KRAMER

USER MANUAL

MODEL:

VM-4HDT

1:4 HDMI to HDBT DA

P/N: 2900-300486 Rev 1

VM-4HDT Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to **http://www.kramerav.com/manual/VM-4HDT** to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

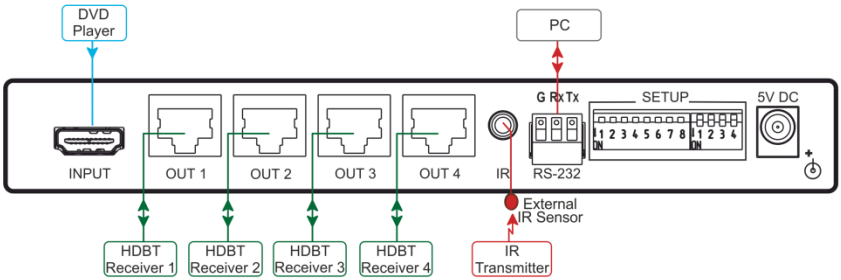
- ☑ The **VM-4HDT** 1:4 HDMI to HDBT DA
- ☑ 1 Power supply (5V DC)
- ☑ 1 Quick start guide
- ☑ 4 Rubber feet
- ☑ Bracket set for TOOLS

Step 2: Install the VM-4HDT

Attach the rubber feet and place on a table or mount the **VM-4HDT** in a rack (using an optional **RK-T2B** rack adapter).

Step 3: Connect inputs and outputs

Always switch OFF the power on each device before connecting it to your **VM-4HDT**.
For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the **VM-4HDT**.



RJ-45 Pinout

For the Ethernet and HDBaseT connectors, see the proper wiring diagram below

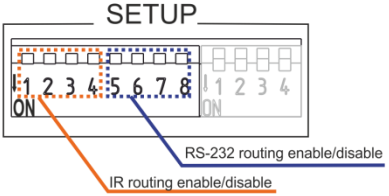
EIA / TIA 568B	
PIN	Wire Color
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown

For optimum range and performance use Kramer's **BC-HDKat6a** cable. This specially built cable significantly outperforms regular CAT 5 / CAT 6 cables.

Step 4: Connect the power

Connect the 5V DC power adapter to the rear of the **VM-4HDT** and connect the adapter to the mains electricity.

Step 5: Set the DIP-Switches



Output #	IR Routing is enabled when:	RS-232 Routing is enabled when:
OUT 1	DIP 1 – OFF	DIP 5 – OFF
OUT 2	DIP 2 – OFF	DIP 6 – OFF
OUT 3	DIP 3 – OFF	DIP 7 – OFF
OUT 4	DIP 4 – OFF	DIP 8 – OFF

For example, setting DIP 1 and 3 to OFF will enable IR signal routing via OUT 1 and OUT 3 while for OUT 2 and OUT 4 IR routing is disabled.

Step 6: Acquire the EDID

Press the EDID Setup button once to display the present EDID. Each additional press cycles through the EDID source options:

LEDs lit:	Chooses:
OUT 1	Output 1 EDID
OUT 2	Output 2 EDID
OUT 3	Output 3 EDID
OUT 4	Output 4 EDID
All LEDS flash	Default EDID

Stop pressing the EDID Setup button when the desired EDID source is lit.

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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 the video, audio, presentation, and broadcasting professional 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 14 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Video Products; GROUP 12: Digital Signage; GROUP 13: Audio; and GROUP 14: Collaboration.

Congratulations on purchasing your Kramer **VM-4HDT** *1*:4 HDMI to HDBT DA, which is ideal for the following typical applications:

- Boardrooms and meeting rooms
- Presentation and multimedia applications
- Broadcast
- Rental and staging

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

Go to http://www.kramerav.com/downloads/VM-4HDT to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighbouring electrical appliances that may adversely influence signal quality
- Position your Kramer **VM-4HDT** away from moisture, excessive sunlight and dust

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

2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

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

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

The Kramer MegaTOOLS® **VM-4HDT** is a high-quality 1:4 HDMI to HDBT DA that takes one HDMI input, equalizes and reclocks the signal and distributes it to four identical HDBT outputs. The **VM-4HDT** distributes signals having resolutions up to 4Kx2K and including WUXGA and 1080p.

