# KRAMER

# USER MANUAL

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# 1    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 video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Congratulations on purchasing your Kramer **VP-778** Presentation Matrix Switcher/Dual Scaler. This product, which incorporates HDMI™ technology, is ideal for any application where switching and/or scaling of multiple video signals is required for projection purposes, e.g., conference rooms, boardrooms, auditoriums, hotels, churches, production studios, and rental & staging.

# 2 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/VP-778 to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

## 2.1 Achieving the Best Performance

To achieve the 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 **VP-778** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

## 2.2 Safety Instructions

**Caution:** There are no operator serviceable parts inside the unit

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

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

**Warning:** Disconnect the power and unplug the unit from the wall before installing

## 2.3    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.

# 3    Overview

**VP-778** is an 8 Input ProScale™ Presentation Matrix Switcher/Dual Scaler with seamless video cuts and 4K30 UHD output support. **VP-778** can be configured as a single 4K output (4K@30 UHD (3840x2160)) or dual HD scaler with full PIP capabilities.

The unit has 4 HDMI inputs; 2 universal (HDMI, VGA, YPbPr or CV) inputs on DVI-U connectors; and 2 HDBaseT inputs. It scales the video, embeds the audio, and outputs the signal to two independent HDMI outputs – each with a parallel HDBaseT output. The unit has both analog and embedded audio inputs and outputs, and includes audio DSP features. Two microphone inputs are also incorporated, as well as digital, analog balanced stereo and amplified speaker outputs. The machine may be externally controlled via its built-in webpages, RS-232 and IR; as well as via its front-panel and user-friendly menu-driven OSD.

The **VP-778** Presentation Switcher / Scaler features:

- Pix Perfect™ Scaling Technology – Kramer's extremely high performance, State-of-the-Art scaling technology with extensive high-quality pull-down and de-interlacing algorithms, and full up-and down-scaling of the video inputs.

- K-IIT XL™ Picture-in-Picture Image Insertion Technology for ultra-stable picture-in-picture, picture-and-picture and split screen capability.

- Seamless video switching (take), transition type (swap or follow) and transition effect (cut or fade) via the OSD menu.

- Dual scalers—for "live" seamless transitions from one source to another—with two independent outputs: a channel 2 output and a channel 1 output. The channel 2 output—including an OSD menu for making adjustments—can be used to determine how the scaled output will look before being displayed live during a presentation.

- 8 CH2 input buttons for switching a selected input to the channel 2 output and 8 CH1 input buttons for switching a selected input to the channel 1 output.

- Main and PiP window customization in the overlay mode.

- Front, back, ceiling front and ceiling back projection setups.

- Maximum output resolution – 4K30 UHD (3840x2160), in the Single Window mode, HDTV and computer graphics resolutions with selectable refresh rates.

- Selectable HDMI, VGA, YUV or CV on two DVI-U inputs, four HDMI and two HDBT inputs.

- Two programmable user buttons that can launch a programmed command (for example, to turn a projector on/off) to a selected destination (DATA RS-232 port, HDBT IN1, HDBT IN2 HDBT OUT1, HDBT OUT2 or all) with a press of a button.

- Serial matrix – Up to eight sets of unidirectional connections can be configured for passing serial data from a selected source to a selected destination (port tunnelling, the DATA RS-232 port, HDBT IN1, HDBT IN2 HDBT OUT1 or HDBT OUT2).

- HDBaseT™ technology with a maximum data rate of up to 6.75Gbps (2.25Gbps per graphic channel).

- System range (HDBaseT) – Up to 130m (430ft) normal mode; up to 180m (590ft) in ultra-mode (1080p @60Hz @24bpp) when using Kramer cables.

  For optimum range and performance use the recommended Kramer cables available at www.kramerav.com/product/VP-778.

- Balanced stereo audio inputs, with two unbalanced microphone inputs, as well as digital stereo and balanced stereo outputs.

- A built-in 2x10W power amplifier with speaker outputs on a 4-pin terminal block connector.

- Selectable microphone talkover or mix modes.

- Auto switching, automatically scans the inputs (based on a predefined priority) and selects the first live one found or the last connected.

- Audio-Follow-Video (AFV) and breakaway options.

- Advanced deinterlacing functions, including 3D comb filtering, film mode, diagonal correction and motion detection.

- Multiple aspect ratio selections.

- Built-in proc-amp with enhanced functions such as color correction, gamma, dither and noise reduction.

- Embedded/de-embedded HDMI and HDBT audio support as well as eight balanced stereo audio inputs and two balanced stereo outputs.

- Input and output audio level adjustment and audio DSP functions.

- Selectable power management modes for energy efficient usage.

- HDCP 1.4 compliance.

In addition, the **VP-778**:

- Features luma- and chroma-keying.

- Features advanced EDID management (native resolution and color depth mode line) per input.

- Allows you to perfectly shift the ratio to get the best image positioning possible.

- Includes built-in test patterns for screen setup and alignment.

- Analyses the connected output's EDID for optimal scaling.

- Provides input and output color space control.

- Supports HDMI deep color for outputs.

- Comes with an On-Screen Display (OSD) for easy setup and adjustment.

- Has a non-volatile memory that retains the settings.

- Supports firmware upgrade via USB (via memory stick).

Control your **VP-778**:

- Directly, via the front panel push buttons.

- Via the Ethernet via webpage.

- Remotely, from the infrared remote control transmitter.

- By RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller.

The **VP-778** is housed in a 19" 1U rack mountable enclosure, with handles and rack ears included, and is fed from a 100-240 VAC universal switching power supply.

## 3.1 HDCP Compliance for HDMI inputs

If an HDMI signal is HDCP protected, it can only appear on HDMI outputs that are connected to HDCP compliant displays.

The **VP-778** will not output a picture on an HDMI display that is not HDCP compliant; instead it will show a green screen.

In the PiP mode (see Section 7.2), even if only one of the inputs is HDCP protected, and is output to a non-compliant display, it will affect the entire screen and turn it green.

## 3.2 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.

## 3.3 Using Twisted Pair Cable

Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products. For optimum range and performance use the recommended Kramer cables available at www.kramerav.com/product/VP-778.

We strongly recommend that you use shielded twisted pair cable.

## 3.4 Defining the VP-778 Presentation Matrix Switcher/Dual Scaler

This section defines the **VP-778**.
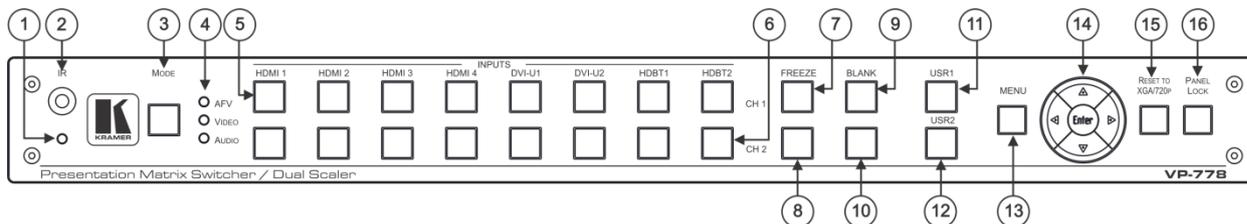
Figure 1: VP-778 Presentation Matrix Switcher/Dual Scaler Front Panel

| # | Feature | | Function |
|---|---------|---|----------|
| 1 | IR LED | | Lights red when the unit accepts IR remote commands. |
| 2 | IR Receiver | | Accepts IR remote commands. |
| 3 | MODE Button | | Select the operation mode: audio follow video (AFV), Video or audio. |
| 4 | Mode LED indicators | | Indicate the operation mode, as selected via the MODE button. |
| 5 | CH 1 INPUT Selector Buttons | HDMI | Press to select the HDMI input (from 1 to 4). |
| | | DVI-U | Press to select the DVI universal input: HDMI, VGA, component or composite video (from 1 to 2). |
| | | HDBT | Press to select the HDBT input (from 1 to 2). |
| 6 | CH 2 INPUT Selector Buttons | HDMI | Press to select the HDMI input (from 1 to 4). |
| | | DVI-U | Press to select the DVI universal input: HDMI, VGA, component or composite video (from 1 to 2). |
| | | HDBT | Press to select the HDBT input (from 1 to 2). |
| 7 | CH 1 FREEZE Button | | Press to freeze/unfreeze the CH 1 output video image. |
| 8 | CH 2 FREEZE Button | | Press to freeze/unfreeze the CH 2 output video image. |
| 9 | CH 1 BLANK Button | | Press to toggle between a blank screen (black) and the CH 1 display. |
| 10 | CH 2 BLANK Button | | Press to toggle between a blank screen (black) and the CH 2 display. |
| 11 | USR1 User-defined Button | | Press to launch a programmed command (for example, to turn a projector on), see Section 8.1.4. |
| 12 | USR2 User-defined Button | | Press to launch a programmed command (for example, to turn a projector off), see Section 8.1.4. |
| 13 | MENU Button | | Press to access/exit the OSD menu, see Section 6. Press and hold the MENU button to toggle between the same menu functions in CH1 and CH2 (for example, between CH1 Brightness and CH2 brightness). When in the MIC Effects menu, press and hold the MENU button to toggle between MIC 1 and MIC 2. |

| # | Feature | | Function |
|---|---------|---|----------|
| 14 | Navigation Buttons | ◁ Button// VOLUME Button | Press to move to the previous level in the OSD screen (see Section 6). When not within the OSD menu, press to decrease the Audio CH1 volume. |
| | | ▷ Button // VOLUME Button | Press to move to the next level in the OSD screen (see Section 6). When not within the OSD menu, increase the Audio CH 1 volume. |
| | | ▽// VOLUME Button | Press to move down the menu list (see Section 6) and to decrease numerical values. When in the transition mode and not within the OSD menu mode, press to decrease the Audio CH 2 volume. |
| | | △// VOLUME Button | Press to move up the menu list values (see Section 6) and to increase numerical values. When in the transition mode and not within the OSD menu mode, press to increase the Audio CH 2 volume. |
| | | ENTER Button | Press to enter sub-menu items and save (see Section 6). When in the transition mode and not within the OSD menu, performs as the TAKE button (to carry out a transition). |
| 15 | RESET TO XGA/720P Button | | Press to reset the video output resolution to XGA or 720p and change the deep color settings to Off on the output. Press and hold for about 3 seconds to toggle between reset to XGA and reset to 720p. |
| 16 | PANEL LOCK Button | | Press and hold for about 3 seconds to lock/unlock the front panel buttons. |
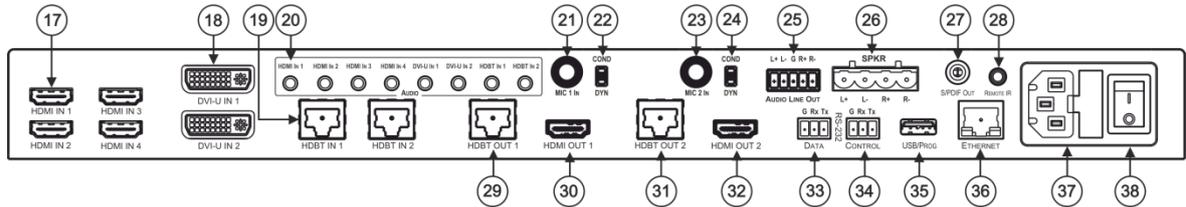
Figure 2: VP-778 Presentation Matrix Switcher/Dual Scaler Rear Panel

| # | Feature | | Function |
|---|---------|---|----------|
| 17 | HDMI IN Connectors | | Connect to the HDMI source (from 1 to 4). |
| 18 | DVI-U IN Connectors | | Connect to the video source that can be HDMI, VGA, Component or Composite video (from 1 to 2). |
| 19 | HDBT IN Connectors | | Connect to an HDBT Transmitter (for example, the Kramer **TP-580Txr**) to pass audio and video signals as well as serial commands (from 1 to 2). |
| 20 | AUDIO Input Unbalanced Connectors | HDMI IN 3.5mm Mini Jack | Connect to an unbalanced audio source for audio takeover of the HDMI 1 to HDMI 4 embedded audio. |
| | | DVI-U IN 3.5mm Mini Jack | Connect to the unbalanced stereo audio of the DVI-U source (from 1 to 2). |
| | | HDBT IN 3.5mm Mini Jack | Connect to the unbalanced stereo audio source for audio takeover of the HDBT1 to HDBT 2 embedded audio). |
| 21 | MIC 1 | 6mm Jack | Connect to a microphone (see pinout in Section 5.3). |
| 22 | | COND/DYN MIC Switch | Select between a condenser and a dynamic type microphone. |
| 23 | MIC 2 | 6mm Jack | Connect to a microphone (see pinout in Section 5.3). Note that Mic2 on the rear panel is identical to Mic2 on the front panel. Mic2 on the front panel overrides Mic2 on the rear panel when connected. |
| 24 | | COND/DYN MIC Switch | Select between a condenser and a dynamic type microphone. |
| 25 | AUDIO LINE OUT (L, R) Terminal Block Connector | | Connect to the L and R balanced stereo audio acceptor. |
| 26 | SPKR OUT 4-pin Terminal Block | | Connects to a pair of loudspeakers. |
| 27 | S/PDIF OUT RCA Connector | | Connect to a digital audio acceptor. |
| 28 | REMOTE IR 3.5mm Mini Jack (opening) Covered by a cap. The 3.5mm connector at the end of the internal IR connection cable fits through this opening | | Connects to an external IR receiver unit for controlling the machine via an IR remote controller (instead of using the front panel IR receiver). Optional. Can be used instead of the front panel (built-in) IR receiver to remotely control the machine (only if the internal IR connection cable has been installed). |

| # | Feature | | Function |
|---|---------|---|----------|
| 29 | Channel 1 output connectors | HDBT OUT 1 RJ-45 | Connect to an HDBT receiver (for example, Kramer **TP-580Rxr**) to pass Ethernet, audio and video signals, as well as serial commands. |
| 30 | | HDMI OUT 1 | Connect to an HDMI acceptor. |
| 31 | Channel 2 Output Connectors | HDBT OUT 2 RJ-45 | Connect to an HDBT receiver (for example, Kramer **TP-580Rxr**) to pass Ethernet, audio and video signals, as well as serial commands. |
| 32 | | HDMI OUT 2 | Connect to an HDMI acceptor. |
| 33 | RS-232 DATA Terminal Block Connectors | | Connect to the PC or the remote controller and pass data between this RS-232 port and the HDBT OUT port or one of the HDBT IN ports. |
| 34 | RS-232 CONTROL Terminal Block Connectors | | Connect to the PC or the remote controller. |
| 35 | USB PROG Connector | | Connects to a USB drive to upgrade the firmware. |
| 36 | ETHERNET Connector | | Connects to the PC or other Controller through computer networking. |
| 37 | Power Connector with Fuse | | AC connector, enabling power supply to the unit. |
| 38 | *POWER* Switch | | Switch for turning the unit on or off. |

# 4 Installing in a Rack

This section provides instructions for rack mounting the unit.

**Before installing in a rack**, be sure that the environment is within the recommended range:

| OPERATING TEMPERATURE: | 0º to +40ºC (32º to 104ºF) |
|---|---|
| STORAGE TEMPERATURE: | -40º to +70ºC (-40º to 158ºF) |
| HUMIDITY: | 10% to 90%, RHL non-condensing |

## ⚠ CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

**1**. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

**2**. Once rack mounted, enough air will still flow around the machine.

**3**. The machine is placed straight in the correct horizontal position.

**4**. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

**5**. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

**To rack-mount a machine:**

**1**. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.
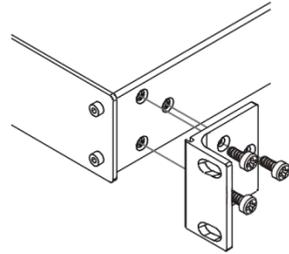
**2**. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:
• In some models, the front panel may feature built-in rack ears
• Detachable rack ears can be removed for desktop use
• Always mount the machine in the rack before you attach any cables or connect the machine to the power
• If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

# 5 Connecting the VP-778

Always switch off the power to each device before connecting it to your **VP-778**. After connecting your **VP-778**, connect its power and then switch on the power to each device.

You do not have to connect all the inputs and outputs, connect only those that are required.

**To connect the VP-778, as illustrated in the example in Figure 3:**

1. Connect an HDMI source (for example, a Blu-ray player) to the HDMI IN 1 connector.

   Alternatively, you can connect the DVI connector on the DVD player to the HDMI connector on the **VP-778** via a DVI-HDMI adaptor. You can connect the audio signal via the AUDIO IN HDMI 3.5mm mini jack or use the embedded audio.

2. Connect a digital or analog source (for example, a Laptop) to the DVI-U universal connector (from 1 to 2).

   You can connect an analog (VGA, composite or component video) or digital (HDMI or DVI) source to the universal DVI connector.

3. Connect an HDBT transmitter (for example, **TP-580Txr**) to the RJ-45 HDBT IN connectors (from 1 to 2).

4. Connect the audio inputs (not shown in Figure 3) to the:
   - HDMI IN audio input 3.5mm mini jacks (from 1 to 4).
   - DVI-U IN audio input 3.5mm mini jacks (from 1 to 2).
   - HDBT IN audio input 3.5mm mini jacks (from 1 to 2).

5. Connect the HDMI OUT 1 to an HDMI acceptor (for example, a projector).

6. Connect the HDBT OUT 1 RJ-45 connector to an HDBT receiver (for example, the input of **TP-580Rxr** connected to HDBT).

7. Connect the HDMI OUT 2 to an HDMI acceptor (for example, an LCD display).

8. Connect the HDBT OUT 2 RJ-45 connector to an HDBT receiver (for example, the input of **TP-580Rxr** connected to HDBT).

9. Connect the AUDIO LINE OUT Terminal Block connector to a balanced audio acceptor and the S/PDIF OUT RCA connector to a digital audio acceptor (not shown in Figure 3).

10. Connect the SPKR OUT block connector to a pair of loudspeakers, by connecting the left loudspeaker to the "L+" and the "L-" terminal block connectors, and the right loudspeaker to the "R+" and the "R-" terminal block connectors. **Do not Ground the loudspeakers**.

11. If required, you can connect a PC and/or controller to the:

    - RS-232 CONTROL terminal block connectors (see Section 8.2).
    - RS-232 DATA terminal block connectors for sending RS-232 commands via HDBT (see Section 8.2).
    - Ethernet connector (see Section 8.3).

12. Connect the power cord (not shown in Figure 3).
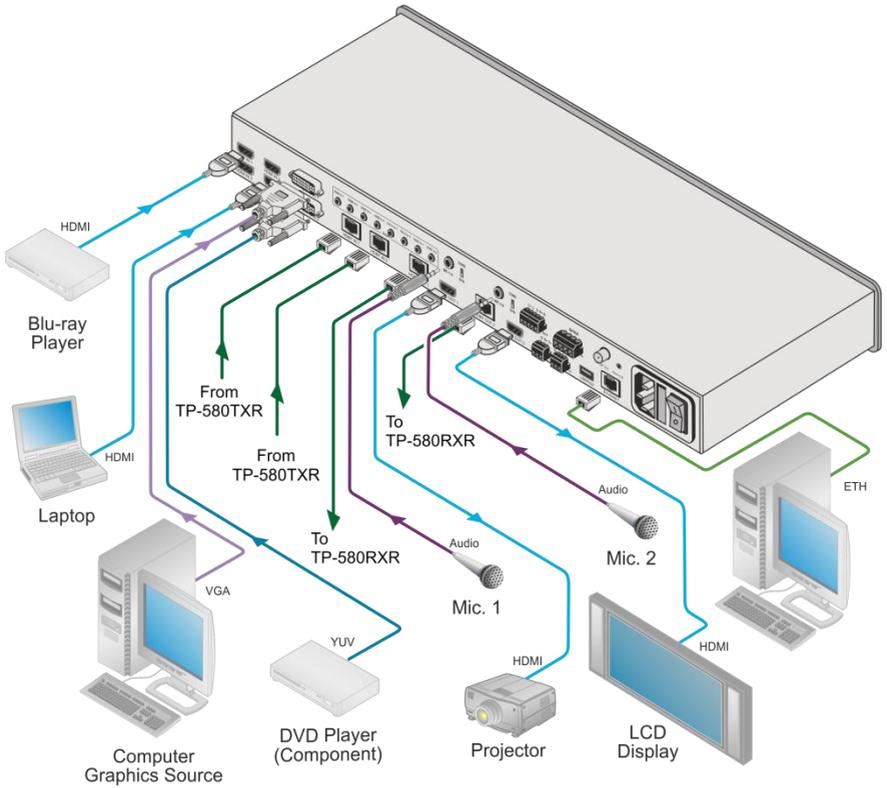
Figure 3: Connecting the VP-778 Presentation Matrix Switcher/Dual Scaler

# 5.1 Wiring the 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 4: TP PINOUT
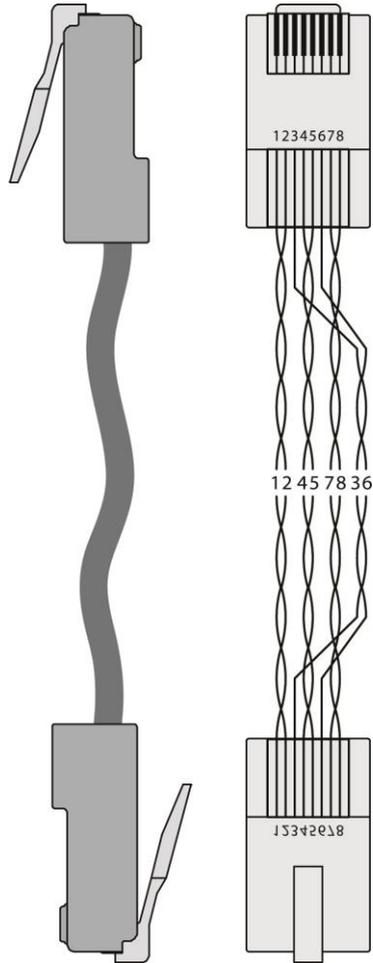
## 5.2 Connecting the Balanced Stereo Audio Line Output
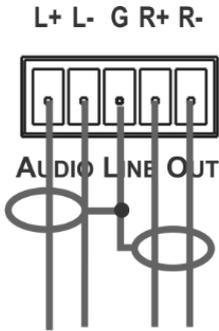


Figure 5: Connecting the Balanced Stereo Audio Output
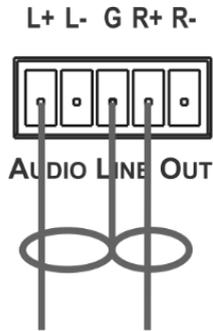


Figure 6: Connecting an Unbalanced Stereo Audio Acceptor to the Balanced Output

## 5.3 Microphone Pinout

This section defines the microphone pinout.

The microphone 6mm jack pinout for a condenser microphone.
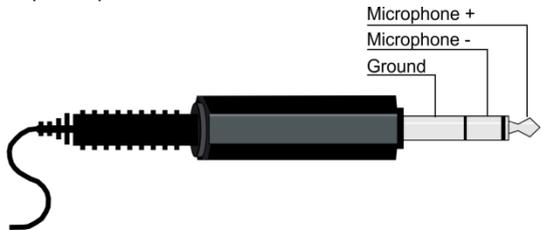


Figure 7: Condenser Microphone Pinout

The microphone 6mm jack pinout for a dynamic microphone.
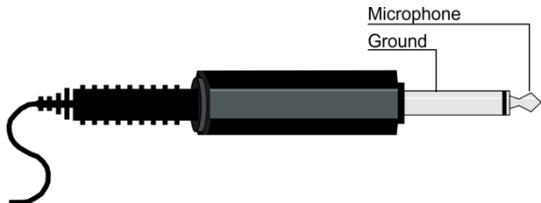


Figure 8: Dynamic Microphone Pinout

# 6     OSD Menu

The OSD menu lets you set the **VP-778** operation parameters.

> Note that the OSD appears only on the CH 2 output in the Overlay mode.

The OSD sub-menu operations appear in the OSD title, as shown in the example in Section 6.1:

- When in the main menu, the OSD title appears empty.

- Level 1 lists the main menu items.

- Level 2 includes the second hierarchy level, below level 1.

- Level 3 includes the third hierarchy level, below level 2 (optional).

- Level 4 includes the fourth hierarchy level, below level 3 (optional).

- Levels 5 and higher are used in some of the menus in the same way.

- Function (the last level), is the selectable parameter or numerical value and can appear either under level 2, 3, 4, 5, 6 or 7.

## 6.1     OSD Menu Operation Example

In the example described below, the Master Connection is set to HDMI2.

The table below shows function 242 (from the Protocol in Section 14.2):

- 2 in the hundreds, represents "Layout" which is the $2^{nd}$ menu item in the main menu list.

- 4 in the tens, represents "Output" which is $4^{th}$ in the Scale menu.

- 2 in the units, represents "Master Connection" which is second in the Output menu.

| Level 1 | Level 2 | Level 3 | Level 4 (Function) | Range | Function |
|---------|---------|---------|--------------------|-------|----------|
| Scale (2) | Output (4) | Master Connection (2) | HDMI1 | 0 | 242 |
| | | | HDBT1 | 1 | |
| | | | HDMI2 | 2 | |
| | | | HDBT2 | 3 | |

The subtitle, below the title line shows the current level accessed (Scale in this example)

Level 1    Title Line    Level 2

Layout

Inputs
**Layout**
Channel 1
Channel 2
Misc

**Display Mode**
**Transition Settings**
**Overlay Settings**
▪ **Output**

---
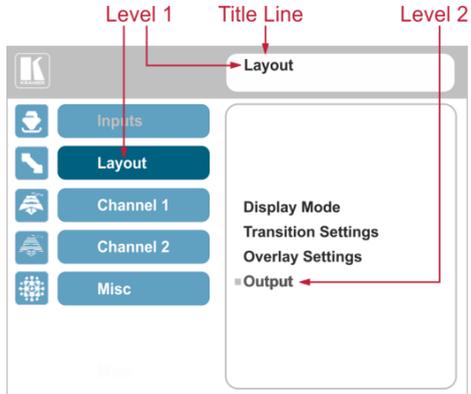
After selecting Output (which is the second Level), it appears in the subtitle

Level 1    Title Line  Level 2    Level 3

Layout
Output

Inputs
**Layout**
Channel 1
Channel 2
Misc

**Video Resolution**
▪ **Master Connection**
**Deep Color**
**Color Space**
**HDCP Mode**

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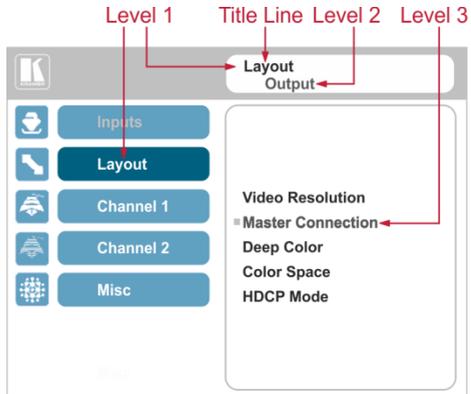
The subtitle shows the current, Level 3, selection and the menu list shows the function (HDMI2)

Level 1    Level 2    Level 3    Level 4

Output
Master Connection

Inputs
**Layout**
Channel 1
Channel 2
Misc

**HDMI1**
**HDBT1**
▪ **HDMI2**
**HDBT2**
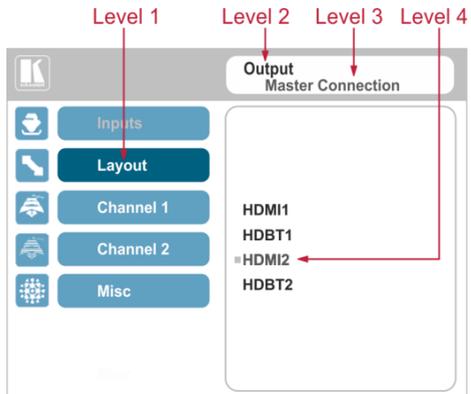
Note that:

- A selected parameter that turns gray becomes valid immediately. You can press Enter at this point to save these parameter changes to the memory immediately (the screen will display "Saving Data" for a split second).

