Kramer Electronics, Ltd.

USER MANUAL

Model:

VM-114H2C

2 Input 1:4 HDMI DA/2x CAT5 Outputs

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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 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer Desktop **VM-114H2C** *2 Input 1:4 HDMI DA/2x CAT5 Outputs*. The **VM-114H2C** is ideal for:

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

The package includes the following items:

- **VM-114H2C** 2 Input 1:4 HDMI DA/2x CAT5 Outputs
- Power adapter (12V DC)
- Kramer **RC-IR3** infrared remote control transmitter (including the required batteries and a separate user manual[2])
- This user manual[2]

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[3]

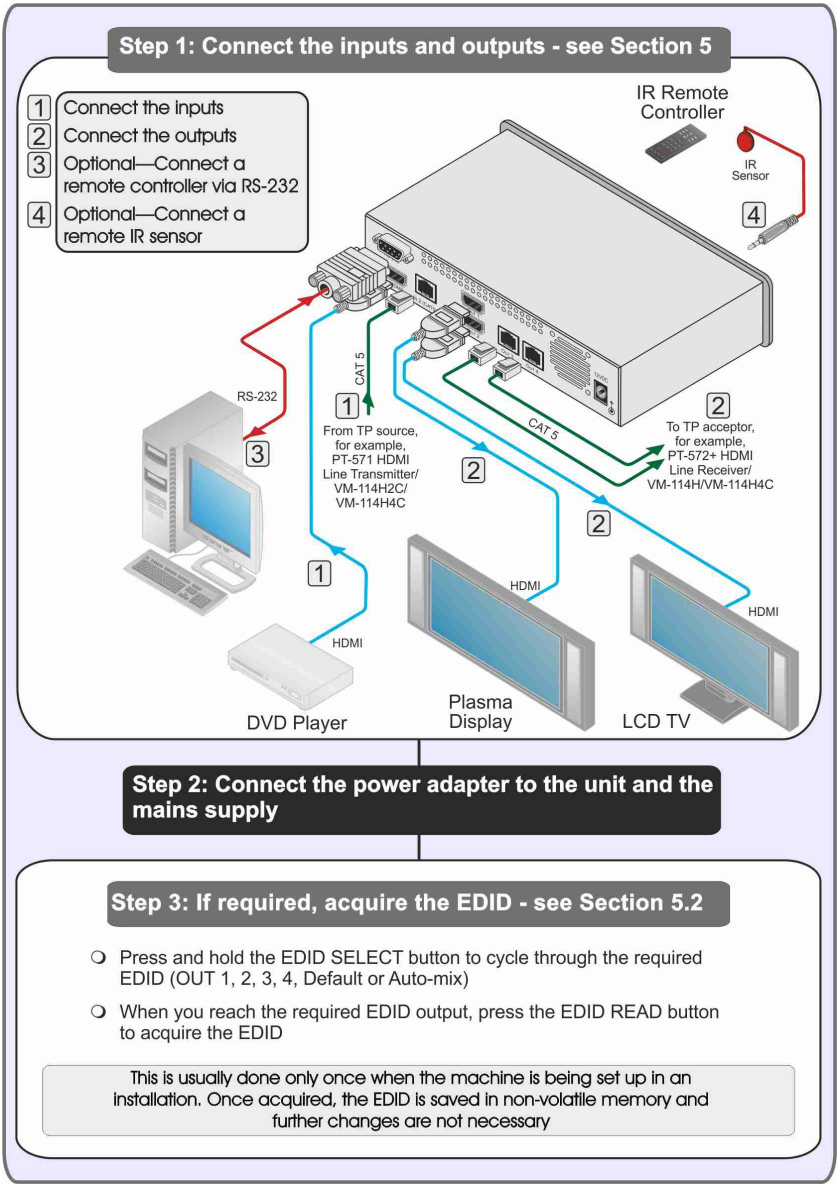
1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download up-to-date Kramer user manuals from http://www.kramerelectronics.com

3 The complete list of Kramer cables is available from http://www.kramerelectronics.com

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps of the **VM-114H2C**.



