

visual engineering
LIGHTWARE

User's Manual



MX2M-FR24R

Hybrid Modular Multimedia Matrix

Important Safety Instructions

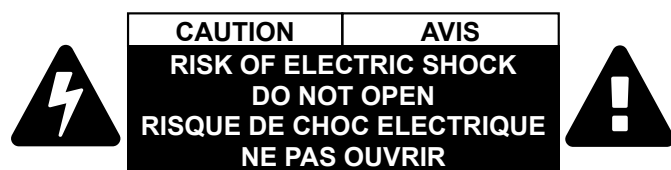
Class I apparatus construction.

This equipment must be used with a mains power system with a protective earth connection. The third (earth) pin is a safety feature, do not bypass or disable it. The equipment should be operated only from the power source indicated on the product.

To disconnect the equipment safely from power, remove the power cord from the rear of the equipment, or from the power source. The MAINS plug is used as the disconnect device, the disconnect device shall remain readily operable.

There are no user-serviceable parts inside of the unit. Removal of the cover will expose dangerous voltages. To avoid personal injury, do not remove the cover. Do not operate the unit without the cover installed.

The appliance must be safely connected to multimedia systems. Follow instructions described in this manual.



Replacing the AC fuse

Unplug the AC power cord from the device. Locate the AC fuse on the rear panel. Replace only the AC fuse as indicated on the rear panel. Connect the power cord to the switcher and to the AC power source. Make sure the switcher is working properly.

Ventilation

For the correct ventilation and to avoid overheating ensure enough free space around the appliance. Do not cover the appliance, let the ventilation holes free and never block or bypass the ventilators (if any).

WARNING

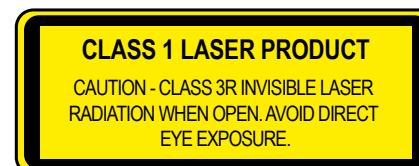
To prevent injury, the apparatus is recommended to securely attach to the floor/wall or mount in accordance with the installation instructions. The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus. No naked flame sources, such as lighted candles, should be placed on the apparatus.

Waste Electrical & Electronic Equipment WEEE

This marking shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.



Caution: Laser product



Common Safety Symbols

Symbol	Description
	Alternating current
	Protective conductor terminal
	On (Power)
	Off (Power)
	Caution, possibility of electric shock
	Caution
	Laser radiation

Symbol Legend

The following symbols and markings are used in the document:

WARNING! Safety-related information which is highly recommended to read and keep in every case!

ATTENTION! Useful information to perform a successful procedure; it is recommended to read.


DIFFERENCE: Feature or function that is available with a specific firmware/hardware version or product variant.


INFO: A notice which may contain additional information. Procedure can be successful without reading it.


DEFINITION: The short description of a feature or a function.


TIPS AND TRICKS: Ideas which you may have not known yet but can be useful.

Navigation Buttons

 Go back to the previous page. If you clicked on a link previously, you can go back to the source page by pressing the button.

 Navigate to the Table of Contents.

 Step back one page.

 Step forward to the next page.

Document Information

All presented functions refer to the indicated products. The descriptions have been made during testing these functions in accordance with the indicated Hardware/Firmware/Software environment:

Item	Version
Lightware Device Controller (LDC) software	2.5.4b3
Lightware Device Updater V2 (LDU2) software	2.8.0b2
Firmware package	1.1.0

Document revision: **v1.1**

Release date: **24-03-2021**

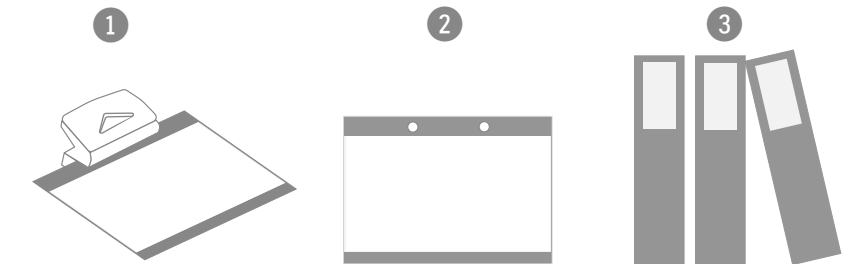
Editor: Tamas Forgacs

About Printing

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TIPS AND TRICKS: Thanks to the size of the original page, a border around the content (grey on the second picture below) makes possible to organize the pages better. After punching the printed pages, they can be placed easily into a ring folder.



Hashtag (#) Keywords in the Document

This user's manual contains keywords with hashtag (#) to help you to find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the # (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP setting command in the LW3 Programmer's reference section.

See the list of all hashtag keywords of the document in the [Hashtag Keyword List](#) section.

Table of Contents

1. INTRODUCTION	7	4. INSTALLATION	30	6. SOFTWARE CONTROL - BUILT-IN WEBSITE	47
1.1. DESCRIPTION	8	4.1. MOUNTING OPTIONS	31	6.1. ESTABLISHING THE CONNECTION	48
1.2. BOX CONTENTS	8	4.2. BOARD INSTALLATION AND HANDLING	32	6.2. THE LAYOUT OF THE BUILT-IN WEB	48
1.3. FEATURES	9	4.2.1. The Layout of the Input/Output Board Slots.....	32	7. SOFTWARE CONTROL - LIGHTWARE DEVICE CONTROLLER	49
1.4. APPLICATION DIAGRAMS	11	4.2.2. Installation of an I/O Board.....	33	7.1. INSTALL AND UPGRADE	50
1.4.1. Live Event Application.....	11	4.3. POWER DRAWER INSTALLATION	33	7.2. RUNNING THE LDC	50
1.4.2. TV Studio Application	12	4.4. ELECTRICAL CONNECTIONS	34	7.3. ESTABLISHING CONNECTION	50
2. PRODUCT OVERVIEW	13	4.4.1. AC Power Connection	34	7.4. CROSSPOINT MENU	52
2.1. MATRIX FRAME - FRONT VIEW	14	4.4.2. USB Mini-B Connector	34	7.4.1. Video Layer	52
2.2. MATRIX FRAME - REAR VIEW	15	4.4.3. Ethernet Connectors	34	7.4.2. Audio Layer	53
2.3. AUXILIARY (AUX) BOARDS	16	4.4.4. RS-232 Connector	35	7.4.3. Legend of the Port Tiles.....	53
2.3.1. MX2M-AUX-DANTE-32CH.....	16	4.4.5. Symmetrical Analog Stereo Audio Connector.....	35	7.5. VIDEO PORT PROPERTIES WINDOWS	55
2.3.2. MX2M-AUX-8AUDIO	17	4.4.6. HDMI Connector	35	7.5.1. HDMI / OPTJ Input Port Properties.....	55
2.4. INPUT (IB) BOARDS	17	4.4.7. DisplayPort Connector	35	7.5.2. DisplayPort Input Port Properties	55
2.4.1. MX2M-4HDMI20-IB	17	4.4.8. SC Fiber Optical Connector.....	35	7.5.3. HDMI / OPTJ Output Port Properties	56
2.4.2. MX2M-4OPTJ-IB	18	4.5. ANALOG AUDIO PORT CONFIGURATION	35	7.5.4. Frame Detector.....	56
2.4.3. MX2M-DH-4DP12-IB.....	19	4.6. CONNECTING STEPS	36	7.5.5. CEC Controller	57
2.5. OUTPUT (OB) BOARDS	20	4.7. POWERING ON	37	7.6. AUDIO PORT PROPERTIES WINDOWS	58
2.5.1. MX2M-4OPTJ-OB.....	20	5. HYBRID MODULAR MATRIX CONCEPT	38	7.6.1. Digital Audio Input Port Properties	58
2.5.2. MX2M-4HDMI20-OB.....	21	5.1. VIDEO LAYER	39	7.6.2. Digital Audio Output Port Properties.....	58
2.6. POWER DRAWERS	21	5.1.1. Port Diagram.....	39	7.6.3. Analog Audio Input Port Properties	59
2.6.1. MX2M-PSU-500-F	21	5.1.2. Video Signal Transmission - Example.....	40	7.6.4. Analog Audio Output Port Properties	59
2.6.2. MX2M-PSU-1250-FP	21	5.2. AUDIO LAYER	41	7.6.5. Dante® Audio Input Port Properties.....	60
3. FRONT PANEL CONTROL	22	5.2.1. Overview.....	41	7.6.6. Dante® Audio Output Port Properties.....	60
3.1. FRONT PANEL BUTTON OPERATIONS	23	5.2.2. Digital Audio Interface	41	7.7. PRESETS	61
3.1.1. Take / Autotake Mode.....	23	5.2.3. Analog Audio Interface	41	7.8. EDID MANAGEMENT MENU	62
3.1.2. View Crosspoint State.....	23	5.2.4. Dante® Audio Interface.....	42	7.8.1. EDID Operations	62
3.1.3. Switching Operations.....	23	5.2.5. Multichannel Routing to the Outputs	43	7.8.2. Editing an EDID	63
3.1.4. Preset Operations.....	24	5.2.6. Audio Signal Transmission - Example.....	44	7.8.3. Creating an EDID - Easy EDID Creator	63
3.1.5. Output Lock	25	5.3. CONSUMER ELECTRONICS CONTROL (CEC) INTERFACE	45	7.8.4. EDID Summary Window	64
3.1.6. Control Lock.....	26	5.4. ETHERNET LAYER	45	7.9. SETTINGS MENU	64
3.2. FRONT PANEL LCD MENU OPERATIONS	26	5.4.1. Control Mode	45	7.9.1. Overview.....	64
3.2.1. Introduction.....	26	5.4.2. Firmware Upgrade Mode	45	7.9.2. Network.....	65
3.2.2. System Settings Menu	27	5.4.3. User Ethernet Mode.....	45	7.9.3. System Log.....	65
3.2.3. Input Ports Menu.....	27	5.5. LICENSING	45	7.9.4. System	66
3.2.4. Output Ports Menu	28	5.6. FURTHER BUILT-IN FEATURES	46	7.10. TERMINAL WINDOW	66
3.2.5. EDID Menu	28	5.6.1. Device Cloning – Configuration Backup and Restore.....	46	7.11. HEALTH MENU	67
3.2.6. Preset Menu.....	29	5.6.2. Advanced EDID Management.....	46	7.11.1. Overview	67
3.2.7. Health Menu	29	5.7. SOFTWARE CONTROL MODES	46	7.11.2. Frame	67

Table of Contents

7.11.3. Aux Slots	68	8.6. VIDEO SWITCHING AND CROSSPOINT SETTINGS	79	8.10. VIDEO DESTINATION PORT SETTINGS - HDMI / OPTJ.....	86
7.11.4. Input Slots	68	8.6.1. Query the Video Crosspoint State	79	8.10.1. Color Space Conversion Setting.....	86
7.11.5. Output Slots	69	8.6.2. Switching an Input to an Output	79	8.10.2. Signal Type Setting.....	86
7.11.6. PSU Drawer Slots	69	8.6.3. Disconnect the Output from any Input.....	79	8.10.3. Power 5V Setting.....	87
7.11.7. Failing Devices.....	70	8.6.4. Switching an Input to All Outputs.....	79	8.10.4. HDCP Mode Setting	87
8. LW3 PROGRAMMERS' REFERENCE	71	8.6.5. Multiple Switching	80	8.10.5. Audio Source Setting	87
8.1. OVERVIEW.....	72	8.6.6. Muting a Video Input.....	80	8.11. ANALOG AUDIO PORT PROPERTIES	88
8.2. INSTRUCTIONS FOR THE TERMINAL APPLICATION USAGE.....	72	8.6.7. Unmuting a Video Input	80	8.11.1. Query the Input Ports of the Board	88
8.3. PROTOCOL RULES.....	72	8.6.8. Locking a Video Input.....	80	8.11.2. Query the Output Ports of the Board.....	88
8.3.1. LW3 Tree Structure and Command Structure (examples).....	72	8.6.9. Unlocking a Video Input	80	8.11.3. Volume Setting in dB.....	88
8.3.2. General Rules.....	72	8.6.10. Muting a Video Output	80	8.11.4. Volume Setting in dB by Steps	89
8.3.3. Command Types	73	8.6.11. Unmuting a Video Output	80	8.11.5. Volume Setting in Percent	89
8.3.4. Prefix Summary	73	8.6.12. Locking a Video Output.....	81	8.11.6. Volume Setting in Percent by Steps.....	89
8.3.5. Error Messages	73	8.6.13. Unlocking a Video Output	81	8.11.7. Balance Setting	89
8.3.6. Escaping	73	8.7. AUDIO SWITCHING AND CROSSPOINT SETTINGS.....	81	8.11.8. Balance Setting by Steps	89
8.3.7. Signature.....	74	8.7.1. Query the Audio Crosspoint State	81	8.11.9. Gain Setting	89
8.3.8. Subscription.....	74	8.7.2. Switching an Input to an Output	81	8.12. DANTE® AUDIO SETTINGS	90
8.3.9. Notifications about the Changes of the Properties	74	8.7.3. Disconnect the Output from any Input.....	81	8.12.1. Channel Label Renaming	90
8.3.10. Legend for the Control Commands.....	74	8.7.4. Switching an Input to All Outputs.....	81	8.12.2. Sample Rate Query.....	90
8.4. SYSTEM COMMANDS.....	75	8.7.5. Multiple Switching	82	8.13. SYSTEM MONITORING COMMANDS.....	90
8.4.1. Query the Product Name.....	75	8.7.6. Channel Mapping	82	8.13.1. Query Connected Device Presence	90
8.4.2. Set the Device Label.....	75	8.7.7. Muting an Audio Input.....	82	8.13.2. Query Video Signal Presence on a Port	90
8.4.3. Query the Serial Number	75	8.7.8. Unmuting an Audio Input	82	8.13.3. Query the Signal Type	91
8.4.4. Query the Firmware Version	75	8.7.9. Locking an Audio Input	82	8.13.4. Query the Resolution of the Stream	91
8.4.5. Query the Date and Time of the System	75	8.7.10. Unlocking an Audio Input.....	82	8.13.5. Query the Total Size of the Stream.....	91
8.4.6. Setting of the Date and Time Manually.....	75	8.7.11. Muting an Audio Output.....	83	8.13.6. Query Embedded Audio Presence.....	91
8.4.7. Setting the Brightness of the LCD Screen.....	76	8.7.12. Unmuting an Audio Output	83	8.13.7. Query the Color Space of the Stream.....	91
8.4.8. Control Lock of the LCD Menu.....	76	8.7.13. Locking an Audio Output	83	8.13.8. Query the Color Range of the Stream	92
8.4.9. Adding License	76	8.7.14. Unlocking an Audio Output.....	83	8.13.9. Query the Color Depth of the Stream.....	92
8.4.10. Removing License	76	8.8. VIDEO SOURCE PORT SETTINGS - HDMI / OPTJ	83	8.13.10. Query the HDCP-encryption Presence	92
8.4.11. Software Resetting the Device	76	8.8.1. HDCP Setting	83	8.13.11. Query the HDCP-encryption Level of the Stream	92
8.4.12. Rebooting the Device	76	8.8.2. Color Range Setting.....	83	8.13.12. Query the Maximum Supported HDCP-encryption Level.....	93
8.4.13. Restore the Factory Default Settings	77	8.8.3. Hot Plug Detect (HPD) Setting	84	8.13.13. Query the HDCP Error	93
8.5. I/O BOARD MANAGEMENT	77	8.9. VIDEO SOURCE PORT SETTINGS - DP.....	84	8.13.14. Query the TMDS Error Counters.....	93
8.5.1. Query the Status of a Board.....	77	8.9.1. Setting the Maximum Lane Number	84	8.13.15. Audio Mismatch Status Query	93
8.5.2. Query the Number of Seated I/O Boards	78	8.9.2. Setting the Maximum Link Data Rate.....	84	8.14. PRESET HANDLING.....	94
8.5.3. Query the List of Seated I/O Boards.....	78	8.9.3. DP Power Setting.....	84	8.14.1. Creating a New Preset	94
8.5.4. Query the List of Operational I/O Boards.....	78	8.9.4. Test Pattern Mode Setting.....	85	8.14.2. Saving the Settings to an Existing Preset.....	94
8.5.5. Query the List of Failed I/O Boards	78	8.9.5. Color Space Conversion Setting.....	85	8.14.3. Loading a Preset	94
8.5.6. Query the Product Name of the I/O Board.....	78	8.9.6. Color Range Setting.....	85	8.14.4. Renaming a Preset.....	94
8.5.7. Query the Serial Number of the I/O Board	78	8.9.7. Restart Link Training	85	8.15. EDID MANAGEMENT	94
8.5.8. Query the Firmware Version of the I/O Board.....	79	8.9.8. Hot Plug Detect (HPD) Setting	86	8.15.1. Query the Emulated EDIDs.....	94
8.5.9. Rebooting the I/O Board	79	8.9.9. HDCP Setting	86	8.15.2. Query the Validity of a Dynamic EDID	95

Table of Contents

8.15.3. Query the Preferred Resolution of a User EDID	95	8.19.3. Sending an OSD String	105	12.1.8. MX2M-4OPTJ-OB	129
8.15.4. Emulating an EDID on an Input Port	95	8.19.4. Sending a CEC Command in Hexadecimal Format	105	12.1.9. MX2M-AUX-DANTE-32CH	130
8.15.5. Copy an EDID to User Memory	95	8.20. FIRMWARE UPGRADING OF THE I/O BOARDS	105	12.1.10. MX2M-AUX-8AUDIO	130
8.15.6. Deleting an EDID from User Memory	95	8.20.1. Query the Firmware Version of the I/O Board	105	12.2. SWITCH SETUP FOR DANTE® AUDIO SIGNAL TRANSMISSION	131
8.15.7. Resetting the Emulated EDIDs	95	8.20.2. Launching the Firmware Update Procedure	105	12.3. FACTORY DEFAULT SETTINGS	132
8.16. HEALTH STATUS MONITORING COMMANDS	96	8.20.3. Cancellation the Firmware Update Procedure	106	12.4. INPUT/OUTPUT PORT NUMBERING	133
8.16.1. Query the Overall Health State of the Matrix	96	8.20.4. Query the Update Progress Status	106	12.4.1. Video Input/Output Port Numbering	133
8.16.2. Query the Temperature Warnings	96	8.20.5. Query the List of Updating Boards	106	12.4.2. Audio Input Port Numbering	133
8.16.3. Query the Temperature Errors	96	8.20.6. Query the Overall Board Update Status	106	12.4.3. Audio Output Port Numbering	134
8.16.4. Query the Voltage Warnings	96	8.21. LW3 PROTOCOL COMMANDS - QUICK SUMMARY	107	12.5. MAXIMUM CABLE DISTANCES	134
8.16.5. Query the Voltage Errors	96	9. FIRMWARE UPGRADE	112	12.5.1. Fiber Optical Cable Distances	134
8.16.6. Query the Current Warnings	97	9.1. ABOUT THE FIRMWARE PACKAGE (LFP2 FILE)	113	12.5.2. CATx Cable Distances	134
8.16.7. Query the Current Errors	97	9.2. SHORT INSTRUCTIONS	113	12.6. FACTORY EDID LIST	135
8.16.8. Query the Fan Warnings	97	9.3. INSTALLATION OF LDU2	113	12.7. CABLE WIRING GUIDE	136
8.16.9. Query the Fan Errors	97	9.4. DETAILED INSTRUCTIONS	113	12.7.1. Audio Ports	136
8.16.10. Query the PSU Drawer Warnings	97	9.4.1. Establish Connection	113	12.8. MECHANICAL DRAWINGS	137
8.16.11. Query the PSU Drawer Errors	97	9.4.2. Start the LDU2 Application and Follow the Steps	113	12.8.1. MX2M-FR24R	137
8.16.12. Query the Health State of an I/O Board	98	9.5. KEEPING THE CONFIGURATION SETTINGS	116	12.8.2. IB/OB Boards	138
8.16.13. Query the Health State of a PSU Drawer	99	10. TROUBLESHOOTING	117	12.8.3. AUX Boards	139
8.16.14. Query the Health State of the HSMB	100	10.1. USE CASES	118	12.9. RELEASE NOTES OF THE FIRMWARE PACKAGES	139
8.16.15. Query the Health State of the CECU	100	10.2. HOW TO SPEED UP THE TROUBLESHOOTING PROCESS	119	12.10. APPLIED PORTS (NETWORK SETTINGS)	140
8.17. NETWORK CONFIGURATION	101	11. TECHNOLOGIES	120	12.11. HASHTAG KEYWORD LIST	140
8.17.1. Query the DHCP State	101	11.1. EDID MANAGEMENT	121	12.12. FURTHER INFORMATION	142
8.17.2. Change the DHCP State	101	11.1.1. Understanding the EDID	121		
8.17.3. Query the IP Address	101	11.1.2. Advanced EDID Management	121		
8.17.4. Change the IP Address (Static)	101	11.2. HDCP MANAGEMENT	122		
8.17.5. Query the Subnet Mask	101	11.2.1. Protected and Unprotected Content	122		
8.17.6. Change the Subnet Mask (Static)	101	11.2.2. Disable Unnecessary Encryption	122		
8.17.7. Query the Gateway Address	101	11.2.3. HDCP v2.2	123		
8.17.8. Change the Gateway Address (Static)	102	11.3. PIXEL ACCURATE RECLOCKING	124		
8.17.9. Apply Network Settings	102	12. APPENDIX	125		
8.18. RS-232 PORT CONFIGURATION	102	12.1. SPECIFICATION	126		
8.18.1. Enable/Disable the Port	102	12.1.1. MX2M-FR24R	126		
8.18.2. BAUD Rate Setting	102	12.1.2. MX2M-PSU-500-F	126		
8.18.3. Databits Setting	102	12.1.3. MX2M-PSU-1250-FP	127		
8.18.4. Parity Setting	103	12.1.4. MX2M-4HDMI20-IB	127		
8.18.5. Stopbits Setting	103	12.1.5. MX2M-DH-4DP12-IB	128		
8.18.6. Protocol Setting	103	12.1.6. MX2M-4OPTJ-IB	128		
8.18.7. Recalling Factory Default Settings on the Serial Port	103	12.1.7. MX2M-4HDMI20-OB	129		
8.19. SENDING CEC COMMANDS	104				
8.19.1. Sending a CEC Command in Text Format	104				
8.19.2. Press&Release Commands	104				

1

Introduction

Thank you for choosing Lightware's MX2M series devices. In the first chapter we would like to introduce the device highlighting the most important features in the below listed sections:

- ▶ [DESCRIPTION](#)
- ▶ [BOX CONTENTS](#)
- ▶ [FEATURES](#)
- ▶ [APPLICATION DIAGRAMS](#)

1.1. Description

MX2M-FR24R is a member of the Lightware MX2 modular matrix switcher series, supporting uncompromised 4K UHD resolution at 60Hz with 4:4:4 sampling pattern and with down-conversion capabilities to 4:2:2, supporting HDCP 1.x and 2.3, 3D, Dolby TrueHD and DTS-HD Master Audio. The non-blocking matrix architecture distributes and switches 24 video signals to 24 outputs, distributed along six 4-port boards respectively per direction.

Full 4k HDMI 2.0
60Hz & 4:4:4 HIGH DEFINITION MULTIMEDIA INTERFACE

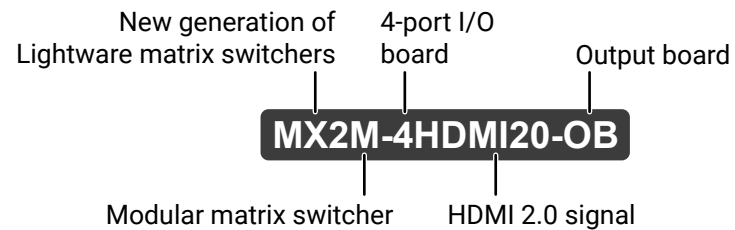
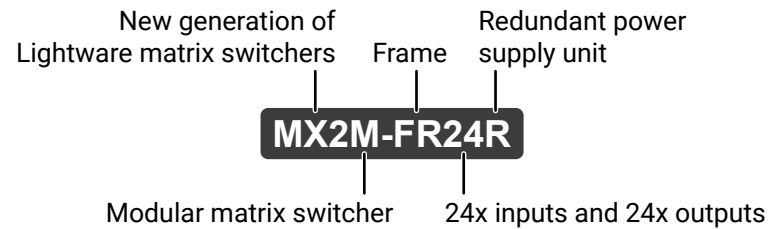
This versatile and customizable device is suitable for various types of applications, the actual application determining the choice of input and output boards to be included in the frame. It is a perfect choice for installations where a huge number of HDMI 2.0 compliant and other types of input and output video ports are required, including HDMI 2.0 and extension through fiber.

Besides the six 4-port input and six 4-port output video boards, there are four low speed installable slots for audio and other low speed signal connectivity.

Control for connected extenders is served by Ethernet layer. The Ethernet layer can also be used for IP extension, as well as for command injection for IR and serial control by third party devices.

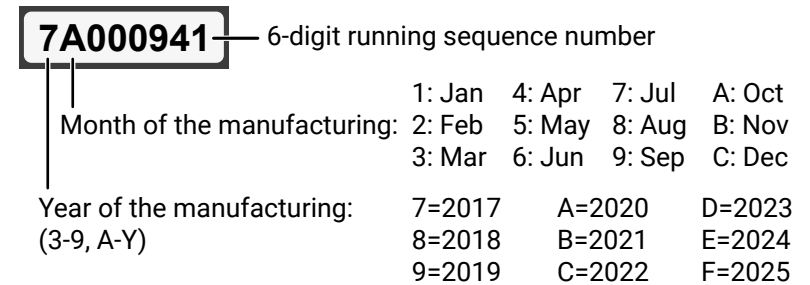
For operation safety power redundancy is available, and PSU drawers are field-exchangeable for ease of maintenance. The device also supports various IT security standards.

Model Denomination



About the Serial Number

Lightware devices contain a label indicating the unique serial number of the product. The structure is the following:



1.2. Box Contents

Matrix switcher frame with rack mounting ears	IEC power cable (2x)	UTP patch cable (3 m)	Handle pair with 4 pcs M5 flat head screws
Safety & Warranty Info, Quick Start Guide	Phoenix® Combicon 5-pole connector (8x) *		

* For MX2M-AUX-8AUDIO auxiliary board only.

1.3. Features

MX2M Hybrid Frame



4K Video without Compression

HDMI 2.0 signal switching with 4k@60Hz and RGB 4:4:4 color space, 18 Gbit/sec bandwidth.



Non-blocking Crosspoint Matrix Architecture

The router allows any input to be switched to any output or more outputs simultaneously.



Hybrid Modular System

Custom I/O sizes with several types of input and output boards give the flexibility for interfacing with different video sources and displays.



Hot Swappable I/O Boards

MX2M series I/O boards and the PSU drawers can be exchanged anytime without powering off the matrix router.



Maximum AV Compatibility

The matrix is compatible with the latest HDMI 2.0 standard as well as with HDMI 1.x and DVI 1.0 standards.



Multilayer Signal Routing

In the MX2M product range Lightware added a third dimension of signal routing, the Media Layers, which provide the flexibility and freedom of independent signal switching. MX2M Hybrid frames manage as many Media Layers as signal types: there are as many individual routers as many signal types are incorporated.



HDCP Compliant

MX2M matrix switcher fulfills the HDCP standard. HDCP capability on the HDMI inputs can be disabled when non-protected content is extended.



No Signal Latency With Zero Frame Delay

The signal management architecture ensures that there is no delay added between the input and the output.



Advanced EDID Management

The user can emulate any EDID on the inputs independently, read out and store any attached monitor's EDID in the internal memory locations.



Pixel Accurate Reclocking

Each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections on the input side.



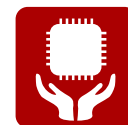
Frame Detector and Signal Analysis

The exact video and audio signal format can be determined such as timing, frequencies, scan mode, HDCP encryption, color range, color space and audio sample rate.



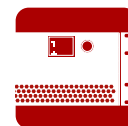
Reliability and Redundancy

At Lightware we build our reputation and pay special attention on designing, developing and making truly reliable products. MX2M hybrid line frames have hot-swappable redundant power supplies. These frames were designed for mission critical operations where redundancy is key and high reliability is required. The redundant hot-swappable power drawers accept AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency on standard IEC connector.



Non-Volatile Memory

The matrix router starts with its latest configuration settings when powered on or after a power failure. Every setting is stored in a non-volatile memory.



Graphic Display and Rotary Jog Dial Control Knob

Easy setting and menu navigation are assured by the color graphic display and the comfortable jog dial control.



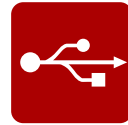
Built-in Website

Easy access from a web browser to control and configure the matrix in systems where software is not allowed to install.



Ethernet Control

Multiple simultaneous TCP/IP connections are available with simple ASCII based protocol for controlling and configuring the matrix router.

**USB Control**

Easily accessible front panel USB configuration port.

**RS-232 Control**

Simple ASCII-based protocol can be used for switching, preset calling, status request, etc.

MX2M-4HDMI20 Series Boards**4K Video without Compression**

HDMI 2.0 signal switching with 4k@60Hz and RGB 4:4:4 color space, 18 Gbit/sec bandwidth.

**Consumer Electronics Control**

Supports transmitting standard CEC commands in order to remote control the source or sink device.

MX2M-DH-4DP12-IB Board**4K Video without Compression**

DisplayPort 1.2 signal switching with 4k@60Hz and RGB 4:4:4 color space, 18 Gbit/sec bandwidth.

**Restart Link Training**

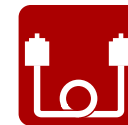
Allows the DisplayPort Link Training to be restarted in case of no signal or bad quality, without unplugging the cable.

**DisplayPort Diagnostics and Management**

Provides detailed DisplayPort-specific connectivity information: AUX handshaking, 1/2/4 lane count, RBR/HBR/HBR2 datarates. DisplayPort AUX-channel analyzer helps debugging and analyzing handshaking problems.

MX2M-4OPTJ Series Boards**4K Video without Compression**

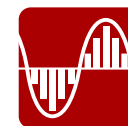
HDMI 2.0 signal switching with 4k@60Hz and RGB 4:4:4 color space, 18 Gbit/sec bandwidth.

**Single Fiber Technology**

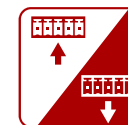
HDMI 2.0 signal with 4k@60Hz up to 18 Gbps signal transmission over a single fiber cable. The MX2M-4OPTJ series boards makes possible direct connection with the fully compatible HDMI20-OPTJ-90 series fiber transmitters and receivers.

**Consumer Electronics Control**

Supports transmitting standard CEC commands in order to remote control the source or sink device.

MX2M-AUX-8AUDIO Board**ADC and DAC Audio Signal Conversion**

Analog to digital and digital to analog audio signal conversion can be applied by the AUX board.

**Configurable Audio Ports**

All analog audio ports of the board can be configurable as input or output by the user by each.

MX2M-AUX-DANTE-32CH Board *#new***Dante® or AES67 Audio**

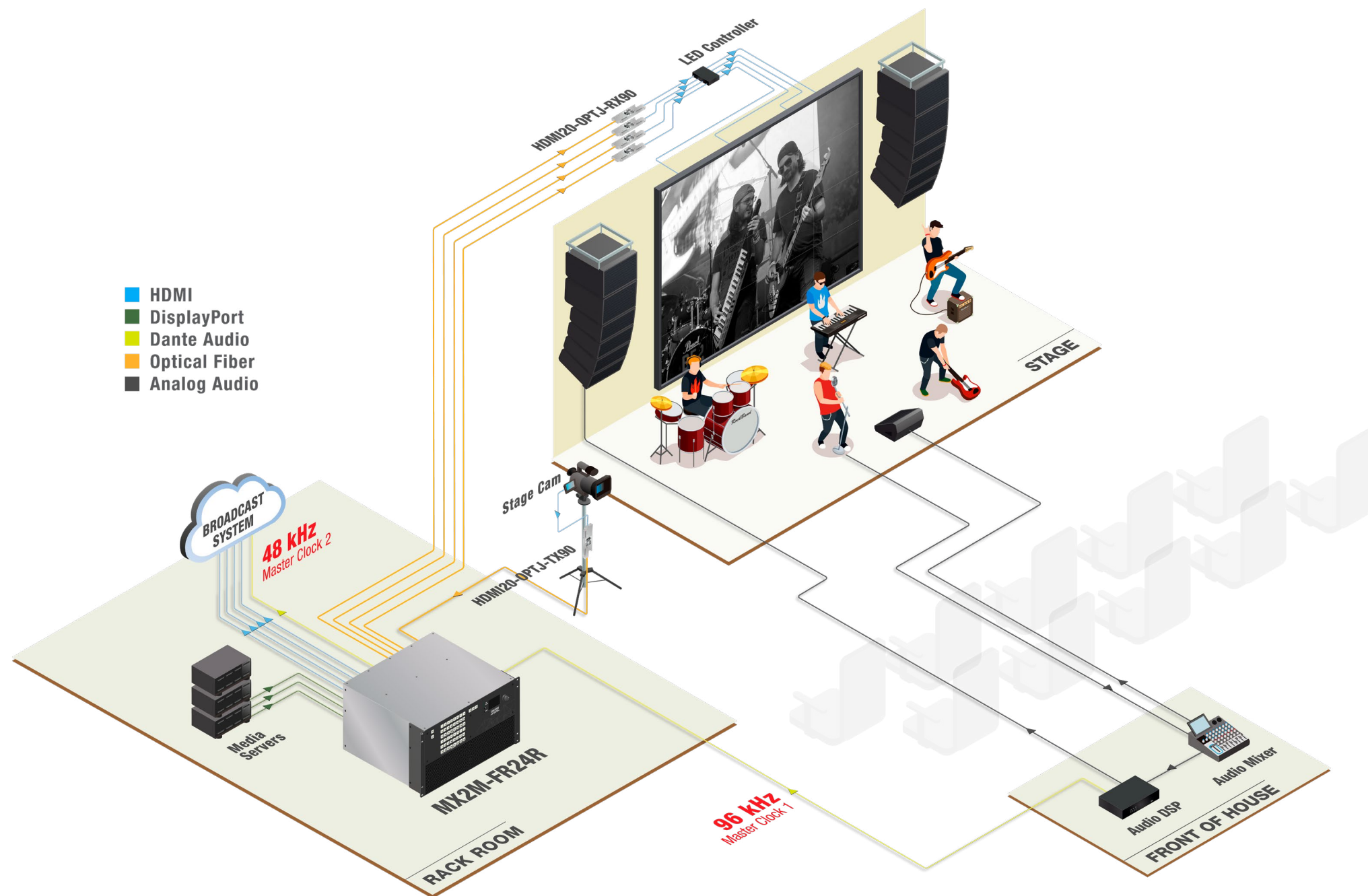
Dante® or AES67 audio signal can be received and the audio of the HDMI / DisplayPort signal can be transmitted up to 32-channel mono Dante® or AES67 signal over the dedicated RJ45 connectors.

**Audio Embedding and De-embedding Function**

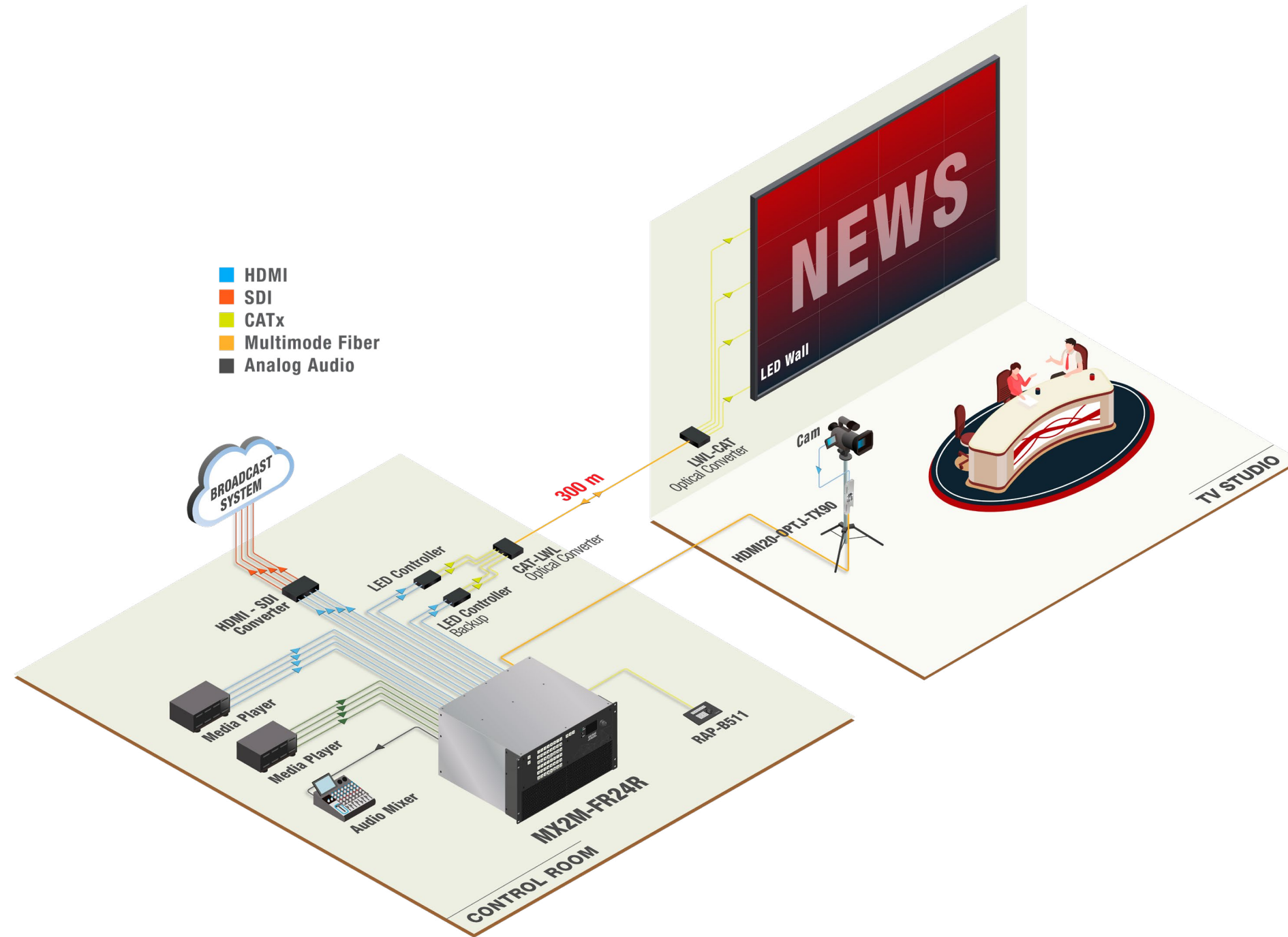
External analog audio signal can embedded in the video stream when port is configured as analog audio input and can be de-embedded from the video stream when port is configured as output.

1.4. Application Diagrams

1.4.1. Live Event Application



1.4.2. TV Studio Application



2

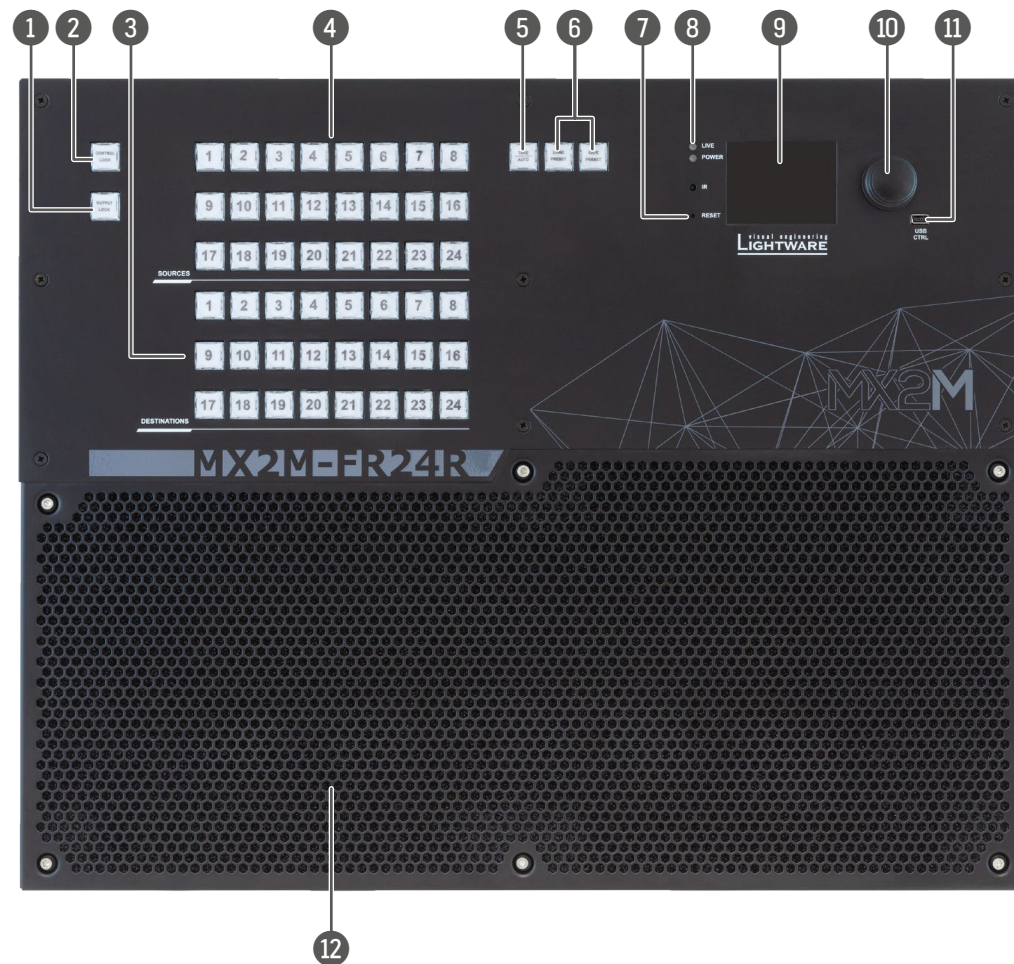
Product Overview

The following sections are about the physical structure of the device, input/output ports and connectors; software and hardware capabilities:

- ▶ [MATRIX FRAME - FRONT VIEW](#)
- ▶ [MATRIX FRAME - REAR VIEW](#)
- ▶ [AUXILIARY \(AUX\) BOARDS](#)
- ▶ [INPUT \(IB\) BOARDS](#)
- ▶ [OUTPUT \(OB\) BOARDS](#)
- ▶ [POWER DRAWERS](#)

2.1. Matrix Frame - Front View

MX2M-FR24R



- 1 **Output lock** Locks and protects one or more outputs. See more details in the [Output Lock](#) section.
- 2 **Control lock** Disables or enables front panel button operations. Red light means the switching and function buttons are disabled. See more details in the [Control Lock](#) section.
- 3 **Destinations** Buttons to select an output or to see the state of an output. See more details in the [Switching Operations](#) section.

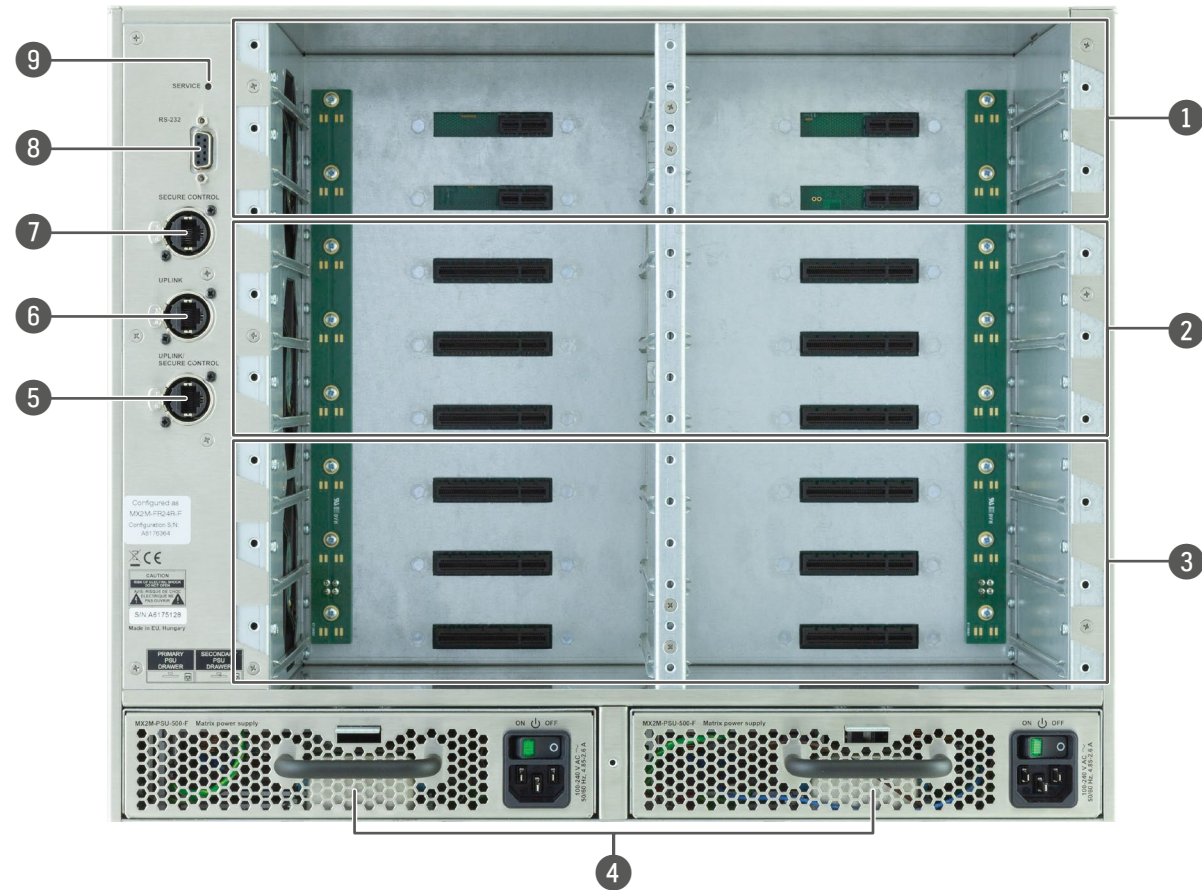
- 4 **Sources** Buttons to select an input, to select a preset number or to view the state of the selected input port. See more details in the [Switching Operations](#) section.
- 5 **Take / Auto** Switching between Take and Autotake working modes; keep the button pressed for 3 seconds to toggle the modes. See more details in the [Take / Autotake Mode](#) section.
- 6 **Preset buttons** Performing preset operations (Load and Save). See more details in the [Preset Operations](#) section.
- 7 **Reset button** Reboots the matrix; the same as switching it off and on again.
- 8 **Status LEDs** The status LEDs give immediate feedback about the matrix.

LIVE	<input type="radio"/>	off	The device is powered off.
	<input checked="" type="radio"/>	blinking (green)	The unit is on and operates properly.
POWER	<input type="radio"/>	off	The unit is powered off or it has internal voltage problem.
	<input checked="" type="radio"/>	on (green)	The device is powered on.
- 9 **LCD screen** LCD screen showing the most important settings and parameters in the front panel menu. See more details in the [Front Panel LCD Menu Operations](#) section.
- 10 **Jog dial control knob** Easy setting and menu navigation by the jog dial control. See more details in the [Front Panel LCD Menu Operations](#) section.
- 11 **USB control** USB connection for Lightware Device Controller (LDC) software.
- 12 **Ventilation grille and dust filter** To ensure the correct ventilation and avoid overheating provide enough free space around the ventilation holes.

INFO: The rack ears allow to mount the device as a standard rack unit installation and the grips on the two sides of the unit help handling the matrix easier. See more details in the [Mounting Options](#) section.

2.2. Matrix Frame - Rear View

MX2M-FR24R



- 1 Auxiliary board slots** Board slots for the [Auxiliary \(AUX\) Boards](#). These slots support low-speed boards only.
- 2 Input board slots** Board slots for the AV [Input \(IB\) Boards](#). These slots support high-speed input boards and low-speed boards either.
- 3 Output board slots** Board slots for the AV [Output \(OB\) Boards](#). These slots support high-speed output boards and low-speed boards either.

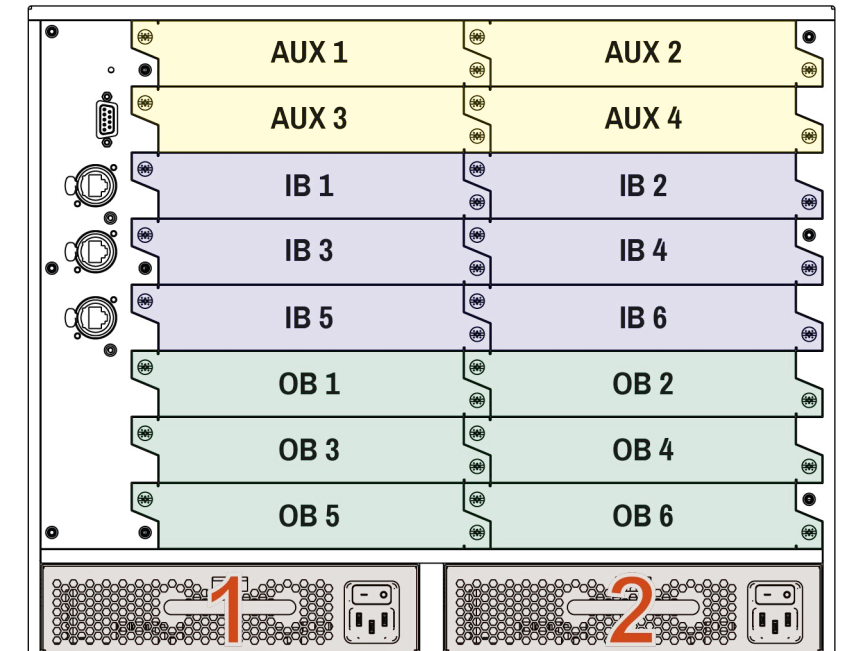
- 4 Power supply units** Hot swap slots for [Power Drawers](#). The matrix has redundant power drawers which can be switched on and off without interrupting the video transmission. Using one or both of the power drawers at the same time is also possible. The double power drawers allow to connect them for two different AC power lines to ensure the continuous power for the matrix.
- 5 Uplink / Secure control connector** Neutrik etherCON Ethernet connector with 1 Gbps Ethernet connection to control the device, firmware upgrade purpose and for user Ethernet access.
- 6 Uplink connector** Neutrik etherCON Ethernet connector with 1 Gbps Ethernet connections for user Ethernet access.
- 7 Secure control connector** Neutrik etherCON Ethernet connector with 1 Gbps Ethernet connection to control the device and firmware upgrade purpose.
- 8 RS-232 connector** 9-pole D-SUB connector for serial communication to control the device.
- 9 Service button** Hidden button for special operations.

Layout of the Input/Output Board Slots and Power Drawer Slots

The following figure shows the layout of the auxiliary (AUX), input (IB), output (OB) board slots and the order of the power drawers on the rear side of the matrix.

See more details about the installation of the I/O boards in the [Board Installation and Handling](#) section.

See more details about the installation of the power supply units in the [Power Drawer Installation](#) section.



2.3. Auxiliary (AUX) Boards

2.3.1. MX2M-AUX-DANTE-32CH











Ports

- 4x RJ45 connectors for Dante® network audio *#new*

Features

- Transmission of 2 x 16 uncompressed mono audio channels from the audio layer to a Dante network
- Reception of 2 x 16 mono audio channels from a Dante network to the Audio layer
- Dante and AES67 support
- Redundant configuration for the Dante network
- Independent transmission of the same audio content from the Audio layer to two separate Dante networks
- Hot-swappable design

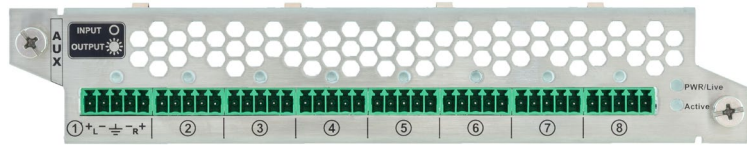
Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the device is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.

Status LEDs of the Dante Connector

	LED1	amber		off	not linked
				on	no activity
				blinking	activity
	LED2	green		off	0 Mbit/s
				on	1000 Mbit/s

2.3.2. MX2M-AUX-8AUDIO



Ports

- 8x 5-pole Phoenix® connectors for analog audio input or output

Features

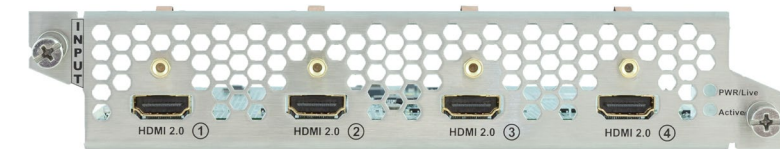
- Independently configurable audio interface direction with interface direction indicator (see more details about it in the [Analog Audio Port Configuration](#) section)
- ADC conversion of balanced or unbalanced stereo analog audio input to the audio layer
- DAC conversion of uncompressed audio from the Audio layer to the balanced stereo analog audio output
- Hot-swappable design

Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the board is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
Input / Output indicator		
	off	The port is configured as analog audio input.
	on	The port is configured as analog audio output.

2.4. Input (IB) Boards

2.4.1. MX2M-4HDMI20-IB



Ports

- 4x HDMI input connectors supporting HDMI 2.0 standard

Features

- 4K@60Hz 4:4:4, 18 Gbps bandwidth
- HDMI 2.0 compliant
- HDCP 1.x and 2.3 support
- Audio de-embedding to the Audio layer
- HDMI input ports have flange mounting option
- Hot-swappable design

Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the board is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.

2.4.2. MX2M-4OPTJ-IB











Ports

- 4x multimode SC simplex input connectors supporting HDMI 2.0 standard









Features

- Single Fiber Technology, multimode transmission via SC connector
- Uncompressed video up to 18 Gbps datarate (600 MHz pixel clock)
- 4096x2160@60Hz/4:4:4 maximum resolution (600MHz)
- Compatible with HDMI20-OPTJ-TX90 fiber optical extender
- Audio de-embedding to the Audio layer
- Hot-swappable design

Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the board is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.

Status LEDs of the SC Connectors

OPTJ 1 / OPTJ 2 / OPTJ 3 / OPTJ 4		
	off	The optical RX module is not powered.
	blinking (red)	No fiber is connected and the laser is disabled.
	on (yellow)	Fiber detected but link initialization failed.
	blinking (green)	Link is receiving video without HDCP encryption.
	on (green)	Link is receiving video with HDCP 1.x encryption.
	on (blue)	Link is receiving video with HDCP 2.x encryption.
	on (pink)	The optical RX module is in bootloader (firmware upgrade) mode.
	blinking (pink)	

2.4.3. MX2M-DH-4DP12-IB



Ports

- 4x DisplayPort input connectors supporting DisplayPort 1.2 standard









Features

- DisplayPort 1.2 compliant
- DisplayPort input signals are converted to HDMI signals via the built-in chipset on each port ¹
- Supported input format of 4K@60Hz with 4:4:4 sampling pattern and 10 bit per component
- Supports conversion from 4K/UHD at 60Hz 4:4:4 10bit to 4K/UHD at 60 Hz YCbCr 4:2:2 10 bit
- Audio de-embedding to the Audio layer
- The board is a perfect fit for environments that primarily utilize DisplayPort connectivity for video signal transmission, such as laptops and high-end monitors without the need for any additional adapters or dongles. ²
- Hot-swappable design

¹ Input signals that do not fit in the HDMI 2.0 data speeds of 18Gbps can be converted to 4:2:2 while maintaining bit depth, thus allowing for HDR transmission.

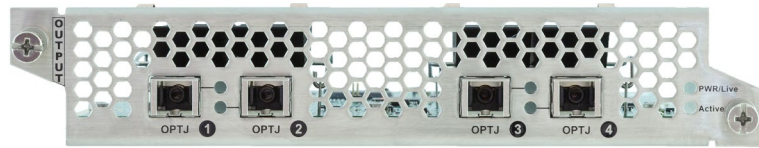
² Ports on the MX2M-DH-4DP12-IB board are recognized by the connected DisplayPort source as DP-to-HDMI converters. Furthermore, it's important to note that DP Multi-Stream (MST), Dual-mode DisplayPort (DP++), Adaptive-Sync and FreeSync™ are not supported.

Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the board is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.

2.5. Output (OB) Boards

2.5.1. MX2M-4OPTJ-OB











Ports

- 4x multimode SC simplex output connectors supporting HDMI 2.0 standard









Features

- Single Fiber Technology, multimode transmission via SC connector
- Uncompressed video up to 18 Gbps datarate (600 MHz pixel clock)
- 4096x2160@60Hz/4:4:4 maximum resolution (600MHz)
- Compatible with HDMI20-OPTJ-RX90 fiber optical extender
- Audio embedding from the Audio layer
- Hot-swappable design

Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the board is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.

Status LEDs of the SC Connectors

OPTJ 1 / OPTJ 2 / OPTJ 3 / OPTJ 4		
	off	The optical TX module is not powered.
	blinking (red)	No fiber is connected and the laser is disabled.
	on (yellow)	Fiber detected but link initialization failed.
	blinking (green)	Link is transmitting video without HDCP encryption.
	on (green)	Link is transmitting video with HDCP 1.x encryption.
	on (blue)	Link is transmitting video with HDCP 2.x encryption.
	on (pink)	The optical TX module is in bootloader (firmware upgrade) mode.
	blinking (pink)	

2.5.2. MX2M-4HDMI20-OB











Ports

- 4x HDMI output connectors supporting HDMI 2.0 standard

Features

- 4K@60Hz 4:4:4, 18 Gbps bandwidth
- HDMI 2.0 compliant
- HDCP 1.x and 2.3 support
- Audio embedding from the Audio layer
- HDMI output ports have flange mounting option
- Hot-swappable design

Status LEDs

PWR/Live		
	off	The board is not powered.
	lit at 50% brightness	The board is under booting procedure.
	blinking fast between 0% and 100% brightness	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.
	blinking between 50% and 100% brightness	The board is operational (the embedded software is running on the controller).
Active		
	off	The control sequence has not been completed.
	on	The control sequence has been completed and the board is being controlled by the matrix switcher.
	blinking (slow)	The device firmware is under firmware upgrade procedure (bootload mode).
	blinking (fast)	The board is fitted in an inappropriate slot (input in an output, output in an input slot). Hence, it is not passing video.

