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ALFATRON ELECTRONICS GmbH

GERMANY

ALF-MUK44N

4K 4x4 Matrix with Audio Outputs



Preface

Read this user manual carefully before using this product. Pictures shown in this manual is for reference only, different model and specifications are subject to the real product.

This manual is only for operation instruction, not for any maintenance usage. The functions described in this version are updated till March 2017. Any changes in functions and parameters since then will be informed separately. Please refer to the dealers for the latest details.

Trademarks

Product model and logo are trademarks. Any other trademarks mentioned in this manual are acknowledged as the properties of the trademark owner. No part of this publication may be copied or reproduced without the prior written consent.

FCC Statement

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at their own expense will be required to take whatever measures may be necessary to correct the interference

Any changes or modifications not expressly approved by the manufacture would void the user's authority to operate the equipment.



Do not dispose of this product with the normal household waste at the end of its life cycle. Return it to a collection point for the recycling of electrical and electronic devices. This is indicated by the symbol on the product, user manual or packaging. The materials are reusable according to their markings. By reusing, recycling or other forms of utilisation of old devices you make an important contribution to the protection of our environment. Please contact your local authorities for details about collection points.

Important Safety Instructions

- Do not expose this device to rain, moisture, dripping or splashing. No objects filled with liquids, such as vases, shall be placed on the device.
- Do not install or place this unit in a bookcase, built-in cabinet, or in another confined space. Ensure the unit is well ventilated.
- To prevent risk of electric shock or fire hazard due to overheating, do not obstruct the unit's ventilation openings with newspapers, tablecloths, curtains, or similar items.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other device (including amplifiers) that produce heat.
- Do not place sources of naked flames, such as lighted candles, on the unit.
- Clean this device only with dry cloth.
- Unplug this device during lightning storms or when unused for long periods of time.
- Protect the power cord from being walked on or pinched, particularly at plugs.
- Only use attachments / accessories specified by the manufacturer.
- Refer all servicing to qualified service personnel

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Introduction

Overview

The ALF-MUK44N is a 4x4 compact HDMI matrix switcher, specially designed for cost conscious projects and buyers. It features not only basic functions like cross-point switching and control (IR, RS-232 and IP), but also advanced functions such as auto-downscaling for each HDMI output when it is connected to 1080P display. There is a SPDIF audio breakout for each HDMI output, to provide more audio feeds to multi-zone audio system.

Features

- 4 HDMI Inputs and 4 HDMI Outputs.
- All HDMI inputs and outputs support HDMI with HDR formats, including HDR 10, HLG, DOLBY VISION up to 4K@60 4:4:4.
- HDCP2.2 compliant.
- With built-in 4K-1080P downscaling for each HDMI Output, the matrix can downscale 4K@60Hz 4:4:4 to 1080P@60 4:4:4. 4K downscaling works automatically when the matrix is connected to a 1080P display and can be set to ON/OFF by API commands.
- Each HDMI output has a SPDIF audio breakout and supports formats up to 5CH HBR (High Bit Rate) or 2CH PCM audio.
- Supports smart EDID; each input can be assigned to smart EDID mode.
- Supports EDID presets, EDID copy and EDID write. By default, each input EDID is set as 4K@60 4:4:4 HDR with 5.1CH encoded audio.
- Supports audio mute as the four SPDIF outputs can be muted separately by API commands.

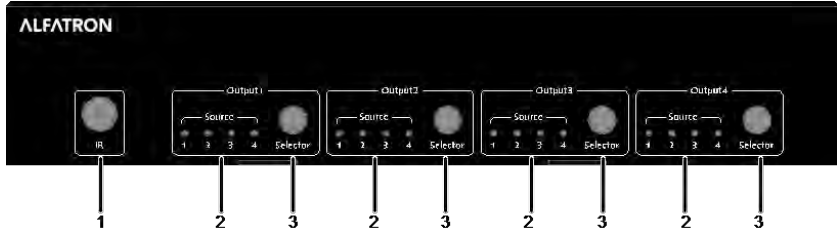
- Supports upgrading firmware via both micro-USB and web UI (for MCU and web module).
- Rich control options, including RS-232, IR, IP Control and front panel buttons control.