3 Overview

The high quality **VM-114H2C** *2 Input 1:4 HDMI DA/2x CAT5 Outputs* is a switcher/distribution amplifier for HDMI and TP (Twisted Pair) signals. It reclocks and equalizes one of two selectable input signals and distributes it to two HDMI and two TP outputs.

In particular, the **VM-114H2C**:

- Supports up to 2.25Gbps bandwidth per graphic channel (HDMI), 1.65Gbps bandwidth per graphic channel (DGKat)[1]
- Can read and store in non-volatile memory the default EDID, or the EDID[2] block from one or a mix[3] of the output display devices, so it can then provide the EDID information to the source even if the display device is not connected
- Features I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling & processing algorithm ensures Plug and Play operation for HDMI systems
- Supports HDMI (V1.4 w 3D, Deep Color[4], x.v.Color™ and 7.1 uncompressed audio channels (Dolby TrueHD, DTS-HD))
- Is HDCP compliant
- Features LEDs indicating the selected input and active output
- Supports IR remote control and has a remote IR 3.5mm mini jack
- Is 12V DC fed and is housed in a Kramer desktop enclosure

1 Suitable for resolutions up to UXGA at 60Hz, and for all HD resolutions

2 EDID is Extended Display Identification Data (see Section 3.4 for a more detailed definition)

3 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

4 On the HDMI input

3.1 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital[1] 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[2]:

- Provides a simple[3] 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[4] cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio[5] 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[6], 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 @60Hz), as well as standard definition formats such as NTSC or PAL

3.2 Using Shielded Twisted Pair Cable

Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products; the Kramer: **BC-DGKat524** (CAT 5 24 AWG), the Kramer **BC-DGKat623** (CAT 6 23 AWG cable), and the Kramer **BC-DGKat7a23** (CAT 7a 23 AWG cable). These specially built cables significantly outperform regular CAT 5/CAT 6 /CAT 7a cables.

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

The **VM-114H2C** supports a range of up to 90m (295ft) at 1080i/SXGA, or up to 30m (98ft) at 1080p/UXGA on shielded **BCP-DGKat524** cable; 90m (295ft) at 1080i or up to 70m (230ft) at 1080p/UXGA on shielded **BCP-DGKat623** cable.

You can daisy-chain up to six devices with the maximum overall distance between the first and last devices being cumulative and limited by the cable type used.

3.3 About the Power Connect™ Feature

The Power Connect™ feature here means that only one unit in a system, the transmitter or receiver, can be connected to a power source when the devices are within 90m (270ft) of each other. The Power Connect™ feature applies as long as the cable can carry power. The distance does not exceed 90m on standard CAT 5 cable, for longer distances, heavy gauge cable should be used[1].

Warning: Using a TP cable that is incorrectly wired will cause permanent damage to the device

3.4 Defining EDID

The Extended Display Identification Data (EDID[2]) is a data-structure, provided by a display, to describe its capabilities to a graphics card (that is connected to the display's source). The EDID enables the **VM-114H2C** 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.

3.5 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)
- Avoid interference from neighboring electrical appliances and position your **VM-114H2C** away from moisture, excessive sunlight and dust

Caution: No operator serviceable parts inside unit

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

Warning: Disconnect power and unplug unit from wall before installing or removing the device or servicing unit

