

USER MANUAL

MODEL:

WP-20 Wall Plate



Contents

Introduction	1
Getting Started	1
Overview	2
Typical Applications	4
About HDBaseT™ Technology	4
Defining WP-20 Wall Plate	5
Mounting WP-20	7
Connecting WP-20 Wall Plate	8
Remote Switches Terminal Block	9
Wiring RJ-45 Connectors	9
Principles of Operation	10
Input Selection	10
Signal Loss and Unplugged Cable Timeouts	10
VGA Phase Shift	11
Operating WP-20	12
Selecting an Input Manually	12
Locking EDID	12
Resetting WP-20	12
Analog Audio Output Volume Control	12
Configuring WP-20	13
Setting Configuration DIP-switch	13
Switching Timeouts	14
Using Step-In Feature	14
Operating WP-20 Remotely Using Web Pages	15
Accessing WP-20 Web Pages	15
Routing Video and Data	17
Device Settings	21
Video and Audio Settings	28
Managing EDID	32
Device Automation	34
About Page	36
Technical Specifications	37
Default IP Parameters	37
Default RS-232 Communication Parameters	38
Default Logon Credentials	38
Supported HDMI Resolutions	39
Supported VGA Resolutions	39
Default EDID	40
HDMI	40
PC-UxGA	41
Protocol 3000	43
Understanding Protocol 3000	44
Kramer Protocol 3000 Syntax	44
Protocol 3000 Commands	45

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/WP-20 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 **WP-20** 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 GPIO 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 located on the bottom of the unit.

**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 GPIO 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 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

Congratulations on purchasing your Kramer **WP-20 Wall Plate**. **WP-20** is a high-performance, 4K, multi-format, wall-plate switcher and transmitter over extended-reach HDBaseT. Offering intelligent Maestro automation, with priority and last-connected switching options, it automatically switches and operates room according to the selected switching scheme based on active video signal detection.



All references in this manual to the **WP-20** in this manual also apply to the **WP-20E** European versions.

The **WP-20** features:

- Simple and Powerful Maestro Room Automation – Intuitive user interface enables you to fully automate your meeting room elements. Configure lights, shades, devices and more to be activated by an extensive range of triggers, including input/output connectivity, routing, and button pressing. By minimizing user intervention, Maestro room automation saves meeting prep time and minimizes human error before presentations.
- Simple and Powerful Maestro Room Automation – Intuitive user interface enables you to fully automate your meeting room elements. Configure lights, shades, devices and more to be activated by an extensive range of triggers, including input/output connectivity, routing, and button pressing. By minimizing user intervention, Maestro room automation

saves meeting prep time and minimizes human error before presentations.

- High Performance Switcher Transmitter – Professional HDBaseT Switcher transmitter for providing extended-reach signals over twisted pair copper infrastructures. This switcher transmitter is a standard transmitter that can be connected to any market-available HDBaseT-compliant extension product.
- BYOD Plug & Play Auto Switcher – Automatically plays the switched user device source signal on the connected display according to user-configured preferences, such as priority or last-connected input. When the user manually switches, by pressing a button, the auto switching is overridden.
- Simple Switching Operation – Local buttons or remotely connected contact-closure buttons for flexible user input selection and switching control.
- HDMI™ Signal Switching – HDCP compliant, supporting deep color, x.v.Color™, lip sync, HDMI uncompressed audio channels, Dolby TrueHD, DTS-HD, 2K, 4K, and 3D as specified in HDMI 2.0.
- I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling, processing, locking and pass-through algorithm ensures plug & play operation for HDMI source and display systems.
- Multi-channel Audio Switching – Up to 32 channels of digital stereo uncompressed signals for supporting studio-grade surround sound.
- Audio Embedding – An auto-detected analog stereo audio input, per user selection, is converted into a digital signal and embedded in the output HDMI signal, replacing the source HDMI audio input signal. This enables, for example, a presenter to temporarily override the playing source audio with speech description.
- Audio De-embedding – The digital audio signal passing-through to the output, is de-embedded, converted to an analog signal and sent to the stereo analog audio output. This enables playing the audio on locally connected speakers, in parallel to playing it on the speakers connected to the AV acceptor device (such as TVs with speakers).
- Ethernet Extension – Ethernet interface data flows in both directions, allowing extension of up to 100Mbps Ethernet connectivity for LAN communication and device control.
- Bidirectional RS-232 Extension – Serial interface data flows in both directions, allowing data transmission and device control.
- Reliable PoE (Power over Ethernet) Powering – Auto-senses the extension line PoE status, it accepts power from a remote PoE provider such as a PoE matrix, with optional mains powering from connected power adapter.
- Cost-effective Maintenance – Status LED indicators for HDMI, VGA and HDBT ports facilitate easy local maintenance and troubleshooting. Remote IP-driven device management via built-in web pages and RS-232 connection. Local and remote firmware upgrade via RS-232 or Ethernet connection tool ensure lasting, field-proven deployment.
- Easy Installation – Compactly fits into standard US, EU and UK 2-gang in-wall box size, supporting decorative integration with room deployed user interfaces such as electrical switches. Wall-plate installation is fast and cost-effective via a single twisted pair cable, providing both video signal and power (PoE) connections.

Typical Applications

WP-20 is ideal for the following typical applications:

- Podium-mounted switcher in lecture halls, training rooms, auditoriums and hospitality applications.
- Wall-mounted switcher within any AV distribution system
- Multimedia and presentation source selection in various corporate application.

About HDBaseT™ Technology

HDBaseT is an advanced, all-in-one connectivity technology (supported by the HDBaseT Alliance). It is particularly suitable in the ProAV – and also the home – environment as a digital networking alternative, where it enables you to replace numerous cables and connectors by a single LAN cable used to transmit, for example, uncompressed, full high-definition video, audio, IR, as well as various control signals.



The products described in this user manual are HDBaseT certified.

Defining WP-20 Wall Plate

[Figure 1](#) and [Figure 2](#) define the front panels of the WP-20 and the WP-20E.

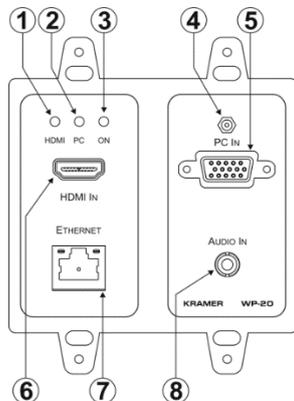


Figure 1: WP-20 Wall Plate Front Panel

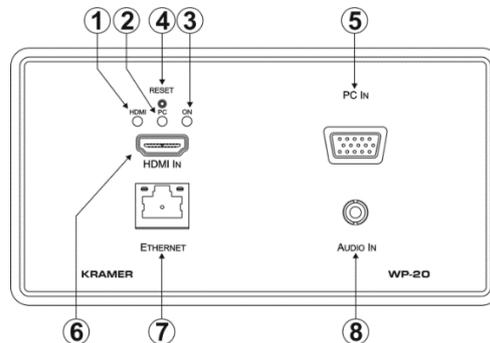


Figure 2: WP-20E Wall Plate Front Panel

#	Feature	Function
1	HDMI LED	When HDMI is selected: Lights orange when external audio is selected. Lights green when embedded audio is selected. When HDMI is not selected the LED does not light.
2	PC Graphics LED	When PC input is selected: Lights orange when external audio is selected. Lights green when there is no audio. When the PC input is not selected the LED does not light.
3	ON LED	The LED indicates the following: Lights green – power is provided by a power adapter. Lights orange – power is provided by PoE.
4	Reset Button	Short press to reset the device, long press (5 seconds) to reset the device to factory default parameters.
5	PC IN Input Connector	Connect to the PC graphics source, (for example, a laptop).
6	HDMI IN Input Connector	Connect to an HDMI source, (for example, a Blu-ray disk player).
7	ETHERNET RJ-45 Connector	Connect to the Ethernet LAN.
8	AUDIO IN 3.5mm Mini Jack	Connect to the unbalanced, stereo audio source, (for example, the audio output of the laptop).

[Figure 3](#) and [Figure 4](#) define the rear panels of the **WP-20** and **WP-20E**.

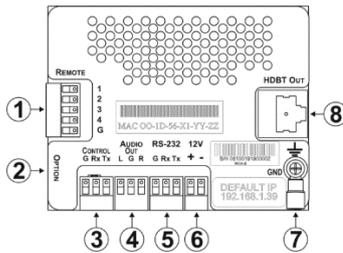


Figure 3: **WP-20** Wall Plate Rear Panel

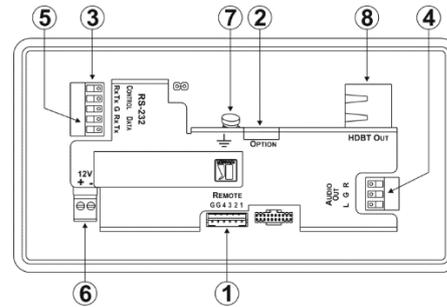


Figure 4: **WP-20E** Wall Plate Rear Panel

#	Feature	Function
1	<i>REMOTE</i> 5-pin Terminal Block	Connect to the remote, contact-closure switches for remote control, (see Remote Switches Terminal Block on page 9).
2	<i>OPTION</i> 4-way DIP-switch	Switches for setting the device behavior, (see Setting Configuration DIP-switch on page 13).
3	<i>CONTROL</i> 3-pin Terminal Block	Connect to the serial controller to control the WP-20 , (for example, a PC).
4	<i>AUDIO OUT</i> 3-pin Terminal Block	Connect to the unbalanced, stereo audio acceptor, (for example, amplified speakers).
5	<i>RS-232</i> 3-pin Terminal Block	Connect to the PC to transfer data via RS-232, (for example, a serial controller for a remote device).
6	<i>12V DC</i> Connector	Connect to the supplied power adapter. Not needed on the WP-20 if there is a PoE provider over HDBaseT.
7	Earth Terminal	Connect to the common ground (optional).
8	<i>HDBT OUT</i> RJ-45 TP Connector	Connect to a compatible HDBT TP switcher or receiver (for example, the TP-780Rxr).

Mounting WP-20

This section provides instructions for mounting **WP-20**. Before installing, verify that the environment is within the recommended range:



- Operation temperature – 0° to 40°C (32 to 104°F).
- Storage temperature – -40° to +70°C (-40 to +158°F).
- Humidity – 10% to 90%, RHL non-condensing.

**Caution:**

- Mount **WP-20** before connecting any cables or power.

**Warning:**

- Ensure that the environment (e.g., maximum ambient temperature & air flow) is compatible for the device.
- Avoid uneven mechanical loading.
- Appropriate consideration of equipment nameplate ratings should be used for avoiding overloading of the circuits.
- Reliable earthing of rack-mounted equipment should be maintained.



For more information go to www.kramerav.com/downloads/WP-20

Connecting WP-20 Wall Plate



Always switch off the power to each device before connecting it to your **WP-20**. After connecting your **WP-20**, connect its power and then switch on the power to each device.

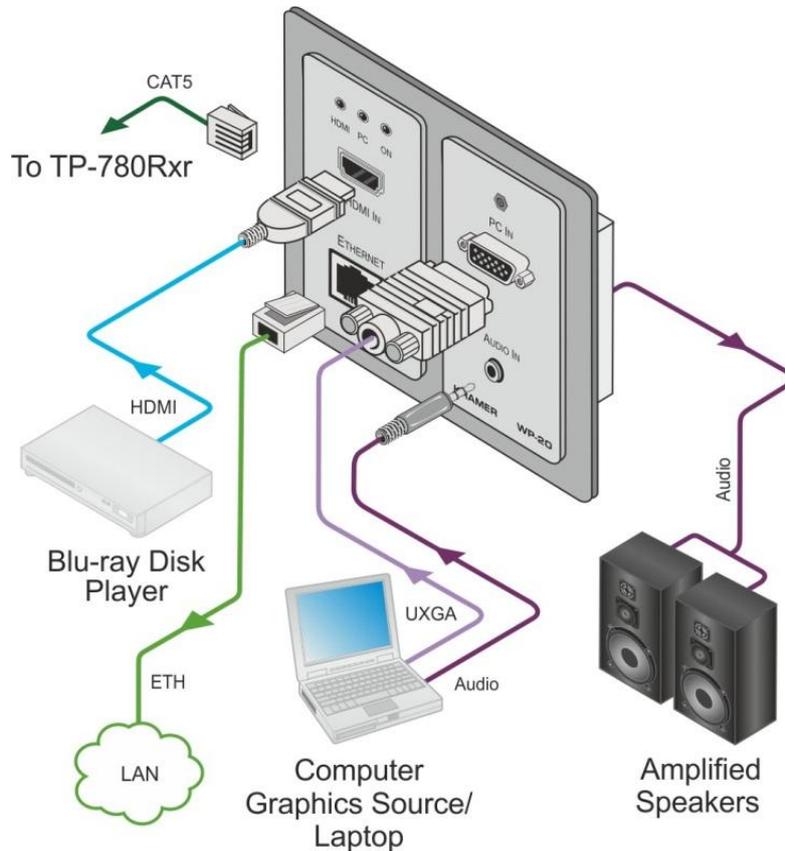


Figure 5: Connecting the WP-20 Wall Plate



When the receiver in use does not support Ethernet, you can replace the left-hand side faceplate with an optional part that does not have a cutout for the RJ-45 Ethernet connector.

To connect the WP-20, as illustrated in the example in [Figure 5](#):

1. Connect an HDMI source, (for example, a Blu-ray disk player) to the HDMI input.
2. Connect a PC graphics source, (for example, a laptop) to the PC In input.
3. Connect an unbalanced stereo audio source, (for example, the audio output from the laptop) to the AUDIO IN 3.5mm mini jack.
4. Connect the Ethernet RJ-45 connector on the front panel to the LAN.
5. Connect the HDBT OUT RJ-45 connector on the rear panel of the **WP-20** to an HDBT-compatible receiver (for example, the **TP-780Rxr**).
6. Connect the AUDIO OUT 3-pin terminal block on the rear panel of the **WP-20** to the unbalanced, stereo audio acceptor, (for example, a power amplifier with speakers).
7. Connect the REMOTE, 5-way terminal block to momentary, contact-closure switches,
8. If the device is not connected to a PoE provider, connect the power adapter to the **WP-20** and to the mains power, (not shown in [Figure 5](#)).

Remote Switches Terminal Block

You can connect remote, momentary-contact contact-closure switches to the terminal block on the rear panel of the **WP-20** to control various functions of the device.

[Figure 6](#) illustrates the connections from the terminal block to the contact-closure switches.

