

# Gefen®

## 8x CAT6 Extender for HDMI®

EXT-HDMI1.3-CAT6-8X

User Manual



[www.gefen.com](http://www.gefen.com)

## ASKING FOR ASSISTANCE

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# INTRODUCTION

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Congratulations on your purchase of the 8x CAT6 Extender for HDMI. Your complete satisfaction is very important to us.

## **Gefen**

Gefen delivers innovative, progressive computer and electronics add-on solutions that harness integration, extension, distribution and conversion technologies. Gefen's reliable, plug-and-play products supplement cross-platform computer systems, professional audio/video environments and HDTV systems of all sizes with hard-working solutions that are easy to implement and simple to operate.

## **The Gefen 8x CAT6 Extender for HDMI**

The Gefen 8x CAT6 Extender for HDMI sends eight independent 1080p HDMI 1.3 signals, with Deep Color support, over a single CAT-6a cable to distances up to 200 feet (60 meters).

The Gefen 8x CAT6 Extender for HDMI supports HDMI 1.3 features such as 1080p Full HD and lossless audio formats with support for Dolby TrueHD and DTS-HD Master Audio.

The Gefen 8x CAT6 Extender for HDMI digital transmission method insures 100% signal integrity over this single cable extension solution.

## **How It Works**

The Gefen 8x CAT6 Extender for HDMI can be connected in two ways :

- 1) When used as an add-on extension to HDMI when the system uses any 8x8 Matrix system as the required solution. In this case simply connect a CAT6 cable between the Sender unit and Receiver units for each zone (room).
- 2) The unit's other purpose is to extend eight (8) separate HDMI signals at long-range (200 feet/60 meters) over CAT6 cable to any HDTV display. Optionally, IR signals can also be extended, adding remote control of any IR functionality located at the source end.

An optional IR remote control can be used at the Sender unit to control the routing or at each Receiver unit to control each individual zone. Additional control is possible using RS-232 control of the 8x8 HDMI 1.3 matrixes: Simply connect the supplied RS-232 cable to the Matrix's RS-232 input and the 8x CAT6 Extender for the HDMI Sender unit's RS-232 output.

## OPERATION NOTES

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### READ THESE NOTES BEFORE INSTALLING OR OPERATING THE 8X CAT6 EXTENDER FOR HDMI

- CAT-6a cables can be used up to 200 feet (60 meters).
- Shielded (STP) CAT-6a is recommended. However, unshielded (UTP) CAT-6a is acceptable.

**NOTE:** Shielded cable has an advantage by providing immunity to Electromagnetic Interference (EMI), cell phones and A/C motors.

# FEATURES

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## Supported HDMI 1.3 Features

- 225 MHz (up to 12 bit YUV 444 @ 1080p)
- Deep Color (x.v.Color)
- Dolby TrueHD & DTS-HD Master Audio
- Color Space Conversion
- 3DTV Pass-Through
- Lip-Sync Pass-Through
- CEC Pass-Through

## Features

- Extends HDMI 1.3 at 1080p up to 200 feet (60 m).
- Single Link DVI Range: 1920x1200 up to 200 feet over CAT-6 cable.
- Built-in IR Extender.
- IR Remote Control.
- IR Back Channel.
- RS-232 serial control.
- IP Control (Sender unit feature).
- Audio and video are transmitted digitally for zero signal loss.
- Supports lossless digital audio (Dolby TrueHD, Dolby Digital Plus and DTS-HD Master Audio).
- Metal enclosure provides better RF shielding.
- Compensation for cable skew.
- Maintains settings on Power-On state.

## Package Includes

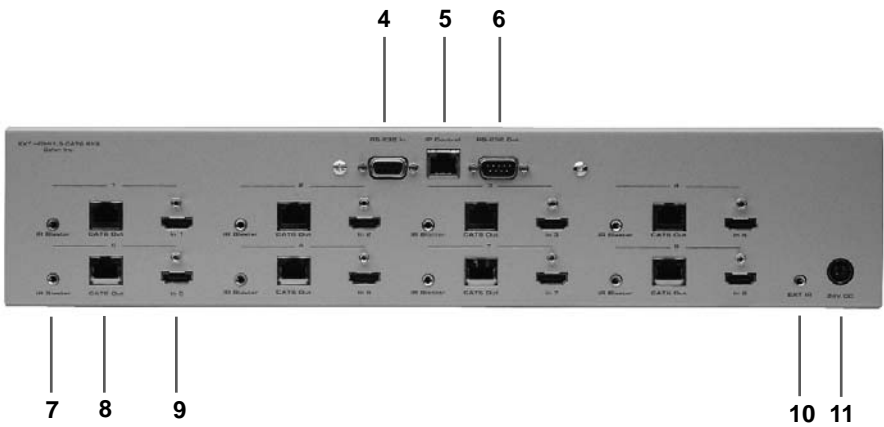
- (1) 8x CAT6 Extender Sender Unit
- (8) 8x CAT6 Extender Receiver Units
- (8) 1 ft. HDMI cables
- (1) RS-232 Serial Cable (M-F)
- (1) 24V DC Power Supply
- (8) 5V DC Locking Power Supply
- (1) Set of Rack Ears (Sender Unit Only)
- (1) User Manual

