KRAMER

USER MANUAL

MODEL:
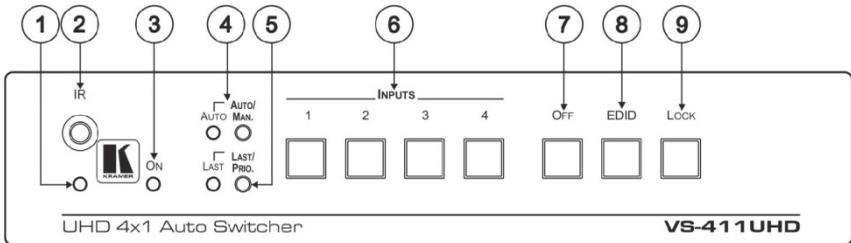
VS-411UHD
UHD 4x1 Auto Switcher

VS-411UHD Quick Start Guide

This guide helps you install and use your **VS-411UHD** for the first time.

Go to **www.kramerav.com/downloads/VS-411UHD** to download the latest user manual and check if firmware upgrades are available.
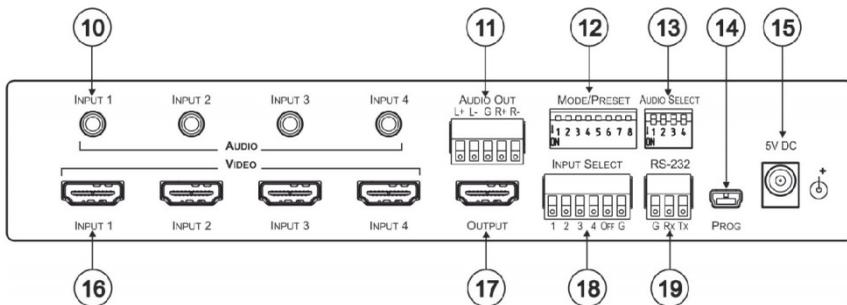
Step 1: Check what's in the box

- ☑ **VS-411UHD** UHD 4x1 Auto Switcher
- ☑ 4 Rubber feet
- ☑ IR remote control transmitter with batteries
- ☑ 1 Power supply (5V DC)
- ☑ 1 Quick start guide

Step 2: Get to know your VS-411UHD

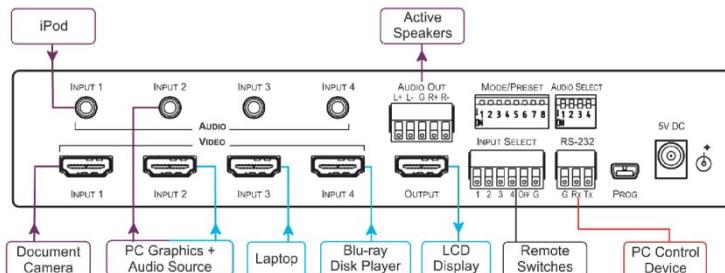| #	Feature	Function
1	IR LED	Lights when the unit accepts IR remote commands.
2	IR Receiver	Accepts IR remote commands.
3	ON LED	Lights when power is connected to the unit.
4	AUTO/MAN. Selector Button and LED	Toggle switch to select between automatic (LED on) or manual switching (LED off)
5	LAST/PRIO. Selector Button and LED	When in the AUTO mode, switch toggles to select switching to the last connected input (LED on) or the highest priority input (LED off).
6	INPUTS Selector Buttons	Press the INPUT button to select the input to switch to the output (from 1 to 4). Button LED indication: A selected input – the button illuminates. An active input that is not selected – the button is dim. A non-active button that is not selected – the button is dark.
7	OFF Button	Press to mute the video output (lit when muted).
8	EDID Button	Press to copy the EDID (button is illuminated).
9	LOCK Button	Press to lock the front panel buttons (button is illuminated).

#	Feature	Function
10	AUDIO INPUT 3.5mm Mini Jack	Connect to the unbalanced stereo audio inputs (from 1 to 4).
11	AUDIO BALANCED OUT Terminal Block Connector	Connect the balanced stereo audio output to a balanced stereo audio acceptor.
12	MODE/PRESET DIP-switches	See Step 6.
13	AUDIO SELECT DIP-switches	Set audio embedding for inputs 1 to 4 (the switch number corresponds to the input number): • Set down (ON) to always embed the analog audio. • Set up (OFF) embeds analog audio only if the HDMI video does not have audio (DVI), see Step 6.
14	PROG mini-USB Port	Connects to a PC to upgrade the firmware.
15	5V DC	+5V DC connector for powering the unit.
16	INPUT HDMI Connectors	Connect to the HDMI sources (from 1 to 4).
17	OUTPUT HDMI Connector	Connect to the HDMI acceptor.
18	INPUT SELECT Terminal Block Connector	Connect to contact closure switches, see Step 6.
19	RS-232 Terminal Block Connector	Connect to the PC or the Remote Controller.

Step 3: Install the VS-411UHD

Attach the rubber feet and place on a table or mount the **VS-411UHD** in a rack (using an optional **RK-1** rack mount).

Step 4: Connect the inputs and outputs

Always switch OFF the power on each device before connecting it to your **VS-411UHD**. For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the **VS-411UHD**.

Step 5: Connect the power

Connect the 5V DC power adapter to the **VS-411UHD** and plug it into the mains electricity.

Step 6: Set the DIP-switches
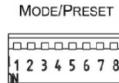
MODE/PRESET

AUDIO SELECT

All DIP-switches are off by default.

Set the Mode/Preset DIP-switches as shown in the following table:

1 2 3 4 5 6 7 8
IN

Set the Audio Select DIP-switches as shown in the lower table:

1 2 3 4
ON

DIP	Function	Off (Up)	On (Down)
1	Audio EDID	Pass audio EDID of sink.	Limit to 2-CH LPCM (effective only after DIP 3 is set to on (down)).
2	Color EDID	Pass deep color parameter of sink.	Limit to RGB 8bpp (effective only after DIP 3 is set to on (down)).
3	Lock EDID	Pass EDID of sink.	Lock current display EDID and the current settings of DIPs 1 and 2 (the settings of DIPs 1 and 2 cannot be changed when DIP 3 is locked). This state also allows copying the default EDID or an EDID file to the inputs (if using EDID Designer, refresh after copying).
4	HDCP	Enable HDCP support . When Off, if the output supports HDCP, the input declares HDCP support. It then handles HDCP on the output and input actively. If the output does not support HDCP then the input does not support HDCP.	Disable HDCP support. When On, the device does not support HDCP on its input, even if HDCP is detected on the output.
5	ARC or Step-in for the 1st HDMI input	Step-in	ARC audio
6	Analog Output Audio From	Source	ARC audio
7	Output Off	Disable (to support audio only embedding).	Enable
8	Output Off Delay Settings	15sec default (configurable).	15min

Audio Select DIP-switches

DIP #	Function	Description	
		Off (Up)	On (Down)
1	Input 1 audio embedding	Embed analog audio only if the HDMI video does not have audio (DVI).	Always embed analog audio.
2	Input 2 audio embedding		
3	Input 3 audio embedding		
4	Input 4 audio embedding		

Step 7: Operation

Manual Switch Mode

In Manual switch mode, the **VS-411UHD** does not automatically switch to another channel even if an input signal is not detected on the manually selected input.