2.6. Power Drawers

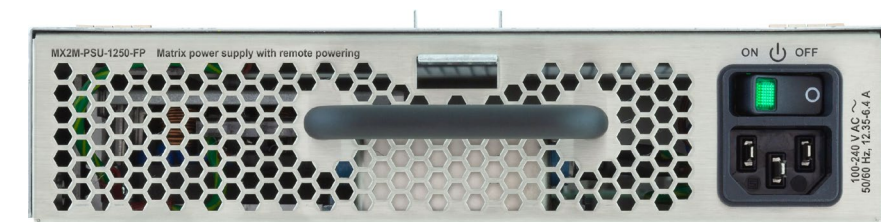
2.6.1. MX2M-PSU-500-F



Features

- 500 W power output
- Built-in power button
- One PSU drawer is able to supply the power requirement of 16 pcs I/O boards
- Hot-swappable design

2.6.2. MX2M-PSU-1250-FP



Features

- 1250 W power output
- Built-in power button
- One PSU drawer is able to supply the power requirement of 16 pcs I/O boards
- Provides local power for the matrix frame, for the IO boards as well as for remote powering (PoE) of PD devices connected to the various IO boards
- Hot-swappable design

3

Front Panel Control

This chapter is about the operating of the device describing the functions which are available by the front panel controls:

- ▶ [FRONT PANEL BUTTON OPERATIONS](#)
- ▶ [FRONT PANEL LCD MENU OPERATIONS](#)

3.1. Front Panel Button Operations

The following section describes the crosspoint switching possibilities using the dedicated buttons on front panel of the matrix frame.

3.1.1. Take / Autotake Mode

The matrix switcher has two different switching modes: **Take** and **Autotake**. If the **Take** button is unlit, **Take** mode is active. When the **Take** button continuously illuminates green, **Autotake** mode is selected.

Press and hold the **Take** button for two seconds to change between **Take** and **Autotake** modes. `#button #crosspoint #switch #takemode #autotakemode`

Take Mode

DEFINITION: The **Take** mode allows the user to connect or disconnect multiple outputs to an input at once but the layout must be confirmed (executed) by the Take button as a final step.



The commands are only realized when the **Take** button is pressed. If no button is pressed for two seconds, all preselected actions (which were not realized with the pressing **Take**) will be ignored, and the router returns to its idle state.

Autotake Mode

DEFINITION: The **Autotake** mode means the switching actions are executed immediately (without user confirmation).



The switching occurs immediately upon pressing one of the input selector buttons. This mode is useful when time delay is not allowed between multiple switching.

3.1.2. View Crosspoint State

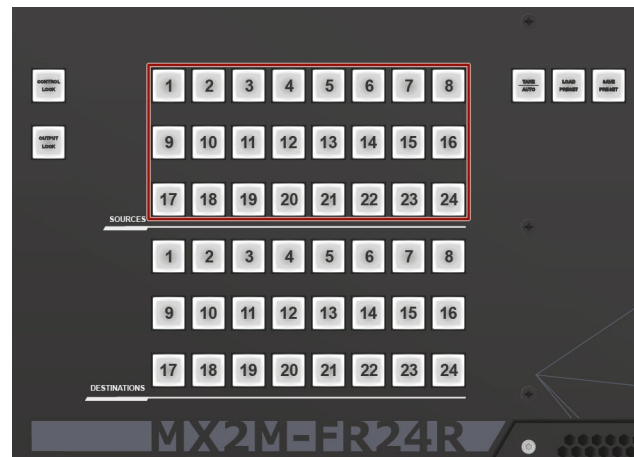
The current switching status can be checked on the front panel by using the front panel buttons. The crosspoint state is displayed slightly different in **Take** or **Autotake** modes because of the different switching methods.

INFO: View mode does not mean, that the router has to be switched in different modes, viewing and switching can be done after each other, without pressing any special buttons.

View Current State in Take Mode

If the router is in **Take** mode, the user can verify both input and output connections. In **Take** mode no accidental change can be done unless **Take** button is pressed.

Press and release a **source button**. Now the selected source button and all destination buttons which are currently connected to the selected source will light up. This informative display will remain active for three seconds, then all buttons turn to dark.



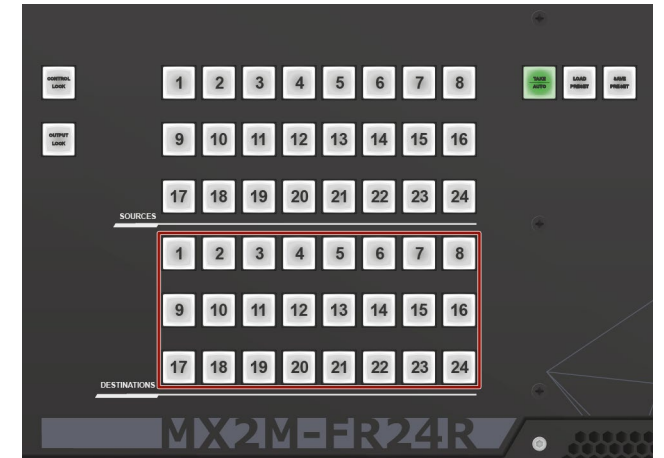
View Current State in Autotake Mode

In Autotake mode only the states of the destinations can be viewed.

Press and release the required **destination** button. Now the source button which is connected to the selected destination will light up. If no source button is lighting, the selected destination is muted or disconnected. By pressing another destination button, the state of that destination can be seen.

ATTENTION! Be careful, as if a source button is pressed in AUTOTAKE mode, it is immediately connected to the last selected destination.

INFO: Muting or disconnecting an output cannot be done in Autotake mode.



3.1.3. Switching Operations

Changing Connections in Take Mode

Step 1. Press and release the desired **source** button. The pressed source button and all destination buttons which are currently connected to this source will light up. This is an informative display about the current status of the selected input (view only).

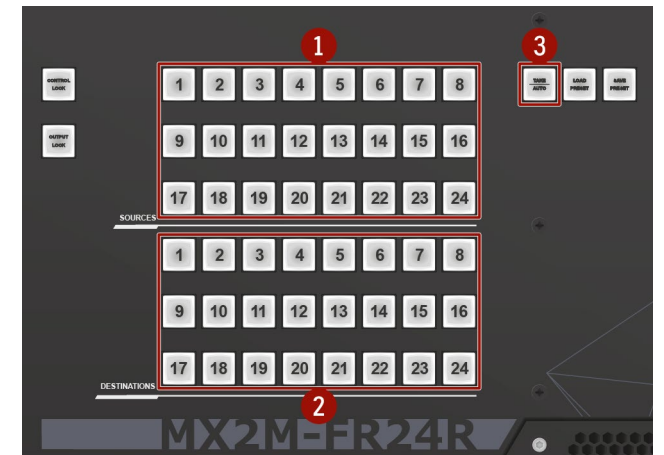
Step 2. Press and release the desired **destination** button(s) which has to be connected to the selected source. The preselected destination button(s) start(s) blinking.

Step 3. Press and release the **Take** button to execute switching. Now the selected input is switched to the selected output or to the multiple outputs.

ATTENTION! A source button can be pressed twice to preselect all outputs. Outputs which are connected to the pressed input light up and all other outputs start to blink. Some outputs can be unselected if needed, and then pressing **Take** executes the switching.

INFO: If the pressed destination is locked then it could not be selected. This is indicated by a short flash of the **Output lock** when a locked destination is pressed.

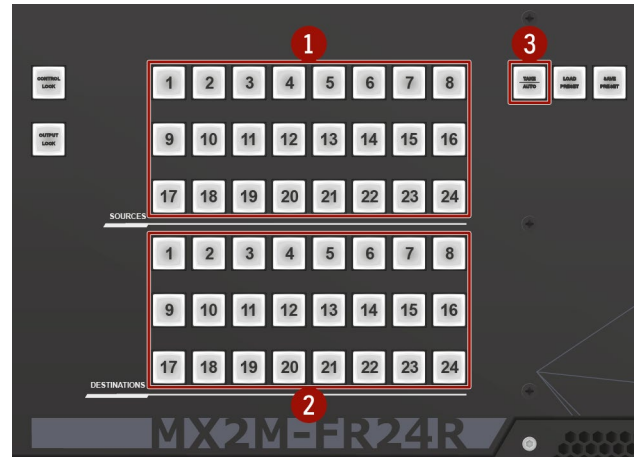
`#crosspoint #switch #takemode`



Disconnecting or Muting in Take Mode

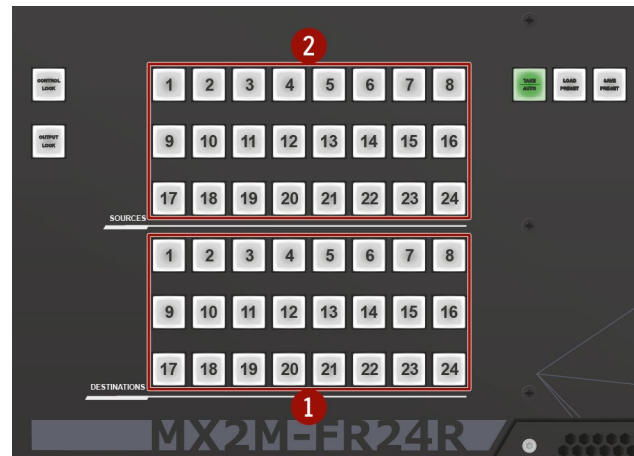
- Step 1.** Press and release the selected **source** button. The pressed source button and all destination buttons which are currently connected to this source will light up.
- Step 2.** Press and release the desired green lighting **destination** button. The pressed destination or multiple destinations will turn dark.
- Step 3.** Press and release **Take** button to execute disconnection.

INFO: Deselected destinations are disconnected from any source, thus output devices will display black image or no signal message, or automatically will turn off.



Changing Connections in Autotake Mode

- Step 1.** Press and release the desired **destination** button. The pressed destination button and the actually pressed connected source button light up green. If no source is connected (the output is muted) no source button will light up.
- Step 2.** Press and release the desired **source** button. Switching is executed immediately. Switching between sources to the selected destination can be done directly.



Disconnecting or Muting in AUTOTAKE Mode

To prevent accidental muting this action is inhibited (disabled) in Autotake mode. Pressing a source button twice would cause accidental disconnecting.

#crosspoint #switch #autotakemode

3.1.4. Preset Operations

DEFINITION: A **preset** stores a configuration regarding all input connections and mute state for all outputs.

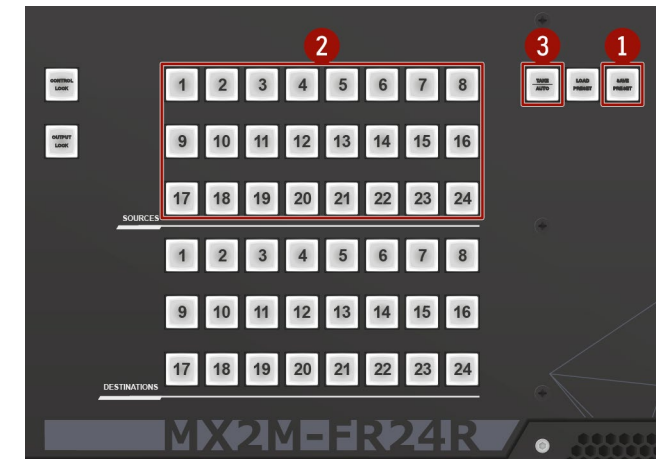
INFO: The matrix switcher has 24 user programmable presets. All presets are stored in a non-volatile memory; the router keeps presets even in the case of a power down. Memory numbers are assigned to source buttons 1 to 24. If the frame has fewer buttons, the higher numbered presets are accessible only through software control.

Saving a Preset in Take Mode *#preset*

Create the desired connections which have to be saved.

- Step 1.** Press and release the **Save preset** button.
- Step 2.** Press and release a **source** button according to the desired memory address (source 1 to 24).
- Step 3.** Press and release the **Take** button. Now the current configuration is stored in the selected memory.

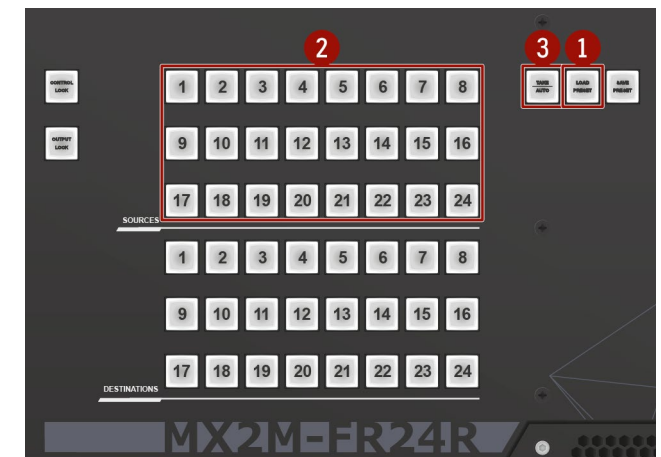
ATTENTION! Preset save action always stores the current configuration for all outputs including mute state, but ignoring lock state.



Loading a Preset in Take Mode

- Step 1.** Press and release the **Load Preset** button.
- Step 2.** Press and release a **source** button according to the desired memory address (source 1 to 24).
- Step 3.** Press and release the **Take** button. Now the selected preset is loaded.

ATTENTION! Loading a preset modifies all output states that are not currently locked.



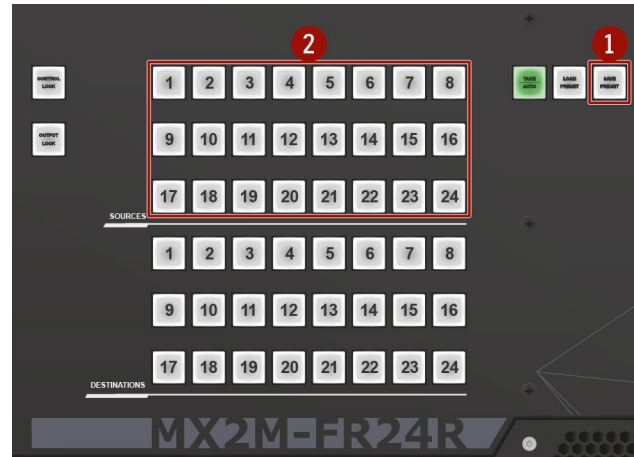
Saving a Preset in Autotake Mode

Create the desired connections which have to be saved.

Step 1. Press and release **Save Preset** button.

Step 2. Press and release a **source** button according to the desired memory address (source 1 to 24). Now the current configuration is stored in the selected memory.

ATTENTION! Preset save action always stores the current configuration for all outputs including mute state, but lock state is ignored.

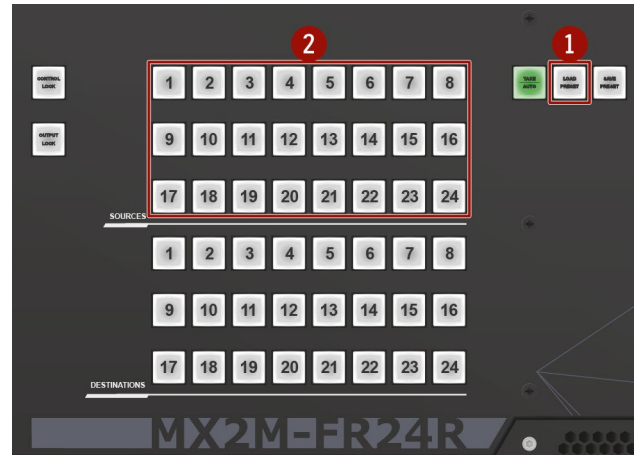


Loading a Preset in Autotake Mode

Step 1. Press and release **Load Preset** button.

Step 2. Press and release a **source** button according to the desired memory address (source 1 to 24). Now the selected preset is loaded.

ATTENTION! Loading a preset modifies all output states that are not currently locked.



3.1.5. Output Lock

DEFINITION: The **Output lock** means that an input port is locked to an output port and no input change or muting can be executed on that particular output port.



Using Lightware matrix it is possible to lock a state of the destination. This feature prevents an accidental switching to the locked destination in the case of an important signal. Destinations can be independently locked or unlocked. Locking a destination does not affect other destinations. `#lock #unlock #outputlock`

View Locked Outputs in Take Mode

Step 1. Press and release the **Output Lock** button

Step 2. The **Output Lock** button starts to blink and all the buttons of any locked destinations light up and remain illuminated for three seconds.

Locking an Output in Take Mode

Step 1. Press and release the **Output Lock** button. Now the Output Lock button starts to blink and the buttons of all the locked outputs illuminate green (view state). If no button is pressed for three seconds the router returns to idle state.

Step 2. Press the desired **destination** buttons. If an unlit destination button is pressed it starts to blink indicating that it is preselected, for output locking.

Step 3. Press and release the **Take** button. The selected destinations are now locked.

Unlocking an Output in Take Mode

Step 1. Press and release the **Output Lock** button. Now the Output Lock button starts to blink and all the locked output's buttons illuminate green (view state). If no button is pressed for three seconds, the router returns to idle state.

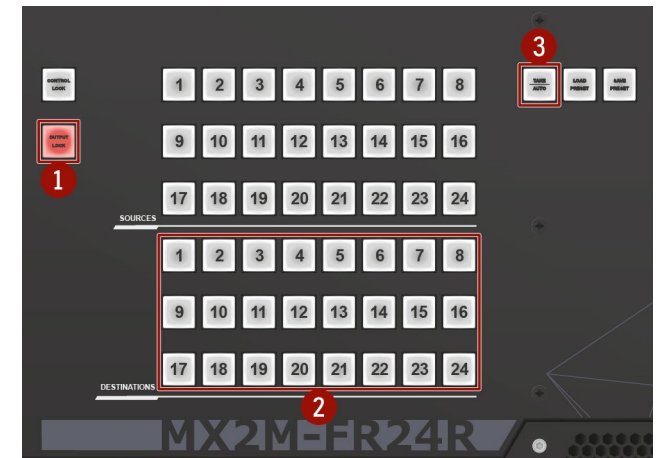
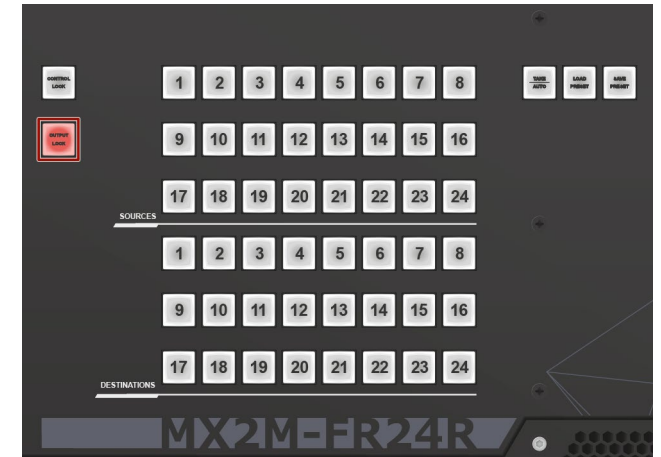
Step 2. If an illuminating **destination** button is pressed, it goes off, to indicate that it is preselected for unlocking.

Step 3. Press and release the **Take** button. The deselected destinations are now unlocked.

View Locked Outputs in Autotake Mode

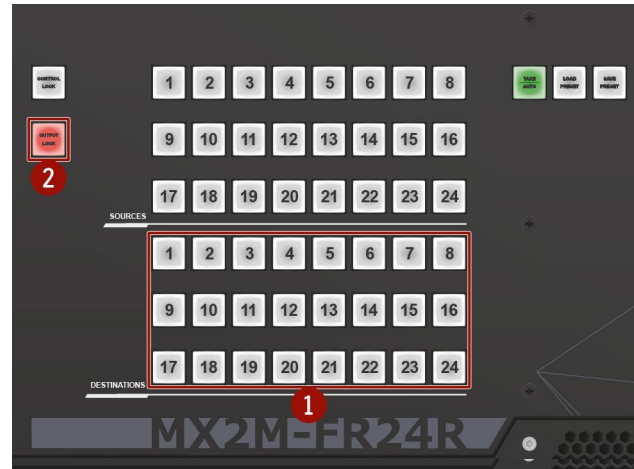
In **Autotake** mode a destination is selected all the time. Therefore the currently selected output and input buttons are illuminated. The **Output Lock** button illuminates regarding the lock state of the current output.

Viewing all locked outputs is not possible in **Autotake** mode, as pressing the **Output Lock** button instantly locks or unlocks the current output.



Locking an Output in Autotake Mode

- Step 1.** Press and release the required **destination** button. Now the selected destination button and the currently configured source button light up (view mode).
- Step 2.** Press and release the **Output Lock** button. Now the Output Lock button lights up in red, and lock function is activated at once. No source can be changed at the locked destination.



Unlocking an Output in Autotake Mode

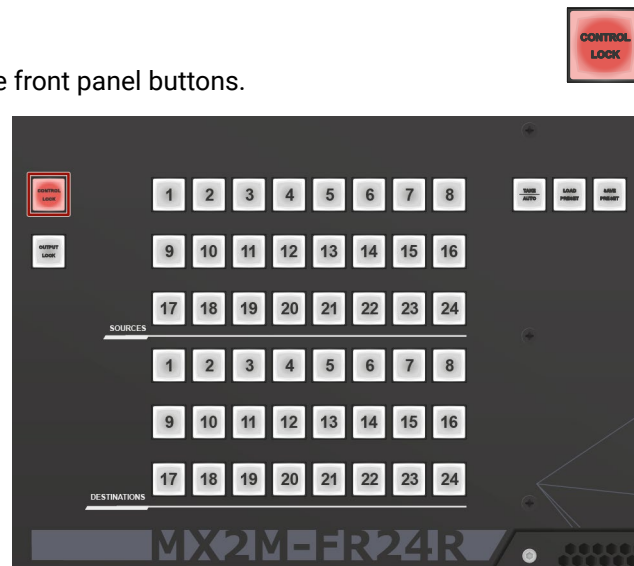
- Step 1.** Press and release the required **destination** button which was previously locked. Now the selected destination button and the currently configured source button and the Output Lock button light up.
- Step 2.** Press and release the **Output Lock** button (deselection). Now the Output Lock button turns off and the port has been unlocked.

3.1.6. Control Lock

DEFINITION: The **Control Lock** means to disable the front panel buttons.

While the front panel buttons are disabled the RS-232, USB and Ethernet control is still enabled. If the button is not illuminated, front panel button operations are enabled. If it illuminates red continuously, front panel operations are inhibited (including LCD menu).

Press and hold the **Control lock** button for 3 seconds to toggle the control lock state. `#button #controllock`



3.2. Front Panel LCD Menu Operations

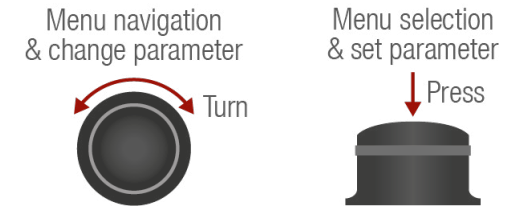
3.2.1. Introduction

The company logo is displayed on the screen during the boot-up. The main menu is displayed after about 30 seconds later and the device is ready to use.

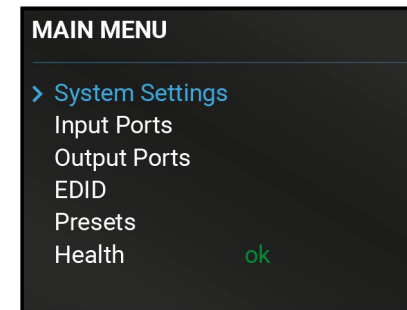
Menu Navigation

The front panel has a color LCD that shows the most important settings and parameters structured in a menu. The jog dial control knob can be used to navigate between the menu items or change the value of a parameter. The knob can be pressed to enter a menu or edit/set a parameter.

TIPS AND TRICKS: The faster you rotate the jog dial, the faster the parameter list is scrolled.



The Menu Structure



Parameter Selection

The **blue** colored line means the selected menu/parameter, the **green** one means the current setting.

Enter the Menu / Submenu

The **>** icon before the line indicates the additional submenus. Click with the rotary to enter.

The **•** icon shows that there is no submenu or setting possibility.

MAIN MENU

- System Settings**
 - Network
 - Time and Date
 - Restore Factory Defaults
 - Display Brightness
- Input Ports**
 - Video Input Ports
 - Audio Input Ports
- Output Ports**
 - Video Output Ports
 - Audio Output Ports
- EDID**
 - View
 - Factory EDIDs
 - Last attached EDIDs
 - User EDIDs
 - Emulated EDIDs
 - Switch
 - Save
- Presets**
 - Load Preset
 - Save Preset
- Health**
 - Uptime
 - Motherboard
 - Control Panel
 - Power Combiner
 - IO Boards

3.2.2. System Settings Menu

Network

The parameters of the network connection can be set in this submenu. The first three lines (IP, Subnet, and Gateway parameters) show the current settings. If the DHCP option is disabled, three more parameters are listed which can be set for a static IP address: *#network #ipaddress #dhcp*

- Static IP,
- Static subnet,
- Static gateway.

ATTENTION! If you change the network settings, always press the Save option under Network menu (not only in the submenu of the parameter) to apply the new settings.

Time and Date

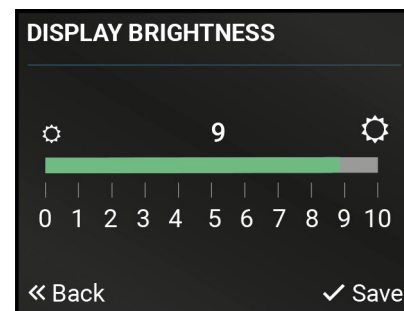
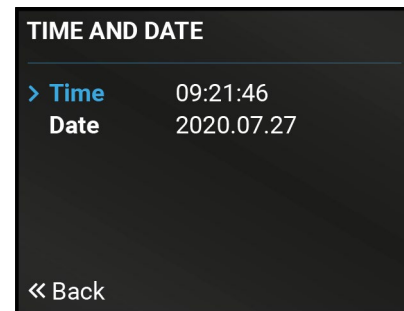
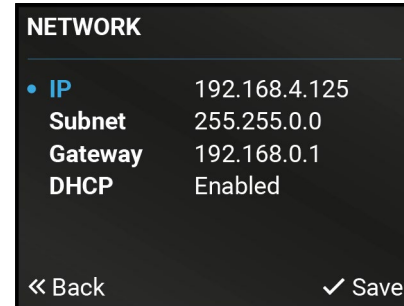
The internal clock and date can be set in this submenu which is used for logging events. *#time #date*

Restore Factory Defaults

The default settings can be reloaded in this submenu, for details see the [Switch Setup for Dante® Audio Signal Transmission](#) section. *#factory*

Display Brightness

The brightness of the LCD can be set from 1 to 10 on a scale.



3.2.3. Input Ports Menu

Video Input Ports #new

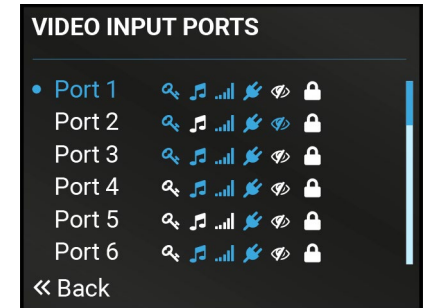
The most important status information of the video input ports are available in the menu.

INFO: The number of the video input ports depends on the installed IB boards in the matrix switcher.

Legend of the Icons

The icons display information about the port and the incoming signals.

Icon	Icon is white (inactive)	Icon is blue (active)
	Signal is not encrypted with HDCP	Signal is encrypted with HDCP
	No audio signal in the video stream	Audio is embedded in the video stream
	Signal is not present	Signal is present
	Source is not connected	Source is connected
	Port is unmuted	Port is muted
	Port is unlocked	Port is locked



Audio Input Ports

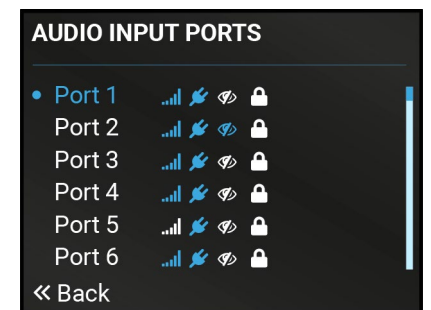
The most important status information of the audio input ports are available in the menu.

INFO: The number of the audio input ports depends on the installed auxiliary and IB boards in the matrix switcher.

Legend of the Icons

The icons display information about the audio port and the incoming signals.

Icon	Icon is white (inactive)	Icon is blue (active)
	Signal is not present	Signal is present
	Source is not connected	Source is connected
	Port is unmuted	Port is muted
	Port is unlocked	Port is locked



3.2.4. Output Ports Menu

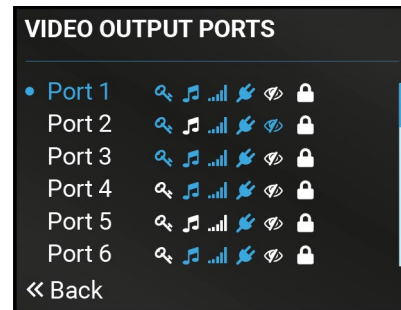
Video Output Ports #new

The most important status information of the video output ports are available in the menu.

INFO: The number of the video output ports depends on the installed OB boards in the matrix switcher.

Legend of the Icons

The icons display information about the port and the transmitted signals.



Icon	Icon is white (inactive)	Icon is blue (active)
	Signal is not encrypted with HDCP	Signal is encrypted with HDCP
	No audio signal in the video stream	Audio is embedded in the video stream
	Signal is not present	Signal is present
	Sink is not connected	Sink is connected
	Port is unmuted	Port is muted
	Port is unlocked	Port is locked

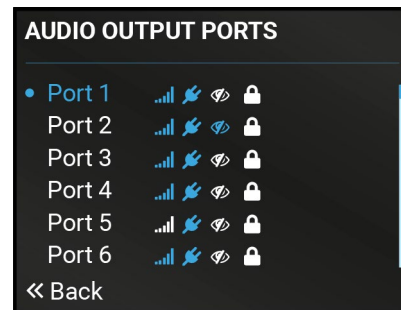
Audio Output Ports

The most important status information of the audio output ports are available in the menu.

INFO: The number of the audio output ports depends on the installed auxiliary and OB boards in the matrix switcher.

Legend of the Icons

The icons display information about the port and the transmitted signals.



Icon	Icon is white (inactive)	Icon is blue (active)
	Signal is not present	Signal is present
	Sink is not connected	Sink is connected
	Port is unmuted	Port is muted
	Port is unlocked	Port is locked

3.2.5. EDID Menu

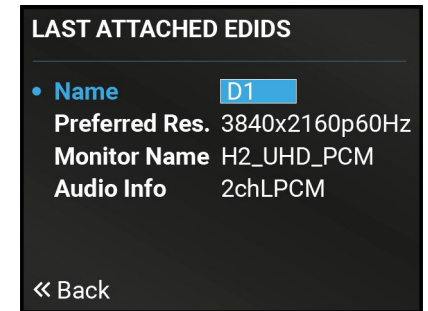
Advanced EDID Management is available in the front panel LCD menu which allows to view an EDID, switch, or save it to the User EDID memory. See more information about EDID technology in [EDID Management](#) section. The EDID memory structure of the device can be found in [Advanced EDID Management](#) section.

#edid

View

Select the desired EDID memory block: **Factory EDIDs**, **Last attached EDIDs**, **User EDIDs**, or **Emulated EDIDs**. Select the Name item and press the knob. Use the jog dial to step between the EDIDs. The following information can be checked:

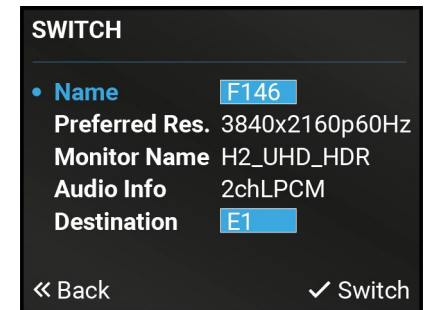
- Preferred Resolution
- Monitor Name
- Audio Info



Switch

The submenu looks similar as the View submenu but in this case, the Destination is also listed. To change an EDID do the following steps:

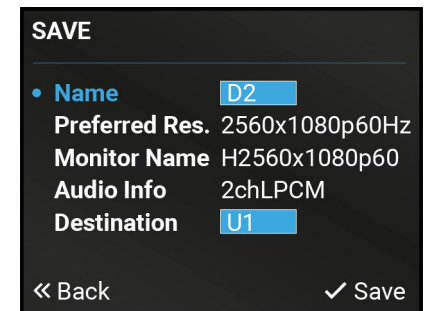
- Step 1.** Navigate to the **EDID / Switch** submenu.
- Step 2.** Select the **Source** EDID item and press the knob. Use the jog dial to select the desired EDID (F1-F148, U1-U100, or D1-D24) and press the knob.
- Step 3.** Select the **Destination** item and press the knob. Use the jog dial to select the desired EDID memory (E1-E2, All) and press the knob.
- Step 4.** Navigate to the **Switch** option and press the knob.



Save

The EDID of a connected sink can be saved to the User EDID memory as follows:

- Step 1.** Navigate to the **EDID / Save** submenu.
- Step 2.** Select the **Source** EDID item and press the knob. Use the jog dial to select the desired EDID (D1-D4) and press the knob.
- Step 3.** Select the **Destination** item and press the knob. Use the jog dial to select the desired EDID memory (U1-U12) and press the knob.
- Step 4.** Navigate to the **Save** option and press the knob.



3.2.6. Preset Menu

The router can store presets and the followings are stored in each slot: Input/output crosspoint state, muted/unmuted states. *#preset*

ATTENTION! When factory default settings are restored, presets are deleted.

Load a Preset

ATTENTION! The Preset loading has an effect on all ports, except the locked ones.

- Step 1.** Navigate to the **Presets / Load Preset** submenu and press the **knob**.
- Step 2.** The previously save presets are listed. Select the desired **memory slot** and press the **knob**. If any other preset had been saved previously they would be also listed.
- Step 3.** Confirm your selection by pressing the **Yes**.

Save a Preset

- Step 1.** Create the desired I/O layout.
- Step 2.** Navigate to the **Presets / Save Preset** submenu and press the **knob**.
- Step 3.** Select the desired **memory slot** and press the **knob**. If any other preset had been saved previously they would be also listed. See the corresponding [Presets](#) section in the Lightware Device Controller (LDC) software.
- Step 4.** Confirm your selection by pressing the **Yes**.

3.2.7. Health Menu

Health status overview of the matrix switcher and the most important information about the motherboard, control panel, power combiner and the I/O boards of the device. *#new*

Uptime

The time passed since the last powering of the device.

Motherboard

Temperatures and fan speed status information are listed in the submenu.

Control Panel

The temperature of the control panel can be checked in the submenu.

Power Combiner

Fan speed, temperature and voltage status information about the Power Combiner 1 and 2 slots.

IO Boards

Temperature and voltage status information about the input (IB), output (OB) and auxiliary (AUX) boards.

HEALTH	
• Uptime	9 days 05:22:46
Motherboard	ok
Control Panel	ok
Power Combiner	ok
IO Boards	error
<< Back	

Legend

Status	Color	Description
ok	green	No active warning or error level log entry exists for the system or a device seated in the system.
warning	yellow	Active warning level log entry exists and no active error level log entry exists for the system or a device seated in the system.
error	red	Active error level log entry exists for the system or a device seated in the system.

4

Installation

The chapter is about the installation of the device and connecting to other appliances, presenting also the mounting options and further assembly steps.

- ▶ [MOUNTING OPTIONS](#)
- ▶ [BOARD INSTALLATION AND HANDLING](#)
- ▶ [POWER DRAWER INSTALLATION](#)
- ▶ [ELECTRICAL CONNECTIONS](#)
- ▶ [ANALOG AUDIO PORT CONFIGURATION](#)
- ▶ [CONNECTING STEPS](#)
- ▶ [POWERING ON](#)

4.1. Mounting Options

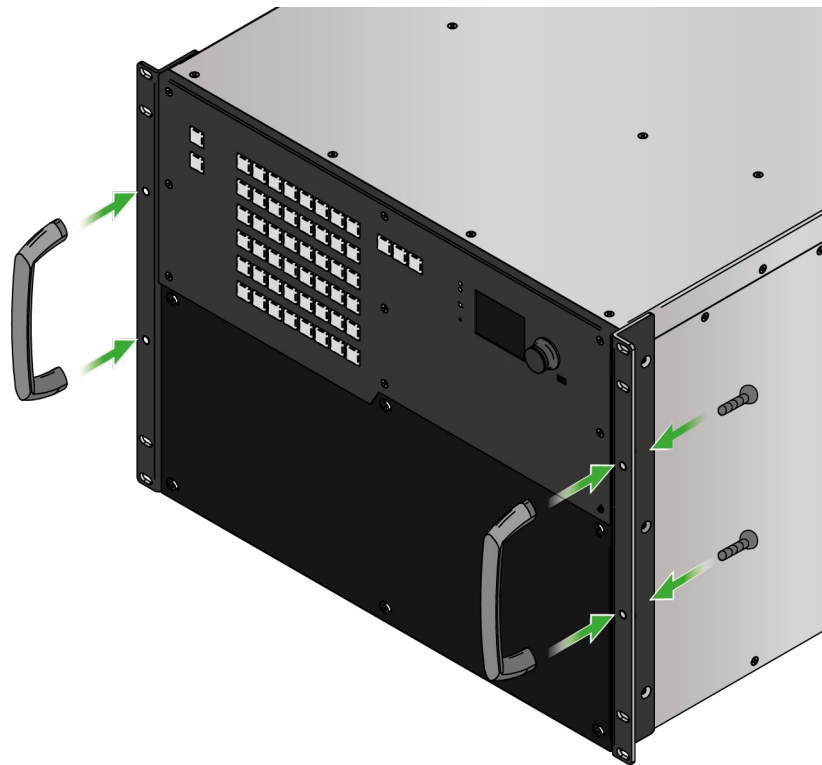
WARNING! For the correct ventilation and to avoid overheating ensure enough free space around the appliance. Do not cover the appliance, let the ventilation holes free and never block or bypass the fans.

INFO: The dimensions of the frame can be found in the [Mechanical Drawings](#) section.

Fixing the Handles

Two handles can be mounted on the rack ears of the matrix switcher. The handles are supplied to the product.

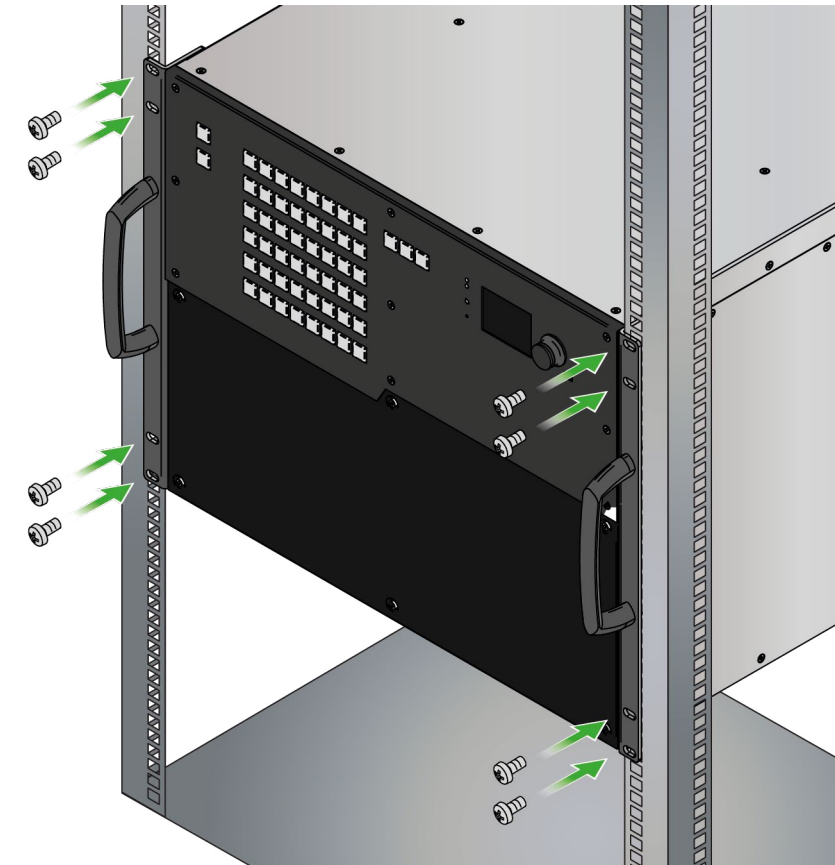
Fasten the 2x 2 pcs M5 flat head fixing screws to fix the handles to the rack ears.



Fixing the handles to the rack ears of the matrix

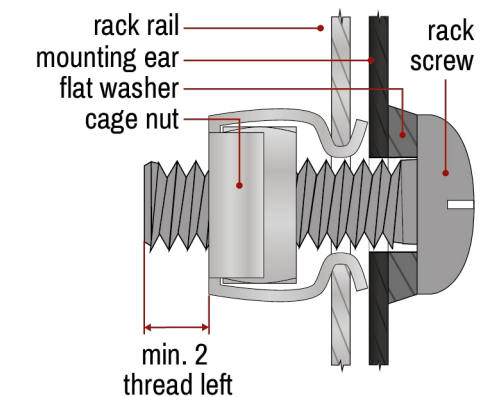
Standard Rack Installation

Two rack ears are supplied with the product, which are fixed on left and right side as shown in the picture. The default position allows mounting the device as a standard rack unit installation.



Standard rack cabinet installation

ATTENTION! Always use all the four screws for fixing the rack shelf ears to the rack rail. Choose properly sized screws for mounting. Keep minimum two thread left after the nut screw.

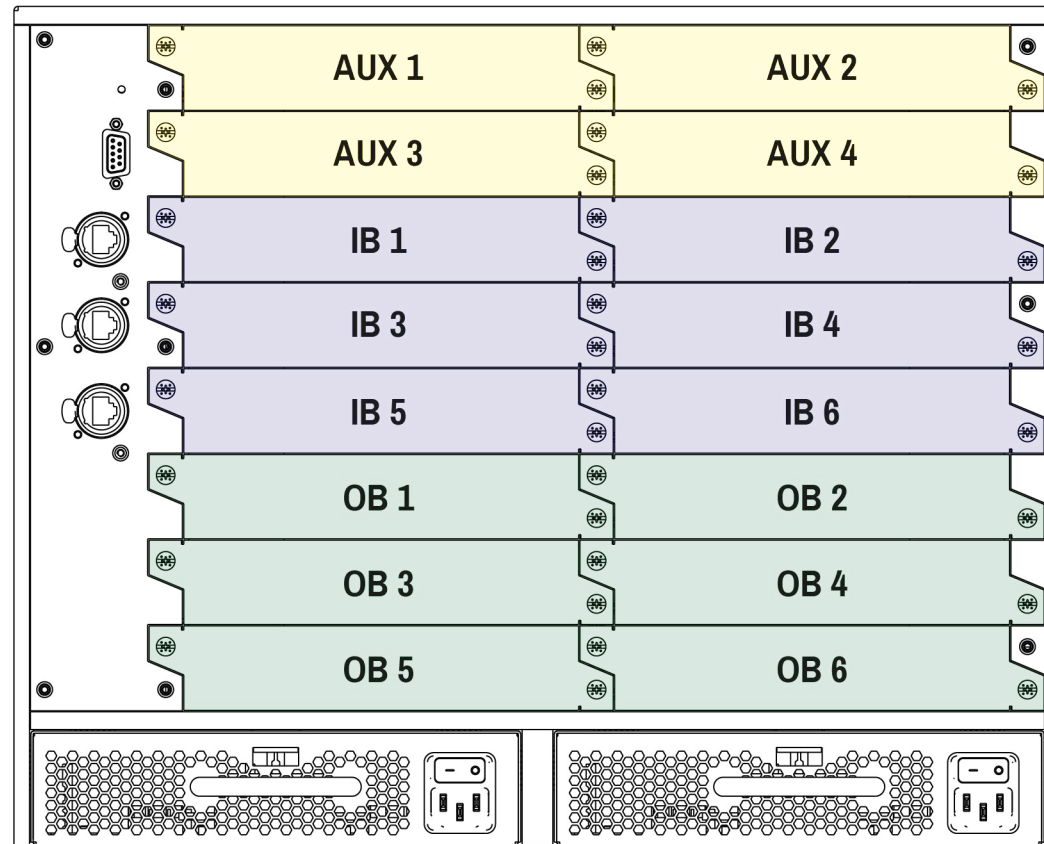


4.2. Board Installation and Handling

The I/O boards and the PSU drawers are hot-swappable. The matrix is not required to be powered off before removing / inserting a board.

4.2.1. The Layout of the Input/Output Board Slots

The following figure shows the layout and the numbering of the auxiliary (AUX, highlighted with yellow), input (IB, highlighted with purple) and output (OB, highlighted with green) board slots on the rear side of the matrix.



The layout of the I/O board slots

Auxiliary (AUX) Board Slots

The first four board slots are dedicated for the **auxiliary (AUX) boards** which are also known as low-speed boards. These slots are able to accept AUX boards only.

The list of AUX boards:

- [MX2M-AUX-DANTE-32CH](#)
- [MX2M-AUX-8AUDIO](#)

Input (IB) Board Slots

The next six board slots are dedicated for the **input (IB) boards** which are also known as high-speed boards. These slots are able to accept IB (high-speed) boards and AUX (low-speed) boards either.

The list of the IB boards:

- [MX2M-4HDMI20-IB](#)
- [MX2M-DH-4DP12-IB](#)
- [MX2M-4OPTJ-IB](#)

Output (OB) Board Slots

The last six board slots are dedicated for the **output (OB) boards** which are also known as high-speed boards. These slots are able to accept OB (high-speed) boards and AUX (low-speed) boards either.

The list of the OB boards:

- [MX2M-4HDMI20-OB](#)
- [MX2M-4OPTJ-OB](#)

4.2.2. Installation of an I/O Board

WARNING! Please pay attention to the protection against electrostatic discharge when touching a board. Do not touch the electrical components on the board as the electrostatic discharge may damage them.

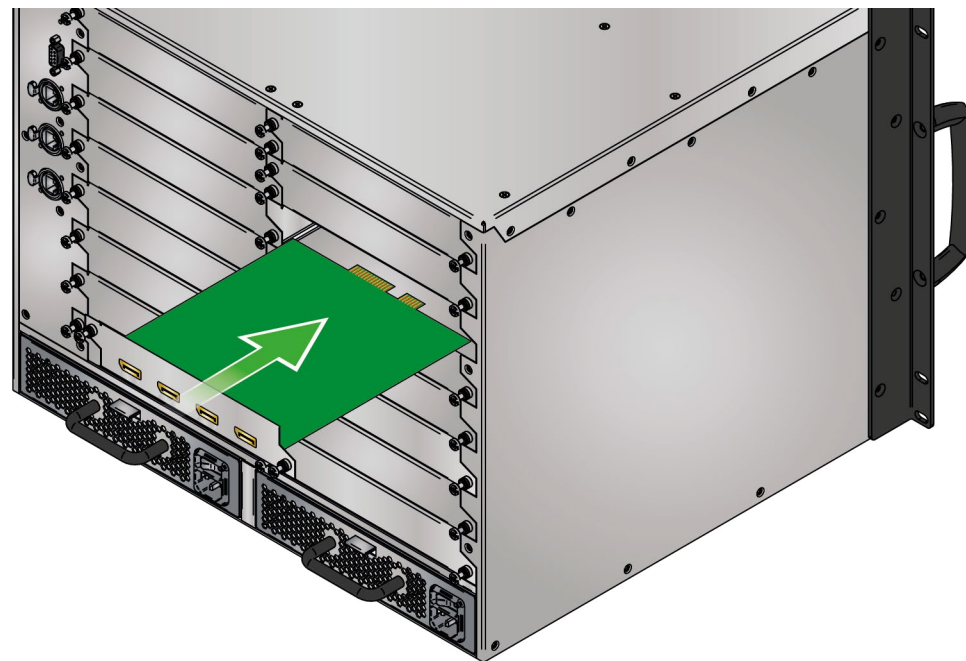


ATTENTION! Please check the orientation of the slots. The AUX, IB and OB boards are assigned to dedicated board slots in the matrix.

INFO: The MX2M series I/O boards are hot-swappable devices. The matrix switcher is not required powering off before the board replacement procedure.

The steps of replacing an auxiliary, input or output board are the followings:

- Step 1.** Loosen the fixing screws and remove the blank cover or the previously installed board.
- Step 2.** Pull out the board and put it in an ESD-safe bag. Take the board by touching the metal plate only, to prevent ESD-caused problems.
- Step 3.** Place the board into the desired empty slot. Place the edge of the panel carefully to the guide rails on the two sides of the slot. Gently push the board in until it stops, then press the plate at the indicated places at once. Thus, the connector of the board and the motherboard will be put together.



Step 4. Tighten the two screws by hand and fix them by a screwdriver with PZ1 head.

Step 5. Connect the necessary cables to the boards and switch on the matrix.

Step 6. Wait until the booting procedure of the board is completed.

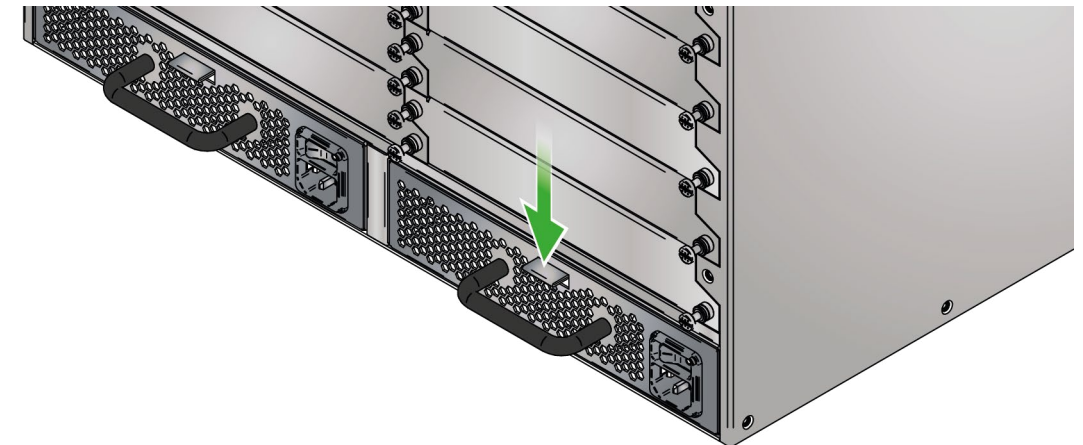
INFO: If the firmware version of the installed I/O board is different than the firmware version of the matrix frame, it is being upgraded by the matrix automatically.

4.3. Power Drawer Installation

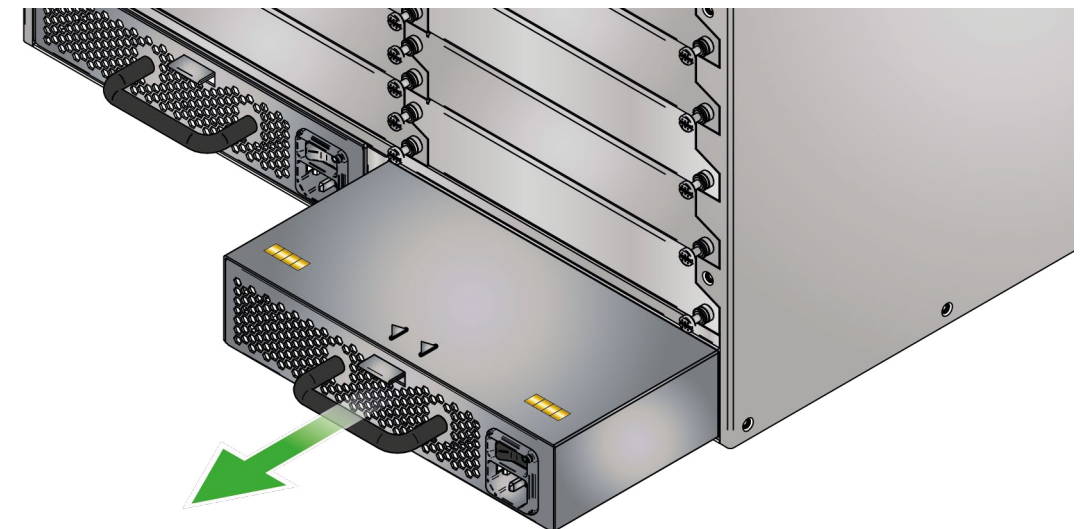
Two dedicated power drawer slots are available in the matrix frame for the [MX2M-PSU-500-F](#) and [MX2M-PSU-1250-FP](#) power supply units. The power drawer of the frame is hot-swappable, thus, you do not have to switch off the matrix to replace or install a power drawer.

The Steps of the Power Drawer Replacement

Step 1. Push down the fixing plate on the power drawer.

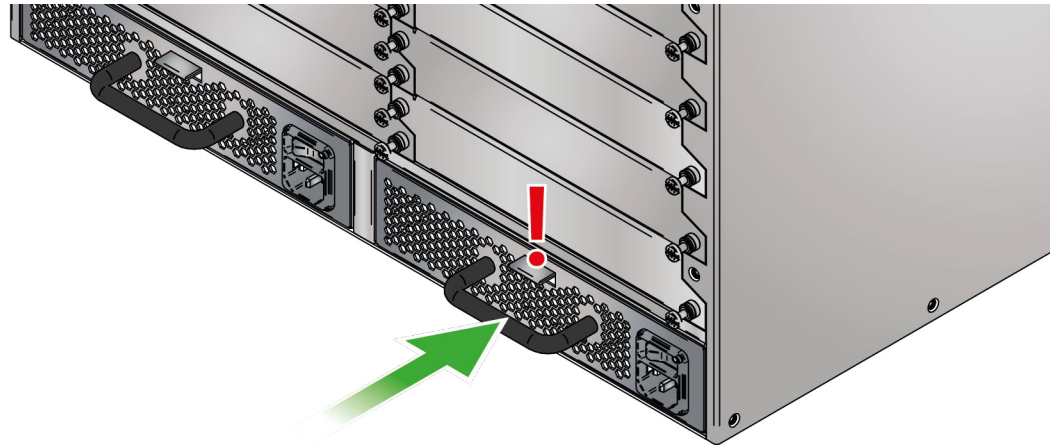


Step 2. Pull out the power drawer using the handle.



Step 3. Place the new power drawer to the power drawer slot and push it using the handle till the device connects to the motherboard of the frame.

ATTENTION! Make sure that the fixing plate is its place correctly.



4.4. Electrical Connections

The following sections describe all possible electrical connections of the MX2M series frames, power drawers and I/O boards.

4.4.1. AC Power Connection

MX2M-PSU-500-F and MX2M-PSU-1250-FP power drawers contain standard IEC power connector and works with 100 to 240 Volts AC, 50 Hz or 60 Hz power sources.

Power drawer	Type	Number of power drawer slots in the frame	Output per power drawer (max)
MX2M-PSU-500-F	hot-swappable	2	500 W
MX2M-PSU-1250-FP	hot-swappable	2	1250 W



See the details about the powering on procedure in the [Powering On](#) section.

4.4.2. USB Mini-B Connector

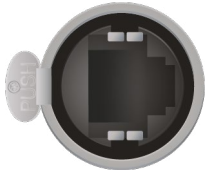
MX2M series matrix frame provides standard USB 2.0 mini B-type connector for software control and firmware upgrade purpose.



4.4.3. Ethernet Connectors

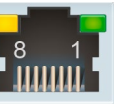
Neutrik etherCON Connectors

MX2M series matrix frame provides Neutrik etherCON RJ45 connectors for secure control purpose, LAN and user Ethernet access.



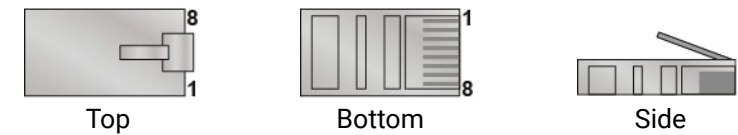
Standard RJ45 Connector

MX2M-AUX-DANTE-32CH I/O board provides standard RJ45 connectors for LAN and user Ethernet access. Always use high quality Ethernet cable.



Wiring of LAN Cables

Lightware recommends the termination of LAN cables on the basis of TIA/EIA T 568 A or TIA/EIA T 568 B standards.



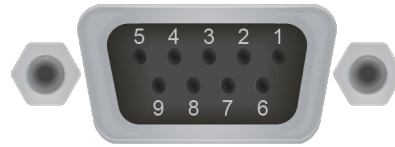
Pin	TIA/EIA T568 A	Color and name	TIA/EIA T568 B	Color and name
1		white/green stripe		white/orange stripe
2		green solid		orange solid
3		white/orange stripe		white/green stripe
4		blue solid		blue solid
5		white/blue stripe		white/blue stripe
6		orange solid		green solid
7		white/brown stripe		white/brown stripe
8		brown solid		brown solid

Wiring of LAN cables by types

WARNING! Never connect non-assembled CATx cable to the port while the unit is powered, it may damage the device.

4.4.4. RS-232 Connector

The matrix frame has standard 9 pin D-sub female (DE9F) miniature receptacle for device control purpose.



Pin nr.	RS-232 straight pin-out	RS-232 cross pin-out
1	Not connected	Not connected
2	TX data transmit (out)	RX data receive (in)
3	RX data receive (in)	TX data transmit (out)
4	DTR (Internally connected to Pin 6)	DTR (Internally connected to Pin 6)
5	GND signal ground (shield)	GND signal ground (shield)
6	DSR (Internally connected to Pin 4)	DSR (Internally connected to Pin 4)
7	RTS (Internally connected to Pin 8)	RTS (Internally connected to Pin 8)
8	CTS (Internally connected to Pin 7)	CTS (Internally connected to Pin 7)
9	Not connected	Not connected

Wiring methods of the DE9F D-sub connector

4.4.5. Symmetrical Analog Stereo Audio Connector

MX2M-AUX-8AUDIO auxiliary board provides 5-pole Phoenix connectors which is used for balanced analog audio (line in/out). Unbalanced audio signals can be connected as well. For asymmetrical output, connect only + and ground. For asymmetrical input connect + and ground to the source and connect – to the ground.

Compatible Plug Type

Phoenix® Combicon series (3.5mm pitch), type: MC 1.5/5-ST-3.5.