In particular, the **VM-4HDT** features:

- A maximum data rate of 10.2Gbps (3.4Gbps per graphic channel)
- HDMI support for 3D, Deep Color, x.v.Color™, Lip Sync, HDMI Uncompressed Audio Channels, Dolby TrueHD, DTS-HD, CEC (only for OUT 1)
- HDCP compliance (note that sources that support HDCP will output HDCP protected content)
- Kramer Equalization & re-Klocking™ Technology that rebuilds the digital signal integrity to travel longer distances
- I-EDIDPro™ Kramer Intelligent EDID Processing™, an intelligent EDID handling and processing algorithm that ensures Plug and Play operation for HDMI systems
- A default EDID for fast and efficient connection of the unit

  The default EDID feature lets you connect the **VM-4HDT** without having to connect a display to the output
- Support for EDID Designer via the USB port
- 3D pass-through
- A 5V DC power source
- A MegaTOOLS® sized enclosure. two devices can be mounted in a 1U rack space using the optional **RK-T2B** adapter

The **VM-4HDT** supports a range of up to 70m (230ft) at 2K resolutions and 40m (130ft) at 4K resolutions (on shielded **BC-HDKat6a** cable).

3.1 About HDBaseT™ Technology

HDBaseT™ is an advanced all-in-one connectivity technology (supported by the HDBaseT Alliance). It is particularly suitable in the ProAV – and also the home – environment as a digital networking alternative, where it enables you to replace numerous cables and connectors by a single LAN cable used to transmit, for example, uncompressed full high-definition video, audio, IR, as well as various control signals.

The products described in this user manual are HDBaseT certified.

3.2 Using Twisted Pair Cable for HDBT

Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products; **BC−HDKat6a** (CAT 6 23 AWG cable) significantly outperforms regular CAT 5 / CAT 6 cables.

We strongly recommend that you use shielded twisted pair cable.

3.3 Defining the VM-4HDT 1:4 HDMI to HDBT DA

Figure 1 defines the **VM-4HDT**.

