



# KD-MLV4x2Pro

4 Inputs to 2 Outputs POH/HDBaseT/HDMI/VGA  
Multi-View Seamless Presentation Matrix Switcher.  
Includes 1 Power over HDBaseT/HDMI Rx Extender.

## Operating Instructions



Screen Modes



The Experts in Digital Video Technology and Solutions™

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## Introduction


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Key Digital's KD-MLV4x2Pro is a seamless multi-format video matrix with UHD/4K resolution up-scaling, multi-view window processing, audio de-embedding, independent audio from video matrix selection, and HDCP 2.2 compliancy. The HDMI and HDBaseT output are independent in full-screen and quad screen modes. KD-X222PO Rx HDBaseT extender receiver is included and powered from the matrix.

KD-MLV4x2Pro is designed to fit a wide variety of professional video installation and live-event needs. It is ideal for digital signage, video wall, conference & board room, huddle spaces, home theater, and bar/restaurant applications.

**Always follow the instructions provided in this Operating Manual.**

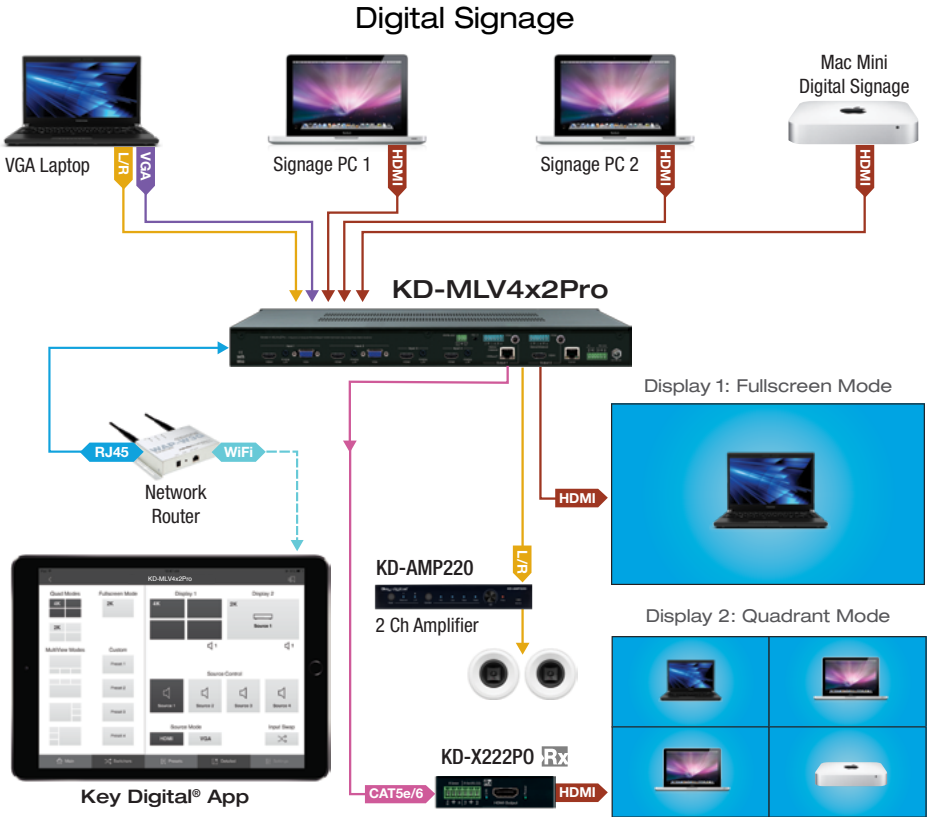
## Key Features

- › **Multi-View Window Processing:** Create & store custom multi-view layouts, recall custom presets in 1080p (2K) Multi-view mode
  - › **Quadrant Mode (4K or 2K):** Independent outputs in four equally-sized windows
  - › **Multi-view Mode (2K):** Linked/mirrored outputs in customized screen layout
- › **Seamless Switching:** Uninterrupted screen transitions during source selections
- › **Independent Matrix Switching:** In full-screen and quadrant modes, linked/mirrored in multi-view mode
- › **Image Layering:** Stack images with customizable priority settings
- › **Window Transparency and Border:** View content through each other and choose window bezel width and coloring
- › **Multi-format Switch:**
  - › **Input:** 2 HDMI, 2 HDMI or Analog video, all with external audio
  - › **Output:** 1 HDMI and 1 HDBaseT output. Rx unit included.
- › **HDBaseT Built-In:** Included KD-X222PORx unit is powered by at KD-MLV4x2Pro
- › **Signal Extension:**
  - › Up to 200 feet @ 1080p/60, 1080p/24, 1080i, 720p with third-party CAT5e/6
  - › Up to 125 feet @ 4096x2160 30Hz [4:4:4] 8bit with third-party CAT5e/6
- › **Ultra HD/4K Up-scaling:** Outputs independently upscale to 4096x2160 30Hz [4:4:4] 8bit in 4K Quadrant mode
- › **HDCP 2.2 Licensing:** Fully licensed and compatible with HDCP 2.2
- › **Resolution Support:** Supports SD, HD, and VESA input resolutions up to 1080p / 1920x1200 on HDMI and analog video Inputs. Outputs fixed to 1080p or 4K.
- › **Audio De-Embedding:** Audio from the selected input can be de-embedded through the Coax digital (PCM) output in addition to the HDMI output
- › **Dolby Digital & DTS Audio:** Supports 2-channel and multi-channel audio formats up to 5.1 Dolby® / DTS™ lossless compressed digital surround sound 
- › **Independent Video & Audio:** Listen to any audio source while in quadrant or multi-view modes
- › **Deep Color Support:** Up to 12 bits/color
- › **Analog to Digital Video Conversion:** Analog video input ports support VGA / DB15 or Component / YPbPr signal types
- › **Full Buffer System™:** Manages TMDS re-clocking / signal re-generation, HDCP authentication to source & display, and EDID Control handshake
- › **EDID:** Internal library with 5 default EDID configurations for input, in addition to native EDID data for any Output / Display
- › **TMDS Re-clocking:** Support for long HDMI connectivity using Key Digital® HDMI cables
- › **Control:** Front panel buttons, IR, RS-232, TCP/IP and Web Control
- › **Web Control Interface:** Reduces installation time and provides basic and advanced video and audio setup
- › **Control System Support:** Compatible with Compass Control®, AMX®, Control4®, Crestron®, KNX®, RTI®, Savant, URC®, Honeywell®, HAI®, Leviton®, etc.
- › **Key Digital® App Ready:** Can be controlled over TCP/IP via Key Digital® App

## Accessories

- › Power Supply: KDPS60W12VQ, 12V/5A, screw-in type
- › IR Remote Control: KD-RMMLV
- › Rack ears / Operating Instructions / Warranty Card