To select the Manual switch mode:

1. Press the AUTO/MAN. button. The Auto LED turns off.

2. Press an INPUTS button (1 to 4) to route this input to the HDMI output. The keys respond as follows:

   Input LED bright: input selected.

   Input LED dim: input active and not selected.

   Input LED off: input is not active and not selected.

Auto Switch Mode

In Auto switch mode, the **VS-411UHD** automatically switches one of four HDMI inputs to a predefined or the last connected input whenever the currently active video signal is interrupted or whenever a higher-priority video signal is detected.

To select Auto switch mode:

1. Press the AUTO/MAN. button to turn the Auto LED on.

2. Press the LAST/PRIO. button to select an auto switch mode:

   Last connected (LAST LED on) – The device always switches to a newly detected active video source. When the device is powered on, the output switches to the highest priority input.

   Priority (LAST LED off) – The device always switches to the highest priority input source. First priority is Input 1 then 2, 3, and 4.

Manual Override Mode

Auto switch mode can be overridden by a manual command, such as pressing an input button or sending a control command. In such a case, the system switches to the manually selected source. If this manually selected source is not active, the system waits a set amount of time (10 seconds, default; can be changed using Protocol 3000 commands) and then switches back to auto mode. Manual override selection is not stored in non-volatile memory.

Step 8: Technical specifications

INPUTS:	4 HDMI connectors, 4 unbalanced stereo audio on 3.5mm mini jacks
OUTPUTS:	1 HDMI connector, 1 balanced stereo audio on 5-pin terminal block
PORTS:	1 RS-232 on a 3-pin terminal block, 1 mini USB for programming
COMPLIANCE WITH HDMI STANDARD:	HDMI 1.4, Deep Color, 3D, ARC, up to 7.1 uncompressed audio channels
MAX. DATA RATE:	8.91Gbps (2.97Gbps per graphic channel)
SUPPORTED RESOLUTIONS:	Up to 4K x 2K, 4K@60Hz (4:2:0)
CONTROLS:	Front panel buttons, contact closure, IR, RS-232 Protocol 3000
SOFTWARE SUPPORT:	Protocol 3000, EDID Designer, K-Upload
POWER CONSUMPTION:	5V DC, 500mA
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
DIMENSIONS:	21.5cm x16.3cm x 4.4cm (8.4" x 6.4" x 7.2") W, D, H
WEIGHT:	0.89kg (1.96lbs) approx.
SHIPPING DIMENSIONS:	31.5cm x 21.2cm x 7.2cm (12.4" x 8.4" x 2.8") W, D, H
SHIPPING WEIGHT:	1.49kg (3.28lbs) approx.
INCLUDED ACCESSORIES:	Power adapter, IR remote control
OPTIONS:	RK-1 19" rack adapter

Contents

Figures

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!

Our 1,000-plus different models now appear INPUT 14 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Video Products; GROUP 12: Digital Signage; GROUP 13: Audio; and GROUP 14: Collaboration.

Congratulations on purchasing your Kramer **VS-411UHD** UHD 4x1 Auto Switcher, which is ideal for the following typical applications:

- Mid- to small-sized meeting/conference rooms
- Educational lecture rooms
- Systems that require automatic HDMI routing
- Presentation and multimedia applications

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/VS-411UHD 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:

- For optimum range and performance, use the recommended Kramer cables available at www.kramerav.com/product/VS-411UHD

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

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

- Position your Kramer **VS-411UHD** 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 Kramer Electronics power supply that is provided with the unit
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

The **VS-411UHD** is an automatic switcher for HDMI (up to 4K@60Hz (4:2:0)) and analog audio signals. The unit automatically switches one of four HDMI inputs to a predefined or the last connected input whenever the currently active video signal is interrupted or whenever a higher-priority video signal is detected. It also supports Kramer's Step-in over HDMI technology.

The unit can embed analog audio to an HDMI signal and can extract the audio from either an input HDMI signal or an output Audio Return Channel (ARC) HDMI signal. The **VS-411UHD** can output an analog audio source on the HDMI output even when an HDMI source is not connected and enters sleep mode when no input is detected.

The **VS-411UHD** features:

- Maximum data rate 8.91Gbps (2.97Gbps per graphic channel)
- Resolution support for up to 4K@60Hz (4:2:0) UHD
- Supports Kramer Step-In over HDMI technology
- HDTV compatible
- Active switching – selectable manual or fast auto switching according to last connected or preset priority
- HDMI 1.4, HDCP and DVI 1.0 compliant
- HDMI 1.4 support for Deep Color, 3D, ARC, up to 7.1 uncompressed audio channels
- HDMI 1 input supports CEC and ARC
- HDMI ARC de-embedding from output to balanced stereo audio line out, uncompressed
- Automatic video input detection and selection
- Auto-power off when no HDMI input for 10 seconds (selectable)
- HDCP on/off switching
- EDID configuration options

- Default EDID

- Contact closure for remote manual switching override

- Audio embedding/de-embedding

- Analog audio input per port

- A LOCK button to prevent tampering

- Firmware upgrade over RS-232, mini-USB

- Support for Protocol 3000, EDID Designer, K-Upload via RS-232

- Varied control options – front panel buttons, contact closure, IR, RS-232
  Protocol 3000

3.1 Defining the VS-411UHD UHD 4x1 Auto Switcher

This section defines the **VS-411UHD**.
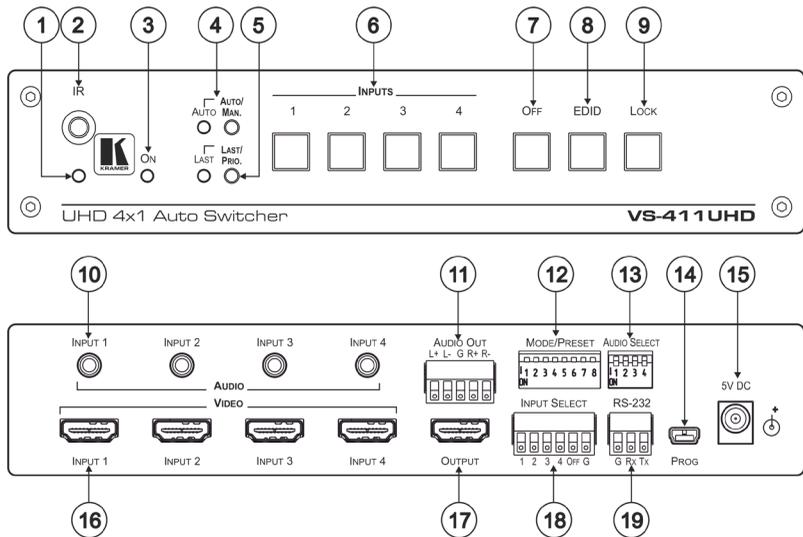
Figure 1: VS-411UHD 4x1 Auto Switcher