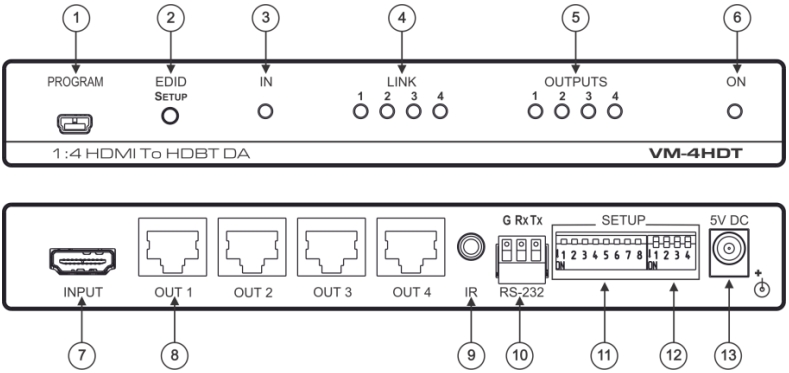

Figure 1: VM-4HDT 1:4 HDMI to HDBT DA

#	Feature	Function
1	PROGRAM Mini USB Connector	Use to send RS-232 Commands (see Section 8.3). Connect to a PC to perform firmware upgrades (via K-Upload) and work with the EDID Designer. K-Upload and EDID Designer can be downloaded from our Web site at: http://www.kramerav.com/manual/EDID Designer
2	EDID SETUP Button	Press to capture the input EDID or select the default EDID (see Section 5)
3	IN LED	Lights when an active input signal is detected
4	LINK LEDs	Lights when a link is established with the receiver (from 1 to 4)
5	OUTPUT LEDs	Lights when an active output acceptor is detected (from 1 to 4)
6	ON LED	Lights when the unit receives power
7	INPUT HDMI Connector	Connects to the HDMI source
8	HDBT OUT Connectors	Connect to an HDBT acceptor (from 1 to 4), for example TP-580R
9	IR 3.5mm Mini Jack	Connect to the remote IR sensor/emitter
10	*RS-232 CONTROL* 3-pin Terminal Block	Connect to the serial controller to send RS-232 data to remote receiver
11	SETUP 8-way DIP-switch	Used to set the IR and RS-232 commands behavior, (see Section 5.1.1)
12	SETUP 4-way DIP-switch	For future use
13	5V DC Connector	Connects to the 5V DC power supply

4 Connecting the VM-4HDT

Always switch off the power to each device before connecting it to your **VM-4HDT**. After connecting your **VM-4HDT**, connect its power and then switch on the power to each device.

Connect the **VM-4HDT** as illustrated in the example in Figure 2:

1. Connect an HDMI input source (for example, a BluRay disk player) to the HDMI IN connector.

2. Connect the four HDBT outputs to up to four HDBT receivers (for example, The **TP-580R** and the **TP-588D**).

Note that If a mac is connected as a source and a non-HDCP is connected as the acceptor, the signal will not pass.

3. Connect the 5V DC power adapter to the power socket unit and then connect the adapter to the mains electricity (not shown in Figure 2). The ON LED lights.

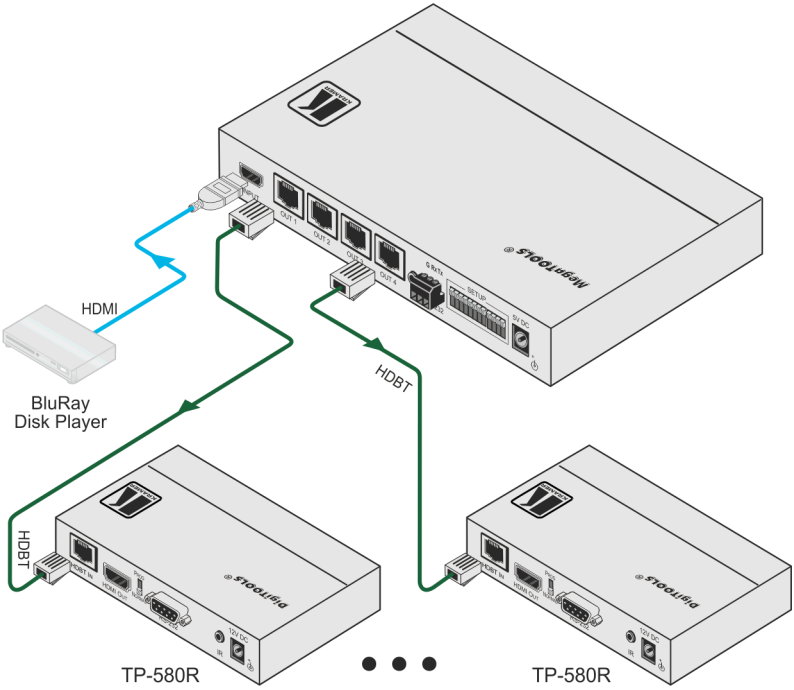

Figure 2: Connecting the VM-4HDT 1:4 HDMI to HDBT DA

5 Operating the VM-4HDT

This section describes how IR and RS-232 signals are routed (see Section 5.1) and how to acquire the EDID (see Section 5.2).

5.1 IR and RS-232 Signal Routing

The **VM-4HDT** can send or receive IR and RS-232 commands via the four HDBT output ports.

