KVM Extender

User Manual

Model : UKM01P-4K6G

4K60Hz USB-C (DisplayPort) KVM Extender with USB-PD 3.0

160m

V1.0

Table of Contents

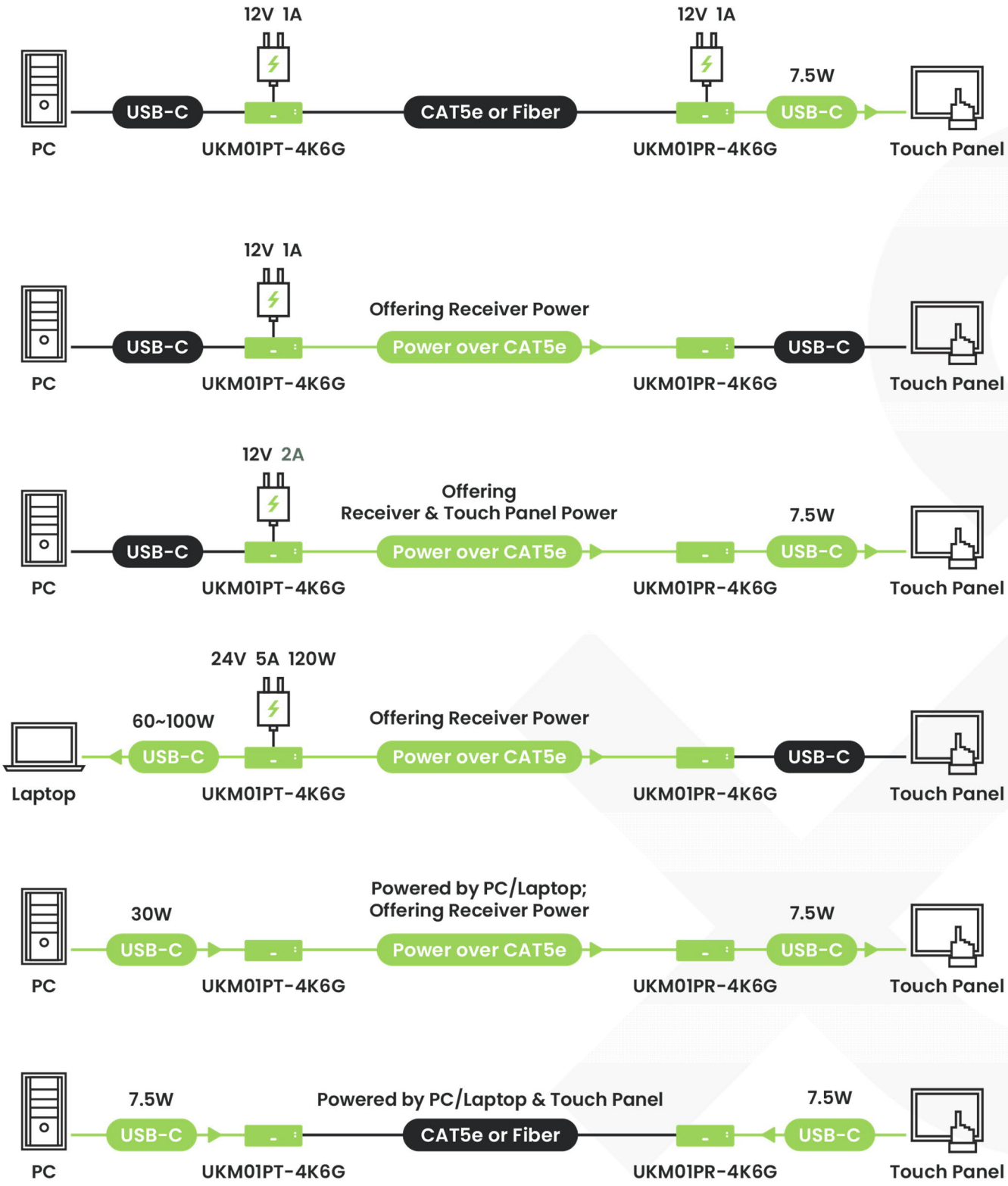
Introduction

UKM01P-4K6G is a 4K60Hz USB Type-C KVM extender that uses a cost-effective Ethernet cable to send audiovisual, USB, and power signals with transmission distance up to 160 meters. Both transmitter and receiver units have a USB Type-C port which can carry audiovisual, USB and power delivery data. The KVM extender can perfectly apply to the broadcasting system, digital signage, home network integration, industrial control...etc. This UKM01PT-4K6G can be paired with an HDMI® receiver to convert USB-C (DP Alt) video signals into HDMI® video for display on a screen. Please refer to model HKM01-4K6G