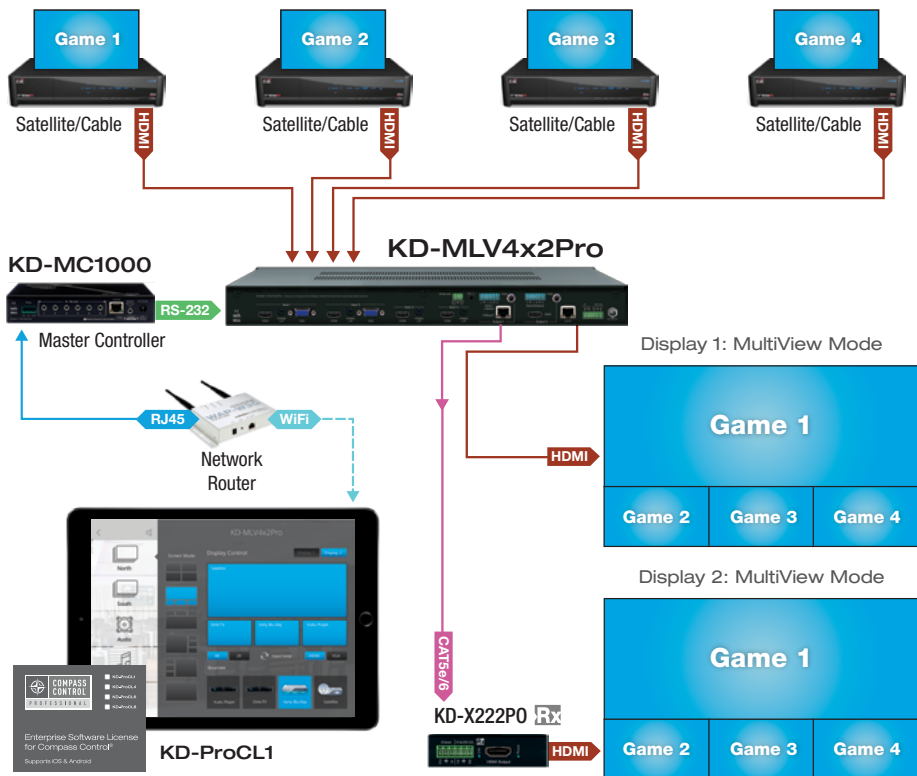
## Application Examples



## Quick Setup Guide

1. Begin with the main unit, Rx unit, and all input/output devices turned off and power cables removed
2. Connect Video and Audio Sources to the desired KD-MLV4x2Pro input ports
3. Connect HDMI output ports to a display/sync device using Key Digital HDMI cables and audio devices to the audio outputs
4. Connect the Rx unit's HDMI output a display/sync device, and use a CAT5e/6 cable to interconnect the Rx and KD-MLV4x2Pro's HDBaseT ports.
5. Connect power to the KD-MLV4x2Pro and power on, then repeat for source devices, then display devices.
6. Choose desired screen layout via front panel buttons, IR, web control interface, RS-232 or TCP/IP
  - » a. Some features not available in all layout and control types. Please refer to following sections for more information on controllability and setup for each control type.

## Bar/Restaurant



### IR Emitter Control

When using an IR Emitter / IR Extender (sold separately), the IR Emitter must be mounted over the IR Sensor on the front of the KD-MLV4x2Pro. One end of the cable is connected to the IR Receiver/ Master Controller / IR Extender / IR Connecting Block, while the other end is mounted over the IR Sensor of the KD-MLV4x2Pro.

### Serial IR Control

As a more robust alternative to optical IR, KD-MLV4x2Pro may also be controlled via hard-wired IR. Use a 3.5mm Male Mono plug with the IR Signal carried on the tip of the connector.

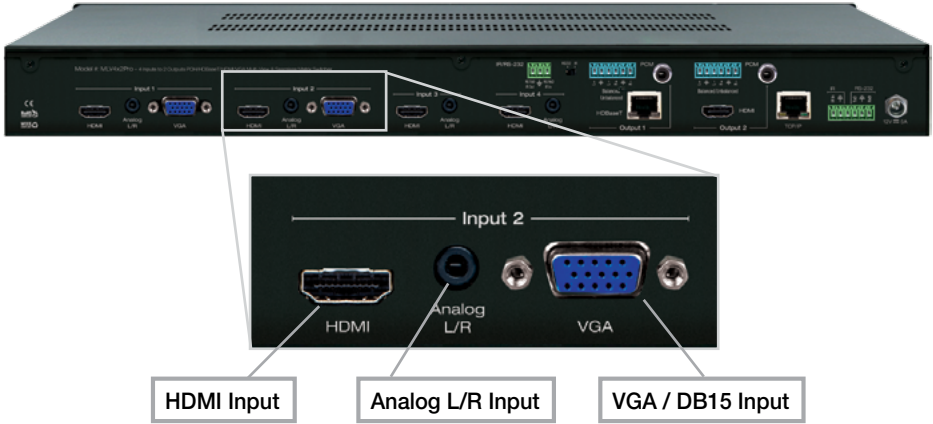
### Rack Mounting

Secure the rack ears to each side of the KD-MLV4x2Pro with the supplied hardware then fasten the unit to the rack rails with the included machine screws.

## Connections, Buttons and LEDs

### Rear Panel Connections:

All connections to the KD-MLV4x2Pro are found on the rear panel of the unit. Refer to the illustrations below for port assignments while making connections:



Input Connections are located on the left side of the back panel

#### › HDMI Inputs (4 total)

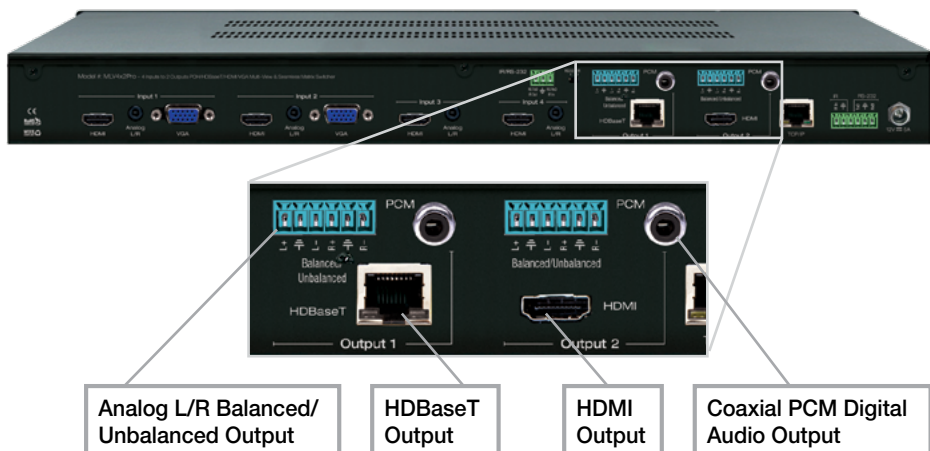
- › Compliant with HDCP 2.2
- › Maximum input resolution = 1080p@60fps
- › Does not support CEC
- › Supports 2ch and surround audio formats up to Dolby/DTS 5.1ch
- › Active link (voltage + data) status with connected source can be viewed with RS-232 or TCP/IP terminal

#### › VGA / DB15 Inputs (4 total)

- › Supports either VGA or Component video signals
- › Component Video input type must be specified via RS-232 or TCP-IP command, if desired
- › Default analog video input type is VGA
- › VGA / DB15 supported input resolutions: 640x480@60/75, 800x600@56/60/75, 1024x768@60/75, 1280x768@60/75, 1366x768@60/75, 1280x1024@60/75, 1440x900@60/75, 1600x900@60, 1600x1200@60, 1920x1080@60, 1920x1200@60
- › Component / YPbPr supported input resolutions: 480i@30, 576i@25, 480p@60, 576@50, 720p@50/60, 1080i@25/30, 1080p@50/60

#### › Analog L/R Inputs (4 total)

- › 3.5mm stereo connector
- › Sampling frequency = 48KHz, 24Bits



## Video Outputs

### › HDMI Output (1 total)

- › Supports either 1080p@60 fps or 4096x2160 30Hz [4:4:4] 8bit
  - › 4096x2160 resolution supported in 4K Quadrant mode only
- › Does not support CEC, 3D, ARC, Ethernet over HDMI
- › Active link (voltage + data) with connected output device can be viewed with RS-232 or TCP/IP terminal