Pin nr.	Signal
1	Left +
2	Left -
3	Ground
4	Right -
5	Right +



5-pole Phoenix connector pin assignments

See more information about the most common audio cable wiring modes in [Cable Wiring Guide](#) section.

You can find more information about audio embedding and de-embedding functions in the [Audio Layer](#) section.

4.4.6. HDMI Connector

MX2M-4HDMI20 series I/O boards provide standard 19-pole HDMI connector for inputs and outputs with HDMI 2.0 support. Always use high quality HDMI cable for connecting sources and displays.

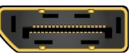


INFO: HDMI input and output connectors have **flange** mounting option.

You can find more information about the video related functions in the [Video Layer](#) section.

4.4.7. DisplayPort Connector

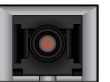
MX2M-DH-4DP12-IB input board provides standard 20-pole DisplayPort connectors for inputs with DisplayPort 1.2 support. Always use high quality DP cable for connecting sources and displays.



You can find more information about the video related functions in the [Video Layer](#) section.

4.4.8. SC Fiber Optical Connector

MX2M-4OPTJ series I/O boards provide multimode SC simplex fiber optical input and output connectors. The connectors are compatible with the HDMI20-OPTJ-90 series fiber optical extenders.



You can find more information about the video related functions in the [Video Layer](#) section.

Maximum cable distances can be found in the [Maximum Cable Distances](#) section.

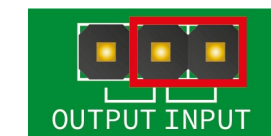
4.5. Analog Audio Port Configuration

The analog audio ports of the MX2M-AUX-8AUDIO board can be configured as input and output by the user. The port configuration can be done by placing a **jumper** to the right pins.

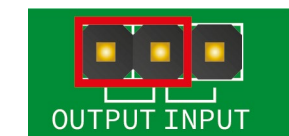
WARNING! Always apply ESD-protection during the port configuration. Electric discharge may harm the electric parts of the board.

Steps of the Configuration

- Step 1.** Release the two fixing screws of the board and pull it out.
- Step 2.** Find the 3-pole port configuration pin set behind the 5-pole Phoenix connector.
- Step 3.** Place the jumper to re-configure the port as the following:



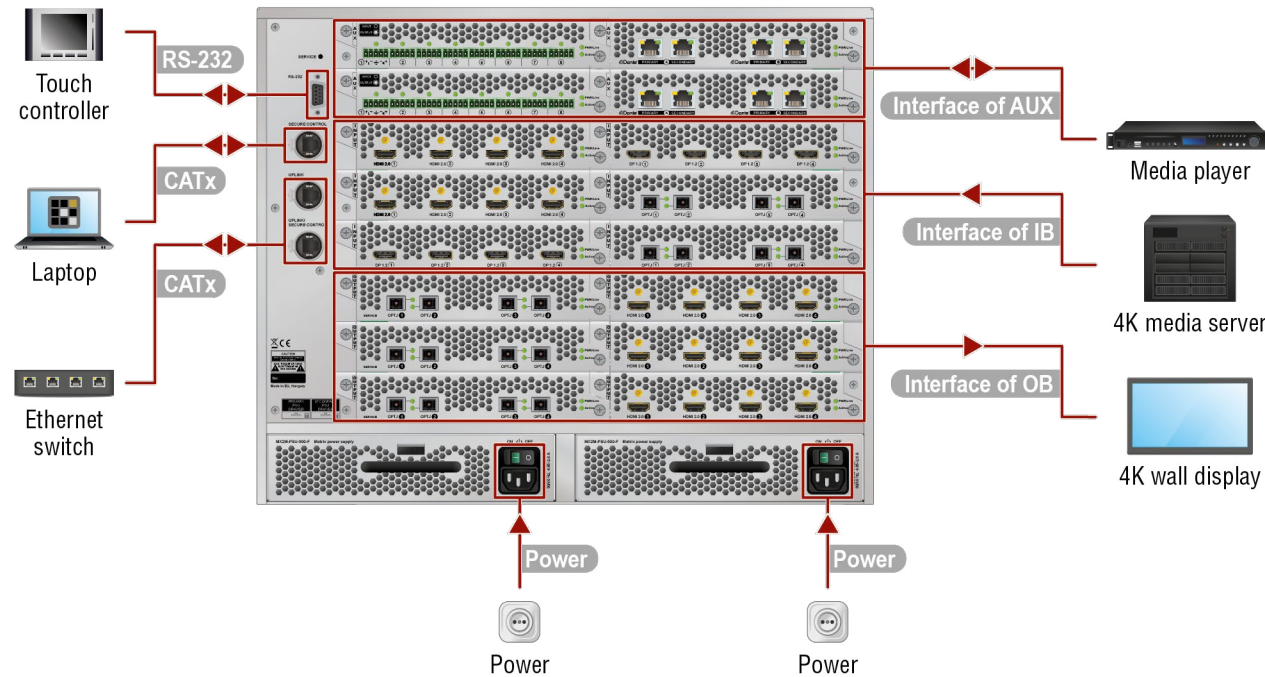
The port is configured as an input



The port is configured as an output

- Step 4.** Place the board into the desired slot.
- Step 5.** Tighten the two screws by hand and fix them by a screwdriver with PZ1 head.
- Step 6.** Connect the necessary cables to the boards and switch on the matrix.
- Step 7.** Wait until the booting procedure of the board is completed.

4.6. Connecting Steps



Interface of AUX

Connect the source / sink devices (e.g. media player) to the ports of the MX2M-AUX series boards via the interface of the board. See the connection possibilities grouped by I/O board variants:

- **MX2M-AUX-8AUDIO** - Connect audio source devices to the audio input connectors and audio sink devices to the audio output connectors. The input/output function of the ports can be modified anytime by the user, see the details in the [Analog Audio Port Configuration](#) section. See the wiring guide for the Phoenix 5-pole connector in the [Cable Wiring Guide](#) section.
- **MX2M-AUX-DANTE-32CH** - Connect the Dante® or AES67 audio source and sink devices to the Primary connectors and the redundant connections to the Secondary connectors via Ethernet cables. The recommended cable type for 1 GbE signal transmission is CAT5e or CAT7e up to 100 m.

Interface of IB

Connect the AV source devices (e.g. 4K media server) to the ports of the MX2M-IB series boards via the interface of the board (DisplayPort, HDMI, fiber optical, etc). See the connection possibilities grouped by I/O board variants:

- **MX2M-4HDMI20-IB** - Connect the source devices using the **HDMI 2.0** ports by HDMI cables.
- **MX2M-DH-4DP12-IB** - Connect the source devices using the **DP 1.2** ports by DisplayPort cables.
- **MX2M-4OPTJ-IB** - Connect a single multimode fiber optical cable between the **OPTJ** SC connectors and the **HDMI20-OPTJ-TX90** extenders. See the details about the maximum fiber cable extensions in the [Maximum Cable Distances](#) section.

Interface of OB

Connect the AV sink devices to the ports (e.g. 4K wall display) of the MX2M-OB series boards via the interface of the board (HDMI, fiber optical, etc). See the connection possibilities grouped by I/O board variants:

- **MX2M-4HDMI20-OB** - Connect the sink devices using the **HDMI 2.0** ports by HDMI cables.
- **MX2M-4OPTJ-OB** - Connect a single multimode fiber optical cable between the **OPTJ** SC connectors and the **HDMI20-OPTJ-RX90** extenders. See the details about the maximum fiber cable extensions in the [Maximum Cable Distances](#) section.

RS-232

Optionally for RS-232 control: connect a controller device (e.g. touch panel) to the **RS-232** port.

CATx

Connect the matrix switcher to a controller device (e.g. laptop) via the **Secure Control** port over a CATx cable.

The port supports 1 GbE data transmission.

CATx

Connect the matrix switcher to a LAN via the **Uplink** and **Uplink / Secure Control** ports over CATx cables. The Uplink port is for user Ethernet access; the Uplink / Secure control port is for user Ethernet access or control the matrix switcher.

Both ports support 1 GbE data transmission.

Power

Connect the power cords to the AC power sockets and to the matrix.

If the matrix is purchased with only one power drawer, connect the power cord to the AC power socket and to the matrix. See more details about it in the [Single PSU License](#) section.

The matrix has redundant PSU drawers which can be switched on and off without interrupting the video transmission. Using one or both of the PSU drawers at the same time is also possible.

The double power drawers allow to connect them for two different AC power lines to ensure the continuous power for the matrix.

See more details about the powering on procedure in the [Powering On](#) section.

4.7. Powering On

Connect the power cords to AC input of the power drawers ([MX2M-PSU-500-F](#) / [MX2M-PSU-1250-FP](#)).

INFO: The router has an internal emergency memory that stores all current settings and tie configurations. This memory is independent from presets and invisible for the user. This built-in feature helps the system to be ready immediately in case of power failure or accidental power down.



Powering On Procedure

After switching the power switch to the **ON** position, the router starts up. If the switch is in the **ON** position, then the matrix starts up immediately when the power cord is connected to the AC source. During the initial self-test and loading of the latest settings, **The matrix is about to start** appears on the LCD screen and the router reloads its last configuration.

INFO: After switching ON, the router reloads the latest settings that were used before it was switched off. The router has an internal emergency memory that stores all current settings and tie configurations.

Redundant Power Supplies

The matrix has redundant power drawers which can be switched on and off without interrupting the video transmission. Using one or both of the power drawers at the same time is also possible.

The double power drawers allow to connect them for two different AC power lines to ensure the continuous power for the matrix. The power drawers are hot-swappable.

5

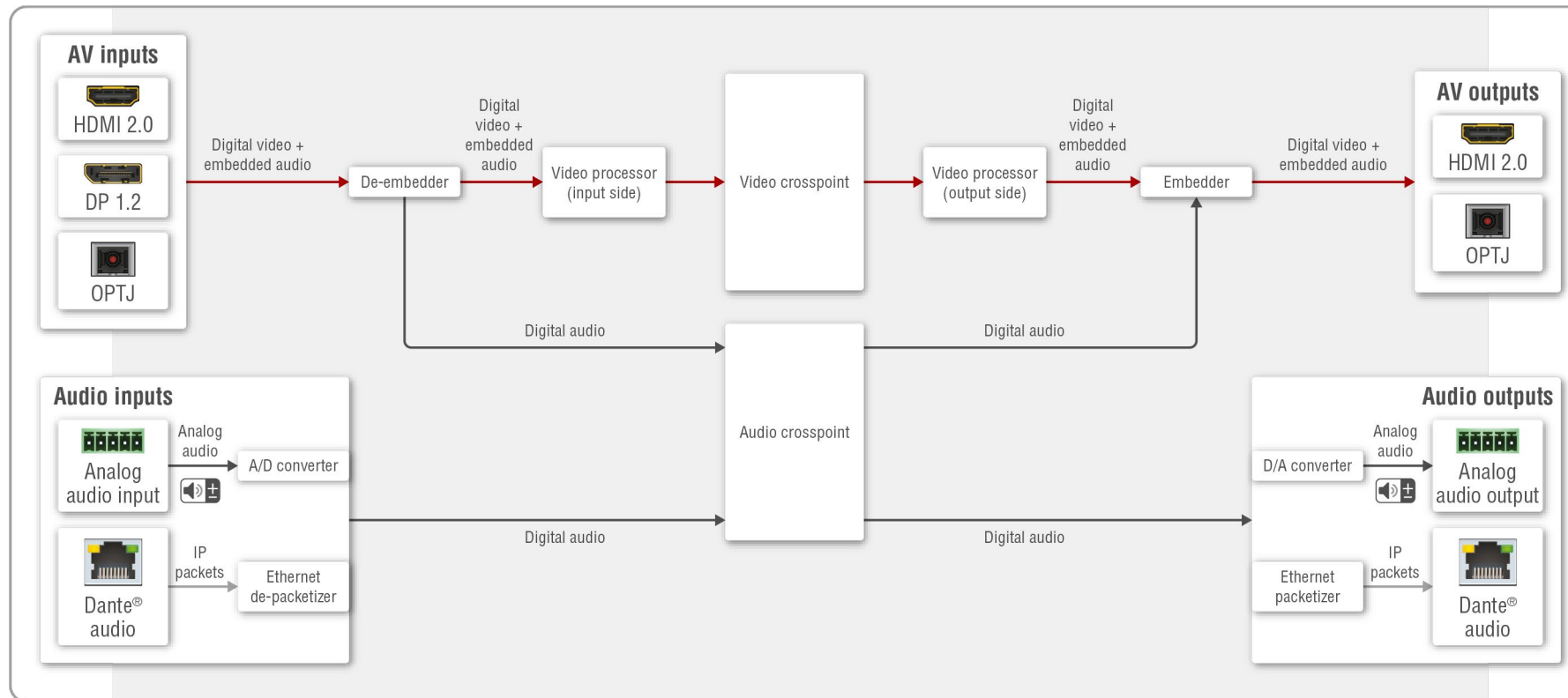
Hybrid Modular Matrix Concept

The following chapter describes the features of the MX2M series frame and I/O boards with few real-life examples. The topics that are described:

- ▶ VIDEO LAYER
- ▶ AUDIO LAYER
- ▶ CONSUMER ELECTRONICS CONTROL (CEC) INTERFACE
- ▶ ETHERNET LAYER
- ▶ LICENSING
- ▶ FURTHER BUILT-IN FEATURES
- ▶ SOFTWARE CONTROL MODES

5.1. Video Layer

5.1.1. Port Diagram



AV port diagram of the MX2M series matrix switcher

INFO: The available audio and video interfaces depend on the installed I/O boards.

Description

The MX2M matrix receives video streams with the embedded audio signal via various types of multimedia ports which are depended on the installed I/O boards. The video streams can be switched to any destination ports in the video crosspoint sized up to 24x24.

The video and audio layers are independent of each other. The audio signal is copied to the Audio layer from the stream and routed to the audio crosspoint where it can be switched to the AV outputs (HDMI or fiber optical) and the audio outputs (analog audio or Dante network) either.

Audio input signals can be received via the analog audio input and Dante audio network. The audio streams can be switched to the audio outputs (analog audio or Dante network) or can be embedded to the output streams (HDMI or fiber optical).

See more details about the audio layer and the available options in the [Audio Layer](#) section.

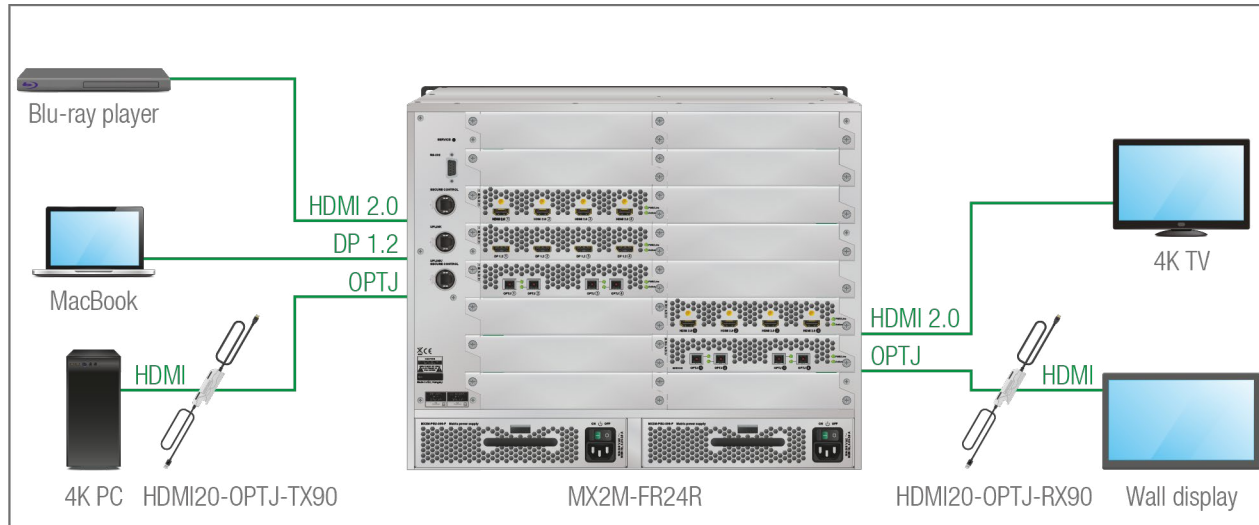
There are video processors on the input and output sides as well. Available functions are the following grouped by AV interfaces:

- **HDMI 2.0**
 - **Input side:** no video processing can be applied.
 - **Output side:** the sampling pattern can be converted from 4:4:4 to 4:2:2.

ATTENTION! The MX2M-4HDMI20-OB output board accepts video signals in 8, 10 and 12 bit color depth but the sampling pattern conversion is always made in 8 bit.

- **DP 1.2**
 - **Input side:** the sampling pattern can be converted from 4:4:4 to 4:2:2 or 4:2:0 and the color depth can be converted 12 bit to 8 bit per channel in case of the signal bandwidth is greater than 18 Gbit/s.
- **OPTJ**
 - **Input side:** no video processing can be applied.
 - **Output side:** the sampling pattern can be converted from 4:4:4 to 4:2:2.

5.1.2. Video Signal Transmission - Example



The Concept

The matrix frame is installed with seven different type of I/O boards:

I/O board		Connection interface	Signal direction	Connected device
IB	MX2M-4HDMI20-IB	HDMI	Input	Blu-ray player
	MX2M-DH-4DP12-IB	DisplayPort	Input	MacBook
	MX2M-4OPTJ-IB	Multimode fiber optical	Input	4K PC over a HDMI20-OPTJ-TX90 fiber optical transmitter
OB	MX2M-4HDMI20-OB	HDMI	Output	4K TV
	MX2M-4OPTJ-OB	Multimode fiber optical	Output	Wall display over a HDMI20-OPTJ-RX90 fiber optical receiver

The video signals of the input boards can be routed to any port of the output boards. The video crosspoint settings can be set by four different methods:

- **Front panel buttons** - see the details in the [Switching Operations](#) section;
- **Built-in website / Lightware Device Controller (LDC) software** - see the details in the [Crosspoint Menu](#) section;
- **LW3 protocol commands** - see the details in the [Video Switching and Crosspoint Settings](#) section.

Available Video Related Settings

The following settings and options are available for the video stream input:

MX2M-4HDMI20-IB and MX2M-4OPTJ-IB boards:

- Input port HDCP capability setting

MX2M-DH-4DP12-IB board:

- Sampling pattern conversion to 4:2:2 or 4:2:0
- Color depth conversion to 8 bit per channel
- Input port HDCP capability setting

The following settings and options are available for the video stream output:

- Sampling pattern conversion to 4:2:2
- Output port HDCP mode setting
- Audio stream embedding setting

5.2. Audio Layer

5.2.1. Overview

The embedded digital audio of the input video stream is copied to the Audio layer and it can be selected to the analog audio interface as well.

On the output side the audio signal can be selected for the output video stream: the original embedded audio is transmitted together with the video or it is changed to another audio (even analog audio) signal which is selected in the audio crosspoint table.

5.2.2. Digital Audio Interface

Inputs

The matrix is able to receive embedded audio streams via the digital video interfaces:

- Embedded HDMI audio over the MX2M-4HDMI20-IB board;
- Embedded HDMI audio over the MX2M-4OPTJ-IB board;
- Embedded DisplayPort audio over the MX2M-DH-4DP12-IB board.

INFO: The audio signal can be that the **HDMI 2.0 standard supports**.

Outputs

The matrix is able to transmit audio streams from the Audio layer as audio embedded in the output video signal provided that the signal on the audio layer qualifies for embedding.

The digital video signals can be:

- LPCM audio format;
- Low bitrate (<6,144 Mbit/s) audio format.

INFO: The audio signal can be **2-channel PCM up to 48kHz** or **compressed (non-HBR) audio**.

Crosspoint Settings

The audio layer is independent of the video layer. Thus, any audio input signal can be selected to any outputs. However, there are limitations on how the respective output can treat the signal:

- Only LPCM audio signals routed from the Audio layer can be selected to the audio outputs of the MX2M-AUX-8AUDIO or MX2M-AUX-DANTE-32CH auxiliary boards;
- Only LPCM and compressed (<6,144 Mbit/s) audio signals routed from the Audio layer can be selected to the outputs of the MX2M series video output boards.

INFO: In case of LPCM audio, at most two channels can be selected for embedding into the output HDMI stream.

5.2.3. Analog Audio Interface

DIFFERENCE: The analog audio interface is available only when the **MX2M-AUX-8AUDIO** auxiliary board is installed.

Configurable Ports

The MX2M-AUX-8AUDIO board is built with 8 pieces 5-pole Phoenix® analog audio ports. Each port can be configured as input or output. See the details about the steps of the configuration in the [Analog Audio Port Configuration](#) section.

Input Side

The matrix is able to receive analog audio streams via the analog audio interface. The received audio stream is converted to digital audio signal and can be embedded to any digital video signal on the output side.

INFO: The analog audio signal is converted to **LPCM with a sampling frequency of 48kHz**.

The following audio settings are available for the analog audio input signal:

- **Volume** adjusting
- **Balance** setting
- **Gain** setting

The audio settings are available in the **Built-in website / Lightware Device Controller (LDC)** software (details in the [Analog Audio Input Port Properties](#) section) and using **LW3 protocol commands** (details in the [Analog Audio Port Properties](#) section).

Output Side

The matrix is able to transmit analog audio streams via the analog audio interface. The transmitted signal can originate from an analog audio interface or can be de-embedded digital audio signal from any digital video interfaces or, it can come from the MX2M-AUX-DANTE-32CH board.

INFO: The analog audio signal is converted to **LPCM with a sampling frequency of 48kHz** on the input side.

The following audio settings are available for the analog audio output signal:

- **Volume** adjustment
- **Balance** setting

The audio settings are available in the **Built-in website / Lightware Device Controller (LDC)** software (details in the [Analog Audio Output Port Properties](#) section) and using **LW3 protocol commands** (details in the [Analog Audio Port Properties](#) section).

5.2.4. Dante® Audio Interface

DIFFERENCE: The Dante/AES67 audio interface is available only when a **MX2M-AUX-DANTE-32CH** board is installed in the matrix frame. *#new*

Digital AoE (Audio over Ethernet) signals can be received and transmitted over the Dante audio interface. The input signals can be routed to any interface within the matrix, for example it can be embedded to the HDMI output signal or transmitted as analog audio. The Dante output signal can be sourced from any other input signal type, for example it can be de-embedded from the HDMI signal or can be received from a microphone as analog audio input.

Supported Audio

Signal type	Input Ports	Output Ports
PCM 16	✓	✗
PCM 24	✓	✓
Compressed DTS/Dolby	✗	✗

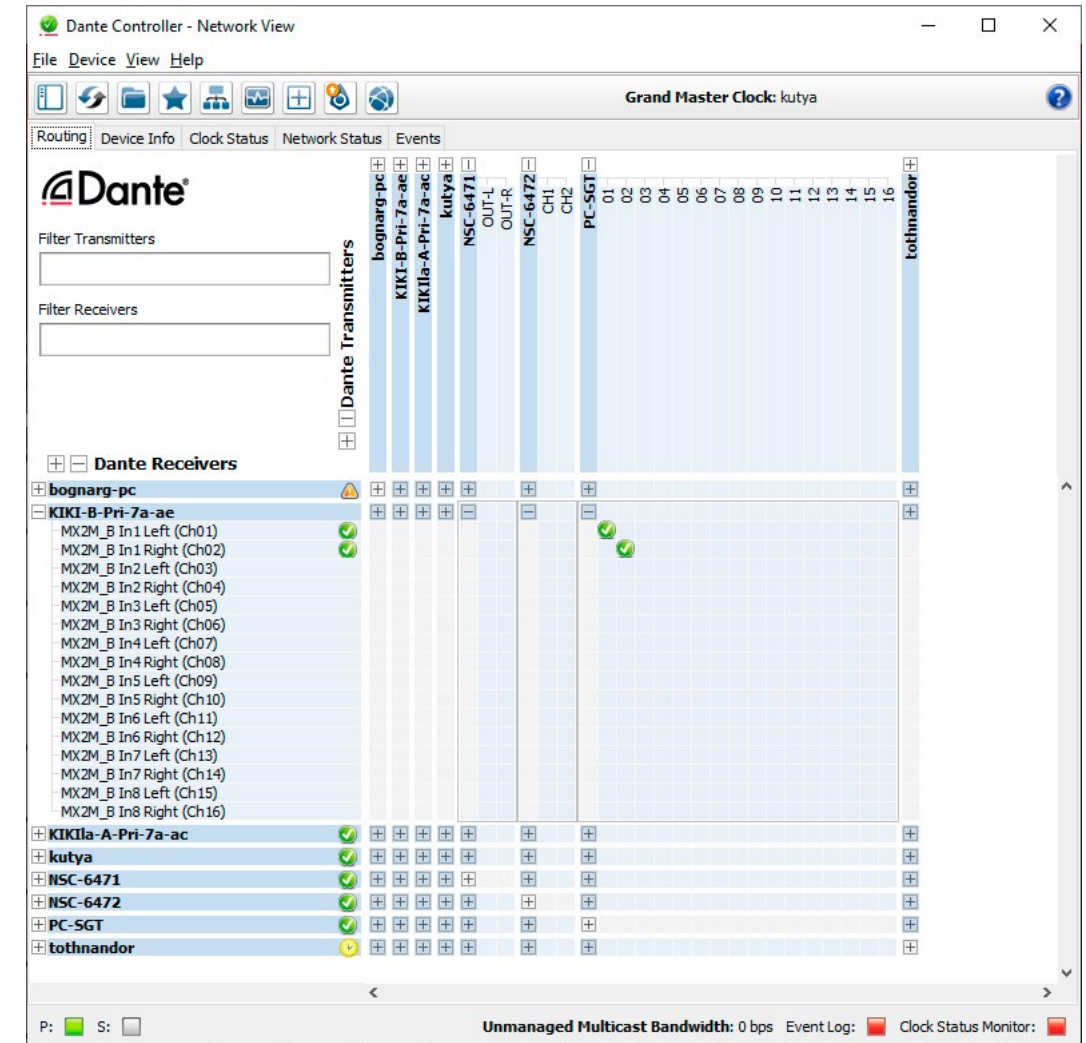
ATTENTION! The supported sample rates are **44.1, 48, 88.2 and 96 kHz**.

Important Notes

- It is essential to have the **right QoS settings** in the network switch where the Dante® audio is connected to. See the details in the [Switch Setup for Dante® Audio Signal Transmission](#) section.
- The **AES67 mode** is supported by the MX2M-AUX-DANTE-32CH auxiliary board, which can be set in the Dante® Controller software.
- Multichannel or encoded audio** format cannot be de-embedded. In this case, no audio is sent to the Dante® network.

Dante® is a registered trademark of Audinate Pty Ltd.

Settings and Signal Routing



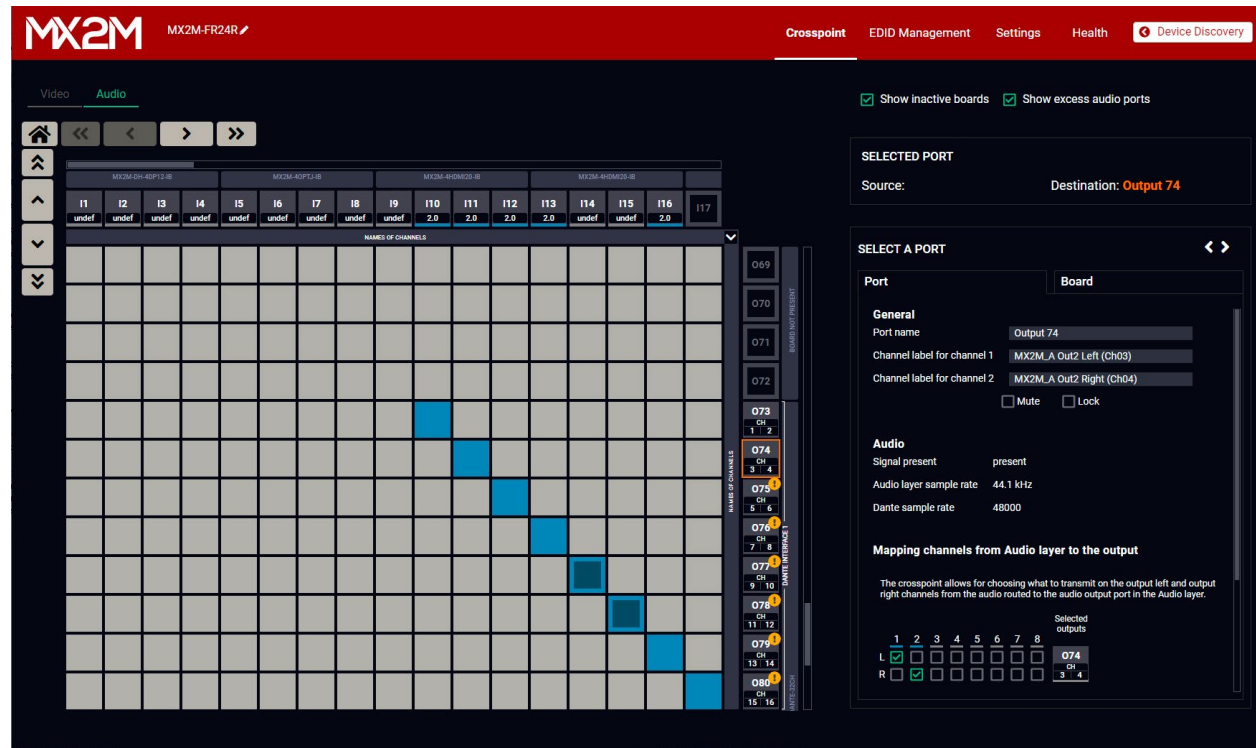
Dante Controller software

All these features are available in the Dante Controller software which can be downloaded from manufacturer's web page: <https://www.audinate.com/products/software>

Device Settings

The discovered Dante-compatible devices are displayed with middle-blue color. Double-click on the name to open the device settings. The channels can be renamed in the LDC application (see the details in [Dante® Audio Input Port Properties](#) and [Dante® Audio Output Port Properties](#) sections) and via LW3 protocol command (see the details in [Channel Label Renaming](#) section).

Dante/AES67 Signal Routing



Crosspoint menu - Audio layer in the Lightware Device Controller software

Dante or AES67 audio signals can be routed to any other interface types within the matrix switcher. The Dante source signal can be embedded to the HDMI signal or transmitted to an analog audio sink device. De-embedded DisplayPort audio can also be transmitted as Dante audio to a network audio sink device.

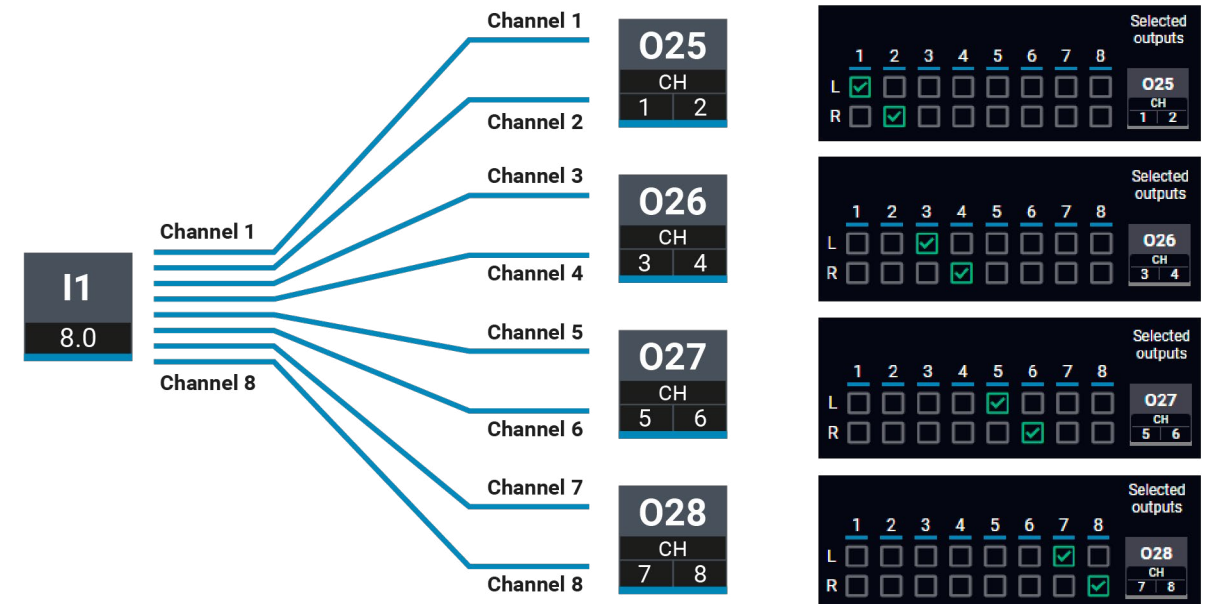
The Dante audio settings are available in the **Built-in website / Lightware Device Controller (LDC) software** (details in the [Dante® Audio Input Port Properties](#) and [Dante® Audio Output Port Properties](#) sections) and using **LW3 protocol commands** (details in the [Dante® Audio Settings](#) section).

5.2.5. Multichannel Routing to the Outputs

This section explains how to transmit a multichannel audio signal to the audio output ports of the matrix.

Example

In our example an 8-channel LPCM audio signal is required to transmit over the MX2M-AUX-DANTE-32CH auxiliary board of the matrix. The figure below shows the method which can be used for transmitting the 8 channels to the output ports.

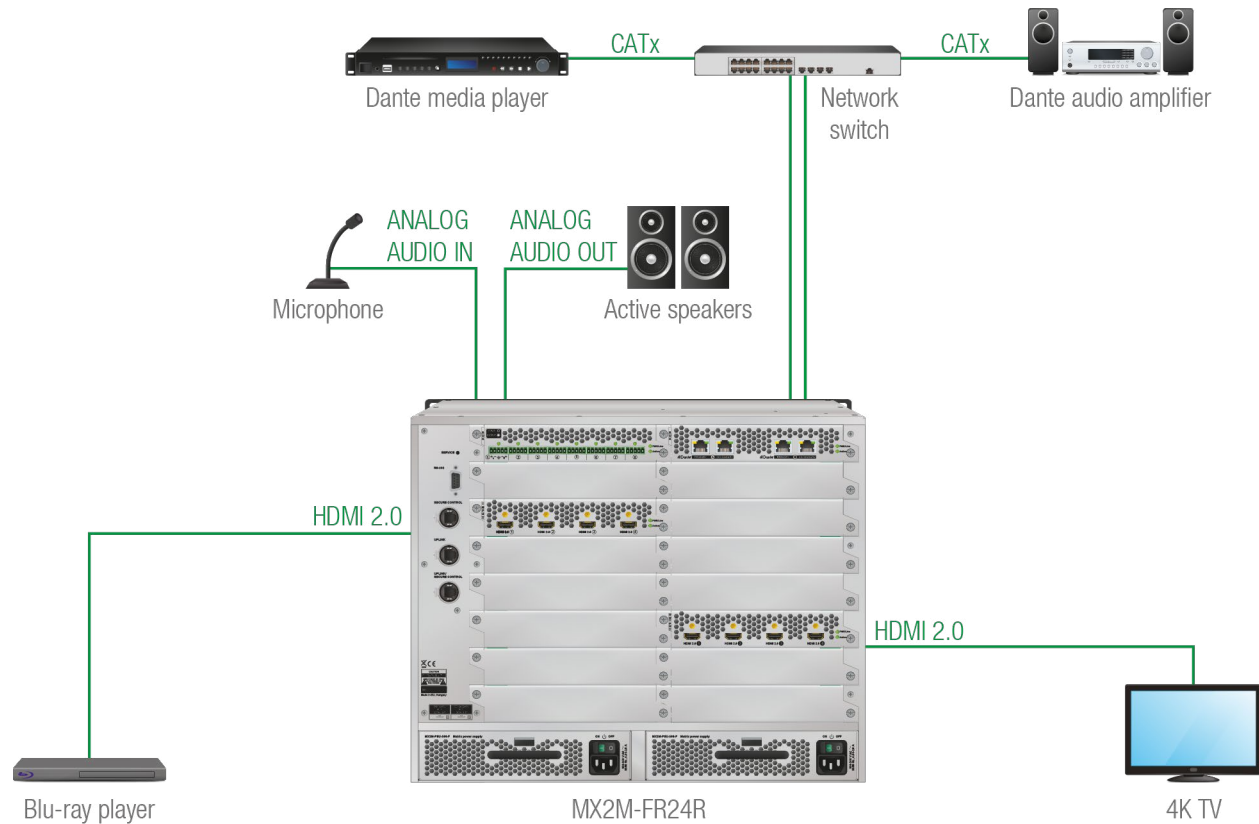


Example for multichannel audio signal routing

Required Settings

- Step 1.** Switch the input port (I1) to four output ports (O25; O26; O27; O28) in the crosspoint table. It can be done with one of the following methods:
 - via **Lightware Device Controller (LDC) software** - see the details in the [Audio Layer](#) section.
 - via **LW3 protocol commands** - see the details in the [Switching an Input to an Output](#) section.
- Step 2.** Set the **channel mapping** to select the desired channels for the output ports. Ensure that all input channels are routed to different output channels. The channel mapping can be done with one of the following methods:
 - via **Lightware Device Controller (LDC) software** - navigate to the Port properties panel of each selected output port by clicking on the output port icon and complete the channel mapping settings. See the details in the [Dante® Audio Output Port Properties](#) section.
 - via **LW3 protocol commands** - see the details in the [Channel Mapping](#) section.

5.2.6. Audio Signal Transmission - Example



The Concept

The matrix frame is installed with different types of I/O boards:

	I/O board	Connection interface	Signal direction	Connected device
AUX	MX2M-AUX-8AUDIO	Analog audio cable with 5-pole Phoenix connector	Input	Microphone
			Output	Active speakers
AUX	MX2M-AUX-DANTE-32CH	CATx	Input	Dante media player over a network switch
			Output	Dante audio amplifier over a network switch
IB	MX2M-4HDMI20-IB	HDMI	Input	Blu-ray player
OB	MX2M-4HDMI20-OB	HDMI	Output	4K TV

Inputs

The matrix can receive audio signals from three types of sources:

- **Analog audio** from the microphone - it is converted to 2-channel LPCM signal and routed to the Audio layer;
- **Digital embedded HDMI audio** from the Blu-ray player - the signal is de-embedded and copied to the Audio layer.
- **AoE (Audio over Ethernet) audio signal from the Dante media player via the network** - the digital audio signal is copied to the Audio layer.

Outputs

On the output side the matrix can transmit three types of audio signals:

- **Analog audio signal** to the active speakers - the transmitted audio signal can be 2-channel LPCM only. As the selected signal can include more than two audio channels, the user can select the two channels which are desired to transmit on the analog audio interface.
- **Digital embedded HDMI audio** to the 4K TV - the embedded audio signal can be 2-channel LPCM or compressed (non-HBR) audio signal only. There are two possibilities in case of audio signal embedding:
 - If the selected signal is of type LPCM, the user can select the two channels which are desired to transmit.
 - If the selected signal is compressed (non-HBR) audio, it can be embedded to the video stream without any further action.
- **AoE (Audio over Ethernet) audio signal to the Dante audio amplifier via the network** - the transmitted audio signal can be PCM 16 and PCM 24 audio signals up to 16 channels. If the selected signal includes more than two audio channels, the user can select the two channels which are desired to transmit.

See more details about the related settings in the **Lightware Device Controller (LDC)** software in the [Audio Port Properties Windows](#) section.

5.3. Consumer Electronics Control (CEC) Interface

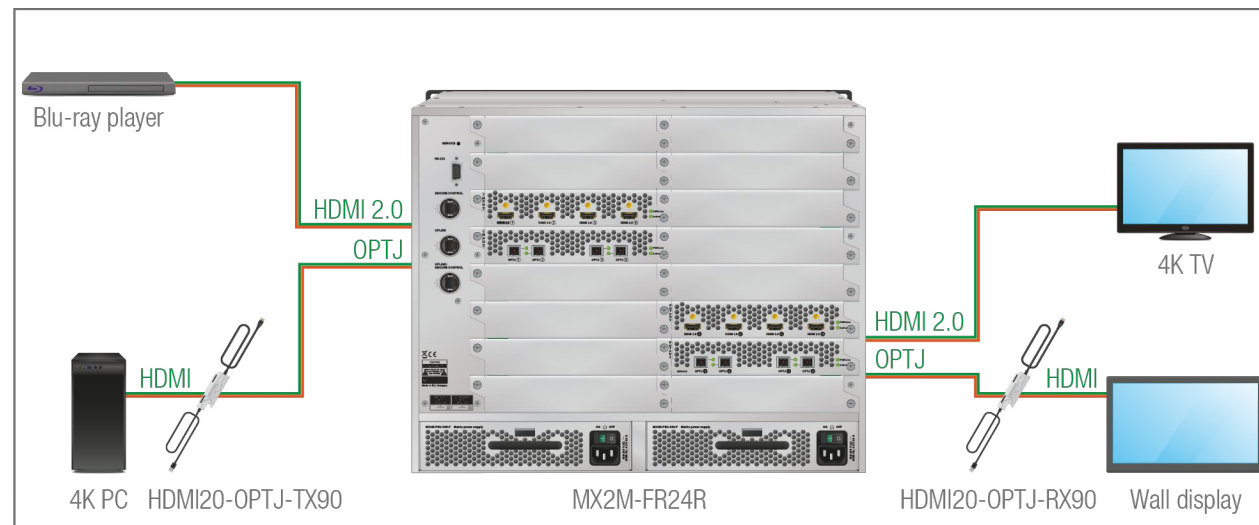
Consumer Electronics Control (CEC) is a bi-directional communication, defined in the HDMI standard. This feature is for remote control of the source and sink devices in the AV system.

MX2M-4HDMI20 and MX2M-4OPTJ series I/O boards are able to send and receive CEC commands, from the input ports towards the source, and from output port towards the sink. For more information about sending CEC messages, see the [CEC Controller \(LDC\)](#) and the [Sending CEC Commands](#) (LW3 protocol commands) sections. *#new*

ATTENTION! CEC has a dedicated pin in the HDMI connector. DVI connector does not contain this pin, so the CEC transmission brakes when HDMI-DVI connector or adapter is in the signal route.

CEC Application Example

The matrix is able to send CEC commands over the HDMI and fiber optical ports to the sink and the source devices as well.



5.4. Ethernet Layer

INFO: All three Ethernet ports of matrix (**Secure Control; Uplink; Uplink/Secure Control**) are equivalent and they can be used for controlling the system.

5.4.1. Control Mode

The matrix can be controlled using the three Ethernet ports with Neutrik RJ45 connectors which provides 1 GbE data transmission per each. The ports accept cables built with Neutrik and RJ45 connectors as well.

The device can be controlled over the Ethernet interface using different methods. See the details about it in the [Software Control Modes](#) section.

5.4.2. Firmware Upgrade Mode

The firmware upgrade of the matrix frame can be applied over the Ethernet interface using the Ethernet ports.

The firmware files of the I/O boards are built in the firmware package of the matrix. The firmware upgrade of the I/O boards is done over the internal Ethernet layer. See the details about the firmware upgrade procedure in the [Firmware Upgrading of the I/O Boards](#) section.

5.4.3. User Ethernet Mode

The MX2M series matrix switchers use the **User Ethernet mode** which acts roughly as an unmanaged Ethernet switch from the point of the customer. The User Ethernet mode provides three equal ports for the customer UP1, UP2 and UP3.

Limitations

Since the MX2M Ethernet network transfers internal audio streams and control frames as well there are some limitations:

- **VLAN ID 100** cannot be used, it is reserved for the internal control frames;
- **VLAN ID 300** cannot be used, it is reserved for the internal audio streams.

ATTENTION! Customer frames with PCP 7 should be avoided in order to preserve the internal audio stream transfer.

5.5. Licensing

Single PSU License

MX2M-FR24R matrix switcher can be purchased with no PSU redundancy. In this case only one PSU drawer is installed with power supply unit (Power Drawer 1, Primary) and the **Single PSU License** is installed on matrix. In this case, the Power Drawer 2 cannot accept the second PSU drawer. Customers have possibility purchasing a code which makes the Single PSU License inactive. For more details please contact sales@lightware.com.

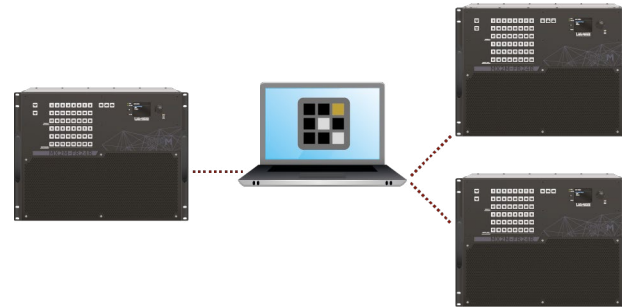
You can check, add or remove licenses to the system with two methods:

- via **Built-in website / Lightware Device Controller (LDC)** software - see the details in the [Overview](#) section;
- using **LW3 protocol commands** - see the details in the [Adding License](#) and [Removing License](#) sections.

5.6. Further Built-in Features

5.6.1. Device Cloning – Configuration Backup and Restore

The device (configuration) cloning of MX2M matrix switcher is a simple method that eliminates the need to repeatedly configure certain devices to have identical (non-factory) settings. If the devices are installed in the same type of system multiple times then it is enough to set up only one device to fit the user's needs and then copy those settings to the others, thus saving time and resources.



See more information about the settings in the [System](#) section.

5.6.2. Advanced EDID Management

Factory Preset EDIDs

The factory EDIDs (F1-F148) are factory preprogrammed and cannot be modified. These are the most common signal formats. They are specially provided to force graphic cards to output only the exact pixel resolution and refresh rate.

Universal EDID allows multiple resolutions including all common VESA defined resolutions. The use of universal EDID is recommended for fast and easy system setup.

Sources and Destinations

The EDID memory consists of four parts:

- **Factory EDID** list shows the pre-programmed EDIDs (F1-F148).
- **Dynamic EDID** list shows the sink connected to the device's outputs (D1-D24). The unit stores the last display devices' EDID on either output, so there is an EDID shown even if there is no display device attached to the output port at the moment.
- **User memory** locations (U1 – U100) can be used to save custom EDIDs.
- **Emulated EDID** list shows the currently emulated EDID for the inputs (E1-E24). The source column displays the memory location that the current EDID was routed from.

The source reads the EDID from the Emulated EDID memory on the input port. Any EDID from any of the User/Factory/Dynamic EDID lists can be copied to the emulated EDID memory.

There are two types of emulation: **static** and **dynamic**.

- **Static EDID emulation:** an EDID from the Factory or User EDID list is selected. Thus, the Emulated EDID remains the same until the user emulates another EDID.
- **Dynamic EDID emulation:** it can be enabled by selecting D1-D24 EDID memory. The attached monitor's EDID is copied to the input; if a new monitor is attached to the output, the emulated EDID changes automatically.

See more information about the settings in the [EDID Management Menu](#) section in the LDC software.

5.7. Software Control Modes

User has more possibilities to control the device besides the front panel buttons. The following list contains the software control modes:

- **Built-in website / Lightware Device Controller (LDC):** you can connect to the device via our control software with using USB, RS-232 or Ethernet interfaces and control or configure the device as you wish. For the details see the [Software Control - Lightware Device Controller](#) chapter.
- **LW3 protocol commands:** you can configure the device by using the full-range command set of LW3 protocol. For more details see the [LW3 Programmers' Reference](#) chapter.

6

Software Control - Built-in Website

The built-in website of the Matrix Management Unit allows to connect to and control the matrix via a web browser. The range of the controlling features are the same as in the case of [Software Control - Lightware Device Controller](#).

- ▶ [ESTABLISHING THE CONNECTION](#)
- ▶ [THE LAYOUT OF THE BUILT-IN WEB](#)

System Requirements

Operating System: Microsoft Windows 10, Apple macOS, Linux.

Web Browser: Mozilla Firefox, Google Chrome, Apple Safari.

ATTENTION! The EDID export function works only in Windows and macOS operating systems under Mozilla Firefox or Google Chrome web browsers.

6.1. Establishing the Connection

ATTENTION! Please be sure that the computer is in the same network as the matrix switcher. If the computer has multiple Ethernet connections (for example Wi-Fi and LAN connections are used simultaneously) you will need to know the **IP address** for the one that is used for controlling the system. *#builtinweb #web*

Step 1. Connect the matrix and the computer either via

- Ethernet, with LAN patch cable, or
- Ethernet, with LAN cross cable.

Step 2. Change to the desired IP settings if needed.

Step 3. Type the IP address to the address bar of the web browser and press enter (the factory default network setting is the DHCP (dynamic IP address)).

6.2. The Layout of the Built-in Web

The built-in web page allows the same controlling functions which are available via the **Lightware Device Controller**. Select a menu item on the left side; the default screen is the Crosspoint menu.

ATTENTION! Please enable the pop-up windows in your browser; certain contents are only displayed in a new window.

The screenshot shows the web interface for the MX2M-FR24R matrix switcher. The browser address bar shows the URL `192.168.4.210/devices/mx2m/index.html`. The interface features a navigation menu with 'Crosspoint', 'EDID Management', 'Settings', and 'Health'. Below the menu is a grid of ports labeled I1 through I16. The grid is organized into columns for 'MX2M-4HDMI20-IB' and 'BOARD NOT PRESENT'. The right side of the interface displays the 'SELECTED PORT' settings for 'Input 1', including options for 'Mute', 'Lock', 'Switch to all', 'Frame detector', and 'CEC Controller'. The 'Video' section shows settings for 'Maximum supported HDCP version' (HDCP 2.2), 'Current HDCP version' (HDCP disabled), 'HDCP stream type' (non HDCP signal), 'HPD enable' (Auto), 'Emulated EDID' (H2_UHD_RB_PCM), '+5V present' (checked), 'Signal present' (checked), and 'Signal bandwidth'.

Built-in website of the MX2M-FR24R matrix switcher

7

Software Control - Lightware Device Controller

The device can be controlled by a computer through Ethernet interface with the Lightware Device Controller (LDC). The software can be installed on a Windows PC or macOS. The application and the User's Manual can be downloaded from www.lightware.com.

- ▶ [INSTALL AND UPGRADE](#)
- ▶ [RUNNING THE LDC](#)
- ▶ [ESTABLISHING CONNECTION](#)
- ▶ [CROSSPOINT MENU](#)
- ▶ [VIDEO PORT PROPERTIES WINDOWS](#)
- ▶ [AUDIO PORT PROPERTIES WINDOWS](#)
- ▶ [PRESETS](#)
- ▶ [EDID MANAGEMENT MENU](#)
- ▶ [SETTINGS MENU](#)
- ▶ [TERMINAL WINDOW](#)
- ▶ [HEALTH MENU](#)

7.1. Install and Upgrade

INFO: After the installation, the Windows and the macOS application has the same look and functionality.

Minimum System Requirement

RAM: 1 GB

Minimum display resolution: 1280x720

Installation for Windows OS

Run the installer. If the User Account Control drops a pop-up message click **Yes**.

During the installation you will be prompted to select the type of the installation: **normal** and the **snapshot** install:

Normal install	Snapshot install
Available for Windows and macOS	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different version can be installed for all users

Comparison of installation types

ATTENTION! Using the Normal install as the default choice is highly recommended.

Installation for macOS

Mount the DMG file with double clicking on it and drag the LDC icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDC into another location just drag the icon over the desired folder.

Upgrading of LDC

Step 1. Run the application.

The **Device Discovery** window appears automatically and the program checks the available updates on Lightware's website and opens the update window if the LDC found updates.

The current and the update version number can be seen at the top of the window and they are shown in this window even with the snapshot install.

The **Update** window can also be opened by clicking the **About icon**  and the **Update** button.

Step 2. Set the desired update setting in the **Options** section.

- If you do not want to check for the updates automatically, uncheck **the circle**, which contains the green tick.
- If you want to postpone the update, a reminder can be set with different delays from the **drop down list**.
- If the proxy settings traverse the update process, set the proper values then click the **OK** button.

Step 3. Click the **Download update** button to start the upgrading.

The updates can be checked manually by clicking the **Check now** button.

7.2. Running the LDC

The common way to start the software is double-click on the LDC icon. But the LDC can be run by command line parameters as follows.

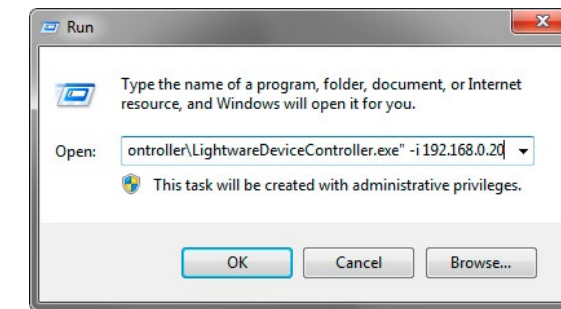
ATTENTION! Please check the **firewall settings** on the **macOS** device. LDC needs to be added to the **exceptions** of the blocked software for the proper operation.

Connecting to a Device with Static IP Address

Format: LightwareDeviceController -i <IP_address>:<port>

Example: LightwareDeviceController -i 192.168.0.20:6107

The LDC is connected to a device with the indicated static IP address directly; the Device Discovery window is not displayed. When the port number is not set, the default port is used: 10001 (LW2 protocol). For LW3 devices use the **6107** port number.



Run window in Windows OS

7.3. Establishing Connection

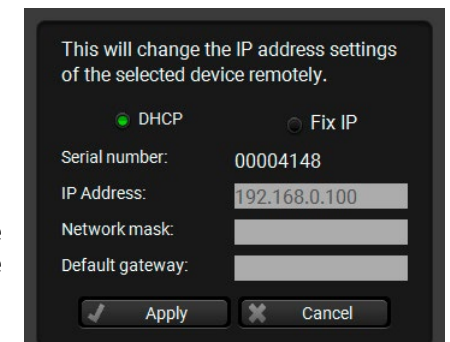
Step 1. Connect the device to a computer via the following methods:

- Ethernet
- RS-232
- USB

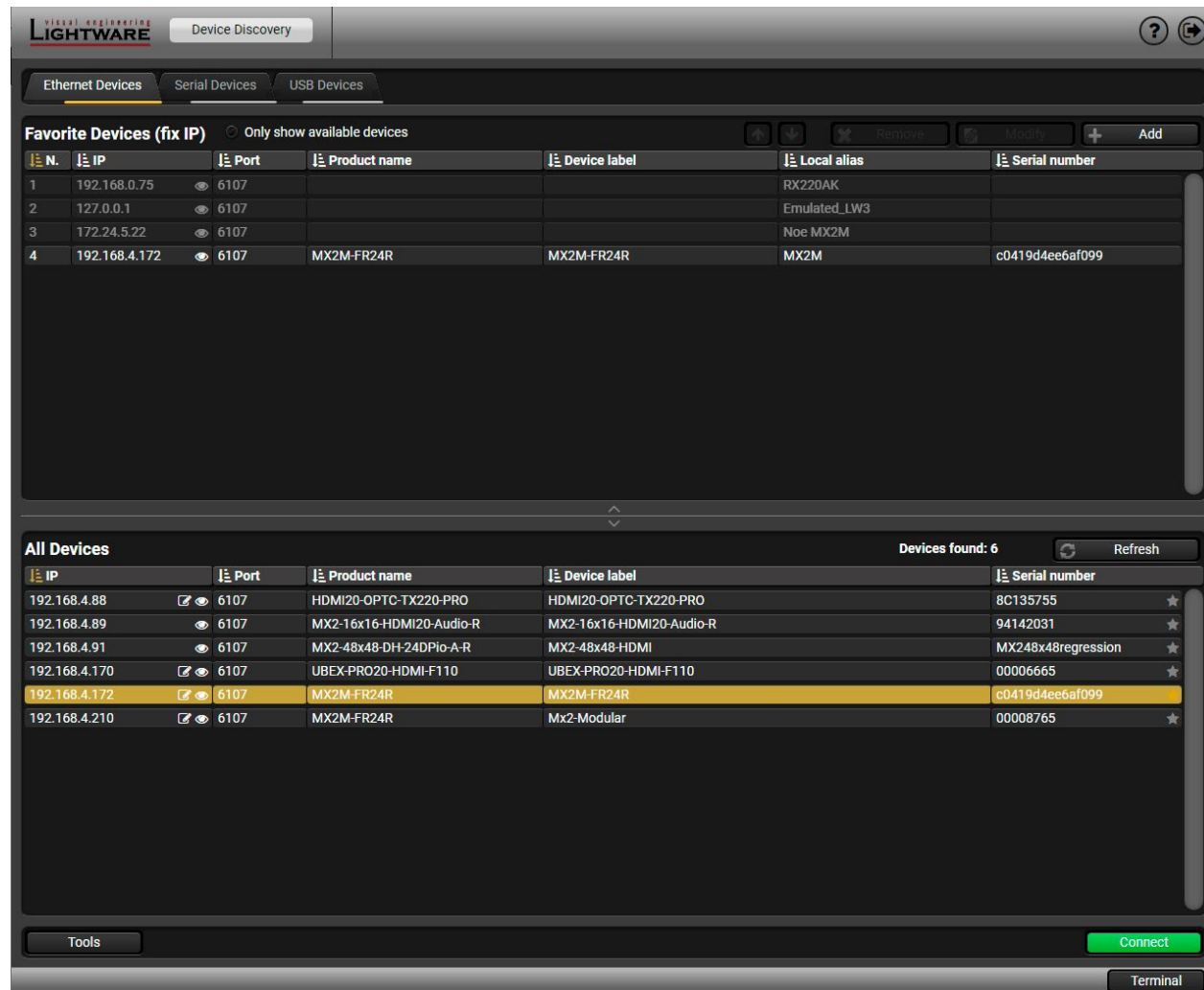
Changing IP Address

To modify IP address settings quickly it is not necessary to enter the device's settings/network menu, you can set them by clicking the pencil icon next to the IP address. `#network #ipaddress #dhcp`

You can see the new settings only in this window.



Step 2. Run the controller software; device discovery window appears automatically.