Each signal can pass commands from the **VM-4HDT** to a single output, several outputs or all of the outputs or the other way around, from the output/s to the **VM-4HDT**.

The IR/RS-232 signal routing is set via the SETUP DIP-switches (see Section 5.1.1)

5.1.1 Setting the DIP-Switches

Figure 3 defines the SETUP DIP-Switches:

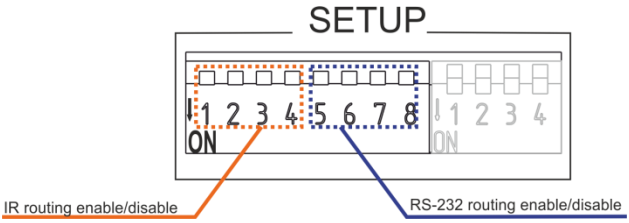

Figure 3: VM-4HDT DIP-Switches

The setup is defined in the table below:

Output #	IR Routing is enabled when:	RS-232 Routing is enabled when:
OUT 1	DIP 1 – OFF	DIP 5 – OFF
OUT 2	DIP 2 – OFF	DIP 6 – OFF
OUT 3	DIP 3 – OFF	DIP 7 – OFF
OUT 4	DIP 4 – OFF	DIP 8 – OFF

For example, in the DIP-switch setup shown in Figure 4, DIPs 1, 4, 7 and 8 are set to OFF. This means that IR signals can be transferred through channels 1 and 4 and RS-232 commands can be passed via channels 3 and 4. All the other channels are set to ON and are therefore disabled.

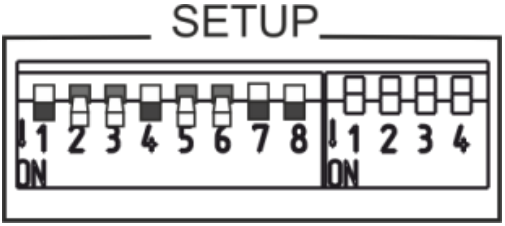

Figure 4: VM-4HDT DIP-Switches Setup

5.1.2 Signal Routing

The example in Figure 5 shows the **VM-4HDT** connected to four **TP-580R** devices. The table below summarizes the types of connections:

Output #	HDMI OUT:	INPUT	IR	RS-232
VM-4HDT		BluRay Disk player	Emitter	PC
TP-580R (1)	Display		Sensor	
TP-580R (2)	Display		Sensor	
TP-580R (3)	Projector		Sensor	Projector
TP-580R (4)	Projector		Sensor	Projector

IR signal Routing

To route the IR signal you have to use the Kramer external IR sensor on one end (P/N: 95-0104050) and the Kramer IR emitter cable on the other end (P/N: C-A35/IRE-10). Note that two IR Emitter Extension Cables are available: a 15 meter cable and a 20 meter cable

In this example, an IR emitter is connected to the streamer and IR sensors are connected to all the **TP-580R** devices. This setup lets you remotely control the streamer via any of the receiver devices using the streamer's IR remote control transmitter.

RS-232 Signal Routing

A laptop can be used to control the product via mini USB port and **K-TOUCH** can be used to send RS-232 commands over HDBaseT to the remote connected device.

In this example, a laptop is connected to the RS-232 terminal block connector on the **VM-4HDT** and the RS-232 ports on **TP-580R** (3) and **TP-580R** (4) are connected to the projector. This type of setup allows you to control the Projectors.

RS-232 commands are sent to both projectors:

- If they are of the same model (for example, both are Projector A), both will respond to these commands
- If they are not of the same make (Projector A and Projector B) The Projector A commands will affect only Projector A and will be ignored by Projector B

In the same way, if the RS-232 are also connected to the displays on **TP-580R** (1) and **TP-580R** (2) they can also receive specific commands each, which will be ignored by devices of a different make.

