



HDMI® Extender

User Manual

Model: HE03L-4K6G

4K60Hz HDMI® CAT6 Extending Distributor with Chainable
Receiver 160m

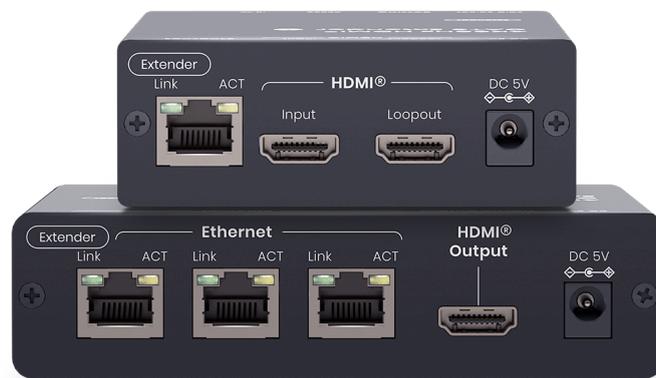


Table of Contents

Introduction.....	2
Features.....	2
Application Diagram.....	2
Panel View.....	3
HE03T-4K6G.....	3
HE03LR-4K6G.....	4
LED Indication.....	5
Power/Link LED.....	5
Link/ACT LED.....	5
Functional Description.....	6
AV Transmission over IP.....	6
Latency.....	6
Transmission Distance.....	7
RJ45 Pin Definition.....	8
Video Interface.....	9
Support Resolution.....	9
EDID Settings.....	10
Audio Interface.....	13
RS232.....	14
RS232 Setting – DIP switch.....	14
Baud Rate Setting/ Check IP or Mac address – Panel Button.....	16
Infrared (IR).....	17
Technical Specification.....	18
Caution.....	20
Package Includes.....	21
Installation.....	22
Installed on a Platform.....	22
Installed on a DIN-rail.....	22
Installed on Wall.....	23
Installed on a Rack.....	23

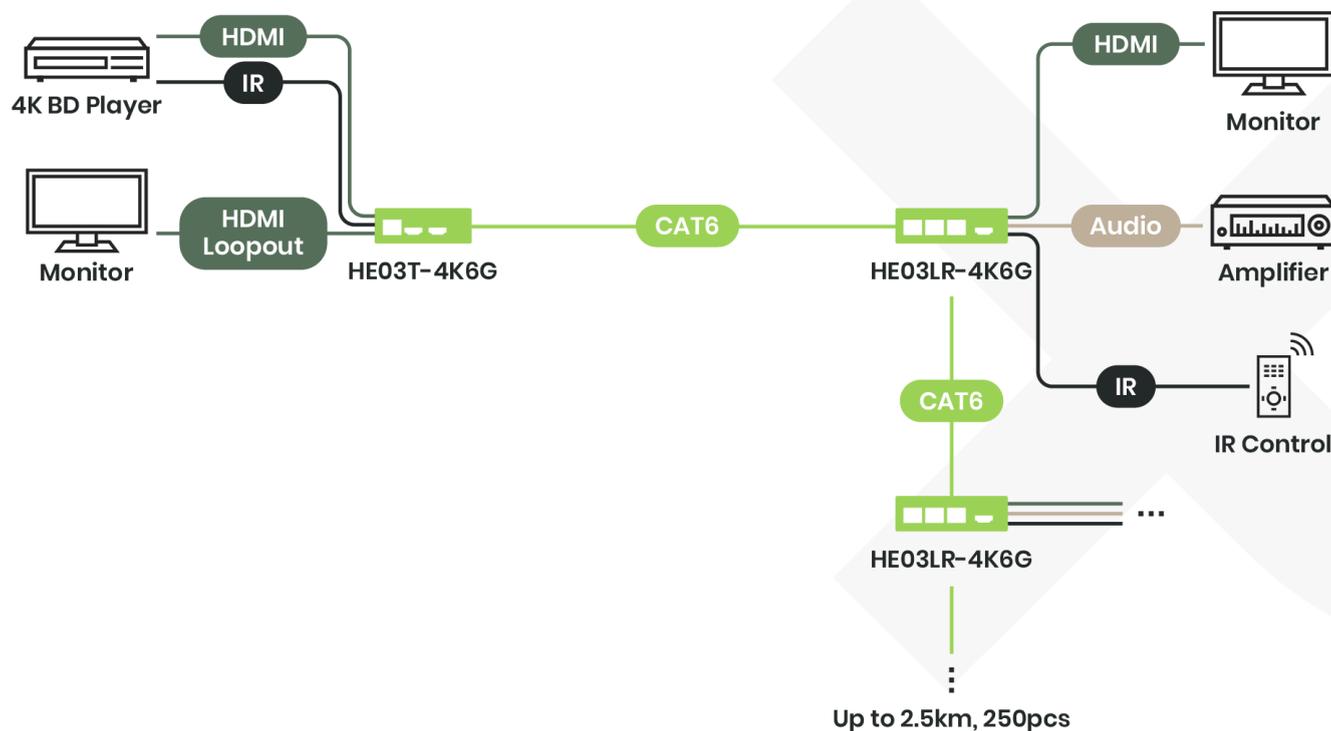
Introduction

HE03L-4K6G is a 4K60Hz HDMI® extender that uses a cost-effective Ethernet cable to send an HDMI® signal for up to 160m. Its chainable receiver allows the extender to split an HDMI® signal into up to 250 ones and display the signals at the same time. By pushing the built-in EDID button, you can effortlessly present the video with desired resolution on the monitor.

Features

- Resolution up to 4K60Hz 4:4:4.
- Signal extension up to 160m.
- Built-in local loop out for an extra HDMI® display at the transmitter side.
- Supports RS232 transmission and EDID management.
- Supports IR passthrough.
- Splits up to 250 HDMI® displays, 2.5KM in total.