Device discovery window in LDC

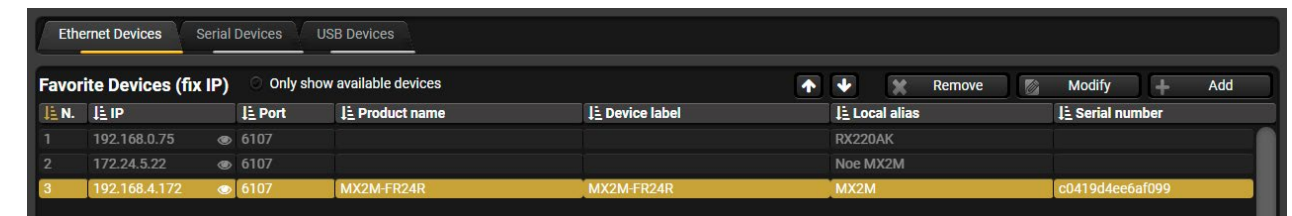
Step 3. Select the MX2M-FR24R device from the discovered **Ethernet devices** or **Serial devices**; when the device is connected through RS-232 click on the Query button next to the desired serial port to display the name of the device and the serial number. Double click on the device name or select the device and click on the green **Connect** button.

Favorite Devices (fix IP)

Clicking on the grey star icon beside of the discovered devices the most used units can be saved to the Favorite devices.

ATTENTION! Only devices with static (fix) IP address can be saved as a favorite device.

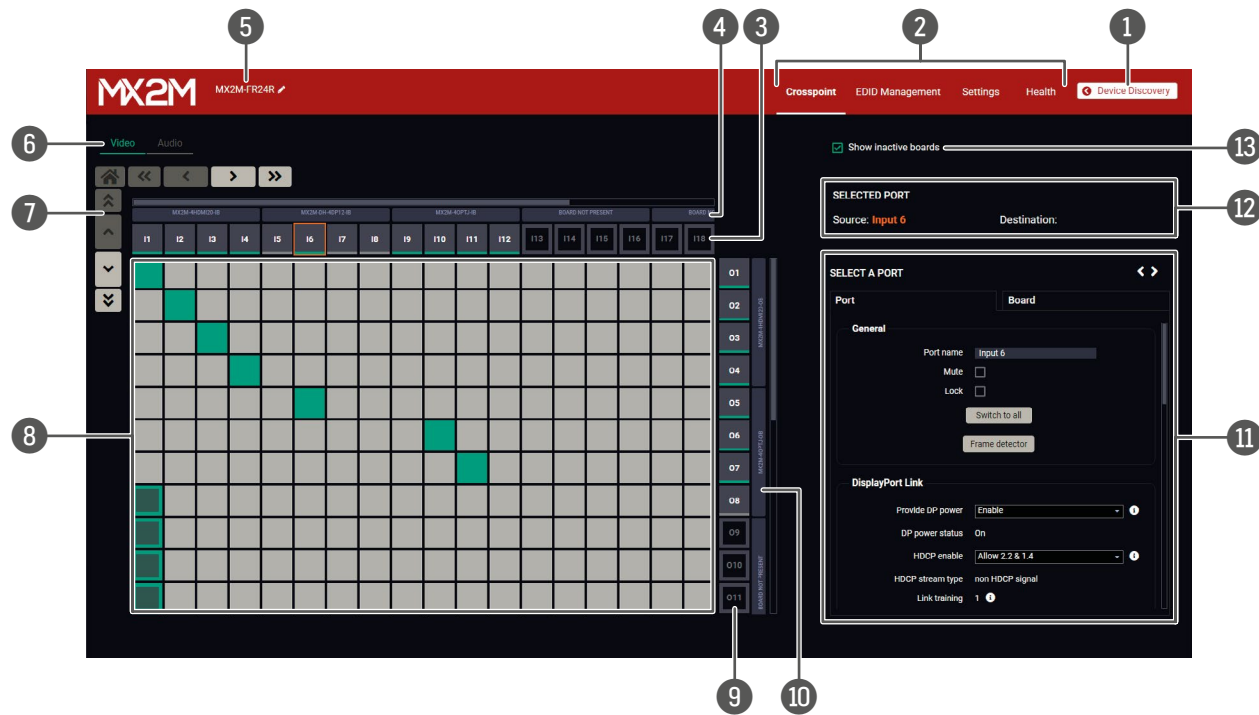
Once the device is set as favorite, the star icon will be highlighted with yellow and the device will be displayed in the Favorite Devices (fix IP) window section.



Favorite Devices window section

7.4. Crosspoint Menu

7.4.1. Video Layer



Crosspoint menu - Video layer

Legend of the Crosspoint Menu

- 1 **Device Discovery** Clicking on the button results in returning to the Device Discovery window. The connection with the current device will be terminated.
- 2 **Main menu** The available menu items ([Crosspoint Menu](#), [EDID Management Menu](#), [Settings Menu](#) and [Health Menu](#)) are displayed. The [Terminal Window](#) window is available under the **Settings** menu.
- 3 **Source streams** Each tile represents a video stream coming from one of the input ports of the input boards (IB). Clicking on the tile opens the [Video Port Properties Windows](#) on the right side.
- 4 **Input Boards** The grey bars group the destination ports belonging to a single input board. **Board not present** description means there is no input board is seated to the frame or the board is unavailable. Enabling the **Show inactive boards** switcher shows the inactive boards in the crosspoint table.

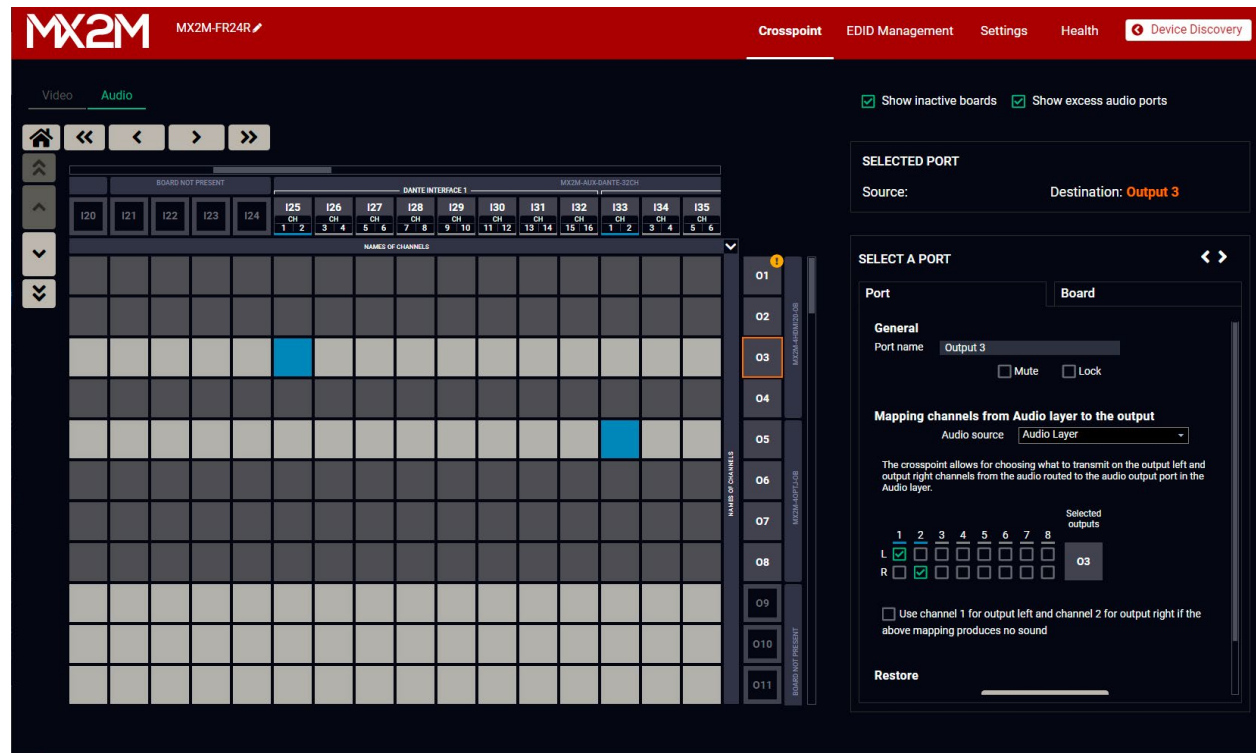
- 5 **Device label** The device label of the matrix is displayed here. It can be modified by the user to any unique name by clicking on the ✎ icon. The device label can be 39 characters long and ASCII characters are allowed. Longer names will be truncated.
- 6 **Layer tabs** The [Video Layer](#) and the [Audio Layer](#) crosspoint panel can be selected on the tabs.
- 7 **Navigation buttons** Clicking on the navigation buttons shows the available sources/destinations and crosspoints which cannot be displayed within the recent window size. The 🏠 icon resets the grid to the default view.
- 8 **Connections** The crosspoint connections can be selected in this table.
- 9 **Destination ports** Each tile represents an output port of the output boards (OB). Clicking on the tile opens the [Video Port Properties Windows](#) on the right side.
- 10 **Output boards** The grey bars group the destination ports belonging to a single output board. **Board not present** description means there is no output board is seated to the frame or the board is unavailable. Enabling of the **Show inactive boards** switcher shows the inactive boards in the crosspoint table.
- 11 **Properties window** The properties, available settings, and status information of the selected source or destination are displayed in this section. Two tabs are available: **Port** and **Board**. See more details about the port settings in the [Video Port Properties Windows](#) section.
- 12 **Selected / Highlighted streams** Showing the currently selected connections. Move the cursor above the desired crosspoint and the names of the source and destination are displayed in the field.
- 13 **Show inactive boards switcher** When it is enabled, the inactive boards are shown in the crosspoint table. When it is disabled, the inactive boards are hidden.

INFO: See the details about the port and crosspoint tiles in the [Legend of the Port Tiles](#) section.

INFO: See more details about video input/output port numbering in the [Video Input/Output Port Numbering](#) section.

`#switch #crosspoint #label #devicelabel`

7.4.2. Audio Layer



Crosspoint menu - Audio layer

The operation of the Audio layer is basically the same as the [Video Layer](#).

Clicking on the source or the destination port the properties panel opens on the right side - all audio related information and options are available here. See the details about the available settings in the [Audio Port Properties Windows](#) section. *#audio #analogaudio #switch #crosspoint*

INFO: See the details about the port and crosspoint tiles in the [Legend of the Port Tiles](#) section.

INFO: See more details about audio input/output port numbering in the [Audio Input Port Numbering](#) and the [Audio Output Port Numbering](#) sections.

Dante / AES67 Crosspoint Settings

ATTENTION! Please note that the Dante/AES67 crosspoint operations in the LDC application effects the signal routing within the matrix switcher only. For external Dante/AES67 sources and destinations please use the **Dante Controller** application. See the details in the [Dante® Audio Interface](#) section.

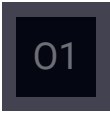




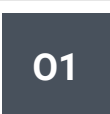
7.4.3. Legend of the Port Tiles





This section helps to identify easily the various type of port and crosspoint tiles on the Crosspoint menu.

Video Layer

Port tile	Description
Port tiles	
	Port is not available because there is no I/O board is installed in the related board slot.
	Port is available but there is no AV signal transmission.
	Port is available and there is AV signal transmission.
Crosspoint tiles	
	No crosspoint connection.
	Crosspoint connection is set but there is no signal on the selected input port.
	Crosspoint connection is set and the signal transmission is on.

Audio Layer

Port tile	Description
Port tiles	
	Port is not available because there is no I/O board is installed in the related board slot.
	In case of output ports of the MX2M-AUX-8AUDIO board only: The port on the board is configured as an analog audio input.
	There is no AV signal transmission on the selected input port (signal is undefined).
	Input port is available and there is signal transmission on the selected audio port (for example 2-channel PCM (2.0)).
	There is no AV signal transmission on the selected output port or the incoming signal is not 2-channel LPCM or uncompressed HBR audio. User needs to define the two audio channel which are wanted to be transmitted - it can be made on the Digital Audio Output Port Properties and the Analog Audio Output Port Properties sections.
	Output port is available for signal transmission.

Port tile	Description
Crosspoint tiles	
	No crosspoint connection.
	Unavailable crosspoint.
	Crosspoint connection is set but there is no signal on the selected input port.
	Crosspoint connection is set and the signal transmission is on.

7.5. Video Port Properties Windows

7.5.1. HDMI / OPTJ Input Port Properties

DIFFERENCE: The following panel is available only when a MX2M-4HDMI20-IB or MX2M-4OPTJ-IB board is installed in the matrix frame.

Clicking on a HDMI or OPTJ input port icon opens the Port properties panel. The most important signal information and settings are available from the panel. `#hdm` `#optj`

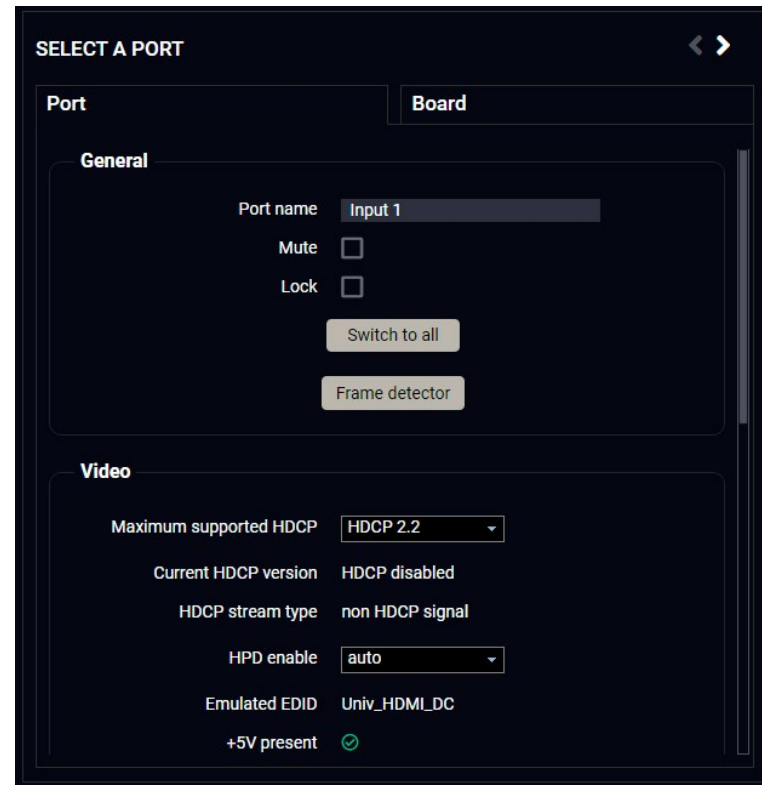
Port Tab

Available Settings and Tools

- **Port naming**
- **Mute/Unmute** **switcher** `#mute` `#unmute`
- **Lock/Unlock** **switcher** `#lock` `#unlock`
- **Switch to all button:** clicking on the button results the selected input stream is switched to all output ports. `#switch`
- **Frame Detector** - The tool displays the frame information of the input stream coming from the input port. `#framedetector`
- **Maximum supported HDCP** (HDCP disabled / HDCP 1.4 / HDCP 2.2); `#hdc`
- **HDP (Hot Plug Detect) enable button** (AUTO / ON / OFF); `#hdp` `#hotplugdetect`
- Video stream information;
- Embedded audio information
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.



7.5.2. DisplayPort Input Port Properties

DIFFERENCE: The following panel is available only when a MX2M-DH-4DP12-IB board is installed in the matrix frame.

Clicking on a DP input port icon opens the Port properties panel. The most important signal information and settings are available from the panel. `#displayport` `#dp`

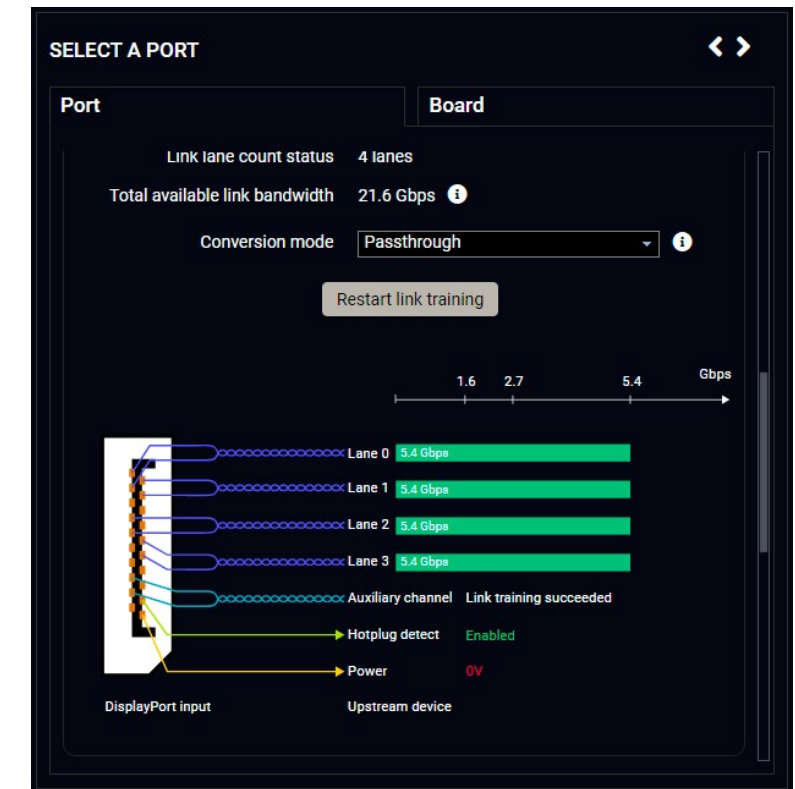
Port Tab

Available Settings and Tools

- **Port naming**
- **Mute/Unmute** **switcher** `#mute` `#unmute`
- **Lock/Unlock** **switcher** `#lock` `#unlock`
- **Switch to all button:** clicking on the button results the selected input stream is switched to all output ports. `#switch`
- **Frame Detector** - The tool displays the frame information of the input stream coming from the input port. `#framedetector`
- **Provide DP power** (Enable / Disable): if enabled, the board sends 1.5W power on the chosen port. `#dppower`
- **HDCP enable** (Disable / Allow 1.4 only / Allow 2.2 & 1.4 / High value mode); `#hdc`
- **Link datarate** (Max RBR 1.62 Gbps / Max HBR 2.7 Gbps / Max HBR2 5.4 Gbps);
- **Link lane count** (Max 1 lanes / Max 2 lanes / Max 4 lanes);
- **Conversion mode** (Passthrough / RGB 4:4:4 to YCbCr 4:2:2 12 bit / RGB 4:4:4 to YCbCr 4:2:0 8 bit); `#colorspace`
- **Restart link training** button; `#linktraining`
- Video stream information;
- Embedded audio information.
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.



7.5.3. HDMI / OPTJ Output Port Properties

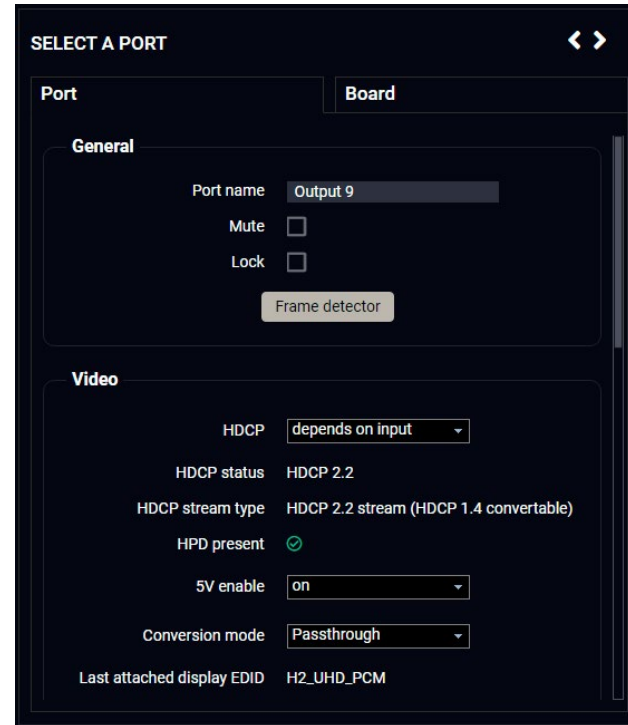
DIFFERENCE: The following panel is available only when a MX2M-4HDMI20-OB or MX2M-4OPTJ-OB board is installed in the matrix frame.

Clicking on a HDMI or OPTJ output port icon opens the Port properties panel. `#hdm` `#optj`

Port Tab

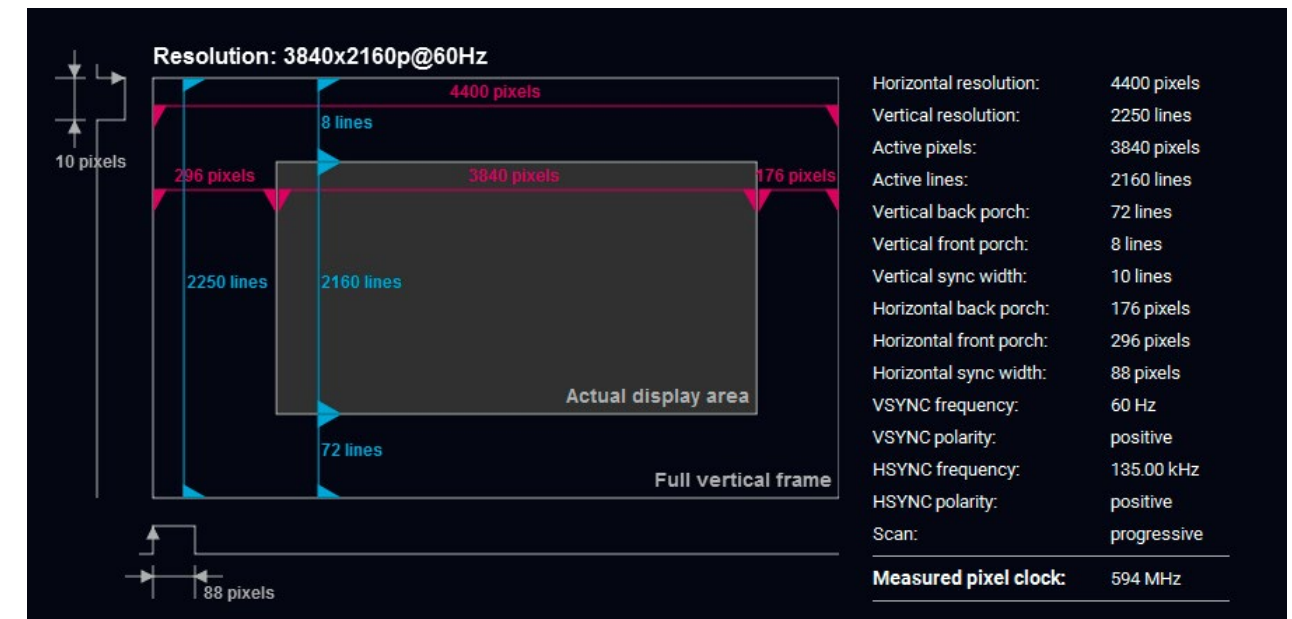
Available Settings and Tools

- **Port naming**
- **Mute/Unmute switcher** `#mute` `#unmute`
- **Lock/Unlock switcher** `#lock` `#unlock`
- **Frame Detector** - The tool displays the frame information of the input stream coming from the input port. `#framedetector`
- **HDCP:** `#hdc`
 - Depends on input: the level and version of HDCP-encryption depends on the source device;
 - Maximum possible: the output ports set the maximum HDCP-encryption level which can accept by the connected sink device.
- **5V enable switcher** (on / off / auto); `#power5v`
- **Conversion mode** (Passthrough / YCbCr 4:2:2); `#colorspace`
- Video stream information;
- **Audio source:** `#embedder` `#audio`
 - HDMI: the original embedded audio is transmitted with the stream. When the crosspoint connection is changed on the Video layer, the embedded audio will be changed as well.
 - Audio layer: the audio signal is selected from the Audio layer.
 - OFF: audio signal is disabled.
- **Mapping channels for Audio layer to the output:** the embedded audio signal can be 2-channel LPCM or compressed (non-HBR) audio signal only. There are two possibilities in case of audio signal embedding:
 - If the selected signal includes more than two audio channels, the user can select the two channels which are desired to transmit.
 - If the selected signal is compressed (non-HBR) audio, it can be embedded to the video stream without any further action. `#mapping` `#channelmapping`
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.



7.5.4. Frame Detector

The ports can show detailed information about the signal like blanking intervals and active video resolution. This feature can be used for troubleshooting if compatibility problems occur during system installation. To access this function, open the port properties window and click on **Frame detector** button.



Frame detector window

Lightware's Frame Detector function works like a signal analyzer and allows to determine the exact video format that is present on the port, thus it helps to identify various problems. E.g. actual timing parameters may differ from the expected and this may cause some displays to drop the picture.

Frame Detector measures detailed timings of the video signals just like a built-in oscilloscope, but it is much easier to use. Actual display area shows the active video size (dark grey). Black area of the full frame is the blanking interval which can contain the info frames and embedded audio data for HDMI signals. Shown values are measured on the actual signal and not retrieved only from the HDMI info frames. `#framedetector`

Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.

7.5.5. CEC Controller

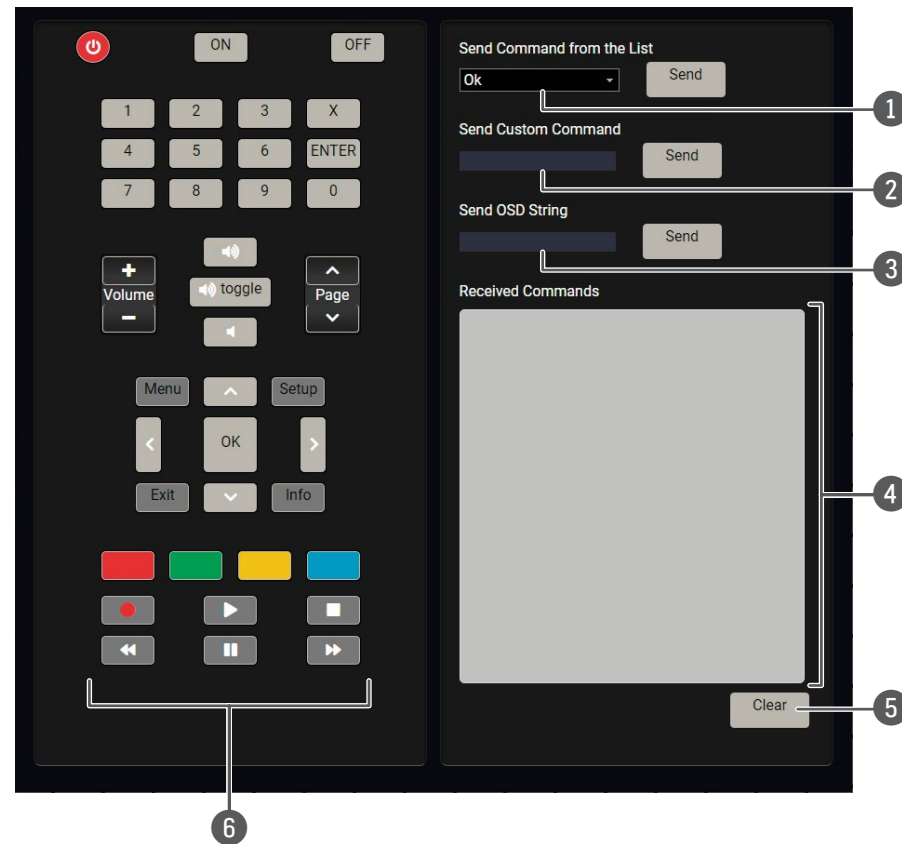
DIFFERENCE: The following panel is available only when a **MX2M-4HDMI20-IB**, **MX2M-4OPTJ-IB**, **MX2M-4HDMI20-OB** or **MX2M-4OPTJ-OB** board is installed in the matrix frame.

The MX2M-4HDMI20 and MX2M-4OPTJ series I/O boards are able to send and receive Consumer Electronics Control (CEC) commands. This feature is for remote control of the source or sink device. CEC is a bi-directional communication via HDMI cable.

ATTENTION! It can occur that the third-party device can receive, but not execute the command because it is not supported by the product. Check the accepted commands in the documentation of the device.

INFO: The first 2x2 bytes of the CEC commands contains identification data of the source and destination address. When the port is input, it is always 04 (from TV to Playback device 1.) when the port is output, it is always 40 (from Playback device 1. to TV).

The CEC panel is available on the port properties window of the **HDMI input**, **HDMI output**, **OPTJ input** and **OPTJ output** ports.



CEC control panel on the HDMI out port properties window

1 Drop-down command list

This list contains the basic CEC commands, most of them are displayed on the graphical interface, too (on the left side). Click on the **Send** button to execute sending the command.

2 Custom command textbox

The text field is for sending hexadecimal commands to the source. The maximum length of the message could be 30 characters (15 bytes). Click on the **Send** button to execute sending the command.

3 OSD string textbox

A max. 14 character-long text can be shown on the sink device. The send OSD (On-screen display) command textbox is the input field of the string. Alphanumeric characters, glyphs and space are accepted. Click on the **Send** button to execute the command.

4 Received Command box

Displays all the sent (in red) CEC commands and the received answers (in blue) with a timestamp.

Legend of the received message:

< [10:33:17] ACK

Answer for the acknowledged command.

< [10:35:01] NACK

Answer for the not acknowledged command.

< [10:33:17] IN PROGRESS

The command is in progress at the moment.

< [10:33:17] FAILED

Answer for other failure.

< [10:35:40] feature_abort_<*>

This is the most common answer from the third-party devices when the command is delivered, but the execution is refused. The cause of the refuse stands after 'feature_abort' expression.

5 Clear button

Click on the **Clear** button to erase the content of the terminal window.

6 CEC command button panel

This panel provides the quick and easy management of CEC commands. These buttons are pre-programmed with basic functions and sends commands towards the sink. The communication is displayed in the Received Command box. For the list of the commands see [Sending a CEC Command in Hexadecimal Format](#) section. Both the layout and functionality are similar to the design of a remote control.

ATTENTION! Make sure that the controlled unit is CEC-capable and this function is enabled.

#cec #new

7.6. Audio Port Properties Windows

7.6.1. Digital Audio Input Port Properties

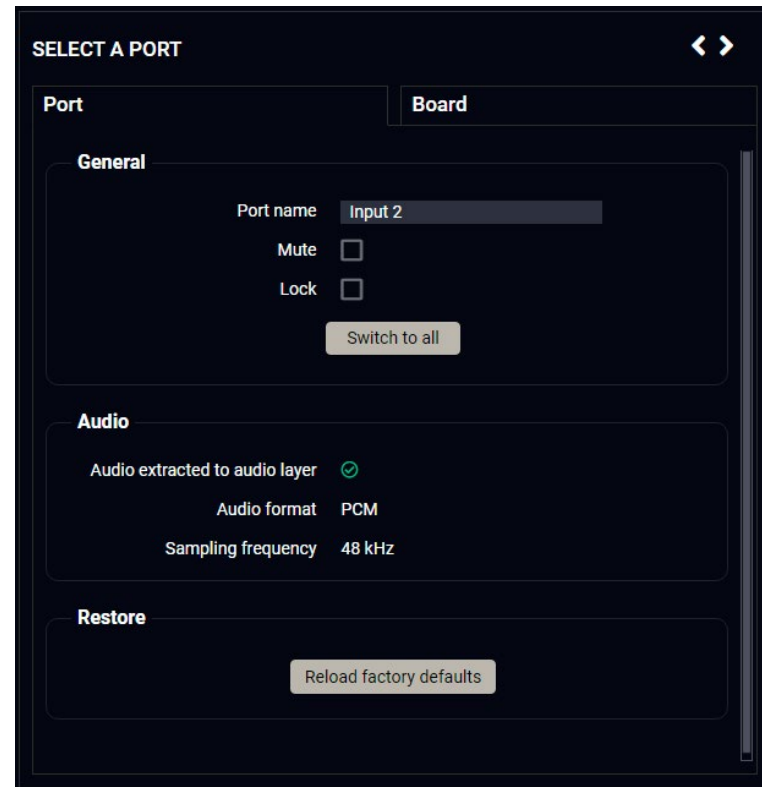
DIFFERENCE: The following panel is available only when a MX2M-4HDMI20-IB, MX2M-4OPTJ-IB or MX2M-DH-4DP12-IB board is installed in the matrix frame.

Clicking on a digital audio input port icon opens the Port properties panel. The most important signal information and settings are available from the panel. [#audio](#) [#hdmi](#) [#optj](#) [#displayport](#) [#dp](#)

Port Tab

Available Settings and Tools

- **Port naming**
- **Mute/Unmute** **switcher** [#mute](#) [#unmute](#)
- **Lock/Unlock** **switcher** [#lock](#) [#unlock](#)
- **Switch to all button:** clicking on the button results the selected input stream is switched to all output ports. [#switch](#)
- Audio signal related information;
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.



Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.

7.6.2. Digital Audio Output Port Properties

DIFFERENCE: The following panel is available only when a MX2M-4HDMI20-OB or MX2M-4OPTJ-OB board is installed in the matrix frame.

Clicking on a HDMI or OPTJ output port icon opens the Port properties panel. The most important signal information and settings are available from the panel. [#audio](#) [#hdmi](#) [#optj](#)

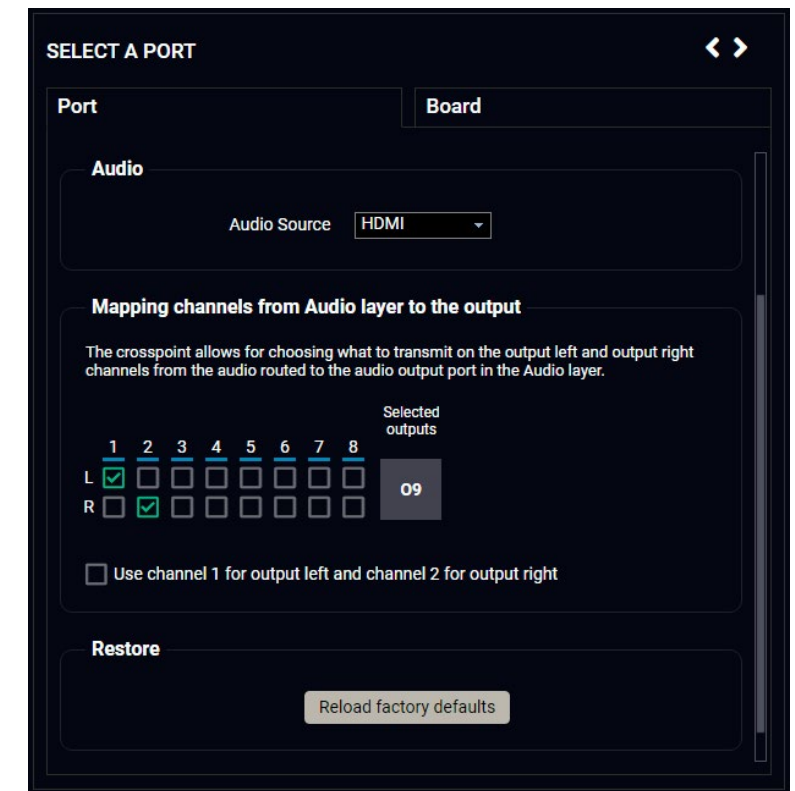
Port Tab

Available Settings and Tools

- **Port naming**
- **Mute/Unmute** **switcher** [#mute](#) [#unmute](#)
- **Lock/Unlock** **switcher** [#lock](#) [#unlock](#)
- **Audio source:** [#embedder](#)
 - HDMI: the original embedded audio is transmitted with the stream. When the crosspoint connection is changed on the Video layer, the embedded audio will be changed as well.
 - Audio layer: the audio signal is selected from the Audio layer.
 - OFF: audio signal is disabled.
- **Mapping channels for Audio layer to the output:** the embedded audio signal can be 2-channel LPCM or compressed (non-HBR) audio signal only. There are two possibilities in case of audio signal embedding:
 - If the selected signal is of type LPCM, the user can select the two channels which are desired to transmit.
 - If the selected signal is compressed (non-HBR) audio, it can be embedded to the video stream without any further action. [#mapping](#) [#channelmapping](#)
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.



7.6.3. Analog Audio Input Port Properties

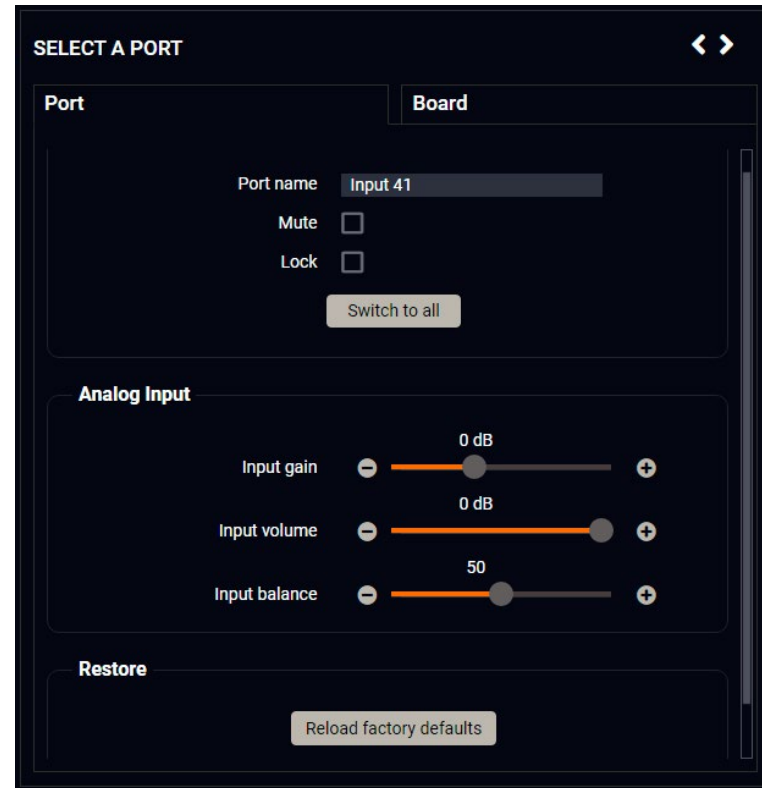
DIFFERENCE: The following panel is available only when a **MX2M-AUX-8AUDIO** board is installed in the matrix frame.

Clicking on an analog audio input port icon opens the Port properties panel. The most important signal information and settings are available from the panel. [#audio](#) [#analogaudio](#)

Port Tab

Available Settings and Tools

- Port naming
- Mute/Unmute** **switcher** [#mute](#) [#unmute](#)
- Lock/Unlock** **switcher** [#lock](#) [#unlock](#)
- Switch to all button:** clicking on the button switches the selected input stream to all output ports. [#switch](#)
- Input gain:** sets the gain between -12 dB and 21 dB. Clicking on the **−** icon results -1 dB, the **+** icon results +1 dB in the gain setting. The default value is 0 dB. [#gain](#)
- Input volume:** sets the input volume (attenuation) between 0% (-95.625 dB) and 100% (0 dB). Clicking on the **−** icon results -1%, the **+** icon results +1% in the volume setting. The default value is 100%. [#volume](#)
- Input balance:** sets the balance between -100 (total left) and 100 (total right). Clicking on the **−** icon results -1, the **+** icon results +1 in the balance setting. The default value is 0 (center). [#balance](#)
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.



Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.

7.6.4. Analog Audio Output Port Properties

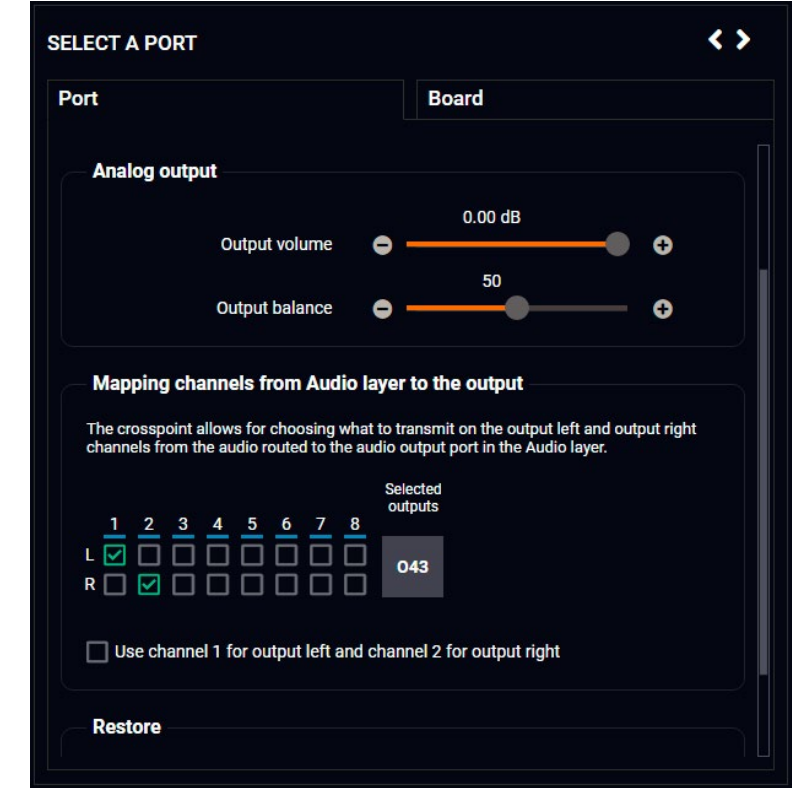
DIFFERENCE: The following panel is available only when a **MX2M-AUX-8AUDIO** board is installed in the matrix frame.

Clicking on an analog audio output port icon opens the Port properties panel. The most important signal information and settings are available from the panel. [#audio](#) [#analogaudio](#)

Port Tab

Available Settings and Tools

- Port naming
- Mute/Unmute** **switcher** [#mute](#) [#unmute](#)
- Lock/Unlock** **switcher** [#lock](#) [#unlock](#)
- Output volume:** sets the volume (attenuation) between 0% (-95.625 dB) and 100% (0 dB). Clicking on the **−** icon results -1%, the **+** icon results +1% in the volume setting. The default value is 100%. [#volume](#)
- Output balance:** sets the balance between -100 (total left) and 100 (total right). Clicking on the **−** icon results -1, the **+** icon results +1 in the balance setting. The default value is 0 (center). [#balance](#)
- Mapping channels for Audio layer to the output:** analog audio output port can convert only LPCM signals, therefore the only option available is the following: if the selected signal is of type LPCM, the user can select the two channels which are desired to transmit. [#mapping](#) [#channelmapping](#)
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.



Board Tab

The most important information about the I/O board is available on the tab like the type of the board and the status of board.

7.6.5. Dante® Audio Input Port Properties

DIFFERENCE: The following panel is available only when a MX2M-AUX-DANTE-32CH board is installed in the matrix frame.

Clicking on a Dante audio input port icon opens the Port properties panel. The most important signal information and settings are available from the panel. *#audio #dante #aes67 #new*

Port Tab

Available Settings and Tools

- Port naming
- Adding Channel label for receive channel 1 and 2
- Mute/Unmute **switcher** *#mute #unmute*
- Lock/Unlock **switcher** *#lock #unlock*
- Switch to all button:** clicking on the button switches the selected input stream to all output ports. *#switch*
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

Board Tab

- Device naming
- IP address mode for Primary and Secondary interfaces: Unknown/Query / LinkLocal / DHCP or LinkLocal / DHCP / Static
- TX channel naming: from TX channel 1 to 16.
- RX channel naming: from RX channel 1 to 16.
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

7.6.6. Dante® Audio Output Port Properties

DIFFERENCE: The following panel is available only when a MX2M-AUX-DANTE-32CH board is installed in the matrix frame.

Clicking on a Dante audio output port icon opens the Port properties panel. The most important signal information and settings are available from the panel. *#audio #dante #aes67 #new*

Port Tab

Available Settings and Tools

- Port naming
- Mute/Unmute **switcher** *#mute #unmute*
- Lock/Unlock **switcher** *#lock #unlock*
- Mapping channels for Audio layer to the output:** the embedded audio signal can be 2-channel LPCM only. If the selected signal includes more than two audio channels, the user can select the two channels which are desired to transmit. *#mapping #channelmapping*
- "Use channel 1 for output left and channel 2 for output right if the above mapping produces no sound" **switcher**
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

Board Tab

- Device naming
- IP address mode for Primary and Secondary interfaces: Unknown/Query / LinkLocal / DHCP or LinkLocal / DHCP / Static
- TX channel naming: from TX channel 1 to 16.
- RX channel naming: from RX channel 1 to 16.
- Restore [Switch Setup for Dante® Audio Signal Transmission](#) button.

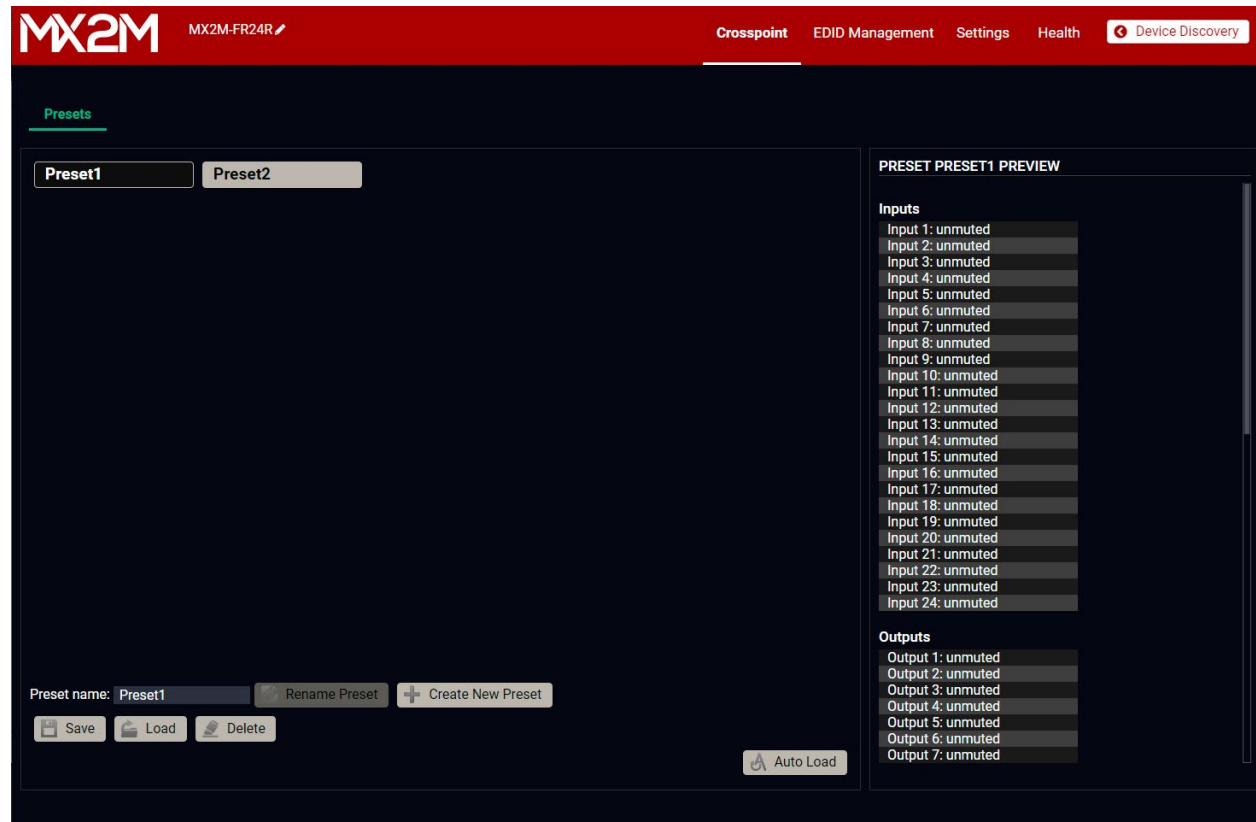
7.7. Presets

Select the Crosspoint / Presets menu to open the preset operations of the matrix. #preset

The router can store presets and the followings are stored in each slot: input/output crosspoint state, muted/unmuted states. Preset loading has an effect on all ports, except the locked ones.

ATTENTION! When factory default settings are restored presets are deleted.

ATTENTION! The Preset loading has an effect on all ports, except the locked ones.



Preset menu

Loading a Preset

Step 1. Select the **Presets** tab from the **Crosspoint** menu.

Step 2. Select the desired preset; check the **Preview** panel and press the **Load** button. Press **Yes** in the confirmation window.

Auto load mode

When the **Auto load** button is highlighted with green, the mode is active. In this case, confirmation is **not** required: the selected preset is loaded immediately when the button is pressed.



Saving a Preset to an Empty Slot

Step 1. Arrange the desired crosspoint connections in **Tile view** or **Grid view**.

Step 2. Select the **Presets** tab from the **Crosspoint** menu and type the desired **Preset name** in the indicated text field up to 16 characters. The followings are allowed when naming: letters (A-Z and a-z), hyphen (-), underscore (_), and numbers (0-9).

Step 3. Press the **Create New Preset** button to store the configuration.

Overwriting an Existing Preset

Step 1. Arrange the desired crosspoint connections.

Step 2. Select an existing preset, press the **Save** button and **Yes** to confirm.

Renaming a Preset

Step 1. Select the desired preset you want to rename.

Step 2. Type the desired name and press the **Rename Preset** button.

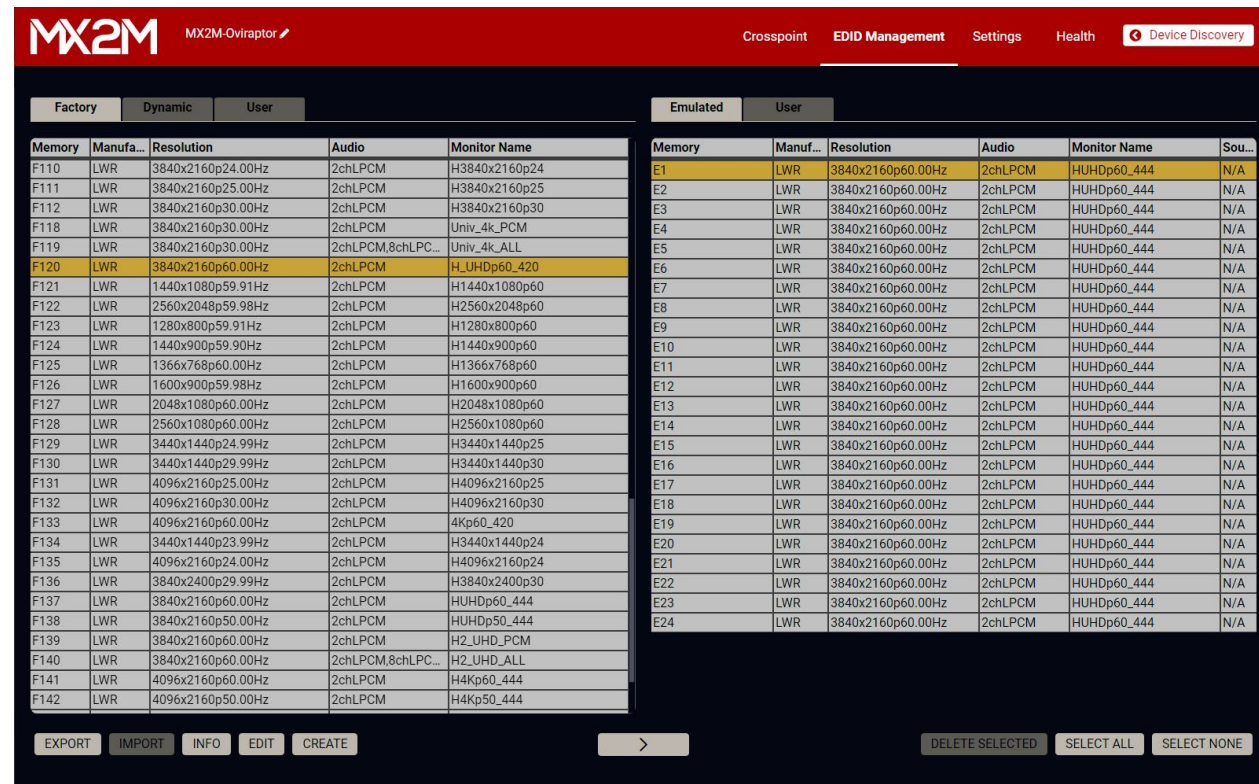
Deleting a Preset

Step 1. Select the desired preset you want to delete.

Step 2. Press the **Delete** button and **Yes** to confirm.

7.8. EDID Management Menu

Advanced EDID Management can be accessed by selecting the EDID Management menu. There are two panels: left one contains Source EDIDs, right one contains Destination places where the EDIDs can be emulated or copied. #edid



EDID Management menu

Control Buttons

- EXPORT** Exporting an EDID (save to a file)
- IMPORT** Importing an EDID (load from a file)
- INFO** Display EDID Summary window
- EDIT** Opening Advanced EDID Editor with the selected EDID
- CREATE** Opening Easy EDID Creator
- Transfer button**: executing EDID emulation or copying
- DELETE SELECTED** Deleting EDID (from User memory)
- SELECT ALL** Selecting all memory places in the right panel
- SELECT NONE** Selecting none of the memory places in the right panel

7.8.1. EDID Operations

Changing Emulated EDID

- Step 1.** Choose the desired **EDID list** on the source panel and select an **EDID**.
- Step 2.** Press the **Emulated** button on the top of the Destination panel.
- Step 3.** Select the desired **port** on the right panel (one or more ports can be selected); the EDID(s) will be highlighted with a yellow cursor.
- Step 4.** Press the **Transfer** button to change the emulated EDID.

Learning an EDID

The process is the same as changing the emulated EDID; the only difference is the Destination panel: press the **User** button. Thus, one or more EDIDs can be copied into the user memory either from the factory memory or from a connected sink (Dynamic).

Exporting an EDID

- Source EDID can be downloaded as a file (*.bin, *.dat or *.edid) to the computer.
- Step 1.** Select the desired **EDID** from the Source panel (line will be highlighted with yellow).
 - Step 2.** Press the **Export** button to open the dialog box and save the file to the computer.

Importing an EDID

- Previously saved EDID (*.bin, *.dat or *.edid file) can be uploaded to the user memory:
- Step 1.** Press the **User** button on the top of the Source panel and select a **memory** slot.
 - Step 2.** Press the **Import** button below the Source panel.
 - Step 3.** Browse the file in the opening window then press the **Open** button. Browsed EDID is imported into the selected User memory.

ATTENTION! The imported EDID overwrites the selected memory place even if it is not empty.

Deleting EDID(s)

- The EDID(s) from User memory can be deleted as follows:
- Step 1.** Press **User** button on the top of the Destination panel.
 - Step 2.** Select the desired **memory** slot(s); one or more can be selected (“Select All” and “Select None” buttons can be used). The EDID(s) will be highlighted with yellow.
 - Step 3.** Press the **Delete selected** button to delete the EDID(s).

7.8.2. Editing an EDID

Select an EDID from Source panel and press Edit button to display Advanced EDID Editor window. The editor can read and write all descriptors, which are defined in the standards, including the additional CEA extensions. Any EDID from the device's memory or a saved EDID file can be loaded into the editor. The software resolves the raw EDID and displays it as readable information to the user. All descriptors can be edited, and saved in an EDID file, or uploaded to the User memory.

EDIT

	0	1	2	3	4	5	6	7	8	9
0	00	FF	FF	FF	FF	FF	FF	00	4C	2D
10	8E	09	00	00	00	00	09	16	01	03
20	80	34	1D	78	0A	7D	D1	A4	56	50
30	A1	28	0F	50	54	BD	EF	80	71	4F
40	81	C0	81	00	81	80	95	00	A9	C0
50	B3	00	01	01	02	3A	80	18	71	38
60	2D	40	58	2C	45	00	09	25	21	00
70	00	1E	66	21	56	AA	51	00	1E	30
80	46	8F	33	00	09	25	21	00	00	1E
90	00	00	00	FD	00	18	4B	1A	51	17
100	00	0A	20	20	20	20	20	20	00	00
110	00	FC	00	54	32	34	42	33	30	31
120	0A	20	20	20	20	01	6C			

EDID Editor window

7.8.3. Creating an EDID - Easy EDID Creator

Since above mentioned Advanced EDID Editor needs more detailed knowledge about EDID, Lightware introduced a wizard-like interface for fast and easy EDID creation. With Easy EDID Creator it is possible to create custom EDIDs in four simple steps. By clicking on the **Create** button below Source panel, **Easy EDID Creator** is opened in a new window.

CREATE

Select Resolution & Interface

Welcome to the Easy EDID Creator!

With this software you are able to create a unique EDID according to your demands. Details can be added or changed in the Advanced EDID Editor later if needed.

Please select the format type and the preferred resolution. If you don't find the proper mode in the list, use the Custom format type setting, enter the resolution and the program will estimate the best blanking times.

Important notes:

- If you want to send audio then you must select HDMI or DisplayPort. DVI and VGA do not support audio transmission.
- Most DVI displays are not able to process HDMI signals. If you have a DVI display, please check its specifications.
- The supported color depth will be 24bits/pixel by default.

Format type:

Resolution:

Interface type: VGA DVI HDMI DisplayPort

EDID Creator window

7.8.4. EDID Summary Window

Select an EDID from Source panel and press **Info** button to display EDID summary.