Package Contents

- Matrix x 1
- Power Adapter (DC 12V 2A) x 1
- AC Power Cord with US Pins x 1
- IR Remote x 1
- IR Receiver x 1
- Phoenix Male Connector (3.5mm, 3-Pin) x 1
- Mounting Brackets (with Screws) x 2
- User Manual x 1

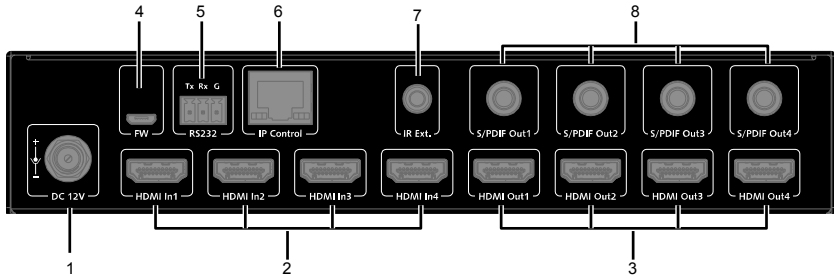
Panel

Front Panel



No.	Name	Description
1	IR Window	Receive IR signals.
2	Input LED (1-4)	On: The current HDMI input is selected. Off: The current HDMI input is not selected.
3	Output Selection Button (1-4)	Press to select input source for each output (1-4) separately.

Rear Panel



No.	Name	Description
1	DC 12V	Connect to the DC 12V power adapter provided.
2	HDMI In 1-4	Connect to HDMI sources such as a Blu-ray Player.
3	HDMI Out 1-4	Connect to HDMI displays.
4	FW	For firmware upgrade.
5	RS-232	Connect to a control PC or control system for RS-232 serial control.
6	IP Control	Connect to local area network or a control system for telnet or Web UI control. Port 23
7	IR Ext.	Connect to the IR receiver cable provided.
8	SPDIF Out 1-4	Connect to audio devices such as AV system for digital de-embedded audio output from HDMI OUT 1-4.

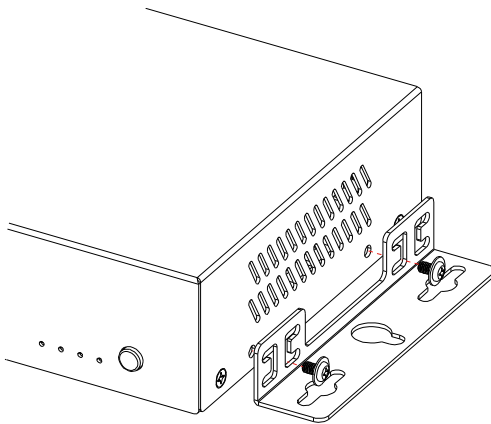
Installation and Application

Bracket Installation

Note: Before installation, please ensure the device is disconnected from the power source.

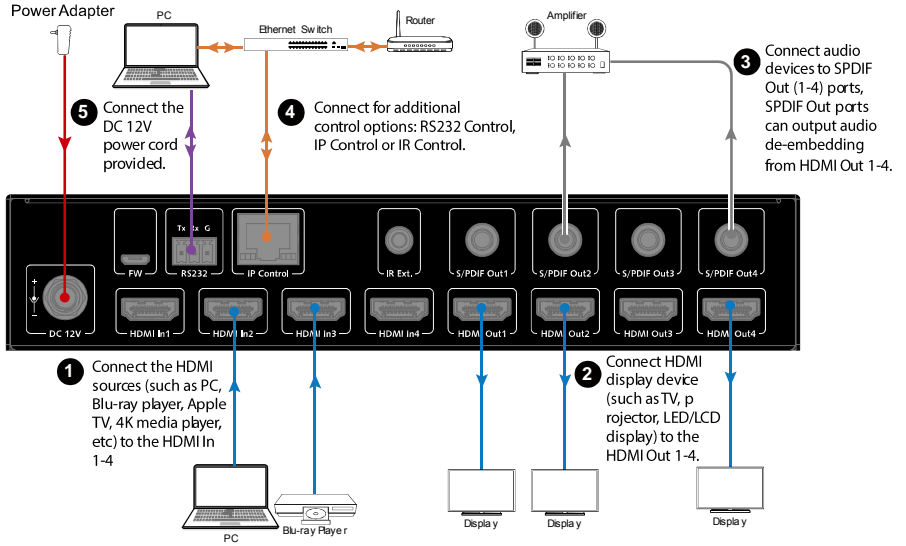
Steps to install the device in a suitable location

