?▮io_mode,in_index**<CR>**
		FEEDBACK
		~nn@HDCP-STAT▮io_mode,in_index,status**<CR><LF>**
			io_mode – Input/Output
			  0 – Input
			  1 – Output
			io_index – Number that indicates the specific number of inputs or outputs (based on io_mode):
			1-N (N=total number of inputs or outputs)
			status – Signal encryption status - valid values On/Off
			  0 – HDCP Off
			  1 – HDCP On
				Get the output HDCP-STATUS of IN 1:
				#HDCP-STAT?▮0,1**<CR>**

HELP	Get command list or help for specific command.	**COMMAND** **#HELP<CR>** **#HELP▮**cmd_name**<CR>** **FEEDBACK** 1. Multi-line: **~nn@Device▮**cmd_name**,▮**cmd_name…**<CR><LF>** To get help for command use: HELP (COMMAND_NAME)**<CR><LF>** **~nn@HELP▮**cmd_name:**<CR><LF>** **description<CR><LF>** **USAGE:usage<CR><LF>**	**cmd_name** – Name of a specific command	Get the command list: **#HELP<CR>** To get help for AV-SW-TIMEOUT: **#HELP▮**av-sw-timeout**<CR>**
IDV	Set visual indication from device. ⓘ Using this command, some devices can light a sequence of buttons or LEDs to allow identification of a specific device from similar devices.	**COMMAND** **#IDV<CR>** **FEEDBACK** **~nn@IDV▮**ok**<CR><LF>**		**#IDV<CR>**

IMAGE-PROP	Set the image size.
	
	ⓘ Sets the image properties of the selected scaler.
		COMMAND
		#IMAGE-PROP▮scaler_id**<CR>**
		FEEDBACK
		~nn@IMAGE-PROP▮scaler_id,video_mode…**<CR><LF>**
			scaler_id – Scaler number –
			  1 – Scaler1
			  2 – Scaler2
			video_mode – Status
			  0 – Video enabled
			  1 – Video disabled
			  2 – Blank picture
				Set the image size:
				#IMAGE-PROP▮1**<CR>**

Function	Description	Syntax	Parameters/ Attributes	Example

IMAGE-PROP?	Get the image size. ⓘ Gets the image properties of the selected scaler.	**COMMAND**
		`#IMAGE-PROP?␣scaler_id,…,p6<CR>`
		FEEDBACK
		`~nn@IMAGE-PROP␣scaler_id,video_mode…<CR><LF>`
			scaler_id – Scaler number –
			1 – Scaler1
			2 – Scaler2
			video_mode – Status
			0 – Video enabled
			1 – Video disabled
			2 – Blank pi
				Get the image size:
				`#IMAGE-PROP?␣1,1,1<CR>`

INFO-IO?	LEGACY COMMAND. Get in/out count.	**COMMAND**
		`#INFO-IO?␣<CR>`
		FEEDBACK
		`~nn@INFO-IO␣IN␣IN␣inputs_count,OUT␣outputs_count<CR><LF>`
			inputs_count – Number of inputs in the unit
			outputs_count – Number of outputs in the unit
				Get inputs count:
				`#INFO-IO?␣<CR>`

INFO-PRST?	LEGACY COMMAND. Get maximum preset count. ⓘ In most units, video and audio presets with the same number are stored and recalled together by commands `#PRST-STO` and `#PRST-RCL`.	**COMMAND**
		`#INFO-PRST?␣<CR>`
		FEEDBACK
		`~nn@INFO-PRST␣VID␣preset_video_count,AUD␣preset_audio_count<CR><LF>`
			video_preset_count – Maximum number of video presets in the unit
			audio_preset_count – Maximum number of audio presets in the unit
				Get number of video and audio presets:
				`#INFO-PRST?␣<CR>`

LABEL	Set input/output label.	**COMMAND**
		`#LABEL␣io_mode,io_index,switch,label_txt<CR>`
		FEEDBACK
		`~nn@LABEL␣io_mode,io_index,switch,label_txt<CR><LF>`
			io_mode – Input/Output
			0 – Input
			1 – Output
			io_index – Number that indicates the specific input or output port:
			1-N (N= the total number of input or output ports)
			switch – On/Off (enable/disable) custom label
			label_txt – Custom label string
				Set input/output label:
				`#LABEL␣1,1,1,1<CR>`

LABEL?	Get input/output label.	**COMMAND**
		`#LABEL?␣io_index<CR>`
		FEEDBACK
		`~nn@LABEL␣io_mode,io_index,switch,label_txt<CR><LF>`
			io_mode – Input/Output
			0 – Input
			1 – Output
			io_index – Number that indicates the specific input or output port:
			1-N (N= the total number of input or output ports)
			switch – On/Off (enable/disable) custom label
			label_txt – Custom label string
				Get input/output label:
				`#LABEL?␣1<CR>`

LOCK-FP	Lock the front panel. ⓘ In NT-52N, this command includes the PortNumber (1-2) parameter.	**COMMAND**
		`#LOCK-FP␣lock/unlock<CR>`
		FEEDBACK
		`~nn@LOCK-FP␣lock/unlock<CR><LF>`
			lock/unlock – On/Off
			0 – Off unlocks front panel buttons or keyboard
			1 – On locks front panel buttons or keyboard
				Unlock front panel:
				`#LOCK-FP␣0<CR>`