INFO

The screenshot shows the EDID summary window. On the left is a vertical list of categories: General, Power Management, Gamma / Colors, Established Timings, Standard Timings, Preferred Timing Mode, 2nd Descriptor Field, 3rd Descriptor Field, 4th Descriptor Field, CEA General, CEA Video, CEA Audio, CEA Speaker Allocation, CEA HDMI, CEA Colorimetry, and CEA Detailed Timing Descriptors. The 'General' category is selected. The main area displays the following information:

General	
EDID version:	1
EDID revision:	3
Manufacturer ID:	SAM (Samsung Electric Company)
Product ID:	8E09
Monitor serial number:	Not present
Year of manufacture:	2012
Week of manufacture:	9
Signal interface:	Digital
Separate Sync H&V:	-
Composite sync on H:	-
Sync on green:	-
Serration on VS:	-
Color depth:	Undefined
Interface standard:	Not defined
Color spaces:	RGB 4:4:4 & YCrCb 4:4:4
Aspect ratio:	0.56
Display size:	52 cm X 29 cm

EDID summary window

7.9. Settings Menu

7.9.1. Overview

The screenshot shows the MX2M Settings menu - Overview tab. The top navigation bar includes Crosspoint, EDID Management, Settings, Health, and Device Discovery. The main content area is divided into three sections:

- General:**

Product name	MX2M-FR24R
Device label	MX2M-FR24R
Part number	91110018
Serial number	00006399
- Firmware versions:**

Package version	v1.0.0b20
Package build time	15/7/2020 12:48
- Licenses:**

No licenses are available

Hardware versions:

CPU board	V11_AABX
Motherboard	V10_AAAX
Control panel 1	V30_BDXX
Control panel 2	V30_BEXX
Control panel 3	V30_BEXX
Control interface board	V10_XXXX
Power distribution board 1	V10_XXAX
Power distribution board 2	V10_XXAX
Power combiner board	V10_AAAX

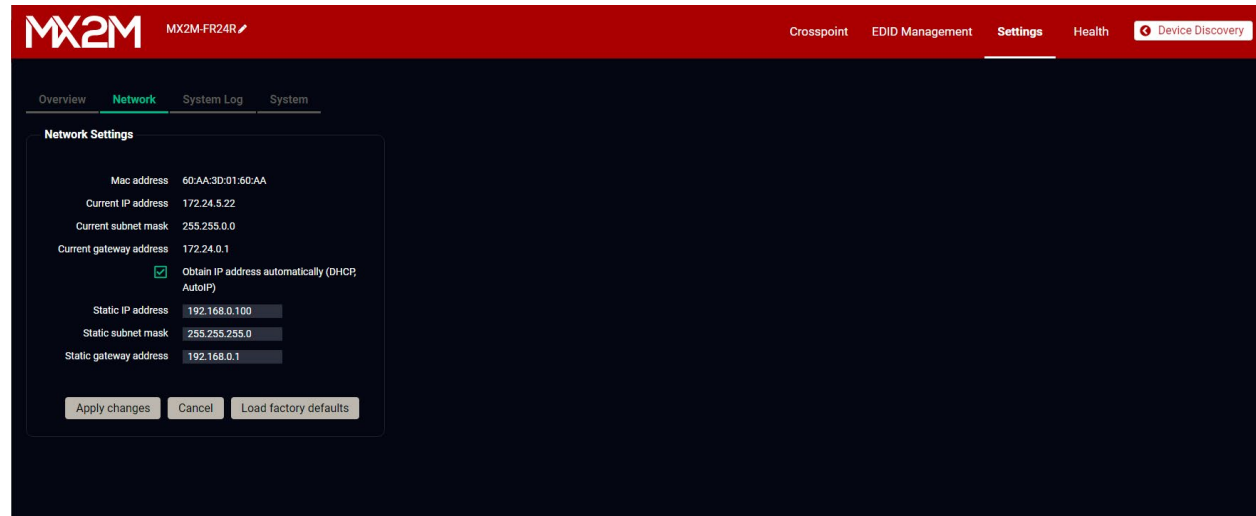
Settings menu - Overview tab

The most important hardware and software related information can be found on this tab: hardware and firmware version, serial numbers, endpoint statistics, temperatures, operation time, and voltage information. **Device label** can be changed to unique description. `#firmwareversion #label #devicelabel #license #producttype #serialnumber`

Licenses

MX2M-FR24R matrix switcher can be purchased with no PSU redundancy. In this case only one PSU drawer is installed with power supply unit (Power Drawer 1, Primary) and the **Single PSU License** is installed on matrix which results the Power Drawer 2 cannot accept the second PSU drawer. Customers have possibility purchasing a code which makes the Single PSU License inactive. For more details please contact sales@lightware.com.

7.9.2. Network

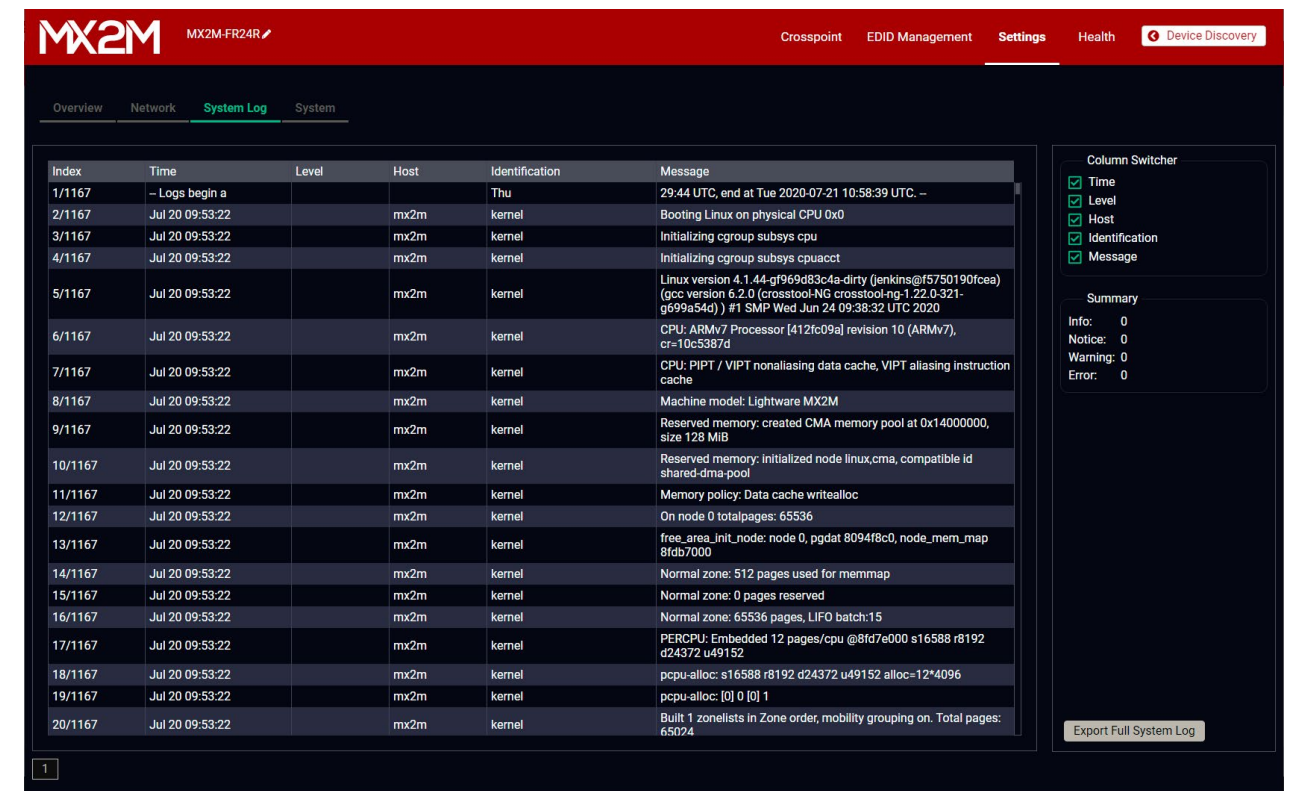


Settings menu - Network tab

Static IP address and DHCP (dynamic IP address) settings can be set on this tab. Always press the **Apply settings** button to save changes.

Factory defaults settings of the matrix can be recalled with a dedicated button. See the factory default values in the [Switch Setup for Dante® Audio Signal Transmission](#) section. `#network #dhcp #ipaddress`

7.9.3. System Log



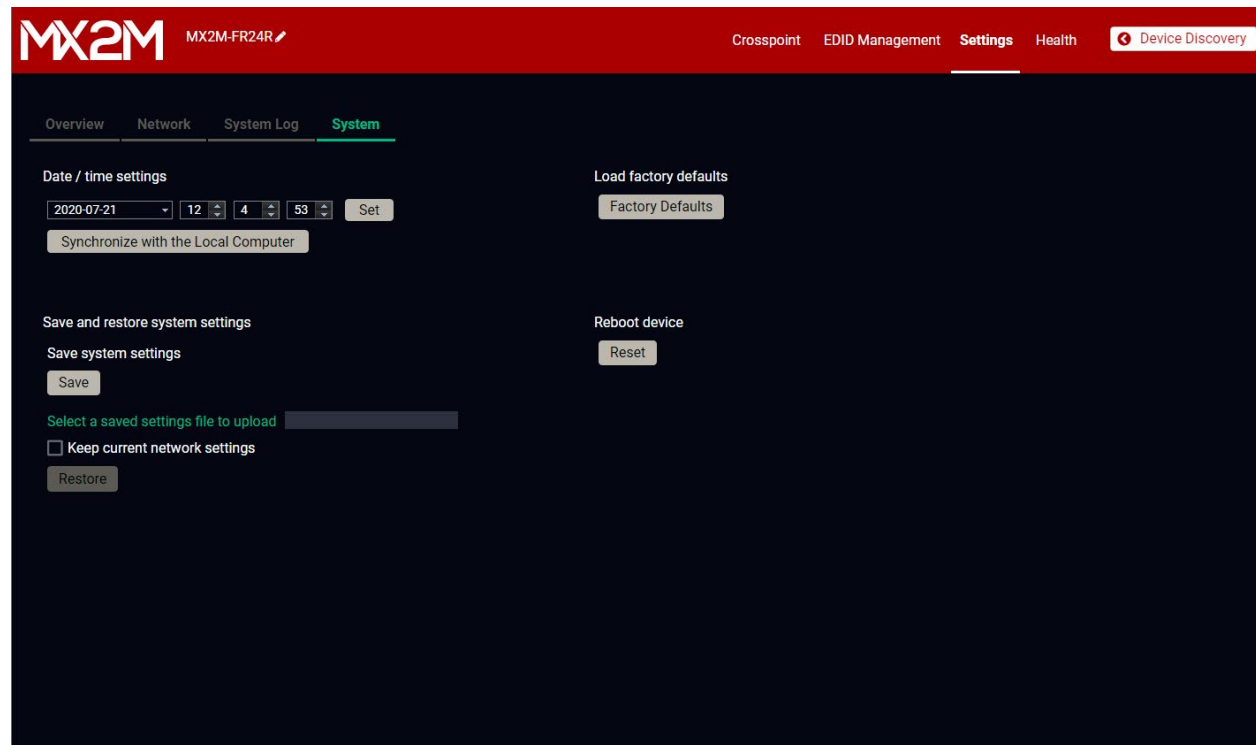
Settings menu - System Log tab

All matrix related notifications are listed in the System log tab which are grouped in four categories: info, notice, warning, and error. The categories are summarized on the right side of the tab in the **Summary** section. The list can be customized by the **Column Switchers** by turning on or off the following columns: Time, Level, Identification, and Message.

All system log tracks can be saved to the control computer with the **Export full system log** button. `#log`

INFO: Please always download the system logs and send to the Lightware Support Team (support@lightware.com) for the most effective collaboration in the case of a troubleshooting issue.

7.9.4. System



Settings menu - System tab

The following functions are available under System tab:

- **Date / time settings** - system time can be set manually or can be synchronized with your control device. *#time #date*
- **Save and restore system settings** *#backup #restore*
 - **Save system settings** - clicking on the **Save** button results saving the actual configuration of the matrix to a file.
 - **Restore** - select a backup file of the matrix on your computer and select the **Restore** button to load it. The configuration settings saved in the file are applied immediately.
- **Load factory defaults** - recalling factory defaults settings and values for the matrix. All factory default settings are listed in the [Switch Setup for Dante® Audio Signal Transmission](#) section. *#factory*
- **Reboot device** - the matrix switcher reboots, it is the same like disconnecting the power source and reconnecting again. *#reboot #restart #reset*

7.10. Terminal Window

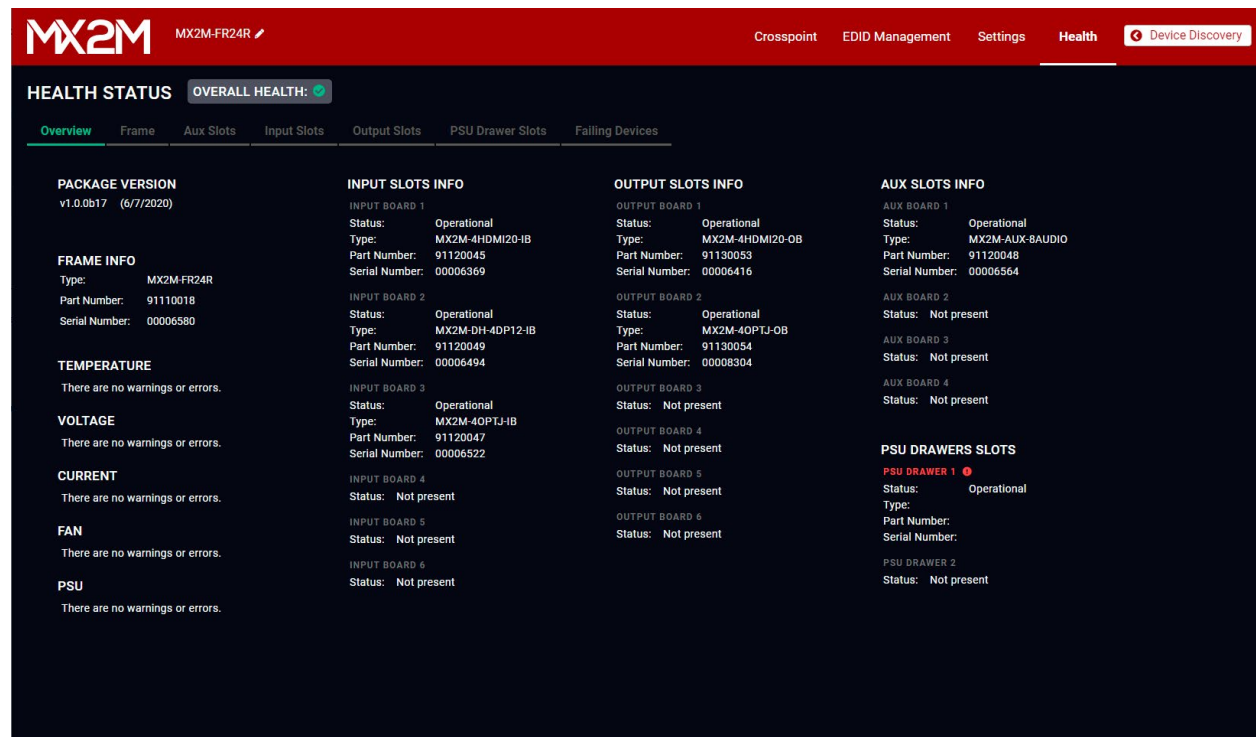
Select the Settings / Terminal menu to open the Terminal window. *#terminal #advancedview*



- 1 LW3 protocol help** Pushing the button results a help window opening which describes the most important information about LW3 protocol commands in HTML format.
- 2 Edit mode** The default appearance is the read-only mode. If you want to modify the values or parameters, tick the option. You will be prompted to confirm your selection.
- 3 Warning mode** If this box checked in, a warning window pops up when you enable Edit mode.
- 4 Node list** Correspondent parameters and nodes are shown which are connected to the selected item in the protocol tree.
Manual button: Manual (short description) of the node can be called and displayed in the terminal window.
Set button: Saves the value/parameter typed in the textbox.
Call button: Calls the method, e.g. reloads factory default settings.
- 5 Protocol tree** LW3 protocol tree; select an item to see its content.
- 6 Command line** Type the desired command and execute it by the **Send** button. Clear all current commands and responses in the Terminal window by the **Clear** button.
- 7 Terminal window** Commands and responses with time and date are listed in this window. Sent command starts with '>' character, received response starts with '<' character. The color of each item depends on the type of the command and response. The content of the window can be emptied by the **Clear** button. If the **Autoscroll** option is ticked, the list is scrolled automatically when a new line is added.

7.11. Health Menu

7.11.1. Overview



Health menu - Overview tab

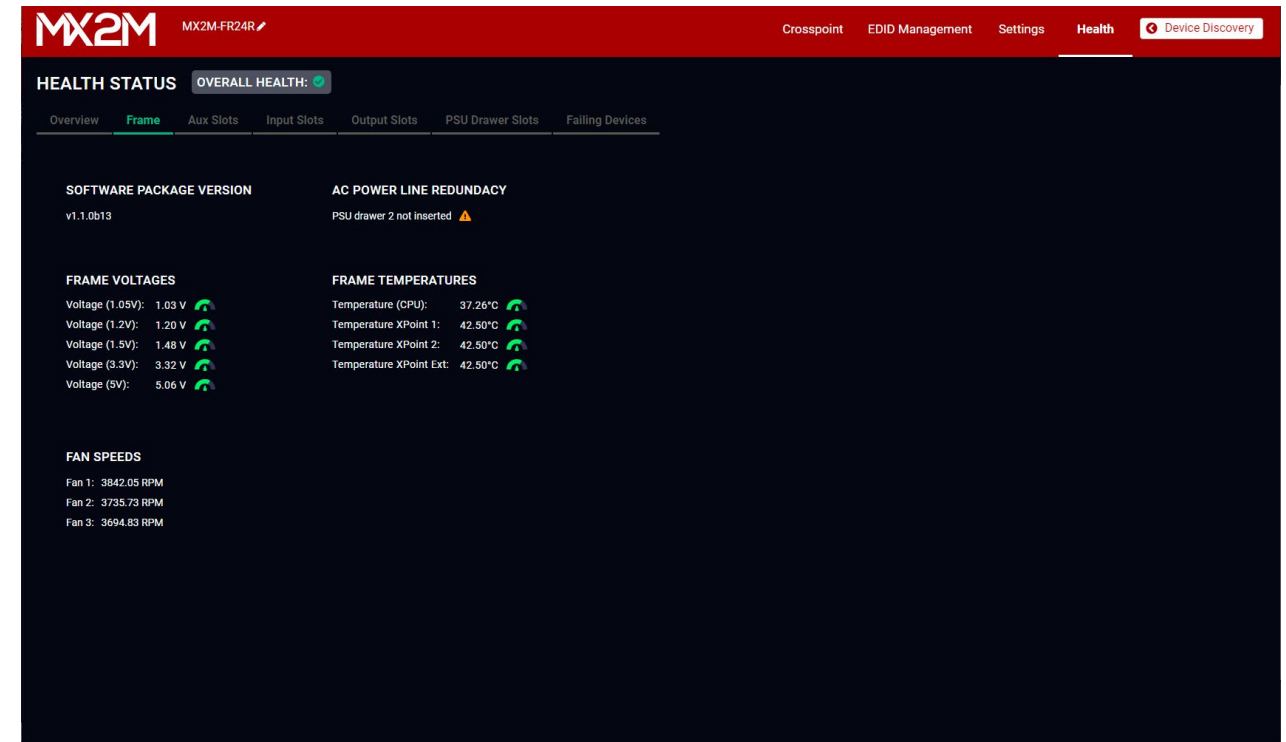
All general information about the matrix frame and the installed I/O boards is available in the Overview tab of the Health menu. The firmware package version, error or warning messages, the list of installed I/O boards grouped by types and the serial and part numbers can be seen on this tab. [#health](#) [#status](#) [#producttype](#)

The **Overall Health** indicator shows there is any warning or error message is in the system:

Icon	Type	Description
	OK	No active warning or error level log entry exists for the system or a device seated in the system.
	Warning	Active warning level log entry exists and no active error level log entry exists for the system or a device seated in the system.
	Error	Active error level log entry exists for the system or a device seated in the system.

[#health](#) [#status](#) [#systemmonitor](#)

7.11.2. Frame



Health menu - Frame tab

The most important information about the matrix frame is available on the Frame tab. The firmware package version, AC power line redundancy, frame voltages, frame temperatures and the fan speeds can be checked.

7.11.3. Aux Slots

HEALTH STATUS OVERALL HEALTH: OK

Overview Frame **Aux Slots** Input Slots Output Slots PSU Drawer Slots Falling Devices

AUX SLOTS

AUX BOARD 1	AUX BOARD 2
Board Status: Operational	Board Status: Not present
Type: MX2M-AUX-8AUDIO	
Temperature (CPU): 24.10°C OK	
Voltage (5V): 5.01 V	
Voltage (3.3V): 3.30 V	
Voltage (1.8V): 1.80 V	
Voltage (1V): 0.99 V	
AUX BOARD 3	AUX BOARD 4
Board Status: Not present	Board Status: Not present

Health menu - Aux Slots tab

The most important information about the auxiliary boards grouped by the board slots is available on the Aux Slots tab. The type of the installed I/O board, the status of the board, the temperature and voltage information can be checked on the tab.

INFO: See the details about the location of the AUX board slots in the [Layout of the Input/Output Board Slots and Power Drawer Slots](#) section.

7.11.4. Input Slots

HEALTH STATUS OVERALL HEALTH: OK

Overview Frame Aux Slots **Input Slots** Output Slots PSU Drawer Slots Falling Devices

INPUT SLOTS

INPUT BOARD 1	INPUT BOARD 2	INPUT BOARD 3
Board Status: Operational	Board Status: Operational	Board Status: Operational
Type: MX2M-4HDMI20-IB	Type: MX2M-DH-4DPT2-IB	Type: MX2M-4OPTJ-IB
Temperature (CPU): 30.68°C OK	Voltage (5V): 5.02 V	Temperature (CPU): 29.71°C OK
Voltage (5V): 4.99 V	Voltage (3.3V): 3.32 V	Temperature 1: 0.00°C OK
Voltage (3.3V): 3.30 V	Voltage (3.3V): 3.33 V	Temperature 2: 28.00°C OK
Voltage (1.8V): 1.81 V	Voltage (1.8V): 1.80 V	Voltage (5V): 4.96 V
Voltage (1V): 1.02 V	Voltage (1.2V): 1.20 V	Voltage (3.3V): 3.30 V
Voltage (1V): 1.00 V	Voltage (1V): 1.01 V	Voltage (1.8V): 1.79 V
	Voltage (1V): 1.00 V	Voltage (1V): 1.01 V
	Temperature (CPU): 32.63°C OK	Voltage (1V): 0.99 V
INPUT BOARD 4	INPUT BOARD 5	INPUT BOARD 6
Board Status: Not present	Board Status: Not present	Board Status: Not present

Health menu - Input Slots tab

The most important information about the input boards grouped by the board slots is available on the Input Slots tab. The type of the installed I/O board, the status of the board, the temperature and voltage information can be checked on the tab.

INFO: See the details about the location of the input board slots in the [Layout of the Input/Output Board Slots and Power Drawer Slots](#) section.

7.11.5. Output Slots

The screenshot shows the MX2M Health Status page with the 'Output Slots' tab selected. The overall health is 'OK'. The page is divided into sections for six input boards. Boards 1, 2, and 3 are operational, while boards 4, 5, and 6 are not present.

INPUT BOARD 1	INPUT BOARD 2	INPUT BOARD 3
Board Status: Operational	Board Status: Operational	Board Status: Operational
Type: MX2M-4HDMI20-IB	Type: MX2M-0H-4DP12-IB	Type: MX2M-4OPTJ-IB
Temperature (CPU): 30.68°C	Voltage (5V): 5.02 V	Temperature (CPU): 29.71°C
Voltage (5V): 4.99 V	Voltage (3.3V): 3.32 V	Temperature 1: 0.00°C
Voltage (3.3V): 3.30 V	Voltage (3.3V): 3.33 V	Temperature 2: 28.00°C
Voltage (1.8V): 1.81 V	Voltage (1.8V): 1.80 V	Voltage (5V): 4.96 V
Voltage (1V): 1.02 V	Voltage (1.2V): 1.20 V	Voltage (3.3V): 3.30 V
Voltage (1V): 1.00 V	Voltage (1V): 1.01 V	Voltage (1.8V): 1.79 V
	Voltage (1V): 1.00 V	Voltage (1V): 1.01 V
	Temperature (CPU): 32.63°C	Voltage (1V): 0.99 V

INPUT BOARD 4: Board Status: Not present
 INPUT BOARD 5: Board Status: Not present
 INPUT BOARD 6: Board Status: Not present

Health menu - Output Slots tab

The most important information about the output boards grouped by the board slots is available on the Output Slots tab. The type of the installed I/O board, the status of the board, the temperature and voltage information can be checked on the tab.

INFO: See the details about the location of the output board slots in the [Layout of the Input/Output Board Slots and Power Drawer Slots](#) section.

7.11.6. PSU Drawer Slots

The screenshot shows the MX2M Health Status page with the 'PSU Drawer Slots' tab selected. The overall health is 'OK'. The page displays details for two power trays.

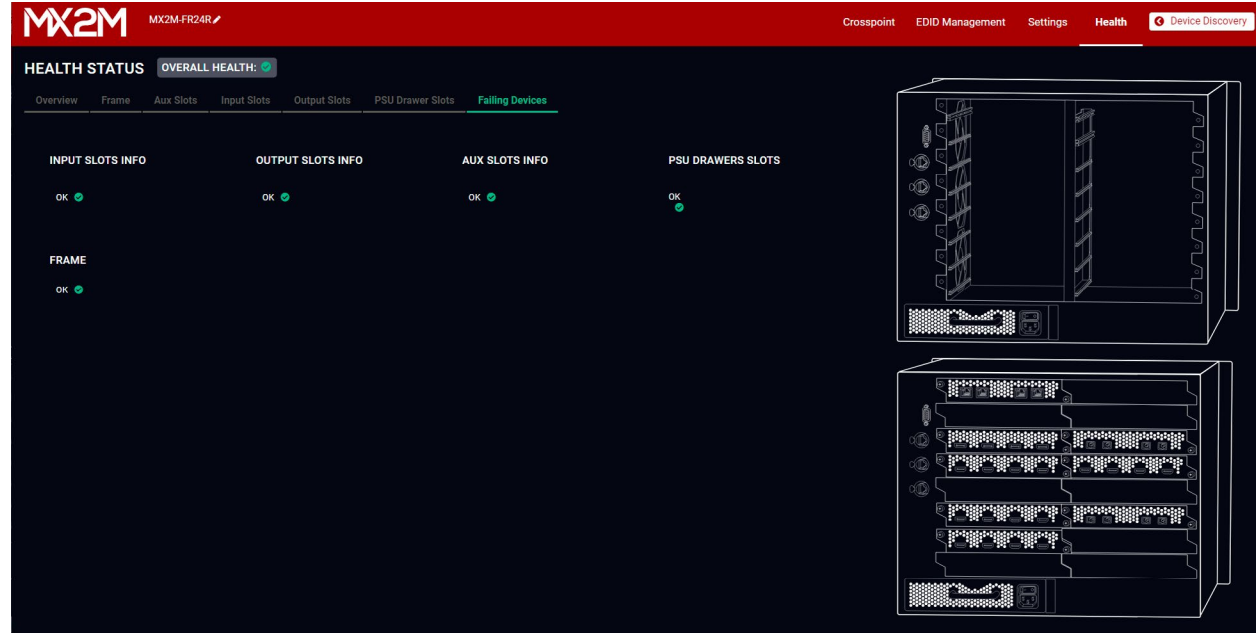
POWER TRAY 1	POWER TRAY 2
Temperature Drawer: 0.00°C	Temperature Drawer: nan°C
Current PSU 12V: 0.00 A	Current PSU 12V: 59.11 A
Current PSU 48V: 0.00 A	Current PSU 48V: 0.00 A
Fan Speed Drawer: 0.00 RPM	Fan Speed Drawer: 0.00 RPM
Power Good 12V: OK	Power Good 12V: OK
Power Good 48V: OK	Power Good 48V: OK

Health menu - PSU Drawer Slots tab

The most important information about the PSU drawers grouped by the power drawer slots is available on the PSU Drawer Slots tab. The temperature, current, voltage and fan speed information can be checked on the tab.

INFO: See the details about the numbering of the PSU drawer slots in the [Layout of the Input/Output Board Slots and Power Drawer Slots](#) section.

7.11.7. Failing Devices






Health menu - Failing Devices tab

The most important status information about the matrix frame and the installed I/O boards is available on the Failing Devices tab.

Overall Health Info about the I/O Board Slots

The indicators show there is any warning or error message is in the system:

Icon	Type	Description
	OK	No active warning or error level log entry exists for the system or a device seated in the system.
	Warning	Active warning level log entry exists and no active error level log entry exists for the system or a device seated in the system.
	Error	Active error level log entry exists for the system or a device seated in the system.

Matrix Drawing

The drawing of the matrix shows the recent installation of the matrix frame including the I/O boards with the slots where they are installed.

8

LW3 Programmers' Reference

The device can be controlled through Lightware 3 (LW3) protocol commands to ensure the compatibility with other Lightware products. The supported LW3 commands are described in this chapter

- ▶ [OVERVIEW](#)
- ▶ [INSTRUCTIONS FOR THE TERMINAL APPLICATION USAGE](#)
- ▶ [PROTOCOL RULES](#)
- ▶ [SYSTEM COMMANDS](#)
- ▶ [I/O BOARD MANAGEMENT](#)
- ▶ [VIDEO SWITCHING AND CROSSPOINT SETTINGS](#)
- ▶ [AUDIO SWITCHING AND CROSSPOINT SETTINGS](#)
- ▶ [VIDEO SOURCE PORT SETTINGS - HDMI / OPTJ](#)
- ▶ [VIDEO SOURCE PORT SETTINGS - DP](#)
- ▶ [VIDEO DESTINATION PORT SETTINGS - HDMI / OPTJ](#)
- ▶ [ANALOG AUDIO PORT PROPERTIES](#)
- ▶ [DANTE® AUDIO SETTINGS](#)
- ▶ [SYSTEM MONITORING COMMANDS](#)
- ▶ [PRESET HANDLING](#)
- ▶ [EDID MANAGEMENT](#)
- ▶ [HEALTH STATUS MONITORING COMMANDS](#)
- ▶ [NETWORK CONFIGURATION](#)
- ▶ [RS-232 PORT CONFIGURATION](#)
- ▶ [SENDING CEC COMMANDS](#)
- ▶ [FIRMWARE UPGRADING OF THE I/O BOARDS](#)
- ▶ [LW3 PROTOCOL COMMANDS - QUICK SUMMARY](#)

8.1. Overview

The Lightware Protocol #3 (LW3) is implemented in almost all new Lightware devices (matrix switchers, signal extenders and distribution amplifiers) since 2012. The protocol is ASCII-based and all commands are terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') pair. It is organized as a tree structure that provides outstanding flexibility and user-friendly handling with 'nodes', 'properties' and 'methods'. The **Advanced View** of the Lightware Device Controller software is the perfect tool for browsing and learning how the LW3 protocol can be used in practice.

8.2. Instructions for the Terminal Application Usage

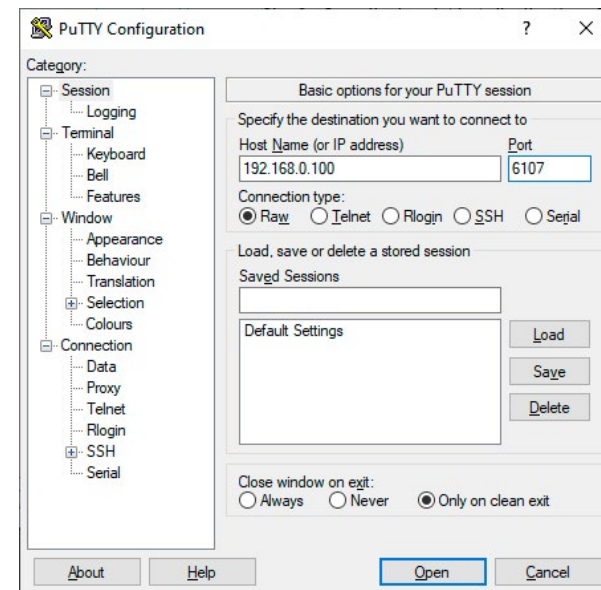
Terminal Application

The LW3 protocol commands can be applied to the receiver using a terminal application. You need to install one of them to your control device, for example **Putty** or **CLI**. `#terminal`

Establishing Connection

Follow the steps for establishing connection to the receiver:

- Step 1.** Connect the receiver to a LAN over Ethernet (see the details in the [Connecting Steps](#) section).
- Step 2.** Open the terminal application (e.g. Putty).
- Step 3.** Add the **IP address** of the device (the default IP setting is the DHCP (dynamic IP address)) and the **port number (6107)**.
- Step 4.** Select the **Raw** connection type, and open the connection.



Once the terminal window is opened, you can enter the LW3 protocol commands which are listed in the following sections.

```

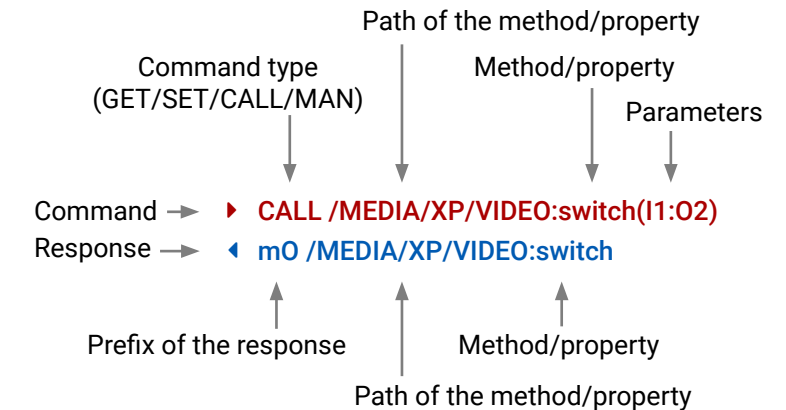
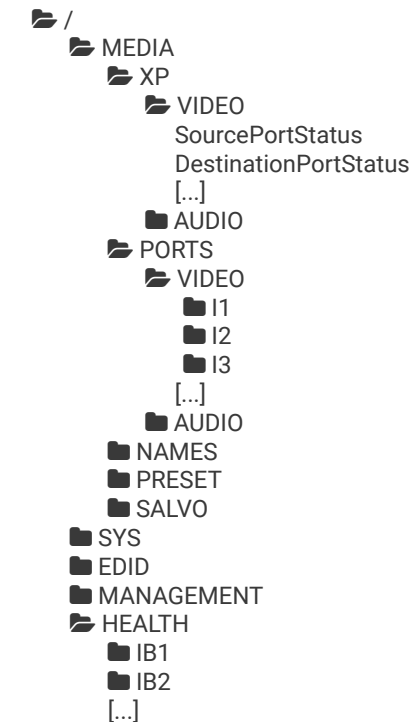
172.24.1.163 - PuTTY
GET /.ProductName
pr /.ProductName=MX2M-FR24R
GET /MANAGEMENT/UID/PACKAGE.Version
pr /MANAGEMENT/UID/PACKAGE.Version=v1.0.0b20
GET /MANAGEMENT/DATETIME.CurrentTime
pr /MANAGEMENT/DATETIME.CurrentTime=2020-07-24T10:00:11
GET /SYS/OB1.Status
pr /SYS/OB1.Status=Not present
GET /SYS/OB2.Status
pr /SYS/OB2.Status=Not present
GET /SYS/OB3.Status
pr /SYS/OB3.Status=Operational

```

LW3 protocol command communication in a terminal window

8.3. Protocol Rules

8.3.1. LW3 Tree Structure and Command Structure (examples)



8.3.2. General Rules

- All names and parameters are **case-sensitive**.
- The nodes are separated by a slash ('/') character.
- The node name can contain the elements of the English alphabet and numbers.
- Use the **TCP port no. 6107** when using LW3 protocol over Ethernet.
- When a command is issued by the device, the received response cannot be processed by the CPU.
- The node paths describe the exact location of the node, listing each parent node up to the root.

8.3.3. Command Types

GET command

The **GET** command can be used to get the child nodes, properties and methods of a specific node. It can also be used to get the value of a property. Use the dot character (.) when addressing a property:

- ▶ [GET /.SerialNumber](#)
- ◀ [pr /.SerialNumber=87654321](#)

GETALL command

The **GETALL** command can be used to get all child nodes, properties and methods of a node with one command.

- ▶ [GETALL /MEDIA/XP](#)
- ◀ [n- /MEDIA/XP/VIDEO](#)
- ◀ [n- /MEDIA/XP/AUDIO](#)
- ◀ [m- /MEDIA/XP:MultiLayer_Connect](#)
- ◀ [m- /MEDIA/XP:MultiLayer_Switch](#)
- ◀ [m- /MEDIA/XP:MultiLayer_SwitchAll](#)
- ◀ [m- /MEDIA/XP:MultiLayer_SwitchMulti](#)

SET command

The **SET** command can be used to modify the value of a property. Use the dot character (.) when addressing the property:

- ▶ [SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.HdcpVersion=2](#)
- ◀ [pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.HdcpVersion=2](#)

CALL command

A method can be invoked by the **CALL** command. Use the colon character (:) when addressing the method:

- ▶ [CALL /EDID:switchAll\(F147\)](#)
- ◀ [mO /EDID:switchAll](#)

MAN command

The manual is a human readable text that describes the syntax and provides a hint for how to use the primitives. For every node, property and method in the tree there is a manual, type the MAN command to get the manual:

- ▶ [MAN /MEDIA/PORTS/VIDEO/O1/PARAMETERS.AudioSource](#)
- ◀ [pm /MEDIA/PORTS/VIDEO/O1/PARAMETERS.AudioSource \["Hdmi" | "AudioLayer" | "Off"\] Sets the source of the embedded audio stream](#)

8.3.4. Prefix Summary

DEFINITION: The prefix is a 2-character long code that describes the type of the response.

The following prefixes are defined in the LW3 protocol:

Prefix	Description	Prefix	Description
n-	a node	pm	a manual for the property
nE	an error for a node	m-	a method
nm	a manual for a node	mO	a response after a success method execution
pr	a read-only property	mF	a response after a failed method execution
pw	read-write property	mE	an error for a method
pE	an error for the property	mm	a manual for a method

8.3.5. Error Messages

There are several error messages defined in the LW3 protocol, all of them have a unique error number.

- ▶ [CALL /MEDIA/XP/VIDEO:lockSource\(IA\)](#)
- ◀ [mE /MEDIA/XP/VIDEO:lockSource %E006: Illegal operation](#)

8.3.6. Escaping

DEFINITION: An escape sequence is a sequence of characters that does not represent itself when used inside a character or string literal, but is translated into another character or a sequence of characters.

Property values and method parameters can contain characters which are used as control characters in the protocol. They must be escaped. The escape character is the backslash ('\') and escaping means injecting a backslash before the character that should be escaped (like in C language).

Control characters are the following: \ { } # % () \r \n \t

8.4. System Commands

8.4.1. Query the Product Name

The name of the product is a read-only parameter and cannot be modified.

Command and Response *#producttype*

- ▶ GET /.ProductName
- ◀ pr /.ProductName=<Product_name>

Example

- ▶ GET /.ProductName
- ◀ pr /.ProductName=MX2M-FR24R

8.4.2. Set the Device Label

INFO: The device label can be changed to a custom text in the [Overview](#) tab of the LDC software. This writable parameter is not the same as the ProductName parameter.

Command and Response *#devicelabel #label*

- ▶ SET /MANAGEMENT/LABEL/DeviceLabel=<Custom_name>
- ◀ pw /MANAGEMENT/LABEL/DeviceLabel=<Custom_name>

The Device Label can be 39 character length and ASCII characters are allowed. Longer names are truncated.

Example

- ▶ SET /MANAGEMENT/LABEL.DeviceLabel=MX2M_Conference
- ◀ pw /MANAGEMENT/LABEL.DeviceLabel=MX2M_Conference

8.4.3. Query the Serial Number

Command and Response *#serialnumber*

- ▶ GET /.SerialNumber
- ◀ pr /.SerialNumber=<serial_number>

Example

- ▶ GET /.SerialNumber
- ◀ pr /.SerialNumber=87654321

8.4.4. Query the Firmware Version

Command and Response *#firmwareversion*

- ▶ GET /MANAGEMENT/UID/PACKAGE.Version
- ◀ pr /MANAGEMENT/UID/PACKAGE.Version=<firmware_version>

Example

- ▶ GET /MANAGEMENT/UID/PACKAGE.Version
- ◀ pr /MANAGEMENT/UID/PACKAGE.Version=1.0.0b20

8.4.5. Query the Date and Time of the System

The query returns with the current date and time which is set in the matrix. The format is based on the ISO 8601 standard.

Command and Response *#time #date*

- ▶ GET /MANAGEMENT/DATETIME.CurrentTime
- ◀ pr /MANAGEMENT/DATETIME.CurrentTime=<date_time>

Parameters

Parameter	Description	Formula
<date_time>	Current date and time	YYYY-MM-DDTHH:MM:SS

Example

- ▶ GET /MANAGEMENT/DATETIME.CurrentTime
- ◀ pr /MANAGEMENT/DATETIME.CurrentTime=2020-09-01T17:38:37

8.4.6. Setting of the Date and Time Manually

The date and time format is based on the ISO 8601 standard.

Command and Response

- ▶ CALL /MANAGEMENT/DATETIME:setTime=<date_time>
- ◀ mO /MANAGEMENT/DATETIME:setTime=

Parameters

Parameter	Description	Formula
<date_time>	Current date and time	YYYY-MM-DDTHH:MM:SS

Example

- ▶ CALL /MANAGEMENT/DATETIME:setTime=2020-12-24T20:00:15
- ◀ mO /MANAGEMENT/DATETIME:setTime=

8.4.7. Setting the Brightness of the LCD Screen

Command and Response

- ▶ SET /SYS/CECU/LCD.Brightness=<parameter>
- ◀ pw /SYS/CECU/LCD.Brightness=<parameter>

Parameters

The <parameter> of display brightness can be set between 0 and 10 values.

Example

- ▶ SET /SYS/CECU/LCD.Brightness=5
- ◀ pw /SYS/CECU/LCD.Brightness=5

8.4.8. Control Lock of the LCD Menu

Enable/disable the operation of the jog dial control knob and the LCD menu control.

Command and Response #controllock

- ▶ SET /SYS/CECU/LCD.ControlLock=<logical_value>
- ◀ pw /SYS/CECU/LCD.ControlLock=<logical_value>

Parameters

Identifier	Parameter description	Value	Value description
<mode>	Control lock mode	true	Enabled
		false	Disabled

Example

- ▶ SET /SYS/CECU/LCD.ControlLock=true
- ◀ pw /SYS/CECU/LCD.ControlLock=true

8.4.9. Adding License

Command and Response #license

- ▶ CALL /MANAGEMENT/LICENSE:addLicense()
- ◀ mO /MANAGEMENT/LICENSE:addLicense=

Example

- ▶ CALL /MANAGEMENT/LICENSE:addLicense()
- ◀ mO /MANAGEMENT/LICENSE:addLicense=

8.4.10. Removing License

Command and Response #license

- ▶ CALL /MANAGEMENT/LICENSE:removeLicense()
- ◀ mO /MANAGEMENT/LICENSE:removeLicense=

Example

- ▶ CALL /MANAGEMENT/LICENSE:removeLicense()
- ◀ mO /MANAGEMENT/LICENSE:removeLicense=

8.4.11. Software Resetting the Device

The core application of the matrix can be restarted.

Command and Response #softreset

- ▶ CALL /SYS:softReset()
- ◀ mO /SYS:softReset=

Example

- ▶ CALL /SYS:softReset()
- ◀ mO /SYS:softReset=

8.4.12. Rebooting the Device

The matrix switcher can be restarted – the current connections and the AV signal transmission will be terminated.

Command and Response #restart #reboot #reset

- ▶ CALL /SYS:reset()
- ◀ mO /SYS:reset=

Example

- ▶ CALL /SYS:reset()
- ◀ mO /SYS:reset=

8.4.13. Restore the Factory Default Settings

Command and Response *#factory*

- ▶ CALL /SYS:factoryDefaults()
- ◀ mO /SYS:factoryDefaults=

Example

- ▶ CALL /SYS:factoryDefaults()
- ◀ mO /SYS:factoryDefaults=

The device is restarted, current connections are terminated, and the default settings are restored. See the complete list in the [Switch Setup for Dante® Audio Signal Transmission](#) section.

8.5. I/O Board Management

8.5.1. Query the Status of a Board

The query returns the actual status of the selected I/O board in the matrix frame.

Command and Response

- ▶ GET /SYS/<board>.Status
- ◀ pr /SYS/<board>.Status=<status>

Parameters

Identifier	Parameter description	Value	Value description
<board>	The identifier of the board.	IB1...IB6	Input board ID, the values can be IB1, IB2, IB3, IB4, IB5 or IB6.
		OB1...OB6	Output board ID, the values can be OB1, OB2, OB3, OB4, OB5 or OB6.
		LS1...LS4	Auxiliary (LS - Low Speed) board ID, the values can be LS1, LS2, LS3, or LS4.
		No power	Board is present but not powered.
<status>	Current status of the I/O board	Not present	Board is not present.
		Seated	Board is seated into the slot.
		Connecting	Connecting to the CPU.
		Connected	Connected to the CPU but not initialized yet.
		Initializing	Under initialization.
		Operational	Board is operational and ready to use.
		Reset	Board is rebooting.
		Debug	Board is in debug mode.
		FirmwareUpgradeEthernet	The firmware of the board is being upgraded by the matrix frame.
		BootloadMode	Board is in bootlode (firmware upgrade) mode which might be happened after an unsuccessful firmware upgrade procedure. Restarting the firmware upgrade procedure is recommended.
		InWrongSlot	The board is seated to wrong slot. See the layout of the I/O board slot in the Board Installation and Handling section.
		Unknown	The status of board is unknown. Reseating of the board is recommended.

Example

- ▶ GET /SYS/OB1.Status
- ◀ pr /SYS/OB1.Status=Operational

8.5.2. Query the Number of Seated I/O Boards

The query returns the number of the seated I/O boards in the matrix frame, including IB, OB, and AUX (Low Speed) boards.

Command and Response

- ▶ GET /SYS/UPDATE.NumberOfBoards
- ◀ pr /SYS/UPDATE.NumberOfBoards=<number>

Example

- ▶ GET /SYS/UPDATE.NumberOfBoards
- ◀ pr /SYS/UPDATE.NumberOfBoards=7

8.5.3. Query the List of Seated I/O Boards

The query returns the list of the seated I/O boards in the matrix frame, including IB, OB, and AUX (Low Speed) boards.

Command and Response

- ▶ GET /SYS/UPDATE.BoardsInSeatedState
- ◀ pr /SYS/UPDATE.BoardsInSeatedState=<board_slot1>;<board_slot2>;...<board_slotX>

Example

- ▶ GET /SYS/UPDATE.BoardsInSeatedState
- ◀ pr /SYS/UPDATE.BoardsInSeatedState=LS1;LS2;IB2;IB4;OB1;OB2;OB3;OB4;OB5

8.5.4. Query the List of Operational I/O Boards

The query returns the list of the operational I/O boards in the matrix frame, including IB, OB, and AUX (Low Speed) boards.

Command and Response

- ▶ GET /SYS/UPDATE.BoardsInOperationalState
- ◀ pr /SYS/UPDATE.BoardsInOperationalState=<board_slot1>;<board_slot2>;...<board_slotX>

Example

- ▶ GET /SYS/UPDATE.BoardsInOperationalState
- ◀ pr /SYS/UPDATE.BoardsInOperationalState=LS1;LS2;IB2;IB4;OB1;OB2;OB3;OB4;OB5

8.5.5. Query the List of Failed I/O Boards

The query returns the list of the failed I/O boards in the matrix frame, including IB, OB, and AUX (Low Speed) boards.

Command and Response

- ▶ GET /SYS/UPDATE.BoardsInErrorState
- ◀ pr /SYS/UPDATE.BoardsInErrorState=<board_slot1>;<board_slot2>;...<board_slotX>

Example

- ▶ GET /SYS/UPDATE.BoardsInErrorState
- ◀ pr /SYS/UPDATE.BoardsInErrorState=LS1;LS2;IB2;IB4;OB1;OB2;OB3;OB4;OB5

8.5.6. Query the Product Name of the I/O Board

The name of the product is a read-only parameter and cannot be modified.

Command and Response *#producttype*

- ▶ GET /SYS/<board>.ProductName
- ◀ pr /SYS/<board>.ProductName=<Product_name>

Example

- ▶ GET /SYS/IB1.ProductName
- ◀ pr /SYS/IB1.ProductName=MX2M-4HDMI20-IB

8.5.7. Query the Serial Number of the I/O Board**Command and Response** *#serialnumber*

- ▶ GET /SYS/<board>.SerialNumber
- ◀ pr /SYS/<board>.SerialNumber=<serial_number>

Example

- ▶ GET /SYS/LS1.SerialNumber
- ◀ pr /SYS/LS1.SerialNumber=87654321

8.6.5. Multiple Switching

The whole crosspoint can be set by sending one command as follows.

Command and Response

- ▶ CALL /MEDIA/XP/VIDEO:switchMulti(<out1_source>;<out2_source>;...;<out8_source>)
- ◀ mO /MEDIA/XP/VIDEO:switchMulti=

The source is not required to set on all output ports (see the **Example2**).

Parameters

The <out#_source> parameters mean the output ports one after the other. The value of the parameter shows the input port switched to the given output port.

Example1

- ▶ CALL /MEDIA/XP/VIDEO:switchMulti(I1;I2;I3;I4;I5;I6;I7;I8)
- ◀ mO /MEDIA/XP/VIDEO:switchMulti=

Example2

- ▶ CALL /MEDIA/XP/VIDEO:switchMulti(I1;I2;;;I5)
- ◀ mO /MEDIA/XP/VIDEO:switchMulti=

8.6.6. Muting a Video Input

Command and Response #mute

- ▶ CALL /MEDIA/XP/VIDEO:muteSource(<in>)
- ◀ mO /MEDIA/XP/VIDEO:muteSource=

Example

- ▶ CALL /MEDIA/XP/VIDEO:muteSource(I1)
- ◀ mO /MEDIA/XP/VIDEO:muteSource=

8.6.7. Unmuting a Video Input

Command and Response #unmute

- ▶ CALL /MEDIA/XP/VIDEO:unmuteSource(<in>)
- ◀ mO /MEDIA/XP/VIDEO:unmuteSource=

Example

- ▶ CALL /MEDIA/XP/VIDEO:unmuteSource(I1;I3)
- ◀ mO /MEDIA/XP/VIDEO:unmuteSource=

8.6.8. Locking a Video Input

Command and Response #lock

- ▶ CALL /MEDIA/XP/VIDEO:lockSource(<in>)
- ◀ mO /MEDIA/XP/VIDEO:lockSource=

Example

- ▶ CALL /MEDIA/XP/VIDEO:lockSource(I1;I2;I3)
- ◀ mO /MEDIA/XP/VIDEO:lockSource=

8.6.9. Unlocking a Video Input

Command and Response #unlock

- ▶ CALL /MEDIA/XP/VIDEO:unlockSource(<in>)
- ◀ mO /MEDIA/XP/VIDEO:unlockSource=

Example

- ▶ CALL /MEDIA/XP/VIDEO:unlockSource(I1;I3)
- ◀ mO /MEDIA/XP/VIDEO:unlockSource=

8.6.10. Muting a Video Output

Command and Response #mute

- ▶ CALL /MEDIA/XP/VIDEO:muteDestination(<out>)
- ◀ mO /MEDIA/XP/VIDEO:muteDestination=

Example

- ▶ CALL /MEDIA/XP/VIDEO:muteDestination(O1;O3)
- ◀ mO /MEDIA/XP/VIDEO:muteDestination=

8.6.11. Unmuting a Video Output

Command and Response #unmute

- ▶ CALL /MEDIA/XP/VIDEO:unmuteDestination(<out>)
- ◀ mO /MEDIA/XP/VIDEO:unmuteDestination=

Example

- ▶ CALL /MEDIA/XP/VIDEO:unmuteDestination(O1;O2)
- ◀ mO /MEDIA/XP/VIDEO:unmuteDestination=

8.7.5. Multiple Switching

The whole crosspoint can be set by sending one command as follows. *#switch #crosspoint*

Command and Response

- ▶ CALL·/MEDIA/XP/AUDIO:switchMulti(<out1_source>;<out2_source>;...;<out8_source>)
- ◀ mO·/MEDIA/XP/AUDIO:switchMulti=

The source is not required to set on all output ports (see the **Example2**).

Parameters

The <out#_source> parameters mean the output ports one after the other. The value of the parameter shows the input port switched to the given output port.

Example1

- ▶ CALL /MEDIA/XP/AUDIO:switchMulti(I1;I2;I3;I4;I5;I6;I7;I8)
- ◀ mO /MEDIA/XP/AUDIO:switchMulti=

Example2

- ▶ CALL /MEDIA/XP/AUDIO:switchMulti(I1;I2;;;I5)
- ◀ mO /MEDIA/XP/AUDIO:switchMulti=

8.7.6. Channel Mapping

The embedded/transmitted audio signal can be 2-channel LPCM or compressed (non-HBR) audio signal only. There are two possibilities in case of audio signal embedding/transmitting:

- If the selected signal is of type LPCM, the user can select the two channels which are desired to transmit.
- If the selected signal is compressed (non-HBR) audio, it can be embedded to the video stream without any further action.

Command and Response *#channelmapping #mapping*

- ▶ SET·/MEDIA/PORTS/AUDIO/<out>/PARAMETERS.MainOutputChannels=<left_channel>;<right_channel>
- ◀ pw·/MEDIA/PORTS/AUDIO/<out>/PARAMETERS.MainOutputChannels=<left_channel>;<right_channel>

Parameters

Identifier	Parameter description	Value	Value description
<left_channel>	Selected channels are transmitted to the left and right channels of the output port	1...8	Channel number
<right_channel>			

Example

- ▶ SET /MEDIA/PORTS/AUDIO/O26/PARAMETERS.MainOutputChannels=1;2
- ◀ pw /MEDIA/PORTS/AUDIO/O26/PARAMETERS.MainOutputChannels=1;2

8.7.7. Muting an Audio Input

Command and Response *#mute*

- ▶ CALL·/MEDIA/XP/AUDIO:muteSource(<in>)
- ◀ mO·/MEDIA/XP/AUDIO:muteSource=

Example

- ▶ CALL /MEDIA/XP/AUDIO:muteSource(I1)
- ◀ mO /MEDIA/XP/AUDIO:muteSource=

8.7.8. Unmuting an Audio Input

Command and Response *#unmute*

- ▶ CALL·/MEDIA/XP/AUDIO:unmuteSource(<in>)
- ◀ mO·/MEDIA/XP/AUDIO:unmuteSource=

Example

- ▶ CALL /MEDIA/XP/AUDIO:unmuteSource(I1;I3)
- ◀ mO /MEDIA/XP/AUDIO:unmuteSource=

8.7.9. Locking an Audio Input

Command and Response *#lock*

- ▶ CALL·/MEDIA/XP/AUDIO:lockSource(<in>)
- ◀ mO·/MEDIA/XP/AUDIO:lockSource=

Example

- ▶ CALL /MEDIA/XP/AUDIO:lockSource(I1;I2;I3)
- ◀ mO /MEDIA/XP/AUDIO:lockSource=

8.7.10. Unlocking an Audio Input

Command and Response *#unlock*

- ▶ CALL·/MEDIA/XP/AUDIO:unlockSource(<in>)
- ◀ mO·/MEDIA/XP/AUDIO:unlockSource=

Example

- ▶ CALL /MEDIA/XP/AUDIO:unlockSource(I1;I3)
- ◀ mO /MEDIA/XP/AUDIO:unlockSource=

8.7.11. Muting an Audio Output

Command and Response *#mute*

- ▶ CALL·/MEDIA/XP/AUDIO:muteDestination(<out>)
- ◀ mO·/MEDIA/XP/AUDIO:muteDestination=

Example

- ▶ CALL /MEDIA/XP/AUDIO:muteDestination(01;03)
- ◀ mO /MEDIA/XP/AUDIO:muteDestination=

8.7.12. Unmuting an Audio Output

Command and Response *#unmute*

- ▶ CALL·/MEDIA/XP/AUDIO:unmuteDestination(<out>)
- ◀ mO·/MEDIA/XP/AUDIO:unmuteDestination=

Example

- ▶ CALL /MEDIA/XP/AUDIO:unmuteDestination(01;02)
- ◀ mO /MEDIA/XP/AUDIO:unmuteDestination=

8.7.13. Locking an Audio Output

Command and Response *#lock*

- ▶ CALL·/MEDIA/XP/AUDIO:lockDestination(<out>)
- ◀ mO·/MEDIA/XP/AUDIO:lockDestination=

Example

- ▶ CALL /MEDIA/XP/AUDIO:lockDestination(01;04)
- ◀ mO /MEDIA/XP/AUDIO:lockDestination=

8.7.14. Unlocking an Audio Output

Command and Response *#unlock*

- ▶ CALL·/MEDIA/XP/AUDIO:unlockDestination(<out>)
- ◀ mO·/MEDIA/XP/AUDIO:unlockDestination=

Example

- ▶ CALL /MEDIA/XP/AUDIO:unlockDestination(01;02;04)
- ◀ mO /MEDIA/XP/AUDIO:unlockDestination=

8.8. Video Source Port Settings - HDMI / OPTJ

The following settings are valid only for the following input boards: *#hdmi #optj*

- MX2M-4HDMI20-IB
- MX2M-4OPTJ-IB

8.8.1. HDCP Setting

This setting allows to send non-encrypted content to a non-HDCP compliant display. See more information in the [HDCP Management](#) section.

Command and Response *#hdcp*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.HdcpVersion=<number>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.HdcpVersion=<number>

Parameters

Identifier	Parameter description	Value	Value description
<number>	The settings sets the maximum enabled HDCP level	0	HDCP-encryption is disabled.
		1	Encryption level is HDCP 1.4
		2	Encryption level is HDCP 2.2

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.HdcpVersion=2
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.HdcpVersion=2

8.8.2. Color Range Setting

Command and Response *#colorrange*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.InputColorRangeMode=<colorrange>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.InputColorRangeMode=<colorrange>

Parameters

Identifier	Parameter description	Value	Value description
<colorrange>	Color range setting	Auto	Color range depends on the input signal.
		Full	Input is treated as full color range.
		Limited	Input is treated as limited color range.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.InputColorRangeMode=Full
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.InputColorRangeMode=Full

8.8.3. Hot Plug Detect (HPD) Setting

Command and Response *#hotplugdetect*

- ▶ SET /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.EnableHPD=<hpd_setting>
- ◀ pw /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.EnableHPD=<hpd_setting>

Parameters

Identifier	Parameter description	Value	Value description
<hpd_setting>	Hot plug detect setting	AUTO	Hot plug detect state matches input 5V state.
		ON	Hot plug detect is enabled.
		OFF	Hot plug detect is disabled.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.EnableHPD=ON
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.EnableHPD=ON

8.9. Video Source Port Settings - DP

The following settings are valid only for the following input board: *#displayport #dp*

- MX2M-DH-4DP12-IB

8.9.1. Setting the Maximum Lane Number

Command and Response

- ▶ SET /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpMaxLaneCount=<lane>
- ◀ pw /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpMaxLaneCount=<lane>

Parameters

Identifier	Parameter description	Value	Value description
<lane>	DisplayPort data transmission proceeds through the lanes. This defines the maximum used lane number.	1	One lane is able transmit 5.4 Gbps data.
		2	Two lane is able transmit 10.8 Gbps data.
		4	Four lane is able transmit 21.6 Gbps data.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpMaxLaneCount=4
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpMaxLaneCount=4

8.9.2. Setting the Maximum Link Data Rate

Command and Response

- ▶ SET /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpMaxLinkRate=<data_rate>
- ◀ pw /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpMaxLinkRate=<data_rate>

Parameters

Identifier	Parameter description	Value	Value description
<data_rate>	The maximum data rate per lane.	RBR	Reduced Bit Rate uses 1.62 Gbps bandwidth.
		HBR	High Bit Rate uses 2.70 Gbps bandwidth.
		HBR2	High Bit Rate2 uses 5.40 Gbps bandwidth.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpMaxLinkRate=HBR2
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpMaxLinkRate=HBR2

8.9.3. DP Power Setting

This property allows to provide 1.5W (500mA @ 3.3W) power on DP_PWR pin. The default value is true.

