# KD-X200ProK

HDBaseT/HDMI via Single CAT5e/6 (Tx+Rx Set) Extenders, with EDID Control, Hot Plug Control, Full Buffer System, IR Sensor, Up/Down IR or RS-232, support Ultra HD/4K & HDCP2.2

KD-X200POHK

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Operating Instructions
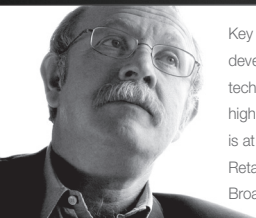
Key Digital®, led by digital video pioneer Mike Tsinberg, develops and manufactures high quality, cutting-edge technology solutions for virtually all applications where high-end video and control are important. Key Digital® is at the forefront of the video industry for Home Theater Retailers, Custom Installers, System Integrators, Broadcasters, Manufacturers, and Consumers.

Key digital®

The Experts in Digital Video Technology and Solutions™

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About KD-X200ProK/KD-X200POHK

KD-X200ProK/KD-X200POHK HDBaseT/HDMI (Tx & Rx) Extenders are an HDCP 2.2 compliant product that extend 4K/UHD 24/25/30 (4:4:4) and 4K/UHD 60 (4:2:0) signals up to 150 ft. using Key Digital® KD-CAT6STP1X Super CAT6A Shielded cable, or up to 125 ft. using a single third-party CAT5e/6 cable. 1080p/60, 1920x1200, 3D signals are extended up to 250 ft. via single Key Digital® KD-CAT6STP1X Super CAT6A shielded cable, or up to 230 ft. using a single third-party CAT5e/6 cable. In addition to HDMI video and audio signals, KD-X200ProK/POHK carries IR or RS-232 for controlling remotely located equipment or the RS-232 port can be used to control the KD-X200ProK/POHK.

Key Features

→ **HDBaseT via Single CAT5e/6 UTP/STP Extension:** With fully automatic adjustment of feedback, equalization, and amplification depending on cabling length

→ **KD-X200POHK:** Features power extension from Tx to Rx with Power Over HDBaseT, Rx unit does not require power supply

→ **Signal Extension:**
  » Up to 150 ft. @ 4K 24/25/30(4:4:4)/60(4:2:0) using KD-CAT6STP1X cabling
  » Up to 125 ft. @ 4K 24/25/30(4:4:4)/60(4:2:0) using third-party CAT5e/6 UTP/STP cabling
  » Up to 250 ft. @ 1080p / 1920x1200 using KD-CAT6STP1X cabling
  » Up to 230 ft. @ 1080p / 1920x1200 using third-party CAT5e/6 UTP/STP cabling

→ **4K/Ultra HD Resolution:** Support for 4096x2160 or 3840x2160 24/25/30Hz at 4:4:4/8 Bit or 60Hz at 4:2:0/8 Bit

→ **HDMI® and HDCP Licensing:** Fully licensed and compatible with HDCP 2.2 and HDMI latest technology such as 4K/UHD 4:2:0/8bit at 60f/s

→ **EDID Control:** Internal library features 15 default EDID configurations and native EDID data from Output/Display devices connected via Rx

→ **Hot Plug Detection Control:** Enables integrator to choose if active signal voltage is forced to connected input devices

→ **Full Buffer System™:** Manages TMDS re-clocking / signal re-generation, HDCP authentication with source & display, EDID Control handshake, and Hot Plug control

→ **IR Sensor:** Sensor powering via +5V on Rx unit's IR In port collects line-of-sight IR from remote(s) without external IR connecting block

→ **Up/Down IR:** Two channels of IR enable control to/from devices connected to Tx and Rx units

→ **RS-232:** Bi-Directional control to/from Tx and Rx unit on 3.5mm connector

→ **Rotary Switch RS-232 Control Mode:** Provides control of Tx unit as well as connectivity status

→ **3D:** Support for standard 3D stereoscopic signal formats

→ **Deep Color Support:** 12bit Deep Color video / 8bit color for 4K/UHD

→ **Lossless compressed digital audio:** Support for Dolby® TrueHD, Dolby® Digital Plus and DTS-HD Master Audio™

→ **CEC Support:** For inter-device control between main input and output HDMI channel

→ **I2C Communication:** EDID and HDCP authentication to Display and Source

→ **Control System Support:** Compatible with Compass Control®, AMX®, Control4®, Crestron®, RTI®, Savant, URC®, Leviton® etc.