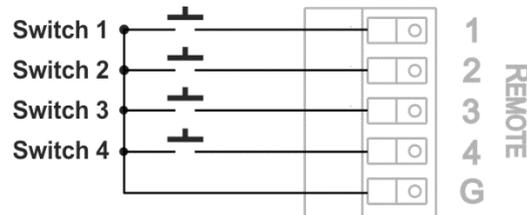


Figure 6: Remote Switches Terminal Block

#	Feature	Function
1	Input selection/VGA phase shift switch	<ul style="list-style-type: none"> Short press – Input toggle. Long press – Adjusts the VGA phase shift, (see VGA Phase Shift on page 11).
2	Step-In switch	Activates the Step-In function.
3	Analog audio output volume increase control	<ul style="list-style-type: none"> Short press – Increases the volume one step (0.5dB). Long press – Increases the volume from -83dB to +24dB in 10 seconds. <p>i Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage (see Routing Video and Data on page 17).</p> <p>(see Analog Audio Output Volume Control on page 12).</p>
4	Analog audio output volume decrease control	<ul style="list-style-type: none"> Short press – Decreases the volume one step (0.5dB). Long press – Decreases the volume from +24dB to -83dB in 10 seconds. <p>i Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage (see Routing Video and Data on page 17).</p> <p>(see Analog Audio Output Volume Control on page 12).</p>
G	Ground	Connect to the common side of the switches.

Wiring RJ-45 Connectors

This section defines the TP pinout, using a straight pin-to-pin cable with RJ-45 connectors.

EIA /TIA 568B	
PIN	Wire Color
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown

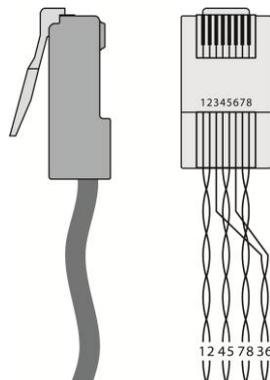


Figure 7: TP PINOUT

Principles of Operation

The **WP-20** selects video and audio inputs based on the rules described below.

Input Selection

The video mode selection is set by the DIP-switches (see [Setting Configuration DIP-switch](#) on page [13](#)) to either of the following modes:

- Manual.
- Auto – Last connected or priority mode.



When in manual override mode, a manual switch to an unconnected input stays connected to output. The device does not go into auto-switch mode.

In manual mode you select an input using, either the remote input selection switches, the Web-page interface, or P3000 commands, and switching occurs whether or not there is a live signal present on the input.

In auto mode, the switching selection is performed based on either last connected or priority input.

In last connected mode the **WP-20** selects the input based on which input was connected last. If the signal on this input is subsequently lost for any reason, the input with a live signal and which was also the last connected is selected automatically.

In priority mode, when the input sync signal is lost for any reason, the input with a live signal and next in priority is selected automatically. This priority is configurable; the default setting is HDMI > PC.



In both last connected and priority modes, manually selecting an input using the remote input selection switches or the web pages (see [Switching Input Signals](#) on page [18](#)) overrides the last automatic selection until the next connection event or power cycle.

Signal Loss and Unplugged Cable Timeouts

In both last connected and priority modes, when the input signal sync is lost (but the cable is not removed) there is a default delay (ten seconds for video, not applicable to the PC input, and five seconds for analog audio) before another input is automatically selected. When an input cable is removed, there is a delay before automatic switching takes place.

Both timeouts are configurable, (see [Setting Configuration DIP-switch](#) on page [13](#)).



Analog audio is not output when there is no display connected. If a display is connected, analog audio is output even in the absence of a video signal.

Audio Signal Control

The Option DIP-switches 3 and 4 (see [Setting Configuration DIP-switch](#) on page [13](#)) control the manner in which audio is handled.

The following table describes which audio signal is embedded in the output.

Selected Video Input	HDMI Embedded Audio Detected	Analog Audio Detected	DIP-switch 3	DIP-switch 4	Audio on HDBT Output
VGA	N/A	Yes	N/A	N/A	Analog audio
VGA	N/A	No	N/A	N/A	No audio
HDMI	N/A	N/A	Manual	Embedded	Embedded audio
HDMI	N/A	N/A	Manual	Analog	Analog audio
HDMI	Yes	No	Auto	N/A	Embedded audio
HDMI	Yes	Yes	Auto	Embedded	Embedded audio
HDMI	Yes	Yes	Auto	Analog	Analog audio
HDMI	No	Yes	Auto	N/A	Analog audio
HDMI	No	No	Auto	N/A	No audio



When there is an audio signal but no video signal the output is a black video pattern in conjunction with the external analog Audio In signal.



The default timeout for audio switching when the input signal is lost is five seconds. This can be changed using either P3000 commands or the Web pages.

VGA Phase Shift

To optimize phase on the input VGA signal, the VGA sampling phase can be shifted using the following methods:

- A long press on the PC IN select button on the front panel.
Each long press steps the phase shift up one step, starting from 0 and going to 31. When set to 31, another long press steps the shift to 0.
- A remote, contact-closure switch connected to pins 1 and G of the Remote terminal block.
Each long press steps the phase shift up one step, starting from 0 and going to 31. When set to 31, another long press steps the shift to 0.
- Using the Web pages, (see [Accessing WP-20 Web Pages](#) on page [15](#)).
- Protocol 3000 commands over RS-232 (see [Protocol 3000](#) on page [43](#)).



VGA phase default value is 6.

Operating WP-20

Powering up the WP-20 recalls the last settings from the non-volatile memory, (that is, the configuration of the device when it was powered down).

Selecting an Input Manually

Any of the following methods can be used to select an input:

- Protocol 3000 command, (see [Protocol 3000](#) on page 43).
- Remote contact-closure switch, (see [Remote Switches Terminal Block](#) on page 9).
- Web pages, (see [Operating WP-20 Remotely Using Web Pages](#) on page 15).

Locking EDID

To prevent the stored EDID (either default or read from a device) from being overwritten, you can lock the current EDID by either sending a Protocol 3000 command or by using the web pages.



Do not power up the display before locking the EDID.

Resetting WP-20

To perform a soft reset of the WP-20:

- Briefly press the Reset button.
The device resets.

To reset the WP-20 to factory default parameters:

- Press and hold the Reset button for five seconds.
The device is reset to factory default parameters.

Analog Audio Output Volume Control

The analog audio output volume can be controlled using the Web pages, (see [Accessing WP-20 Web Pages](#) on page 15) or via the remote, contact-closure switches connected to pins 3 and 4 of the Remote terminal block, (see [Remote Switches Terminal Block](#) on page 9) and for using P3000 commands to control the volume (see [Protocol 3000](#) on page 43).

The volume is adjustable from -83dB to +24dB in steps of 0.5dB.



Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage (see [Routing Video and Data](#) on page 17).

Configuring WP-20

Setting Configuration DIP-switch

The 4-way DIP-switch provides the ability to configure a number of device functions. A switch that is down is on; a switch that is up is off.

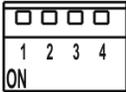


Figure 8: The Configuration DIP-switch

 After changing a DIP-switch you must power cycle the device to implement the change.

Video Switching Selection

DIP-switch 1	DIP-switch 2	Video Input Selection
Off (up)	Off (up)	Automatic – Last connected. Where more than one source is connected the last one connected has priority.
Off (up)	On (down)	Automatic – Priority selection. HDMI → PC IN.
On (down)	Off (up)	Manual.
On (down)	On (down)	Manual.

Audio Switching Selection

DIP-switch 3	DIP-switch 4	Audio Input Selection
Off (up)	Off (up)	Automatic – Priority selection. Embedded HDMI → analog Audio In.
Off (up)	On (down)	Automatic – Priority selection. Analog Audio In → embedded HDMI.
On (down)	Off (up)	Embedded HDMI.
On (down)	On (down)	Analog Audio In.

Switching Timeouts

When the **WP-20** is configured for auto switching, the timeouts (before a new input is automatically selected) can be changed as shown in the tables below. (For the delay settings on the Web page (see [Setting Video Switching Mode](#) on page [29](#)).

Timeout	Minimum Timeout	Default Timeout
Delay switching upon signal loss while cable is plugged in (signal off, 5V power on).	5 seconds.	10 seconds.
Delay switching upon cable unplug (signal off, power off).	0 seconds.	0 seconds.
Delay 5V power off upon signal loss. (delay must be greater than "Delay switching upon signal loss").	Should at least equal the larger of the above two values (signal loss timeout and cable unplug timeout).	900 seconds.



For example, if:

Delay switching upon signal loss = 15 seconds.

Delay switching upon cable unplug = 30 seconds.

Then:

Delay 5V power off upon signal loss must be \geq 30 seconds.

Using Step-In Feature

To be able to use the Step-In feature, you need to assign the RS-232 signal that is transmitted over the HDBT link to control (see [Step-In Control through HDBaseT](#) on page [20](#)). The Step-In switch on the Remote Switches Terminal Block operates in conjunction with a compatible receiver (see [Remote Switches Terminal Block](#) on page [9](#)).

Operating WP-20 Remotely Using Web Pages

The WP-20 can be operated remotely using the embedded Web pages. The Web pages are accessed using a Web browser and an Ethernet connection.

Before attempting to connect:

- Ensure that your browser is supported (see [Default IP Parameters](#) on page 37).
- Ensure that JavaScript is enabled.

Accessing WP-20 Web Pages

 In the event that a Web page does not update correctly, clear your Web browser's cache by pressing CTRL+F5.

To access the WP-20 Web pages:

1. Open your Internet browser.
2. Type the IP number of the device (see [Default IP Parameters](#) on page 37) in the Address bar of your browser.



 If authentication is enabled, the following window ([Figure 9](#)) appears and you must enter the valid username and password to access the Web pages. For default authentication details, see [Default Logon Credentials](#) on page 38.

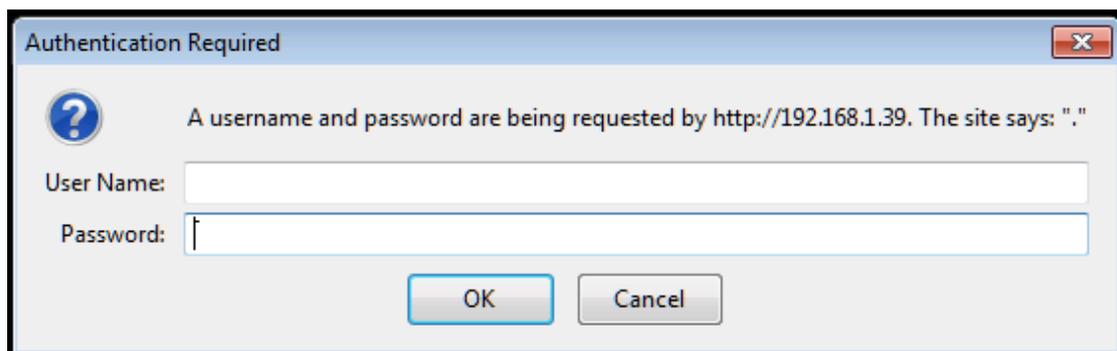


Figure 9: Entering Logon Credentials

Following a successful logon, the screen shown in [Figure 10](#) appears.

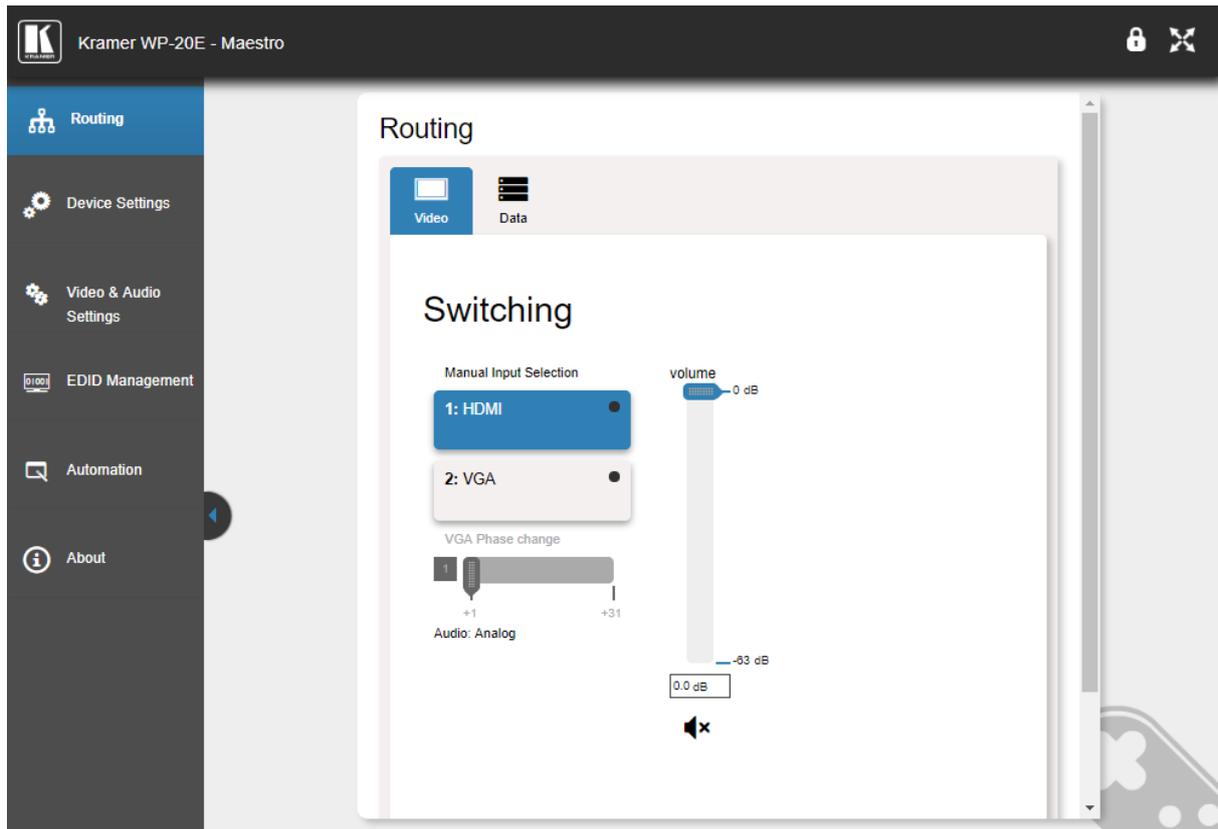


Figure 10: WP-20 Web pages

- To open / hide the navigation panel, click  / .
- To lock the webpages, click .
- To toggle in and out of full screen mode, click .

