

# **Kramer Electronics, Ltd.**



## **USER MANUAL**

### **Models:**

***VM-28H, 2 Input 1:8 HDMI Distributor***

***VM-216H, 2 Input 1:16 HDMI Distributor***

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## 1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups<sup>1</sup> that are clearly defined by function.

Congratulations on purchasing your Kramer **VM-28H 2 Input 1:8 HDMI**<sup>2</sup> *Distributor* and/or **VM-216H 2 Input 1:16 HDMI Distributor**! Each machine is ideal for:

- Home theater, presentation and multimedia applications
- Rental and staging

The package includes the following items:

- **VM-28H** and/or **VM-216H**
- Power cord and rack “ears”
- Infrared remote control transmitter (including the required batteries and a separate user manual<sup>3</sup>)
- This user manual<sup>3</sup>

## 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
- Use Kramer high performance high resolution cables<sup>4</sup>

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1 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 Products

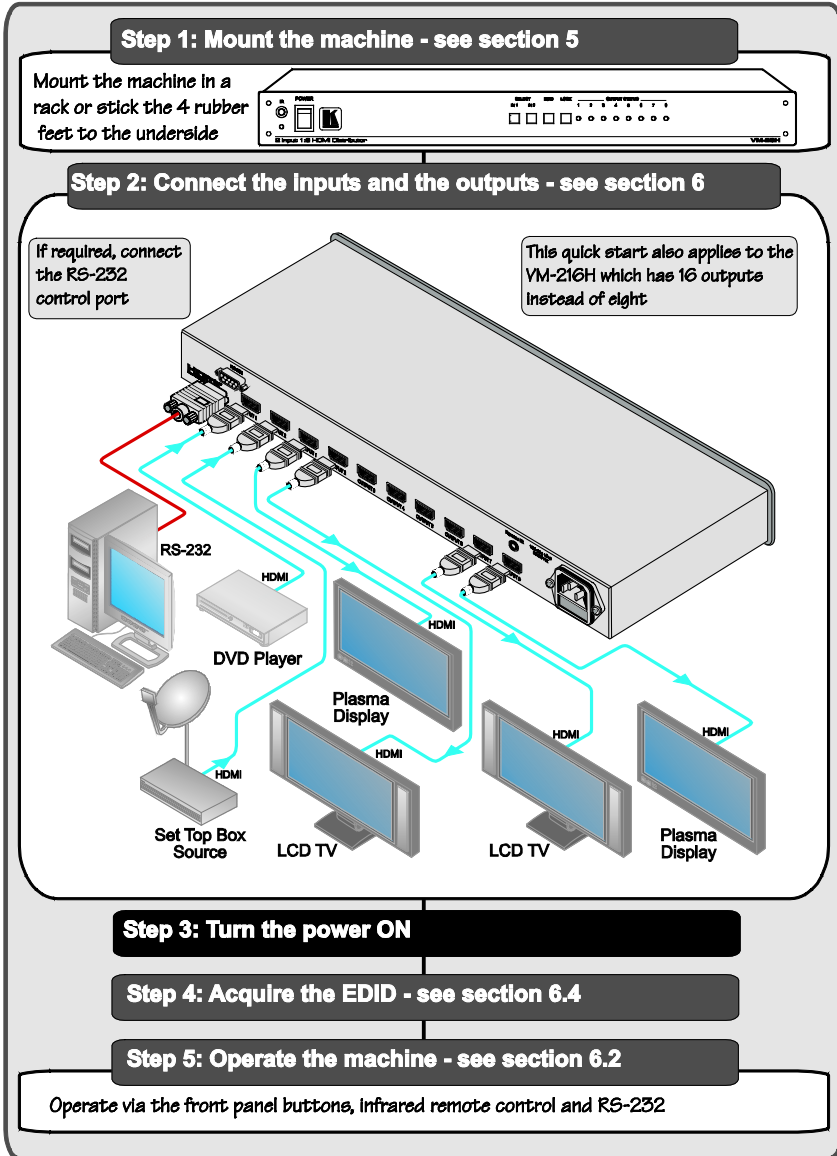
2 High-Definition Multimedia Interface

3 Download up-to-date Kramer user manuals from the Internet at this URL: <http://www.kramerelectronics.com>

4 The complete list of Kramer cables is on our Web site at <http://www.kramerelectronics.com>

## 2.1 Quick Start

This quick start chart summarizes the basic setup and operation<sup>1</sup>:



<sup>1</sup> This quick start applies both to the VM-28H and the VM-216H

### 3 Overview

The Kramer **VM-28H 2 Input 1:8 HDMI Distributor** and **VM-216H 2 Input 1:16 HDMI Distributor** are high quality distributors that accept one of two HDMI inputs and distribute the signal to 8/16 outputs, allowing one or more of the outputs to be connected to receiving devices, thus making them a versatile, reliable component in a video system. The **VM-28H / VM-216H** distributes signals having resolutions up to UXGA (1600x1200), including all HDTV formats.

Each high quality *HDMI Distributor* accepts one of two HDMI inputs, and distributes the selected signal to:

- 8 outputs (the **VM-28H**)
- 16 outputs (the **VM-216H**)

Both machines—the **VM-28H** and **VM-216H**:

- Support up to 2.25Gbps bandwidth per graphic channel<sup>1</sup>
- Can read and store, in non-volatile memory<sup>2</sup>, the EDID<sup>3</sup> block, for each input separately, from an output display device, so it can then provide the EDID information to the HDMI source even if the display device is not connected
- Let you acquire the EDID from one output, from several connected outputs or acquire the default EDID for fast and efficient connection of the unit<sup>4</sup>
- Have a 19" 1U rack-mountable enclosure, and are fed from a 100-240 VAC universal switching power supply

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1 Suitable for resolutions up to UXGA (1600x1200) at 60Hz, and for all HD resolutions

2 While the machine is ON

3 EDID is Extended Display Identification Data (see section 3.1 for a detailed definition)

4 Lets you use the EDID default value when no display from which to read the EDID is connected

### 3.1 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital<sup>1</sup> audio/video interface, widely supported in the entertainment and home cinema industry. It delivers the highest high-definition image and sound quality.

In particular, HDMI<sup>2</sup>:

- Provides a simple<sup>3</sup> interface between any audio/video source, such as a set-top box, DVD player, or A/V receiver and video monitor, such as a digital flat LCD / plasma television (DTV), over a single lengthy<sup>4</sup> cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio<sup>5</sup> on a single cable
- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements
- Benefits consumers by providing superior, uncompressed digital video quality via a single cable<sup>6</sup>, and user-friendly connector
- Is backward-compatible with DVI (Digital Visual Interface)
- Supports two-way communication between the video source (such as a DVD player) and the digital television, enabling new functionality such as automatic configuration and one-button play

HDMI has the capacity to support:

- Existing high-definition video formats (720p, 1080i, and 1080p/60), as well as standard definition formats such as NTSC or PAL

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1 Ensuring an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions

2 HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI licensing LLC

3 With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in A/V systems is reduced

4 HDMI technology has been designed to use standard copper cable construction at up to 15m

5 HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

6 HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

### 3.2 Defining EDID

The Extended Display Identification Data (EDID<sup>1</sup>) is a data-structure, provided by a display, to describe its capabilities to an HDMI source. The EDID enables the **VM-28H / VM-216H** to “know” what kind of monitor is connected to the output. The EDID includes the manufacturer’s name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data.

### 3.3 Recommendations for Best Performance

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances and position your **VM-28H / VM-216H** away from moisture, excessive sunlight and dust

## 4 Your VM-28H / VM-216H

[Figure 1](#) illustrates the **VM-28H**, [Figure 2](#) illustrates the **VM-216H** and [Table 1](#) defines the front and rear panels.