# SENDER UNIT LAYOUT

Front



Back



## SENDER UNIT DESCRIPTION

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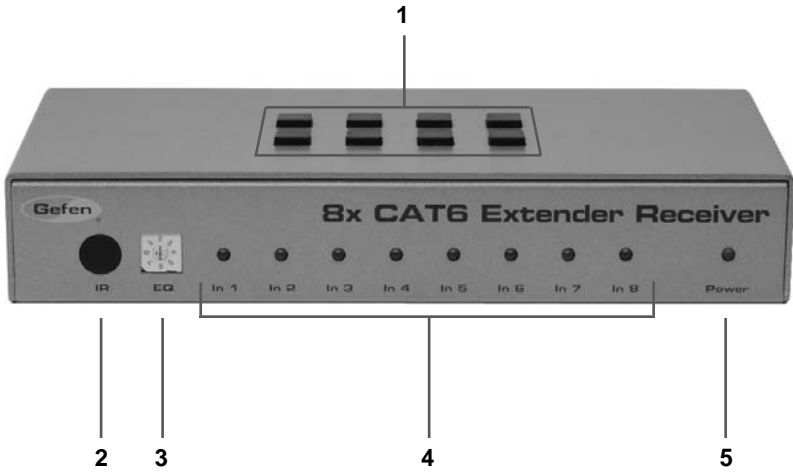
- 1 Standby Button**  
Sets the 8x CAT6 Extender for HDMI into Standby Mode.
- 2 IR Sensor**  
Receives signals from the IR Remote Control.
- 3 Power Indicator**  
This LED will turn bright red once the locking power supply has been properly connected.
- 4 RS-232 Serial Port (Input)**  
The 8x8 Matrix may be switched remotely using serial communications with any office computer or a control automation device by connecting to this port. Please see page 20 for details.
- 5 IP Control**  
(Reserved for future use).
- 6 RS-232 Serial Port (Output)**  
Connects to the RS-232 control device. The 8x8 may be switched remotely using this port. See page 20 for details.
- 7 IR Blaster (8)**  
Used to connect the IR Blaster to the Source device.
- 8 CAT-6 Output Jack (8)**  
Connects the Sender unit to the Receiver unit using CAT-6.
- 9 Locking HDMI Port (8)**  
Connect an HDTV display to this HDMI port.
- 10 IR Extender Port**  
Used to extend the IR range.
- 11 24V DC Power Connector**  
Connects the included 24V DC power supply to this receptacle.