LOCK-FP?	Get the front panel lock state. ⓘ In NT-52N, this command includes the PortNumber (1-2) parameter.	**COMMAND**
		`#LOCK-FP?␣<CR>`
		FEEDBACK
		`~nn@LOCK-FP␣lock/unlock<CR><LF>`
			lock/unlock – On/Off
			0 – Off unlocks front panel buttons or keyboard
			1 – On locks front panel buttons or keyboard
				Get the front panel lock state:
				`#LOCK-FP?<CR>`

MACH-NUM	Set machine number. ⓘ Some devices do not set the new machine number until the device is restarted. Some devices can change the machine number only from DIP-switches.	**COMMAND**
		`#MACH-NUM␣machine_id<CR>`
		FEEDBACK
		`~nn@MACH-NUM␣machine_id<CR><LF>`
			machine_id – New device machine number	Set machine number:
				`#MACH-NUM␣1<CR>`

MACH-NUM?	Get machine number. ⓘ Some devices do not set the new machine number until the device is restarted. Some devices can change the machine number only from DIP-switches.	**COMMAND**
		`#MACH-NUM?␣<CR>`
		FEEDBACK
		`~nn@MACH-NUM␣machine_id<CR><LF>`
			machine_id – New device machine number	Get machine number:
				`#MACH-NUM?␣1<CR>`

MODEL?	Get device model.	**COMMAND**
		`#MODEL?␣<CR>`
		FEEDBACK
		`~nn@MODEL␣model_name<CR><LF>`
			model_name – String of up to 19 printable ASCII chars	Get the device model:
				`#MODEL?␣<CR>`

MUTE	Set audio mute.	**COMMAND**
		`#MUTE␣out_index,mute_mode<CR>`
		FEEDBACK
		`~nn@MUTE␣out_index,mute_mode<CR><LF>`
			out_index – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			mute_mode – On/Off
			0 – Off
			1 – On
				Set Output 1 to mute:
				`#MUTE␣1,1<CR>`

MUTE?	Get audio mute.	**COMMAND**
		`#MUTE?␣out_index<CR>`
		FEEDBACK
		`~nn@MUTE␣out_index,mute_mode<CR><LF>`
			out_index – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			mute_mode – On/Off
			0 – Off
			1 – On
				Get mute status of output 1
				`#MUTE␣1?<CR>`

Function	Description	Syntax	Parameters/Attributes	Example

MUTE-ANA	Set analog output settings.	**COMMAND**
		`#MUTE-ANA␣channel,mute_mode<CR>`
		FEEDBACK
		`~nn@MUTE-ANA␣channel,mute_mode<CR><LF>`
			channel – * (All)
			mute_mode – 0 – off unmute, 1 – on mute
				Set analog output settings:
				`#MUTE-ANA␣*,1<CR>`

MUTE-ANA?	Get analog output settings.	**COMMAND**
		`#MUTE-ANA?␣channel<CR>`
		FEEDBACK
		`~nn@MUTE-ANA␣channel,mute_mode<CR><LF>`
			channel – * (All)
			mute_mode – 0 – off unmute, 1 – on mute
				Get analog output settings:
				`#MUTE␣<CR>`

NET-DHCP	Set DHCP mode.
	
	ⓘ Only 1 is relevant for the mode value. To disable DHCP, the user must configure a static IP address for the device.
	
	Connecting Ethernet to devices with DHCP may take more time in some networks.
	
	To connect with a randomly assigned IP by DHCP, specify the device DNS name (if available) using the **NAME** command. You can also get an assigned IP by direct connection to USB or RS-232 protocol port, if available.
	
	For proper settings consult your network administrator.
	
	ⓘ For Backward compatibility, the **id** parameter can be omitted. In this case, the Network ID, by default, is 0, which is the Ethernet control port.
		COMMAND
		`#NET-DHCP␣netw_id,dhcp_state<CR>`
		FEEDBACK
		`~nn@NET-DHCP␣netw_id,dhcp_state<CR><LF>`
			netw_id – Network ID–the device network interface (if there are more than one). Counting is 0 based, meaning the control port is '0', additional ports are 1,2,3....
			dhcp_state –
			1 – Try to use DHCP. (If unavailable, use the IP address set by the factory or the net-ip command).
				Enable DHCP mode for port 1, if available:
				`#NET-DHCP␣1,1<CR>`

NET-DHCP?	Get DHCP mode.
	
	ⓘ For Backward compatibility, the **id** parameter can be omitted. In this case, the Network ID, by default, is 0, which is the Ethernet control port.
		COMMAND
		`#NET-DHCP?␣netw_id<CR>`
		FEEDBACK
		`~nn@NET-DHCP␣netw_id,dhcp_mode<CR><LF>`
			netw_id – Network ID–the device network interface (if there are more than one). Counting is 0 based, meaning the control port is '0', additional ports are 1,2,3....
			dhcp_mode –
			0 – Do not use DHCP. Use the IP set by the factory or using the **net-ip** or **net-config** command.
			1 – Try to use DHCP. If unavailable, use the IP set by the factory or using the **net-ip** or **net-config** command.
				Get DHCP mode for port 1:
				`#NET-DHCP?␣1<CR>`

NET-GATE	Set gateway IP.
	
	ⓘ A network gateway connects the device via another network and maybe over the Internet. Be careful of security issues. For proper settings consult your network administrator.
		COMMAND
		`#NET-GATE␣ip_address<CR>`
		FEEDBACK
		`~nn@NET-GATE␣ip_address<CR><LF>`
			ip_address – Format: xxx.xxx.xxx.xxx	Set the gateway IP address to 192.168.0.1:
				`#NET-GATE␣192.168.000.001<CR>`

NET-GATE?	Get gateway IP.
	