Features

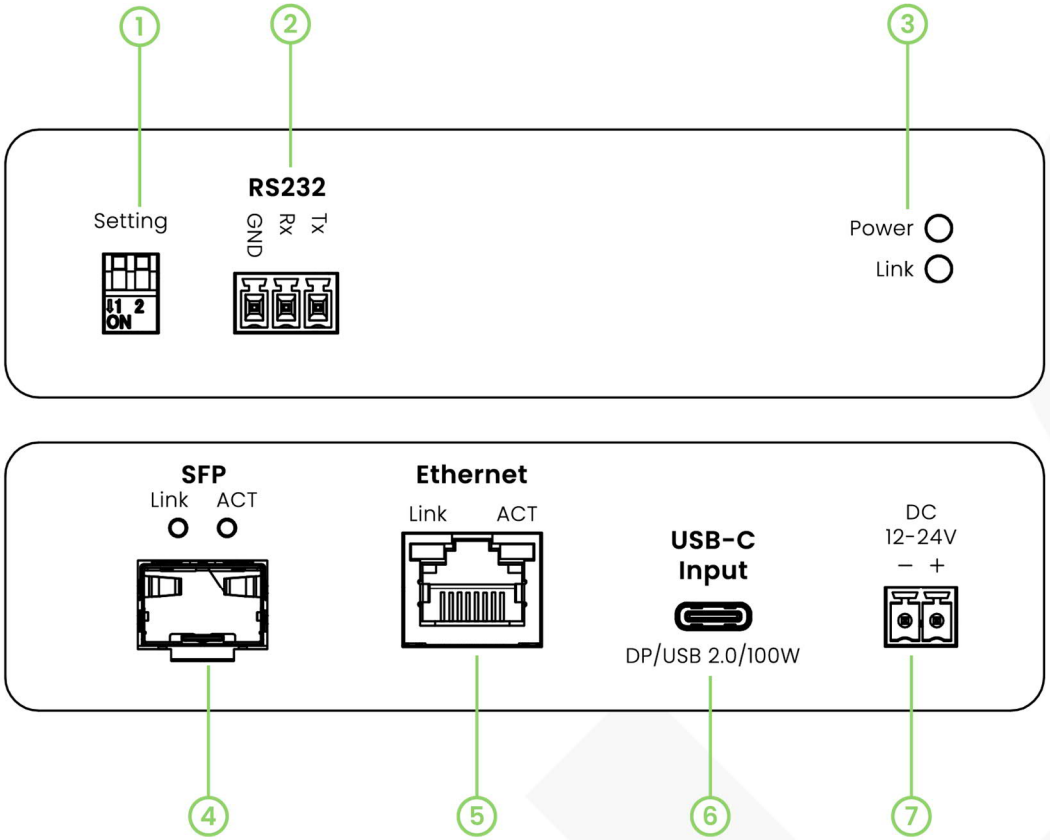
- Resolution up to 4K60Hz.
- Signal extension up to 160m over CAT5e/6 cable.
- Built-in USB type-C port on both transmitter and receiver units.
- Workable with HKM01-4K6G, refers to HKM01-4K6G.
- Supports USB power delivery up to 100W.

Application Diagram



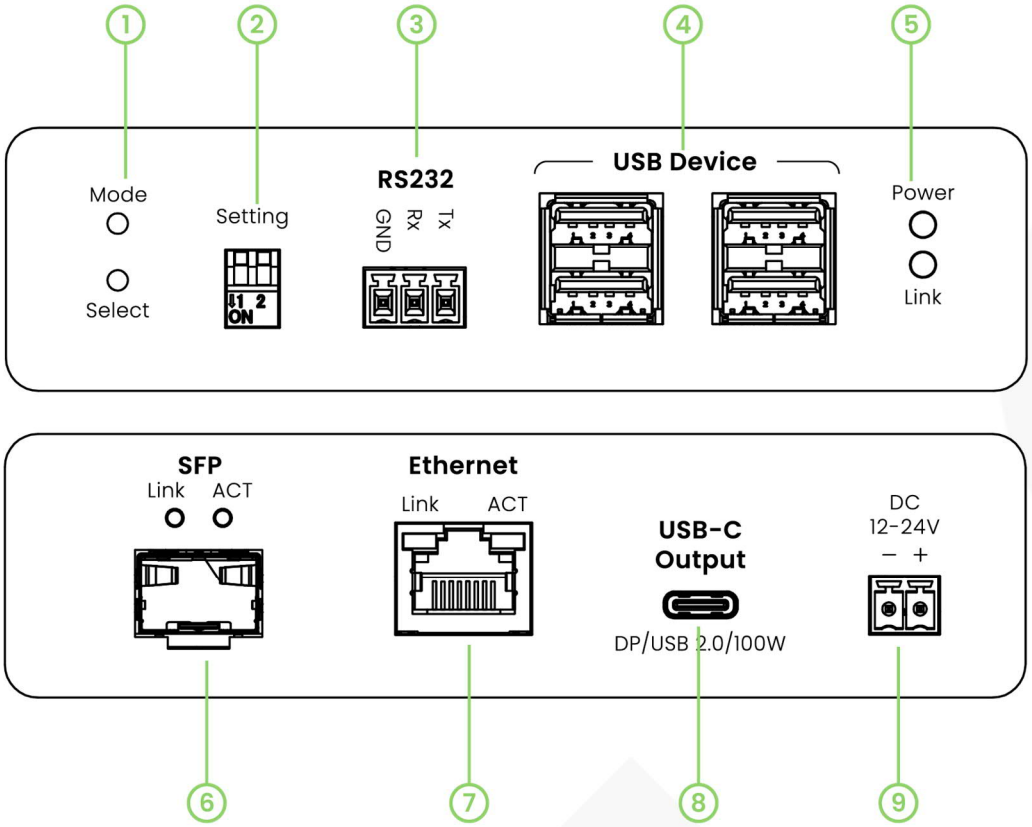
Panel View

UKM01PT-4K6G



Item	Interface	Description
1	Setting	Refer to DIP switch settings
2	RS232	To connect to RS232-command-controllable device
3	Power/Link LED	Refer to LED Indication
4	SFP	To connect to UKM01R-4K6G via SFP fiber module
5	Ethernet	To connect to UKM01R-4K6G via Ethernet cable
6	USB-C Host	To connect to USB-C Host Device (supporting DP Alt Mode, USB 2.0 and PD 3.0)
7	Power Input	To plug in DC 12~24V power adapter

UKM01PR-4K6G

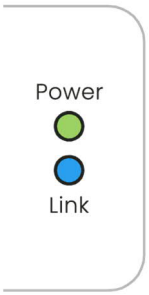


Item	Interface	Description
1	Mode/Select	Mode and Select button. Refer to settings
2	Setting	Refer to DIP switch Settings
3	RS232	To connect to RS232-command-controllable device
4	USB Type-A	To connect to USB device, USB2.0
5	Power/Link LED	Refer to LED Indication
6	SFP	To connect to UKM01T-4K6G via SFP fiber module
7	Ethernet	To connect to UKM01T-4K6G via Ethernet cable
8	USB-C Device	To connect to USB-C Client Device (supporting DP Alt Mode, USB 2.0 and PD 3.0)
9	Power Input	To plug in DC 12~24V power adapter

LED Indication

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

Power/Link LED



Functional Description

KVM Transmission over IP

UKM01P-4K6G allows Keyboard, Video, and Mouse (KVM) transmission over IP using advanced technologies which enable the encoding and decoding of audiovisual (AV) signals into IP packets for transmission over Ethernet cables or fiber optic 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 ethernet or fiber optic cables.