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<sup>1</sup> Defined by a standard published by the Video Electronics Standards Association (VESA)

Your VM-28H / VM-216H

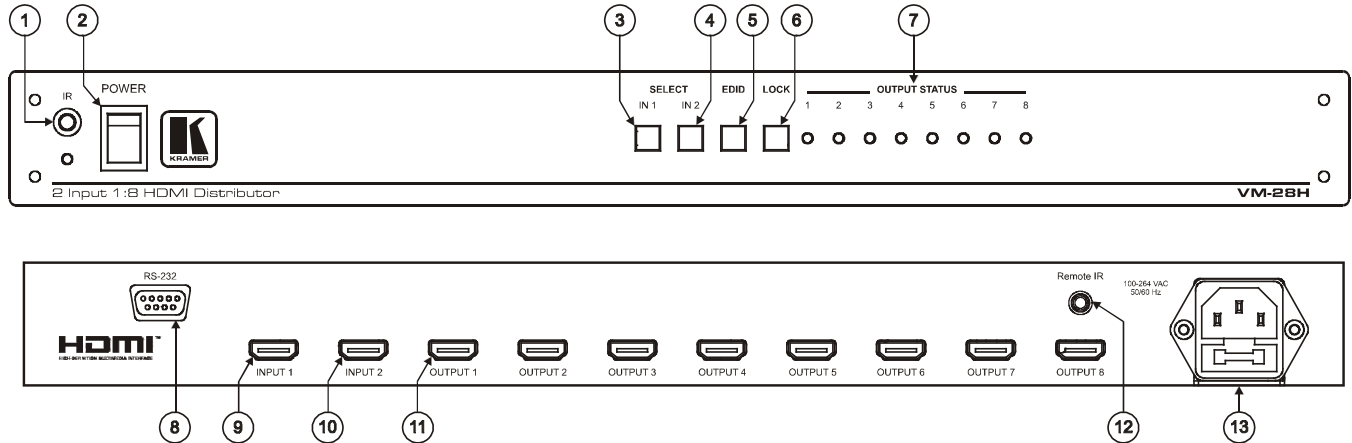


Figure 1: VM-28H 2 Input 1:8 HDMI Distributor



Your VM-28H / VM-216H

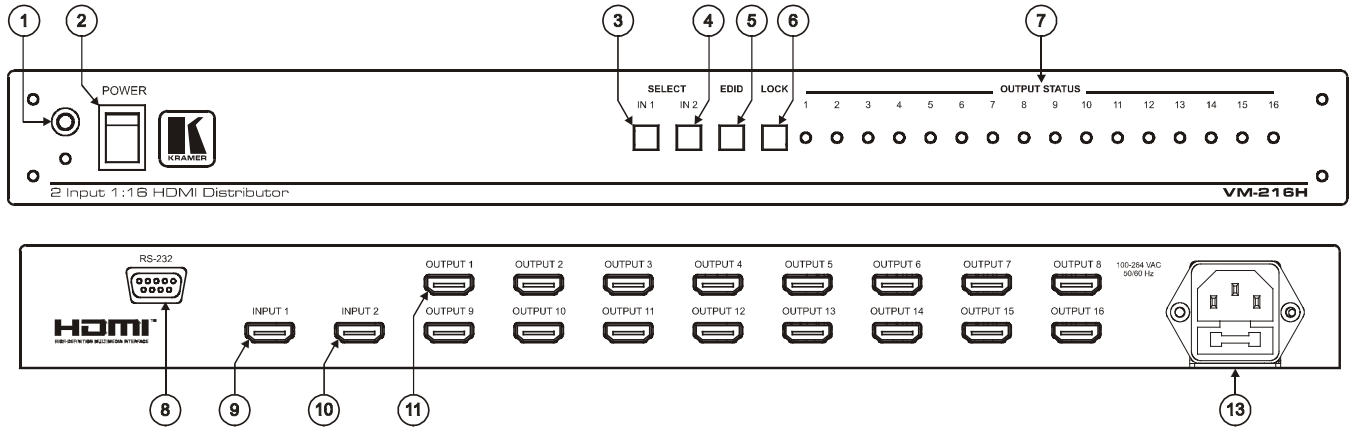


Figure 2: VM-216H 2 Input 1:16 HDMI Distributor<sup>1</sup>

<sup>1</sup> The remote IR opening, item 12, is not included in this machine

Table 1: VM-28H / VM-216H Features

#	Feature	Function
1	IR Receiver	The red LED is illuminated when receiving signals from the Kramer Infrared remote control transmitter
2	POWER Switch	Illuminated switch for turning the unit ON or OFF
3	SELECT IN 1 Button <sup>1</sup>	Press to select source 1 and distribute this signal to the outputs (when the EDID button does not illuminate) Also used for acquiring/changing the EDID (see <a href="#">Section 6.4</a> )
4		IN 2 Button <sup>1</sup>
5	EDID Button <sup>2</sup>	Press for more than 3 seconds to set to the EDID mode
6	LOCK Button <sup>3</sup>	Press to engage/disengage the front panel switches
7	OUTPUT STATUS LEDs	LEDs light when an output(s) is connected and active; LEDs blink when selecting the EDID (see <a href="#">Section 6.4</a> ) or when connecting a non-HDCP display while providing HDCP content <sup>4</sup> to the <b>VM-28H / VM-216H</b>
8	RS-232 9-pin D-sub Port	Connects to the PC or the Remote Controller
9	INPUT 1 HDMI Connector	Connects to the HDMI source 1
10	INPUT 2 HDMI Connector	Connects to the HDMI source 2
11	OUTPUT HDMI Connector	Connects to the HDMI acceptor [from 1 to 8 (for the <b>VM-28H</b> ), from 1 to 16 (for the <b>VM-216H</b> )]
12	REMOTE IR Opening <sup>5</sup> (for the <b>VM-28H</b> )	Connects to an external IR receiver unit for controlling the machine via an IR remote controller instead of using the front panel IR receiver <sup>6</sup>
13	Power Connector with Fuse	AC connector enabling power supply to the unit

