4K Ultra HD Extender over One Fiber

w/ RS-232 and 2-way IR

EXT-HDRS2IR-4K2K-1FO

User Manual

RELEASE A1

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this product near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install or place this product near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. To reduce the risk of electric shock and/or damage to this product, never handle or touch this unit or power cord if your hands are wet or damp. Do not expose this product to rain or moisture.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. Batteries that may be included with this product and/or accessories should never be exposed to open flame or excessive heat. Always dispose of used batteries according to the instructions.

Warranty Information

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, refer to the Warranty and Return Policy under the Support section of the Gefen Web site at www.gefen.com.

Technical Support

8:00 AM to 5:00 PM Monday - Friday, Pacific Time
(818) 772-9100 (800) 545-6900

Fax

(818) 772-9120

Email

support@gefen.com

Web

http://www.gefen.com

Mailing Address

Gefen, LLC
c/o Customer Service
20600 Nordhoff St.
Chatsworth, CA 91311

Product Registration

Register your product online by visiting the Register Product page under the Support section of the Gefen Web site.

- This product operates with SC-terminated single strand multimode fiber optic cable. Singlemode fiber is not supported.

This product uses UL or CE listed power supplies.

Features

- Extends HDMI, RS-232, and Bi-Directional IR over a single fiber strand
- Extends Ultra HD 4K x 2K (3840 x 2160 @ 30Hz) up to:
  - ► 3300 feet (1000 meters) over 50/125µm OM3e/OM4 fiber
  - ► 500 feet (150 meters) over 50/125µm (OM3) fiber
  - ► 165 feet (50 meters) over 62.5/125µm (OM1) fiber
- Extends 1080p Full HD (1920 x 1080 @ 60Hz) up to:
  - ► 6600 feet (2000 meters) over 50/125µm OM3e/OM4 fiber
  - ► 1000 feet (300 meters) over 50/125µm (OM3) fiber
  - ► 330 feet (100 meters) over 62.5/125µm (OM1) fiber
- Supported HDMI Features
  - ► HDCP-compliant
  - ► 12-bit Deep Color
  - ► LPCM 7.1, Dolby® TrueHD, and DTS-HD Master Audio™
  - ► 3DTV pass-through
  - ► Lip-sync pass-through
- EDID Management for rapid integration of source and display
- Full duplex RS-232 up to 115200 baud
- RS-232 pass-through
- Automatic calibration based on the type and length of fiber optic cable
- Immune to electromagnetic interference (EMI)
- Locking power supplies
- Firmware upgradable via USB
- Surface-mountable

Packing List

The 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR ships with the items listed below. If any of these items are not present in the box when you first open it, immediately contact your dealer or Gefen.

- 1 x 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR (Sender unit)
- 1 x 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR (Receiver unit)
- 1 x 6 ft. HDMI cable (M-M)
- 1 x DB-9 cable (M-F)
- 1 x IR extender
- 1 x IR emitter
- 2 x 5V DC power supplies
- 1 x Quick-Start Guide

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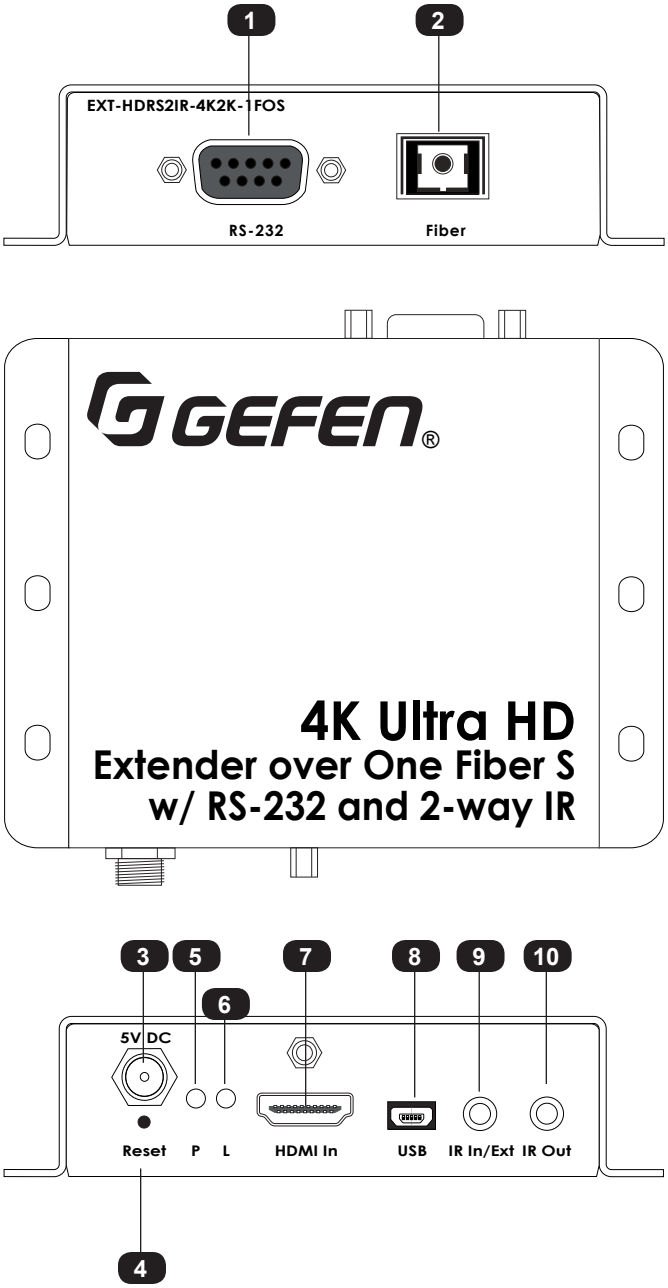
4K Ultra HD Extender over One Fiber

