HL-2S
HDMI Extender System
with HDBaseT-Lite and ARC

Installation Manual
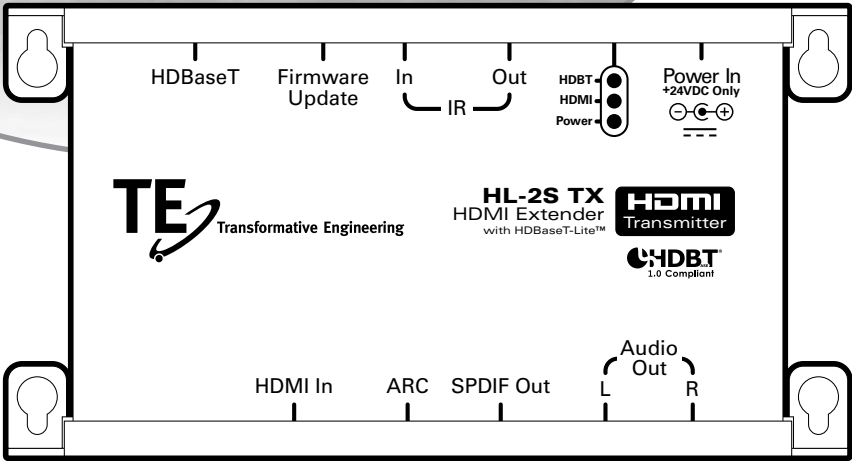
HDBaseT Firmware In   Out   HDBT   Power In
         Update   HDMI   +24VDC Only
                  └ IR ┘   Power

TE⤷ Transformative Engineering   **HL-2S TX**
                                  HDMI Extender **HDMI**
                                  with HDBaseT-Lite™ Transmitter

                                  ⚡HDBT
                                  1.0 Compliant

                                           Audio
                                            Out
         HDMI In   ARC SPDIF Out   L   R

TE⤷ **Transformative Engineering**

Table of Contents

INTRODUCTION

Thank you for purchasing Transformative Engineering's HL-2S HDMI Extender Kit. This product incorporates many advanced technologies to accomplish full-function, 1.4a - 2.0 HDMI compliant extension of the High Definition MultiMedia Interface protocol over one length of Category 5e/6/7 wire. Among these is certified HDBase-T technology, licensed here. This unique conversion of HDMI signals provides for the most reliable, stable and predictable method to transfer all HDMI requirements. More information on this technology may be found at the HDBase-T website, www.hdbaset.org . We are proud to be an early Adopter Member of the Alliance.

Proper connection and attention to limitations of this product will provide secure, reliable, and predictable results. The most important variable to success will depend on wire chosen as the interconnection between our Transmitter and Receiver. All Category wire is not created equal. It is vital that care is taken at all times to avoid kinks, crimps, nicks, and other abuse of the wire and jacket. Also, we highly recommend that all wire be sweep tested before and after installation to insure full bandwidth is not impaired. A sweep-test generator, such as the Fluke CableIQ Qualification Tester, or its equivalent, is suggested. Please be sure to specify Category 5e, or better, cable that meets a minimum of 400MHz bandwidth. Typical high-quality Category 6 cable performs from 550-850 MHz, and Category 7 cable should pass 1GHz or more.

This HDMI Extender will meet our rated specifications using CAT 5e/6/7 UTP cable. It will also perform with STP (shielded twisted pair) cable as well. MOST FAILURES OR INCONSISTENT PERFORMANCE ARE THE RESULT OF INFERIOR WIRE OR IMPROPER TERMINATIONS. The first step in diagnosing problems with this product should center on the connection and choice of the wire used.

Please follow the instructions and diagrams shown in this Manual. Any questions should be directed to your Dealer, Distributor, or to our Technical Department. Our Contact information is:

Transformative Engineering, Inc.
194 Vanderbilt Ave.
Norwood, MA 02062-5000
Telephone: 781-769-6410
Fax: 781-255-0975
Email: info@transformativeengineering.com

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Kit Contents

KIT CONTENTS

(1) HL-2S Transmitter Unit (HL-2STX)

(1) HL-2S Receiving Unit (HL-2SRX)

(1) 24V .75A DC Power Supply

(1) SMA-1 IR Adapter Dongle

(4) Integrated Metal Mounting Tabs

(1) User Manual

Features

FEATURE SET

- HD / UHD4K HDMI Extender
- Full HDCP Security, HDCP2.2 compliant
- Audio Return Channel (ARC)
- Optical Digital Audio Path
- EDID Protocol Integrity
- Bi-Directional IR Pass-Thru with Power for Active Pickup
- 24V Power Supply for Robust Performance
- Single Power Supply at Either the Tx OR Rx unit powers both
- Extruded Aluminum Construction with Flexible Mounting Options
- 2-Channel Analog Audio Derived from TV's ARC or TOSLINK Optical Output

Specifications

SPECIFICATIONS

Input Signal:	HDMI Version 1.0 thru 2.0 IR Signal – Pass Thru (Industry Compatible) IR Powered Pickup – Ring (Ground), Tip (Signal), Sleeve (+12VDC) (see page 8)
Video Formats Supported:	480i/576i/480p/576p/720p/1080i/1080p/ UHD4K-60Hz-4-2-0/UHD4K-30Hz-4-4-4
Audio Formats Supported:	All HDMI Supported Formats, including DTSHD, Dolby-HD, DVD-A, Dolby TrueHD, 8-CH LPCM
Output Signal:	HDMI Version 1.0 thru 2.0 IR Signal – Pass Thru (Xantech Compatible) (See page 8)
Maximum Distance (with CAT6):	70 Meters (230 Feet), @ 1080p 40 Meters (130 Feet), @ UHD4K
Power Supply X1 (supplied):	24 VDC, .75A DC
Dimensions (Each):	5.75"W x 1.1"H x 3.75"D
Weight:	1.0 Lbs (Each)

Transmitter Connections

TRANSMITTER
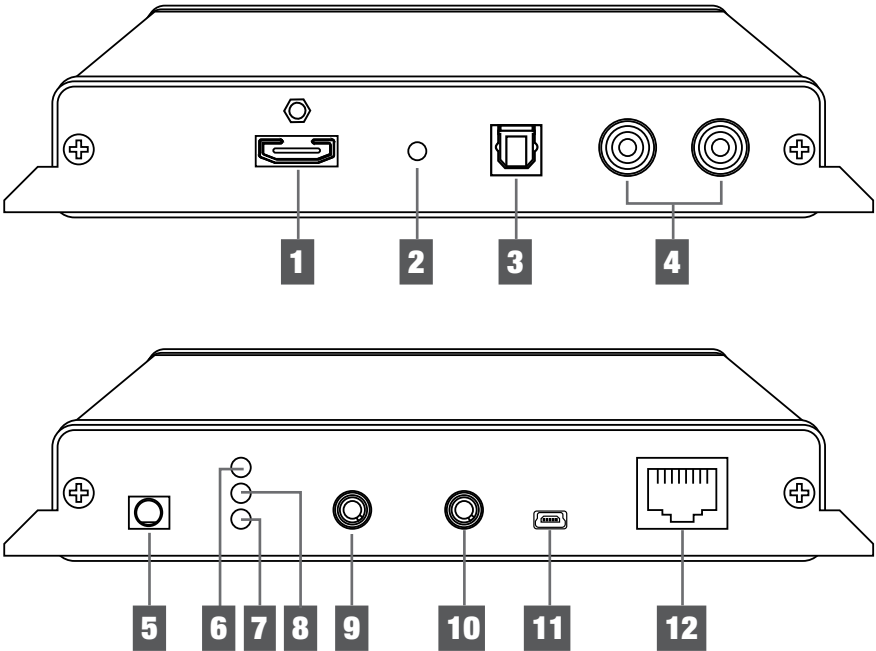
1 HDMI Input		**7** HDCP Indicator	
2 ARC Indicator		**8** HDBaseT Link Indicator	
3 Digital Optical Out (SPDIF)		**9** IRDA Out	
4 Analog Audio Out		**10** IRDA In	
5 Power Input (Choose One)		**11** Mini USB (Firmware Update)	
6 Power Indicator		**12** HDBaseT Link Connection	

Receiver Connections

RECEIVER
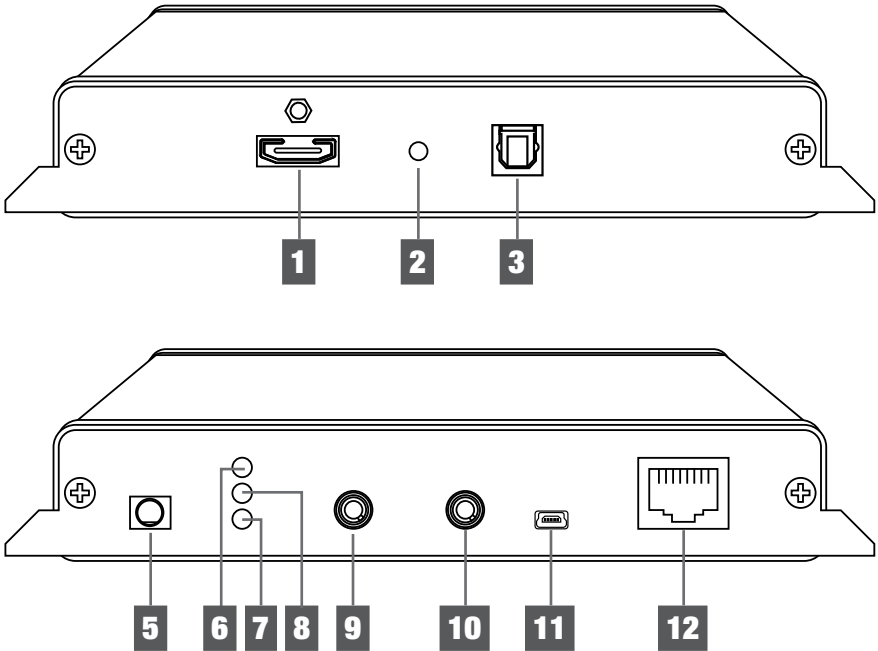
1 HDMI Output	**7** HDCP Indicator
2 ARC Indicator	**8** HDBaseT Link Indicator
3 Digital Optical In (SPDIF)	**9** IRDA Out
5 Power Input (Choose One)	**10** IRDA In
6 Power Indicator	**11** Mini USB (Firmware Update)
	12 HDBaseT Link Connection

TRANSMITTER FUNCTIONS - See pg 7

1 **HDMI Input –** Connect this to your HDMI Source – Cable Box, Disc Player, etc.

2 **ARC Indicator –** This light will illuminate whenever a completed audio signal from ARC or the TOSLINK connection is established.

3 **Digital Optical Out (SPDIF) –** Connect to Optical in of Surround Receiver as an alternative to ARC for improved sound from your SmartTV.

4 **Analog Audio Out –** This is a 2-channel decoded audio source derived from the Audio Return Channel or TOSLINK Digital stream from the TV to an amplifier.

5 **Power Input –** Utilizing the supplied 24V .75A supply, when connected at the Transmitter side, No Power Supply is necessary at the Receiver side.

6 **Power Indicator –** This light indicates that power is being supplied to the unit.Connection of the (included) Power Supply should illuminate this light on both Transmitter and Receiver Units.

7 **HDCP Indicator –** This light shows that a valid HDMI connection has been made, "handshake" has taken place, and there is a High Definition Copy Protect flag in operation. Attempts to copy Digital content will not be allowed. Any connection to a non-compliant Digital copy device will cause this light to go off, and will result in the loss of signal.

8 **HDBaseT Link Indicator –** These lights show that communication has been properly established with the HDBase-T Receiver. No other connections need be made for these lights to indicate your connection is secure. If the "POWER" light is not on, you should check that the power supply is properly connected.