Command and Response *#dppower*

- ▶ SET /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpEnablePower=<logical_value>
- ◀ pw /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpEnablePower=<logical_value>

Parameters

Identifier	Parameter description	Value	Value description
<logical_value>	DP power sending setting	true	The board sends 1.5W power on the chosen port.
		false	The board does not provide any power on the chosen port.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpEnablePower=true
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpEnablePower=true

8.9.4. Test Pattern Mode Setting

Command and Response *#testpattern #nosyncscreen*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpTpgMode=<tpg_mode>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpTpgMode=<tpg_mode>

Parameters

Identifier	Parameter description	Value	Value description
<tpg_mode>	The testpattern is enabled or disabled.	0	Disabled
		1	Enabled

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpTpgMode=1
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpTpgMode=1

8.9.5. Color Space Conversion Setting

INFO: DisplayPort signals over 18Gbps will be converted down by either truncating bit depth or by converting RGB signal to YUV 4:2:2 12-bit signal based on user selection. The second option will not reduce the color depth rather, it results in loss of chroma information.

Command and Response *#colorspace*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpConversion=<conversion_mode>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpConversion=<conversion_mode>

Parameters

Identifier	Parameter description	Value	Value description
<conversion_mode>	Color space conversion mode	OFF	Pass-through mode, the video signal is transmitted without any changing.
		422	The video converter subsamples the signal to 4:2:2.
		420	The video converter subsamples the signal to 4:2:0.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpConversion=422
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpConversion=422

8.9.6. Color Range Setting

Command and Response *#colorrange*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.InputColorRangeMode=<colorrange>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.InputColorRangeMode=<colorrange>

Parameters

Identifier	Parameter description	Value	Value description
<colorrange>	Color range setting	Auto	Color range depends on the input signal.
		Full	Input is treated as full color range.
		Limited	Input is treated as limited color range.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.InputColorRangeMode=Full
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.InputColorRangeMode=Full

8.9.7. Restart Link Training

This method is equal with pulling out and plug in again the DP connector.

Command and Response *#linktraining*

- ▶ CALL·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpLinkTrain()
- ◀ m0·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpLinkTrain=

Example

- ▶ CALL /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpLinkTrain()
- ◀ m0 /MEDIA/PORTS/VIDEO/I1/PARAMETERS.DpLinkTrain=

8.9.8. Hot Plug Detect (HPD) Setting

Command and Response *#hotplugdetect #hpd*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.EnableHPD=<hpd_setting>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.EnableHPD=<hpd_setting>

Parameters

Identifier	Parameter description	Value	Value description
<hpd_setting>	Hot plug detect setting	AUTO	Hot plug detect state matches input 5V state.
		ON	Hot plug detect is enabled.
		OFF	Hot plug detect is disabled.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.EnableHPD=ON
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.EnableHPD=ON

8.9.9. HDCP Setting

This setting allows to send non-encrypted content to a non-HDCP compliant display. See more information in the [HDCP Management](#) section.

Command and Response *#hdcpc*

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.HdcpVersion=<number>
- ◀ pw·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.HdcpVersion=<number>

Parameters

Identifier	Parameter description	Value	Value description
<number>	The settings sets the maximum enabled HDCP level	0	HDCP-encryption is disabled.
		1	Encryption level is HDCP 1.4
		2	Encryption level is HDCP 2.2

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.HdcpVersion=2
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS.HdcpVersion=2

8.10. Video Destination Port Settings - HDMI / OPTJ

The following settings are valid only for the following output boards: *#hdmi #optj*

- MX2M-4HDMI20-OB
- MX2M-4OPTJ-OB

8.10.1. Color Space Conversion Setting

ATTENTION! The MX2M-4HDMI20-OB output board accepts video signals in 8, 10 and 12 bit color depth but the sampling pattern conversion is always made in 8 bit.

Command and Response *#colorspace*

- ▶ SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.ColorSpaceSetting=<conversion_mode>
- ◀ pw·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.ColorSpaceSetting=<conversion_mode>

Parameters

Identifier	Parameter description	Value	Value description
<conversion_mode>	Color space conversion mode	0	Auto mode, the color space setting depends on the source signal.
		1	RGB
		2	YUV 4:4:4
		3	YUV 4:2:2
		4	YUV 4:2:0

Example

- ▶ SET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.ColorSpaceSetting=3
- ◀ pw /MEDIA/PORTS/VIDEO/O1/PARAMETERS.ColorSpaceSetting=3

8.10.2. Signal Type Setting

Command and Response

- ▶ SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.ForcedSignalType=<signal_type>
- ◀ pw·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.ForcedSignalType=<signal_type>

Parameters

Identifier	Parameter description	Value	Value description
<signal_type>	Forced signal type of the output stream	AUTO	Signal type depends on the input signal.
		HDMI	Forced HDMI
		DVI	Forced DVI

Example

- ▶ SET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.ForcedSignalType=HDMI
- ◀ pw /MEDIA/PORTS/VIDEO/O1/PARAMETERS.ForcedSignalType=HDMI

8.10.3. Power 5V Setting

DIFFERENCE: The settings is only available for the MX2M-4HDMI20-OB board.

The setting enables/disables power 5V output.

Command and Response *#power5v*

- ▶ SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.Enable5V=<power_mode>
- ◀ pw·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.Enable5V=<power_mode>

Parameters

Identifier	Parameter description	Value	Value description
<power_mode>	Power 5V output mode	AUTO	On change of TMDS clock power 5V is disabled for 1s after that it is enabled again.
		ON	Enabled
		OFF	Disabled

Example

- ▶ SET /MEDIA/PORTS/VIDEO/01/PARAMETERS.Enable5V=ON
- ◀ pw /MEDIA/PORTS/VIDEO/01/PARAMETERS.Enable5V=ON

8.10.4. HDCP Mode Setting

Command and Response *#hdcpc*

- ▶ SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.HdcpMode=<HDCP_mode>
- ◀ pw·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.HdcpMode=<HDCP_mode>

Parameters

Identifier	Parameter description	Value	Value description
<HDCP_mode>	HDCP mode setting	AUTO	The setting is the same as on the input port. The encryption of the signal on the output is the same as on the input.
		ALWAYS	Enabling maximum possible encryption all the time. The setting applies encryption on originally unencrypted streams.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/01/PARAMETERS.HdcpMode=AUTO
- ◀ pw /MEDIA/PORTS/VIDEO/01/PARAMETERS.HdcpMode=AUTO

8.10.5. Audio Source Setting

The setting sets the source of the embedded audio stream.

Command and Response *#embedder #audio*

- ▶ SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.AudioSource=<audio_source>
- ◀ pw·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.AudioSource=<audio_source>

Parameters

Identifier	Parameter description	Value	Value description
<audio_source>	Source of the audio stream setting	Hdmi	The original embedded audio signal is transmitted in the output stream.
		AudioLayer	The audio stream is selected and embedded from the audio layer (e.g. analog audio signal).
		Off	Audio signal is disabled in the video stream.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/01/PARAMETERS.AudioSource=AudioLayer
- ◀ pw /MEDIA/PORTS/VIDEO/01/PARAMETERS.AudioSource=AudioLayer

8.11. Analog Audio Port Properties

INFO: The analog audio ports of the MX2M-AUX-8AUDIO board can be configured as an input or output by the user. See the details about it in the [Analog Audio Port Configuration](#) section.

INFO: Audio input port numbering can be found in the [Audio Input Port Numbering](#), the audio output port numbering can be found in the [Audio Output Port Numbering](#) section.

The following settings are valid only for the following auxiliary (LS) board: *#analogaudio #audio*

- MX2M-AUX-8AUDIO

8.11.1. Query the Input Ports of the Board

The query returns which ports are configured as inputs out of the available eight ones.

Command and Response

- ▶ GET /SYS/<board>.AudioInput
- ◀ pw /SYS/<board>.AudioInput=<status_of_the_ports>

Parameters

Identifier	Parameter description	Value	Value description
<board>	The identifier of the board.	LS1...LS4	Auxiliary (LS - Low Speed) board ID, the values can be LS1, LS2, LS3, or LS4.
<status_of_the_ports>	The list of recent status of the analog audio ports	0	The port is not input port.
		1	The port is configured as input.

Example

- ▶ GET /SYS/LS1.AudioInput
- ◀ pw /SYS/LS1.AudioInput=1;1;1;0;0;0;0;0;0;0;0

Explanation

The first four ports are configured as inputs.

8.11.2. Query the Output Ports of the Board

The query returns which ports are configured as outputs out of the available eight ones.

Command and Response

- ▶ GET /SYS/<board>.AudioOutput
- ◀ pw /SYS/<board>.AudioOutput=<status_of_the_ports>

Parameters

Identifier	Parameter description	Value	Value description
<board>	The identifier of the board.	LS1...LS4	Auxiliary (LS - Low Speed) board ID, the values can be LS1, LS2, LS3, or LS4.
<status_of_the_ports>	The list of recent status of the analog audio ports	0	The port is not output port.
		1	The port is configured as output.

Example

- ▶ GET /SYS/LS1.AudioOutput
- ◀ pw /SYS/LS1.AudioOutput=0;0;0;0;1;1;1;0;0;0;0;0

Explanation

The last four ports are configured as outputs.

8.11.3. Volume Setting in dB

Command and Response *#volume*

- ▶ SET /MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.VoluedB=<volume>
- ◀ pw /MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.VoluedB=<volume>

Parameters

Parameter	Parameter description
<volume>	Sets the input volume (attenuation) between -95.625 dB and 0 dB in step of -0.375dB.

Example

- ▶ SET /MEDIA/PORTS/AUDIO/I41/PARAMETERS.VoluedB=-15
- ◀ pw /MEDIA/PORTS/AUDIO/I41/PARAMETERS.VoluedB=-15.000

8.11.4. Volume Setting in dB by Steps

Command and Response

- ▶ CALL·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepVolumedB(<volume>)
- ◀ mO·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepVolumedB=

Example

- ▶ CALL /MEDIA/PORTS/AUDIO/I41/PARAMETERS:stepVolumedB(4)
- ◀ pw /MEDIA/PORTS/AUDIO/I41/PARAMETERS:stepVolumedB=

8.11.5. Volume Setting in Percent

Command and Response

- ▶ SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.VolumePercent=<percent>
- ◀ pw·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.VolumePercent=<percent>

Example

- ▶ SET /MEDIA/PORTS/AUDIO/I41/PARAMETERS.VolumePercent=50
- ◀ pw /MEDIA/PORTS/AUDIO/I41/PARAMETERS.VolumePercent=50

8.11.6. Volume Setting in Percent by Steps

Command and Response

- ▶ CALL·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepVolumePercent(<percent>)
- ◀ mO·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepVolumePercent=

Example

- ▶ CALL /MEDIA/PORTS/AUDIO/I41/PARAMETERS:stepVolumePercent(20)
- ◀ pw /MEDIA/PORTS/AUDIO/I41/PARAMETERS:stepVolumePercent=

8.11.7. Balance Setting

Command and Response #balance

- ▶ SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.Balance=<balance>
- ◀ pw·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.Balance=<balance>

Parameters

Parameter	Parameter description
<balance>	Sets the balance; -100 means left balance, +100 means right balance, step is 1. Center is 0 (default).

Example

- ▶ SET /MEDIA/PORTS/AUDIO/O41/PARAMETERS.Balance=-15
- ◀ pw /MEDIA/PORTS/AUDIO/O41/PARAMETERS.Balance=-15.000

8.11.8. Balance Setting by Steps

Command and Response

- ▶ CALL·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepBalance(<balance>)
- ◀ mO·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepBalance=

Example

- ▶ CALL /MEDIA/PORTS/AUDIO/I41/PARAMETERS:stepBalance(34)
- ◀ pw /MEDIA/PORTS/AUDIO/I41/PARAMETERS:stepBalance=

8.11.9. Gain Setting

Command and Response #gain

- ▶ SET·/MEDIA/PORTS/AUDIO/<in>/PARAMETERS.Gain=<gain>
- ◀ pw·/MEDIA/PORTS/AUDIO/<in>/PARAMETERS.Gain=<gain>

Parameters

Parameter	Parameter description
<gain>	Sets the input gain between -12 dB and -6 dB.

Example

- ▶ SET /MEDIA/PORTS/AUDIO/I41/PARAMETERS.Gain=-10
- ◀ pw /MEDIA/PORTS/AUDIO/I41/PARAMETERS.Gain=-10.000

8.12. Dante® Audio Settings

INFO: Audio input port numbering can be found in the [Audio Input Port Numbering](#), the audio output port numbering can be found in the [Audio Output Port Numbering](#) section.

The following settings are valid only for the following auxiliary (LS) board: `#dante #aes67 #new`

- MX2M-AUX-DANTE-32CH

8.12.1. Channel Label Renaming

Command and Response

- ▶ `SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.ChannelLabel<number>=<channellabel>`
- ◀ `pw·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.ChannelLabel<number>=<channellabel>`

Parameters

Identifier	Parameter description	Value	Value description
<number>	Number of the channel	0	ChannelLabel1
		1	ChannelLabel2
<channellabel>	Unique name of the channel		Unique name of the channel. The following characters are not allowed in the parameter: () { } # % \ \r \n \t

Example

- ▶ `SET /MEDIA/PORTS/AUDIO/I25/PARAMETERS.ChannelLabel1=FlacPlayer_Left`
- ◀ `pw /MEDIA/PORTS/AUDIO/I25/PARAMETERS.ChannelLabel1=FlacPlayer_Left`

8.12.2. Sample Rate Query

Command and Response

- ▶ `GET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.SampleRate`
- ◀ `pr·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.SampleRate=<samplerate>`

Example

- ▶ `GET /MEDIA/PORTS/AUDIO/I25/PARAMETERS.SampleRate`
- ◀ `pr /MEDIA/PORTS/AUDIO/I25/PARAMETERS.SampleRate=48000`

8.13. System Monitoring Commands

TIPS AND TRICKS: All listed parameters which are listed in this section can be queried in one step with the following command:

▶ `GETALL /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS`

8.13.1. Query Connected Device Presence

Connected property indicates that cable or device is connected to the input or output port.

Command and Response

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.Connected`
- ◀ `pr·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.Connected=<parameter>`

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Connected device or cable indicator	0	Not present
		1	Present
		F	Unknown

Example

- ▶ `GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.Connected`
- ◀ `pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.Connected=1`

8.13.2. Query Video Signal Presence on a Port

SignalPresent property indicates valid signal present on the port.

Command and Response

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.SignalPresent`
- ◀ `pr·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.SignalPresent=<parameter>`

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Signal present indicator	0	Not present
		1	Present
		F	Unknown

Example

- ▶ `GET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.SignalPresent`
- ◀ `pr /MEDIA/PORTS/VIDEO/O1/PARAMETERS.SignalPresent=1`

`#status #systemmonitor`

8.13.3. Query the Signal Type

SignalType property provides the type of the video signal.

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.SignalType
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.SignalType=<signal_type>

Parameters

Parameter	Parameter description	Value	Value description
<signal_type>	Signal type	0	DVI
		1	HDMI
		2	DP
		F	Unknown

Example

- ▶ GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.SignalType
- ◀ pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.SignalType=2

8.13.4. Query the Resolution of the Stream

The query returns with the resolution of the stream without blanking.

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.Resolution
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.Resolution=<resolution>

Example

- ▶ GET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.Resolution
- ◀ pr /MEDIA/PORTS/VIDEO/O1/PARAMETERS.Resolution=3840x2160p60

8.13.5. Query the Total Size of the Stream

The query returns with the resolution of the stream including the blanking.

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.TotalSize
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.TotalSize=<resolution>

Example

- ▶ GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.TotalSize
- ◀ pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.TotalSize=4400x2248

8.13.6. Query Embedded Audio Presence

EmbeddedAudioPresent property indicates that embedded audio is present in the video stream.

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.EmbeddedAudioPresent
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.EmbeddedAudioPresent=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Embedded audio presence indicator	0	Not present
		1	Present
		F	Unknown

Example

- ▶ GET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.EmbeddedAudioPresent
- ◀ pr /MEDIA/PORTS/VIDEO/O1/PARAMETERS.EmbeddedAudioPresent=1

8.13.7. Query the Color Space of the Stream

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorSpace
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorSpace=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Color space of the stream	1	RGB
		2	YUV 4:4:4
		3	YUV 4:2:2
		4	YUV 4:2:0
		F	Unknown

Example

- ▶ GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.ColorSpace
- ◀ pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.ColorSpace=4

8.13.8. Query the Color Range of the Stream

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorRange
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorRange=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Color range of the stream	0	Full
		1	Limited
		F	Unknown

Example

- ▶ GET /MEDIA/PORTS/VIDEO/01/PARAMETERS.ColorRange
- ◀ pr /MEDIA/PORTS/VIDEO/01/PARAMETERS.ColorRange=0

8.13.9. Query the Color Depth of the Stream

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorDepth
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorDepth=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Color depth of the stream	0	8 bit per pixel
		1	10 bit per pixel
		2	12 bit per pixel
		3	16 bit per pixel
		F	Unknown

Example

- ▶ GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.ColorDepth
- ◀ pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.ColorDepth=1

8.13.10. Query the HDCP-encryption Presence

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.HdcpActive
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.HdcpActive=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	Presence of the HDCP-encryption	0	Not encrypted
		1	Encrypted
		F	Unknown

Example

- ▶ GET /MEDIA/PORTS/VIDEO/01/PARAMETERS.HdcpActive
- ◀ pr /MEDIA/PORTS/VIDEO/01/PARAMETERS.HdcpActive=0

8.13.11. Query the HDCP-encryption Level of the Stream

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ActiveHdcpVersion
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ActiveHdcpVersion=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	HDCP-encryption level of the stream	0	Not encrypted
		1	HDCP v1.4
		2	HDCP v2.2

Example

- ▶ GET /MEDIA/PORTS/VIDEO/01/PARAMETERS.ActiveHdcpVersion
- ◀ pr /MEDIA/PORTS/VIDEO/01/PARAMETERS.ActiveHdcpVersion=0

8.13.12. Query the Maximum Supported HDCP-encryption Level

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.MaxSupportedHdcpVersion
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.MaxSupportedHdcpVersion=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	HDCP-encryption level of the stream	0	None
		1	HDCP v1.4
		2	HDCP v2.2

Example

- ▶ GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.MaxSupportedHdcpVersion
- ◀ pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.MaxSupportedHdcpVersion=2

8.13.13. Query the HDCP Error

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.HdcpError
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.HdcpError=<parameter>

Parameters

Parameter	Parameter description	Value	Value description
<parameter>	HDCP error presence indicator	0	None
		1	Link integrity
		2	Incompatible

Example

- ▶ GET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.HdcpError
- ◀ pr /MEDIA/PORTS/VIDEO/O1/PARAMETERS.HdcpError=0

8.13.14. Query the TMDS Error Counters

Command and Response

- ▶ GET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.TmdsErrorCounters
- ◀ pr /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.TmdsErrorCounters=<ch0_error_cnt>;<ch1_error_cnt>;<ch2_error_cnt>

Parameters

Parameter	Description
<ch0_error_cnt>	TMDS error counter of the channel 0.
<ch1_error_cnt>	TMDS error counter of the channel 1.
<ch2_error_cnt>	TMDS error counter of the channel 2.

Example

- ▶ GET /MEDIA/PORTS/VIDEO/I1/PARAMETERS.TmdsErrorCounters
- ◀ pr /MEDIA/PORTS/VIDEO/I1/PARAMETERS.TmdsErrorCounters=0;0;0

8.13.15. Audio Mismatch Status Query

The query returns the audio mismatch status of the audio output port.

Command and Response

- ▶ GET /MEDIA/PORTS/AUDIO/<out>/PARAMETERS.AudioMismatch
- ◀ pr /MEDIA/PORTS/AUDIO/<out>/PARAMETERS.AudioMismatch=<status>

Parameters

Parameter	Parameter description	Value	Value description
<status>	Audio mismatch status	No mismatch	No mismatch
		Compressed audio	Compressed audio
		Channel not found thus falling back	Channel not found thus falling back
		Channel not found and cannot fall back	Channel not found and cannot fall back
		HBR audio	HBR audio

Example

- ▶ GET /MEDIA/PORTS/VIDEO/O1/PARAMETERS.AudioMismatch
- ◀ pr /MEDIA/PORTS/VIDEO/O1/PARAMETERS.AudioMismatch=No mismatch

8.15.2. Query the Validity of a Dynamic EDID

Command and Response

- ▶ GET /EDID/D/<dynamic>.Validity
- ◀ pr /EDID/D/<dynamic>.Validity=<logical_value>

Parameters

The <logical_value> can be **true** or **false**.

Example

- ▶ GET /EDID/D/D1.Validity
- ◀ pr /EDID/D/D1.Validity=true

The 'Validity' property is true then a valid EDID is stored in D1 memory place.

8.15.3. Query the Preferred Resolution of a User EDID

Command and Response

- ▶ GET /EDID/U/<user>.PreferredResolution
- ◀ pr /EDID/U/<user>.PreferredResolution=<resolution>

Example

- ▶ GET /EDID/U/U2.PreferredResolution
- ◀ pr /EDID/U/U2.PreferredResolution=1920x1080p60.00Hz

8.15.4. Emulating an EDID on an Input Port

Command and Response

- ▶ CALL /EDID:switch(<dynamic|user|factory>:<emulated>)
- ◀ mO /EDID:switch

Example

- ▶ CALL /EDID:switch(F49:E1;U3:E2)
- ◀ mO /EDID:switch

8.15.5. Copy an EDID to User Memory

Command and Response

- ▶ CALL /EDID:copy(<dynamic|emulated|factory|user>:<user>)
- ◀ mO /EDID:copy

Example

- ▶ CALL /EDID:copy(D1:U1;F148:U2)
- ◀ mO /EDID:copy

The EDID of the last connected sink of D1 (Output 1) is copied to U1, the F148 factory EDID is copied to U2.

8.15.6. Deleting an EDID from User Memory

Command and Response

- ▶ CALL /EDID:delete(<user>)
- ◀ mO /EDID:delete

Example

- ▶ CALL /EDID:delete(U1;U5)
- ◀ mO /EDID:delete

8.15.7. Resetting the Emulated EDIDs

Command and Response

- ▶ CALL /EDID:reset()
- ◀ mO /EDID:reset

Example

- ▶ CALL /EDID:reset()
- ◀ mO /EDID:reset

Calling this method switches all emulated EDIDs to factory default one. See the table in the [Switch Setup for Dante® Audio Signal Transmission](#) section.

8.16. Health Status Monitoring Commands

8.16.1. Query the Overall Health State of the Matrix

The query returns the overall health state of the matrix switcher which equals the maximum value of the OverallHealthState parameter of each I/O board, the CECU, the HSMB, the Power Tray 1 and Power Tray 2.

#health

ATTENTION! In case of **WARNING** or **ERROR** result of the query please download the system logs of the matrix immediately and power off the device as soon as possible.

Command and Response

- ▶ GET /HEALTH.OverallHealthState
- ◀ pr /HEALTH.OverallHealthState=<status>

Parameters

Parameter	Parameter description	Value	Value description
<status>	Overall health state of the matrix	OK	No active warning or error level log entry exists for the system or a device seated in the system.
		WARNING	Active warning level log entry exists AND no active error level log entry exists for the system or a device seated in the system.
		ERROR	Active error level log entry exists for the system or a device seated in the system.

Example

- ▶ GET /HEALTH.OverallHealthState
- ◀ pr /HEALTH.OverallHealthState=OK

8.16.2. Query the Temperature Warnings

The query returns with a semi-colon separated list of the devices that have an active temperature warning.

ATTENTION! If a device has active temperature warning, please make sure the air ventilation of the matrix is correct.

Command and Response

- ▶ GET /HEALTH.TemperatureWarning
- ◀ pr /HEALTH.TemperatureWarning=<device1>;<device2>;...<deviceN>

Example

- ▶ GET /HEALTH.TemperatureWarning
- ◀ pr /HEALTH.TemperatureWarning=

8.16.3. Query the Temperature Errors

The query returns with a semi-colon separated list of the devices that have an active temperature error.

WARNING! If a device has active temperature error, please make sure the air ventilation of the matrix is correct. Keeping the device in too high temperature long term may harm the electrical parts of the matrix.

Command and Response

- ▶ GET /HEALTH.TemperatureError
- ◀ pr /HEALTH.TemperatureError=<device1>;<device2>;...<deviceN>

Example

- ▶ GET /HEALTH.TemperatureError
- ◀ pr /HEALTH.TemperatureError=

8.16.4. Query the Voltage Warnings

The query returns with a semi-colon separated list of the devices that have an active voltage warning.

Command and Response

- ▶ GET /HEALTH.VoltageWarning
- ◀ pr /HEALTH.VoltageWarning=<device1>;<device2>;...<deviceN>

Example

- ▶ GET /HEALTH.VoltageWarning
- ◀ pr /HEALTH.VoltageWarning=

8.16.5. Query the Voltage Errors

The query returns with a semi-colon separated list of the devices that have an active voltage error.

WARNING! If a device has active voltage error, power off the device as soon as possible.

Command and Response

- ▶ GET /HEALTH.VoltageError
- ◀ pr /HEALTH.VoltageError=<device1>;<device2>;...<deviceN>

Example

- ▶ GET /HEALTH.VoltageError
- ◀ pr /HEALTH.VoltageError=

8.16.6. Query the Current Warnings

The query returns with a semi-colon separated list of the devices that have an active current warning.

Command and Response

- ▶ GET /HEALTH.CurrentWarning
- ◀ pr /HEALTH.CurrentWarning=<device1>;<device2>;...<deviceN>

Example

- ▶ GET /HEALTH.CurrentWarning
- ◀ pr /HEALTH.CurrentWarning=

8.16.7. Query the Current Errors

The query returns with a semi-colon separated list of the devices that have an active current error.

WARNING! If a device has active current error, power off the device as soon as possible.

Command and Response

- ▶ GET /HEALTH.CurrentError
- ◀ pr /HEALTH.CurrentError=<device1>;<device2>;...<deviceN>

Example

- ▶ GET /HEALTH.CurrentError
- ◀ pr /HEALTH.CurrentError=

8.16.8. Query the Fan Warnings

The query returns with a semi-colon separated list of the devices that have an active system fan warning.

Command and Response

- ▶ GET /HEALTH.FanWarning
- ◀ pr /HEALTH.FanWarning=<fan1>;<fan2>;...<fanN>

Example

- ▶ GET /HEALTH.FanWarning
- ◀ pr /HEALTH.FanWarning=

8.16.9. Query the Fan Errors

The query returns with a semi-colon separated list of the devices that have an active system fan error.

Command and Response

- ▶ GET /HEALTH.FanError
- ◀ pr /HEALTH.FanError=<fan1>;<fan2>;...<fanN>

Example

- ▶ GET /HEALTH.FanError
- ◀ pr /HEALTH.FanError=

8.16.10. Query the PSU Drawer Warnings

The query returns with a semi-colon separated list of the devices that have an active PSU warning.

Command and Response

- ▶ GET /HEALTH.PsuWarning
- ◀ pr /HEALTH.PsuWarning=<PSU1>;<PSU2>

Example

- ▶ GET /HEALTH.PsuWarning
- ◀ pr /HEALTH.PsuWarning=

8.16.11. Query the PSU Drawer Errors

The query returns with a semi-colon separated list of the devices that have an active PSU error.

WARNING! If a device has active PSU drawer error, power off the device as soon as possible.

Command and Response

- ▶ GET /HEALTH.PsuError
- ◀ pr /HEALTH.PsuError=<PSU1>;<PSU2>

Example

- ▶ GET /HEALTH.PsuError
- ◀ pr /HEALTH.PsuError=

8.16.12. Query the Health State of an I/O Board

The query returns with the actual health status information about the selected I/O board.

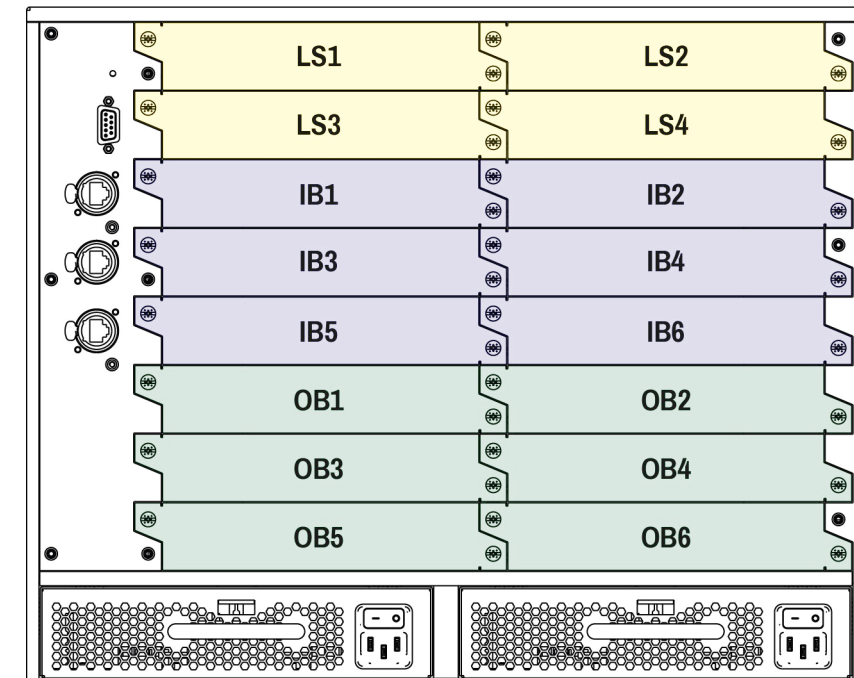
Command and Response

- ▶ GETALL /HEALTH/<board>
- ◀ pr /HEALTH/<board>.Status=<status>
- ◀ pr /HEALTH/<board>.ProductName=<product_name>
- ◀ pr /HEALTH/<board>.SerialNumber=<serial_number>
- ◀ pr /HEALTH/<board>.PartNumber=<part_number>
- ◀ pr /HEALTH/<board>.UpTime=<second>
- ◀ pr /HEALTH/<board>.TemperatureState=<status>
- ◀ pr /HEALTH/<board>.VoltageState=<status>
- ◀ pr /HEALTH/<board>.OverallHealthState=<status>
- ◀ pr /HEALTH/<board>.Temperature0=<temperature0>
- ◀ pr /HEALTH/<board>.Temperature1=<temperature1>
- ◀ pr /HEALTH/<board>.Temperature2=<temperature2>
- ◀ pr /HEALTH/<board>.Temperature3=<temperature3>
- ◀ pr /HEALTH/<board>.Temperature4=<temperature4>
- ◀ pr /HEALTH/<board>.Voltage0=<voltage0>
- ◀ pr /HEALTH/<board>.Voltage1=<voltage1>
- ◀ pr /HEALTH/<board>.Voltage2=<voltage2>
- ◀ pr /HEALTH/<board>.Voltage3=<voltage3>
- ◀ pr /HEALTH/<board>.Voltage4=<voltage4>

Parameters

Identifier	Parameter description	Value	Value description
		IB1...IB6	Input board ID, the values can be IB1, IB2, IB3, IB4, IB5 or IB6.
<board>	The identifier of the board.	OB1...OB6	Output board ID, the values can be OB1, OB2, OB3, OB4, OB5 or OB6.
		LS1...LS4	Auxiliary (LS - Low Speed) board ID, the values can be LS1, LS2, LS3, or LS4.

Layout of the Matrix



Example

- ▶ GETALL /HEALTH/IB5
- ◀ pr /HEALTH/IB5.Status=Operational
- ◀ pr /HEALTH/IB5.ProductName=MX2M-DH-4DP12-IB
- ◀ pr /HEALTH/IB5.SerialNumber=00006522
- ◀ pr /HEALTH/IB5.PartNumber=91120049
- ◀ pr /HEALTH/IB5.UpTime=343393
- ◀ pr /HEALTH/IB5.TemperatureState=Ok
- ◀ pr /HEALTH/IB5.VoltageState=Ok
- ◀ pr /HEALTH/IB5.OverallHealthState=Ok
- ◀ pr /HEALTH/IB5.Temperature0=45.30 C;0.00;115.00;0.00;125.00;34.58;46.52;
- ◀ pr /HEALTH/IB5.Voltage0=5.01 V;4.85;5.15;4.75;5.25;4.96;5.01;
- ◀ pr /HEALTH/IB5.Voltage1=3.30 V;3.20;3.40;3.14;3.47;3.30;3.33;
- ◀ pr /HEALTH/IB5.Voltage2=1.79 V;1.75;1.85;1.71;1.89;1.79;1.79;
- ◀ pr /HEALTH/IB5.Voltage3=1.02 V;0.97;1.03;0.95;1.05;1.00;1.02;
- ◀ pr /HEALTH/IB5.Voltage4=1.00 V;0.97;1.03;0.95;1.05;0.99;1.00;

8.16.13. Query the Health State of a PSU Drawer

The query returns with the actual health status information about the selected PSU drawer.

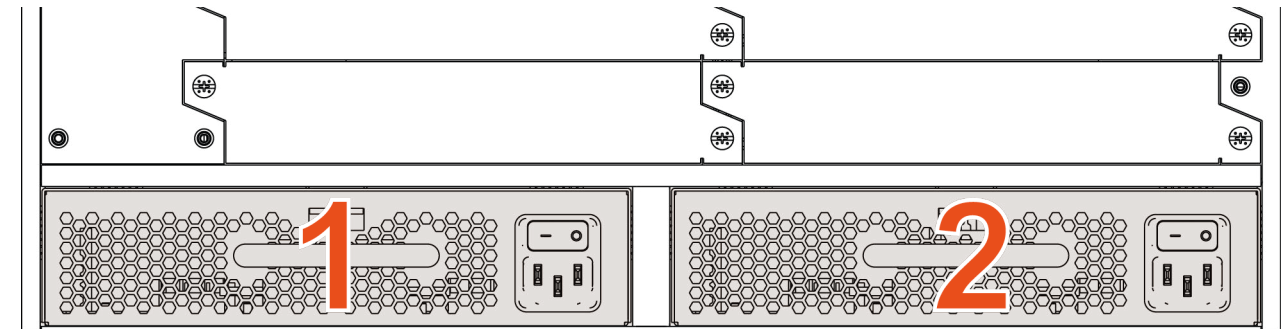
Command and Response

- ▶ GETALL /HEALTH/<PSU>
- ◀ pr /HEALTH/<PSU>.Enabled=<logical_value>
- ◀ pr /HEALTH/<PSU>.FanSpeed0=<fanspeed>
- ◀ pr /HEALTH/<PSU>.Temperature0=<temperature>
- ◀ pr /HEALTH/<PSU>.Current0=<current0>
- ◀ pr /HEALTH/<PSU>.Current1=<current1>
- ◀ pr /HEALTH/<PSU>.DcOk0=<logical_value>
- ◀ pr /HEALTH/<PSU>.DcOk1=<logical_value>
- ◀ pr /HEALTH/<PSU>.PowerGood0=<logical_value>
- ◀ pr /HEALTH/<PSU>.PowerGood1=<logical_value>
- ◀ pr /HEALTH/<PSU>.TemperatureState=<status>
- ◀ pr /HEALTH/<PSU>.CurrentState=<status>
- ◀ pr /HEALTH/<PSU>.FanState=<status>
- ◀ pr /HEALTH/<PSU>.PowerDrawerState=<status>
- ◀ pr /HEALTH/<board>.OverallHealthState=<status>
- ◀ pr /HEALTH/<board>.Status=<status>
- ◀ pr /HEALTH/<PSU>.ProductName=<product_name>
- ◀ pr /HEALTH/<PSU>.SerialNumber=<serial_number>
- ◀ pr /HEALTH/<PSU>.PartNumber=<part_number>

Parameters

Identifier	Parameter description	Value	Value description
<PSU>	The identifier of the PSU drawer.	POWERDRAWER1	PSU drawer 1
		POWERDRAWER2	PSU drawer 2

Layout of the Matrix



Example

- ▶ GETALL /HEALTH/POWERDRAWER1
- ◀ pr /HEALTH/POWERDRAWER1.Enabled=true
- ◀ pr /HEALTH/POWERDRAWER1.FanSpeed0=0.00 RPM;10.00;65535.00;0.00;65535.00;0.00;0.00
- ◀ pr /HEALTH/POWERDRAWER1.Temperature0=0.00 C;0.00;100.00;0.00;110.00;0.00;0.00
- ◀ pr /HEALTH/POWERDRAWER1.Current0=59.11 A;0.00;38.00;0.00;42.00;59.11;59.11
- ◀ pr /HEALTH/POWERDRAWER1.Current1=0.00 A;0.00;14.00;0.00;15.60;0.00;0.00
- ◀ pr /HEALTH/POWERDRAWER1.DcOk0=true
- ◀ pr /HEALTH/POWERDRAWER1.DcOk1=true
- ◀ pr /HEALTH/POWERDRAWER1.PowerGood0=true
- ◀ pr /HEALTH/POWERDRAWER1.PowerGood1=true
- ◀ pr /HEALTH/POWERDRAWER1.TemperatureState=OK
- ◀ pr /HEALTH/POWERDRAWER1.CurrentState=OK
- ◀ pr /HEALTH/POWERDRAWER1.FanState=OK
- ◀ pr /HEALTH/POWERDRAWER1.PowerDrawerState=Operational
- ◀ pr /HEALTH/POWERDRAWER1.OverallHealthState=OK
- ◀ pr /HEALTH/POWERDRAWER1.Status=Operational
- ◀ pr /HEALTH/POWERDRAWER1.ProductName=MX2M-PSU-500-F
- ◀ pr /HEALTH/POWERDRAWER1.SerialNumber=87654321
- ◀ pr /HEALTH/POWERDRAWER1.PartNumber=

8.16.14. Query the Health State of the HSMB

The query returns with the actual health status information about the High Speed Motherboard (HSMB).

Command and Response

```

▶ GETALL /HEALTH/HSMB
◀ pr /HEALTH/HSMB.Voltage0_1V0=<voltage0>
◀ pr /HEALTH/HSMB.Voltage1_1V2=<voltage1>
◀ pr /HEALTH/HSMB.Voltage2_1V5=<voltage2>
◀ pr /HEALTH/HSMB.Voltage3_3V3=<voltage3>
◀ pr /HEALTH/HSMB.Voltage4_5V0=<voltage4>
◀ pr /HEALTH/HSMB.Voltage5_12V0=<voltage5>
◀ pr /HEALTH/HSMB.Voltage6_48V0=<voltage6>
◀ pr /HEALTH/HSMB.Temperature0=<temperature0>
◀ pr /HEALTH/HSMB.Temperature1=<temperature1>
◀ pr /HEALTH/HSMB.Temperature2=<temperature2>
◀ pr /HEALTH/HSMB.FanSpeed0=<fanspeed0>
◀ pr /HEALTH/HSMB.FanSpeed1=<fanspeed1>
◀ pr /HEALTH/HSMB.FanSpeed2=<fanspeed2>
◀ pr /HEALTH/HSMB.UnevenCurrentShare=<logical_value>
◀ pr /HEALTH/HSMB.BoardsInRightSlotState=<status>
◀ pr /HEALTH/HSMB.TemperatureState=<status>
◀ pr /HEALTH/HSMB.VoltageState=<status>
◀ pr /HEALTH/HSMB.FanState=<status>
◀ pr /HEALTH/HSMB.OverallHealthState=<status>

```

Example

```

▶ GETALL /HEALTH/HSMB
◀ pr /HEALTH/HSMB.Voltage0_1V0=1.04 V;1.02;1.08;1.00;1.10;1.03;1.04
◀ pr /HEALTH/HSMB.Voltage1_1V2=1.17 V;1.16;1.24;1.14;1.26;1.17;1.17
◀ pr /HEALTH/HSMB.Voltage2_1V5=1.48 V;1.46;1.55;1.43;1.58;1.48;1.48
◀ pr /HEALTH/HSMB.Voltage3_3V3=3.32 V;3.20;3.40;3.14;3.47;3.32;3.32
◀ pr /HEALTH/HSMB.Voltage4_5V0=5.06 V;4.95;5.25;4.85;5.36;5.06;5.12
◀ pr /HEALTH/HSMB.Voltage5_12V0=0.26 V;11.50;12.60;11.00;13.00;0.26;0.26
◀ pr /HEALTH/HSMB.Voltage6_48V0=0.00 V;46.00;52.00;44.00;56.00;0.00;0.00
◀ pr /HEALTH/HSMB.Temperature0=65.00 C;0.00;75.00;0.00;85.00;0.00;72.50
◀ pr /HEALTH/HSMB.Temperature1=72.50 C;0.00;75.00;0.00;85.00;65.00;72.50
◀ pr /HEALTH/HSMB.Temperature2=72.50 C;0.00;75.00;0.00;85.00;65.00;72.50
◀ pr /HEALTH/HSMB.FanSpeed0=0.00 RPM;10.00;65535.00;0.00;65535.00;0.00;0.00

```

```

◀ pr /HEALTH/HSMB.FanSpeed1=0.00 RPM;10.00;65535.00;0.00;65535.00;0.00;0.00
◀ pr /HEALTH/HSMB.FanSpeed2=0.00 RPM;10.00;65535.00;0.00;65535.00;0.00;0.00
◀ pr /HEALTH/HSMB.UnevenCurrentShare=false
◀ pr /HEALTH/HSMB.BoardsInRightSlotState=OK
◀ pr /HEALTH/HSMB.TemperatureState=OK
◀ pr /HEALTH/HSMB.VoltageState=OK
◀ pr /HEALTH/HSMB.FanState=OK
◀ pr /HEALTH/HSMB.OverallHealthState=OK

```

8.16.15. Query the Health State of the CECU

The query returns with the actual health status information about the Central Electronic Control Unit (CECU).

Command and Response

```

▶ GETALL /HEALTH/CECU
◀ pr /HEALTH/CECU.Temperature0=<temperature>
◀ pr /HEALTH/CECU.TemperatureState=<status>
◀ pr /HEALTH/CECU.OverallHealthState=<status>

```

Example

```

▶ GETALL /HEALTH/CECU
◀ pr /HEALTH/CECU.Temperature0=47.72 C;0.00;65.00;0.00;70.00;44.24;53.52
◀ pr /HEALTH/CECU.TemperatureState=OK
◀ pr /HEALTH/CECU.OverallHealthState=OK

```

8.17. Network Configuration

ATTENTION! Calling the `ApplySettings()` method after the network setting is always required. See the details in the [Apply Network Settings](#) section. `#network #dhcp #ipaddress`

8.17.1. Query the DHCP State

Command and Response

- ▶ `GET /MANAGEMENT/NETWORK.DhcpEnabled`
- ◀ `pw /MANAGEMENT/NETWORK.DhcpEnabled=<logical_value>`

Parameters

The `<logical_value>` can be **true** or **false**.

Example

- ▶ `GET /MANAGEMENT/NETWORK.DhcpEnabled`
- ◀ `pw /MANAGEMENT/NETWORK.DhcpEnabled=true`

8.17.2. Change the DHCP State

Command and Response

- ▶ `SET /MANAGEMENT/NETWORK.DhcpEnabled=<logical_value>`
- ◀ `pw /MANAGEMENT/NETWORK.DhcpEnabled=<logical_value>`

Parameters

The `<logical_value>` can be set to **true** or **false**.

Example

- ▶ `SET /MANAGEMENT/NETWORK.DhcpEnabled=false`
- ◀ `pw /MANAGEMENT/NETWORK.DhcpEnabled=false`

8.17.3. Query the IP Address

Command and Response

- ▶ `GET /MANAGEMENT/NETWORK.IpAddress`
- ◀ `pr /MANAGEMENT/NETWORK.IpAddress=<IP_address>`

Example

- ▶ `GET /MANAGEMENT/NETWORK.IpAddress`
- ◀ `pr /MANAGEMENT/NETWORK.IpAddress=192.168.0.100`

8.17.4. Change the IP Address (Static)

Command and Response

- ▶ `SET /MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>`
- ◀ `pw /MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>`

Example

- ▶ `SET /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85`
- ◀ `pw /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85`

8.17.5. Query the Subnet Mask

Command and Response

- ▶ `GET /MANAGEMENT/NETWORK.NetworkMask`
- ◀ `pr /MANAGEMENT/NETWORK.NetworkMask=<netmask>`

Example

- ▶ `GET /MANAGEMENT/NETWORK.NetworkMask`
- ◀ `pr /MANAGEMENT/NETWORK.NetworkMask=255.255.255.0`

8.17.6. Change the Subnet Mask (Static)

Command and Response

- ▶ `SET /MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>`
- ◀ `pw /MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>`

Example

- ▶ `SET /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0`
- ◀ `pw /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0`

8.17.7. Query the Gateway Address

Command and Response

- ▶ `GET /MANAGEMENT/NETWORK.GatewayAddress`
- ◀ `pr /MANAGEMENT/NETWORK.GatewayAddress=<gw_address>`

Example

- ▶ `GET /MANAGEMENT/NETWORK.GatewayAddress`
- ◀ `pr /MANAGEMENT/NETWORK.GatewayAddress=192.168.0.1`

8.17.8. Change the Gateway Address (Static)

Command and Response

- ▶ SET /MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>
- ◀ pw /MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Example

- ▶ SET /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.1
- ◀ pw /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.1

8.17.9. Apply Network Settings

Command and Response

- ▶ CALL /MANAGEMENT/NETWORK:ApplySettings()
- ◀ mO /MANAGEMENT/NETWORK:ApplySettings

Example

- ▶ CALL /MANAGEMENT/NETWORK:ApplySettings()
- ◀ mO /MANAGEMENT/NETWORK:ApplySettings

8.18. RS-232 Port Configuration

8.18.1. Enable/Disable the Port

Command and Response

- ▶ SET /MANAGEMENT/SERIAL.Enabled=<logical_value>
- ◀ pw /MANAGEMENT/SERIAL.Enabled=<logical_value>

Parameters

Parameter	Parameter description	Value	Value description
<logical_value>	Port enable/disable setting	true	The port is enabled.
		false	The port is disabled.

Example

- ▶ SET /MANAGEMENT/SERIAL.Enabled=true
- ◀ pw /MANAGEMENT/SERIAL.Enabled=true

8.18.2. BAUD Rate Setting

Command and Response

- ▶ SET /MANAGEMENT/SERIAL.Baudrate=<baudrate>
- ◀ pw /MANAGEMENT/SERIAL.Baudrate=<baudrate>

Parameters

Parameter	Parameter description	Value	Value description
		0	0
		200	200
		300	300
		600	600
		1200	1200
		1800	1800
<baudrate>	Baud rate value	2400	2400
		4800	4800
		9600	9600
		19200	19200
		38400	38400
		57600	57600
		115200	115200

Example

- ▶ SET /MANAGEMENT/SERIAL.Baudrate=57600
- ◀ pw /MANAGEMENT/SERIAL.Baudrate=57600

8.18.3. Databits Setting

Command and Response

- ▶ SET /MANAGEMENT/SERIAL.DataBits=<databits>
- ◀ pw /MANAGEMENT/SERIAL.DataBits=<databits>

Parameters

Parameter	Parameter description	Value	Value description
<databits>	Databits value	8	8 databits
		9	9 databits

Example

- ▶ SET /MANAGEMENT/SERIAL.DataBits=8
- ◀ pw /MANAGEMENT/SERIAL.DataBits=8

8.18.4. Parity Setting

Command and Response

- ▶ SET·/MANAGEMENT/SERIAL.Parity=<parity>
- ◀ pw·/MANAGEMENT/SERIAL.Parity=<parity>

Parameters

Parameter	Parameter description	Value	Value description
<parity>	Parity value	None	None
		Odd	Odd
		Even	Even
		Mark	Mark
		Space	Space

Example

- ▶ SET /MANAGEMENT/SERIAL.Parity=Even
- ◀ pw /MANAGEMENT/SERIAL.Parity=Even

8.18.5. Stopbits Setting

Command and Response

- ▶ SET·/MANAGEMENT/SERIAL.StopBits=<stopbits>
- ◀ pw·/MANAGEMENT/SERIAL.StopBits=<stopbits>

Parameters

Parameter	Parameter description	Value	Value description
<stopbits>	Stop bits value	1	1
		2	2

Example

- ▶ SET /MANAGEMENT/SERIAL.StopBits=1
- ◀ pw /MANAGEMENT/SERIAL.StopBits=1

8.18.6. Protocol Setting

Command and Response

- ▶ SET·/MANAGEMENT/SERIAL.Protocol=<protocol>
- ◀ pw·/MANAGEMENT/SERIAL.Protocol=<protocol>

Parameters

Parameter	Parameter description	Value	Value description
<protocol>	Command protocol on the serial port	LW2	Lightware LW2 command protocol
		LW3	Lightware LW3 command protocol
		P#2	Third-party command protocol

Example

- ▶ SET /MANAGEMENT/SERIAL.Protocol=LW3
- ◀ pw /MANAGEMENT/SERIAL.Protocol=LW3

8.18.7. Recalling Factory Default Settings on the Serial Port

Command and Response

- ▶ CALL·/MANAGEMENT/SERIAL:factoryDefault()
- ◀ mO·/MANAGEMENT/SERIAL:factoryDefault=

Example

- ▶ CALL /MANAGEMENT/SERIAL:factoryDefault()
- ◀ mO /MANAGEMENT/SERIAL:factoryDefault=

INFO: See the factory default values for the RS-232 port in the [Switch Setup for Dante® Audio Signal Transmission](#) section.

8.19. Sending CEC Commands

INFO: The hidden first 2 bytes of the CEC command is static, it refers to the logical address of the sender and the addressee. When the port is input, it is always 04 (from TV to Playback device 1), when the port is output, it is always 40 (from Playback device 1 to TV). Broadcast addressing is also possible (in this case it is 0F or 4F). *#cec #new*

INFO: The port numbering of the relevant I/O boards can be found in the [Video Input/Output Port Numbering](#) section.

The following settings are valid only for the following input and output boards:

- MX2M-4HDMI20-IB
- MX2M-4HDMI20-OB
- MX2M-4OPTJ-IB
- MX2M-4OPTJ-OB

8.19.1. Sending a CEC Command in Text Format

Command and Response

- ▶ `CALL /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:send(<command>)`
- ◀ `mO /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:send`

Parameters

The followings are accepted as <command>:

image_view_on	standby	text_view_on	active_source	give_power_status
get_cec_version	set_osd	clear_osd		

Example

- ▶ `CALL /MEDIA/PORTS/VIDEO/01/PARAMETERS/CEC:send(power_on)`
- ◀ `mO /MEDIA/PORTS/VIDEO/01/PARAMETERS/CEC:send`

8.19.2. Press&Release Commands

Below CEC commands are called 'push-button commands' like a button in a remote controller, e.g. volume up/down. When the CEC command is sent, the 'release' command is also sent in the background. Certain devices require this feature for the proper working, but this is necessary only for push-button commands.

Command and Response

- ▶ `CALL /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:sendClick(<command>)`
- ◀ `mO /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:sendClick`

Parameters

The followings are accepted as <command>:

ok	number_2	input_select	rewind	select_media_4
back	number_3	display_info	fast_forward	select_media_5
up	number_4	power_legacy	eject	power_toggle
down	number_5	page_up	skip_forward	power_on
left	number_6	page_down	skip_backward	power_off
right	number_7	volume_up	3d_mode	stop_function
root_menu	number_8	volume_down	stop_record	f1
setup_menu	number_9	mute_toggle	pause_record	f2
contents_menu	dot	mute	play_forward	f3
favorite_menu	enter	unmute	play_reverse	f4
media_top_menu	clear	play	select_next_media	
media_context_menu	channel_up	stop	select_media_1	
number_0	channel_down	pause	select_media_2	
number_1	sound_select	record	select_media_3	

Example

- ▶ `CALL /MEDIA/PORTS/VIDEO/01/PARAMETERS/CEC:sendClick(play)`
- ◀ `mO /MEDIA/PORTS/VIDEO/01/PARAMETERS/CEC:sendClick`

8.19.3. Sending an OSD String

Sending the OSD string consists of two steps. First, set the **CEC.OsdString** property with the desired text, after that, call the **CEC.send(set_osd)** method.

Step 1 – Setting the CEC.OsdString Property

Command and Response

- ▶ SET /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC.OsdString=<text>
- ◀ pw /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC.OsdString=<text>

Parameters

<text> Letters (A-Z) and (a-z), hyphen (-), underscore (_), numbers (0-9), and dot (.). Max length: 14 characters.

Example

- ▶ SET /MEDIA/PORTS/VIDEO/I1/PARAMETERS/CEC.OsdString=Lightware
- ◀ pw /MEDIA/PORTS/VIDEO/I1/PARAMETERS/CEC.OsdString=Lightware

Step 2 – Call the CEC.send(set_osd) method

Command and Response

- ▶ CALL /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:send(set_osd)
- ◀ mO /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:send

Example

- ▶ CALL /MEDIA/PORTS/VIDEO/I1/PARAMETERS/CEC:send(set_osd)
- ◀ mO /MEDIA/PORTS/VIDEO/I1/PARAMETERS/CEC:send

8.19.4. Sending a CEC Command in Hexadecimal Format

Command and Response

- ▶ CALL /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:sendHex(<hex_code>)
- ◀ mO /MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:sendHex

Parameters

<hex_code> Accepted command is max. 30 character long (15 byte) in hexadecimal format.

Example

- ▶ CALL /MEDIA/PORTS/VIDEO/I1/PARAMETERS/CEC:sendHex(8700E091)
- ◀ mO /MEDIA/PORTS/VIDEO/I1/PARAMETERS/CEC:sendHex

8.20. Firmware Upgrading of the I/O Boards

The firmware package files of all available MX2M series I/O boards are built-in into the firmware package of the MX2M matrix frame. The upgrading procedure can be applied inside the frame without using any external application like Lightware Device Updater V2 (LDU2).

Parameters

Identifier	Parameter description	Value	Value description
		IB1...IB6	Input board ID, the values can be IB1, IB2, IB3, IB4, IB5 or IB6.
<board>	The identifier of the board.	OB1...OB6	Output board ID, the values can be OB1, OB2, OB3, OB4, OB5 or OB6.
		LS1...LS4	Auxiliary (LS - Low Speed) board ID, the values can be LS1, LS2, LS3 or LS4.

8.20.1. Query the Firmware Version of the I/O Board

Command and Response #*firmwareversion*

- ▶ GET /SYS/<board>.PackageVersion
- ◀ pr /SYS/<board>.PackageVersion=<firmware_version>

Example

- ▶ GET /SYS/LS1.PackageVersion
- ◀ pr /SYS/LS1.PackageVersion=1.0.0b20

8.20.2. Launching the Firmware Update Procedure

Calling the method results launching the firmware update procedure on the selected I/O board.

Command and Response

- ▶ CALL /SYS/<board>:updateFirmware()
- ◀ mO /SYS/<board>:updateFirmware=

Example

- ▶ CALL /SYS/IB1:updateFirmware()
- ◀ mO /SYS/IB1:updateFirmware=

8.20.3. Cancellation the Firmware Update Procedure

Calling the method results the cancellation of the running firmware update procedure on the selected I/O board.

Command and Response

- ▶ CALL /SYS/<board>:cancelFirmwareUpdate()
- ◀ mO /SYS/<board>:cancelFirmwareUpdate=

Example

- ▶ CALL /SYS/OB1:cancelFirmwareUpdate()
- ◀ mO /SYS/OB1:cancelFirmwareUpdate=

8.20.4. Query the Update Progress Status

The query returns with the logical value means there is a board in the matrix under firmware upgrade or not.

Command and Response

- ▶ GET /SYS/UPDATE.BoardUpdateInProgress
- ◀ pr /SYS/UPDATE.BoardUpdateInProgress=<logical_value>

Parameters

Identifier	Parameter description	Value	Value description
<logical_value>	Update in progress	true	One or more I/O boards are under firmware upgrading.
		false	No I/O board is under firmware upgrade.

Example

- ▶ GET /SYS/UPDATE.UpdateInProgress
- ◀ pr /SYS/UPDATE.UpdateInProgress=true

8.20.5. Query the List of Updating Boards

The query returns with the list of the I/O boards which are currently under firmware upgrade.

Command and Response

- ▶ GET /SYS/UPDATE.BoardsInUpdateState
- ◀ pr /SYS/UPDATE.BoardsInUpdateState=<board_slot1>;<board_slot2>;...<board_slotN>

Example

- ▶ GET /SYS/UPDATE.BoardsInUpdateState
- ◀ pr /SYS/UPDATE.BoardsInUpdateState=LS2;IB3;OB5

8.20.6. Query the Overall Board Update Status

The query returns with the the overall progress of the board update.

Command and Response

- ▶ GET /SYS/UPDATE.BoardUpdateStatus
- ◀ pr /SYS/UPDATE.BoardUpdateStatus=<status>

Example

- ▶ GET /SYS/UPDATE.BoardUpdateStatus
- ◀ pr /SYS/UPDATE.BoardUpdateStatus=3/3

Explanation

Firmware upgarde procedure of three I/O boards out of the three one are successfully completed.