w/ RS-232 and 2-way IR

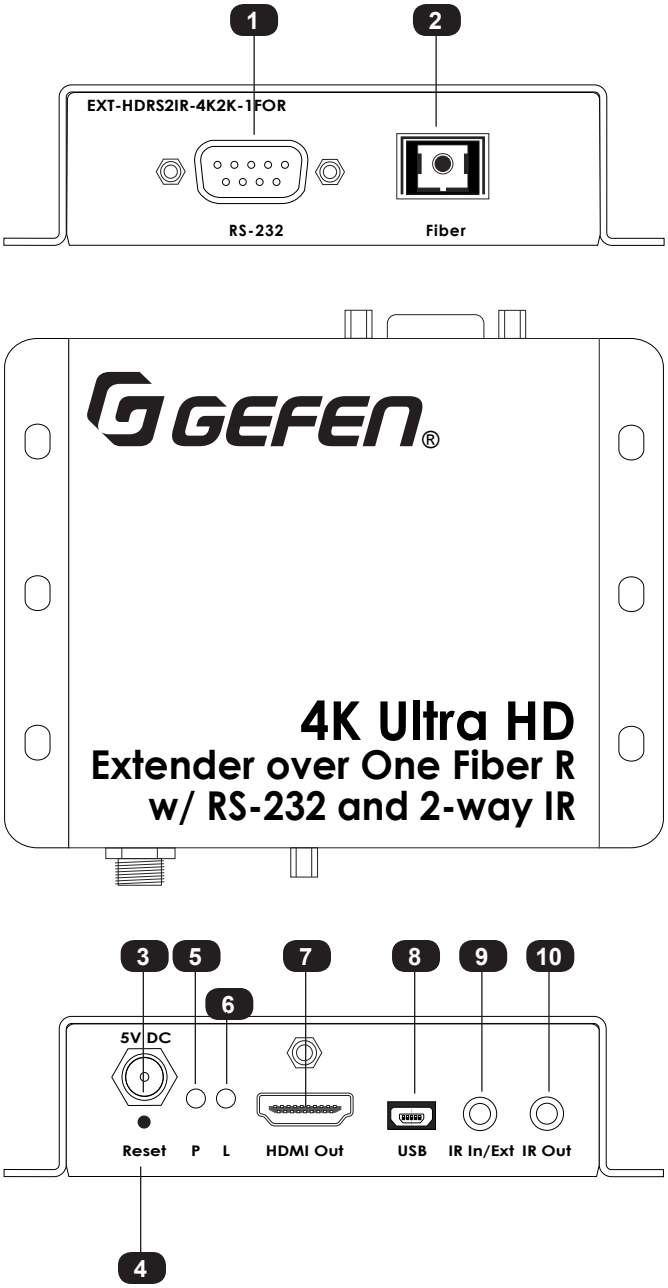
1 Getting Started

Sender Unit


1
2
EXT-HDRS2IR-4K2K-1FOS
RS-232
Fiber
GEFEN®
4K Ultra HD
Extender over One Fiber S
w/ RS-232 and 2-way IR
3
5
7
8
9
10
6
5V DC
Reset
P
L
HDMI In
USB
IR In/Ext
IR Out
4

ID	Name	Description
1	RS-232	Connect an RS-232 cable from this port to an RS-232 device. See Using RS-232 (page 17) for more information.
2	Fiber	Connect an SC-terminated multimode fiber optic cable from this connector to the Fiber connector on the Receiver unit.
3	5V DC	Connect the included 5V DC power supply to this locking power receptacle.
4	Reset	Press this button, using the end of a paper clip or other pointed object, to power-cycle the Sender unit. This is the same as disconnecting and reconnecting the power supply.
5	P	Under normal operating conditions, this LED indicator will glow bright blue. See LED Indicator Status (page 13) for details on LED status messages.
6	L	Under normal operating conditions, this LED indicator will glow bright green. See LED Indicator Status (page 13) for details on LED status messages.
7	HDMI In	Use the included HDMI cable to connect a Ultra Hi-Def source to this HDMI port.
8	USB	Used for upgrading the firmware. See Updating the Firmware (page 20) for more information.
9	IR In/Ext	Connect an IR Extender (Gefen part no. EXT-RMT-EXTIRN) to this port. Alternatively, connect the 3.5mm mini-stereo connector of the IR cable from the **IR In/Ext** port to the automation system.
10	IR Out	Connect the included single infrared IR emitter from this jack to the IR sensor on the source device.

Receiver Unit



ID	Name	Description
1	RS-232	Connect an RS-232 cable from this port to an RS-232 device. See Using RS-232 (page 17) for more information.
2	Fiber	Connect an SC-terminated multimode fiber optic cable from this connector to the Fiber connector on the Sender unit.
3	5V DC	Connect the included 5V DC power supply to this locking power receptacle.
4	Reset	Press this button, using the end of a paper clip or other pointed object, to power-cycle the Receiver unit. This is the same as disconnecting and reconnecting the power supply.
5	P	Under normal operating conditions, this LED indicator will glow bright blue. See LED Indicator Status (page 13) for details on LED status messages.
6	L	Under normal operating conditions, this LED indicator will glow bright green. See LED Indicator Status (page 13) for details on LED status messages.
7	HDMI Out	Use an HDMI cable to connect an Ultra Hi-Def display to this HDMI port.
8	USB	Used for upgrading the firmware. See Updating the Firmware (page 20) for more information.
9	IR In/Ext	Connect the included IR extender to this port. Alternatively, connect the 3.5mm mini-stereo connector of the IR cable from the **IR In/Ext** port to the automation system.
10	IR Out	Connect an IR emitter (Gefen part no. EXT-IREMIT) from this jack to the IR sensor on the source device.

Connection Instructions

► **Video**

1. Connect the included HDMI cable between the Ultra Hi-Def source and the **HDMI In** port on the Sender unit.

2. Connect an Ultra HD display to the **HDMI Out** port on the Receiver unit using another HDMI cable.

► **Fiber**

3. Connect a single multimode SC-terminated fiber optic cable, up to 6600 feet (2000 meters), between the **Fiber** port on the Sender unit and the **Fiber** port on the Receiver unit. See the table, below for details on fiber cable types and distance.

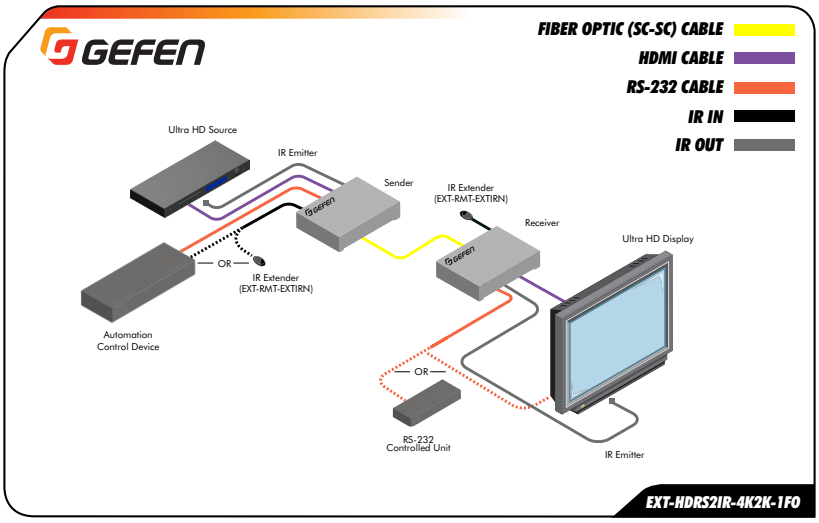
► **IR**

4. For information on using IR control, see Bidirectional IR Control (page 10) for more information.

► **Power**

5. Use the included locking power supplies to connect the Sender and Receiver unit to available electrical outlets. Do not overtighten the locking power connectors.