1. Attach the installation bracket to the enclosure using the screws that are provided in the package separately.
2. The bracket is attached to the enclosure as shown below.



3. Repeat steps from 1 to 2 for the other side of the unit.
4. Attach the brackets to the desired surface using the screws (separately).

Application

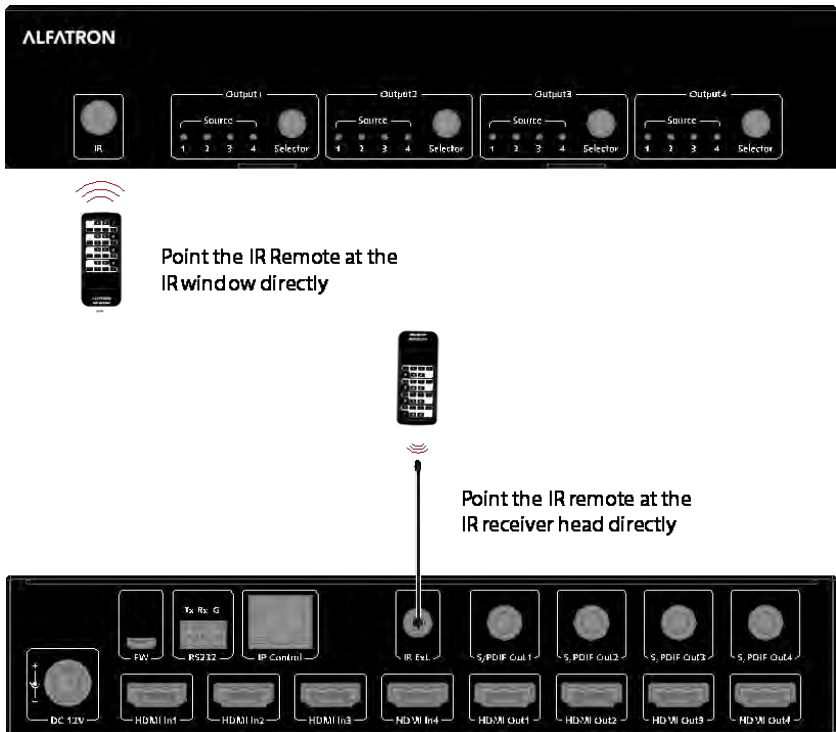


IR Remote Control

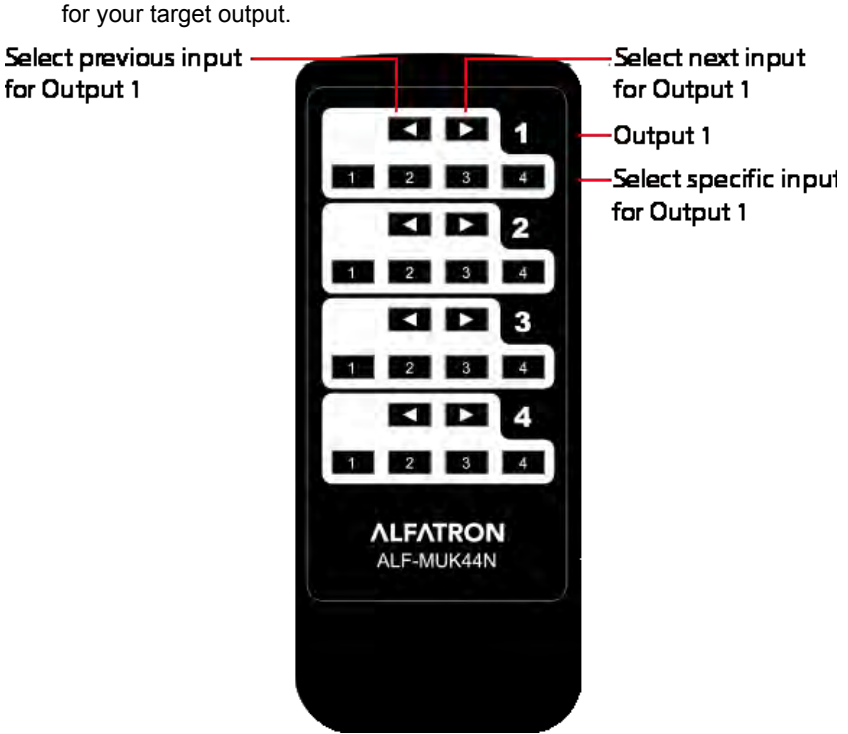
You can switch among multiple inputs for each output display by pointing the matrix IR remote directly at the IR window on the front panel or the IR receiver connected to the rear panel.

Steps for IR Remote Operation:

1. Point the matrix IR Remote directly at the IR window on front panel or at the IR receiver connected to the rear panel. As shown in the following pictures:



2. Locate the target output you want to switch inputs for on the remote, numbered 1-4 vertically along the right side.
3. Press the desired input number to select the corresponding input source



- To cycle through multiple inputs for your target output, press the previous (◀) or next (▶) button.