Latency

UKM01P-4K6G has a latency[1] less than one frame according to our test, and here is our test condition. The

UKM01P-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

test result is shown as follows:

[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

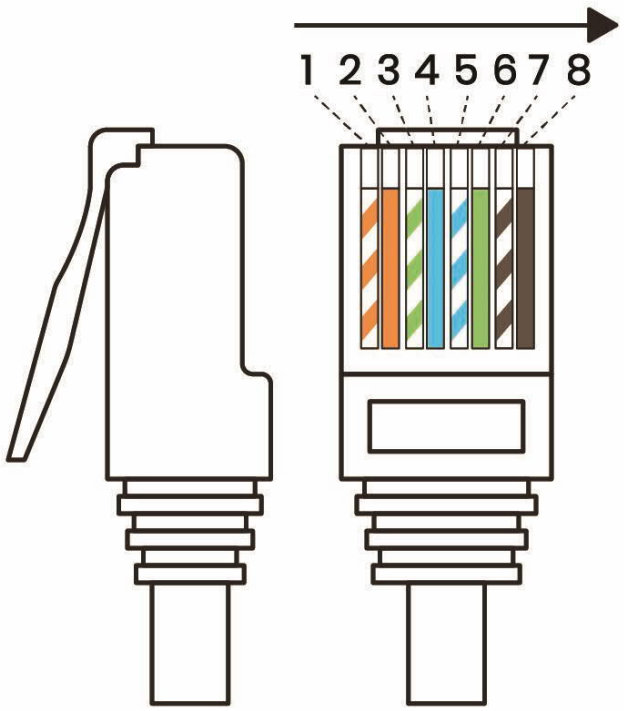
At 4K60Hz 4:4:4, UKM01P-4K6G could reach up to 160m, the distance may differ by cable or construction quality. The transmission distance test result is shown as follows:

UKM01P-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 termination[2] 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.

KVM Transmission over Fiber Optic

UKM01P-4K6G also offers KVM transmission over longer distances using fiber optic cables. Depending on the specific SFP (Small Form-factor Pluggable) modules and fiber optic cables used, transmission distances can extend from hundreds of meters to several kilometers without signal degradation.

UKM01PT-4K6G converts electrical AV signals into optical signals by the SFP transmitter module for transmission over fiber optic cables, while UKM01PR-4K6G converts optical signals back into electrical AV signals with the SFP receiver module at the receiving end.

UKM01P-4K6G is compatible with both single-mode and multi-mode fiber optic cables, offering flexibility in deployment based on distance requirements and installation environments.

Transmission Distance

UKM01P-4K6G optional package includes a pair of SFP transceiver modules. Single-mode modules, FM01S-20K, can be used when distances up to 20 kilometers are needed, while multi-mode modules, FM01M-550 are used for shorter distances up to 550 meters.

SFP Pin Definition

UKM01P-4K6G meets the pin configuration of SFP modules which adheres to industry standards governed by the Multi-Source Agreement (MSA). The SFP MSA outlines mechanical, electrical, and functional specifications for SFP modules, including the pin out configuration, ensuring interoperability and compatibility with SFP compatible devices from different manufacturers. Below tables is the pin configuration for SFP transceivers.

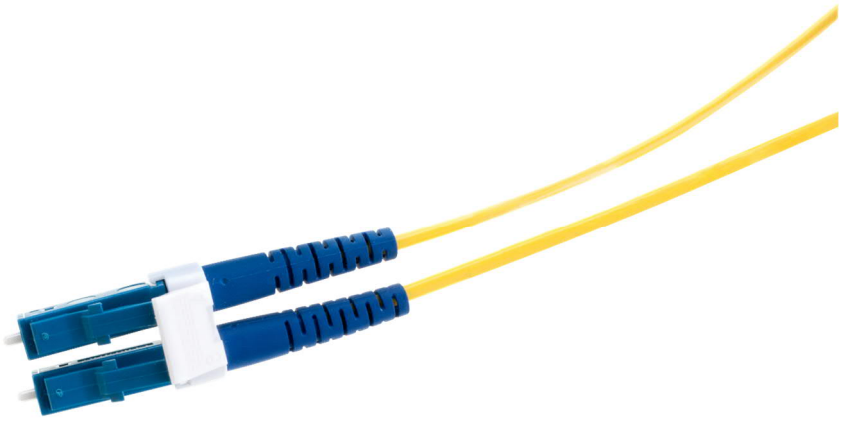
Pin	Pin Name	Description
1	Vee	Ground connection
2	TX_FAULT	Indicates a fault condition in the transmitter
3	TX_DISABLE	When pull low, disables the transmitter circuitry
4	MOD_DEF2	Used for module identification and management purposes
5	MOD_DEF1	Used for module identification and management purposes
6	MOD_DEF0	Used for module identification and management purposes
7	Rate Select	No connection required
8	RX_LOS	Indicates the loss of signal condition on the receiver side
9	Vee	Ground connection
10	Vee	Ground connection
11	Vee	Ground connection
12	RD-	Differential pair for receiving data signals
13	RD+	Differential pair for receiving data signals

14	Vee	Ground connection
15	Vcc	Provides power to the SFP module
16	Vcc	Provides power to the SFP module
17	Vee	Ground connection
18	TD+	Differential pair for transmitting data signals
19	TD-	Differential pair for transmitting data signals
20	Vee	Ground connection

Bidirectional Small Form-factor Pluggable (Bi-Di SFP) is also supported by UKM01P-4K6G. Unlike traditional SFP modules, which use separate fibers for transmitting and receiving data (one for each direction), Bi-Di SFP modules utilize wavelength division multiplexing (WDM) technology to transmit and receive signals over the same fiber strand.