Sample Wiring Diagram



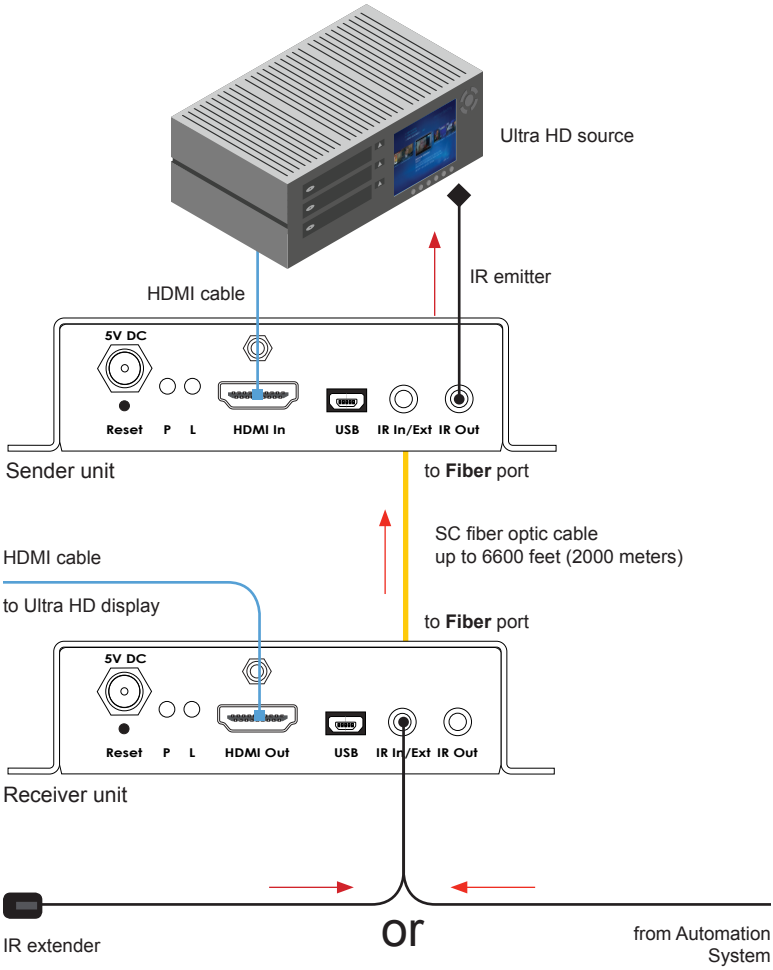
4K Ultra HD Extender over One Fiber
w/ RS-232 and 2-way IR

2 Basic Operation

Controlling the Source from the Viewing Location

1. Connect the included IR extender to the **IR In/Ext** port on the Receiver unit. If using an automation system, connect the 3.5mm mini-stereo connector from the **IR In/Ext** port on the Receiver unit to the automation system.

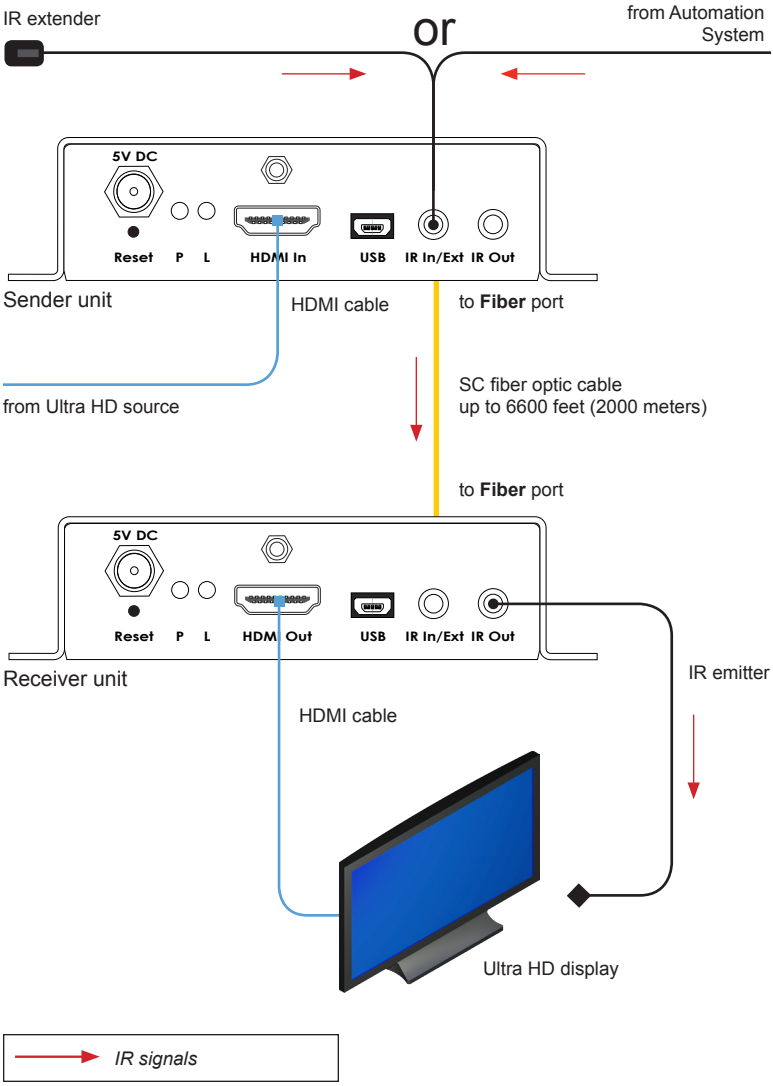
2. Connect the included IR emitter from the **IR Out** port on the Sender unit to the IR sensor window on the source device.



Controlling the Display from the Source Location

1. Connect the included IR extender to the **IR In** port on the Sender unit. If using an automation system, connect the 3.5mm mini-stereo connector from the **IR In** port on the Sender unit to the automation system.