Virtual IR Code Supported by Default (Matrix Switching Code):

Code	IN1	IN2	IN 3	IN 4
OUT 1	0X80	0X81	0X82	0X83
OUT 2	0X90	0X91	0X92	0X93
OUT 3	0XA0	0XA1	0XA2	0XA3
OUT 4	0XB0	0XB1	0XB2	0XB3

RS-232 Control

Advanced users may need to control the matrix through RS-232 serial communication. Connect a control PC or control system to the RS-232 port of the receiver. API commands for RS-232 control is available in the separate document “API Command Set_ALF-MUK44N”. A 3rd party RS-232 serial interface software may be required for testing or debugging.

Before executing the API command through an RS-232 serial connection, please ensure the RS-232 interface of the device and the control PC are configured correctly.

Serial Port Parameters and settings:

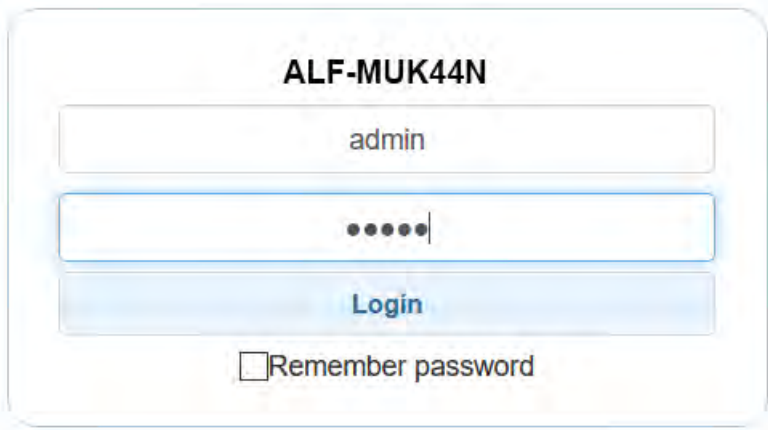
Parameters	Value
Baud Rate	115200 bps
Data Bits	8 bits
Parity	None
Stop Bits	1 bit
Flow Control	None

Web UI Control

The Web UI designed for the matrix is available for switching control, general and advanced settings. The Web UI is accessible through a browser such as, Chrome, Firefox, Safari, Opera, IE10+, etc.