### › HDBaseT Output/Tx (1 total)

- › Native integration with KD-X222PO Rx (included)
- › Provides power to KD-X222PO Rx via HDBaseT
- › Sends HDMI video & audio of selected source, as well as IR or RS-232 connected into IR/RS-232 pass-through port to KD-X222PO Rx
- › Integrates with third-party HDBaseT Rx built-in on compliant devices such as monitors and projectors.
  - › Compatibility is not guaranteed with third-party devices
- › Active link (voltage + data) with connected output device can be viewed with RS-232 or TCP/IP terminal

## Audio Outputs

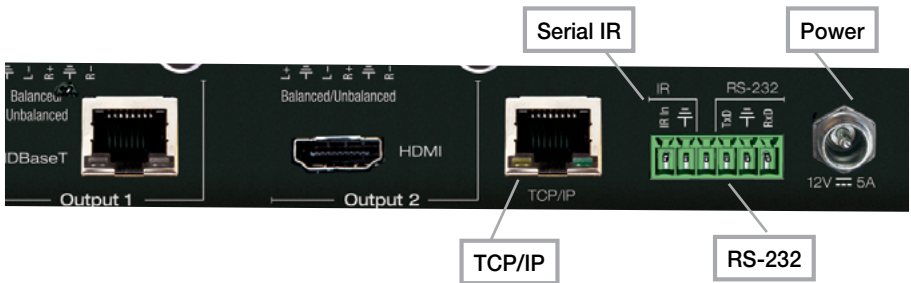
### › Analog L/R Balanced/Unbalanced (1 per output)

- › 6-Pin Terminal Block
- › Pin assignment:
  - › Pin 1 = Left +
  - › Pin 2 = Left ground
  - › Pin 3 = Left -
  - › Pin 4 = Right +
  - › Pin 5 = Right ground
  - › Pin 6 = Right -

- › **Coaxial PCM Digital** (1 per output)
  - › RCA connector, SPDIF format
- › Audio outputs provide de-embedded audio output from selected HDMI input source
- › There are no volume or tone control features, only muting control of the external audio outputs via RS-232 and TCP/IP
- › There are no format conversion features. Audio must be configured in the source.  
*For example*, in order to achieve 2ch analog audio output, the selected HDMI input source audio format must be 2ch.

Audio Input Signal Format	Audio L/R Output	Digital Audio Output
2CH PCM	Pass-through	Pass-through
Multi-Channel PCM	MUTE	MUTE
DOLBY/DTS	MUTE	Pass-through

## Control and Power Ports

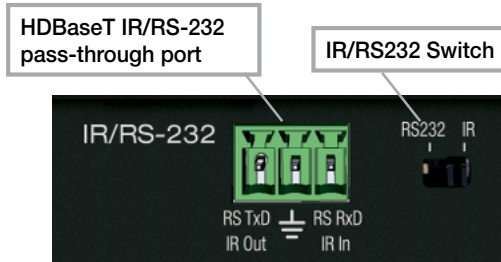


### › KD-MLV4x2Pro Control Ports

- › Serial IR and RS-232 on a 6-Pin Terminal Block
- › Advanced control possible via RS-232 and TCP/IP. Basic control via IR
- › Pin out of Serial IR / RS-232 Main Unit Control
  - › Pin 1 = IR In
  - › Pin 2 = IR Ground
  - › Pin 3 = N/C
  - › Pin 4 = RS-232 Tx
  - › Pin 5 = RS-232 Ground
  - › Pin 6 = RS-232 Rx
- › For TCP/IP control, connect an Ethernet cable from a network router or directly from a PC
  - › The TCP/IP port is used for control and firmware updates
  - › Refer to the RS-232 and TCP/IP Commands and Protocol section for complete code-set



- » A Network Setup Tutorial video is available at: <https://youtu.be/AMC7KvPPJsg>
- » The default TCP-IP address of the KD-MLV4x2Pro unit is **192.168.1.239**
- » The default port number is **23**.



#### » HDBaseT IR/RS-232 pass-through port

- » Supports bi-directional control with KD-X222PO Rx
- » Choose IR or RS-232 via slide Switch

#### » Pin out (KD-MLV4x2Pro):

- » Pin 1 = RS-232 Tx / IR Out
- » Pin 2 = Ground
- » Pin 3 = RS-232 Rx / IR In

#### » Pin out (Rx unit):

- » Pin 1 = IR In
- » Pin 2 = IR Ground
- » Pin 3 = 5V (IR sensor power)
- » Pin 4 = RS-232 Tx / IR Out
- » Pin 5 = Ground
- » Pin 6 = RS-232 Rx



#### » IR Accessory Wiring

##### » IR Emitter:

- » IR Signal = Dashed
- » Ground = Solid

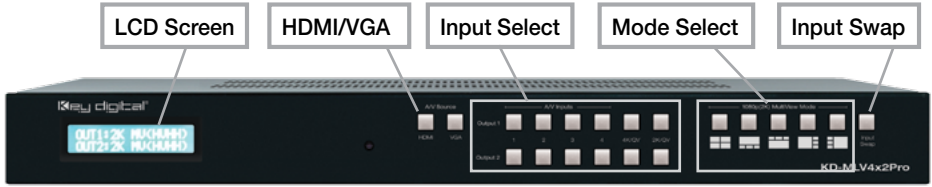


##### » IR Sensor:

- » a. IR Signal = White
- » b. Ground = Black
- » c. Sensor Power = Red



## Front Panel Operation



The front-panel of KD-MLV4x2Pro features 3 sets of buttons:

### HDMI / VGA input-type select (2 buttons)

- › Enables selection of the HDMI digital video input or VGA analog video input for the specified source
  - › Note: Selection of VGA or Component video input type for the Analog Video input must be done by RS-232 or TCP-IP
- › To select HDMI or VGA input type:
  - › 1. Press either HDMI or VGA, as desired
  - › 2. Using the Output 1 row of buttons, press the desired input number that you'd like to apply the setting to
  - › 3. Confirmation of your selection is shown on the LCD screen
    - › a. Example: When input 1 input-type has been set to VGA, the LCD screen will show [A/V SOURCE ] INPUT 1 = VGA

### Matrix switching source select (2 rows of 6 buttons)

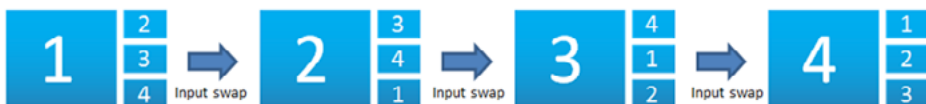
- › Enables selection of any input source (1-4) for the respective output, or to enter 4K Quadrant or 2K Quadrant modes
  - › 2K QV mode divides the image into 4 equally-sized quadrants
  - › 4K QV mode divides the image into 4 equally-sized quadrants
    - › The overall image is 4K, making each quadrant a full-1080p resolution
- › The selected source is indicated by a blue fill of the respective button
- › If any 4K or 2K QV quadrant modes are chosen, the Matrix switching source select buttons will not be illuminated for the respective output
- › Confirmation of your matrix switching selection and respective input-type for selected source is shown (in parenthesis) on the LCD screen:
  - › OUT 1: IN 1 (HDMI)
  - › OUT 2: IN 2 (VGA)
- › Confirmation of 4K quadrant mode and respective input-type for sources (in parenthesis) is shown on the LCD screen:
  - › OUT 1: 4K QV (HVHH)
  - › OUT 2: IN 2 (VGA)