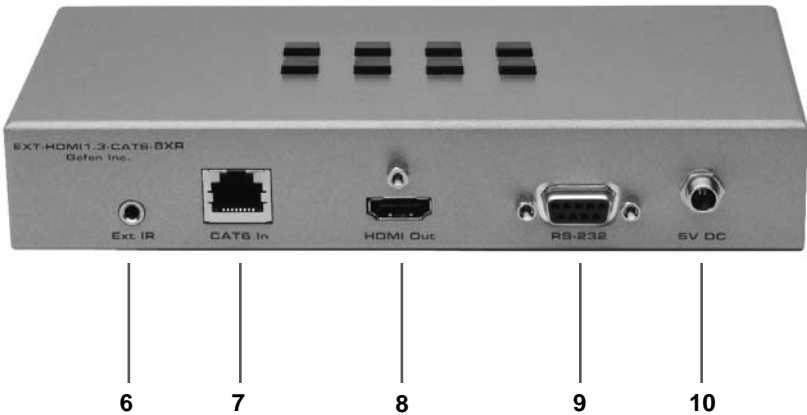
# RECEIVER UNIT LAYOUT

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## Front Panel



## Back Panel



## RECEIVER UNIT DESCRIPTIONS

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- 1 Control Buttons**  
When connected to any 8x8 Matrix for HDMI, these remote buttons on the Receiver unit can switch between the 8 Hi-Def inputs connected to the 8x8 Matrix for HDMI.
- 2 IR Sensor**  
Control the Receiver unit by pointing the IR Remote Control to the IR Sensor.
- 3 EQ Trimpot**  
Used to equalize the signal to compensate for distance and skew variations found in various brands of CAT-6 cable.
- 4 Input Indicators (HDMI In 1 - HDMI In 8)**  
An LED will Displays the current input of the 8x8 Matrix.
- 5 Power Indicator**  
This LED will turn bright red once the power supply has been properly connected.
- 6 External IR Jack**  
Connects an optional infrared extender to this jack.
- 7 CAT-6 In Connector**  
Connect the CAT-6 cable from the Sender unit to the RJ-45 connector.
- 8 HDMI Out**  
Connect the HDMI cable from the HDTV display to the HDMI Out.
- 9 RS-232 Input**  
Connects a controlling device to this port.
- 10 5V DC Locking Power Connector**  
Connects the included 5V DC Locking Power Supply to this receptacle.

## IR REMOTE DESCRIPTION

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### RMT-8IR Remote (Optional)



- 1 Activity Indicator**  
This LED will be activated momentarily each time a button is pressed.
- 2 Input Source Selection Buttons (1 - 8)**  
These buttons are used to select which input source is routed to the HDTV display.

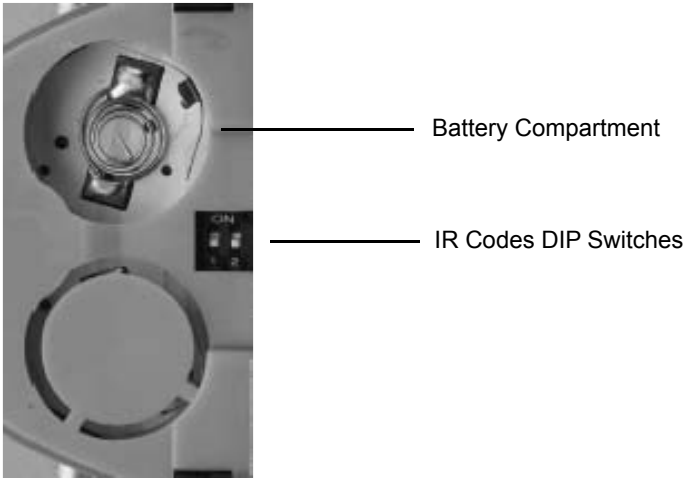
# RMT-8IR REMOTE INSTALLATION

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## Installing the RMT-8IR Battery

To use the RMT-8IR Remote, remove the battery cover on the back of the remote to reveal the battery compartment. Insert the included battery into the open battery slot. The positive (+) side should be facing up. Ensure that both DIP switches are set to the OFF position. Replace the battery cover and the IR Remote is ready for action.

The IR Remote ships with 2 batteries. One battery is required for operation and the other battery is a spare.



# RMT-8IR REMOTE CONFIGURATION

## Setting the IR Remote Channel on the RMT-8IR

In the event that IR commands from other remote controls conflict with the supplied RMT-8IR Remote, changing the remote IR channel will fix this issue. The RMT-8IR Remote has a bank of DIP switches for setting the Remote IR channel.

The DIP Switch bank on the RMT-8IR is located underneath the battery cover.



**Left:** Picture of the opened rear battery compartment of the RMT-8IR remote showing the exposed DIP Switch bank between the battery chambers.

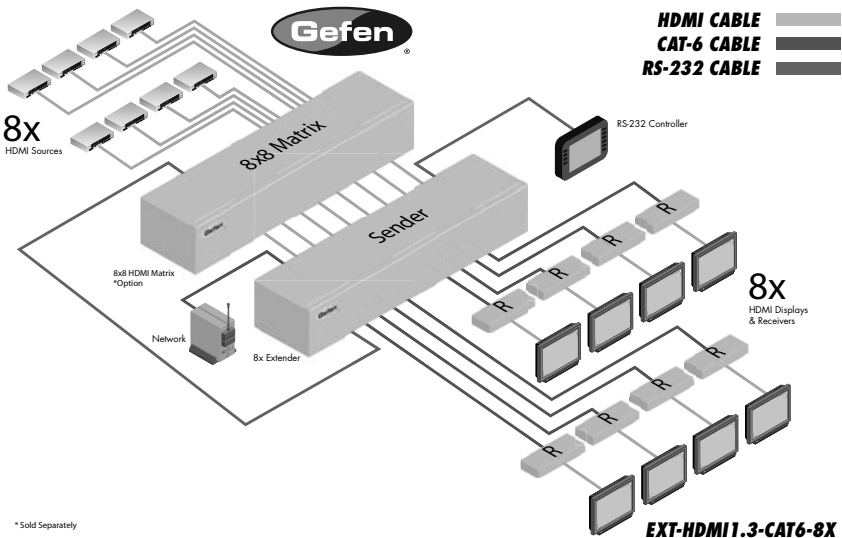
The IR channel selected on the RMT-8IR Remote must match the IR channel assigned to the 8x CAT6 Extender for HDMI. For example, if you set both DIP switches on the remote to the down position (IR channel 1), you must set the 8x CAT6 Extender for HDMI to use IR channel 1.