The **WP-20** Web pages enable configuring the following:

- [Routing Video and Data](#) on page [17](#).
- [Device Settings](#) on page [21](#).
- [Video and Audio Settings](#) on page [28](#).
- [Managing EDID](#) on page [32](#).
- [Device Automation](#) on page [34](#).

Routing Video and Data

The Routing page enables the following:

- [Switching Input Signals](#) on page 18.
- [Changing VGA Phase](#) on page 18.
- [Adjusting Audio Output Volume](#) on page 18.
- [Muting Audio Output](#) on page 19.
- [Unmuting Audio Output](#) on page 19.
- [Defining HDBaseT Control Settings](#) on page 19.

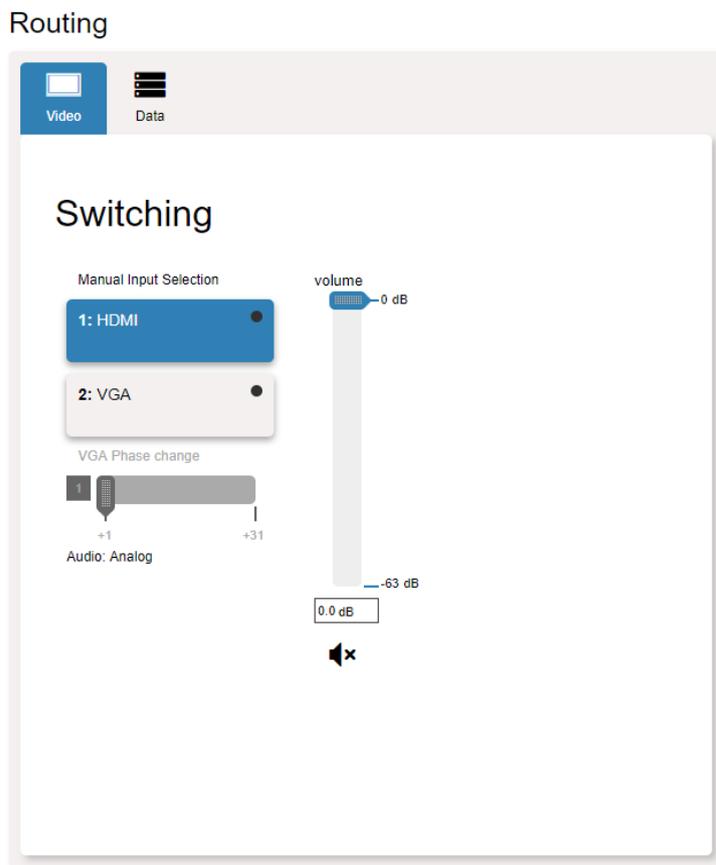


Figure 11: Routing page Video tab

Item	Description
HDMI Button	Click to select the HDMI input. The button color indicates whether or not there is a live signal on the input.
VGA Button	Click to select the VGA input.
VGA Phase change Slider	Click and slide to the left or right to adjust the VGA phase change (+1 to +31).
Volume Slider	Click and slide up and down to increase or decrease the audio output volume (-83dB to +24dB). <i>i</i> Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage (see Routing Video and Data on page 17).
Mute/Unmute Button	Click to mute or unmute the output audio.

Switching Input Signals

To manually switch Input signals:

1. In the Navigation pane, click **Routing**.
The Routing page appears.
2. Select the Video tab.
The Switching tab appears ([Figure 11](#)).
3. Select the input source (HDMI, or VGA).
The input chosen is routed to the output.

Changing VGA Phase

To change VGA phase:

1. In the Navigation pane, click **Routing**.
The Routing page appears.
2. Select the Video tab.
The Switching tab appears ([Figure 11](#)).
3. Select VGA input source.
The VGA input is routed to the output.
4. Select VGA phase change (1-31).
VGA phase changes to selected value.

Adjusting Audio Output Volume

To increase/decrease audio output:

1. In the Navigation pane, click **Routing**.
The Routing page appears.
2. Select the Video tab.
The Switching tab appears ([Figure 11](#)).
3. Move the volume slider up or down (or type in a value -83 to +24 in the field below the volume slider).
The output volume changes based on selected value.



Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage (see [Routing Video and Data](#) on page [17](#)).

Muting Audio Output

To mute audio output:

1. In the Navigation pane, click **Routing**.
The Routing page appears.
2. Select the Video tab.
The Switching tab appears ([Figure 11](#)).
3. Click the speaker icon  to mute the volume.
The icon changes to  and the volume is muted.

Unmuting Audio Output

To unmute audio output:

1. In the Navigation pane, click **Routing**.
The Routing page appears.
2. Select the Video tab.
The Switching tab appears ([Figure 11](#)).
3. Click the speaker icon  to unmute the volume.
The icon changes to  and the volume is unmuted.

Defining HDBaseT Control Settings

The Control Settings page lets you can configure the HDBaseT line to send serial (RS-232) communication in one of three ways:

- **HDBaseT Tunneling from Data Port** – Route RS-232 data from the RS-232 DATA port to the HDBaseT port (pass-through mode).
- **Step-In Control through HDBaseT** – Send a Step-In command from **WP-20** to a Step-In master over HDBaseT.
- **Maestro Control over HDBaseT** – Send RS-232 commands over HDBaseT to turn on/off peripheral devices via a **Maestro** trigger.

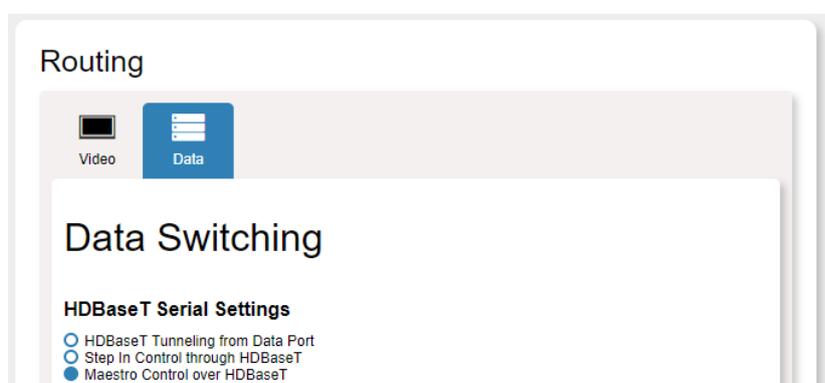


Figure 12: Data Tab

HDBaseT Tunneling from Data Port

The port tunneling feature lets you send and receive simple RS-232 signals between a controller and a serial device via the **WP-20** which is connected to the Ethernet and outputs via HDBaseT cable.

Step-In Control through HDBaseT

To be able to use the Step-In feature, you need to assign the RS-232 signal that is transmitted over the HDBT link to control. The Step-In switch on the Remote Switches Terminal Block will now operate in conjunction with a compatible receiver (see [Remote Switches Terminal Block](#) on page 9).

Maestro Control over HDBaseT

The Remote Device Control section of the Automation page (see [Device Automation](#) on page 34) is powered by Maestro and enables you to configure single-trigger room element automation scenarios.

Use the Control Settings page to access Kramer Maestro room automation. Maestro is a powerful tool that enables you to configure single-trigger room element automation scenarios without the need for complicated programming. To use room automation, you need to define triggers that, upon an event, execute scripts which include a sequence of actions (commands, which can appear in different scenarios) that are carried out via any defined ports.

For further details on how to use room automation, refer to the *Kramer Maestro User Manual*, available at www.kramerav.com/downloads/WP-20.

Device Settings

The Device Settings page enables the following:

- [Changing Device Name](#) on page [22](#).
- [Changing Programmable Button Behavior](#) on page [22](#).
- [Loading and Saving Configurations](#) on page [23](#).
- [Resetting Device](#) on page [23](#).
- [Configuring Network Settings](#) on page [24](#).
- [Setting Time and Date](#) on page [25](#).
- [Upgrading Firmware](#) on page [26](#).
- [Setting Authentication](#) on page [27](#).



After making any change to the parameters on the Device Settings page, you must power cycle the device to activate the changes.

Device Settings

General
Communication
Time & Date
FW Upgrade
Authentication

General Settings

Unit Name Set

Model **WP-20E**

Firmware Version **3.3.54366**

Serial Number **60631500223**

Programmable Buttons Mode Programmable Default

Save/Load Settings

All Settings Load... Save...

Factory reset

Figure 13: General tab

Item	Description
Unit Name	Enter a descriptive, easy to identify name for the WP-20 .
Model	Displays the model of the device.
Firmware Version	Displays the firmware version of the device.
Serial Number	Displays the serial number of the device.
Programmable Buttons Mode	Enable a response for external event.
Load & Save buttons	Click Load to retrieve a previously saved configuration, click Save to save the present configuration (see Loading and Saving Configurations on page 23).
Factory reset button	Click to reset the device to factory default parameters. After the success message appears, power cycle the device (see Resetting Device on page 23)



following power-up signal stabilization short duration, last actively-switched input with stable signal is reconnected, otherwise the last input detected to have stable signal is connected

Changing Device Name

To Change the Device Name:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the General tab.
The General tab appears ([Figure 13](#)).
3. Type in a Unit Name (up to 15 alpha-numeric characters) and click **Set**.
The Device Name is changed.

Changing Programmable Button Behavior

The back panel of the **WP-20** ([Figure 3](#) & [Figure 4](#)) contains a Toggle Switch Terminal Block (see [Remote Switches Terminal Block](#) on page 9) where physical switches can be attached to control the front panel buttons (e.g., Input, Step-In, Volume Up/Down).

Setting Programmable buttons mode to **Default** ensures that each physical press of the remote button is the same as pressing a front panel button.

Setting Programmable buttons mode to **Programmable** ensures that each physical press of the remote button is the same as sending a Maestro command (i.e., a trigger) which may include several steps (e.g., closing the lights and opening a projector screen upon HDMI trigger).

To change programmable button behavior:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the General tab.
The General tab appears ([Figure 13](#)).
3. Set Programmable buttons mode.
Programmable buttons behavior changes.

Loading and Saving Configurations

The **WP-20** enables loading and saving device setting configurations. This is especially useful when setting up multiple **WP-20** devices.



IP is not saved in configuration file.

To load a configuration:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the General tab.
The General tab appears ([Figure 13](#)).
3. Click the **Load** button.
The File Upload browser window appears.
4. Browse to the required file and click **Open**.
The configuration is retrieved and the success message appears.

To save the current configuration:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the General tab.
The General tab appears ([Figure 13](#)).
3. Click the **Save** button.
The Save Configuration success message appears.

Resetting Device

To reset the WP-20 to factory default parameters:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the General tab.
The General tab appears ([Figure 13](#)).
3. Click the **Factory reset** button.
A confirmation message appears.
 Clicking **Cancel** exits the reset procedure without making any changes.
4. Click **OK**.
A progress message appears. Upon completion, a success message appears.

Configuring Network Settings

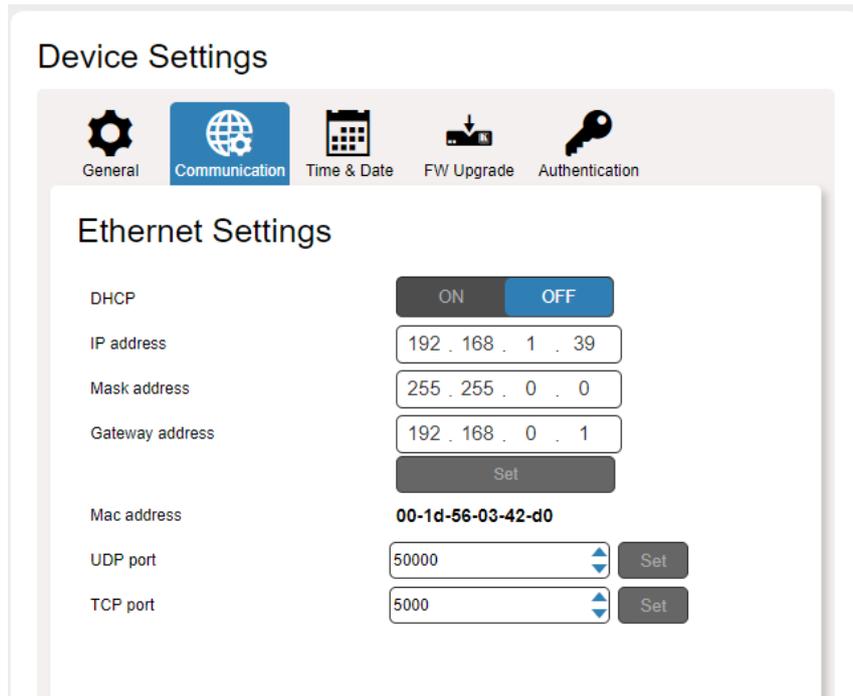


Figure 14: Communication Tab

Item	Description
DHCP ON/OFF buttons	Click ON to turn DHCP on; click OFF to turn DHCP off and use static IP addressing
IP address	The IP address of the device. To set a new IP address, enter the new valid IP address and click Set
Mask address	The network mask of the device. To set a new mask address, enter the new valid mask address and click Set
Gateway address	The network gateway for the device. To set a new gateway address, enter the new valid gateway address and click Set
Mac address	The MAC address of the device
UDP port	The UDP port number of the device. To set a new UDP port number, enter the new valid port number or use the spin controls and click Set
TCP port	The TCP port number of the device. To set a new TCP port number, enter the new valid port number or use the spin controls and click Set

To configure network settings:

- In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
- Select the Communication tab.
The Communication tab appears ([Figure 14](#)).
- Change the network settings as required.
–OR–
If you want the device to obtain an IP address via DHCP server, click DHCP **ON**.
- Verify that the TCP port is correct.
The web page logs out and the browser reloads with the new network information.

Setting Time and Date

You can set a device Time and Date or Sync the Device Time and Date to any server around the world.

The screenshot shows the 'Time And Date' configuration page. At the top, there are navigation tabs: General, Communication, Time & Date (selected), FW Upgrade, and Authentication. Below the tabs, the 'Time And Date' section contains the following settings:

- Device Date: 14/8/3261
- Device Time: 07:48
- Time Zone: (GMT+00:00) Greenwic
- Daylight Savings Time: YES (selected), NO
- Use Time Server (NTP): YES (selected), NO
- Time Server Address: 129.6.15.30
- Server Status: Unreachable
- Sync Every Day at (0-23): 0 Hrs

A 'Save Changes' button is located at the bottom of the form.