Fiber Connector Type

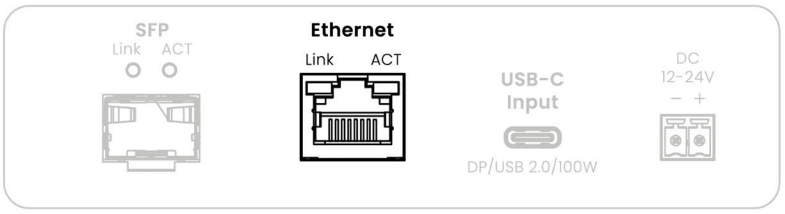
The SFP modules provided in our optional package use Lucent Connector (LC) type dual fiber connectors for seamless integration with existing fiber optic infrastructure. The LC connector's small form-factor and dual fiber design enable high-density connections and efficient use of fiber optic cables in networking environments.



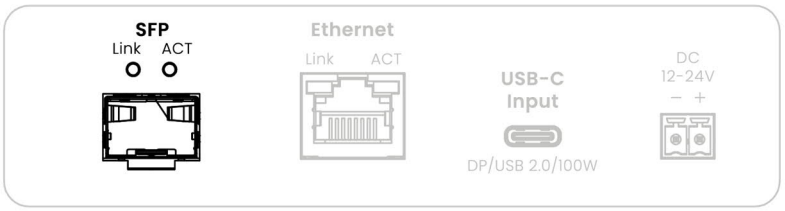
SFP/ Ethernet Link – Detection Mode

UKM01P-4K6G will detect the connection status before booting and decide whether to use the Ethernet or fiber optic cable for transmission. We recommend you connect the cable you desire to UKM01P-4K6G before booting it, and it will automatically detect the cable when booting. To configure the operation, follow these steps:

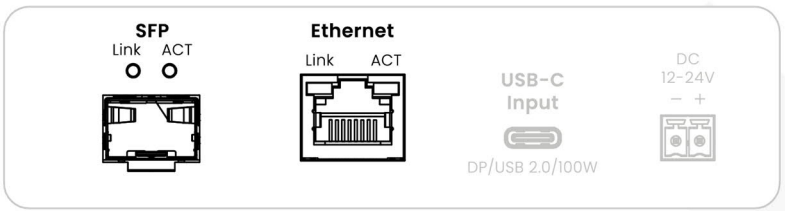
- Connect Ethernet interface before booting: Ethernet cable transmission mode



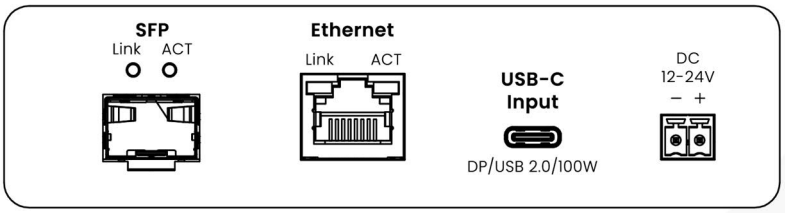
- Connect SFP interface before booting: Fiber optic cable transmission mode



- Connect both Ethernet and SFP interfaces before booting: Fiber optic cable transmission mode



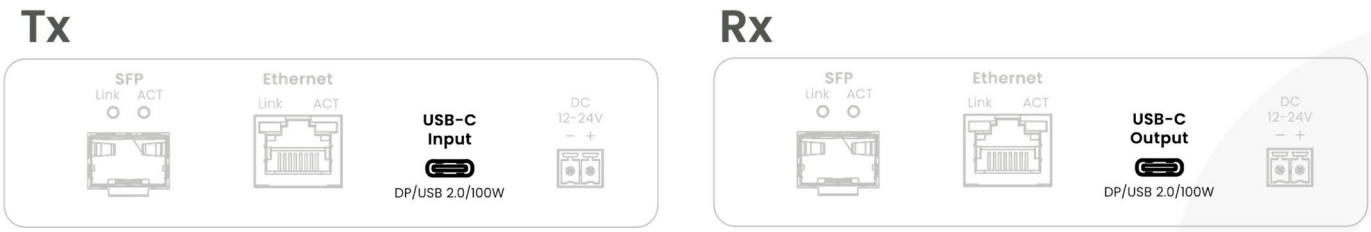
- Connect neither Ethernet nor SFP interfaces before booting: Ethernet cable transmission mode



- If you want to change the transmission mode during operation, you need to turn off UKM01P-4K6G, reconnect, and then reboot UKM01P-4K6G to change the transmission mode.

Video Interface

The USB type-C (DP Alt Mode) Video input and output functionality in UKM01P-4K6G allows for the transmission and reception of high-definition video signals for longer distances.



Support Resolution

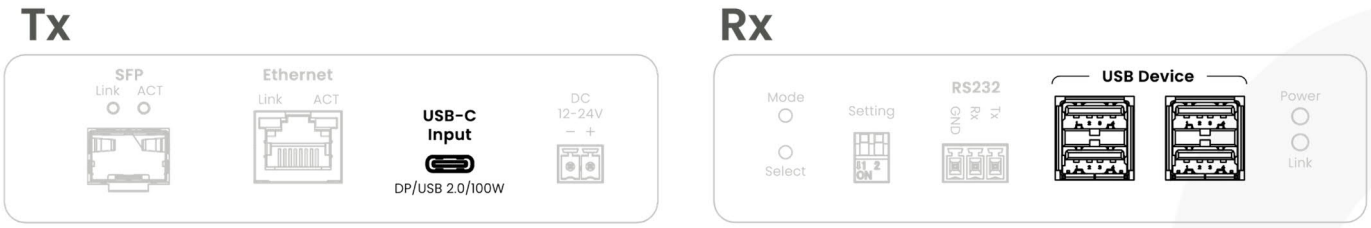
UKM01P-4K6G supports various resolutions, indicated by the below table:

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.