1 CAT 5 cable is still suitable for the video/audio transmission, but not for feeding the power at these distances

2 Defined by a standard published by the Video Electronics Standards Association (VESA)

4 Defining the VM-114H2C

Figure 1 and Table 1 define the front panel of the **VM-114H2C.**

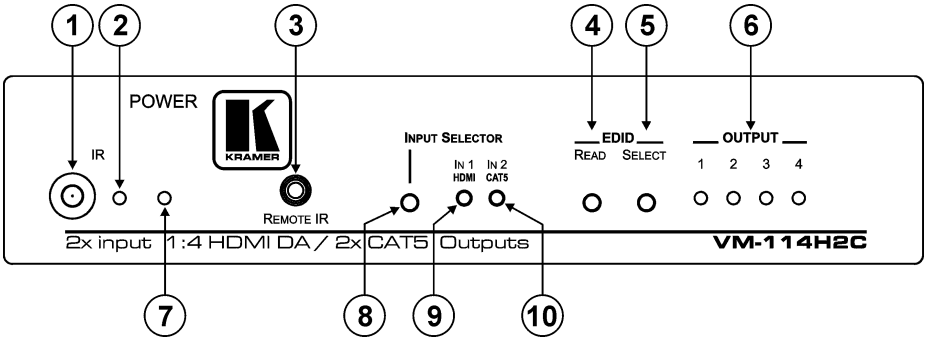


Figure 1: VM-114H2C Front Panel

Table 1: VM-114H2C Front Panel Features

#	Feature		Function
1	*IR* Remote Control Sensor		Sensor for the remote control IR transmitter
2	*IR* LED		Lights yellow when receiving signals from the IR remote control transmitter
3	*REMOTE IR* 3.5mm Mini Jack		Connect to a remote IR sensor
4	*EDID* Buttons	*READ* Button	Press (when one of the input LEDs is flashing to indicate a selected input) to read the selected EDID (see Section 5.2)
5		*SELECT* Button	Press repeatedly to cycle through the inputs to select an input from which to read the EDID. The relevant LED flashes (see Section 5.2)
6	*OUTPUT* LEDS	*1*	The relevant LED lights green when an acceptor is connected to the output[1]
		2	
		3	
		4	
7	*POWER* LED		Lights green when the unit receives power
8	*INPUT SELECTOR* Button		Press to select an input. The relevant *IN 1 HDMI/IN 2 CAT5* LED lights
9	*IN1 HDMI* LED	Input LEDs	Lights green when HDMI input 1 is selected
10	*IN2 CAT5* LED		Lights green when the TP CAT 5 input 2 is selected

1 Also lights or flashes during EDID setup (see Section 3.4)

Figure 2 and Table 2 define the rear panel of the **VM-114H2C.**

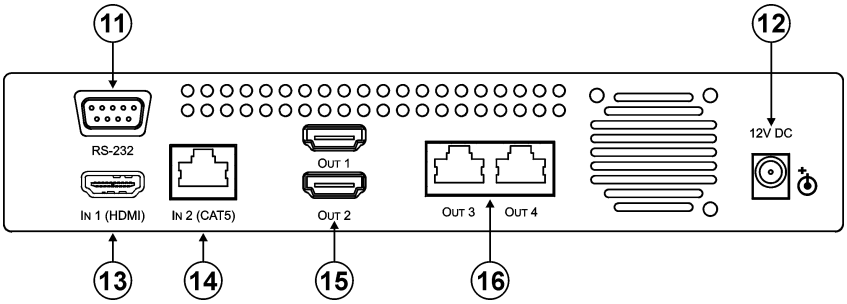


Figure 2: VM-114H2C Rear Panel

Table 2: VM-114H2C Rear Panel Features

#	Feature		Function
11	*RS-232* 9-pin D-sub (F) Connector		Connect to a PC or remote controller
12	*12V DC* Power Connector		Connect to the +12V DC power adapter, center pin positive
13	*IN1 (HDMI)* Input HDMI Connector	Inputs	Connect to an HDMI source
14	*IN2 (CAT5)* Input RJ-45 Connector		Connect to a TP source (for example, **PT-571** *HDMI Line Transmitter*, **VM-114H2C** or **VM-114H4C**)
15	*OUT 1* *OUT 2*	HDMI Output Connectors	Connect to the HDMI acceptors
16	*OUT 3* *OUT 4*	TP RJ-45 Output Connectors	Connect to the TP acceptors (for example, **PT-572+** *HDMI Line Receiver*, **VM-114H** or **VM-114H4C**)

5 Using the VM-114H2C

This section describes how to:

- Connect the **VM-114H2C** (see Section 5.1)
- Use the EDID SELECT button (see Section 5.2).