	ⓘ A network gateway connects the device via another network and maybe over the Internet. Be aware of security problems.
		COMMAND
		`#NET-GATE?␣<CR>`
		FEEDBACK
		`~nn@NET-GATE␣ip_address<CR><LF>`
			ip_address – Format: xxx.xxx.xxx.xxx	Get the gateway IP address:
				`#NET-GATE?␣<CR>`

NET-IP	Set IP address.
	
	ⓘ For proper settings consult your network administrator.
		COMMAND
		`#NET-IP␣ip_address<CR>`
		FEEDBACK
		`~nn@NET-IP␣ip_address<CR><LF>`
			ip_address – Format: xxx.xxx.xxx.xxx	Set the IP address to 192.168.1.39:
				`#NET-IP␣192.168.001.039<CR>`

NET-IP?	Get IP address.	**COMMAND**
		`#NET-IP?␣<CR>`
		FEEDBACK
		`~nn@NET-IP␣ip_address<CR><LF>`
			ip_address – Format: xxx.xxx.xxx.xxx	Get the IP address:
				`#NET-IP?␣<CR>`

NET-MAC?	Get MAC address.
	
	ⓘ For backward compatibility, the **id** parameter can be omitted. In this case, the Network ID, by default, is 0, which is the Ethernet control port.
		COMMAND
		`#NET-MAC?␣id<CR>`
		FEEDBACK
		`~nn@NET-MAC␣id,mac_address<CR><LF>`
			id – Network ID–the device network interface (if there are more than one). Counting is 0 based, meaning the control port is '0', additional ports are 1,2,3....
			mac_address – Unique MAC address. Format: XX-XX-XX-XX-XX-XX where X is hex digit
				`#NET-MAC?␣id<CR>`

Function	Description	Syntax	Parameters/ Attributes	Example
NET-MASK	Set subnet mask. ⓘ For proper settings consult your network administrator.	**COMMAND** #NET-MASK_net_mask**<CR>** **FEEDBACK** ~nn@NET-MASK_net_mask**<CR><LF>**	net_mask – Format: xxx.xxx.xxx.xxx	Set the subnet mask to 255.255.0.0: #NET-MASK_255.255.000.000**<CR>**
NET-MASK?	Get subnet mask.	**COMMAND** #NET-MASK?_**<CR>** **FEEDBACK** ~nn@NET-MASK_net_mask**<CR><LF>**	net_mask – Format: xxx.xxx.xxx.xxx	Get the subnet mask: #NET-MASK?**<CR>**
PICTURE-RST	Reset picture settings	**COMMAND** #PICTURE-RST_**<CR>** **FEEDBACK** ~nn@PICTURE-RST_OK**<CR><LF>**		Recall preset 1: #PICTURE-RST_**<CR>**
PROT-VER?	Get device protocol version.	**COMMAND** #PROT-VER?_**<CR>** **FEEDBACK** ~nn@PROT-VER_3000:version**<CR><LF>**	version – XX.XX where X is a decimal digit	Get the device protocol version: #PROT-VER?_**<CR>**
PRST-LST?	Get saved preset list. ⓘ In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL.	**COMMAND** #PRST-LST?_**<CR>** **FEEDBACK** ~nn@PRST-LST_preset,preset,…**<CR><LF>**	preset – Preset number	Show preset list: #PRST-LST?**<CR>**
PRST-RCL	Recall saved preset list. ⓘ In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL.	**COMMAND** #PRST-RCL_preset**<CR>** **FEEDBACK** ~nn@PRST-RCL_preset**<CR><LF>**	preset – Preset number	Recall preset 1: #PRST-RCL_1**<CR>**
PRST-STO	Store current connections, volumes and modes in preset. ⓘ In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL.	**COMMAND** #PRST-STO_preset**<CR>** **FEEDBACK** ~nn@PRST-STO_preset**<CR><LF>**	preset – Preset number	Store preset 1: #PRST-STO_1**<CR>**
PRST-VID?	Get video connections from saved preset. ⓘ In most units, video and audio presets with the same number are stored and recalled together by commands #PRST-STO and #PRST-RCL.	**COMMAND** #PRST-VID?_preset,out**<CR>** #PRST-VID?_preset,***<CR>** **FEEDBACK** ~nn@PRST-VID_preset,>out_id**<CR><LF>** ~nn@PRST-VID_preset,in>1,in>2,in>3,…**<CR><LF>**	preset – Preset number – Number that indicates the specific input: 1 – N (N= the total number of inputs) 0 – Output is disconnected > – Connection character between in and out parameters out_id –Output number * for all outputs	Get video connections from preset 3 for all outputs: #PRST-VID?_3,***<CR>**
RESET	Reset device. ⓘ To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.	**COMMAND** #RESET_**<CR>** **FEEDBACK** ~nn@RESET_OK**<CR><LF>**		Reset the device: #RESET_**<CR>**
RESTORE	Restore data from USB flash drive.	**COMMAND** #RESTORE_**<CR>** **FEEDBACK** ~nn@RESTORE_OK**<CR><LF>**		Restore: #RESTORE_**<CR>**
ROTATE	Set output rotation angle.	**COMMAND** #ROTATE_out_id,win_id,angle**<CR>** **FEEDBACK** ~nn@ROTATE_out_id,win_id,angle**<CR><LF>**	out_id – 0 win_id – 0 angle – 0 - off, 1 left 90 degree, 2 right 90 degree)	Set output rotation angle: #ROTATE_P1,P2,P3**<CR>**
ROTATE?	Get output rotation angle.	**COMMAND** #ROTATE?_**<CR>** **FEEDBACK** ~nn@ROTATE_out_id,win_id,angle**<CR><LF>**	out_id – 0 win_id – 0 angle – 0 - off, 1 left 90 degree, 2 right 90 degree)	Get output rotation angle: #ROTATE?**<CR>**