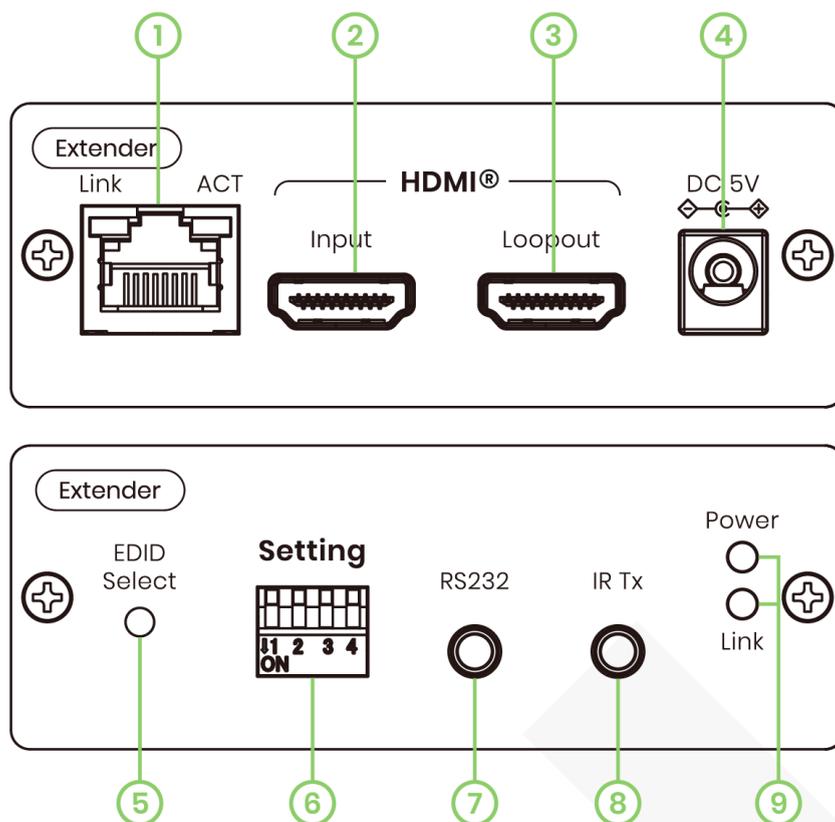
Application Diagram



Note: in this application, auxiliary audio and IR are also supported.

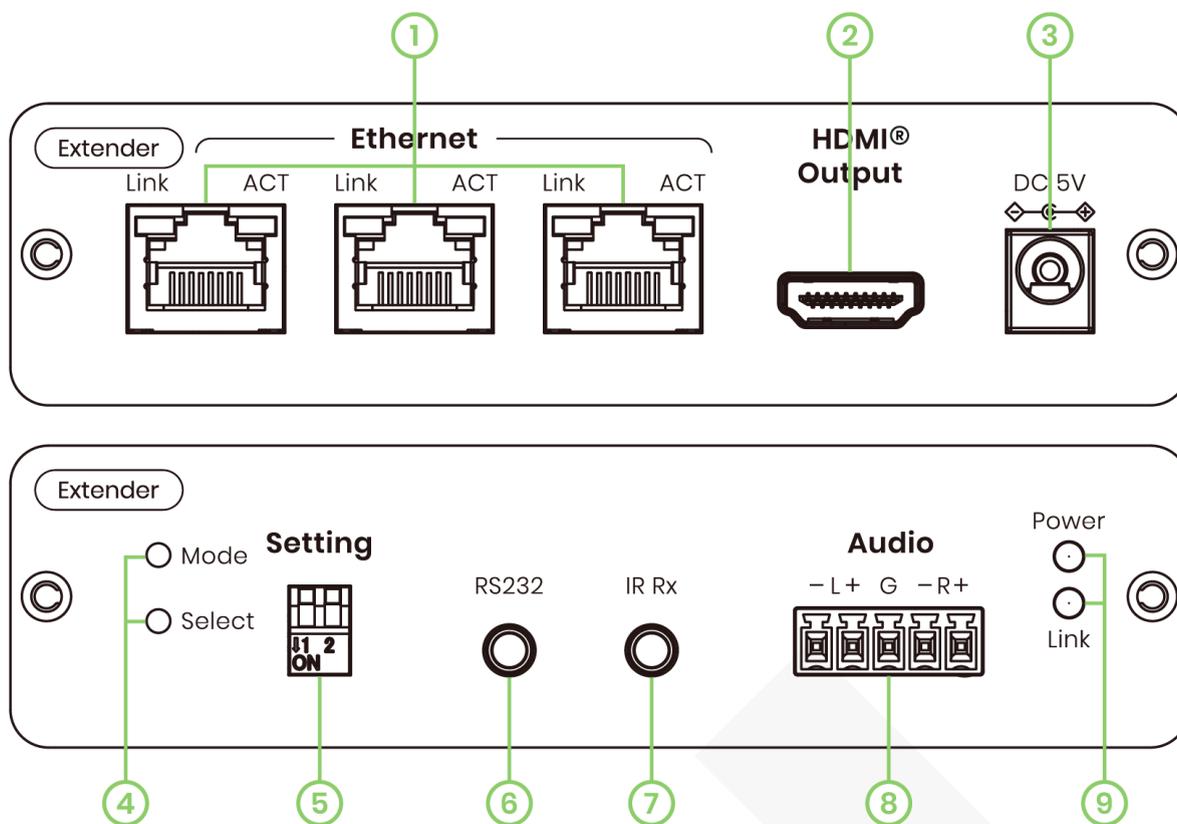
Panel View

HE03T-4K6G



Item	Interface	Description
1	Ethernet	To connect to HE03LR-4K6G via Ethernet cable
2	HDMI® Input	To connect to HDMI® source
3	HDMI® Loopout	To connect to monitor or TV
4	DC Jack	To plug in DC 5V power adapter
5	EDID Select	EDID Select button. Refer to EDID settings
6	Setting	Refer to EDID settings and RS232 settings - DIP switch
7	RS232	To connect to RS232-command-controllable device (needs 3.5mm jack cable to RS232)
8	IR Tx	To connect to IR emitter
9	Power/Link LED	Refer to LED Indication