## 1080p(2K) Multi-View mode select (5 buttons) and Input Swap (1 button)

- › Pressing any of the 5 Multi-View mode select buttons will activate both outputs to simultaneously enter the selected screen layout
  - › **IMPORTANT:** Selecting 2K Multi-View mode results in linking of the two KD-MLV4x2Pro outputs (showing same image at the same time).
- › The 5 layouts are, by default:
  - › 1. **Quadrant**
  - › 2. **Top**
  - › 3. **Bottom**
  - › 4. **Left**
  - › 5. **Right**
- › If desired, the layouts can be over-written via the Web Control Interface, RS-232, or TCP-IP, by saving to the KD-MLV4x2Pro's preset bank
- › Resetting the KD-MLV4x2Pro to factory default will restore these 5 layouts in the preset bank as layouts 1-5, respectively.
- › The **Input Swap** button serves 2 purposes:
  - › 1. If used in standard 4x2 matrix, full-screen mode, pressing Input Swap will simultaneously and synchronously switch both outputs:



- › 2. If used in Multi-View mode, pressing Input Swap rotates source content of the 4 inputs through the 4 windows:



- › Confirmation of 2K multi-view mode and respective input-type for sources (in parenthesis) is shown on the LCD screen:
  - › OUT 1: 2K MV (VHHH)
  - › OUT 2: 2K MV (VHHH)

## Factory Default Reset via the Front panel

To reset the unit to Factory Default settings, simultaneously press and hold the HDMI Input-Type Select button and Input Swap button for approximately 10 seconds

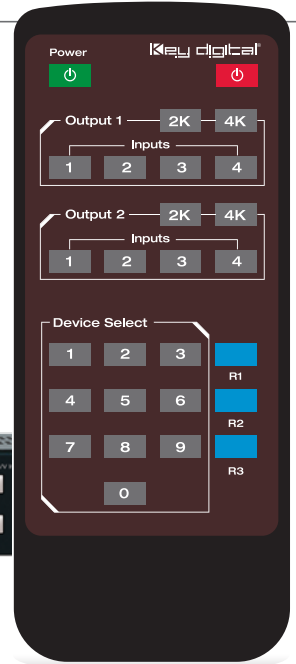
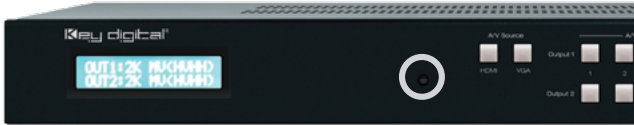
- › Default Settings:
  - › Unit Address is 00
  - › Output 1 is set to Input 1
  - › Output 2 is set to Input 1
  - › EDID to all inputs is Default 2 (1080p, 2ch audio)
  - › All other internal parameters set to default

## IR Remote Control

The IR Remote Control included with KD-MLV4x2Pro provides convenient but limited control of the switching features and unit setup.

There are 3 main groups of controls:

- › Group for output 1 source and 2K / 4K output resolution select
- › Group for output 2 source and 2K / 4K output resolution select
- › Group for device select buttons
- › Additionally, there are discrete power on and off buttons and function buttons R1, R2, and R3.
  - › The remote is powered by a CR2025 type battery
  - › The circular IR sensor accepts control signals from the remote control. The sensor is located in the center of the front panel.



### Switching via IR

To execute a switching command, press the desired source select button within the desired output button group.

### Multi-View Modes via IR

1080p (2K) Multi-View presets can be called using the IR remote by pressing the following remote button sequence:

- › **R1, 0-9**
  - › **1-9** = Desired preset, where 1-5 are, by default, Quadrant, Top, Bottom, Left, Right.
    - › All presets may be overwritten using the Web Control Interface, RS-232, or TCP-IP terminal
  - › **0** = Input Swap

### Quad-View/Multi-View Audio Select via IR

You may select the desired audio source if in Quad or Multi-View modes with the following two-button remote sequence:

- › **R3, A**
  - › **A** = Input Select button from Output 1 or Output 2 button group

### EDID Control via IR

KD-MLV4x2Pro has a built-in library of 5 EDID settings and the ability to copy EDID data from any output specified via IR, RS-232, and TCP-IP. EDID Control setup via RS-232 and TCP-IP can be found in the RS-232 Commands and Protocol TCP-IP Setup and Control sections.

### Set to Default EDID

- › To change the EDID settings for a particular input via IR, press the following buttons on the IR remote control: **R2, R1, R3, A, X**
  - › **A** = Desired Input to provide EDID for. Chosen using the Input Select button from Output2 button group.
  - › **X** = Desired Default EDID, chosen from the below table:

No	EDID Description	No	EDID Description
1	1080i, 2CH AUDIO	4	1920x1080 DVI
2	<b>1080p, 2CH AUDIO (DEFAULT)</b>	5	1920x1200 DVI
3	1280x1024 DVI		

### Copy EDID from Output

To copy EDID from Output “B” to input “A”, press the following buttons on the remote control: **R2, R1, R3, A, B**

- › **A** = Desired Input to provide EDID for. Chosen using the Input Select button from the Output2 button group.
- › **B** = Desired output to copy EDID from. Chosen using the Output1 button group.

### Addressing via IR

To apply a two-digit address to your KD-MLV4x2Pro unit, press the following buttons on the remote control: **R3, R1, R2, X1, X2**. X1 and X2 are chosen using the Device Select number pad.

- › 00 is the default unit address

If a unit address other than 00 is applied, all commands via IR will require an address prefix, XX. The address prefix is entered using the Device Select buttons. RS-232 and TCP-IP codes also require an address prefix if an address other than 00 is applied. More information is available in the RS-232 and TCP-IP Commands and Protocol section.

## Web Control Interface

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The KD-MLV4x2Pro Web Control Interface provides basic and advanced setup and control features for video, audio, and network.

To use the Web Control Interface, setup the KD-MLV4x2Pro on your Local Area Network by connecting a network wire to the TCP-IP port located on the far-right of the back panel.

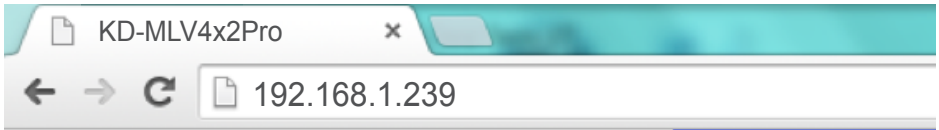
- » The default TCP-IP address of the KD-MLV4x2Pro unit is **192.168.1.239**
- » The default port number is **23**.

You can connect to the KD-MLV4x2Pro unit on a 192.168.1.1 type router, or using a network cable directly from your computer.

The TCP-IP address and port number of the KD-MLV4x2Pro unit can be adjusted to accommodate your LAN's setting. The settings are adjusted via Web Control Interface, RS-232, or TCP/IP.

See the RS-232 and TCP-IP Commands and Protocol section for more information.