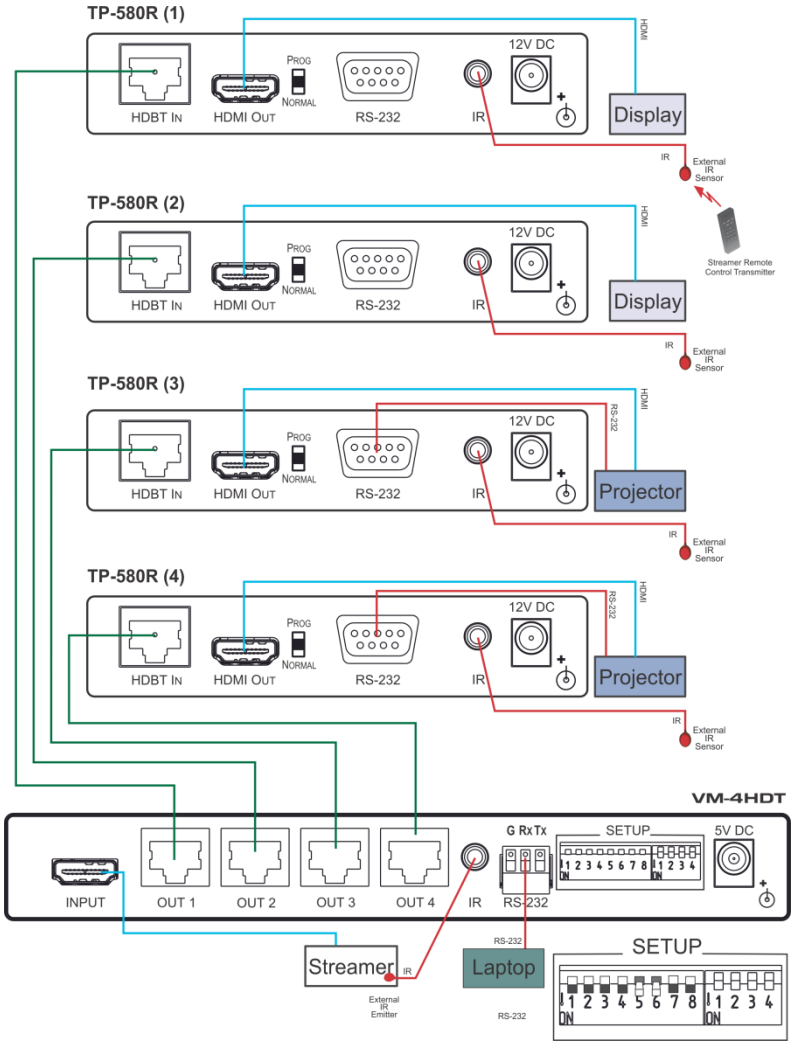

Figure 5: IR/RS-232 Routing Example

5.2 Acquiring an EDID

To acquire an EDID, press the EDID SETUP button as follows:

1. The first press of the EDID SETUP button displays the present EDID status similar to that shown in the next step.
2. The second press of EDID SETUP enters the read mode and each additional press cycles through the source options:
   OUT 1 -> OUT 2 -> OUT 3 -> OUT 4 -> all LEDs flash for a default EDID.
3. When the desired EDID source is reached, release the EDID SETUP button. The **VM-4HDT** reads the EDID for a few seconds. When finished, all LEDS return to display the present output connection status.

Note that if an unconnected output is chosen or the EDID cannot be read, the **VM-4HDT** loads the default EDID

Note that **VM-4HDT** Supports EDID Designer (via the mini USB port) that can be loaded from our Web site: Kramer EDID Designer

Note that in order to use the mini USB port, you need to download and the Kramer USB driver from our Web site at:
http://www.kramerelectronics.com/support/product_downloads.asp and install it

5.2.1 Forcing the RGB Mode

If you want to force the EDID, that the source is seeing, to support only RGB color space, press and hold the EDID button until all the output LEDs flash together, and then read the desired EDID.