Function	Description	Syntax	Parameters/Attributes	Example
ROUTE	Set layer routing. ⓘ This command replaces all other routing commands.	**COMMAND** **#ROUTE␣**layer,dest,src**<CR>** **FEEDBACK** **~nn@ROUTE␣**layer,dest,src**<CR><LF>**	**layer** – Layer Enumeration 1– Video 2– Audio **dest** 1– win A 2– win B 3– win C 4– D 5*– ALL **src** – Source id 1– Input 1 2– Input 2 3– Input 3 4– Input 4 0 – Audio Mute	First specify video or audio, then the target output, and then the source input : **#ROUTE␣**1,8,2**<CR>**
ROUTE?	Get layer routing.	**COMMAND** **#ROUTE?␣<CR>** **FEEDBACK** **~nn@ROUTE␣**layer,dest,src**<CR><LF>**	**layer** – Layer Enumeration 1– Video 2– Audio **dest** 1– win A 2– win B 3– win C 4– D 5*– ALL **src** – Source id 2– Input 1 3– Input 2 4– Input 3 5– Input 4 0 – Audio Mute	Get the layer routing: **#ROUTE?␣**layer,dest,src**<CR>**
RSTLAYOUT	Reset Custom Layout setting.	**COMMAND** **#RSTLAYOUT␣**layout**<CR>** **FEEDBACK** **~nn@RSTLAYOUT␣**layout**<CR><LF>**	**Layout** – Custom Layout 1-7	Reset custom layout: **#RSTLAYOUT␣**1**<CR>**
SCLR-AS	Set auto-sync features. ⓘ Sets the auto sync features for the selected scaler.	**COMMAND** **#SCLR-AS␣**scaler_index,sync_speed**<CR>** **FEEDBACK** **~nn@SCLR-AS␣**scaler_index,sync_speed**<CR><LF>**	**scaler_index** – Scaler Number – 1-Scaler1, 2-Scaler2 **sync_speed** – 0, 1 or 2 0– off 1– fast 2– slow	Set auto-sync features: **#SCLR-AS␣**1,1**<CR>**
SCLR-AS?	Get auto-sync features. ⓘ Gets the auto sync features for the selected scaler.	**COMMAND** **#SCLR-AS?␣**scaler_index**<CR>** **FEEDBACK** **~nn@SCLR-AS␣**scaler_index,sync_speed**<CR><LF>**	**scaler_index** – Scaler Number – 1-Scaler1, 2-Scaler2 **sync_speed** – 0, 1 or 2 0– off 1– fast 2– slow	Get auto-sync features: **#SCLR-AS?␣**1**<CR>**
SCRLAY	Set the video wall array column and row layout setting, such as 4X4, 2x8, 8x2, 5x3.	**COMMAND** **#SCRLAY␣**col,row**<CR>** **FEEDBACK** **~nn@SCRLAY␣**col,row**<CR><LF>**	**col** – 1-16 **row** – 1-16	Set the screen layout column and row c features: **#SCRLAY␣**1,2**<CR>**
SCRLAY?	Get the video wall array column and row layout setting.	**COMMAND** **#SCRLAY?␣<CR>** **FEEDBACK** **~nn@SCRLAY␣**col,row**<CR><LF>**	**col** – 1-16 **row** – 1-16	Set auto-sync features: **#SCRLAY?␣**1,2**<CR>**
SHOW-OSD	Set the OSD of selected channel.	**COMMAND** **#SHOW-OSD␣**out_index,switch**<CR>** **FEEDBACK** **~nn@SHOW-OSD␣**out_index,switch**<CR><LF>**	**out_index** – Number that indicates the specific output: 1-N (N= the total number of outputs) **switch** – On/Off 0– Off 1– On	Set the OSD of selected channel: **#SHOW-OSD␣**1,1**<CR>**
SHOW-OSD?	Get the OSD of selected channel.	**COMMAND** **#SHOW-OSD?␣**out_index**<CR>** **FEEDBACK** **~nn@SHOW-OSD␣**out_index,switch**<CR><LF>**	**out_index** – Number that indicates the specific output: 1-N (N= the total number of outputs) **switch** – On/Off 0– Off 1– On	Get the OSD of selected channel: **#SHOW-OSD?␣**1**<CR>**
SIGNAL?	Get input signal status.	**COMMAND** **#SIGNAL?␣**in_index**<CR>** **FEEDBACK** **~nn@SIGNAL␣**in_index,status**<CR><LF>**	**in_index** – Number that indicates the specific input: 1-N (N= the total number of inputs) **status** – Signal status according to signal validation: 0– Off 1– On	Get the input signal lock status of IN 1: **#SIGNAL?␣**1**<CR>**