Figure 15: Time and Date tab

Item	Description
Device Date	Sets device date Independent of server time.
Device Time	Sets device time Independent of server time.
Time Zone	Sets time zone (based on GMT).
Daylight Savings Time	Sets daylight savings time (on/off).
Use Time Server (NTP)	Setting this to YES enables the server fields and allow you to sync the machine to a server's date and time.
Time Server Address	Server address to sync time and date.
Server Status	Indicates if the server is reachable.
Sync Every Day at (0-23)	Sync every day at a specific hour midnight thru 11pm.

To set device time and date:

- In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
- Select the Time & Date tab.
The Time & Date tab appears ([Figure 15](#)).
- Set Use Time Server (NTP) to NO.
Device Time & Date Fields are enabled and network fields are disabled.
- Type a new time & date and click **Save Changes**.
The devices date and time are set.

To sync device time and date to a server:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the Time & Date tab.
The Time & Date tab appears ([Figure 15](#)).
3. Set Use Time Server (NTP) to YES.
Device Time & Date Fields are disabled and network fields are enabled.
4. Type in server information and click **Save Changes**.
The devices date and time are synchronized to the server address entered.

Upgrading Firmware

As problems are fixed or features are added, new firmware versions are released for downloading on the Kramer website.

To upgrade the firmware:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the FW Upgrade tab.
The FW Upgrade tab appears ([Figure 16](#)).



Figure 16: Firmware Upgrade tab

3. Click **Update**.
The Windows Browser opens.
4. Browse to the required file and click **Open**.
The firmware file name is displayed in the Firmware Upgrade tab.
5. Click **Start Upgrade**.
The firmware file is loaded and a progress bar is displayed.



Do not interrupt the process or the **WP-20** may be damaged.

6. When the process is complete reboot the device.
The firmware is upgraded.



You can upgrade firmware for multiple **WP-20** devices installed in the organization via Kramer Network.

Setting Authentication

The Authentication tab enables activating device security and defining logon authentication details. When device security is enabled, Web page access requires authentication. The default password is **Admin**. The upper right corner of the webpage displays  or  indicating whether authentication is required.

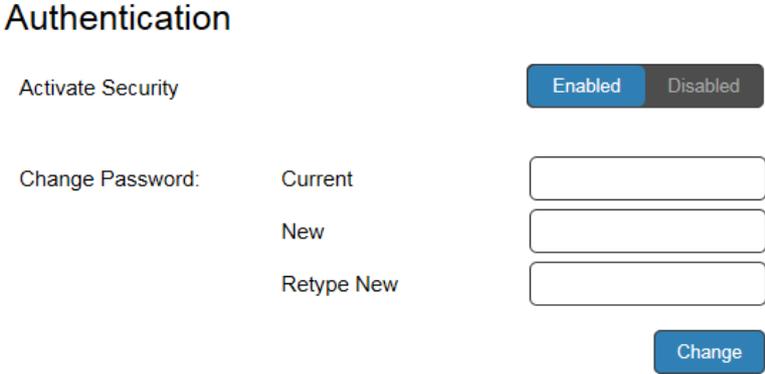


Figure 17: Authentication tab

The following table describes the elements of the Authentication tab:

Item		Description
Activate Security Button		Click to enable/disable security settings. When enabled, the valid username and password must be provided to allow Web page access
Change Password	Current password box	Enter the current password
	New password box	Enter the new password, (up to 15 printable ASCII characters)
	Retype New password box	Retype the new password
Change button		Click Change to save the new authentication details

To set authentication:

1. In the Navigation pane, click **Device Settings**.
The Device Settings page appears.
2. Select the Authentication.
The Authentication tab appears ([Figure 17](#)).
3. Click the **Enabled** button for Active Security.
The web page refreshes and the password fields are visible.
4. Type the current password and new password twice and click the **Change** button.
The upper right icon changes to .

To undo authentication:

1. In the Navigation pane, click **Device Settings**.

The Device Settings page appears.

2. Select the Authentication.

The Authentication tab appears ([Figure 17](#)).

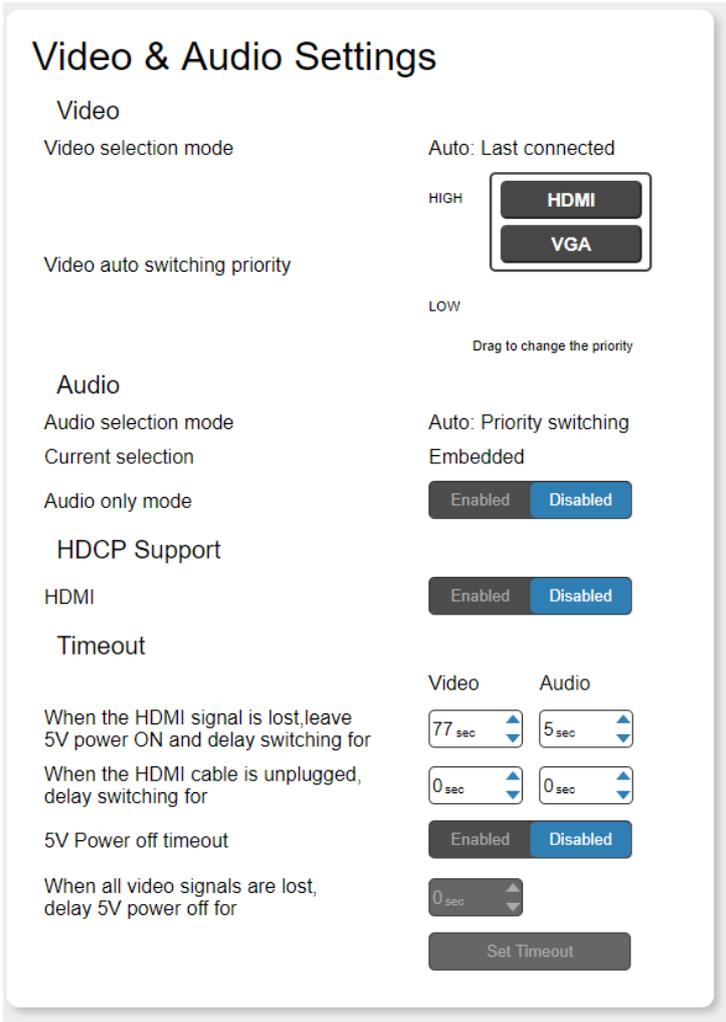
3. Click the **Disabled** button for Active Security.

The webpage refreshes, the password fields disappear, and the upper right icon changes to .

Video and Audio Settings

The Video and Audio Settings page enables the following:

- [Setting Video Switching Mode](#) on page [29](#).
- [Setting Audio Selection Setting](#) on page [30](#).
- [Setting Input HDCP Behavior](#) on page [30](#).
- [Setting Timeouts](#) on page [31](#).



Video & Audio Settings

Video

Video selection mode: Auto: Last connected

HIGH: HDMI VGA

LOW:

Drag to change the priority

Audio

Audio selection mode: Auto: Priority switching

Current selection: Embedded

Audio only mode: Enabled Disabled

HDCP Support

HDMI: Enabled Disabled

Timeout

When the HDMI signal is lost, leave 5V power ON and delay switching for: Video: 77 sec, Audio: 5 sec

When the HDMI cable is unplugged, delay switching for: Video: 0 sec, Audio: 0 sec

5V Power off timeout: Enabled Disabled

When all video signals are lost, delay 5V power off for: 0 sec

Set Timeout

Figure 18: Video and Audio Settings tab

The following table describes the elements of the Video and Audio Settings tab:

Item	Description
Video selection mode Indicator	Indicates the current video selection mode; manual, auto, or auto last connected.
Video auto switching priority Buttons	Click and drag the buttons to the required priority level to use when in auto mode.
Audio selection mode Indicator	Indicates the current audio selection; manual, auto, or auto last connected.
Current selection Audio Indicator	Indicates the current audio selection; Embedded or analog.
Audio only mode Buttons	Select to enable/disable audio only mode. Disabled – Audio only mode is disabled. Enabled – Audio only mode is enabled. When enabled, if there is no video signal in the input, the device outputs a black pattern and the analog audio input continues to input any audio signal.
HDCP Support (on HDMI input) Buttons	Select HDCP support for HDMI. Disabled – HDCP encrypted content is not passed. Enabled – HDCP support is dictated by the display.
Delay switching upon signal loss for (leave 5V on) Box	Sets the delay for video and audio before switching (in auto mode) because of a signal loss on the currently selected input, while the cable is plugged in. Value in seconds (see Signal Loss and Unplugged Cable Timeouts on page 10).
Delay switching input upon cable unplug for Box	Sets the delay for video and audio before switching (in auto mode) because the currently selected input cable is unplugged. Value in seconds (see Signal Loss and Unplugged Cable Timeouts on page 10).
5V Power off timeout button	5V power turns off when the signal is lost (allowing displays to shut down).
Delay power off 5V upon signal loss for Box	Sets the delay for turning off the 5V output because of a signal loss on the currently selected input. Value in seconds (see Signal Loss and Unplugged Cable Timeouts on page 10).

Setting Video Switching Mode

Setting video switching mode to automatic ensures that should a signal in an active input fail, the **WP-20** automatically chooses a signal from another input to avoid AV downtime.

Automatic switching – last connected always switches to the latest cable plugged into the **WP-20** and reverts to the previously connected signal should the current signal fail.

Automatic switching – priority selection allows you to set the order of which signal has priority over another.

To set video switching mode to automatic-last connected:

1. In the Navigation pane, click **Video & Audio Settings**.

The Video & Audio Settings page appears.

2. Set **WP-20** DIP-switch 1 to up and DIP-switch 2 to up.

The video selection mode changes to Last Connected.

To set video switching mode to automatic-priority selection:

1. In the Navigation pane, click **Video & Audio Settings**.
The Video & Audio Settings page appears.
2. Set **WP-20** DIP-switch 1 to up and DIP-switch 2 to down.
The video selection mode changes to Priority.
3. Drag and drop the inputs to set which inputs get higher priority ([Figure 19](#)).

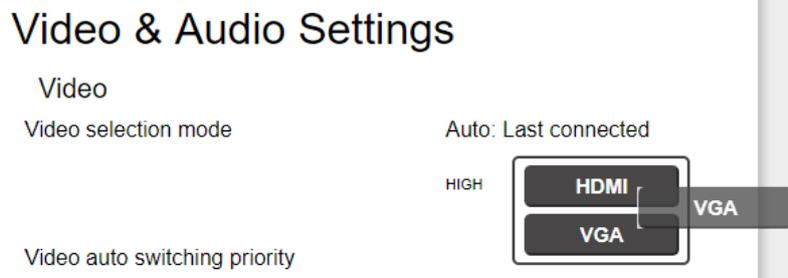


Figure 19: Dragging input to change priority

The video inputs priority changes.

To set video switching mode to manual selection only:

1. In the Navigation pane, click **Video & Audio Settings**.
The Video & Audio Settings page appears.
2. Set **WP-20** DIP-switch 1 to down.
The video selection mode changes to Manual.

Setting Audio Selection Setting

See Audio Switching Selection in [Setting Configuration DIP-switch](#) on page [13](#) for details.

Setting Input HDCP Behavior

There are video sources (e.g., some Apple devices) that automatically switch to HDCP mode if connected to a device that supports HDCP (e.g. **WP-20**). If an acceptor/display connected to **WP-20** does not support HDCP, you might want to set Input HDCP to Off, so that the video source does not auto-switch to HDCP mode and the acceptor does not display the video.

To set input HDCP behavior On/Off:

1. In the Navigation pane, click **Video & Audio Settings**.
The Video & Audio Settings page appears.
2. Click the **Enabled** or **Disabled** button for input HDMI.
Input HDMI supports an HDCP device if HDCP is set to Enabled.

Setting Timeouts

Use the **Timeout Settings** web page to set the time delay before shutdown if no input signal is detected.



The video and audio switching priority can only be set by the DIP-switches (see [Setting Configuration DIP-switch](#) on page 13).

To set the timeout for switching video inputs if no signal is detected:

1. In the Navigation pane, click **Video & Audio Settings**.
The Video & Audio Settings page appears.
2. Under “When the HDMI signal is lost, leave 5V power ON and delay switching for” set the delay time 0-905 seconds (where 0 is no timeout) and click **Set Timeout**.
Timeout is set.

To set the timeout for switching video inputs for unplugged HDMI cable:

1. In the Navigation pane, click **Video & Audio Settings**.
The Video & Audio Settings page appears.
2. Under “When the HDMI cable is unplugged, delay switching for” set the delay time 0-905 seconds (where 0 is no timeout) and click **Set Timeout**.
Timeout is set.

To set the 5V timeout after detecting no AV signal:

1. In the Navigation pane, click **Video & Audio Settings**.
The Video & Audio Settings page appears.
2. Under “5V Power off timeout” click the **Enabled** button.
The timeout field beneath the button is enabled.
3. Under “When all video signals are lost, delay 5V power off for”
Timeout is set.

Managing EDID

The EDID page lets you copy EDID data to either or all of the inputs from the following sources:

- Output
- Input
- Default EDID
- EDID data file

From this page you can also lock the EDID on each input independently by pressing the lock icon.

EDID Management

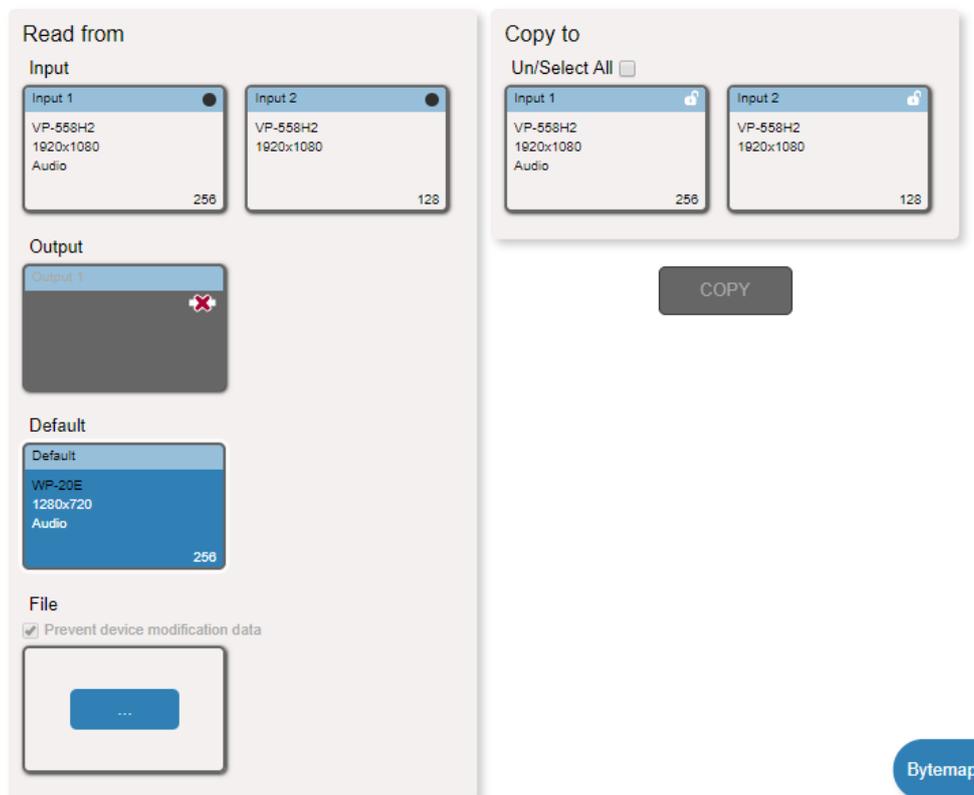


Figure 20: EDID Management Page



When the status of an EDID changes on the device (caused by outputs being exchanged), the display is not updated automatically. In the browser, click **Refresh** to update the display.