1 Illuminates when selected and there is a signal, blinks when selected but there is no signal

2 Illuminates when configuring the EDID When the EDID button does not illuminate the machine is in Distribution mode (lets you distribute an input signal to the outputs)

3 Illuminates when the front panel switches are locked, pressing another button causes the LOCK button to blink once warning that you need to unlock to regain control via the front panel The LOCK button also blinks (the IN 1, IN 2 and EDID buttons do not blink at the same time) when the machine is busy (perhaps searching between signals) and no operation is permitted When powering up, the VM-28H / VM-216H front panel is automatically locked

4 The specific OUTPUT STATUS LEDs blink when the outputs are not HDCP compatible

5 Covered by a cap The 3.5mm connector at the end of the internal IR connection cable fits through this opening

6 Optional Can be used instead of the front panel (built-in) IR receiver to remotely control the machine (only if the internal IR connection cable has been installed)

## 4.1 Using the IR Transmitter for the VM-28H

You can use the **RC-IR2** or **RC-IR3** IR transmitter to control the machine via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver<sup>1</sup>. The external IR receiver can be located 15 meters away from the machine. This distance can be extended to up to 60 meters when used with three extension cables<sup>2</sup>

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable<sup>3</sup> with the 3.5mm connector that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm connector.

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1 Model: C-A35M/IRR-50

2 Model: C-A35M/A35F-50

3 P/N: 505-70434010-S

## 5 Installing in a Rack

This section provides instructions for rack mounting the unit.

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

OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing



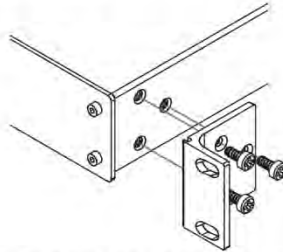
### CAUTION!