5.1 Connecting the VM-114H2C

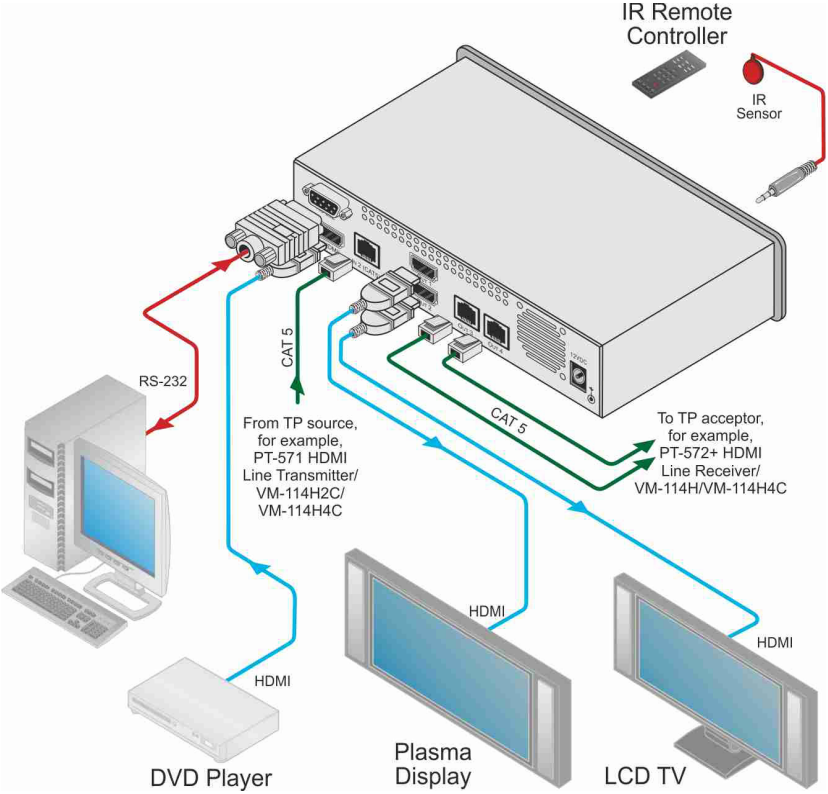


Figure 3: Connecting the VM-114H2C

To connect[1] the VM-114H2C as illustrated[2] in the example in Figure 3:

1. Connect the HDMI source (for example, a DVD player) to the IN 1 (HDMI) connector.

1 Switch off the power on each device before connecting it to your VM-114H2C. After connecting your VM-114H2C, switch on its power and then switch on the power on each device

2 The power adapter is not shown

2. Connect the TP source (for example, a **PT-571** *HDMI Line Transmitter*[1], another **VM-114H2C** or a **VM-1114H4C**) to the IN 2 (CAT5) connector.
3. Connect the HDMI OUT connectors to up to two HDMI acceptors (for example, LCD TV or plasma displays)
4. Connect the TP RJ-45 output connectors to up to two TP acceptors (for example, the **PT-572+** *HDMI Line Receiver*[2], the **VM-114H** or the **VM-114H4C**).
5. Optional—Plug the remote IR sensor into the front panel remote IR 3.5mm mini jack.
6. Optional—Connect a PC via RS-232 to the RS-232 port on the **VM-114H2C** (see Section 5.3).
7. Connect the power adapter to the power socket on the **VM-114H2C** and to the mains electricity (not shown in Figure 3).
8. Optional—Press the EDID READ button to acquire or change the EDID information (see Section 5.2).

5.2 Acquiring the EDID

Each input on the **VM-114H2C** has a factory default EDID loaded[3] (see Section 3.4). This lets you connect the power before having to connect one of the acceptors. The EDID for each input can be changed independently by uploading an EDID binary file to each input via the RS-232 port using **Kramer EDID Sender** software[4].