Please refer to page 19 on how to change the IR channel on the 8x CAT6 Extender for HDMI.

# CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI

## How to Connect the 8x CAT6 Extender for HDMI (Matrix Mode)

1. Using any 8x8 Matrix for HDMI as a source, connect an HDMI cable from HDMI Out 1 on the 8x8 Matrix to HDMI In 1 on the 8x CAT6 Extender for HDMI Sender unit. To ensure correct operation of the 8x CAT6 Extender with the 8x8 Matrix, make sure all connections are made: Connect HDMI Out 2 on the 8x8 Matrix to HDMI In 2 on the Extender, and so on.
2. Connect the HDMI Out on the 8x CAT6 Extender Receiver unit to the display with a user-supplied HDMI cable.
3. Using one CAT-6 cable, connect CAT6 Out 1 on the Sender unit to CAT6 In on the Receiver unit.
4. Connect additional Receiver units as described above.
5. Connect the 5V DC locking power supplies to each Receiver unit. Do not overtighten the locking connectors. Plug the power cord into an available wall outlet.
6. Connect the 24V DC power supply to the 8x CAT6 Extender Sender unit and plug the power cord into an available wall outlet.



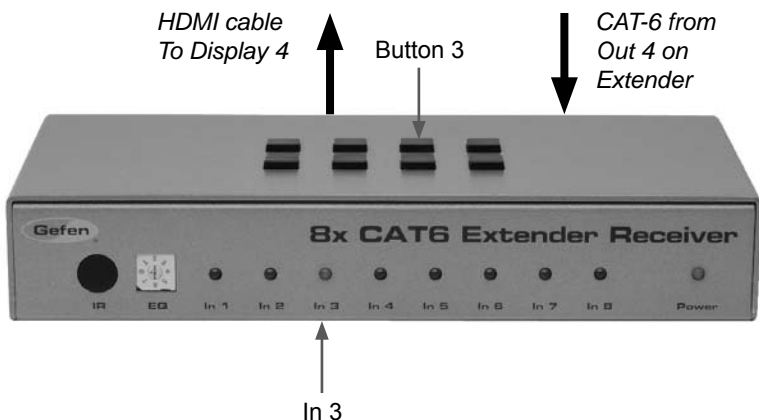
# CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI

## How to Operate the 8x CAT6 Extender for HDMI (using an 8x8 Matrix)

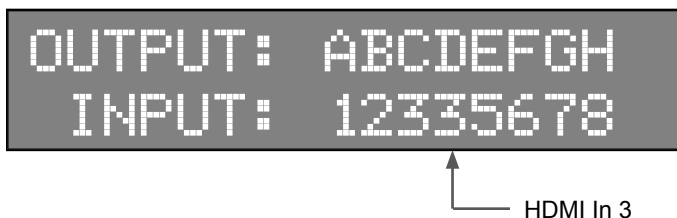
The front panel of each Receiver unit for the 8x CAT6 Extender for HDMI contains a set of LED indicators which corresponds to an input (source) on the 8x8 Matrix device. A blue LED indicates which input has been routed from the 8x8 Matrix. On the top of each Receiver unit there are a set of 8 push-buttons which are used to control the switching of the 8x8 Matrix.

*Example 1: Routing Input (source) 3 to Output (display) 4.*

1. Connect an HDMI cable from HDMI Out 4 on the 8x8 Matrix to HDMI In 4 on the 8x CAT6 Extender for HDMI Sender unit.
2. Connect an 8x CAT6 Extender Receiver unit to Display 4.
3. Press button 3 on the top of the Receiver unit. Button 3 is shown below. The In 3 LED will turn bright blue, indicating that Input 3 on the 8x8 Matrix has been routed to Display 4 (Zone 4).



