

HDBaseT EXTENDER  
B-540-EXT-230-RS

**BINARY**

## INSTALLATION MANUAL



## IMPORTANT SAFETY INSTRUCTIONS

To reduce the risk of fire or electric shock, read and follow all instructions and warnings in this manual. Keep this manual for future reference.

1. Do not expose this apparatus to rain or moisture. Do not expose this equipment to dripping or splashing, and ensure that no objects filled with liquids, such as vases, are placed on the equipment. Do not use this apparatus near water.
2. Do not remove cover. No user serviceable parts inside.
3. Clean only with a dry cloth.
4. Do not block any ventilation openings. Install according to manufacturer's instructions.
5. Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus (including amplifiers) that produce heat.
6. Do not override the safety purpose of the polarized or grounding plug. A polarized plug has two blades, one of which is wider than the other. A grounding plug has two matching blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
7. Protect the power cord from being walked on or pinched, particularly at the plug end and where the power cord is attached to the apparatus.
8. Only use attachments and accessories specified by the manufacturer.
9. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power supply cord or plug is damaged, liquid has been spilled on or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, the apparatus does not operate normally, or it has been dropped.
10. To completely disconnect this equipment from power, disconnect the power supply cord from the power outlet.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



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## 1. PRODUCT OVERVIEW

Welcome to Binary. This product is engineered to provide years of exceptional reliability. We appreciate your business, and we stand committed to providing our customers with the highest degree of quality and service in the industry.

This device extends HDMI over a single category cable using HDBaseT technology allowing video and audio transmission to remote displays. In addition, the device is equipped with bidirectional IR and RS-232 over the same category cable.

This unit supports all HDMI defined audio and video formats, including 4K2K@30 Hz, and is compatible with HDMI 2.0 and HDCP 2.2 products. The Power over Cable (PoC) feature enables the extender to be powered from either end.

## 2. FEATURES

- Extends all HDMI formats up to:

Cable Type	Cat 5e/6	Cat 6a/7
1080i/720p 24-bit color	200'	230'
Full HD 1080p 24-bit color	200'	230'
Full HD 1080p 36-bit color	200'	230'
Ultra HD 4K2K@30 Hz	115'	130'

\*Compatible with HDMI 2.0 and HDCP 2.2

- Supports all HDMI supported audio formats, including DTS-HD Master and Dolby TrueHD
- Bidirectional IR and RS-232
- PoC capable - can be powered from either the transmitter or receiver

## 3. PACKAGE CONTENTS

- 1x B-540-EXT-230-RS Transmitter
- 1x B-540-EXT-230-RS Receiver
- 1x 24V DC, 1A Power Supply
- 4x Mounting Ears
- 4x Mounting Screws
- 8x Rubber Feet
- 1x Installation Manual
- 1x Power Supply Label
- 2x HDBaseT Labels
- 1x IR Adapter Cable

## 4. DEVICE LAYOUT

### 4.1. B-540-EXT-230-RS Transmitter

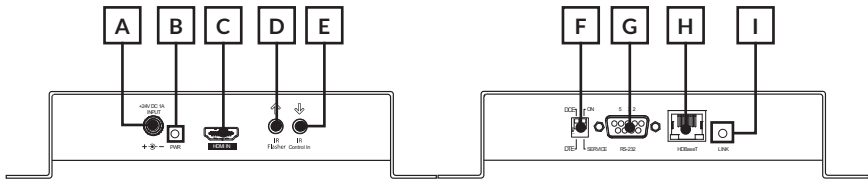


FIGURE 1: Transmitter Layout

#### A. Thread-locking Power Connector

Connect the included 24VDC,1A power supply

#### B. Power LED

Lights blue when the unit has power

#### C. HDMI IN

HDMI Input for connection to a source HDMI output

#### D. IR Flasher Out

IR output for connection to IR Flasher

#### E. IR Control In

Connect to the IR output of a control system or IR connecting block to send IR signals to the remote location. Does not supply power.