- Functions may also have 2 digits only (Display Mode, for example is 21).

- Parameters that appear red are not available.

- In any case, exiting the menu saves the parameter to the memory.

- Data is saved per window and per input (to a dedicated input + window memory), as applicable.

The control buttons let you control the **VP-778** via the OSD menu. Press the:

- MENU (or ◁) button to enter the menu, exit the menu, and when in the OSD menu, move to the previous level and change menu settings in the OSD screen.
  Changes are immediate.
  The default timeout is set to 30 seconds and can be changed (see Section 6.5).

- ENTER (or ▷) button to access sub-menu items.

- Arrow buttons to move through the OSD menu.

- Up or down arrows to change settings.

When exiting the menu, all the changes are automatically saved to the non-volatile memory.
The default OSD timeout for auto exit is set to 30 seconds and can be changed (see Section 6.5).

## 6.2 Inputs Menu
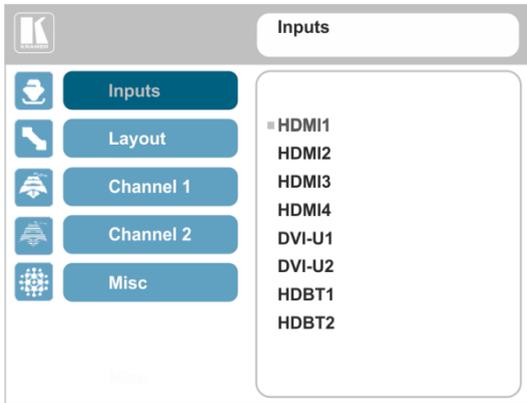


Figure 9: Inputs Menu

| Setting | Function |
|---|---|
| Set the parameters for each of the inputs: HDMI1, HDMI2, HDMI3, HDMI4, DVI-U1, DVI-U2, HDBT1, HDBT2 <br><br> Note that if you are setting the parameters of a selected input (front button panel illuminates) an "Active Input" warning appears. | |
| Type | Select the signal type for the DVI-U inputs: **HDMI**, **YUV**, **VGA**, or **CV** <br><br> Note that YUV, VGA or CV signals are only valid for when a DVI input is connected. |
| EDID Management | Set the: <br> **Native Resolution** – select the native resolution for each input (for HDMI, HDBT and VGA inputs only): 1024x768@60, 1280x800@60, 1280x1024@60, 1366x768@60, 1440x900@60, 1400x1050@60, 1600x900@60, 1600x1200@60, 1680x1050@60, 1920x1200@60RB, 720p50, 720p60, 1080p50, 1080p60, 2k50 or 2k60. <br><br> **Color Depth** – select the color depth to be **12bpp** or **8bpp** after selecting the native resolution. <br> **Modeline** – Native as **Multiple Modelines** – generating a group of resolutions in the detailed timing, including the native resolution), or Native as **Single Modeline** – generating only the native resolution in the detailed timing. <br><br> **Audio Channels** – Select 5.1 or Stereo. |
| HDCP Mode | Select the HDCP option for each HDMI/HDBT input: either **On** (the default) or **Off** <br> Setting HDCP mode to Off on the HDMI/HDBT input allows the source to transmit a non-HDCP signal if required (for example, when working with a Mac computer). <br> Note that if you did not get the source to transmit the desired result, make sure you have saved the change (by pressing the ENTER button) and then physically disconnect and reconnect the cable connecting the source to the HDMI/HDBT input. |
| Color Space | Select the color space for each input to **RGB**, **YPbPr** or **Follow Input**. |
| Volume | Slide the progress bar to set the audio level for each input. |

## 6.3 Layout Menu



Figure 10: Layout Menu

| Setting | | Function |
|---|---|---|
| Display Mode | | Set to the **Transition** mode or the **Overlay** mode (see Section 7). |
| Transition Settings | Speed | Slide the progress bar to set the transition speed. |
| | Mode | Set the transition mode to either **Swap** (Channel 1 and Channel 2 sources switch places) or **Follow** (the Channel 1 source follows the Channel 2 source). |
| | Effect | Select one of the following effects: **Cut, Fade, Diagonal**, **Wipe**, **Circle** or **Curtain**. |
| | Direction | Applies to the following effects: Diagonal: From Top Right, From Top Left, From Bottom Right or From Bottom Left. Wipe: Left to Right, Right to Left, Up or Down. Circle: Inbonund or Outbound. Curtain: Horizontal or Vertical. |
| | Take | Select to carry out the seamless switching transition. A transition can be carried out only when Channel 1 and Channel 2 have the same output resolution. |
| Overlay Settings | Single Window | Set to a single window mode operation with one channel displayed. |
| | Picture in Picture | (PiP) – dual window mode operation, a smaller window superimposed over a full screen image (see Section 7.2). |
| | Picture + Picture | (PoP) – dual window mode operation, both images appear side-by-side and the aspect ratios of both images are maintained (see Section 7.2). |
| | Split | (SbS) – dual window mode operation, both images are placed side-by-side with the same height (see Section 7.2). |
| | Customized Single | Select the customized Channel 1 window as set in Window Customization, see Section 6.4. |
| | Customized Dual | Select the customized Channel 2 window as set in Window Customization, see Section 6.4. |

VP-778 - OSD Menu

| Setting | | Function |
|---------|---|----------|
| Output | Video Resolution | Select the output resolution: Native, 640x480@60, 640x480@75, 800x600@50, 800x600@60, 800x600@75, 1024x768@50, 1024x768@60, 1024x768@75, 1280x768@50, 1280x768@60, 1280x800@60, 1280x1024@50, 1280x1024@60, 1280x1024@75, 1360x768@60, 1366x768@50, 1366x768@60, 1400x1050@50, 1400x1050@60, 1600x900@60, 1600x1200@50, 1600x1200@60, 1680x1050@60, 1920x1200@60RB, 480p60, 576p50, 720p50, 720p59.94, 720p60, 1080i50, 1080i60, 1080p23.976, 1080p24, 1080p25, 1080p29.97, 1080p30, 1080p50, 1080p59.94, 1080p60, 2k50, 2k60, 4k2k30.<br><br>ⓘ Note that setting the output resolution to 4k2k30 will automatically change the window settings to Single Window in the Overlay mode. |
| | Master Connection | Set **HDMI1**, **HDBT1**, **HDM2** or **HDBT2** to be the Master connection (see Section 6.3.1).<br><br>If the native resolution is not supported by the selected Master Connection, the system searches for the best supported resolution. If the search fails (for example, if the master connection is disconnected or EDID is unreadable), the resolution will default to XGA. |
| | Deep Color | Set to Off or Follow Output. |
| | Color Space | Select RGB, YPbPr422 or YPbPr444. |
| | HDCP Mode | Define the output HDCP activation policy. Set to:<br>**Follow Output** (this option is recommended when the HDMI type output is connected to a splitter/switcher) – to activate the HDCP per output according to the setting of the HDMI acceptor to which it is connected; that is, if the HDMI acceptor is not HDCP compliant, the **VP-778** always outputs without HDCP and vice versa.<br>**Follow Input** – to activate the HDCP on all HDMI type outputs in the case that the video on the Main or PiP window is HDCP encrypted.<br>Note that the **VP-778** will output a green screen if the output acceptor to which it is connected is not HDCP compliant, in the case that the video on the Main or PiP window is HDCP encrypted. |

## 6.3.1 Master Connection Settings

The Master Connection (HDMI OUT1, HDBT OUT1, HDMI OUT2 or HDBT OUT2) is usually set to the main output display so that the optimal resolution for that display can be obtained.

By setting the output resolution to Native, the **VP-778** is triggered to read the EDID of the main display and change the output resolution value according to the native resolution of the display.

If HDMI/HDBT is selected as the Master Connection, and a new display is connected to the Master Connection output (hot plug), the **VP-778** automatically reads the EDID of that display and updates the output resolution accordingly.

If it is not supported by the selected Master Connection, the system searches for the best supported resolution. If the search fails (for example, if the master connection is disconnected or EDID is unreadable), the resolution will default to XGA.

## 6.4 Channel 1 / Channel 2 Menus

The Channel 1 and Channel 2 menus are identical.

Note that when browsing the Channel 1 OSD menu, use a long press on the MENU button to jump to the same menu item in the Channel 2 menu and vice versa.



Figure 11: Channel 1/Channel 2 Menus

| Setting | | Function |
|---|---|---|
| Source | | Select the source: HDMI 1, HDMI 2, HDMI 3, HDMI 4, DVI-U1, DVI-U2, HDBT 1 or HDBT 2 and then set the parameters below (which are specific per input) |
| Scaling | Aspect Ratio | Set (see Section 6.4.2) to:<br>**Follow Input** – If the input resolution ≤ output resolution, display with a blank border.<br>input > output is denied, and the aspect ratio automatically changes to Follow Output.<br>**Follow Output** – If the input resolution < output resolution, scale up the picture. If the input resolution > output resolution, scale down the picture.<br>**Best Fit** – the best possible compromise between the input and the output aspect ratios Channel 1.<br>**Letterbox** – to compress the top and bottom edges of the input signal, but fill the width of the screen.<br>Note that when in the overlay mode (any setting other than Single Window), the aspect ratio will be set to Follow Output. Any other setting will set the overlay mode to Single Window. |
| | Overscan | Set the Overscan to **Follow Input**, **Off**, **5%** or **10%**. |
| | Zoom Shift Mode | **Auto** – to set zoom to 100% and fit the image to the display.<br>**Semi Auto** – to manually set the zoom and shift. Changes until the resolution is changed and/or the source is replaced.<br>**Customized** – to manually set the zoom shift (H image shift and V Image Shift). |
| | Zoom | Slide the progress bar to set the zoom.<br>If Zoom Shift Mode is set to Auto, this function is disabled. |
| | H image Shift | Slide the progress bar to set the horizontal position of the image within the window (note that this is a volatile parameter when selecting Zoom Shift Mode > Auto). |

| Setting | Function | |
|---|---|---|
| | V image Shift | Slide the progress bar to set the vertical position of the image within the window (note that this is a volatile parameter when selecting Zoom Shift Mode > Auto). |
| Window Customization | Slide the progress bar to set the **H position** and **Width**, **V position** and **Width** which will appear when selecting Customized Single/Dual in Layout>Overlay Settings, see [Section 6.3](). | |
| Picture | Brightness | Slide the progress bar to set the brightness level. |
| | Contrast | Slide the progress bar to set the contrast level. |
| | H Sharpness | Slide the progress bar to select the horizontal sharpness level. |
| | V Sharpness | Slide the progress bar to select the vertical sharpness level. |
| Color | Chroma | Slide the progress bar to set the color level. |
| | Hue | Slide the progress bar to set the color hue. |
| | Color Temperature | Set the color temperature to **6500K** or **9300K**. |
| | Gamma Mode | Set the gamma correction factor to **Off**, **0.4**, **0.8**, **1.2**, **1.6**, **2.0**, **2.4** or **2.8**.<br>The higher the value, the darker the image. |
| | Color Correction Blue | Slide the progress bar to set the blue color level from 0 to 4. |
| | Color Correction Green | Slide the progress bar to set the green color level from 0 to 4. |
| | Color Correction Flesh | Slide the progress bar to set the flesh color level from 0 to 4. |
| De-interlacing | Film Mode | Set to:<br>**Off** – for no pull-down.<br>**Follow Input** – to automatically identify the required pull-down (2:2, 2:3, 2:3:3:2, 2:3:3:2:2, 2:3:2:3:2, 5:5 or 8:7 pull-down).<br>**24PsF** – to force 24PsF pull-down. |
| | PD Time | Slide the progress bar to set the pull down time (0 to 15). |
| | Motion Detection Sensitivity | Set (from **Level 1** to **Level 5**).<br>Select the motion detection sensitivity for filtering of interlaced images. Set a high value for video where there is generally a large amount of motion, or a low value for little motion. |
| | Diagonal Correction | Slide the progress bar to set the level of diagonal interpolation from 0 to 3.<br>When set to the lower level, the diagonal image does not appear smooth. |
| Noise Reduction | Horizontal NR | Slide the progress bar to reduce the horizontal noise |
| | Vertical NR | Slide the progress bar to reduce the vertical noise |
| | Temporal NR | Slide the progress bar to set the temporal NR.<br>The higher the level, the stronger the filtering of the image. Useful when the noise is visible to the eye. |
| | Block NR | Slide the progress bar to set the Block NR.<br>As the level is set higher, the block noise disappears, and the image appears softer. |
| | Mosquito NR | Slide the progress bar to set the Mosquito NR.<br>The higher the level, the stronger the filtering of the image. |
| | Combing NR | Slide the progress bar to set the Combing NR.<br>Improves the quality of the subtitles. |

| Setting | Function | |
|---|---|---|
| Advanced | Projection | Set to: |
| | | **Front** – to place a projector in front of the screen. |
| | | **Back** – to place a projector behind the screen. |
| | | **Ceiling Front** – to suspend a projector from the ceiling upside-down in front of the screen. |
| | | **Ceiling Back** – to suspend a projector from the ceiling upside-down behind the screen. |
| | Pause | Set the output **Freeze**, **Blank** and **Mute** to On or Off: |
| | | Set **Freeze** to **On** to freeze the window (freezing the window will also mute the audio output). |
| | | Any change in the input source may cancel the freeze and blank settings. |
| | | Set **Blank** to **On** to display a blank window (blanking the window will also mute the audio output). |
| | | Any change in the input source may cancel the freeze and blank settings. |
| | | Set **Mute** to **On** to mute the audio output. A mute icon appears on screen for a few seconds. |
| | Sync Off | Set to **Auto** to enter the power save mode after a set time (1 to 5 minutes) if no input is present. |
| | | Set to **Manual** to enter the power save mode (once Manual is selected, a 5-second countdown appears, letting you cancel the process and revert to the previous state by pressing the MENU or left arrow button). |
| | | This is useful, for example, when the output is connected to a projector, and the projector will automatically shut down when it has no input. |
| | | Press any front panel button or key on the IR remote control transmitter to exit the Sync Off mode. |

| Setting | Function | |
|---|---|---|
| | Test Pattern | Set the Test pattern to **Slide Bar** (non-HDCP), **Color Bar** (HDCP) or **Off**.<br>Each test pattern includes a sinusoid audio signal at 10dB @1kHz.<br>We recommend that you set the Display Mode to Single Window and set the Output Resolution to 1080p. |
| | No Signal | If there is no signal on the input set the output color to **Gray**, **Blue** or **Black**. |
| | Fade-Thru | When switching inputs, select fade thru **Black** or fade thru **Freeze**. |
| | Auto Switching | Set the Mode and the Priority.<br>**Mode** – set to Off, Scan Mode or Last Connected.<br>In scan mode, as the device scans each of the active (connected) inputs, each of the corresponding input buttons briefly lights blue.<br>**Priority** – is effective in Scan Mode Only – set the switching priority for each input from 1 (the highest priority) to 8 (the lowest priority) and enable or disable each priority level (Active: on/off). |
| Audio | Source | Select the audio source to be:<br>**AFV** for the audio to follow the video.<br>**Analog 1** to **Analog 8** to select any of the analog audio inputs. |
| | AFV Source | When in the AFV mode, select **Embedded** for the embedded audio source to follow the video.<br>Select **Analog** for the analog audio source to follow the video<br>Applies only when in the AFV mode. |
| | Proc Amp | Slide the progress bar to set the **Output Volume** level and **Bass** level [dB].<br>Slide the progress bar to adjust the **Mid**range frequency, the **Treble** and the **Balance**. |
| | Lip Sync | Slide the progress bar to set the Lip Sync delay value [msec] . |
| | Pass-Through | Set to pass-through to On to pass the input audio to the output or set to Off. |
| | Mic Effect | For Channel 1 only (see Section 6.4.1) . |
| | ⓘ | Note that the audio settings do not apply for Channel 2 when in the Overlay mode. |

## 6.4.1    Setting the Mic Effects

The Mic effect audio settings apply to Channel 1 only.

| Setting | Function | |
|---|---|---|
| Select **Mic1**, **Mic 2** (and then set the parameters below which are specific per microphone) or set **Line Mute** to On or Off | | |
| Mic Mode | Set the mode to **Talkover** (see Figure 12) or **Mix** | |
| Talkover Settings | Talkover Depth [%] | Slide the progress bar to determine the decrease of the audio level during microphone takeover (press + to further decrease the talkover audio output level; press – to lessen the talkover output audio decrease level). |
| | Talk Over Trigger [dB] | Slide the progress bar to determine the microphone threshold level that triggers the audio output-level decrease. |
| | Attack Time | Slide the progress bar to set the transition time of the audio level reduction after the signal rises above the threshold level. |
| | Hold Time | Slide the progress bar to define the time period talkover remains active although the signal falls below the threshold level (for a short period of time). |
| | Release Time | Slide the progress bar to define the transition time for the audio level to return from its reduced level to its normal level after the Hold Time period. |
| Mic Mix | Slide the progress bar to set the microphone mix level. | |
| Mic Volume | Slide the progress bar to set the Mic volume. | |
| Mic Delay | Slide the progress bar to set the microphone delay time: 1 to 40ms. | |
| Mic Mute | Set to On or Off. | |
| Line Mix | Slide the progress bar to set the Line mix level. | |
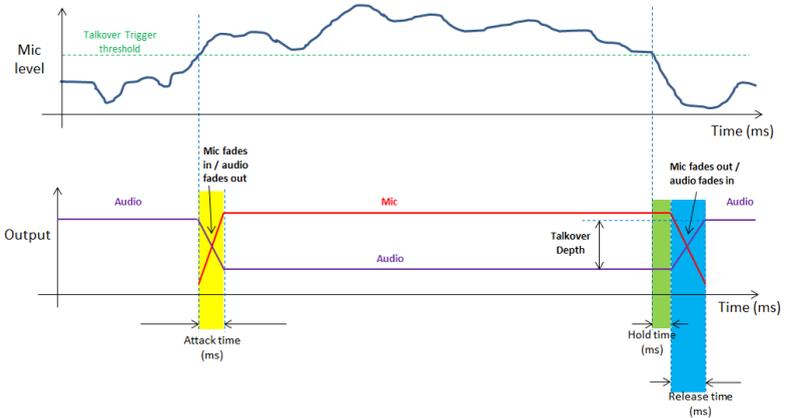


- **Attack time:** The transition time of the audio level reduction after the signal rises above the threshold level
- **Hold time:** The time period talkover remains active although the signal falls below the threshold level (for a short period of time)
- **Release time:** The transition time for the audio level to return from its reduced level to its normal level after the Hold Time period

Figure 12: Talkover Mode

### 6.4.2 Selecting the Correct Aspect Ratio

You can configure the aspect ratio of any output image to fit your application. The **VP-778** offers four different aspect ratio settings: Follow Input, Follow Output, Best Fit and Letterbox. Here is how each of these settings works.

**FOLLOW INPUT** – The aspect ratio and resolution of the input video or graphics signal are both preserved (no scaling). For example, a composite video image with a 4:3 aspect ratio will appear with the same aspect ratio on a 1080p (16:9) output image, surrounded by black bars.



**FOLLOW OUTPUT** – The aspect ratio and resolution of the input signal is re-sized to precisely match the aspect ratio and resolution of the **VP-778** output signal. This may result in some distortion to the input signal images.
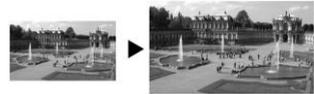


**BEST FIT** – This setting re-sizes the video or graphics input signal to "best fit" the output resolution while maintaining the aspect ratio of the input signal. For example, a composite video signal (4:3 aspect ratio) will "best fit" to the top and bottom of a widescreen output image, resulting in black pillars on either side.



**LETTERBOX** – This setting compresses the top and bottom edges of the input signal, but fills the width of the screen. For example, to preserve a widescreen film image on a 4:3 display.



### 6.4.3 Window Customization

Window customization lets you change the size and position of a selected window.

In the following examples, PiP Window Control is selected, but the same procedure applies to Main Window Control.

Note that you can also customize the window size and position via the "Y" commands (see Section 14.2) or protocol 3000 (see Section 14.4).

### 6.4.3.1 Changing the Size of the Main and/or PiP Window

Use the H Width and V Height to change the size of the window using the + and – buttons on the front panel or remote control transmitter (as illustrated in Figure 13).
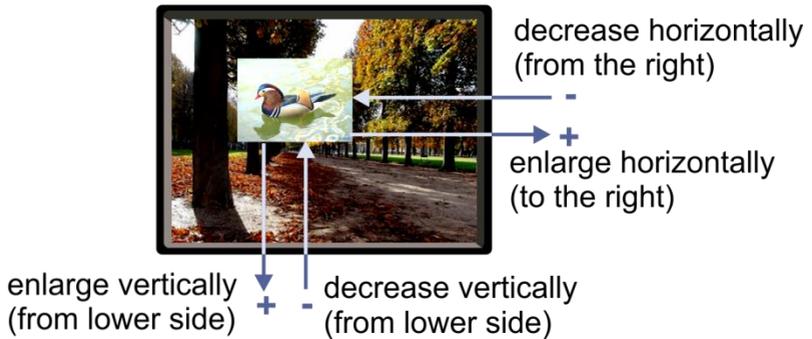


Figure 13: Changing the Size of the Window

**To change the size of the window:**

1. Check that window control is set as required (for example, PiP Window Control).

2. Select Window Customization (see Figure 17).

3. Select H width (an OSD slide bar appears) and press + to increase the width, or – to decrease the width, see Figure 14.
   The following example shows how to increase the width of the window:
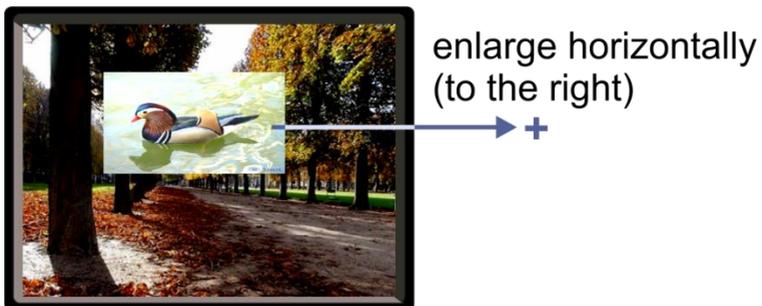


Figure 14: Increasing the Width

4. Select V Height (an OSD slide bar appears) and press + to increase the height, or – to decrease the height, see Figure 15.
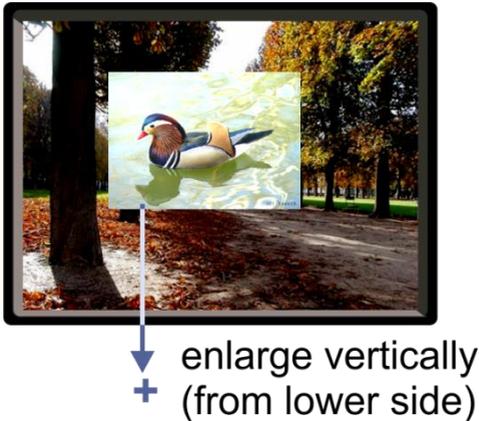


Figure 15: Increasing the Height

### 6.4.3.2 Moving the Position of the Main and/or PiP Window

Use the H Position and V Position items in the OSD to change the position of the window using the + and – buttons on the front panel or remote control transmitter (as illustrated in Figure 16).
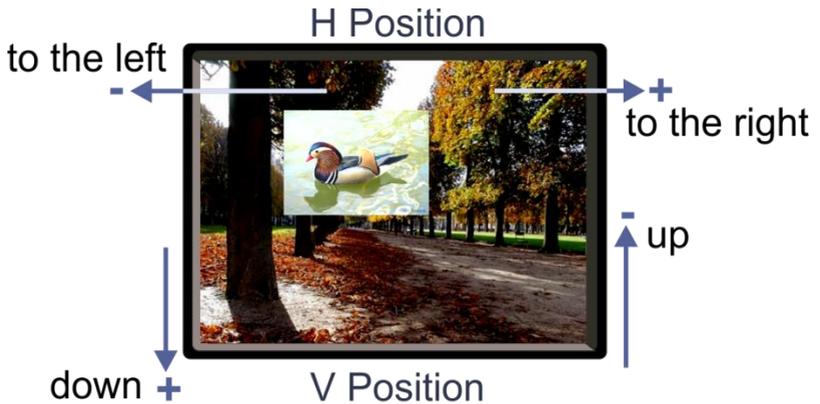


Figure 16: Positioning the Window

**To move the position of the window:**

1. Check that window control is set as required (for example, PiP Window Control).

2. Select Window Customization.
   The following Window appears:
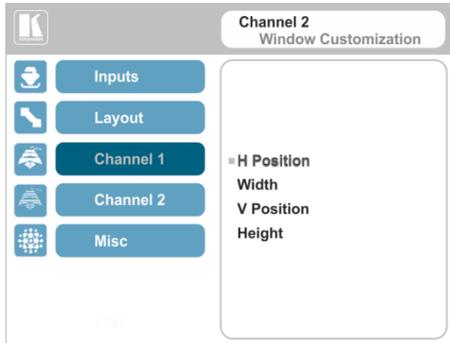


Figure 17: Window Customization

3. To move the picture to the right, select H Position.
   An OSD slide bar appears:
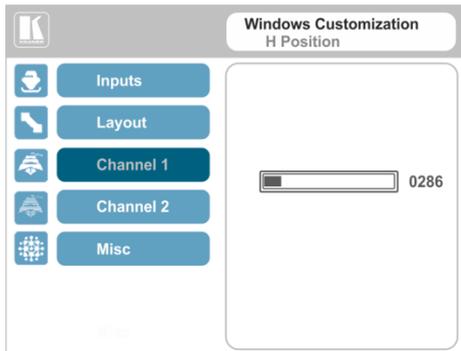


Figure 18: H‑Position Slide Bar

4. Press the +/- buttons to move the PiP window horizontally.

Use the V Position menu item in the same way to move the PiP vertically, see Figure 19.
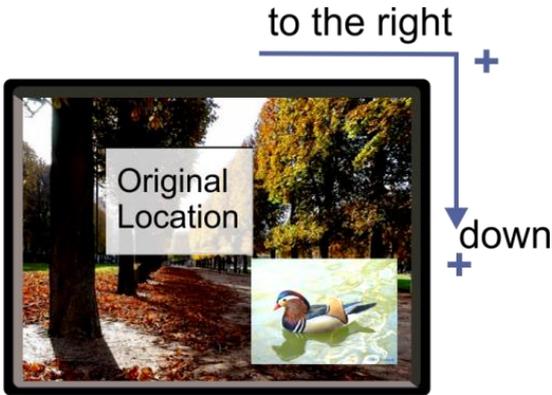


Figure 19: Moving the PiP Window

> The sequence in which you change the size and position of the window is insignificant, as long as you make sure that the resized image does not go beyond the window boundaries.