**To enter the Web Control Interface, ensure that your computer is on the same network as the KD-MLV4x2Pro or use a network cable with your computer's network setting adjusted to 192.168.1.xxx, open your web browser, and enter the IP address of the KD-MLV4x2Pro in the web address cell.**



### Admin Login Page

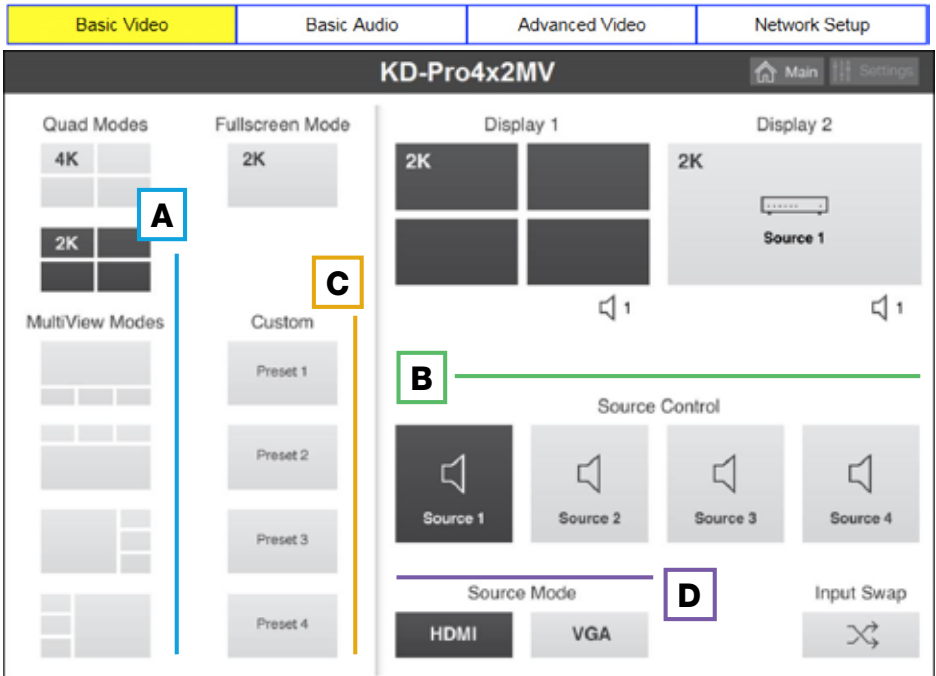
- » Default password: admin
- » Password may be changed in the Network Setup section of the Web Control Interface

### KD-Pro4x2MV

**Admin Login**

Password

## Basic Video



The Basic Video setup page enables selection of the following:

- > **A.** Entering Quad and Multi-View modes and choosing desired layout from default presets.
  - » Enter Multi-View mode affects both outputs and loses independence of each output.
  - » The default Multi-View presets are unit presets 1-5 which can be written over manually in the Advanced Video setup screen, or by RS-232 or TCP/IP terminal
  - » To swap windows, press the Input Swap button on the bottom right of the screen and each window will rotate counter-clockwise
- > **B.** Independent matrix switching control for outputs 1 or 2
- > **C.** Choosing user defined manual presets 1-4, which are unit presets 6, 7, 8, and 9 respectively and can be defined and stored in the Advanced Video setup screen or by RS-232 or TCP/IP
- > **D.** Input type (HDMI or VGA) for Inputs 1 and 2

## Basic Audio

Basic Video	Basic Audio	Advanced Video	Network Setup
<b>Audio Source</b> <b>Input1</b> <input type="radio"/> HDMI <input type="radio"/> EXT.		<b>Audio Source</b> <b>Output1</b> <input checked="" type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
<b>Input2</b> <input type="radio"/> HDMI <input checked="" type="radio"/> EXT.		<b>Output2</b> <input type="radio"/> 1 <input checked="" type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4	
<b>Input3</b> <input type="radio"/> HDMI <input type="radio"/> EXT.			
<b>Input4</b> <input type="radio"/> HDMI <input type="radio"/> EXT.			

The Basic Audio setup page enables selection of the following:

- > A. Input type (HDMI or external 3.5mm Stereo analog) of each audio source
- > B. Selection of desired audio source for Output 1 or Output 2, independently.

## Advanced Video

Basic Video	Basic Audio	Advanced Video	Network Setup
<b>1080P (2K) Multiview Mode Configuration</b>			
<b>Input1</b>	X0: <input type="text" value="0"/> Y0: <input type="text" value="0"/>	X1: <input type="text" value="959"/> Y1: <input type="text" value="539"/>	
<b>Input2</b>	X0: <input type="text" value="960"/> Y0: <input type="text" value="0"/>	X1: <input type="text" value="1919"/> Y1: <input type="text" value="539"/>	
<b>Input3</b>	X0: <input type="text" value="0"/> Y0: <input type="text" value="540"/>	X1: <input type="text" value="959"/> Y1: <input type="text" value="1079"/>	
<b>Input4</b>	X0: <input type="text" value="960"/> Y0: <input type="text" value="540"/>	X1: <input type="text" value="1919"/> Y1: <input type="text" value="1079"/>	
<b>Bring to Front (Layer Setting)</b>			
<b>Input1</b>	<input checked="" type="radio"/> L1	<input type="radio"/> L2	<input type="radio"/> L3 <input type="radio"/> L4
<b>Input2</b>	<input type="radio"/> L1	<input checked="" type="radio"/> L2	<input type="radio"/> L3 <input type="radio"/> L4
<b>Input3</b>	<input type="radio"/> L1	<input type="radio"/> L2	<input checked="" type="radio"/> L3 <input type="radio"/> L4
<b>Input4</b>	<input type="radio"/> L1	<input type="radio"/> L2	<input type="radio"/> L3 <input checked="" type="radio"/> L4
Preset Quad	<input type="button" value="Save"/>	<input type="button" value="Apply"/>	



The Advanced Video setup page enables creation of custom screen layouts and preset creation.

To create custom layouts in the Web Control Interface, the following tools are given:

- › **A. Window location and sizing control using 1080p (2K) Multi-view Mode Configuration tool**
  - › An X/Y axis is used, enabling control of each pixel of the 1920x1080 screen
    - › **X0 / X1 range = 0 - 1919**
    - › **Y0 / Y1 range = 0 - 1079**
  - › **X0** = Desired location of Top-Left handle of window, from Left to Right horizontally across the screen
  - › **Y0** = Desired location of Top-Left handle of window, from Top to Bottom vertically across the screen
  - › **X1** = Desired location of Bottom-Right handle of window, from Left to Right horizontally across the screen
  - › **Y1** = Desired location of Bottom-Right handle of window, from Top to Bottom vertically across the screen
- › **B. Image priority layering using Bring to Front (Layer Setting) tool**
  - › Available layer settings are 1-4
    - › 1 = Top layer / front
    - › 4 = Bottom layer / back
- › **C. Save or Apply custom layouts to presets**
  - › Use the drop down menu to choose the desired 1080p (2K) Multi-View Custom preset
  - › Press the **Apply button** if you wish to set the KD-MLV4x2Pro unit's outputs to the selected screen layout
  - › Press the **Save button** if you wish to write the entered values of the Advanced Video section to the selected screen layout using the dropdown menu.
    - › 1. NOTE: Saving to "Preset Quad", "Preset Down", "Preset Up", "Preset Right", or "Preset Left" will affect the unit's default presets called on the front panel. To restore the default presets, a factory default setting must be applied.
    - › 2. Use the Window Location and Sizing Control and Image Priority Layering tools (A and B in the previous image, respectively) to configure desired screen layout, then press the **Save button**

## Network Setup

Basic Video	Basic Audio	Advanced Video	Network Setup
-------------	-------------	----------------	---------------

Network Configuration	
MAC Address	<input type="text" value="60:89:B1:20:00:01"/>
<b>A</b> Host IP Address	<input type="text" value="192.168.1.239"/>
<b>B</b> Subnet Mask	<input type="text" value="255.255.255.0"/>
<b>C</b> Router IP Address	<input type="text" value="192.168.1.1"/>
<b>D</b> TCP Port	<input type="text" value="23"/>
<input type="button" value="Apply"/>	

Admin Password	
Old Password	<input type="text" value="*****"/>
New Password	<input type="text" value="*****"/>
Confirm Password	<input type="text" value="*****"/>
<input type="button" value="Apply"/>	

After connecting to KD-MLV4x2Pro by using a 192.168.1.xxx type network or using a crossover cable, you can adjust and view the unit's TCP-IP settings using the Web Control Interface.