Item		Description
Read from Section	Input 1 button	Click to read the EDID from input 1 (HDMI)
	Input 2 button	Click to read the EDID from input 2 (VGA)
	Output button	Click to read the EDID from output
	DEFAULT EDID button	Click to read the default EDID
	File ...	Click to open the file browser to select an EDID file on your computer
Short Summary Information Section		Displays the current selection of EDID source, destination, video resolution, and audio availability
Copy to Section	Un/Select All selection box	Check to select or deselect all inputs
	Lock button	Locks the EDID on the currently selected input
	Input 1 button	Click to select input 1 as the destination (HDMI)
	Input 2 button	Click to select input 2 as the destination (VGA)
COPY Button		Click to copy the EDID from the selected source to the selected destination
Bytemap Button		Click to view the hex code of the EDID

 An input must be connected to the device to read the EDID from a connected output. If a video signal is not detected on the input, the output is disabled and the EDID cannot be read.

The selected EDID can be copied to the selected input/s.

 View the currently selected EDID source Bytemap by clicking **Bytemap** on the right side.

To copy an EDID from an output to an input:

1. In the Navigation pane, click **EDID Management**.
The EDID Management page appears ([Figure 20](#)).
2. Select the EDID source (for example, one of the inputs).

 If you are reading EDID from an output, make sure that that output is connected to an acceptor.

3. Select one or more inputs and click **COPY**.
The Input EDID is copied to the selected inputs.

To read the EDID from the default EDID:

1. In the Navigation pane, click **EDID Management**.
The EDID Management page appears ([Figure 20](#)).
2. Click **Default**.
3. Select one or more inputs and click **COPY**.
The default EDID is copied to the selected inputs.

To load a customized EDID file:

1. In the Navigation pane, click **EDID Management**.
The EDID Management page appears ([Figure 20](#)).
2. Click **File**.
The Windows Browser opens.
3. Select the EDID file and click **Open**.
The file is selected.
4. Select one or more inputs and click **COPY**.
The EDID file is copied to the selected inputs.

Device Automation

Use the Automation page to access Kramer Maestro room automation. Maestro is a powerful tool that enables you to configure single-trigger room element automation scenarios without the need for complicated programming. To use room automation, you need to define triggers that, upon an event, executes scripts which include a sequence of actions (commands, which can appear in different scenarios) that are carried out via any defined ports.

Download the Kramer Maestro User Manual from the Kramer web site at www.kramerav.com/downloads/WP-20 to learn how to use Kramer Maestro.



Note that all the ports, actions and triggers that are relevant to **WP-20** are included in the Kramer Maestro, as well as ports, actions and triggers that are relevant to other Kramer devices.



The Panel tab in the Automation page is currently unavailable.

To access Kramer Maestro:

1. In the Navigation pane, click **Automation**.
The Automation page appears ([Figure 21](#)).

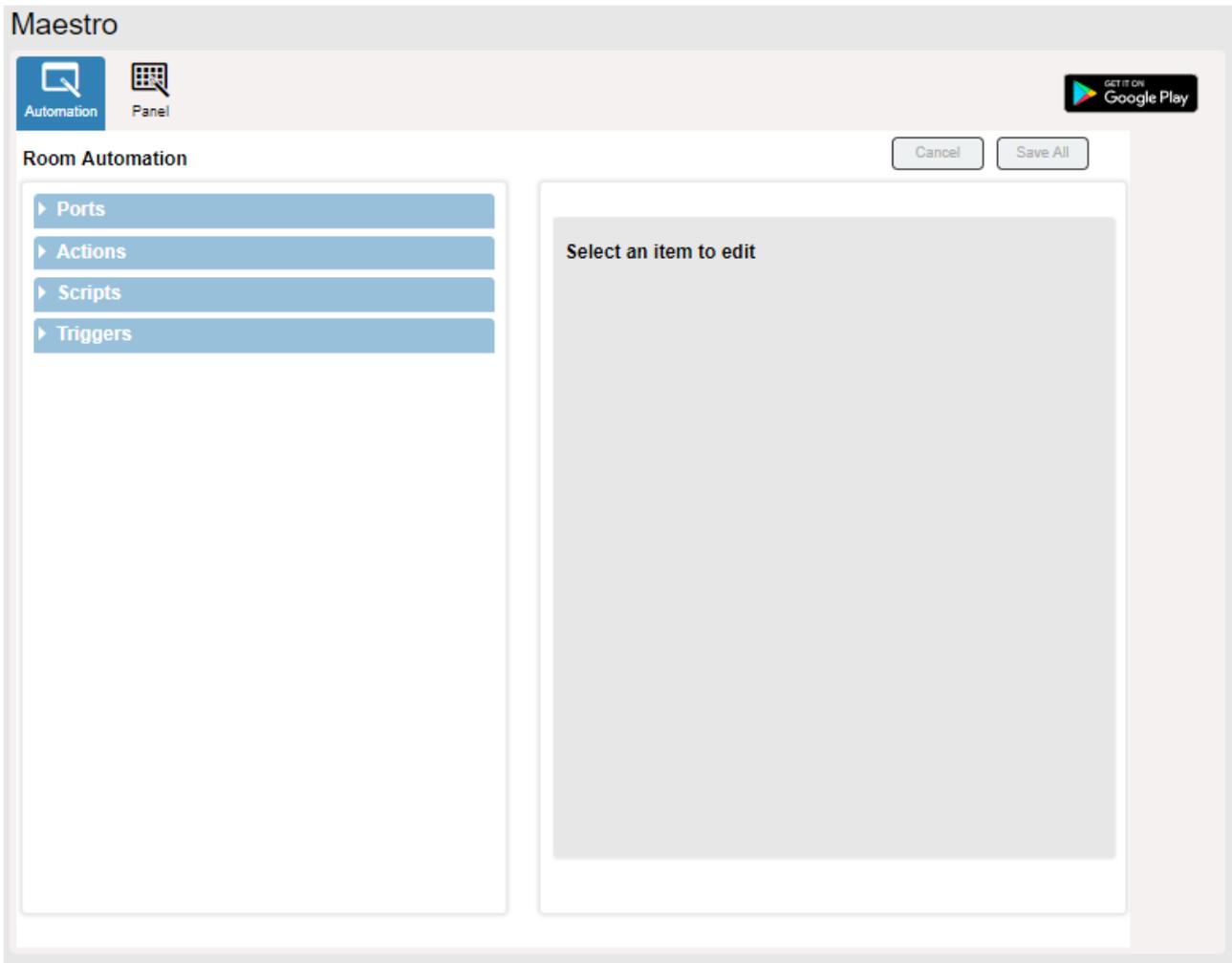


Figure 21: Automation Page

2. Configure the ports, actions, scripts and triggers as described in the Kramer Maestro User Manual.

Once the triggers are defined the trigger activates the scripts configured in the automation page. For example, when using the Scheduling trigger, you can activate a series of actions following a preset schedule.

About Page

The WP-20 About page displays the Web version and Kramer contact information.



Figure 22: About Page

Technical Specifications

INPUTS:	Video:	1 HDMI on an HDMI connector 1 VGA on a 15-pin HD (F) connector
	Audio:	1 Unbalanced stereo audio on a 3.5mm jack
OUTPUTS:	1 HDBaseT on an RJ-45 connector. 1 Unbalanced stereo audio on a 3.5mm jack.	
PORTS:	1 RS-232 on a 3-pin terminal block for serial link extension. 1 100BaseT Ethernet on an RJ-45 connector. 1 RS-232 on a 3-pin terminal block for device serial control.	
CONTROLS:	4 contact-closure switches on a 5-pin terminal block for remote device operation.	
VIDEO:	Max. Data Rate: 10.2Gbps (3.4Gbps per graphic channel). Max. Resolution: 4K@60Hz (4:2:0) 24bpp resolution. Supports deep color, x.v.Color™, lip sync, HDMI uncompressed audio channels, Dolby TrueHD, DTS-HD, 2K, 4K, and 3D as specified in HDMI 2.0. HDCP 1.4 signal compliance.	
EXTENSION LINE:	Up to 100m (330ft): At 4K@60Hz (4:2:0) Up to 130m (430ft): At full HD (1080p @60Hz 36bpp) Up to 180m (590ft): At HDBaseT ultra mode and full HD (1080p @60Hz 24bpp) Note: When using Kramer HDBaseT cables HDBaseT 1.0 compliant	
ANALOG AUDIO:	Max. Level: 3.1 Vpp THD: 0.013% SNR: -70dB	
EXTENDED ETHERNET:	Line rate bandwidth: Up to 100Mbps	
EXTENDED RS-232:	Baud rate: 300 to 115200	
POWER:	SOURCE: 12V DC, 2A, PoE CONSUMPTION: 12V DC, 850mA	
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)	
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)	
HUMIDITY:	10% to 90%, RHL non-condensing	
COOLING:	Convection	
ENCLOSURE TYPE:	Aluminum	
DIMENSIONS:	2 Gang USA 11.6 cm x 5.1cm x 11.4cm (4.57" x 2.01" x 4.49") W, D, H 2 Gang EU 15.1cm x 4.7cm x 8.6cm (5.94" x 1.85" x 3.39") W, D, H	
WEIGHT:	0.23kg (0.51lbs) approx.	
SHIPPING WEIGHT:	0.51kg (1.12lbs) approx.	
ENVIRONMENTAL & REGULATORY COMPLIANCE:	RoHs, WEEE and CE	
VIBRATION:	ISTA 1A in carton (International Safe Transit Association)	
INCLUDED ACCESSORIES:	Power adapter	
WARRANTY:	7 years parts and labor	

Default IP Parameters

Parameter	Values	Default
Device Name	Any alphanumeric string up to 14 chars (can include hyphen, but not at the beginning or end)	KRAMER_

Parameter	Values	Default
DHCP	ON/OFF	OFF
IP Address	Any valid IP address	192.168.1.39
Mask	Any valid network mask	255.255.0.0
Gateway	Any valid gateway address	192.168.0.1
TCP Port	0 to 65535	5000
UDP Port	0 to 65535	50000

Default RS-232 Communication Parameters

Parameter	Values
Baud Rate	115200
Data Bits	1
Stop Bits	1
Parity	None
Command Format	ASCII

Default Logon Credentials

Parameter	Values
Name	Admin
Password	Admin

Supported HDMI Resolutions

Resolution	Refresh Rate (Hz)
640x480p	85Hz; 75Hz; 72Hz; 60Hz; 59.95Hz
720x480p	60Hz
720x480i	30Hz
720x576p	50Hz
800x600p	85Hz; 75Hz; 72Hz; 60Hz
848x480p	60Hz
852x480p	60Hz
1024x768p	85Hz; 75Hz; 70Hz; 60Hz
1152x864p	75Hz
1280x768p	60Hz
1280x800p	60Hz
1280x960	60Hz
1280x1024p	75Hz; 60Hz
1360x768p	60Hz
1366x768	60Hz; 50Hz
1400x1050p	60Hz
1440x900p	60Hz
1600x900p	60Hz
1600x1200p	60Hz
1680x1050p	60Hz
1920x1080p	50Hz; 60Hz; 30Hz; 24Hz;
1920x1080i	50Hz; 60Hz;
3840x2160	30Hz
4096x2160	30Hz

Supported VGA Resolutions

Resolution	Refresh Rate
640x480p	60Hz
720x480p	60Hz
800x600p	60Hz
848x480p	60Hz
1024x768p	60Hz
1152x864	75Hz
1280x720p	60Hz; 50Hz
1280x768	60Hz
1280x800	60Hz
1280x960p	60Hz
1280x1024p	60Hz
1360x768	60Hz;
1366x768	60Hz; 50Hz
1400x1050	60Hz
1440x900	60Hz
1920x1080p	60Hz
1920x1200	60Hz; 50Hz

Default EDID

Each input on the WP-20 is loaded with a factory default EDID.