Function	Description	Syntax	Parameters/Attributes	Example
SIG-TYPE	Set signal type on input/output. ⓘ "Set" command is not available for all devices (refer to device specifications).	**COMMAND** **#SIG-TYPE␣**io_mode,io_index,signal_src**<CR>** **FEEDBACK** **~nn@SIG-TYPE␣**io_mode,io_index,signal_src**<CR><LF>**	**io_mode** – Input/Output 0– Input 1– Output **io_index** – Number that indicates the specific input or output port: 1-N (N= the total number of input or output ports) **signal_src** – Signal type 0– No signal 1– DVI 2– HDMI 3– DisplayPort 4– HDBaseT 5– SDI 6– VGA 7– Follow output 8– DGKat	Set signal type on input/output: **#SIG-TYPE␣**1,1,1**<CR>**
SN?	Get device serial number.	**COMMAND** **#SN?␣<CR>** **FEEDBACK** **~nn@SN␣**serial_num**<CR><LF>**	**serial_num** – 14 decimal digits, factory assigned	Get the device serial number: **#SN?␣<CR>**
VERSION?	Get firmware version number.	**COMMAND** **#VERSION?␣<CR>** **FEEDBACK** **~nn@VERSION␣**firmware_version**<CR><LF>**	**firmware_version** – XX.XX.XXXX where the digit groups are: major.minor.build version	Get the device firmware version number: **#VERSION?␣<CR>**

Function	Description	Syntax	Parameters/ Attributes	Example

VID-RES	Set output resolution.
	
	ⓘ "Set" command with is_native=ON sets native resolution on selected output (resolution index sent = 0). Device sends as answer actual VIC ID of native resolution.
	
	To use "custom resolutions" (entries 100-105 In View Modes), define them using the DEF-RES command.
		COMMAND
		`#VID-RES_io_mode,io_index,is_native,resolution<CR>`
		FEEDBACK
		`~nn@VID-RES_io_mode,io_index,is_native,resolution<CR><LF>`
			io_mode – Input/Output
			 0– Input
			 1– Output
			io_index – Number that indicates the specific input or output port:
			1-N (N= the total number of input or output ports)
			is_native – Native resolution flag
			 0– Off
			 1– On
			resolution – Resolution index
			0=No Signal (for input) / Native – EDID (for output)
			1=640x480p@59.94Hz/60Hz
			2=720x480p@59.94Hz/60Hz
			3=720x480p@59.94Hz/60Hz
			4=1280x720p@59.94Hz/60Hz
			5=1920x1080i@59.94Hz/60Hz
			6=720(1440)x480i@59.94Hz/60Hz
			7=720(1440)x480i@59.94Hz/60Hz
			8=720(1440)x240p@59.94Hz/60Hz
			9=720(1440)x240p@59.94Hz/60Hz
			10=2880x480i@59.94Hz/60Hz
			11=2880x480i@59.94Hz/60Hz
			12=2880x240p@59.94Hz/60Hz
			13=2880x240p@59.94Hz/60Hz
			14=1440x480p@59.94Hz/60Hz
			15=1440x480p@59.94Hz/60Hz
			16=1920x1080p@59.94Hz/60Hz
			17=720x576p@50Hz
			18=720x576p@50Hz
			19=1280x720p@50Hz
			20=1920x1080i@50Hz
			21=720(1440)x576i@50Hz
			22=720(1440)x576i@50Hz
			23=720(1440)x288p@50Hz
			24=720(1440)x288p@50Hz
			25=2880x576i@50Hz
			26=2880x576i@50Hz
			27=2880x288p@50Hz
			28=2880x288p@50Hz
			29=1440x576p@50Hz
			30=1440x576p@50Hz
			31=1920x1080p@50Hz
			32=1920x1080p@23.97Hz/24Hz
			33=1920x1080p@25Hz
			34=1920x1080p@29.97Hz/30Hz
			35=2880x480p@59.94Hz/60Hz
			36=2880x480p@59.94Hz/60Hz
			37=2880x576p@50Hz
			38=2880x576p@50Hz
			39=1920x1080i@50Hz
			40=1920x1080i@100Hz
			41=1280x720p@100Hz
			42=720x576p@100Hz
			43=720x576p@100Hz
			44=720(1440)x576i@100Hz
			45=720(1440)x576i@100Hz
			46=1920x1080i@119.88/120Hz
			47=1280x720p@119.88/120Hz
			48=720x480p@119.88/120Hz
			49=720x480p@119.88/120Hz
			50=720(1440)x480i@119.88/120Hz
			51=720(1440)x480i@119.88/120Hz
			52=720x576p@200Hz
			53=720x576p@200Hz
			54=720(1440)x576i@200Hz
			55=720(1440)x576i@200Hz
			56=720x480p@239.76/240Hz
			57=720x480p@239.76/240Hz
			58=720(1440)x480i@239.76/240Hz
			59=720(1440)x480i@239.76/240Hz
			60=1280x720p@23.97Hz/24Hz
			61=1280x720p@25Hz
			62=1280x720p@29.97Hz/30Hz
			63=1920x1080p@119.88/120Hz
			64=1920x1080p@100Hz
			65=800x600p@60Hz
			66=1024x768@60Hz
			67=1280x768p@60Hz
			68=1280x1024p@60Hz
			69=1600x1200p@60Hz
			70=1680x1050p@60Hz
			71=1920x1200@60Hz
			72=3840x2160p@24Hz
			73=3840x2160p@25Hz
			74=3840x2160p@30Hz
			75=3840x2160p@50Hz
			76=3840x2160p@60Hz
			77-100=(Reserved)
			100=Custom resolution 1
			101=Custom resolution 2
			102=Custom resolution 3
			103=Custom resolution 4
			104=Custom resolution 5
			104-254=(Reserved)
				Set output resolution:
				`#VID-RES_1,1,1,1<CR>`