- › **A. Host IP Address** is the IP address that you'd like to apply to the connected KD-MLV4x2Pro unit.
- › **B. Subnet mask** can be adjusted to accommodate your network's subnet
- › **C. Router IP Address** is the IP address of the network router, AKA the Default Gateway of the network that the KD-MLV4x2Pro is/will be on
- › **D. TCP Port** is set to 23 by default, however it is fully adjustable, up to 9999

## Custom Layout Examples

To help gain comfort and familiarity with the Advanced Video setup tool, please review and practice the follow examples.

### Example 1: Full-sized background image with 3-small layered and fanned windows

Screen:



Setup:

1080P (2K) Multiview Mode Configuration				
Input1	X0: <input type="text" value="0"/>	Y0: <input type="text" value="0"/>	X1: <input type="text" value="1919"/>	Y1: <input type="text" value="1079"/>
Input2	X0: <input type="text" value="30"/>	Y0: <input type="text" value="30"/>	X1: <input type="text" value="510"/>	Y1: <input type="text" value="300"/>
Input3	X0: <input type="text" value="230"/>	Y0: <input type="text" value="280"/>	X1: <input type="text" value="710"/>	Y1: <input type="text" value="550"/>
Input4	X0: <input type="text" value="430"/>	Y0: <input type="text" value="530"/>	X1: <input type="text" value="910"/>	Y1: <input type="text" value="820"/>
Bring to Front (Layer Setting)				
Input1	<input type="text" value="L1"/>	<input type="text" value="L2"/>	<input type="text" value="L3"/>	<input checked="" type="text" value="L4"/>
Input2	<input type="text" value="L1"/>	<input type="text" value="L2"/>	<input checked="" type="text" value="L3"/>	<input type="text" value="L4"/>
Input3	<input type="text" value="L1"/>	<input checked="" type="text" value="L2"/>	<input type="text" value="L3"/>	<input type="text" value="L4"/>
Input4	<input checked="" type="text" value="L1"/>	<input type="text" value="L2"/>	<input type="text" value="L3"/>	<input type="text" value="L4"/>
<input type="button" value="Update"/>				

## Example 2: Image layering with proportionate size decrease

Screen:



Setup:

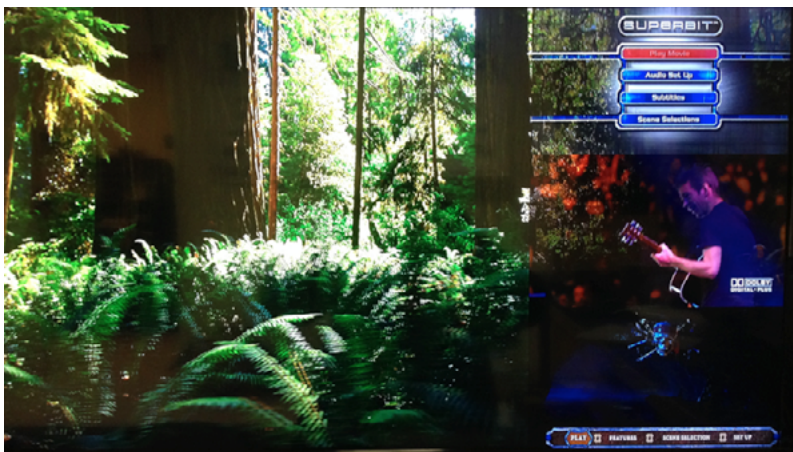
1080P (2K) Multiview Mode Configuration				
Input1	X0: <input type="text" value="468"/>	Y0: <input type="text" value="263"/>	X1: <input type="text" value="1452"/>	Y1: <input type="text" value="817"/>
Input2	X0: <input type="text" value="346"/>	Y0: <input type="text" value="194"/>	X1: <input type="text" value="1574"/>	Y1: <input type="text" value="885"/>
Input3	X0: <input type="text" value="192"/>	Y0: <input type="text" value="108"/>	X1: <input type="text" value="1728"/>	Y1: <input type="text" value="972"/>
Input4	X0: <input type="text" value="0"/>	Y0: <input type="text" value="0"/>	X1: <input type="text" value="1919"/>	Y1: <input type="text" value="1079"/>
Bring to Front (Layer Setting)				
Input1	<input checked="" type="checkbox"/> L1	<input type="checkbox"/> L2	<input type="checkbox"/> L3	<input type="checkbox"/> L4
Input2	<input type="checkbox"/> L1	<input checked="" type="checkbox"/> L2	<input type="checkbox"/> L3	<input type="checkbox"/> L4
Input3	<input type="checkbox"/> L1	<input type="checkbox"/> L2	<input checked="" type="checkbox"/> L3	<input type="checkbox"/> L4
Input4	<input type="checkbox"/> L1	<input type="checkbox"/> L2	<input type="checkbox"/> L3	<input checked="" type="checkbox"/> L4
<input type="button" value="Update"/>				

### Example 3: Full-sized background window with small, right-stacked windows and transparency applied

Note: Currently, transparency settings are only able to be applied via RS-232 or TCP-IP terminal. See the RS-232 Commands and Protocol and Window Transparency and Border settings section for more information.

- » Example 3 depicts a 25% transparency setting applied to inputs
- » In addition to transparency, a custom border may be applied to each window via RS-232 or TCP-IP terminal.

Screen:



Setup:

1080P (2K) Multiview Mode Configuration								
Input1	X0:	<input type="text" value="0"/>	Y0:	<input type="text" value="0"/>	X1:	<input type="text" value="1919"/>	Y1:	<input type="text" value="1079"/>
Input2	X0:	<input type="text" value="1280"/>	Y0:	<input type="text" value="0"/>	X1:	<input type="text" value="1919"/>	Y1:	<input type="text" value="369"/>
Input3	X0:	<input type="text" value="1280"/>	Y0:	<input type="text" value="360"/>	X1:	<input type="text" value="1919"/>	Y1:	<input type="text" value="719"/>
Input4	X0:	<input type="text" value="1280"/>	Y0:	<input type="text" value="720"/>	X1:	<input type="text" value="1919"/>	Y1:	<input type="text" value="1079"/>
Bring to Front (Layer Setting)								
Input1	<input type="text" value="L1"/>	<input type="text" value="L2"/>	<input type="text" value="L3"/>	<input checked="" type="text" value="L4"/>				
Input2	<input type="text" value="L1"/>	<input type="text" value="L2"/>	<input checked="" type="text" value="L3"/>	<input type="text" value="L4"/>				
Input3	<input type="text" value="L1"/>	<input checked="" type="text" value="L2"/>	<input type="text" value="L3"/>	<input type="text" value="L4"/>				
Input4	<input checked="" type="text" value="L1"/>	<input type="text" value="L2"/>	<input type="text" value="L3"/>	<input type="text" value="L4"/>				
<input type="button" value="Update"/>								

## RS-232 and TCP-IP Commands and Protocol

### RS-232 Protocol:

The KD-MLV4x2Pro provides access to all functions when used with an RS-232 control system.

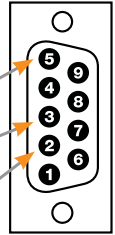
- › Baud Rate = 57600 bits per second
- › Data Bits = 8
- › Stop Bits = 1
- › Parity = None
- › Flow Control = None
- › Carriage Return: Required
- › Line Feed: Required
- › Commands are not case-sensitive.  
Spaces shown below may be excluded.
- › Carriage return and line feed is required at the end of each string.