To return to the normal mode press and hold the EDID button until the output LEDs light together and then read the desired EDID.

6 Default EDID

Model name..... VM-4HDT
Manufacturer..... KMR
Plug and Play ID..... KMR0672
Data string..... Default-EDID
Serial number..... 2
Manufacture date..... 2012, ISO week 255
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 520 x 320 mm (24.0 in)
Power management..... Standby, Suspend, Active off/sleep
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... Not supported

Color characteristics
Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.674 - Ry 0.319
Green chromaticity..... Gx 0.188 - Gy 0.706
Blue chromaticity..... Bx 0.148 - By 0.064
White point (default).... Wx 0.313 - Wy 0.329
Additional descriptors... None

Timing characteristics
Horizontal scan range.... 30-83kHz
Vertical scan range..... 56-76Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
640 x 480p at 60Hz - IBM VGA
640 x 480p at 75Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 75Hz - VESA
1024 x 768p at 60Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1280 x 1024p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD
1152 x 864p at 75Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Supported
Basic audio..... Supported
YCbCr 4:4:4..... Supported
YCbCr 4:2:2..... Supported
Native formats..... 1
Detailed timing #1..... 1920x1080p at 60Hz (16:9)
Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
Detailed timing #4..... 720x480p at 60Hz (16:9)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync

CE video identifiers (VICs) - timing/formats supported
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
720 x 480p at 60Hz - EDTV (16:9, 32:27)
720 x 480p at 60Hz - EDTV (4:3, 8:9)
720 x 480i at 60Hz - Doublescan (16:9, 32:27)
720 x 576i at 50Hz - Doublescan (16:9, 64:45)
640 x 480p at 60Hz - Default (4:3, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 2-channel, 16/20/24 bit depths at 32/44/48 kHz

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

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

Report information
Date generated..... 11/11/2014
Software revision..... 2.60.0.972
Data source..... Real-time 0x0032
Operating system..... 6.1.7601.2.Service Pack 1

7 Technical Specifications

INPUT:	1 HDMI connector
OUTPUTS:	4 HDBT connectors
MAX. DATA RATE:	10.2Gbps (3.4Gbps per graphic channel)
MAX. RESOLUTION:	4K@30Hz and 4K@60Hz 4:2:0
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI and HDCP
CONTROLS:	EDID Setup button
INDICATOR LEDs:	OUTPUTS 1 to 4, LINK 1 to 4, IN
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
POWER CONSUMPTION:	5V DC, 3.2A
DIMENSIONS:	18.8cm x 11.5cm x 2.9cm (7.4" x 4.53" x 1.15") W, D, H
WEIGHT:	0.46kg (1.01lb)
ACCESSORIES:	Power supply
OPTIONS:	RK-T2B 19” rack adapter
Specifications are subject to change without notice at http://www.kramerelectronics.com	

7.1 Default Communication Parameters

RS-232		
Baud Rate:		115,200
Data Bits:		8
Stop Bits:		1
Parity:		None
Factory Reset		
Protocol 3000	FACTORY command to reset to factory default configuration	
RS-232		
Command Format:		ASCII protocol 3000
Example (Route the video HDMI input to the output ports):		#ROUTE 1,1,2<cr>

8 Protocol 3000

The **VM-4HDT** can be operated using serial commands from a PC, remote controller, or touch screen. The unit communicates using the default Kramer Protocol 3000.

This section describes:

- Kramer Protocol 3000 syntax (see Section 8.1)
- Kramer Protocol 3000 commands (see Section 8.2)
- Kramer Protocol 3000 detailed commands (See Section 8.3)

8.1 Kramer Protocol 3000 Syntax

8.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*device_id@*	**Message**	CR

8.1.1.1 Simple Command

Command string with only one command without addressing:

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

8.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address (optional)	Body	Delimiter
#	*device_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

8.1.2 Device Message Format

Start	Address (optional)	Body	Delimiter
#	*device_id@*	**Message**	CR LF

8.1.2.1 Device Long Response

Echoing command:

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

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

8.1.3 Command Terms

Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

Parameters

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

Message string

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

Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character

'#' – For host command/query

'~' – For device response

Device ID (Optional, for K-NET)

K-NET Device ID followed by '@'

Query sign

'?' follows some commands to define a query request.