#	Feature		Function
1	IR LED		Lights yellow when the unit accepts IR remote commands.
2	IR Receiver		Accepts IR remote commands.
3	ON LED		Lights when power is connected to the unit.
4	AUTO/MAN Selector Button and LED		Toggle switch to select between automatic (LED on) or manual switching (LED off).
5	LAST/PRIO. Selector Button and LED		When in the AUTO mode, toggle switch to select switching to the last connected input (LED on) or the highest priority input (LED off).
6	INPUT Select Buttons		Press the INPUT button to select the input to switch to the output (from 1 to 4). Button LED indication: A selected input – the button illuminates. An active input that is not selected – the button is dim. A non-active input that is not selected – the button is dark.
7	OFF Button		Press to mute the video output (lit when muted).
8	EDID Button		Press to copy the EDID (button is lit), see Section 5.4.
9	LOCK Button		Press to lock the front panel buttons (button is lit).
10	AUDIO	INPUT 3.5mm Mini Jack	Connect to the unbalanced stereo audio inputs (from 1 to 4).
11		BALANCED OUT Terminal Block Connector	Connect the balanced stereo audio output to a balanced stereo audio acceptor.
12	MODE/PRESET DIP-switches		See Section 4.2.1.
13	AUDIO SELECT DIP-switches		Set audio embedding for inputs 1 to 4 (the switch number corresponds to the input number): • Set down (ON) to always embed the analog audio. • Set up (OFF) embeds analog audio only if the HDMI video does not have audio (DVI), see Section 4.2.2.
14	PROG mini-USB Port		Connects to a PC to upgrade the firmware.
15	5V DC		+5V DC connector for powering the unit.
16	INPUT HDMI Connectors		Connect to the HDMI sources (from 1 to 4).
17	OUTPUT HDMI Connector		Connect to the HDMI acceptor.
18	INPUT SELECT Terminal Block		Connects to contact closure switches, see Section 6.2.
19	RS-232 Terminal Block Connector		Connect to the PC or the Remote Controller.

4 Connecting the VS-411UHD

> Always switch off the power to each device before connecting it to your **VS-411UHD**. After connecting your **VS-411UHD**, 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 **VS-411UHD** as illustrated in the example in Figure 2:

1. Connect an HDMI source (for example, a laptop) to the INPUT 1 HDMI connector and connect an analog audio source (for example, an audio player) to the INPUT 1 3.5 mini-jack connector.
   You can also connect a DVD player with a DVI connector, using a DVI-HDMI adapter to transfer video signals

2. Connect HDMI sources (examples: document camera, Blu-ray player, or PC) to the INPUT 2, 3, 4 HDMI connectors and connect audio inputs as required to the INPUT 2, 3, 4 3.5 mini-jack connectors.

3. Connect the OUT HDMI connector to the HDMI acceptor (for example, an LCD display).

4. Connect the AUDIO OUT terminal block connector to a balanced stereo audio acceptor (for example, active speakers).

5. Set the AUDIO SELECT DIP-switches (see Section 5.1.2)

6. Set the MODE/PRESET DIP-switches (see Section 5.1.2)

7. If required, connect a PC and/or controller to the RS-232 terminal block connector (see Section 4.1).

8. If required, connect the contact closure terminal block connectors (see Section 6.2).

9. Connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 2).
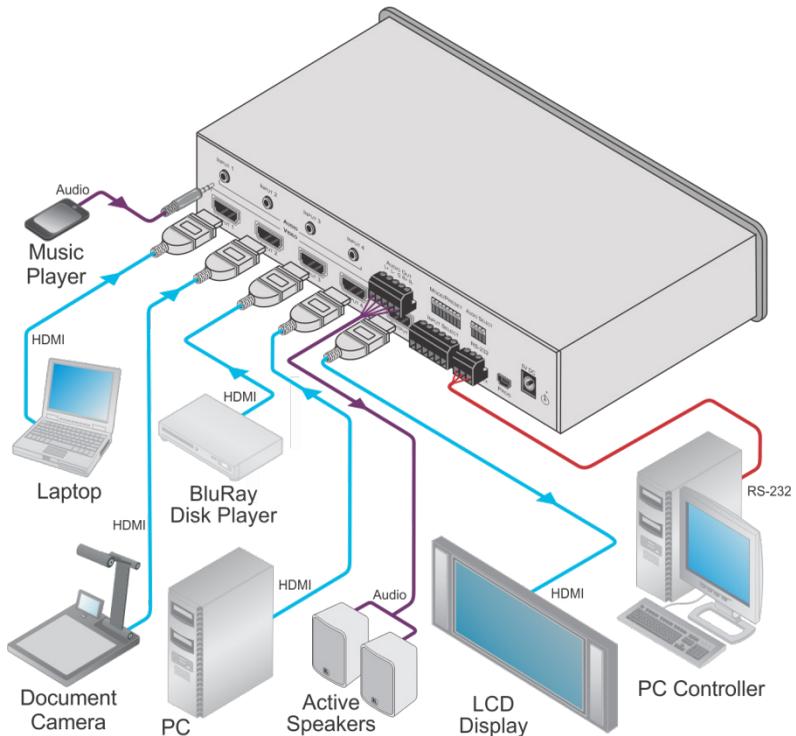
Figure 2: Connecting the VS-411UHD UHD 4x1 Auto Switcher

4.1 Connecting a Serial Controller to the VS-411UHD via RS-232

The **VS-411UHD** operates at two baud rates – 9600 (default) and 115,200 (see all communication parameters in <u>Section 9.1</u>).

To connect a serial controller to the VS-411UHD:

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

    - Pin 2 to the TX pin on the **VS-411UHD** RS-232 terminal block

    - Pin 3 to the RX pin on the **VS-411UHD** RS-232 terminal block

    - Pin 5 to the GND pin on the **VS-411UHD** RS-232 terminal block

4.2 Setting the DIP-Switches

The DIP-switches dictate the behavior of the **VS-411UHD**. All DIP-switches are off by default.

4.2.1 Mode/Preset DIP-Switches

DIP	Function	Off (Up)	On (Down)
1	Audio EDID	Pass audio EDID of sink.	Limit to 2-CH LPCM (effective only after DIP 3 is set to on (down)).
2	Color EDID	Pass deep color parameter of sink.	Limit to RGB 8bpp (effective only after DIP 3 is set to on (down)).
3	Lock EDID	Pass EDID of sink.	Lock current display EDID and the current settings of DIPs 1 and 2 (the settings of DIPs 1 and 2 cannot be changed when DIP 3 is locked). This state also allows copying the default EDID or an EDID file to the inputs (if using EDID Designer, refresh after copying).
4	HDCP	Enable HDCP support. When Off, if the output supports HDCP, the input declares HDCP support. It then handles HDCP on the output and input actively. If the output does not support HDCP then the input does not support HDCP.	Disable HDCP support. When On, the device does not support HDCP on its input, even if HDCP is detected on the output.
5	ARC or Step-in for the 1st HDMI input	Step-in	ARC audio
6	Analog Output Audio From	Source	ARC audio
7	Output Off	Disable (to support audio only embedding).	Enable
8	Output Off Delay Settings	15sec default (configurable).	15min

4.2.2 Audio Select DIP-Switches

AUDIO SELECT

Figure 3: AUDIO SELECT DIP-Switches

DIP #	Function	Description	
		Off (Up)	On (Down)
1	Input 1 audio embedding	Embed analog audio only if the HDMI video does not have audio.	Always embed analog audio.
2	Input 2 audio embedding		
3	Input 3 audio embedding		
4	Input 4 audio embedding		

5 Operating the VS-411UHD

This section describes the **VS-411UHD** setup.