KD-X200ProK Accessories

→ (2) 5V 2A DC Power Supplies (Screw-In Type), (2) Mounting Brackets, (1) IR Emitter, (1) IR Sensor

→ **KD-X200ProK requires power on both Tx and Rx units**

KD-X200POHK Accessories

→ (1) 12V 2A DC Power Supply (Screw-In Type), (2) Mounting Brackets, (1) IR Emitter, (1) IR Sensor

→ **KD-X200POHK only requires power on the Tx unit, which extends power to the Rx unit**

Quick Setup Guide

Step 1: Find a safe and convenient location to mount or place your KD-X200ProK/KD-X200POHK units

Step 2: Begin with the KD-X200ProK/KD-X200POHK Tx/Rx units and all input/output devices turned off with power cables removed

Step 3: Connect your HDMI source to the input port of your KD-X200ProK/KD-X200POHK Tx unit

Step 4: Connect your HDMI displays to the output port of your KD-X200ProK/KD-X200POHK Rx unit

Step 5: Connect KD-X200ProK/KD-X200POHK Tx unit to KD-X200ProK/KD-X200POHK Tx with CAT5e/6 cable

Step 6: Connect additional IR/RS-232 control connections and IR sensors

Step 7: <u>BEFORE connecting power supply to power outlet,</u> screw-in the power supply to the KD-X200ProK/KD-X200POHK Tx units and KD-X200ProK Rx unit

Step 8: <u>AFTER all connections are made,</u> plug-in power supplies to power outlets

Step 9: Power on input/output devices

Installation and Operation

Before permanently securing the unit for final installation, test for proper operation of the unit and cables in your system. It is recommended that you leave enough ventilation space to provide sufficient airflow and cooling.

⚠ You MUST use the Power Supply provided with your unit or you VOID the Key Digital® Warranty and risk damage to your unit and associated equipment.

Application Examples
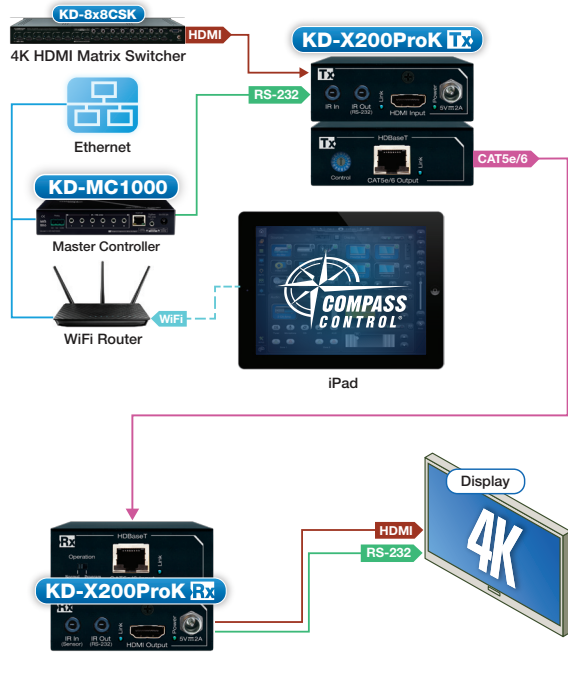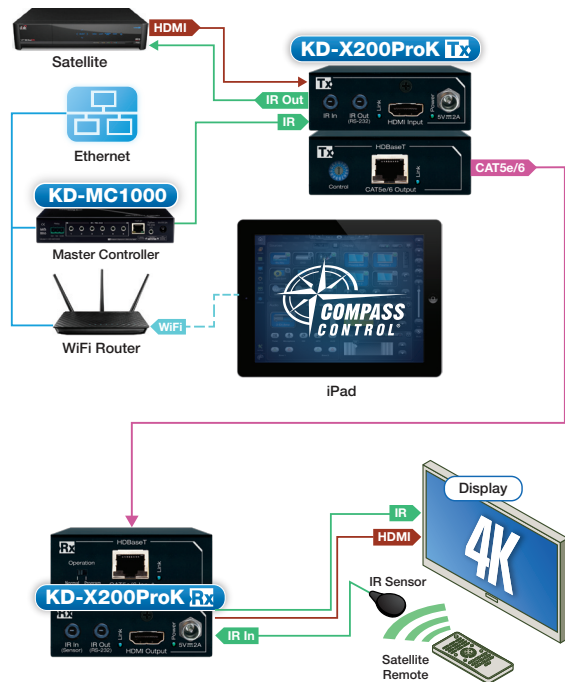
Connections