## 6.5 Misc Menu
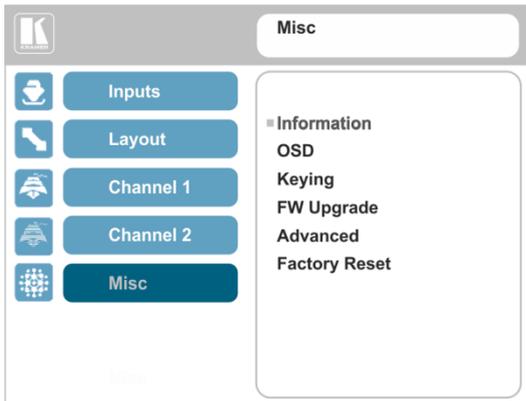


Figure 20: Misc Menu

| Setting | Function | |
|---|---|---|
| Information | Channel 1 and Channel 2 information – (input selected, input resolution, FH, FV and output resolution). | |
| | If the selected output is the native output resolution, it will be displayed under "Native Output" (the master connection will also appear, before "Native Output") ; in case of an explicit output resolution the title will be "Output:" | |
| | If the input video is encrypted, an HDCP icon appears next to the input information. | |
| | FW Versions – shows the firmware versions and update date and time. | |
| | Network – shows the IP address, Netmask, Gateway and DHCP status (ON or OFF) | |
| | HDBT – Firmware shows the firmware version ID, the version date, the firmware and hardware type and the active bank per HDBT port. Status – shows the port status, including the link status, the cable length, the quality of the signal and so on. | |
| OSD | H Position | Slide the progress bar to set the horizontal position of the OSD. |
| | V Position | Slide the progress bar to set the vertical position of the OSD. |
| | Transparency | Set the transparency to On or Off. |
| | Gain | Slide the progress bar to set the transparency level (once transparency is set to On). |
| | Bias | Slide the progress bar to set the transparency level. |
| | Timeout | Set to 30 seconds before OSD timeout, 60 seconds before OSD timeout or OFF (Off means that that the OSD appears continuously). |
| Keying | Chroma Keying Red | Slide the progress bar to set the threshold value of the red components for chroma keying. |
| | Chroma Keying Green | Slide the progress bar to set the threshold value of the green components for chroma keying. |
| | Chroma Keying Blue | Slide the progress bar to set the threshold value of the blue components for chroma keying. |
| | (i) | Note that the combination of threshold values (for red, green and blue) determines the chroma keying threshold. Any image with combined values of red, green and blue that are below this threshold will become transparent when chroma keying is enabled (see below). |
| | Chroma Keying | Set to On or Off to enable/disable chroma keying. Note that this feature is available in dual windows mode. |
| | Luma Keying | To turn the keying on the PiP window On or Off (see Section 6.5.1). Note that this feature is available in overlay mode dual windows. |
| FW Upgrade | Upgrade | Select to upgrade the firmware (see Section 12.1). |
| | Rollback | Select to return to the previous firmware revision (see Section 12.2). |
| Advanced | | |
| Network | Set DHCP to Off or On. | |
| Port Tunneling | Port Settings | Slide the progress bar to set the Port Type to UDP or TCP and set the Port Number (0 to 64000). |
| | UART Setting | Baudrate – 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200. |
| | | Data Bits – set the data bits: 5, 6, 7 or 8. |
| | | Parity – set to None, Odd, Even, Mark or Space. |
| | | Stop Bits – set to 1 or 2. |
| Serial Matrix | Connection 1-8 | For each connection, set the source: Port Tunneling, DATA, HDBT-IN1, HDBT-IN2, HDBT-OUT1, HDBT-OUT2 or None. Set the Destination: Port Tunneling, DATA, HDBT-IN1, HDBT-IN2, HDBT-OUT1, HDBT-OUT2 or None. |
| | Disconnect All | Disconnect all the port tunneling connections. |

| Setting | Function |
|---|---|
| Power Amplifier | Set the power amplifier (SPKR OUT) level to Off or to levels 1 to 4.<br>This submenu item is specific for the power amplifier on top of the general volume level. |
| USR KeyPad | For USR1 / USR2 select:<br>Setup the keypad parameters for a programmable serial command to pass to a selected destination (with a single press of a USR button), see Section 8.1.4.<br>**Baudrate** – 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.<br>**Data Bits** – set the data bits: 5, 6, 7 or 8.<br>**Parity** – set to None, Odd, Even, Mark or Space.<br>**Stop Bits** set to 1 or 2.<br>**Destination** – Port Tunneling, DATA, HDBT-IN1, HDBT-IN2, HDBT-OUT1, HDBT-OUT2, All or None.<br>**Data Display** – displays the command data as selected from the protocol.<br>**Launch** – execute the command (same as pressing a USR button). |
| Alert System | N/A |
| Factory Reset | |
| Factory Reset | Reset to factory default values (see Section 13.1).<br>Select **Including ETH** to perform a full factory reset or **Excluding ETH** to reset without ETH parameters.<br>Once Factory Reset is selected, a countdown appears, letting you cancel the process and revert to the previous state.<br><br>**DO NOT** turn the machine off during the factory reset process.<br>The factory reset process takes up to 3 minutes in which all the front panel button lights turn off (except for the PANEL LOCK button) and then turn on again; the image on the displays reappears and only then you can turn the machine off if required. |

### 6.5.1 The Luma Keying Feature

The luma keying feature lets you display the Channel 2 window (the key image) as semi-transparent over the Channel 1 window. This feature can be used to have the Channel 2 window display a static or dynamic logo, for example, which will appear on a transparent background.

To apply the luma keying feature, first set the Channel 2 window to the desired size and location and then turn luma keying On. The Channel 2 image will show without its background.

The lower the luminance in the Channel 2 window, the more transparent it becomes, thus letting the Channel 1 window image show. The higher the luminance, the less transparent it becomes, not letting the Channel 1 window show through. To use this feature it is recommended to set the Channel 2 image as follows: use low-luminance colors for the background (the key image portion) and high-luminance colors for the logo.

# 7    VP-778 Layout – Features and Effects

For each channel you can select an input to switch to CH 1 and/or Ch 2:

- By pressing the desired INPUT front panel button in CH 1 and/or CH 2 rows.

- Selecting the source in the Channel 1/Channel 2 OSD menu (see Section 6.4).

- Selecting an input in the Routing and Scaling web page (see Section 9.2.2).

The **VP-778** can function in two modes, the:

- Transition mode, see Section 7.1.

- Overlay mode, see Section 7.2.

The operation modes are set by selecting the display mode via the Layout menu (see Section 6.3).

## 7.1    Transition Mode

In the transition mode you can setup the input, view it via the Channel 2 output and then switch it to the Channel 1 output.

The **VP-778** has two output channels (Channel 1 and Channel 2). Each channel includes an HDMI connector and an HDBT port: Each of these channels functions independently. An input is routed to the Channel 1 outputs by pressing that CH 1 INPUT front panel button. In the same way pressing a CH 2 INPUT front panel button will route that input to the Channel 2 outputs.

Use the Channel 2  outputs to:

- See how the scaled output looks before displaying live during a presentation.

- Harmonize the transition to the Channel 2 output after determining the look and feel.

Use the OSD menu (see [Section 6.3](#)) and embedded web pages (see Section 9.3) to adjust and choose the transition mode settings:

- Determine the type of the transition:
  **Swap** – Channel 1 and Channel 2 inputs seamlessly switch places.
  **Follow** – Channel 1 input setting follows the Channel 2 setting and both display the same input.

- Set the transition effect via the OSD menu:
  **Cut** –An instantaneous transition from the Channel 2 output to Channel 1.
  **Fade** –selectable fading effects for gradual channel transition.

  > Seamless switching is carried out when Swap and Cut are selected in the Transition mode.

- Set the speed of the transition.

**To switch the inputs in the transition mode via the OSD menu:**

1. In the Channel 2>Advance>Audio, set the audio signal:

   - Set either AFV for the audio to follow the video, or an analog input from 1 to 8.

   - If AFV was selected, set that audio signal to be embedded or analog.

   - Set the output volume, bass, mid, treble, balance and lip sync.

2. In the Layout menu, set the display mode (for example, Transition).

3. Define the transition settings: Speed, Mode, Effect and Direction.

4. In the Channel 2 menu, select an Input.

5. In the Layout menu select **Take** to carry out the transition.

For example, select **Swap** to seamlessly interchange Channel 2 with Channel 1 and **Cut** for an instantaneous transition.

**To switch the inputs in the transition mode via the front panel buttons:**

1.  In the Channel 2>Advance>Audio menu, set the Audio signal:

    ▪ Set either AFV for the audio to follow the video, or an analog input from 1 to 8.

    ▪ If AFV was selected, set that audio signal to be embedded or analog.

    ▪ Set the output volume, bass, mid, treble, balance and lip sync.

2.  In the Layout menu, set the display mode (for example, Transition).

3.  Define the transition settings: Speed, Mode, Effect and Direction.

4.  Press the desired CH 2 INPUT front panel button.

5.  Press **ENTER** to carry out the transition.

To set the channel 1 input, repeat the above procedures using the Channel 1 menu.

to switch the inputs in the transition mode via the embedded web pages, see Section 9.3.

## 7.2 Overlay Mode

In the Overlay mode both outputs are identical and can display a single image (single window display mode), two images one over the other, two images side by side (dual window display mode) or customized window settings.

A selected CH 1 input appears as the main image in a dual window display mode (such as PiP) or as the only image in a single window display mode.
A selected CH 2 input will appear as the PiP window in the dual window display mode and will not appear at all in the single window display mode.

The overlay settings item in the Layout menu (see Section 6.3) lets you set a Single Window, Picture in Picture (PiP), Picture + Picture (PoP) or Split images. For example, you can show a live video window on top of a graphic background, or show two images on screen of the same input channel. The PiP window appears even if no input signals are connected. In this case the PiP and Main windows appear as set in Channel 1/2>Advanced>No Signal?>Gray/Blue/Black.

The preset PiP configurations are available:

**Picture-in-Picture**, with a smaller PiP window superimposed over a full main window image.



**Picture + Picture**, where both images appear side-by-side and the aspect ratios of both images are maintained.



**Split**, where both images are placed side-by-side with the same height.



**Customized Single**, where the size and position of a single image appears as defined in Channel 1>Window Customization.

**Customized Dual**, where the size and position of both images appear as defined in Channel 1>Window Customization and in Channel 2>Window Customization/

You can superimpose any input type over any or the same input.

If the HDMI signal is HDCP protected, it can appear on HDMI and HDBT outputs that are connected to supported HDCP compliant displays. However, it cannot appear on a display that is not HDCP

compliant and will show a green screen instead.

## 7.2.1 Setting the PiP

**To set the PiP window in the Overlay mode:**

1. In the Layout menu select Overlay Settings.
   When in the Overlay display mode.

2. Select the type of image you want displayed: Picture in Picture, Picture +
   Picture, Split or Single Window.

### 7.2.1.1 Selecting the PiP Source via the Front Panel Buttons

When in the Overlay mode (set only via the OSD menu, see Section 6.3) select the
main window by pressing a CH 1 input front panel button and select the PiP window
by pressing a CH 2 front panel button (see Figure 1).



Figure 21: VGA superimposed over HDMI

### 7.2.1.2 Selecting the PiP Source via the IR Remote Control Transmitter

When in the Overlay mode press an OUT 1 button to select the main window and
press ENTER; press an OUT 2 button to select the PiP window (see Section 8.5).

### 7.2.1.3    Selecting the Channel 1/Channel 2 Source via the OSD Menu

You can select an input source only after you set the Display Mode to the Overlay Mode (see Section 6.3).

**To set the Channel 1/Channel 2 source via the OSD menu:**

1. Press the MENU button to access the OSD menu.

2. In the Layout menu set Display Mode to Overlay.

3. In Overlay Settings set the image display to any of the dual window options or to single window.

4. In the Channel 1/Channel 2 menu, select Source.

5. Select an input (from 1 to 8).

6. Press the ENTER button.

7. Press the MENU a few times until you exit the OSD menu (changes are saved upon exit).

# 8 Controlling the VP-778

The **VP-778** can be controlled via:

- The front panel buttons (see Section 8.1).

- The OSD menu (see Section 6).

- The embedded web pages (see Section 9).

- The infrared remote control transmitter (see Section 8.5).

## 8.1 Controlling via the Front Panel Buttons

The **VP-778** includes the following front panel buttons:

- Input selector buttons for selecting the required input: HDMI (1 to 4), DVI-U (1 and 2) and HDBT (1 and 2), see Section 3.4.

- Mode button to select AFV, Video or Audio switching.

- Separate FREEZE and BLANK buttons for each channel (note, these buttons illuminate when selected).

- Two user buttons, USR (1 and 2), which can be configured via the OSD menu and the protocol commands (for example, to turn a projector on and off), see Section 8.1.4.

- MENU and ENTER buttons, as well as left, right, up, and down arrow buttons.

- Output volume up (+) and down (-) buttons (when not in the OSD mode).

- RESET TO XGA/720p and PANEL LOCK buttons.

### 8.1.1 Using the Mode Buttons

Press the MODE button to toggle between the AFV (green LED) mode, the VIDEO (orange LED) mode and the Audio (red LED) mode. When selected, each mode defines the function of the CH 1 and CH 2 front panel buttons when next pressing the front panel buttons. That is, when in the:

- AFV mode, press an INPUT button to select the video together with its audio signal.

- VIDEO mode, to select the video inputs only.

- AUDIO mode to select the audio inputs only.

> Note that the MODE button indicates the status for the next press on the front panel input buttons only.

The input buttons light in accordance with the selected modes:

A bright green button indicates that both the audio and video signals of that input are selected (AFV with **embedded** audio signal).

A medium green button indicates that both the audio and video signals of that input are selected (AFV with **analog** audio signal).

An orange button indicates that only the video signal of that input is selected.

A red button indicates that only the audio signal of that input is selected.

A dim button indicates an ineffective signal (for all button colors).

A dim blue button indicating Auto switching.

The following example shows how to use the front panel buttons to switch inputs:

CH 1 **DVI-U2** and CH 2 **DVI-U1** are selected. The AFV mode is selected (CH 1-embedded audio signal; CH 2 analog audio signal).
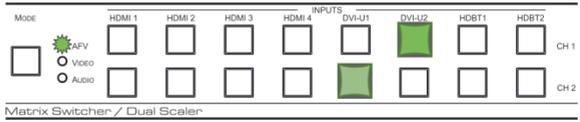
Press the **MODE** button to set it to the **VIDEO** mode.
This will affect the next press of input buttons.

Press CH 1 **HDMI4** – the video only switches to **HDMI4** and the audio remains in **DVI-U2**.
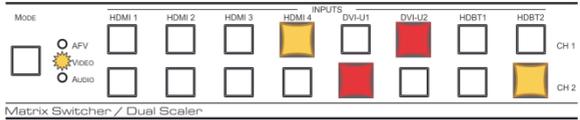
Press CH 2 **HDBT2** – the video only switches to **HDBT2** and the audio remains in **DVI-U1**.
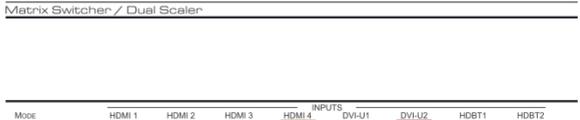
Press the MODE button to set it to the AUDIO mode.
This will affect the next press of input buttons
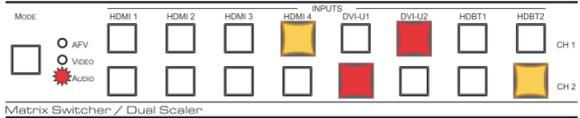
Press CH 1 **HDMI1** – the audio only switches to **HDMI1** and the video remains in **HDMI4**.
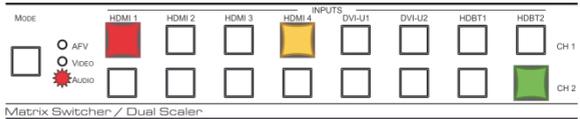
Press CH 2 **HDBT2** – the audio only switches to **HDBT2** and the video remains in **HDBT2** so that audio follows video and the button light green.

## 8.1.2 Button Behavior in the Transition Mode

When in the Transition mode, pressing the ENTER front panel button in the Swap mode will swap the CH 1 and CH 2 inputs as follows, from:
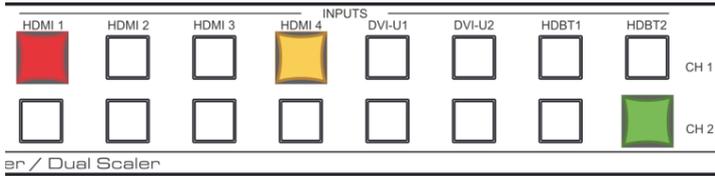


**TO**
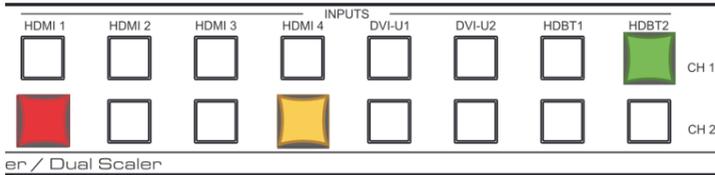


When in the Transition mode, pressing the ENTER front panel button in the Follow mode will switch the CH 1 inputs to follow the CH 2 inputs:
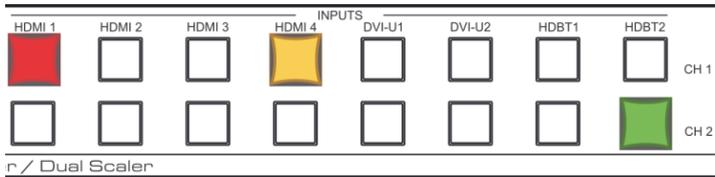


**TO**
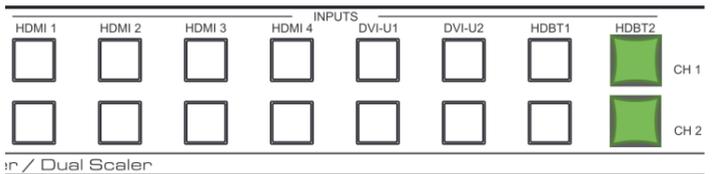
## 8.1.3 Button Behavior in the Overlay Mode

When in the overlay mode, the **VP-778** does not pass the CH 2 audio signal to the output.

In the Overlay dual mode the CH 2 audio input button is dimmed:
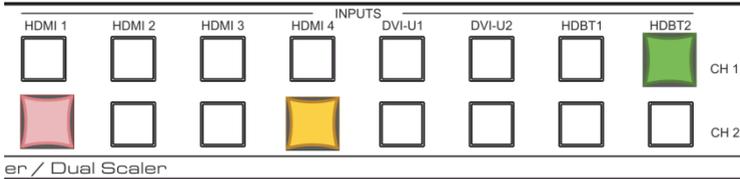


When in the Overlay mode, in the Single Window setting (see Section 7.2), the CH 2 buttons (Audio, Video and AFV) appear dim, as illustrated in the following examples:
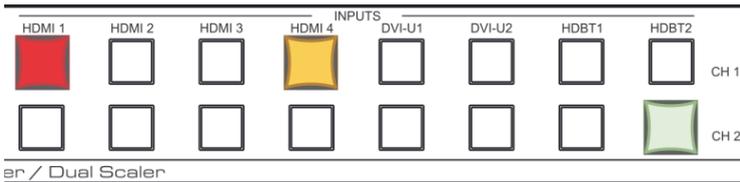


**Or**
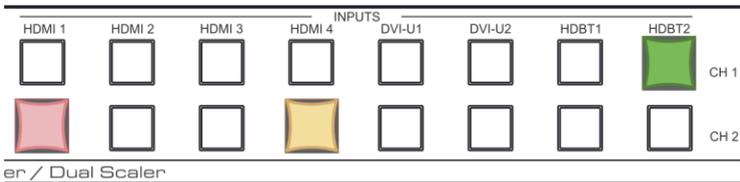


> If you want to adjust the image of a selected input in a window, press that input button again (up to 3 times) for fast tuning. Pressing that input button for the fourth time initiates full tuning of the window.

## 8.1.4  USR Keypad Buttons

Use USR keypad buttons to launch a specific programmable serial command to a selected destination (with a single press of a USR button).

**To configure, program and launch a serial command using a USR Keypad button (for example USR 1):**

1. Configure the USR Keypad communication parameters (Baud rate, data bits, parity, stop bits and the destination to which the command is sent) via:

   - OSD menu – in the Misc menu, select Advance>USR KeyPad, see Section 6.5.

   - Y commands – select Misc>Advance>USR KeyPad, see table in Section 14.2.2.5.

   - Protocol 3000 commands – see the **CBIN** command in Section 14.7.5.1.

2. Program the USR Keypad button command via the **DBIN** protocol 3000 command (see Section 14.7.5.2).
   You can view the command via the **Data Display** item in the USR KeyPad menu.

3. Launch the USR Keypad command in any of the following ways:

   - Pressing **USR 1** on the **VP-778** front panel or IR remote control transmitter.

   - Selecting Misc>Advance>USR KeyPad>Launch via Y commands, see table in Section 14.7.5.2.

   - Clicking **Launch** in the USR Keypad OSD menu, see Section 6.5.

   - Sending the **BIN** command, see Section 14.7.5.3.

The **BIN** command can also be used to launch a one-time custom command that overrides the **DBIN** programmed command.

## 8.2    Connecting to the VP-778 via RS-232

The **VP-778** features two RS-232 ports:

- RS-232 DATA to pass data to and from the machines that are connected to the HDBT connectors.

- RS-232 CONTROL to control the **VP-778**.

Connect the RS-232 terminal block on the rear panel of the **VP-778** to a PC/controller, as follows (see Figure 22):

- TX pin to Pin 2.

- RX pin to Pin 3.

- GND pin to Pin 5.
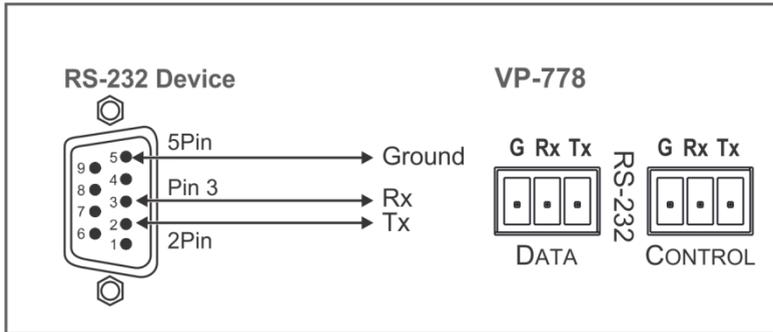


Figure 22: RS-232 Connection

## 8.3    Connecting the VP-778 via the ETHERNET Port

You can connect to the **VP-778** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Section 8.3.1).

- Via a network hub, switch, or router, using a straight-through cable (see Section 8.3.1.1).

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

## 8.3.1 Connecting the Ethernet Port Directly to a PC

You can connect the Ethernet port of the **VP-778** directly to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the **VP-778** with the factory configured default IP address.

**After connecting the VP-778 to the Ethernet port, configure your PC as follows:**

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

2. Click **Change Adapter Settings**.

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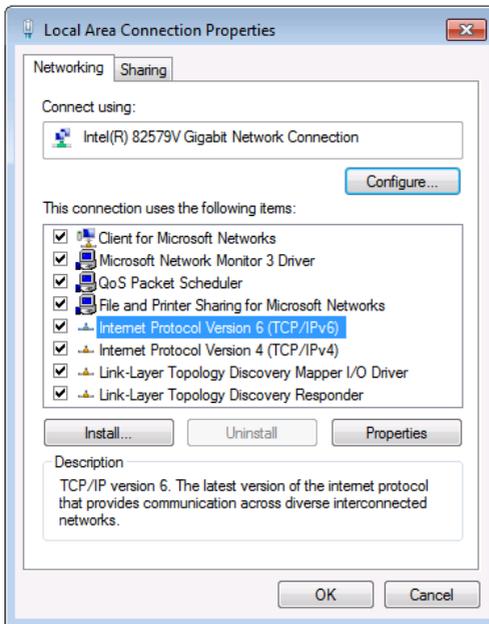


Figure 23: Local Area Connection Properties Window

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

5. Click **Properties**.

   The Internet Protocol Properties window relevant to your IT system appears as shown in Figure 24 or Figure 25.
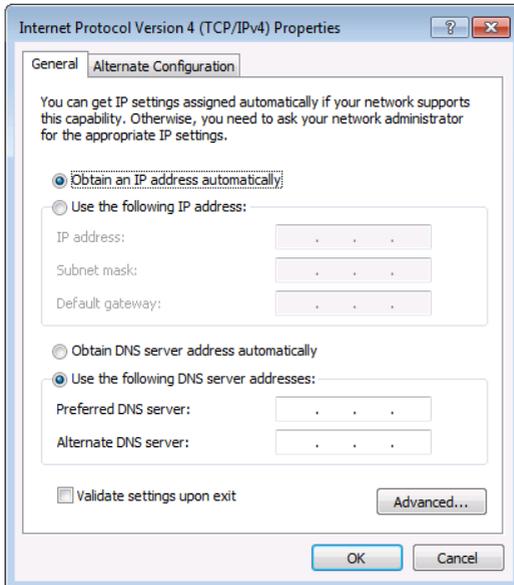


Figure 24: Internet Protocol Version 4 Properties Window
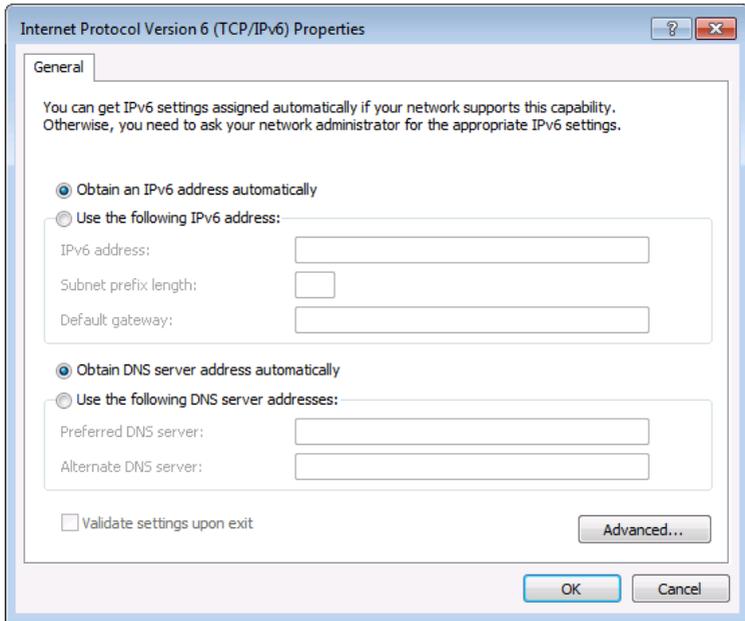
Figure 25: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in Figure 26.
   For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.