2. Connect the included IR emitter from the **IR Out** port on the Receiver unit to the IR sensor on the display.

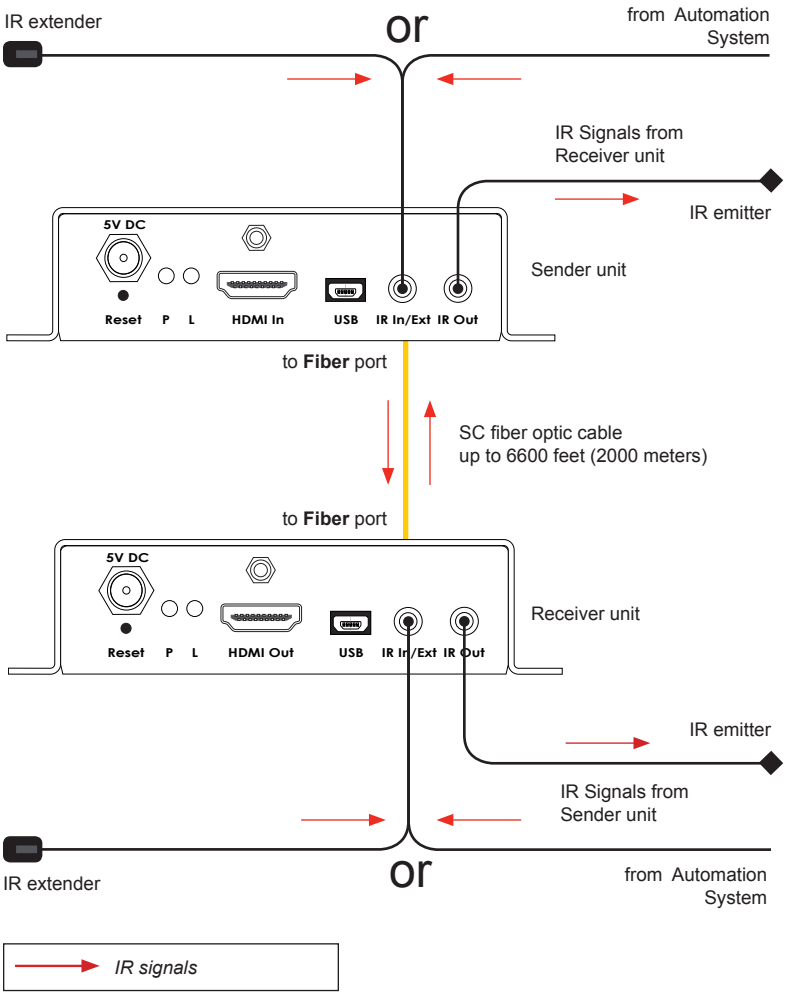


Controlling the Source / Display from Different Locations

Information

Additional IR extenders (Gefen part no. EXT-RMT-EXTIRN) and IR emitters (Gefen part no. RMT-IREMIT) will be required for this configuration.

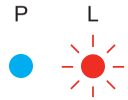
Using bidirectional IR, the 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR allows the source and/or display to be controlled from the viewing location or the source location. Refer to the diagram, below, for connection details. The video cables have been removed for clarity.



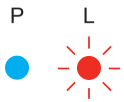
The Power (P) and Link (L) LED indicators on the Sender and Receiver unit provides basic information on the current status of the 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR.

Sender unit	Receiver unit	Description
P L 	P L 	• Normal operation
P L 	P L 	• Display (sink) device is not connected to the Receiver unit OR the source device is not connected to the Sender unit. • Link LED on Sender unit slowly flashes bright green.
P L 	P L 	• Fiber cable has been disconnected from the Sender or Receiver unit OR the fiber cable may be damaged. • The Link LED flashes quickly on the Sender unit; the Link LED flashes slower on the Receiver unit.
P L 	P L 	• USB cable has been connected between the computer and the Sender unit. See Updating the Firmware (page 20) for more information. • The Link LED on both the Sender and Receiver unit flash at the same rate of speed.
P L 	P L 	• USB cable has been connected between the computer and the Receiver unit. See Updating the Firmware (page 20) for more information. • The Link LED flashes quickly on the Sender unit; the Link LED flashes slower on the Receiver unit.

(continued on next page)

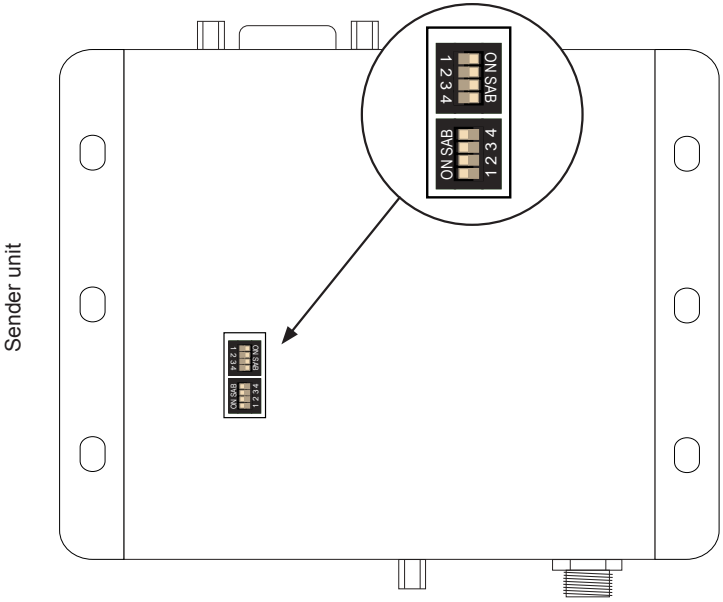
Sender unit	Receiver unit	Description
		• The Receiver unit is not powered. • The Link LED flashes quickly on the Sender unit.
		• The Sender unit is not powered. • The Link LED flashes on the Receiver unit.

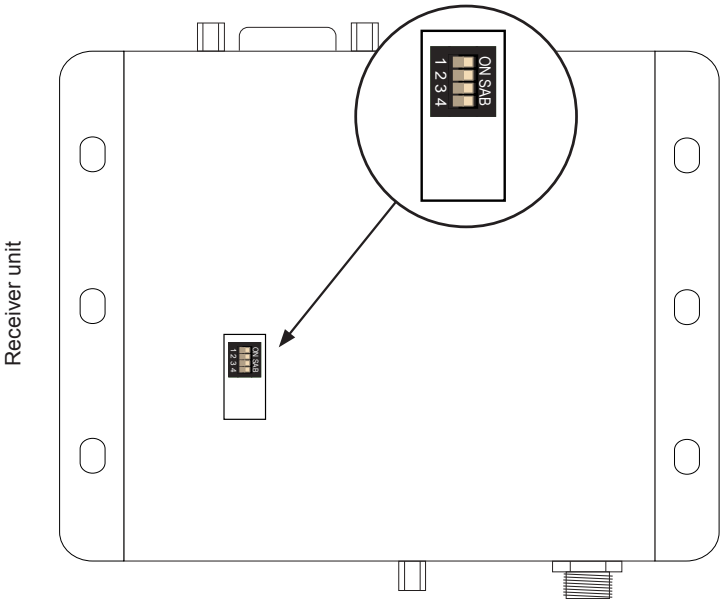
The following table outlines the LED status when the firmware is being updated. See Updating the Firmware (page 20) for more information.