9 **IRDA Out –** Used for connecting to an Infra-Red Emitter for controlling a device at this end. The IR Signal would originate from the Receiver end either from a Powered Pickup or an IR Pass-Thru. (See diagrams on pages 12 and 13)

Recievers Functions

10 **IRDA In –** Used for connecting to a 12V Xantech Compatible Powered Infra-Red Pickup Device via 3-conductor mini-jack, or to IR encoded signal for Pass-Thru to the IRDA OUT at the Receiver end. (See diagram on page 12 and 13 for suggested use)

11 **Mini USB (Firmware Update) –** For Firmware updates (provided if necessary) by Transformative Engineering. DO NOT attempt to connect this port for any other reason. Loss of all operation may result.

12 **HDBase-T Link Connection –** Connect via Category 5e/6/7 cable to the HL-2S Receiver Unit ONLY. DO NOT CONNECT THIS RJ-45 CONNECTOR TO ETHERNET. DAMAGE TO THIS PRODUCT AND YOUR NETWORK MAY RESULT. Recommended minimum length is 5 Meters up to our maximum rated specification of 70 Meters.

12a **Audio Return Channel –** Audio Return Channel (ARC) is incorporated into the HDMI connector and serves to provide a pathway for the audio signal that originates from the Display (TV) source. When utilizing ARC-enabled Smart TVs to "stream" content from internet providers, the audio from that content may be presented back to the head-end and into ARC-enabled Surround Receivers. This is effectively a method for bi-directional use of the HDMI signal path. Only Audio from the ARC-enabled TV may be sent over this method. Please refer to setup instructions on your AV Surround Receiver and Television display for details.

RECEIVER FUNCTIONS - See Page 8

1 **HDMI Output –** Connect this to your Display device – TV, Projector, etc. All video signals input to the HDMI Input on the Transmitter will appear here.

2 **ARC Indicator –** This light will illuminate whenever a completed audio signal from ARC or the TOSLINK connection is established.

3 **Digital Optical In (SPDIF) –** Use the Optical output from a SmartTV as an alternative to ARC for improved sound.

5 **Power Input –** Utilizing the supplied 24V .75A supply, when connected at the Receiver side, No Power Supply is necessary at the Transmitter side.

6 **Power Indicator –** This light indicates that power is being supplied to the unit. Connection of the (included) Power Supply should illuminate this light on both Transmitter and Receiver Units.

7 **HDCP Indicator –** Refer to Item (7) above.

8 **HDBaseT Link Indicator –** Refer to Item (8) above.

9 **IRDA Out –** Used for connecting to an Infra-Red Emitter for controlling a device at this end. The IR Signal would originate from the Transmitter end either from a Powered Pickup or an IR Pass-Thru. (See diagrams on pages 12 and 13)

10 **IRDA In –** Used for connecting to a Powered Infra-Red Pickup Device (Xantech compatible) via 3-conductor mini-jack, or to IR encoded signal for Pass-Thru to the IRDA OUT at the Transmitter end. (See diagrams on pages 12 and 13)

11 **Mini USB (Firmware Update) –** For Firmware updates (provided if necessary) by Transformative Engineering. DO NOT attempt to connect this port for any other reason. Loss of all operation may result.

12 **HDBase-T Link Connection –** Refer to Item (1) above.

TROUBLESHOOTING

As mentioned previously, most malfunctions can be addressed by careful examination of the Category cable terminations and suitability of the UTP cable itself. Once the "Link" lights are on, this system is operating normally. Lack of function should be traced to a failure in HDMI interconnection cables or device settings. If all this has been examined with no resolution of your problem, please contact our Technical Support Department at 781-769-6410 or via email at: info@transformativeengineering.com.

IR Connection Diagrams

IR Pass Thru IR Connection Diagram

UTP Cable

HDBaseT   Firmware   In   Out   HDBT
          Update   IR   HDMI   Power In
                                     Power +24VDC Only

TE Transformative Engineering   **HL-2S TX**
                                      HDMI Extender   HDMI
                                      with HDBaseT-Lite™ Transmitter
                                                       HDBT
                                                       1.0 Compliant

(Any) Pickup

IR Signal

                                              Audio Out
HDMI In   ARC   SPDIF Out   L   R

Connecting Block

SMA-1 Adapter

Power Supply for P/U

HDBaseT   Firmware   In   Out   HDBT
          Update   IR   HDMI   Power In
                                     Power +24VDC Only