HE03LR-4K6G



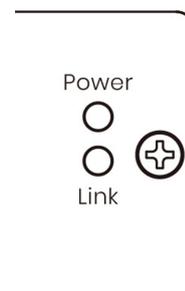
Item	Interface	Description
1	Ethernet	To connect to HE03T-4K6G/HE03LR-4K6G/HE03R-4K6G via Ethernet cable
2	HDMI® Output	To connect to monitor or TV
3	DC Jack	To plug in DC 5V power adapter
4	Mode/Select	Mode & Select button. Refer to Baud Rate Setting / Check IP or Mac address – Panel Button
5	Setting	Refer RS232 settings - DIP switch
6	RS232	To connect to RS232-command-controllable device (needs 3.5mm jack cable to RS232)
7	IR Rx	To connect to IR receiver
8	Audio Output	To use an audio cable to connect with speakers or an amplifier. Refer to audio connection

9	Power/Link LED	Refer to LED Indication
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LED Indication

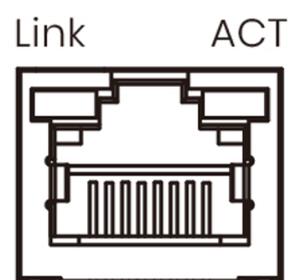
Power/Link LED

LED Indication	Status	Description
Power (Green)	On	Power On
	Off	Power Off
Link (Blue)	On	Ethernet Linked
	Off	Ethernet Unlinked



Link/ACT LED

LED Indication	Status	Description
Ethernet Connection Link (Green)	On	Ethernet Linked
	Off	Ethernet Unlinked
Ethernet Connection ACT (Yellow)	Flash	Data Transferring



Functional Description

AV Transmission over IP

HE03L-4K6G allows audiovisual (AV) transmission over IP using advanced technologies which enables the encoding and decoding of AV signals into IP packets for transmission over Ethernet cables connections, allowing for longer reach distance without compromising signal quality.

The compression algorithms employed by the codec reduce the size of AV data, allowing for efficient transmission over 1 Gigabit IP networks.

Latency

HE03L-4K6G has a latency¹ less than one frame according to our test, and here is our test condition. The test results are shown as follows:

HE03L-4K6G Latency Test			
Test condition			Test result
Distance	Resolution	Cable used	
160m	4K60Hz 4:4:4	CAT5e COMMSCOPE ISO-EN COMPLIANT 27 CAT5E UTP SOLIDPR04 AWG24 1917 RN19040036	Less than 1 frame

¹ The compression introduces ultra-low latency which is crucial for real-time applications such as video conferencing and live streaming, where minimizing delay is essential for smooth and responsive communication.

Transmission Distance

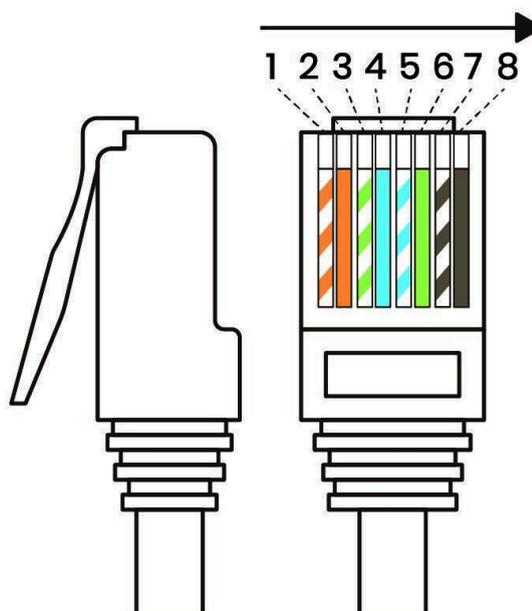
At 4K60Hz 4:4:4, HE03L-4K6G could reach up to 160m, the distance may differ by cable or construction quality. The transmission distance test results are shown as follows:

HE03L-4K6G Transmission Distance Test		
Test condition		Test result
Resolution	Cable used	
4K60Hz 4:4:4	CAT5e COMMSCOPE ISO-EN COMPLIANT 27 CAT5E UTP SOLIDPR04 AWG24 1917 RN19040036	160m
4K60Hz 4:4:4	CAT6 COMMSCOPE E98256 4PR 24AWG U/UTP	160m

RJ45 Pin Definition

RJ45 connectors are commonly used for Ethernet cables in networking and AV over IP applications. Understanding the pinout or pin configuration of the connector is essential for proper cable termination² and connectivity.

Pin	Color	Data
1	Orange-white	DATA0 +
2	Orange	DATA0 -
3	Green-white	DATA1 +
4	Blue	DATA2 +
5	Blue-white	DATA2 -
6	Green	DATA1 -
7	Brown-white	DATA3 +
8	Brown	DATA3 -



² When terminating Ethernet cables with RJ45 connectors, it's crucial to follow the TIA/EIA-568 wiring standards, which specify the wiring scheme for T568B pinout.

Video Interface

The HDMI® Video input and output functionality in HE03L-4K6G allows for the transmission and reception of high-definition video signals over IP for longer distances. These features enable integration of HDMI®-equipped audiovisual sources and displays into the AV over IP, facilitating flexible and scalable multimedia content distribution.