Sender unit	Receiver unit	Description
		• The Sender unit is being updated in 2x OR 10x mode. • The Link LED on the Sender unit is solid green. • The Power LED on the Receiver unit is solid blue; the Link LED on the Receiver unit will flash bright red.
		• The Receiver unit is being updated in 2x OR 10x mode. • The Link LED on the Receiver unit is solid green. • The Power LED on the Sender unit is solid blue; the Link LED on the Sender unit will flash bright red.

DIP Switch Configuration

The bottom of the Sender unit has two banks of DIP switches. The bottom of the Receiver unit has a single bank of DIP switches. Each bank is comprised of four DIP switches. Each DIP switch provides control over a different function. Remove the piece of colored tape to reveal the DIP switch banks.

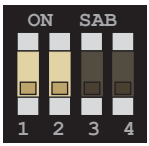
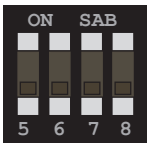
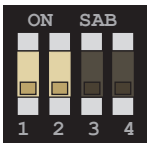
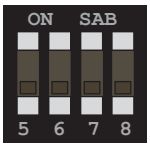




As of this writing, the only available feature supported by the DIP switches is the baud rate. Other DIP switches are reserved for future use.

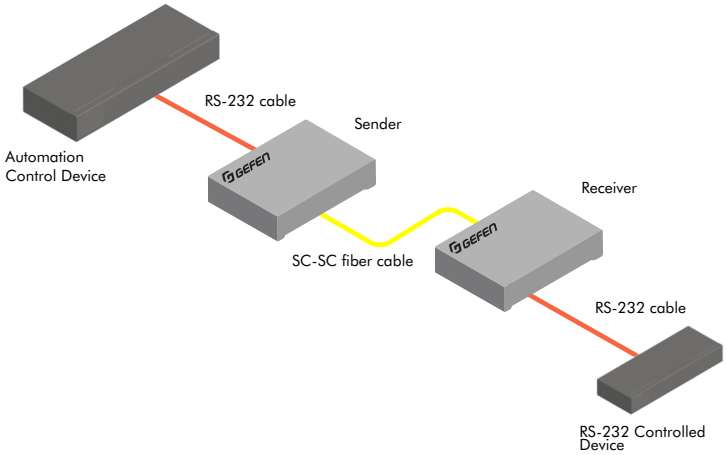
Baud Rate

The baud rate is controlled by DIP switches on the Sender unit. Use the following DIP switch settings to configure the port speed of the RS-232 interface. See Using RS-232 (page 17) for more information.

Description	Sender unit		Receiver unit
115200 Bps			
19200 Bps (default)			
57600 Bps			
9600 Bps			

The 4K Ultra HD Extender w/ RS-232 and 2-way IR supports RS-232 pass-through, allowing the control of remote RS-232 devices. The Sender and Receiver unit which are being used to pass-through the RS-232 data must be set to the same baud rate as the RS-232 host and client. The example, below, shows a sample application. The video cables have been removed for clarity.

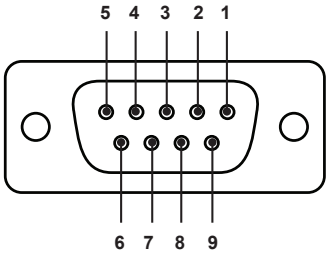
Figure 2.1 - Sample RS-232 connection



1. Connect the RS-232 automation device to the desired Sender unit.

2. Connect the RS-232-controlled display (or other RS-232 device) to the Receiver unit.

3. Set the required baud rate using the DIP switches on the bottom of the Sender unit. Consult the User Manual for the client device for the proper RS-232 settings. See Baud Rate (page 16) for more information on setting the DIP switches.

RS-232 pinout	Pin	Signal	Description
	1	DCD	Data Carrier Detect
	2	RXD	Receive Data
	3	TXD	Transmit Data
	4	DTR	Data Terminal Ready
	5	GND	Signal Ground
	6	DSR	Data Set Ready
	7	RTS	Request to Send
	8	CTS	Clear to Send
NOTE: Only TX, RX, and GND are used.	9	RI	Ring Indicator

4K Ultra HD Extender over One Fiber

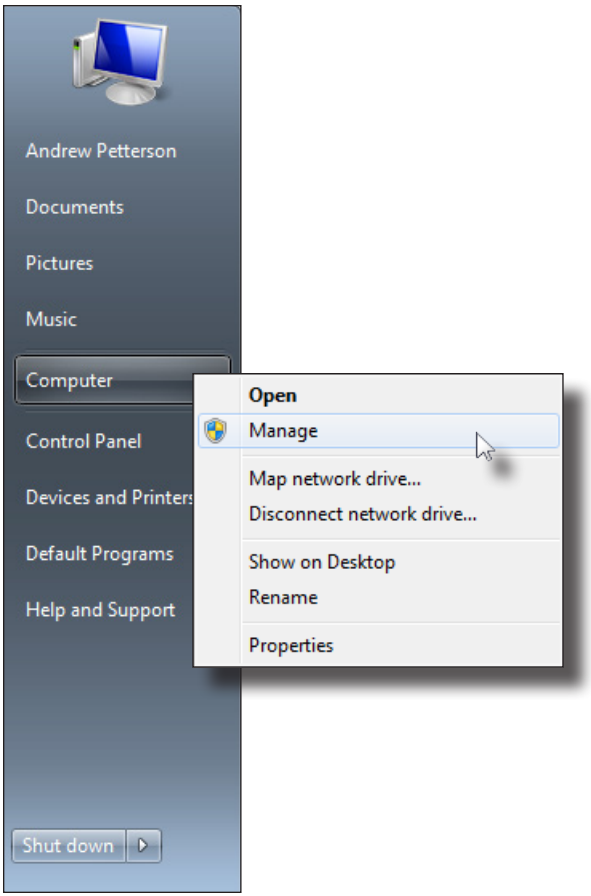
w/ RS-232 and 2-way IR

3 Appendix

Installing the Device Driver

If you are updating the firmware for the first time, the 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR device driver must be installed.

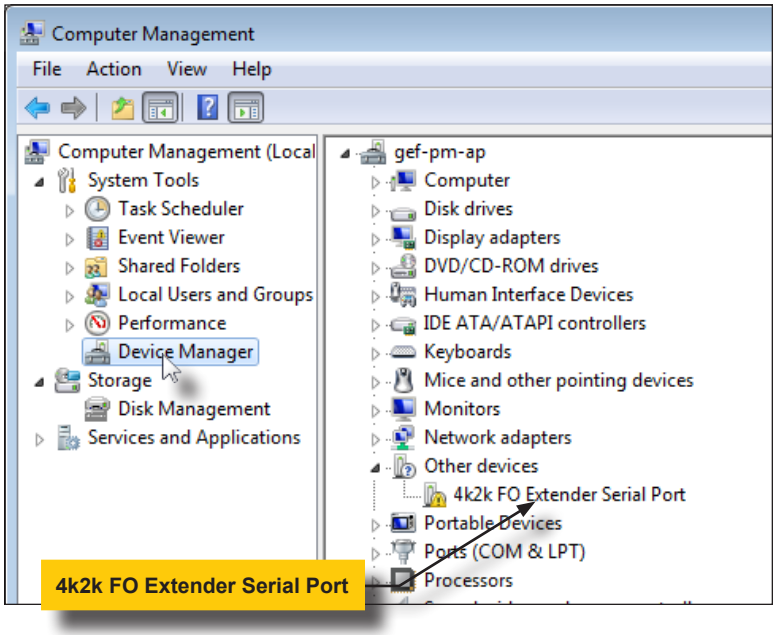
1. Connect the included 5V DC power supply to the Sender unit.
2. Connect a USB cable (not included) from the Sender unit to the PC. Both the Sender and Receiver unit accept a USB Mini-B plug.
3. The **P** LED indicator will glow solid blue. The **L** LED indicator will flash green.
4. From the Windows Desktop, click the **Start** button.
5. Select **Computer**, then right-click on **Manage**.



6. The **Computer Management** window will open.

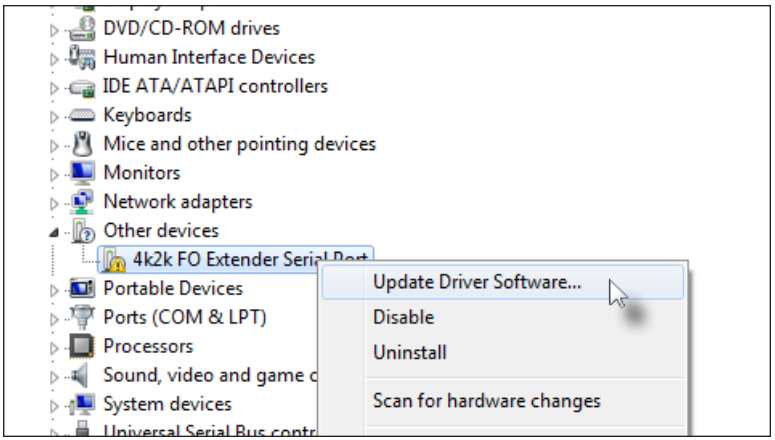
7. In the left window pane, under **System Tools**, click **Device Manager**.