HDMI

```

Monitor
Model name..... WP-20
Manufacturer..... KMR
Plug and Play ID..... KMR1200
Serial number..... n/a
Manufacture date..... 2015, ISO week 255
Filter driver..... None
-----
EDID revision..... 1.3
Input signal type..... Digital
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 520 x 320 mm (24.0 in)
Power management..... Standby, Suspend, Active off/sleep
Extension blocs..... 1 (CEA-EXT)
-----
DDC/CI..... Not supported
Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.674 - Ry 0.319
Green chromaticity..... Gx 0.188 - Gy 0.706
Blue chromaticity..... Bx 0.148 - By 0.064
White point (default)... Wx 0.313 - Wy 0.329
Additional descriptors... None
Timing characteristics
Horizontal scan range.... 30-83kHz
Vertical scan range..... 56-76Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz (16:10)
  Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #1..... 1920x1080p at 60Hz (16:10)
  Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
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
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1280 x 1024p at 75Hz - VESA STD
1280 x 1024p at 85Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD
1024 x 768p at 85Hz - VESA STD
800 x 600p at 85Hz - VESA STD
640 x 480p at 85Hz - VESA STD
1152 x 864p at 70Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Supported
Basic audio..... Supported
YCbCr 4:4:4..... Supported
YCbCr 4:2:2..... Supported
Native formats..... 1
Detailed timing #1..... 1920x1080p at 60Hz (16:10)
  Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:10)
  Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1280x720p at 60Hz (16:10)
  Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #4..... 720x480p at 60Hz (16:10)
  Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
CE audio data (formats supported)
LPCM 2-channel, 16/20/24 bit depths at 32/44/48 kHz
CE video identifiers (VICs) - timing/formats supported
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)

```


1600 x 1200p at 60Hz - VESA STD
1024 x 768p at 85Hz - VESA STD
800 x 600p at 85Hz - VESA STD
640 x 480p at 85Hz - VESA STD
1152 x 864p at 70Hz - VESA STD
1280 x 960p at 60Hz - VESA STD

Report information

Date generated..... 28/11/2017
Software revision..... 2.90.0.1020
Data source..... Real-time 0x0021
Operating system..... 6.1.7601.2.Service Pack 1

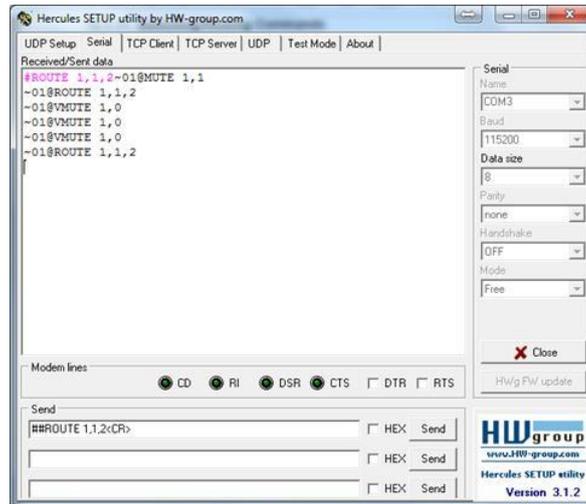
Raw data

00,FF,FF,FF,FF,FF,FF,00,2D,B2,00,12,00,00,00,00,FF,19,01,03,6E,34,20,78,EE,B3,25,AC,51,30,B4,26,
10,50,54,FF,FF,80,81,8F,81,99,A9,40,61,59,45,59,31,59,71,4A,81,40,01,1D,00,72,51,D0,1E,20,6E,28,
55,00,07,44,21,00,00,1E,00,00,00,FD,00,38,4C,1E,53,11,00,0A,20,20,20,20,20,00,00,00,FC,00,57,
50,2D,32,30,0A,20,20,20,20,20,02,3A,80,18,71,38,2D,40,58,2C,45,00,07,44,21,00,00,1E,00,C5

Protocol 3000

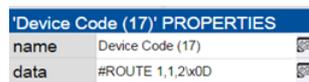
The **WP-20** can be operated using the Kramer Protocol 3000 serial commands. The command framing varies according to how you interface with the **WP-20**. For example, a basic video input switching command that routes a layer 1 video signal to HDBT out 1 from HDMI input 2 (`ROUTE 1, 1, 2`), is entered as follows:

- Terminal communication software, such as Hercules:



 The framing of the command varies according to the terminal communication software.

- K-Touch Builder (Kramer software):



- K-Config (Kramer configuration software):



 All the examples provided in this section are based on using the K-Config software.

You can enter commands directly using terminal communication software (e.g., Hercules) by connecting a PC to the serial or Ethernet port on the **WP-20**. To enter `CR` press the Enter key (`LF` is also sent but is ignored by the command parser).

Commands sent from various non-Kramer controllers (e.g., Crestron) may require special coding for some characters (such as, `/X##`). For more information, refer to your controller's documentation.

For more information about:

- Using Protocol 3000 commands, see [Understanding Protocol 3000](#) on page [44](#)

- General syntax used for Protocol 3000 commands, see [Kramer Protocol 3000 Syntax](#) on page [44](#)
- Protocol 3000 commands available for the **WP-20**, see [Protocol 3000 Commands](#) on page [45](#)

Understanding Protocol 3000

Protocol 3000 commands are structured according to the following:

- **Command** – A sequence of ASCII letters (A-Z, a-z and -). A command and its parameters must be separated by at least one space.
- **Parameters** – A sequence of alphanumeric ASCII characters (0-9, A-Z, a-z and some special characters for specific commands). Parameters are separated by commas.
- **Message string** – Every command entered as part of a message string begins with a message starting character and ends with a message closing character.



A string can contain more than one command. Commands are separated by a pipe (|) character.

The maximum string length is 64 characters.

- **Message starting character:**

– For host command/query

~ – For device response

- **Device address** – K-NET Device ID followed by @ (optional, K-NET only)
- **Query sign** – ? follows some commands to define a query request
- **Message closing character:**

CR – Carriage return for host messages (ASCII 13)

CR LF – Carriage return for device messages (ASCII 13) and line-feed (ASCII 10)

- **Command chain separator character** – Multiple commands can be chained in the same string. Each command is delimited by a pipe character (|). When chaining commands, enter the message starting character and the message closing character only at the beginning and end of the string.



Spaces between parameters or command terms are ignored. Commands in the string do not execute until the closing character is entered. A separate response is sent for every command in the chain.

Kramer Protocol 3000 Syntax

The Kramer Protocol 3000 syntax uses the following delimiters:

- CR = Carriage return (ASCII 13 = 0x0D)
- LF = Line feed (ASCII 10 = 0x0A)
- SP = Space (ASCII 32 = 0x20)

Some commands have short name syntax in addition to long name syntax to enable faster typing. The response is always in long syntax.

The Protocol 3000 syntax is in the following format:

- **Host Message Format:**

Start	Address (optional)	Body	Delimiter
#	<i>Device_id@</i>	Message	CR

- **Simple Command** – Command string with only one command without addressing:

Start	Body	Delimiter
#	Command SP <i>Parameter_1,Parameter_2,...</i>	CR

- **Command String** – Formal syntax with command concatenation and addressing:

Start	Address	Body	Delimiter
#	<i>Device_id@</i>	Command_1 <i>Parameter1_1,Parameter1_2,...</i> Command_2 <i>Parameter2_1,Parameter2_2,...</i> Command_3 <i>Parameter3_1,Parameter3_2,...</i> ...	CR

- **Device Message Format:**

Start	Address (optional)	Body	Delimiter
~	<i>Device_id@</i>	Message	CR LF

- **Device Long Response** – Echoing command:

Start	Address (optional)	Body	Delimiter
~	<i>Device_id@</i>	Command SP [<i>Param1,Param2 ...</i>] result	CR LF

Protocol 3000 Commands

This section includes the following commands:

- System Commands (see [System Commands](#) on page [46](#))
- Authentication Commands (see [Authentication Commands](#) on page [58](#))
- Switching/Routing Commands (see [Switching/Routing Commands](#) on page [61](#))
- Video Commands (see [Video Commands](#) on page [62](#))
- Audio Commands (see [Audio Commands](#) on page [63](#))
- Communication Commands (see [Communication Commands](#) on page [67](#))
- EDID Handling Commands (see [EDID Handling Commands](#) on page [71](#))

System Commands

Command	Description
#	Protocol handshaking (system mandatory)
BUILD-DATE	Get device build date (system mandatory)
FACTORY	Reset to factory default configuration
HELP	Get command list (system mandatory)
MODEL	Get device model (system mandatory)
PROT-VER	Get device protocol version (system mandatory)
RESET	Reset device (system mandatory)
SN	Get device serial number (system mandatory)
VERSION	Get device firmware version (system mandatory)
AV-SW-MODE	Set/get auto switch mode (system)
AV-SW-TIMEOUT	Set/get auto switching timeout (system)
DISPLAY	Get output HPD status (system)
DPSW-STATUS	Get the DIP-switch status (system)
FPGA-VER	Get current FPGA version (system)
HDCP-MOD	Set/get HDCP mode (system)
HDCP-STAT	Get HDCP signal status (system)
NAME	Set/get machine (DNS) name (system – Ethernet)
NAME-RST	Reset machine (DNS) name to factory default (system – Ethernet)
PRIORITY	Set/get priority for all channels (system)
SIGNAL	Get input signal lock status (system)

#

Functions	Permission	Transparency
Set: #	End User	Public
Get: -	-	-
Description	Syntax	
Set: Protocol handshaking	# <input type="checkbox"/> CR	
Get: -	-	
Response		
~nn@SP OK CR LF		
Parameters		
Response Triggers		
Notes		
Validates the Protocol 3000 connection and gets the machine number Step-in master products use this command to identify the availability of a device		
K-Config Example		
`#`, 0x0D		

BUILD-DATE

Functions		Permission	Transparency
Set:	-	-	-
Get:	BUILD-DATE?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device build date	# BUILD-DATE? <code>CR</code>	
Response			
~ <code>nn</code> @ BUILD-DATE <code>SP</code> <i>date</i> <code>SP</code> <i>time</i> <code>CR LF</code>			
Parameters			
<i>date</i> – Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day			
<i>time</i> – Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			
Response Triggers			
Notes			
K-Config Example			
`#BUILD-DATE?`, 0x0D			

FACTORY

Functions		Permission	Transparency
Set:	FACTORY	End User	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset device to factory default configuration	# FACTORY <code>CR</code>	
Get:	-	-	
Response			
~ <code>nn</code> @ FACTORY <code>SP</code> OK <code>CR LF</code>			
Parameters			
Response Triggers			
Notes			
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.			
K-Config Example			
`#FACTORY`, 0x0D			

FEATURE-LIST

Functions		Permission	Transparency
Set:	-	-	-
Get:	FEATURE-LIST?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get feature state according to the feature ID	# FEATURE-LIST? <input type="checkbox"/> id <input type="checkbox"/>	
Response			
~ <input type="checkbox"/> @ FEATURE-LIST <input type="checkbox"/> id,enable <input type="checkbox"/> <input type="checkbox"/> CR LF			
Parameters			
<i>id</i> – feature id number: 1 (Maestro), 2 (Room Controller), 3 (Maestro panel) <i>enable</i> – 0 (disable), 1 (enable)			
Response Triggers			
Notes			
K-Config Example			
Get feature state for Maestro: `#FEATURE-LIST? 1",0x0D`			

HELP

Functions		Permission	Transparency
Set:	-	-	-
Get:	HELP	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get command list or help for specific command	1. #HELP <input type="checkbox"/> 2. #HELP <input type="checkbox"/> COMMAND_NAME <input type="checkbox"/>	
Response			
1. Multi-line: ~ <input type="checkbox"/> @Device available protocol 3000 commands: <input type="checkbox"/> command, <input type="checkbox"/> command... <input type="checkbox"/> <input type="checkbox"/> 2. Multi-line: ~ <input type="checkbox"/> @HELP <input type="checkbox"/> command: <input type="checkbox"/> description <input type="checkbox"/> USAGE:usage <input type="checkbox"/> <input type="checkbox"/>			
Parameters			
COMMAND_NAME – name of a specific command			
Response Triggers			
Notes			
To get help for a specific command use: HELP <input type="checkbox"/> COMMAND_NAME <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
K-Config Example			
`#HELP",0x0D`			

MODEL

Functions		Permission	Transparency
Set:	-	-	-
Get:	MODEL?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device model	# MODEL? <code>[CR]</code>	
Response			
~ <code>nn</code> @ MODEL <code>[SP]</code> <i>model_name</i> <code>[CR LF]</code>			
Parameters			
<i>model_name</i> – String of up to 19 printable ASCII chars			
Response Triggers			
Notes			
This command identifies equipment connected to Step-in master products and notifies of identity changes to the connected equipment. The Matrix saves this data in memory to answer REMOTE-INFO requests			
K-Config Example			
`#MODEL?`, 0x0D			

PROT-VER

Functions		Permission	Transparency
Set:	-	-	-
Get:	PROT-VER?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device protocol version	# PROT-VER? <code>[CR]</code>	
Response			
~ <code>nn</code> @ PROT-VER <code>[SP]</code> 3000: <i>version</i> <code>[CR LF]</code>			
Parameters			
<i>version</i> - XX.XX where X is a decimal digit			
Response Triggers			
Notes			
K-Config Example			
`#PROT-VER?`, 0x0D			

RESET

Functions		Permission	Transparency
Set:	RESET	Administrator	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset device	# RESET <input type="checkbox"/>	
Get:	-	-	
Response			
~ <input type="checkbox"/> <input type="checkbox"/> @ RESET <input type="checkbox"/> SP OK <input type="checkbox"/> CR LF			
Parameters			
Response Triggers			
Notes			
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.			
K-Config Example			
"#RESET", 0x0D			

SN

Functions		Permission	Transparency
Set:	-	-	-
Get:	SN?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device serial number	# SN? <input type="checkbox"/>	
Response			
~ <input type="checkbox"/> <input type="checkbox"/> @ SN <input type="checkbox"/> SP <i>serial_number</i> CR LF			
Parameters			
<i>serial_number</i> – 11 decimal digits, factory assigned			
Response Triggers			
Notes			
This device has a 14 digit serial number, only the last 11 digits are displayed			
K-Config Example			
"#SN?", 0x0D			

VERSION

Functions		Permission	Transparency
Set:	-	-	-
Get:	VERSION?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get firmware version number	# VERSION? <code>CR</code>	
Response			
~ <code>nn</code> @ VERSION? <code>SP</code> <i>firmware_version</i> <code>CR LF</code>			
Parameters			
<i>firmware_version</i> – XX.XX.XXXX where the digit groups are: major.minor.build version			
Response Triggers			
Notes			
K-Config Example			
`#VERSION?",0x0D			

AV-SW-MODE

Functions		Permission	Transparency
Set:			
Get:	AV-SW-MODE?	End user	Public
Description		Syntax	
Set:			
Get:	Get input auto switch mode (per output)	# AV-SW-MODE? <code>SP</code> <i>layer,output_id</i> <code>CR</code>	
Response			
~ <code>nn</code> @ AV-SW-MODE? <code>SP</code> <i>layer,output_id,mode</i> <code>CR LF</code>			
Parameters			
<i>layer</i> – 1 (video), 2 (audio) <i>output_id</i> – for video layer: 1 (HDBT Out), for audio layer: 1 (Audio Out) <i>mode</i> – 0 (manual), 1 (priority switch), 2 (last connected switch)			
Response Triggers			
Notes			
K-Config Example			
Get the input audio switch mode for HDBT Out: `#AV-SW-MODE? 1,1",0x0D			