You can acquire the EDID[5] from:

- One output (the relevant output LED flashes)
- The default EDID (all output LEDs flash)
- Up to four connected outputs using the Auto-mix Mode[6] (all output LEDs light)

When pressing the EDID SELECT button briefly, the OUTPUT LEDs indicate the source from which the EDID was acquired as follows:

- OUTPUT 1 LED flashes—the EDID from OUTPUT 1 was the last acquired
- OUTPUT 2 LED flashes—the EDID from OUTPUT 2 was the last acquired, and so on

1 Another example is the TP-573

2 Another example is the TP-574

3 The VM-114H2C reads the EDID, which is stored in the non-volatile memory

4 Available for download from http://www.kramerelectronics.com

5 This is usually done only once, when the machine is being set up in an installation. Once acquired, the EDID is saved in non-volatile memory and further acquisition is not necessary

6 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

- All OUTPUT LEDs flash—the Default EDID is stored in the non-volatile memory
- All OUTPUT LEDs light—the Auto-Mix[6] EDID is stored in the non-volatile memory

To acquire the EDID:

1. Connect the power.
2. Connect the output(s) from which you want to acquire the EDID.
3. Press and hold the EDID SELECT button to cycle through to the required output.
4. Release the button when reaching the desired source[1].
5. Press EDID READ.
   The EDID is acquired.

5.2.1 Disabling/Enabling Deep Color Support

You can disable EDID deep color support to prevent signal deterioration when using long twisted pair cables on INPUT 2.

To disable deep color and acquire EDID:

1. Disconnect the power.
2. Connect the output or outputs from which you want to acquire the EDID.
3. Connect the power while pressing the EDID READ button.
4. Perform steps 3 through 5 in Section 5.2.

To enable deep color and acquire EDID:

1. Disconnect the power.
2. Connect the output or outputs from which you want to acquire the EDID.
3. Connect the power while pressing the EDID SELECT button.
4. Perform steps 3 through 5 in Section 5.2.

5.3 Connecting to the VM-114H2C via RS-232

You can connect to the **VM-114H2C** 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-114H2C** via RS-232:

- Connect the RS-232 9-pin D-sub rear panel port on the **VM-114H2C** 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

1 If you set the machine to acquire the EDID from an output that is not connected, the default EDID will be acquired

5.4 RS-232 and IR Control and Pass-through

The **VM-114H2C** can be controlled via RS-232 and infrared. Depending on how the RS-232 and IR connections are configured, the device will either respond to control signals or transparently pass them through to another receiver or transmitter. Three examples in Sections 5.4.2.1, 5.4.2.2 and 5.4.2.3 of various configurations illustrate this functionality.

5.4.1 RS-232 Control and Pass-through Using the VM-114H2C

As shown in Figure 3, you can connect a PC (or other serial controller) directly to the **VM-114H2C** to control the **VM-114H2C.**

The **VM-114H2C** also transparently passes bidirectional RS-232 signals over the TP cable from the **TP-573** transmitter to the **TP-574** receiver. For example, a PC connected to the RS-232 port on the **TP-573** can control an RS-232-controllable device (for example, a projection screen) connected to the **TP-574**.