Accessing the Web Interface

1. Connect the IP Control port of the matrix to the Ethernet switch and connect your PC to the same network.
Note: The IP mode of the matrix is DHCP and utilizes **port number 23** for control, please ensure the Ethernet switch is connected to a DHCP server.
2. Use the tool such as 'SmartSetGUI' to search the IP address of the device or send API command to get IP address (See the separate document "API Command Set_ALF-MUK44N").
3. Input the IP address in your browser and press Enter to enter the login page.
4. Enter the username and password on the login page, then click "Login".
5. The default username and password are both "**admin**".



Web Interface Introduction

The main screen includes General and Advanced Setting.

General

The General Page includes: Switch, EDID, EDID Read, CEC, Audio Mute, HDCP and Preset.

(1) Switch

Switch

Outputs/Inputs	INPUT 1	INPUT 2	INPUT 3	INPUT 4
OUTPUT 1	■			
OUTPUT 2		■		
OUTPUT 3			■	
OUTPUT 4				■
ALL				

The Switch section manages distribution of input sources to output displays. By default, Input 1 corresponds to Output 1, Input 2 corresponds to Output 2,

i.e. Input (n) corresponds to Output (n), n = 1, 2, 3, 4.

Click the button in the table to select the input for the output display (button turns from white to green once selection is done).

ALL: Click to switch INPUT (n) for all OUTPUTs.

(2) EDID



The screenshot shows a web interface titled "EDID" with four input configuration sections:

- INPUT 1:** A dropdown menu showing "4K@60Hz 5.1ch audio With HDR" and an "Apply" button.
- INPUT 2:** A dropdown menu showing "4K@60Hz 5.1ch audio With HDR" and an "Apply" button.
- INPUT 3:** A dropdown menu showing "4K@60Hz 5.1ch audio With HDR" and an "Apply" button.
- INPUT 4:** A dropdown menu showing "4K@60Hz 5.1ch audio With HDR" and an "Apply" button.

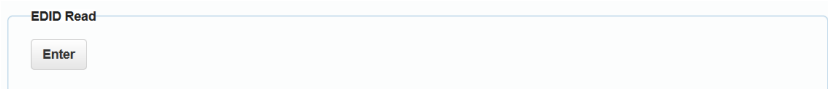
This section allows you to configure EDID settings of each input port.

Select the item from the drop-down menu, then click "Apply" to take effect.

Note: If EDID copy fails, the input EDID will be 4K@30Hz 2.0ch audio.

By default, input EDID is set as 4K@60Hz 5.1ch audio with HDR.

EDID Read



The screenshot shows a web interface titled "EDID Read" with a text input field and an "Enter" button.

Click "Enter" to open the EDID Setting page.

- **Select Port:** Click from the drop-down menu to choose an Output port (1-4) for EDID setting.
- **Read:** Click to read the EDID of the Output port you choose.
- **Write:** Click to write the EDID of the Output port you choose to corresponding Input selected by the output.
- **Save:** Click to save the EDID of the Output as bin file to a desired location.
- **Open:** Click to open an EDID file from the local PC. Then you can click "Write" to write the EDID information instead of Output port's EDID to corresponding Input.

(3) CEC

- Output Port:** Select one Output (1-4) port or all from the drop-down menu to control.

Note: When Output port is set to “all”, the Auto CEC and Delay Time (min) settings are disabled.
- Manual (ON/OFF):** Click “ON/OFF” button to power on/off the CEC-enabled display immediately.
- Auto CEC:** Click “ON/OFF” button to set Auto CEC control enable/disable.
- The default setting is “ON”.
- Delay Time (min):** Click the up/down arrow to set the time for the display to power off automatically when no signal is present, then click “Apply” to take effect. For example, if Auto control is set as on and the time is set to 2 minutes, click “Apply”, the output display will power off automatically when there’s no signal at the display for 2 minutes.

(4) Audio Mute



- ON/OFF:** This section allows you to set Audio output (1-4) mute to ON/OFF. The default setting is OFF.