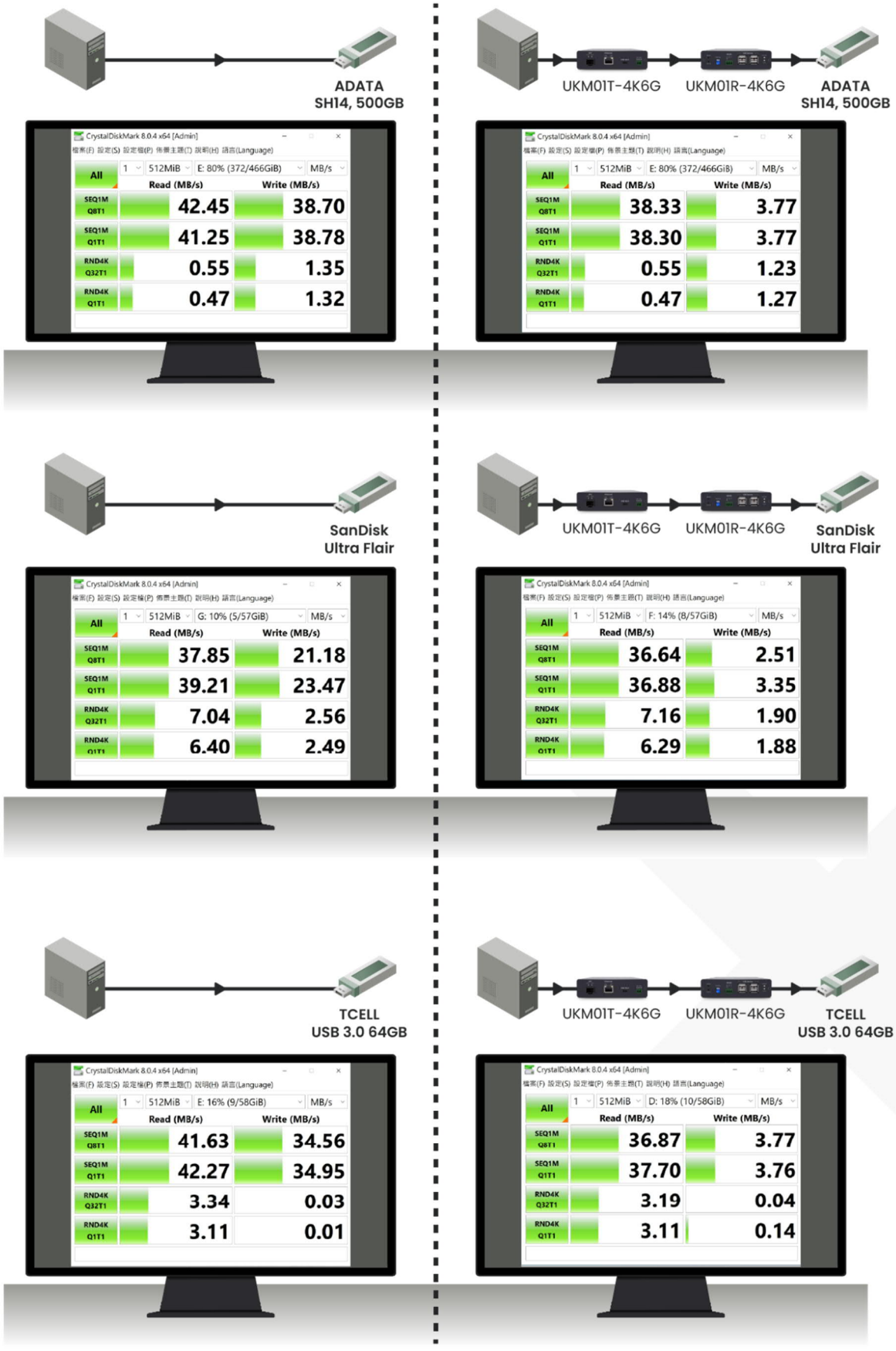
USB Interface

In addition to audiovisual data transmission, UKM01P-4K6G supports the transmission of USB data streams over IP. This feature allows users to transmit USB 2.0, USB 1.1 and USB 1.0 data between connected devices, such as computers, peripherals, USB storage devices, etc.



Read and write speed

UKM01P-4K6G uses four-pair STP/UTP cable to enable high-speed USB data transfer over a CAT5e cable or higher. UKM01P-4K6G has low impact on USB read/write speeds, the read and write speed via UKM01P-4K6G/direct transfer between USB host and USB device is shown as follows:



(Results may vary with devices from different manufacturers.)

USB Compatibility

UKM01P-4K6G complies with USB 2.0[4], it is backwards compatible with USB 1.1 and USB 1.0, and support all USB transfer types[5]. However, it's not certain that it will work with every USB device or host because different factors can affect how USB devices perform over long distances.
UKM01P-4K6G is compatible with a variety of communication protocols and device types, allowing it to send different kinds of data including files, sound, picture, and input from devices like mice, keyboards, and touchpads that connect via USB cable or Bluetooth.
UKM01P-4K6G supports one upstream port and 14 downstream ports with configurable endpoint type.

USB Power Delivery

UKM01P-4K6G is designed to operate flexibly under multiple power conditions. Power can be supplied from external adapters or provided through the USB-C connections from a host PC or display device. The UKM01PT-4K6G and UKM01PR-4K6G intelligently manage power distribution to ensure stable operation of audiovisual, USB, control data and Power Delivery functions.

Supported Power Scenarios:

Both Transmitter and Receiver Powered Externally

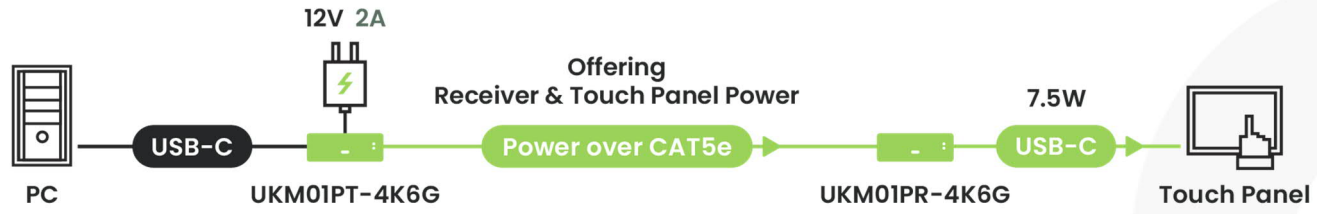
- Transmitter and Receiver each operate independently from their own adapters.
- No cross-power transmission is required.
- USB-C PD is not provided to connected devices by default.
- Recommended for installations requiring maximum stability and minimal PD dependency.