#### F. DIP Switches

##### DCE/DTE

Select for DTE or DCE mode serial (RS232) communication via DB-9

##### SERVICE /ON (RS-232)

Select SERVICE for firmware operation, or ON for passthrough (normal) operation

#### G. RS-232

Connect to communicate RS-232 commands when connected to a control system

#### H. HDBaseT (RJ45 )

Connect to the HDBaseT RJ45 port on receiver

#### I. Link LED

Lights green when synced with receiver

## 4.2. B-540-EXT-230-RS Receiver

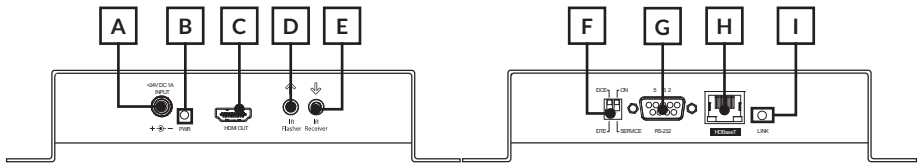


FIGURE 2: Receiver Layout

### A. Thread-locking Power Connector

Connect to the included 24VDC,1A power Supply

### B. Power LED

Lights up blue when the unit has power

### C. HDMI Out

HDMI Output to connect to the HDMI input of a sink(display)

### D. IR Flasher

IR output to connect to IR Flasher

### E. IR Receiver

IR input to connect to IR Receiver or to output of a control system

### F. DIP Switches

#### DCE/DTE

Select for DTE or DCE mode serial (RS232) communication via DB-9

#### ON/SERVICE

ON for Pass-Through (normal operation)/Service for Firmware update

### G. RS-232

Connect to communicate RS-232 commands when connected to a control system

### H. HDBaseT (RJ45 )

Connect to the HDBaseT RJ45 port on receiver

### I. Link LED

Lights green when synced with receiver

## 5. INSTALLATION

**⚠CAUTION:** Do not connect power to the device until all other connections are made and the unit is installed.

### 5.1. B-540-EXT-230-RS Transmitter Installation

1. Run category cable from the location of the transmitter to the remote location of the receiver.
2. Mount the device transmitter in the desired location.
3. Connect the HDMI Out of a source component using an HDMI cable.
4. Connect the RS-232 DB-9 from a control system if being used.
5. Connect an IR control system to the IR receiver and/or IR flasher if being used. Refer to Section 6.2.
6. Connect the category cable to the device transmitter.
7. Connect the 24V DC, 1A power supply to the thread-locking power connector unless PoC is being used to send power from the receiver. DO NOT plug the power supply into an AC outlet until Receiver Installation is completed.

### 5.2. B-540-EXT-230-RS Receiver Installation

1. Run category cable from the location of the transmitter to the remote location of the receiver.
2. Mount the device receiver in the desired location.
3. Connect the category cable to the device receiver.
4. Connect an IR flasher and/or IR receiver if being used. Refer to Section 6.2.
5. Connect an HDMI cable from the HDMI Out of device receiver to the display.
6. Connect the RS-232 DB9 to an RS-232 controllable source if being used.
7. Connect the 24V DC, 1A power supply to the thread-locking power connector, unless PoC is being used to send power from the transmitter.
8. Connect the power supply to the AC outlet.

## 6. APPLICATIONS

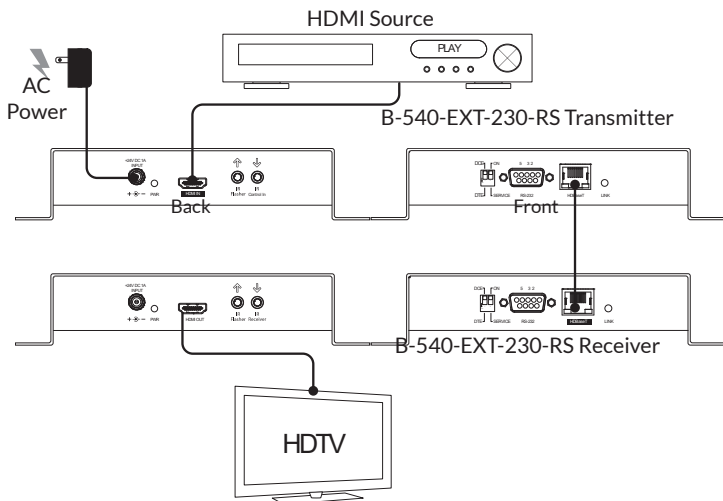


FIGURE 3: Application Diagram

**Note:** When a power supply is connected to either the transmitter or receiver, the HDBaseT link sends power to the other unit. Only one unit requires a power supply to be connected.

### 6.1. HDBaseT Link (RJ45) Connection

This device is specified to operate with category cables for communication between the transmitter and receiver. The transmission path may include a maximum of two keystones and two patch cables, as long as the total length does not exceed 200' for Cat 5e/6 and 230' for Cat 6a/7.

TIA/EIA Standard 568-B (Gold Pins Facing Up)

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



FIGURE 4: RJ45 Connections

**Note:** The HDBaseT Link RJ45 connection includes a 24V signal. Do not connect anything to this port other than an HDBaseT transmitter or receiver.



## 6.2. IR Control Connections

Bidirectional IR signals can be transmitted between transmitter and receiver through category cable. The IR signal can be generated either from a powered receiver or from a control system. The following section describes these two use cases.

**⚠CAUTION:** Pinout configurations for IR receivers and control systems vary. Before connecting to this input, review this section carefully in order to match the pinouts for the device.

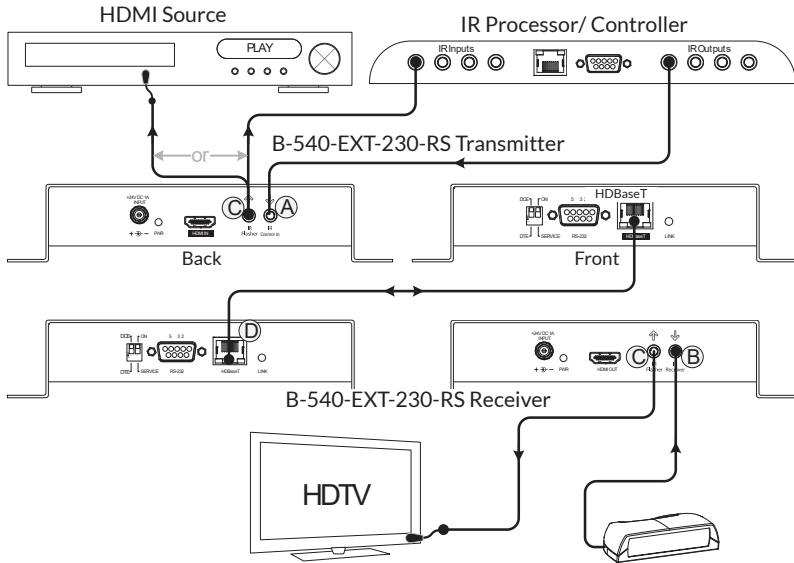


FIGURE 5: IR Connections

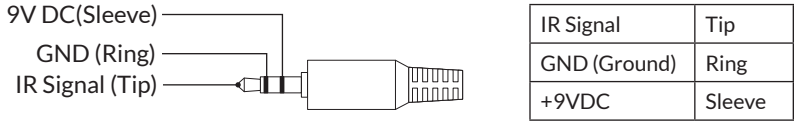
**Note:** Arrow direction indicates signal flow.

- Ⓐ IR Control In-3.5 mm Mono—See Section 6.2.2
- Ⓑ IR Receiver In-3.5 mm Stereo—See Section 6.2.1
- Ⓒ IR Flasher Out-3.5 mm Mono—See Section 6.2.3
- Ⓓ HDBaseT Link category cable (RJ45)—See Section 6.1

### 6.2.1. Point-to-Point IR Receiver - Stereo (3.5mm) Receiver Only

The IR Receiver port is used to send an IR signal from a +9V DC powered IR Receiver to an IR Flasher connected to the Transmitter. Use a 3.5mm {1/8"} Stereo Cable to connect directly to an IR Receiver.

**⚠CAUTION:** DO NOT connect a mono cable to this connection as damage may occur.



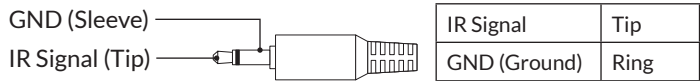
**Pinout Configuration**

FIGURE 6: Point-to-Point IR settings

Use the included IR adapter cable between the control system output and the IR receiver input if the system requires a control system connection to send IR to the Transmitter.

### 6.2.2. IR Control In Mono (3.5mm) - Transmitter Only

The IR Control IN port is used to send a wired IR signal from an IR Output of the control system. This connection does not include power for an IR Receiver. Use a 3.5mm {1/8"} mono cable to connect directly to the control system IR output.

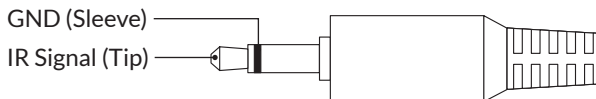


**Pinout Configuration**

FIGURE 7 : Control System IR settings

Use a powered IR block between the IR receiver and the IR control IN port on the Transmitter if the system requires a powered IR Receiver at the Transmitter.

### 6.2.3. IR Flasher Out-3.5mm Mono - Transmitter and Receiver

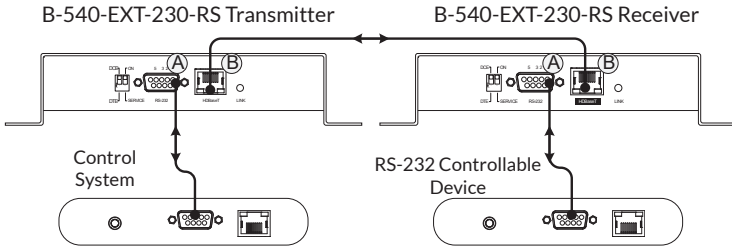


**Pinout Configuration**

FIGURE 8: IR Flasher Out

### 6.3. RS-232 Control Connections

Bidirectional RS-232 signals are transmitted between the device transmitter and receiver over the category cable. The transmitter may be connected to a control system, and the receiver may be connected to an RS-232 controllable device.



- Ⓐ RS-232 Control (DB-9)- See Section 6.3.1
- Ⓑ HDBaseT Link category - See Section 6.1

FIGURE 9: RS-232 Connections

#### 6.3.1. RS-232 Control (DB-9) Connection

Bidirectional RS-232 signals are transmitted between the B-540-EXT-230-RS Transmitter and Receiver over the Cat 5e/6 cable. The transmitter may be connected to a control system controller and the Receiver connected to an RS-232 controllable device.

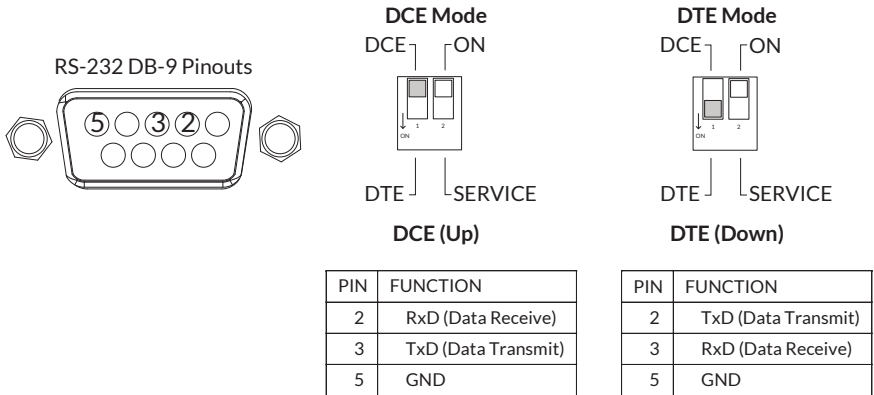
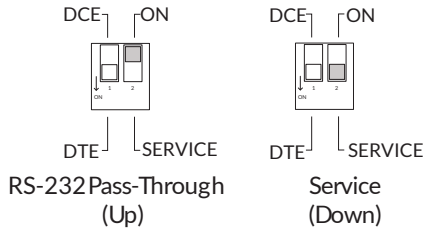


FIGURE 10: RS-232 Modes and Connections

### 6.3.1.1. RS-232 Operation Mode

The RS232 connection is used for performing Firmware updates in addition to sending RS232 signals. Switch 2 is used to set the RS232 Mode.

Note: Switch 2 must set to ON (Up) during normal RS232 Pass-Through operation.



### 6.3.1.2. Firmware Update Operation

As new source and display devices become available, it may be necessary to modify the firmware in the B-540-EXT-230-RS. To perform firmware updates, the dipswitches must be set to DTE (Down) and Service. Detailed instructions and updated firmware will be posted to [www.snapav.com](http://www.snapav.com) as they are released.

## 6.4. Thread-Locking Power Connector

This extender pair is Power over Cable capable and therefore can be powered from either the transmitter or receiver. When a power supply is connected to either the transmitter or receiver, the HDBaseT link sends power to the other end.

**⚠CAUTION: DO NOT** connect the power supply to the device until it is completely installed and all connections have been made.

## 7. SPECIFICATIONS

Technical	Transmitter	Receiver	
HDMI Compliance	HDMI 3D		
HDCP Compliance	Yes		
Video Bandwidth	10.2 Gbps		
HDMI over UTP Transmission	<b>Resolution</b>	<b>Cat 5e/6</b>	<b>Cat 6a/7</b>
	1080i / 720p 24-bit color	200 ft	230 ft
	Full HD 1080P 24-bit color	200 ft	230 ft
	Full HD 1080P 36-bit deep color	200 ft	230 ft
	4K@30Hz (4:4:4)/ 4K@60Hz (4:2:0)	115 ft	130 ft
Input TMDS Signal	1.2V (peak-to-peak)		
Input DDC Signal	5V (peak-to-peak, TTL)		
ESD Protection	(1) Human body model: $\pm 15\text{kV}$ (air-gap discharge) & $\pm 8\text{kV}$ (contact discharge) (2) Core chipset – $\pm 8\text{kV}$		
IR Signal (Bidirectional)	Carrier frequency: 20–60kHz		
<b>Connections</b>			
HDBaseT Link	1x RJ45	1x RJ45	
HDMI	1x HDMI Type A (19-pin female)	1x HDMI Type A (19-pin female)	
IR Receiver (In)	---	1x 3.5mm Stereo	
IR Control In	1 x 3.5mm Mono	---	
IR Flasher (Out)	1x 3.5mm Mono	1x 3.5mm Mono	
RS-232 pass-through	DB-9	DB-9	
Power	Thread-Locking		
<b>Controls</b>			
DIP switch 1	RS-232 Pin Configuration (DTE or DCE)		
DIP switch 2	RS-232 Operation Mode (SERVICE/ON)		
<b>Mechanical</b>			
Housing	Metal enclosure		
Dimensions	6.25"x3.1"x1.3"		
Weight	1.1 lbs.		
Power Supply	24V DC, 1A		
Power Consumption	12W (max)		
Operation Temperature	32–104°F		
Storage Temperature	-4–140°F		
Relative Humidity	20–90% RH (no condensation)		
Certifications and Compliance	Product: CE, FCC, RoHS		
	Power Supply: CE, FCC, RoHS, UL		

## 8. CONTACTING TECH SUPPORT

Phone: 866.838.5052

For SnapAV customers, [snapav.com](http://snapav.com)

For Aisle 8 customers, [onaisle8.com](http://onaisle8.com)

## 9. WARRANTY

### 2-Year Limited Warranty

This Binary Product has a 2-Year limited warranty. This warranty includes parts and labor repairs on all components found to be defective in material or workmanship under normal conditions of use. This warranty shall not apply to products that have been abused, modified or disassembled. Products to be repaired under this warranty must be returned to a designated service center with prior notification and an assigned return authorization number (RA).



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