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

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

### To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

#### Note:

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

## 6 Using the VM-28H / VM-216H

This section describes how to:

- Connect the **VM-28H / VM-216H**, see [Section 6.1](#)
- Control the **VM-28H / VM-216H** via RS-232, see [Section 6.2](#)
- Operate the **VM-28H / VM-216H**, see [Section 6.3](#)
- Use the EDID button, see [Section 6.4](#)

### 6.1 Connecting the VM-28H / VM-216H

This section describes how to connect the:

- **VM-28H**, see [Section 6.1.1](#)
- **VM-216H**, see [Section 6.1.2](#)

#### 6.1.1 Connecting the VM-28H 2 Input 1:8 HDMI Distributor

To connect the **VM-28H**, as the example in [Figure 3](#) shows, do the following<sup>1</sup>:

1. Connect the HDMI OUTPUT connectors<sup>2</sup> to up to 8 HDMI acceptors, using Kramer HDMI copper cables. In this example<sup>3</sup>, connect the:
  - OUTPUT 1 connector to acceptor 1 (for example, a plasma display)
  - OUTPUT 2 connector to acceptor 2 (for example, an LCD TV)
  - OUTPUT 7 connector to acceptor 7 (for example, an LCD TV)
  - OUTPUT 8 connector to acceptor 8 (for example, a plasma display)
2. Connect the two HDMI sources, for example, a DVD player and a set top box, to the INPUT 1 and INPUT 2 connectors, respectively, using the Kramer HDMI copper cables.
3. If required, connect a PC and/or controller to the RS-232 port (see [Section 6.2](#)).
4. Connect the power cord to the mains electricity.

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<sup>1</sup> Switch OFF the power on each device before connecting it to your VM-28H. After connecting your VM-28H, switch on its power and then switch on the power on each device.

<sup>2</sup> As required. Up to 8 outputs can be connected. Not all outputs need to be connected.

<sup>3</sup> Only connections from the first two acceptors and the last two acceptors are shown in [Figure 3](#).

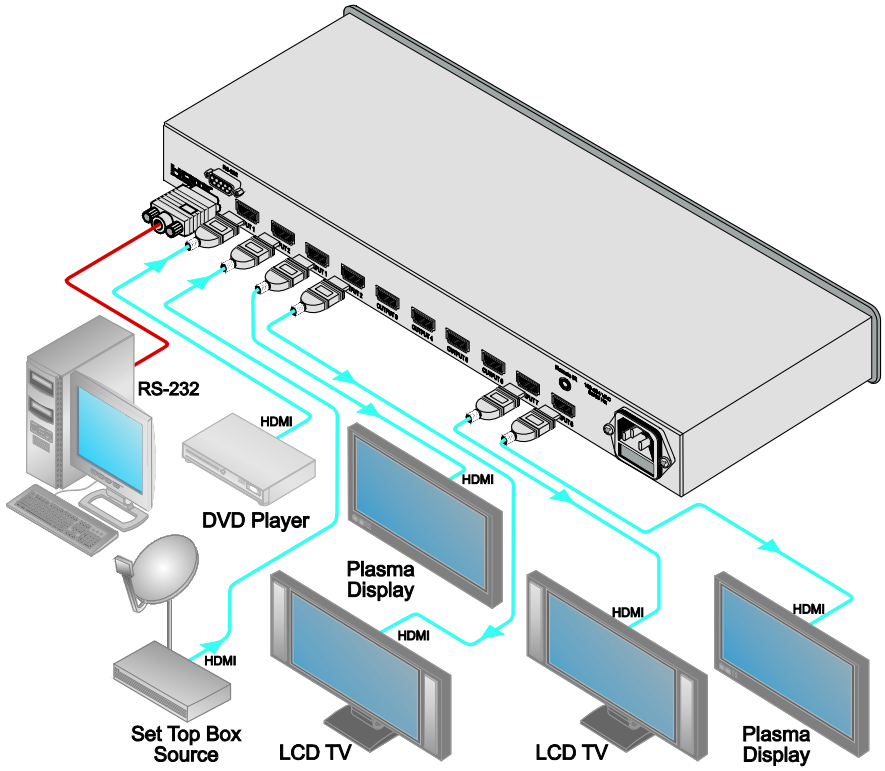


Figure 3: Connecting a VM-28H 2 Input 1:8 HDMI Distributor

### 6.1.2 Connecting the VM-216H 2 Input 1:16 HDMI Distributor

To connect the **VM-216H**, as the example in [Figure 4](#) shows, do the following<sup>1</sup>:

1. Connect the HDMI OUTPUT connectors<sup>2</sup> to up to 16 HDMI acceptors, using Kramer HDMI copper cables. In this example<sup>3</sup>, connect the:
  - OUTPUT 1 connector to acceptor 1 (for example, a plasma display)
  - OUTPUT 2 connector to acceptor 2 (for example, an LCD TV)
  - OUTPUT 15 connector to acceptor 15 (for example, an LCD TV)
  - OUTPUT 16 connector to acceptor 16 (for example, a plasma display)
2. Connect the two HDMI sources, for example, a DVD player and a set top box, to the INPUT 1 and INPUT 2 connectors, respectively, using the Kramer HDMI copper cables.
3. If required, connect a PC and/or controller to the RS-232 port (see [Section 6.2](#)).
4. Connect the power cord to the mains electricity.

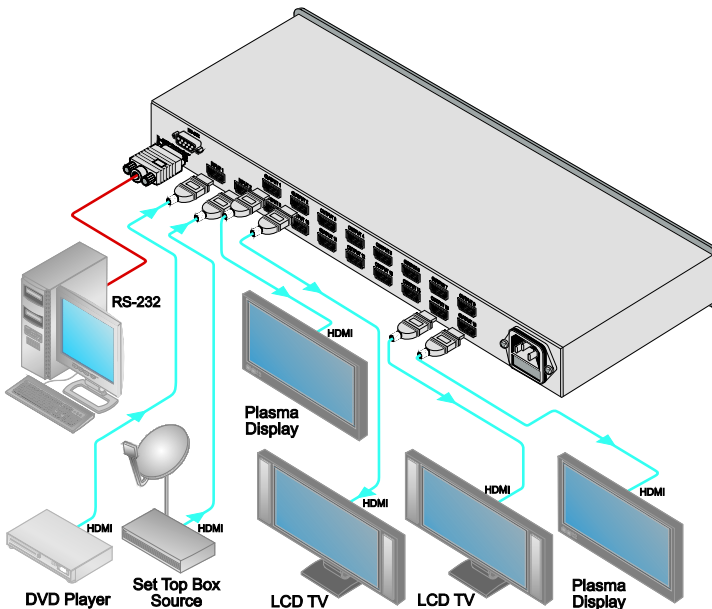


Figure 4: Connecting a VM-216H 2 Input 1:16 HDMI Distributor

1 Switch OFF the power on each device before connecting it to your VM-216H. After connecting your VM-216H, switch on its power and then switch on the power on each device.

2 As required. Up to 16 outputs can be connected. Not all outputs need to be connected.

3 Only connections from the first two acceptors and the last two acceptors are shown in [Figure 4](#).

## 6.2 Connecting to the VM-28H / VM-216H via RS-232

You can connect to the **VM-28H / VM-216H** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the **VM-28H / VM-216H** via RS-232:

- Connect the RS-232 9-pin D-sub rear panel port on the **VM-28H / VM-216H** unit via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

## 6.3 Operating the VM-28H / VM-216H

To operate the **VM-28H / VM-216H**:

1. Turn ON the POWER.
2. Select the desired input.
3. Press the EDID button to acquire or change the EDID data (see [Section 6.4](#)).

## 6.4 Using the EDID Button

Initially, the **VM-28H / VM-216H** operates with the factory default EDID.

You can acquire the EDID from:

- One Output (the selected output LED illuminates)
- The Default EDID (all the output LEDs blink)
- Several Connected Outputs, the Auto-mix Mode<sup>1</sup> (the output LEDs blink in sequence)

To cycle between the different modes (One Output, Default and Auto-mix), press the input button (IN 1 or IN 2) to which you want to read the EDID, as defined in [Table 2](#). Note, that the EDID feature has a 10 second timeout.

