

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

# KD-MLV4x2

4 Inputs to 2 Outputs MultiView Seamless Matrix Switcher, supports Ultra HD/4K

## Operating Instructions



Key digital®

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The Experts in Digital Video Technology and Solutions™

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## Table of Contents

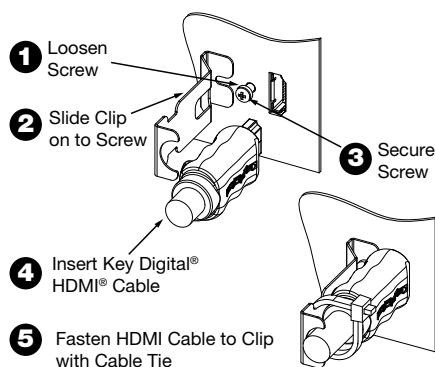
Introduction . . . . .	1
Quick Setup Guide . . . . .	2
Application Example . . . . .	3
Connections, Buttons and LEDs . . . . .	4
Front Panel Operation . . . . .	7
IR Remote Control . . . . .	9
Web Control Interface . . . . .	10
Custom Layout Examples . . . . .	15
RS-232 and TCP-IP Commands and Protocol . . . . .	18
Window Transparency and Border Settings . . . . .	21
Specifications . . . . .	22
Important Product Warnings & Safety Instructions . . . . .	23
How to Contact Key Digital® . . . . .	24
Warranty Information . . . . .	24

### Accessories

- › Power Supply: KDPS12V3A, 12V/3A, Screw-in type
- › IR Remote Control: KD-RMMLV
- › 6 HDMI lacing clips (see instructions to right)
- › Rack ears
- › Operating Instructions & Warranty Card

### Rack Mounting:

Rack mount: Secure the rack ears to each side of the KD-MLV4x2 with the supplied hardware then fasten the unit to the rack rails with the included machine screws.



## Introduction

Key Digital's Multi-View Series KD-MLV4x2 is a seamless matrix switcher with UHD/4K resolution up-scaling, multi-view window processing, analog to digital conversion of incoming VGA or YPbPr with analog audio signals, audio de-embedding, and independent audio from video matrix selection.