*Example:* HDMI input 3 is routed to HDMI Out 4 (a sample of the 8x8 Matrix display panel is shown below). The image shown on Display 4 will be the HDMI source (3), on the 8x8 Matrix input connected to Output D.



## CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI

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### How to Connect the 8x CAT6 Extender for HDMI with RS-232 control to the 8x8 Matrix for HDMI and to the controlled device

1. Follow steps 1 - 6 on How to Connect the 8x CAT6 Extender for HDMI (see page 11).
2. Connect an RS-232 cable from the RS-232 serial port on the controlling device to the RS-232 In port on the rear of the 8x CAT6 Extender for HDMI Sender unit.
3. Connect another RS-232 serial cable from the RS-232 Out port on the rear of the 8x CAT Extender Sender unit to the RS-232 port on the rear of the 8x8 Matrix.

**NOTE:** Please refer to page 20 for details on configuring RS-232 control.

*Example 1: Routing Input (source) 3 to Output (display) 1 using the 8x8 Matrix.*

Make sure a Receiver unit is connected to CAT6 Out 1 on the Sender unit. Use the controlling device to send the following command:

r 1 3

The LED for In 3 will turn bright blue and the source from the 8x8 Matrix (In 3) will be displayed on the HDTV display connected to this Receiver unit. See page 22 for details on routing using RS-232.



# **CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI**

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## **How to Connect the 8x CAT6 Extender for HDMI (Stand-alone Mode)**

The 8x CAT6 Extender for HDMI is dependent upon an external 8x8 Matrix to manage all the zone switching. When used as a stand-alone, without the 8x8 Matrix attached, the product functions as a one-to-one extender for each HDMI unit. Eight parallel extenders are used.

1. Connect an HDMI cable from the source device to HDMI In 1 on the back of the Sender unit.
2. Connect the Display to the 8x CAT6 Extender Receiver unit with a user-supplied HDMI cable.
3. Using a single CAT-6 cable, connect CAT6 Out 1 on the Sender unit to the CAT6 In on the Receiver unit.
4. If additional Receiver units will be used, complete these connections at this time, as described above.
5. Connect the 5V DC locking power supplies to each Receiver unit. Do not overtighten the locking connectors. Plug the power cord into an available wall outlet.
6. Connect the 24V DC power supply to the 8x CAT6 Extender for HDMI and plug the power cord into an available wall outlet.

# CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI

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## Routing Sources using the Optional RMT-8IR Remote Unit (Matrix Mode)

There are a total of 8 buttons on the RMT-8IR remote, which represent each of the 8 buttons on the Receiver unit.

*Example 1: Route the source connected to HDMI In 3 (from the 8x8 Matrix) on the Sender unit to the display connected to HDMI Out 2.*

Point the Remote at the Receiver unit connected to Display 2, then press button 3 on the RMT-8IR.

**Table of IR Remote Commands  
for the Optional RMT-8IR Remote Unit**

RMT-8IR Button	Source
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

The RMT-8IR remote control unit will allow the selection of any input (source) on the 8x8 Matrix unit can be will be routed to any of eight Receiver units. Use the information in the table above when routing the desired input to a display.

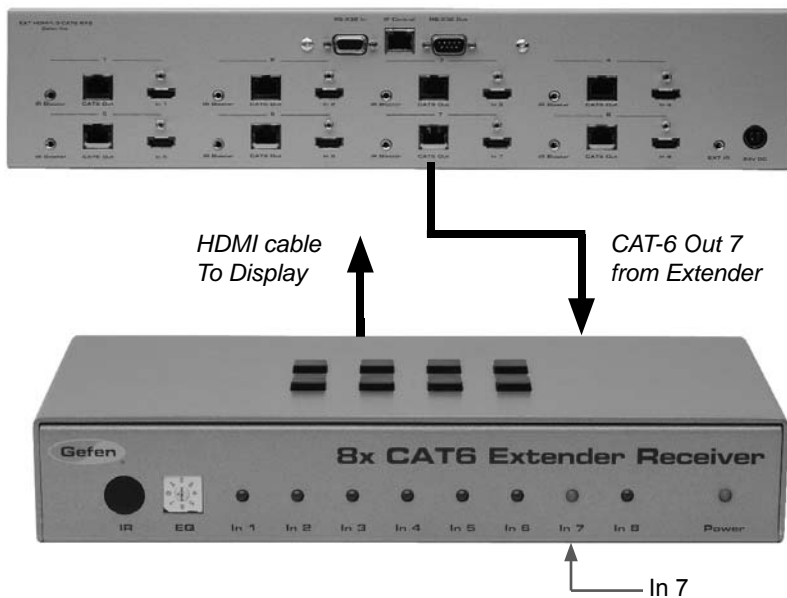
# CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI

## How to Operate the 8x CAT6 Extender for HDMI (Stand-alone Mode)

When the 8x CAT6 Extender for HDMI is used without an 8x8 Matrix, it can only be used as an HDMI extender.