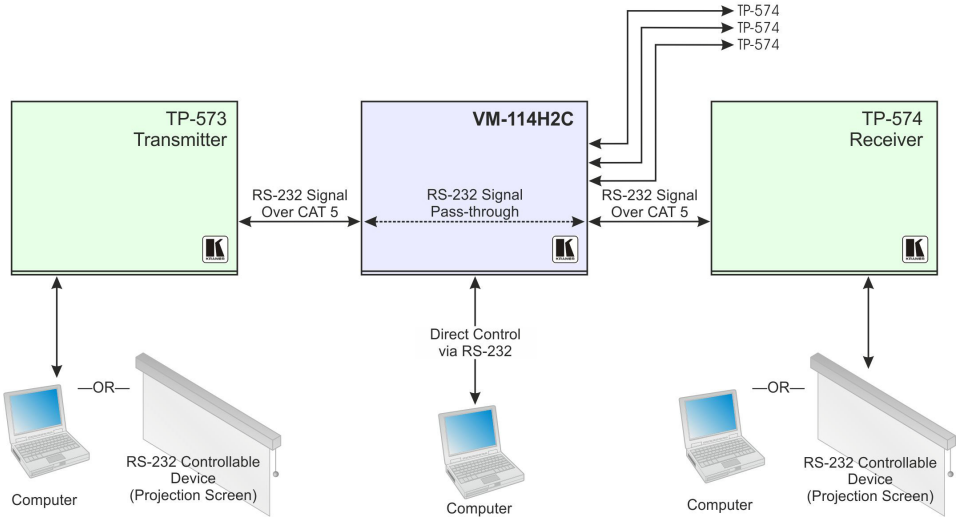


Figure 4: VM-114H2C RS-232 Control and Pass-through

5.4.2 Local IR Control and IR Pass-through Using the VM-114H2C

The **VM-114H2C** provides an IR sensor and a 3.5mm mini jack for connecting a remote IR emitter or sensor. When the **VM-114H2C** is connected to suitable transmitters and receivers (for example, the **TP-573** and **TP-574)**, the **VM-114H2C** can act as a pass-through for IR control signals, allowing remote control of multiple devices using multiple IR remote controllers.

When there is no IR sensor or emitter connected to the IR Remote 3.5mm mini jack, all signals received by the IR sensor on the front panel are passed to the transmitter and receiver bi-directionally over the TP cable allowing control of remote devices.

When an IR sensor or emitter is connected to the IR Remote 3.5mm mini jack, the connection between the IR sensor on the front panel and the IR on the transmitter/receiver is broken so that any signal received by the IR sensor on the front panel remains local to the **VM-114H2C** and controls only the **VM-114H2C**.

To control any device you need to use the appropriate IR remote controller, for example, the Kramer remote controller controls Kramer devices, the LCD remote controller controls the LCD display and so on, as shown in the following examples.

The following examples illustrate just three of the possible ways of connecting the **VM-114H2C** to provide local and remote IR control.

5.4.2.1 IR Local Control and Pass-through Example One

The configuration is shown in Figure 5.

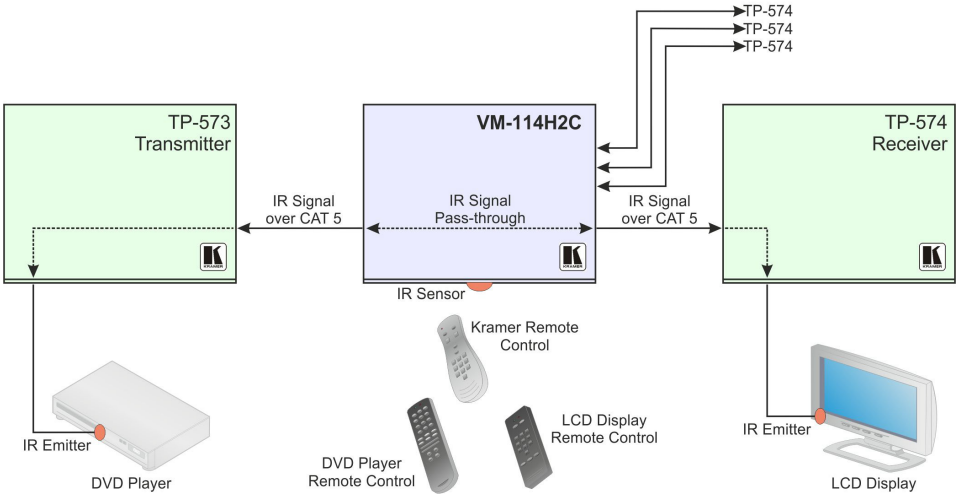


Figure 5: VM-114H2C IR Control and Pass-through Example One

A DVD player is connected to the **TP-573** transmitter via an IR emitter.

An LCD display is connected to the **TP-574** receiver via an IR emitter.

Both the **TP-573** and the **TP-574** are connected to the **VM-114H2C** via TP cabling.

To control a device, point the appropriate remote control for the device at the **VM-114H2C** IR sensor.

5.4.2.2 IR Local Control and Pass-through Example Two

The configuration is shown in Figure 6.