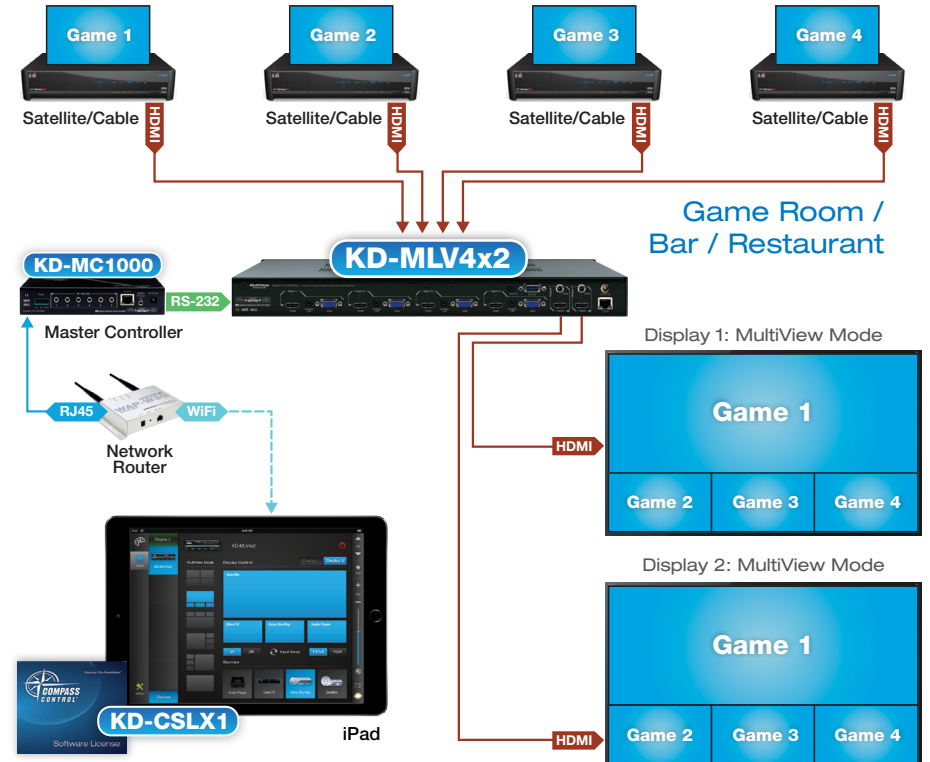
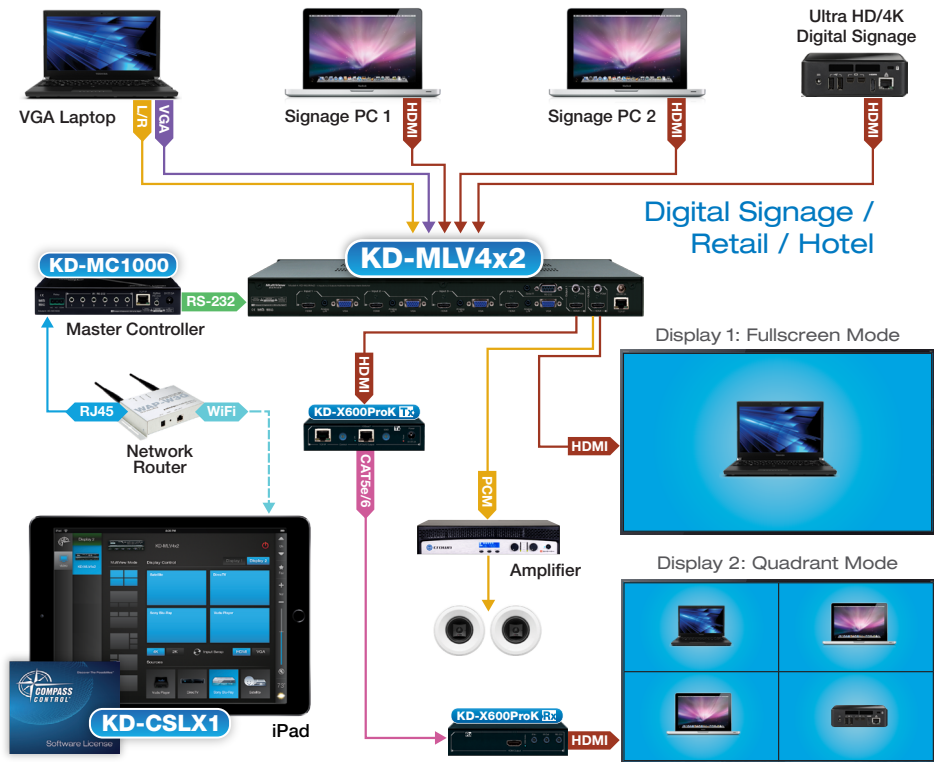
KD-MLV4x2 is designed to fit a wide variety of professional video installation and live-event needs. It is ideal for digital signage, video wall, conference & board room, class room, home-theater, and bar/restaurant applications.

### Key Features

- › **HDMI Matrix Switching:** 4 HDMI/Analog sources to 2 HDMI outputs, independent in full-screen and quadrant modes
- › **Seamless Switching:** Un-interrupted screen transitions during source selections in full-screen mode or multi-view modes
- › **Resolution Support:** Supports SD, HD, and VESA input resolutions up to 1080p / 1920x1200 on HDMI and analog video inputs
- › **Analog to Digital Video Conversion:** Analog video input ports support VGA / DB15 or Component / YPbPr signal types
- › **Ultra HD/4K Up-scaling:** Outputs independently upscale to UHD/4K in 4K Quadrant mode
- › **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
- › **Image Layering:** Stack images on top of each other with customizable priority settings
- › **Window Transparency and Border:** View content through each other and choose window bezel width and coloring
- › **Web Control Interface:** Reduces installation time and provides basic and advanced video and audio setup
- › **Audio De-Embed:** Audio from the selected input is de-embedded through the Coax digital (PCM) output in addition to the HDMI output
- › **Independent Video & Audio Matrixing:** Listen to any audio source while in quadrant or multi-view modes
- › **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
- › **Deep Color Support:** Up to 12 bits/color
- › **Licensing:** Fully licensed and compatible with all HDMI and HDCP technologies
- › **Control:** Front panel buttons, Serial IR, Optical IR, RS-232, TCP-IP and Web Control, including discrete power ON/OFF via IR, RS-232, and TCP-IP
- › **Control System Support:** Compass Control®, AMX®, Control4®, Crestron®, KNX®, RTI®, Savant, URC®, Honeywell®, HAI®, Leviton®, etc.