Note: The SPDIF Out 1-4 is following the audio output of HDMI OUT.

(5) HDCP



HDCP Support allows you to enable or disable HDCP compatibility of each input. By default, HDCP Support is switched ON at each input and content protected by HDCP standard will be received.

(6) Preset

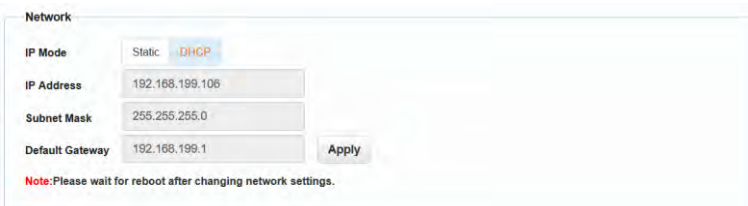


The Preset section saves or loads the Switch settings to or from the matrix.

Advanced

The Advanced page includes Network, Login Password, Custom Web UI Logo, WEB Firmware Upgrade, ARM Firmware Upgrade, MCU Firmware Upgrade, System, Firmware Version.

(1) Network



Network settings is used to toggle between the dynamic and static IP addressing.

- **DHCP:** When enabled, the IP address of the Matrix is assigned automatically by the DHCP server connected.
- **Static:** When enabled, set up the IP address manually.

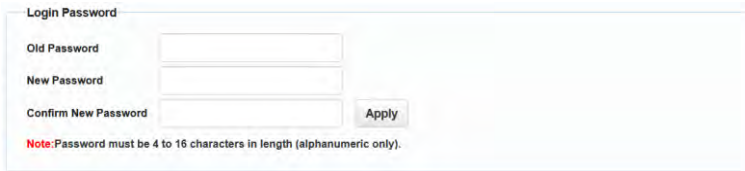
- **Apply:** Click to enable the network setting.

The default setting is DHCP.

Note:

- When “Static” is selected, please ensure your PC is in the same network segment as the Matrix, i.e. the IP address of your PC should be set as 192.168.xxx.xxx (x is suggested among 2 to 253).
- Please wait for 2-3 minutes for the Matrix’s LAN module to reboot and reconnect after the network setting is changed.

(2) Login Password



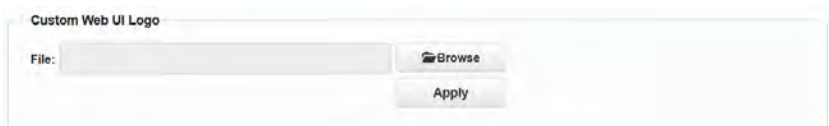
This section allows you to change login password. The default password is “admin”.

- **Apply:** Click to save the changes.

Note: The new password must be 4 to 16 characters in length (alphanumeric only).

(3) Custom Web UI Logo

Custom Web UI Logo allows you to load your own logo for the Web UI.



To create customized Web UI logo:

- 1) Click “Browse” button to browse the LOGO file.

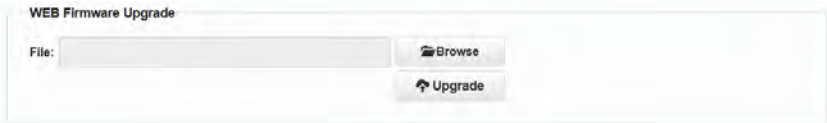
- 2) Click "Apply", and the following window will appear. Click "here" to reconnect the system. When completed, the new logo will appear on the upper left corner of the screen.

Congratulations

If no image appears please clear the web browser history.

Please click [here](#) to reconnect system

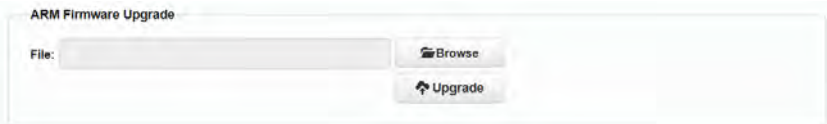
(4) WEB Firmware Upgrade



- 1) Click "Browse" to load the update file.
- 2) Click "Update" to start the Web UI upgrade.
- 3) The matrix LAN Module will update and reboot automatically when Web UI is completed. Please wait for about 3 minutes and then refresh the web page and log in again.