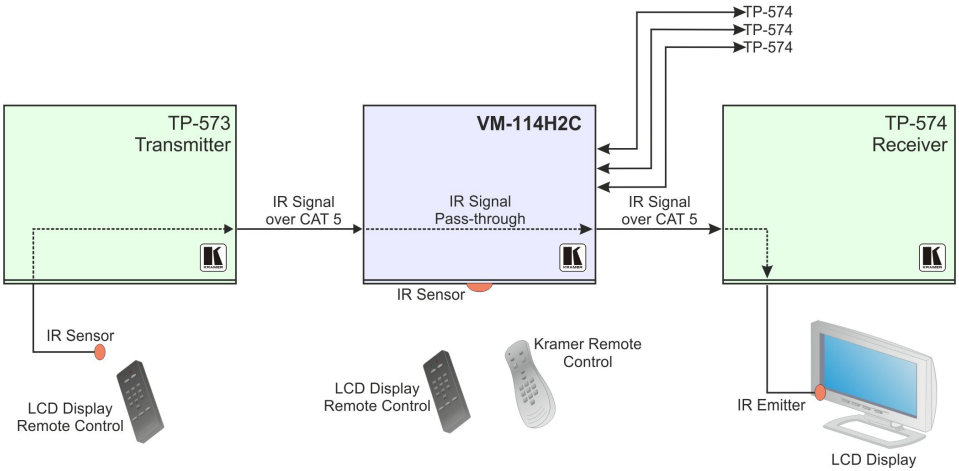


Figure 6: VM-114H2C IR Control and Pass-through Example Two

An IR sensor is connected to the **TP-573** transmitter.

An LCD display is connected to the **TP-574** receiver via an IR emitter.

Both the **TP-573** and the **TP-574** are connected to the **VM-114H2C** via TP cabling.

To control the LCD display, point the LCD display remote control either at the **TP-573** IR sensor or at the **VM-114H2C** IR sensor. To control the **VM-114H2C**, point the Kramer remote control at the **VM-114H2C** IR sensor.

5.4.2.3 IR Local Control and Pass-through Example Three

The configuration is shown in Figure 7.

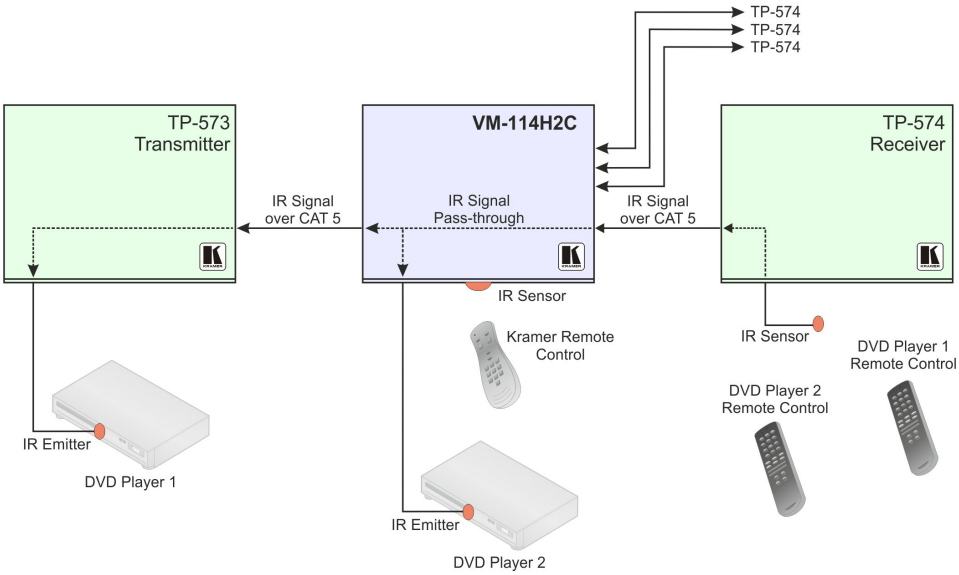


Figure 7: VM-114H2C IR Control and Pass-through Example Three

The first DVD player (player 1) is connected to the **TP-573** transmitter via an IR emitter.