5.1 Switching – Manual and Auto

Switching can be performed automatically or manually using the device's keypad, remote control, or control commands. This section describes using the keypad buttons to select Auto or Manual switch modes. The same procedure can also be used for controlling switching via the remote control. For information about switching via control commands, see Section 10.3.

5.1.1 The Manual Switching Mode

In the manual mode, the **VS-411UHD** acts as a regular switcher, switching the input video and audio signals to the output via the four front panel INPUT buttons.

To select the Manual switch mode:

1. Press the AUTO/MANUAL button to turn the AUTO LED off.

2. Press the INPUT1 to INPUT4 button to route this input to the HDMI output. The keys respond as follows:

   - Input LED bright: input active and selected

   - Input LED dim: input active and not selected

   - Input LED off: input is not active and not selected

5.1.2 Auto Switch Mode

In Auto switch mode, the **VS-411UHD** automatically switches one of four HDMI inputs to a predefined or the last connected input whenever the currently active video signal is interrupted or whenever a higher-priority video signal is detected.

To select Auto switch mode:

1. Press the AUTO/MAN. button to turn the AUTO LED on.

2. Press the LAST/PRIO. button to select an auto switch mode:

   - Last connected (LAST LED on) – The device always switches to a newly detected active video source. When the device is powered on, the output switches to the highest priority input

   - Priority (LAST LED off) – The device always switches to the highest priority input source. The default priority is Input 1 then Input 2.

5.1.3 Manual Override Mode

Auto switch mode can be overridden by a manual command, such as pressing an input button or sending a control command. In such a case, the system switches to the manually selected source. If this manually selected source is not active, the system waits a set amount of time (10 seconds, default) and then switches back to auto mode. Manual override selection is not stored in non-volatile memory.

5.2 Setting the Switching Speed

The **VS-411UHD** supports setting normal and fast (default) switching speeds.

To set switching speed modes:

1. Disconnect device power.

2. Press and hold one of the following buttons together with the OFF button:

   - INPUT 1 button – for setting fast switching speed mode.

   - INPUT 2 button – for setting normal switching speed mode.

3. Power the device on.
   The device switching speed is modified.

5.3 Muting the Output

- Press the OFF button to mute the audio and video outputs

5.4 Copying the EDID

The EDID is a data structure transmitted by the display that enables the **VS-411UHD** to recognize the display connected to the output. The **VS-411UHD** acquires and stores the EDID to make reconnection to the display effortless.

When the device is first powered on, it has default EDID loaded. The device automatically reads and saves the first read EDID. Use DIP-switches 1-3 to set EDID functionality (see Section 4.2).

While copying EDID data, the input port's HPD function changes from Low to High which may affect the channel's auto-switching.

> The device automatically recognizes EDID differences between input and output channels based on parts of the EDID data, including manufacturer, serial number, and first block check-sum information. EDID data is not copied if any difference is recognized.
>
> Note: If a corrupted EDID is copied, the device loads the default EDID on all inputs.

5.5 Setting the 5V Output Time Delay

Use DIP-switch 8 to set the delay time. Off (Up) delays 15 seconds, On (Down) delays 15 minutes. A Protocol 3000 command can modify the delay time.

When there is no signal clock or 5V input on all inputs for the set delay, the device shuts down the 5V output.

5.6 Setting HDCP Capability

The **VS-411UHD** supports HDCP communication automatically, by default. When HDCP is detected in the input signal, it is enabled in the output signal. You can also disable HDCP support using DIP-switch 4 (see Section 4.2). Enabling or disabling HDCP support is universal for all inputs.

5.7 Setting Audio Output

The **VS-411UHD** enables customizing the audio output by embedding audio in HDMI, de-embedding HDMI ARC from output to the uncompressed balanced stereo audio line out, or routing the HDMI / analog inputs to the uncompressed balanced stereo audio line out.

5.7.1 Embedding Audio in HDMI

The **VS-411UHD** can output audio to the HDMI Out port from the original HDMI input or the Analog unbalanced 3.5mm audio input, by embedding it in the HDMI input signal. The **VS-411UHD** enables setting the audio output separately for each input using DIP-switches 5 and 6 (see Section 4.2).

> An Input 1 analog audio signal can only be embedded in the Input 1 HDMI signal.
>
> An Input 2 analog audio signal can only be embedded in the Input 2 HDMI signal.

5.7.2 Outputting Audio from ARC or Device Inputs

The **VS-411UHD** can output audio to the balanced stereo Audio Out terminal block from the following input sources:

- ARC – In this mode, the device does not enable embedding audio in the HDMI signal.

- HDMI inputs / Analog unbalanced 3.5mm audio inputs – In this mode, the balanced stereo Audio Out terminal block and the HDMI Out port both output audio. The Audio Out terminal block mutes the audio when the input audio signal is not LPCM.

Use DIP-switch 7 to set output to ARC / device inputs (see Section 4.2).

> When de-embedding multichannel audio, the device outputs FL (front left) and FR (front right) channels only and cuts the rest of the audio channels.

5.8 Using the Remote Control

You can use the **RC-IR3** wireless remote control to control the **VS-411UHD** via the built-in IR receiver on the front panel. For more information, see www.kramerav.com/Product/RC-IR3.

5.9 Step-In Support

The **VS-411UHD** supports programmable step-in functionality when used in conjunction with compatible step-in devices, such as the **SID-X3N** and **DIP-31** (using an HDMI cable that supports HEC, the HDMI Ethernet Channel).

When ARC mode is enabled, Input 1 step-in mode is disabled. If you require step-in mode on Input 1, set the audio output to the device inputs (see Section 5.7.2).

5.10 Using VCOM on USB

USB can work as a port for virtual com (VCOM). Verify that the USB port on the PC that connects to the **VS-411UHD** is configured as a VCOM port. You may need to install a driver to do this. Use a tool such as Hercules or K-Config to use Protocol 3000 over USB. For more information on using the commands see Section 10.

5.11 Upgrading the Firmware

The **VS-411UHD** can be upgraded via USB or RS-232.

For instructions on upgrading the firmware, see "*K-Upload Software User Guide*" (k.kramerav.com/support/download.asp?f=39700).

6 Controlling the VS-411UHD

The **VS-411UHD** can be controlled via:

- The front panel buttons (see Section 6.1)

- Contact closure (see Section 6.2)

- The RC-IR3 Remote control transmitter (see Section 6.3)

- RS-232 port (see Section 6.4)

6.1 Using the Front Panel Buttons

The **VS-411UHD** includes the following front panel buttons:

- The AUTO/MAN. button, toggling between the Auto and the manual mode (see Section 5.1)

- The LAST/PRIO. button, toggling between set priorities or last connected modes (see Section 5.1.2)

- Front Panel INPUT buttons (see Section 3.1)

- The OFF button to mute the video output

- The EDID button to copy EDID (see Section 5.4)

- The LOCK button to lock the front panel buttons

The front panel button LEDs behave as follows:

- Bright red: an active input signal is detected and selected

- Dim red: that input is active, but not selected

- Off: no signal is detected (or the signal is not active)
  If a non-active signal is selected, the display appears black

6.2 Switching via the Terminal Block Connector

The INPUT SELECT terminal block connector includes five input pins and a G pin for selecting an input:

- 1 – Switch to Input 1
- 2 – Switch to Input 2
- 3 – Switch to Input 3
- 4 – Switch to Input 4
- OFF – Mutes the HDMI output

For example, you may override (equivalent to pressing a different input button) the presently routed input by using the remote control contact closure. To do so, connect the appropriate input number (input 1, 2, 3 or 4) pin on the REMOTE terminal block connector to the G (Ground) pin, as Figure 4 illustrates.