Always follow the instructions provided in this Operating Manual.

## Application Example



## Quick Setup Guide

1. Begin with the KD-MLV4x2 and all input/output devices turned off and power cables removed
2. Connect HDMI and/or Analog Video and Audio Sources to the desired KD-MLV4x2 input ports
3. Connect display devices to the HDMI outputs and audio devices to the audio outputs
4. Connect power to the KD-MLV4x2 and power on, then repeat for source devices, then display devices.
5. 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.

## 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-MLV4x2. 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-MLV4x2.

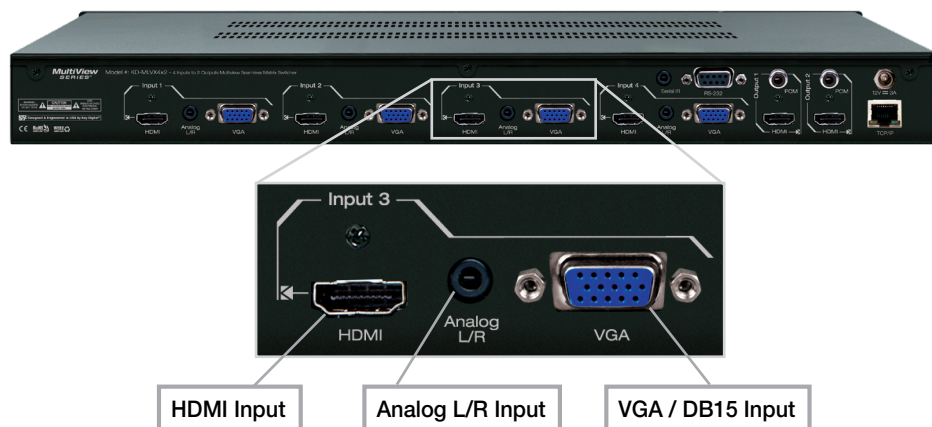
## Serial IR Control

As a more robust alternative to optical IR, KD-MLV4x2 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.

## Connections, Buttons and LEDs

### Rear Panel Connections:

All connections to the KD-MLV4x2 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)

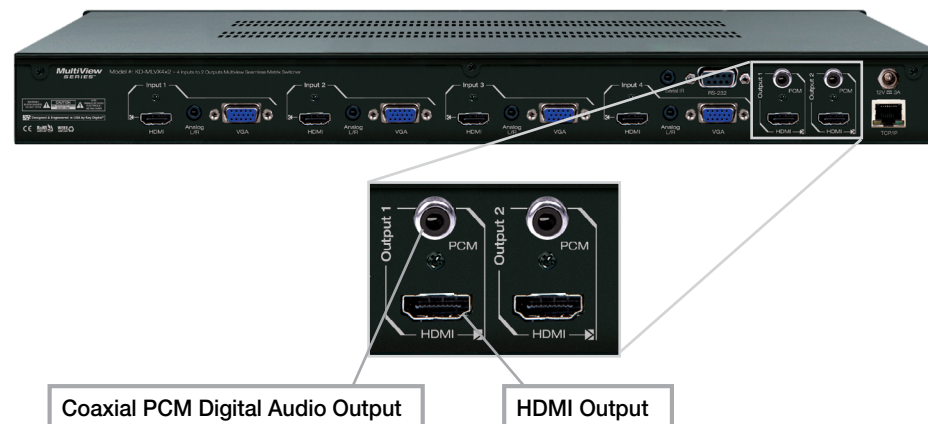
- » Compatible with HDMI 1.3b standard
- » Does not support CEC
- » Does not support HDMI audio formats greater than 2ch
- » Active link (voltage + data) with connected source can be viewed with RS-232 or TCP-IP terminal