Support Resolution

HE03L-4K6G supports various resolutions, indicated by the below table:

Resolution	
3840x2160	30/50/60Hz
2560x1600	60Hz
2560x1440	60Hz
1920x1200	60Hz
1920x1080 ³	30/50/60/120Hz
1680x1050	60Hz
1600x1200	60Hz
1600x900	60Hz
1440x900	60Hz
1280x1024	60Hz
1280x720	50/60Hz
1024x768	60/75Hz
800x600	60/75Hz
640x480	60/75Hz

³ The timing of 1920x1080 is also supported in interlace mode.

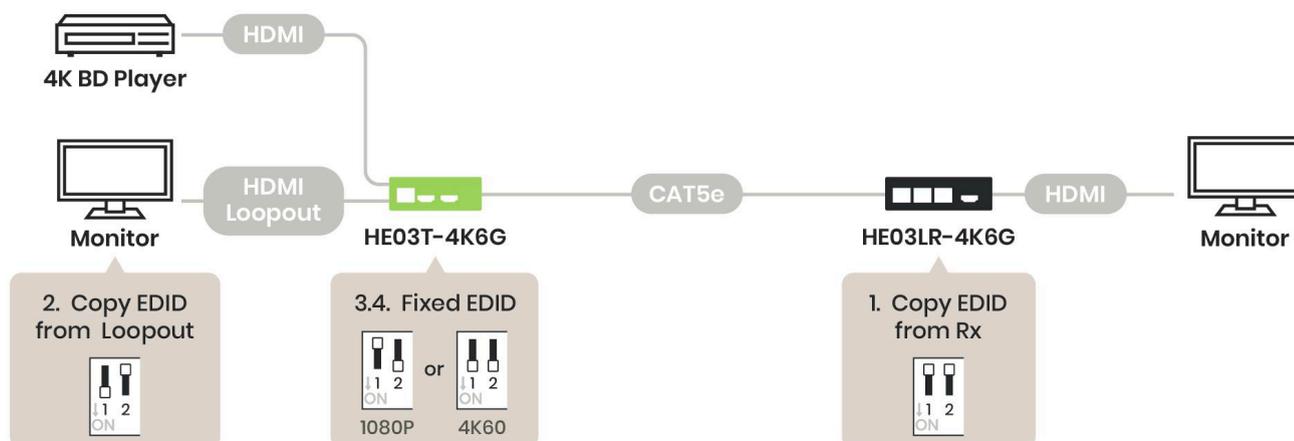
EDID Settings

HE03L-4K6G offers users the flexibility to configure EDID settings based on their specific requirements and preferences. The settings have to be done on both transmitter and receiver sides.

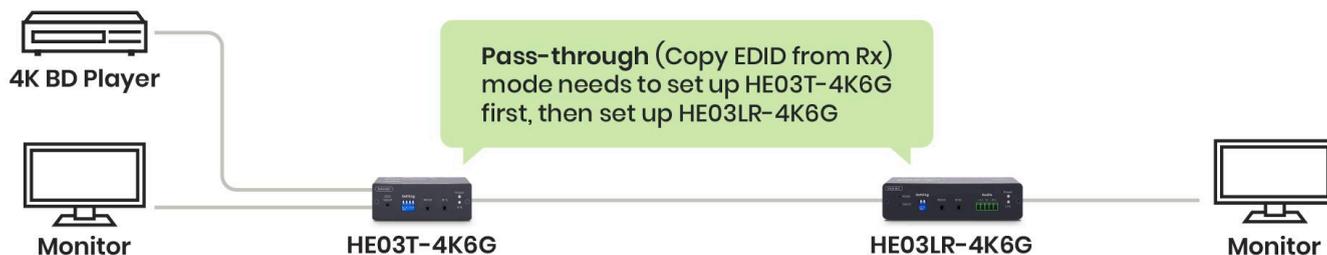
EDID Setup Steps

The following steps are the configuration for the EDID mode:

1. Connect the HE03T-4K6G to HE03LR-4K6G via Ethernet cable.
2. Connect the source and display devices to the HE03T-4K6G and HE03LR-4K6G respectively.
3. The default mode is the "Pass-through Mode", which uses the EDID of the monitor connected to the HE03LR-4K6G.
4. The EDID setup includes four modes: 1. pass-through, 2. copy from loop-out, 3. 1080 max, 4. 4K60Hz max. For the 1. pass-through mode, activate it via the HE03T-4K6G's DIP switch and configure the HE03LR-4K6G in the OSD to enable it. The other three modes can be set directly through the HE03T-4K6G's DIP switch without additional OSD adjustments. (point 5.6.7. are the steps to enable EDID pass-through mode, The steps are mandatory while using EDID pass-through mode, even if there is only one monitor.)



5. Choose a desired monitor, connected to the corresponding HE03LR-4K6G, which EDID is needed to be pass-through. (To distribute signals from one to many using an Ethernet switch, first connect the HE03T-4K6G/HE03LR-4K6G to set up the EDID mode, then connect to the Ethernet switch.)
6. Press Button 1 on the corresponding HE03LR-4K6G, the OSD menu would show on the connected monitor, press button 2 while "Change EDID" is shown to confirm the selection. (There are 4 options in the OSD menu: Change EDID, Mac address, IP address and Baud Rate.)
7. Adjust and set up EDID mode by using the DIP switch and EDID select button on the HE03T-4K6G
 - a. Set up the DIP switch of the HE03T-4K6G (refers to EDID Mode table).
 - b. Push the EDID Select button for 1 sec to activate the setting.



First, set up HE03T-4K6G



a Move the first two dip switches of HE03T-4K6G up



b Poke "EDID Select" button once to confirm

Second, set up HE03LR-4K6G



c Poke "Mode" once



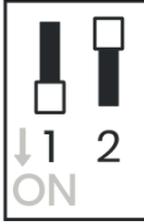
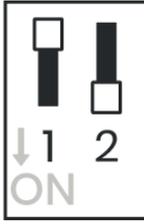
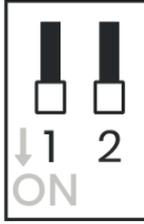
d Poke "Select" to confirm

e The letters turn red, the setting is successful, and the EDID of the screen connected to HE03LR-4K6G has been copied to HE03T-4K6G



EDID Modes

There are four modes for EDID settings, refer to the below table:

HE03T-4K6G EDID Mode				
SWITCH	EDID Mode / Settings			
Diagram				
Function	Pass-through Mode (Default)	Loop-out Mode	Max resolution 1080P	Max resolution 4K60Hz

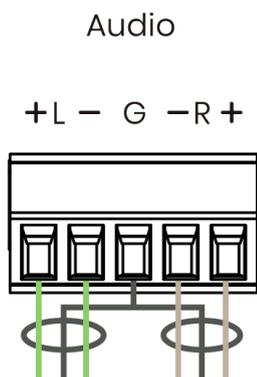
Audio Interface

Audio transmission over IP through HE03L-4K6G enables the extension of high-quality audio signals over IP with ultra-low latency and fully synchronized with the video signal.

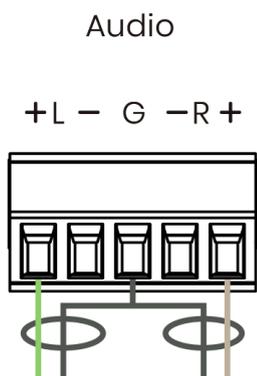
Apart from audio transmitted through HDMI® port, HE03L-4K6G supports audio extraction through a phoenix contact.

The following are the connections to a balanced or unbalanced stereo audio receiver:

1. Connect Audio out to a balanced stereo audio speaker



2. Connect Audio out to an unbalanced stereo audio speaker



※ The surround sound will output only through 2 channels

RS232

HE03L-4K6G supports RS232⁴ control, used for connecting various electronic devices. It defines the electrical characteristics and timing of signals for serial communication between devices⁵, typically facilitating communication between computers and peripherals such as modems, printers, and other serial devices.

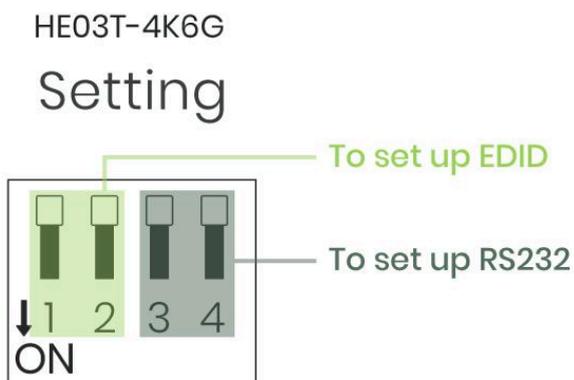
For successful communication, both communicating devices must operate at the same baud rate⁶. If one device transmits at a different baud rate than the other, communication errors may occur.

Lower baud rates are often chosen for longer communication distances and improved resistance to noise interference. In certain environments, a lower baud rate is preferred to ensure stable communication.

RS232 Setting – DIP switch

The following steps are the configuration for the RS232 setting:

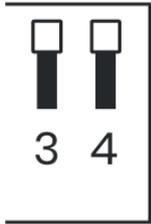
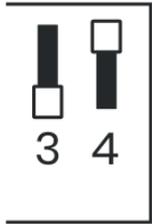
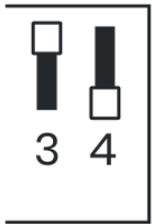
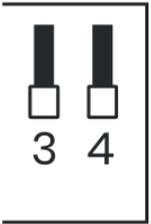
1. Connect the HE03T-4K6G to HE03LR-4K6G and other HE03LR-4K6Gs via Ethernet cable.
2. Connect the source and sink devices to the HE03T-4K6G and HE03LR-4K6Gs respectively.
3. Adjust the DIP switch on HE03T-4K6G to set up the RS232 settings. Refer to the instructions below to adjust the DIP switch.



⁴ RS232 is used for serial communication, allowing data to be transmitted one bit at a time over a single wire.

⁵ RS232 communication can be simplex (one-way), half-duplex (two-way, but only one direction at a time), or full-duplex (two-way, simultaneous communication).

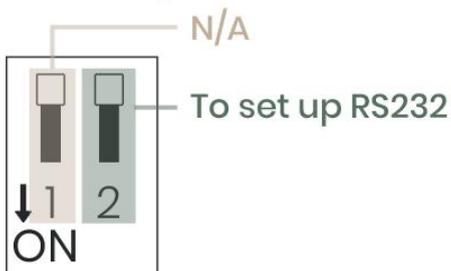
⁶ Common baud rates in RS232 communication include 2400, 4800, 9600, 19200, 38400, 57600, 115200, and more. The selection of baud rate depends on the capabilities and requirements of the communicating devices.

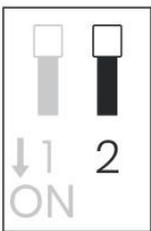
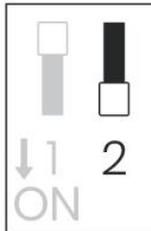
HE03T-4K6G			
SWITCH	Function/Settings		
Diagram		 	
Function	RS232 on (Default)	Debug console	N/A

4. Adjust the DIP switch on HE03LR-4K6G to set up the RS232 settings.

HE03LR-4K6G

Setting



HE03LR-4K6G	
SWITCH	Function/Settings
Diagram	 
Function	RS232 on (Default) Debug console