To disconnect the inputs from the output, connect the OFF pin on the REMOTE terminal block connector to the G (Ground) pin, as Figure 4 illustrates.

> When in the manual mode (AUTO front panel LED is off), you can switch an input to the output using the front panel INPUT SELECT button.
>
> Note that unless the connection is permanent, the **VS-411UHD** reverts to an automatic switcher when the connection is removed.

> **DO NOT** Connect more than one pin to the Ground pin at the same time.
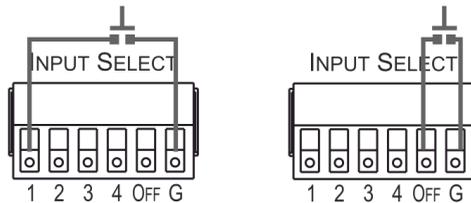
To select HDMI 1 (2, 3, 4), momentarily connect the INPUT SELECT 1 (2, 3, 4) pin to the G pin

To disconnect all the inputs from the output, momentarily connect the INPUT SELECT OFF pin to the G pin

Figure 4: Connecting the Contact Closure Remote Control Pins

6.3 Using the RC-IR3 Remote Control Transmitter with the VS-411UHD

You can control the **VS-411UHD** via the Kramer **RC-IR3** Remote Control Transmitter.

To switch an input to the output:

- Press key 1 (2, 3, 4) to switch INPUT 1 (2, 3, 4) to the output

To mute audio and video on the output:

- Press the OFF key to disconnect the output

The IR LED behaves as follows:

- When the device is powered on, the IR LED turns on for a short time and then turns off
- Before finding the sink, the LED is off
- After finding the sink, the LED is on
- When receiving information, the LED flashes

6.4 Connecting to the VS-411UHD via RS-232

Connect the RS-232 Terminal block connector on the product to the RS-232 9-pin D-sub port on your PC/controlled device to control the **VS-411UHD**, as shown in Figure 5:

Connect this pin on the terminal block connector	To this pin on the 9-pin D-sub Connector
Tx	Pin 2
Rx	Pin 3
GND	Pin 5
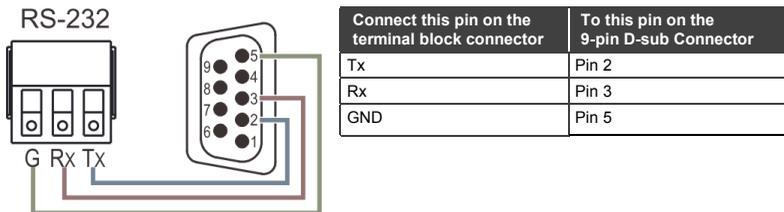
Figure 5: RS-232 Pinout

6.5　Performing a Factory Reset

Factory reset returns all the parameters of the device to their factory default settings.

To perform a factory reset:

1. Disconnect device power.

2. Press and hold INPUT 1 while reconnecting device power.
   All indicators flash while resetting to the factory default parameters.

3. When all the lights turn off the reset is complete.

7 Technical Specifications

INPUTS:	4 HDMI connectors, 4 unbalanced stereo audio on 3.5mm mini jacks
ANALOG AUDIO UNBALANCED INPUT:	Nominal level: 316mVRMS, Maximum level: 1VRMS, Impedance: 10kΩ.
OUTPUTS:	1 HDMI connector, 1 balanced stereo audio on 5-pin terminal block
ANALOG AUDIO BALANCED OUTPUT:	Nominal level: 316mVRMS, Maximum level: 1VRMS, Impedance: 150Ω.
PORTS:	1 RS-232 on a 3-pin terminal block, 1 mini USB for programming
COMPLIANCE WITH HDMI STANDARD:	HDMI 1.4, Deep Color, 3D, ARC, up to 7.1 uncompressed audio channels, CEC
MAX. DATA RATE:	8.91Gbps (2.97Gbps per graphic channel)
SUPPORTED RESOLUTIONS:	Up to 4K x 2K, 4K@60Hz (4:2:0)
CONTROLS:	Front panel buttons, contact closure, IR, RS-232 Protocol 3000
SOFTWARE SUPPORT:	Protocol 3000, EDID Designer, K-Upload
POWER CONSUMPTION:	5V DC, 500mA
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
DIMENSIONS:	21.5cm x16.3cm x 4.4cm (8.4" x 6.4" x 7.2") W, D, H
WEIGHT:	0.89kg (1.96lbs) approx.
SHIPPING DIMENSIONS:	31.5cm x 21.2cm x 7.2cm (12.4" x 8.4" x 2.8") W, D, H
SHIPPING WEIGHT:	1.49kg (3.28lbs) approx.
INCLUDED ACCESSORIES:	Power adapter, IR remote control
OPTIONS:	RK-1 19" rack adapter
Specifications are subject to change without notice at www.kramerav.com	

8   Supported Resolutions

Resolution	Refresh Rate
640 x 480p (59.95Hz is available on quantum 780B)	85Hz; 75Hz; 72Hz; 60Hz; 59.95Hz
720 x x480p	60Hz
720 x x576p	50Hz
800 x 600p	85Hz; 75Hz; 72Hz; 60Hz
848 x 480p	60Hz
852 x 480p (available on quantum 780B)	60Hz
1024 x 768p	85Hz; 75Hz; 70Hz; 60Hz
1280 x 960	60Hz
1280 x 1024p	75Hz; 60Hz
1280 x 768p (available on quantum 780B)	60Hz
1280x800p	60Hz
1920 x 1080p	50Hz; 60Hz; 30Hz; 24Hz;
1920 x 1080p	60Hz;
1920 x 1080i	50Hz; 60Hz;
1600 x 1200p	60Hz
1920 x 1200p	
1600 x 900p	60Hz
1152 x 864p	75Hz
1440 x 900p	60Hz
1680 x 1050p	60Hz
1360 x 768p	60Hz
1366 x 768	60Hz; 50Hz
1400 x 1050p	60Hz
720 x 480i (available on quantum 780B)	30Hz
3840 x 2160	30Hz; 25Hz; 24Hz; 60Hz 4:2:0
4096 x 2160	24Hz

9 Default Settings

The **VS-411UHD** has the following default settings for communication, first power on and EDID.

9.1 Default Communication Settings

RS-232	
Protocol 3000 (Default)	
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Command Format	ASCII

9.2 First Power On Default Settings

Parameter	Value
Out HDCP mode	Follow
Communication Format	KMR3000 (KMR device)
Close Output 5v Time	15sec
Current Input Source Port	Input port 1
Manual/Auto Switch Mode	Auto mode
Pr/Lc Switch Mode	Priority mode
ARC/De-embed Audio Out	DE-embed audio out
RS-232 Connection	CPU
Input Port HDCP	All ON
Kramer 3000 Model Name	'V', 'S', '-', '4', '1', '1', 'U', 'H', 'D'
EDID	Default
USB for Virtual Com	Virtual Com
IP Address	192.168.1.39
Mask Number	255.255.0.0
Gateway Number	192.168.0.254
DHCP	Disabled (OFF)

9.3   Default EDID

Monitor
  Model name............... VS-411UHD
  Manufacturer............. KMR
  Plug and Play ID......... KMR03ED
  Serial number............ 1
  Manufacture date......... 2015, ISO week 20
  Filter driver............ None

  EDID revision............ 1.3
  Input signal type........ Digital (HDMI-a)
  Color bit depth.......... Undefined
  Display type............. RGB color
  Screen size.............. 700 x 390 mm (31.5 in)
  Power management......... Not supported
  Extension blocs.......... 1 (CEA-EXT)

  DDC/CI.................. Not supported

Color characteristics
  Default color space...... Non-sRGB
  Display gamma............ 2.20
  Red chromaticity......... Rx 0.640 - Ry 0.341
  Green chromaticity....... Gx 0.286 - Gy 0.610
  Blue chromaticity........ Bx 0.146 - By 0.069
  White point (default).... Wx 0.284 - Wy 0.293
  Additional descriptors... None

Timing characteristics
  Horizontal scan range.... 31-94kHz
  Vertical scan range...... 50-85Hz
  Video bandwidth.......... 170MHz
  CVT standard............. Not supported
  GTF standard............. Not supported
  Additional descriptors... None
  Preferred timing......... Yes
  Native/preferred timing.. 1280x720p at 60Hz
    Modeline............... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
  Detailed timing #1....... 1920x1080p at 60Hz (16:9)
    Modeline............... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync

Standard timings supported
     720 x 400p at 70Hz - IBM VGA
     720 x 400p at 88Hz - IBM XGA2
     640 x 480p at 60Hz - IBM VGA
     640 x 480p at 67Hz - Apple Mac II
     640 x 480p at 72Hz - VESA
     640 x 480p at 75Hz - VESA
     800 x 600p at 56Hz - VESA
     800 x 600p at 60Hz - VESA
     800 x 600p at 72Hz - VESA
     800 x 600p at 75Hz - VESA
     832 x 624p at 75Hz - Apple Mac II
    1024 x 768i at 87Hz - IBM
    1024 x 768p at 60Hz - VESA
    1024 x 768p at 70Hz - VESA
    1024 x 768p at 75Hz - VESA
    1280 x 1024p at 75Hz - VESA
    1152 x 870p at 75Hz - Apple Mac II
    1280 x 720p at 60Hz - VESA STD
    1280 x 800p at 60Hz - VESA STD
    1440 x 900p at 60Hz - VESA STD
    1280 x 960p at 60Hz - VESA STD
    1280 x 1024p at 60Hz - VESA STD
    1400 x 1050p at 60Hz - VESA STD
    1680 x 1050p at 60Hz - VESA STD
    1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
  Revision number.......... 3
  IT underscan............. Not supported
  Basic audio............. Supported
  YCbCr 4:4:4............. Not supported
  YCbCr 4:2:2............. Not supported
  Native formats........... 1
  Detailed timing #1....... 720x480p at 60Hz (4:3)
    Modeline.............. "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
  Detailed timing #2....... 1920x1080i at 60Hz (16:9)
    Modeline.............. "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #3....... 1920x1080i at 50Hz (16:9)
    Modeline.............. "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
  Detailed timing #4....... 1280x720p at 60Hz (16:9)
    Modeline.............. "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
  Detailed timing #5....... 1280x720p at 50Hz (16:9)
    Modeline.............. "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

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

CE audio data (formats supported)
  LPCM   2-channel, 24-bits   at 44/48 kHz

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

CE vendor specific data (VSDB)
  IEEE registration number. 0x000C03
  CEC physical address..... 1.0.0.0
  Maximum TMDS clock....... 165MHz

Report information
  Date generated........... 25/07/2016
  Software revision........ 2.70.0.989
  Data source............. Real-time 0x0071
  Operating system......... 6.1.7601.2.Service Pack 1

Raw data
00,FF,FF,FF,FF,FF,FF,00,2D,B2,ED,03,01,00,00,00,14,19,01,03,80,34,20,78,E2,B3,25,AC,51,30,B4,26,
10,50,54,FF,FF,80,81,8F,81,99,A9,40,61,59,45,59,31,59,71,4A,81,40,01,1D,00,72,51,D0,1E,20,6E,28,
55,00,07,44,21,00,00,1E,00,00,00,FF,00,32,39,35,2D,38,38,33,34,35,30,31,30,30,00,00,00,FC,00,56,
53,2D,34,31,31,55,48,44,00,00,00,00,00,00,00,FD,00,38,4C,1E,53,11,00,0A,20,20,20,20,20,20,01,41,
02,03,1B,C1,23,09,07,07,48,10,05,84,03,02,07,16,01,65,03,0C,00,10,00,83,01,00,00,02,3A,80,18,71,
38,2D,40,58,2C,45,00,07,44,21,00,00,1E,01,1D,80,18,71,1C,16,20,58,2C,25,00,07,44,21,00,00,9E,01,
1D,00,72,51,D0,1E,20,6E,28,55,00,07,44,21,00,00,1E,8C,0A,D0,8A,20,E0,2D,10,10,3E,96,00,07,44,21,
00,00,18,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,77

10   Protocol 3000

The **VS-411UHD** can be operated using the Kramer Protocol 3000 serial commands. The command framing varies according to how you interface with the **VS-411UHD**. 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:

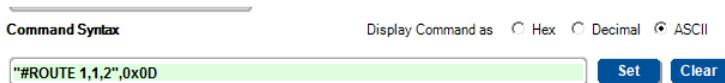- Terminal communication software, such as Hercules:
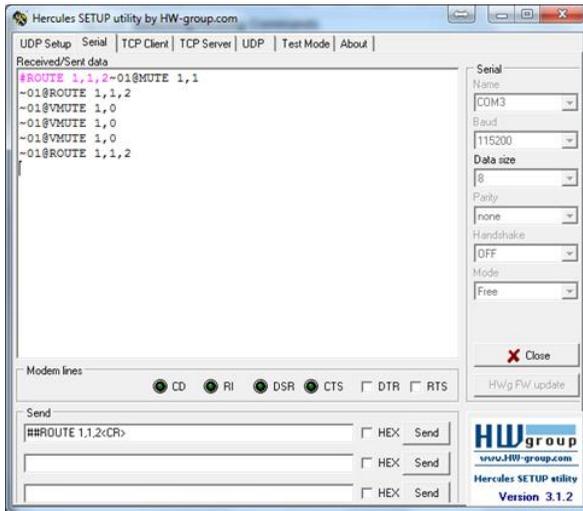
> The framing of the command varies according to the terminal communication software. This command is used for demonstration purposes only and its syntax may vary per device.

- K-Touch Builder (Kramer software):

- As a driver in K-Config (Kramer configuration software):

Command Syntax	Display Command as	○ Hex ○ Decimal ● ASCII

`"#ROUTE 1,1,2",0x0D`   [Set] [Clear]

You can enter commands directly using terminal communication software (e.g., Hercules) by connecting a PC to the serial port on the **VS-411UHD**. 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

- General syntax used for Protocol 3000 commands, see

- Protocol 3000 commands available for the **VS-411UHD**, see

10.1 Understanding Protocol 3000

Protocol 3000 commands are structured according to the following:

- **Command –** A sequence of ASCII letters (`A-Z`, `a-z` and `-`). A command and its parameters must be separated by at least one space.

- **Parameters –** A sequence of alphanumeric ASCII characters (`0-9`, `A-Z`, `a-z` and some special characters for specific commands). Parameters are separated by commas.

- **Message string –** Every command entered as part of a message string begins with a message starting character and ends with a message closing character.

  > A string can contain more than one command. Commands are separated by a pipe (`|`) character.
  >
  > The maximum string length is 64 characters.

- **Message starting character:**

  - `#` – For host command/query

- ~ – For device response

- **Device address** – K-NET Device ID followed by @ (optional, K-NET only)

- **Query sign** – ? follows some commands to define a query request

- **Message closing character:**

  - `CR` – Carriage return for host messages (ASCII 13)

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

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

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

10.2 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,…|* **Command_2** *Parameter2_1,Parameter2_2,…|* **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

10.3 Protocol 3000 Commands

This section includes the following commands:

- System Commands Mandatory (see Section 10.3.1)

- System Commands (see Section 10.3.2)

- Switching/Routing Commands (see Section 10.3.3)

- EDID Handling Commands (see Section 10.3.4)

10.3.1 System Commands - Mandatory

Command	Description
#	Protocol handshaking (system mandatory)
BUILD-DATE	Get device build date (system mandatory)
FACTORY	Reset to factory default configuration
HELP	Get command list (system mandatory)
MODEL	Get device model (system mandatory)
PROT-VER	Get device protocol version (system mandatory)
RESET	Reset device (system mandatory)
SN?	Get device serial number (system mandatory)
VERSION	Get device firmware version (system mandatory)

10.3.1.1

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			

10.3.1.2 BUILD-DATE

Functions			Permission	Transparency
Set:	`BUILD-DATE`		End User	-
Get:	-		-	-

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
`time` – Format: `hh:mm:ss` where `hh` = hours, `mm` = minutes, `ss` = seconds

K-Config Example
Read the device build date: `"#BUILD-DATE?",0x0D`

10.3.1.3 FACTORY

Functions		Permission	Transparency
Set:	`FACTORY`	End User	Public
Get:	-	-	-

Description	Syntax
Set:	Reset device to factory defaults 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. Your device may require powering off and powering on for the changes to take effect.

K-Config Example
Reset the device to its factory default configuration: `"#FACTORY",0x0D`

10.3.1.4 HELP

Functions		Permission	Transparency
Set:	-	-	-
Get:	`HELP`	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	`#HELP`CR	
Response			
1. Multi-line: `~`nn`@Device available protocol 3000 commands:`CR LF`command,`SP `command...`CR LF			
Parameters			
`COMMAND_NAME` – name of a specific command			
Notes			
To get help for a specific command use: `HELP`SP`COMMAND_NAME`CR LF			
K-Config Example			
"#HELP",0x0D			

10.3.1.5 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			
Get device model: "#MODEL?",0x0D			

10.3.1.6   PROT-VER

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

10.3.1.7   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 the device: "#RESET",0x0D			

10.3.1.8 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			
K-Config Example			
Get device serial number: "#SN?",0x0D			

10.3.1.9 VERSION

Functions		Permission	Transparency
Set:	-	-	-
Get:	VERSION?	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get version number	#VERSION?`CR`	
Response			
~nn@VERSION`SP`firmware_version`CR LF`			
Parameters			
firmware_version – format: XX.XX.XX.XXXX where the digits group are: major, minor, build, revision			
K-Config Example			
Get the firmware version number: "#VERSION?",0x0D			

10.3.2   System Commands

Command	Description
HDCP-MOD	Set/get HDCP mode
HDCP-STAT?	Get HDCP signal status
LOCK-FP	Set/get front panel lock
UART	Set/get comm port configuration

10.3.2.1   HDCP-MOD

Functions		Permission	Transparency
Set:	HDCP-MOD	Administrator	Public
Get:	HDCP-MOD?	End User	System

Description		Syntax
Set:	Set HDCP mode	#HDCP-MOD SP *inp_id,mode* CR
Get:	Get HDCP mode	#HDCP-MOD? SP *stage_id* CR

Response
Set / Get: ~ nn @HDCP-MOD SP *stage_id,mode* CR LF

Parameters
inp_id - input number: 1.. (max number of inputs)
mode - HDCP mode: 0 (HDCP OFF), 1 (HDCP ON)

Response triggers
Response is sent to the com port from which the Set (before execution) / Get command was received
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 device input**:
HDCP supported – HDCP ON [default]
HDCP not supported – HDCP OFF
HDCP support changes following detected sink – MIRROR OUTPUT

K-Config Example
Set HDCP mode on HDMI 1 on:
"#HDCP-MOD 1,1",0x0D

10.3.2.2 HDCP-STAT

Functions		Permission	Transparency
Set:	-	-	-
Get:	`HDCP-STAT?`	End User	Public

Description		Syntax	
Set:	-	-	
Get:	Get HDCP signal status	`#HDCP-STAT?`SP`stage,stage_id`CR	

Response
`~` nn`@HDCP-STAT`SP`stage,stage_id,mode`CR LF

Parameters
`stage` – `0` (input), `1` (output) `stage_id` – for input stage: `1` (Input 1 HDMI), `2` (Input 2 HDMI), for output stage: `1` (HDMI Out) `actual_status` – HDCP signal encryption status: `0` (Off), `1` (On), `2` (Follow input), `3` (Mirror output – MAC mode)

Response Triggers
A response is sent to the comm port from which the Get command was received

Notes
Output stage (`1`) – get the HDCP signal status of the sink device connected to HDMI Out Input stage (`0`) – get the HDCP signal status of the source device connected to the specified input

K-Config Example
Get the HDCP input signal status of the source device connected to Input 1 HDMI: `"#HDCP-STAT? 0,1",0x0D`

10.3.2.1 LOCK-FP

Functions		Permission	Transparency
Set:	`LOCK-FP`	End User	-
Get:	`LOCK-FP?`	End User	System

Description		Syntax	
Set:	Lock front panel	`#LOCK-FP`SP`P1`CR	
Get:	Get front panel lock state	`#LOCK-FP?`CR	

Response
`~`nn`@LOCK-FP`SP`P1`SP`OK`CR LF

Parameters
`P1` – **0** (No) **1** (Yes)

K-Config Example
Lock the front panel: **`"#LOCK-FP 1",0x0D`**

10.3.2.1 UART

Command Name		Permission	Transparency
Set:	`UART`	Administrator	Public
Get:	`UART?`	End User	Public

Description		Syntax
Set:	Set comm port configuration	`#UART`SP`Com_Num,Baud_Rate,Data_Bit,Parity,Stop_Bit`CR
Get:	Get comm port configuration	`#UART?`SP`Com_Num`CR

Response
Set: ~ nn`@UART`SP`ComNum,BaudRate,DataBit,Parity,StopBit` CR LF
Get: ~ nn`@UART?`SP`ComNum,BaudRate,DataBit,Parity,StopBit,SerialType` CR LF

Parameters
`COM_Num` – 1 (RS-232 terminal block) `baud_rate` - 9600 – 115200 `data_bit` - 7,8 `parity` - 0 (No), 1 (Odd), 2 (Even), 3 (Mark), 4 (Space) `stop_bit` - 1,2 `serial1_type` - 232

Response Triggers

Notes

K-Config Example
Set the RS-232 terminal block to 115200 baud rate,8 data bits, no parity,1 stop bit: "#UART 1,115200,8,N,1",0x0D

10.3.3 Switching Commands

Command	Description
DISPLAY?	Get output HPD status
MTX-MODE	Set/get auto-switch mode
VID	Set/get video switch state

10.3.3.1 DISPLAY

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

10.3.3.1 MTX-MODE

Functions		Permission	Transparency
Set:	MTX-MODE	End User	Public
Get:	MTX-MODE?	End User	Public
Description		**Syntax**	
Set:	Set auto-switch mode	#MTX-MODE␣*output_id,mode*CR	
Get :	Get auto-switch mode	#MTX-MODE?␣*output_id*CR	
Response			
~nn@MTX-MODE␣*output_id,mode*CR			
Parameters			
output_id – 1 (HDMI Out) *mode* – 0 (manual), 1 (auto priority), 2 (auto last connected)			
Response Triggers			
After execution, a response is sent to the comm port from which the Set/Get was received After execution, a response is sent to all comm ports if MTX-MODE was set by any other external control device (button press, WEB, device menu and similar)			
Notes			
Not recommended for new devices			
K-Config Example			
Set the auto switch mode of HDMI Out to last connected input: "#MTX-MODE 1,2",0x0D			

10.3.3.2 VID

Functions		Permission	Transparency
Set:	VID	End User	Public
Get:	VID?	End User	Public
Description		**Syntax**	
Set:	Set video switch state	#VID SP in>out CR	
Get:	Get video switch state	#VID? SP out CR	
Response			
Set: ~ nn @VID SP in>out CR LF Get: ~ nn @VID SP in>out CR LF			
Parameters			
in – 0 (disconnect output), 1 (Input 1 HDMI), 2 (Input 2 HDMI) *>* – Connection character between in and out parameters *out* – 1 (HDMI Out), * (all outputs)			
Response Triggers			
Notes			
The GET command identifies input switching on Step-in clients New Step-in modules support the ROUTE command			
K-Config Example			
Set the video switch state of HDMI Out to HDMI INPUT 1: "#VID 1>1",0x0D			

10.3.4 EDID Handling Commands

Command	Description
CPEDID	Copy EDID data from the output to the input EEPROM
GEDID	Set/get EDID data
LDEDID	Load EDID data

10.3.4.1 CPEDID

Functions		Permission	Transparency
Set:	**CPEDID**	End User	Public
Get:	-	-	-

Description		Syntax
Set:	Copy EDID data from the output to the input EEPROM	#CPEDID SP *src_type*,*src_id*,*dst_type*, *dest_bitmap* CR
Get:	-	-

Response
~ nn @CPEDID SP *src_type*,*src_id*,*dst_type*,*dest_bitmap* CR LF

Parameters
src_type – EDID source type (usually output): `1` (output), `2` (default EDID) *src_id* – for output source: `1` (HDMI Out), for default EDID source: `1` (default EDID) *dst_type* – EDID destination type (usually input): `0` (input) *dest_bitmap* – destination input to which the EDID data is copied: `0x1` (Input 1 HDMI), `0x2` (Input 2 HDMI), `0x3` (Input 3 HDMI), `0x4` (Input 4 HDMI)

Response Triggers
Response is sent to the comm port from which the Set was received (before execution)

Notes

K-Config Example
Copy the EDID data from the HDMI Out output (EDID source) to the Input 1 HDMI: "#CPEDID 1,1,0,0x1",0x0D Copy the EDID data from the default EDID source to Input 2 HDMI: "#CPEDID 2,1,0,0x2",0x0D

10.3.4.2 GEDID

Command Name		Permission	Transparency
Set:	`GEDID`	Administrator	Public
Get:	–	–	–

Description		Syntax	
Set:	Set EDID data from device	`#GEDID`[SP]`stage,stage_id`[CR]	
Get:	–	–	

Response
Set:
Multi-line response:
`~nn@GEDID`[SP]`stage,stage_id,size`[CR LF]
`EDID_data`[CR LF]
`~nn@GEDID`[SP]`stage,stage_id`[SP]`OK`[CR LF]

Parameters
stage - input/output: `0` (input), `1` (output), `2` (default EDID)
stage_id - number of chosen stage (`1`.. max number of inputs/outputs)
size - EDID data size. For Set, size of data to be sent from device, for Get, `0` means no EDID support

Response Triggers
Response is sent to the comm port from which the Set (before execution) / Get command was received

Notes
For Get, size=`0` means EDID is not supported
For old devices that do not support this command, `~nn@ERR 002`[CR LF] is received

K-Config Example
Set the EDID data (size x) from the HDMI Out 1:
`"#GEDID 1,1",0x0D`

10.3.4.3 LDEDID

Command Name		Permission	Transparency
Set:	LDEDID	End User	Public
Get:	-	-	-

Description		Syntax	
Set:	Write EDID data from external application to device	Multi-step syntax (see following steps)	
Get:	–	–	

Communication Steps (Command and Response)

Step 1: #LDEDID`SP`*dst_type,dest_bitmask,size,safe_mode*`CR`

Response 1: ~`nn`@LDEDID`SP`*dst_type,dest_bitmask,size,safe_mode*`SP`READY`CR``LF` or

~`nn`@LDEDID`SP`ERRnn`CR``LF`

Step 2: If ready was received, send `EDID_DATA`

Response 2: ~`nn`@LDEDID`SP`*dst_type, dest_bitmask, size, safe_mode*`SP`OK`CR``LF` or

~`nn`@LDEDID`SP`ERRnn`CR``LF`

Parameters

dst_type - EDID destination type – 0 (input)

dest_bitmask – (see table below) bitmap representing destination IDs. The binary presentation of this number is a bit mask for destinations. Setting '1' means EDID data has to be copied to this destination

size - EDID data size (see table below)

safe_mode - 0 (device accepts the EDID as is without trying to adjust `EDID_DATA` - data in protocol packets)

dest_bitmask	size	dest_bitmask	size
0x01=HDMI1	256	0x40=HDBT1	256
0x02=HDMI2	256	0x80=HDBT2	256
0x04=HDMI3	256	0x100=HDBT3	256
0x08=HDMI4	256	0x200=HDBT4	256
0x10=HDMI5	256	0x01=PC	128
0x20=HDMI6	256		

Response Triggers

Response is sent to the comm port from which the Set (before execution)

Notes

When the unit receives the LDEDID command it replies with READY and enters the special EDID packet wait mode. In this mode the unit can receive only packets and not regular protocol commands.

If the unit does not receive correct packets for 30 seconds or is interrupted for more than 30 seconds before receiving all packets, it sends timeout error ~`nn`@LDEDID`SP`ERR01`CR``LF` and returns to the regular protocol mode. If the unit received data that is not a correct packet, it sends the corresponding error and returns to the regular protocol mode.

K-Config Example

Write EDID to input1:
"#LDEDID 0,0x01,256,1",0x0D

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