Kramer Electronics, Ltd.

USER MANUAL

Models:

TP-104, TP-104HD, XGA Line Transmitter/DA
TP-105, TP-105(HD), CAT 5 Line Driver/DA
TP-121, XGA/Audio Line Transmitter
TP-122, XGA/Audio Line Receiver
TP-123, XGA/Audio/Data Line Transmitter
TP-124, XGA/Audio/Data Line Receiver
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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 that are clearly defined by function.

Thank you for purchasing your Kramer TOOLS: TP-104, TP-104HD XGA Line Transmitter/DA, and/or TP-105, TP-105(HD), CAT 5 Line Driver/DA, and/or TP-121 XGA/Audio Line Transmitter, and/or TP-122 XGA/Audio Line Receiver, and/or TP-123, XGA/Audio/Data Line Transmitter, and/or TP-124, XGA/Audio/Data Line Receiver, which are ideal for:

- Presentation and multimedia applications
- Long range graphics distribution for schools, hospitals, security, and stores

The package includes one or more of the following Kramer TOOLS:

- TP-104/TP-104HD, TP-105/TP-105(HD), TP-121, TP-122, TP-123, or TP-124
- Power adapter (12V DC)
- This user manual

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

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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 at [http://www.kramerelectronics.com](http://www.kramerelectronics.com)

3 The complete list of Kramer cables is on our Web site at [http://www.kramerelectronics.com](http://www.kramerelectronics.com)
2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.
**Getting Started**

**Step 1: Connect the Machines**

1. TP-104: Connect a source to the video input
2. TP-104: Connect the OUT connectors (from 1 to 4) to up to four XGA receivers (TP-120) via CAT5 cabling
3. TP-120: Connect a video output to each receiver

**Quick Start: TP-104 TP-105**

1. TP-104
2. Display 1
3. TP-120
4. Display 2
5. TP-120
6. Display 3

**Step 2: Connect the power**

- Adjust the EQ and LEVEL
- Set the Polarity switch(es)

---

**If required:**
3 Overview

This user manual describes the following Kramer TOOLS:

- **TP-104/TP-104HD XGA Line Transmitter/DA** is a line transmitter/1:4 DA that receives an XGA signal and transmits it over four CAT 5 cables to appropriate receivers (see section 4)
- **TP-105/TP-105(HD) CAT 5 Line Driver/DA** receives a CAT 5 input\(^1\) and distributes it to two identical outputs (see section 5)
- **TP-121 XGA/Audio Line Transmitter** and the **TP-122 XGA/Audio Line Receiver** (see section 6)
- **TP-123 XGA/Audio/Data Line Transmitter** and the **TP-124 XGA/Audio/Data Line Receiver** (see section 7)

This section describes:

- Using shielded twisted pair (STP)/unshielded twisted pair (UTP), see section 3.1
- The power connect feature, see section 3.2
- Recommendations for achieving the best performance, see section 3.3

### 3.1 Shielded Twisted Pair (STP)/Unshielded Twisted Pair (UTP)

We recommend that you use Shielded Twisted Pair (STP) cable. There are different levels of STP cable available, and we advise you to use the best quality STP cable that you can afford. Our non-skew-free cable, Kramer **BC-STP** is intended for analog signals where skewing is not an issue. For cases where there is skewing, our UTP skew-free cable, Kramer **BC-XTP**, may be used. Bear in mind, though, that we advise using STP cables where possible, since the compliance to electromagnetic interference was tested using those cables.

Although Unshielded Twisted Pair (UTP) cable might be preferred for long range applications, the UTP cable should be installed far away from electric cables, motors and so on, which are prone to create electrical interference. However, since the use of UTP cable might cause inconformity to electromagnetic standards, Kramer does not commit to meeting the standard with UTP cable.

\(^1\) Video only
3.2 About the Power Connect Feature

The Power Connect feature applies as long as the cable can carry power. This feature is available when using STP cable and the distance does not exceed 50m on standard CAT 5 cable. For longer distances, heavy gauge cable should be used\(^1\). For units which are connected via RJ-45 connectors, make sure that the shield of the STP cable is connected to the metal casing of the connectors on both ends of the cable. For units which are connected via terminal block connectors, the shield of the STP cable must be connected to a ground terminal on the units at both ends (use the ground terminal of the power supply connection if necessary).

For a CAT 5 cable exceeding a distance of 50m, separate power supplies should be connected to the transmitter and to the receiver simultaneously.

3.3 Recommendations for Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables\(^2\) to avoid 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 that may adversely influence signal quality and position your Kramer product away from moisture, excessive sunlight and dust.

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

\(^2\) Available from Kramer Electronics on our Web site at [http://www.kramerelectronics.com](http://www.kramerelectronics.com)
4 Your TP-104/TP-104HD XGA Line Transmitter/DA

The **TP-104/TP-104HD**\(^1\) is a line transmitter/1:4 DA that receives an XGA signal\(^2\) and transmits it over four CAT 5 cables to appropriate receivers.