The LED on the front panel will show which HDMI is active on the Sender unit.

Example: Connect a CAT-6 cable to CAT6 Out 7 and CAT6 In, between the Sender unit and Receiver unit.



# CONNECTING AND OPERATING THE 8X CAT6 EXTENDER FOR HDMI

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## How to Equalize the 8x CAT6 Extender for HDMI (Matrix Mode / Stand-alone Mode)

The 8x CAT6 Extender for HDMI Receiver unit has an equalization trimpot to compensate for variances that can be found in different CAT-6a cable brands. If there is no output video or if output video contains artifacts and/or video noise, use the steps below to adjust the EQ trimpot.



1. Insert a small flat-head screwdriver into the trimpot on the front panel of the Receiver unit.
2. The EQ trimpot can be set to one of eight different positions. Turn the trimpot clockwise until it clicks into the next position. Continue adjusting the trimpot until the signal shows best results.

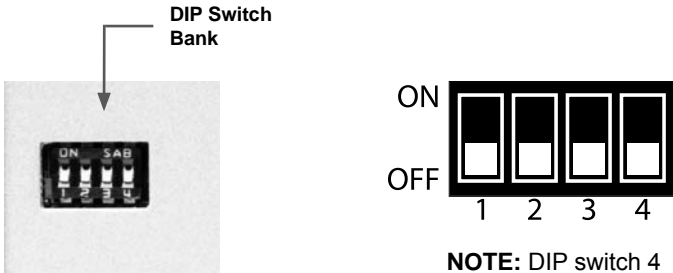
# DIP SWITCH CONFIGURATION

## DIP Switch Location (Matrix Mode / Stand-alone Mode)

On the bottom of each Receiver unit, there are four (4) DIP switches. Each DIP switch performs a different function.

Before modifying DIP switch settings, disconnect the power from the Receiver unit. After the DIP switches have been configured, reconnect the power.

### Receiver Unit (bottom)



### Default settings for DIP switches

DIP Switch	Position
1	ON
2	OFF
3	OFF
4	NOT USED

# DIP SWITCH CONFIGURATION

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## DIP Switches (Matrix Mode / Stand-alone Mode)

### DIP 1 - EDID Management

- *OFF - Local EDID*

When Local EDID mode is used, the EDID will be assembled by copying all video and audio features of the connected device. Deep Color support will be manually controlled: If Deep Color is supported by the display(s), DIP 2 should be set to the ON position (see DIP 2 - Deep Color, below). By default, the unit is shipped with DIP 1 in the OFF position.

- *ON - Pass-through EDID*

Allows all video and audio features of the connected devices to be passed to the source device without control over Deep Color.

### DIP 2 - Deep Color

- *OFF - Disables Deep Color support*

Disables Deep Color in the EDID. Deep Color management is only available when Local EDID is being used.

- *ON - Enables Deep Color support*

Enables Deep Color support. In Pass-through EDID Mode, setting DIP2 = ON has no effect since all EDID information is passed through.

### DIP 3 / DIP 4 - IR Remote Channel

The IR channel assigned to the IR Remote Control must match the IR channel assigned to the 8x CAT6 Extender for HDMI Receiver unit. The factory setting (default) for DIP 3 and DIP 4 are in the OFF position.

DIP 3	DIP 4	IR Channel
OFF	OFF	1
ON	OFF	2
OFF	ON	3
ON	ON	4

# RS-232 SERIAL CONTROL INTERFACE



Only Pins 2 (RX), 3 (TX), and 5 (Ground) are used on the RS-232 serial interface

## Binary Table

ASCII	Corresponding RMT-8IR Button	Binary
1	1	0011 0001
2	2	0011 0010
3	3	0011 0011
4	4	0011 0100
5	5	0011 0101
6	6	0011 0110
7	7	0011 0111
8	8	0011 1000

## RS-232 Settings

Bits per second ..... 19200

Data bits ..... 8

Parity ..... None

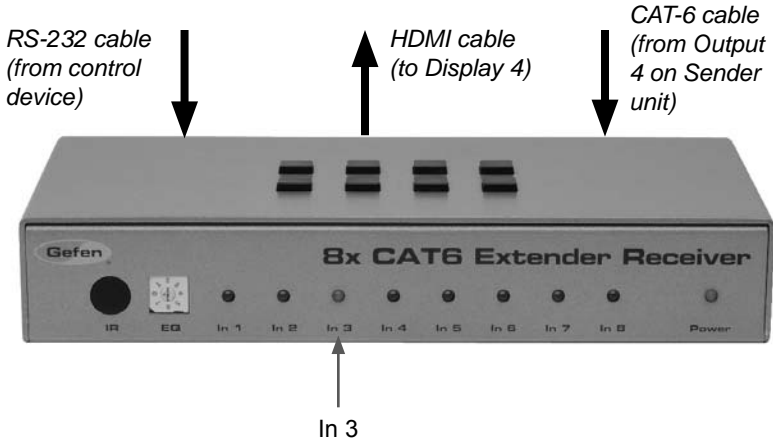
Stop bits ..... 1

Flow Control ..... None

# RS-232 SERIAL CONTROL INTERFACE

## Routing Sources using RS-232 Receiver Unit (Matrix Mode)

1. Prepare the Receiver unit by connecting an RS-232 cable from the computer or other controlling device to the RS-232 serial port on the back of the Receiver unit (see page 6 - 7).
2. Configure the controller using the RS-232 settings on page 20.



*Example 1: Route input 3 on the 8x8 Matrix to Output 4 on the 8x CAT6 Extender for HDMI.*

Use the RS-232 controller to send the following command:

r3

The blue LED for In 3 will turn bright blue and the source from Input 4 on the 8x8 Matrix will be displayed. See page 22 for details on routing using RS-232.



# RS-232 SERIAL COMMANDS

## Functions Syntax

The syntax for each function is always the same:

#Character as the start flag → Function name → Space ( \_ ) as function name end flag → Parameter 1 → Space → Parameter n → Carriage Return ( \r ) →

Sample:

```
#FunctionName_param1_param2_param3_param4...\r
```

Syntax is NOT case sensitive.

## Commands

Simplified syntax was used for command implementation for faster operation with the device. The commands are not case-sensitive.

Command	Description
<i>R</i>	Routing command
<i>M</i>	Routes a single input to all outputs
<i>F</i>	+5V for Fiber Optic Extender Status

## **R Command**

The R command allows specific routing of inputs and outputs when controlling the 8x CAT6 for HDMI Sender unit.

### Syntax:

```
r param1 param2
```

### Parameters:

<i>param1</i>	HDMI Output	[1 - 8]
<i>param2</i>	HDMI Input	[1 - 8]

### Notes:

When controlling the Receiver unit using RS-232, use the following syntax: r param, where *param1* is the selected input.

*Example: r2 routes Input 2 on the 8x8 Matrix to the selected Receiver unit.*

## M Command

The M command displays the current routing status of the matrix.

Syntax:

m

Parameters:

None

## Fiber Optic Extender Status F0 Command

The F0 command returns the state of pin 18 on the HDMI inputs.

Syntax:

f

Parameters:

None

Notes:

“High” is returned if +5V is present on HDMI input. “Low” is returned if +0V is present on HDMI input. Setting *param1* to a value of 0 will return the state of pin 18 of all HDMI inputs.

### Using parameters with the F Command

Permits disabling / enabling of +5V for Fiber Optic Extenders.

Syntax:

f param1 param2

Parameters:

*param1* HDMI input [1 - 8]

*param2* State [0 - 1]

Value	Meaning
0	Disable
1	Enable

# RS-232 SERIAL COMMANDS

## General Functions

Simplified syntax was used for command implementation for faster operation with the device: # character – isn't needed, the command name is reduced to 1 letter. The commands are not case-sensitive.

Function	Description
#RMTIRADD	Routing command
#LOCKPOWER	Routes a single input to all outputs

### **#RMTIRADD Function**

The #RMTIRADD function set the remote IR channel.

#### Syntax:

#RMTIRADD param1

#### Parameters:

param1 IR channel [0 - 3]

Value	Meaning
0	IR channel 1
1	IR channel 2
2	IR channel 3
3	IR channel 4

### **#LOCKPOWER Function**

The #LOCKPOWER enables/disables the power lock state. Enabling this feature will store the 5V status for each input prior to shutting the unit down.

#### Syntax:

#LOCKPOWER param1

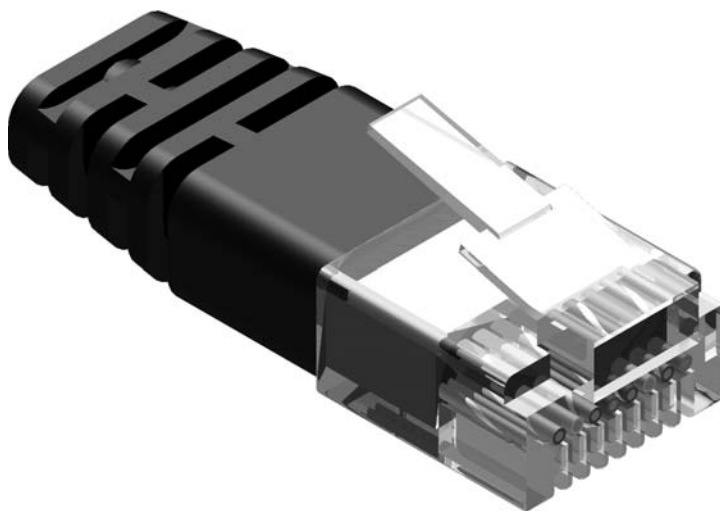
#### Parameters:

param1 State [0 - 1]

Value	Meaning
0	Disable Power Lock
1	Enable Power Lock

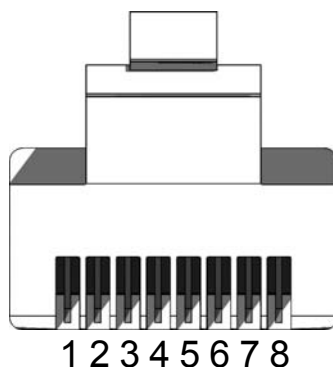
## NETWORK CABLE WIRING DIAGRAM

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Gefen recommends the TIA/EIA-568-B wiring option. Please adhere to the table below when field-terminating the CAT-6 cable for use with Gefen products.

Pin	Color
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown



CAT-6 cabling comes in stranded and solid core types. Gefen recommends using solid core cabling.

It is recommended to use one continuous run from one end to the other. Connecting through a patch is not recommended.

## SPECIFICATIONS

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Video Amplifier Bandwidth .....	225 MHz
Input Video Signal.....	1.2 V p-p
Input DDC Signal.....	5V p-p (TTL)
Maximum Video Resolution.....	1080p / 1920 x 1200
HDMI Connector.....	Type A 19-pin
Link Connector.....	RJ-45 Shielded
Power Indicator (Sender / Receiver).....	LED (red)
Source Indicators (Receiver).....	LED (blue)
RS-232 Interface (Sender).....	1x DB9 serial (F), 1x DB9 serial (M)
RS-232 Interface (Receiver).....	1x DB9 serial (M)
Power Supply.....	24V DC (Sender), 5V DC (Receiver)
Power Consumption (Sender).....	60 W (max.)
Power Consumption (Receiver).....	10 W (max.)
Operating Temperature .....	0 - 40 °C
Sender Dimensions.....	17.1" W x 3.5" H x 4.5" D
Receiver Dimensions.....	7.5" W x 1.3" H x 3.5" D
Shipping Weight.....	16 lbs
Certifications.....	UL (power supply), RoHS, CE

## WARRANTY

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Gefen warrants the equipment it manufactures to be free from defects in material and workmanship.

If equipment fails because of such defects and Gefen is notified within two (2) years from the date of shipment, Gefen will, at its option, repair or replace the equipment, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications. Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

This warranty is in lieu of all other warranties expressed or implied, including without limitation, any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

1. Proof of sale may be required in order to claim warranty.
2. Customers outside the US are responsible for shipping charges to and from Gefen.
3. Copper cables are limited to a 30 day warranty and cables must be in their original condition.

The information in this manual has been carefully checked and is believed to be accurate. However, Gefen assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will Gefen be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the features and specifications is subject to change without notice.

For the latest warranty coverage information, please visit Gefen's Warranty web page at <http://www.gefen.com/kvm/aboutus/warranty.jsp>

## PRODUCT REGISTRATION

**Please register your product online by visiting Gefen's web site at <http://www.gefen.com/kvm/Registry/Registration.jsp>**

## LICENSING

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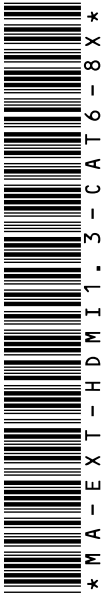
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