Before making any connections, power off your source and display devices.

Tx Unit:

→ Using a short HDMI cable, connect your source device to the HDMI port labeled "HDMI Input". To connect DVI or Display Port, use appropriate adapters.

→ Connect the CAT6 STP cable that connects to the Rx Unit at the port labeled "CAT5e/6 Output".

→ Make IR In and Out connections to receive (IR In port) or send (IR Out port) control signals. Refer to the "Extending IR & RS-232 Control" for more information.

→ Connect a 3.5mm Stereo cable for bi-directional RS-232 control. Refer to the "Extending IR or RS-232 Control" and the "RS-232 Commands" section for more information.

Rx Unit:

→ Using a short HDMI cable, connect your output / display device to the HDMI port labeled "HDMI Output".

→ Connect the CAT5e/6 cable at the port labeled "CAT5e/6 Input".
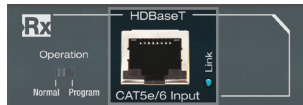
→ If you are sending or receiving IR, connect included IR Sensor and/or IR Emitter
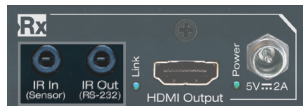
→ If you are transmitting or receiving RS-232, connect to the IR out (RS-232) port

→ After all the connections are made, connect power to the Tx and Rx (KD-X200ProK only) using the included power supplies and then power up your source and display equipment.

Extending IR or RS-232 Control

RS-232:

Bi-directional RS-232 is achieved utilizing the IR Out (RS-232) port on the Tx and Rx units. The connector is 3.5mm stereo and the pinout is the same on the Tx and Rx unit. **RS-232 can not be used at the same time as IR.**

→ RS-232 Pass-through Mode

» Send and receive (bi-directional) RS-232 commands for controlling remote equipment.

→ Control Mode

» Provides control of Tx units as well as connectivity status

» See RS-232 Commands section for more information

→ Firmware Upgrade Mode

» Two different types of firmware may be updated: MCU (KD-X200ProK/KD-X200POHK units), and HDBaseT (extension over CAT5e/6)

Rotary Control Switch

RS-232 Cabling

3.5mm stereo to RS-232 adapter cables are available through Key Digital and other wire suppliers, and can also be fabricated by skilled technicians.

3.5mm stereo to Female DB9 connector (not included).
Key Digital part KD-3.5FDB96.
Typically used to connect to the COM port of the computer or master controller.

3.5mm stereo to Male DB9 connector (not included).
Key Digital part KD-3.5MDB96.
Typically used to connect to the controlled device.

RS-232 Mode	Tip	Ring	Sleeve	Control Rotary
Pass-through	Tx	Rx	Ground	0-7
Control Mode	Tx	Rx	Ground	8, 9
F/W MCU	Tx	Rx	Ground	A, B
F/W HDBaseT	Tx	Rx	Ground	C, D, E, F

IR

Bi-directional IR control extension is supported. **IR can not be used at the same time as RS-232.**

» "IR In" port on the Tx unit extends to the "IR Out" port of the Rx unit
» "IR In" port on the Rx unit extends to the "IR Out" port of the Tx unit

→ **IR In:** The IR In port is different for the Tx and Rx units. The Tx unit's IR In port supports a Serial IR (hardwired) connection. The Rx unit's IR In port supports an IR Sensor.