AV-SW-TIMEOUT

Functions		Permission	Transparency
Set:	AV-SW-TIMEOUT	End User	Public
Get:	AV-SW-TIMEOUT?	End User	Public
Description		Syntax	
Set:	Set auto switching timeout	# AV-SW-TIMEOUT [SP] <i>action,time_out</i> [CR]	
Get:	Get auto switching timeout	# AV-SW-TIMEOUT? [SP] <i>action</i> [CR]	
Response			
~nn@ AV-SW-TIMEOUT [SP] <i>action,time_out</i> [CR]			
Parameters			
<p><i>action</i> – event that triggers the auto switching timeout:</p> <ul style="list-style-type: none"> 0 (video signal lost) 2 (audio signal lost) 4 (disable 5V on video output if no input signal detected) 5 (video cable unplugged) 6 (audio cable unplugged) <p><i>timeout</i> – timeout in seconds: 0-60000</p>			
Response Triggers			
Notes			
<p>The timeout must not exceed 60000 seconds.</p> <p>The timeout for video and audio signal lost (0, 2) events must not be less than 5 seconds.</p> <p>The timeout for video and audio cable unplugged (5, 6) events must not exceed the timeout for the disable 5V on video output if no input signal detected (4) event.</p> <p>The timeout for the disable 5V on video output if no input signal detected (4) event must not be less than the timeout for video and audio cable unplugged (5, 6) events.</p> <p>The timeout for the disable 5V on video output if no input signal detected (4) event overlaps with the timeouts for all other events (0, 2, 5, 6).</p>			
K-Config Example			
<p>Set the auto switching timeout to 5 seconds in the event of video signal lost:</p> <pre>"#AV-SW-TIMEOUT 0,5",0x0D</pre>			

DISPLAY

Functions		Permission	Transparency
Set:	-	-	-
Get	DISPLAY?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get output HPD status	# DISPLAY? [SP] <i>out_id</i> [CR]	
Response			
~ <i>nn</i> @ DISPLAY [SP] <i>out_id,status</i> [CR LF]			
Parameters			
<i>out_id</i> - 1 (HDBT Out) <i>status</i> - HPD status according to signal validation : 0 (Off), 1 (On), 2 (On and all parameters are stable and valid)			
Response Triggers			
A response is sent to the com port from which the Get was received, after command execution and: After every change in output HPD status from On to Off (0) After every change in output HPD status from Off to On (1) After every change in output HPD status form Off to On and all parameters (new EDID, etc.) are stable and valid (2)			
Notes			
K-Config Example			
Get the output HPD status of HDBT Out: `#DISPLAY? 1",0x0D			

DPSW-STATUS

Functions		Permission	Transparency
Set:	-	-	-
Get	DPSW-STATUS?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get the DIP-switch status	# DPSW-STATUS? [SP] <i>dp_sw_id</i> [CR]	
Response			
~ <i>nn</i> @ DPSW-STATUS? [SP] <i>dp_sw_id,status</i> [CR LF]			
Parameters			
<i>Dp_sw_id</i> - 1 (video switch), 2 (video switch), 3 (audio switch), 4 (audio switch) <i>status</i> - 0 (up / Off), 1 (down / On)			
Response Triggers			
Notes			
K-Config Example			
Get the status of DIP-switch 1 (video switch): `#DPSW-STATUS? 1",0x0D			

FPGA-VER

Functions		Permission	Transparency
Set:	-	-	-
Get:	FPGA-VER?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get current FPGA version	# FPGA-VER? [SP] <i>id</i> [CR]	
Response			
~ <i>nn</i> @ FPGA-VER [SP] <i>id,major_ver,minor_ver</i> [CR LF]			
Parameters			
<i>id</i> -1 (FPGA)			
<i>major_ver</i> - Major FPGA version number for current firmware			
<i>minor_ver</i> - Minor FPGA version number for current firmware			
Response Triggers			
Notes			
FPGA – field programmable gate array			
K-Config Example			
Get the FPGA version number for the current firmware: `#FPGA-VER? 1",0x0D`			

HDCP-MOD

Functions		Permission	Transparency
Set:	HDCP-MOD	Administrator	Public
Get:	HDCP-MOD?	End User	Public
Description		Syntax	
Set:	Set HDCP mode	# HDCP-MOD [SP] <i>inp_id,mode</i> [CR]	
Get:	Get HDCP mode	# HDCP-MOD? [SP] <i>inp_id</i> [CR]	
Response			
Set / Get: ~ <i>nn</i> @ HDCP-MOD [SP] <i>inp_id,mode</i> [CR LF]			
Parameters			
<i>inp_id</i> - input number: 1 (HDMI In 1), 2 (HDMI In 2), 3 (PC In)			
<i>mode</i> - HDCP mode: 0 (HDCP Off), 3 (Mirror output – MAC mode)			
Response Triggers			
A response is sent to the com port from which the set (before execution) / get command was received A response is sent to all com ports after command execution if HDCP-MOD was set by any other external control device (device button, device menu or other) or if the HDCP mode changed			
Notes			
Set HDCP working mode on the device input: HDCP not supported - HDCP Off HDCP support changes following detected sink - MIRROR OUTPUT			
K-Config Example			
Disable HDCP mode on HDMI In 2: `#HDCP-MOD 2,0",0x0D`			

HDCP-STAT

Functions		Permission	Transparency
Set:	-	-	-
Get:	HDCP-STAT?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get HDCP signal status	# HDCP-STAT? <input type="text"/> stage, <input type="text"/> stage_id <input type="text"/>	
Response			
~ <input type="text"/> @ HDCP-STAT <input type="text"/> stage, <input type="text"/> stage_id, <input type="text"/> mode <input type="text"/> CR LF			
Parameters			
stage – 0 (input), 1 (output) stage_id – for input stage: 1 (HDMI In 1), 2 (HDMI In 2), 3 (PC In), for output stage: 1 (HDBT Out) actual_status – signal encryption status: 0 (On), 1 (Off)			
Response Triggers			
A response is sent to the com port from which the Get command was received			
Notes			
Output stage (1) – get the HDCP signal status of the sink device connected to HDBT Out Input stage (0) – get the HDCP signal status of the source device connected to the specified input			
K-Config Example			
Get the HDCP input signal status of the source device connected to HDMI In 1: `#HDCP-STAT? 0,1",0x0D`			

NAME

Functions		Permission	Transparency
Set:	NAME	Administrator	Public
Get:	NAME?	End User	Public
Description		Syntax	
Set:	Set machine (DNS) name	# NAME <input type="text"/> machine_name <input type="text"/>	
Get:	Get machine (DNS) name	# NAME? <input type="text"/>	
Response			
Set: ~ <input type="text"/> @ NAME <input type="text"/> machine_name <input type="text"/> CR LF			
Get: ~ <input type="text"/> @ NAME? <input type="text"/> machine_name <input type="text"/> CR LF			
Parameters			
machine_name - String of up to 14 alpha-numeric characters (can include hyphens but not at the beginning or end)			
Response Triggers			
Notes			
The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on).			
K-Config Example			
Set the DNS name of the device to "room-442": `#NAME room-442",0x0D`			

NAME-RST

Functions		Permission	Transparency
Set:	NAME-RST	Administrator	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset machine (DNS) name to factory default	# NAME-RST <input type="checkbox"/> CR	
Get:	-	-	
Response			
~ <input type="checkbox"/> <input type="checkbox"/> @ NAME-RST <input type="checkbox"/> SP <input type="checkbox"/> OK <input type="checkbox"/> CR LF			
Parameters			
Response Triggers			
Notes			
Factory default of machine (DNS) name is "KRAMER_"			
K-Config Example			
Reset the DNS name of the device to the factory default: `#NAME-RST`, 0x0D			

PRIORITY

Functions		Permission	Transparency
Set:	PRIORITY	Administrator	Public
Get:	PRIORITY?	Administrator	Public
Description		Syntax	
Set:	Set input priority	# PRIORITY <input type="checkbox"/> SP $layer, PRIORITY1, PRIORITY2, PRIORITY3$ <input type="checkbox"/> CR	
Get:	Get input priority	# PRIORITY? $layer$ <input type="checkbox"/> CR	
Response			
~ <input type="checkbox"/> <input type="checkbox"/> @ PRIORITY <input type="checkbox"/> SP $layer, PRIORITY1, PRIORITY2, PRIORITY3$ <input type="checkbox"/> CR LF			
Parameters			
$layer$ – 1 (video): <i>PRIORITY1</i> - priority of HDMI In 1: 1 (highest priority), 2 (second priority), 3 (third priority) <i>PRIORITY2</i> - priority of HDMI In 2: 1 (highest priority), 2 (second priority), 3 (third priority) <i>PRIORITY3</i> - priority of PC In: 1 (highest priority), 2 (second priority), 3 (third priority) $layer$ – 2 (audio): <i>PRIORITY1</i> - priority of embedded audio: 1 (highest priority), 2 (second priority) <i>PRIORITY2</i> - priority of Audio In: 1 (highest priority), 2 (second priority)			
Response Triggers			
Notes			
The number of PRIORITY parameters differs according to the selected layer 1 is the highest priority			
K-Config Example			
Set the video input priority of PC In as the highest priority: `#PRIORITY 1, 2, 3, 1`, 0x0D			

SIGNAL

Functions		Permission	Transparency
Set:	-	-	-
Get	SIGNAL?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get input signal lock status	# SIGNAL? <code>SP</code> <i>inp_id</i> <code>CR</code>	
Response			
~ <code>nn</code> @ SIGNAL <code>SP</code> <i>inp_id,status</i> <code>CR LF</code>			
Parameters			
<i>inp_id</i> – input number: 1 (HDMI In 1), 2 (HDMI In 2), 3 (PC In)			
<i>status</i> – lock status according to signal validation: 0 (Off), 1 (On)			
Response Triggers			
After execution, a response is sent to the com port from which the Get was received A response is sent after every change in input signal status from On to Off or from Off to On			
Notes			
K-Config Example			
Get the input signal lock status of HDMI In 2: `#SIGNAL? 2",0x0D`			

Authentication Commands

Command	Description
LOGIN	Set/get protocol permission
LOGOUT	Cancel current permission level
PASS	Set/get password for login level
SECUR	Set/get current security state

LOGIN

Functions	Permission	Transparency
Set: LOGIN	Not Secure	Public
Get: LOGIN?	Not Secure	Public
Description	Syntax	
Set:	# LOGIN [SP] <i>login_level,password</i> [CR]	
Get:	# LOGIN? [CR]	
Response		
Set: ~ <i>nn</i> @ LOGIN [SP] <i>login_level,password</i> [SP]OK[CR LF] or ~ <i>nn</i> @ LOGIN [SP]ERR[SP]004[CR LF] (if bad password entered)		
Get: ~ <i>nn</i> @ LOGIN [SP] <i>login_level</i> [CR LF]		
Parameters		
<i>login_level</i> – level of permissions required: User, Admin <i>password</i> – predefined password (by PASS command). Default password is an empty string		
Response Triggers		
Notes		
When the permission system is enabled, LOGIN enables running commands with the User or Administrator permission level When set, login must be performed upon each connection The permission system works only if security is enabled with the SECUR command. It is not mandatory to enable the permission system in order to use the device		
K-Config Example		
Set the protocol permission level to Admin (when the password defined in the PASS command is 33333): `#LOGIN Admin,33333",0x0D`		

LOGOUT

Functions		Permission	Transparency
Set:	LOGOUT	Not Secure	Public
Get:	-	-	-
Description		Syntax	
Set:	Cancel current permission level	# LOGOUT <input type="checkbox"/> CR	
Get:	-	-	
Response			
~ <input type="checkbox"/> <input type="checkbox"/> @ LOGOUT <input type="checkbox"/> SP <input type="checkbox"/> OK <input type="checkbox"/> CR LF			
Parameters			
Response Triggers			
Notes			
Logs out from User or Administrator permission levels			
K-Config Example			
`#LOGOUT`,0x0D			

PASS

Functions		Permission	Transparency
Set:	PASS	Administrator	Public
Get:	PASS?	Administrator	Public
Description		Syntax	
Set:	Set password for login level	# PASS <input type="checkbox"/> SPlogin_level,password <input type="checkbox"/> CR	
Get:	Get password for login level	# PASS? <input type="checkbox"/> SPlogin_level <input type="checkbox"/> CR	
Response			
~ <input type="checkbox"/> <input type="checkbox"/> @ PASS <input type="checkbox"/> SPlogin_level,password <input type="checkbox"/> CR LF			
Parameters			
login_level – level of login to set: User, Admin password – password for the login_level. Up to 15 printable ASCII chars.			
Response Triggers			
Notes			
The default password is an empty string			
K-Config Example			
Set the password for the Admin protocol permission level to 33333: `#PASS Admin,33333`,0x0D			

SECUR

Functions		Permission	Transparency
Set:	SECUR	Administrator	Public
Get:	SECUR?	Not Secure	Public
Description		Syntax	
Set:	Start/stop security	# SECUR [SP] <i>security_mode</i> [CR]	
Get:	Get current security state	# SECUR? [CR]	
Response			
~nn@ SECUR [SP] <i>security_mode</i> [CR LF]			
Parameters			
<i>security_mode</i> – 1 (On / enable security), 0 (Off / disable security)			
Response Triggers			
Notes			
The permission system works only if security is enabled with the SECUR command			
K-Config Example			
Enable the permission system: `#SECUR 0`,0x0D			

Switching/Routing Commands

Command	Description
ROUTE	Set/get layer routing

ROUTE

Functions	Permission	Transparency
Set: ROUTE	End User	Public
Get: ROUTE?	End User	Public
Description	Syntax	
Set: Set layer routing	# ROUTE [SP] <i>layer,dest,src</i> [CR]	
Get: Get layer routing	# ROUTE? [SP] <i>layer,dest</i> [CR]	
Response		
~ <i>nn</i> @ ROUTE [SP] <i>layer,dest,src</i> [CR LF]		
Parameters		
<i>layer</i> – 1 (video), 3 (data) <i>dest</i> – for video layer: 1 (HDBT Out), for data layer: 1 (HDBT data port), 2 (WP-20 data port), 3 (WP-20 internal control port) <i>src</i> – for video layer: 1 (HDMI In 1), 2 (PC In), for data layer: 1 (HDBT data port), 2 (WP-20 data port), 3 (WP-20 internal control port)		
Response Triggers		
Notes		
The get command identifies input switching on Step-in clients The set command is for remote input switching on Step-in clients (essentially via by the Web)		
K-Config Example		
Set the remote input switching of data to control mode: ``#ROUTE 3,1,3``,0x0D Set the remote input switching of data to data mode: ``#ROUTE 3,1,2``,0x0D		

Video Commands

Command	Description
VGA-PHASE	Set/get ADC (VGA) sampling phase
VMUTE	Set/get video on output mute