#### > 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



**Output Connections** are located on the right side of the back panel

#### > HDMI Outputs (2 total)

- » Compatible with HDMI 1.4a standard
- » Supports either 1080p@60 fps or 4Kx2K @ 30 fps [4:4:4]
  - » 4Kx2K output 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

#### > Coaxial PCM Digital Audio Output (2 total)

- » RCA Connector, SPDIF format.
- » Active with de-embedded digital audio output of the selected audio source
- » Sampling frequency = up to 192KHz
- » **Supports 2-channel audio only**
  - » The connection is automatically muted if the selected audio source format is not 2-channel PCM

Audio Format from Input Source	Coaxial Digital Audio Output
2CH PCM	Pass-through
Multi-Channel PCM	MUTE
DOLBY/DTS	MUTE
HD Audio	MUTE

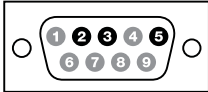


**Control and Power Ports** are located on the right side of the back panel

› **RS-232 and Serial IR ports are located above the Input 4 connection set**


- › The RS-232 port is used for control, as well as firmware updates
- › Refer to RS-232 Commands and Protocol section for complete code-set
- › The RS-232 baud rate is 57,600
- › The RS-232 port is a Female connection, and is straight-thru:

RS-232	Pin 2	Pin 3	Pin 5
		Tx	Rx



- › The Serial IR port is a 3.5mm Mono connector for hard-wired IR signals:

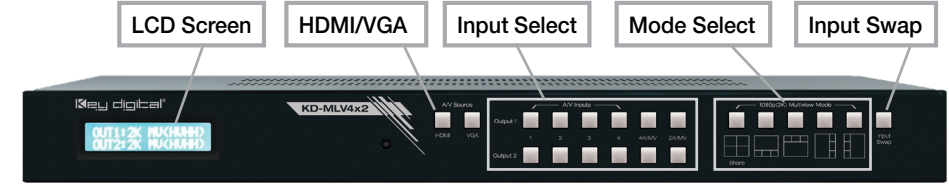
Serial IR	Tip	Ring
		IR Signal



› **TCP-IP and Power ports are located on the far-right of the back panel**

- › The TCP-IP port is used for control, as well as firmware updates
- › Refer to RS-232 and TCP-IP Commands and Protocol section for complete code-set

## Front Panel Operation



The front-panel of KD-MLV4x2 features 3 sets of buttons:

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

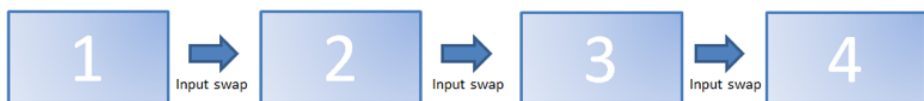
- › Enables selection of the HDMI digital video input or VGA analog video input for the specified source
  - › Note: Selection of VGA or Component video input type for the Analog Video input must be done by RS-232 or TCP-IP
- › To select HDMI or VGA input type:
  - › 1. Press either HDMI or VGA, as desired
  - › 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)

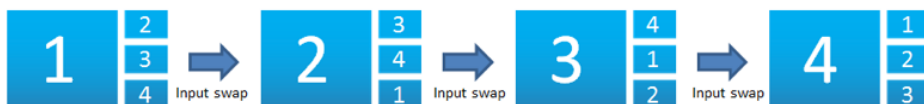
- › Enables selection of any input source (1-4) for the respective output, or to enter 4K Quadrant or 2K Quadrant modes
  - › 2K MV mode divides the image into 4 equally-sized quadrants
  - › 4K MV mode divides the image into 4 equally-sized quadrants
    - › The overall image is 4K, making each quadrant a full-1080p resolution
- › The selected source is indicated by a blue fill of the respective button
- › If any 4K or 2K MV 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 multi-view mode and respective input-type for sources (in parenthesis) is shown on the LCD screen:
  - › OUT 1: 4K MV (HVHV)
  - › OUT 2: IN 4 (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-MLV4x2 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-MLV4x2's preset bank
- › Resetting the KD-MLV4x2 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 (VHVH)
  - › OUT 2: 2K MV (VHVH)