**VP-778 - Controlling the VP-778**
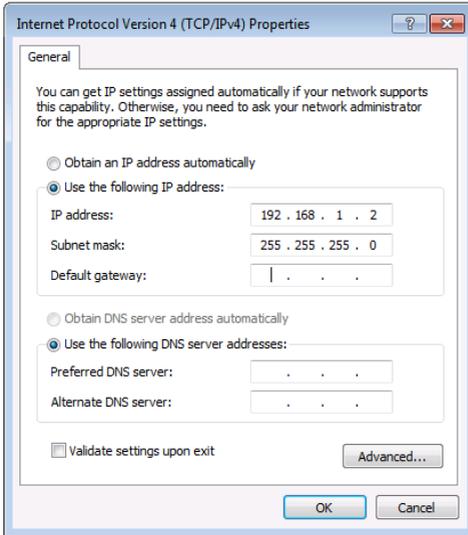
Figure 26: Internet Protocol Properties Window

    7. Click **OK**.

    8. Click **Close**.

#### 8.3.1.1 Connecting the ETHERNET Port via a Network Hub or Switch

You can connect the Ethernet port of the **VP-778** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

## 8.4 Controlling via the OSD Menu

You can change PiP Window parameters, main window parameters and entire system parameters via the OSD menu, as described in Section 6.

## 8.5 Controlling via the Infrared Remote Control Transmitter

You can control the **VP-778** from the infrared remote control transmitter:



Figure 27: Infrared Remote
Control Transmitter

| Keys | | Function |
|---|---|---|
| POWER | | Toggle the power save mode ON or OFF. |
| RESET | | Press to reset to the default resolution (toggles between RESET TO XGA and 720p). |
| Inputs to switch to OUT 1 | HDMI1 | Select the HDMI 1 input. |
| | HDMI2 | Select the HDMI 2 input. |
| | HDMI3 | Select the HDMI 3 input. |
| | HDMI4 | Select the HDMI 4 input. |
| | DVI1 | Select the DVI 1 input. |
| | DVI2 | Select the DVI 2 input. |
| | HDBT1 | Select the HDBT 1 input. |
| | HDBT2 | Select the HDBT 2 input. |
| OUT 1 Control | FREEZE | Freeze/unfreeze the output video image. |
| | BLANK | Toggle between a blank screen (black) and the output video image. |
| | MUTE | Toggle between muting (blocking out the sound) and enabling the audio output. |
| USR1 | | Press to launch a programmed command, see Section 8.1.4. |
| USR2 | | Press to launch a programmed command, see Section 8.1.4. |
| | | Press ENTER to access menu levels (when in the OSD) Use the up and down arrows to adjust numerical values and adjust the output volume level (when not within the OSD). |
| MENU | | Enter/Exit the OSD menu and return to the previous menu level. |
| LOCK | | Lock the front panel buttons. |
| Inputs to switch to OUT 2 | HDMI1 | Select the HDMI 1 input. |
| | HDMI2 | Select the HDMI 2 input. |
| | HDMI3 | Select the HDMI 3 input. |
| | HDMI4 | Select the HDMI 4 input. |
| | DVI1 | Select the DVI 1 input. |
| | DVI2 | Select the DVI 2 input. |
| | HDBT1 | Select the HDBT 1 input. |
| | HDBT2 | Select the HDBT 2 input. |
| OUT 2 Control | FREEZE | Freeze/unfreeze the output video image. |
| | BLANK | Toggle between a blank screen (black) and the output video image. |
| | MUTE | Toggle between muting (blocking out the sound) and enabling the audio output. |

### 8.5.1 Using the IR Transmitter

You can use the IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver. The external IR receiver can be located up to 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three IR extension cables.

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

### 8.5.1.1 Ethernet Port Configuration and Control

Use the Kramer **K-Upload** software to configure the **VP-778** and the web pages to control it via the Ethernet (for example, set the IP address).

Do not use **K-Upload** to upgrade the firmware.

The latest version of **K-Upload** and installation instructions can be downloaded from the Kramer Web site at www.kramerav.com/support/product_downloads.asp.

# 9 Using the Embedded Web Pages

The **VP-778** 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:

- Perform the procedures in Section 8.3.

- Ensure that your browser is supported.

The following Web browsers are supported:

| Windows 7 and higher: | |
|---|---|
| Chrome: from version 20 and higher | IE: from 10 and higher |
| Firefox: from 28 and higher | Edge: from 14 and higher |
| **Mac (PC) Yosemite 10 and higher**: | |
| Chrome: from version 20 and higher | Safari: from 7.1 and higher |
| **iOS 8.0 and higher**: | |
| Chrome: from version 20 and higher | Safari: from 7.1 and higher |
| Firefox: from 28 and higher | |
| **Android OS 4.4 and higher**: | |
| Chrome: from version 20 and higher | Native |

- Make sure that the Web client device (for example, a tablet) resolution supports width > 1500 and height > 1100.

## 9.1 Browsing the VP-778 Web Pages

There are nine web pages:

- The Routing & Scaling page (see Section 9.2).

- The Transition Settings page (see Section 9.3).

- The Input Settings page (see Section 9.4).

- The Audio Settings page (see Section 9.5).

- The Output Settings page (See Section 9.6).

- The Channel 1/2 Settings page (see Section 9.7).

- The Device Settings page (see Section 9.8).

- The Security page (see Section 9.9).

- The About page (see Section 9.10).

**To browse the VP-778 web pages:**

1. Open your Internet browser.

2. Type the IP address of the device in the Address bar of your browser. For example, the default IP address:



The Routing & Scaling web page appears.

Figure 28 shows the Routing & Scaling page that is also the first web page. The navigation list on the left shows the available web pages.
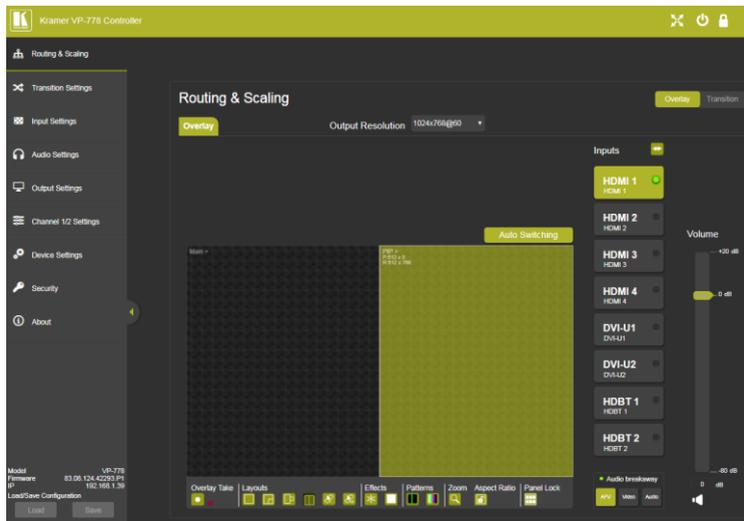


Figure 28: Routing and Scaling Page with Navigation List on Left

Click the arrow to hide the navigation list on the left (note that the page icons remain visible allowing you to select a Web page even if the list is hidden).

On the top right side of the page:

- Click  to view the Web pages in full screen and click  to exit.

- Click  to enter the standby mode.

- View the security state:  password-protected access or  for free access.

## 9.2 Routing & Scaling the Image

Use the Routing & Scaling web page to perform the following functions (for CH 1 and CH 2) which apply to both the Overlay and Transition modes:

- Setting to Overlay or Transition mode (see Section 9.2.1).

- Selecting an input (see Section 9.2.2).

- Selecting the output resolution (see Section 9.2.3).

- Selecting Effects and Test Patterns (see Section 9.2.4).

- Zooming the image (see Section 9.2.5).

- Locking the panel (see Section 9.2.6).

- Auto Switching (see Section 9.2.7).

- Setting or muting the output volume (see Section 9.2.8).

- Setting the audio breakaway mode (see Section 9.2.9).

Functions that are specific to the Transition or Overlay modes are specified in sections 9.2.10 and 9.2.11, respectively.

### 9.2.1 Setting the Operation Mode

The Routing & Scaling page enables you to set the **VP-778** either to the Transition mode (see Section 7.1) or the Overlay mode (see Section 7.2).

**To set the operation mode:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears:
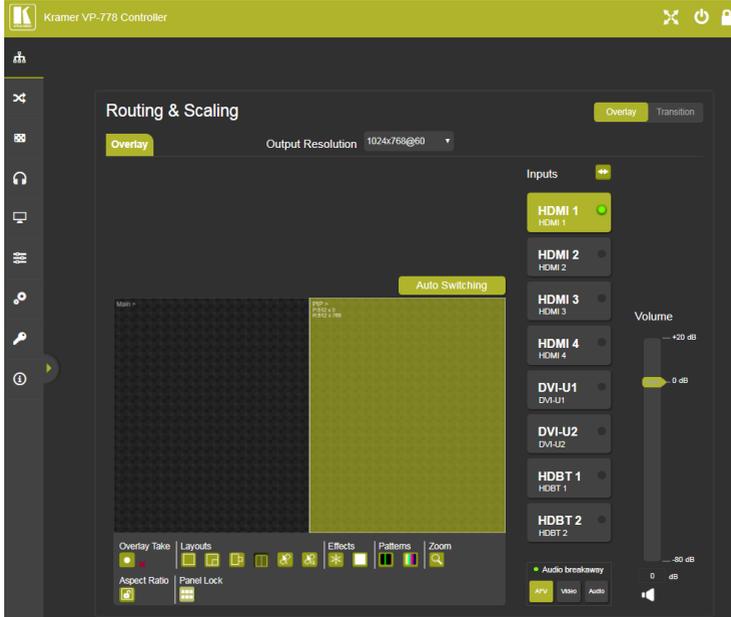


Figure 29: Routing and Scaling Page

2. Click either the Transition or the Overlay button to set the required operation mode.

Note that the lower operation buttons change according to the operation mode:

In the Transition mode:



In the Overlay mode:

### 9.2.2 Selecting an Input

An input can be selected separately for CH 1 and CH 2 in the Transition mode or for the Main and PIP in the Overlay mode.

**To select an input:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Select an input from the **Inputs** list. If there is an active signal present on the selected input, the signal indicator lights green (depending on the AFV mode), see HDMI 1 in <u>Figure 29</u>.

### 9.2.3 Setting the Output Resolution

**To set the output resolution:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Open the Output Resolution drop-down box and select the desired resolution.

### 9.2.4 Setting the Effects and Test Patterns

**To set the effects:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Click ❄ to freeze the image or click ▢ to set a blank display.

**To select a test pattern:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Click a pattern.

Two patterns are available: the slide bar pattern (for clear content) and the color bar pattern (for HDCP content). Note that selecting a test pattern disables the Effect buttons.

## 9.2.5 Setting the Zoom

The **Zoom** button lets you zoom the image up to 4000% and shift the image to zoom into a specific area.

> (i) If there is no active signal on the input, the Zoom window does not open.

**To zoom into the image:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Click 🔍 .
   The CH1-RATIO window appears:
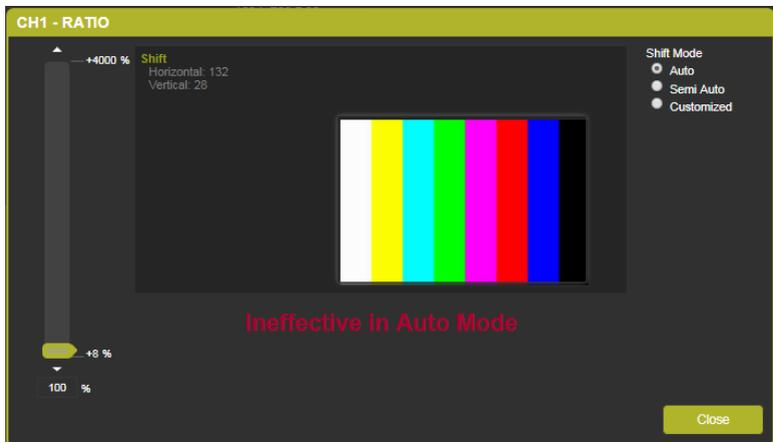


Figure 30: Routing and Scaling Page – Zoom Window

Three zooming options are available:

- **Auto** – Automatically sets the Zoom to 100% and places the image correctly on the display.

- **Semi Auto** – The zoom and shift that are set manually. Do not change unless the input resolution is changed. In that case, the zoom shift mode will return to Auto mode.

- **Customized** – The zoom and shift are set manually and do not change even if the source/input resolution are changed.

### 9.2.6 Panel Lock

You can lock and unlock the front panel.

**To lock:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Click ![icon] to lock the front panel buttons on the device.

3. Click ![icon] to unlock the front panel buttons on the device.

### 9.2.7 Auto Switching

To set the auto switching mode:

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Click **Auto Switching**.
   The Auto Switching window appears:
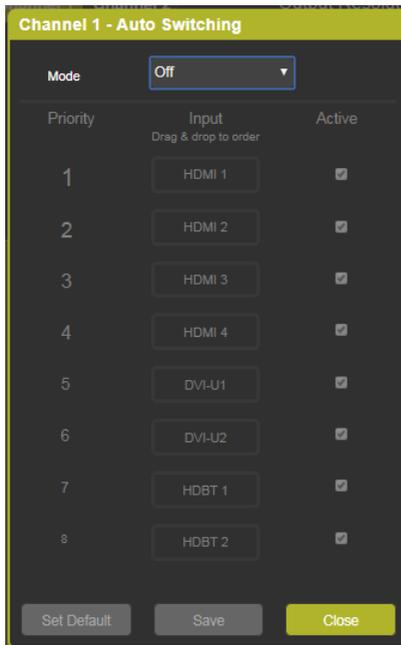


Figure 31: Routing & Scaling Page – Auto Switching Window

3. Open the drop-down list to set the switching mode (Off, Scan or Last Connected).

4. Select the switching mode (for example, select Scan).

The Auto Switching window is enabled:
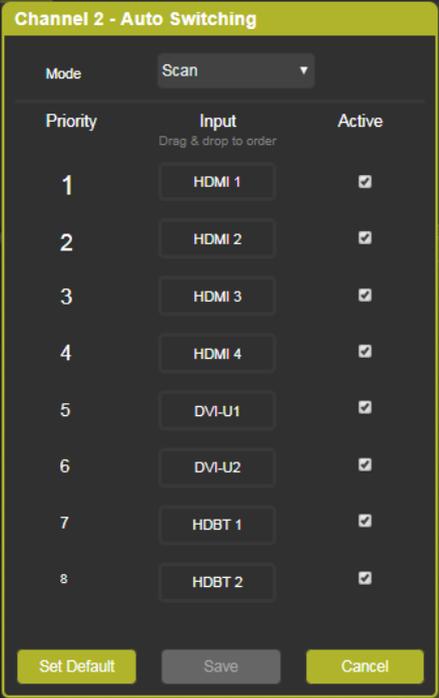


Figure 32: Routing & Scaling Page – Scan Mode

5. Check the inputs that should be active in the scan and uncheck to disable others.

6. Drag and Drop inputs to set them to the desired priority:
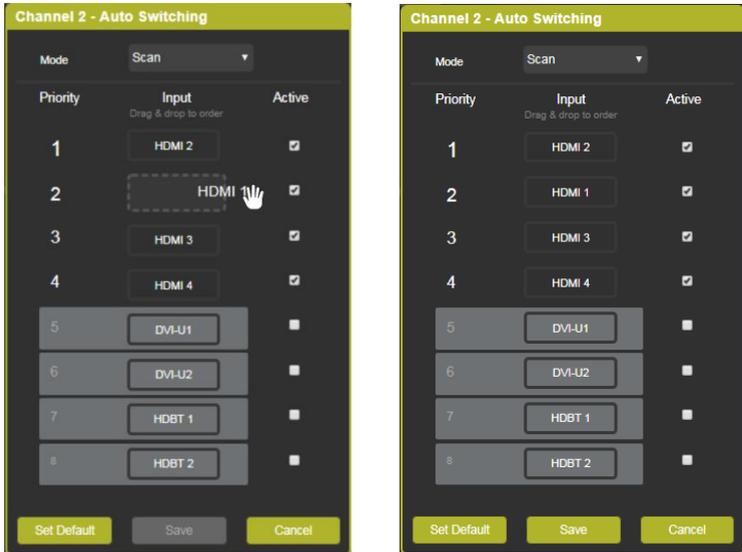


Figure 33: Routing & Scaling Page – Setting Auto Switching Priorities

7. Click:

- **Save**, to save the changes.

- **Set Default**, to set inputs to their default settings.

- **Cancel**, to close the window without saving the changes.

In scan mode, as the device scans each of the selected inputs, each of the corresponding input buttons briefly lights blue.

### 9.2.8 Setting the Output Volume

**To set the output volume:**

1. In the Navigation pane, click **Routing & Scaling**. The Routing & Scaling page appears.

2. Use the volume slider on the right side to set the output volume and click the speaker button to mute ( ) or unmute ( ) the audio output.

### 9.2.9 Setting the Audio Breakaway Mode

Set the Audio Breakaway status to AFV, Video or Audio:

- **AFV**, to select an input source to route the video together with its audio signal.

- **Video**, to route the video input only.

- **Audio**, to route the audio input only.

(i) The Audio Breakaway mode on the web page functions independently of the MODE button on the front panel of the device.
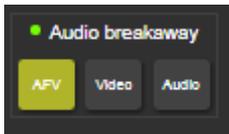


Figure 34: Routing and Scaling Page – Setting Audio Breakaway Mode

(i) The mode button indicates the status for the next switching step. For example, when setting to **Video**, the next input selected will route the video only.

### 9.2.10 Transition Mode Specific Functions

In the transition mode, press ▶ (Transition Take) button to carry out a transition (swap or follow) as defined in .



Figure 35: Routing and Scaling Page – Transition Take

### 9.2.11 Overlay Mode Specific Functions

The Overlay mode enables you to perform the following functions:

- Set the size and the position of the Main and PIP images.

- Set the Overlay mode layout.

- Set the customized image size.

- Keep aspect ratio when resizing the image.

- Use the Overlay Take function.

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**To set the size of the Main and PIP images:**

1. Drag and pull a horizontal or a vertical arrow to change the size of the width and height of the image, respectively.



Main > HDMI 1
P:392 x 321
R:1124 x 582

Figure 36: Routing and Scaling Page – Changing the Image Size

**To set the position of the image:**

1. Click and drag the image to its new location.

The size and position of the image are set as the customized image sizes and appear when selecting Customized Single or Customized Dual layouts. The size and position of the image is indicated on the top left side of the image.

**To set the layout:**

1. Click the desired layout button: Single Window, Picture in Picture, Picture + Picture, Split or customized (single and dual, as defined when setting the size and the position of the image):



Layouts

Figure 37: Routing and Scaling Page – Selecting the Layout

For example, setting the Picture in Picture layout results in the following:
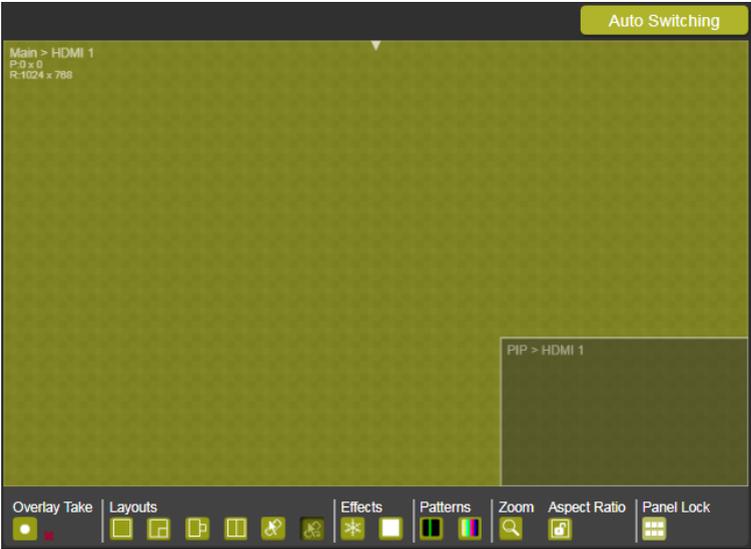


Figure 38: Routing and Scaling Page – Setting the Layout

Setting to customized Dual shows the manually defined images:
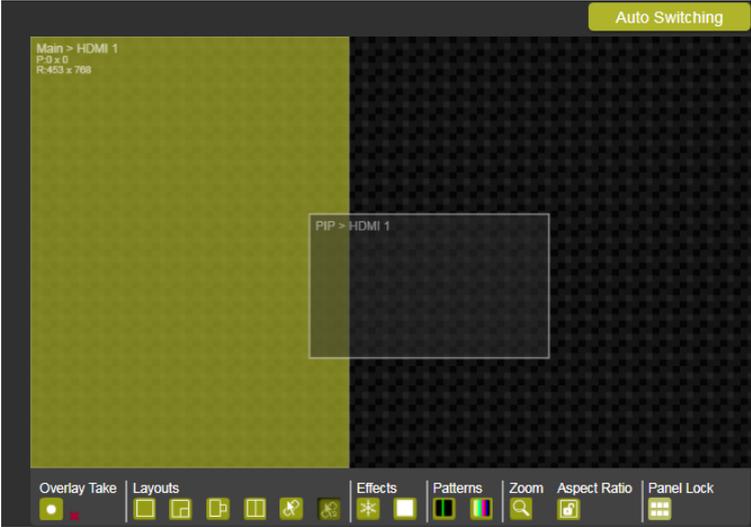


Figure 39: Routing and Scaling Page – Customized Dual Layout

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**To swap inputs:**

1. Select one of the PiP layouts (for example Picture + Picture).



Figure 40: Routing and Scaling Page – Before Swapping Pictures

2. Click [⬌].



Figure 41: Routing and Scaling Page – After Swapping Pictures

**To use the Overlay Take function:**

1. Click ⚪. The following areas are framed red.
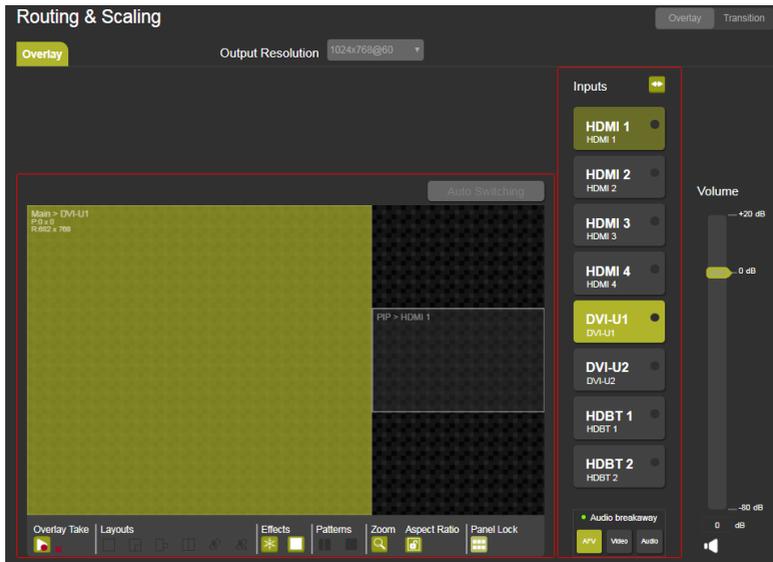


Figure 42: Routing and Scaling Page – Overlay Take

2. Perform any changes within the red frames.

ℹ️ To cancel Overlay Take changes, click 🔳 and discard.

3. Click 🔳 to carry out the changes.

## 9.3    Transition Settings Page

The Transition Settings page is enabled in the Transition mode:
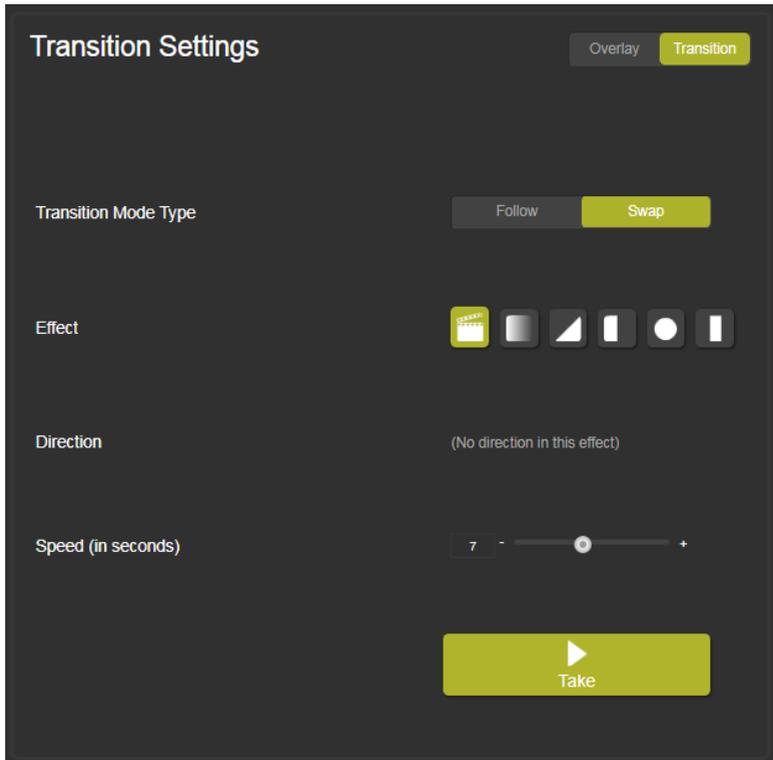


Figure 43: Transition Settings Page

Use the Transition Settings page to perform the following functions (see Section 16.3 for further details):

- Clicking **Transition** to set **VP-778** to the Transition mode.