VGA-PHASE

Functions	Permission	Transparency
Set: VGA-PHASE	End User	Public
Get: VGA-PHASE?	End User	Public
Description	Syntax	
Set:	Set ADC (VGA) sampling phase	
Get:	Get ADC (VGA) sampling phase	
	#VGA-PHASE	[SP]channel,value[CR]
	#VGA-PHASE?	[SP]channel[CR]
Response	~nn@VGA-PHASE[SP]channel,value[CR LF]	
Parameters	<i>channel</i> – input number: 3 (PC In) <i>value</i> – phase number in LSB units: 1-30, ++ (increase current value), -- (decrease current value)	
Response Triggers		
Notes		
K-Config Example	Increase the current value of the ADC (VGA) sampling phase: "#VGA-PHASE 3,++",0x0D	

VMUTE

Functions	Permission	Transparency
Set: VMUTE	End User	Public
Get: VMUTE?	End User	Public
Description	Syntax	
Set:	Set enable/disable video on output	
Get:	Get video on output status	
	#VMUTE	[SP]output_id,flag[CR]
	#VMUTE?	[SP]output_id[SP][CR]
Response	Set / Get: ~nn@VMUTE[SP]output_id,flag[CR LF]	
Parameters	<i>output_id</i> – 1 (HDBT Out) <i>flag</i> – 0 (disable video on output), 1 (enable video on output), 2 (blank video)	
Response Triggers		
Notes		
K-Config Example	Disable the video output on HDBT Out: "#VMUTE 3,0",0x0D	

Audio Commands

Command	Description
AUD-EMB	Get audio in video embedding status
AUD-LVL	Set/get volume for specific amplifier output
AUD-SIGNAL?	Get audio input signal status
MUTE	Set/get audio mute

AUD-EMB

Functions	Permission	Transparency
Set:		
Get:	End User	Public
Description		Syntax
Set:		
Get:	Get audio in video embedding status	#AUD-EMB? <u>SP</u> <i>in, out</i> <u>CR</u>
Response		
~ <u>nn</u> @AUD-EMB <u>SP</u> <i>in, out, status</i> <u>CR LF</u>		
Parameters		
<i>in</i> – embedded audio input number: 1 (Audio In)		
<i>out</i> – video output number in which audio is embedded: 1 (HDBT Out)		
<i>status</i> – embedded status: 1 (On), 0 (Off)		
Response Triggers		
A response is sent to the com port from which the get command was received After execution, a response is sent to all com ports if AUD-EMB was set by any other external control device (button press, device menu and similar)		
Notes		
K-Config Example		
`#AUD-EMB? 1,1",0x0D`		

AUD-LVL

Functions		Permission	Transparency
Set:	AUD-LVL	End User	Public
Get:	AUD-LVL?	End User	Public
Description		Syntax	
Set:	Set volume for specific amplifier output	#AUD-LVL ^[SP] stage,channel,volume ^[CR]	
Get:	Get volume for specific amplifier output	#AUD-LVL? ^[SP] stage,channel ^[CR]	
Response			
~nn@AUD-LVL ^[SP] stage,channel,volume ^[CR] LF			
Parameters			
<i>stage</i> – 1 (audio output) <i>channel</i> – output channel number of selected stage: 1 (Audio Out) <i>volume</i> – audio volume: -83 to +24 (dB value), ++ (increase current value by 0.5dB), -- (decrease current value by 0.5dB)			
Response Triggers			
Notes			
All values are in decibels (dB) A minus sign precedes negative values  Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage (see Routing Video and Data on page 17).			
K-Config Example			
Set the volume of the Audio Out (1) output to -17dB: "#AUD-LVL 1,1,-17",0x0D			

AUD-LVL-RANGE

Functions		Permission	Transparency
Set:	AUD-LVL-RANGE	End User	Public
Get:	AUD-LVL-RANGE?	End User	Public
Description		Syntax	
Set:	Set audio level min and max range	#AUD-LVL-RANGE ^[SP] stage,channel,min_val,max_val ^[CR]	
Get:	Get audio level min and max range	#AUD-LVL-RANGE? ^[SP] stage,channel ^[CR]	
Response			
~nn@AUD-LVL-RANGE ^[SP] stage,channel,min_val,max_val ^[CR] LF			
Parameters			
<i>stage</i> – 1 (audio output) <i>channel</i> – output channel number of selected stage: 1 (Audio Out) <i>min_val</i> – minimum available audio level: range = -83 to +24 <i>max_val</i> – maximum available audio level: range = -83 to +24			
Response Triggers			
Notes			
All values are in decibels (dB) A minus sign precedes negative values  Upper and lower volume ranges may vary depending on the version of your device hardware. The ranges are displayed on the Routing Video and Data webpage.			
K-Config Example			
Set the audio level to a minimum of -17Db and a maximum of +15Db: "#AUD-LVL-RANGE 1,1,-17,15",0x0D			

AUD-ONLY

Functions		Permission	Transparency
Set:	AUD-ONLY	End User	Public
Get:	AUD-ONLY?	End User	Public
Description		Syntax	
Set:	Enable/Disable audio only mode	# AUD-ONLY [SP] <i>channel</i> , <i>mode</i> [CR]	
Get:	Get audio only mode status	# AUD-ONLY? [CR]	
Response			
~ <i>nn</i> @ AUD-ONLY [SP] <i>channel</i> , <i>mode</i> [CR LF]			
Parameters			
<i>channel</i> – output channel number of selected stage: 1 (Audio Out)			
<i>mode</i> – audio only status: 0 (disabled), 1 (enabled)			
Response Triggers			
Notes			
K-Config Example			
Enable audio only mode: `#AUD-ONLY 1,1,0x0D			

AUD-SIGNAL

Functions		Permission	Transparency
Set:	-	-	-
Get:	AUD-SIGNAL?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get audio input signal status	# AUD-SIGNAL? [SP] <i>inp_id</i> [CR]	
Response			
~ <i>nn</i> @ AUD-SIGNAL [SP] <i>inp_id</i> , <i>status</i> [CR LF]			
Parameters			
<i>inp_id</i> – audio input number: 1 (Audio In)			
<i>status</i> – 0 (Off / no signal), 1 (On / signal present)			
Response Triggers			
After execution, a response is sent to the com port from which the get command was received A response is sent to all com ports if the audio status was changed on any input			
Notes			
K-Config Example			
`#AUD-SIGNAL? 1",0x0D			

MUTE

Functions		Permission	Transparency
Set:	MUTE	End User	Public
Get:	MUTE?	End User	Public
Description		Syntax	
Set:	Set audio mute	# MUTE [SP] <i>channel</i> , <i>mute_mode</i> [CR]	
Get:	Get audio mute	# MUTE? [SP] <i>channel</i> [CR]	
Response			
~nn@ MUTE [SP] <i>channel</i> , <i>mute_mode</i> [CR LF]			
Parameters			
<i>channel</i> – audio output number: 1 (Audio Out)			
<i>mute_mode</i> – 0 (Off), 1 (On)			
Response Triggers			
Notes			
K-Config Example			
Mute the Audio Out output: `#MUTE 1,1",0x0D			

Communication Commands

Command	Description
ETH-PORT	Set/get Ethernet port protocol
NET-DHCP	Set/get DHCP mode
NET-GATE	Set/get gateway IP
NET-IP	Set/get IP address
NET-MAC	Get MAC address
NET-MASK	Set/get subnet mask

ETH-PORT

Functions	Permission	Transparency
Set:	Administrator	Public
Get:	End User	Public
Description	Syntax	
Set:	#ETH-PORT[SP]portType,ETHPort[CR]	
Get:	#ETH-PORT?[SP]portType[CR]	
Response		
~nn@ETH-PORT[SP]portType,ETHPort[CR LF]		
Parameters		
<i>portType</i> – string of 3 letters indicating the port type: TCP, UDP		
<i>ETHPort</i> – TCP / UDP port number: 0-65565		
Response Triggers		
Notes		
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)		
K-Config Example		
Set the Ethernet port protocol for TCP to port 12457: "#ETH-PORT TCP,12457",0x0D		

NET-DHCP

Functions		Permission	Transparency
Set:	NET-DHCP	Administrator	Public
Get:	NET-DHCP?	End User	Public
Description		Syntax	
Set:	Set DHCP mode	# NET-DHCP [SP] <i>mode</i> [CR]	
Get:	Get DHCP mode	# NET-DHCP? [CR]	
Response			
~nn@ NET-DHCP [SP] <i>mode</i> [CR LF]			
Parameters			
<i>mode</i> – 0 (do not use DHCP. Use the IP address set by the factory or the NET-IP command), 1 (try to use DHCP. If unavailable, use the IP address set by the factory or the NET-IP command)			
Response Triggers			
Notes			
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 Consult your network administrator for correct settings			
K-Config Example			
Enable DHCP mode, if available: "#NET-DHCP 1",0x0D			

NET-GATE

Functions		Permission	Transparency
Set:	NET-GATE	Administrator	Public
Get:	NET-GATE?	End User	Public
Description		Syntax	
Set:	Set gateway IP	# NET-GATE [SP] <i>ip_address</i> [CR]	
Get:	Get gateway IP	# NET-GATE? [CR]	
Response			
~nn@ NET-GATE [SP] <i>ip_address</i> [CR LF]			
Parameters			
<i>ip_address</i> – gateway IP address, in the following format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
A network gateway connects the device via another network, possibly over the Internet. Be careful of security problems. Consult your network administrator for correct settings.			
K-Config Example			
Set the gateway IP address to 192.168.0.1: "#NET-GATE 192.168.000.001",0x0D			

NET-IP

Functions		Permission	Transparency
Set:	NET-IP	Administrator	Public
Get:	NET-IP?	End User	Public
Description		Syntax	
Set:	Set IP address	# NET-IP [SP] <i>ip_address</i> [CR]	
Get:	Get IP address	# NET-IP? [CR]	
Response			
~nn@ NET-IP [SP] <i>ip_address</i> [CR LF]			
Parameters			
<i>ip_address</i> – IP address, in the following format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
Consult your network administrator for correct settings			
K-Config Example			
Set the IP address to 192.168.1.39: `#NET-IP 192.168.001.039`, 0x0D			

NET-MAC

Functions		Permission	Transparency
Set:	-	-	-
Get:	NET-MAC?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get MAC address	# NET-MAC? [CR]	
Response			
~nn@ NET-MAC [SP] <i>mac_address</i> [CR LF]			
Parameters			
<i>mac_address</i> – unique MAC address. Format: XX-XX-XX-XX-XX-XX where X is hex digit			
Response Triggers			
Notes			
K-Config Example			
`#NET-MAC?`, 0x0D			

NET-MASK

Functions		Permission	Transparency
Set:	NET-MASK	Administrator	Public
Get:	NET-MASK?	End User	Public
Description		Syntax	
Set:	Set subnet mask	# NET-MASK [SP] <i>net_mask</i> [CR]	
Get:	Get subnet mask	# NET-MASK? [CR]	
Response			
~nn@ NET-MASK [SP] <i>net_mask</i> [CR LF]			
Parameters			
<i>net_mask</i> - format: xxx.xxx.xxx.xxx			
Response Triggers			
The subnet mask limits the Ethernet connection within the local network Consult your network administrator for correct settings			
Notes			
K-Config Example			
Set the subnet mask to 255.255.0.0: "#NET-MASK 255.255.000.000",0x0D			

EDID Handling Commands

Additional EDID data functions can be performed via the **WP-20** web pages or a compatible EDID management application, such as Kramer EDID Designer (see www.kramerav.com/product/WP-20).

Command	Description
CPEDID	Copy EDID data from the output to the input EEPROM
LOCK-EDID	Lock last read EDID

CPEDID

Functions	Permission	Transparency
Set:	CPEDID	End User
Get:	-	Public
Get:	-	-
Description	Syntax	
Set:	Copy EDID data from the output to the input EEPROM	#CPEDID ^[SP] <i>src_type,src_id,dst_type,dest_bitmap</i> ^[CR]
Get:	-	-
Response		
	~ ^[nn] @CPEDID ^[SP] <i>src_type,src_id,dst_type,dest_bitmap</i> ^[CR LF]	
Parameters		
	<i>src_type</i> – EDID source type (usually output): 0 (input), 1 (output), 2 (default EDID)	
	<i>src_id</i> – for input source: 1 (HDMI In 1), 2 (HDMI In 2), 3 (PC In), for output source: 1 (HDBT Out), for default EDID source: 0 (default EDID)	
	<i>dst_type</i> – EDID destination type (usually input): 0 (input), 1 (output), 2 (default EDID)	
	<i>dest_bitmap</i> – bitmap representing destination IDs. Format: XXXX...X, where X is hex digit. The binary form of every hex digit represents corresponding destinations. Setting '1' indicates that EDID data is copied to this destination. Setting '0' indicates that EDID data is not copied to this destination.	
Response Triggers		
	Response is sent to the com port from which the Set was received (before execution)	
Notes		
	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 this device, if the destination type is input (0), the bitmap size is 3 bits, for example bitmap 0x5 means inputs 1 and 3 are loaded with the new EDID.	
K-Config Example		
	Copy the EDID data from the HDBT Out output (EDID source) to the HDMI In 1 input: `#CPEDID 1,1,0,0x1",0x0D`	
	Copy the EDID data from the default EDID source to HDMI In 1 and PC In inputs: `#CPEDID 2,0,0,0x5",0x0D`	

LOCK-EDID

Functions		Permission	Transparency
Set:	LOCK-EDID	End User	End User
Get:	LOCK-EDID?	End User	End User
Description		Syntax	
Set:	Lock last read EDID	# LOCK-EDID [SP] <i>input_id</i> , <i>lock_mode</i> [CR]	
Get :	Get EDID lock state	# LOCK-EDID? [SP] <i>input_id</i> [CR]	
Response			
~ <i>nn</i> @ LOCK-EDID [SP] <i>input_id</i> , <i>lock_mode</i> [CR LF]			
Parameters			
<i>input_id</i> – 1 (HDMI In 1), 2 (HDMI In 2), 3 (PC In), <i>lock_mode</i> – 0 (Off: unlocks EDID), 1 (On: locks EDID)			
Response Triggers			
Notes			
K-Config Example			
Lock the last read EDID from the HDMI In 2 input: `#LOCK-EDID 2,1",0x0D`			



SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

For the latest information on our products and a list of Kramer distributors, visit our website where updates to this user manual may be found.

We welcome your questions, comments, and feedback.

The terms HDMI, HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing Administrator, Inc. All brand names, product names, and trademarks are the property of their respective owners.