8.21. LW3 Protocol Commands - Quick Summary

System Commands

Query the Product Name

- ▶ GET·/.ProductName

Set the Device Label

- ▶ SET·/MANAGEMENT/LABEL/DeviceLabel=<Custom_name>

Query the Serial Number

- ▶ GET·/.SerialNumber

Query the Firmware Version

- ▶ GET·/MANAGEMENT/UID/PACKAGE.Version

Query the Date and Time of the System

- ▶ GET·/MANAGEMENT/DATETIME.CurrentTime

Setting of the Date and Time Manually

- ▶ CALL·/MANAGEMENT/DATETIME:setTime=<date_time>

Setting the Brightness of the LCD Screen

- ▶ SET·/SYS/CECU/LCD.Brightness=<parameter>

Control Lock of the LCD Menu

- ▶ SET·/SYS/CECU/LCD.ControlLock=<logical_value>

Adding License

- ▶ CALL·/MANAGEMENT/LICENSE:addLicense()

Removing License

- ▶ CALL·/MANAGEMENT/LICENSE:removeLicense()

Software Resetting the Device

- ▶ CALL·/SYS:softReset()

Rebooting the Device

- ▶ CALL·/SYS:reset()

Restore the Factory Default Settings

- ▶ CALL·/SYS:factoryDefaults()

I/O Board Management

Query the Status of a Board

- ▶ GET·/SYS/<board>.Status

Query the Number of Seated I/O Boards

- ▶ GET·/SYS/UPDATE.NumberOfBoards

Query the List of Seated I/O Boards

- ▶ GET·/SYS/UPDATE.BoardsInSeatedState

Query the List of Operational I/O Boards

- ▶ GET·/SYS/UPDATE.BoardsInOperationalState

Query the List of Failed I/O Boards

- ▶ GET·/SYS/UPDATE.BoardsInErrorState

Query the Product Name of the I/O Board

- ▶ GET·/SYS/<board>.ProductName

Query the Serial Number of the I/O Board

- ▶ GET·/SYS/<board>.SerialNumber

Query the Firmware Version of the I/O Board

- ▶ GET·/SYS/<board>.PackageVersion

Rebooting the I/O Board

- ▶ CALL·/SYS/<board>:reset()

Video Switching and Crosspoint Settings

Query the Video Crosspoint State

- ▶ GET·/MEDIA/XP/VIDEO.DestinationConnectionStatus

Switching an Input to an Output

- ▶ CALL·/MEDIA/XP/VIDEO:switch(<in>:<out>)

Disconnect the Output from any Input

- ▶ CALL·/MEDIA/XP/VIDEO:switch(0:<out>)

Switching an Input to All Outputs

- ▶ CALL·/MEDIA/XP/VIDEO:switchAll(<in>)

Multiple Switching

- ▶ CALL·/MEDIA/XP/VIDEO:switchMulti(<out1_source>;<out2_source>;...;<out8_source>)

Muting a Video Input

- ▶ CALL·/MEDIA/XP/VIDEO:muteSource(<in>)

Unmuting a Video Input

- ▶ CALL·/MEDIA/XP/VIDEO:unmuteSource(<in>)

Locking a Video Input

- ▶ CALL·/MEDIA/XP/VIDEO:lockSource(<in>)

Unlocking a Video Input

- ▶ CALL·/MEDIA/XP/VIDEO:unlockSource(<in>)

Muting a Video Output

- ▶ CALL·/MEDIA/XP/VIDEO:muteDestination(<out>)

Unmuting a Video Output

- ▶ CALL·/MEDIA/XP/VIDEO:unmuteDestination(<out>)

Locking a Video Output

- ▶ CALL·/MEDIA/XP/VIDEO:lockDestination(<out>)

Unlocking a Video Output

- ▶ CALL·/MEDIA/XP/VIDEO:unlockDestination(<out>)

Audio Switching and Crosspoint Settings**Query the Audio Crosspoint State**

- ▶ GET·/MEDIA/XP/AUDIO:DestinationConnectionStatus

Switching an Input to an Output

- ▶ CALL·/MEDIA/XP/AUDIO:switch(<in>:<out>)

Disconnect the Output from any Input

- ▶ CALL·/MEDIA/XP/AUDIO:switch(0:<out>)

Switching an Input to All Outputs

- ▶ CALL·/MEDIA/XP/AUDIO:switchAll(<in>)

Multiple Switching

- ▶ CALL·/MEDIA/XP/AUDIO:switchMulti(<out1_source>;<out2_source>;...;<out8_source>)

Channel Mapping

- ▶ SET·/MEDIA/PORTS/AUDIO/<out>/PARAMETERS.MainOutputChannels=<left_channel>;<right_channel>

Muting an Audio Input

- ▶ CALL·/MEDIA/XP/AUDIO:muteSource(<in>)

Unmuting an Audio Input

- ▶ CALL·/MEDIA/XP/AUDIO:unmuteSource(<in>)

Locking an Audio Input

- ▶ CALL·/MEDIA/XP/AUDIO:lockSource(<in>)

Unlocking an Audio Input

- ▶ CALL·/MEDIA/XP/AUDIO:unlockSource(<in>)

Muting an Audio Output

- ▶ CALL·/MEDIA/XP/AUDIO:muteDestination(<out>)

Unmuting an Audio Output

- ▶ CALL·/MEDIA/XP/AUDIO:unmuteDestination(<out>)

Locking an Audio Output

- ▶ CALL·/MEDIA/XP/AUDIO:lockDestination(<out>)

Unlocking an Audio Output

- ▶ CALL·/MEDIA/XP/AUDIO:unlockDestination(<out>)

Video Source Port Settings - HDMI / OPTJ**HDCP Setting**

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.HdcpVersion=<number>

Color Range Setting

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.InputColorRangeMode=<colorange>

Hot Plug Detect (HPD) Setting

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.EnableHPD=<hpd_setting>

Video Source Port Settings - DP**Setting the Maximum Lane Number**

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpMaxLaneCount=<lane>

Setting the Maximum Link Data Rate

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpMaxLinkRate=<data_rate>

DP Power Setting

- ▶ SET /MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpEnablePower=<logical_value>

Test Pattern Mode Setting

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpTpgMode=<tpg_mode>

Color Space Conversion Setting

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.DpConversion=<conversion_mode>

Color Range Setting

- ▶ SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.InputColorRangeMode=<colorange>

Restart Link Training

- ▶ `CALL·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS:DpLinkTrain()`

Hot Plug Detect (HPD) Setting

- ▶ `SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.EnableHPD=<hpd_setting>`

HDCP Setting

- ▶ `SET·/MEDIA/PORTS/VIDEO/<in>/PARAMETERS.HdcpVersion=<number>`

Video Destination Port Settings - HDMI / OPTJ**Color Space Conversion Setting**

- ▶ `SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.ColorSpaceSetting=<conversion_mode>`

Signal Type Setting

- ▶ `SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.ForcedSignalType=<signal_type>`

Power 5V Setting

- ▶ `SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.Enable5V=<power_mode>`

HDCP Mode Setting

- ▶ `SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.HdcpMode=<HDCP_mode>`

Audio Source Setting

- ▶ `SET·/MEDIA/PORTS/VIDEO/<out>/PARAMETERS.AudioSource=<audio_source>`

Analog Audio Port Properties**Query the Input Ports of the Board**

- ▶ `GET·/SYS/<board>.AudioInput`

Query the Output Ports of the Board

- ▶ `GET·/SYS/<board>.AudioOutput`

Volume Setting in dB

- ▶ `SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.VoluedB=<volume>`

Volume Setting in dB by Steps

- ▶ `CALL·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepVoluedB(<volume>)`

Volume Setting in Percent

- ▶ `SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.VolumePercent=<percent>`

Volume Setting in Percent by Steps

- ▶ `CALL·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepVolumePercent(<percent>)`

Balance Setting

- ▶ `SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.Balance=<balance>`

Balance Setting by Steps

- ▶ `CALL·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS:stepBalance(<balance>)`

Gain Setting

- ▶ `SET·/MEDIA/PORTS/AUDIO/<in>/PARAMETERS.Gain=<gain>`

Dante® Audio Settings**Channel Label Renaming**

- ▶ `SET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.ChannelLabel<number>=<channellabel>`

Sample Rate Query

- ▶ `GET·/MEDIA/PORTS/AUDIO/<in|out>/PARAMETERS.SampleRate`

System Monitoring Commands**Query Connected Device Presence**

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.Connected`

Query Video Signal Presence on a Port

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.SignalPresent`

Query the Signal Type

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.SignalType`

Query the Resolution of the Stream

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.Resolution`

Query the Total Size of the Stream

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.TotalSize`

Query Embedded Audio Presence

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.EmbeddedAudioPresent`

Query the Color Space of the Stream

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorSpace`

Query the Color Range of the Stream

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorRange`

Query the Color Depth of the Stream

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ColorDepth`

Query the HDCP-encryption Presence

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.HdcpActive`

Query the HDCP-encryption Level of the Stream

- ▶ `GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.ActiveHdcpVersion`

Query the Maximum Supported HDCP-encryption Level

- ▶ GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.MaxSupportedHdcpVersion

Query the HDCP Error

- ▶ GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.HdcpError

Query the TMDS Error Counters

- ▶ GET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS.TmdsErrorCounters

Audio Mismatch Status Query

- ▶ GET·/MEDIA/PORTS/AUDIO/<out>/PARAMETERS.AudioMismatch

Preset Handling**Creating a New Preset**

- ▶ CALL·/MEDIA/PRESET:create(<preset_name>,VIDEO)

Saving the Settings to an Existing Preset

- ▶ CALL·/MEDIA/PRESET/<preset_name>.save(1)

Loading a Preset

- ▶ CALL·/MEDIA/PRESET/<preset_name>.load()

Renaming a Preset

- ▶ CALL·/MEDIA/PRESET:rename(<Old_name>,<New_name>)

EDID Management**Query the Emulated EDIDs**

- ▶ GET·/EDID.EdidStatus

Query the Validity of a Dynamic EDID

- ▶ GET·/EDID/D/<dynamic>.Validity

Query the Preferred Resolution of a User EDID

- ▶ GET·/EDID/U/<user>.PreferredResolution

Emulating an EDID on an Input Port

- ▶ CALL·/EDID:switch(<dynamic|user|factory>:<emulated>)

Copy an EDID to User Memory

- ▶ CALL·/EDID:copy(<dynamic|emulated|factory|user>:<user>)

Deleting an EDID from User Memory

- ▶ CALL·/EDID:delete(<user>)

Resetting the Emulated EDIDs

- ▶ CALL·/EDID:reset()

Health Status Monitoring Commands**Query the Overall Health State of the Matrix**

- ▶ GET·/HEALTH.OverallHealthState

Query the Temperature Warnings

- ▶ GET·/HEALTH.TemperatureWarning

Query the Temperature Errors

- ▶ GET·/HEALTH.TemperatureError

Query the Voltage Warnings

- ▶ GET·/HEALTH.VoltageWarning

Query the Voltage Errors

- ▶ GET·/HEALTH.VoltageError

Query the Current Warnings

- ▶ GET·/HEALTH.CurrentWarning

Query the Current Errors

- ▶ GET·/HEALTH.CurrentError

Query the Fan Warnings

- ▶ GET·/HEALTH.FanWarning

Query the Fan Errors

- ▶ GET·/HEALTH.FanError

Query the PSU Drawer Warnings

- ▶ GET·/HEALTH.PsuWarning

Query the PSU Drawer Errors

- ▶ GET·/HEALTH.PsuError

Query the Health State of an I/O Board

- ▶ GETALL·/HEALTH/<board>

Query the Health State of a PSU Drawer

- ▶ GETALL·/HEALTH/<PSU>

Query the Health State of the HSMB

- ▶ GETALL·/HEALTH/HSMB

Query the Health State of the CECU

- ▶ GETALL·/HEALTH/CECU

Network Configuration**Query the DHCP State**

- ▶ GET·/MANAGEMENT/NETWORK.DhcpEnabled

Change the DHCP State

- ▶ SET·/MANAGEMENT/NETWORK.DhcpEnabled=<logical_value>

Query the IP Address

- ▶ GET·/MANAGEMENT/NETWORK.IpAddress

Change the IP Address (Static)

- ▶ SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Query the Subnet Mask

- ▶ GET·/MANAGEMENT/NETWORK.NetworkMask

Change the Subnet Mask (Static)

- ▶ SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Query the Gateway Address

- ▶ GET·/MANAGEMENT/NETWORK.GatewayAddress

Change the Gateway Address (Static)

- ▶ SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_address>

Apply Network Settings

- ▶ CALL·/MANAGEMENT/NETWORK:ApplySettings()

RS-232 Port Configuration**Enable/Disable the Port**

- ▶ SET·/MANAGEMENT/SERIAL.Enabled=<logical_value>

BAUD Rate Setting

- ▶ SET·/MANAGEMENT/SERIAL.Baudrate=<baudrate>

Databits Setting

- ▶ SET·/MANAGEMENT/SERIAL.DataBits=<databits>

Parity Setting

- ▶ SET·/MANAGEMENT/SERIAL.Parity=<parity>

Stopbits Setting

- ▶ SET·/MANAGEMENT/SERIAL.StopBits=<stopbits>

Protocol Setting

- ▶ SET·/MANAGEMENT/SERIAL.Protocol=<protocol>

Recalling Factory Default Settings on the Serial Port

- ▶ CALL·/MANAGEMENT/SERIAL:factoryDefault()

Sending CEC Commands**Sending a CEC Command in Text Format**

- ▶ CALL·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:send(<command>)

Press&Release Commands

- ▶ CALL·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:sendClick(<command>)

Sending an OSD String

- ▶ SET·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC.OsdString=<text>
- ▶ CALL·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:send(set_osd)

Sending a CEC Command in Hexadecimal Format

- ▶ CALL·/MEDIA/PORTS/VIDEO/<in|out>/PARAMETERS/CEC:sendHex(<hex_code>)

Firmware Upgrading of the I/O Boards**Query the Firmware Version of the I/O Board**

- ▶ GET·/SYS/<board>.PackageVersion

Launching the Firmware Update Procedure

- ▶ CALL·/SYS/<board>:updateFirmware()

Cancellation the Firmware Update Procedure

- ▶ CALL·/SYS/<board>:cancelFirmwareUpdate()

Query the Update Progress Status

- ▶ GET·/SYS/UPDATE.BoardUpdateInProgress

Query the List of Updating Boards

- ▶ GET·/SYS/UPDATE.BoardsInUpdateState

Query the Overall Board Update Status

- ▶ GET·/SYS/UPDATE.BoardUpdateStatus

9

Firmware Upgrade

The MX2M series matrix switchers can be upgraded by using Lightware Device Updater V2 (LDU2) software via Ethernet. The firmware pack with the necessary components (*.lfp2 file) for your specific product, and the LDU2 application can be downloaded from the Support page of our website www.lightware.com.

- ▶ [ABOUT THE FIRMWARE PACKAGE \(LFP2 FILE\)](#)
- ▶ [SHORT INSTRUCTIONS](#)
- ▶ [INSTALLATION OF LDU2](#)
- ▶ [DETAILED INSTRUCTIONS](#)
- ▶ [KEEPING THE CONFIGURATION SETTINGS](#)

ATTENTION! While the firmware is being upgraded, the normal operation mode is suspended as the endpoint is switched to bootload mode. Signal processing is not performed. Do not interrupt the firmware upgrade. If any problem occurs, reboot the receiver and restart the process.

ATTENTION! The firmware upgrade process has an effect on the configuration and the settings of the device. For more details, please see the [Keeping the Configuration Settings](#) section before the upgrade.

9.1. About the Firmware Package (LFP2 File)

The firmware files are packed in an LFP2 package. You need only this file to do the upgrade on your device.

- The package contains all the necessary components, binary, and other files;
- The package also contains each firmware with version number and a list showing the compatible devices.

9.2. Short Instructions

Step 1. Get the firmware pack and the Lightware Device Updater v2 (LDU2) application.

Step 2. Install the LDU2 application.

Step 3. Establish connection between the computer and the device(s) via Ethernet.

Step 4. Start LDU2 and follow the instructions shown on the screen.

9.3. Installation of LDU2

Minimum System Requirement

RAM: 2 GB

Installation Modes

INFO: After the installation the Windows and the macOS application has the same look and functionality.

LDU2 has two installation modes: **Normal** and **Snapshot**.

Normal install	Snapshot install
Available for Windows and macOS	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different version can be installed for each user

Comparison of install types

ATTENTION! Using the Normal install as the default value is highly recommended.

ATTENTION! Please check the **firewall settings** on the macOS device. LDU2 needs to be added to the exceptions of the blocked software for the proper operation.

Installation for Windows OS

Run the installer. If the User Account Control drops a pop-up message click **Yes**. During the installation you will be prompted to select the type of the installation.

Installation for macOS

Mount the DMG file with double clicking on it and drag the LDU2 icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDU2 into another location just drag the icon over the desired folder.

9.4. Detailed Instructions

9.4.1. Establish Connection

Make sure that the computer and the device are connected over **Ethernet**.

9.4.2. Start the LDU2 Application and Follow the Steps

The Steps of the Upgrade in Quick Summary:

Step 1. Select the firmware package file.

Step 2. Select the matrix switcher for upgrading.

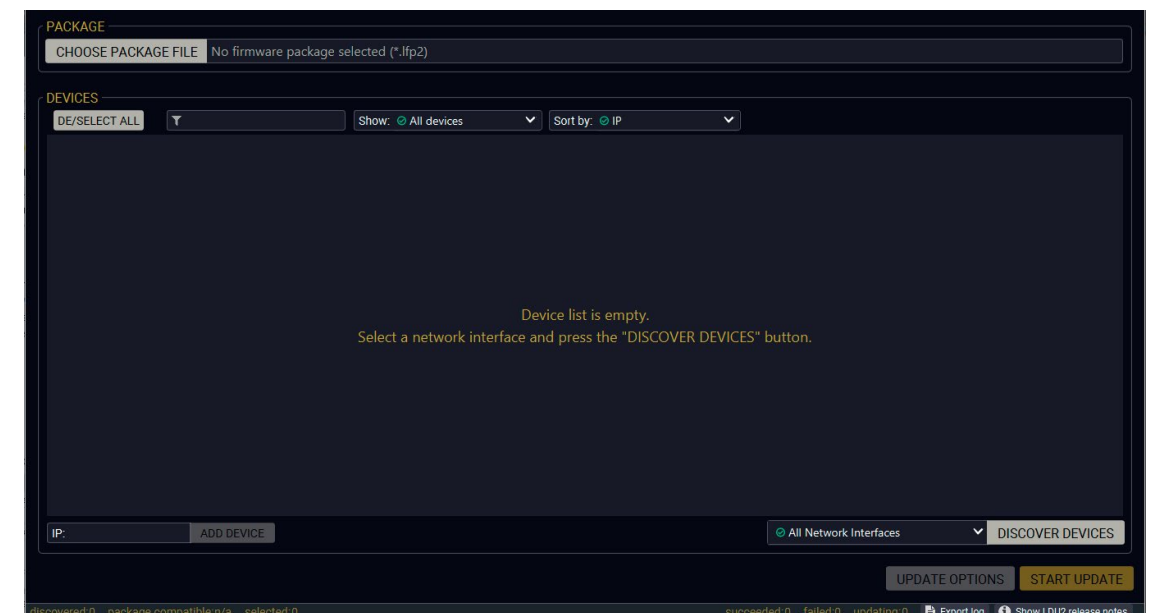
Step 3. Check the update options.

Step 4. Start the update and wait until it is finished.

Step 5. Wait until the unit reboots with the new firmware.

Discovering the Devices

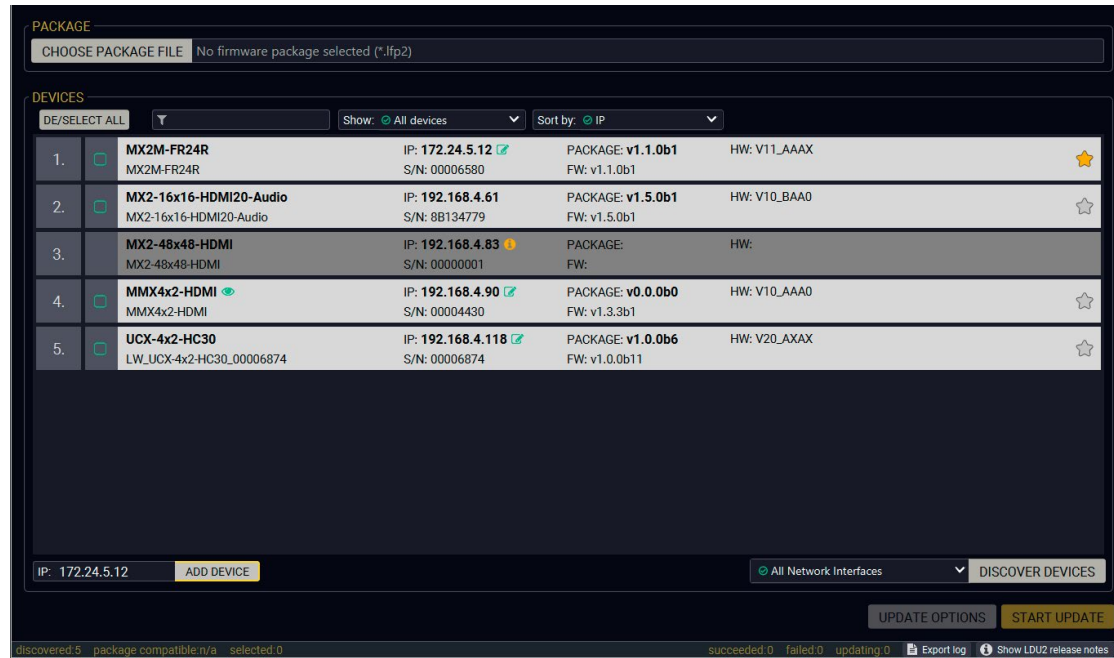
After launching LDU2 the device discovery an empty window appears. Click on the **Search for devices** button to start finding the Lightware devices on the network.



Device discovery is in progress in LDU2

Device List

When the discovery has completed, the devices available on the network are listed in the application.



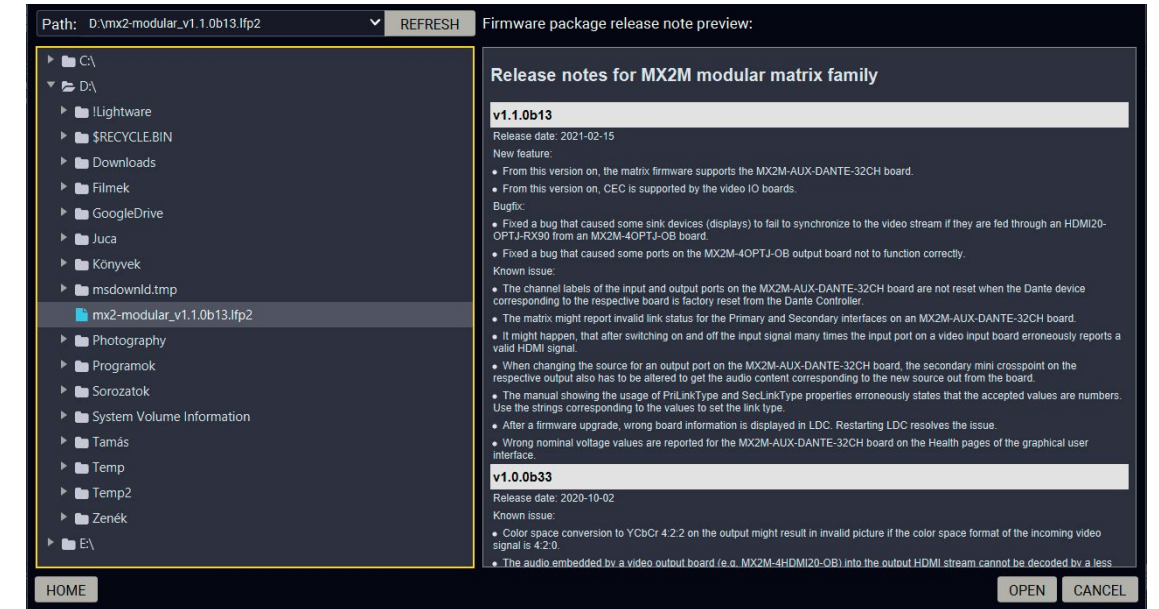
Legend of the Icons

Icon	Name	Description
	Identify the device	Clicking on the icon causes the four front panel LEDs blink in green for 10 seconds. The feature helps to identify the device itself in the rack shelf.
	IP address editor	To modify IP address settings quickly it is not necessary to enter the device's settings/network menu, you can set them by clicking the pencil icon next to the IP address.
	Favorite device	Frequently used devices can be highlighted with the star icon as favorite unit. In this case the star becomes orange filled.
	Further information available	Device is unreachable. Change the IP address using the front panel LCD menu or the IP address editor of the LDU2.
	Cleartext login enabled	The password-protection is enabled. You have to enter the password to perform the firmware upgrade in the Parameters window or in the appearing window in the beginning of the upgrade.
	Service mode	The device is in bootload (service) mode. The firmware upgrade procedure can be continued in this mode.

Upgrade Steps

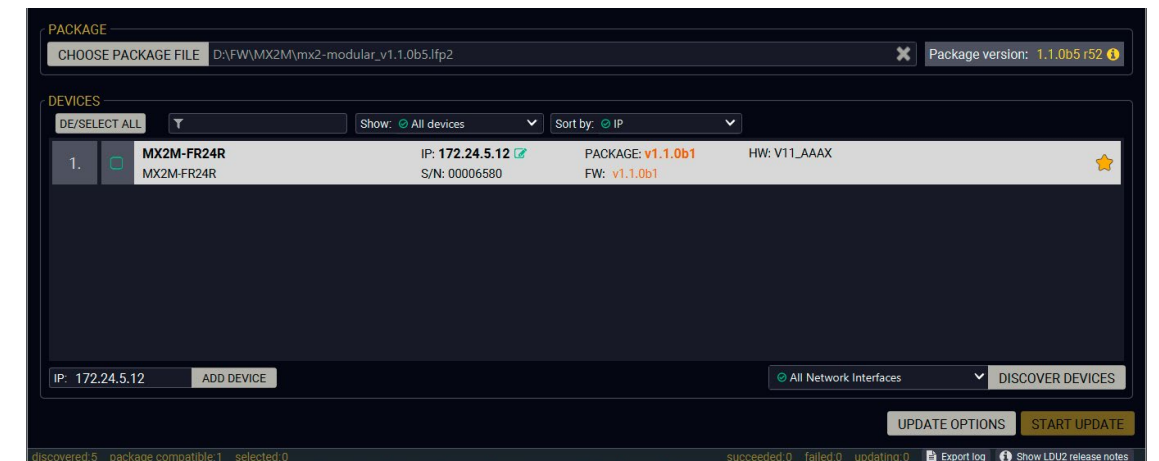
Step 1. Select the firmware package.

Click on the **Choose Package File** button and navigate to the location where the LFP2 file of the UBEX endpoint is saved. When you click on the name of package, the preview of the release notes are displayed on the right side.



Firmware file browser and the release notes window

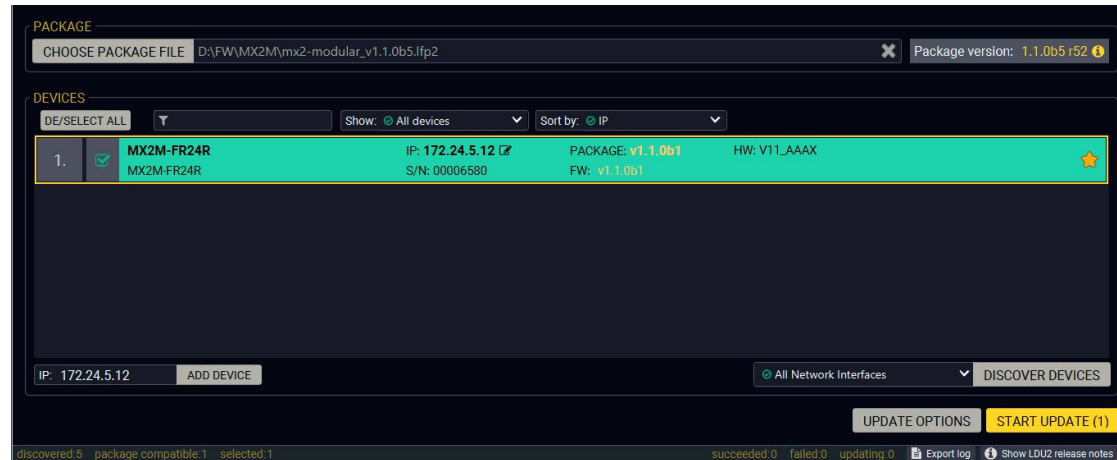
After the package file is loaded, the list is filtered to show compatible devices only. The current firmware version of the device is highlighted in orange if it is different from the version of the package loaded.



Filtered device list based on the selected firmware package

Step 2. Select the matrix switcher for upgrading.

Pick the device for upgrading. The selected line will be highlighted in green.



The remote unit is selected for upgrading

Step 3. Check the update options.

ATTENTION! The default settings in the Update options window should be fine for most cases. Please do not modify them if it is not necessary.

Click on the **Update options** button to configure the firmware upgrade.

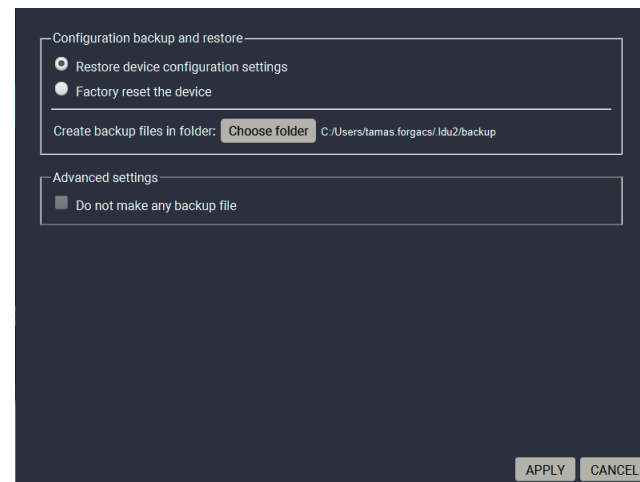
Configuration Backup and Restore

- **Restore device configuration settings:** the configuration settings of the endpoint devices will be restored after the firmware upgrade.
- **Factory reset the device:** if it is checked, all user settings and parameters will be cleared and the factory default settings will be applied to the device when the upgrade is done. See the whole list of factory default settings of the endpoint device in the [Switch Setup for Dante® Audio Signal Transmission](#) section.
- **Backup folder:** Set the path of the device configuration backup file which is created automatically. The default path is **USER_HOME/.ldu2/backup**.

Advanced Settings

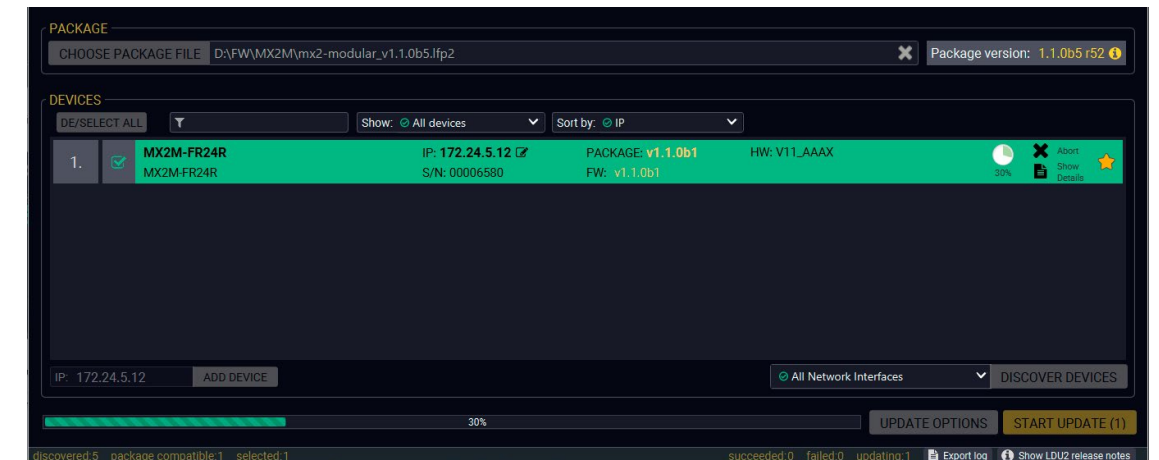
- **Do not make any backup file:** if it is checked, the configuration of the matrix switcher will not be restored after the firmware upgrade.

Once the parameters are set, click on the **Apply** button to save the settings.

**Step 4. Start the update and wait until it is finished.**

Click on the **Start Update** button to start the procedure.

The status is shown in percent in the right side of the device line and the status of the all procedures in the lower light green progress bar.



Firmware upgrade is in progress

INFO: The device might reboot several times during the firmware upgrade procedure.

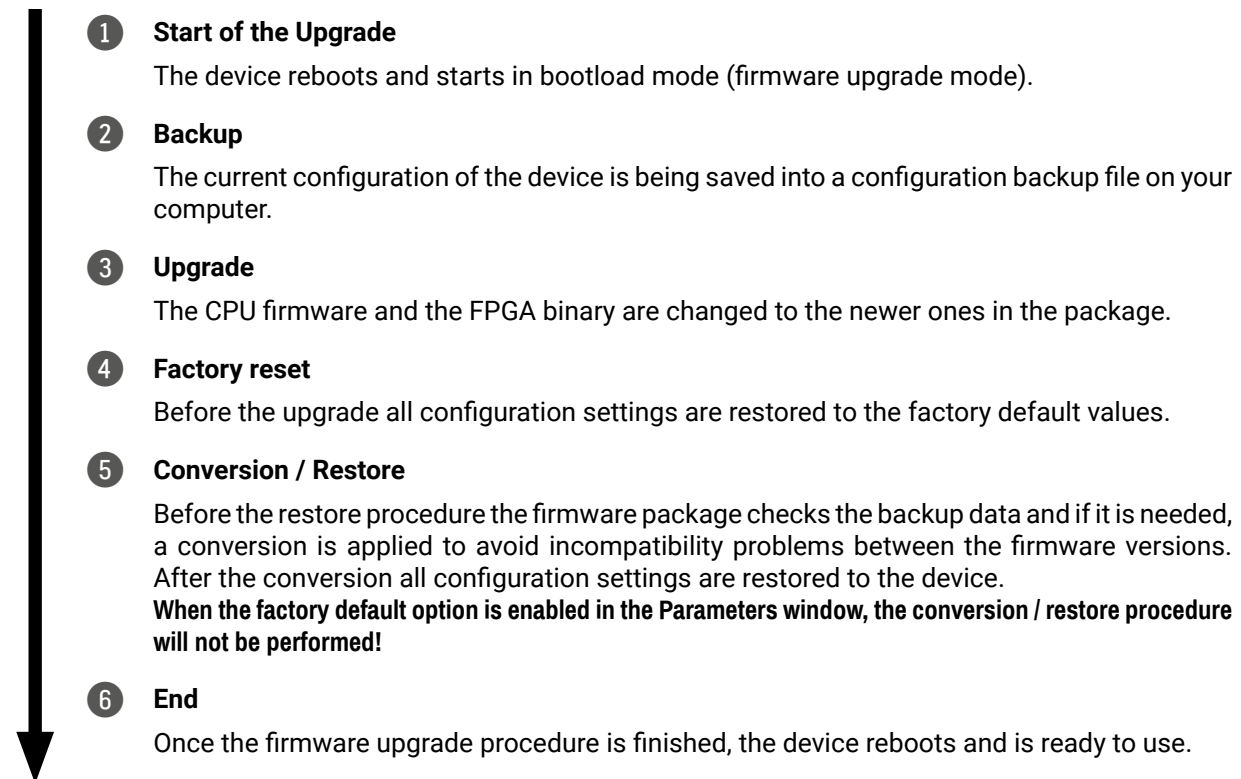
Step 5. Wait until the unit reboots with the new firmware.

Once the firmware upgrade procedure is completed, the unit reboots with the new firmware.

9.5. Keeping the Configuration Settings

By default, device configuration settings are restored when firmware upgrade is finished. If factory reset has been chosen in the parameters window, all device settings will be erased. In the case of factory reset you can save the settings of the device in the Lightware Device Controller software and restore it later. See the details in the [System](#) section.

The following flow chart demonstrates how this function works in the background.







The details about the procedure: when firmware upgrade starts, the first step is making a backup of the settings of the device. The firmware package checks the backup data and if it is needed, a conversion is applied to avoid incompatibility problems between the firmware versions. If you do not want to keep configuration settings, you can set the **Factory default** option enabled.

10

Troubleshooting

Usually, if the system seems not to transmit the signal as expected, the best strategy for troubleshooting is to check signal integrity through the whole signal chain starting from source side and moving forward to destination end.


















-  Link to connections/cabling section.
-  Link to front panel operation section.
-  Link to LDC software section.
-  Link to LW3 protocol commands section.



















The following sections are available in the chapter:









- ▶ [USE CASES](#)
- ▶ [HOW TO SPEED UP THE TROUBLESHOOTING PROCESS](#)

10.1. Use Cases

At first, check front panel LEDs and take the necessary steps according to their states. For more information about status LEDs of the matrix frame and the I/O boards refer to the [Product Overview](#) chapter.

Symptom	Root cause	Action	Refer to
Video signal			
No picture on the video output	Device or devices are not powered properly	Check the matrix and the other devices if they are properly powered; try to unplug and reconnect them.	 4.4.1
	Cable connection problem	Cables must fit very well, check all the AV connectors.	 4.4
	Optical cable became contaminated	Use special fiber optical cable cleaning equipment to clean it carefully.	
	No incoming signal	Check the cable connections on the input ports.	 4.4
	Not the proper video stream is the active one	Check which video stream switched to the current output.	 3.1.2  7.4.1  8.6.1
	Input port is muted	Check the mute state of input port and unmute it.	 7.5  8.6.7
	Output port is muted	Check the mute state of output port and unmute it.	 7.5  8.6.11
	Display is not able to receive the video format	Check the emulated EDID; select another (e.g. emulate the EDID of the display on the input port).	 3.2.5  7.8  8.15
	HDCP is disabled	Enable HDCP on the input and output port.	 7.5  8.8.1  8.9.9  8.10.4
Not the desired picture displayed on the video output	Video output is set to test pattern (no sync screen) as there is no picture on video source	Check video settings of the source.	

Symptom	Root cause	Action	Refer to
Video signal			
Colors of the video is incorrect	Incorrect color space setting is active	Check the color space settings of the output port	 7.5.2  8.9.5
Audio signal			
No audio is present on output	Source audio volume is low or muted	Check the audio settings of the source.	
	The incoming audio signal is unsupported	Query the status of the audio output port and select a supported signal source	 7.6.2  7.6.4
	The analog audio output port is muted	Check the analog audio output port properties	 7.6.4  8.7.12
	Volume of the analog audio port is set low	Check the analog audio input/output port properties	 7.6.3  7.6.4  8.11.3
	Audio output is undefined	Use the Mapping channels for audio layer to the output tool defining the two audio channel which are wanted to be transmitted.	 7.6.2  7.6.4
HDMI output signal contains no audio	DVI EDID is emulated	Check the EDID and select and HDMI EDID to emulate (the setting is available in the transmitter side).	 3.2.5  7.8  8.15
Not the desired audio can be heard on the output	Audio stream is switched to another output	Check which audio stream switched to the current output.	 7.4.2  8.7.1
	Audio source setting is incorrect	Check the audio source setting on the digital audio input	 7.6.2  8.10.5

Symptom	Root cause	Action	Refer to
Network			
No LAN connection can be established	Incorrect IP address is set (fix IP)	Use dynamic IP address by enabling DHCP option.	 3.2.2  7.9.2  8.17
		Restore the factory default settings (with DHCP).	 3.2.2  7.9.4  8.4.13
	IP address conflict	Check the IP address of the other devices, too.	
Miscellaneous			
Front panel button is out of operation	The button or front panel LCD menu is locked	Disable control lock.	 3.1.6  8.4.8

10.2. How to Speed Up the Troubleshooting Process

Lightware's technical support team is always working hard to provide the fastest support possible. Our team's response time is one of the best in the industry and in the toughest of cases we can directly consult with the hardware or software engineer who designed the product to get the information from the most reliable source.

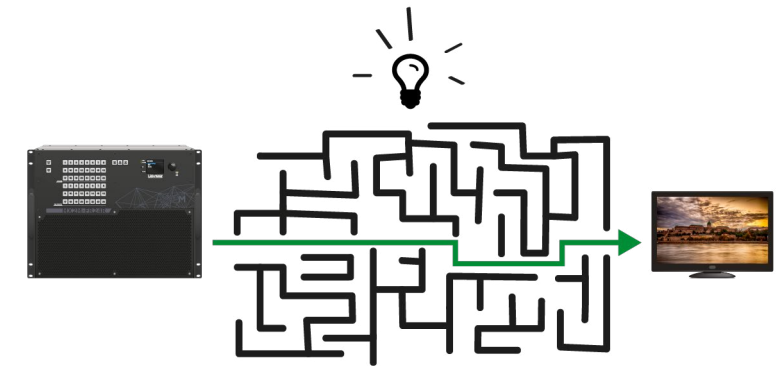
However, the troubleshooting process can be even faster... with your help.

There are certain pieces of information that push us in the right direction to finding the root cause of the problem. If we receive most of this information in the first e-mail or it is gathered at the time when you call us, then there is a pretty high chance that we will be able to respond with the final solution right away.

This information is the following:

- Schematic (a pdf version is preferred, but a hand drawing is sufficient).
- Serial number(s) of the device(s) (it is either printed somewhere on the box or you can query it in the Device Controller software or on the built-in website).
- Firmware versions of the devices (please note that there may be multiple CPUs or controllers in the device and we need to know all of their firmware versions, a screenshot is the best option).
- Cable lengths and types.
- Patch panels, gender changers or anything else in the signal path that can affect the transmission.
- Signal type (resolution, refresh rate, color space, deep color).
- Emulated EDID(s) (please save them as file and send them to us).
- Actions to take in order to re-create the problem (if we cannot reproduce the problem, it is hard for us to find the cause).
- Photo or video about the problem (for example: "image noise" can mean many different things, it's better if we see it too).
- Error logs from the Device Controller software.
- In the case of Event Manager issue the event file and/or backup file from the Device Controller software.

The more of the above information you can give us the better. Please send these information to the Lightware Support Team (support@lightware.com) to speed up the troubleshooting process.



11

Technologies

The following sections contain descriptions and useful technical information how the devices work in the background. The content is based on experiences and cases we met in the practice. These sections help to understand features and technical standards like the followings:

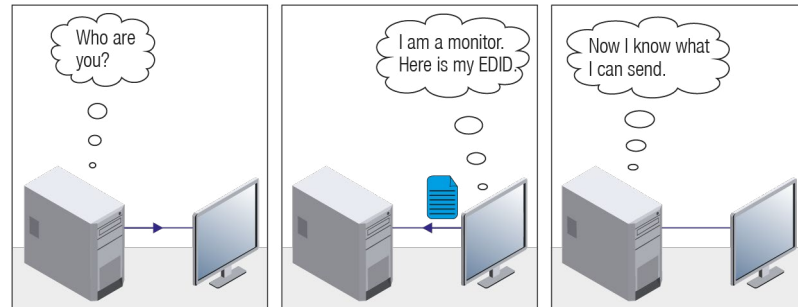
- ▶ [EDID MANAGEMENT](#)
- ▶ [HDCP MANAGEMENT](#)
- ▶ [PIXEL ACCURATE RECLOCKING](#)

11.1. EDID Management

11.1.1. Understanding the EDID

The Extended Display Identification Data (EDID) is the passport of display devices (monitors, TV sets, projectors). It contains information about the capabilities of the display, such as supported resolutions, refresh rates (these are called Detailed Timings), the type and manufacturer of the display device, etc.

After connecting a source to a display (DVI, HDMI, DP), the source reads out the EDID to determine the resolution and refresh rate of the image to be transmitted.



EDID Communication

Most DVI computer displays have 128-byte long EDID structure. However, Digital Televisions and HDMI capable displays may have another 128 bytes, which is called E-EDID and defined by CEA (Consumer Electronics Association). This extension contains information about additional Detailed Timings, audio capabilities, speaker allocation and HDMI capabilities. It is important to know that all HDMI capable devices must have CEA extension, but not all devices with CEA extension are HDMI capable.

Common Problems Related to EDID

Problem: “My system consists of the following: a computer, a Lightware device, a WUXGA (1920x1200) LCD monitor, and an SXGA (1280x1024) projector. I would like to see the same image on the monitor and the projector. What EDID should I choose on the Lightware device?”

Solution: If you want to see the image on both displays, you need to select the resolution of the smaller display (in this case SXGA), otherwise the smaller display may not show the higher resolution image.

Problem: “I have changed to a different EDID on an input port of the Lightware device to have a different resolution but nothing happens.”

Solution: Some graphics cards and video sources read out the EDID only after power-up and later they do not sense that EDID has been changed. You need to restart your source to make it read out the EDID again.

11.1.2. Advanced EDID Management

Each DVI sink (e.g. monitors, projectors, plasma displays, etc...) must support the EDID data structure. Source BIOS and operating systems are likely to query the sink using DDC2B protocol to determine what pixel formats and interface are supported. DVI standard uses EDID data structure to identify the monitor type and capabilities. Most DVI sources (VGA cards, set top boxes, etc.) will output DVI signal after accepting the connected sink's EDID information. In the case of EDID readout failure or missing EDID, the source will not output DVI video signal.

Lightware devices provide the Advanced EDID Management function that helps system integration. The built-in EDID Router can store and emulate factory pre-programmed- and User programmable EDIDs. The EDID of the attached monitors or projectors for each output are stored in a non-volatile memory. This way the EDID of a monitor is available when the monitor is unplugged or switched off.

Any EDID can be emulated on any input. An emulated EDID can be copied from the EDID router's memory (static EDID emulation), or from the last attached monitor's memory (dynamic EDID emulation). For example, the Lightware device can be set up to emulate a sink device, which is connected to one of the outputs. In this case, the EDID automatically changes, if the monitor is replaced with another display device (as long as it has a valid EDID).

EDID is independently programmable for all inputs without affecting each other. All inputs have their own EDID circuit.

INFO: The user is not required to disconnect the video cable to change an EDID as opposed to other manufacturer's products. EDID can be changed even if a source is connected to the input and powered ON.

INFO: When EDID has been changed, the router toggles the HOTPLUG signal for 2 seconds. Some sources do not sense this signal. In such cases, the source device must be restarted or powered OFF and ON again.

11.2. HDCP Management

Lightware Visual Engineering is a legal HDCP adopter. Several functions have been developed which helps to solve HDCP related problems. Complex AV systems often have both HDCP and non-HDCP components. The matrix allows transmitting HDCP encrypted and unencrypted signals. The devices will be still HDCP compliant as they will never output an encrypted signal to a non-HDCP compliant display device. If an encrypted signal is switched to a non-compliant output, a red screen alert or muted screen will appear.

11.2.1. Protected and Unprotected Content

Many video sources send HDCP protected signal if they detect that the sink is HDCP capable – even if the content is not copyrighted. This can cause trouble if an HDCP capable device is connected between the source and the display. In this case, the content cannot be viewed on non-HDCP capable displays and interfaces like event controllers. Rental and staging technicians often complain about certain laptops, which are always sending HDCP encrypted signals if the receiver device (display, matrix router, etc.) reports HDCP compliancy. However, HDCP encryption is not required all the time e.g. computer desktop image, certain laptops still do that.

To avoid unnecessary HDCP encryption, Lightware introduced the HDCP enabling/disabling function: the HDCP capability can be disabled in the Lightware device. If HDCP is disabled, the connected source will detect that the sink is not HDCP capable, and turn off authentication.

11.2.2. Disable Unnecessary Encryption

HDCP Compliant Sink

All the devices are HDCP-compliant, no manual setting is required, both protected and unprotected contents are transmitted and displayed on the sink.



Not HDCP-compliant Sink 1.

Not-HDCP compliant sink is connected to the matrix. Some sources (e.g. computers) always send HDCP encrypted signals if the receiver device reports HDCP compliancy, however, HDCP encryption is not required all the time (e.g. computer desktop image). If HDCP is enabled in the matrix, the image will not be displayed on the sink.



Setting the HDCP parameter to Auto on the output port and disable HDCP on the input port, the transmitted signal will not be encrypted if the content is not protected. Thus, non-HDCP compliant sinks will display non-encrypted signal.

Not HDCP-compliant Sink 2.

The layout is the same as in the previous case: non-HDCP compliant display device is connected to the matrix but the source would send protected content with encryption. If HDCP is enabled on the input port of the matrix, the source will send encrypted signal.



The sink is not HDCP compliant, thus, it will not display the video signal (but blank/red/muted/etc. screen). If HDCP is disabled on the input port of the matrix, the source will not send the signal. The solution is to replace the display device to an HDCP-capable one.

11.2.3. HDCP v2.2

HDCP v2.2 is the latest evolution of copy protection. It is designed to create a secure connection between a source and a display. The 2.x version of HDCP is not a continuation of HDCPv1, and is rather a completely different link protection. One of the main differences is the number of the allowed devices within a closed A/V system: HDCP v2.2 allows 32 devices (HDCP v1.4 allows 128 devices). Further limit is that up to four level is allowed which means the protected signal can be transmitted over at most four repeater/matrix/switcher device. HDCP content protection is activated only if an active video stream is transmitted from the source to the display. The encryption is not activated without a video signal.

HDCP v2.2 standard allows to apply a previous version of HDCP (e.g. HDCP v1.4) between the source and the display if the source device allows it. According to the standard if the image content is protected with HDCP, the highest supported content protection level has to be applied. However, if the highest level of protection is not justified by the source content the level may be decreased to avoid compatibility problems; this case is determined by the source.

HDCP v2.2 Source and HDCP v1.4 Sink

In this case the signal of an HDCP v2.2 compliant source is switched to an HDCP v1.4 compliant sink device. The signal is encrypted with HDCP v2.2 on the input and encrypted with HDCP v1.4 on the output of the Lightware device. A lower level of encryption may be applied only if the source device/content allows it - according to the HDCP standard. In this case the HDCP setting on the input port has to be set to HDCP 1.4 and Depends on input on the output port.



HDCP v1.4 Source and HDCP v2.2 Sink

The below example is the reversal of the previous case. An HDCP v1.4 compliant source sends a signal with HDCP v1.4 encryption. The signal is switched to an HDCP v2.2 compliant sink device. In this case the outgoing signal has to be encrypted with the highest supported encryption level towards the sink, as the Lightware device and the sink are both HDCP v2.2 compliant. The HDCP v2.2 standard does not allow keeping the original HDCP v1.4 encryption level on the output.



What Kind of Signal Will be on the Output of the Lightware Device?

See below table that summarizes the possible cases:

Incoming Signal	HDCP v1.4 Compatible Sink on the Output	HDCP v2.2. Compatible Sink on the Output
HDCP v1.4	HDCP v1.4	HDCP v2.2
HDCP v2.2 (convertable)*	HDCP v1.4	HDCP v2.2
HDCP v2.2 (not convertable)*	Red screen	HDCP v2.2

* Stream type 0: the video stream allows to convert the signal to apply a lower level of encryption.

** Stream type 1: the video stream does not allow to convert the signal.

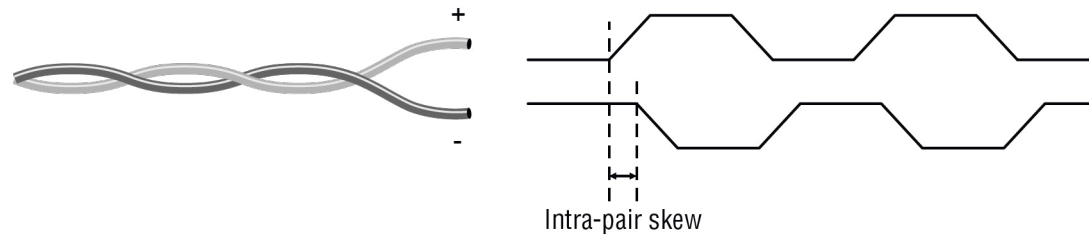
11.3. Pixel Accurate Reclocking

Signal reclocking is an essential important procedure in digital signal transmission. After passing the reclocking circuit, the signal becomes stable, jitter-free, and can be transmitted over more equipment like processors, or event controllers. Without reclocking, sparkles, noise, and jaggies appear on the image.

Lightware's sophisticated Pixel Accurate Reclocking technology fixes more problems than general TMDS reclocking. It removes not only intra-pair skew but inter-pair skew as well. The Pixel Accurate Reclocking circuit eliminates the following errors:

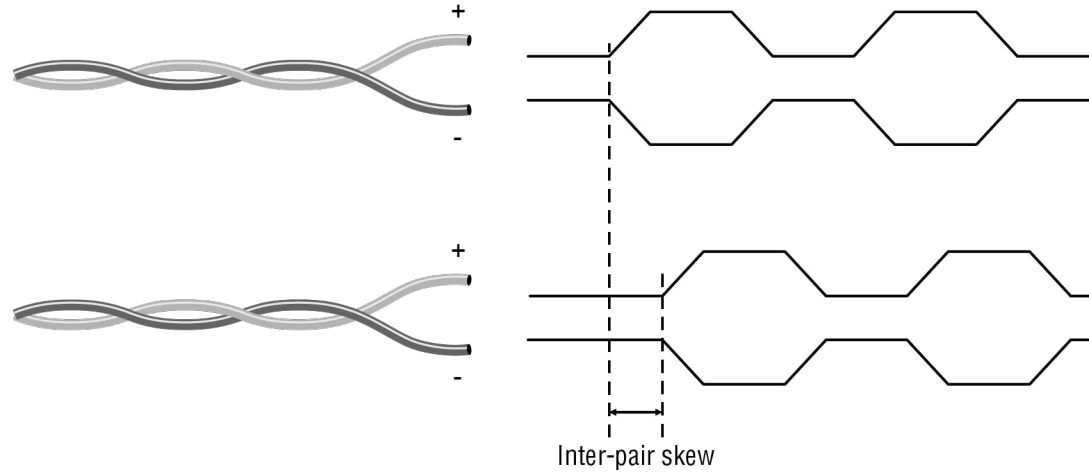
Intra-pair skew

Skew between the + and - wires within a differential wire pair (e.g. Data2- and Data2+). It's caused by different wire lengths or slightly different wire construction (impedance mismatch) in DVI cable. It results in jitter.



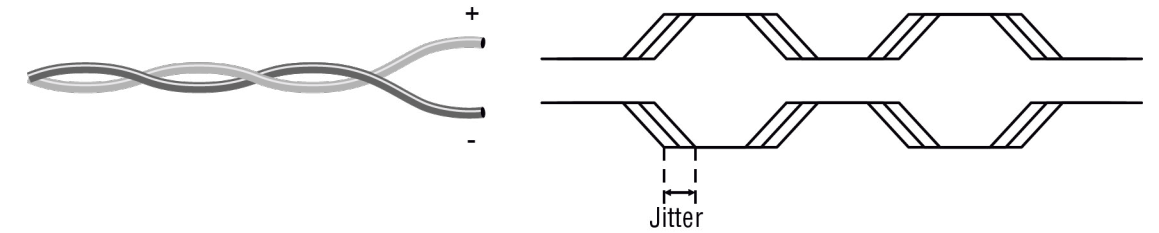
Inter-pair skew

Skew between two differential wire pairs in a cable. It is caused by different wire pair lengths or different number of twists in the DVI cable. Too much inter-pair skew results color shift in the picture or sync loss.



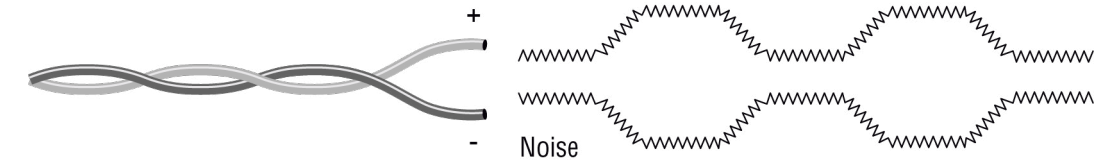
Jitter

Signal instability in the time domain. The time difference between two signal transitions should be a fixed value, but noise and other effects cause variations.



Noise

Electromagnetic interference between other electronic devices such as mobile phones, motors, etc. and the DVI cable are coupled onto the signal. Too much noise results in increased jitter.