## 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

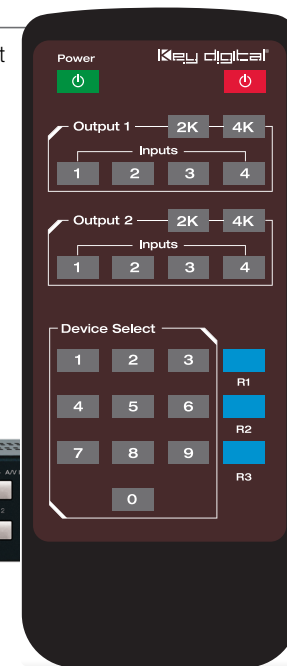
- › Default Settings:
  - › Unit Address is 00
  - › Output 1 is set to Input 1
  - › Output 2 is set to Input 1
  - › EDID to all inputs is Default 2 (1080p, 2ch audio)
  - › All other internal parameters set to default

## IR Remote Control

The IR Remote Control included with KD-MLV4x2 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

## EDID Control via IR

KD-MLV4x2 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-MLV4x2 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

The KD-MLV4x2 Web Control Interface provides basic and advanced setup and control features for video, audio, and network.

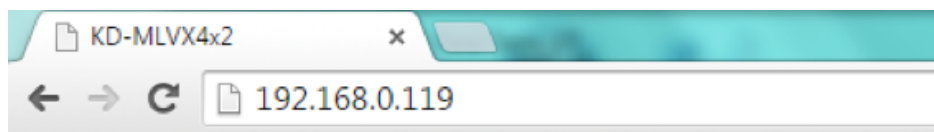
To use the Web Control Interface, setup the KD-MLV4x2 on your Local Area Network by connecting a network wire to the TCP-IP port located on the far-right of the back panel.

- » The default TCP-IP address of the KD-MLV4x2 unit is **192.168.0.239**
- » The default port number is **23**.

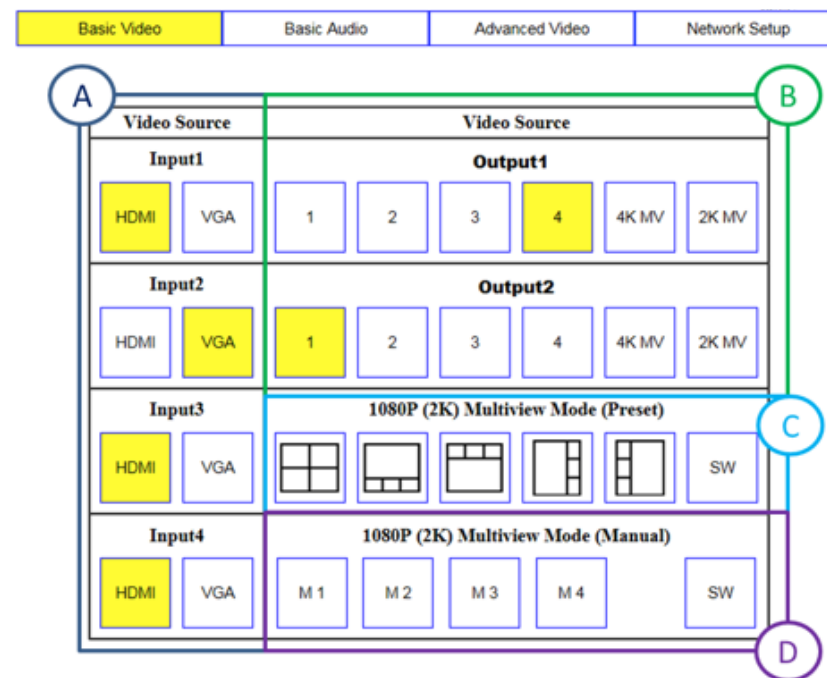
You can connect to the KD-MLV4x2 unit on a 192.168.0.xxx type router, or using a crossover network cable directly from your computer.