In particular, the **TP-104/TP-104HD**:

- Has a transmission range of more than 300ft (more than 100m)
- Can power or be powered by the receiver over the same CAT 5 cable and is 12V DC fed

**Figure 1** defines the TP-104 and **Figure 2** defines the TP-104HD:

---

1 The TP-104HD is similar to the TP-104 but can also receive HD signals (high definition resolutions: 480p, 576p, 720p, 1080i and 1080p)

2 The terminology XGA is used throughout this manual, where this implies any RGBHV signal on a 15-pin HD (F) connector having a resolution from VGA up to XGA
Table 1: TP-104, TP-104HD XGA Line Transmitter/DA Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12V DC</td>
<td>+12V DC connector for powering the unit</td>
</tr>
<tr>
<td>2</td>
<td>OUT 4 RJ-45 connector</td>
<td>Connects to the LINE IN RJ-45 connector on the TP-122 XGA/Audio Line Receiver or the TP-120 XGA Line Receiver</td>
</tr>
<tr>
<td>3</td>
<td>OUT 3 RJ-45 connector</td>
<td>Connects to the LINE IN RJ-45 connector on the TP-122 XGA/Audio Line Receiver or the TP-120 XGA Line Receiver</td>
</tr>
<tr>
<td>4</td>
<td>OUT 2 RJ-45 connector</td>
<td>Connects to the LINE IN RJ-45 connector on the TP-122 XGA/Audio Line Receiver or the TP-120 XGA Line Receiver</td>
</tr>
<tr>
<td>5</td>
<td>OUT 1 RJ-45 connector</td>
<td>Connects to the LINE IN RJ-45 connector on the TP-122 XGA/Audio Line Receiver or the TP-120 XGA Line Receiver</td>
</tr>
<tr>
<td>6</td>
<td>INPUT 15-pin HD (F) connector</td>
<td>Connect to the XGA source</td>
</tr>
<tr>
<td>7</td>
<td>ON LED</td>
<td>Illuminates when receiving power</td>
</tr>
</tbody>
</table>

Figure 3 and Table 2 define the TP-104 and TP-104HD underside panel:

![Figure 3: TP-104 (Underside Panel)](image)

Table 2: TP-104 (Underside Panel) Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VS Switch</td>
<td>Slide the switch up (to NORMAL) to retain the polarity Slide the switch down³ to change the VS polarity to NEGATIVE polarity⁴</td>
</tr>
<tr>
<td>2</td>
<td>HS Switch</td>
<td>Slide the switch up (to NORMAL) to retain the polarity Slide the switch down³ to change the HS polarity to NEGATIVE polarity⁴</td>
</tr>
</tbody>
</table>

1 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)
2 Refer to the separate user manual: PT-110, WP-110, PT-120, TP-120, which can be downloaded at http://www.kramerelectronics.com. Also, see the example illustrated in Figure 17
3 By default, both switches are set to NORMAL
4 Downward syncs
Your TP-105/TP-105(HD) CAT 5 Line Driver/DA

The **TP-105** receives a CAT 5 input, and distributes it to two identical outputs.

In particular, the **TP-105**:

- Has a transmission range of more than 300ft (more than 100m) over UTP cabling
- Includes EQ. and level controls and is 12V DC fed

**Figure 4** and **Table 3** define the **TP-105**:

![Figure 4: TP-105 CAT 5 Line Driver/DA](image)

**Table 3: TP-105 CAT 5 Line Driver/DA Features**

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>12V DC</strong></td>
<td>+12V DC connector for powering the unit</td>
</tr>
<tr>
<td>2</td>
<td><strong>OUT 2 RJ-45 connector</strong></td>
<td>Connects to (^2) the LINE IN RJ-45 connector on the <strong>TP-120 XGA Line Receiver</strong></td>
</tr>
<tr>
<td>3</td>
<td><strong>OUT 1 RJ-45 connector</strong></td>
<td>Connects to (^2) the LINE IN RJ-45 connector on the <strong>TP-120 XGA Line Receiver</strong></td>
</tr>
<tr>
<td>4</td>
<td><strong>INPUT RJ-45 connector</strong></td>
<td>Connects to (^2) the LINE OUT RJ-45 connector on the <strong>PT-110 XGA Line Transmitter</strong></td>
</tr>
<tr>
<td>5</td>
<td>EQ. trimmer</td>
<td>Adjusts the video EQ. (equalization) compensation</td>
</tr>
<tr>
<td>6</td>
<td>LEVEL trimmer</td>
<td>Adjusts (^3) the video signal level</td>
</tr>
<tr>
<td>7</td>
<td>ON LED</td>
<td>Illuminates when receiving power</td>
</tr>
</tbody>
</table>

---

1 The TP-105HD (identified by a sticker on its underside) is identical in appearance to the TP-105. However, the TP-105HD can also receive HD signals (high definition resolutions: 480p, 576p, 720p, 1080i and 1080p), for example, from a TP-112HD XGA/HD Line Transmitter-DA, and not only computer graphics signals (for example, from a PT-110 as **Figure 18** illustrates)

2 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in **Table 12** and **Figure 14**)

3 Insert a screwdriver into the hole and carefully rotate it, to trim the level
6 Your TP-121/TP-122

This section defines the **TP-121 XGA/Audio Line Transmitter** (see section 6.1), and the **TP-122 XGA/Audio Line Receiver** (see section 6.2).

6.1 Your TP-121 XGA/Audio Line Transmitter

The **TP-121** is an XGA/audio stereo line transmitter that receives an XGA signal and an unbalanced stereo analog audio signal and transmits them over CAT 5 cable to a **TP-122** receiver, converting the unbalanced stereo analog audio signal to digital audio (S/PDIF) stream before transmitting, thus preserving the quality of the audio signal. In particular, the **TP-121**:

- Has a transmission range of more than 300ft (more than 100m), and a 20kHz audio bandwidth with an S/N ratio that exceeds 80dB on the same transmission range
- Can power or be powered by the receiver over the same CAT 5 cable
- Is 12V DC fed

*Figure 5* and *Table 4* define the **TP-121**:

![Figure 5: TP-121 XGA/Audio Line Transmitter](image)

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12V DC</td>
<td>+12V DC connector for powering the unit</td>
</tr>
<tr>
<td>2</td>
<td>AUDIO IN 3.5mm mini jack</td>
<td>Connects to the audio source</td>
</tr>
<tr>
<td>3</td>
<td>LINE OUT RJ-45 connector</td>
<td>Connects to the LINE IN RJ-45 connector on the <strong>TP-122 XGA/Audio Line Receiver</strong></td>
</tr>
<tr>
<td>4</td>
<td>XGA IN 15-pin HD (F) connector</td>
<td>Connects to the XGA source</td>
</tr>
<tr>
<td>5</td>
<td>ON LED</td>
<td>Illuminates when receiving power</td>
</tr>
</tbody>
</table>

1 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in *Table 12* and *Figure 14*)
6.1.1 The TP-121 Internal Polarity Switches

Figure 6 and Table 5 define the internal sync polarity switches inside the TP-121.