12

Appendix

Tables, drawings, guides, and technical details as follows:

- ▶ [SPECIFICATION](#)
- ▶ [SWITCH SETUP FOR DANTE® AUDIO SIGNAL TRANSMISSION](#)
- ▶ [FACTORY DEFAULT SETTINGS](#)
- ▶ [INPUT/OUTPUT PORT NUMBERING](#)
- ▶ [MAXIMUM CABLE DISTANCES](#)
- ▶ [FACTORY EDID LIST](#)
- ▶ [CABLE WIRING GUIDE](#)
- ▶ [MECHANICAL DRAWINGS](#)
- ▶ [RELEASE NOTES OF THE FIRMWARE PACKAGES](#)
- ▶ [APPLIED PORTS \(NETWORK SETTINGS\)](#)
- ▶ [HASHTAG KEYWORD LIST](#)
- ▶ [FURTHER INFORMATION](#)

12.1. Specification

12.1.1. MX2M-FR24R

General

Compliance	CE
Electrical safety compliance	EN 62368-1:2014 Class II
EMC compliance (emission)	EN 55032:2015
EMC compliance (immunity)	EN 55035:2017
RoHS compliance	EN 50581:2012
Warranty	3 years
Cooling	5x built-in cooling fans
Operating temperature	0 to +50°C (+32 to +122°F)
Storage temperature	-30° to +80°C (-22° to +176°F)
Operating humidity	10% to 90%, non-condensing

Power

Number of power drawer slots	2
Applicable power drawers	MX2M-PSU-500-F
.....	MX2M-PSU-1250-FP

Enclosure

Rack mountable	Yes
Material	1.5 mm steel
Rack size	8U high, 1 rack wide
Dimensions in mm	441W x 400D x 354.8H
Dimensions in inch	17.4W x 15.7D x 14H
Dimensions with rack ears and PSU drawers in mm	483W x 473D x 354.8H
Dimensions with rack ears and PSU drawers in inch	19W x 18.6D x 14H
Weight (frame only)	15,9 kg (35.05 lbs)
Weight (installed with two power supply units)	24,9 kg (54.89 lbs)

Control Ports

Ethernet Ports

Number of ports	3
-----------------------	---

Connector type	Neutrik etherCON RJ45 female connector
Ethernet data rate	10/100/1000Base-T, full duplex with autodetect
Power over Ethernet (PoE)	Not supported

RS-232 Serial Port

Number of ports	1
Connector type	9-pole D-SUB female
Baud rates	Between 4800 and 115200 Baud
Data bits	8 or 9
Parity	None / Odd / Even
Stop bits	1 / 1.5 / 2

USB Port

Number of ports	1
Connector type	USB mini-B type
USB compliance	USB 2.0

12.1.2. MX2M-PSU-500-F

General

Compliance	CE
Electrical safety compliance	EN 62368-1:2014 Class II
EMC compliance (emission)	EN 55032:2015
EMC compliance (immunity)	EN 55035:2017
RoHS compliance	EN 50581:2012
Warranty	3 years
Cooling	by cooling fan fitted in the frame
Operating temperature	0 to +50°C (+32 to +122°F)
Storage temperature	-40° to +85°C (-40° to +185°F)
Operating humidity	10% to 90%, non-condensing

Power Adaptor

Supported power source	100-240 V AC; 50/60 Hz
Input voltage range	90-264 VAC
Input frequency range	47-63 Hz
Input AC current (typ)	4.85 A

Rated output current.....	41.7 A @ 12 VDC
AC power connector	IEC C14 receptacle
Nominal power.....	500 W

Enclosure

Hot-swappable.....	Yes
Dimensions in mm.....	206W x 376D x 48H
Dimensions in inch	8.11W x 14.8D x 1.89H
Weight.....	3110 g (6.86 lbs)

12.1.3. MX2M-PSU-1250-FP**General**

Compliance	CE
Electrical safety compliance.....	EN 62368-1:2014 Class II
EMC compliance (emission).....	EN 55032:2015
EMC compliance (immunity).....	EN 55035:2017
RoHS compliance	EN 50581:2012
Warranty	3 years
Cooling.....	by cooling fan fitted in the frame
Operating temperature	0 to +50°C (+32 to +122°F)
Storage temperature.....	-40° to +85°C (-40° to +185°F)
Operating humidity	10% to 90%, non-condensing

Power Adaptor

Supported power source	100-240 V AC; 50/60 Hz
Input voltage range	90-264 VAC
Input frequency range.....	47-63 Hz
Input AC current (typ)	12.35 A
Rated output current.....	41.7 A @ 12 VDC, 15.7A @ 48 VDC
AC power connector	IEC C14 receptacle
Nominal power.....	1250 W

Enclosure

Hot-swappable.....	Yes
--------------------	-----

Dimensions in mm.....	206W x 376D x 48H
Dimensions in inch	8.11W x 14.8D x 1.89H
Weight.....	4480 g (9.87 lbs)

12.1.4. MX2M-4HDMI20-IB**General**

Compliance	CE
Electrical safety compliance.....	EN 62368-1:2014 Class II
EMC compliance (emission).....	EN 55032:2015
EMC compliance (immunity).....	EN 55035:2017
RoHS compliance	EN 50581:2012
Warranty	3 years
Cooling.....	passive
Operating temperature	0 to +50°C (+32 to +122°F)
Storage temperature.....	-40° to +85°C (-40° to +185°F)
Operating humidity	10% to 90%, non-condensing

Enclosure

Material.....	1.5 mm steel
Dimensions in mm.....	194,5W x 208,5D x 35,5H
Dimensions in inch	17.4W x 15.7D x 1.4H
Weight.....	276 g (0.6 lbs)

Video Inputs

Number of ports.....	4
Connector type.....	19-pole HDMI Type A receptacle
A/V standard.....	DVI 1.0, HDMI 2.0
HDCP compliance.....	HDCP 1.4 and HDCP 2.2
Color space	RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Video delay.....	0 frame
Supported resolutions at 8 bits/color *.....	up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
.....	up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
.....	1920x1080@60Hz (4:4:4) up to 12 bits/color

Reclocking	Pixel Accurate Reclocking
3D support.....	Yes
Audio formats	8 channel PCM
.....	Dolby TrueHD, DTS-HD Master Audio 7.1
Input cable equalization	Yes, +12dB fixed

* All standard VESA, CEA and other custom resolutions up to 120MHz (HDMI 2.0) are supported.

12.1.5. MX2M-DH-4DP12-IB

General

Compliance	CE
Electrical safety compliance	EN 62368-1:2014 Class II
EMC compliance (emission)	EN 55032:2015
EMC compliance (immunity).....	EN 55035:2017
RoHS compliance	EN 50581:2012
Warranty	3 years
Cooling.....	passive
Operating temperature	0 to +50°C (+32 to +122°F)
Storage temperature.....	-40° to +85°C (-40° to +185°F)
Operating humidity	10% to 90%, non-condensing

Enclosure

Material.....	1.5 mm steel
Dimensions in mm	194,5W x 208,5D x 35,5H
Dimensions in inch	17.4W x 15.7D x 14H
Weight.....	288 g (0.63 lbs)

Video Inputs

Number of ports.....	4
Connector type.....	20-pole DisplayPort receptacle
A/V standard	DP 1.2a
HDCP compliance.....	HDCP 1.4 and HDCP 2.2
Color space	RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Video delay.....	0 frame

Supported resolutions at 8 bits/color *	up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
.....	up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
.....	1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking	Pixel Accurate Reclocking
3D support.....	Yes
Audio formats	8 channel PCM
.....	
* All standard VESA, CEA and other custom resolutions up to 120MHz (DP 1.2) are supported.	

12.1.6. MX2M-40PTJ-IB

General

Compliance	CE
Electrical safety compliance	EN 62368-1:2014 Class II
EMC compliance (emission).....	EN 55032:2015
EMC compliance (immunity).....	EN 55035:2017
RoHS compliance	EN 50581:2012
Warranty	3 years
Cooling.....	2x built-in cooling fans
Operating temperature	0 to +50°C (+32 to +122°F)
Storage temperature.....	-40° to +85°C (-40° to +185°F)
Operating humidity	10% to 90%, non-condensing

Enclosure

Material.....	1.5 mm steel
Dimensions in mm	194,5W x 208,5D x 35,5H
Dimensions in inch	17.4W x 15.7D x 14H
Weight.....	340 g (0.74 lbs)

Video Inputs

A/V standard	DVI 1.0, HDMI 2.0
HDCP compliance.....	HDCP 1.4 and HDCP 2.2
Color space	RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Video delay.....	0 frame

Supported resolutions at 8 bits/color *	..... up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
.....	..... up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
.....	..... 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking	..... Pixel Accurate Reclocking
3D support	..... Yes
Audio formats	..... 8 channel PCM
.....	..... Dolby TrueHD, DTS-HD Master Audio 7.1
Input cable equalization	..... Yes, +12dB fixed

* All standard VESA, CEA and other custom resolutions up to 120MHz (HDMI 2.0) are supported.

Fiber Optical Ports

Number of ports	..... 4
Connector type	..... SC simplex
Fiber type	..... 50/125 SC multimode fiber
Laser wavelengths	..... High speed lane: 780, 800, 825, 850 nm
.....	..... Low speed lane: 910, 980 nm
Compliance	..... IEC/EN 60825-1:2014-05 Ed. 3.0; 21CFR Subchapter J Parts 1040.40 and 1040.11
Transmitter output OMA (Optical Modulation Amplitude)	..... -6.25 dBm (worst case)
Receiver OMA (Optical Modulation Amplitude) sensitivity	..... -14.25 dBm (worst case)
Optical loss budget	..... 8 dBm (worst case)

12.1.7. MX2M-4HDMI20-OB

General

Compliance	..... CE
Electrical safety compliance	..... EN 62368-1:2014 Class II
EMC compliance (emission)	..... EN 55032:2015
EMC compliance (immunity)	..... EN 55035:2017
RoHS compliance	..... EN 50581:2012
Warranty	..... 3 years
Cooling	..... passive
Operating temperature	..... 0 to +50°C (+32 to +122°F)
Storage temperature	..... -40° to +85°C (-40° to +185°F)
Operating humidity	..... 10% to 90%, non-condensing

Enclosure

Material	..... 1.5 mm steel
Dimensions in mm	..... 194,5W x 208,5D x 35,5H
Dimensions in inch	..... 17.4W x 15.7D x 1.4H
Weight	..... 276 g (0.6 lbs)

Video Outputs

A/V standard	..... DVI 1.0, HDMI 2.0
HDCP compliance	..... HDCP 1.4 and HDCP 2.2
Color space	..... RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Video delay	..... 0 frame
Supported resolutions at 8 bits/color *	..... up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
.....	..... up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
.....	..... 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking	..... Pixel Accurate Reclocking
3D support	..... Yes
Audio formats	..... 8 channel PCM
.....	..... Dolby TrueHD, DTS-HD Master Audio 7.1
Input cable equalization	..... Yes, +12dB fixed

* All standard VESA, CEA and other custom resolutions up to 120MHz (HDMI 2.0) are supported.

12.1.8. MX2M-4OPTJ-OB

General

Compliance	..... CE
Electrical safety compliance	..... EN 62368-1:2014 Class II
EMC compliance (emission)	..... EN 55032:2015
EMC compliance (immunity)	..... EN 55035:2017
RoHS compliance	..... EN 50581:2012
Warranty	..... 3 years
Cooling	..... 2x built-in cooling fans
Operating temperature	..... 0 to +50°C (+32 to +122°F)
Storage temperature	..... -40° to +85°C (-40° to +185°F)
Operating humidity	..... 10% to 90%, non-condensing

Enclosure

Material.....	1.5 mm steel
Dimensions in mm.....	194,5W x 208,5D x 35,5H
Dimensions in inch.....	17.4W x 15.7D x 14H
Weight.....	340 g (0,74 lbs)

Video Outputs

A/V standard.....	DVI 1.0, HDMI 2.0
HDCP compliance.....	HDCP 1.4 and HDCP 2.2
Color space.....	RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Video delay.....	0 frame
Supported resolutions at 8 bits/color *.....	up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0) up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0) 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking.....	Pixel Accurate Reclocking
3D support.....	Yes
Audio formats.....	8 channel PCM Dolby TrueHD, DTS-HD Master Audio 7.1
Input cable equalization.....	Yes, +12dB fixed

* All standard VESA, CEA and other custom resolutions up to 120MHz (HDMI 2.0) are supported.

Fiber Optical Ports

Number of ports.....	4
Connector type.....	SC simplex
Fiber type.....	50/125 SC multimode fiber
Laser wavelengths.....	High speed lane: 780, 800, 825, 850 nm Low speed lane: 910, 980 nm
Compliance.....	IEC/EN 60825-1:2014-05 Ed. 3.0; 21CFR Subchapter J Parts 1040.40 and 1040.11
Transmitter output OMA (Optical Modulation Amplitude).....	-6.25 dBm (worst case)
Receiver OMA (Optical Modulation Amplitude) sensitivity.....	-14.25 dBm (worst case)
Optical loss budget.....	8 dBm (worst case)

12.1.9. MX2M-AUX-DANTE-32CH**General**

Compliance.....	CE
Electrical safety compliance.....	EN 62368-1:2014 Class II
EMC compliance (emission).....	EN 55032:2015
EMC compliance (immunity).....	EN 55035:2017
RoHS compliance.....	EN 50581:2012
Warranty.....	3 years
Cooling.....	passive
Operating temperature.....	0 to +50°C (+32 to +122°F)
Storage temperature.....	-40° to +85°C (-40° to +185°F)
Operating humidity.....	10% to 90%, non-condensing

Enclosure

Material.....	1.5 mm steel
Dimensions in mm.....	194,5W x 208,5D x 35,5H
Dimensions in inch.....	17.4W x 15.7D x 14H
Weight.....	275 g (0.6 lbs)

Audio Ports

Number of ports.....	4
Connector type.....	RJ45 female connector
Audio formats.....	Dante® or AES67
Supported channels.....	2-channel stereo
Sampling rates.....	44.1, 48, 88.2, 96 kHz

12.1.10. MX2M-AUX-8AUDIO**General**

Compliance.....	CE
Electrical safety compliance.....	EN 62368-1:2014 Class II
EMC compliance (emission).....	EN 55032:2015
EMC compliance (immunity).....	EN 55035:2017
RoHS compliance.....	EN 50581:2012

Warranty 3 years
 Cooling..... passive
 Operating temperature0 to +50°C (+32 to +122°F)
 Storage temperature.....-40° to +85°C (-40° to +185°F)
 Operating humidity 10% to 90%, non-condensing

Enclosure

Material..... 1.5 mm steel
 Dimensions in mm..... 194,5W x 208,5D x 35,5H
 Dimensions in inch 17.4W x 15.7D x 1.4H
 Weight..... 275 g (0.6 lbs)

Audio Ports

Number of ports..... 8
 Connector type..... 5-pole Phoenix connector
 Port type Configurable by jumper (Input / Output)

Analog Audio Inputs

Audio formats 2 channel PCM
 Sampling frequency.....48 kHz
 Maximum input level+4 dBu, 1.228 Vrms, 3.47 Vpp
 Signal transmission Balanced audio
 Balance..... -100 - 100 (0 = center)
 Gain..... -12 dB - 6 dB
 Volume..... -95 dB - 0 dB
 Frequency response 20 Hz - 20 kHz
 THD + Noise -70 dB @ -1 dBFS
 Interchannel isolation.....83 dB

Analog Audio Outputs

Audio formats 2 channel PCM
 Supported sampling frequency..... 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
 Volume..... -78 dB - 0 dB
 Balance..... -100 - 100 (0 = center)
 Nominal Differential Output Level @ 0 dB Gain+4 dBu, 1.228 Vrms, 3.47 Vpp

12.2. Switch Setup for Dante® Audio Signal Transmission

You can configure the QoS settings to ensure good system performance in a busy network. QoS (Quality of Service) refers to technology for prioritizing the transfer of specific data. By configuring the QoS settings recommended by Dante on a network switch, you can prioritize the transfer of Dante clock synchronization data and audio data over background data traffic. This will ensure good system performance when you need to transfer non-Dante data over the same network. QoS is required when using Dante in networks that have 100Mbps devices and is optional in networks with Gigabit devices. We recommend that QoS be enabled in all Dante networks in order to ensure proper operation under all possible conditions.

The table below shows how Dante uses various Diffserv Code Points (DSCP) packet priority values: *

Priority	Usage	DSCP Label	Hex	Decimal	Binary
High	Time critical PTP events	CS7	0x38	56	111000
Medium	Audio, PTP	EF	0x2E	46	101110
Low	(reserved)	CS1	0x08	8	001000
None	Other traffic	BestEffort	0x00	0	000000

Green Ethernet in the Network

EEE (Energy Efficient Ethernet) is a technology that reduces switch power consumption during periods of low network traffic. It is also sometimes known as Green Ethernet and IEEE802.3az.

Although power management should be negotiated automatically in switches that support EEE, it is a relatively new technology, and some switches do not perform the negotiation properly. This may cause EEE to be enabled in Dante networks when it is not appropriate, resulting in poor synchronisation performance and occasional dropouts.

* source: <https://www.audinate.com/learning/faqs>

12.3. Factory Default Settings

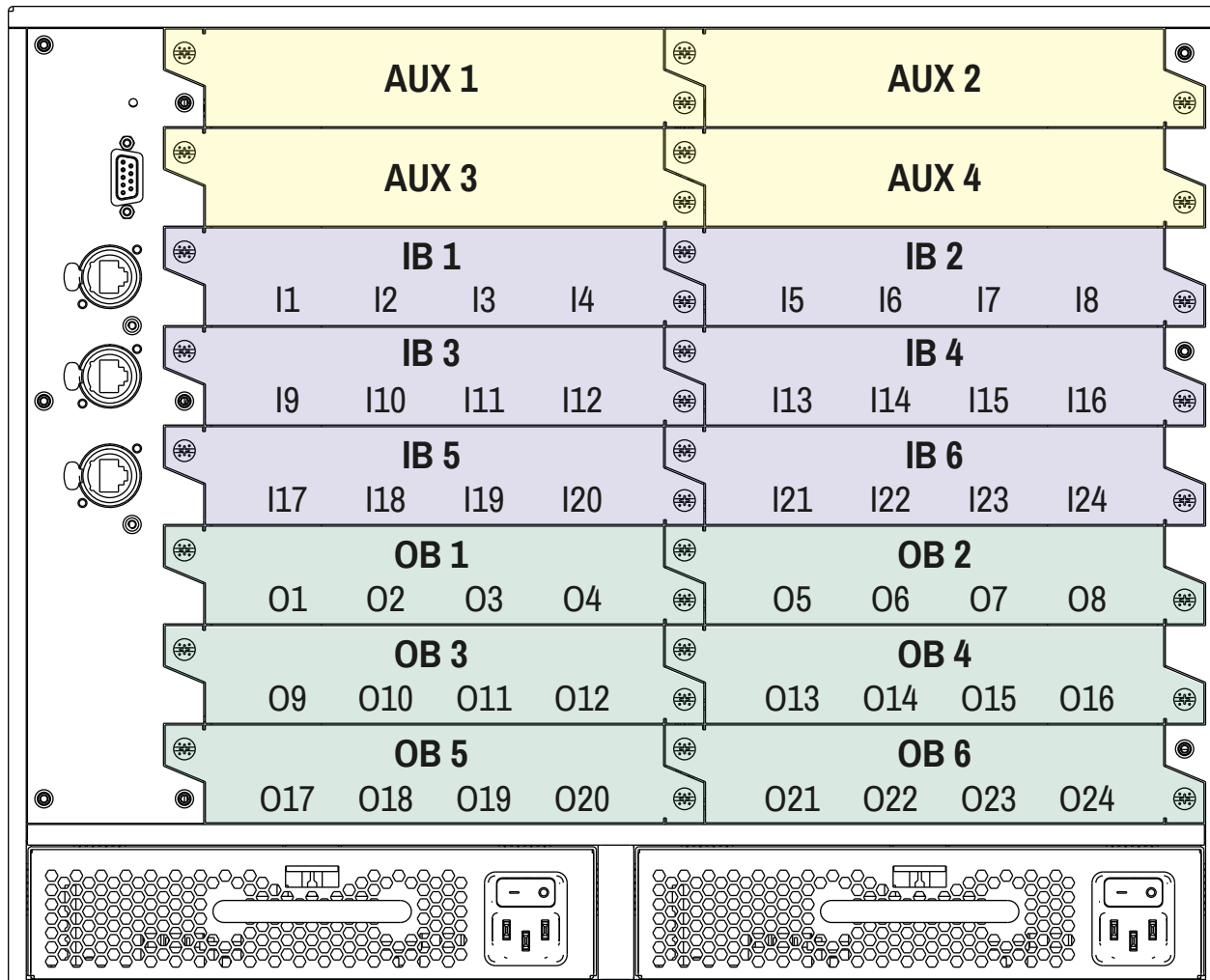
Parameter	Setting/Value
General settings	
Display backlight	10
Jog dial rotary direction	Clockwise (CW down)
Control lock	Disabled
Output lock	Disabled
Network settings	
DHCP (dynamic IP address)	Enabled
LW3 control protocol port number	6107
HTTP port number	80
RS-232 port settings	
Configuration	115200 BAUD 8N1
AV crosspoint settings	
Audio crosspoint	I1 to all outputs
Video crosspoint	I1 to all outputs
Video input port settings MX2M-4HDMI20-IB / MX2M-4OPTJ-IB	
HDCP authentication	Enabled
Maximum enabled HDCP version	HDCP 2.2
Color range	Auto
Hot plug detect	Auto
Video input port settings MX2M-DH-4DP12-IB	
HDCP authentication	Enabled
Maximum enabled HDCP version	HDCP 2.2
Input lane count capability	4
Maximum link rate availability	HBR2
DP power sending	Enabled
Color space conversion	Passthrough
Color range	Auto
Hot plug detect	Auto
No sync screen (test pattern) mode	Disabled

Parameter	Setting/Value
Video output port settings MX2M-4HDMI20-OB / MX2M-4OPTJ-OB	
HDCP mode	Auto (depends on input)
Power 5V mode	On
Signal type	Auto
Color space	Passthrough
Color depth	8 bit per pixel
Audio source	HDMI
Audio port settings MX2M-AUX-8AUDIO	
Port configuration	Input
Analog audio input port properties	
Volume	0.00 dB (100%)
Balance	0 (center)
Gain	0.00 dB
Analog audio output port properties	
Volume	0.00 dB (100%)
Balance	0 (center)

12.4. Input/Output Port Numbering

12.4.1. Video Input/Output Port Numbering

The following drawing describes the video port numbering of the MX2M-FR24R matrix frame.



12.4.2. Audio Input Port Numbering

The following table shows the audio input numbering of the matrix. The audio port numbers are reserved and fixed for each I/O board slots because of the following reasons:

- The I/O board models are built with different number of ports;
- The boards can be installed to various board slots;
- The AUX boards can be also installed to the slots which are dedicated to IB and OB boards.

Input port numbering on IB boards	Input port numbering on AUX boards	Layout of the matrix	Input port numbering on IB boards	Input port numbering on AUX boards
		Left side	Right side	
-	I25-I40		-	I41-I56
-	I57-I72		-	I73-I88
I1-I4	I89-I104		I5-I8	I105-I120
I9-I12	I121-I136		I13-I16	I137-I152
I17-I20	I153-I168		I21-I24	I169-I184
-	I185-I200		-	I201-I216
-	I217-I232		-	I233-I248
-	I249-I264		-	I265-I280

12.4.3. Audio Output Port Numbering

The following table shows the audio output numbering of the matrix. The audio port numbers are reserved and fixed for each I/O board slots because of the following reasons:

- The I/O board models are built with different number of ports;
- The boards can be installed to various board slots;
- The AUX boards can be also installed to the slots which are dedicated to IB and OB boards.

Output port numbering on OB boards	Output port numbering on AUX boards	Layout of the matrix		Output port numbering on OB boards	Output port numbering on AUX boards
		Left side	Right side		
-	025-040			-	041-056
-	057-072			-	073-088
-	089-0104			-	0105-0120
-	0121-0136			-	0137-0152
-	0153-0168			-	0169-0184
01-04	0185-0200			05-08	0201-0216
09-012	0217-0232			013-016	0233-0248
017-020	0249-0264			021-024	0265-0280

12.5. Maximum Cable Distances

12.5.1. Fiber Optical Cable Distances

The following table shows the maximum allowed fiber optical cable distances.

Affected boards:

- MX2M-4OPTJ-IB
- MX2M-4OPTJ-OB

Resolution, Pixel clock rate	OM1	OM2	OM3	OM4
1280x720p60 Hz	800 m	1000 m	2500 m	2500 m
1920x1080p60 Hz	500 m	1000 m	2500 m	2500 m
3840x2160p30 Hz (4k30 4:4:4)	200 m	600 m	1500 m	1500 m
3840x2160p60 Hz (4k60 4:2:0)	200 m	600 m	1500 m	1500 m
3840x2160p60 Hz (4k60 4:4:4)	Not supported	300 m	600 m	600 m
4096x2160p60 Hz (DCI 4K60)	Not supported	300 m	600 m	600 m

12.5.2. CATx Cable Distances

The following table shows the maximum allowed CATx cable distances.

Affected board:

- MX2M-AUX-DANTE-32CH

Connection	CAT5e	CAT7e
Connection between the auxiliary board and the network switch	100 m	

12.6. Factory EDID List

Mem.	Resolution		Type
F1	640 x	480 @ 60.00 Hz	D
F2	848 x	480 @ 60.00 Hz	D
F3	800 x	600 @ 60.32 Hz	D
F4	1024 x	768 @ 60.00 Hz	D
F5	1280 x	768 @ 50.00 Hz	D
F6	1280 x	768 @ 59.94 Hz	D
F7	1280 x	768 @ 75.00 Hz	D
F8	1360 x	768 @ 60.02 Hz	D
F9	1280 x	1024 @ 50.00 Hz	D
F10	1280 x	1024 @ 60.02 Hz	D
F11	1280 x	1024 @ 75.02 Hz	D
F12	1400 x	1050 @ 50.00 Hz	D
F13	1400 x	1050 @ 60.00 Hz	D
F14	1400 x	1050 @ 75.00 Hz	D
F15	1680 x	1050 @ 60.00 Hz	D
F16	1920 x	1080 @ 50.00 Hz	D
F17	1920 x	1080 @ 60.00 Hz	D
F18	2048 x	1080 @ 50.00 Hz	D
F19	2048 x	1080 @ 60.00 Hz	D
F20	1600 x	1200 @ 50.00 Hz	D
F21	1600 x	1200 @ 60.00 Hz	D
F22	1920 x	1200 @ 50.00 Hz	D
F23	1920 x	1200 @ 59.56 Hz	D
F24	2048 x	1200 @ 59.96 Hz	D
F29	Universal DVI		
F30	1440 x	480 @ 60.05 Hz	H
F31	1440 x	576 @ 50.08 Hz	H
F32	640 x	480 @ 59.95 Hz	H

Mem.	Resolution		Type
F33	720 x	480 @ 59.94 Hz	H
F34	720 x	576 @ 50.00 Hz	H
F35	1280 x	720 @ 50.00 Hz	H
F36	1280 x	720 @ 60.00 Hz	H
F37	1920 x	1080 @ 50.04 Hz	H
F38	1920 x	1080 @ 50.00 Hz	H
F39	1920 x	1080 @ 60.05 Hz	H
F40	1920 x	1080 @ 60.05 Hz	H
F41	1920 x	1080 @ 24.00 Hz	H
F42	1920 x	1080 @ 25.00 Hz	H
F43	1920 x	1080 @ 30.00 Hz	H
F44	1920 x	1080 @ 50.00 Hz	H
F45	1920 x	1080 @ 60.00 Hz	H
F46	1920 x	1080 @ 60.00 Hz	H
F47	Universal HDMI with PCM audio		
F48	Universal HDMI with All audio		
F49	Universal HDMI, all audio, deep color		
F91	1024 x	2400 @ 60.01 Hz	H
F98	1280 x	720 @ 60.00 Hz	H
F99	1920 x	1080 @ 60.00 Hz	H
F100	1024 x	768 @ 60.00 Hz	H
F101	1280 x	1024 @ 50.00 Hz	H
F102	1280 x	1024 @ 60.02 Hz	H
F103	1280 x	1024 @ 75.02 Hz	H
F104	1600 x	1200 @ 50.00 Hz	H
F105	1600 x	1200 @ 60.00 Hz	H
F106	1920 x	1200 @ 59.56 Hz	H
F107	2560 x	1440 @ 59.95 Hz	H

Mem.	Resolution		Type
F108	2560 x	1600 @ 59.86 Hz	H
F109	3840 x	2400 @ 24.00 Hz	H
F110	3840 x	2160 @ 24.00 Hz	H
F111	3840 x	2160 @ 25.00 Hz	H
F112	3840 x	2160 @ 30.00 Hz	H
F118	Universal HDMI, 4K, PCM audio		
F119	Universal HDMI, 4K, all audio		
F120	3840 x	2160 @ 60.00 Hz	H
F121	1440 x	1080 @ 59.91 Hz	H
F122	2560 x	2048 @ 59.98 Hz	H
F123	1280 x	800 @ 59.91 Hz	H
F124	1440 x	900 @ 59.90 Hz	H
F125	1366 x	768 @ 60.00 Hz	H
F126	1600 x	900 @ 59.98 Hz	H
F127	2048 x	1080 @ 60.00 Hz	H
F128	2560 x	1080 @ 60.00 Hz	H
F129	3440 x	1440 @ 24.99 Hz	H
F130	3440 x	1440 @ 29.99 Hz	H
F131	4096 x	2160 @ 25.00 Hz	H
F132	4096 x	2160 @ 30.00 Hz	H
F133	4096 x	2160 @ 60.00 Hz	4:2:0
F134	3440 x	1440 @ 23.99 Hz	H
F135	4096 x	2160 @ 24.00 Hz	H
F136	3840 x	2400 @ 29.99 Hz	H
F137	3840 x	2160 @ 60.00 Hz	H2
F138	3840 x	2160 @ 50.00 Hz	H2
F139	Universal HDMI 2.0, UHD, PCM audio		
F140	Universal HDMI 2.0, UHD, all audio		

Mem.	Resolution		Type
F141	4096 x	2160 @ 60.00 Hz	4:4:4
F142	4096 x	2160 @ 50.00 Hz	4:4:4
F143	Universal HDMI 2.0, 4K, PCM audio		
F144	Universal HDMI 2.0, 4K, all audio		
F146	3840 x	2160 @ 60.00 Hz	HDR
F147	3840 x	2160 @ 60.00 Hz	RB, PCM
F148	3840 x	2160 @ 60.00 Hz	RB, ALL

Legend

- D:** DVI EDID
- H:** HDMI EDID
- U:** Universal EDID (supporting many common EDIDs)
- 4:2:0:** EDID with chroma color subsampling
- 4:4:4:** EDID without color subsampling
- H2:** HDMI2.0-compatible EDID
- HDR:** EDID with High Dynamic Range mode support
- RB:** Reduced blanking interval
- PCM:** With PCM audio support
- ALL:** All type of audio support (within the HDMI standard)

Please note that minor changes in the factory EDID list may be applied in farther firmware versions.

12.7. Cable Wiring Guide

Inputs and outputs of audio devices are symmetric or asymmetric. The main advantage of the symmetric lines is the better protection against the noise therefore, they are widely used in the professional audio industry. Symmetric audio is most often referred to as balanced audio, as opposed to asymmetric, which is referred to as unbalanced audio. Lighthouse products are usually built with 5-pole Phoenix connectors so we would like to help users assembling their own audio cables. See the most common cases below.

ATTENTION! Symmetric and asymmetric lines can be linked with passive accessories (e.g. special cables), but in this case half of the line level is lost.

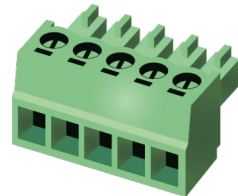
ATTENTION! There are numerous types of regularly used connector and cable types to connect audio devices. Please always make sure that a connector or cable fits your system before use.

ATTENTION! Never join the phase-inverted (negative, cold or -) poles (either right and left) to the ground or to each other on the output side, as this can damage the unit.

INFO: Use a galvanic isolation in case of a ground loop.

12.7.1. Audio Ports

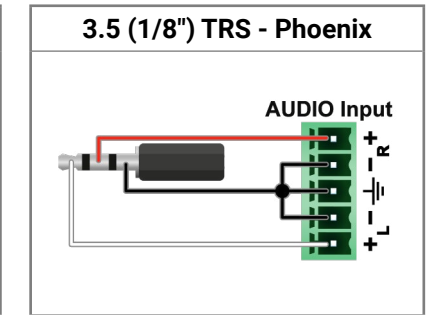
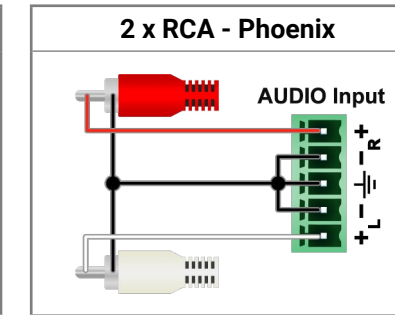
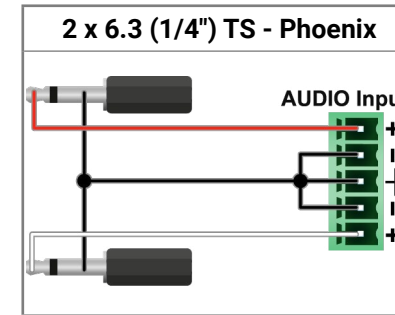
The Pinout of the 5-pole Phoenix Connector



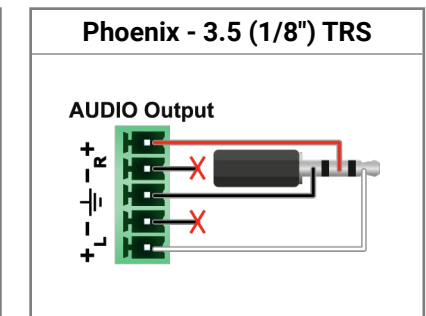
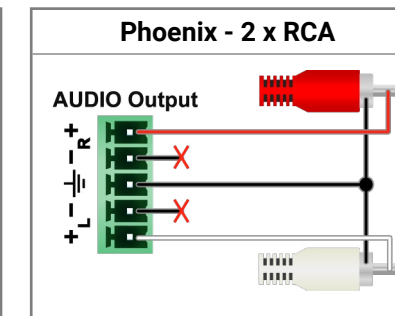
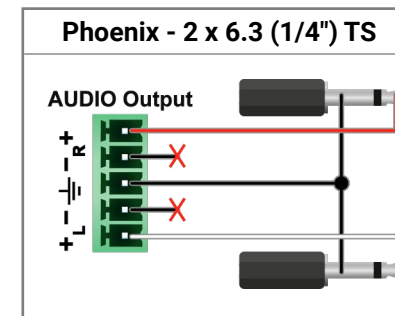
Pin nr.	Signal
1	Left+
2	Left-
3	Ground
4	Right-
5	Right+

Compatible Plug Type: Phoenix® Combicon series (3.5mm pitch, 5-pole), type: MC 1.5/5-ST-3.5.

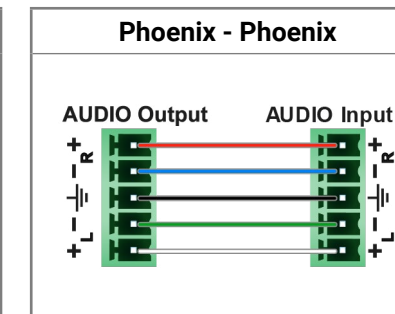
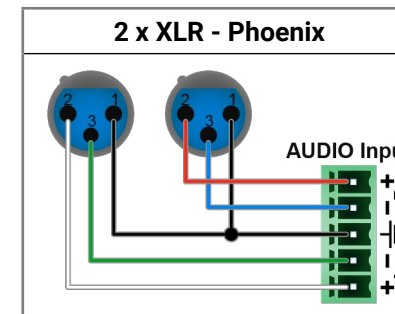
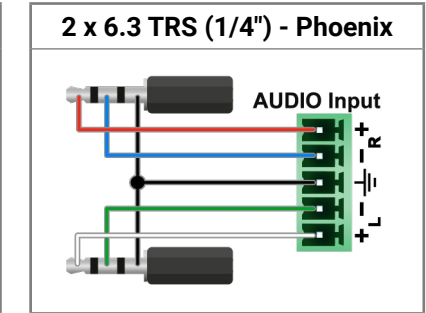
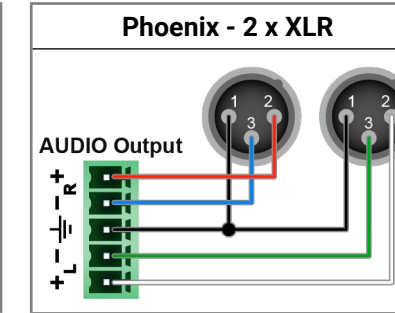
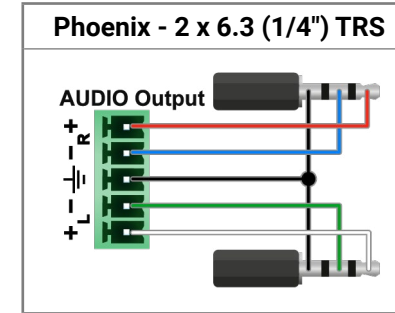
From Unbalanced Output to Balanced Input



From Balanced Output to Unbalanced Input



From Balanced Output to Balanced Input

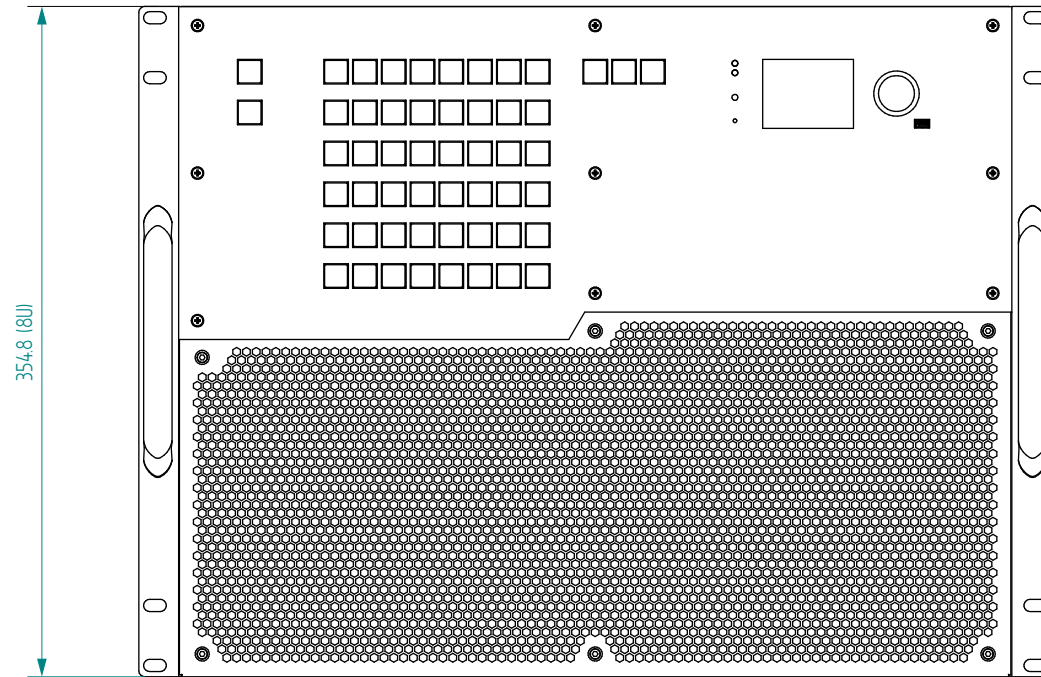


12.8. Mechanical Drawings

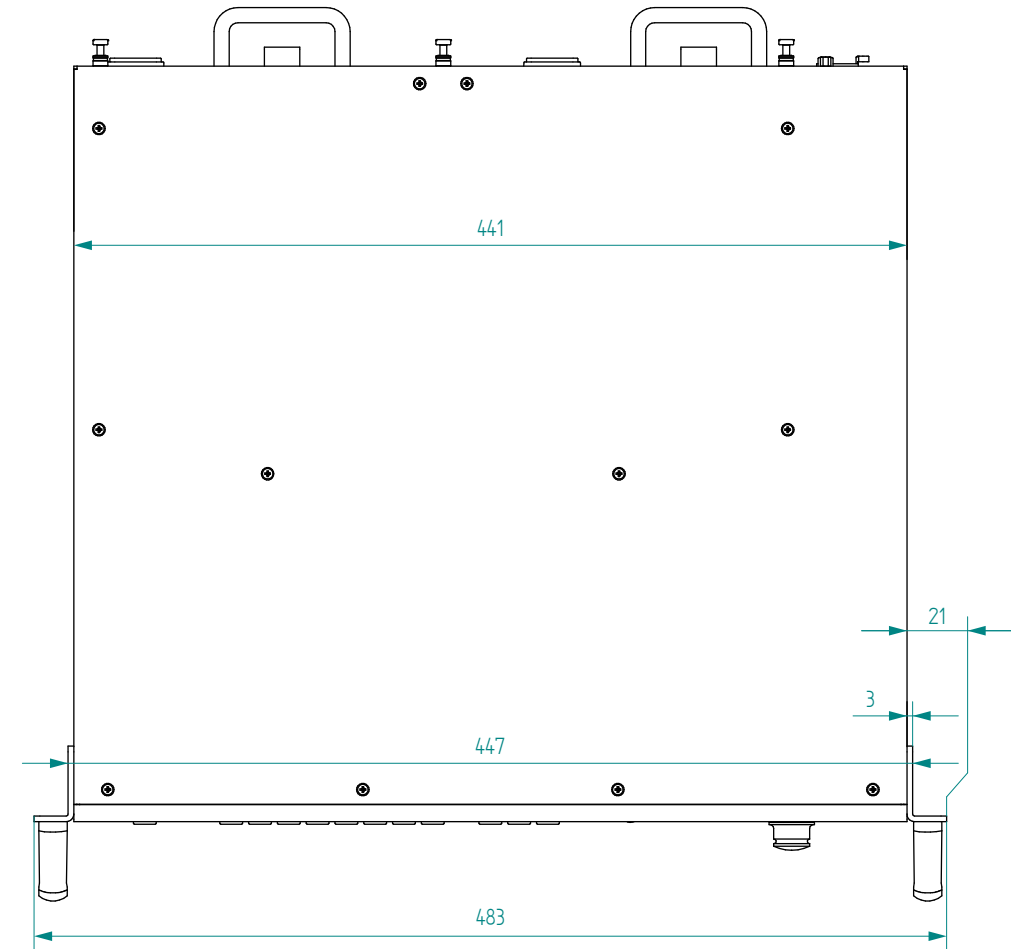
12.8.1. MX2M-FR24R

The following drawings present the physical dimensions of the MX2M-FR24R matrix frame. Dimensions are in mm.

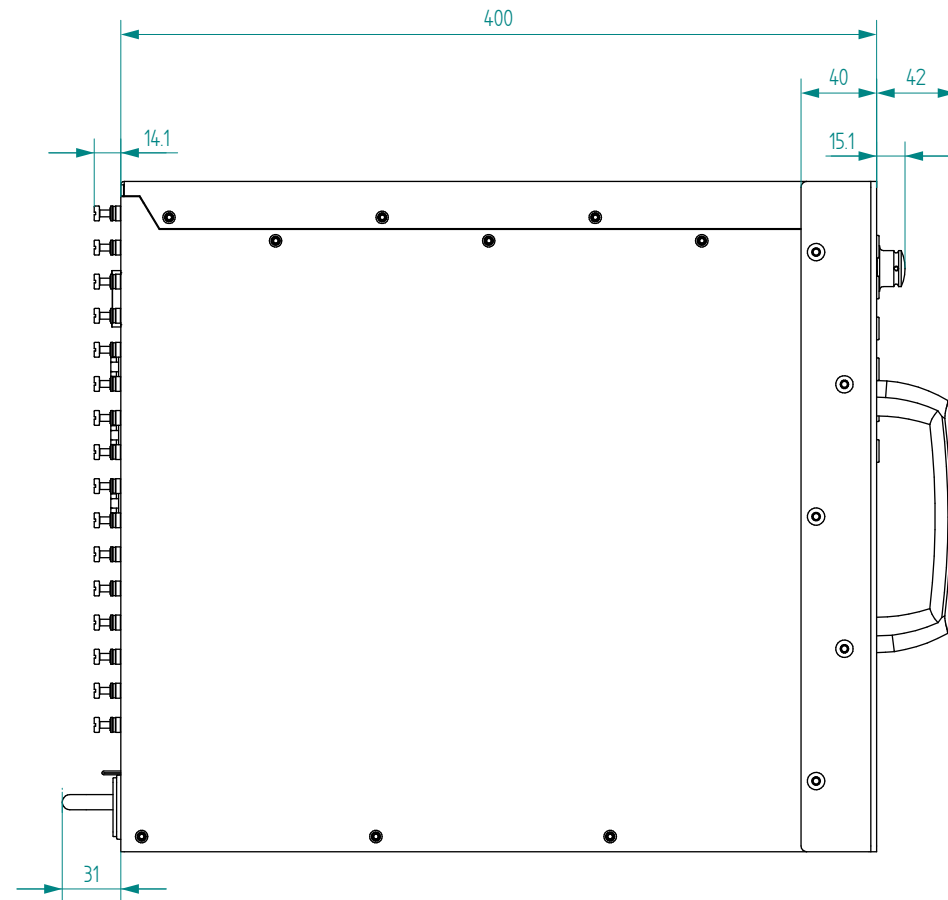
Front View (1:4)



Top View (1:4)



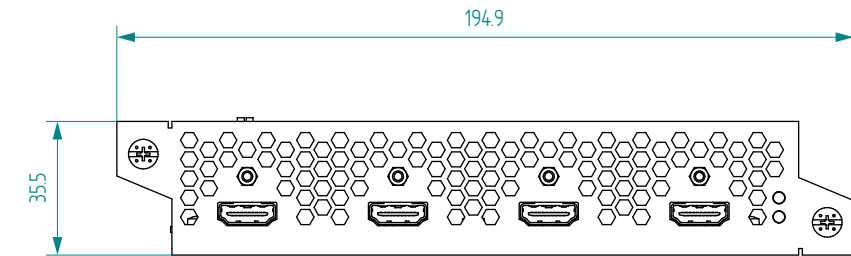
Side View (1:4)



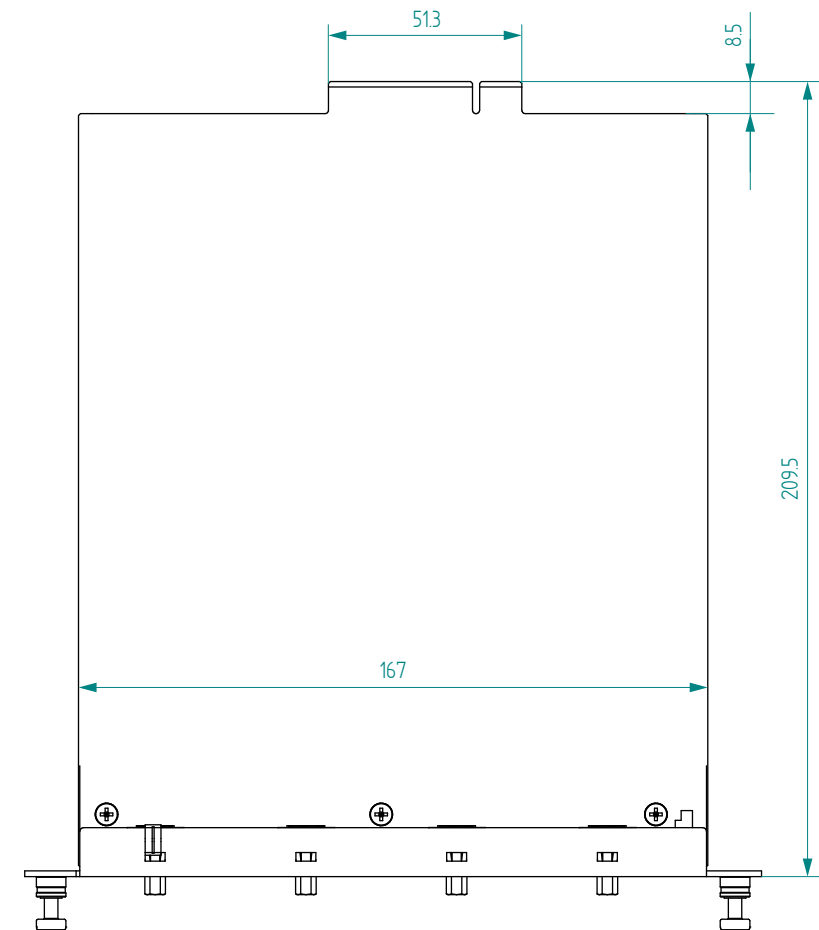
12.8.2. IB/OB Boards

The following drawings present the physical dimensions of the MX2M series input (IB) and output (OB) boards. Dimensions are in mm.

Front View (1:2)



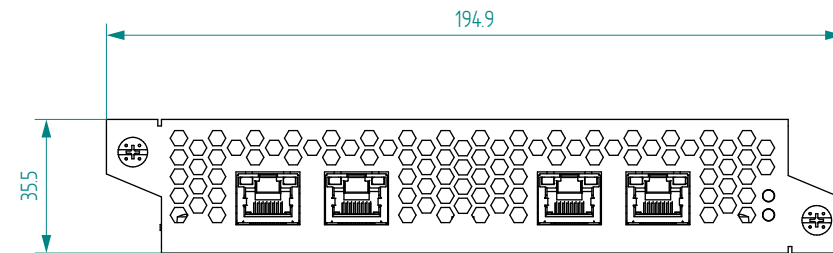
Top View (1:2)



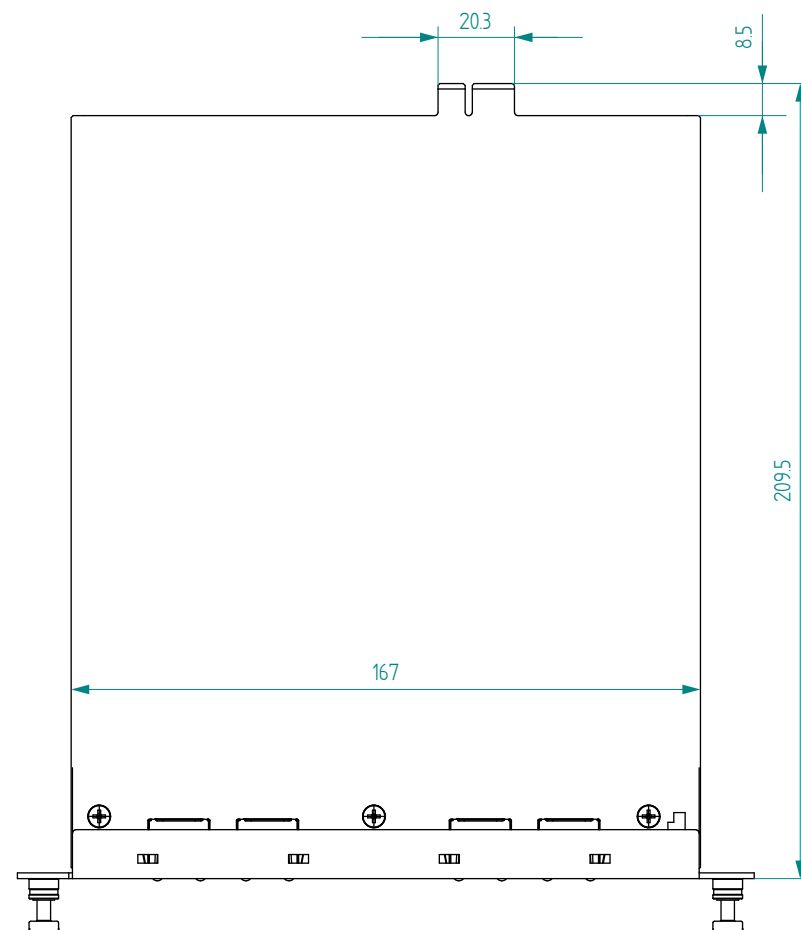
12.8.3. AUX Boards

The following drawings present the physical dimensions of the MX2M series auxiliary (AUX) boards. Dimensions are in mm.

Front View (1:2)



Top View (1:2)



Applied firmware package: v1.1.0 | LDC software: v2.5.4b3

12.9. Release Notes of the Firmware Packages

v1.1.0b13

Release date: 2021-02-15

New feature:

- From this version on, the matrix firmware supports the MX2M-AUX-DANTE-32CH board.
- From this version on, CEC is supported by the video IO boards.

Bugfix:

- Fixed a bug that caused some sink devices (displays) to fail to synchronize to the video stream if they are fed through an HDMI20-OPTJ-RX90 from an MX2M-4OPTJ-OB board.
- Fixed a bug that caused some ports on the MX2M-4OPTJ-OB output board not to function correctly.

Known issue:

- The channel labels of the input and output ports on the MX2M-AUX-DANTE-32CH board are not reset when the Dante device corresponding to the respective board is factory reset from the Dante Controller.
- The matrix might report invalid link status for the Primary and Secondary interfaces on an MX2M-AUX-DANTE-32CH board.
- It might happen, that after switching on and off the input signal many times the input port on a video input board erroneously reports a valid HDMI signal.
- When changing the source for an output port on the MX2M-AUX-DANTE-32CH board, the secondary mini crosspoint on the respective output also has to be altered to get the audio content corresponding to the new source out from the board.
- The manual showing the usage of PriLinkType and SecLinkType properties erroneously states that the accepted values are numbers. Use the strings corresponding to the values to set the link type.
- After a firmware upgrade, wrong board information is displayed in LDC. Restarting LDC resolves the issue.
- Wrong nominal voltage values are reported for the MX2M-AUX-DANTE-32CH board on the Health pages of the graphical user interface.

v1.0.0b33

Release date: 2020-10-02

Known issue:

- Color space conversion to YCbCr 4:2:2 on the output might result in invalid picture if the color space format of the incoming video signal is 4:2:0.
- The audio embedded by a video output board (e.g. MX2M-4HDMI20-OB) into the output HDMI stream cannot be decoded by a less error resilient player device (like a HDMI receiver). The same audio is played back seamlessly and without any problem by a regular television.
- The audio cannot be de-embedded from the input video on an MX2M-4HDMI20-IB or MX2M-4OPTJ-IB board when the source of the input video is an output board and the respective output is set to embed audio from the Audio layer.
- It might take an unusually long time for some sink devices (displays) to synchronize to the video stream if they are fed through an HDMI20-OPTJ-RX90 from an MX2M-4OPTJ-OB board.
- The output video stream might contain wrong audio channels when zero or one channel is selected for embedding in the output video stream on video output boards.
- Presets created via the front panel are displayed as audio presets on the embedded web and in the LDC application.
- The audio input ports on an MX2M-AUX-8AUDIO board cannot be muted.

12.10. Applied Ports (Network Settings)

The following ports are necessary to pass via a network switch/firewall for a proper working between the device and the softwares:

Purpose/function	Affected Lightware software	Protocol	Port nr.
Firmware upgrade TFTP	LDU2	UDP	69
		UDP	49990
		UDP	49995
Device Discovery	LDC	UDP	224.0.0.251:5353
Remote IP	LDC	UDP	230.76.87.82:37421
LW3 command protocol	-	TCP	6107
HTTP port (built-in web server)	-	TCP	80

12.11. Hashtag Keyword List

This user's manual contains keywords with hashtag (#) to help you to find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the # (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP (dynamic IP address) setting in the front panel operation, the Lightware Device Controller (LDC) and the LW3 programmer's reference section.

The following list contains all hashtag keywords placed in the document with a short description belonging to them. The list is in **alphabetical order** by the hashtag keywords.

Hashtag Keyword ↓↕	Description
#advancedview	Terminal (advanced view) window
#aes67	Dante/AES67 audio related settings
#analogaudio	Analog audio related settings
#audio	Audio related settings
#autotakemode	Autotake mode
#backup	Configuration cloning (backup)
#balance	Balance (for analog audio) setting
#builtinweb	Built-in web
#button	Front panel button operations
#cec	CEC related settings
#channelmapping	Audio channel mapping setting
#colorrange	Color range setting
#colorspace	Color space converter related settings
#controllock	Front panel control lock
#crosspoint	Crosspoint switch setting
#dante	Dante/AES67 audio related settings
#date	Date setting

Hashtag Keyword ↓	Description
#devicelabel	Device label
#dhcp	Dynamic IP address (DHCP) setting
#displayport	DisplayPort related audio/video setting
#dp	DisplayPort related audio/video setting
#dppower	DisplayPort power send setting
#edid	EDID related settings
#embedder	Audio embedder (audio source) setting
#factory	Factory default settings
#firmwareversion	Firmware version query
#framedetector	Frame detector in LDC/built-in web
#gain	Gain (for analog audio) setting
#hdcpc	HDCP-encryption related setting
#hdmi	HDMI related audio/video setting
#health	System monitoring (health) related information
#hotplugdetect	Hot plug detect setting
#hpd	Hot plug detect setting
#ipaddress	IP address related settings
#label	Device label
#license	License settings
#linktraining	DisplayPort link training setting
#lock	Port lock settings
#log	System log
#mapping	Audio channel mapping setting
#mute	Port mute setting
#network	Network (IP address) related settings
#nosyncscreen	Test pattern (no sync screen) settings
#optj	OPTJ related audio/video setting
#outputlock	Front panel output lock
#power5v	Power 5V mode setting
#preset	Preset related settings
#producttype	Product type query

Hashtag Keyword ↓	Description
#reboot	Restarting the device
#reset	Restarting the device
#restart	Restarting the device
#restore	Configuration cloning (restore)
#serialnumber	Serial number query
#softreset	Software resetting of the device
#status	Status query
#switch	Crosspoint switch setting
#systemmonitor	System monitoring (health) related information
#takemode	Take mode
#terminal	Terminal (advanced view) window
#testpattern	Test pattern (no sync screen) settings
#time	Time setting
#unlock	Port unlock settings
#unmute	Port unmute setting
#volume	Volume (for analog audio) setting
#web	Built-in web

12.12. Further Information

Limited Warranty Statement

1. Lightware Visual Engineering LLC (Lightware) warrants to all trade and end user customers that any Lightware product purchased will be free from manufacturing defects in both material and workmanship for three (3) years from purchase unless stated otherwise below. The warranty period will begin on the latest possible date where proof of purchase/delivery can be provided by the customer. In the event that no proof can be provided (empty 'Date of purchase' field or a copy of invoice), the warranty period will begin from the point of delivery from Lightware.

1.1. 25G and MODEX product series will be subject to a seven (7) year warranty period under the same terms as outlined in this document.

1.2. If during the first three (3) months of purchase, the customer is unhappy with any aspect of a Lightware product, Lightware will accept a return for full credit.

1.3. Any product that fails in the first six (6) months of the warranty period will automatically be eligible for replacement and advanced replacement where available. Any replacements provided will be warranted for the remainder of the original unit's warranty period.

1.4. Product failures from six (6) months to the end of the warranty period will either be repaired or replaced at the discretion of Lightware. If Lightware chooses to replace the product then the replacement will be warranted for the remainder of the original unit's warranty period.

2. The above-stated warranty and procedures will not apply to any product that has been:

2.1. Modified, repaired or altered by anyone other than a certified Lightware engineer unless expressly agreed beforehand.

2.2. Used in any application other than that for which it was intended.

2.3. Subjected to any mechanical or electrical abuse or accidental damage.

2.4. Any costs incurred for repair/replacement of goods that fall into the above categories (2.1., 2.2., 2.3.) will be borne by the customer at a pre-agreed figure.

3. All products to be returned to Lightware require a return material authorization number (RMA) prior to shipment and this number must be clearly marked on the box. If an RMA number is not obtained or is not clearly marked on the box, Lightware will refuse the shipment.

3.1. The customer will be responsible for in-bound and Lightware will be responsible for out-bound shipping costs.

3.2. Newly repaired or replaced products will be warranted to the end of the originally purchased products warranty period.

Document Revision History

Rev.	Release date	Changes	Editor
1.0	13-08-2020	Initial version	Tamas Forgacs
1.1	24-03-2021	Added supplement in connection with MX2M-AUX-DANTE-32CH auxiliary board, added CEC command sending feature, added Firmware upgrade chapter	Tamas Forgacs

Contact Us

sales@lightware.com

+36 1 255 3800

support@lightware.com

+36 1 255 3810

Lightware Visual Engineering LLC.

Peterdy 15, Budapest H-1071, Hungary

www.lightware.com

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