The TCP-IP address and port number of the KD-MLV4x2 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-MLV4x2 or use a cross-over cable with your computer's network setting adjusted to 192.168.0.xxx, open your web browser, and enter the IP address of the KD-MLV4x2 in the web address cell.**



## Basic Video



The Basic Video setup page enables selection of the following:

- » **A.** Input type (HDMI or VGA) of each source
- » **B.** Independent matrix switching control or entering 4K Quadrant or 2K Quadrant modes for output 1 or 2
- » **C.** Entering 2K Multi-View mode and choosing desired layout from default presets.
  - » Entering 2K Multi-View mode affects both outputs, and loses independence of each output.
  - » The default 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 SW button and content of each window will rotate counter-clockwise
- » **D.** Choosing user defined manual presets, M1, M2, M3, or M4, which are units presets 6, 7, 8, and 9, respectively and can be defined and store in the Advanced Video setup screen, or by RS-232 or TCP-IP terminal.
  - » To swap windows, press the SW button and content of each window will rotate counter-clockwise.

## Basic Audio

Basic Video	Basic Audio	Advanced Video	Network Setup										
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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>A</b> <table border="1"> <thead> <tr> <th colspan="5">1080P (2K) Multiview Mode Configuration</th> </tr> </thead> <tbody> <tr> <td>Input1</td> <td>X0: <input type="text" value="0"/></td> <td>Y0: <input type="text" value="0"/></td> <td>X1: <input type="text" value="959"/></td> <td>Y1: <input type="text" value="539"/></td> </tr> <tr> <td>Input2</td> <td>X0: <input type="text" value="960"/></td> <td>Y0: <input type="text" value="0"/></td> <td>X1: <input type="text" value="1919"/></td> <td>Y1: <input type="text" value="539"/></td> </tr> <tr> <td>Input3</td> <td>X0: <input type="text" value="0"/></td> <td>Y0: <input type="text" value="540"/></td> <td>X1: <input type="text" value="959"/></td> <td>Y1: <input type="text" value="1079"/></td> </tr> <tr> <td>Input4</td> <td>X0: <input type="text" value="960"/></td> <td>Y0: <input type="text" value="540"/></td> <td>X1: <input type="text" value="1919"/></td> <td>Y1: <input type="text" value="1079"/></td> </tr> </tbody> </table>				1080P (2K) Multiview Mode Configuration					Input1	X0: <input type="text" value="0"/>	Y0: <input type="text" value="0"/>	X1: <input type="text" value="959"/>	Y1: <input type="text" value="539"/>	Input2	X0: <input type="text" value="960"/>	Y0: <input type="text" value="0"/>	X1: <input type="text" value="1919"/>	Y1: <input type="text" value="539"/>	Input3	X0: <input type="text" value="0"/>	Y0: <input type="text" value="540"/>	X1: <input type="text" value="959"/>	Y1: <input type="text" value="1079"/>	Input4	X0: <input type="text" value="960"/>	Y0: <input type="text" value="540"/>	X1: <input type="text" value="1919"/>	Y1: <input type="text" value="1079"/>
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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-MLV4x2 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

Network Configuration	
MAC Address	60:89:B1:20:00:01
Host IP Address	192.168.0.119
Subnet Mask	255.255.255.0
Router IP Address	192.168.1.1
TCP Port	23
Apply	

After connecting to KD-MLV4x2 by using a 192.168.0.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-MLV4x2 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-MLV4x2 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 following examples.

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

Screen:



Setup:

1080P (2K) Multiview Mode Configuration				
Input1	X0: 0	Y0: 0	X1: 1919	Y1: 1079
Input2	X0: 30	Y0: 30	X1: 510	Y1: 300
Input3	X0: 230	Y0: 280	X1: 710	Y1: 550
Input4	X0: 430	Y0: 530	X1: 910	Y1: 820
Bring to Front (Layer Setting)				
Input1	L1	L2	L3	L4
Input2	L1	L2	L3	L4
Input3	L1	L2	L3	L4
Input4	L1	L2	L3	L4
Update				

**Example 2: Image layering with proportionate size decrease**

Screen:



Setup:

1080P (2K) Multiview Mode Configuration				
Input1	X0: 468	Y0: 263	X1: 1452	Y1: 817
Input2	X0: 346	Y0: 194	X1: 1574	Y1: 885
Input3	X0: 192	Y0: 108	X1: 1728	Y1: 972
Input4	X0: 0	Y0: 0	X1: 1919	Y1: 1079
Bring to Front (Layer Setting)				
Input1	L1	L2	L3	L4
Input2	L1	L2	L3	L4
Input3	L1	L2	L3	L4
Input4	L1	L2	L3	L4
Update				