Only Transmitter Powered (12V 1A) and Power Forwarded to Receiver

[4] USB 2.0 supports speeds up to 480 Mbps.
[5] Control Transfers：Typically used for command and status operations, along with bulk, interrupt and isochronous transfers. Bulk Transfers：Used for transmission of large quantities of data, typically by mass storage devices, cameras that generate compressed video streams, and other devices that require fast file transfers.
Interrupt Transfers：Used by devices, such as keyboards and mice.
Isochronous Transfers：Used by time-sensitive devices such as streaming cameras and audio products.

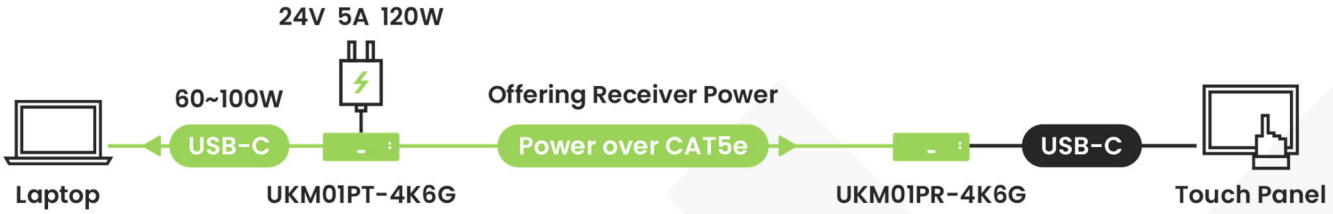
- The transmitter powers itself and supplies sufficient power to the receiver through the CAT cable.
- Receiver operates normally, including audiovisual, USB, and control functionality.
- USB-C PD to the display is not available in this configuration.
- Suitable for basic video and touch applications where the display has its own power.

Only Transmitter Powered (12V 2A) and Receiver Powered + PD to Display (7.5W)



- Higher-capacity 12V 2A power supply enables:
  - Operation of the transmitter
  - Forward powering of the receiver
  - USB-C Power Delivery (7.5W) to the connected monitor or touch panel
- Ideal for low-power USB-C displays or touch panels where light PD is sufficient for operation.

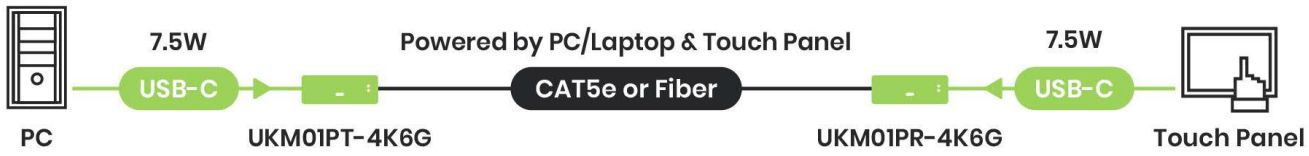
Only Transmitter Powered (24V 5A) and Full PD to Laptop (60~100W) + Receiver Powered



- The 24V 5A adapter enables the highest-power mode:
  - Full system power for the transmitter and receiver
  - High-power USB-C PD (60~100W) delivered upstream to a connected laptop
  - Supports power-hungry laptops while maintaining stable operation of the extender system
- Ideal for meeting rooms where the laptop is charged directly through the transmitter USB-C port.

No Power Adapters, PC Provides PD (30W) and Receiver Powered + PD to Display (7.5W)

- The transmitter is powered directly by a host PC that provides 30W PD.
- System can forward power to:
  - Receiver via CAT cable
  - USB-C PD output (7.5W) for the display or touch panel
- Suitable for setups where the PC can supply moderate power and the display requires only light USB-C power.



- The transmitter receives 7.5W from the host PC (minimum operating level).
- The receiver receives 7.5W from the USB-C display or touch panel.
- The system operates by combining available power from both ends.
- USB-C PD passthrough is limited, and no additional PD budget is available.
- Intended for minimal-power installations where both host and display contribute power.

Summary

Scenario	Transmitter Power Source	Receiver Power Source	Display Charging(PD)	Laptop Charging(PD)
1	12V 1A Adapter	12V 1A Adapter	Yes (7.5W)	No
2	12V 1A Adapter	PoC from Transmitter	No	No
3	12V 2A Adapter	PoC from Transmitter	Yes (7.5W)	No
4	24V 5A Adapter	PoC from Transmitter	Yes (7.5W)	Yes (60~100W)
5	PC PD 30W	PoC from Transmitter	Yes (7.5W)	No
6	PC PD 7.5W	Display PD 7.5W	No	No

Note:

The availability of 7.5W USB-C Power Delivery to the display depends on the total power consumption of USB peripherals connected to the system. If connected USB devices draw excessive power, the remaining power budget may not be sufficient to provide PD to the display.

RS232

UKM01P-4K6G supports RS232[6] control, used for connecting various electronic devices. It defines the electrical characteristics and timing of signals for serial communication between devices[7], 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 rate[8]. If one device transmits at a different baud rate than the other, communication errors may occur.

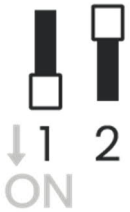
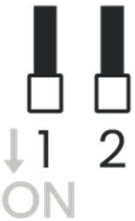
Lower baud rates are often chosen for longer communication distances and improved resistance to noise interference. In certain environments, a lower baud rate is preferred to ensure stable communication.

RS232 Setting – DIP switch

The following steps are the configuration for the RS232 setting:

1. Connect the UKM01PT-4K6G to UKM01PR-4K6G via Ethernet or fiber optic cable.
2. Connect the source and sink devices to the UKM01PT-4K6G and UKM01PR-4K6G respectively.
3. Adjust the DIP switch on UKM01PT-4K6G and UKM01PR-4K6G to set up the RS232 settings.