8. In the right window pane, locate **Other devices**. The device "4k2k FO Extender Serial Port" will be displayed.

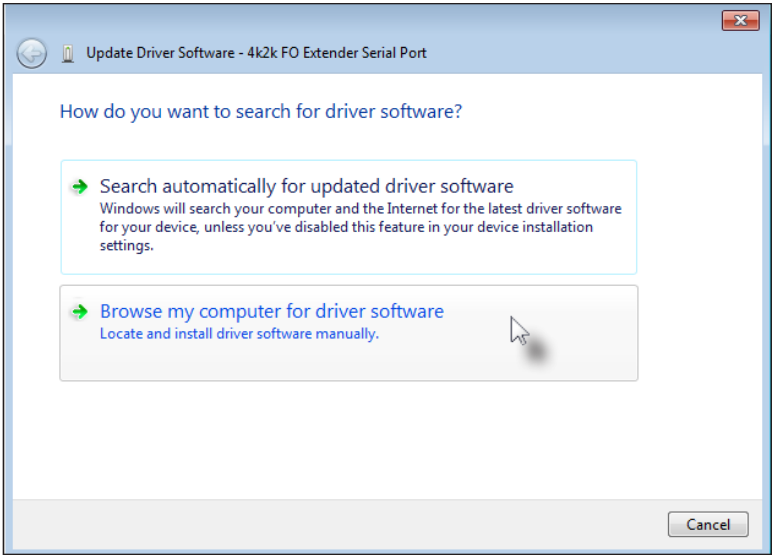


9. Select and right-click the "4k2k FO Extender Serial Port" device.

10. From the context menu, select **Update Driver Software...**

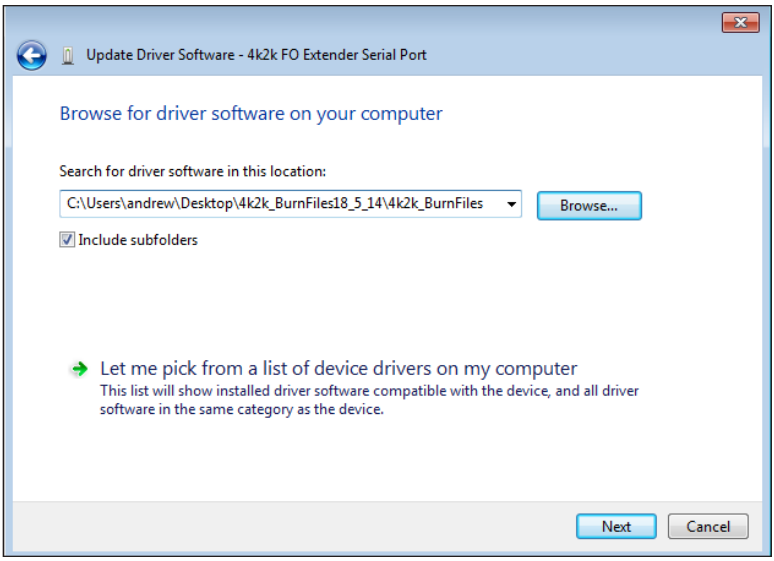


11. Select **Browse my computer for driver software**.



12. Click the **Browse...** button.

13. Select the directory containing the `4K2KFiberOpticExtender.inf` file, then click the **OK** button.



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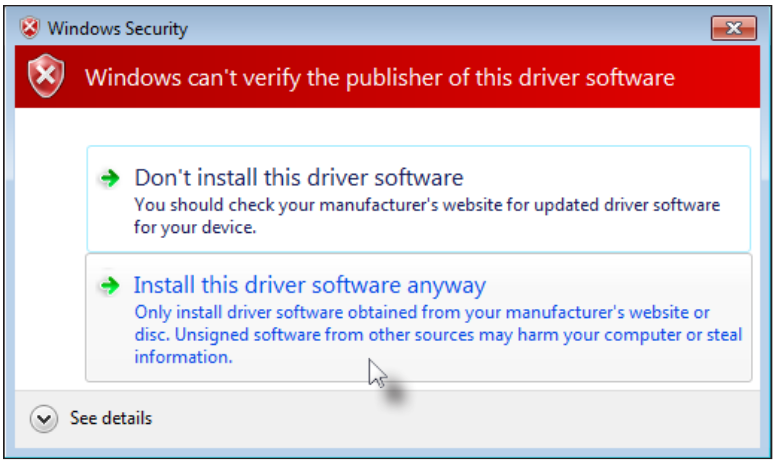
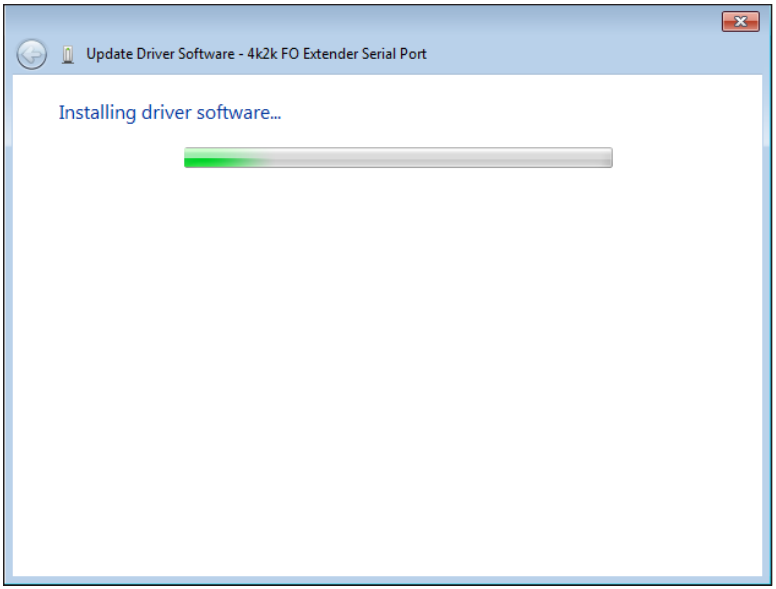
14. The following Windows Security dialog will be displayed:



15. Click **Install this driver software anyway** to being installing the driver. This process may take several minutes.



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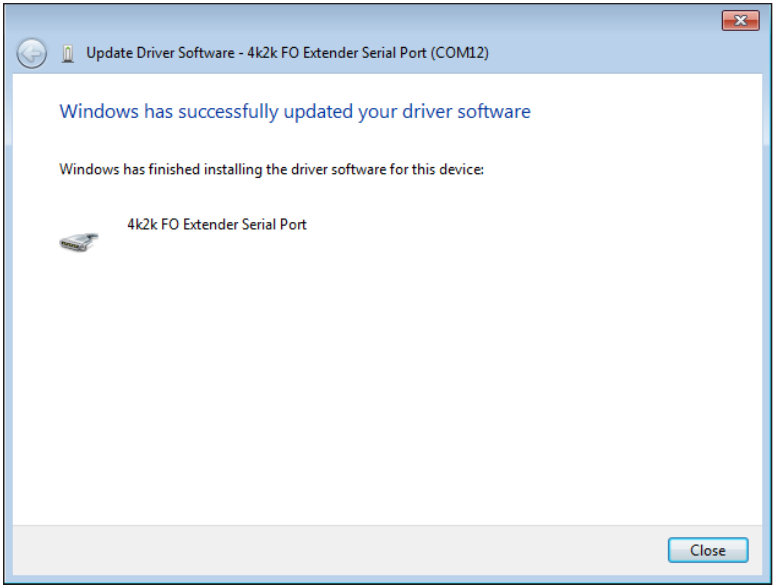
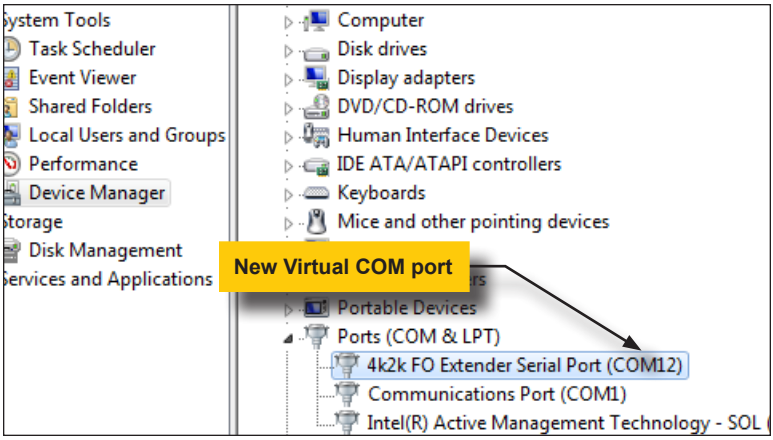
16. Once the driver has been successfully installed, the following dialog will be displayed:

    The COM port for the driver will also be indicated. COM12 is shown in the examples below. Your COM port assignment may vary.



17. Click the **Close** button.

    The installed driver will now be displayed under the **Computer Management** window.



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Updating the Firmware

Before beginning the update procedure, make sure you have the following:

- ► Windows® PC with installed terminal-emulation program
- ► Mini USB cable
- ► 4K Ultra HD Extender over One Fiber w/ RS-232 and 2-way IR Sender and Receiver unit(s)

1. Download the latest firmware here: http://www.gefen.com/support/download.jsp
2. Extract the contents of the .zip file to the desktop on your computer.
3. Make sure the power is connected to both the Sender and Receiver unit.
4. Connect a USB cable (not included) from the Sender unit to the PC. Both the Sender and Receiver unit accept a USB Mini-B plug.

   The order in which the Sender and Receiver unit are updated does not matter. In this example, we will be starting with the Sender unit.

5. The **P** LED indicator will glow solid blue. The **L** LED indicator will flash green.
6. Launch the desired terminal program.
7. Set the serial port to the COM port that was created by the 4k2k FO Extender Serial Port driver.
8. Press any key on the computer keyboard.
9. The following menu system will be displayed:

```
------ Sender Appl Menu (Ver 1.15) --------
Remote operation temporary not allowed
Download Omron Data file___________________1
Download Sender 2xx MCU FW_________________4
Download Sender 10x MCU FW_________________5
View 10x version and Omron Data file_____6
Upgrade Now / Reboot_____________________9
Cancel_____________________________________0

=========================================
```

(continued on next page)

10. Press ‘4’ on the computer keyboard. The following will be displayed:

```
Please send FW file for Sender 2xx MCU
Waiting for the file to be sent ... (press 'a' to abort)
CCCCCCCCCC
```

11. Begin the file transfer using the terminal program. For example, if using Hyperterminal, click **Transfer > Send File...**

12. Select the following firmware file: `FO2K4K_20xS_app_[version].bin`.

    Firmware files for the Sender unit will contain the characters `10xS` and `20xS`.

13. Select the **YModem** protocol and click the **OK** button.

14. The firmware update process will begin.

15. After the process has completed, the following will be displayed. Note that the number, next to “Size”, may vary depending upon the file:

```
Download Completed Successfully!
Size: 20720
```

16. Press ‘5’ on the computer keyboard. The following will be displayed:

```
Please send FW file for Sender 10x MCU
Waiting for the file to be sent ... (press 'a' to abort)
CCCCCCCCCC
```

17. Click **Transfer > Send File...**

18. Select the following firmware file: `FO2K4K_10xS_app_[version].bin`.

19. Select the **YModem** protocol and click the **OK** button.

20. After the update process has completed, disconnect the USB cable from the Sender unit.

21. Reboot the Sender unit using any one of the following methods:

    a. Press ‘9’ on the computer keyboard.

    b. Press the **Reset** button on the front of the unit.

    c. Disconnect and reconnect the power cable from the power receptacle.

22. The Sender unit is now updated.

23. Connect the USB cable to the Receiver unit.

24. Press any key on the computer keyboard. The following will be displayed:

```
------ Receiver Appl Menu (Ver 1.15) ------
Remote operation temporary not allowed
Download Receiver 2xx MCU FW_____________2
Download Receiver 10x MCU FW_____________3
View 10x version and set Equalizer_______6
Upgrade Now / Reboot_____________________9
Cancel___________________________________0
=========================================
```

25. Repeat the same process for the Receiver unit. Use the following firmware files for the Receiver unit:

    `FO2K4K_10xR_app_[version].bin`.
    `FO2K4K_20xR_app_[version].bin`.

    Firmware files for the Receiver unit will contain the characters `10xR` and `20xR`.

26. Press '2' on the computer keyboard and upload the `FO2K4K_20xR_app_[version].bin` firmware file.

27. Wait for the update process to complete.

28. Press '3' on the computer keyboard and upload the `FO2K4K_10xR_app_[version].bin` firmware file.

29. Wait for the update process to complete.

30. After the update process has completed, disconnect the USB cable from the Receiver unit.

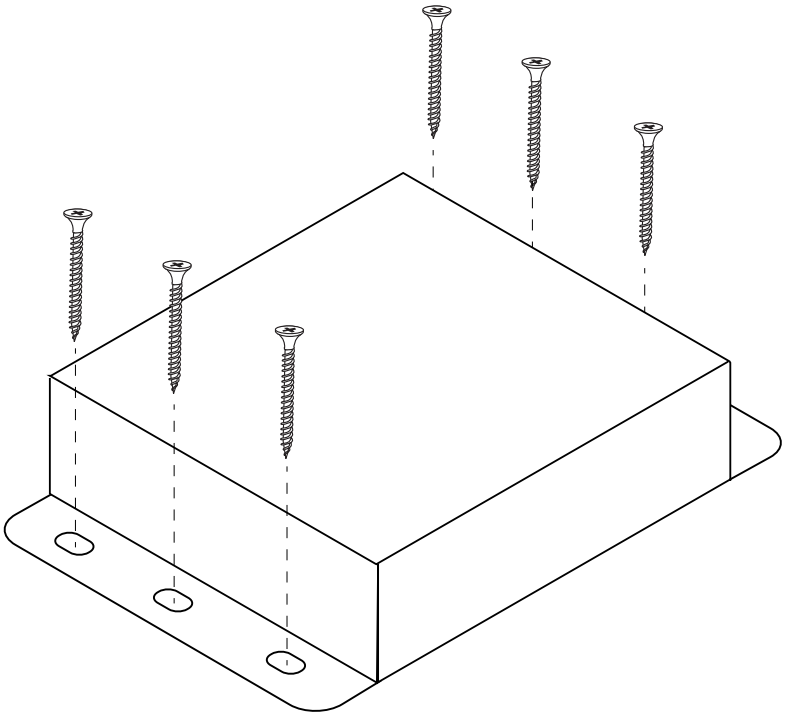
31. Reboot the Receiver unit using any one of the methods that are outlined in step 21.

32. The update process for the Receiver unit is complete.

Surface Mounting Instructions

The Sender and Receiver units can be mounted on any flat surface, as shown below (screws not included). There should be an inch or two of clearance between the edges of the unit and any walls or vertical surfaces to allow for enough clearance for connection and disconnection of the HDMI cables.

For installation on a drywall surface, use a #6 drywall screw. When installing, it is recommended to use the center hole on a stud.



Specifications

Supported Formats	
Video	• 4K x 2K (Ultra HD) • 1920 x 1200 (WUXGA) • 1080p Full HD
Audio	• 7.1 Linear PCM • Dolby® Digital • DTS-HD Master Audio™

Connectors, Indicators, and Controls	
Video Input (Sender)	• 1 x HDMI Type A, 19-pin, female
Video Output (Receiver)	• 1 x HDMI Type A, 19-pin, female
Link (Sender / Receiver)	• 1 x SC-type, female
RS-232 (Sender)	• 1 x DB-9, female
RS-232 (Receiver)	• 1 x DB-9, male
IR Out (Sender / Receiver)	• 1 x 3.5mm mini-mono, female
IR In / Ext (Sender / Receiver)	• 1 x 3.5mm mini-stereo, female
Power (Sender / Receiver)	• 1 x Locking-type
Power Indicator (Sender / Receiver)	• 1 x LED, blue / red
Link Indicator (Sender / Receiver)	• 1 x LED, green / red
DIP switches (Sender)	• 2 x banks, 4 each
DIP switches (Receiver)	• 1 x bank, 4 each

Operational	
Maximum Pixel Clock	• 300 MHz
Power Input (ea.)	• 5V DC
Power Consumption (ea.)	• 2.5W (max.)
IR Carrier Frequency Range	• 30 kHz to 60 kHz
Operating Temperature	• +32 to +104 °F (0 to +40 °C)

Physical	
Dimensions (W x H x D) (Sender / Receiver)	• 4.3” x 1.0” x 3.4” (110mm x 26mm x 86mm)
Unit Weight (ea.)	• 0.4 lb (0.2 kg)

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