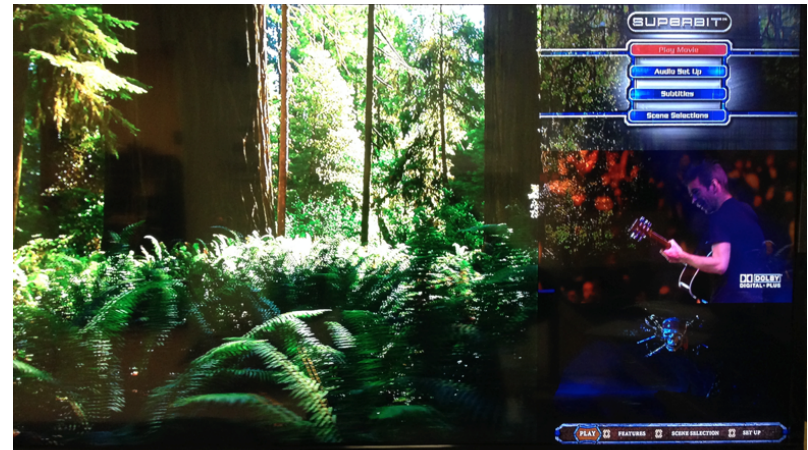
**Example 3: Full-sized background window with small, right-stacked windows and transparency applied**

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: 0	Y0: 0	X1: 1919	Y1: 1079
Input2	X0: 1280	Y0: 0	X1: 1919	Y1: 359
Input3	X0: 1280	Y0: 360	X1: 1919	Y1: 719
Input4	X0: 1280	Y0: 720	X1: 1919	Y1: 1079
Bring to Front (Layer Setting)				
Input1	L1	L2	L3	L4
Input2	L1	L2	L3	L4
Input3	L1	L2	L3	L4
Input4	L1	L2	L3	L4
Update				

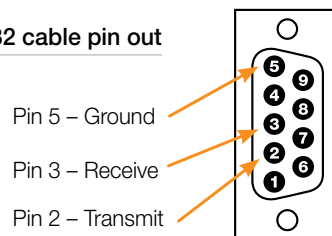
## RS-232 and TCP-IP Commands and Protocol

### RS-232 Protocol:

The KD-MLV4x2 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



### TCP/IP Setup:

- › The default TCP-IP address is **192.198.0.239**
  - » You can connect to the unit on a 192.168.0.xxx type network, or using a crossover cable
  - » If you are not using a 192.168.0.xxx 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-MLVX4x2>h

```
-----
--                               Key Digital Systems HELP                               --
-----
-- KD-MLVX4x2      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=YpPr]  --
-- SPIA VT y  : Set All VGA Input by Video Type y [1=VGA, 2=YpPr]  --
--
-- 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=Multiview 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-axis 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 Output yy to Input xx    --
-- SPCEDIDA H yy  : Copy EDID from Output 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
-- SPCE TIPR xxx.xxx.xxx.xxx : Set Route IP Address to xxx.xxx.xxx.xxx
-- SPCE TIPP zzzz : Set TCP/IP Port to zzzz
--
-- System Address Setup Command: xx = [00~99], 00 = Single
-- SPC Axx : Set System Address to xx
```

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

**KD-MLVX4x2>sta**

```
-----
-- Key Digital Systems STATUS
-----
-- KD-MLVX4x2 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 = 192.168.000.239
-- Net Mask = 255.255.255.000
-- Router IP Address = 192.168.000.001
-- 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-MLVX4x2 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

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

### Technical:

- » Inputs (each): 1 HDMI connector, Type A, 19 pin female; 1 HD analog video 15-pin female, 1 analog audio connector, 3.5mm stereo female
- » Outputs (each): 1 HDMI connector, Type A, 19 pin female; 1 digital coaxial audio on RCA connector, female, follows SPDIF format IEC 60958
- » TMDS Bandwidth: 9 Gb/s total
- » Deep Color Support: Supports digital video formats in Deep Color Mode up to 12 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, (6) HDMI Lacing Clips
- » 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:

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:

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:

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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### 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 Lifetime Product Warranty Policy.

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