Note, that you need to open the TP-121 unit to gain access to the Vs and Hs Polarity switches. After setting the switches, close the TP-121 unit.

![Figure 6: TP-121 Internal Polarity Switches](image)

Table 5: Features of the TP-121 Internal Polarity Switches

<table>
<thead>
<tr>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS Switch</td>
<td>Slide the switch down⁵, to set the V SYNC to negative polarity (NEG.); slide the switch up, to set the V SYNC to its input polarity (NORM.)</td>
</tr>
<tr>
<td>HS Switch</td>
<td>Slide the switch down⁴, to set the H SYNC to negative polarity (NEG.); slide the switch up, to set the H SYNC to its input polarity (NORM.)</td>
</tr>
</tbody>
</table>

6.2 Your TP-122 XGA/Audio Line Receiver

This section describes the topside (see section 6.2.1), and the underside² (see section 6.2.2) of the TP-122 XGA/Audio Line Receiver.

6.2.1 Your TP-122 XGA/Audio Line Receiver (Topside)

The TP-122 is an XGA/audio line receiver that receives the coded CAT 5 signal transmitted by a TP-121, decodes it and converts it to XGA, stereo analog and S/PDIF digital audio outputs. The TP-122, with a TP-121, allows an operation range of more than 300ft (more than 100m) over standard CAT 5 cable.

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¹ By default, both switches are set down (for a negative V SYNC and H SYNC polarity)
² The underside is identical on the TP-122 and TP-124
In addition, the TP-122:

- Can power or be powered by the transmitter over the same CAT 5 cable
- Can change the polarity of decoding H and V Sync for video
- Includes EQ. and level controls
- Is 12V DC fed

Figure 7 and Table 6 define the TP-122 XGA/Audio Line Receiver topside:

![Figure 7: TP-122 XGA/Audio Line Receiver (Topside)](image)

Table 6: TP-122 XGA/Audio Line Receiver (Topside) Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12V DC</td>
<td>+12V DC connector for powering the unit</td>
</tr>
<tr>
<td>2</td>
<td>AUDIO OUT</td>
<td>S/PDIF RCA connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connects to the digital audio acceptor</td>
</tr>
<tr>
<td>3</td>
<td>ANALOG</td>
<td>3.5mm mini jack</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connects to the analog audio acceptor</td>
</tr>
<tr>
<td>4</td>
<td>LINE IN</td>
<td>RJ-45 connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connects to the TP-121 or the TP-104</td>
</tr>
<tr>
<td>5</td>
<td>XGA OUT</td>
<td>15-pin HD (F) connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connects to the XGA acceptor</td>
</tr>
<tr>
<td>6</td>
<td>LINK LED</td>
<td>Illuminates when receiving the correct input signal</td>
</tr>
<tr>
<td>7</td>
<td>LEVEL trimmer</td>
<td>Adjusts the output signal level</td>
</tr>
<tr>
<td>8</td>
<td>EQ.3 trimmer</td>
<td>Adjusts the cable compensation equalization level</td>
</tr>
<tr>
<td>9</td>
<td>ON LED</td>
<td>Illuminates when receiving power</td>
</tr>
</tbody>
</table>

1 Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)
2 The TP-104 does not accept the audio signals
3 Degradation and VGA/XGA signal loss can result from using long cables (due to stray capacitance), sometimes leading to a total loss of sharpness in high-resolution signals
4 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level
6.2.2 Your TP-122 XGA/Audio Line Receiver (Underside)

Figure 8 and Table 7 define the underside\(^1\) of the TP-122 XGA/Audio Line Receiver:

![Figure 8: TP-122 XGA/Audio Line Receiver (Underside\(^1\))](image)

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VS Switch</td>
<td>Slide the switch up(^2) to set the V SYNC to positive polarity; slide the switch down to set the V SYNC to negative polarity</td>
</tr>
<tr>
<td>2</td>
<td>HS Switch</td>
<td>Slide the switch up(^2) to set the H SYNC to positive polarity; slide the switch down to set the H SYNC to negative polarity</td>
</tr>
</tbody>
</table>

\(^1\) The underside is identical on the TP-122 and TP-124

\(^2\) By default, both switches are set down (for a negative V SYNC and H SYNC polarity)
7 Your TP-123/TP-124

This section describes the **TP-123 XGA/Audio/Data Line Transmitter** (see section 7.1), and the **TP-124 XGA/Audio/Data Line Receiver** (see section 7.2).

### 7.1 Your TP-123 XGA/Audio/Data Line Transmitter

The **TP-123** is a high-performance transmitter that accepts a computer graphics input signal, an unbalanced stereo analog audio signal, unidirectional (RxD) RS-232 control commands and 12V DC power, over CAT 5 cable, and transmits to a **TP-124** receiver. The stereo analog audio signal is converted to the digital audio (S/PDIF) stream before transmitting, thus preserving the quality of the audio source signals.

The **TP-123/TP-124** pair has a transmission range of more than 300ft (more than 100m) over UTP cabling. In addition, the **TP-123**:

- Can power or be powered by the **TP-124** receiver over the same CAT 5 cable and is 12V DC fed.

**Figure 9** and **Table 8** define the **TP-123**:

![Figure 9: TP-123 XGA/Audio/Data Line Transmitter](image-url)
Table 8: TP-123 XGA/Audio/Data Line Transmitter Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12V DC</td>
<td>+12V DC connector for powering the unit</td>
</tr>
<tr>
<td>2</td>
<td>AUDIO IN 3.5mm mini jack</td>
<td>Connects to the audio source</td>
</tr>
<tr>
<td>3</td>
<td>RS-232 terminal block connector</td>
<td>Connects to the PC or the Remote Controller (see section 9.1)</td>
</tr>
<tr>
<td>4</td>
<td>LINE OUT RJ-45 connector</td>
<td>Connects to the LINE IN RJ-45 connector on the TP-124 XGA/Audio Line Receiver</td>
</tr>
<tr>
<td>5</td>
<td>XGA IN 15-pin HD (F) connector</td>
<td>Connects to the XGA source</td>
</tr>
<tr>
<td>6</td>
<td>ON LED</td>
<td>Illuminates when receiving power</td>
</tr>
</tbody>
</table>

7.1.1 The TP-123 Internal Polarity Switches

Figure 10 and Table 9 define the internal sync polarity switches inside the TP-123.

Note, that you need to open the TP-123 unit to gain access to the Vs and Hs Polarity switches. After setting the switches, close the TP-123 unit.

![Figure 10: TP-123 Internal Polarity Switches]

Table 9: Features of the TP-123 Internal Polarity Switches

<table>
<thead>
<tr>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS Switch</td>
<td>Slide the switch down(^2) to set the V SYNC to negative polarity (NEG.); slide the switch up to set the V SYNC to its input polarity (NORM.)</td>
</tr>
<tr>
<td>HS Switch</td>
<td>Slide the switch down(^2) to set the H SYNC to negative polarity (NEG.); slide the switch up to set the H SYNC to its input polarity (NORM.)</td>
</tr>
</tbody>
</table>

---

\(^1\) Using a UTP CAT 5 cable with RJ-45 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)

\(^2\) By default, both switches are set down (for a negative V SYNC and H SYNC polarity)
7.2 Your TP-124 XGA/Audio/Data Line Receiver

The TP-124 is a high-performance receiver obtaining the computer graphics signal/audio/control data from the Kramer TP-123 via UTP cabling at its CAT 5 Line input. The TP-124 outputs a computer graphics signal, an unbalanced stereo analog audio signal, a converted digital audio (S/PDIF) signal and RS-232 control commands. The unidirectional (TxD) RS-232 interface makes it possible to control virtually any devices over a transmission range of more than 300ft (more than 100m) over UTP cabling. The TP-124 can power or be powered by the TP-123 transmitter over the same CAT 5 cable.

In addition, the TP-124 features:
- Level and EQ. control for the XGA signals
- The capability to change the polarity of decoding H and V Sync
- 24 bit 48kHz S/PDIF digital audio that supplies the highest quality audio
- Is 12V DC fed

This section describes the topside of the TP-124 XGA/Audio/Data Line Receiver. The underside of the TP-124 is described in section 6.2.2. Figure 11 and Table 10 define the topside of the TP-124 XGA/Audio/Data Line Receiver:

![Figure 11: TP-124 XGA/Audio/Data Line Receiver (Topside)](image-url)

1 The underside is identical on the TP-124 and TP-122
Table 10: TP-124 XGA/Audio/Data Line Receiver (Topside) Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12V DC</td>
<td>+12V DC connector for powering the unit</td>
</tr>
<tr>
<td>2</td>
<td>AUDIO OUT S/PDIF RCA</td>
<td>Connects to the digital audio acceptor</td>
</tr>
<tr>
<td>3</td>
<td>ANALOG 3.5mm mini jack</td>
<td>Connects to the analog audio acceptor</td>
</tr>
<tr>
<td>4</td>
<td>RS-232 Terminal Block</td>
<td>Connects to the controlled unit</td>
</tr>
<tr>
<td>5</td>
<td>LINE IN RJ-45 connector</td>
<td>Connects to the LINE OUT RJ-45 connector on the TP-123 or the TP-104</td>
</tr>
<tr>
<td>6</td>
<td>XGA OUT 15-pin HD (F) connector</td>
<td>Connects to the XGA acceptor</td>
</tr>
<tr>
<td>7</td>
<td>LEVEL trimmer</td>
<td>Adjusts the output signal level</td>
</tr>
<tr>
<td>8</td>
<td>EQ. trimmer</td>
<td>Adjusts the cable compensation equalization level</td>
</tr>
<tr>
<td>9</td>
<td>ON LED</td>
<td>Illuminates when receiving power</td>
</tr>
</tbody>
</table>

7.2.1 Your TP-124 XGA/Audio/Data Line Receiver (Underside)

Figure 12 and Table 11 define the underside of the TP-124 XGA/Audio/Data Line Receiver:

![Figure 12: TP-124 XGA/Audio/Data Line Receiver (Underside)](image)

Table 11: TP-124 XGA/Audio/Data Line Receiver (Underside) Features

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VS Switch</td>
<td>Slide the switch up to set the V SYNC to positive polarity; slide the switch down to set the V SYNC to negative polarity</td>
</tr>
<tr>
<td>2</td>
<td>HS Switch</td>
<td>Slide the switch up to set the H SYNC to positive polarity; slide the switch down to set the H SYNC to negative polarity</td>
</tr>
</tbody>
</table>