- Managing the transition (see Section 9.3.1).

### 9.3.1    Managing the Transition Effects

Set the Transition Mode Type, Effect, Direction and Speed and then press **Take** to carry out the transition.

## 9.3.1.1 Setting Transition Effects

**To set the transition effects:**

1. In the Navigation pane, click **Transition Settings**. The Transition Settings page appears.

   > Transition Settings page is enabled only in the Transition mode.

2. Make sure that **VP-778** set to Transition mode. If not, click **Transition**.

3. Click **Follow** or **Swap**.

   Follow Mode: Channel 1 input follows the Channel 2 input.

   Swap mode: Channel 1 and Channel 2 inputs seamlessly swap places.

4. Set the transition effect and its direction, as shown in the table below.

| The Effect | Direction |
|---|---|
| (Cut) | N/A |
| (Fade) | N/A |
| (Diagonal) | ↗ ↘ ↖ ↗ |
| (Wipe) | → ← ↑ ↓ |
| (Circle) | ⤧ ⤢ |
| (Curtain) | ⤢ ⤡ |
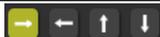
5. Use the **Speed** slider to set the speed of the transition.

6. Click **Take** to carry out the transition setup.

   > The transition can be carried out only when both displays have the same output resolution. Otherwise **Take** is disabled.

## 9.4 Input Settings

Use Input Settings page to define each input and set EDID Parameters.

**To set the inputs:**

1. In the Navigation pane, click **Input Settings**. The Input Settings page appears:



Figure 44: Input Settings Page

2. Select an input and define its parameters:

- **Label**: enter a label name, if required.

- **Type**: for DVI-U1 and DVI-U2, select **HDMI**, **YUV**, **VGA** or **CV**.

- **HDCP**: click **ON** or **OFF**.

- **Color Space**: select **RGB**, **YPbPr** or **Follow Input**.

3. For each selected input, define the following EDID parameters:

   ▪ **Native Resolution**: Select the native resolution.

   ▪ **Color Depth**: click **8 BPP** or **12 BPP**.

   ▪ **Modeline:** click **Single** or **Multiple**.

   ▪ **Audio Channels**: click **Stereo** or **5.1**.

4. For each selected input, use the **Volume** slider on the right to adjust the input audio level.

## 9.5 Audio Settings Page

Use the Audio Settings page to define the output and microphone audio parameters in the Overlay and Transition modes and set the power amplifier level.

> In the Transition mode you can set the Channel 1 and Channel 2 audio parameters. In the Overlay mode, Channel 2 is disabled.

### 9.5.1 Output Audio Tab

The Audio tab enables performing the following functions:

- Set AFV or audio breakaway mode (see Section 9.5.1.1).

- Adjust the Bass, Middle, Treble, balance and Lip Sync (see Section 9.5.1.2).

- Adjust the output volume (see Section 9.5.1.3).

### 9.5.1.1 Setting AFV or Breakaway Mode

**To set audio operation mode:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.
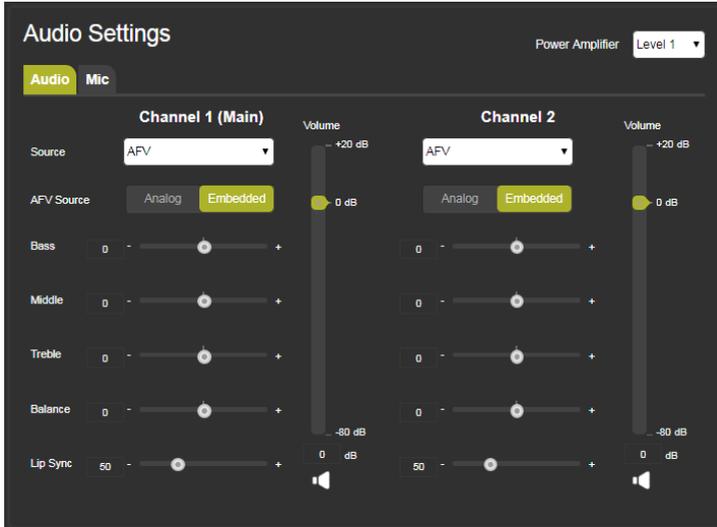


Figure 45: Audio Settings Page – Audio Tab (in Transition Mode)

2. Select the **Audio** tab.

3. Set the source to AFV or to any of the 8 analog inputs.

> If AFV is selected, choose the AFV source to be **Analog** or **Embedded**.

### 9.5.1.2 Adjusting Audio Parameters

**To adjust audio parameters:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.

2. Select the Audio tab.

3. Use the various sliders to set the audio parameters.

### 9.5.1.3　Setting the Output Volume Level

**To set the output volume level:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.

2. Select the Audio tab.

3. Use the volume slider on the right to set the output volume and click the speaker button to mute () or unmute () the audio output.

### 9.5.2　Mic Tab

The Mic tab enables performing the following functions for Mic 1 and Mic 2:

- Set to Mix mode or TalkOver mode (see Section 9.5.2.1).
- Set the delay (see Section 9.5.2.2).
- Set the mix level in Mix mode or the talkover parameters in TalkOver mode (see Section 9.5.2.3).
- Adjust the Mic volume (see Section 9.5.2.4).

### 9.5.2.1    Setting Microphone Operation Mode

**To set the microphones operation mode:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.
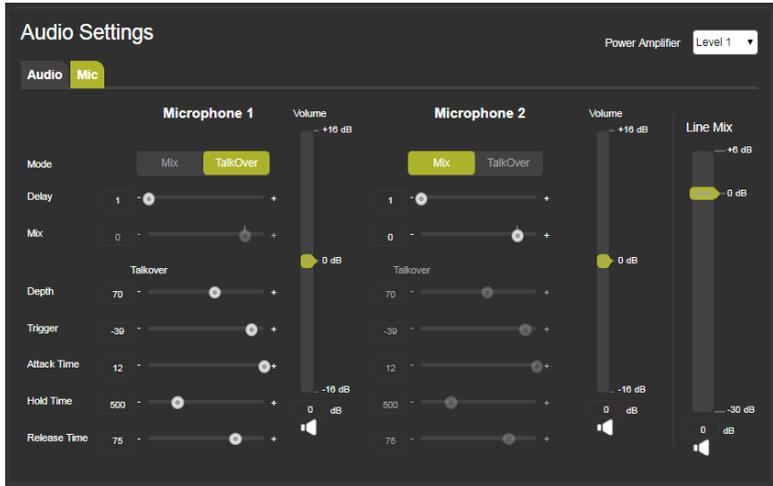


Figure 46: Audio Settings Page – Mic Settings Tab

2. Select the Mic tab.

3. Set the operation mode to Mix or TalkOver.

### 9.5.2.2    Setting the Delay time

**To set the delay time:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.

2. Select the Mic tab.

3. Set the microphone delay time.

> If an analog audio source is selected, the AFV source is disabled and is set to Analog.

### 9.5.2.3    Setting Microphone Parameters

**To set microphone parameters:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.

2. Select the Mic tab.

3. In Mix mode, set the Mix level.
   On TalkOver mode, set the Depth, Trigger, Attack time Hold time and Release time (for further information see Section 6.4.1).

### 9.5.2.4    Setting the Microphone Volume Level

**To set the volume level:**

1. In the Navigation pane, click **Audio Settings**. The Audio Settings page appears.

2. Select the Mic tab.

3. Use the **Volume** slider to set the volume of each Microphone and click the speaker button to mute (🔇) or unmute (🔈) the audio output.

4. Use the **Line Mix** slider in the **Mix** mode to set the mix volume.

## 9.6    Output Settings Page

Use the Output Settings page to define output parameters and set the following functions:

- Output resolution, see Section 9.6.1.

- **Master connection**: for Channel 1 (**HDMI 1, HDBT 1** or **From Channel 2**) and for Channel 2 (**HDMI 2**, **HDBT 2** or **From Channel 1**).

- **Deep color**: click **Follow OUTPUT** or **OFF**.

- **Color space**: select **RGB**, **YPbPr422** or **YPbPr444**.

- **HDCP mode**: click **Follow INPUT** or **Follow OUTPUT**.

### 9.6.1 Setting the Output Resolution

**To set the output resolution:**

1. In the Navigation pane, click **Output Settings**. The Output Settings page appears:



Figure 47: Output Settings Page

2. In the **Transition** mode select the:
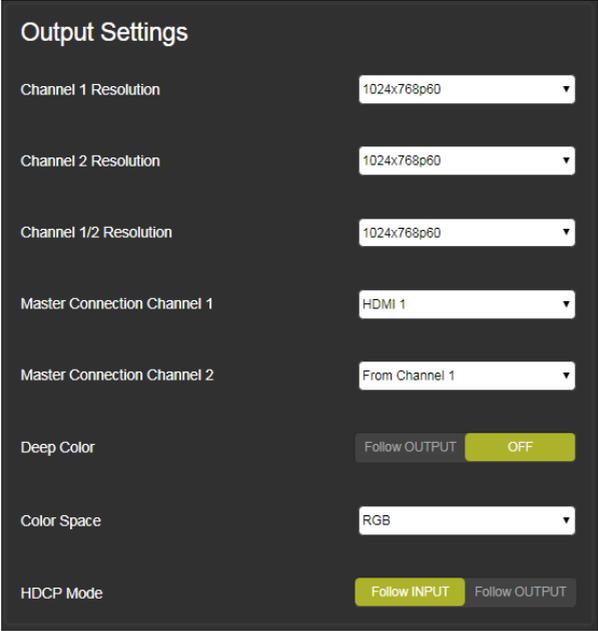
   - Channel 1 resolution.

   - Channel 2 resolution.

   - Channel 1/2 resolution.

   > A transition can be carried out only when Channel 1 and Channel 2 have the same output resolution.

   In the **Overlay** mode select the:

   - Channel 1/2 resolution.

## 9.7 Channel 1/2 Settings Page

Use the Channel 1/2 Settings page to set Channel 1 and Channel 2 parameters.

**To set Channel 1 and Channel 2 parameters:**

1. In the Navigation pane, click **Channel 1/2 Settings**. The Channel 1/2 Settings page appears:
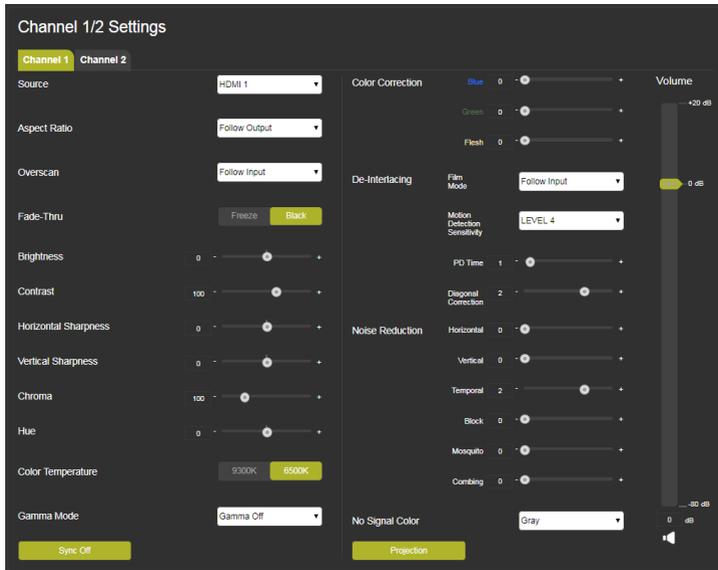


Figure 48: Channel 1/2 Settings Page

2. Use the Channel 1/2 Settings page to define the following settings for each channel:

   - Select the input **Source**.

   - Select the **Aspect ratio**: Follow Input, Follow Output, Best Fit or Letterbox.

   - Select **Overscan**: Follow Input, Off, 5% or 10%.

   - **Fade-Thru**: click Freeze or Black.

   - Adjust **Brightness**, **Contrast**, **Horizontal sharpness**, **Vertical sharpness**, **Chroma**, and **Hue**.

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- **Color temperature**: click 9300K or 6500K.

- Select **Gamma Mode**.

- Define **Sync Off** behavior, see Section 9.7.1.

- Adjust **Color Correction**.

- Select **Film mode** and **Motion Detection Sensitivity** and adjust **PD time** (Pull Down time) and **Diagonal Correction**.

- Adjust **Noise Reduction**.

- Choose the **No signal color**: Gray Blue or Black.

- Click **Projection** to set the actual projector position.

## 9.7.1   Sync Settings

**To set Sync behaviour:**

1. Click **Sync Off**.

   The Sync Off window appears:
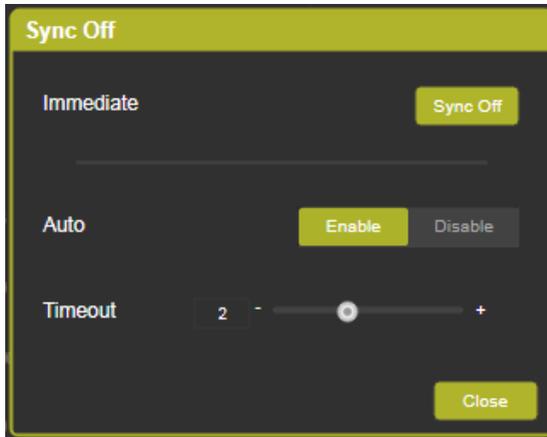


Figure 49: Channel 1\2 Settings page – Sync Off Window

> (i)   By default, Auto Sync off is enabled.

2.  If required:

    ▪  Adjust the timeout for auto sync off.

    ▪  **Disable**/**Enable** Auto Sync.

    ▪  Click **Sync Off** to enable Sync off immediately:
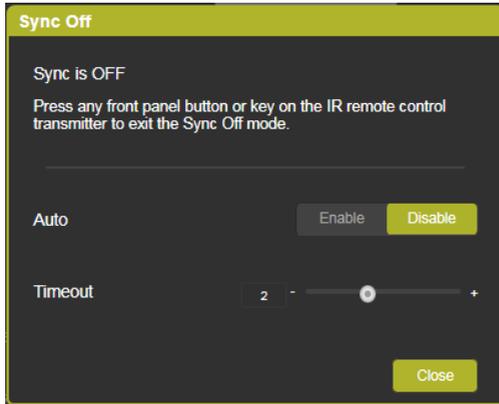


Figure 50: Channel 1/2 Settings page – Sync is Off

> (i) Press any front panel button or key on the IR remote control transmitter to exit the Sync Off mode.

3.  Click **Close**.

## 9.8    Device Settings Page

Use the Device Settings page (<u>Figure 53</u>) to set the:

- Unit name (type the name and click **Set**).

- Ethernet parameters (see <u>Section 9.8.1</u>).

- View the Information and HDBT information windows (see <u>Section 9.8.2</u> and <u>Section 9.8.3</u>, respectively).

- Perform factory reset (see <u>Section 9.8.4</u>).

### 9.8.1 Setting the Ethernet Parameters

**To change Ethernet parameters:**

1. In the Navigation pane, click **Device Settings**. The Device Settings page appears.



Figure 51: Device Settings Page

2. If required, change any of the following:

   - IP Address

   - Subnet Mask

   - Gateway

The Communication Warning message appears:



**Communication warning**

Following this action, the current Web session will be disconnected.
In order to proceed you need to reload the page with the new URL. You can find the new URL in the OSD menu at:
    *Misc -> Information -> Network*
or via the protocol using the *"#net-ip?"* command.

Do you want to continue?

OK    Cancel
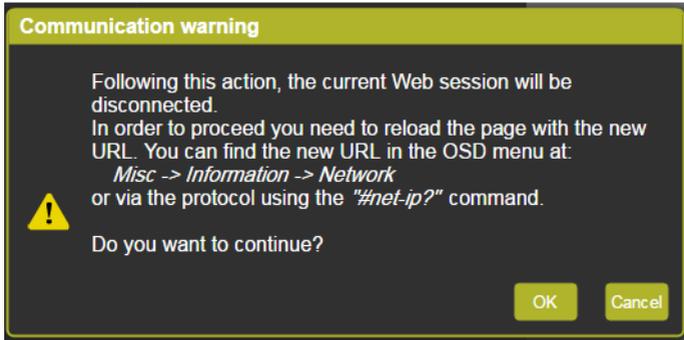
Figure 52: Device Settings Page – Communication Warning

3. Click **OK** to continue.

## 9.8.1.1    Setting DHCP

Set DHCP to ON or OFF. When setting DHCP **OFF**, the DHCP OFF window lets you select the default IP address or a custom IP address:



**DHCP OFF**                                                   ✖

Set a new IP address.
Following this you will lose your connection to the device.
To reconnect, enter the new IP address in your Web browser.

⬤  Custom IP        192 . 168 .  1  . 39

⬤  Default IP       **192.168.1.39**

Cancel    Apply
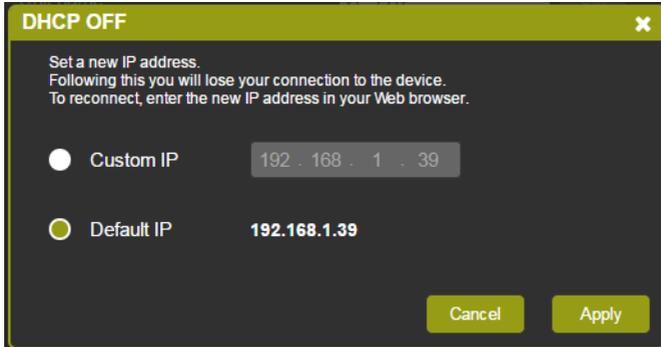
Figure 53: Device Settings Page – DHCP Window

Click **Apply** to confirm changes.

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When setting DHCP **ON**, the following window appears:
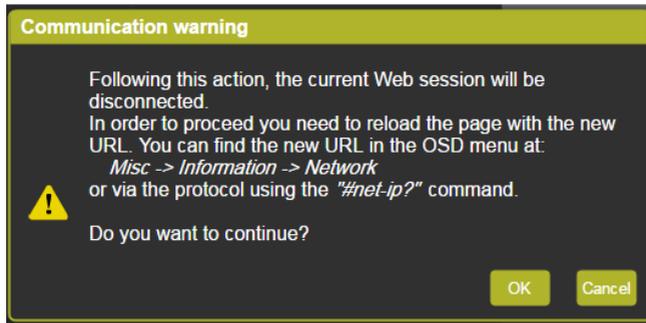


Figure 54: Device Settings Page – DHCP ON Notification

You can retrieve the new IP address via the OSD menu by selecting:

**MIsc**>**Information**>**Network**, and use that new IP Address to reopen the web pages or via the #net-ip? Protocol command (see Section 14.7.2.4).

### 9.8.2 Viewing VP-778 Information

Click the ⓘ to view the device information and click **Documentation** to access the **VP-778** page on our Web site.
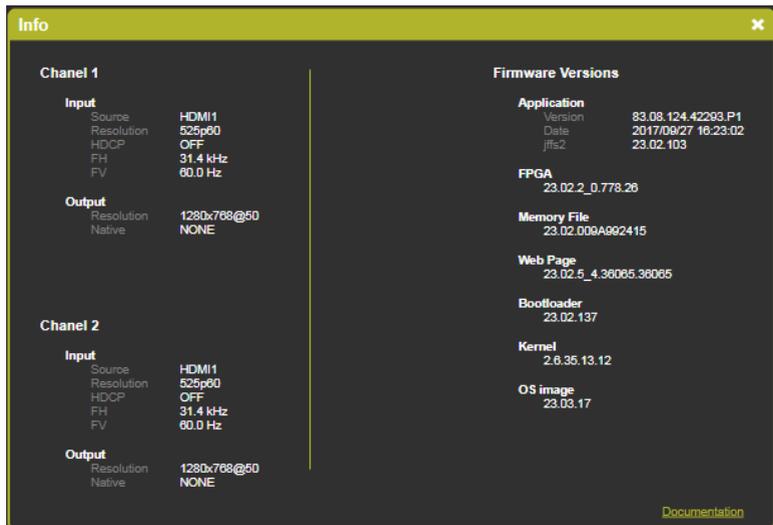


Figure 55: Device Settings Page – Info Window

### 9.8.3 Viewing HDBT Information

Click **HDBT info** in the Device Settings page to view the HDBT IN and HDBT OUT information:



Figure 56: Device Settings Page – HDBT Info Window

### 9.8.4 Performing Factory Reset

**To perform factory reset:**

1.  In the Navigation pane, click **Device Settings**. The Device Settings page appears.

2.  Click **Factory Reset**.
    The following message appears:
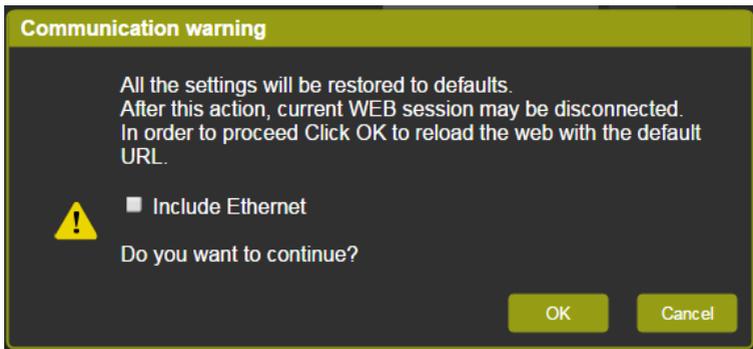


Figure 57: Device Settings Page – Communication Warning

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3. Check **Include Ethernet** if you also want to reset Ethernet parameters to their default value.

4. Click **OK**.

   The following message appears on the screen:
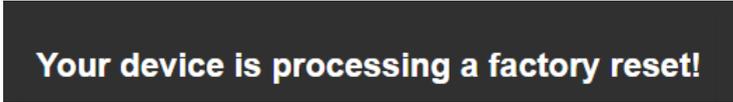


Figure 58: Device Settings Page – Factory Reset Message

## 9.9 Security Page

Use the Security page to set web access permission. To access the web pages with a password, set **Activate security** to **ON**; to allow free access, set to **OFF**.

**To access web pages without using the password:**

1. In the Navigation pane, click **Security**. The Security page appears:
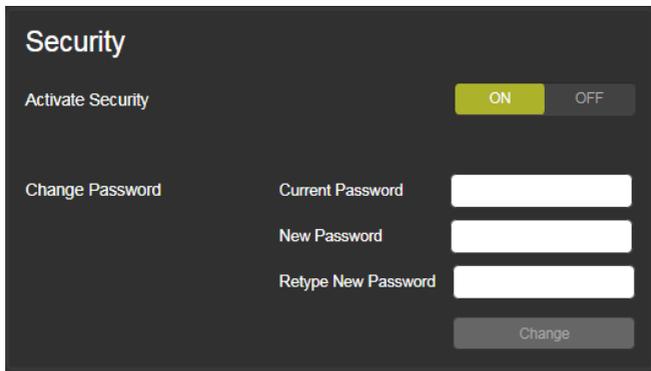


Figure 59: Security Page

2. Click **OFF**.

3. The following message appears:
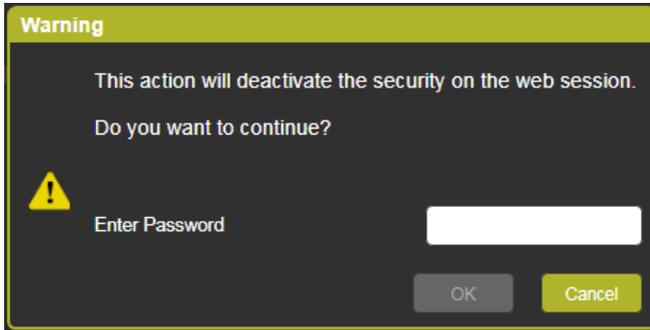


Figure 60: Security Page – Security Deactivation Message

4. Enter current password (Admin by default).

5. Click **OK**.
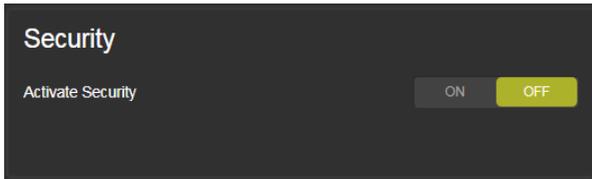


Figure 61: Security Page – Security Off

The web pages are now unlocked.

**To access web pages using the password:**

1. In the Navigation pane, click **Security**. The Security page appears:
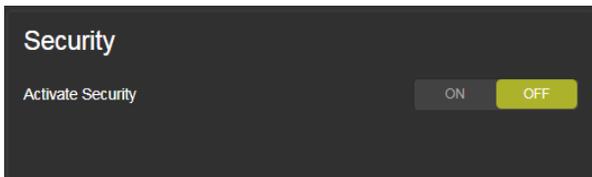


Figure 62: Security Page – Security Off State

2. Click **ON**. The Security window appears:
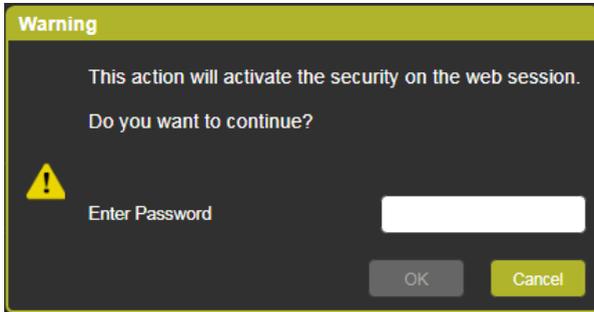


Figure 63: Security Page – Security Activation Message

3. Enter the latest password and click **Continue**.

4. The page refreshes and you can access it only by using the password:
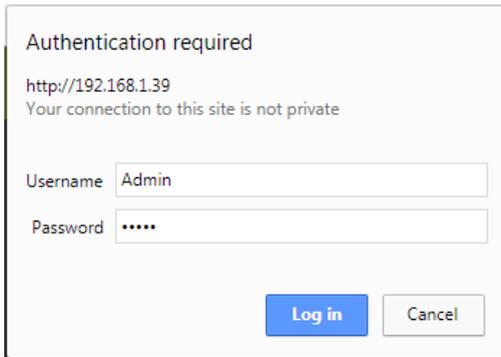


Figure 64: Security Page – Secure Access

5. Click **Log in**.

6. If required, change the current password.

## 9.10 About Page

The **VP-778** About page lets you view the Web page version and Kramer Electronics Ltd details.