TE Transformative Engineering   **HL-2S RX**
                                      HDMI Extender   HDMI
                                      with HDBaseT-Lite™ Transmitter
                                                       HDBT
                                                       1.0 Compliant

IR flasher (emitter)

HDMI Out   ARC   SPDIF In

IR Connection Diagrams

Powered Pickup IR Connection Diagram

IR Signal

Xantech-Compatible Pickup

HDBaseT   Firmware   In   Out   HDBT   Power In
            Update   IR   HDMI   +24VDC Only
                                Power

TE *Transformative Engineering*   **HL-2S TX**
HDMI Extender
with HDBaseT-Lite™   HDMI Transmitter
                     HDBT 1.0 Compliant

HDMI In   ARC   SPDIF Out   L   Audio Out   R

UTP Cable

HDBaseT   Firmware   In   Out   HDBT   Power In
            Update   IR   HDMI   +24VDC Only
                                Power

TE *Transformative Engineering*   **HL-2S RX**
HDMI Extender
with HDBaseT-Lite™   HDMI Transmitter
                     HDBT 1.0 Compliant

IR flasher (emitter)

HDMI Out   ARC   SPDIF In

Warranty

WARRANTY

Transformative Engineering, Inc. guarantees this product for Two Years from your original purchase. We guarantee performance and operation to published specifications including all parts and labor. We do not warranty against mis-use or abuse. To obtain warranty service, please contact our Technical Support Department at 781-769-6410 or via email at: info@transformativeengineering.com.
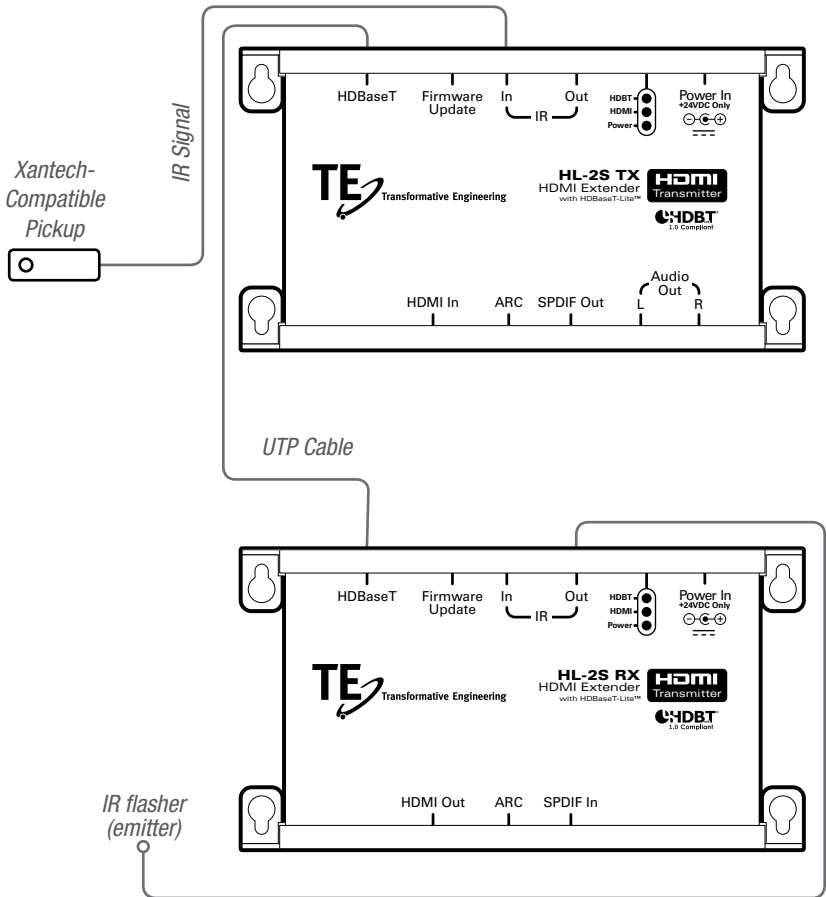
TE⟳ Transformative Engineering

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