VID-RES?	Get output resolution.	**COMMAND**	io_mode – Input/Output	Set output resolution:
		`#VID-RES?␣io_mode,io_index,is_native<CR>`	0– Input	`#VID-RES?␣1,1,1<CR>`
	ⓘ "Get" command with is_native=ON returns native resolution VIC, with is_native=OFF returns current resolution. To use "custom resolutions" (entries 100-105 In View Modes), define them using the DEF-RES command.	**FEEDBACK** `~nn@VID-RES?␣io_mode,io_index,is_native,resolution<CR><LF>`	1– Output **io_index** – Number that indicates the specific input or output port: 1-N (N= the total number of input or output ports) **is_native** – Native resolution flag 0– Off 1– On **resolution** – Resolution index **0**=No Signal (for input) / Native – EDID (for output) **1**=640x480p@59.94Hz/60Hz **2**=720x480p@59.94Hz/60Hz **3**=720x480p@59.94Hz/60Hz **4**=1280x720p@59.94Hz/60Hz **5**=1920x1080i@59.94Hz/60Hz **6**=720(1440)x480i@59.94Hz/60Hz **7**=720(1440)x480i@59.94Hz/60Hz **8**=720(1440)x240p@59.94Hz/60Hz **9**=720(1440)x240p@59.94Hz/60Hz **10**=2880x480i@59.94Hz/60Hz **11**=2880x480i@59.94Hz/60Hz **12**=2880x240p@59.94Hz/60Hz **13**=2880x240p@59.94Hz/60Hz **14**=1440x480p@59.94Hz/60Hz **15**=1440x480p@59.94Hz/60Hz **16**=1920x1080p@59.94Hz/60Hz **17**=720x576p@50Hz **18**=720x576p@50Hz **19**=1280x720p@50Hz **20**=1920x1080i@50Hz **21**=720(1440)x576i@50Hz **22**=720(1440)x576i@50Hz **23**=720(1440)x288p@50Hz **24**=720(1440)x288p@50Hz **25**=2880x576i@50Hz **26**=2880x576i@50Hz **27**=2880x288p@50Hz **28**=2880x288p@50Hz **29**=1440x576p@50Hz **30**=1440x576p@50Hz **31**=1920x1080p@50Hz **32**=1920x1080p@23.97Hz/24Hz **33**=1920x1080p@25Hz **34**=1920x1080p@29.97Hz/30Hz **35**=2880x480p@59.94Hz/60Hz **36**=2880x480p@59.94Hz/60Hz **37**=2880x576p@50Hz **38**=2880x576p@50Hz **39**=1920x1080i@50Hz **40**=1920x1080i@100Hz **41**=1280x720p@100Hz **42**=720x576p@100Hz **43**=720x576p@100Hz **44**=720(1440)x576i@100Hz **45**=720(1440)x576i@100Hz **46**=1920x1080i@119.88/120Hz **47**=1280x720p@119.88/120Hz **48**=720x480p@119.88/120Hz **49**=720x480p@119.88/120Hz **50**=720(1440)x480i@119.88/120Hz **51**=720(1440)x480i@119.88/120Hz **52**=720x576p@200Hz **53**=720x576p@200Hz **54**=720(1440)x576i@200Hz **55**=720(1440)x576i@200Hz **56**=720x480p@239.76/240Hz **57**=720x480p@239.76/240Hz **58**=720(1440)x480i@239.76/240Hz **59**=720(1440)x480i@239.76/240Hz **60**=1280x720p@23.97Hz/24Hz **61**=1280x720p@25Hz **62**=1280x720p@29.97Hz/30Hz **63**=1920x1080p@119.88/120Hz **64**=1920x1080p@100Hz **65**=800x600p@60Hz **66**=1024x768@60Hz **67**=1280x768p@60Hz **68**=1280x1024p@60Hz **69**=1600x1200p@60Hz **70**=1680x1050p@60Hz **71**=1920x1200@60Hz **72**=3840x2160p@24Hz **73**=3840x2160p@25Hz **74**=3840x2160p@30Hz **75**=3840x2160p@50Hz **76**=3840x2160p@60Hz **77-100**=(Reserved) **100**=Custom resolution 1 **101**=Custom resolution 2 **102**=Custom resolution 3	

Function	Description	Syntax	Parameters/ Attributes	Example
			103=Custom resolution 4 **104=**Custom resolution 5 **104-254=**(Reserved)	

`VIEW-MOD`	Set view mode.	**COMMAND**
		`#VIEW-MOD_mode<CR>`
		FEEDBACK
		`~nn@VIEW-MOD_mode<CR><LF>`
			mode – View Modes
			0 – PIP off (matrix)
			1 – PIP on (dual PIP)
			2 – Preview (not applicable)
			3 – Quad
			4 – Video wall
			5 – POP
				Set view mode:
				`#VIEW-MOD_1<CR>`

`VIEW-MOD?`	Get view mode.	**COMMAND**
		`#VIEW-MOD?_<CR>`
		FEEDBACK
		`~nn@VIEW-MOD_mode<CR><LF>`
			mode – View Modes
			0 – PIP off (matrix)
			1 – PIP on (dual PIP)
			2 – Preview (not applicable)
			3 – Quad
			4 – Video wall
			5 – POP
				Get view mode:
				`#VIEW-MOD?_<CR>`