Figure 65: About Page

# 10 Port Tunneling

The port tunneling feature lets you send and receive simple RS-232 signals between a controller and a serial device via the **VP-778** which is connected to the Ethernet and outputs via TP cable.

The example, illustrated in Figure 66, shows a Kramer room controller that is connected to the **VP-778** via the Ethernet. The HDBT OUT connector on the **VP-778** is connected via TP to an HDBT receiver. This HDBT receiver connects to a display via HDMI and RS-232.
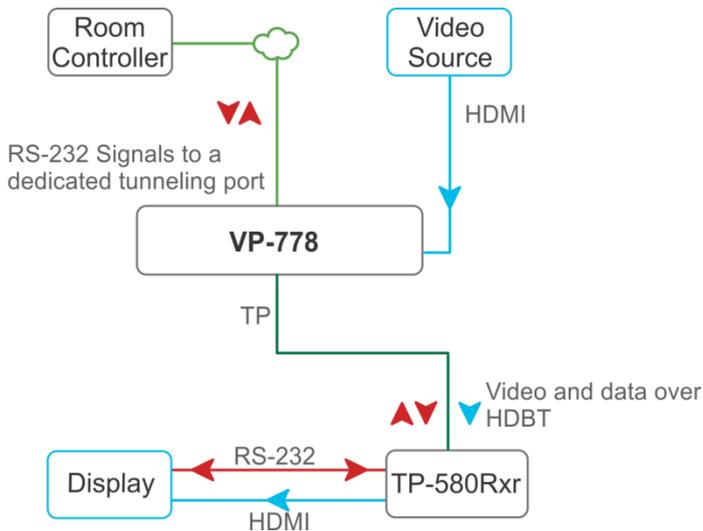


Figure 66: Port Tunneling

The room controller sends RS-232 signals over the Ethernet via a dedicated Tunneling port to the **VP-778**. The **VP-778** sends these signals via TP to a display that is connected to the receiver. This way, control data can flow between the room controller and the display device, tunneling through the **VP-778**.

**To setup and activate port tunneling on the VP-778:**

1. Set the dedicated port tunneling Ethernet connection port type and port number through which the **VP-778** will be passing RS-232 signals via:

   - OSD menu – in the Misc menu, select Advance>Port Tunneling>Port Settings>Port Type, see Section 6.5.

   - Y commands – select Misc>Advance>Port Tunneling>Port Settings To change these settings see table in Section 14.2.2.

   - **PTN-CFG** protocol 3000 command – see Section 14.7.5.1.

2. Set the HDBT UART via:

   - OSD menu – in the Misc menu, select Advance>Port Tunneling>Port Settings>Port Number, see Section 6.5.

   - Y commands – select Misc>Advance>Port Tunneling>Port Settings To change these settings see table in Section 14.2.2.

   - **UART** protocol 3000 command – see Section 14.7.5.2.

3. Make sure that the **VP-778** is connected to Ethernet.

The **VP-778** is now ready to tunnel RS-232 signals via Ethernet port tunneling.

# 11    Routing Serial Data

The **VP-778** lets you route serial data through its various ports in the following ways:

- Serial matrix – up to eight sets of connections are created for passing serial data from a selected source to a selected destination.
  Select the source/destination ports: port tunnelling, data, HDBT IN1, HDBT IN2 HDBT OUT1, HDBT OUT2 or none (for no connection).

- USR buttons – a programmed command is launched to a selected destination with a press of a USR button (see Section 8.1.4).
  Select the source/destination ports: port tunnelling, data, HDBT IN1, HDBT IN2 HDBT OUT1, HDBT OUT2, all or none (for no connection).

# 12 Flash Memory Upgrade

This section describes the firmware upgrade of the **VP-778** components that are described in the table below:

| File Type | In OSD | Description | Becomes Effective After |
|---|---|---|---|
| RBF | [R] | An *.rbf file to upgrade FPGA. | **VP-778** application restart. |
| Memory | [M] | upgrades the other Alteras and the OSD bitmap. | **VP-778** application restart. |
| Application | [A] | The main **VP-778** application. | **VP-778** application restart. |
| Linux kernel | [K] | Includes all drivers for the **VP-778** board. | Rebooting the board. |
| Cramfs | [C] | A read only Linux file system. | Rebooting the board. |
| Bootloader | [B] | Launches the Linux kernel. | Rebooting the board. |
| Jffs2 | [J] | A read/write file system including the RBF and Memory files, as well as the application. | Rebooting the board. |

The latest firmware version can be downloaded from the Kramer web site at www.kramerav.com/downloads/VP-778

## 12.1 Firmware Upgrade Process

Unzip the firmware files on your desktop to a folder named "VP-778" and then copy that folder to an empty, FAT32-formated USB memory stick (with at least 30Mb of free space) as a root folder. After copying the "VP-778" folder as a single root folder, the USB memory stick is ready to be used by attaching it into the device.

Make sure that you remove the USB memory stick safely from your PC. Failing to do so may corrupt the firmware files on the memory stick

**To upgrade the firmware:**

1. Connect the USB memory stick to the S/W UPGRADE USB port on the rear panel of the **VP-778**.

VP-778 - Flash Memory Upgrade

2. On the front panel click the MENU button, select FW Upgrade and then select Upgrade (see Section 6.5).

The OSD shows the firmware version found in the memory stick:



Figure 67: Firmware Upgrade – list of Files to Upgrade

3. Click the ENTER button on the front panel.

Wait for the completion of the upgrade process:
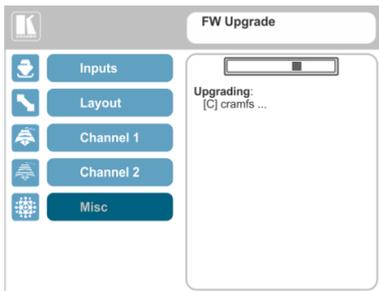


Figure 68: Firmware Upgrade – Upgrade Process

When the firmware upgrade is complete, the list of upgraded files appears:



Figure 69: Firmware Upgrade – Upgrade Complete

4. Remove the USB memory stick and click the ENTER button on the front panel to reboot the system.

## 12.2 Rollback

The Rollback feature lets you restore the previous firmware version installed by the user. To do so:

1. On the front panel click the MENU button, select FW Upgrade and then select Rollback (see Section 6.5).
   The OSD shows the firmware version found in the system:
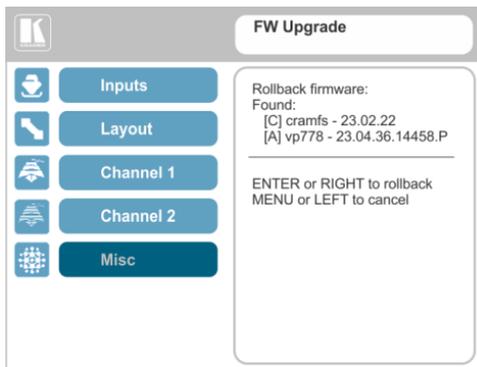


Figure 70: Firmware Upgrade – list of Files to Rollback

2. Press the ENTER button or the left arrow to proceed.
   Wait for completion of the procedure.

3. Reboot the machine by turning it off and then on again.

**VP-778 - Flash Memory Upgrade**

# 13 Technical Specifications

| | |
|---|---|
| Inputs: | 4 HDMI (deep color) connectors<br>8 DVI-U (deep color) connectors (DVI, HDMI, PC, YPb Pr, CV)<br>2 HDBT on RJ-45 connectors<br>4 HDMI, 2 DVI-U, 2 HDBT on 3.5mm mini jack connectors<br>2 Mic unbalanced and high impedance on 6mm jack connectors (with selectable 48V phantom power) |
| Outputs: | 2 HDMI (deep color) connectors<br>2 HDBaseT on an RJ-45 connector<br>1 S/PDIF digital audio on an RCA connector<br>1 balanced stereo audio on a 5-pin terminal block connector<br>1 stereo speaker output, 2x10W into 8Ω, on a 4-pin terminal block connector |
| Compliance with HDMI Standard: | Supports HDMI and HDCP 1.4 |
| Output Resolutions: | 640x480@60Hz, 640x480@75Hz, 800x600@50Hz, 800x600@60Hz, 800x600@75Hz, 1024x768@50Hz, 1024x768@60Hz, 1024x768@75Hz, 1280x768@50Hz, 1280x768@60Hz, 1280x800@60Hz, 1280x1024@50Hz, 1280x1024@60Hz, 1280x1024@75Hz, 1360x768@60Hz, 1366x768@50Hz, 1366x768@60Hz, 1400x1050@50Hz, 1400x1050@60Hz, 1600x900@60Hz, 1600x1200@50Hz, 1600x1200@60Hz, 1680x1050@60Hz, 1920x1200@60Hz, 480i@60Hz, 480p@60Hz, 576i@50Hz, 576p@50Hz, 720p@50Hz, 720p@59.94Hz, 720p@60Hz, 1080p@23.976Hz, 1080p@24Hz, 1080p@25Hz, 1080p@29.97Hz, 1080p@30HZ, 1080p@50Hz, 1080p@59.94Hz, 1080p@60Hz, 2048x1080@60Hz, 2048x1080@50Hz, 4K2K@30Hz |
| Controls: | Front panel buttons, OSD, IR remote control, web pages, 2 RS-232 on terminal block connector, Ethernet, cond/dyn selector switch |
| 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 |
| Power Consumption: | 100-240V AC, 50VA max. |
| Dimensions: | 19" (W), 9.3" (D) 1U (H) rack mountable |
| Shipping Dimensions: | 52.5cm x 33cm x 10.7cm (20.7" x 13" x 4.2") W, D, H |
| Weight: | 2.6kg (5.7lbs) approx. |
| Shipping Weight: | 3.8kg (8.4lbs) approx. |
| Included Accessories: | Power cord, rack ears, IR remote control, 2 ADC-DMA/5BF cables. 2 AD-DM/GF adaptors |
| Specifications are subject to change without notice at www.kramerav.com | |

## 13.1 Default Communication Parameters

| RS-232 | |
|---|---|
| Protocol: | 3000 |
| Baud Rate: | 115,200 |
| Data Bits: | 8 |
| Stop Bits: | 1 |
| Parity: | None |
| Command Format: | ASCII |
| Example (set display mode to Picture-in-Picture): | #Y 0,23,1<CR> |
| **Ethernet** | |
| To reset the IP settings to the factory reset values, power cycle the device while holding in the Ethernet Reset button, located on the rear panel of the unit | |
| IP Address: | 192.168.1.39 |
| Subnet Mask: | 255.255.000.000 |
| Default Gateway: | 192.168.0.1 |
| TCP Port #: | 5000 |
| UDP Port #: | 50000 |
| Maximum UDP Ports: | Unlimited |
| Maximum TCP Ports: | Unlimited |
| **Full Factory Reset** | |
| Front Panel Buttons: | Turn power off. Turn power on again while holding the RESET TO XGA/720p front panel button. The arrow and ENTER buttons flash. Full factory reset is complete once the LEDs cease to flash and react normally. Note that Full Factory reset includes Ethernet reset as well |
| OSD: | Factory Reset through the Misc menu item (including or excluding ETH) |
| Web Pages: | Factory reset via the Device Settings embedded web page (including or excluding ETH) |
| Protocol 3000: | Including ETH: use Factory Reset command "Including ETH" or #Y 0,561,1<CR> |
| | Excluding ETH: use Factory Reset command "Excluding ETH" or #Y 0,562,1<CR> |

**VP-778 - Technical Specifications**

## 13.2 Input Resolutions

This section defines the input resolutions for each input.

### 13.2.1 CV Input Resolutions

NTSC and PAL

### 13.2.2 Component Analog Video (YPbPr) Input Resolutions

| PC Input Resolutions | | | |
|---|---|---|---|
| NTSC | 720_P50 | 1080_P30 | 1080_P50 |
| PAL | 720_P60 | 1080_P23_976 | 1080_P60 |
| 525_P60 | 1080_I50 | 1080_P24 | 1080_I100 |
| 625_P50 | 1080_I60 | 1080_P25 | |

### 13.2.3 RGBHV Analog Video Input Resolutions

| RGBHV Input Resolutions | | | | |
|---|---|---|---|---|
| 640X480_60 | 800x600_75 | 625_P50 | 1280x1024_60 | 1400x1050_75 |
| 640x480_72 | 800x600_85 | 525_P60 | 1280x1024_75 | 1600x900_60 |
| 640x480_75 | 1024x768_60 | 720_P50 | 1280x1024_85 | 1600x1200_60 |
| 640x480_85 | 1024x768_70 | 720_P60 | 1360x768_60 | 1680x1050_60 |
| 800x600_56 | 1024x768_75 | 1280x800_60 | 1366x768_60 | 1920x1200_60RB |
| 800x600_60 | 1024x768_85 | 1280x960_85 | 1440x900_60 | 1080_P50 |
| 800x600_72 | 1152x864_75 | 1280x768_60 | 1400x1050_60 | 1080_P60 |

### 13.2.4 HDMI Digital Video Input Resolutions

| HDMI Input Resolutions | | | | |
|---|---|---|---|---|
| NTSC | 1080_I60 | 640x480_72 | 1024x768_70 | 1360x768_60 |
| PAL | 1080_P23_976 | 640x480_75 | 1024x768_75 | 1366x768_60 |
| 525_P60 | 1080_P24 | 640x480_85 | 1024x768_85 | 1440x900_60 |
| 625_P50 | 1080_P25 | 800x600_56 | 1152x864_75 | 1400x1050_60 |
| 720_P24 | 1080_P30 | 800x600_60 | 1280x800_60 | 1400x1050_75 |
| 720_P25 | 1080_P50 | 800x600_72 | 1280x960_85 | 1600x900_60 |
| 720_P30 | 1080_P60 | 800x600_75 | 1280x768_60 | 1600x1200_60 |
| 720_P50 | 2k50 | 800x600_85 | 1280x1024_60 | 1680x1050_60 |
| 720_P60 | 2k60 | 848x480_60 | 1280x1024_75 | 1920x1200_60RB |
| 1080_I50 | 640X480_60 | 1024x768_60 | 1280x1024_85 | |

## 13.3    Output Resolutions

This section defines the output resolutions

### 13.3.1    HDMI Digital Video Output Resolutions

| HDMI Output Resolutions | | | |
|---|---|---|---|
| 640x480@60 | 1280x1024@50 | 1680x1050@60 | 1080p30 |
| 640x480@75 | 1280x1024@60 | 1920x1200@60 | 1080p50 |
| 800x600@50 | 1280x1024@75 | 480p60 | 1080p59.94 |
| 800x600@60 | 1360x768@60 | 576p50 | 1080p60 |
| 800x600@75 | 1366x768@50 | 720p50 | 1080i50 |
| 1024x768@50 | 1366x768@60 | 720p59.94 | 1080i60 |
| 1024x768@60 | 1400x1050@50 | 720p60 | 2k50 |
| 1024x768@75 | 1400x1050@60 | 1080p23.976 | 2k60 |
| 1280x768@50 | 1600x900@60 | 1080p24 | 4k2k@30 |
| 1280x768@60 | 1600x1200@50 | 1080p25 | |
| 1280x800@60 | 1600x1200@60 | 1080p29.97 | |

# 14 VP-778 RS-232 Communication Protocol

The Kramer Protocol lets you control the **VP-778** from any standard terminal software (for example, the Windows® HyperTerminal Application).

## 14.1 Using the Communication Protocol

There are three different methods to control the **VP-778** RS-232 or the Ethernet:

- Protocol commands mimicking the OSD, see Section 14.2.

- The button functions mimicking the remote controller buttons (as well as the front panel buttons), see Section 14.3.

- Protocol 3000 common commands, see Section 14.4.

> All three tables together include all the protocol commands, but they are not identical and do not always include the same information. Some of the data may appear in one or two of the tables but not in the third table and vice versa.

The protocol 3000 communications protocol uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

## 14.2 Communication Protocol: Mimicking OSD

The audio/video protocol commands defines all the function numbers, their valid parameters can be used with protocol 3000.

### 14.2.1 Using the Communication Protocol with Protocol 3000 (the "Y" Command)

**Set Command**:

Type in: "Y Control_Type=0,Function,Param"
Reply: "~id=01Y Control_Type=0,Function,Param OK"

Set command example: set HDCP mode for input 1 (113) to "On"
Send: "#y 0,113,1"

Result: "~01@Y 0,113,1 OK"

**Get Command:**

Type in: "Y Control_Type=1,Function"
Result: "~id=01Y Control_Type=1,Function,Param"

Get command example: get HDCP mode for input 3 (113):
Send: "#y 1,113"
Result: "~01@y 1,113,1"

The "Y" command also supports the value increment/decrement of any command using the '+' or '-' signs as the third parameter of the "Y" command.

For example, in order to decrease the volume on the DVI-U2 input (165)

Send: "#Y 0,165,-<CR>"

Reply: "~01@Y 0,165,-OK"

Note that if the value after the decrease is out of range, the reply will show an error such as:"~01@Y ERR -03"

| Character Symbols Definitions | |
|---|---|
| **Symbol** | **Meaning** |
| □ | Space |
| [CR] | Carriage Return, ASCII code 0x0D |
| [LF] or > | Line Feed, ASCII code 0x0A |

## 14.2.2  Protocol Table: Mimicking OSD

You can associate a function number to its description and valid parameters intuitively by navigating the OSD menu according to the following logic:
A function number is directly related to its location in the OSD menu.
For example, the second menu on the OSD is Layout (2 in the hundreds). The third menu item in Layout is Overlay Settings (2 in the tens), therefore the function number for it will be 230 (2nd item on the Main menu and the 3rd item in the Layout submenu (see also Section 6.1). When navigating in the OSD MENU you will be able to see the Overlay Settings valid parameters.

Note that for the Inputs, menu levels 3, 4 and 5 are valid for each input from 1 to 8. For example, Type (3$^{rd}$ level) item is 111 for Input 1 and 121 for Input 2, and so on. In order not to repeat the Inputs menu for each input, the function list will have an x denoting the input number from 1 to 8. For example, the Type item will have 1x1 as the function number x being from 1 to 8.

The following table shows the Program function numbering.

Note that some items that appear in red on the OSD menu seem missing in the table below. These items will be enabled in future firmware and will be described in detail.

The following table defines the protocol commands:

## 14.2.2.1 Inputs Commands Table (1$^{st}$ Level)

| 2$^{nd}$ Level | 3$^{rd}$ Level | 4$^{th}$ Level | 5$^{th}$ Level | Range | Func. | Notes |
|---|---|---|---|---|---|---|
| HDMI 1<br>HDMI 2<br>HDMI 3<br>HDMI 4<br>DVI-U1<br>DVI-U2<br>HDBT1<br>HDBT2 | Type | HDMI (default) | | 0 | 1x1 | |
| | | YUV | | 1 | | DVI input only |
| | | VGA | | 2 | | DVI input only |
| | | CV | | 3 | | DVI input only |
| | EDID Management | Native Resolution | 1024x768@60 | 0 | 1x21 | |
| | | | 1280x800@60 | 1 | | |
| | | | 1280x1024@60 | 2 | | |
| | | | 1366x768@60 | 3 | | |
| | | | 1440x900@60 | 4 | | |
| | | | 1400x1050@60 | 5 | | |
| | | | 1600x900@60 | 6 | | |
| | | | 1600x1200@60 | 7 | | |
| | | | 1680x1050@60 | 8 | | |
| | | | 1920x1200@60RB | 9 | | |
| | | | 720p50 | 10 | | |
| | | | 720p60 | 11 | | |
| | | | 1080p50 | 12 | | |
| | | | 1080p60 (default) | 13 | | |
| | | | 2k50 | 14 | | |
| | | | 2k60 | 15 | | |
| | | Color Depth | 12 BPP | 0 | 1x22 | |
| | | | 8 BPP | 1 | | |
| | | Modeline | Multiple Modeline | 0 | 1x23 | |
| | | | Single Modeline | 1 | | |
| | | Audio Channels | 5.1 | 0 | 1x24 | |
| | | | Stereo | 1 | | |
| | HDCP Mode | Off | | 0 | 1x3 | |
| | | On | | 1 | | |
| | Color Space | RGB | | 0 | 1x4 | |
| | | YPbPr | | 1 | | |
| | | Follow Input | | 2 | | |
| | Volume | <progress bar> | | [-80:+20] | 1x5 | |

## 14.2.2.2 Layout Commands Table (1st Level)

| 2nd Level | 3rd Level | 4th Level | Range | Func. | Notes |
|---|---|---|---|---|---|
| Display Mode | Transition | | 0 | 21 | |
| | Overlay | | 1 | | |
| Transition settings | Speed | <progress bar> | [1:15] | 221 | Transition Mode only |
| | Mode | Swap | 0 | 222 | |
| | | Follow | 1 | | |
| | Effect | Cut | 0 | 223 | |
| | | Fade | 1 | | |
| | | Diagonal | 2 | | |
| | | Wipe | 3 | | |
| | | Circle | 4 | | |
| | | Curtain | 5 | | |
| | Directions | Left to Right / From Top Left / Inbound | 0 | 224 | Direction applies only to certain effect types (see table in Section 14.2.2.3 |
| | | Right to Left / From Bottom Left / Outbound | 1 | | |
| | | Up / From Top Right / Horizontal | 2 | | |
| | | Down / From Bottom Right / Vertical | 3 | | |
| | Take | <action> | - | 225 | |
| Overlay Settings | Single Window | | 0 | 23 | |
| | Picture in Picture | | 1 | | |
| | Picture + Picture | | 2 | | |
| | Split | | 3 | | |
| | Customize Single | | 4 | | |
| | Customize Dual | | 5 | | |
| Output | Video Resolution | NATIVE | 0 | 241 | |
| | | 640x480p60 | 1 | | |
| | | 640x480p75 | 2 | | |
| | | 800x600p50 | 3 | | |
| | | 800x600p60 | 4 | | |
| | | 800x600p75 | 5 | | |
| | | 1024x768p50 | 6 | | |
| | | 1024x768p60 | 7 | | |
| | | 1024x768p75 | 8 | | |
| | | 1280x768p50 | 9 | | |
| | | 1280x768p60 | 10 | | |
| | | 1280x800p60 | 11 | | |
| | | 1280x1024p50 | 12 | | |
| | | 1280x1024p60 | 13 | | |
| | | 1280x1024p75 | 14 | | |
| | | 1360x768p60 | 15 | | |
| | | 1366x768p50 | 16 | | |
| | | 1366x768p60 | 17 | | |
| | | 1400x1050p50 | 18 | | |
| | | 1400x1050p60 | 19 | | |
| | | 1600x900p60 | 20 | | |
| | | 1600x1200p50 | 21 | | |
| | | 1600x1200p60 | 22 | | |

| 2ⁿᵈ Level | 3ʳᵈ Level | 4ᵗʰ Level | Range | Func. | Notes |
|---|---|---|---|---|---|
| | | 1680x1050p60 | 23 | | |
| | | 1920x1200p60RB | 24 | | |
| | | 480p60 | 25 | | |
| | | 576p50 | 26 | | |
| | | 720p50 | 27 | | |
| | | 720p59_94 | 28 | | |
| | | 720p60 | 29 | | |
| | | 1080p23_976 | 30 | | |
| | | 1080p24 | 31 | | |
| | | 1080p25 | 32 | | |
| | | 1080p29_97 | 33 | | |
| | | 1080p30 | 34 | | |
| | | 1080p50 | 35 | | |
| | | 1080p59_94 | 36 | | |
| | | 1080p60 | 37 | | |
| | | 1080i50 | 38 | | |
| | | 1080i60 | 39 | | |
| | | 2k50 | 40 | | |
| | | 2k60 | 41 | | |
| | | 4k2k30 | 42 | | |
| | Master Connection | HDMI1 | 0 | 2421 | |
| | | HDBT1 | 1 | | |
| | | From channel 2 | 2 | | |
| | | HDMI2 | 0 | 2422 | |
| | | HDBT2 | 1 | | |
| | | From Channel 2 | 2 | | |
| | Deep Color | Off | 0 | 243 | |
| | | Follow Output | 1 | | |
| | Color Space | RGB | 0 | 244 | |
| | | YPbPr422 | 1 | | |
| | | YPbPr444 | 2 | | |
| | HDCP Mode | Follow Output | 0 | 245 | |
| | | Follow Input | 1 | | |

### 14.2.2.3  Transition Settings

The direction (#Y command 224) of a transition effect (#Y command 223) is specific

to the effect. The following table defines the directions that are specific for each effect.

| Effect Type | Range | Direction | |
|---|---|---|---|
| 0 = Cut | | Unavailable | |
| 1 = Fade | | Unavailable | |
| 2 = Diagonal | [0-3] | 0 = From Top Right<br>1 = From Top Left | 2 = From Bottom Right<br>3 = From Bottom Left |
| 3 = Wipe | [0-3] | 0 = Left To Right<br>1 = Right To Left | 2 = Up<br>3 = Down |
| 4 = Circle | [0-1] | 0 = Inbound<br>1 = Outbound | |
| 5 = Curtain | [0-1] | 0 = Horizontal<br>1 = Vertical | |

## 14.2.2.4    Channel 1 and Channel 2 Commands Table (1st Level)

| 2nd Level | 3rd Level | 4th Level | 5th Level | 6th Level | Range | Func. CH1/CH2 |
|---|---|---|---|---|---|---|
| Input | HDMI1 | | | | 1 | |
| | HDMI2 | | | | 2 | |
| | HDMI3 | | | | 3 | |
| | HDMI4 | | | | 4 | 31/41 |
| | DVI-U1 | | | | 5 | |
| | DVI-U2 | | | | 6 | |
| | HDBT1 | | | | 7 | |
| | HDBT2 | | | | 8 | |
| Scaling | Aspect Ratio | Follow Input | | | 0 | |
| | | Follow Output | | | 1 | 321/421 |
| | | Best Fit | | | 2 | |
| | | Letterbox | | | 3 | |
| | Overscan | Follow Input | | | 0 | |
| | | Off | | | 1 | 322/422 |
| | | 5% | | | 2 | |
| | | 10% | | | 3 | |
| | Zoom Shift Mode | Auto | | | 0 | |
| | | Semi Auto | | | 1 | 323/423 |
| | | Customized | | | 2 | |
| | Zoom | <progress bar> | | | [8:4000] | 324/424 |
| | H Image Shift | <progress bar> | | | [20:790] | 325/425 |
| | V Image Shift | <progress bar> | | | [4:239] | 326/426 |
| Window Customization | H position | <progress bar> | | | [0:2046] | 331/431 |
| | Width | <progress bar> | | | [16:3840] | 332/432 |
| | V position | <progress bar> | | | [0:2046] | 333/433 |
| | Height | <progress bar> | | | [9:2160] | 3334/4334 |
| | 1. Ineffective in transition mode.<br>2. In overlay single window will trigger Customize Single.<br>3. In overlay Dual window (pip p+p…) will trigger Customize Dual. | | | | | |
| Picture | Brightness | <progress bar> | | | [-512:512] | 341/441 |
| | Contrast | <progress bar> | | | [10:160] | 342/442 |
| | H Sharpness | <progress bar> | | | [-10:10] | 343/443 |
| | V Sharpness | <progress bar> | | | [-10:10] | 344/444 |
| Color | Chroma | <progress bar> | | | [0:400] | 351/451 |
| | Hue | <progress bar> | | | [-180:180] | 352/452 |
| | Color Temperature | 6500K | | | 0 | 353/453 |
| | | 9300K | | | 1 | |
| | Gamma Mode | Gamma Off | | | 0 | |
| | | Gamma 0.4 | | | 1 | |
| | | Gamma 0.8 | | | 2 | |
| | | Gamma 1.2 | | | 3 | |
| | | Gamma 1.6 | | | 4 | 354/454 |
| | | Gamma 2.0 | | | 5 | |
| | | Gamma 2.4 | | | 6 | |
| | | Gamma 2.8 | | | 7 | |
| | Color Correction Blue | <progress bar> | | | [0:4] | 355/455 |
| | Color Correction Green | <progress bar> | | | [0:4] | 356/456 |

| 2nd Level | 3rd Level | 4th Level | 5th Level | 6th Level | Range | Func. CH1/CH2 |
|---|---|---|---|---|---|---|
| | Color Correction Red | <progress bar> | | | [0:4] | 357/457 |
| De-interlacing | Film Mode | Off | | | 0 | 361/461 |
| | | Follow Input | | | 1 | |
| | | 24PsF Mode | | | 2 | |
| | PD (Pull Down) time | <progress bar> | | | [0:15] | 362/462 |
| | Motion Detection Sensitivity | LEVEL1 | | | 0 | 363/463 |
| | | LEVEL2 | | | 1 | |
| | | LEVEL3 | | | 2 | |
| | | LEVEL4 | | | 3 | |
| | | LEVEL5 | | | 4 | |
| | Diagonal Correction | <progress bar> | | | [0:3] | 364/464 |
| Noise Reduction | Horizontal NR | <progress bar> | | | [0:3] | 371/471 |
| | Vertical NR | <progress bar> | | | [0:3] | 372/472 |
| | Temporal NR | <progress bar> | | | [0:3] | 373/473 |
| | Block NR | <progress bar> | | | [0:3] | 374/474 |
| | Mosquito NR | <progress bar> | | | [0:3] | 375/475 |
| | Combing NR | <progress bar> | | | [0:3] | 376/476 |
| Advance | Projection | Front | | | 1 | 381/481 |
| | | Back | | | 2 | |
| | | Ceiling Front | | | 3 | |
| | | Ceiling Back | | | 4 | |
| | Pause | Freeze | Off | | 0 | 3821/4821 |
| | | | On | | 1 | |
| | | Blank | Off | | 0 | 3822/4822 |
| | | | On | | 1 | |
| | | Mute | Off | | 0 | 3823/4823 |
| | | | On | | 1 | |
| | Sync Off | Auto | Enable | Off | 0 | 38311/48311 |
| | | | | On | 1 | |
| | | | Timeout | <progress bar> | [0:5] | 38312/48312 |
| | | Manual | <countdown action> | | - | 3832/4832 |
| | Test Pattern | Off | | | 0 | 384/484 |
| | | Slide Bar | | | 1 | |
| | | Color Bar | | | 2 | |
| | No Signal | Gray | | | 0 | 385/485 |
| | | Blue | | | 1 | |
| | | Black | | | 2 | |
| | Fade-Thru | Black | | | 0 | 386/486 |
| | | Freeze | | | 1 | |
| | Auto Switching | Mode | Off | | 0 | 3871/4871 |
| | | | Scan Mode | | 1 | |
| | | | Last Connected | | 2 | |
| | | Priority | see Priority Commands table below | | | |

| 2nd Level | 3rd Level | 4th Level | 5th Level | 6th Level | Range | Func. CH1/CH2 |
|---|---|---|---|---|---|---|
| Audio | Source | AFV | | | 0 | 391/491 |
| | | Analog 1 | | | 1 | |
| | | Analog 2 | | | 2 | |
| | | Analog 3 | | | 3 | |
| | | Analog 4 | | | 4 | |
| | | Analog 5 | | | 5 | |
| | | Analog 6 | | | 6 | |
| | | Analog 7 | | | 7 | |
| | | Analog 8 | | | 8 | |
| | AFV Mode | Embedded | | | 0 | 392/492 |
| | | Analog | | | 1 | |
| | Proc Amp | Output Volume | <progress bar> | | [-80:20] | 3931/4931 |
| | | Bass | <progress bar> | | [-18,18] | 3932/4932 |
| | | Mid | <progress bar> | | [-18,18] | 3933/4933 |
| | | Treble | <progress bar> | | [-10,10] | 3934/4934 |
| | | Balance | <progress bar> | | [-10,10] | 3935/4935 |
| | Lip Sync | <progress bar> | | | [0:170] | 394/494 |
| | Pass-Through | Off | | | 0 | 395/495 |
| | | On | | | 1 | |
| | Mic Effect | See Audio Mic Effect table below | | | | |

**Priority commands**

| 4th Level | 5th Level | 6th Level | 7th Level | Range | Func. CH1/CH2 |
|---|---|---|---|---|---|
| Priority | 1-8 | Input | HDMI1 | 0 | 3872x1/4872x1 |
| | | | HDMI2 | 1 | |
| | | | HDMI3 | 2 | |
| | | | HDMI4 | 3 | |
| | | | DVI-U1 | 4 | |
| | | | DVI-U2 | 5 | |
| | | | HDBT1 | 6 | |
| | | | HDBT2 | 7 | |
| | | Active | Off | 0 | 3872x2/4872x2 |
| | | | On | 1 | |

**The Audio MIC Effect applies only to Channel 1 (1ˢᵗ Level)**

| 2ⁿᵈ Level | 3ʳᵈ Level | 4ᵗʰ Level | 5ᵗʰ Level | 6ᵗʰ Level | Range | Func. MIC1/MIC2 |
|---|---|---|---|---|---|---|
| Audio | Mic1 / Mic 2 | Mic Mode | Talkover | | 0 | 39611/39711 |
| | | | Mix | | 1 | |
| | | Talkover Settings | Talkover Depth | <progress bar> | [30:100] | 396121/397121 |
| | | | Talkover Trigger | <progress bar> | [-90:33] | 396122/397122 |
| | | | Attack Time | <progress bar> | [1:12] | 396123/397123 |
| | | | Hold Time | <progress bar> | [0:2000] | 396124/397124 |
| | | | Release Time | <progress bar> | [0:100] | 396125/397125 |
| | | Mic Mix | <progress bar> | | [-30:6] | 39623/39723 |
| | | Mic Volume | <progress bar> | | [-16:16] | 39614/39624 |
| | | Mic Delay | <progress bar> | | [1:40] | 39625/39725 |
| | | Mic Mute | Off | | 0 | 39616/39626 |
| | | | ON | | 1 | |
| | | Line Mix | <progress bar> | | [-30:6] | 39627/39727 |
| | Line Mute | Off | | | 0 | 3963 |
| | | On | | | 1 | |

## 14.2.2.5 Misc Commands Table

| 2st Level | 3st Level | 4st Level | 5st Level | 6st Level | Range | Func. |
|---|---|---|---|---|---|---|
| Information | Channel 1 | <info screen> | | | - | 511 |
| | Channel 2 | <info screen> | | | - | 512 |
| | FW Version | <info screen> | | | - | 513 |
| | Network | <info screen> | | | - | 514 |
| | HDBT | HDBT-IN1 / HDBT-IN2 / HDBT-OUT1 / HDBT-OUT2 | Firmware | <info screen> | | 515x1 |
| | | | Status | <info screen> | | 515x2 |
| | For: HDBT-IN1 (x=1) / HDBT-IN2 (x=2) / HDBT-OUT1 (x=3) / HDBT-OUT2 (x=4) | | | | | |
| OSD | H Position | <progress bar> | | | [0:2047] | 521 |
| | V Position | <progress bar> | | | [0:2047] | 522 |
| | Transparency | Off | | | 0 | 523 |
| | | On | | | 1 | |
| | Gain | <progress bar> | | | [1:4] | 524 |
| | Bias | <progress bar> | | | [-128:127] | 525 |
| | Timeout | Off | | | 0 | 526 |
| | | 30 Sec | | | 1 | |
| | | 60 Sec | | | 2 | |
| Keying | Chroma Keying Red | <progress bar> | | | [0:240] | 531 |
| | Chroma Keying Green | <progress bar> | | | [0:240] | 532 |
| | Chroma Keying Blue | <progress bar> | | | [0:240] | 533 |
| | Chroma Keying | Off | | | 0 | 534 |
| | | On | | | 1 | |
| | Luma Keying | Off | | | 0 | 535 |
| | | On | | | 1 | |

| 2st Level | 3st Level | 4st Level | 5st Level | 6st Level | Range | Func. |
|-----------|-----------|-----------|-----------|-----------|-------|-------|
| FW Upgrade | Upgrade | \<action screen> | | | - | 541 |
| | Rollback | \<action screen> | | | - | 542 |
| Advance | Network | DHCP | Off | | 0 | 5511 |
| | | | On | | 1 | |
| | Port Tunneling | Port Settings | Port Type | UDP | 0 | 55211 |
| | | | | TCP | 1 | |
| | | | Port Number | \<progress bar> | [0:64000] | 55212 |
| | | UART Setting | Baudrate | 1200 | 0 | 55221 |
| | | | | 2400 | 1 | |
| | | | | 4800 | 2 | |
| | | | | 9600 | 3 | |
| | | | | 19200 | 4 | |
| | | | | 38400 | 5 | |
| | | | | 57600 | 6 | |
| | | | | 115200 | 7 | |
| | | | Data Bits | 5 | 0 | 55222 |
| | | | | 6 | 1 | |
| | | | | 7 | 2 | |
| | | | | 8 | 3 | |
| | | | Parity | None | 0 | 55223 |
| | | | | Odd | 1 | |
| | | | | Even | 2 | |
| | | | | Mark | 3 | |
| | | | | Space | 4 | |
| | | | Stop Bits | 1 | 0 | 55224 |
| | | | | 2 | 1 | |
| | | Serial Matrix | Connection 1 \ Connection 2 \ Connection 3 \ Connection 4 \ Connection 5 \ Connection 6 \ Connection 7 \ Connection 8 | Source \ Destination | Port Tunneling | 0 | 553x1 (source) 553x2 (destination) |
| | | | | | DATA | 1 | |
| | | | | | HDBT-IN1 | 2 | |
| | | | | | HDBT-IN2 | 3 | |
| | | | | | HDBT-OUT1 | 4 | |
| | | | | | HDBT-OUT2 | 5 | |
| | | | | | None | 6 | |
| | | Disconnect All | \<action screen> | | - | 5535 |
| | Power Amplifier | Off | | | 0 | 554 |
| | | Power Level 1 | | | 1 | |
| | | Power Level 2 | | | 2 | |
| | | Power Level 3 | | | 3 | |
| | | Power Level 4 | | | 4 | |
| | USR KeyPad | USR1 / USR2 | Baudrate | 1200 | 0 | 555x1 |
| | | | | 2400 | 1 | |
| | | | | 4800 | 2 | |
| | | | | 9600 | 3 | |
| | | | | 19200 | 4 | |
| | | | | 38400 | 5 | |
| | | | | 57600 | 6 | |
| | | | | 115200 | 7 | |

| 2st Level | 3st Level | 4st Level | 5st Level | 6st Level | Range | Func. |
|-----------|-----------|-----------|-----------|-----------|-------|-------|
| | | | Data Bits | 5 | 0 | 555x2 |
| | | | | 6 | 1 | |
| | | | | 7 | 2 | |
| | | | | 8 | 3 | |
| | | | Parity | None | 0 | 555x3 |
| | | | | Odd | 1 | |
| | | | | Even | 2 | |
| | | | | Mark | 3 | |
| | | | | Space | 4 | |
| | | | Stop Bits | 1 | 0 | 555x4 |
| | | | | 2 | 1 | |
| | | | Destination | Port Tunneling | 0 | 555x5 |
| | | | | DATA | 1 | |
| | | | | HDBT-IN1 | 2 | |
| | | | | HDBT-IN2 | 3 | |
| | | | | HDBT-OUT1 | 4 | |
| | | | | HDBT-OUT2 | 5 | |
| | | | | All | 6 | |
| | | | | None | 7 | |
| | | | Data Display | <action screen> | - | 555x6 |
| | | | Launch | <action screen> | - | 555x7 |
| | Factory Reset | Including ETH | <action screen> | | - | 561 |
| | | Excluding ETH | <action screen> | | - | 562 |

## 14.3 Protocol Table: Mimicking Remote and Front Panel Buttons

The keystroke codes operate in the following way:

SET command third param =0,

Syntax example: "#Y 0,920,0<CR>" => MENU keystroke

GET command for keystrokes will return ERR

The following table defines the keystroke function codes:

| Button | Keystroke Code | Button | Keystroke Code | Button | Keystroke Code |
|--------|---------------|--------|---------------|--------|---------------|
| KEYCODE MENU | 920 | KEYCODE PREV FREEZE | 932 | KEYCODE CH2 HDMI2 | 944 |
| KEYCODE ENTER | 921 | KEYCODE CH1 BLANK | 933 | KEYCODE CH2 HDMI3 | 945 |
| KEYCODE DOWN | 922 | KEYCODE CH1 FREEZE | 934 | KEYCODE CH2 HDMI4 | 946 |
| KEYCODE UP | 923 | KEYCODE CH1 HDMI1 | 935 | KEYCODE CH2 DVI-U1 | 947 |
| KEYCODE LEFT | 924 | KEYCODE CH1 HDMI2 | 936 | KEYCODE CH2 DVI-U2 | 948 |
| KEYCODE RIGHT | 925 | KEYCODE CH1 HDMI3 | 937 | KEYCODE CH2 HDBT1 | 949 |
| KEYCODE RESET | 926 | KEYCODE CH1 HDMI4 | 938 | KEYCODE CH2 HDBT2 | 950 |
| KEYCODE LOCK | 927 | KEYCODE CH1 DVI-U1 | 939 | KEYCODE CH1 MUTE | 951 |
| USR1 | 928 | KEYCODE CH1 DVI-U2 | 940 | KEYCODE CH2 MUTE | 952 |
| USR2 | 929 | KEYCODE CH1 HDBT1 | 941 | KEYCODE POWER | 953 |
| KEYCODE MODE | 930 | KEYCODE CH1 HDBT2 | 942 | | |
| KEYCODE CH2 BLANK | 931 | KEYCODE CH2 HDMI1 | 943 | | |

## 14.4 Protocol 3000 Common Operation Commands

The **VP-778** can be operated using the Kramer Protocol 3000 serial commands. The command framing varies according to how you interface with the **VP-778**. For example, a basic video input switching command that routes a layer 1 video signal to HDMI out 1 from HDMI input 2 (`ROUTE 1,1,2`), is entered as follows:

- Terminal communication software, such as Hercules:
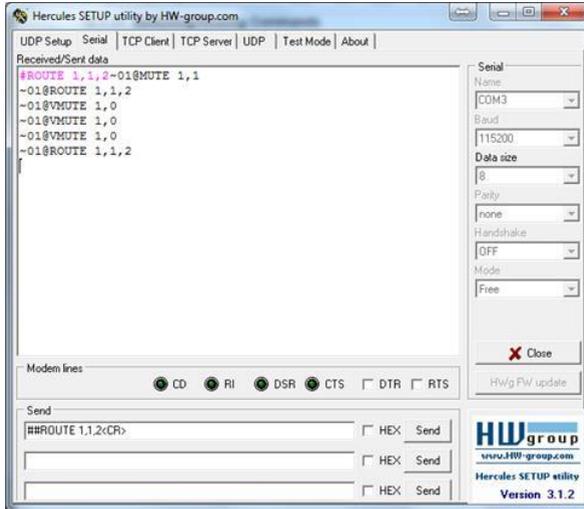


> The framing of the command varies according to the terminal communication software.

- K-Touch Builder (Kramer software):

- K-Config (Kramer configuration software):



| Command Syntax | Display Command as | ○ Hex | ○ Decimal | ● ASCII |
| --- | --- | --- | --- | --- |

"#ROUTE 1,1,2",0x0D    [ Set ]   [ Clear ]
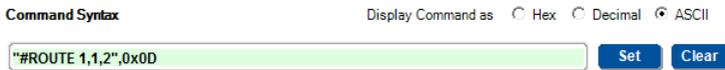
> All the examples provided in this section are based on using the K-Config software.

You can enter commands directly using terminal communication software (e.g., Hercules) by connecting a PC to the serial or Ethernet port on your device. 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 Section 14.5.

- General syntax used for Protocol 3000 commands, see Section 14.6.

- Protocol 3000 commands available for the **VP-778**, see Section 14.7.

## 14.5 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.

**VP-778 - VP-778 RS-232 Communication Protocol**

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.

## 14.6 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 |
|-------|--------------------|------|-----------|
| # | Device_id@ | Message | CR |

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

| Start | Body | Delimiter |
|-------|------|-----------|
| # | **Command** SP Parameter_1,Parameter_2,… | CR |

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

| Start | Address | Body | Delimiter |
|-------|---------|------|-----------|
| # | Device_id@ | **Command_1** Parameter1_1,Parameter1_2,…\| <br> **Command_2** Parameter2_1,Parameter2_2,…\| <br> **Command_3** Parameter3_1,Parameter3_2,…\|… | CR |

- Device Message Format:

| Start | Address (optional) | Body | Delimiter |
|-------|--------------------|------|-----------|
| ~ | Device_id@ | Message | CR LF |

- Device Long Response – Echoing command:

| Start | Address (optional) | Body | Delimiter |
|-------|--------------------|------|-----------|
| ~ | Device_id@ | Command SP [*Param1 ,Param2 …*] result | CR LF |

## 14.7 Protocol 3000 Commands

This section includes the following commands:

- System commands (see ).
- Communication commands (see
- Route commands (see ).
- Device-specific commands (see ).
- Audio commands (see ).
- Video commands (see ).

### 14.7.1 System Commands

| Command | Description |
|---------|-------------|
| # | Protocol handshaking |
| BUILD-DATE | Get device build date (system mandatory) |
| FACTORY | Reset to factory default configuration |
| 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) |
| NAME | Set machine (DNS) name |
| LOCK-FP | Set/get front panel lock |
| NAME-RST | Reset machine (DNS) name to factory default |
| TIME | Device time and date |
| POWER | Set/get power mode |
| HDCP-MOD | Set/Get HDCP mode |
| TIME-LOC | Set/get local time offset from UTC/GMT |

#### 14.7.1.1 #

| Functions | | Permission | Transparency |
|-----------|--|------------|--------------|
| Set: | # | End User | Public |
| Get: | - | - | - |
| **Description** | | **Syntax** | |
| Set: | Protocol handshaking | #CR | |
| Get: | - | - | |
| **Response** | | | |
| ~nn@SP**OK**CR LF | | | |
| **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 | | | |

## 14.7.1.2 BUILD-DATE

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

## 14.7.1.3 FACTORY

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **FACTORY** | End User | Public |
| Get: | - | - | - |
| **Description** | | **Syntax** | |
| Set: | Reset device to factory default configuration | #**FACTORY** CR | |
| Get: | - | - | |
| **Response** | | | |
| ~ nn @**FACTORY** SP OK CR LF | | | |
| **Notes** | | | |
| This command deletes all user data from the device. The deletion can take some time.<br>Your device may require powering off and powering on for the changes to take effect. | | | |
| **K-Config Example** | | | |
| "#FACTORY",0x0D | | | |

### 14.7.1.4 MODEL

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | - | - | - |
| Get: | MODEL? | End User | Public |
| Description | | Syntax | |
| Set: | - | - | |
| Get: | Get device model | #MODEL?CR | |
| Response | | | |
| ~nn@MODEL SP model_name CR LF | | | |
| Parameters | | | |
| model_name – String of up to 19 printable ASCII chars | | | |
| 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 | | | |

### 14.7.1.5 PROT-VER

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | - | - | - |
| Get: | PROT-VER? | End User | Public |
| Description | | Syntax | |
| Set: | - | - | |
| Get: | Get device protocol version | #PROT-VER?CR | |
| Response | | | |
| ~nn@PROT-VER SP 3000:version CR LF | | | |
| Parameters | | | |
| version – XX.XX where X is a decimal digit | | | |
| K-Config Example | | | |
| "#PROT-VER?",0x0D | | | |

## 14.7.1.6 RESET

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **RESET** | Administrator | Public |
| Get: | - | - | - |
| Description | | Syntax | |
| Set: | Reset device | **#RESET**`CR` | |
| Get: | - | - | |
| Response | | | |
| ~`nn`@**RESET**`SP`OK`CR LF` | | | |
| 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 | | | |

## 14.7.1.7 SN

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | - | - | - |
| Get: | **SN?** | End User | Public |
| Description | | Syntax | |
| Set: | - | - | |
| Get: | Get device serial number | **#SN?**`CR` | |
| Response | | | |
| ~`nn`@**SN**`SP`*serial_number*`CR LF` | | | |
| Parameters | | | |
| *serial_number* – 14 decimal digits, factory assigned | | | |
| Notes | | | |
| This device has a 14 digit serial number that are displayed | | | |
| K-Config Example | | | |
| "#SN?",0x0D | | | |

### 14.7.1.8    VERSION

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | - | - | - |
| Get: | VERSION? | End User | Public |
| **Description** | | **Syntax** | |
| Set: | - | - | |
| Get: | Get firmware version number | #VERSION?CR | |
| **Response** | | | |
| ~nn@**VERSION**SP*firmware_version*CR LF | | | |
| **Parameters** | | | |
| *firmware_version* – *XX.XX.XXX.XXXXX.XX* where the digit groups are: major.minor.build version.FW version.board HW version | | | |
| **Notes** | | | |
| Digit groups are defined as follows:  | | | |
| **K-Config Example** | | | |
| "#VERSION?",0x0D | | | |

### 14.7.1.9    NAME

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | NAME | Administrator | Public |
| Get: | NAME? | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set machine (DNS) name | #NAMESP*machine_name*CR | |
| Get: | Get machine (DNS) name | #NAME?CR | |
| **Response** | | | |
| Set: ~nn@**NAME**SP*machine_name*SPOKCR LF <br> Get: ~nn@**NAME?**SP*machine_name*CR LF | | | |
| **Parameters** | | | |
| *machine_name* - String of up to 14 alpha-numeric characters (can include hyphens but not at the beginning or end) | | | |
| **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": <br> "#NAME room-442",0x0D | | | |

## 14.7.1.10 LOCK-FP

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **LOCK-FP** | End User | Public |
| Get: | **LOCK-FP?** | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Lock the port | **#LOCK-FP**SP*lock_mode*CR | |
| Get: | Get the port lock state | **#LOCK-FP?**CR | |
| **Response** | | | |
| ~nn@**LOCK-FP**SP*lock_mode*SPOKCR LF | | | |
| **Parameters** | | | |
| *Lock_mode* – Front panel locking state: *0* (unlock front panel buttons), *1* (lock front panel buttons) | | | |
| **K-Config Example** | | | |
| Unlock port:<br>"#LOCK-FP 0",0x0D | | | |

## 14.7.1.11 NAME-RST

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **NAME-RST** | Administrator | Public |
| Get: | | | |
| **Description** | | **Syntax** | |
| Set: | Reset machine (DNS) name to factory default | **#NAME-RST**CR | |
| Get: | - | - | |
| **Response** | | | |
| ~nn@**NAME-RST**SPOKCR LF | | | |
| **Notes** | | | |
| Factory default of machine (DNS) name is "VP-778-" + 4 last digits of device serial number | | | |
| **K-Config Example** | | | |
| Reset machine (DNS) name to factory default:<br>"#NAME-RST",0x0D | | | |

## 14.7.1.12  TIME

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `TIME` | - | - |
| Get: | `TIME?` | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set device time and date | `#TIME`SP`day_of_week,date,time`CR |
| Get: | Get device time and date | `#TIME?`CR |
| **Response** | | | |
| ~nn@**TIME**SP`day_of_week,date,time`SP OK CR LF | | | |
| **Parameters** | | | |
| `day_of_week` – `Sun,Mon,Tue,Wed,Thu,Fri,Sat` (Day of the week)<br>`date` – `DD-MM-YYYY` (date)<br>`time` – set: `hh:mm:ss` (Time) | | | |
| **Notes** | | | |
| The year must be 4 digits; The device does not validate the day of week from the date<br>Time format - 24 hours; Date format - Day, Month, Year | | | |
| **K- Config Example** | | | |
| Set the date and time:<br>"#TIME Tue,25-04-2017,16:30:00",0x0D | | | |

## 14.7.1.13  POWER

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `POWER` | End User | Public |
| Get: | `POWER?` | End User | Audio |
| **Description** | | **Syntax** | |
| Set: | Set power mode | `#POWER`SP`power-mode`CR |
| Get: | Get power mode status | `#POWER?`CR |
| **Response** | | | |
| ~nn@**POWER**SP`power_mode`SP OK CR LF | | | |
| **Parameters** | | | |
| `Power_mode` – power state: `0` (Power off, enter standby mode), `1` (Power on) | | | |
| **K-Config Example** | | | |
| Set power to Off:<br>"#power 0",0x0D | | | |

## 14.7.1.14  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*stage,stage_id,mode*CR | |
| Get: | Get HDCP mode | `#HDCP-MOD?`SP*stage,stage_id*CR | |
| **Response** | | | |
| Set/get:  ~nn@**HDCP-MOD**SP*stage,stage_id,mode*CR LF | | | |
| **Parameters** | | | |
| *stage* – 0 (Input), 1 (Output)<br>*stage_id* – For input: 0 (HDMI 1), 1 (HDMI 2), 2 (HDMI 3), 3 (HDMI 4), 4 (DVI-U1), 5 (DVI-U2), 6 (HDBT 1), 7 (HDBT 2)<br>*mode* – Status for input: 0 (Off), 1 (On) status for output: 2 (Follow Input), 3 (Follow Output) | | | |
| **Response Triggers** | | | |
| Response is sent to the com port from which the Set (before execution) / Get command was received<br>Response is sent to all com ports after execution if *HDCP-MOD* was set by any other external control device (button press, device menu and similar) or HDCP mode changed. | | | |
| **Notes** | | | |
| Set HDCP working mode on the device input:<br>• HDCP supported – HDCP_ON  (default)<br>• HDCP not supported – HDCP OFF | | | |
| **K-Config Example** | | | |
| Set the DP input HDCP off:<br>"#HDCP-MOD 0,0,0",0x0D | | | |