Refer to the instructions below to adjust the DIP switch.

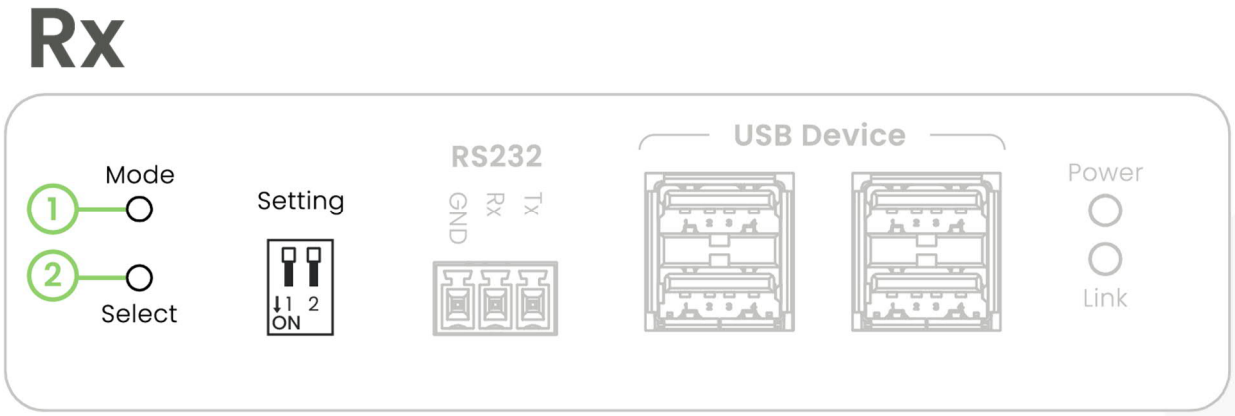
UKM01PT-4K6G / UKM01PR-4K6G				
SWITCH	Function/Settings			
Diagram				
Function	RS232 on (Default)	Debug console	Firmware Update	N/A

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

[7] 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).

[8] 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.

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



1. Press Button 1 on UKM01PR-4K6G to show the Mac address, IP address, and Baud Rate.
2. Press Button 2 to select a 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.

Technical Specification

UKM01P-4K6G	UKM01PT-4K6G	UKM01PR-4K6G
Compliance		
Standard	DP 1.2 (USB-C DP Alt Mode) PD 3.0 USB 2.0/ 1.1/ 1.0	
Max. Video Resolution	4K60Hz	
Max. Transmission Distance	160m over CAT5e/CAT6 20km over Single Mode Fiber Optic 550m over Multi-Mode Fiber Optic	
Dynamic Range Standard[9]	SDR, HDR	
Audio Format[10]	PCM 2CH	
Ports & Interfaces		
Video Input	1 x USB Type-C	1 x RJ45
Video Output	1 x RJ45	1 x USB Type-C
Power		
Power Supply[11]	12V 1A 12V 2A 24V 5A	12V 1A
Power Consumption	5.4W	4.92W
Power Saving	3.6W	2.64W
Ambient Temperature		
Operation	0 to 55°C	
Storage	-40 to 80°C	
Operating Altitude	2000m	
Humidity	Up to 95%	
Physical Characteristics		
Dimension	123 x 88 x 32mm	123 x 88 x 32mm
Weight	350.8 g	356.6 g

[9] Dynamic range metadata in the input stream is pass-through and fully maintained.

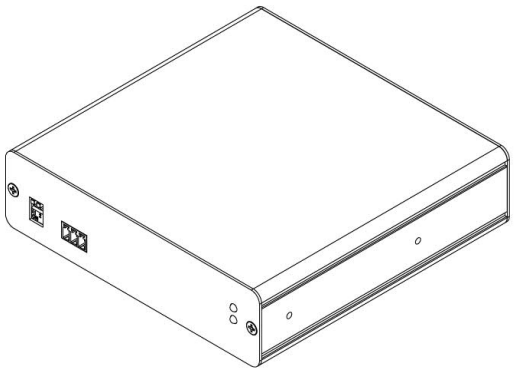
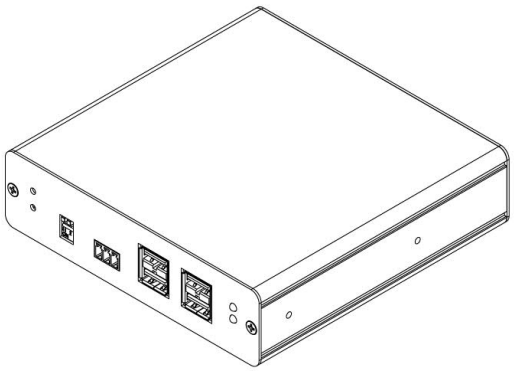
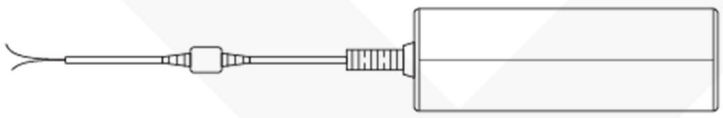
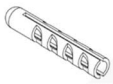
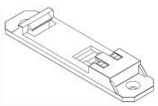
[10] Audio data in the input stream is pass-through and fully maintained.

[11] Check USB Power Delivery Section for more information

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 USB 3.2 Gen 2 (10Gbps) or Thunderbolt 3 cables supporting DP Alt Mode for high-resolution video and USB 2.0 signals 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 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. Transmission can be selected between Ethernet cable and SFP optical fiber cable, but cannot work at the same time.
10. Power delivery is not supported when using fiber extension.