Message closing character

CR – For host messages; carriage return (ASCII 13)

CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character

When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

8.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

8.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

8.1.6 Chaining Commands

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

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

8.1.7 Maximum String Length

64 characters

8.2 Kramer Protocol 3000 Commands

Command	Description	Permission
#	Protocol handshaking	End User
BUILD-DATE?	Read device build date	End User
CPEDID	Copy EDID data from the output to the input EEPROM	End User
DISPLAY?	Read if output is valid	End User
FACTORY	Reset to factory default configuration	
GEDID	Read EDID data	User SW Internal
HELP	List of commands	End User
MODEL?	Read device model	End User
NAME?		
PROT-VER?	Read device protocol version	End User
RESET	Reset device	Administrator
SIGNAL?	Read if input is valid	End User
SN?	Read device serial number	End User

Note that the some of the following commands differ from the Kramer standard protocol commands.

8.3 Kramer Protocol 3000 – Detailed Commands

This section describes the detailed commands list.

Command - **BUILD-DATE**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**BUILD-DATE?**	End User	Public
Description		**Syntax**	
Set:	Get device build date	#**BUILD-DATE**CR	
Get:	-	-	
Response			
~nn@**BUILD-DATE**SP*date*SP*time*CR LF			
Parameters			
date - Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day *time* - Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			

Command - **CPEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**CPEDID**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Copy EDID data from the output to the input EEPROM	#**CPEDID** SP *output_id, input_id* CR	
Get:	-	-	
Response			
~nn@**CPEDID** SP *output_id, input_id* CR LF			
Parameters			
output_id – Video output id *input_id* – Video input id			
Response Triggers			
Response is sent to the com port from which the Set was received (before execution)			

Command - **DISPLAY?**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**DISPLAY?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get output HPD status	#**DISPLAY?** SP *out_id* CR	
Response			
~ nn@**DISPLAY** SP *out_id,status* CR LF			
Parameters			
out_id - output number *status* - HPD status according to signal validation – 0: Signal or sink is not valid, 1: Signal or sink is valid			
Response Triggers			
After execution, response is sent to the com port from which the Get was received Response is sent after every change in output HPD status ON to OFF Response is sent after every change in output HPD status OFF to ON and ALL parameters (new EDID, etc.) are stable and valid			

Command – **FACTORY**		Command Type – System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**FACTORY**	End User	-
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device to factory defaults configuration	#FACTORY[CR]	
Get :	-	-	
Response			
~[nn]@**FACTORY**[SP]OK[CR LF]			
Notes			
This command deletes all user data from the device. The deletion can take some time.			

Command - **GEDID**		Command Type - System	
Command Name		**Permission**	**Transparency**
Get:	**GEDID**	End User	Public
Description		**Syntax**	
Get:	Read EDID data	#**GEDID**[SP]*eeprom_id* [CR]	
Response			
Multi line response: ~[nn]@**GEDID**[SP] *eeprom_id,size*[CR LF] EDID_data[CR LF] ~[nn]@**GEDID**[SP] *eeprom_id* [SP]**OK**[CR LF]			
Parameters			
eeprom_id – EEPROM to get the EDID from *size* – Device sends this parameter in response. Size of EDID that will print. *edid_data* **–** EDID data as stream of bytes.			
Response Triggers			
Response is sent to the com port from which the Set (before execution) / Get command was received			
Notes			
For Get, size=0 means EDID is not supported For old devices that do not support this command, ~nn@ ERR 002[CR LF] is received			