`VMUTE`	Set enable/disable video on output.	**COMMAND**
		`#VMUTE_out_index,flag<CR>`
		FEEDBACK
		`~nn@VMUTE_out_index,flag<CR><LF>`
			out_index – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			flag – Video Mute
			0 – Video enabled
			1 – Video disabled
			2 – Blank picture
				Disable the video output on OUT 2:
				`#VMUTE_2,0<CR>`

`VMUTE?`	Get video on output status.	**COMMAND**
		`#VMUTE?_out_index<CR>`
		FEEDBACK
		`~nn@VMUTE_out_index,flag<CR><LF>`
			out_index – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			flag – Video Mute
			0 – Video enabled
			1 – Video disabled
			2 – Blank picture
				Get video on output status:
				`#VMUTE?_2<CR>`

`W-BRD`	Enable/disable window border.	**COMMAND**
		`#W-BRD_win_number,enable<CR>`
		FEEDBACK
		`~nn@W-BRD_win_number,enable<CR><LF>`
			win_num – Window number to enable/disable
			enable – 1, disable 0
				Enable/disable window border :
				`#VMUTE_1,1<CR>`

`W-BRD?`	Get window border status.	**COMMAND**
		`#W-BRD?_win_num<CR>`
		FEEDBACK
		`~nn@W-BRD_win_num,enable<CR><LF>`
			win_num – Window number to enable/disable
			enable – 1, disable 0
				Get window border status:
				`#VMUTE_1<CR>`

`W-HUE`	Set window hue value.
	
	(i) Value limits can vary for different devices.
	
	Value is a property of input connected to current window. Changing window input source might cause changes in this value (refer device definitions).
		COMMAND
		`#W-HUE_win_num,value<CR>`
		FEEDBACK
		`~nn@W-HUE_win_num,value<CR><LF>`
			win_num – Window number setting contrast
			value – Hue value
				Set window hue value:
				`#W-HUE_1,1<CR>`

`W-HUE?`	Get window hue value.
	
	(i) Value limits can vary for different devices.
	
	Value is a property of input connected to current window. Changing window input source might cause changes in this value (refer device definitions).
		COMMAND
		`#W-HUE?_win_num<CR>`
		FEEDBACK
		`~nn@W-HUE_win_num,value<CR><LF>`
			win_num – Window number setting contrast
			value – Hue value
				Get window hue value:
				`#W-HUE?_1<CR>`

`W-LAYER`	Set window overlay order. Set all window overlay orders.
	
	(i) In case of overlays order list, number of expected layers is maximum number of windows in device.
		COMMAND
		`#W-LAYER_win_num,value<CR>`
		
		`#W-LAYER_0xFF,value1,value2,…,valueN<CR>`
		FEEDBACK
		Set1/Get1:
		`~nn@W-LAYER_win_num,value<CR><LF>`
		Set2/Get2:
		`~nn@W-LAYER_0xFF,value1,value2,…,valueN<CR><LF>`
			win_num – Window number setting layer
			value – Overlay order number
				Set window overlay value:
				`#W-LAYER_1,1<CR>`

`W-LAYER?`	Set window overlay order. Set all window overlay orders.
	
	(i) In case of overlays order list, number of expected layers is maximum number of windows in device.
		COMMAND
		`#W-LAYER?_win_num<CR>`
		
		`#W-LAYER?_0xFF<CR>`
		FEEDBACK
		`~nn@W-LAYER_win_num,value<CR><LF>`
		
		`~nn@W-LAYER_0xFF,value1,value2,…,valueN<CR><LF>`
			win_num – Window number setting contrast
			value – Hue value
				Get window overlay value:
				`#W-LAYER?_1<CR>`

Function	Description	Syntax	Parameters/ Attributes	Example

W-POS	Set window position.	**COMMAND**
		`#W-POS_win_num,x0,y0,width,height<CR>`
		FEEDBACK
		`~nn@W-POS_win_num,x0,y0,width,height<CR><LF>`
			`win_num` – Window number setting window position
			`x0,y0` – Origin coordinate
			`width` – Window width
			`height` – Window height
				Set window position:
				`#W-POS?_1,1,1,1,1<CR>`

W-POS?	Get window position.	**COMMAND**
		`#W-POS?_win_num<CR>`
		FEEDBACK
		`~nn@W-POS_win_num,x0,y0,width,height<CR><LF>`
			`win_num` – Window number setting window position
			`x0,y0` – Origin coordinate
			`width` – Window width
			`height` – Window height
				Get window overlay value:
				`#W-POS?_1<CR>`

W-SATURATION	Set image saturation per output.
	
	(i) Value limits can vary for different devices.
	
	Value is a property of input connected to current output. Changing input source might cause changes in this value (refer device definitions).
	
	In devices that enable showing multiple outputs on one display – each in a separate window – this command relates only to the window associated with the output indicated in the out-index parameter.
		COMMAND
		`#W-SATURATION_out_index,value<CR>`
		FEEDBACK
		`~nn@SATURATION_out_index,value<CR><LF>`
			`out_index` – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			`value` – Saturation value (0-100)
				Set saturation for output 1 to 50:
				`#W-SATURATION_1,50<CR>`

W-SATURATION?	Get image saturation per output.
	
	(i) Value limits can vary for different devices.
	
	Value is a property of input connected to current output. Changing input source might cause changes in this value (refer device definitions).
	