### RS-232 cable pin out

Pin 5 – Ground

Pin 3 – Receive

Pin 2 – Transmit



### TCP/IP Setup:

- › The default TCP-IP address is **192.198.1.239**
  - » You can connect to the unit on a 192.168.1.xxx type network, or using a crossover cable
  - » If you are not using a 192.168.1.1 type network, you can adjust the TCP-IP address and port number settings via RS-232 to your desired network setup, and then connect to the unit.
- › The default TCP-IP port number is 23
- › Control commands are exactly the same via TCP-IP as they are via RS-232

**Response from Help command** – List and description of all available RS-232 / TCP-IP commands:

### KD-MLV4x2Pro>h

```
-----
--                               Key Digital Systems HELP                               --
-----
-- KD-MLV4x2Pro   System Address = 00                               F/W Version : 1.05   --
--
-- Azz           : All Commands start by Prefix System Address zz, if [01-99] --
-- H             : Help                                           --
-- STA          : Show Global System Status                       --
--
-- Video Input Setup Command ( xx=[01~04], y=[1~2] )           --
-- SPI xx VS y   : Set Input xx by Video Source y [1=HDMI, 2=VGA] --
-- SPIA VS y     : Set All Input by Video Source y [1=HDMI, 2=VGA] --
-- SPI xx AS y   : Set Input xx by Audio Source y [1=HDMI, 2=Ext. Audio] --
-- SPIA AS y     : Set All Input by Audio Source y [1=HDMI, 2=Ext. Audio] --
-- SPI xx VT y   : Set VGA Input xx by Video Type y [1=VGA, 2=YPbPr] --
-- SPIA VT y     : Set All VGA Input by Video Type y [1=VGA, 2=YPbPr] --
--
-- Video Output Setup Command
-- ( xx=[01~02], yy=[01~06,05=4K, 06=2K QUAD Multiview], z=[1~2] ) --
-- SPO xx SI yy  : Set Output xx to Video Input yy             --
-- SPOA SI yy    : Set All Outputs to Video Input yy           --
```

```

-- SPO xx ON/OFF : Set Output xx ON or Set Output xx OFF --
-- SPOA ON/OFF : Set All Outputs ON or Set All Outputs OFF --
-- SPO xx DBG ON/OFF: Set Outputs xx Debug Mode ON/OFF --
-- SPOA DBG ON/OFF : Set Outputs xx Debug Mode ON/OFF --
-- SPO MV z : Set Outputs by z [1=Normal, 2=Mutliview Mode] --
--
-- Audio Output Setup Commands: ( xx=[01~02], [E=Enable, D=Disable] ) --
-- SPO xx SA yy : Set Output xx Audio by Input yy [yy=01~04] in M/V --
-- SPOA SA yy : Set All Output xx Audio by Input yy [yy=01~04] in M/V--
-- SPO xx HA E/D : Set HDMI Audio Output xx E/D --
-- SPOA HA E/D : Set All HDMI Audio Outputs E/D --
-- SPO xx DA E/D : Set External Digital PCM Output xx E/D --
-- SPOA DA E/D : Set All External Digital PCM Outputs E/D --
--
-- Multiview Mode Setup Command ( z=[1~9] ) --
-- [1=QUAD, 2=DOWN, 3=UP, 4=RIGHT, 5=LEFT, 6~9=MANUAL1~4] --
-- SPM VIS : Set Input Swap --
-- SPM VSS z : Save User Screen Mode to z, (z=[1~9]) --
-- SPM VSM z : Set Predefined Screen Mode z at 2K Multiview Mode --
--
-- Multiview Screen Manual Setup Command --
-- ( vv=[01~04], aaaa=[0000~1919], bbbb=[0000~1079] ) --
-- ( cccc=[0000~1919], dddd=[0000~1079], z=[0~9] ) --
-- SPM vv XY aaaa.bbbb.cccc.dddd : Set Start of X/Y-axis by aaaa/bbbb--
-- and End of X/Y-aixs by cccc/dddd on the Output Screen for Input vv--
-- SPM TY z : Set Transparency by z [0=00%, 1=25%, 2=50%, 3=75%] --
-- SPM BLW z : Set Border Line Width by z [0=None, 1~9Pixels] --
-- SPM BLC rrr.ggg.bbb : Set Border Line Color by RED/GREEN/BLUE --
-- ( rrr=[001~255], ggg=[001~255], bbb=[001~255] ) --
-- SPM PT abcd : Set Priority of Inputs by abcd [1234~4321] --
--
-- EDID Setup Command ( xx=[01~04], yy=[01~02], zz=[01~05] ) --
-- SPCEDID xx H yy : Copy EDID from Ouput yy to Input xx --
-- SPCEDIDA H yy : Copy EDID from Ouput yy to All Inputs --
-- SPCEDID xx D zz : Copy EDID from Default EDID zz to Input xx --
-- SPCEDIDA D zz : Copy EDID from Default EDID zz to All Inputs --
-- DEFAULT EDID 01 : HDMI Video 1080i@60, Audio 2CH PCM --
-- DEFAULT EDID 02 : HDMI Video 1080p@60, Audio 2CH PCM --
-- DEFAULT EDID 03 : DVI Video Max. 1280x720@60, No Audio --
-- DEFAULT EDID 04 : DVI Video Max. 1280x1024@60, No Audio --
-- DEFAULT EDID 05 : DVI Video Max. 1920x1080@60, No Audio --
--
-- System Control Setup Commands: --
-- SPCFB E/D : Set Front Panel Buttons E/D (E=Enable,D=Disable) --
-- SPCFD ON/OFF : Set Front LCD Backlight and LEDs ON/OFF --
-- SPCDF : Reset to Factory Defaults --
-- SPCDF00 : Reset to Factory Defaults Except of Network Setting --
--
-- Network Setup, ( xxx=[000~255], zzzz=[0001~9999] ) --
-- SPCE TIPA xxx.xxx.xxx.xxx : Set Host IP Address to xxx.xxx.xxx.xxx --
-- SPCE TIPM xxx.xxx.xxx.xxx : Set Net Mask to xxx.xxx.xxx.xxx --

```

```
-- SPcETIPR xxx.xxx.xxx.xxx : Set Route IP Address to xxx.xxx.xxx.xxx --
-- SPcETIPP zzzz           : Set TCP/IP Port to zzzz --
--
-- System Address Setup Command: xx = [00-99], 00 = Single --
-- SPcAxx      : Set System Address to xx --
```

### Response from Help command – Current settings and/or status of unit:

**KD-MLVX4x2Pro>sta**

```
-----
--                               Key Digital Systems STATUS                               --
-----
--   KD-MLVX4x2Pro   System Address = 00           F/W Version : 1.05   --
--
-- RS232 : Baud Rate=57600bps, Data=8bit, Parity=None, Stop=1bit --
-- Front Panel Button : Enable --
-- Front LCD Display Backlight : ON --
--
-- Network Setting(Telnet Server) Status --
-- MAC Address = 60:89:b1:20:00:01 --
-- Host IP Address = 192.168.001.239 --
-- Net Mask = 255.255.255.000 --
-- Router IP Address = 192.168.001.001 --
-- TCP Port = 0023 --
--
-- Video Input Status --
-- 01: EDID = DEFAULT02, Link = ON , Video = HDMI , Audio = HDMI --
-- 02: EDID = DEFAULT02, Link = ON , Video = HDMI , Audio = HDMI --
-- 03: EDID = DEFAULT02, Link = ON , Video = HDMI , Audio = HDMI --
-- 04: EDID = DEFAULT02, Link = ON , Video = HDMI , Audio = HDMI --
--
-- Video Output Status --
-- 01: Input = 01(2K Full Screen ), Link = ON , Output = ON --
-- 02: Input = 01(2K Full Screen ), Link = ON , Output = ON --
--
-- Audio Output Status --
-- 01: Input = 01, HDMI = Enable , External PCM = Enable , Debug = OFF --
-- 02: Input = 01, HDMI = Enable , External PCM = Enable , Debug = OFF --
--
-- Multiview Mode Status --
-- Predefined Screen Mode = QUAD --
-- Transparency = 00% , Border Line = 0, Priority = 1234 --
--
-- Multiview Screen Manual Setup Command --
-- 01: SX = 0000, SY = 0000, EX = 0959, EY = 0539, Priority = 1 --
-- 02: SX = 0960, SY = 0000, EX = 1919, EY = 0539, Priority = 2 --
-- 03: SX = 0000, SY = 0540, EX = 0959, EY = 1079, Priority = 3 --
-- 04: SX = 0960, SY = 0540, EX = 1919, EY = 1079, Priority = 4 --
```