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<sup>1</sup> The EDID acquired is a weighted average of all the connected outputs. For example, if several displays with different resolutions are connected to the outputs, the acquired EDID supports all the resolutions, as well as other parameters included in the EDID



Table 2: The EDID Modes

Current EDID Mode	Appearance	To cycle to the Default EDID	To cycle to the Auto-mix EDID	To cycle to the One output EDID
One output	The selected output LED illuminates	Press the IN button once again after selecting output 8 (for <b>VM-28H</b> ) or output 16 (for <b>VM-216H</b> ). The output LEDS blink		
Default	The output LEDs blink		Press the IN button once	
Auto-mix	The output LEDs blink in sequence			Press the IN button to select the required output. The selected output blinks

To acquire or change the EDID of a new output display from:

- One output, see [Section 6.4.1](#)
- The default EDID, see [Section 6.4.2](#)
- Several connected outputs, see [Section 6.4.3](#)

#### 6.4.1 Acquiring / Changing the EDID from one Output

To acquire or change the EDID of a new output display:

1. Connect the power supply.
2. Connect the new output display device.
3. Press the EDID button for more than 3 seconds.
4. Press an input button (either IN 1 or IN 2) once<sup>1</sup>. The selected input button illuminates.
5. Enter the One output mode as defined in [Table 2](#) (with either IN 1 or IN 2).
6. Press that input button to set the appropriate OUTPUT STATUS LED. The OUTPUT STATUS LED illuminates indicating that that output channel is selected.
7. Press the LOCK button to copy the EDID of the selected OUTPUT to the input.

While the EDID is being copied the EDID button blinks. The new EDID is copied, when the EDID button no longer blinks.

<sup>1</sup> Depending if you want to copy the new EDID to input 1 or to input 2

#### 6.4.2 Acquiring the Default EDID

To reset the default EDID, do the following:

1. Connect the power supply.
2. Press the EDID button for more than 3 seconds.
3. Press an input button (either IN 1 or IN 2)<sup>1</sup> once.  
The selected input button illuminates.
4. Enter the default mode as defined in [Table 2](#) (with either IN 1 or IN 2).  
All the OUTPUT STATUS LEDs blink simultaneously.
5. Press the LOCK to copy the default EDID to the input.  
While the EDID is being copied both the EDID and the Lock buttons blink. The new EDID is copied, when the EDID and the Lock buttons no longer blink.

#### 6.4.3 Acquiring the EDID from several Outputs

To acquire or change an EDID via several connected outputs:

1. Connect the power supply.
2. Connect several output display devices.
3. Press the EDID button for more than 3 seconds.
4. Press an input button (either IN 1 or IN 2)<sup>1</sup> once.  
The selected input button illuminates.
5. Enter the Auto-mix mode as defined in [Table 2](#) (with either IN 1 or IN 2).  
The OUTPUT STATUS LEDs blink in sequence.
6. Press the LOCK button to copy the EDID of the selected OUTPUT to the input.  
While the EDID is being copied the EDID button blinks. The new EDID is copied, when the EDID button no longer blinks.

## 7 Technical Specifications

[Table 3](#) and [Table 4](#) include the technical specifications<sup>1</sup> of the **VM-28H** and **VM-216H**, respectively:

*Table 3: VM-28H Technical Specifications*

INPUTS:	2 on HDMI connectors
OUTPUTS:	8 on HDMI connectors
BANDWIDTH:	Supports up to 2.25Gbps bandwidth per graphic channel
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI and HDCP
CONTROLS:	EDID, IN 1, IN 2, IR remote controller and LOCK buttons
INDICATOR LEDES:	Output status LEDs
OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing
POWER CONSUMPTION:	100-240V AC, 50/60Hz 28VA
DIMENSIONS:	19" x 7" x 1U W, D, H, rack mountable
WEIGHT:	2.5kg (5.5lbs) approx.
ACCESSORIES:	Power cord, rack "ears", IR remote control transmitter
OPTIONS:	HDMI/HDMI male-to-male cables, fiber optic HDMI Cable (C-FOHM/FOHM), External remote IR receiver cable <sup>2</sup>