Baud Rate Setting/ Check IP or Mac address - Panel Button

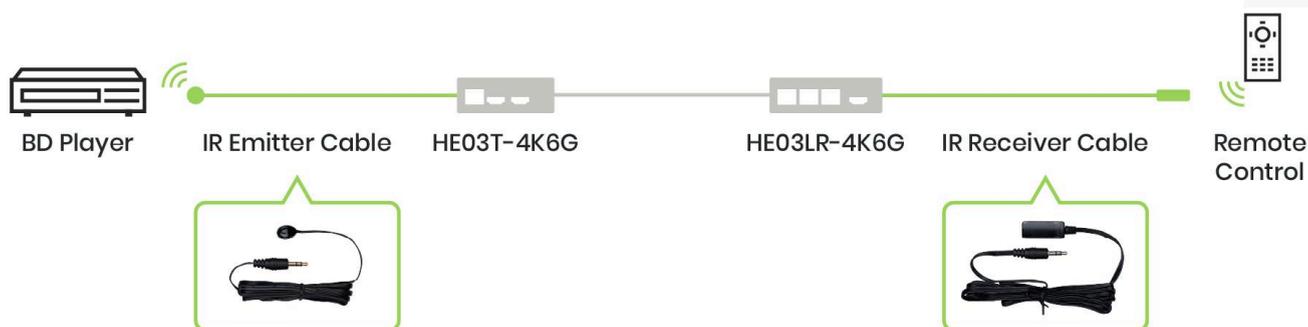


1. Press Button 1 on HE03LR-4K6G to show OSD menu (there are 4 options: Change EDID, Mac address, IP address, and Baud Rate), keep pressing button 1 till "UART: XXXX" is shown.
2. Press Button 2 to switch to a desired Baud Rate. The options are as below:
115200 (Default), 57600, 38400, 19200, 14400, 9600, 4800, 2400, 1200bps
3. Press Button 1 again to confirm the change.
4. Above steps have to be followed by every connected HE03LR-4K6G.

Infrared (IR)

This function facilitates the transmission of IR signals from a remote control to the IR Receiver connected to the HE03LR-4K6G, which then passes the signal over IP to the HE03T-4K6G. The HE03T-4K6G, equipped with an IR emitter cable, emits the IR signal to control external devices such as DVD players, TVs, or set-top boxes.

HE03L-4K6G does not have built-in IR interface, in order to transmit IR signal, you would need to connect both IR receiver and emitter cable.



Technical Specification

HE03L-4K6G	HE03T-4K6G	HE03LR-4K6G
Compliance		
Standard	HDMI® 2.0 HDCP 2.2	
Max. Video Resolution	4K60Hz	
Max. Transmission Distance	160m over CAT5e	
Dynamic Range Standard ⁷	SDR, HDR, HDR10, HDR10+ Dolby Vision	
Audio Format ⁸	PCM 2CH, 5.1CH, 7.1CH Dolby True HD, Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3), Dolby Atmos (AC4) DTS, DTS-HD Master Audio, DTS: X	
Analog Audio	Impedance: 500Ω Signal-to-noise Ratio (SNR): 114dB (A-weighted) Dynamic Range: 114dB THD+N: -94dB	
RS232 Baud Rate	115200bps	
IR Support	20-60kHz, ±45°, 5M	
Ports & Interfaces		
Video Input	1 x HDMI® Type-A	1 x RJ45
Video Output	1 x RJ45	1 x HDMI® Type-A 2 x RJ45
Video Loop-out	1 x HDMI® Type A	-
Analog Audio Output	-	Terminal Block 5-Pin
IR	External Transmitter: 3.5mm Stereo Phone Jack: 20~60kHz / ±45° / 5M	External Receiver: 3.5mm Stereo Phone Jack 20~60kHz / ±45° / 5M
RS232	1 x 3.5mm Phone Jack	
Power		

⁷ Dynamic range metadata in the input stream is pass-through and fully maintained

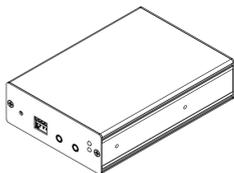
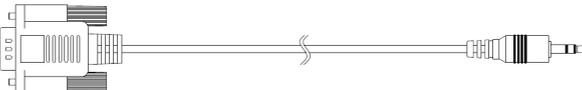
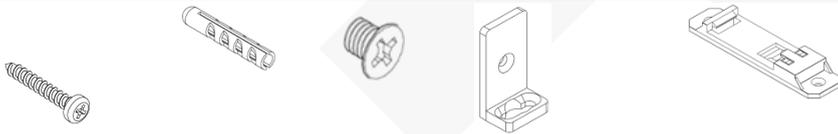
⁸ Audio data in the input stream is pass-through and fully maintained.

Power Supply	5V 2A	
Power Consumption	5.5W	5.15W
Power Saving	1.9W	3.15W
Ambient Temperature		
Operation	0 to 55°C	
Storage	-40 to 80°C	
Operating Altitude	2000m	
Humidity	Up to 95%	
Physical Characteristics		
Dimension (D x W x H)	123 x 88 x 32mm	123 x 125 x 32mm
Weight	254g	344g

Caution

1. This product is designed for indoor applications. If you plan to use it outdoors, we recommend installing additional equipment for waterproof protection and surge protectors to prevent damage caused by lightning.
2. Do not put anything on the power and system cables, place them where they cannot be stepped on. Please be sure there is nothing resting on any cables.
3. Avoid using this product close to water places, or near high temperature devices such as radiators, stoves, etc.
4. Shut down the power supply and unplugged all equipment immediately if:
 - A. water or any kind of liquid has been spilled into the product;
 - B. the product has been damaged by external force;
 - C. the product does not operate normally as this manual indicates;
 - D. please contact us for further repair if above conditions happen.
5. Using certified Premium HDMI® cables to transfer high-resolution video is recommended.
6. The UTP Ethernet cable is recommended to use high-quality CAT5e, CAT6 UTP/STP/FTP cable. Improper installation may cause unstable connection, and video or audio interruption.
7. The transmission distance may be shortened by the equipment (gigabit switch), cable or construction quality. Using CAT5e, CAT6 cable between transmitter and receiver, the transmission distance can reach up to 160 meters.
8. The data rate can reach up to 850Mbps, which might affect other devices at the same LAN, so we recommend using the Closed Ethernet Network.
9. RS232 does not support hardware handshake.
10. If connected to a switching hub, disabling IEEE 802.3az Energy Efficient Ethernet is recommended to avoid unstable connection, and video or audio interruption.

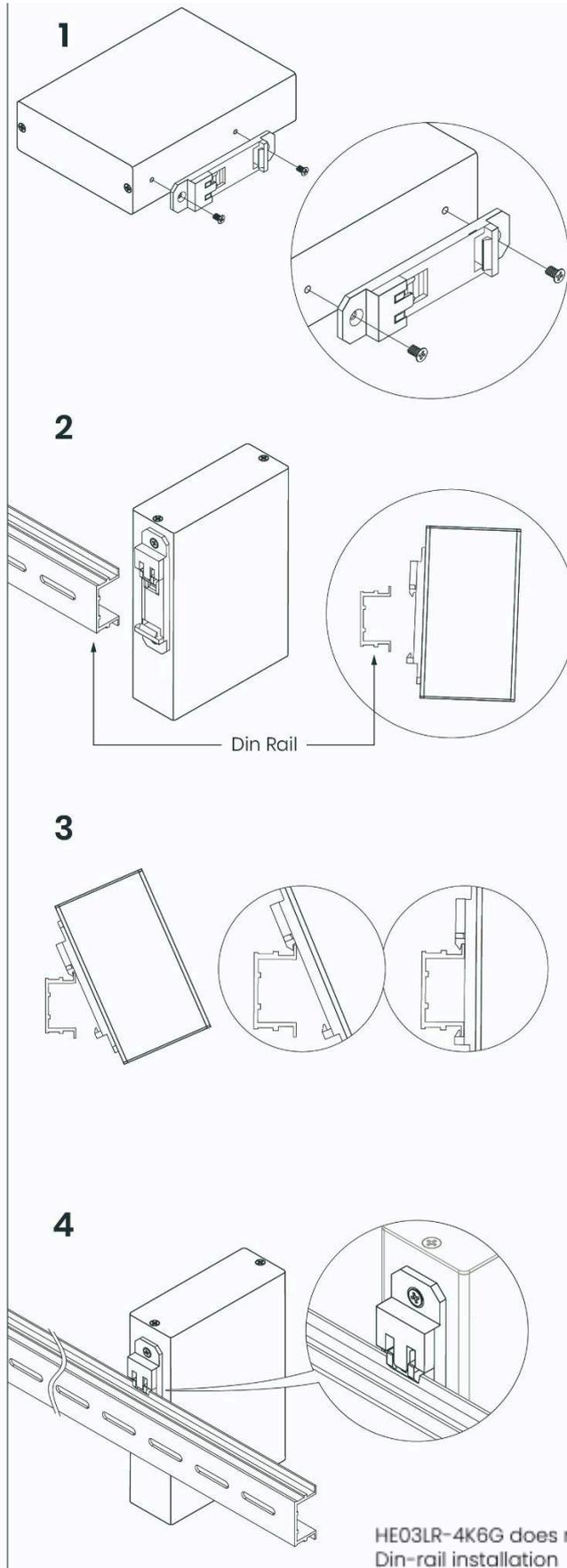
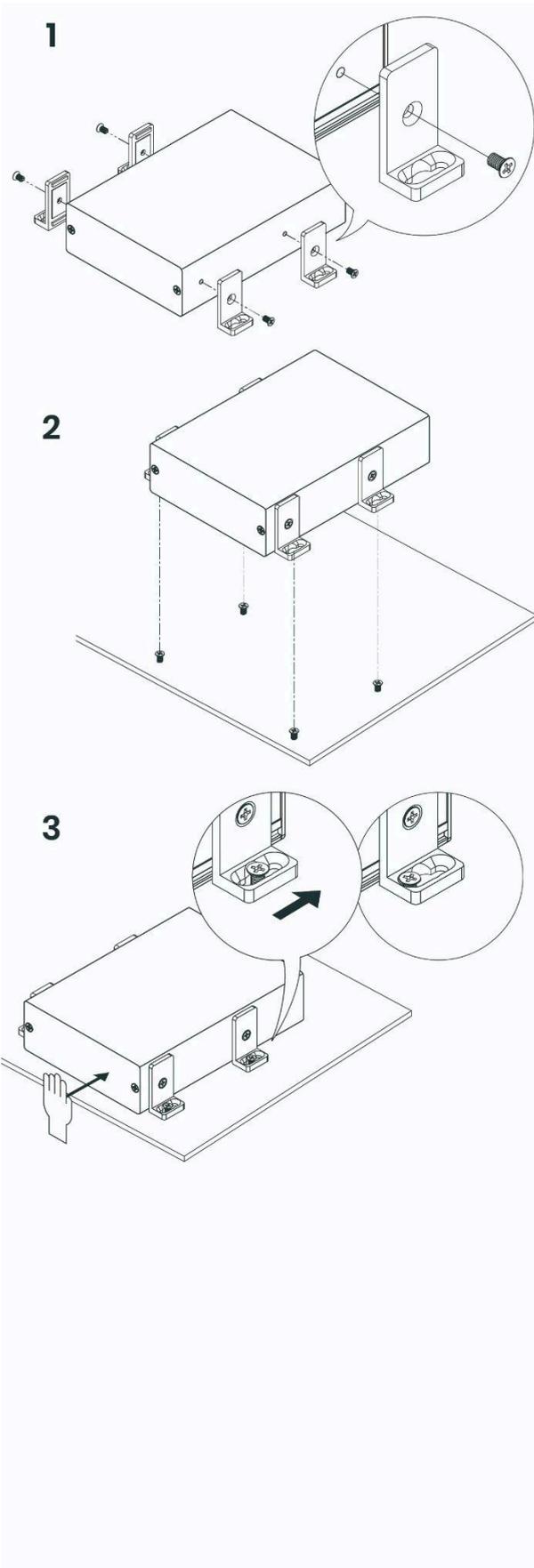
Package Includes

Item	Amount	Image
HE03T-4K6G (Transmitter)	1 pc	 <p>The unit has a width of 88mm and accommodates four units within a standard 19-inch rack</p>
HE03LR -4K6G (Receiver)	1 pc	 <p>The unit has a width of 125mm and accommodates three units within a standard 19-inch rack. (This unit does not support Din-rail installation.)</p>
DC 5V2A Power Adapter	2 pcs	
IR Emitter Cable	1 pc	
IR Receiver Cable	1 pc	
DB9(M) to 3.5mm phone jack	1 pc	
DB9(F) to 3.5mm phone jack	1 pc	
Mounting Screw Pack	2 bags	 <p>4 pcs (bag) 4 pcs (bag) 4 pcs (bag) 4 pcs (bag) 1 pc (bag)</p>
Rubber gasket Pack	2 bags	 <p>4 pcs (bag)</p>

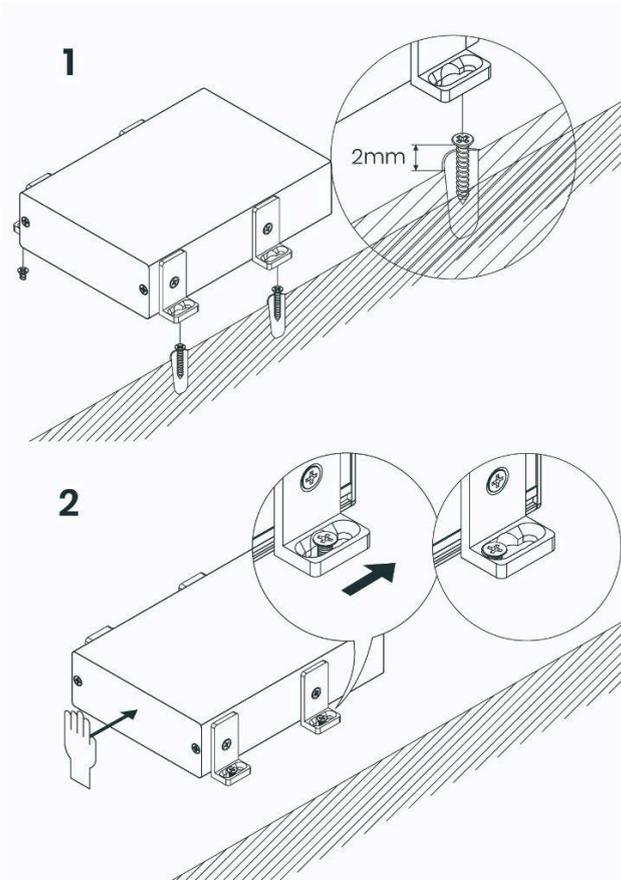
Installation

Installed on a Platform

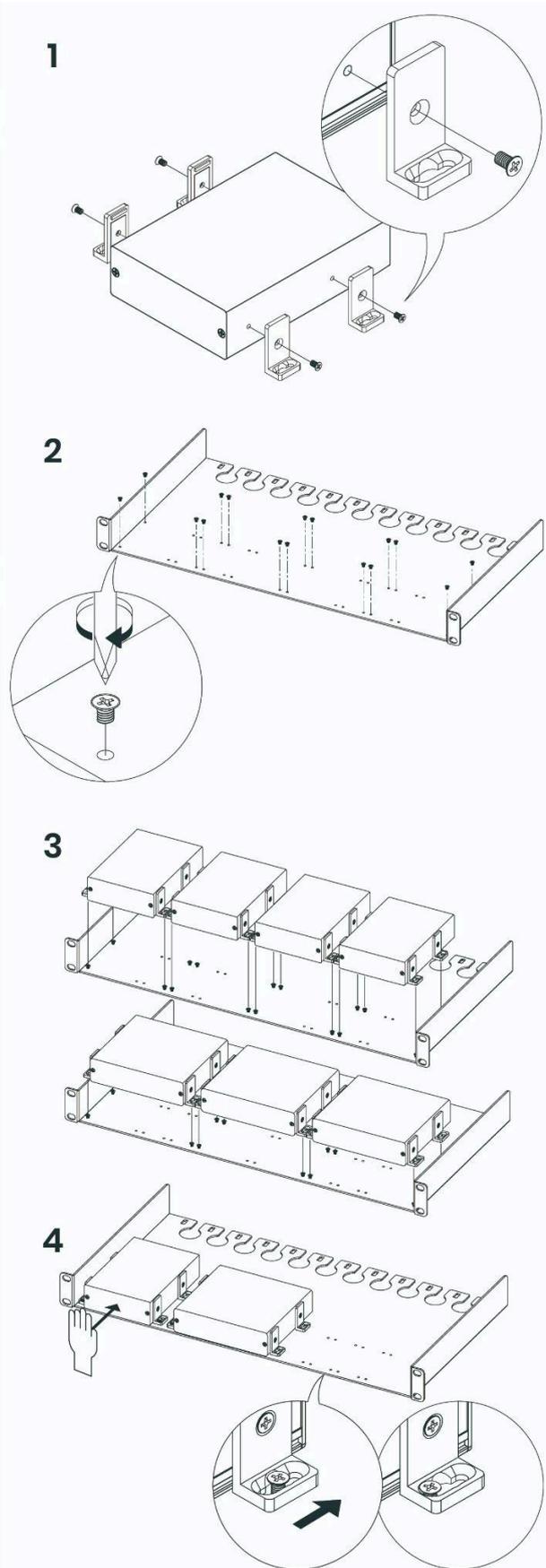
Installed on a DIN-rail



Installed on Wall



Installed on a Rack



RoHS CE