## Window Transparency and Border Settings

In addition to the possible custom settings applied using the Advanced Video screen of the Web Control Interface, window transparency and border settings can be applied to all windows in 4K or 2K Quadrant Modes, as well as 2K Multi-View mode.

At the time of introduction, window Transparency and Border settings can only be applied / viewed via RS-232 or TCP-IP terminal. Please see the RS-232 and TCP-IP Commands and Protocol section for additional information

### Transparency

While in 4K or 2K Quadrant Modes, as well as 2K Multi-View mode, transparency can be applied to the source windows, allowing windows in the back (ie. Layer 4) to be viewable through windows in the front (ie. Layer 2, 3, or 4) of a custom layout.

- › Transparency settings are not independent for each window.
- › The possible transparency setting applied to each window is 0%, 25%, 50%, and 75%
- › The RS-232 / TCP-IP command to apply transparency is as follows:
  - » **SPM TY z**
- › Set Transparency by z [0=00%, 1=25%, 2=50%, 3=75%]

### Window Border

KD-MLV4x2Pro enables a border-line / bezel to be applied and customized if desired. The border-line width and color of the border-line can be specified

- › The RS-232 / TCP-IP command to apply border-line width is as follows:
  - » **SPM BLW z**
- › Set Border Line Width by z [0=None, 1~9Pixels]
- › The RS-232 / TCP-IP command to apply the desired color to the border-line is as follows:
  - » **SPM BLC rrr.ggg.bbb**
    - › Set Border Line Color by RED/GREEN/BLUE
    - › (rrr=[001~255], ggg=[001~255], bbb=[001~255])
- › Color-picker reference values:

Color	rrr value	ggg value	bbb value
Red	255	0	0
Orange	255	165	0
Gold	255	215	0
Light Blue	173	216	230
White	255	255	255
Black	0	0	0
Purple	128	0	128
Navy Blue	0	0	128
Royal Blue	65	105	255
Yellow	255	255	0

Color	rrr value	ggg value	bbb value
Teal	0	128	128
Blue	0	0	255
Brown	139	68	19
Maroon	128	0	0
Silver	192	192	192
Green	0	128	0

## Specifications

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### Technical:

- » Inputs: 4 HDMI connectors, Type A, 19 pin female; 2 HD analog video 15-pin female, 4 analog audio connector, 3.5mm stereo female
- » Outputs: 1 HDMI connector, Type A, 19 pin female; 1 HDBaseT RJ45 female; 2 digital coaxial audio on RCA connector, female, follows SPDIF format IEC 60958; 2 Analog balanced/unbalanced 6-pin terminal block
- » TMDS Bandwidth: 9 Gb/s total
- » Deep Color Support: Supports digital video formats in Deep Color Mode up to 8 bits/color with all HDMI and HDCP technologies
- » Link: Single Link
- » DDC Signal (Data): Input DDC signal – 5 Volts p-p (TTL)
- » HDMI Video/Audio Signal: 1.2 Volts p-p
- » DDC Communication: EDID And HDCP buffering between source and display
- » Wired IR: Modulated IR signal input, 0-5V TTL or -10 to +10V, 3.5mm mono female connector with signal on tip
- » Power: External power supply; 12V/3A

### General:

- » Regulation: CE, RoHS, WEEE
- » Enclosure: Black metal
- » Rack Mount: 1U, full rack-width (rack ears included)
- » Accessories: Rack Ears
- » Product: 17.25" x 8.875" x 1.75"; Weight: 6.5 lbs
- » Packaging: 18.5" x 13" x 3.5"; Weight: 8.8 lbs



## Important Product Warnings:

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1. Connect all cables before providing power to the unit.
2. Test for proper operation before securing unit behind walls or in hard to access spaces.
3. If installing the unit into wall or mounting bracket into sheet-rock, provide proper screw support with bolts or sheet-rock anchors.



## Safety Instructions:

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Please be sure to follow these instructions for safe operation of your unit.

1. Read and follow all instructions.
2. Heed all warnings.
3. Do not use this device near water.
4. Clean only with dry cloth.
5. Install in accordance with the manufacturer's instructions.
6. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
7. Only use attachments/accessories specified by the manufacturer.
8. Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way including:
  - » Damage to the power supply or power plug
  - » Exposure to rain or moisture



## Power Supply Use:

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You **MUST** use the Power Supply **provided** with your unit or you **VOID** the Key Digital® Warranty and risk damage to your unit and associated equipment.

## How to Contact Key Digital®

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### **System Design Group (SDG)**

For system design questions please contact us at:

- › Phone: 914-667-9700
- › E-mail: [sdg@keydigital.com](mailto:sdg@keydigital.com)

### **Customer Support**

For customer support questions please contact us at:

- › Phone: 914-667-9700
- › E-mail: [customersupport@keydigital.com](mailto:customersupport@keydigital.com)

### **Technical Support**

For technical questions about using Key Digital® products, please contact us at:

- › Phone: 914-667-9700
- › E-mail: [tech@keydigital.com](mailto:tech@keydigital.com)

### **Repairs and Warranty Service**

Should your product require warranty service or repair, please obtain a Key Digital® Return Material Authorization (RMA) number by contacting us at:

- › Phone: 914-667-9700
- › E-mail: [rma@keydigital.com](mailto:rma@keydigital.com)

### **Feedback**

Please email any comments/questions about the manual to:

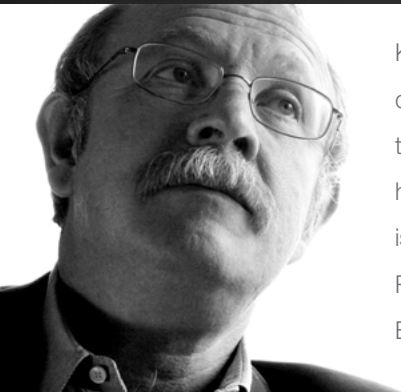
- › E-mail: [customersupport@keydigital.com](mailto:customersupport@keydigital.com)

## Warranty Information

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All Key Digital® products are built to high manufacturing standards and should provide years of trouble-free operation. They are backed by a Key Digital Limited 3 Year Product Warranty Policy.

<http://www.keydigital.com/warranty.htm>



Key Digital®, led by digital video pioneer Mike Tsinberg, develops and manufactures high quality, cutting-edge technology solutions for virtually all applications where high-end video and control are important. Key Digital® is at the forefront of the video industry for Home Theater Retailers, Custom Installers, System Integrators, Broadcasters, Manufacturers, and Consumers.