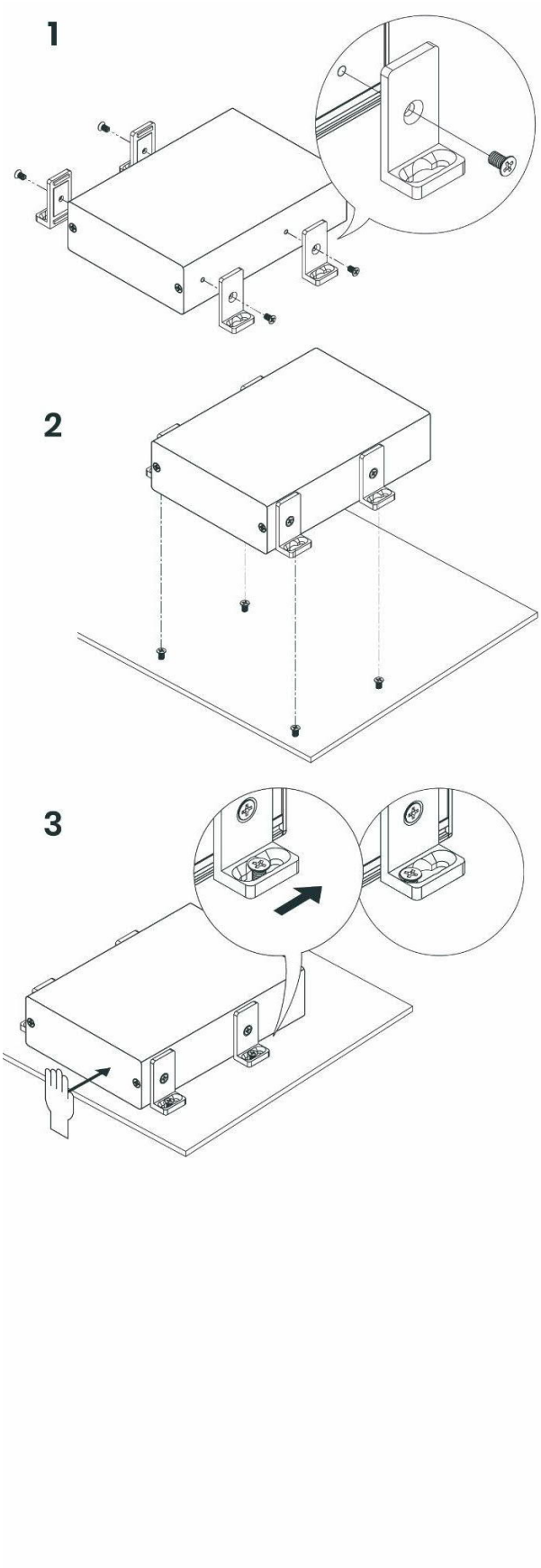
Package Includes

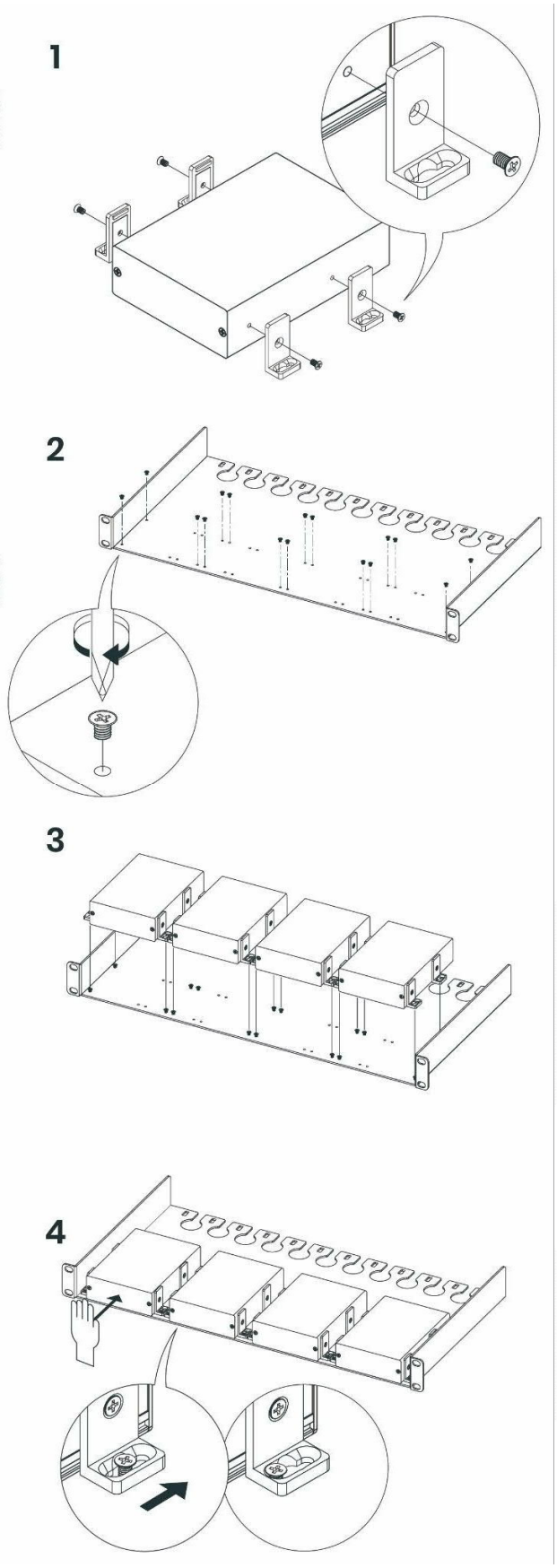
Item	Amount	Image
UKM01PT-4K6G (Transmitter)	1 pc	 The unit has a width of 88mm and accommodates three units within a standard 19-inch rack
UKM01PR-4K6G (Receiver)	1 pc	 The unit has a width of 88mm and accommodates three units within a standard 19-inch rack
DC 24V5A Power Adapter	1 pc	
USB C to C cable	2 pcs	
Mounting Screw Pack	2 bags	 4 pcs (bag)  4 pcs (bag)  4 pcs (bag)  4 p (ba  1 pcs (bag)
Rubber gasket Pack	2 bags	 x4

Installation

Installed on a Platform

Installed on a Rack


1
2
3


1
2
3
4