The second DVD player (player 2) is connected to the **VM-114H2C** via an IR emitter.

An IR sensor is connected to the **TP-574** receiver.

Both the **TP-573** and the **TP-574** are connected to the **VM-114H2C** via TP cabling.

To control DVD player 1, point the DVD player 1 IR remote control at the **TP-574** IR sensor. To control DVD player 2, point the DVD player 2 IR remote control at the **TP-574** IR sensor. To control the **VM-114H2C**, point the Kramer remote control at the **VM-114H2C** IR sensor.

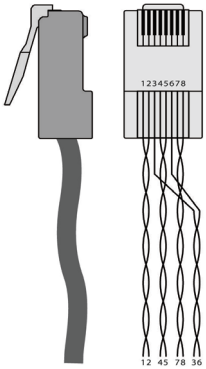
6 Wiring the Twisted Pair RJ-45 Connectors

When using STP cable, connect/solder the cable shield to the RJ-45 connector shield. Figure 8 defines the TP pinout using a straight pin-to-pin cable with RJ-45 connectors.

Note, that the cable Ground shielding must be connected/soldered to the connector shield.

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
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

Figure 8: CAT 5 Pinout



7 Technical Specifications

Table 3 includes the technical specifications[1] of the **VM-114H2C.**

Table 3: Technical Specifications of the VM-114H2C

INPUTS:	1 HDMI Connector 1 TP on an RJ-45 Connector
OUTPUTS:	2 HDMI Connectors 2 TP on RJ-45 Connectors
BANDWIDTH:	Up to 2.25Gbps bandwidth per graphic channel (HDMI), 1.65Gbps bandwidth per graphic channel (DGKat)
COMPLIANCE WITH HDMI STANDARD:	Supports HDMI and HDCP
CONTROLS:	Input select button, EDID select button, panel lock button, RS-232, local and remote IR controls
INDICATOR LEDs:	IR communication, Power, IN 1 HDMI, IN 2 CAT5, OUTPUT 1, 2, 3 and 4
POWER SOURCE:	12V DC, 1.4A
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
DIMENSIONS:	21.5cm x 16.3cm x 4.4cm (8.5in x 6.4in x 1.7in) W, D, H
WEIGHT:	0.9kg (1.98lbs) approx.
ACCESSORIES:	Power supply, RC-IR3 infrared remote control transmitter
OPTIONS:	HDMI/HDMI male-to-male cables, RK-1 19” rack adapter

8 Default Communication Parameters

Table 4 lists the default communication parameters for the **VM-114H2C**.

Table 4: Default Communication Parameters

RS-232	
Protocol 2000	
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	HEX
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81

1 Specifications are subject to change without notice

9 Default EDID

The factory default EDID is listed below.

```
Monitor
  Model name..... VM114H2C
  Manufacturer..... KRM
  Plug and Play ID..... KRM0114
  Serial number..... 505-707455010
  Manufacture date..... 2009, ISO week 10
  ------------------------
  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..... n/a

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 (16:10)
    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 ST
```

10 Kramer Protocol 2000

This RS-232 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

	MSB							LSB
	DESTI-NATION	**INSTRUCTION**						
0	D	N5	N4	N3	N2	N1	N0	
7	6	5	4	3	2	1	0	
1st byte								
	INPUT							
1	I6	I5	I4	I3	I2	I1	I0	
7	6	5	4	3	2	1	0	
2nd byte								
	OUTPUT							
1	O6	O5	O4	O3	O2	O1	O0	
7	6	5	4	3	2	1	0	
3rd byte								
			MACHINE NUMBER					
1	OVR	X	M4	M3	M2	M1	M0	
7	6	5	4	3	2	1	0	
4th byte								

1st 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).

2nd 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.

3rd 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.

4th 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 VIDEO	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
61	IDENTIFY MACHINE	1 - video machine name 3 - video software version 9 - protocol 2000 version	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	1 - for video 2 - for audio	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 (i.e. 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 (i.e. 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 (i.e. 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

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