*Table 4: VM-216H Technical Specifications*

INPUTS:	2 on HDMI connectors
OUTPUTS:	16 on HDMI connectors
BANDWIDTH:	Supports up to 2.25Gbps bandwidth per graphic channel
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI and HDCP
CONTROLS:	EDID, IN 1, IN 2, IR remote controller and LOCK buttons
INDICATOR LEDES:	Output status LEDs
OPERATING TEMPERATURE:	0° to +55°C (32° to 131°F)
STORAGE TEMPERATURE:	-45° to +72°C (-49° to 162°F)
HUMIDITY:	10% to 90%, RHL non-condensing
POWER CONSUMPTION:	100-240V AC, 50/60Hz, 48VA
DIMENSIONS:	19" x 7" x 1U W, D, H, rack mountable
WEIGHT:	2.5kg (5.5lbs) approx.
ACCESSORIES:	Power cord, rack "ears", IR remote control transmitter
OPTIONS:	HDMI/HDMI male-to-male cables, Fiber Optic HDMI Cable (C-FOHM/FOHM)

### Warning:

This is a class A product, for professional applications and environments only

<sup>1</sup> Specifications are subject to change without notice

<sup>2</sup> P/N: C-A35M/IRR-50

## 8 Communication Protocol

The **VM-28H/VM-216H** is compatible with Kramer's Protocol 2000 (version 0.48) (below). This RS-232/RS-485 communication protocol uses four bytes of information as defined below. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 5: Protocol Definitions

<b>MSB</b>							<b>LSB</b>	
	<b>DESTI- NATION</b>	<b>INSTRUCTION</b>						
0	D	N5	N4	N3	N2	N1	N0	
7	6	5	4	3	2	1	0	
1st byte								
	<b>INPUT</b>							
1	6	I5	I4	I3	I2	I1	I0	
7	6	5	4	3	2	1	0	
2nd byte								
	<b>OUTPUT</b>							
1	O6	O5	O4	O3	O2	O1	O0	
7	6	5	4	3	2	1	0	
3rd byte								
	<b>MACHINE NUMBER</b>							
1	OVR	X	M4	M3	M2	M1	M0	
7	6	5	4	3	2	1	0	
4th byte								

1<sup>st</sup> BYTE: Bit 7 – Defined as 0

D – “DESTINATION”: 0 - for sending information to the switchers (from the PC);

1 - for sending to the PC (from the switcher)

N5 N0 – “INSTRUCTION”

The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits) Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO , which was performed The instruction codes are defined according to the table below (INSTRUCTION NO is the value to be set for N5 N0)

2<sup>nd</sup> BYTE: Bit 7 – Defined as 1

I6 I0 – “INPUT”

When switching (ie instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched For other operations, these bits are defined according to the table

3<sup>rd</sup> BYTE: Bit 7 – Defined as 1

O6 O0 – “OUTPUT”

When switching (ie instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched For other operations, these bits are defined according to the table

4<sup>th</sup> BYTE: Bit 7 – Defined as 1

Bit 5 – Don't care

OVR – Machine number override

M4 M0 – MACHINE NUMBER

Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply

For a single machine controlled via the serial port, always set M4 M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1

Table 6: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
1	SWITCH V DEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

NOTES on the above table:

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code

01 85 88 83

was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:

41 81 87 83

to the PC.

When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

7D 96 90 81 (ie 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte)

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D 83 85 81 (ie 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte)

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D D9 C3 81 (ie 128dec+ ASCII for "Y"; 128dec+ ASCII for "C")

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E 82 81 82 (ie request the number of outputs)

would be HEX codes

7E 82 90 82

ie 16 outputs

NOTE 15 - When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) will cause all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it will perform any "video" instruction.

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

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**Caution**

**Safety Warning:**

Disconnect the unit from the power supply before opening/servicing.



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3

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