Command - **HELP**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	2 options: 1. #**HELP**[CR] 2. #**HELP**[SP]*command_name*[CR]	
Response			
1. Multi-line: ~nn@**Device available protocol 3000 commands:**[CR LF]*command*,[SP]*command*…[CR LF] **To get help for command use: HELP (COMMAND_NAME)**[CR LF] 2. Multi-line: ~nn@**HELP**[SP]*command***:**[CR LF]*description*[CR LF]**USAGE:** *usage* [CR LF]			

Command - **NAME**		Command Type - System (Ethernet)	
Command Name		**Permission**	**Transparency**
Set:	**NAME**	Administrator	Public
Get:	**NAME?**	End User	Public
Description		**Syntax**	
Set:	Set machine (DNS) name	#**NAME**[SP]*machine_name*[CR]	
Get:	Get machine (DNS) name	#**NAME?**[CR]	
Response			
Set: ~nn@**NAME**[SP]*machine_name*[CR LF] Get: ~nn@**NAME?**[SP]*machine_name*[CR LF]			
Parameters			
machine_name - String of up to 15 alpha-numeric chars (can include hyphen, not at the beginning or end)			
Notes			
The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on)			

Command – **MODEL?**		Command Type – System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**MODEL?**	End User	-
Description		**Syntax**	
Set:	-	-	
Get :	Get device model	#MODEL?[CR]	
Response			
~nn@**MODEL**[SP]*model_name*[CR LF]			
Parameters			
model_name – String of up to 19 printable ASCII chars			

Command - **PROT-VER?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device protocol version	#**PROT-VER?**CR	
Response			
~nn@**PROT-VER**SP3000:*version*CR LF			
Parameters			
Version - XX.XX where X is a decimal digit			

Command - **RESET**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**RESET**	Administrator	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Reset device	#**RESET**CR	
Get:	-	-	
Response			
~nn@**RESET**SP**OK**CR LF			
Notes			
To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.			

Command - **SIGNAL**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	-	-	-
Get	**SIGNAL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get input signal lock status	#**SIGNAL?**SP*inp_id*CR	
Response			
~ nn@**SIGNAL**SP *inp_id,status* CR LF			
Parameters			
inp_id - input number *status* - lock status according to signal validation – 0: Signal or sink is not valid, 1: Signal or sink is valid			
Response Triggers			
After execution, a response is sent to the com port from which the Get was received Response is sent after every change in input signal status ON to OFF, or OFF to ON			

Command - **SN?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device serial number	#**SN?**CR	
Response			
~nn@**SN**SP*serial_number*CR LF			
Parameters			
serial_number - 11 decimal digits, factory assigned			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

8.3.1 Packet Protocol Structure

The packet protocol is designed to transfer large amounts of data, such as files, IR commands, EDID data, and so on.

8.3.1.1 Using the Packet Protocol

To use the packet protocol:

4. Send a command: LDEDID
5. Receive Ready or ERR###
6. If Ready:
   - Send a packet
   - Receive OK on the last packet
   - Receive OK for the command
7. Packet structure:
   - Packet ID (1, 2, 3…) (2 bytes in length)
   - Length (data length + 2 for CRC) - (2 bytes in length)
   - Data (data length -2 bytes)
   - CRC - 2 bytes

01	02	03	04	05…	
Packet ID		Length		Data	CRC

8. Response:

~*NNNN*SP**OK**CR LF

Where *NNNN* is the received packet ID in ASCII hex digits.

8.3.1.2 Calculating the CRC

The polynomial for the 16-bit CRC is:

CRC-CCITT: 0x1021 = $x^{16} + x^{12} + x^5 + 1$

Initial value: 0000

Final XOR Value: 0

For a code example, see:

http://sanity-free.org/133/crc_16_ccitt_in_csharp.html

CRC example:

Data = “123456789”

Result => 0x31C3

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SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.

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