1 Using a UTP cable with CAT 5 connectors at both ends (the PINOUT is defined in Table 12 and Figure 14)
2 The TP-104 does not accept the audio signals
3 Degradation and VGA/XGA signal loss can result from using long cables (due to stray capacitance), sometimes leading to a total loss of sharpness in high-resolution signals
4 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level
5 The underside is identical on the TP-122 and TP-124
6 By default, both switches are set down (for a negative V SYNC and H SYNC polarity)
8 Connecting the XGA/Audio Line Transmitter/Receiver

You can use the TP-121 and TP-122 to configure an XGA/Audio Line-to-Twisted Pair Transmitter and Receiver system.

To connect the TP-121 XGA/Audio Line Transmitter with the TP-122 XGA/Audio Line Receiver, as the example in Figure 13 illustrates, do the following:

1. On the TP-121, connect the XGA source (for example, a laptop’s graphics card) to the XGA INPUT 15-pin HD (F) connector and an audio source to the AUDIO IN 3.5mm mini jack, for example, using a Kramer C-GMA/GMA cable (VGA 15-pin HD (M) +Audio jack to VGA 15-pin HD (M) +Audio jack). Alternatively, you can connect an XGA source to the XGA INPUT 15-pin HD (F) connector, and a separate audio source to the AUDIO IN 3.5mm mini jack.

2. On the TP-122, connect the XGA OUT 15-pin HD (F) connector to the XGA acceptor (for example, a display), and connect the AUDIO OUT S/PDIF RCA connector to the digital audio acceptor (for example, an AV Receiver), and the ANALOG 3.5mm mini jack to the analog audio acceptor (for example, a stereo audio recorder).

3. Connect the LINE OUTPUT RJ-45 connector on the TP-121 to the LINE IN RJ-45 connector on the TP-122, via UTP cabling (with a range of more than 300ft (>100m)), see section 8.1.

4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity on both the TP-121 and the TP-122. The signal from the XGA source is transmitted via CAT 5 cable, decoded and converted at the XGA OUT 15-pin HD (F) connector to the XGA acceptor.

5. On the TP-122:
   - Adjust the video output signal level and/or cable compensation equalization level, if required
   - If necessary, set the H SYNC and V SYNC switches, on the underside

---

1 Not supplied. The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2 If you cannot connect the power to both the TP-121 and TP-122, you can just connect the power to the TP-122

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)
Figure 13: Connecting the XGA/Audio Line Transmitter/Receiver System
8.1 Wiring the CAT 5 LINE IN/LINE OUT RJ-45 Connectors

Table 12 and Figure 14 define the UTP CAT 5 PINOUT, using a straight pin to pin cable with RJ-45 connectors:

<table>
<thead>
<tr>
<th>EIA / TIA 568A</th>
<th>EIA / TIA 568B</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN</td>
<td>Wire Color</td>
</tr>
<tr>
<td>1</td>
<td>Green/White</td>
</tr>
<tr>
<td>2</td>
<td>Green</td>
</tr>
<tr>
<td>3</td>
<td>Orange/White</td>
</tr>
<tr>
<td>4</td>
<td>Blue</td>
</tr>
<tr>
<td>5</td>
<td>Blue/White</td>
</tr>
<tr>
<td>6</td>
<td>Orange</td>
</tr>
<tr>
<td>7</td>
<td>Brown/White</td>
</tr>
<tr>
<td>8</td>
<td>Brown</td>
</tr>
<tr>
<td>Pair 1</td>
<td>4 and 5</td>
</tr>
<tr>
<td>Pair 2</td>
<td>3 and 6</td>
</tr>
<tr>
<td>Pair 3</td>
<td>1 and 2</td>
</tr>
<tr>
<td>Pair 4</td>
<td>7 and 8</td>
</tr>
</tbody>
</table>

9 Connecting the XGA/Audio/Data Line Transmitter/Receiver

You can use the TP-123 XGA/Audio/Data Line Transmitter and the TP-124 XGA/Audio/Data Line Receiver to configure a twisted pair transmitter and receiver system, to transmit the video, audio and RS-232 control signals via CAT 5 UTP cable. To connect the TP-123 and the TP-124 to configure a twisted pair transmitter and receiver system, as the example in Figure 15 illustrates, do the following:

1. On the TP-123, connect:
   - An XGA source (for example, a laptop’s graphics card) to the XGA IN 15-pin HD (F) connector and an audio source to the Audio IN 3.5mm mini jack, for example, using a Kramer C-GMA/GMA cable (VGA 15-pin HD (M) + Audio jack to VGA 15-pin HD (M) + Audio jack)\(^1\)
   - An RS-232 cable with a 9-pin D-sub connector at one end to the laptop, and a 2 PIN terminal block connector at the other end to

---

\(^1\) Not supplied. The full list of Kramer cables is on our Web site at [http://www.kramerelectronics.com](http://www.kramerelectronics.com). Alternatively, you can connect an XGA source to the XGA IN 15-pin HD (F) connector, and a separate audio source to the AUDIO IN 3.5mm mini jack.
the TP-123 RS-232 port¹

2. On the **TP-124**, connect:
   - The XGA OUT 15-pin HD (F) connector to a display
   - The S/PDIF Audio OUT RCA connector to a digital AV Receiver (leave the ANALOG Audio OUT 3.5mm mini jack unconnected)
   - An RS-232 cable with a 2 PIN terminal block connector at one end to the **TP-124** RS-232 port¹, and a 9-pin D-sub connector at the other end to the RS-232 port on an RS-232 controllable device (for example, a switcher)

3. Connect the Line OUT RJ-45 connector on the **TP-123** to the LINE IN RJ-45 connector on the **TP-124**, via UTP cabling² (with a range of more than 300ft (>100m)).

4. Connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity on both³ the **TP-123** and the **TP-124**.

5. On the **TP-124**:
   - Adjust⁴ the video output signal level and/or cable compensation equalization level, if required
   - If necessary, set the H SYNC and V SYNC switches⁵, on the underside

---

¹ As defined in Figure 16 and Table 13
² For details of how to wire a CAT 5 LINE IN/LINE OUT RJ-45 connector, see section 8.1
³ If you cannot connect the power to both the TP-123 and TP-124, you can just connect the power to any one unit
⁴ Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level
⁵ By default, both switches are set down (for negative V SYNC and H SYNC polarity)
Figure 15: Connecting the XGA/Audio/Data Line Transmitter/Receiver System
9.1 Controlling via RS-232 (for example, using a PC)

Prepare an RS-232 cable with a 9-pin D-sub connector at one end, and a 2 PIN terminal block connector at the other end, as defined in Figure 16 and Table 13:

**Figure 16: RS-232 PINOUT Connection**

**Table 13: RS-232 PINOUT Connection**

<table>
<thead>
<tr>
<th>Connect this PIN on the Terminal Block Connector:</th>
<th>To this PIN on the 9-pin D-sub Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TxD</td>
<td>PIN 2</td>
</tr>
<tr>
<td>RxD</td>
<td>PIN 3</td>
</tr>
<tr>
<td>GND</td>
<td>PIN 5</td>
</tr>
</tbody>
</table>
10 Configuring a 1:4 XGA to TP Transmitter/Receiver/DA

You can use the TP-104 XGA Line Transmitter/DA with the TP-120 XGA Line Receiver\(^1\) to configure a 1:4 XGA-to-Twisted Pair DA system.

To connect the TP-104 to four TP-120 units, as the example in Figure 17 illustrates, do the following:

1. On the TP-104, connect the XGA source (for example, a computer graphics source) to the XGA INPUT 15-pin HD (F) connector, and connect the line output RJ-45 connector\(^2\):
   - OUT 1 to the LINE IN RJ-45 connector on the TP-120 Unit I
   - OUT 2 to the LINE IN RJ-45 connector on the TP-120 Unit II
   - OUT 3 to the LINE IN RJ-45 connector on the TP-120 Unit III
   - OUT 4 to the LINE IN RJ-45 connector on the TP-120 Unit IV

2. On the four TP-120 units, connect the:
   - XGA OUT 15-pin HD (F) connector of Unit I to the XGA acceptor (for example, Display 1)
   - XGA OUT 15-pin HD (F) connector of Unit II to the XGA acceptor (for example, Display 2)
   - XGA OUT 15-pin HD (F) connector of Unit III to the XGA acceptor (for example, Display 3)
   - XGA OUT 15-pin HD (F) connector of Unit IV to the XGA acceptor (for example, Display 4)

3. On each of the five Kramer TOOLS, connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity. The signal from the XGA source is transmitted via the four CAT 5 cables, decoded and converted at the each of the XGA OUT 15-pin HD (F) connectors to the XGA acceptors.

4. On each of the five Kramer TOOLS:
   - Adjust\(^3\) the video output signal level and/or cable compensation equalization level, if required
   - If necessary, on the TP-120 units, set the H SYNC and V SYNC switches\(^4\), on the underside

---

\(^1\) Refer to the separate user manual: PT-110, WP-110, PT-120, TP-120, which can be downloaded at http://www.kramerelectronics.com

\(^2\) Via UTP cabling (with a range of more than 300ft (>100m)). For details of how to wire a CAT 5 LINE IN/LINE OUT RJ-45 connector, see section 8.1.

\(^3\) Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

\(^4\) By default, both switches are set down (for negative V SYNC and H SYNC polarity)
Figure 17: Configuring a 1:4 XGA to Twisted Pair Transmitter/Receiver/DA
11 Configuring a TP-105 CAT 5 Line Driver/DA

You can connect the **TP-105 CAT 5 Line Driver/DA**—using a **PT-110 XGA Line Transmitter** and two **TP-120 XGA Line Receiver** units—to transmit a computer graphics signal to two displays via long line CAT 5 UTP cabling.

To connect the **TP-105**, as the example in [Figure 17](#) illustrates, do the following:

1. On the **PT-110**, connect the:
   - Computer graphics source to the XGA INPUT 15-pin HD (F) connector
   - LINE OUTPUT RJ-45 connector\(^2\) to the INPUT RJ-45 connector on the **TP-105**

2. On the **TP-105**, connect the:
   - OUT 1 RJ-45 connector to the LINE IN RJ-45 on the first **TP-120**
   - OUT 2 RJ-45 connector to the LINE IN RJ-45 on the second **TP-120**

3. On the two **TP-120** units, connect the:
   - XGA OUT 15-pin HD (F) connector on the first **TP-120** unit to the XGA acceptor (for example, Display 1)
   - XGA OUT 15-pin HD (F) connector on the second **TP-120** unit to the XGA acceptor (for example, Display 2)

4. On each of the four Kramer units, connect the 12V DC power adapter to the power socket and connect the adapter to the mains electricity. The signal from the XGA source is transmitted via the two CAT 5 cables, decoded and converted at each of the XGA OUT 15-pin HD (F) connectors to the XGA acceptors.

5. If necessary:
   - Adjust\(^3\) the video output signal level and/or cable compensation equalization level on the **TP-105** and on both the **TP-120** units
   - Set the H SYNC and V SYNC switches\(^4\) on the underside of the **TP-120** units

---

1 Refer to the separate user manual: PT-110, WP-110, TP-120, which can be downloaded from the Internet at [http://www.kramerelectronics.com](http://www.kramerelectronics.com)

2 Via UTP cabling (with a range of more than 300ft (~100m)). For details of how to wire a CAT 5 LINE IN/LINE OUT RJ-45 connector, see section 8.1.

3 Use a screwdriver to carefully rotate the trimmer, adjusting the appropriate level

4 By default, both switches are set down (for negative V SYNC and H SYNC polarity)
Figure 18: Configuring a TP-105 CAT 5 Line Driver/DA
# Technical Specifications

Table 14 includes the technical specifications of the **TP-104**, Table 15 includes the technical specifications of the **TP-105**, and Table 16 includes the technical specifications of the **TP-121, TP-122, TP-123, and TP-124**:

**Table 14: Technical Specifications** of the **TP-104** and the **TP-104HD**

<table>
<thead>
<tr>
<th><strong>TP-104</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUTS:</strong></td>
<td>1 VGA/UXGA on a 15-pin HD connector</td>
</tr>
<tr>
<td><strong>OUTPUTS:</strong></td>
<td>4 RJ-45 OUT connectors</td>
</tr>
<tr>
<td><strong>MAX. OUTPUT LEVEL:</strong></td>
<td>1.4Vpp</td>
</tr>
<tr>
<td><strong>BANDWIDTH (-3dB)</strong></td>
<td>&gt;150MHz, up to 1080p&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>DIFF. GAIN</strong></td>
<td>3.2%</td>
</tr>
<tr>
<td><strong>DIFF. PHASE</strong></td>
<td>0.5Deg</td>
</tr>
<tr>
<td><strong>K-FACTOR</strong></td>
<td>&lt;0.05%</td>
</tr>
<tr>
<td><strong>S/N RATIO</strong></td>
<td>80dB</td>
</tr>
<tr>
<td><strong>CONTROLS</strong></td>
<td>EQ.: 0 to 33dB; LEVEL: –7.5dB to 4.4dB</td>
</tr>
<tr>
<td><strong>COUPLING</strong></td>
<td>AC</td>
</tr>
<tr>
<td><strong>POWER SOURCE</strong></td>
<td>12V DC 180mA</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td>12.1cm x 7.18cm x 2.42cm (4.76” x 2.83” x 0.95”) W, D, H</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>0.3kg (0.67lbs) approx.</td>
</tr>
<tr>
<td><strong>ACCESSORIES</strong></td>
<td>Power supply</td>
</tr>
</tbody>
</table>

**Table 15: Technical Specifications** of the **TP-105** and the **TP-105(HD)**

<table>
<thead>
<tr>
<th><strong>TP-105</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUTS:</strong></td>
<td>1 RJ-45 OUT connector</td>
</tr>
<tr>
<td><strong>OUTPUTS:</strong></td>
<td>2 RJ-45 OUT connectors</td>
</tr>
<tr>
<td><strong>MAX. OUTPUT LEVEL:</strong></td>
<td>1.6Vpp</td>
</tr>
<tr>
<td><strong>BANDWIDTH (-3dB)</strong></td>
<td>Appropriate for VGA-UXGA, up to 1080p&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>DIFF. GAIN</strong></td>
<td>3.7%</td>
</tr>
<tr>
<td><strong>DIFF. PHASE</strong></td>
<td>0.5Deg</td>
</tr>
<tr>
<td><strong>K-FACTOR</strong></td>
<td>&lt;0.05%</td>
</tr>
<tr>
<td><strong>S/N RATIO</strong></td>
<td>69dB</td>
</tr>
<tr>
<td><strong>CONTROLS</strong></td>
<td>EQ.: 0 to 4.4dB @ 50MHz; LEVEL: –5.5dB to 1.4dB</td>
</tr>
<tr>
<td><strong>COUPLING</strong></td>
<td>AC</td>
</tr>
<tr>
<td><strong>POWER SOURCE</strong></td>
<td>12V DC 220mA</td>
</tr>
<tr>
<td><strong>DIMENSIONS</strong></td>
<td>12.1cm x 7.18cm x 2.42cm (4.76” x 2.83” x 0.95”) W, D, H</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>0.3kg (0.67lbs) approx.</td>
</tr>
<tr>
<td><strong>ACCESSORIES</strong></td>
<td>Power supply</td>
</tr>
</tbody>
</table>

---

1 Specifications are subject to change without notice
2 With 60m CAT 5 cable
3 For the TP-104 Transmitter/ TP-120 Receiver SETUP
4 The HD resolutions apply to the HD version of the machine
5 For the PT-110 to TP-105 to TP-120 Receiver SETUP
Table 16: Technical Specifications of the TP-121/TP-122/TP-123/TP-124

<table>
<thead>
<tr>
<th></th>
<th>TP-121</th>
<th>TP-122</th>
<th>TP-123</th>
<th>TP-124</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUTS:</strong></td>
<td>VIDEO: 1 VGA/UXGA on a 15-pin HD connector &lt;br&gt; AUDIO: 1 audio ANALOG 3.5mm mini jack</td>
<td>1 RJ-45 LINE IN connector</td>
<td>VIDEO: 1 VGA/UXGA on a 15-pin HD connector &lt;br&gt; AUDIO: 1 audio ANALOG 3.5mm mini jack</td>
<td>1 RJ-45 LINE IN connector</td>
</tr>
<tr>
<td><strong>OUTPUTS:</strong></td>
<td>1 RJ-45 OUT connector</td>
<td>VIDEO: 1 VGA/UXGA on a 15-pin HD connector &lt;br&gt; AUDIO: 1 audio S/PDIF RCA connector &lt;br&gt; 1 audio ANALOG 3.5mm mini jack</td>
<td>1 RJ-45 OUT connector</td>
<td>VIDEO: 1 VGA/UXGA on a 15-pin HD connector &lt;br&gt; AUDIO: 1 audio ANALOG 3.5mm mini jack</td>
</tr>
<tr>
<td><strong>MAX. OUTPUT LEVEL:</strong></td>
<td>VIDEO: 1V&lt;br&gt; AUDIO: 2.5V</td>
<td>VIDEO: 1V&lt;br&gt; AUDIO: 2.5V</td>
<td>AUDIO: S/PDIF RCA connector &lt;br&gt; 1 audio ANALOG 3.5mm mini jack</td>
<td>AUDIO: S/PDIF RCA connector &lt;br&gt; 1 audio ANALOG 3.5mm mini jack</td>
</tr>
<tr>
<td><strong>CONTROLS:</strong></td>
<td>Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
<td>RS-232 2 PIN Terminal Block</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
<td></td>
</tr>
<tr>
<td><strong>BANDWIDTH (-3dB)</strong></td>
<td>AUDIO: 20Hz – 20kHz @ 0.5dB</td>
<td>AUDIO: 20Hz – 20kHz @ 0.5dB</td>
<td>AUDIO: 20Hz – 20kHz @ 0.5dB</td>
<td>AUDIO: 20Hz – 20kHz @ 0.5dB</td>
</tr>
<tr>
<td><strong>S/N RATIO:</strong></td>
<td>VIDEO: 58dB unweighted, 68.3dB @ 5MHz weighted</td>
<td>AUDIO: ~80dB</td>
<td>AUDIO: ~80dB</td>
<td>AUDIO: ~80dB</td>
</tr>
<tr>
<td><strong>TOTAL GAIN:</strong></td>
<td>AUDIO: Analog/analog: 0dB; Analog/SPDIF: –12dBFS</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
</tr>
<tr>
<td><strong>COUPLING:</strong></td>
<td>AC</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
<td>RS-232 2 PIN Terminal Block Level: –7.5dB to +4.4dB, EQ.: 0dB to +33dBm (130m) @ 50MHz</td>
</tr>
<tr>
<td><strong>TND+N:</strong></td>
<td>AUDIO: &lt;0.01%</td>
<td>AUDIO: &lt;0.01%</td>
<td>AUDIO: &lt;0.01%</td>
<td>AUDIO: &lt;0.01%</td>
</tr>
<tr>
<td><strong>POWER SOURCE:</strong></td>
<td>12V DC 130mA (TP-121) &lt;br&gt; 12V DC 190mA (TP-122) &lt;br&gt; 12V DC 540mA (TP-121/TP-122 pair when powered from TP-121 via Power Connect) &lt;br&gt; 12V DC 390mA (TP-121/TP-122 pair when powered from TP-122 via Power Connect)</td>
<td>12V DC 130mA (TP-123) &lt;br&gt; 12V DC 200mA (TP-124) &lt;br&gt; 12V DC 550mA (TP-123/TP-124 pair when powered from TP-123 via Power Connect) &lt;br&gt; 12V DC 390mA (TP-123/TP-124 pair when powered from TP-124 via Power Connect)</td>
<td>12V DC 130mA (TP-123) &lt;br&gt; 12V DC 200mA (TP-124) &lt;br&gt; 12V DC 550mA (TP-123/TP-124 pair when powered from TP-123 via Power Connect) &lt;br&gt; 12V DC 390mA (TP-123/TP-124 pair when powered from TP-124 via Power Connect)</td>
<td>12V DC 130mA (TP-123) &lt;br&gt; 12V DC 200mA (TP-124) &lt;br&gt; 12V DC 550mA (TP-123/TP-124 pair when powered from TP-123 via Power Connect) &lt;br&gt; 12V DC 390mA (TP-123/TP-124 pair when powered from TP-124 via Power Connect)</td>
</tr>
<tr>
<td><strong>DIMENSIONS:</strong></td>
<td>12.1cm x 7.18cm x 2.42cm (4.76&quot; x 2.83&quot; x 0.95&quot;) W, D, H</td>
<td>12.1cm x 7.18cm x 2.42cm (4.76&quot; x 2.83&quot; x 0.95&quot;) W, D, H</td>
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</tr>
<tr>
<td><strong>WEIGHT:</strong></td>
<td>0.3kg (0.67lbs) approx.</td>
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<td>0.3kg (0.67lbs) approx.</td>
</tr>
<tr>
<td><strong>ACCESSORIES:</strong></td>
<td>Power supply</td>
<td>Power supply</td>
<td>Power supply</td>
<td>Power supply</td>
</tr>
<tr>
<td><strong>OPTIONS:</strong></td>
<td>19&quot; rack mount</td>
<td>19&quot; rack mount</td>
<td>19&quot; rack mount</td>
<td>19&quot; rack mount</td>
</tr>
</tbody>
</table>

1 For the Transmitter/Receiver pair
LIMITED WARRANTY
Kramer Electronics (hereafter Kramer) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY
Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?
Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED
Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.

2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.

3. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:

   a) Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.

   b) Use the supplied DC power supply to feed power to the machine.

   c) Please use recommended interconnection cables to connect the machine to other components.

   * FCC and CE approved using STP cable (for twisted pair products)
For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found. We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.