Note: DO NOT disconnect the matrix during update process.

(5) ARM Firmware Upgrade

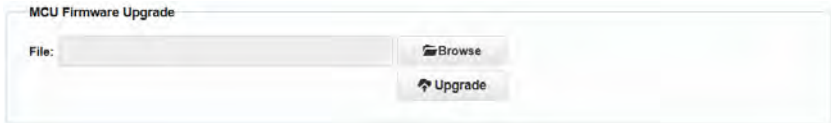


- 1) Click "Browse" to load the update bin file.
- 2) Click "Upgrade" to start the ARM Firmware upgrade.
- 3) The matrix will upgrade and reboot automatically when upgrading ARM

is completed. Please wait for about 3 minutes and then refresh the web page and log in again.

Note: DO NOT power off the device when upgrading.

(6) MCU Firmware Upgrade



- 1) Click "Browse" to load the update bin file.
- 2) Click "Upgrade" to start the MCU Firmware upgrade.
- 3) The matrix will upgrade and reboot automatically when upgrading MCU is completed. Please wait for about 3 minutes and then refresh the web page and log in again.

Note: DO NOT power off the device when upgrading.

(7) System



This section allows you to reset the device to factory default settings or reboot the device.

To reset the device to factory default settings:

Click the "Factory Default" icon, the following window will be popped up, click "OK" to reset the device to factory default.



Note: Please wait about 30 seconds before refreshing the browser to access the Web UI.

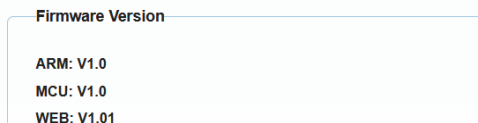
To reboot the device:

Click the “Reboot” icon, the following window will pop up, click “Ok” to reboot the device.



Note: Please wait about 30 seconds before refreshing the browser to access the Web UI.

(8) Firmware Version



This section allows you to obtain information of the current firmware in use.

Specifications

Technical	
Input/Output Port	4 x HDMI In, 4 x HDMI Out, 1 x RS-232, 1 x IP Control (RJ45), 4 x SPDIF Out (Digital), 1 x FW (Micro USB), 1 x DC 12V IN
Input/Output Signal Type	HDMI with 4K@60Hz 4:4:4, HDR 10, HLG & Dolby Vision, HDCP 2.2 Note: Dolby vision is not supported in down scaler mode.
Input/Output Resolution Supported	VESA: 800x600 ⁸ , 1024x768 ⁸ , 1280x768 ⁸ , 1280x800 ⁸ , 1280x960 ⁸ , 1280x1024 ⁸ , 1360x768 ⁸ , 1366x768 ⁸ , 1440x900 ⁸ , 1600x900 ⁸ , 1600x1200 ⁸ , 1680x1050 ⁸ , 1920x1200 ⁸ SMPTE: 720x576P ⁶ , 1280x720P ^{6,7,8} , 1920x1080P ^{2,5,6,7,8} , 3840x2160 ^{2,3,5,6,8} , 4096x2160 ^{2,3,5,6,8} 2 = at 24 Hz, 3 = at 25 Hz, 5 = at 30 Hz, 6 = at 50 Hz, 7 = at 59.94 Hz, 8 = 60 Hz
Audio Format	HDMI IN/OUT: Fully supports audio formats in HDMI 2.0 specification, including PCM 2.0/5.1/7.1, Dolby TrueHD, Dolby Atmos, DTSHD Master Audio and DTS:X S/PDIF OUT: Supports PCM 2.0/5.1, Dolby digital and DTS up to 5.1 Channel
Maximum Data Rate	18Gbps
Control Method	Front Panel Buttons, RS-232, IR, IP (Telnet &Web UI)