» **Tx Unit / Serial IR:**
  » A fixed 5V input signal with a 3.5mm mini jack
  » IR signal on the tip. Mono or stereo 3.5mm mini jacks are supported, with the ring open / having no contact.
  » Typically fed from a dedicated control system or an IR distribution block

» **Rx Unit / IR Sensor:**
  » IR Sensors can be connected directly into the Rx unit's IR In port, without the need for an external IR distribution block
  » IR signal on the Tip, with 5V powering of the IR sensor on the Ring.

IR In	Tip	Ring	Sleeve	Typical 3.5mm Connector-type
Serial IR (Tx)	IR In	N/C	Ground	Mono
IR Sensor (Rx)	IR In	5V	Ground	Stereo

→ **IR Out**:
  » Pass-through from signal of corresponding IR In port or bi-directional RS-232, as determined by the position of the Control Rotary
  » Driving power: 5V with 32mA minimum current
  » Typically connected with an IR emitter

IR Out	Tip	Ring	Sleeve	Control Rotary Position
Serial IR	IR Out	N/C	Ground	Any

IR Cabling

Your KD-X200ProK includes an IR Sensor and an IR Emitter.

Signal acceptance: The IR Sensor receives signals from a 90° angle at up to 30 ft. away. It accepts a maximum IR burst frequency of 55kHz.

Only the included IR sensors are compatible with the KD-X200ProK/ KD-X200POHK. Third-party IR Sensors may not work with KD-X200ProK/ KD-X200POHK.

The included IR Sensor.
*The 3.5mm connector is **stereo** and it connects to the **IR In** port of the Rx unit.*

The included blinking-type IR Emitter.
*The 3.5mm connector is **mono** and it connects to the **IR Out** port of the Tx or Rx unit.*

The sleeve of the 3.5mm Male connector must have good physical contact with 3.5 mm Female input/output on the KD-X200ProK.

Some 3.5mm Male plugs feature a plastic sleeve that extends longer than an average sleeve. This may cause poor grounding contact. See the example on the left.

Settings

EDID Control

EDID authentication is provided from the KD-X200ProK/ KD-X200POHK Tx unit to the connected input / source device. The EDID file (AKA "handshake") is selected using the EDID Control rotary on the Tx unit and provides a list of compatible video and audio formats as well as digital data, informing the source device what it should output. Most sources will comply with a new EDID file without a power-cycle, but each source may behave differently.

Default EDID Control Table, selected via RS-232

01	1080i, 2CH AUDIO	10	4Kx2K@60, 2CH AUDIO
02	1080i, DOLBY/DTS 5.1	11	4Kx2K@60, DOLBY/DTS 5.1
03	1080i, HD AUDIO	12	4Kx2K@60, HD AUDIO
04	1080p, 2CH AUDIO	13	1280x720p@60 DVI (no audio)
05	1080p, DOLBY/DTS 5.1	14	1920x1080p@60 DVI (no audio)
06	1080p, HD AUDIO		
07	4Kx2K@30, 2CH AUDIO		
08	4Kx2K@30, DOLBY/DTS 5.1		
09	4Kx2K@30, HD AUDIO		

Control Rotary

The Control rotary enables the integrator to choose the desired setting for IR Out (RS-232) ports, RS-232 Mode, Hot Plug Detection Control, and EDID Mode.

The Control Rotary is located on the Tx unit.

IMPORTANT! Please apply light pressure to the Control rotary when making your selection

Control Rotary Position Assignments:

Position	IR Out (RS-232) Mode	Hot Plug Detection Control	EDDI Control
0	Serial IR	Bypass	Copy
1	Serial IR	Bypass	Default
2	Serial IR	Forced HPD On	Copy
3	Serial IR	Forced HPD On	Default
4	RS-232 Pass-Through	Bypass	Copy
5	RS-232 Pass-Through	Bypass	Default
6	RS-232 Pass-Through	Forced HPD On	Copy
7	RS-232 Pass-Through	Forced HPD On	Default
8	RS-232 Control	Bypass	Copy
9	RS-232 Control	Bypass	Default
A	Firmware Upgrade for MCU	Forced HPD On	Copy
B	Firmware Upgrade for MCU	Forced HPD On	Default
C	Firmware Upgrade for HDBaseT	Bypass	Copy
D	Firmware Upgrade for HDBaseT	Bypass	Default
E	Firmware Upgrade for HDBaseT	Forced HPD On	Copy
F	Firmware Upgrade for HDBaseT	Forced HPD On	Default

Forced Hot Plug Detection (HPD)

Hot Plug Detection (HPD) may be forced on the Tx Rx unit in order to provide connected devices with necessary voltage to inform the device that a partner (display) is connected and active. If the Control rotary is set to any HPD Bypass setting, HPD signals from the output to the input device will pass as normal. In cases of many layers of connectivity, HPD may be lost leading to no signal at the display. In those cases, fix the Control rotary to any Forced HPD setting.

Range and Resolution:

Distance performance is significantly increased when using Key Digital KD-CAT6STP1X Super CAT6/STP Cabling.

→ Up to 150 ft. @ 4K 24/25/30(4:4:4)/60(4:2:0) using KD-CAT6STP1X cabling
→ Up to 125 ft. @ 4K 24/25/30(4:4:4)/60(4:2:0) using third-party CAT5e/6 UTP/STP cabling
→ Up to 250 ft. @ 1080p / 1920x1200 using KD-CAT6STP1X cabling
→ Up to 200 ft. @ 1080p / 1920x1200 using third-party CAT5e/6 UTP/STP cabling

NOTE: Use shielded metal RJ45 connectors with soldered ground wires when terminating shielded CAT5e/6. Key Digital part: KD-RJ45SC (compatible with KD-CAT6STP1X and other third-party CAT6/STP)

LED Indicator Lights

Power:

- » **Color:** Green
- » Solid illumination during power on state, as provided by healthy connection with power supply.
- » Steady blink if power is not adequate and/or if there is a connectivity problem with the KD-X200POH Rx unit

HDMI Active (HDMI Input/Output):

- » **Color:** Blue
- » Tx Unit: Solid illumination from active signal (HDMI TMDS) reception from connected source device
- » Rx Unit: Solid illumination from active Hot Plug Detection voltage with connected display/output device
- » If Hot Plug Detection is forced to input device from Tx unit, the HDMI Active light will illuminate solid regardless of HDMI signal from connected device.

CAT5e/6 Input/Output:

- » **Color:** Blue
- » Tx Unit: Solid illumination from active link and Hot Plug Detection voltage from Rx unit
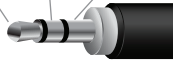- » Rx Unit: Solid illumination from active link with Tx unit

RS-232 Commands

Connection protocol is as follows:
→ Baud Rate = 57600 bits per second
→ Data Bits = 8
→ Stop Bits = 1
→ Parity = None
→ Flow Control = None
→ Carriage Return: Required
→ Line Feed: Required

RS-232 Pinout:

Tip	Ring	Sleeve
Tx	Rx	Ground

Commands are not case-sensitive. Spaces shown below may be excluded. Carriage return and line feed is required at the end of each string.

Commands:

```
KD-X200ProK> H
--------------------------------------------------------------------
--                 Key Digital Systems  HELP                      --
--------------------------------------------------------------------
-- Azz   : All Commands may have Prefix System Address zz=[01-99]  --
-- H     : Help                                                    --
-- STA   : Global Status                                           --
-- SPCA xx : Set System Address, xx = [00-99] (00=Single)          --
--                                                                 --
-- Video I/O Setup Commands:                                       --
-- SPO DBG ON/OFF : Set Output DGB ON/OFF                          --
-- SPO ON/OFF     : Set CAT5e/6 Output ON/OFF                      --
--                                                                 --
-- SPC EDID xx    : Set Default EDID to xx, z=[01-14]              --
-- SPC RSB z      : Set RS232 Baud Rate to z bps, z=[0-4]          --
--                  [0:57600, 1:38400, 2:19200, 3:9600, 4:4800]   --|
--------------------------------------------------------------------
```

Status:

```
KD-X200ProK> STA
--------------------------------------------------------------------
--                 Key Digital Systems  STATUS                    --
--------------------------------------------------------------------
-- KD-X200ProK     System Address : 00      F/W Version : 1.00    --
-- RS232 : Baud Rate=57600bps, Data=8bit, Parity=None, Stop=1bit  --
-- Running Day : 000, Time : 00:05                                --
-- HD-BaseT Mode : Normal    , Link = ON                          --
--                                                                 --
-- Video Input Status                                             --
-- EDID = 04, PWR5V = ON , Link = ON , HDCP = 1.x, Video = HDMI   --
--                                                                 --
-- CAT5e/6 video Output Status                                    --
-- DISP = SAM 2014, HPD = ON , HDCP = 1.x, DDC = GOOD, OUT = ON , HDMI --
--------------------------------------------------------------------
```

Specifications

Technical:

→ Inputs Tx (Each): 1 HDMI, 1 IR In
→ Outputs Tx (Each): 1 CAT5e/6 UTP/STP, 1 IR Out /RS-232 Bi-Directional
→ Inputs Rx (Each): 1 CAT5e/6 UTP/STP, 1 IR In
→ Outputs Rx (Each): 1 HDMI, 1 IR Out /RS-232 Bi-Directional
→ DDC Signal (Data): Input DDC Signal: 5 Volts p-p (TTL)
→ HDMI Video/Audio Signal: Input Video Signal: 1.2 Volts p-p
→ HDMI Connector: Type A, 19 Pin Female
→ RJ45 Connector: Shielded Link Connector, HDBaseT
→ IR In Connector: 3.5 mm stereo mini jack
→ IR Out (RS-232) Connector: 3.5 mm stereo mini jack

General

→ Regulation: CE, RoHS, WEEE
→ Enclosure: Black Metal
→ Product (Each): 4.125" x 2.625" x 0.875", Weight: 0.5 lbs
→ KD-X200ProK Power: (2) KD-PS5V2ASC, 5V/2A, 100-240VAC, 50-60Hz, Interchangeable head with screw-in connector
→ KD-X200POHK Power (Tx Only): KD-PS12V2ASC, 12V/2A, 100-240VAC, 50-60Hz, Interchangeable head with screw-in connector
→ Accessories: (2) Mounting Brackets, (1) IR Emitter, (1) IR Sensor

⚠️ Important Product Warnings:

1. Connect all cables before providing power to the unit.
2. Test for proper operation before securing unit behind walls or in hard to access spaces.
3. If installing the unit into wall or mounting bracket into sheet-rock, provide proper screw support with bolts or sheet-rock anchors.

⚠️ Safety Instructions:

Please be sure to follow these instructions for safe operation of your unit.

1. Read and follow all instructions.
2. Heed all warnings.
3. Do not use this device near water.
4. Clean only with dry cloth.
5. Install in accordance with the manufacturer's instructions.
6. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
7. Only use attachments/accessories specified by the manufacturer.
8. Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way including:
   » Damage to the power supply or power plug
   » Exposure to rain or moisture

⚠️ Power Supply Use:

You MUST use the Power Supply provided with your unit or you VOID the Key Digital® Warranty and risk damage to your unit and associated equipment.

How to Contact Key Digital®

System Design Group (SDG)

For system design questions please contact us at:
→ Phone: 914-667-9700
→ E-mail: sdg@keydigital.com

Customer Support

For customer support questions please contact us at:
→ Phone: 914-667-9700
→ E-mail: customersupport@keydigital.com

Technical Support

For technical questions about using Key Digital® products, please contact us at:
→ Phone: 914-667-9700
→ E-mail: tech@keydigital.com

Repairs and Warranty Service

Should your product require warranty service or repair, please obtain a Key Digital® Return Material Authorization (RMA) number by contacting us at:
→ Phone: 914-667-9700
→ E-mail: rma@keydigital.com

Feedback

Please email any comments/questions about the manual to:
→ E-mail: customersupport@keydigital.com

Warranty Information

All Key Digital® products are built to high manufacturing standards and should provide years of trouble-free operation. They are backed by a Key Digital Limited 10 Year Product Warranty Policy. http://www.keydigital.com/warranty.htm