## 14.7.1.15  TIME-LOC

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `TIME-LOC` | End User | - |
| Get: | `TIME-LOC?` | End User | Audio |
| **Description** | | **Syntax** | |
| Set: | Set local time offset from UTC/GMT | `#TIME-LOC`SP*UTC_off,DayLight*CR | |
| Get: | Get local time offset from UTC/GMT | `#TIME-LOC?`CR | |
| **Response** | | | |
| ~nn@**TIME-LOC**SP*UTC_off,DayLight*SP OK CR LF | | | |
| **Parameters** | | | |
| *UTC_off* – x.xx (Offset of device time from UTC/GMT, without daylight time correction)<br>*DayLight* – 0 (No daylight saving time), 1 (Daylight saving time) | | | |
| **K-Config Example** | | | |
| Set the offset of the device time to 4:57 with no daylight saving time:<br>"#TIME-LOC 4.57,0",0x0D | | | |

## 14.7.1.16  TIME-SRV

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `TIME-SRV` | Administrator | Public |
| Get: | `TIME-SRV?` | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set time server | `#TIME-SRV`SP`mode,time_server_IP`CR |
| Get: | Get time server | `#TIME-SRV?`CR |
| **Response** | | | |
| ~nn@**TIME-SRV**SP`mode,time_server_IP`SP OK CR LF | | | |
| **Parameters** | | | |
| `mode` – `0` (Off), `1` (On)<br>`time_server_IP` – Time server IP address, in the following format: `xxx.xxx.xxx.xxx` | | | |
| **K-Config Example** | | | |
| Set the offset of the device time to 4:57 with no daylight saving time:<br>`"#TIME-LOC 4.57,0",0x0D` | | | |

## 14.7.2  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 |

## 14.7.2.1  ETH-PORT

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `ETH-PORT` | Administrator | Public |
| Get: | `ETH-PORT?` | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set Ethernet port protocol | `#ETH-PORT`SP`portType,ETHPort`CR |
| Get: | Get Ethernet port protocol | `#ETH-PORT?`SP`portType`CR |
| **Response** | | | |
| ~nn@**ETH-PORT**SP`portType,ETHPort`SP OK CR LF | | | |
| **Parameters** | | | |
| `portType` – string of 3 letters indicating the port type: `TCP`, `UDP`<br>`ETHPort` – `1-65535` (TCP / UDP port number)，`0` (reset port to factory default: 50000 for UDP, 5000 for TCP) | | | |
| **Notes** | | | |
| If the port number you enter is already in use, an error is returned | | | |
| **K-Config Example** | | | |
| Set the Ethernet port protocol for TCP to port 12457:<br>`"#ETH-PORT TCP,12457",0x0D` | | | |

## 14.7.2.2   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`mode`CR | |
| Get: | Get DHCP mode | `#NET-DHCP?`CR | |
| Response | | | |
| ~nn@**NET-DHCP**SP`mode`SPOK CR LF | | | |
| Parameters | | | |
| `mode` – `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), `2` (try to use DHCP, if unavailable use AUTO-IP) | | | |
| 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:<br>`"#NET-DHCP 1",0x0D` | | | |

## 14.7.2.3   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`ip_address`CR | |
| Get: | Get gateway IP | `#NET-GATE?`CR | |
| Response | | | |
| ~nn@**NET-GATE**SP`ip_address`SPOK CR LF | | | |
| Parameters | | | |
| `ip_address` – gateway IP address, in the following format: `xxx.xxx.xxx.xxx` | | | |
| 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:<br>`"#NET-GATE 192.168.000.001",0x0D` | | | |

## 14.7.2.4 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*ip_address*CR | |
| Get: | Get IP address | **#NET-IP?**CR | |
| **Response** | | | |
| ~nn@**NET-IP**SP*ip_address*SPOKCR LF | | | |
| **Parameters** | | | |
| *ip_address* – IP address, in the following format: *xxx.xxx.xxx.xxx* | | | |
| **Notes** | | | |
| Consult your network administrator for correct settings | | | |
| **K-Config Example** | | | |
| Set the IP address to 192.168.1.39:<br>"#NET-IP 192.168.001.039",0x0D | | | |

## 14.7.2.5 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*mac_address*CR LF | | | |
| **Parameters** | | | |
| *mac_address* – unique MAC address. Format: *XX-XX-XX-XX-XX-XX* where X is hex digit | | | |
| **K-Config Example** | | | |
| "#NET-MAC?",0x0D | | | |

### 14.7.2.6 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 *net_mask* CR | |
| Get: | Get subnet mask | **#NET-MASK?** CR | |
| **Response** | | | |
| ~ nn @ **NET-MASK** SP *net_mask* SP OK CR LF | | | |
| **Parameters** | | | |
| *net_mask* - 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 | | | |
| **K-Config Example** | | | |
| Set the subnet mask to 255.255.0.0: `"#NET-MASK 255.255.000.000",0x0D` | | | |

### 14.7.3  Route Commands

| Command | Description |
|---|---|
| **ROUTE** | Set/get layer routing |

### 14.7.3.1  ROUTE

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **ROUTE** | End User | Public |
| Get: | **ROUTE** | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set layer routing | **#ROUTE** SP *layer,dest,src* CR | |
| Get: | Get layer routing | **#ROUTE?** SP *layer,dest* CR | |
| **Response** | | | |
| ~ nn @ **ROUTE** SP *layer,dest,src* SP OK CR LF | | | |
| **Parameters** | | | |
| *layer* – Input to route: *1* (video), *2* (audio), *12* (AFV) | | | |
| *dest* – Scaler: *0* (Channel 1), *1* (Channel 2) | | | |
| *src* – For video and AFV, Input numbers: *1* (HDMI 1), *2* (HDMI 2), *3* (HDMI 3), *4* (HDMI 4), *5* (DVI-U1), *6* (DVI-U2), *7* (HDBT 1), *8* (HDBT 2) For audio: *0* (embedded), *1* (HDMI 1), *2* (HDMI 2), *3* (HDMI 3), *4* (HDMI 4), *5* (DVI-U1), *6* (DVI-U2), *7* (HDBT 1), *8* (HDBT 2) | | | |
| **K-Config Example** | | | |
| Route Video to channel 1 from HDMI 4: `"#ROUTE 1,0,3",0x0D` | | | |

## 14.7.4 Security Commands

| Command | Description |
|---|---|
| **WEB-SECUR** | Set/get security mode |
| **WEB-USER** | Set/get port tunneling com port configuration |
| **WEB-PASSW** | Configure USR Keypad communication parameters |

## 14.7.4.1 WEB-SECUR

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **WEB-SECUR** | Administrator | Public |
| Get: | **WEB-SECUR?** | Not Secure | Public |
| **Description** | | **Syntax** | |
| Set: | Set the security mode | **#WEB-SECUR**SP*security_mode,password*CR | |
| Get: | Get the security mode | **#WEB-SECUR?**SP | |
| **Response** | | | |
| ~nn@**WEB-SECUR**SP*security_mode,password*SP OK CR LF | | | |
| **Parameters** | | | |
| Security_mode – *1* (ON, enables security), *0* (OFF, disables security) | | | |
| password – insert the current password | | | |
| **K-Config Example** | | | |
| Enable security:<br>"#WEB-SEC 1,Admin",0x0D | | | |

## 14.7.4.2 WEB-USER

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | | | |
| Get: | **WEB-USER?** | Not Secure | Public |
| **Description** | | **Syntax** | |
| Set: | - | - | |
| Get: | Get port tunneling Ethernet configuration | **#WEB-USER?**SP | |
| **Response** | | | |
| ~nn@**WEB-*USER***SP*user_name*CR LF | | | |
| **Parameters** | | | |
| User_name – Admin | | | |
| **K-Config Example** | | | |
| Get user?<br>"#WEB-USER?",0x0D | | | |

### 14.7.4.3 WEB-PASSW

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **WEB-PASSW** | Administrator | Public |
| Get: | | | |
| **Description** | | **Syntax** | |
| Set: | Set a new password. | #**WEB-PASSW**SP*new_password,current_password*CR |
| Get: | - | - | |
| **Response** | | | |
| ~nn@**WEB-PASSW**SP*new_password,current_password*SPOKCR LF | | | |
| **Parameters** | | | |
| *New_password* – insert a string of 4 to 16 alpha-numeric characters<br>*Current_password* – insert the current password | | | |
| **K-Config Example** | | | |
| Change default password to 1234:<br>"#WEB-PASSW 1234,Admin",0x0D | | | |

### 14.7.5 Device-Specific Commands

| Command | Description |
|---|---|
| **PTNL-CFG** | Set/get port tunneling configuration |
| **UART** | Set/get port tunneling com port configuration |
| **CBIN** | Configure USR Keypad communication parameters |
| **DBIN** | Program USR Keypad command |
| **BIN** | Launch USR Keypad command |
| **P3KB** | Set/get RS-232 com port baud rate |
| **VERBOSE** | Set/get the verbosity level of P3K protocol |
| **Y** | Set/get scaler parameters with Y command |

### 14.7.5.1 PTNL-CFG

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **PTNL-CFG** | End User | - |
| Get: | **PTNL-CFG?** | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set port tunneling Ethernet configuration | #**PTNL-CFG** SP*port_type,port_number*CR |
| Get: | Get port tunneling Ethernet configuration | # **PTNL-CFG?**SP |
| **Response** | | | |
| ~nn@PTNL-CFGSP*port_type,port_number*SPOKCR LF | | | |
| **Parameters** | | | |
| P0 –: *UDP*, *TCP* (Port type)<br>P1 –: *1-64000* (Port number) | | | |
| **K-Config Example** | | | |
| Set port type to UDP to port 5050:<br>"#PTNL-CFG UDP,5050",0x0D | | | |

## 14.7.5.2 UART

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `UART` | Administrator | Public |
| Get: | `UART?` | End User | Public |

| Description | | Syntax |
|---|---|---|
| Set: | Set port tunneling UART configuration | `#UART`SP`baud_rate,data_bits,parity,stop_bits`CR |
| Get: | Get port tunneling UART configuration | `#UART?`SP |

| Response |
|---|
| ~nn@**UART**SP`baud_rate,data_bits,parity,stop_bits`SP OK CR LF |

| Parameters |
|---|
| `baude_rate` − *1200*, *2400*, *4800*, *9600*, *19200*, *38400*, *57600*, *115200*<br>`data_bits` − *5* to *8* (data bits)<br>`parity` − *none*, *odd*, *even*, *mark*, *space*, *n*, *o*, **e**, *m*, *s*<br>`stop_bits` − *1*, *2* (stop bits) |

| K-Config Example |
|---|
| Set baud rate to 9600, 8 data bits, parity to none and stop bit to 1:<br>"#UART 9600,8,none,1",0x0D |

## 14.7.5.1 CBIN

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `CBIN` | End User | - |
| Get: | – | End User | - |

| Description | | Syntax |
|---|---|---|
| Set: | Configure USR Keypad communication parameters | `#CBIN`SP`P0,P1,P2,P3,P4,P5,P6`CR |
| Get: | - | - |

| Response |
|---|
| ~nn@**CBIN**SP`P0,P1,P2,P3,P4,P5,P6`SP OK CR LF |

| Parameters |
|---|
| P0 − *USR1* (User keypad button 1), *USR2* (User keypad 2)<br>P1 − *UART* (UART port type)<br>P2 − *1200*, *2400*, *4800*, *9600*, *19200*, *38400*, *57600*, *115200* (baud rate)<br>P3 − *5* to *8* (data bits)<br>P4 −: *none*, *odd*, *even*, *mark*, *space*, *n*, *o*, *e*, *m*, *s* (parity)<br>P5 −: *1*, *2* (stop bits)<br>P6 − *PT* (Port tunneling), *DATA* (RS-232 DATA port), *IN1*, *IN2*, *OUT1*, *OUT2*, *ALL*, *NONE*, (destination) |

| K-Config Example |
|---|
| Set USR1 Keypad, UART, 9600,8,none,1 to port tunneling destination:<br>"#CBIN USR1,UART,9600,8,n,1,PT",0x0D |

## 14.7.5.2 DBIN

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **DBIN** | End User | - |
| Get: | - | End User | - |
| **Description** | | **Syntax** | |
| Set: | Program USR Keypad command | **#DBIN**SP*P0,P1,*START_TOKEN*P2*END_TOKEN CR |
| Get: | - | - | |
| **Response** | | | |
| ~nn@**DBIN**SP*P0,P1*SP OK CR LF | | | |
| **Parameters** | | | |
| *P0* – *USR1* (User keypad button 1), *USR2* (User keypad 2) | | | |
| *P1* – *1* to *1024*: (Set command byte numbers) | | | |
| START_TOKEN = "[" = HEX 5B = 0x5B | | | |
| *P2* – command data (binary) | | | |
| END_TOKEN = "]" = HEX 5D = 0x5D | | | |
| **K-Config Example** | | | |
| Program USR1 Keypad to a 4-byte command (0X01, 0X82, 0X80, 0X81): | | | |
| "#DBIN USR1,4," START_TOKEN ,0X01,0X82,0X80,0X81, END_TOKEN ,0x0D | | | |
| **Hercules Example** | | | |
| Program USR1 Keypad to a 4-byte command (0X01, 0X82, 0X80, 0X81): | | | |
| ##DBIN USR1,4,[$01$82$80$81] <CR> | | | |

### 14.7.5.3    BIN

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **BIN** | End User | – |
| Get: | – | End User | |
| **Description** | | **Syntax** | |
| Set: | Launch USR Keypad command | #**BIN**SP*P0,P1,P2,* START_TOKEN *P3* END_TOKEN CR | |
| Get: | 14.7.5.314.7.5.3 | | |
| **Response** | | | |
| ~ nn **@BIN** SP P0,P1,P2 SP OK CR LF | | | |
| **Parameters** | | | |
| **P0** – *USR1* (User keypad button 1), *USR2* (User keypad 2) | | | |
| **P1** – UART (UART port type), ETH (Ethernet port type) | | | |
| **P2** – when – –1=launch USR command data as programmed (see **DBIN** Section 14.7.5.2) or when 1 to 1024=set byte numbers of one-time custom command | | | |
| START_TOKEN = "[" = HEX 5B = 0x5B | | | |
| **P3** – one-time custom command data (binary) | | | |
| END_TOKEN = "]" = HEX 5D = 0x5D | | | |
| **Notes** | | | |
| The BIN command can be used to launch the **DBIN** programmed command (*P2=–1*) or to launch a one-time custom command that overrides **DBIN** programmed command (*P2=1-1024*). When *P2* is set to *-1*, BIN command syntax is complete. When *P2* is set to *1* to *1024*, *P3* and its tokens are mandatory to the BIN command syntax | | | |
| **K-Config Examples** | | | |
| Launch USR1 Keypad programmed command: "#BIN USR1,UART,–1",0x0D Launch one-time custom command (6-byte; 0X01, 0X82, 0X80, 0X81, 0X50, 0X71 command) using USR1 Keypad configuration (CBIN, see Section 14.7.5.1): "#BIN USR1,UART,6,[",0X01,0X82,0X80,0X81,0X50,0X71,"]",0x0D | | | |

### 14.7.5.4    P3KB

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **P3KB** | End User | Public |
| Get: | **P3KB?** | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set RS-232 com port baud rate | **#P3KB** SP *P0* CR | |
| Get: | Get RS-232 com port baud rate | **#P3KB?** CR | |
| **Response** | | | |
| ~ nn @**P3KB** SP *P0* SP OK CR LF | | | |
| **Parameters** | | | |
| *P0* – *0* (19200bps), *1* (115200, the default) | | | |
| **K-Config Example** | | | |
| Set the RS-232 baud rate to 19200bps: "#P3KB 0",0x0D | | | |

### 14.7.5.5 VERBOSE

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **VERBOSE** | End User | Public |
| Get: | **VERBOSE?** | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set the verbosity level of P3K protocol | **#VERBOSE** SP *P0* CR | |
| Get: | Get the verbosity level of P3K protocol | **#VERBOSE?** CR | |
| **Response** | | | |
| ~ nn @VERBOSE SP *P0* SP OK CR LF | | | |
| **Parameters** | | | |
| *P0* – *0* (Silent mode, the default), *1* (enable P3K notification messages to all connected interfaces) | | | |
| **K-Config Example** | | | |
| Set the verbosity to silent mode:<br>"#VERBOSE 0",0x0D | | | |

### 14.7.5.6 Y

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **Y** | End User | Public |
| Get: | **Y?** | End User | Public |
| **Description** | | **Syntax** | |
| Set: | Set scaler parameters with Y command | **#Y** SP *P0*,*P1*,*P2* CR | |
| Get: | Get scaler parameters with Y command | **#Y** SP *P0*,*P1* CR | |
| **Response** | | | |
| ~ nn @Y SP *P0*,*P1*,*P2* SP OK CR LF | | | |
| **Parameters** | | | |
| *P0* – *0* (Set command), *1* (Get command)<br>*P1* – *Function*<br>*P2* – *parameter*<br>See functions and parameters as described in the tables in Section 14.2.2 | | | |
| **K-Config Example** | | | |
| Set the parameter in function 31 to parameter 5 (select CH 1 DVI-U2 input):<br>"#Y 0,31,5",0x0D | | | |

## 14.7.6 Audio Commands

| Command | Description |
|---------|-------------|
| **AUD-LVL** | Set/get input/output volume |
| **VOLUME** | Set the audio level |
| **MUTE** | Set/get audio mute |

## 14.7.6.1 AUD-LVL

| Functions | | Permission | Transparency |
|-----------|--|------------|--------------|
| Set: | **AUD-LVL** | End User | - |
| Get: | **AUD-LVL?** | End User | Audio |
| **Description** | | **Syntax** | |
| Set: | Set audio level in specific amplifier stage | **#AUD-LVL**SP*stage,channel,volume*CR | |
| Get: | Get audio level in specific amplifier stage | **#AUD-LVL?**SP*stage,channel*CR | |
| **Response** | | | |
| ~nn@**AUD-LVL**SP*stage,channel,volume*SP OK CR LF | | | |
| **Parameters** | | | |
| *stage* – *0* (Input), *1* (Output)<br>*channel* – *0* to *7* (Audio Inputs, *stage* set to *0*) Audio Outputs, (*stage* set to *1*): *0* (CH 1), *1* (CH 2)<br>　　　Note that you can choose an input channel or the output, based on the selected *stage*.<br>*volume* – *-80 to 20* (audio level) minus sign precedes negative values.<br>　　　　　*++* increase current value<br>　　　　　*--* decrease current value | | | |
| **K-Config Example** | | | |
| Set the input 3 AUD-LVL to 18:<br>"#AUD-LVL 0,2,18",0x0D | | | |

## 14.7.6.2 VOLUME

| Functions | | Permission | Transparency |
|-----------|--|------------|--------------|
| Set: | **VOLUME** | End User | - |
| Get: | **VOLUME?** | End User | Audio |
| **Description** | | **Syntax** | |
| Set: | Set volume | **#VOLUME**SP*channel,audio_level*CR | |
| Get: | Get volume | **#VOLUME?**SP*channel*CR | |
| **Response** | | | |
| ~nn@**VOLUME**SP*channel,audio_level*SP OK CR LF | | | |
| **Parameters** | | | |
| *channel* –: *0* (Channel 1), *1* (Channel 2)<br>*audio_level* – *-80* to *20* (audio level) minus sign precedes negative values.<br>　　　　　*++* increase current value,<br>　　　　　*--* decrease current value | | | |
| **K-Config Example** | | | |
| Set the output volume to 10:<br>"#VOLUME 10",0x0D | | | |

### 14.7.6.3 MUTE

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `MUTE` | End User | - |
| Get: | `MUTE?` | End User | Audio |
| **Description** | | **Syntax** | |
| Set: | Set audio mute | `#MUTE`SP`channel,mute_mode`CR | |
| Get: | Get audio mute | `#MUTE?`SP`channel`CR | |
| **Response** | | | |
| ~nn@**MUTE**SP`channel,mute_mode`SP OK CR LF | | | |
| **Parameters** | | | |
| `channel` –Output number: *0* (Channel 1), *1* (Channel 2)<br>`mute_mode` – mute status: *0* (Off)=, *1* (On) | | | |
| **K-Config Example** | | | |
| Set channel 2 mute to on:<br>"#MUTE 1,1",0x0D | | | |

### 14.7.7 Video Commands

| Command | Description |
|---|---|
| `VID-RES` | Set/get video resolution |
| `VMUTE` | Enable/disable video on output |

### 14.7.7.1 VID-RES

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | `VID-RES` | End User | Public |
| Get | `VID-RES?` | End User | Video |
| **Description** | | **Syntax** | |
| Set: | Set video resolution | `#VID-RES`SP`p0,p1`CR | |
| Get: | Get video resolution | `#VID-RES?`SP`p0,p1`CR | |
| **Response** | | | |
| ~nn@**VID-RES**SP`p0,p1,video_resolution`CR LF | | | |
| **Parameters** | | | |
| `P0` – *0* (input for get only), *1* (Output),<br>`P1` – *0* (Channel 1), *1* (Channel 2), *2* (Channel 1 + Channel 2, for set only)<br>`Video_resolution` – *0* (Native) to *42* (4K30)<br>See output resolution key codes in Section 14.7.7.3 and input resolution key codes in Section <u>14.7.7.4</u>. | | | |
| **Response triggers** | | | |
| • After execution, response is sent to the com port from which the **Set /Get** was received<br>• After execution, response is sent to all com ports if `VID-RES` was set by any other external control device (button press, device menu and similar) | | | |
| **Notes** | | | |
| The "Set" command is only applicable when *stage 1* (Output) | | | |
| **K-Config Example** | | | |
| Set video resolution on output to 1400x1050 @60Hz:<br>"#VID-RES 1,1,0,19",0x0D | | | |

## 14.7.7.2    VMUTE

| Functions | | Permission | Transparency |
|---|---|---|---|
| Set: | **VMUTE** | End User | - |
| Get: | **VMUTE?** | End User | Audio |
| **Description** | | **Syntax** | |
| Set: | Set enable/disable video on output | **#VMUTE**SP*output_id,flag*CR | |
| Get: | Get video on output status | **#VMUTE?**SP*output_id*CR | |
| **Response** | | | |
| ~nn@**VMUTE**SP*output_id,flag*SPOKCR_LF | | | |
| **Parameters** | | | |
| *output_id* –Output number: *0* (Channel 1), *1* (Channel 2) <br> *flag* – video mute status: *0* (Off), *1* (On) | | | |
| **K-Config Example** | | | |
| Set channel 1 video mute to on: <br> "#VMUTE 0,1",0x0D | | | |

## 14.7.7.3    Output Resolutions Key

| # | Resolution | # | | # | Resolution |
|---|---|---|---|---|---|
| 0 | NATIVE | 15 | 1360x768p60 | 29 | 720p60 |
| 1 | 640x480p60 | 16 | 1366x768p50 | 30 | 1080p23_976 |
| 2 | 640x480p75 | 17 | 1366x768p60 | 31 | 1080p24 |
| 3 | 800x600p50 | 18 | 1400x1050p50 | 32 | 1080p25 |
| 4 | 800x600p60 | 19 | 1400x1050p60 | 33 | 1080p29_97 |
| 5 | 800x600p75 | 20 | 1600x900p60 | 34 | 1080p30 |
| 6 | 1024x768p50 | 21 | 1600x1200p50 | 35 | 1080p50 |
| 7 | 1024x768p60 | 22 | 1600x1200p60 | 36 | 1080p59_94 |
| 8 | 1024x768p75 | 23 | 1680x1050p60 | 37 | 1080p60 |
| 9 | 1280x768p50 | 24 | 1920x1200p60RB | 38 | 1080i50 |
| 10 | 1280x768p60 | 25 | 480p60 | 39 | 1080i60 |
| 11 | 1280x800p60 | 26 | 576p50 | 40 | 2k50 |
| 12 | 1280x1024p50 | 27 | 720p50 | 41 | 2k60 |
| 13 | 1280x1024p60 | 28 | 720p59_94 | 42 | 4k2k30 |
| 14 | 1280x1024p75 | | | | |

## 14.7.7.4 Input Resolutions Key

| # | Resolution | # | Resolution |
|---|---|---|---|
| 0 | NTSC | 34 | 640x350@70 |
| 1 | PALM | 35 | 720x400@70 |
| 2 | PAL60 | 36 | 640x350@85 |
| 3 | N443 | 37 | 640x480@72 |
| 4 | NTSC_4 | 38 | 640x480@75 |
| 5 | SECAM | 39 | 848x480@60 |
| 6 | PAL | 40 | 640x480@85 |
| 7 | PALNC | 41 | 720x400@85 |
| 8 | NTSC_8 | 42 | 800x600@56 |
| 9 | 240p60.05 | 43 | 800x600@60 |
| 10 | 240p59.83 | 44 | 1024x768@43 |
| 11 | 288p50.08 | 45 | 800x600@72 |
| 12 | 288p49.92 | 46 | 800x600@75 |
| 13 | 288p49.76 | 47 | 800x600@85 |
| 14 | 525p60 | 48 | 1024x768@60 |
| 15 | 625p50 | 49 | 1366x768@60 |
| 16 | 720p60 | 50 | 1280x768@60 |
| 17 | 720p50 | 51 | 1024x768@70 |
| 18 | 720p24 | 52 | 1024x768@75 |
| 19 | 720p25 | 53 | 1280x800@6 |
| 20 | 720p30 | 54 | 1024x768@85 |
| 21 | 1080i60 | 55 | 1400x1050@60 |
| 22 | 1080i50 | 56 | 1400x1050@75 |
| 23 | 1080i50_VIC39 | 57 | 1440x900@60 |
| 24 | 1080i100 | 58 | 1152x864@75 |
| 25 | 1080p60 | 59 | 1600x900@60 |
| 26 | 1080p50 | 60 | 1280x1024@60 |
| 27 | 1080p30 | 61 | 1280x1024@75 |
| 28 | 1080p23.976 | 62 | 1280x960@85 |
| 29 | 1080p24 | 63 | 1920x1200@60RB |
| 30 | 1080p25 | 64 | 1280x1024@85 |
| 31 | 2k50 | 65 | 1600x1200@60 |
| 32 | 2k60 | 66 | 1680x1050@60 |
| 33 | 640x480@60 | | |

**VP-778 - VP-778 RS-232 Communication Protocol**

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2. All Kramer fiber optic cables and adapters, all Kramer speakers and Kramer touch panels are covered by a standard one (1) year warranty.

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

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

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

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2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.

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

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

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

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**SAFETY WARNING**
Disconnect the unit from the power supply before opening and servicing

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