	In devices that enable showing multiple outputs on one display – each in a separate window – this command relates only to the window associated with the output indicated in the out-index parameter.
		COMMAND
		`#W-SATURATION?_out_index<CR>`
		FEEDBACK
		`~nn@W-SATURATION_out_index,value<CR><LF>`
			`out_index` – Number that indicates the specific output:
			1-N (N= the total number of outputs)
			`value` – Saturation value (0-100)
				Set window position:
				`#W-SATURATION?_1<CR>`

WND-BRD	Enable/disable window border.	**COMMAND**
		`#WND-BRD_win_num,enable<CR>`
		FEEDBACK
		`~nn@WND-BRD_win_num,enable<CR><LF>`
			`win_num` – Window number to enable/disable
			`enable` – 1, disable 0
				Set window position:
				`#WND-BRD_1,1<CR>`

WND-BRD?	Get window border status.	**COMMAND**
		`#WND-BRD?_win_num<CR>`
		FEEDBACK
		`~nn@WND-BRD_win_num,enable<CR><LF>`
			`win_num` – Window number to enable/disable
			`enable` – 1, disable 0
				Set window position:
				`#WND-BRD?_1<CR>`

Result and Error Codes

Syntax

In case of an error, the device responds with an error message. The error message syntax:

- **~NN@ERR XXX<CR><LF>** – when general error, no specific command
- **~NN@CMD ERR XXX<CR><LF>** – for specific command
- **NN** – machine number of device, default = 01
- **XXX** – error code

Error Codes

Error Name	Error Code	Description
P3K_NO_ERROR	0	No error
ERR_PROTOCOL_SYNTAX	1	Protocol syntax
ERR_COMMAND_NOT_AVAILABLE	2	Command not available
ERR_PARAMETER_OUT_OF_RANGE	3	Parameter out of range
ERR_UNAUTHORIZED_ACCESS	4	Unauthorized access
ERR_INTERNAL_FW_ERROR	5	Internal FW error
ERR_BUSY	6	Protocol busy
ERR_WRONG_CRC	7	Wrong CRC
ERR_TIMEDOUT	8	Timeout
ERR_RESERVED	9	(Reserved)
ERR_FW_NOT_ENOUGH_SPACE	10	Not enough space for data (firmware, FPGA…)
ERR_FS_NOT_ENOUGH_SPACE	11	Not enough space – file system
ERR_FS_FILE_NOT_EXISTS	12	File does not exist
ERR_FS_FILE_CANT_CREATED	13	File can't be created
ERR_FS_FILE_CANT_OPEN	14	File can't open
ERR_FEATURE_NOT_SUPPORTED	15	Feature is not supported
ERR_RESERVED_2	16	(Reserved)
ERR_RESERVED_3	17	(Reserved)
ERR_RESERVED_4	18	(Reserved)
ERR_RESERVED_5	19	(Reserved)
ERR_RESERVED_6	20	(Reserved)
ERR_PACKET_CRC	21	Packet CRC error
ERR_PACKET_MISSED	22	Packet number isn't expected (missing packet)
ERR_PACKET_SIZE	23	Packet size is wrong
ERR_RESERVED_7	24	(Reserved)
ERR_RESERVED_8	25	(Reserved)
ERR_RESERVED_9	26	(Reserved)
ERR_RESERVED_10	27	(Reserved)
ERR_RESERVED_11	28	(Reserved)
ERR_RESERVED_12	29	(Reserved)
ERR_EDID_CORRUPTED	30	EDID corrupted
ERR_NON_LISTED	31	Device specific errors
ERR_SAME_CRC	32	File has the same CRC – not changed
ERR_WRONG_MODE	33	Wrong operation mode
ERR_NOT_CONFIGURED	34	Device/chip was not initialized

The warranty obligations of Kramer Electronics Inc. ("Kramer Electronics") for this product are limited to the terms set forth below:

What is Covered
This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered
This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long this Coverage Lasts
The standard limited warranty for Kramer products is seven (7) years from the date of original purchase, with the following exceptions:

1. All Kramer VIA hardware products are covered by a standard three (3) year warranty for the VIA hardware and a standard three (3) year warranty for firmware and software updates; all Kramer VIA accessories, adapters, tags, and dongles are covered by a standard one (1) year warranty.

2. Kramer fiber optic cables, adapter-size fiber optic extenders, pluggable optical modules, active cables, cable retractors, ring mounted adapters, portable power chargers, Kramer speakers, and Kramer touch panels are covered by a standard one (1) year warranty. Kramer 7-inch touch panels purchased on or after April 1st, 2020 are covered by a standard two (2) year warranty.

3. All Kramer Calibre products, all Kramer Minicom digital signage products, all HighSecLabs products, all streaming, and all wireless products are covered by a standard three (3) year warranty.

4. All Sierra Video MultiViewers are covered by a standard five (5) year warranty.

5. Sierra switchers & control panels are covered by a standard seven (7) year warranty (excluding power supplies and fans that are covered for three (3) years).

6. K-Touch software is covered by a standard one (1) year warranty for software updates.

7. All Kramer passive cables are covered by a lifetime warranty.

Who is Covered
Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics Will Do
Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.

2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product. If a direct or similar replacement product is supplied, the original product's end warranty date remains unchanged and is transferred to the replacement product.

3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics Will Not Do Under This Limited Warranty
If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy Under This Limited Warranty
To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, visit our web site at www.kramerav.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required (RMA number). You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

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