General	
Operating Temperature	0°C to 45°C (32°F to 113°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	10% to 90%, non-condensing
ESD Protection	Human-body Model: ±8kV (Air-gap discharge)/ ±4kV (Contact discharge)
Power Supply	DC 12V 2A
Power Consumption (Max)	10.8W
Device Dimension (W x H x D)	215mm x 42mm x 120.2mm/8.46" x 1.65" x 4.73" (Without mounting brackets)"
Product Weight	0.54kg/1.19lb

Transmission Distance

Cable Type	Range	Supported Video
HDMI	Input: 15m/50ft Output: 10m/33ft	1080P@60Hz 24bpp
	Input/Output: 10m/33ft	4K@30Hz 4:4:4 24bpp 4K@60Hz 4:2:0 24bpp
	Input/Output: 3m/10ft	4K@60Hz 4:4:4 24bpp

Trouble Shooting

Troubleshooting steps:

- 1 **Power:** Please make sure all devices are powered on. (source, matrix, display devices)
- 2 **Indicator:** Please make sure LED indicators of the device are normal according to the user manual.
- 3 **Devices:** Please ensure picture can be shown normally when connecting source to display devices directly.
- 4 **Cable:** Plug in and out HDMI cable or try another HDMI cable.
- 5 **Compatibility:** Please test other source and display devices to determine whether it is a compatibility issue.

Warranty

1.1 This limited warranty covers defects in materials and workmanship in this product.

1.2 Should warranty service be required, proof of purchase must be presented to the Company. The serial number on the product must be clearly visible and not have been tampered with in any way whatsoever.

1.3 This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by the Company to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover equipment enclosures, cables or accessories used in conjunction with this product.

This limited warranty does not cover the cost of normal maintenance. Failure of the product due to insufficient or improper maintenance is not covered.

1.4 The Company does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

1.5 Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

1.6 Unless otherwise specified, the goods are warranted in accordance with the manufacturer's product specific warranties against any defect attributable to faulty workmanship or materials, fair wear and tear being excluded.

1.7 This limited warranty only covers the cost of faulty goods and does not include the cost of labor and travel to return the goods to the Company's premises.

1.8 In the event of any improper maintenance, repair or service being carried out by any third persons during the warranty period without the Company's written authorization, the limited warranty shall be void.

1.9 A 7 (seven) year limited warranty is given on the aforesaid product where used correctly according to the Company's instructions, and only with the use of the Company's components.

1.10 The Company will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1.10.1 Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition.; or

1.10.2 Replace this product with a direct replacement or with a similar product deemed by the Company to perform substantially the same function as the original product; or

1.10.3 Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

1.11 The Company is not obligated to provide the Customer with a substitute unit during the limited warranty period or at any time thereafter.

1.12 If this product is returned to the Company this product must be insured during shipment, with the insurance and shipping charges prepaid by the Customer. If this product is returned uninsured, the Customer assumes all risks of loss or damage during shipment. The Company will not be responsible for any costs related to the removal or reinstallation of this product from or into any installation. The Company will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

1.13 Please be aware that the Company's products and components have not been tested with competitor's products and therefore the Company cannot warrant products and/or components used in conjunction with competitor's products.

1.14 The appropriateness of the goods for the purpose intended is only warranted to the extent that the goods are used in accordance with the Company's installation, classification and usage instructions.

1.15 Any claim by the Customer which is based on any defect in the quality or condition of the goods or their failure to correspond with specification shall be notified in writing to the Company within 7 days of delivery or (where the defect or failure was not apparent on reasonable inspection by the Customer) within a reasonable time after discovery of the defect or failure, but, in any event, within 6 months of delivery.

1.16 If delivery is not refused, and the Customer does not notify the Company accordingly, the Customer may not reject the goods and the Company shall have no liability and the Customer shall pay the price as if the goods had been delivered in accordance with the Agreement.

1.17 THE MAXIMUM LIABILITY OF THE COMPANY UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT.