

UMX4x4-Pro2



User's Manual

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 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.

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

Ventilation

For the correct ventilation and 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.

WEEE (Waste Electrical & Electronic Equipment)

Correct Disposal of This Product



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.

Table of contents

1. INTRODUCTION.....	9
2. GENERAL DESCRIPTION.....	9
2.1. BOX CONTENTS.....	9
2.2. FEATURES.....	9
2.3. TYPICAL APPLICATIONS.....	11
3. CONTROLS AND CONNECTIONS	12
3.1. FRONT VIEW	12
3.2. REAR VIEW	13
3.3. PORT DIAGRAMS	14
3.4. ELECTRICAL CONNECTIONS	15
3.4.1. DVI inputs and outputs	15
3.4.2. Digital audio inputs and outputs.....	16
3.4.3. Analog stereo audio inputs and outputs	16
3.4.1. Ethernet port	17
3.4.1. RS-232 control port.....	18
4. TECHNOLOGIES	19
4.1. BASICS.....	19
4.1.1. Common problems related to EDID.....	19
4.2. ADVANCED EDID MANAGEMENT	20
4.3. HDCP MANAGEMENT	21
4.3.1. Mixing encrypted and unencrypted signals	21
4.3.2. HDCP key caching.....	21
4.3.3. Avoiding unnecessary HDCP encryption.....	21
4.4. PIXEL ACCURATE RECLOCKING.....	23
4.5. RICOD	24
4.5.1. Introduction	24
4.5.2. RICOD capable devices	24
4.5.3. Operation: Master and Slave mode	24
4.5.4. Factory defaults	25
4.5.5. Enable / disable RICOD.....	25
4.5.6. Validity of RICOD.....	26
4.5.7. Locking the remote device.....	26
4.5.8. An example application.....	27
5. OPERATION.....	28
5.1. POWER.....	28
5.2. FRONT PANEL OPERATIONS	28
5.2.1. Signal layers	28
5.2.2. TAKE / AUTOTAKE modes	28
5.2.3. CONTROL LOCK	28
5.2.4. SOURCES and DESTINATIONS buttons	29
5.2.5. Viewing crosspoint state	29
5.2.6. Switching.....	30
5.2.7. Switching operations flowchart	31
5.2.8. Preset operations.....	32
5.2.9. OUTPUT LOCK	32
5.3. ABOUT EDID MEMORY	34
5.3.1. EDID types.....	34
5.3.2. Factory EDID list.....	35
5.4. FRONT PANEL LCD MENU OPERATION	36
5.4.1. Basic concept.....	36
5.4.2. Menu structure	36
5.4.3. Navigation	37
5.4.4. Normal mode	37
5.4.5. EDID mode	44
5.4.6. Signal Present mode	45

6.	REMOTE OPERATION	46
6.1.1.	Control interfaces.....	46
6.1.2.	User interface comparison.....	46
6.1.3.	Multiple simultaneous connections.....	47
6.1.4.	Serial port settings.....	47
6.1.5.	IP settings.....	47
6.1.6.	Control protocols.....	47
7.	SOFTWARE CONTROL –LIGHTWARE DEVICE CONTROLLER AND WEB.....	49
7.1.	INSTALLING LIGHTWARE DEVICE CONTROLLER.....	49
7.1.1.	The normal install.....	49
7.1.2.	The snapshot install.....	49
7.1.3.	Steps of the installation in case of Windows OS.....	50
7.1.4.	Steps of the installation in case of Mac OS X.....	52
7.1.5.	Upgrading the LDC.....	53
7.2.	ESTABLISHING THE CONNECTION.....	54
7.3.	WEB CONTROL – USING BUILT-IN WEBSITE.....	56
7.3.1.	Establishing the connection.....	56
7.4.	CONTROLLER WINDOW.....	57
7.5.	CROSSPOINT MENU.....	58
7.5.1.	Grid view.....	58
7.5.2.	Tile view.....	60
7.5.3.	Input parameter settings.....	64
7.5.4.	Output parameter settings.....	69
7.5.5.	Presets.....	71
7.5.6.	Global port settings.....	72
7.6.	EDID MENU.....	73
7.6.1.	EDID operations.....	74
7.7.	SETTINGS MENU.....	76
7.7.1.	Configuration.....	76
7.7.2.	Device information.....	77
7.7.3.	Status.....	77
7.7.4.	Log.....	78
7.7.5.	User preferences (only in LDC).....	79
7.8.	TERMINAL WINDOW.....	80
8.	PROGRAMMERS REFERENCE.....	81
8.1.	CHANGING PROTOCOLS.....	81
8.2.	PROTOCOL DESCRIPTION.....	81
8.3.	STORAGE SETTINGS.....	83
8.4.	STATUS AND IDENTIFICATION COMMANDS.....	83
8.4.1.	View product type.....	83
8.4.2.	View serial number.....	83
8.4.3.	View Firmware version of the CPU.....	83
8.4.4.	View CPU firmware compile time.....	84
8.4.5.	View installed controllers' firmware.....	84
8.4.6.	View current control protocol.....	84
8.4.7.	Set current control protocol.....	84
8.4.8.	View crosspoint size.....	85
8.4.9.	View LAN versions.....	85
8.4.10.	View router's health.....	85
8.4.11.	View installed I/O boards.....	86
8.4.12.	View error list.....	86
8.5.	SYSTEM COMMANDS.....	87
8.5.1.	Reload factory defaults.....	87
8.5.2.	Count HDCP keys.....	87
8.5.3.	Clear HDCP key cache.....	87
8.5.4.	Restart matrix router.....	88
8.6.	COMMUNICATION SETUP COMMANDS.....	88
8.6.1.	Query IP settings.....	88

8.6.2.	Reload factory default IP settings	88
8.6.3.	Enable DHCP IP setting	89
8.6.4.	Query RS-232 baud rate.....	89
8.6.5.	Change RS-232 baud rate	89
8.7.	EDID ROUTER COMMANDS	90
8.7.1.	Change EDID on input.....	90
8.7.2.	Change EDID on all inputs	90
8.7.3.	Save EDID to user memory (Learn EDID).....	90
8.7.4.	View emulated EDIDs on all inputs.....	91
8.7.5.	Watch EDID validity table	91
8.7.6.	View EDID header	92
8.7.7.	Download EDID content from the router.....	92
8.7.8.	Upload EDID content to the router	93
8.7.9.	Delete EDID from memory.....	94
8.7.10.	View emulated EDIDs type	94
8.8.	CONTROL COMMANDS	95
8.8.1.	Switch one input to one output	95
8.8.2.	Switch one input to all outputs	95
8.8.3.	Switch diagonal.....	96
8.8.4.	View connection on output.....	96
8.8.5.	View connection on all outputs	96
8.8.6.	Mute specified output.....	97
8.8.7.	Unmute specified output	97
8.8.8.	Lock specified output	97
8.8.9.	Unlock specified output.....	97
8.8.10.	Save preset to memory location	97
8.8.11.	Load preset from memory location	98
8.8.12.	View preset	98
8.8.13.	Rename a preset	98
8.8.14.	Rename an input	98
8.8.15.	Rename an output	98
8.8.16.	Read a preset's name.....	99
8.8.17.	Read an input's name.....	99
8.8.18.	Read an output's name.....	99
8.8.19.	Reload default preset names.....	99
8.8.20.	Reload default input names	99
8.8.21.	Reload default output names.....	99
8.9.	PORT STATUS COMMANDS	100
8.9.1.	Input port status	100
8.9.2.	Output port status	100
8.9.3.	All port status	100
8.10.	INPUT PROPERTIES.....	101
8.10.1.	Set input port properties	101
8.10.2.	Query input port properties	104
8.10.3.	Reload factory defaults of input port properties.....	104
8.10.4.	Set analog timing properties	105
8.10.5.	Query analog timing properties.....	105
8.10.6.	Reset analog timing properties	106
8.10.7.	Set analog color properties	106
8.10.8.	Save analog color properties	107
8.10.9.	Query analog color properties	107
8.10.10.	Reset analog color properties.....	107
8.10.11.	Set analog input audio parameters.....	107
8.10.12.	Query analog input audio properties	108
8.10.13.	Reset analog input audio properties	108
8.10.14.	Set the color of 'no sync' picture.....	108
8.10.15.	Query the color of 'no sync' picture	108
8.10.16.	Reset the status and the color of 'no sync' picture	108
8.10.17.	Query timings of the incoming signal.....	109
8.11.	OUTPUT PROPERTIES	110
8.11.1.	Set output video properties.....	110

8.11.2.	Query output video properties	111
8.11.3.	Reset output video properties.....	112
8.11.4.	Set output audio properties.....	112
8.11.5.	Query output audio properties	112
8.11.6.	Reset analog output audio properties.....	112
8.12.	RICOD RELATED COMMANDS	113
8.12.1.	Set RICOD MASTER status on inputs	113
8.12.2.	Query RICOD MASTER status on inputs	114
8.12.3.	Set RICOD SLAVE status on output	114
8.12.4.	Query RICOD slave status on output	114
8.13.	ROUTER INITIATED COMMANDS	115
8.13.1.	EDID status changed.....	115
8.13.2.	Port status changed.....	115
8.14.	ERROR RESPONSES	115
9.	COMMANDS – QUICK SUMMARY	116
10.	FIRMWARE UPGRADE	119
10.1.	INSTALLING THE BOOTLOADER.....	119
10.1.1.	Installing and launching the Bootloader software	119
10.2.	UPGRADE PROCESS	121
10.2.1.	Tips for the upgrade process	121
10.2.2.	Firmware upgrade.....	121
11.	TROUBLESHOOTING	128
11.1.	GENERAL PROBLEMS.....	128
11.2.	SERIAL CONNECTION PROBLEMS	128
11.3.	TCP/IP CONNECTION PROBLEMS	128
11.4.	PICTURE IS NOT DISPLAYED OR DISTORTED.....	129
11.5.	BOOTLOAD	129
12.	SPECIFICATIONS.....	131
12.1.	MECHANICAL DRAWINGS	133
13.	VERSION APPLICABILITY.....	134
14.	WARRANTY	135
15.	DOCUMENT REVISION HISTORY	136

1. Introduction

Dear Customer,

Thank you for choosing Lightware UMX4x4-Pro2 matrix switcher. It is able to switch 4 inputs to 4 outputs in a non-blocking crosspoint configuration.

The UMX4x4-Pro2, the all-round universal matrix switcher, is the perfect solution for ever-changing environments such as small board rooms and classrooms. UMX (Universal MatriX) technology was developed by Lightware to support various analog and digital audio visual formats. VGA, YUV, digital DVI, HDMI with HDCP, stereo analog and S/PDIF digital audio signals are all supported.

2. General description

2.1. Box contents

- UMX4x4-Pro2 matrix switcher
- IEC power cable
- LAN UTP crosslink cable, CAT5e type, 3m length
- RS-232 straight serial cable (9 pole D-sub Male to Female)
- VGA to DVI-D adapter cable (4 pcs.)
- User's manual (this document)

2.2. Features

- **Advanced EDID Management** – The user can emulate any EDID on the switcher's inputs independently, read out and store any attached monitor's EDID in the internal memory locations, upload and download EDID files using Lightware Device Controller.
- **Non-blocking cross point matrix architecture** – The router allows any input to be switched to any output or more outputs simultaneously.
- **2.25 Gb/s channel transmission** – Routes any DVI single link or HDMI signal between 25 and 225 MHz pixel clock frequency conforming to DVI 1.0 and HDMI1.3 standards.
- **Supports all HDTV resolutions** – 720p, 1080i, 1080p 2K etc. HDTV signals up to 225 MHz pixel clock frequency regardless of the actual resolution passed through the router.
- **Control by front panel buttons** – 4 source select, 4 destination select, Video layer, Audio layer, Take, Load preset, Save preset, EDID function, Signal present, Control Lock, Output Lock.
- **Reconfigurable buttons** – Each button has a removable flat cap and a translucent label that can be inserted under the cap to identify sources and destinations.
- **RS-232 control** – Simple ASCII based RS-232 protocol is used for switching, preset calling, status request, etc.
- **Ethernet control** – TCP/IP Ethernet 10Base-T or 100Base-TX (Auto- Sensing).
- **Built-in WEB site** – Easy access from a WEB browser to control and configure the switcher.

- **Universal power supply** – UMX4x4-Pro2 matrices accept AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency on standard IEC connector.
- **Power failure memory** – In case of power failure, the unit stores its latest configuration, and after next power up it loads automatically.
- **HDCP compliant** – UMX4x4-Pro2 matrices comply with HDCP1.2 standard. Lightware is a legal HDCP adopter. The included Advanced HDCP Management eliminates the need for re-authentication upon switching.
- **20 meter input cable compensation** – Using 22AWG high quality DVI or HDMI cable, the inputs are automatically compensated for up to 20 meter cable length, which extends installation possibilities even at the highest HDTV or computer resolutions.
- **Pixel Accurate Reclocking** – (removes jitter caused by long cables) Each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.
- **Frame detector and signal analysis** – Using the built-in webpage or Lightware Device Controller (LDC) software the user can monitor incoming signal parameters such as resolution, signal timing parameters, audio type, scan rate, HDCP encryption and so on.
- **DVI/HDMI conversion** – The router is able to convert from HDMI to DVI signals so that you can watch HDMI videos on your computer display without audio.
- **Fiber cable support** – Self powered DVI fiber cables using +5V from DVI sources (VGA cards, etc.) usually consume more than 50 mA, which load is maximum allowed by DVI 1.0 standard. UMX4x4-Pro2 supports +5V 500 mA constant current output on each DVI output to power long distance fiber optical cables.
- **Zero frame delay – Even on Analog Inputs** - Lightware's UMX4x4-Pro2 matrix switchers add no frame delay to the switched signal. There is no frame or line period delays to the signals when passing a Lightware router.
- **Separate Audio and Video matrix switching** – Video and audio signals can be separated and switched independently. Even if the HDMI stream contains embedded audio.
- **Analog Audio and Video A/D conversion** – UMX4x4-Pro2 matrices convert uncompressed analog audio and video signal to digital and the digital or digitized analog audio can be embedded in the video stream.
- **Accepts analog and digital audio signals** – UMX4x4-Pro2 accepts unbalanced analog stereo; 5.1 S/PDIF and even 7.1 HDMI embedded audio signals.

2.3. Typical applications

Some typical connection variations with the matrix router are shown on [Figure 2-1](#).

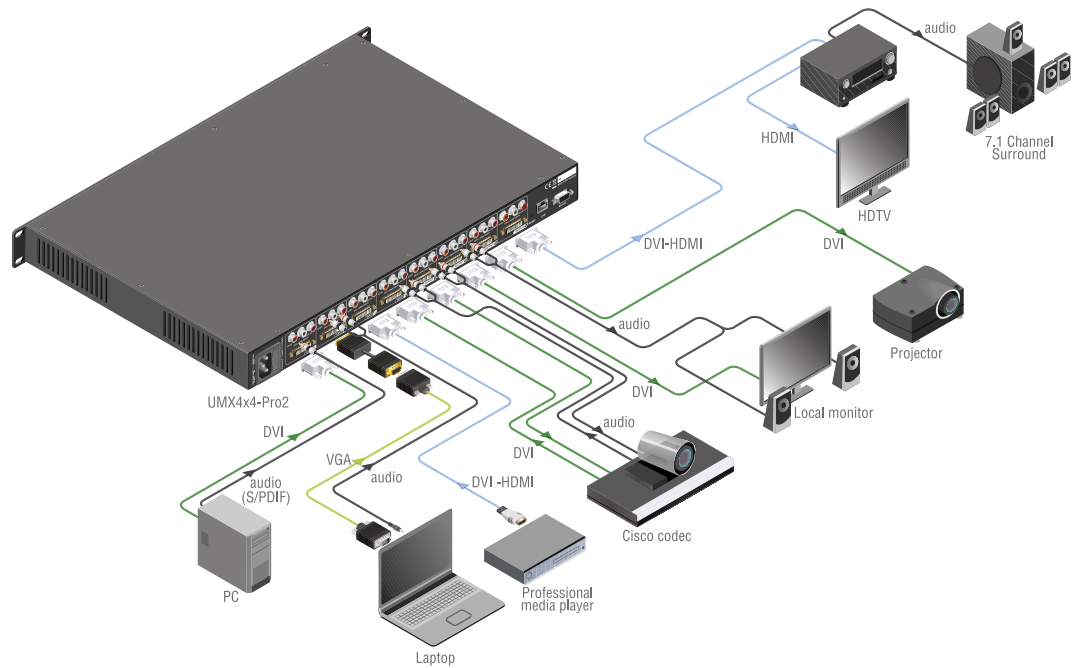


Figure 2-1. Typical application for UMX4x4-Pro2

Application examples

- Small classrooms
- Conference rooms, collaborative telepresence
- Control room
- Multiroom video
- Home cinema

3. Controls and connections

3.1. Front view

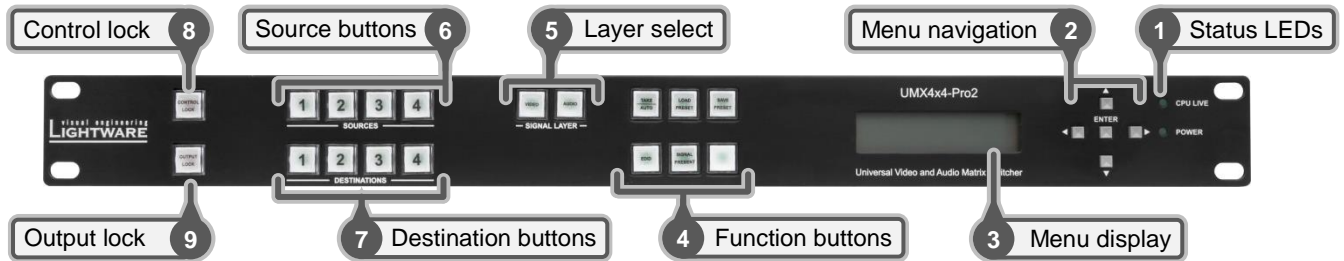


Figure 3-1. UMX4x4-Pro2 front view

- | | |
|-------------------------------------|---|
| <p>① Status LEDs</p> | POWER LED indicates that the unit is powered on and CPU LIVE blinking LED indicates normal operation. |
| <p>② Menu navigation</p> | (UP, DOWN, LEFT, RIGHT, ENTER) buttons for menu navigation. |
| <p>③ Menu display</p> | 2x16-character LCD display with backlight for menu operations and settings. |
| <p>④ Function buttons</p> | Switching between working modes (Normal / EDID / Signal present, Take / Autotake) and Preset operations are available with the Function buttons. |
| <p>⑤ Layer select</p> | Audio and video signals are placed on different layers so they can be switched separately or at the same time. Layer select buttons chose the desired signal(s) to be switched. |
| <p>⑥ Source buttons</p> | Source buttons have three functions: select an input, select a preset number and view the selected input's state (take mode). |
| <p>⑦ Destination buttons</p> | Destination buttons have two functions: select an output, or view the selected output's state. |
| <p>⑧ Control lock</p> | Disables or enables front panel operation. When it illuminates red, operations on front panel are prohibited. |
| <p>⑨ Output lock</p> | Locks and protects one (or more) outputs. It inhibits accidental input changing on protected outputs. |

3.2. Rear view

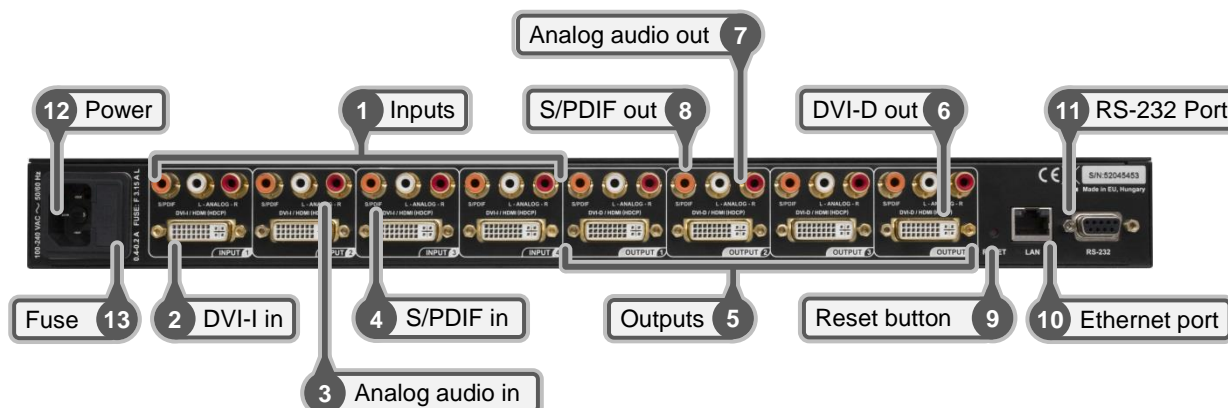


Figure 3-2. UMX4x4-Pro2 rear view

- | | |
|----------------------------------|--|
| <p>① Inputs</p> | UMX4x4-Pro2 has 4 input ports. Each port has one video, one analog stereo audio and one digital audio input. |
| <p>② DVI-I in</p> | Standard 29 pole DVI-I connectors for input connections. It accepts analog and digital signals. |
| <p>③ Analog audio in</p> | Double RCA jack connector for unbalanced, analog stereo audio input signal (left and right channels). |
| <p>④ S/PDIF in</p> | RCA jack connector for S/PDIF digital audio signal. |
| <p>⑤ Outputs</p> | UMX4x4-Pro2 has 4 output ports. Each port has one video, one unbalanced, analog stereo audio and one digital audio output. |
| <p>⑥ DVI-D out</p> | Standard 29 pole DVI connectors for outputs - only digital pins are connected. |
| <p>⑦ Analog audio out</p> | Double RCA jack connector for unbalanced, analog stereo audio output signal (left and right channels). |
| <p>⑧ S/PDIF out</p> | RCA jack connector for S/PDIF digital audio signal. Embedded audio is still present on the DVI-D outputs. |
| <p>⑨ Reset button</p> | Hardware reset button. It resets the whole router, however saved settings, presets and EDIDs will be preserved. |
| <p>⑩ Ethernet port</p> | Standard RJ45 connector. This port can be connected to a computer directly or to LAN via switch or router. |
| <p>⑪ RS-232 port</p> | 9 pole D-sub female connector for standard RS-232 port. |
| <p>⑫ Power</p> | Standard IEC power connector. The router works with 100 to 240 Volts, 50 or 60 Hz power sources. |
| <p>⑬ Fuse</p> | Replace with F 3.15AL type only. |

3.3. Port diagrams

Explanation of the device input and output ports:

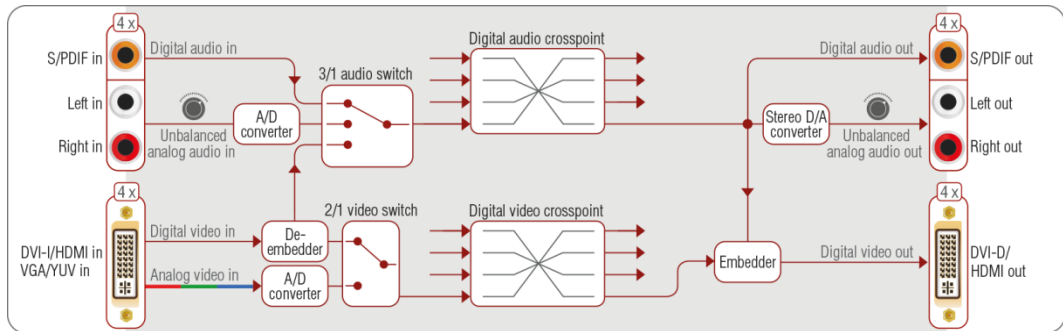


Figure 3-3. UMX4x4-Pro2 port diagram

Input side:

- The DVI-I connector accepts analog (VGA, YUV) or digital (DVI, HDMI) video signals.
- Analog video is always digitalized by the A/D converter of the input port.
- The embedded audio is always unwrapped from the HDMI signal by the de-embedder of the input port.
- Analog audio is always digitalized by the A/D converter of the input port.
- The input port properties (2/1 video and 3/1 audio switch) determinate which video (digitalized analog or digital) and which audio (digitalized analog, S/PDIF or unwrapped) signal reaches the crosspoint.

Output side:

- The embedder of the output port wrap the selected audio (selecting by the digital audio crosspoint) into the HDMI stream.
- If the video output is forced to DVI mode, there is no embedded audio.
- S/PDIF gives out the selected audio up-to two channels of uncompressed PCM audio or compressed 5.1/7.1 surround sound (such as DTS audio codec). (Dolby TrueHD and DTS-HD Master Audio bandwidth needs exceed the standard S/PDIF capability.)
- Analog audio output gives the first two channels of the selected audio, if it is not compressed (e.g. LPCM).

3.4. Electrical connections

3.4.1. DVI inputs and outputs

DVI Inputs

UMX4x4-Pro2 matrix switchers provide standard 29 pole DVI-I connectors for inputs. This way, users can plug in any DVI connector, but keep in mind that analog signals (such as VGA or RGBHV) are processed only on the DVI inputs.

Always use high quality DVI cable for connecting sources and displays.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-
2	TMDS Data2+	10	TMDS Data1+	18	TMDS Data0+
3	TMDS Data2 Shield	11	TMDS Data1 Shield	19	TMDS Data0 Shield
4	<i>Not Connected inside</i>	12	<i>Not Connected inside</i>	20	<i>Not Connected inside</i>
5	<i>Not Connected inside</i>	13	<i>Not Connected inside</i>	21	<i>Not Connected inside</i>
6	DDC Clock	14	+5V Power	22	TMDS Clock Shield
7	DDC Data	15	GND (for +5V)	23	TMDS Clock+
8	<i>Analog Vertical Sync¹</i>	16	Hot Plug Detect	24	TMDS Clock-
C1	<i>Analog Red¹</i>	C2	<i>Analog Green¹</i>	C3	<i>Analog Blue¹</i>
C4	<i>Analog Horizontal Sync¹</i>	C5	GND		

Table 3-1. DVI-I connector pin assignments

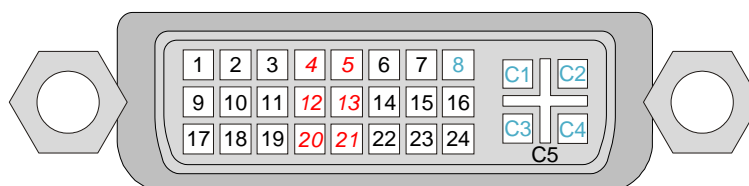


Figure 3-4. DVI connector

¹ - These pins are connected only on the DVI inputs.

DVI outputs

29 pole DVI-I connectors for outputs have only digital pins internally connected. This way, users can plug in any DVI connector, but keep in mind that analog signals (such as VGA or RGBHV) are NOT available on the outputs.

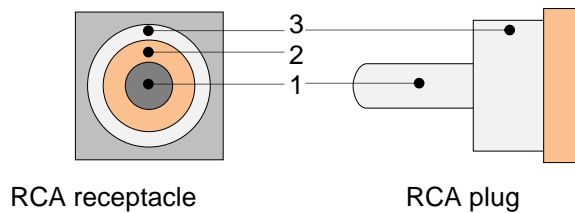
Fiber Cable powering

DVI outputs are able to supply 500 mA current on DDC +5V output (pin 14 on output connectors) which is sufficient to supply power to fiber optical DVI cables. Standard DVI outputs usually supply only 55 mA current on +5V output, thus unable to directly power a fiber optical cable.

Info: The matrix switcher does not check if the connected sink (monitor, projector or other equipment) supports Hotplug or EDID signals but outputs the selected signal immediately after switch command.

3.4.2. Digital audio inputs and outputs

UMX4x4-Pro2 matrix switchers have standard RCA receptacles for digital coaxial audio inputs and outputs.



RCA receptacle

RCA plug

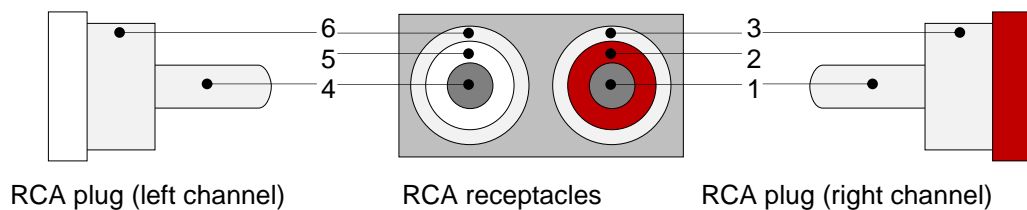
Nr.	Name
1	S/PDIF input or output
2	Plastic insulator
3	GND

Table 3-2. RCA connector pin assignments for digital audio

Info: Plugs and sockets on consumer equipment are conventionally color-coded by CEA/CEDIA-863-B (ANSI) to aid correct connections. According to the standard Lightware uses orange colored RCA connectors for S/PDIF signals.

3.4.3. Analog stereo audio inputs and outputs

UMX4x4-Pro2 matrix switchers have standard RCA receptacle for analog stereo audio inputs and outputs. Inputs and outputs work with standard line-in and line-out voltage levels.



RCA plug (left channel)

RCA receptacles

RCA plug (right channel)

Nr.	Name
1	Right channel input or output
2	Plastic insulator
3	GND
4	Left channel input or output
5	Plastic insulator
6	GND

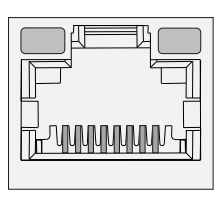
Table 3-3. RCA connector pin assignments for analog audio

Info: Plugs and sockets on consumer equipment are conventionally color-coded by CEA/CEDIA-863-B (ANSI) to aid correct connections. According to the standard Lightware uses red colored RCA connectors for right channel of analog stereo audio signals and white colored RCA connectors for left channel of analog stereo audio signals.

3.4.1. Ethernet port

Lightware UMX4x4-Pro2 matrix switchers can be remote controlled through Ethernet as well. The Ethernet port can be connected to a LAN hub, switch or router with a UTP patch cable. If connecting to a computer directly, a cross UTP cable has to be used!

The device contains two bi-color LEDs built into the front of the connector:



	LED1	LED2
OFF	no link	no activity
Amber	10 Mbps	half duplex
Green	100 Mbps	full duplex
Blink	N/A	activity

Figure 3-5. RJ45 receptacle connector

See section [6](#) about remote operation on page [46](#) for more information.

Wiring of RJ45 plugs



Figure 3-6. RJ45 plug

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

















Pin	Name	TIA/EIA T568 A	color and name	TIA/EIA T568 B	color and name
1	TX +		white/green stripe		white/orange stripe
2	TX -		green solid		orange solid
3	RX +		white/orange stripe		white/green stripe
4	Not used		blue solid		blue solid
5	Not used		white/blue stripe		white/blue stripe
6	RX -		orange solid		green solid
7	Not used		white/brown stripe		white/brown stripe
8	Not used		brown solid		brown solid

Table 3-4. Recommended termination of TP cables

3.4.1. RS-232 control port

UMX4x4-Pro2 matrix switchers can be remote controlled through industry standard 9-pole D-SUB female connector. The router can be ordered with RS 232 control port.

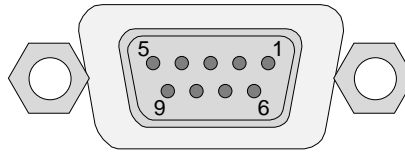


Figure 3-7. D-SUB 9 pole female connector (DE9F)

Pin nr.	RS-232
1	NC - not connected
2	TX data transmit (output)
3	RX data receive (input)
4	NC - not connected
5	GND signal ground (shield)
6	NC - not connected
7	NC - not connected
8	NC - not connected
9	NC - not connected

Table 3-5. D-sub connector pin assignment for standard RS-232

4. Technologies

4.1. Basics

EDID stands for Extended Display Identification Data. Simply put, EDID is the passport of display devices (monitors, TV sets, projectors). It contains information about the display's capabilities, such as supported resolutions, refresh rates (these are called Detailed Timings), the type and manufacturer of the display device, etc.

After connecting a DVI source to a DVI display, the source reads out the EDID to determine the resolution and refresh rate of the image to be transmitted.

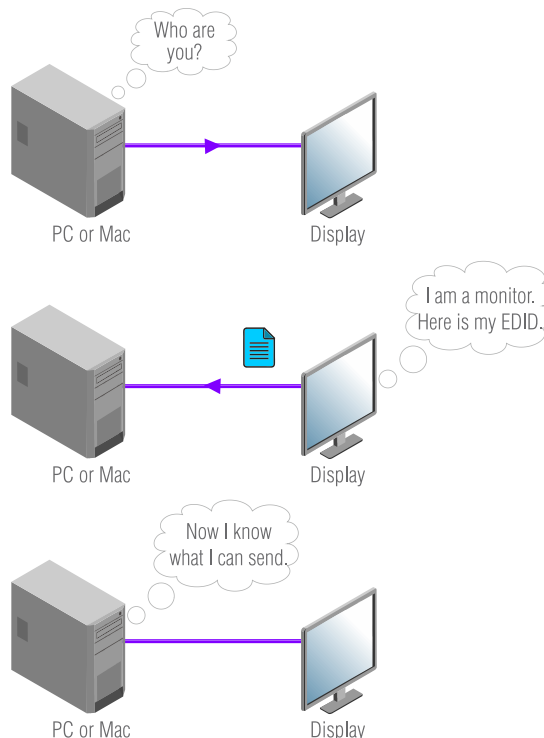


Figure 4-1. EDID communication

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 the most common extension is 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 are HDMI capable which have the extension.

4.1.1. Common problems related to EDID

Problem: „My system consists of the following: a computer, a Lightware UMX4x4-Pro2 matrix, a WUXGA (1920x1200) LCD monitor, and an SXGA (1280x1024) projector. I would like to see the same image on the monitors and the projector. What EDID should I chose on the monitor and the projector?“

Solution: If you want to see the image on both displays, you need to select the resolution of the smallest 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 matrix 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 don't sense that EDID has been changed. You need to restart your source to make it read out the EDID again.
- Problem:** „I have a UMX4x4-Pro2 and I'm using a Lightware factory preset EDID. I would like to be able to choose from different resolutions, but my source allows only one resolution.”
- Solution:** Most of the Lightware factory preset EDIDs allow only one resolution, forcing the sources to output only that particular signal. You need to select a Universal EDID. It supports all common VESA resolutions. Additionally it also features audio support.

4.2. Advanced EDID management

Each DVI sink (e.g. monitors, projectors, plasma displays, and switcher inputs) 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. HDMI standard makes use of EDID data structure for the identification of 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 case of EDID readout failure or missing EDID the source will not output DVI video signal. UMX4x4-Pro2 provides Lightware's Advanced EDID Management function that helps system integration. The built in EDID memory stores and emulates pre-programmed factory EDIDs, user's EDIDs and all monitor's EDID that is connected to the output connectors. The router stores the EDID of all attached monitors or projectors for each output in a non-volatile memory. This way the EDID from 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 monitors memory (dynamic EDID emulation). For example, the router can be set up to emulate a 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. EDID management can be controlled via serial port or Ethernet.

- Info: The user is not required to disconnect the DVI 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 it is powered ON.*
- Info: When EDID has been changed, the router toggles the HOTPLUG signal for 2 seconds. Some sources do not observe this signal, so in this case the change is not recognized by the source. In such cases the source device must be restarted or powered OFF and ON again.*

4.3. HDCP management

Lightware Visual Engineering is a legal HDCP adopter, and several functions have developed which help to solve HDCP related problems.

4.3.1. Mixing encrypted and unencrypted signals

Complex AV systems often have both HDCP and non-HDCP components. Lightware UMX matrices allow to use HDCP encrypted and unencrypted signals in the same system.

The router will be still HDCP compliant as it will never output an encrypted signal to a non-HDCP compliant display device. If an encrypted signal should be switched to a non-compliant output, it will be muted.

Info: If an output is connected to an input and the output gets a valid video signal (external video source or no screen screen) from the crosspoint, then the muting means the device gives black screen. The resolution and refresh rate of the black screen is the same as the incoming video. If there is no incoming video (via the crosspoint) muting results a missing signal.

4.3.2. HDCP key caching

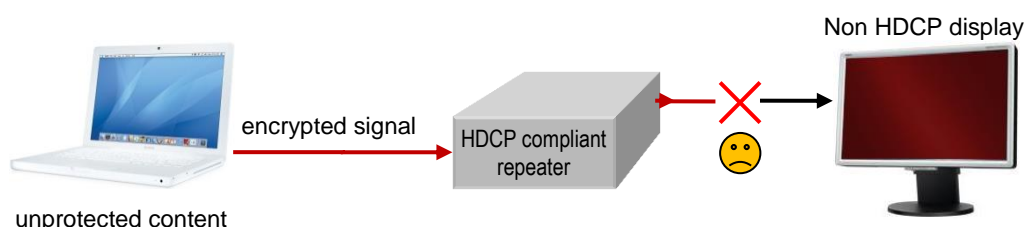
Lightware introduced the HDCP key caching technique in early 2009 that validates all the display keys in an AV system during system boot up and keeps them constantly available for sources. This method eliminates the HDCP handshake at every switch and keeps all sources sending uninterrupted signals.

Without this function the sources should re-authenticate HDCP after each crosspoint switch which makes the displays to drop the signal and go black for 5-8 seconds. The HDCP key caching technique avoids this and allows instantaneous switching between two encrypted signals.

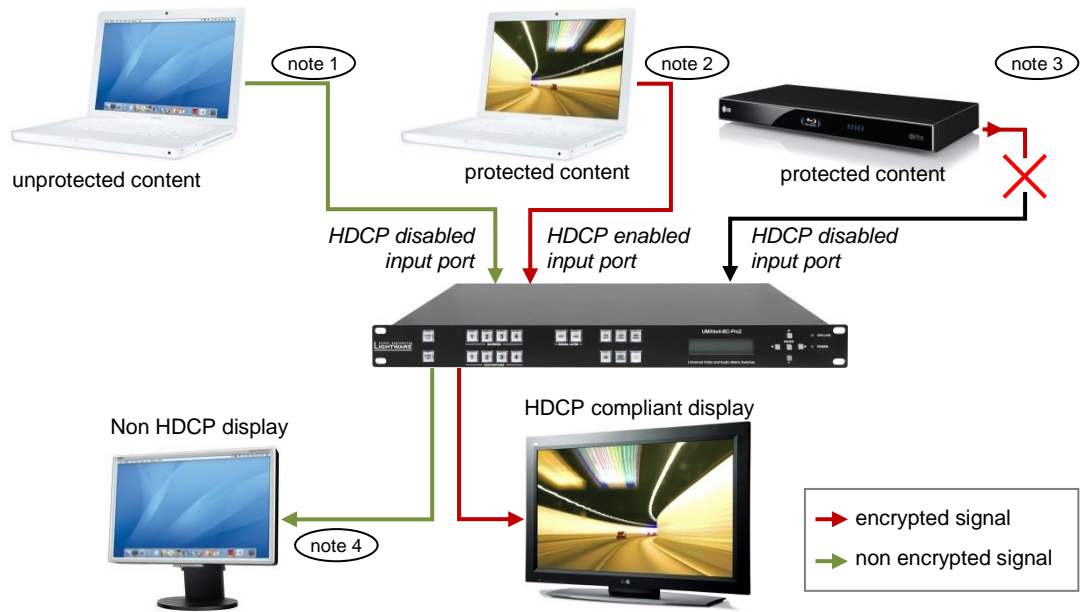
4.3.3. Avoiding unnecessary HDCP encryption

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 a HDCP capable device (e.g. repeater or matrix router) is connected between the source and the display. In this case the content can't be viewed on non-HDCP capable displays and interfaces like event controllers.

Rental and staging technicians often complain about certain laptops, who always send 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 on each input port separately. If HDCP is disabled on an input port, the connected source will detect that the sink is not HDCP capable, and turn off authentication. The source will not be able to communicate with any of the devices (displays, repeaters, etc.) that are connected to the routers output, therefore it could not see if they are HDCP capable or not.



Note 1: If a source detects that the input port is HDCP disabled, it will send only unprotected content.

Note 2: If a source detects that the input port is HDCP enabled, it could send protected or unprotected contents as well.

Note 3: HDCP protected content will not be sent to any input port with disabled HDCP setting.

Note 4: HDCP protected content will never be sent to a non HDCP compliant display.

Please note that if HDCP capability is disabled on an input port, the connected source cannot send protected content to any display. If HDCP function is enabled on an input port and the source sends encrypted signal, the non-HDCP compliant devices cannot display the video. This new feature does not remove the encryption of an encrypted signal, and does not void HDCP standard at all.

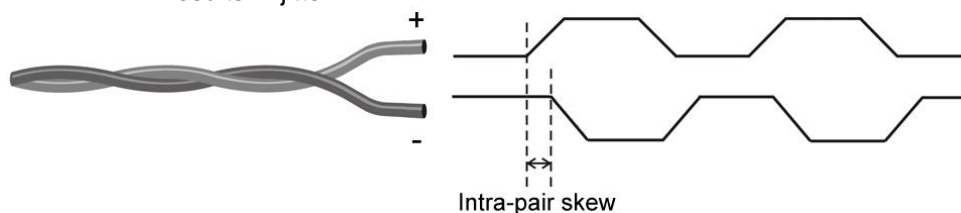
4.4. Pixel Accurate Reclocking

Signal reclocking is an essential important procedure in digital signal transmission. After passing the reclocking circuit, the signal becomes stable and jitter-free, and can be transmitted over more equipment like processors, or event controllers. Without reclocking, sparkles, noise and jaggies can be seen on the image.

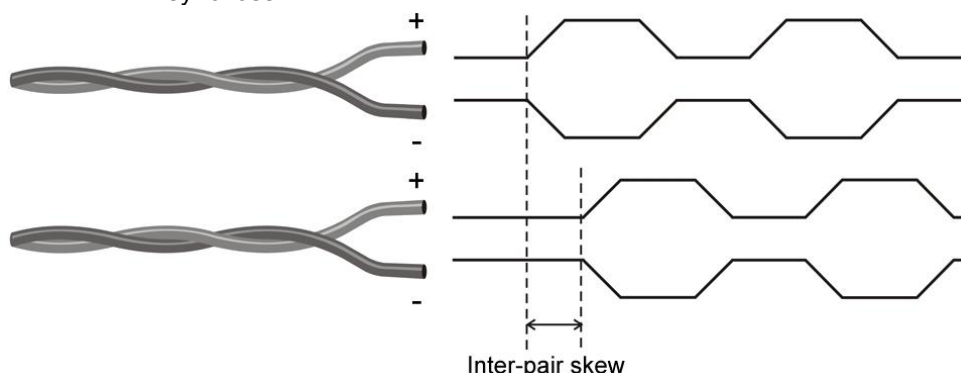
Lightware's sophisticated Pixel Accurate Reclocking technology fixes more problems than general TMDS reclocking. It removes not only intra-pair skew but inter-pair skew as well.

The Pixel Accurate Reclocking circuit eliminates the following errors:

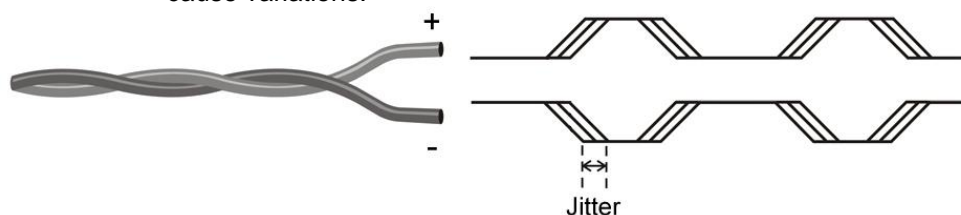
Intra-pair skew: skew between the + and - wires within a differential wire pair (e.g. Data2- and Data2+). It's caused by different wire lengths or slightly different wire construction (impedance mismatch) in HDMI cable. It results in jitter.



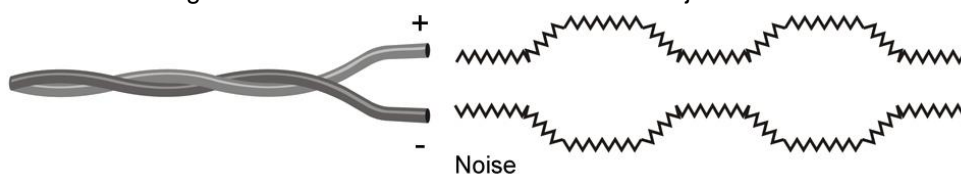
Inter-pair skew: skew between two differential wire pairs in a cable. It's caused by different wire pair lengths or different number of twists in the HDMI cable. Too much inter-pair skew results in color shift in the picture or sync loss.



Jitter: signal instability in the time domain. The time difference between two signal transitions should be a fix value, but noise and other effects cause variations.



Noise: electromagnetic interference between other electronic devices such as mobile phones, motors, etc. and the HDMI cable are coupled onto the signal. Too much noise results in increased jitter.



The Pixel Accurate Reclocking circuit completely regenerates the original video signal and outputs a strong, high-quality digital signal that conforms to the HDMI specification.

4.5. RICOD

4.5.1. Introduction

The main goal of Remote Input Control Over DDC (RICOD) is to control the remote Lightware transmitters attached to a router (local device). The control means input switching (select video and audio sources) and locking /unlocking the remote buttons / switches.

Info: There is no possibility to send other kind of commands, including Lightware protocol commands or any other character sequence. The "RS-232 extension" function is out of the question.

Info: RICOD is Lightware's intellectual property and proprietary function. It works only with Lightware devices.

4.5.2. RICOD capable devices

The RICOD functionality must be implemented in the firmware of the devices. (It can be implemented in the Lightware devices with more than one input ports.)

It is currently implemented in the following devices:

- UMX4x4-Pro, firmware version 1.2.4r and above
- UMX4x4-Pro2, firmware version 2.0.0r and above
- WP-UMX-TP-TX100, firmware version 1.1.0r and above
- FP-UMX-TP-TX100, firmware version 1.1.0r and above
- UMX-TP-TX100R, with firmware version 1.1.6r and above
- MX-CPU2, with firmware version 3.3.5r and above*

* The MX-FR series modular matrix frames with MX-CPU2 processor boards (with firmware version 3.3.5r and above) support reduced RICOD capabilities: only MASTER mode is available and only by protocol commands. RICOD SLAVE mode and the front panel operation are not implemented.

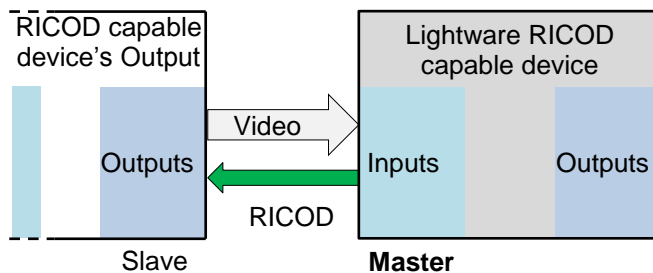
4.5.3. Operation: Master and Slave mode

First of all it is important to understand the direction of RICOD and the working modes.

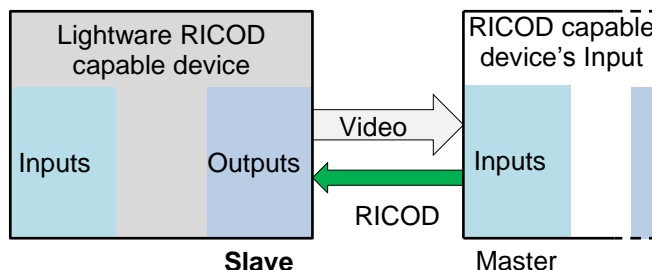
Lightware RICOD capable devices are able to send out remote switching commands on their video inputs towards another RICOD capable devices' video output and / or they can receive remote switching commands on their video outputs from another RICOD capable devices' video input.

One device can work as a Master or a Slave.

- **Master** - If a device sends out RICOD commands over its video input it works as a Master, like the device on the right side. The Lightware Matrices (e.g. UMX4x4-Pro2) work as RICOD Masters typically.



- **Slave** - If a device receives RICOD commands over its video outputs it works as a Slave, like the device on the left side. In this case the devices are capable of receiving commands over their outputs (e.g. connected to another Lightware device) if the function is enabled. This means that the remote device is capable of being controlled from that given output. (The command affects only that output where the RICOD command was received). The Lightware transmitters (e.g. WP-UMX-TP-TX100) work as RICOD Slaves typically.



4.5.4. Factory defaults

After firmware upgrade the **Slave** mode is always **enabled** (commands from the Master devices are accepted and executed) and the **Master** mode is always **disabled**. This state will be caused by reloading the factory defaults with {FACTORY=ALL}, protocol command. For more information about reloading the factory defaults see the user's manual of the devices.

4.5.5. Enable / disable RICOD

Users can enable or disable the RICOD function for each input and output video port separately. For example, one can enable the RICOD on the 1st and the 2nd video input and the 1st and the 3rd video output port. RICOD is disabled on the other video input and output ports. Figure 4-2 shows this case. Video ports where RICOD is enabled are green.

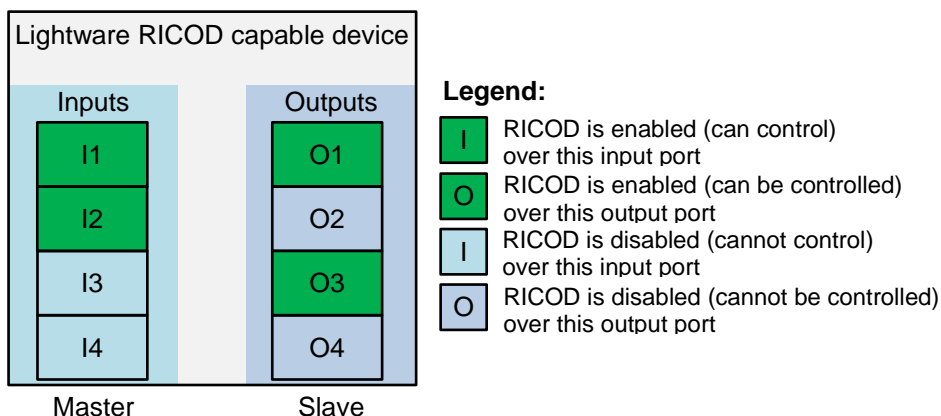


Figure 4-2. Enabling RICOD

The RICOD can be enabled or disabled by LW2 protocol commands for every Lightware device. (For more information see section [RICOD related commands](#) on page 113.)

Another way to change RICOD state is available for devices which have front panel LCD. In this case users can change settings with front panel operation. The section RICOD master on page 42 introduces the UMX4x4-Pro2 front panel menu contents affected by RICOD.

4.5.6. Validity of RICOD

The last command will be saved for each input and will be preserved until a new command arrives or until the function is disabled. If the remote controlled device is restarted, replaced or disconnected and connected again, then the command will be executed again. The command will take effect even if the local device (e.g. the UMx4x4-Pro2) is restarted or the function is enabled again.

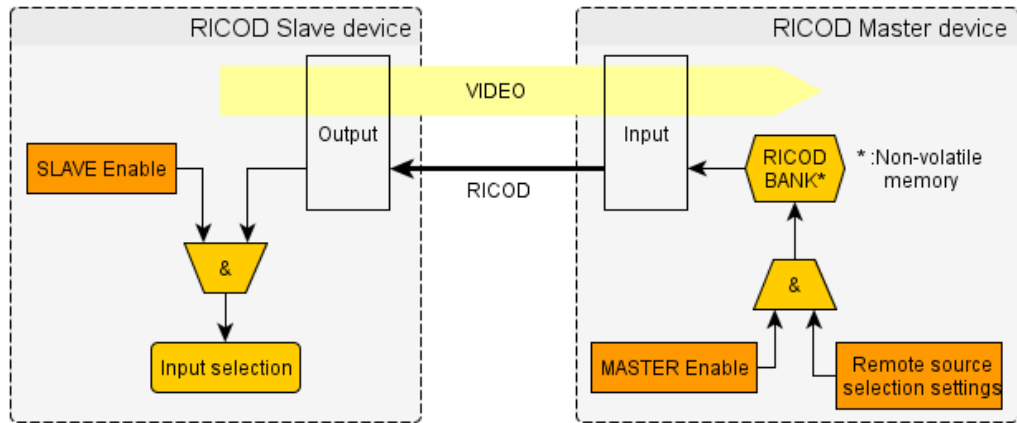


Figure 4-3. Working of RICOD

Info: The communication between the devices is uni-directional, so there is no feedback from the remote controlled device.

4.5.7. Locking the remote device

The intention of this feature is to prevent accidental or unwanted switching when the remote device is installed near to the end-users. The remote device can be locked by the local device via a RICOD command. The behavior is different for the video routers and for the extenders:

Extenders

If an extender (talking about transmitters, i.e. WP-UMX-TP-TX100) receives a lock command by the RICOD function, then it will disable the front panel switching buttons. The buttons are disabled until the device is disconnected (connection is detected by the Hotplug detect signal – which is carried by the DDC CAT cable when using CATx extenders) or the remote lock command is cleared by the local device. This can be done by turning off the RICOD function or by turning off only the lock command.

If a new device is connected which doesn't support RICOD commands then the remote lock will be disabled.

Note that when the buttons are disabled, then they don't react at all - switching and unlocking are also impossible.

The transmitters are still able to receive and execute commands via their local control interface (e.g. RS-232 or USB) while RICOD lock is enabled. The remote lock command affects only the buttons, but doesn't prevent the switching if it is commanded locally.

Locking operation flowchart

Buttons on the extenders can be locked by front panel operation or remotely, but the two ways of locking are not the same. If buttons were locked by a front panel operation, they can be unlocked by a RICOD unlock command followed by an unlock operation on the front panel. To better understand the locking sequence, please study [Figure 4-4](#).

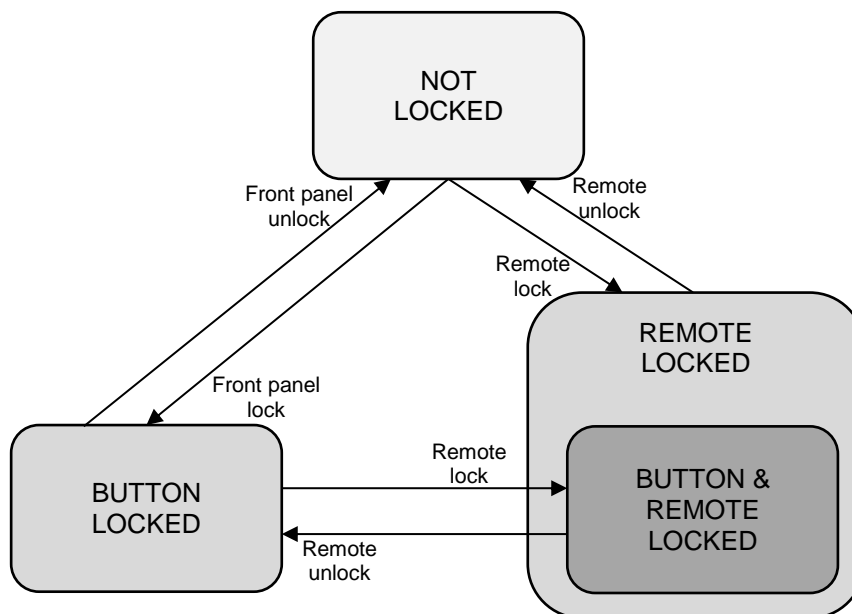


Figure 4-4. Locking flowchart of the extenders

Routers

The routers behave differently because locking the whole front panel is not reasonable. When the RICOD function is enabled for an output port (see RICOD_SLEN command in chapter [8.12.3](#) on page [114](#)) and a lock command is received over the same port, then the output port will be "output locked". This is the same output lock function as described in the manual of the router. The output lock is reported back by the protocol (is shown in the control software and in the web) and is displayed on the front panel. The output lock can be overridden and turned off by protocol or front panel.

If the output lock is enabled for a given port, a remote RICOD command is also able to turn it off.

Important! The accepted RICOD command overrides the output lock function. If the RICOD function is turned on for a given output port, then the output lock condition can be changed remotely.

4.5.8. An example application

An example connection variation with UMX4x4-Pro2 router and WP-UMX-TP-TX100 extenders are shown on [Figure 4-5](#).

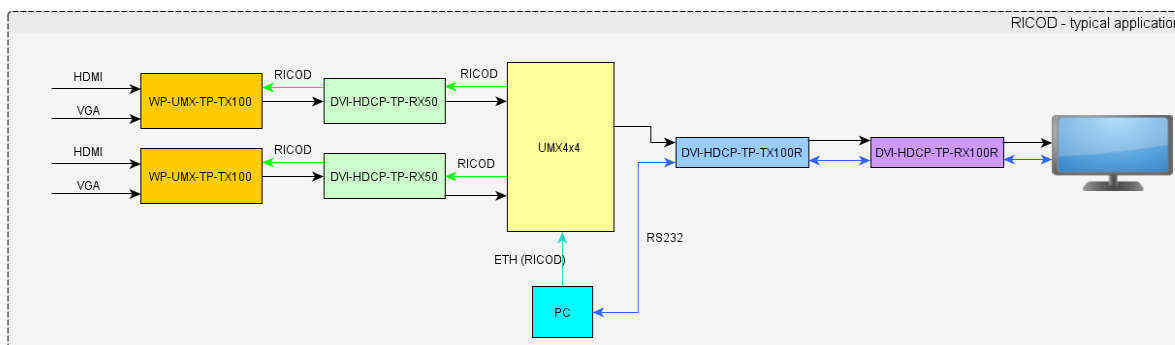


Figure 4-5. A typical application

5. Operation

5.1. Power

Connect the power cord to the device's IEC C14 standard power input connector. The router is immediately powered ON when the power cord is connected to the AC source.

During the initial self-test and loading of the latest settings „Booting...” appears on the LCD screen. After the self-test, the router reloads its last configuration and it is ready to use. In case of hardware failure, an error message is displayed.

Info: After switching ON, the router reloads the latest settings that were used before it was turned off. 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.

5.2. Front panel operations

5.2.1. Signal layers

Video and audio signals are in different layers. It means video and audio signals can be switched separately or together. For example the video signal of the first input and the audio signal of the second input can be switched to the first output.

At least one layer is selected all the time. Therefore the currently selected layer buttons are illuminated. To toggle between the layers' on and off state press the VIDEO and/or the AUDIO signal layer buttons. If a layer was selected the button is light continuously. If only one layer was selected and the associated button is pressed the layer will be deselected and the other layer will be selected.

Before every operation which effects input and output signals (e.g. switching, muting, locking, etc.) the desired layer should be selected.

5.2.2. TAKE / AUTOTAKE modes

The router has two different switching modes: TAKE and AUTOTAKE. If the TAKE / AUTO button is unlit, TAKE mode is active. When the TAKE / AUTO button continuously lights green, AUTOTAKE mode is selected.

Press and hold the TAKE / AUTO button for three seconds to toggle between TAKE and AUTOTAKE modes.

TAKE mode allows the user to connect or disconnect multiple outputs to an input at once. This mode is useful when time delay is not allowed between multiple switching. 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 is useful when immediate actions must be done or fast switching is needed between sources on a particular destination. In this mode switching occurs immediately upon pressing one of the input selector buttons.

5.2.3. CONTROL LOCK

Front panel button operations can be enabled or disabled using CONTROL LOCK button, while RS-232 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) and LCD shows the “Control lock” text in case of any button is pressed.

Press and hold the CONTROL LOCK button for 3 seconds to toggle the control lock status. The current status is stored by the matrix and will be reloaded after a reboot.

5.2.4. SOURCES and DESTINATIONS buttons

Input and output ports have dedicated buttons on the front panel. These buttons are labeled with numbers and have backlight to indicate active or selected ports. These are referred as SOURCES and DESTINATIONS buttons.

5.2.5. Viewing crosspoint state

User can check the current switching status on the front panel using front panel buttons. This status view feature is slightly different in TAKE or AUTOTAKE modes because of different switching philosophy of the two modes.

Important! Each layer has own crosspoint state. If only one layer is selected the current state belongs to the active layer. If both of the layers are selected the showed crosspoint state belongs to the VIDEO layer.

Info: Status view occurs whenever the router has to be switched. After entering the view state, the user can change the routing configuration. Viewing and switching can be done after each other, or if nothing is pressed for three seconds, the router returns to idle state.

View current state in TAKE mode

If all source and destination buttons and TAKE button are unlit (the unit is in TAKE mode, and no input was selected in last 3 seconds), user can verify both input and output connections for any layer. This informative display will remain for 3 seconds, and then all button lamps go out. In TAKE mode no accidental change can be done unless TAKE button is pressed.

For viewing **input connections**, select the desired layer(s) then press and release a source button. Now the selected source button and all destination buttons will light up which are currently connected to the selected source.

For viewing **output connections**, select the desired layer(s) then press and release a 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 in muted state.

View current state in AUTOTAKE mode

In AUTOTAKE mode only states of destinations can be viewed.

Select the desired layer. 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.

Info: Muting or disconnecting an output cannot be done in AUTOTAKE mode.

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

5.2.6. Switching

Creating connections in TAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** 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. The dark remaining destination buttons are not connected to this source. This is an informative display about current status of the selected input (view only).
- Step 3.** Press and release the desired destination button or buttons which has to be connected to the selected source. The preselected destination button(s) start(s) blinking.
- Step 4.** Press and release TAKE button to execute switching. Now the selected input is switched to the selected output or to the multiple outputs.

Info: 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, 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.

Disconnecting or muting in TAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** 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. The dark remaining destination buttons are not connected to this source. This is an informative display about current status of the selected input (view only).
- Step 3.** Press and release the selected, green lighting destination button which has to be disconnected from the selected source. The pressed destination or multiple destinations will turn dark.
- Step 4.** 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.

Info: If the pressed destination is locked then it could not be deselected. This is indicated by a short flash of the OUTPUT LOCK when a locked destination is pressed.

Info: Multiple switching and deselecting actions can be done simultaneously, during only one TAKE action.

Creating a connection in AUTOTAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Press and release the desired destination button. The pressed destination button and the actually connected source button light up green. If no source is connected (the output is muted) no source button will light up.
- Step 3.** Press and release the desired input button. The switch action will be executed immediately. Switching between sources to the selected destination can be done directly.

Info: If the pressed destination is locked then sources could not be selected. This is indicated by a continuously light of the OUTPUT LOCK when a locked destination is pressed.

5.2.7. Switching operations flowchart

To better understand the viewing and switching sequence in TAKE and AUTOTAKE modes, please study the below diagrams.

Switching sequences are the same with any layer selection.

Info: Layers can be selected or deselected whenever during the switching sequence.

TAKE mode

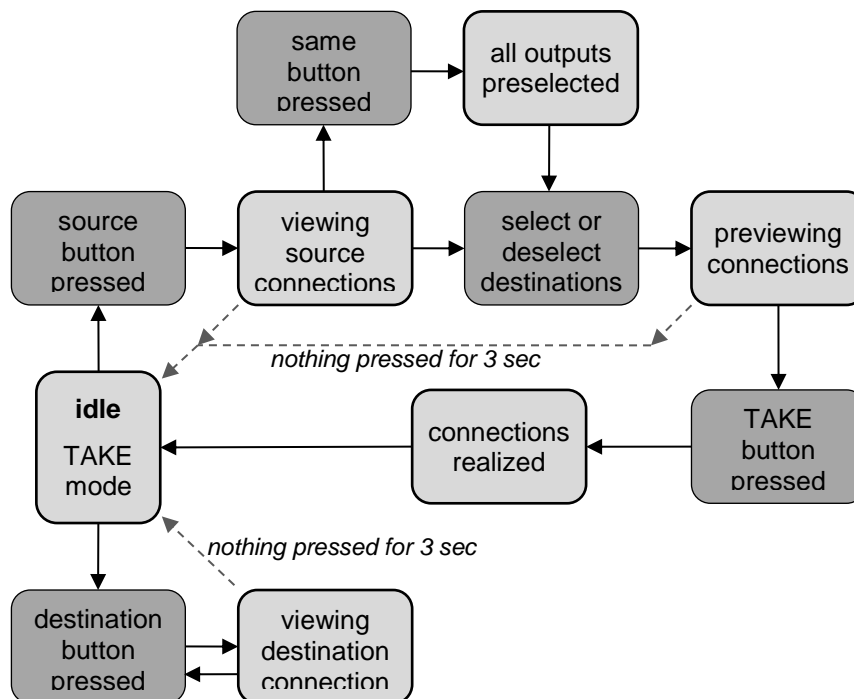


Figure 5-1. Switching flowchart in TAKE mode

AUTOTAKE mode

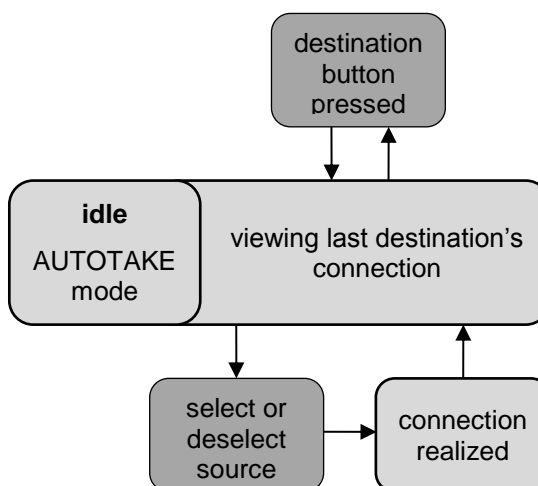


Figure 5-2. Switching flowchart in AUTOTAKE mode

5.2.8. Preset operations

All Lightware matrices have 32 user programmable presets. Each preset stores a configuration regarding all input connections and mute state for all outputs and both of the layers. All presets are stored in a non-volatile memory; the router keeps presets even in case of power down. Memory numbers are assigned to source buttons 1 to 4. The higher numbered presets are accessible only through software control.

Saving a Preset in TAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Create the desired connections which have to be saved.
- Step 3.** Press and release the SAVE PRESET button.
- Step 4.** Press and release a source button according to the desired memory address (source 1 to 4).
- Step 5.** Press and release TAKE button. Now the current configuration is stored in the selected memory.

Info: 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 LOAD PRESET button.
- Step 2.** Press and release a source button according to the desired memory address (source 1 to 4).
- Step 3.** Press and release TAKE button. Now the selected preset is loaded.

Info: Loading a preset modifies all output states that are not currently locked.

Saving a Preset in AUTOTAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Create the desired connections which have to be saved.
- Step 3.** Press and release SAVE PRESET button.
- Step 4.** Press and release a source button according to the desired memory address (source 1 to 4). Now the current configuration is stored in the selected memory.

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

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 4). Now the selected preset is loaded.

Info: Loading a preset modifies all output states that are not currently locked.

5.2.9. OUTPUT LOCK

Using Lightware routers it is possible to lock a destination's state. This feature prevents an accidental switching to the locked destination in case of important signal. Locking a destination means, that no input change or muting can be executed on that particular destination.

Destinations can be independently locked or unlocked. Locking a destination does not affect other destinations. Layers can be independently locked or unlocked as well. Locking a layer does not affect the other layer.

View locked outputs in TAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Press and release the Output Lock button.
- Step 3.** The Output Lock button starts to blink and all the buttons of any locked destinations light up, and remain illuminated for three seconds.

Lock an output in TAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Press and release the Output Lock button.
- Step 3.** Now the Output Lock button starts to blink and all the locked output's buttons illuminate green (view state).
- Step 4.** If no button is pressed for three seconds, the router returns to idle state.
- Step 5.** If an unlit output button is pressed, it starts to blink, to indicate that it is preselected for output locking.
- Step 6.** Press and release TAKE button. The selected destinations are now locked.

Unlock an output in TAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Press and release the Output Lock button.
- Step 3.** Now the Output Lock button starts to blink and all the locked output's buttons illuminate green (view state).
- Step 4.** If no button is pressed for three seconds, the router returns to idle state.
- Step 5.** If an illuminating output button is pressed, it goes off, to indicate that it is preselected for unlocking.
- Step 6.** 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 to 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.

Lock an output in AUTOTAKE mode

- Step 1.** Select the desired layer. (Video or audio or both of them)
- Step 2.** Press and release the required destination button. Now the selected destination button and the currently configured source button light up (view mode).
- Step 3.** 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.

Unlock 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 (deselect). Now the Output Lock button turns off, and the locking function has been cancelled.

5.3. About EDID memory

EDID memory is non-volatile and consists of four blocks, each for different purpose. These blocks are:

- Factory preset EDIDs
- User saved EDIDs
- Dynamic EDIDs (EDID of last connected sink on a specific output port)
- Emulated EDIDs (EDID currently emulated on a specific input port).

EDIDs are numbered from 1 in each block, and they can be referred as the first letter of the block name, and the number of the desired EDID. This way F02 refers to the second factory preset EDID, and D04 refers to the display device's EDID on output 4.

The memory structure is as follows:

```
F01..F99 ..... Factory Preset EDIDs
U01..U50 ..... User programmable memories
D01..D04..... Last attached monitor's EDIDs (on outputs)
E01..E04 ..... Emulated EDIDs (on inputs)
```

All EDIDs (including factory preset; user programmable memories; EDID at other inputs; and EDID at outputs) can be switched and emulated at any of the inputs.

Info: The factory EDIDs (Fxx) are factory preprogrammed and cannot be modified. These are the most commonly used resolutions.

Info: UMX4x4-Pro2 matrix switcher can handle both 128 Byte EDID and 256 Byte extended EDID structures.

Info: The attached monitor's EDID is stored automatically, until a new monitor is attached to that particular output. In case of powering the unit off, the last attached monitor's EDID remains in non-volatile memory even is the monitor is unconnected.

5.3.1. EDID types

Most of the factory preset EDIDs include only one resolution. This is to force the connected source to give a signal with the needed resolution. However there are Universal EDIDs as well which allow many resolutions.

The factory EDIDs are divided into groups regarding their type. Some EDIDs are supporting DVI only, some support HDMI, and some are for analog VGA signals.

Analog EDIDs can be used for input ports which have a VGA (RGBHV) source.

DVI EDIDs does not support audio. The Universal DVI EDID indicates support for many PC resolutions.

HDMI EDIDs support embedded LPCM audio.

5.3.2. Factory EDID list

Memory	Resolution	Type	Memory	Resolution	Type
F01	640 x 480 @ 60.0 Hz	DVI	F50	720 x 480 @ 30.1 Hz	Analog
F02	848 x 480 @ 60.0 Hz	DVI	F51	720 x 576 @ 25.3 Hz	Analog
F03	800 x 600 @ 60.30 Hz	DVI	F52	640 x 480 @ 60.0 Hz	Analog
F04	1024 x 768 @ 60.0 Hz	DVI	F53	640 x 480 @ 75.0 Hz	Analog
F05	1280 x 768 @ 50.0 Hz	DVI	F54	800 x 600 @ 50.0 Hz	Analog
F06	1280 x 768 @ 59.92 Hz	DVI	F55	800 x 600 @ 60.30 Hz	Analog
F07	1280 x 768 @ 75.0 Hz	DVI	F56	800 x 600 @ 74.99 Hz	Analog
F08	1360 x 768 @ 60.1 Hz	DVI	F57	1024 x 768 @ 49.98 Hz	Analog
F09	1280 x 1024 @ 50.0 Hz	DVI	F58	1024 x 768 @ 60.0 Hz	Analog
F10	1280 x 1024 @ 60.1 Hz	DVI	F59	1024 x 768 @ 75.2 Hz	Analog
F11	1280 x 1024 @ 75.1 Hz	DVI	F60	1280 x 768 @ 50.0 Hz	Analog
F12	1400 x 1050 @ 49.99 Hz	DVI	F61	1280 x 768 @ 59.92 Hz	Analog
F13	1400 x 1050 @ 59.99 Hz	DVI	F62	1280 x 768 @ 75.0 Hz	Analog
F14	1400 x 1050 @ 75.0 Hz	DVI	F63	1360 x 768 @ 60.1 Hz	Analog
F15	1680 x 1050 @ 59.99 Hz	DVI	F64	1364 x 768 @ 50.0 Hz	Analog
F16	1920 x 1080 @ 50.0 Hz	DVI	F65	1364 x 768 @ 59.93 Hz	Analog
F17	1920 x 1080 @ 60.0 Hz	DVI	F66	1364 x 768 @ 74.98 Hz	Analog
F18	2048 x 1080 @ 50.0 Hz	DVI	F67	1280 x 1024 @ 50.0 Hz	Analog
F19	2048 x 1080 @ 59.99 Hz	DVI	F68	1280 x 1024 @ 60.1 Hz	Analog
F20	1600 x 1200 @ 50.0 Hz	DVI	F69	1366 x 1024 @ 59.99 Hz	Analog
F21	1600 x 1200 @ 60.0 Hz	DVI	F70	1400 x 1050 @ 49.99 Hz	Analog
F22	1920 x 1200 @ 50.0 Hz	DVI	F71	1400 x 1050 @ 59.99 Hz	Analog
F23	1920 x 1200 @ 59.55 Hz	DVI	F72	1400 x 1050 @ 75.0 Hz	Analog
F24	2048 x 1200 @ 59.95 Hz	DVI	F73	1920 x 540 @ 50.0 Hz	Analog
F25	Reserved	DVI	F74	1920 x 540 @ 59.98 Hz	Analog
F26	Reserved	DVI	F75	1920 x 1080 @ 50.0 Hz	Analog
F27	Reserved	DVI	F76	1920 x 1080 @ 60.0 Hz	Analog
F28	Reserved	DVI	F77	1600 x 1200 @ 50.0 Hz	Analog
F29	Universal_DVI	DVI	F78	1600 x 1200 @ 60.0 Hz	Analog
F30	1440 x 240 @ 60.3 Hz	HDMI	F79	1920 x 1200 @ 59.55 Hz	Analog
F31	1440 x 288 @ 50.6 Hz	HDMI	F80	1920 x 1200 @ 50.0 Hz	Analog
F32	640 x 480 @ 59.94 Hz	HDMI	F81	Reserved	Analog
F33	720 x 480 @ 59.92 Hz	HDMI	F82	Reserved	Analog
F34	720 x 576 @ 50.0 Hz	HDMI	F83	Reserved	Analog
F35	1280 x 720 @ 50.0 Hz	HDMI	F84	Reserved	Analog
F36	1280 x 720 @ 60.0 Hz	HDMI	F85	Reserved	Analog
F37	1920 x 540 @ 50.3 Hz	HDMI	F86	Reserved	Analog
F38	1920 x 540 @ 50.0 Hz	HDMI	F87	Reserved	Analog
F39	1920 x 540 @ 59.98 Hz	HDMI	F88	Reserved	Analog
F40	1920 x 540 @ 60.5 Hz	HDMI	F89	Universal_Analog	Analog
F41	1920 x 1080 @ 24.0 Hz	HDMI	F90	Reserved	
F42	1920 x 1080 @ 24.99 Hz	HDMI	F91	Reserved	
F43	1920 x 1080 @ 30.0 Hz	HDMI	F92	Reserved	
F44	1920 x 1080 @ 50.0 Hz	HDMI	F93	Reserved	
F45	1920 x 1080 @ 59.93 Hz	HDMI	F94	Reserved	
F46	1920 x 1080 @ 60.0 Hz	HDMI	F95	Reserved	
F47	Reserved	HDMI	F96	Reserved	
F48	Reserved	HDMI	F97	Reserved	
F49	Universal_HDMI_2CH	HDMI	F98	Reserved	
			F99	Reserved	

Table 5-1. Factory preset EDID list

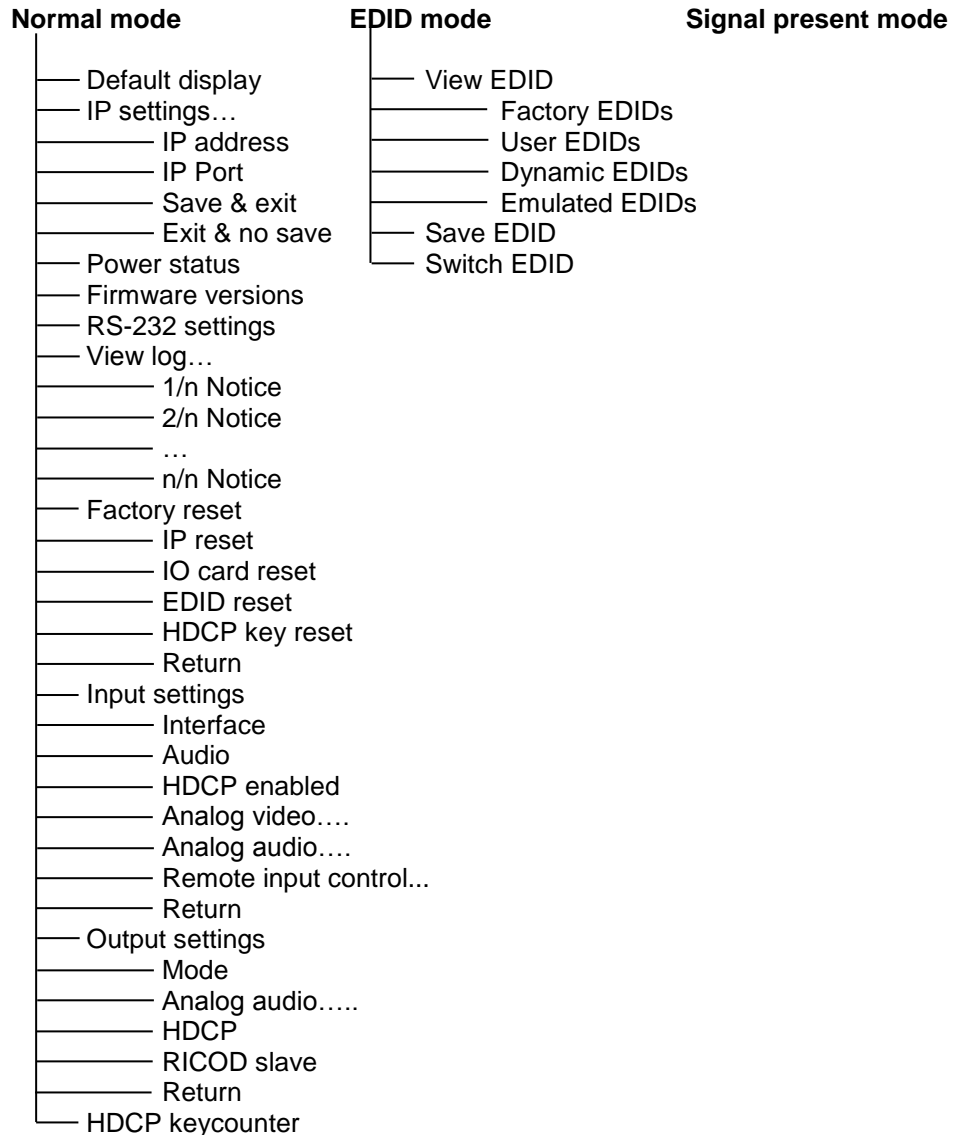
5.4. Front panel LCD menu operation

5.4.1. Basic concept

There are three operating modes of the LCD menu:

- Normal mode** Most settings can be done in this mode. It is active when neither the EDID nor the SIGNAL PRESENT button lights.
- EDID mode** Use this mode to set up the emulated EDID on the inputs, learn EDID form the outputs or to view the EDID memory. Enter or exit this mode by pressing the EDID button. The illuminated button shows that this mode is active.
- Signal present mode** This mode is for checking the presence of the display devices and incoming signals. Enter or exit this mode by pressing the SIGNAL PRESENT button. The illuminated button shows that this mode is active.

5.4.2. Menu structure



5.4.3. Navigation

The front panel LCD has 2 lines and 16 characters in each line. The left ◀ and right ▶ buttons can be used to scroll between menu items. The enter ⬤ button steps in the submenus or makes changes available. The up ▲ and down ▼ navigation buttons modify the value for the current menu item.

5.4.4. Normal mode

Main menu list

Left ◀ and right ▶ buttons select between menu items. Enter ⬤ button steps in submenus or select the changeable values.

Default display

Default display activates after power up. This screen shows the current IP address, the current IP port and the serial number of the matrix.

```
192.168.254.254
10001 59058505
```

IP settings menu

This menu contains IP address assignment settings and TCP/IP Port value. If the DHCP is switched off then IP Gateway and IP Subnet mask can be set as well. Changes take place only when 'Save & settings' is executed. Select the 'Exit & no save' to return to main menu without saving any changes.

```
IP settings...
```

IP address settings

Navigate to this item and press ENTER ⬤ button to be able to change the value. Use the up ▲ and down ▼ buttons to toggle between DHCP and fix IP address. If the DHCP is switched off then the IP address can be set by the user. The four part of the fix IP address can be set separately. Use the left ◀ and right ▶ buttons to select the part, and then use the up ▲ and down ▼ buttons to change the value of that part. To take effect settings press ENTER ⬤ button.

```
IP ADDR DHCP
```

```
IP ADDR fixIP
192.168.000.105
```

TCP / IP Port value

Navigate to this item with the up left ◀ and right ▶ buttons and press ENTER ⬤ button to be able to change the value. Use the up ▲ and down ▼ buttons to change the TCP/IP port value. To take effect settings press ENTER ⬤ button.

```
IP PORT 10001
MAC:0080A3A33414
```

IP Gateway

If the DHCP is switched off then IP Gateway settings are available. This address can be set the same like IP address.

```
IP GATEWAY
000.000.000.000
```

IP Subnet

If the DHCP is switched off then IP Subnet settings are available. This address can be set the same like IP address.

```
IP SUBNET
000.000.000.000
```

Save settings

Any changes made in the IP settings menu come alive only when 'Save & exit' is executed. To do this, navigate to this item with the left ◀ and right ▶ buttons, then press ENTER ⬤.

```
Save & exit
```

The 'Operation in progress' message appears on the LCD. If saving the settings succeed then 'Operation done!' message is shown for 3 seconds.

Important! New IP settings can be applied while an active connection is alive on the Ethernet port but in this case the active connection will be closed automatically. To reconnect the Ethernet port needs to be used again.

Info: If you get „OPERATION FAILED” message then please disconnect the remote TCP/IP sockets and try again.

Exit without save

To discard changes execute 'Exit & no save'. To do this, navigate to this item with the left ◀ and right ▶ buttons, then press ENTER ◀.

```
Exit & no save
```

Power status

Navigate to this menu in the main menu list and press ENTER ◀. The monitored voltage levels (nominal 3.3V and nominal 5V) and the temperature of the main processor are shown on the LCD panel. String to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character.

```
Power status
3.30V 5.01V 31.4
```

```
Power status
3.30V 5.01V 31.4
```

No changes can be made here. Press left ◀ and right ▶ buttons to select another menu item.

```
Power status
.30V 5.01V 31.4C
```

Firmware versions

Navigate to this menu in the main menu list and press the up ▲ and down ▼ buttons to view the desired firmware version number. Press left ◀ and right ▶ buttons to select another menu item.

```
Firmware: CPU
2.0.3
```

```
Firmware: WEB
1.4.3
```

```
Firmware: SERVER
2.0.5
```

RS-232 settings menu

The serial port baud rate value can be set here. Press the ENTER ◀ and use the up ▲ and down ▼ buttons to change the baud rate value. Changes take place when ENTER ◀ is pressed. A beep sound and the 'Operation done!' message indicate that the baud rate is changed.

```
RS232 baudrate..
57600.8.N.1
```

```
OPeration
Done!
```

View log menu

Navigate to this menu in the main menu list and press ENTER ◀ Use the up ▲ and down ▼ buttons to toggle between the notices.

```
View log...
0 error
```

System events and errors can be checked in this menu. Use the up ▲ and down ▼ buttons to scroll between the log entries. The first line of each log entry shows the current entry number, number of all entries, and the level of the current entry. The second line is the name of the event that created the entry. The third line shows a hexadecimal parameter and an occurrence counter. The occurrence shows how many times the event happened since the last startup.

```
1/2 Notice
BOOT P:0x00 o:1
```


```
2/2 Notice
READY P:0x00 o:1
```

Press the ENTER ◀ button to return to main menu.





Level	Description
Notice	Not an error. Initialization information.
Warning	Possible problem without influencing normal operation.
Matter	Problem that may lead to further errors.
Error	Serious error. Must report to support.
Fatal	Fatal error. Normal operation is not possible.

Info: This log can contain NOTICES and WARNINGS under normal operation. These entries do not mean that there is any problem with the matrix!

Factory reset

This menu contains submenus which can reload factory defaults for certain group of settings separately. Press the ENTER  button to enter to the submenus. After selecting an

```
Factory reset...
```

option (submenu) with the left  and right  buttons, press ENTER  to execute it. Any reset operation has to be confirmed with ENTER . 'Operation is progress!' message appears during the executing, and 'Operation done!' message and a beep sound indicate the successful execute. The 'IO card reset' operation needs to reboot the matrix.

```
Return
```

Select the 'Return' to step back to the main menu.


IP reset submenu




This operation reloads the factory default IP settings.

Parameter	Default value
IP address (fix)	192.168.254.254
port number	10001
Subnet mask	255.255.0.0
Gateway	0.0.0.0

```
IP reset
```

```
IP reset?  
Press ENTER to P
```


Press the ENTER  button to execute IP reset. Confirmation message will be appeared. String to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character.

Press the ENTER  button again to confirm the operation or press the up  or down  buttons to cancel the operation.




IO card reset submenu

This operation reloads the factory default settings for all input and output ports. The matrix will reboot after execution.

```
IO card reset
```

Press the ENTER  button to execute IP reset. A confirmation message will be appeared. The string to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character.


```
IO card reset?  
Press ENTER to P
```

Press the ENTER  button again to confirm the operation or press the up  or down  buttons to cancel the operation.




EDID reset submenu

This operation emulates the factory default F49 EDID (Universal HDMI) to all input ports.

```
EDID reset
```

Press the ENTER  button to execute IP reset. Confirmation message will be appeared. The string to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character.





```
EDID reset?  
Press ENTER to P
```

Press the ENTER  button again to confirm the operation or press the up  or down  buttons to cancel the operation.

HDCP key reset submenu

This operation clears the HDCP key cache in the matrix. This is useful when a source cannot accept as many keys as the matrix stores.



Press the ENTER  button to execute IP reset. Confirmation message will be appeared. The string to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character. Press the ENTER  button again to confirm the operation or press the up  or down  buttons to cancel the operation.

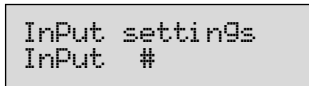


Input settings





Navigate to this menu in the main menu list.



Select the input port

Use the up  and down  buttons to select the port that needs adjustment and then press the ENTER  button.



Input port settings submenu





Use the left  and right  buttons to select the parameter to be changed. Use the up  and down  buttons to change the value.

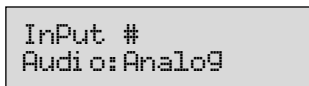
- 1) The 'Interface' parameter sets the video signal type which is connected to the input port. It can be set to Auto, Digital, Analog YUV, Analog RGB or Analog auto. Use the up  and down  buttons to change the value.



The Auto source setting accepts both digital and analog signals on the input and selects the one which is first detected.

Info: If the source signal type is unknown the recommended interface setting is the Auto.

- 2) Different audio sources can be connected to one input port at the same time. The 'Audio' parameter selects which incoming audio signal will be placed to the selected output port. Use the left  and right  buttons to select the parameter to be changed. Use the up  and down  buttons to change the value.



The audio source settings can be:

SPDIF, Analog
HDMI, Analog
SPDIF, HDMI, Analog
HDMI, SPDIF, Analog
Analog
SPDIF
HDMI
Muted (No audio)

If only one input is selected (**Analog** or **SPDIF** or **HDMI**); than only this type of audio can be placed on the output.

If **Mute** is selected than the matrix ignores the audio input signals.

Every line which has more values has a priority order. The matrix checks the first item of the priority list. If there is a valid audio signal on that audio input the signal

will be placed to the outputs. If there isn't the matrix checks the second item of the priority list. And so on.

Info: If the second item of the priority list was selected (e.g. Analog) and the first item (e.g. HDMI embedded) appears on the input UMX4x4-Pro2 selects the first one (HDMI embedded) immediately.

- 3) The HDCP capability on the input port can be enabled or disabled with the **HDCP enabled** setting. It can be set to Yes or No. This can prevent unnecessary HDCP encryption with certain source devices. Note that only unprotected contents can be played on the source if this setting is No. Use the up ▲ and down ▼ buttons to change the value. For more information about HDCP handling see section 4.3 on page 21.

```
InPut #
HDCP enabled:Yes
```

- 4) Navigate to the 'Analog video....' submenu then press the ENTER ◀ button to change the analog video settings on the selected input port. Use the left ◀ and right ▶ buttons to select the parameter to be changed. Use the up ▲ and down ▼ buttons to change the value.

```
InPut #
Analog video....
```

a. Phase

```
InPut #
Phase:0
```

```
InPut #
H.Size:1600
```

b. H.Pos

c. V.Pos

d. H.Size

e. V.Size

f. Clock

g. Return

```
InPut #
H.Pos:455
```

```
InPut #
Clock:2160
```

```
InPut #
V.Pos:41
```

```
InPut #
V.Size:1200
```

Navigate to the 'Return' item then press the ENTER ◀ button to step back to the 'Analog video' menu.

```
InPut #
Return
```

Info: The 'Analog video' submenu available only if there is a valid analog audio signal on the current input port.

Info: UMX4x4-Pro2 examines the analog video signal on the input port and adjusts the analog video settings automatically. The user can modify these values.

- 5) Navigate to the 'Analog audio....' submenu then press the ENTER ◀ button to change the analog audio settings on the selected input port. Use the left ◀ and right ▶ buttons to select the parameter to be changed. Use the up ▲ and down ▼ buttons to change the value.

```
InPut #
Analog Audio....
```

Gain

Analog audio gain is the amplify of the built in preamplifier. It can be set up manually from 0 .. +24 dB.

```
InPut #
Gain:0 dB
```

Navigate to the 'Input 1 Return' item then press the ENTER ◀ button to step back to the input port settings.

```
InPut #
Return
```

- 6) Use the left ◀ and right ▶ buttons to select the 'Remote input control...' submenu and press the ENTER ◀ button to enter into it.

```
InPut 1
Remote inPut con
```

Use the left ◀ and right ▶ buttons to select the part, and then use the up ▲ and down ▼ buttons to change the value of that part.

Info: Changes take effect immediately, don't need to press the ENTER ◀ button.

RICOD master:

- a. **'Disabled'**: The RICOD function is disabled on the local device's selected input port. It means the local device cannot send out RICOD commands to the controlled device over its input port. (Master mode is disabled on the selected input.)

```
InPut 1
RICOD master:Dis
```

- b. **'Enabled'**: The RICOD function is enabled on the local device's selected input port and the remote controlled device is unlocked. It means the local device can send out RICOD commands to the controlled device over its input port. (Master mode is enabled on the selected input and the connected slave device is unlocked.)

```
InPut 1
RICOD master:Ena
```

- c. **'Enabled & slave lock'**: The RICOD function is enabled on the local device's selected input port and the remote controlled device is locked. It means the local device can send out RICOD commands to the controlled device over its input port. (Master mode is enabled on the selected input and the slave device is locked.)

```
InPut 1
RICOD master:Ena
```

The video source selection of the remote device

"Video" parameter gives the remote device which video input port will be selected if it is available:

- a. **From the 1st input to the 8th**: If the given input port is available on the remote controlled device it will be selected.

```
InPut 1
Video source:1.
```

- b. **'Automatic'**: If Autoselect mode is available on the remote controlled device it will be selected.

```
InPut 1
Video source:Aut
```

- c. **'Muted'**: If output port muting is available it will be executed on the video layer.

```
InPut 1
Video source:Mut
```

- d. **'Not controlled'**: If audio switching or locking command is executed, the selected video input port won't be changed on the remote controlled device.

```
InPut 1
Video source:Not
```

Info: The LCD menu shows always 8 input ports to control regardless of the remote controlled device.

Info: All the four cases will take effect only if the remote controlled device is able to perform the switching command. (e.g. If the remote controlled device is not able to mute its output port the mute command will be ignored.)

The audio source selection of the remote device

"Audio" parameter gives the remote device which audio input port should be selected if it is available:

- a. **From the 1st input to the 8th input**: If the given input port is available on the remote controlled device it will be selected.

```
InPut 1
Audio source:1.
```

- b. **'Automatic'**: If Autoselect mode is available on the remote controlled device it will be selected.

```
InPut 1
Audio source:Aut
```

- c. **'Muted'**: If output port muting is available it will be executed on the audio layer.

```
InPut 1
Audio source:Mut
```

- d. **'Not controlled'**: If video switching or locking command is executed, the selected audio input port won't be changed on the remote controlled device.


```
InPut 1
Audio source:Not
```

Info: The LCD menu shows always 8 input ports to control irrespectively of the remote controlled device.

Info: All the four cases will take effect only if the remote controlled device is able to perform the switching command. (e.g. If the remote controlled device is not able to mute its output port the mute command will be ignored.)

Select the 'Return' to step back to the "Input settings" submenu.

```
InPut 1
Return
```

- 7) Navigate to the 'Return' item then press the ENTER  button to step back to the main menu.

```
Return
```

Output settings





Navigate to this menu in the main menu list.

Select the output port



```
OutPut settings
OutPut #
```





Use the up  and down  buttons to select the port that needs adjustment and then press the ENTER  button.

Output port settings submenu

Use the left  and right  buttons to select the parameter to be changed. Use the up  and down  buttons to change the value.

```
OutPut #
Mode: Auto
```


- 1) Mode: The 'Mode' can be set to Auto, DVI, HDMI. The 'Auto' option sets the signal mode regarding to the attached display device's EDID and the incoming signal. Use the up  and down  buttons to change the value.

- 2) Analog audio....: The 'Analog audio....' submenu contains the attributes of the analog audio signal which is connected to the input port. Use the left  and right  buttons to select the parameter to be changed. Use the up  and down  buttons to change the value.



```
OutPut #
Analog audio....
```

- a. Volume: from 0 dB to -78 dB
- b. Balance: from 0% to 100%
- c. Return





```
OutPut #
Volume: -0dB
```

Navigate to the 'Output 1 Return' item then press the ENTER  button to step back to the output port settings


```
OutPut #
Return
```


- 3) The 'HDCP' option sets the HDCP encryption on the output. The Auto setting applies encryption when the incoming signal is encrypted. The Always setting forces encryption on any incoming video signal. Use the up  and down  buttons to change the value.

```
OutPut #
HDCP: Auto
```

- 4) Use the left  and right  buttons to select the 'RICOD slave' settings. Use the up  and down  buttons to change the value. It can be:
- a. **'Enabled'**: The local device is able to receive RICOD commands over its output port. (Slave mode is enabled on the selected output port.)
 - b. **'Disabled'**: The local device is not able to receive RICOD commands on its output port. (Slave mode is disabled on the selected output port.)

```
OutPut 1
RICOD slave: Disa
```

Info: Changes take effect immediately, don't need to press the ENTER  button.

- 5) Return: Navigate to the 'Return' item then press the ENTER  button to step back to the out port settings.

HDCP keycounter

This menu allows to test source devices how many HDCP keys they can accept. Select the input port with the up ▲ and down ▼ buttons, to which the tested device is connected to, and then press the ENTER ◆ button to execute keycounter test. Confirmation message appears: 'Start test? It takes about 1-2 minutes.' The string to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character.

```
HDCP keycounter
InPut #
```

```
Start test?
It takes about 1
```

Press the ENTER ◆ button to start the operation.

A message appears showing the test progress. It can take several minutes to complete. Interrupt is not allowed during the HDCP keycount test. Wait with other operations until the test is finished.

```
Tryin9 ## keys..
65%
```

After the test is finished, the result is shown. Press ENTER ◆ to acknowledge the result and return to previous menu.

```
Finished
Result: # key
```

5.4.5. EDID mode

To enter or to exit from this mode press and release the EDID button. EDID mode is active when the EDID button is illuminated on the front panel. All EDIDs are referred with their memory location e.g. F49 or D03, see section [5.3](#) about EDID memory structure on page [34](#).

Select menu items with the left ◀ and right ▶ buttons and then press ENTER ◆ to step in submenus.

Info: You can cancel any not yet executed operation by exiting the EDID menu with pressing the EDID button.

Info: Source and destination buttons are disabled while EDID mode is active.

View EDID

If the EDID button is pressed the View EDID submenu opens automatically. All the stored EDIDs can be checked through this menu.

```
EDID VIEW F17
LWR 1920x1080@60
```

The most important information about each EDID is shown in the submenu. The string to be shown is longer than LCD display line. Wait a second and the string will be shifted to left character by character.

Use the up ▲ and down ▼ buttons to select the desired EDID. The monitor name and the preferred resolution can be checked.

Save EDID menu

The EDID from any connected monitor can be learned to user memory slots.

```
Save EDID..
```

Select 'Save EDID..' menu items with the left ◀ and right ▶ buttons and then press ENTER ◆ to step in the submenu.

Select the dynamic EDID of the output port with the up ▲ and down ▼ buttons. Then press left ◀ or right ▶ buttons and select the user EDID slot where the monitor's EDID has to be stored.

```
EDID SAV D01>U11
-
```

After the desired dynamic EDID and user memory is selected press the ENTER ◆ button to store the EDID.

The 'Operation is progress' message appears on the LCD. If switching the EDID succeed then the 'Operation done!' message is shown for 2 seconds.

Switch EDID menu

Select 'Switch EDID..' menu items with the left ◀ and right ▶ buttons and then press ENTER ⬤ to step in the submenu.

```
Switch EDID..
```

The emulated EDIDs can be changed in this menu. Dynamic, User or Factory EDIDs can be selected in the top row with the up ▲ and down ▼ buttons. The preferred resolution of the selected EDID is shown in the second row of the screen.

```
EDID Sw F17>E02  
LWR 1920x1080@60
```

Press left ◀ or right ▶ button then select the input port with the up ▲ and down ▼ buttons.

After the desired EDID and input port is selected press the ENTER ⬤ button to change the emulated EDID.

The 'Operation is progress' message appears on the LCD. If switching the EDID succeed then the 'Operation done!' message is shown for 2 seconds.

5.4.6. Signal Present mode

To enter or exit this mode you have to press the SIGNAL PRESENT button. Signal present mode is active when Signal present button is illuminated.

```
OutPut 1 Video  
No signal
```

In this mode the source and destination buttons show the actual connection state of the corresponding port. Press any SOURCE or DESTINATION button, and detailed information of that port can be checked on the LCD menu. (Resolution, refresh rate, type of the video signal)

```
InPut 2 Video  
1920x1200P60 DVI
```

Source and destination buttons

If a source button is illuminated then a signal is present on that source. If a destination button is illuminated then a powered display is attached to this output (Hot Plug Detect signal is present). You can quickly check the cable connections with this feature.

6. Remote operation

Lightware matrix routers can be controlled through various interfaces remotely. This makes it possible to use functions that are not accessible via the front panel. Also, this helps system integrators and operators to control multiple devices in a big system through a single user interface.

6.1.1. Control interfaces

Users can connect to the matrix through

- Ethernet (TCP/IP),
- Serial port (RS-232)

After establishing connection, there is no difference between connection types (except some rare cases, which are uniquely noted).

The available remote connections and the relating chapters are listed below.

User interface	Connection type		further information
	Ethernet port	RS-232 serial port	
Lightware Device Controller	✓	✓	chapter 7 on page 49
Built-in website	✓	no	chapter 7 on page 49
third party control system	✓	✓	chapter 8 on page 81

Table 6-1. Available remote connections

Info: Ethernet port can be connected to a LAN hub, switch or router with a UTP patch cable. If connecting to a computer directly, a crosslink UTP cable has to be used!

6.1.2. User interface comparison

The built-in website and the Lightware Device Controller software have little different capabilities. The table below summarizes the main differences, helping you to select the interface that suits your needs.

Function	Lightware Device Controller	Built-in website
platform	Windows / MAC	ANY ✓
installation	installation required	web browser needed only ✓
User preferences	✓	no
EDID Info	✓	no
Easy EDID creator	✓	no
EDID editor	✓	no
EDID upload / download	✓	✓

Table 6-2. User interface comparison

6.1.3. Multiple simultaneous connections

The matrix allows simultaneous remote control over multiple interfaces. Ethernet and Serial connections can be used at the same time. However, only 1 connection can be used with the Lightware Device Controller (LDC) via Ethernet por.

6.1.4. Serial port settings

UMX4x4-Pro2 uses RS-232 communication port. The device uses standard RS-232 interface with the following default settings:

57600 Baud, 8 data bit, 1 stop bit, no parity

The serial port baud rate can be changed on the front panel LCD menu (see section [5.4.4](#) on page [37](#)) or remotely by protocol command (see sections [8.6.4](#), [8.6.5](#) from page [89](#)).

6.1.5. IP settings

The Ethernet port can be configured on the front panel LCD menu, remotely through the Lightware Device Controller (LDC) software, or the built-in website.

The factory default IP settings or DHCP mode can be activated quickly through front panel shortcut buttons. To reset the IP configuration perform the following:

Resetting the IP address

Reset to factory default IP configuration or to DHCP mode with front panel buttons.

Step 1. Switch the router to TAKE mode if used previously in AUTOTAKE mode by pressing TAKE button for 3 seconds (light will go off).

Step 2. Press and hold down the Control Lock button for 3 seconds (Control Lock button lights in up red continuously).

Step 3. Press and keep pressed the Output Lock button.

Step 4. Press and release the

a) **Load Preset** button to set the **factory default IP** settings

IP address:	192.168.254.254
port number:	10001
subnet mask:	255.255.0.0
gateway:	0.0.0.0

b) **Save Preset** button to set **DHCP enabled**

IP address:	Acquired with DHCP
port number:	unchanged
subnet mask:	Get from DHCP server
gateway:	Get from DHCP server

Step 5. A beep can be heard and a light sequence will occur to confirm the command. (Save Preset, Load Preset and Take/Auto buttons will light up one after the other)

Step 6. After about three seconds another beep can be heard and a reverse light sequence will occur to indicate that, the settings have been completed. (Take/Auto, Load Preset and Save Preset buttons will light up one after the other)

Step 7. Press Control Lock button for 3 seconds (red light will go off) to back to the normal operation.

Step 8. Wait about 5 seconds before connecting the router via Ethernet.

6.1.6. Control protocols

Matrix routers can be controlled with multiple control protocols. Lightware routers have a special protocol, but to interoperate with third party devices, a secondary protocol is also provided.

Info: Lightware Device Controller software and the built-in website works only with LW protocol (#1)!

The currently used protocol can be viewed or changed any time on the matrix front panel or with protocol commands.

Change (view) protocol on the front panel

Step 1. Switch the router to TAKE mode if used previously in AUTOTAKE mode by pressing TAKE button for 4 seconds. (light will go off)

Step 2. Press Control Lock button for 3 seconds (it lights in up red continuously)

Step 3. Press and keep pressed the Output Lock button. Now the active protocol is displayed: (view protocol) One source button lights up according to the current protocol:

- Source#1 lights: Lightware protocol is active on both control interfaces (serial and Ethernet)
- Source#2 lights: Protocol#2 is active on both control interfaces (serial and Ethernet)

Step 4.

- a) If you do not want to change the protocol, release the Output Lock button (view only).
- b) If you want to change the protocol keep the Output Lock button pressed, and press the desired Source button.

Step 5. If the control protocol for any interface has changed then a beep will sound to notify the change.

Step 6. Press Control Lock button for 3 seconds (red light will go off) to back to the normal operation.

7. Software control –Lightware Device Controller and Web

This version of the Lightware Device Controller (LDC) software is also available for Windows and Mac OS X platform. An online update function was integrated into the LDC which helps the users to have always the latest version.

Important! All Lightware devices are supported by LDC (except 25G and MODEX, which have their own controller surface). Functions and features have been tested device by device deeply with the latest firmware package that was available in May, 2014. As LDC takes the advantage of all new features implemented in the latest firmware, it is recommended to upgrade your devices to prevent any possible incompatibility issues. Detailed instructions about the upgrading can be found in section [7.1.5](#) on page [53](#). In case of having any question about firmware upgrades please contact your local representative, or Lightware support team. (The global support contact is in chapter [14](#) on page [135](#).)

Info: The built-in website and the Lightware Device Controller software have same functions but the website does not support User preferences settings, EDID info, Easy EDID creator and EDID editor.

7.1. Installing Lightware Device Controller

The new concept

There are two different ways to install the application: the normal and the snapshot install methods.

7.1.1. The normal install

- Available for Windows and Mac OS X operating system.
- This is the default setting.
- An installer can update only this instance.
- Only one updateable instance can exist for all users.
- The updateable version does not contain the version number in its name.

7.1.2. The snapshot install

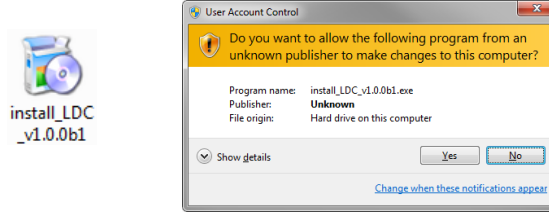
- Available for Windows operating system.
- Can be chosen during the install process.
- The snapshot instances cannot be updated.
- More than one different version can be installed for all users.
- The snapshot instances contain the version number in their name by default.

7.1.3. Steps of the installation in case of Windows OS

Info: After the installation the Windows and the Mac application has the same looks and functionality.

Step 1. Run *Install_LDC_v1.0.0b1.exe*

If the User Account Control drops a popup message click Yes.

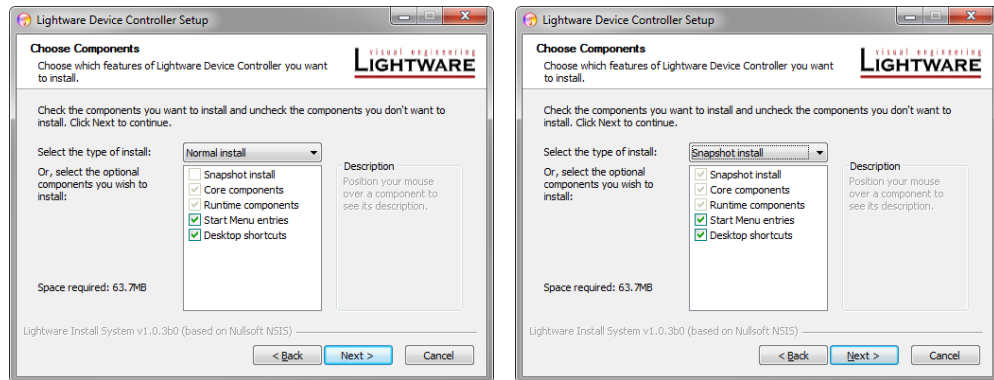


Step 2. A welcome window opens. Click Next.

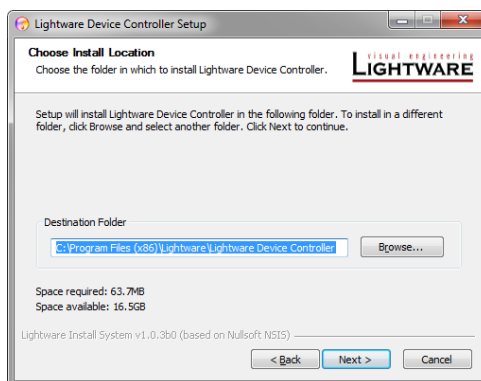


Step 3. Select the type of the installation. Here can be chosen the normal and the snapshot install as mentioned in the section 7.1 on page 49. Select the optional components then click Next.

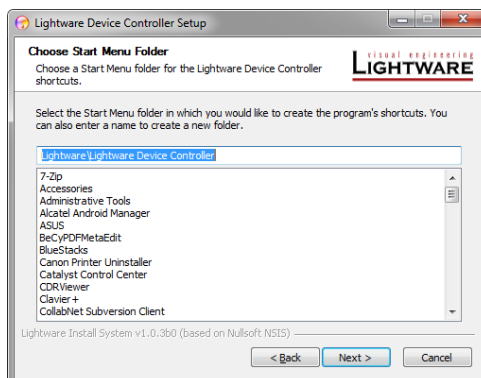
(Using the Normal install as the default value is highly recommended.)



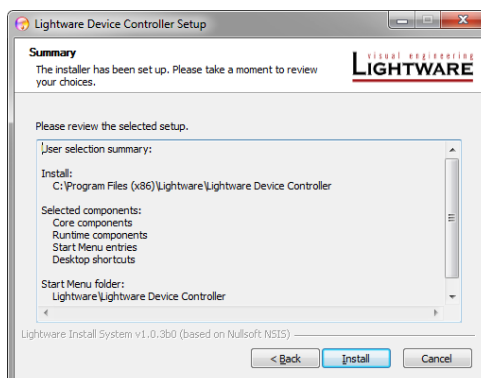
Step 4. Select the destination folder and click Next. (Using the default path is highly recommended.)



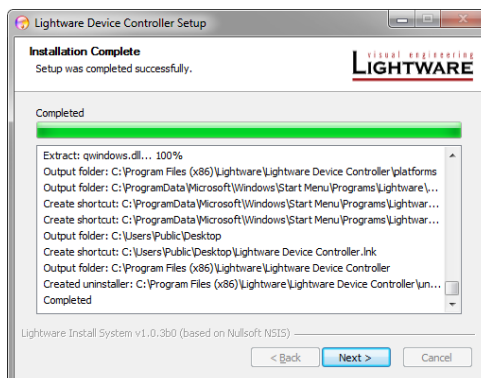
Step 5. Select the Start Menu Folder and click Next. (Using the default folder is highly recommended. If the Start menu entries was not checked in the Step 2. this window will be skipped.)



Step 6. Verify the settings and if they are correct click Install. (If not, click Back and change the setting.)



Step 7. After the installation of the last component the Next button is activated. Click on it.



Step 8. If the installation is complete, click **F**inish. (Uncheck the box if the running of the LDC will be delayed.)



7.1.4. Steps of the installation in case of Mac OS X

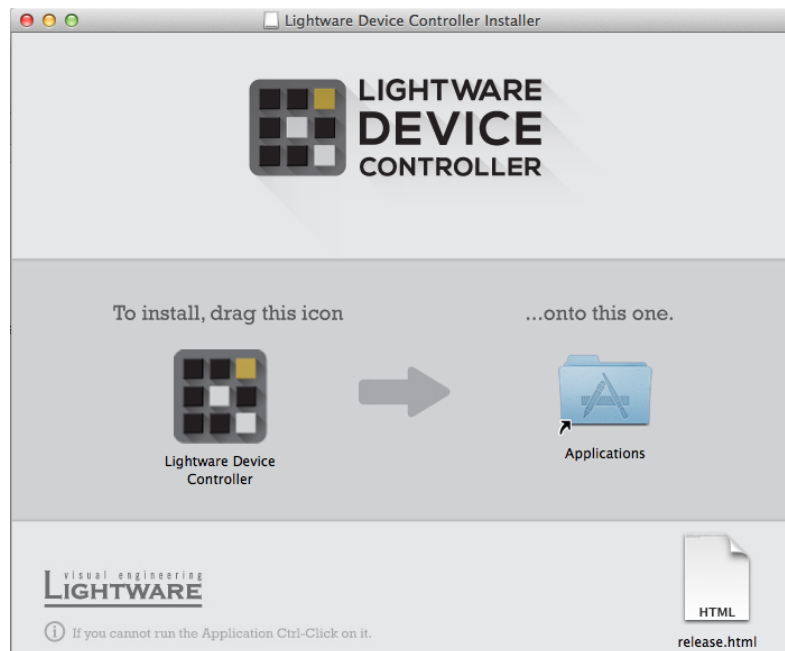
Info: After the installation the Windows and the Mac application has the same looks and functionality.

Step 1. Mount the DMG file with double clicking on it.



LightwareDeviceContro
llerInstaller.dmg

Step 2. 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.

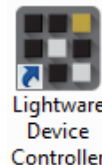


Info: This type of the installer is equal with the Normal install in case of Windows. (See section [7.1.3](#) on page [50](#).) This is an updateable version with the same attributes.

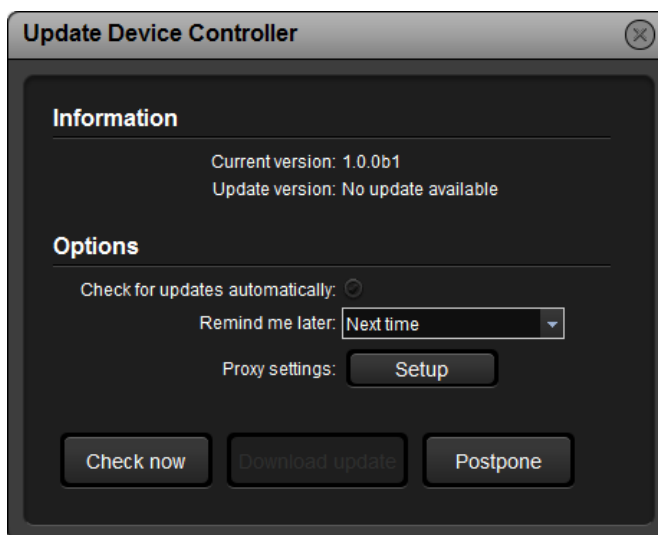
7.1.5. Upgrading the LDC

Step 1. Start the application.

To run the controller software double clicks on the icon on the desktop or select proper shortcut from Start Menu → All Programs → Lightware → Lightware Device Controller folder.



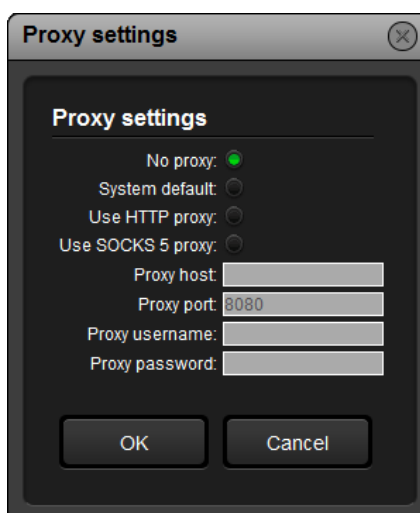
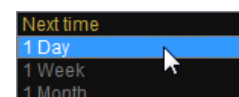
The Device Discovery window appears automatically and the program checks the available updates on the Lightware website and opens the update window if the LDC found updates.



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

Step 2. Set the desired update setting in the option section.

- a) If you do not want to check the update automatically, uncheck the circle, which contains the green tick.
- b) If the postponing is the desired choice for the updating, the reminder can be set for different duration with the drop-down list.
- c) 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.

Step 4. User can check updates manually by clicking the Check now button.

7.2. Establishing the connection

The unit can be controlled from a Windows or OS X based computer using the LDC through Ethernet or RS 232 connection.

Step 1. Connect the device and the computer either via:

- a) Serial port, with RS-232 cable
- b) Ethernet, with LAN cross cable
- c) Ethernet, with LAN patch cable

Info: If the connection is made through the device's Ethernet port, be sure that the computer is in the same sub network as the device to be connected.

Info: If the computer has multiple Ethernet connections (for example Wi-Fi and LAN connections are used simultaneously), you will have to know the IP address for the one that is used for controlling the device.

Step 2. Start the application. (This is the same method as mentioned in chapter 7.1.5 on page 53 in the Step 1.)

To run the controller software click double on the icon on the desktop or select proper shortcut from Start Menu → All Programs → Lightware → Lightware Device Controller folder.



The Device Discovery window appears automatically.

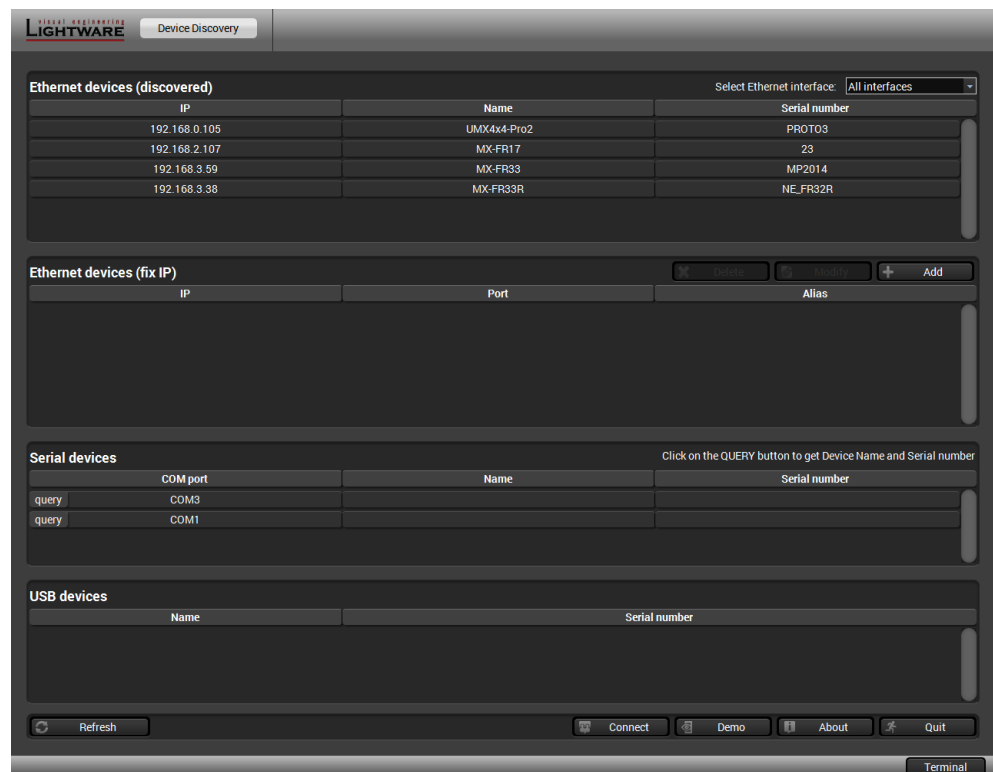


Figure 7-1. Lightware Device Controller software startup

If the connection has been made via **Ethernet**, the software picks all Ethernet interfaces, and shows the available Lightware devices on those ports. The device type and the serial number are displayed automatically. Click the desired device, to highlight it.

If the computer has more Ethernet ports (for example Wi-Fi and LAN connections are used simultaneously), you must select the one that is used to control the

router from the drop-down list. If you are unsure which one to use, try to search for devices on all of them.

Info: Some devices are able to make only one connection via Ethernet. If there is a live connection between the device and another computer, the device discovery will recognize it. In this case the lines of these kinds of devices are grey instead of white, and there is no possibility to make connection with them.

Ethernet devices (discovered)			Select Ethernet interface: All interfaces
IP	Name	Serial number	
192.168.0.105	UMX4x4-Pro2	PROTO3	
192.168.2.107	MX-FR17	23	
192.168.3.59	MX-FR33	MP2014	
192.168.0.106	N/A	N/A	

Figure 7-2. Ethernet connection

If the connection has been made via **serial port**, the device type and serial number can be inquired by double clicking the appropriate port, or it can be highlighted with a single click.

Serial devices			Click on the QUERY button to get Device Name and Serial number
COM port	Name	Serial number	
query COM3			
query COM1	UMX4x4-Pro2	PROTO3	

Figure 7-3. Serial connection

Step 3. Click on the Connect button to connect to the device

Info: The controller software can communicate only with Lightware protocol. If the matrix router is set to other protocol, the software will ask to set the protocol.

Info: If the router is not listed in the “available devices on Ethernet” box, try searching again, or see the troubleshooting guide in the user’s guide of the device.

Info: Be sure that the firewall is not blocking the application!

Info: For RS-232 connection, the router has to use 9600 or 57600 baud rate. The controller software determines the baud rate automatically.

7.3. Web control – Using built-in website

Lightware matrices have a built-in web page, which can be accessed over TCP/IP protocol and offers you full control over all settings even if you don't have the opportunity to install new programs. The router's built-in website is compatible with most widely spread browsers and requires no additional software components.

To access the webpage just run your preferred web browser and type the IP address of the router as URL. The computer and the router have to be in the same subnet.

Info: The only way to find out the router's IP address (if it is not known) is to search for devices with the Lightware Device Controller software. If this is not possible for some reason, the IP address can be reset to factory default (192.168.254.254) with the front panel buttons. See section [6.1.5](#) on page [47](#) for details.

Info: Only one opened web page is allowed simultaneously. Other TCP/IP connections are prohibited while the web page is opened. Using more instances of the web page simultaneously will result in inadequate operations.

Info: Some of the Lightware Device Controller functions are not available in the built-in website. Please read section [6.1.2](#) on page [46](#) to compare the user interfaces.

7.3.1. Establishing the connection

Step 1. Connect the matrix switcher and the computer either via

- Ethernet, with LAN patch cable (to a Hub, Switch or Router)
- Ethernet, with LAN cross cable (directly to Computer)

Info: If the connection is made through the router's Ethernet port, be sure that the computer is in the same network as the router.

Info: If the computer has multiple Ethernet connections (for example WiFi and LAN connections are used simultaneously) you will have to know the IP address for the one that is used for controlling the matrix.

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

Step 3. Check the IP address of the matrix on the front panel LCD.

Step 4. Type the IP address to the address bar of the web browser. After a few seconds the control menu appears. The current state of the crosspoint switch is displayed.

7.4. Controller window

After the establishing of the connection, the usage of the LDC and the Web is the same. When the hardware was found, GUI determines the product type, and the controller starts with the default page. (Grid or Tile view, it depends on the user settings)

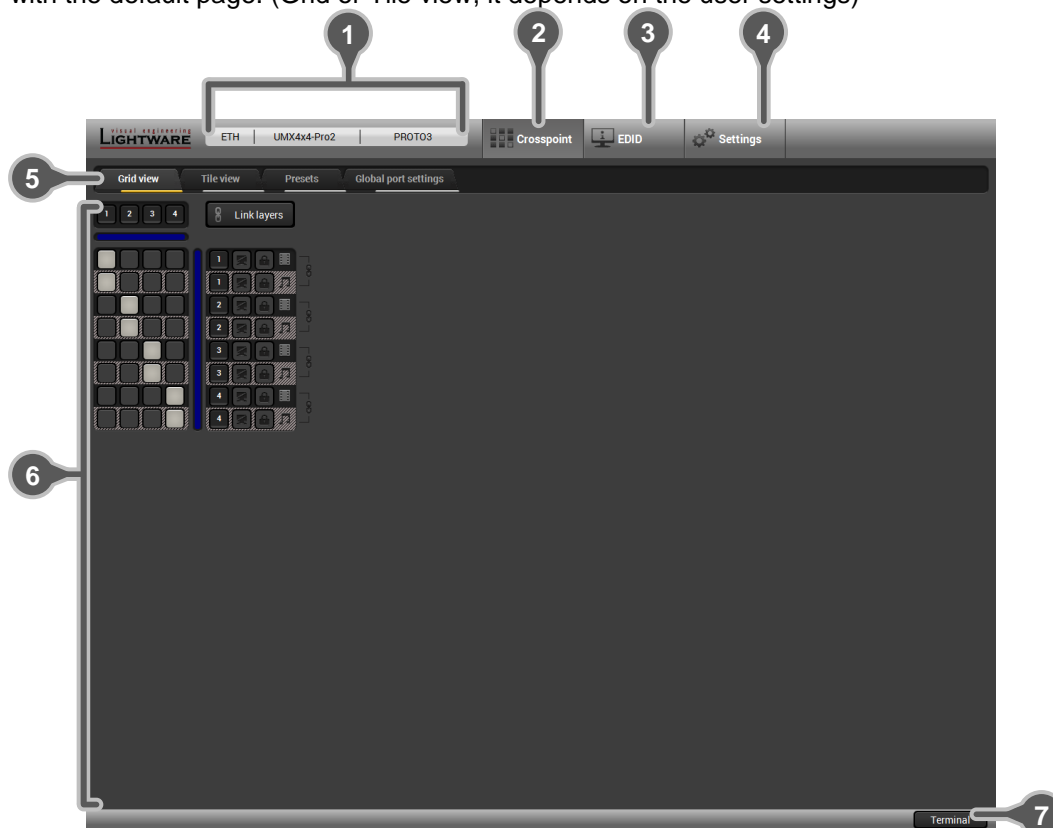


Figure 7-4. Grid view as factory default start page of the LDC

- | | |
|------------------------------|--|
| <p>1 Information ribbon</p> | <p>This label shows the interface type, the name and the serial number of the connected device. If the device has more than one interface, the ribbon shows only that one, which has made the connection. The device discovery window can be started by clicking on this ribbon.</p> |
| <p>2 Crosspoint menu</p> | <p>This menu contains both of the crosspoint areas, the preset area and the genlock settings. After connecting to a device, this menu appears by default with the Grid view. (For more information, see section 7.5 on page 58.)</p> |
| <p>3 EDID menu</p> | <p>Advanced EDID Management can be accessed by selecting the <i>EDID</i> menu. (For more information, see section 7.6 on page 73.)</p> |
| <p>4 Settings menu</p> | <p>The settings menu contains Hardware- and Software-related settings and information about connected device. (For more information, see section 7.7 on page 76.)</p> |
| <p>5 Tab selector ribbon</p> | <p>The crosspoint and the settings menu contain more than one tabs. Click to the desired one to select it. The yellow line shows that which tab is the active one.</p> |
| <p>6 Working area</p> | <p>The working area shows the content of the selected tab of the selected menu. The content depends on the device type, the menu and tab selections.</p> |
| <p>7 Terminal</p> | <p>This general-purpose terminal is created mainly for testing and debugging purposes. (For more information, see section 7.8 on page 80.)</p> |

7.5. Crosspoint menu

The crosspoint menu contains the crosspoint state with Grid and Tile views, the Preset area and the Global port settings.

7.5.1. Grid view

In this view, the current state of the crosspoint switch is displayed.

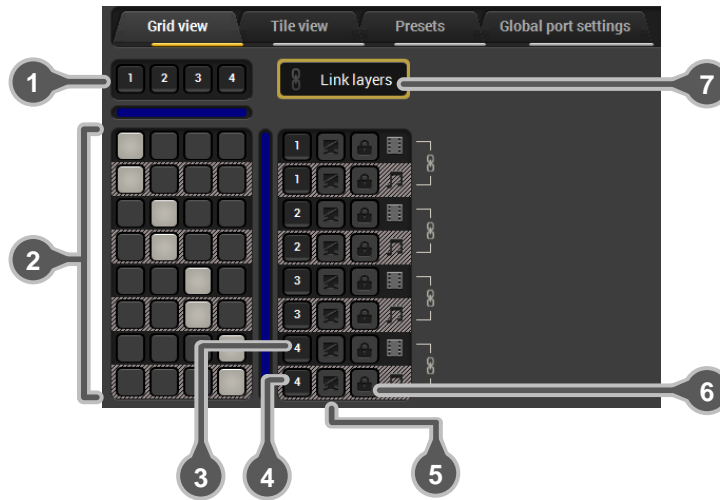


Figure 7-5. Crosspoint array of a UMX4x4-Pro2matrix

- 1** Input ports

Each number represents a video and audio input port.
- 2** Connections

Light grey square means the port is available but no connection between the input and the output. White square means there is a connection between the input and the output port.
- 3** Video output ports

Each number represents a video output port.
- 4** Audio output ports

Each number represents an audio output port.
- 5** Mute buttons

Outputs can be easily muted by clicking on the mute button.
- 6** Lock buttons

For the prevention of the unwanted switching, outputs can be locked to any input.
- 7** Link layers button

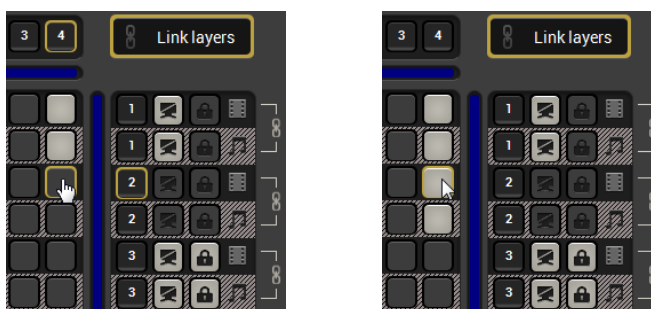
If this button is active, audio and video outputs can be switched to inputs, muted and locked at the same time.

Crosspoint operations

Switching

For making a connection click on the desired square. If there is no connection between the desired input and output (the square is dark grey), the mouse pointer becomes a hand (link pointer) before the clicking. If the output port is not locked, then the connection is made, the square becomes white and the cursor is changed back to a pointer.

For example, input 4 is not connected to output 2 according to the first picture above. After the connection the square becomes light grey.



Muting outputs

Outputs can be easily muted by clicking on the button figured a crossed monitor beside the output. This means that black screen is present at this output. If mute is active, the color of the button's background changes to white.



Info: Switching muted outputs does not unmute them, muting remains active until mute button is clicked again.

Info: Outputs can be disconnected from any inputs (by protocol command). In this case the crosspoint view will not show any white square for the disconnected output and the output will have no signal just like when muted. Click on a crosspoint square to connect the output again to an input.

Locking outputs

Outputs can be locked to any input. After locking an input to an output, no switching is permitted to this output unless it is unlocked again. If output lock is active, the color of the button's background changes to white.



Info: Loading a preset does not change either the lock state or the switch state of a locked output. If an output is locked to an input before preset loading it will also be locked to that input after preset loading, so locked outputs ignore the preset.

7.5.2. Tile view

Tile view is a different approach to display the input and output ports by tiles. Each tile means an input or output port and additionally shows the most important port and signal information. Thus, user can check the status of many ports at the same time without clicking on a port or opening port settings window.

Three display modes are defined in *Tile view* for UMx4x4-Pro2 matrices:

- View mode,
- Input switch mode and
- Output switch mode.

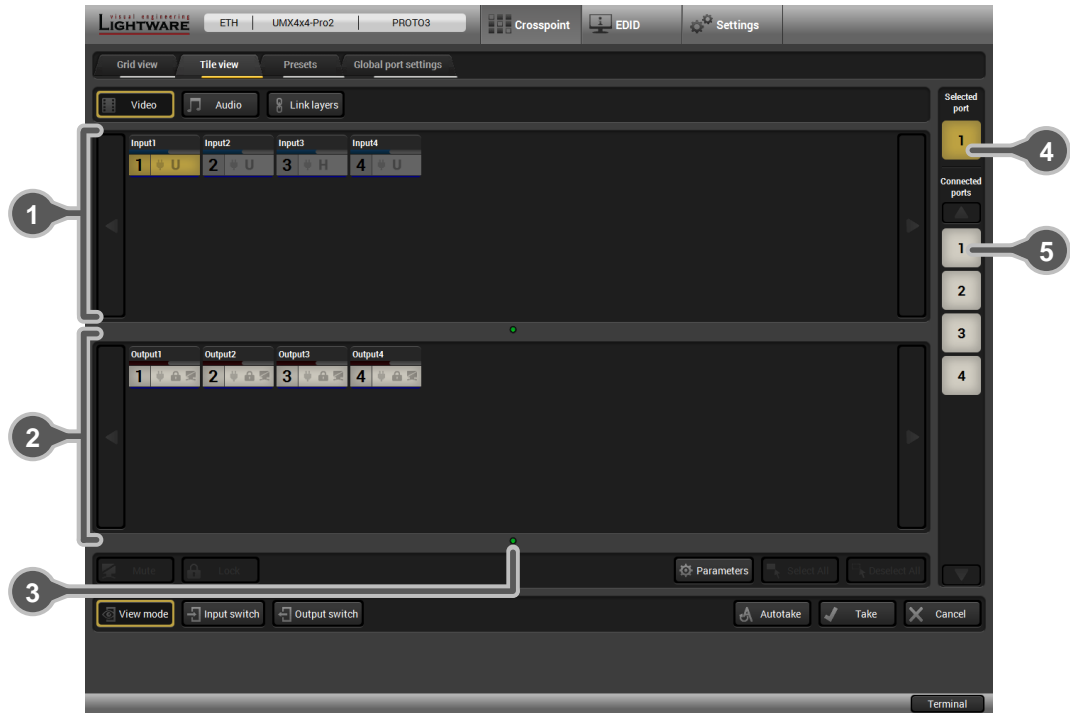

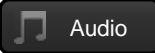









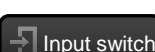



Figure 7-6. Tile view in Crosspoint menu

- | | |
|--|--|
| <p>① Input ports</p> <p>② Output ports</p> <p>③ Page indicator</p> <p>④ Selected port</p> <p>⑤ Connected port(s)</p> | <p>Each tile represents an input port.</p> <p>Each tile represents an output port.</p> <p>Current page is displayed with green dot. (In case of UMx4x4-Pro2 there is only one page.)</p> <p>Last selected port is displayed with yellow background on the port bar. Press the button to open port settings window.</p> <p>Those ports are listed (with white background) on the port bar, which are connected to the <i>Selected port</i>.</p> |
|--|--|

Layer buttons

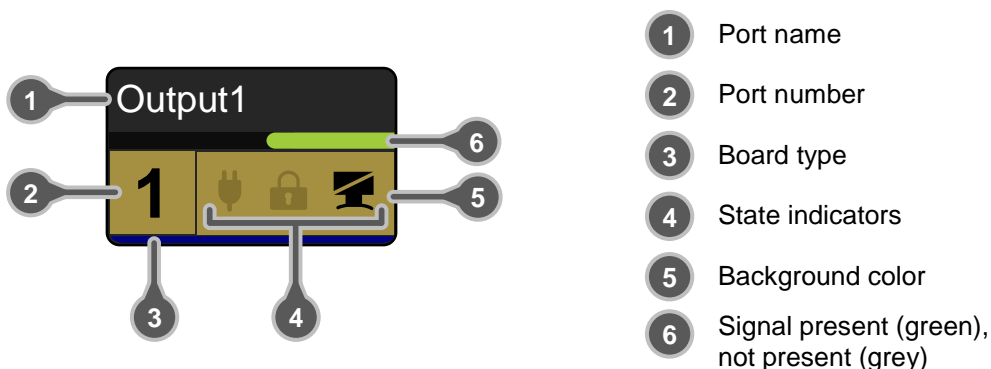
 Video	Select or deselect the video layer	 Audio	Select or deselect the audio layer
 Link layers	Link layers to each other		

Control buttons

 Mute	Mute or unmute selected output port(s)	 Parameters	Open port settings window
 Lock	Lock or unlock selected output port(s)	 Select All	Select all ports (only in output switch mode)
 View mode	Activate <i>View mode</i>	 Deselect All	Deselect all ports (only in output switch mode)
 Input switch	Activate <i>Input switch</i> mode	 Autotake	Toggle Autotake mode ON/OFF
 Output switch	Activate <i>Output switch</i> mode	 Take	Execute crosspoint changes in Take mode

Port tiles

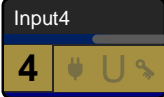

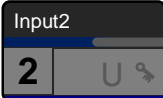
The colors of the port tiles and the displayed icons represent different states and information about selected port:



Following sections describe these meanings.




Background colors (port state)

The colors of the port tiles represent different states of the port as follows:

	Yellow Selected port		White Connected port
	Light grey Port is available		



State indicators (output ports)

Following icons display different states of the output port:

Icon	Icon is not displayed	Icon is grey	Icon is black
	No information is available about connection status	Port is available but inactive	Port is available and sink is connected (hotplug detected)
	-	Port is unlocked	Port is locked
	-	Port is unmuted	Port is muted

State indicators (input ports)

Following icons display different states of the input port/signal:

Icon	Icon is not displayed	Icon is grey	Icon is black
	No information is available about connection status	Port is available but inactive	Port is available and source is connected (power +5V detected)
[Signal type]	No information is available	Last detected signal type is displayed	U – unknown signal D – DVI signal H – HDMI signal A – Analog signal S – SDI signal
	HDCP is not supported	Signal is not encrypted with HDCP	Signal is encrypted with HDCP

Board type

The type of the installed boards is displayed with a colored line on the bottom of the port. The following color is defined in case of UMX4x4-Pro2:

 DVII board with HDCP capability

View mode

This mode was designed to display crosspoint state of a selected- and its connected port(s).



Info: Crosspoint settings cannot be changed in View mode but port settings are available.

Changing crosspoint settings

Crosspoint changes can be made in *Input switch* mode and *Output switch* mode. The working method is the same in both cases but the priority is different.

Input switch mode

The mode can be also named as 'Input priority-mode'. In the mode an input port has to be selected at first then connected output port(s) is/are shown. Thus, the output port(s) connected to the input port can be changed.

Output switch mode

The mode can be also named as 'Output priority-mode'. In the mode an output port has to be selected at first then connected input port is shown. Thus, the output port connected to the input port can be changed.

Info: Output ports can be (un)locked, (un)muted only in Output switch mode.

Switching operations

Take mode

If the *Autotake* button is outlined with **black** color *Take mode* is active. In *Take mode* any crosspoint change – (dis)connect ports to/from the previously selected port – is executed only after pressing the *Take* button. Following steps describe the process of the switching:



- Step 1.** Press the desired *Input switch* or *Output switch* button to select switching mode.
- Step 2.** Select the desired port; it will be highlighted with yellow color and also displayed on the port bar on the right.
- Step 3.** Connected port(s) is/are highlighted with white color and also displayed on the port bar on the right.
- Step 4.** Create the desired crosspoint settings by (de)selecting the ports; they will start to blink.
- Step 5.** Press *Take* button to execute changes or *Cancel* to ignore the operations.

Info: *Take mode remains active until it is switched off. Selecting another view mode or menu does not change the Take/Autotake mode state.*

Autotake mode

If the *Autotake* button is outlined with **yellow** color *Autotake mode* is active. In this mode any crosspoint change – (dis)connect ports to/from the previously selected port – is executed immediately after pressing the port button. Following steps describe the process of the switching:



- Step 1.** Press the desired *Input switch* or *Output switch* button to select switching mode.
- Step 2.** Select the desired port; it will be highlighted with yellow color and also displayed on the port bar on the right.
- Step 3.** Connected ports are highlighted with white color and also displayed on the port bar on the right.
- Step 4.** Create the desired crosspoint settings by (de)selecting the ports; the changes are executed immediately.

Info: *Autotake mode remains active until it is switched off. Selecting another view mode or menu does not change the Take/Autotake mode state.*

Port settings

Press the desired port button on the port bar on the right.



Info: *Port settings of selected port are also available by pressing the Parameters button.*

7.5.3. Input parameter settings

For UMX4x4-Pro2 matrices the input port settings are displayed in a new window with the available functions.

By clicking on a port number on the Grid view, or on the Parameters button on the Tile view, a dialog window appears showing the parameters for the corresponding port.



Figure 7-7. Input parameter window

Info: If the video source setting is Digital or the incoming signal is digital (DVI or HDMI) the Analog options are missing from the port properties window.

Cable equalization

The amplitude of high frequency signals decreases after they pass through long distances in copper cables. To counter-act this phenomenon, input port can amplify the digital signal while maximizing the amplitude at a certain level, which is defined by the DVI 1.0 standard. This process is called equalization. The digital inputs are automatically compensated for up to 20 meter cable length.

Rename port

To help memorizing the connected sources and destinations, names can be assigned to inputs and outputs. I/O names can be maximum 15 characters long, and consist of alphanumeric characters (lowercase letters, uppercase letters and numbers). All lower case characters are converted to uppercase ones.

The text box contains the current name of the port. To rename it, click into the text box, type the new name then click on the Rename button.

Switch this input to all outputs

This is a fast way to switch the current input to all outputs. Only unlocked outputs can be connected to this input, locked ones ignore the switching command.

Emulated EDID information

Manufacturer, Monitor name, Resolution and Source (where the EDID is stored) is read out from the current emulated EDID.

Reload factory defaults

Current input: Reloads the default values to the currently selected input.

All inputs: Loads the factory default values to all inputs.

General settings

Scope of changes

There are two options to apply changes. To set the scope of the changed settings, select the desired option in the top left box.

Apply changes to current input: this option means the modified parameters are applied only to the currently selected port.

Apply changes to all inputs: this option means that the modified parameters are applied to all input ports.

Info: When opening this window again, the scope selection will be set to "Current Input" regardless of the active selection at the time of closing. It is to avoid making changes to all inputs by mistake.

Video Source

The signal type of the connected source can be selected in this drop down list: Analog RGB, Analog YUV, Analog auto, Digital, and Auto source. The Analog auto setting determines the color space of the connected analog video signal automatically. The Auto source setting accepts both digital and analog signals on the input and selects the one which is first detected.

Info: If the source signal type is unknown the recommended interface setting is the Auto.

Emulated EDID

This is the type of the video signal (Analog, DVI and HDMI) which is required by the emulated EDID.

Audio source

Three different audio sources (embedded, analog and S/PDIF) can be connected to one input port at the same time. The 'Audio source' parameter selects which incoming audio signal will be placed on the selected output port. Select the desired option from the "Audio source" drop-down list:

The audio source settings can be:

No audio,
HDMI audio,
Analog,
SPDIF
Auto (HDMI, SPDIF, Analog)
Auto (SPDIF, HDMI)
Auto (HDMI, Analog),
Auto (SPDIF, Analog)

If only one input is selected (**Analog** or **SPDIF** or **HDMI**) than only this type of audio can be placed on the output.

If the **No audio (Mute)** is selected than the matrix ignores the audio input signals.

Every **AUTO** value has a priority order. The matrix checks the first item of the priority list. If there is a valid audio signal on that audio input the signal will be placed on the outputs. If there isn't the matrix checks the second item of the priority list. And so on.

Info: If the second item of the priority list was selected (e.g. SPDIF) and the first item (e.g. HDMI embedded) appears on the input UMX4x4-Pro2 selects the first one (HDMI embedded) immediately.

HDCP enable

The HDCP capability can be enabled or disabled on the input port with using the HDCP enable checkbox. This can prevent unnecessary HDCP encryption with certain source devices. Note that only unprotected content can be played on the source if this setting is disabled. For more information about HDCP handling see section [4.3](#) on page [21](#).

Status

Connection status of the selected input port is shown here. (Type of the video signal, HDCP encryption, the source 5V, sync type)

Video signal info

Resolution, color depth and color space, Timing type and Timing ID of the incoming signal are shown here.

The 'Timing type' and 'Timing ID' fields show which parameters are used to digitize the incoming analog signal. The input port measures the incoming analog signal and determines the timings. If the parameters need adjustment, it can be done on the right side at 'analog options'. In this case, the 'Timing ID' field changes to 'user modified' unless the parameters are not saved.

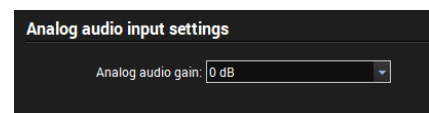
Audio signal info

Information about the **embedded** audio signal is shown here. (Signal present, audio type, sampling frequency, channel allocation)

Analog audio input settings

Gain of analog audio input (amplify of the built in preamplifier) signal can be adjusted as follows:

from 0 .. +24 dB with 3 dB steps



Analog video options

Analog video signals are digitized on the input. The timing parameters can be adjusted here if needed. Timing presets can be saved for each resolution separately.

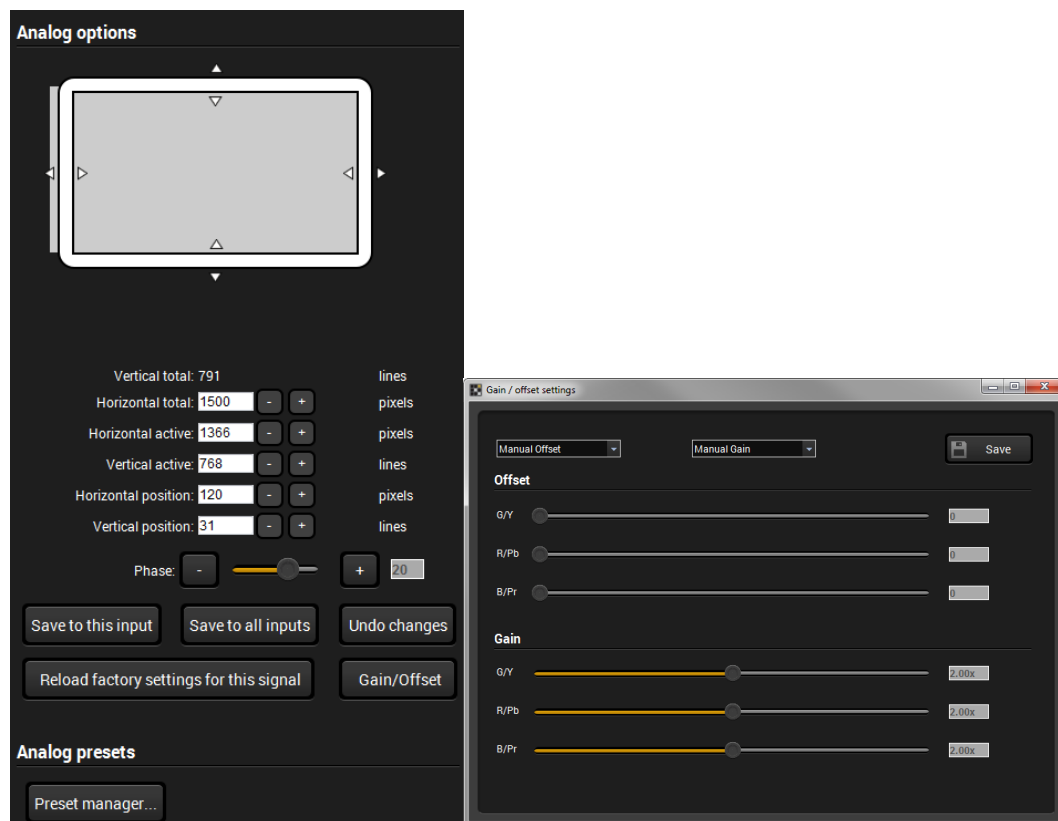
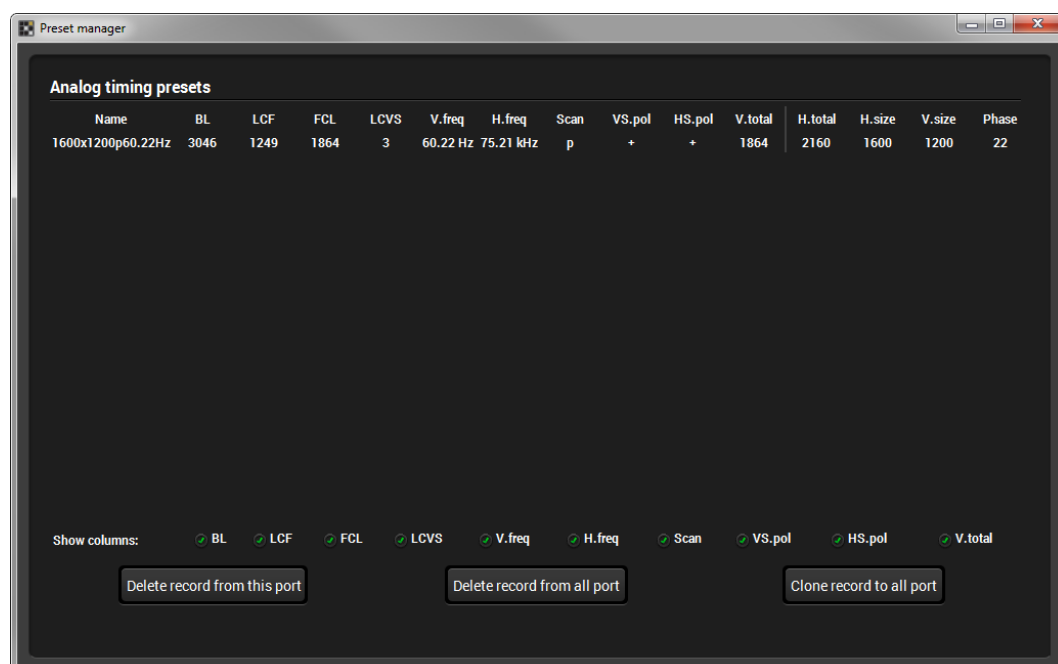


Figure 7-8. Input parameters for analog signal

Analog presets

Presets can be named and saved, nevertheless the preset list can be saved to a file and loaded at any time.



Frame detector (on video input ports)

Input ports can show detailed information about the signal like blanking intervals and active video resolution. This feature is a good troubleshooter if compatibility problems occur during system installation. To access this function, open Properties panel of the input port on which the signal has to be checked. Click on Frame Detector button to show detailed timings.

Frame detector

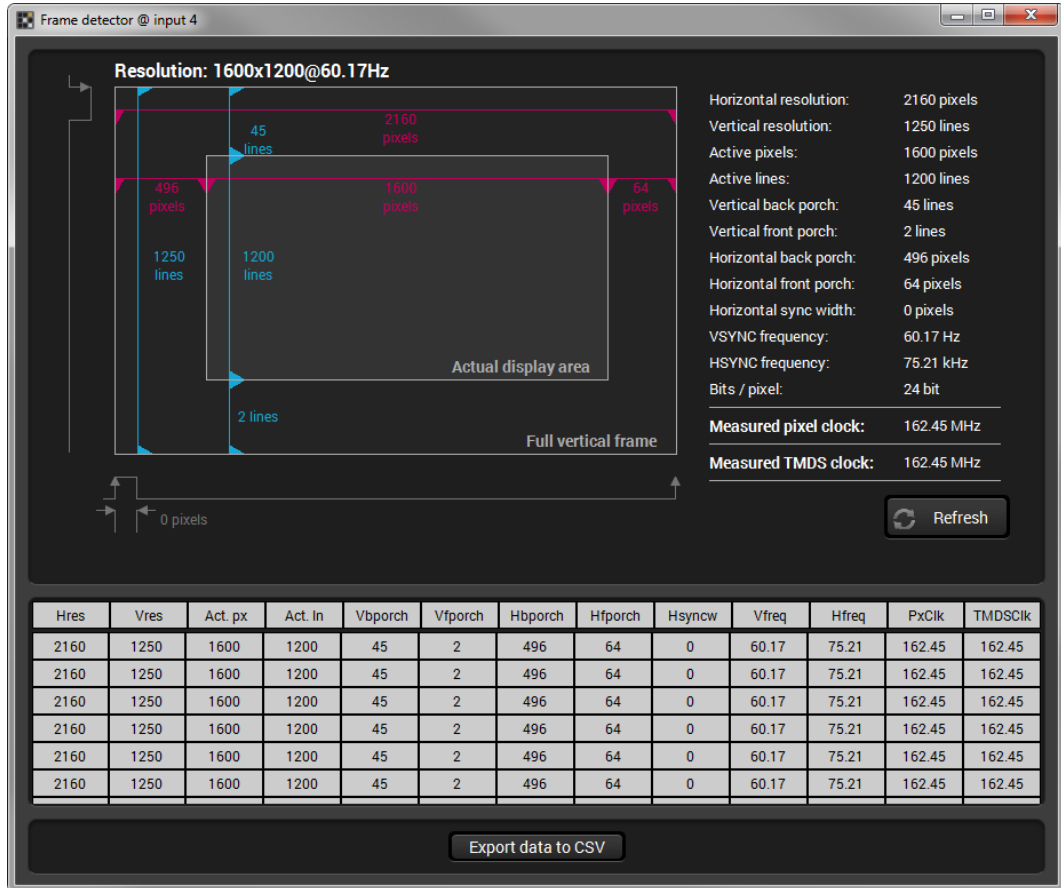


Figure 7-9. The frame detector window

Lightware's frame detector function works like an input signal analyzer and makes possible to determine the exact video format that is sent by the source, thus helps to identify many 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 on the incoming video signals just like a built-in oscilloscope, but it is much more easy to use. Actual display area shows the active video size (light grey). Dark gray 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 actually on the signal and not retrieved only from the HDMI info frames.

The listed values are measured in real time, and they are refreshed in every three seconds. The results are listed in a table which can be exported into CSV file. Clicking on the Refresh button triggers a new measurement.

7.5.4. Output parameter settings

For UMX4x4-Pro2 matrices the output port settings are displayed in a new window with the available functions.

By clicking on a port number on the Grid view, or on the Parameters button on the Tile view, a dialog window appears showing the parameters for the corresponding port.

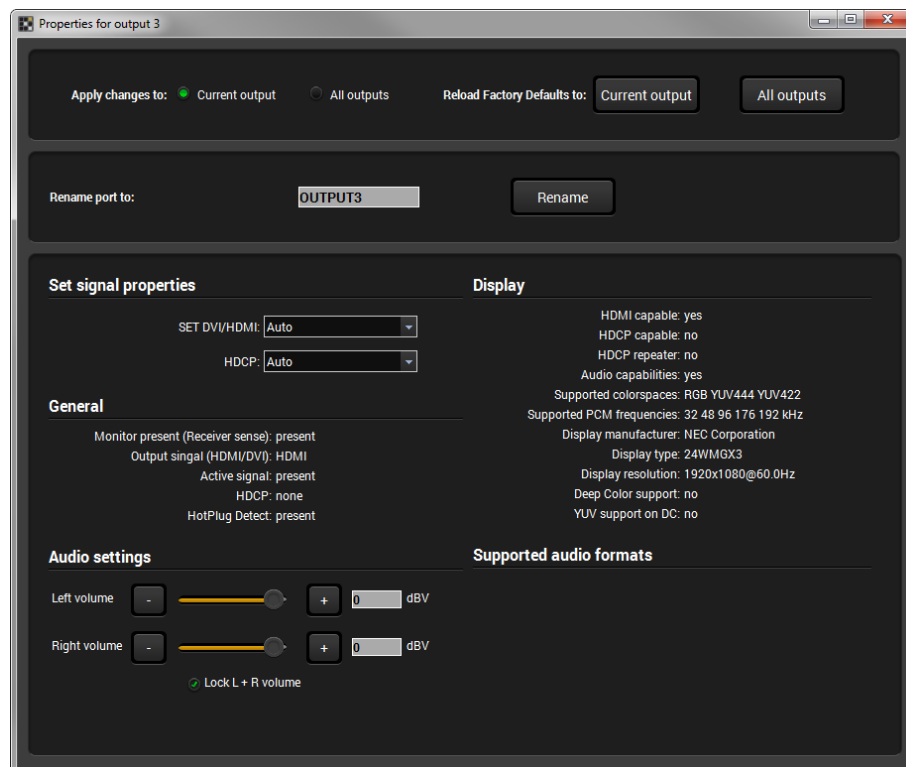


Figure 7-10. Output parameters

Scope of changes

There are two options to apply changes. To set the scope of the changed settings, select the desired option in the top left box.

Apply changes to current output: this option means the modified parameters are applied only to the currently selected port.

Apply changes to all outputs: this option means that the modified parameters are applied to all output ports.

Info: When opening this window again, the scope selection will be set to “Current Output” regardless of the active selection at the time of closing. It is to avoid making changes to all outputs by mistake.

Reload factory defaults

Current output: Reloads the default values to the currently selected output.

All outputs: Loads the factory default values to all outputs.

Rename port

To help memorizing the connected sources and destinations, names can be assigned to inputs and outputs. I/O names can be maximum 15 characters long, and consist of alphanumeric characters (lowercase letters, uppercase letters and numbers). All lower case characters are converted to uppercase ones.

The text box contains the current name of the port. To rename it, click into the text box, type the new name then click on the Rename button.

Set signal properties

Mode

The 'Mode' can be set to Auto, force DVI and force HDMI. The 'Auto' option sets the signal mode regarding to the attached display device's EDID and the incoming signal. Force modes ignore the attached device even if the picture couldn't see (e.g. HDMI signal on a DVI monitor).

HDCP

The 'HDCP' option sets the HDCP encryption on the output. The Auto setting applies encryption when the incoming signal is encrypted. The Always setting forces encryption on any incoming video signal.

General

Information about the signal and the connection status is shown here.

Analog audio

The left and right audio volume can be set up regarding the analog stereo output. If the channel lock box is ticked, left and right volume can be set at the same time.

Display

Information retrieved from the connected display's EDID is shown.

Supported audio formats

The connected display's supported audio formats are shown based on the read EDID.

7.5.5. Presets

Preset operations can be done in *Crosspoint* submenu on the *Preset* tab. Each Lightware UMX4x4-Pro2 matrix switcher has 32 preset memories that can be loaded and saved at any time.

Info: A preset setting stores a full configuration of all outputs, so preset loading have an effect on every output, except the locked ones.

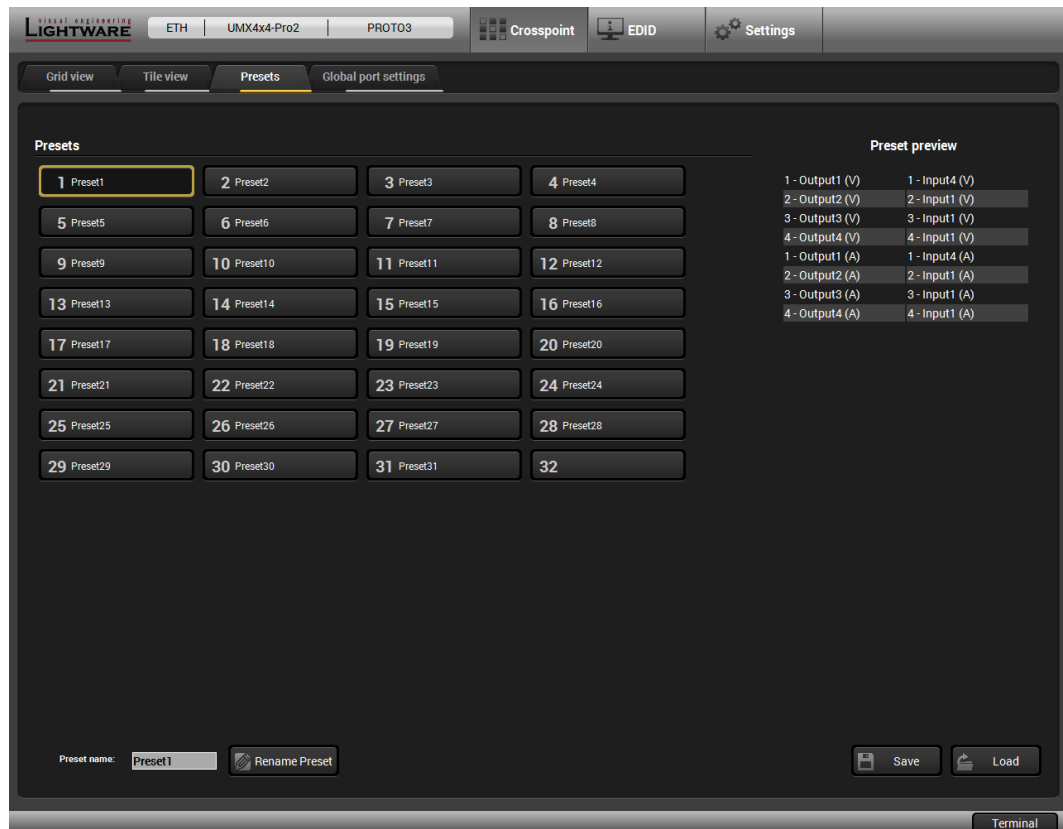


Figure 7-11. Presets tab

A preset can be selected by pressing its button on the left. Preview preset (on the right) will show the crosspoint settings of input and output ports.

Loading a preset

- Step 1.** Select *Preset* tab from *Crosspoint* menu.
- Step 2.** Select the preset memory (Preset1...Preset32) you want to load as the next crosspoint configuration.
- Step 3.** Press *Load* button below *Preset preview* list. Now the preset is loaded.
- Step 4.** The new I/O configuration is displayed in *Grid view*.

Saving a preset

- Step 1.** Make the desired crosspoint connections in *Tile view* or *Grid view*.
- Step 2.** Select the preset memory (Preset1...Preset32) where you want to save your current crosspoint connections.
- Step 3.** Press *Save* button below *Preset preview* list.
- Step 4.** A confirmation message is displayed on the information bar; the preset is stored.

Renaming a preset

- Step 1.** Select the preset memory (Preset1...Preset32) you want to rename.
- Step 2.** Type the desired name and press *Rename Preset* button; the new name is stored.

Info: Loading a preset doesn't alter either the lock state or the switch state of a locked output. If an output is locked to an input before preset loading it will also be locked to that input after preset loading, so locked outputs ignore the preset.

Preset preview

The text format crosspoint state of a selected preset can be viewed at the right side of the window.

7.5.6. Global port settings

'No sync' color

The device generates a solid color image (640x480@60Hz, 24bit) which can be displayed when there is no incoming signal on the port. User can enable or disable this function (**enabled** by factory default) and can select the color of the picture (**0f0f0f** by factory default).

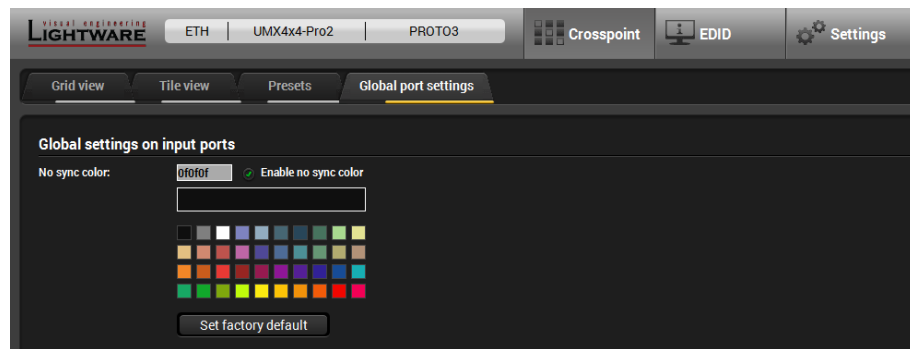


Figure 7-12. Global port settings

Tick the small checkbox to enable the function.

Write the hex RGB code* into the textbox then press ENTER or click on the desired color in the color palette to change the color of the picture.

* For example *d18970* hex RGB code means:

RED = d1 (hex) -> 209 (dec)
GREEN = 89 (hex) -> 137 (dec)
BLUE = 70 (hex) -> 112 (dec)

The table below contains the exact commands, which are called by using the GUI window items (buttons, text boxes, check boxes)

No sync color: <input type="text" value="d18970"/>	{SETBG=x;209;137;112;}
<input checked="" type="checkbox"/> Enable no sync color	{SETBG=1;}
<input type="checkbox"/> Enable no sync color	{SETBG=0;}
Set factory default	{SETBG=FACTORY}

Set factory default values for all I/O ports

Input and output ports have many properties and they also have factory default values. To reset all of them click on the Set factory defaults button.

The table below contains the exact commands, which are called by pressing of the button.

Set factory defaults

```
{:DVII#1@AI=FACTORY}
{:ADC#1@AI=FACTORY}
{:ANALOG#1@AI=RESET}
{:PICTURE#1@AI=FACTORY}
{SETBG=FACTORY}
{:HDMI#1@AO=FACTORY}
{:AUDIO#1@AO=FACTORY}
```

7.6. EDID menu

Advanced EDID Management can be accessed by selecting *EDID* menu.

The screenshot shows the EDID management interface with two main panels: Source and Destination. The Source panel has tabs for Factory, User, Dynamic, and Emulated. The Destination panel has tabs for Emulated and User. Both panels display tables of EDID entries with columns for Memory, Manuf., Resolution, and Monitor Name. The Source table lists 27 factory EDIDs, and the Destination table lists 4 emulated EDIDs. At the bottom, there are buttons for Save, Info, Edit, Create, and a Terminal window.

Memory	Manuf.	Resolution	Monitor Name
Factory 1	LWR	640x480@60.0Hz	D640x480p60
Factory 2	LWR	848x480@60.0Hz	D848x480p60
Factory 3	LWR	800x600@60.30Hz	D800x600p60
Factory 4	LWR	1024x768@60.0Hz	D1024x768p60
Factory 5	LWR	1280x768@50.0Hz	D1280x768p50
Factory 6	LWR	1280x768@59.92Hz	D1280x768p60
Factory 7	LWR	1280x768@75.0Hz	D1280x768p75
Factory 8	LWR	1360x768@60.1Hz	D1360x768p60
Factory 9	LWR	1280x1024@50.0Hz	D1280x1024p50
Factory 10	LWR	1280x1024@60.1Hz	D1280x1024p60
Factory 11	LWR	1280x1024@75.1Hz	D1280x1024p75
Factory 12	LWR	1400x1050@49.99Hz	D1400x1050p50
Factory 13	LWR	1400x1050@59.99Hz	D1400x1050p60
Factory 14	LWR	1400x1050@75.0Hz	D1400x1050p75
Factory 15	LWR	1680x1050@59.99Hz	D1680x1050p60
Factory 16	LWR	1920x1080@50.0Hz	D1920x1080p50
Factory 17	LWR	1920x1080@60.0Hz	D1920x1080p60
Factory 18	LWR	2048x1080@50.0Hz	D2048x1080p50
Factory 19	LWR	2048x1080@59.99Hz	D2048x1080p60
Factory 20	LWR	1600x1200@50.0Hz	D1600x1200p50
Factory 21	LWR	1600x1200@60.0Hz	D1600x1200p60
Factory 22	LWR	1920x1200@50.0Hz	D1920x1200p50
Factory 23	LWR	1920x1200@59.55Hz	D1920x1200p60
Factory 24	LWR	2048x1200@59.95Hz	D2048x1200p60
Factory 25			
Factory 26			
Factory 27			



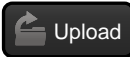




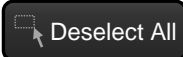

EDID Inputs	Manuf.	Resolution	Monitor Name	Source
Input 1	LWR	1920x1080@60.0Hz	H1920x1080p60	F046
Input 2	LWR	1920x1080@60.0Hz	H1920x1080p60	F046
Input 3	LWR	1920x1080@60.0Hz	H1920x1080p60	F046
Input 4	LWR	1920x1080@60.0Hz	H1920x1080p60	F046

Figure 7-13. EDID management

There are two panels: left one contains *Source* EDIDs, right one contains *Destination* places where the EDIDs can be emulated. The list can be scrolled by mouse wheel or by grabbing and moving up and down.

Info: The built-in website and the Lightware Device Controller software have same functions but the website does not support EDID info, Easy EDID creator and EDID editor.

Control buttons

	Exporting an EDID (save to a file)		Executing EDID emulation or learning (Transfer button)
	Importing an EDID (load from a file)		Deleting EDID (from user memory)
	Opening selected EDID with Summary window		Selecting all memory places in the right panel
	Opening Advanced EDID Editor with selected EDID		Selecting none of the memory places in the right panel
	Opening Easy EDID Creator		

7.6.1. EDID operations

Changing emulated EDID

- Step 1.** Select desired EDID list from one of the three sources by pressing its button.
- Step 2.** Select an EDID from the *Source* panel that has to be emulated.
- Step 3.** Press *Emulated* button above *Destination* panel.
- Step 4.** Select desired port where the EDID has to be emulated (more ports can also be selected); the EDID(s) will be highlighted with yellow cursor.
- Step 5.** Press *Transfer* button to change emulated EDID.

Learning an EDID

Info: The process is the same like changing emulated EDID; the only difference is the *Destination* panel: select 'User' button. Thus, one or more EDIDs can be copied into user memory either from 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 desired EDID from the *Source* panel (highlight with yellow cursor).
- Step 2.** Press *Save* button to open *Save as* dialog and download 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 *User* button above *Source* panel.
- Step 2.** Select a memory slot from the *Source* panel.
- Step 3.** Press the *Upload* button below *Source* panel.
- Step 4.** Browse the file in the opening window then press *Open* button. Browsed EDID is imported into the selected User memory.

Info: The imported EDID overwrites the selected memory place even if it is not empty.

EDID Summary window

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

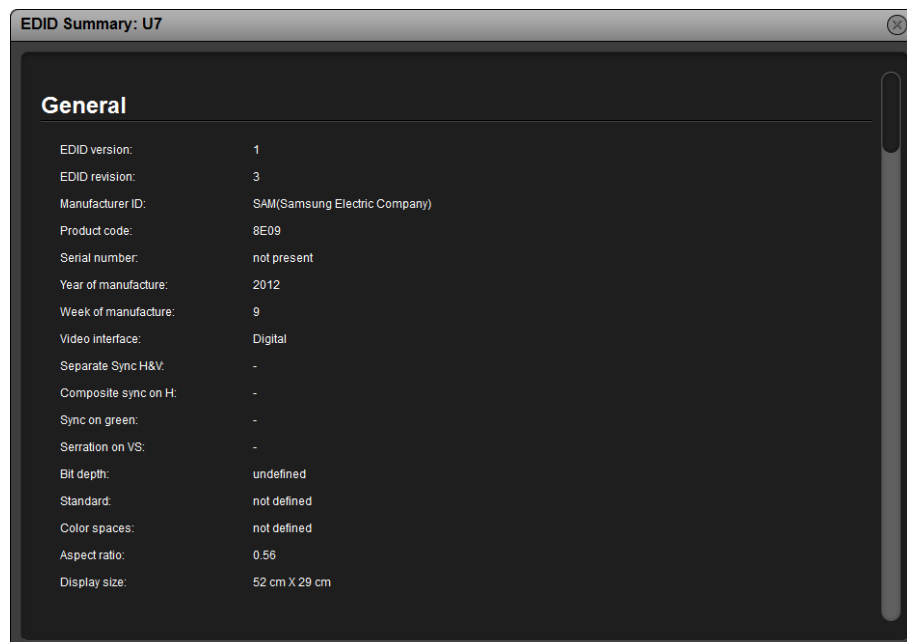


Figure 7-14. EDID Summary

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 in 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*.

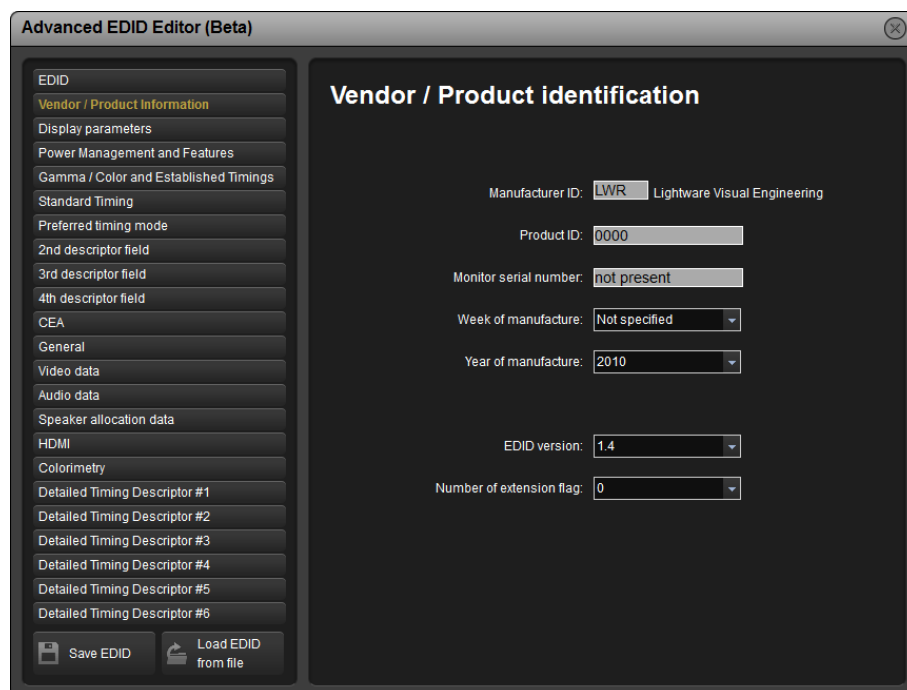


Figure 7-15. Advanced EDID Editor

Creating an EDID (Easy EDID Creator)

Since above mentioned *Advanced EDID Editor* needs more complex 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 *EEC* button below *Source* panel, *Easy EDID Creator* is opened in a new window.

Deleting EDID(s)

The EDID(s) from User memory can be deleted as follows:

Step 1. Press *User* button above *Destination* panel.

Step 2. Select desired memory slot(s); more ports can be selected. Use *Select All* and *Deselect All* buttons according to the needs. The EDID(s) will be highlighted with yellow cursor.

Step 3. Press *Delete selected* button to delete the EDID(s).

7.7. Settings menu

The menu contains Hardware- and Software-related settings and information about connected device. The content of the tabs is also device-dependent.

7.7.1. Configuration

Settings about establishing the connection to the desired device are available on this tab.

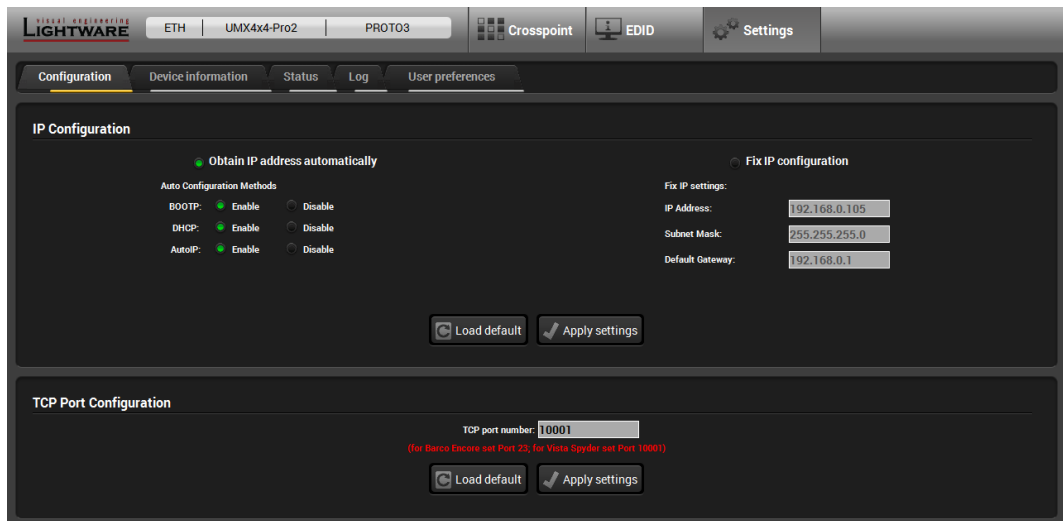


Figure 7-16. Configuration tab

IP Configuration

The IP address and TCP/IP port can be set up here.

Obtain IP address automatically

By selecting the *Obtain IP address automatically* option, the device gets the IP address from the DHCP server on the LAN, or if DHCP server is not present, it gets an AutoIP address from 169.254.xxx.xxx domain. Set BOOTP, DHCP and AutoIP settings according to your network requirements. Always press the *Apply settings* button to save changes.

Info: *Load default* button restores the default network settings (fix IP) to the device: IP Address: 192.168.254.254, Subnet Mask: 255.255.0.0, Default Gateway: 0.0.0.0.

Info: *When serial port is used for connection, these settings cannot be changed.*

Fix IP configuration

In this case, connected device has an IP address configuration set up by the user/administrator. Depending on modified settings, you might need to restart the device and the Control Software. Always press the *Apply settings* button to save changes.

Info: Load default button restores the default network settings (fix IP) to the device: IP Address: 192.168.254.254, Subnet Mask: 255.255.0.0, Default Gateway: 0.0.0.0.

Info: When serial port is used for connection these settings cannot be changed.

TCP Port Configuration

Devices can be accessed via this TCP/IP port number with TCP connection. Port number can be modified to any number between 1025 and 65535 except the followings:

9999, 14000 - 14009, 30704, and 30718.

To use a matrix with Barco Encore set port to 23.

To use a matrix with Vista Spyder set port to 10001.

Always press the *Apply settings* button to save changes.

Serial Port Configuration

Devices can be accessed via serial port (standard RS-232), as well. The baud rate can be modified to followings:

9600, 19200, 38400, 57600, 115200

Info: The default value is 57600.

7.7.2. Device information

Basic information about connected device and installed cards are listed on this tab.

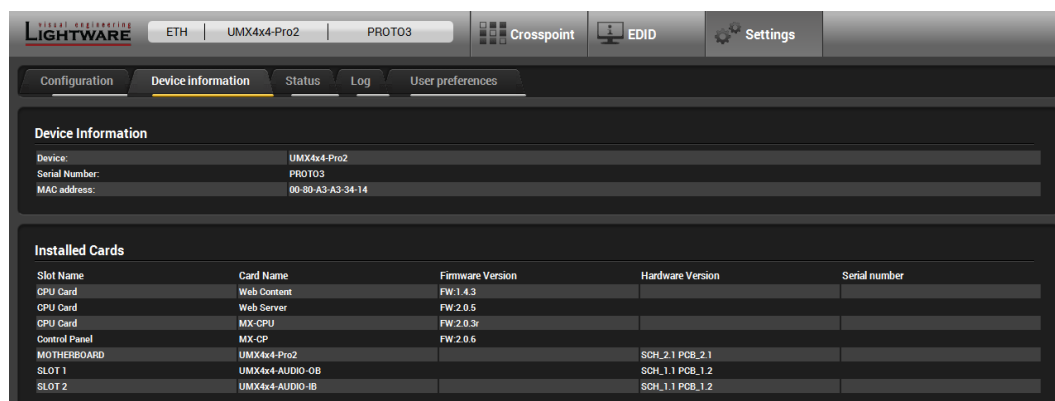


Figure 7-17. Device information tab

7.7.3. Status

The voltage levels and temperature measured by the CPU of the device are shown. Press the *Refresh* button to show/update values.

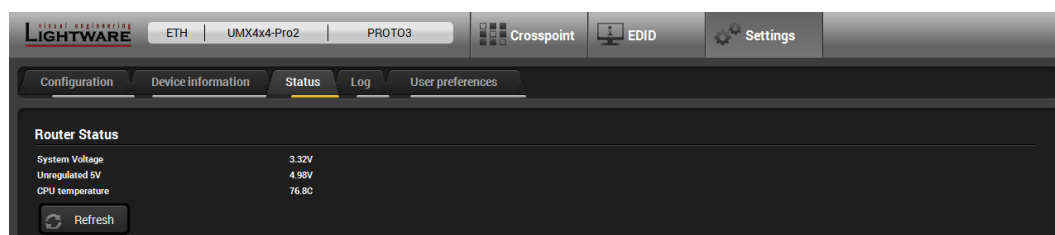


Figure 7-18. Status tab

7.7.4. Log

Report generators can be found on Log tab.

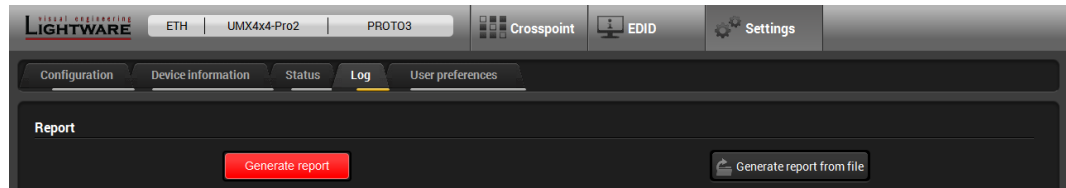


Figure 7-19. Log tab

Report section

The controller is able to collect information from the device and save it to a report file. This information package can be sent to Lightware support team when a problem may arise with the device.

- Step 1.** Press the red button: *Generate report file*.
- Step 2.** Controller collects the needed information; this may take up to 5 minutes.
- Step 3.** After generating the report the 'Save as' dialog box appears. Select the folder where you want to save the report file. The default file name can be changed.

The report contains the following device-dependent information: (if available)

- Current command protocol
- Device type and serial number
- Current crosspoint state
- Firmware versions of all the internal controllers
- Installed I/O board types and versions
- Hardware health status
- All EDID headers and status (emulated, dynamic, factory, user)
- Basic error list
- Log file list
- Last detailed error log

Open custom report from file

The Controller Software is able to send a custom command file to certain devices (matrices). The command file can be generated by Lightware support. This is needed when some special commands has to be used for configuring the device or troubleshooting.

Info: This function is only for special troubleshooting cases.

7.7.5. User preferences (only in LDC)

Users can customize the LDC. Crosspoint behavior can be set on the User preferences tab.

Info: These settings are stored only in the LDC software, not in the matrix.

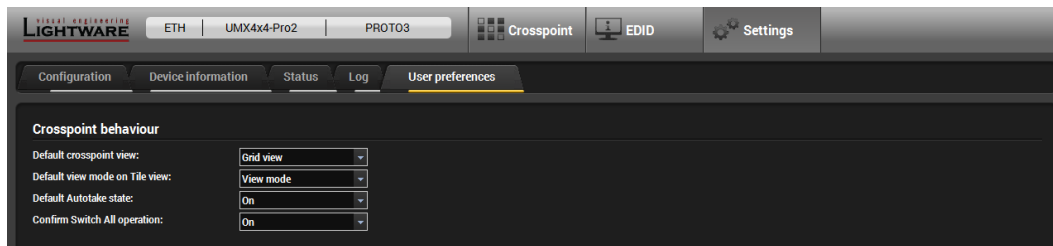


Figure 7-20. User preferences tab

Default crosspoint view

When LDC starts, it loads the default crosspoint view. It can be the

- Grid view or
- Tile view.

Default view mode on Tile view

According to the most common operation, the Tile view can start with:

- View mode
- Input switch mode or
- Output switch mode

Default Autotake state of Tile view

If the switching with Autotake is preferred, do not need to enable the function all the time. It is enough to save the setting in this tab.

Confirm Switch All operation

The software does not let switching one input to all outputs without confirm.

7.8. Terminal window

This general purpose terminal is created mainly for testing and debugging purposes. After a successful connection is established with a device this terminal can be used either via serial RS-232 or TCP/IP LAN connection. The command text can be typed directly. Press *Terminal* button in the right bottom corner to open the window.

```

Web Terminal
2015.04.29. 17:00:41 > {S}
2015.04.29. 17:00:41 < {SN:PROTOS}
2015.04.29. 17:00:42 > {F}
2015.04.29. 17:00:42 < {FW:2.0.3r}
2015.04.29. 17:00:43 > {CT}
2015.04.29. 17:00:43 < {Compiled:Oct 6 2015 15:50:58 Build:3564}
2015.04.29. 17:00:44 > {FC}
2015.04.29. 17:00:44 < {CF MX-CP FW:2.0.6 @ 0X10}
2015.04.29. 17:00:44 < {CF END}
2015.04.29. 17:00:45 > {LAN_VER=?}
2015.04.29. 17:00:45 < {MAC_ADDR=00-80-A3-A3-34-14}
2015.04.29. 17:00:45 < {WEB_VER=1.4.3}
2015.04.29. 17:00:45 < {SERVER_VER=2.0.5}
2015.04.29. 17:00:46 > {IP_CONFIG=?}
2015.04.29. 17:00:46 < {IP_CONFIG=7 192.168.000.105 10001 255.255.255.000 192.168.000.001}
2015.04.29. 17:00:47 > {IS}
2015.04.29. 17:00:47 < {SL# 0 UMX4x4-Pro2 SCH_2.1 PCB_2.1}
2015.04.29. 17:00:47 < {SL# 1 UMX4x4-AUDIO-OB SCH_1.1 PCB_1.2}
2015.04.29. 17:00:47 < {SL# 51 UMX4x4-AUDIO-IB SCH_1.1 PCB_1.2}
2015.04.29. 17:00:47 < {SL END}
2015.04.29. 17:00:48 > {ST}
2015.04.29. 17:00:48 < {ST 3.32V 4.96V 77.1C}
2015.04.29. 17:00:49 > {WV}
2015.04.29. 17:00:50 > {WH}
2015.04.29. 17:00:50 < {EH# 0 -}
2015.04.29. 17:00:51 > {VEDID}
2015.04.29. 17:00:51 < {VEDID F046 F046 F046 F046}
2015.04.29. 17:00:52 > {:OSD}
2015.04.29. 17:00:52 < {OSD 0000}
2015.04.29. 17:00:53 > {:ISD}
2015.04.29. 17:00:53 < {ISD 0000}
2015.04.29. 17:00:54 > {ELIST=?}
2015.04.29. 17:00:54 < {ELIST#1 Notice BOOT p:0x03 o:1}
2015.04.29. 17:00:54 < {ELIST#2 Notice READY p:0x00 o:1}
2015.04.29. 17:00:55 > {:ELIST=?}
2015.04.29. 17:00:56 > {SD_DIRREC=M:\LOG\*}
  
```

Figure 7-21. Terminal window

By default commands are automatically surrounded by framing brackets. Every sent command is red-colored and gets a ‘>’ prefix. Received responses are blue-colored and starts with ‘<’.

The timecode in every row shows the exact time when the command was sent or the response received.

If the *Command framing* checkbox is unchecked, you can send multiple commands together, however in this case you have to type in the framing brackets manually.

If the *Autoscroll* checkbox is checked, the window is scrolled down automatically when a new row is added.

The window can be emptied by pressing the *Clear* button.

8. Programmers reference

Users can connect to the matrix through Ethernet or serial port. After establishing connection, there is no difference between connection types (except some rare cases, which are uniquely noted).

Lightware matrix routers can be controlled with external devices which can communicate according to the router protocol. Lightware routers have a special protocol, but to interoperate with third party devices, a secondary protocol is also provided.

Please see section [6](#) on page [46](#) about remote operation and connection setup.

8.1. Changing protocols

The router is equipped with multiple router protocols.

The currently used protocol can be viewed or changed any time on the matrix front panel (see [6.1.6](#) on page [47](#)) or with protocol commands (see [8.4.7](#) on page [84](#)).

8.2. Protocol description

The protocol description hereinafter stands for Lightware protocol.

The matrices accept commands surrounded by curly brackets - { } - and responds with data surrounded by round brackets - () - only if a command was successfully executed. All input commands are converted to uppercase, but respond commands can contain upper and lower case letters as well.

Legend for control commands:

<in>	=	input number in 1 or 2 digit ASCII format (01,5,07,16 etc.)
<out>	=	output number in 1 or 2 digit ASCII format
<in ² >	=	input number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<out ² >	=	output number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<loc>	=	location number in 1, 2 or 3 digit ASCII format
<id>	=	id number in 1 or 2 digit ASCII format
<id ² >	=	id number in 2 digit ASCII format
< <i>italic</i> >	=	italic parameters are optional
CrLf	=	Carriage return, Line feed (0x0D, 0x0A)
•	=	space character (0x20)
→	=	each command issued by the controller
←	=	each response received from the router

ASCII table:

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	[NUL]	32	20	[Space]	64	40	@	96	60	`
1	01	[SOH]	33	21	!	65	41	A	97	61	a
2	02	[STX]	34	22	"	66	42	B	98	62	b
3	03	[ETX]	35	23	#	67	43	C	99	63	c
4	04	[EOT]	36	24	\$	68	44	D	100	64	d
5	05	[ENQ]	37	25	%	69	45	E	101	65	e
6	06	[ACK]	38	26	&	70	46	F	102	66	f
7	07	[BEL]	39	27	'	71	47	G	103	67	g
8	08	[BS]	40	28	(	72	48	H	104	68	h
9	09	[TAB]	41	29	)	73	49	I	105	69	i
10	0A	[LF]	42	2A	*	74	4A	J	106	6A	j
11	0B	[VT]	43	2B	+	75	4B	K	107	6B	k
12	0C	[FF]	44	2C	,	76	4C	L	108	6C	l
13	0D	[CR]	45	2D	-	77	4D	M	109	6D	m
14	0E	[SOH]	46	2E	.	78	4E	N	110	6E	n
15	0F	[SI]	47	2F	/	79	4F	O	111	6F	o
16	10	[DLE]	48	30	0	80	50	P	112	70	p
17	11	[DC1]	49	31	1	81	51	Q	113	71	q
18	12	[DC2]	50	32	2	82	52	R	114	72	r
19	13	[DC3]	51	33	3	83	53	S	115	73	s
20	14	[DC4]	52	34	4	84	54	T	116	74	t
21	15	[NAK]	53	35	5	85	55	U	117	75	u
22	16	[SYN]	54	36	6	86	56	V	118	76	v
23	17	[ETB]	55	37	7	87	57	W	119	77	w
24	18	[CAN]	56	38	8	88	58	X	120	78	x
25	19	[EM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUB]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESC]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FS]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GS]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RS]	62	3E	>	94	5E	^	126	7E	~
31	1F	[US]	63	3F	?	95	5F	_	127	7F	[DEL]

The most frequently used characters are highlighted.

8.3. Storage settings

The matrix stores many configuration settings and parameters and uses different memories. In some cases it is important to know which setting or parameter will or will not change after a firmware upgrade.

Setting or parameter	After firmware upgrade
Matrix router serial number	remain unchanged
HDCP options	remain unchanged
I/O port and preset names	remain unchanged
EDID lists (F, U, D)	remain unchanged
EDID emulation table (E)	remain unchanged
Input port settings	remain unchanged
Output port settings	remain unchanged
Crosspoint settings	remain unchanged
Crosspoint presets	remain unchanged
Serial port settings	remain unchanged
IP settings	remain unchanged
Analog video timings	remain unchanged
Protocol modes	remain unchanged
Remote alert send levels	remain unchanged
Basic error list	cleared on reboot

8.4. Status and identification commands

8.4.1. View product type

Description: Identification of the device. Type 'i' or 'l' then the router responds its name.

Format	Example
Command {i}	→ {i}
Response (<PRODUCT_TYPE>)CrLf	← (l:UMX4x4-Pro2)CrLf

Legend: <PRODUCT_TYPE > shows the router model.

Explanation: The connected device is a UMX4x4-Pro2.

8.4.2. View serial number

Description: The router responds its 8-digit serial number.

Format	Example
Command {S}	→ {s}
Response (<SERIAL_NUMBER>)CrLf	← (SN:59058505)CrLf

Legend: < SERIAL_NUMBER > shows the serial number of the router.

Explanation: The connected device's serial number is 59058505.

8.4.3. View Firmware version of the CPU

Description: View the CPU firmware revision.

Format	Example
Command {F}	→ {f}
Response (<FW_VERSION>)CrLf	← (FW:2.0.3r)CrLf

Legend: <FW_VERSION> is the firmware version. It is followed by <s> string which may indicate special versions. <s>=r indicates standard version.

Explanation: The connected device's firmware version is 2.0.3r.

8.4.4. View CPU firmware compile time

Description: Shows the CPU firmware compile time.

Format	Example
Command {CT}	→ {ct}
Response (Compiled:<DATE>•<TIME>• Build:<tag>)CrLf	← (Compiled:Oct 6 2015 15:50:58 Build:3564)CrLf

Legend: <DATE> Month, Day and Year
<TIME> Hours, minutes and seconds
<tag> Identification number of the firmware

Explanation: The firmware was made in 06.11.2015, 15:50:58 and the identification number of the firmware is 3564.

8.4.5. View installed controllers' firmware

Description: Shows the firmware revisions of the installed controllers.

Format	Example
Command {FC}	→ {fc}
Response (CF•<TYPE>•<VER>• @•<INFO>)CrLf (CF•END)CrLf	← (CF MX-CP FW:2.0.6 @ 0X10)CrLf ← (CF END)CrLf

Legend: <TYPE> Installed controller's type
<VER> The controller's firmware version
<INFO> Optional information about controller configuration

Explanation: The installed matrix controller firmware is 2.0.6 and has the '0X10' configuration ID.

8.4.6. View current control protocol

Description: Matrix routers can be controlled with different control protocols. This command queries the active protocol for the used control interface.

Format	Example
Command {P_?}	→ {p_?}
Response (CURRENT•PROTOCOL• =#<x>)CrLf	← (CURRENT PROTOCOL = #1)CrLf

Legend: <x> stands for the active protocol.

Explanation: Protocol 1 is active here.

Possible settings:

<protocol>	Control protocol
1	Lightware (default)
2	Protocol #2

8.4.7. Set current control protocol

Description: Sets the RS-232 and TCP/IP control protocol (Default is '1').

Format	Example
Command {P_x}	→ {p_1}
Response (PROTOCOL•#<x>• SELECTED!)CrLf	← (PROTOCOL #1 SELECTED!)CrLf

Legend: Please read section [8.4.6](#). ([View current control protocol](#))

Explanation: Protocol 1 is activated.

8.4.8. View crosspoint size

Description: Shows the physical crosspoint size.

Format	Example
Command {GETSIZE}	→ {getsize}
Response (SIZE=<size>)CrLf	← (SIZE=4x4)CrLf

Explanation: The router reports that it has a 4x4 crosspoint.

Legend: <size> only can be 4x4 in case of UMX4x4-Pro2 matrices.

8.4.9. View LAN versions

Description: Shows information about the LAN interface.

Format	Example
Command {LAN_VER=?}	→ {lan_ver=?}
Response (MAC_ADDR=<mac>)CrLf	← (MAC_ADDR=00-80-A3-A3-34-20)CrLf
(WEB_VER=<ver1>)CrLf	← (WEB_VER=1.4.3)CrLf
(SERVER_VER=<ver2>)CrLf	← (SERVER_VER=2.0.5)CrLf

Legend: <mac> MAC (Media Access Control) address of the device.

<ver1> Version of built-in website user interface (web content).

<ver2> Version of LAN controller firmware (web server).

Explanation: MAC address, web content and web server versions are shown.

8.4.10. View router's health

Description: Queries health status. Response varies depending on the frame type.

Format	Example
Command {ST}	→ {st}
Response (ST●<DESC>)CrLf	← (ST 3.30V 4.95V 59.2C)CrLf

Legend: <DESC> INNER VOLTAGE 1 (nominal: 3.3V)

INNER VOLTAGE 2 (nominal 5V)

INNER TEMPERATURE

Explanation: Internal voltages and temperature are shown.

8.4.11. View installed I/O boards

Description: Shows the hardware name and revision of the installed cards. The number of responses varies regarding the frame size (number of slots).

Format	Example
Command {IS}	→ {is}
Response (SL#●0●<MB_DESC>)CrLf (SL#●1●<OB_DESC>)CrLf (SL#●51●<IB_DESC>)CrLf (SL●END)CrLf	← (SL# 0 UMX4x4-Pro2 SCH_2.1 PCB_2.1)CrLf ← (SL# 1 UMX4x4-AUDIO-OB SCH_1.1 PCB_1.2)CrLf ← (SL# 51 UMX4x4-AUDIO-IB SCH_1.1 PCB_1.2)CrLf ← (SL END)CrLf

Legend:

Slot name	Explanation
SL# 0...	This "slot" represents the motherboard.
SL# 1-50...	Slots from 1 to 50 are showing the output boards.
SL# 50-100...	Slots from 51 to 100 are showing the input boards.
SL END	This message indicates the end of the list.

Explanation: The router reports that it has one output and one input slot. There is one input card and one output card installed.

8.4.12. View error list

Description: Shows the basic error list since last boot up.

Format	Example
Command {ELIST=?}	→ {elist=?}
Response (ELIST#<num>●<elevel>●<code> ●<param>●<occ>)CrLf ... (ELIST#<num>●<elevel>●<code> ●<param>●<occ>)CrLf	← (ELIST#1 Notice BOOT p:0x03 o:1)CrLf ... ← (ELIST#2 Notice READY p:0x00 o:1)CrLf

Legend:

- <num>: line number
- <elevel>: NOTICE = Not an error. Initialization information.
WARNING = Possible problem without influencing normal operation.
MATTER = Problem that may lead to further errors.
ERROR = Serious error. Must report to support.
FATAL = Fatal error. Normal operation is not possible.
- <code>: short name for type of log entry
- <param>: technical parameter
- <occ>: occurrence number for this type of log entry

Explanation: There are no errors only standard notices that occur on boot up.

Info: The error list can contain NOTICES and WARNINGS under normal operation. These entries do not mean that there is any problem with the matrix!

8.5. System commands

8.5.1. Reload factory defaults

Description: Factory default settings can be reloaded for different functions separately. Multiple functions can be entered.

Format	Example
Command {FACTORY=<f1>;<f2>;...;<fx>}	→ {factory=xpoint;iocards;edids}
Response (FACTORY●<f1>...)CrLf	← (FACTORY XPOINT...)CrLf
...	← (FACTORY IOCARDS...)CrLf
(FACTORY●<fx>...)CrLf	← (FACTORY EDIDS...)CrLf

Legend: <f1>, <f2> are the names of the functions which have to be reset to factory default. Any number of <fx> can be entered, separated by semicolons.

<fx>	Restores factory settings to	Additional response
XPOINT	Crosspoint table and configuration (All outputs to in1, unmute, unlock)	none
IONAMES	Input and output names	(INAME#1=Input1) (ONAME#1=Output1)
PRESETS	Crosspoint presets (All output to in1, unmuted), and preset names	(PNAME#1=Preset1) (I1 ALL) (SPR01)...(SPR32)
IOCARDS	All I/O settings for boards currently in the frame	none
EDIDS	Emulated EDIDs (F49 is default)	(DE_OK)
EDIDMEM	Clear User and Dynamic EDIDs	(DE_OK)
ALL	Restores all of the factory settings listed above	as above

Explanation: Factory default settings reloaded for crosspoint and I/O card configurations and emulated EDIDs.

Info: The response may contain additional messages as the router makes the configurations. These responses can be omitted.

Info: After resetting the needed parameters, the matrix restarts.

8.5.2. Count HDCP keys

Description: If there is an HDCP source on any input of the matrix, the matrix can ask the source whether it can handle <num> piece of sink devices.

Format	Example
Command {:HDCPTEST<in>@<num>}	→ {:hdcptest2@8}
Response (HDCPTEST=SUCCESS)CrLf	← (HDCPTEST=SUCCESS)CrLf

Legend: <in> input port where the key counting will be executed
<num> the number of the HDCP keys

Explanation: The source on the 2nd input can handle 8 HDCP sink devices.

Info: If there is no source (or available but cannot handle HDCP) on the selected input port, the device responses (HDCPTEST=UNAVAILABLE).

8.5.3. Clear HDCP key cache

Description: The matrix stores the HDCP keys from the connected devices. These cached keys can be cleared with this command.

Format	Example
Command {:HDCPRESET}	→ {:hdcpreset}
Response (Done)CrLf	← (Done)CrLf

Explanation: HDCP key cache is cleared.

Info: This function is useful when too many keys were cached and a connected source device cannot accept so many keys.

8.5.4. Restart matrix router

Description: The matrix router can be restarted without unplugging power.

Format	Example
Command {RST}	→ {rst}
Response (Booting...)CrLf	← (Booting...)CrLf
(<name>●Ready!)CrLf	← (UMX4x4-Pro2 Ready!)CrLf

Legend: <name> is the type of the matrix

Explanation: The matrix reboots and sends a message when it is ready.

Info: The response can be seen only if the connection to the router is still alive.

8.6. Communication setup commands

8.6.1. Query IP settings

Description: IP settings can be retrieved from the router with this command.

Format	Example
Command {IP_CONFIG=?}	→ {ip_config=?}
Response (IP_CONFIG=<id> ●<ip_address>●<port> ●<mask>●<gateway>)CrLf	← (IP_CONFIG=0 192.168.000.105 10001 255.255.255.000 192.168.000.001)CrLf

Legend:

Identifier	Description	Default value
<id>	0: fix IP 2: DHCP	0
<ip_address>	IP address	192.168.254.254
<port>	TCP/IP port	10001
<mask>	subnet mask	255.255.0.0
<gateway>	gateway address	0.0.0.0

Explanation: The router has a fix IP address 192.168.0.105 on the 255.255.255.0 subnet with a gateway on 192.168.0.1 and communicates over TCP port: 10001.

8.6.2. Reload factory default IP settings

Description: This command sets the router to the factory default IP setup.

Format	Example
Command {IP_CONFIG=!}	→ {ip_config=!}
Response (Changing●IP● configuration...)CrLf (DONE!)CrLf or (FAILED!)CrLf	← (Changing IP configuration...)CrLf ← (DONE!)CrLf

Parameters after successful command execution:

Parameter	Value
IP address	192.168.254.254
port number	10001
Subnet mask	255.255.0.0
Gateway	0.0.0.0

Info: This command can be used on all control interfaces (LAN and RS-232) but the '(DONE!)' response cannot be seen on LAN because the connection is dropped just after the '(Changing IP configuration...)' response.

Info: DHCP setting can be reloaded by the front panel buttons as well (see section [6.1.5](#) on page [47](#)) or on the front panel LCD menu (see section [5.4.4](#) on page [37](#)), as well.

8.6.3. Enable DHCP IP setting

Description: After sending this command the router will inquire IP address with DHCP.

Format	Example
Command {IP_CONFIG=D}	→ {ip_config=d}
Response (Changing●IP● configuration...)CrLf (DONE!)CrLf or (FAILED!)CrLf	← (Changing IP configuration...)CrLf ← (DONE!)CrLf

Parameters after successful command execution:

Parameter	Value
IP address	Acquired with DHCP
port number	unchanged
Subnet mask	Acquired with DHCP
Gateway	Acquired with DHCP

Info: This command can be used on all control interfaces (LAN and RS-232) but the '(DONE!)' response cannot be seen on LAN because the connection is dropped just after the '(Changing IP configuration...)' response.

Info: DHCP setting can be reloaded by the front panel buttons as well (see section [6.1.5](#) on page [47](#)) or on the front panel LCD menu (see section [5.4.4](#) on page [37](#)), as well.

8.6.4. Query RS-232 baud rate

Description: The RS-232 baud rate can be checked. It works via LAN and RS-232 as well, but if RS-232 is used the command has to be sent with the appropriate baud rate.

Format	Example
Command {RS232BAUD=?}	→ {rs232baud=?}
Response (RS232BAUD=<rate>)CrLf	← (RS232BAUD=57600)CrLf

Explanation: The router communicates with 57600 baud on the RS-232 port.

Info: RS-232 Baud rate can be checked and set on the front panel LCD menu (see section [5.4.4](#) on page [37](#)), as well.

8.6.5. Change RS-232 baud rate

Description: The RS-232 baud rate can be set. If RS-232 connection is used, the command has to be sent with the earlier baud rate but the response comes with the new baud rate.

Format	Example
Command {RS232BAUD=<rate>}	→ {rs232baud=9600}
Response (RS232BAUD=<rate>)CrLf	← (RS232BAUD=9600)CrLf

Explanation: The router RS-232 port is set to 9600 baud.

Possible settings:

<rate>	Baud rate
9600	9600 baud
19200	19 200 baud
38400	38 400 baud
57600	57 600 baud (default)
115200	115 200 baud

Info: RS-232 Baud rate can be checked and set on the front panel LCD menu (see section [5.4.4](#) on page [37](#)), as well.

Info: In case of giving invalid number, the device leaves the baud rate untouched.

8.7. EDID router commands

The EDID router manipulates the EDID memory, which has memory locations that are assigned to specific input or output ports. Please read section [5.3](#) on page [34](#) about EDID memory structure.

8.7.1. Change EDID on input

Description: Copy EDID from memory location <loc2> to input port <loc1>.

Format	Example
Command {<loc1>:<loc2>}	→ {e4:f10}
Response (E_SW_OK)CrLf ...delay... (E_S_C)CrLf	← (E_SW_OK)CrLf ...delay... ← (E_S_C)CrLf

Legend: <loc1> has to be 'Exx'.
<loc2> can be 'Fxx' or 'Uxx' or 'Dxx'.

Explanation: Factory EDID F10 is copied to input 4.

Info: If <loc2> is 'Fxx' or 'Uxx' then static EDID routing occurs. In this case the router will keep the same EDID on the input until it is changed with another command.

Info: If <loc2> is 'Dxx' then dynamic EDID routing occurs. In this case the router will follow the EDID changes on the output. Every time a different EDID is recognized on the output, it is copied instantly to the input.

Info: The router sends (E_S_C) only if the new EDID is different from the earlier one.

8.7.2. Change EDID on all inputs

Description: Copy EDID from memory location <loc2> to all inputs. Location <loc2> should be 'Fxx' or 'Uxx' for static routing and 'Dxx' for dynamic routing.

Format	Example
Command {EA:<loc2>}	→ {ea:u2}
Response (E_SW_OK)CrLf ...delay... (E_S_C)CrLf	← (E_SW_OK)CrLf ...delay... ← (E_S_C)CrLf

Legend: <loc2> can be 'Fxx' or 'Uxx' or 'Dxx'.

Explanation: User EDID U2 is copied to all inputs.

Info: This operation can take several seconds.

8.7.3. Save EDID to user memory (Learn EDID)

Description: Learn EDID from <loc2> to <loc1>.

Format	Example
Command {<loc1>:<loc2>}	→ {u4:d3}
Response (E_SW_OK)CrLf (E_S_C)CrLf	← (E_SW_OK)CrLf ← (E_S_C)CrLf

Legend: <loc1> must be 'Uxx'.

Explanation: EDID from output 3 is saved to user EDID #4.

8.7.6. View EDID header

Description: Shows basic information about EDIDs in the memory.

Format	Example
Command {WH<loc>}	→ {whe1}
Response (EH#<loc>•<EDID_HEADER>)CrLf	← (EH#E1 NEC 1280x1024@60 LCD1970NXp)CrLf

Legend: Depending on <loc> the query can be for one EDID, all EDID in the block.

<loc>	Result	Response
Fxx	Factory EDID query	header for one EDID
Uxx	User EDID query	
Dxx	Dynamic EDID query	
Exx	Emulated EDID query	
F*	All Factory preset EDIDs	headers for all Factory EDIDs
U*	All User saved EDIDs	headers for 50 user EDIDs
D*	All Dynamic EDIDs	headers from all outputs
E*	All Emulated EDIDs	headers from all inputs

<EDID_HEADER> consists of 3 fields separated by spaces:

PNPID code The three letter abbreviation of the manufacturer

Preferred resolution The resolution and refresh rate stored in the preferred detailed timing block.

Name The name of display device stored in product descriptor.

Explanation: Shows the EDID from the input 1.

8.7.7. Download EDID content from the router

Description: EDID hex bytes can be read directly. The router will issue the whole content of the EDID present on memory location <loc> (256 bytes).

Format	Example
Command {WE<loc>}	→ {wef1>}
Response (EB#<loc>•<B0>•<B2>•..•<B255>)CrLf	← (EB#F1 00 FF FF FF FF FF FF 00 32 F2 00 00 00 00 92)CrLf

Legend: <B0> .. <B255> are space separated hex characters represented in ASCII format.

Explanation: Full EDID from memory location 1 is downloaded.

8.7.8. Upload EDID content to the router

Description: EDID hex bytes can be written directly to the user programmable memory locations.

Sequence:

- Step 1.** Prepare the router to accept EDID bytes to the specified location <loc> with command {WL#<loc>}
- Step 2.** Router responds that it is ready to accept EDID bytes with (E_L_S)CrLf
- Step 3.** Send 1 block of EDID (1 block consist of 8 bytes of hex data represented in ASCII format) with command:
{WB#<num>•<B0>•<B1>•<B2>•<B3>•<B4>•<B5>•<B6>•<B7>}
- Step 4.** The router acknowledges with response (EL#<num>)
- Step 5.** Repeat steps 3 and 4 to send the remaining 31 blocks of EDID (32 altogether)
- Step 6.** After the last acknowledge, the router indicates that the EDID status changed by sending (E_S_C) CrLf

Format	Example
Command {WL#<loc>}	→ {wl#u3}
Response (E_L_S)CrLf	← (E_L_S)CrLf
Command {WB#1•<B0>•<B1>•<B2>•<B3>•<B4>•<B5>•<B6>•<B7>}	→ {wb#1 00 FF FF FF FF FF FF 00}
Response (EL#<num>)CrLf	← (EL#1)CrLf
Command {WB#2•<B8>•<B9>•<B10>•<B11>•<B12>•<B13>•<B14>•<B15>}	→ {wb#2 38 A3 8E 66 01 01 01 01}
Response (EL#<num>) CrLf	← (EL#2)CrLf
⋮	⋮
Command {WB#32•<B248>•<B249>•<B250>•<B251>•<B252>•<B253>•<B254>•<B255>}	→ {wb#32 36 59 42 0A 20 20 00 96}
Response (EL#<num>) CrLf	← (EL#32)CrLf
Response (E_S_C) CrLf	← (E_S_C)CrLf

Legend: <num> represents the sequential number of every 8 byte part of EDID. <num> is between 1 and 32. <B0>..<B255> are the bytes of EDID.

Explanation: Full EDID uploaded to memory location U3.

8.7.9. Delete EDID from memory

Description: Clear EDID from memory location <loc>.

Format	Example
Command {DE<loc>}	→ {deu*}
Response (DE_OK)CrLf	← (DE_OK)CrLf
(E_S_C)CrLf	← (E_S_C)CrLf

Legend: Depending on <loc>, one EDID, or all EDIDs in a block can be cleared.

<loc>	Result
Fxx	Not valid! Factory EDID cannot be deleted. No response.
Uxx	Specified User EDID is deleted.
Dxx	Specified Dynamic EDID is deleted. It will be empty until a new monitor is connected.
Exx	Specified Emulated EDID cleared. By default F49 EDID is copied to it.
F*	Not valid! Factory EDID cannot be deleted. No response.
U*	All User EDIDs are deleted.
D*	All Dynamic EDIDs are deleted. They will be empty until a new monitor is connected.
E*	All Emulated EDIDs are cleared. By default F49 EDID is copied to them.

Explanation: All user EDIDs are cleared from memory.

8.7.10. View emulated EDIDs type

Description: Shows the type (Analog, DVI, HDMI) of the currently emulated EDIDs for each input.

Format	Example
Command {WITE}	→ {wite}
Response (WITE●<in1><in2><in3><in4>)CrLf	← (WITE DHAA)CrLf

Legend: All <inx> indexes show a type (what kind of EDID is emulated to that input port.)

Explanation: DVI EDID is emulated on the input 1. HDMI EDID is emulated on the input 2. Analog EDID is emulated on the input 3 and input 4.

8.8. Control commands

Description: The following commands with <A/V/AV> option can take effect in multiple layers, according to their parameters. Depending on 'A' or 'V' it can change only the Audio, or only the Video layer; or 'AV' changes both.

Info: <A/V/AV> option usually can be skipped for legacy purposes. In this case using router commands the router changes all (Video & Audio) layers, but using status commands it displays information about only the Video layer. Please use AV option, when available.

Usually the commands are sent one by one to the router, but this is not a must. Any command can be send to the router in a batch. To do this, just use the same commands (including { } brackets), but put the "CrLf" only at the end of the batch.

The below example shows a batch command that resulted group switching:

One by one commands	Batch commands (UMX4x4-Pro2)
→ {02@01}CrLf	→ {02@01}{04@03}CrLf ← (O01 I02)CrLf ← (O03 I04)CrLf
← (O01 I02)CrLf	
→ {04@03}CrLf	
← (O03 I04)CrLf	

8.8.1. Switch one input to one output

Description: This command switches an output to an input.

Format	Example
Command {<in>@<out>●<A/V/AV>}	→ {4@1 av}
Response (O<out²>●I<in²>●<A/V/AV>)CrLf	← (O01 I04 AV)CrLf

Legend: <A/V/AV>: **Layer select:**
A: Audio layer
V: Video layer
AV: Audio & Video layer

If the command is used without the <A/V/AV> parameter, both layers will be affected by the command.

Explanation: The example shows how to connect both Audio and Video from input 4 to output 1.

8.8.2. Switch one input to all outputs

Description: This command switches all video and/or audio outputs to one input.

Format	Example
Command {<in>@O●<A/V/AV>}	→ {3@o av}
Response (I<in²>●ALL●<A/V/AV>)CrLf	← (I03 ALL AV)CrLf

Legend: Please read section [8.8.1. \(Switch one input to one output\)](#)

Explanation: The example shows how to connect all outputs to input 3.

8.8.3. Switch diagonal

Description: This command switches all video and / or audio outputs to the same numbered inputs. Output 1 will be switched to the Input 1, Output 2 to Input 2, etc.

Format	Example
Command {<in>@D●<A/V/AV>}	→ {1@d av}
Response (ALLV●<out²>●<out²>●<out²>●<out²>)CrLf	← (ALLV 01 02 03 04)CrLf
(ALLA●<out²>●<out²>●<out²>●<out²>)CrLf	← (ALLA 01 02 03 04)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

Explanation: The example shows how to connect audio and video outputs to the same numbered inputs. The response contains all the connections, if both layers are selected the response is two messages.

8.8.4. View connection on output

Description: This command shows the video connection status of an output.

Format	Example
Command {?<out>}	→ {?2}
Response (O<out²>●I<in²>)CrLf	← (O02 I03)CrLf

Explanation: The example shows that video output 2 is connected to input 3

Info: This command is kept for legacy purposes; to get information about all layers, please use the multilayer command: [8.8.5](#). ([View connection on all outputs](#))

Info: The response shows connections only for the video layer.

8.8.5. View connection on all outputs

Description: This command displays all connections on a single or multiple layers.

Format	Example
Command {VC●<A/V/AV>}	→ {vc av}
Response (ALLV●<in²>●<in²>●<in²>●<in²>)CrLf	← (ALLV 02 02 02 03)CrLf
(ALLA●<in²>●<in²>●<in²>●<in²>)CrLf	(ALLA 02 02 02 04)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

<in²> Contains mute & lock state of the output:

M = muted

L = locked

U = muted & locked.

and contains the number of the selected input

(02 = connected to input no. 2)

(M02 = muted output, selected input: no. 2)

(L02 = locked to input: no. 2)

(U02 = muted & locked output, selected input: no. 2)

Explanation: The response contains all the connections, if both channels are selected the response is two messages.

The example shows that output 1,2,3 Audio & Video are connected to input 2 A&V; output 4 video is connected to input 3 and output 4 audio is connected to input 4.

(ALLV M02 U02 L02 03) response means video output 1 is muted, video output 2 is muted & locked and video output 3 is locked to input 2.

Info: If the command is used without the <A/V/AV> parameter, the response prefix is only ALL (instead of ALLV) but shows only the video layer connections.

8.8.6. Mute specified output

Description: This command mutes an output on a single or multiple layers.

Format	Example
Command {#<out>●<A/V/AV>}	→ {#2 a}
Response (1MT<out²>●<A/V/AV>)CrLf	← (1MT02 A)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

Explanation: The example shows how to mute audio output no. 2.

8.8.7. Unmute specified output

Description: This command unmutes an output on a single or multiple layers.

Format	Example
Command {+<out>●<A/V/AV>}	→ {+2 a}
Response (0MT<out²>●<A/V/AV>)CrLf	← (0MT02 A)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

Explanation: The example shows how to unmute audio output no. 2. Now output 2 is switched to the input it was connected to prior to the mute command.

8.8.8. Lock specified output

Description: This command locks an output on a single or multiple layers.

Format	Example
Command {#><out>●<A/V/AV>}	→ {#>4 av}
Response (1LO<out²>●<A/V/AV>)CrLf	← (1LO04 AV)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

Explanation: The example shows how to lock audio & video on output no. 4.

8.8.9. Unlock specified output

Description: This command unlocks an output on a single or multiple layers.

Format	Example
Command {+<<out>●<A/V/AV>}	→ {+<4 av}
Response (0LO<out²>●<A/V/AV>)CrLf	← (0LO04 AV)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

Explanation: The example shows how to unlock audio & video on output no. 4.

8.8.10. Save preset to memory location

Description: Save current crosspoint configuration on one or more layers.

Format	Example
Command {\$<id>●<A/V/AV>}	→ {\$4 a}
Response (SPR<id²>●<A/V/AV>)CrLf	← (SPR04 A)CrLf

Legend: Please read section [8.8.1](#). ([Switch one input to one output](#))

Explanation: Current audio crosspoint state is saved to preset 4, including the mute state of the outputs. It is possible to save only one layer, in that case the other layer in the preset will be not affected.

Info: Lock states are not saved. Lock state is assigned to the physical output of the router. Presets don't affect output locks.

Info: The maximum preset number is limited to 32 for all routers.

8.8.11. Load preset from memory location

Description: Load preset <id>.

Format	Example
Command { %<id>●<A/V/AV> }	→ { %4 av }
Response (LPR<id²>●<A/V/AV>)CrLf	← (LPR04 AV)CrLf

Explanation: Current crosspoint state is changed according to preset 4, including the mute state of the outputs. It is possible to load only one layer, in that case other layer crosspoint will be not affected.

8.8.12. View preset

Description: View the <id> numbered preset configuration without switching anything.

Format	Example
Command { VP#<id>=? }	→ { vp#3=? }
Response (VP#<id>V●<out²>●<out²>●<out²>●<out²>)CrLf (VP#<id>A●<out²>●<out²>●<out²>●<out²>)CrLf	← (VP#3V 01 02 03 04)CrLf ← (VP#3A 01 02 03 04)CrLf

Explanation: Current crosspoint state will not be changed and Preset 3 crosspoint state is shown. If Preset 3 is selected audio and video outputs will be switched to diagonal.

Renaming Presets / Inputs / Outputs

Description: Allows storing names for each preset / input / output. Any 16-byte long string is allowed (16 characters). All characters are converted to uppercase! The router accepts <id> for I/O names depending on the actual frame size. All router models have 32 presets memories.

8.8.13. Rename a preset

Format	Example
Command { PNAME#<id>=<preset_name> }	→ { pname#1=first preset }
Response (PNAME#<id>=<preset_name>)CrLf	← (PNAME#1=FIRST PRESET)CrLf

Explanation: Preset 1 was named as “FIRST PRESET”.

8.8.14. Rename an input

Format	Example
Command { INAME#<id>=<input_name> }	→ { iname#3=Media Player }
Response (INAME#<id>=<input_name>)CrLf	← (INAME#3=MEDIA PLAYER)CrLf

Explanation: Input 3 was named as “MEDIA PLAYER”.

8.8.15. Rename an output

Format	Example
Command { ONAME#<id>=<output_name> }	→ { ONAME#2=Monitor_no2 }
Response (ONAME#<id>=<output_name>)CrLf	← (ONAME#2=MONITOR_NO2)CrLf

Explanation: Output 2 was named as “MONITOR_NO2”.

Query names of Presets / Inputs / Outputs

Description: Each preset / input / output name can be read from the router.

8.8.16. Read a preset's name

Format	Example
Command {PNAME#<id>=?}	→ {pname#1=?}
Response (PNAME#<id>=<preset_name>)CrLf	← (PNAME#1=FIRST PRESET)CrLf

Explanation: Name for preset 1 is "FIRST PRESET".

8.8.17. Read an input's name

Format	Example
Command {INAME#<in>=?}	→ {iname#3=?}
Response (INAME#<in>=<input_name>)CrLf	← (INAME#3=MEDIA PLAYER)CrLf

Explanation: Name for input 3 is "MEDIA PLAYER".

8.8.18. Read an output's name

Format	Example
Command {ONAME#<out>=?}	→ {oname#2=?}
Response (ONAME#<out>=<output_name>)CrLf	← (ONAME#2=MONITOR_NO2)CrLf

Explanation: Name for output 2 is "MONITOR_NO2".

Set default names of Presets / Inputs / Outputs

Description: Renames **all** preset / input / output names to the default: Preset 1..32 / Input 1..4 / Output 1..4 respectively.

Info: The <id> field is not relevant here, only has to be a valid one. The command will affect **ALL** Presets / Inputs / Outputs disregarding the actual number that was in the command.

8.8.19. Reload default preset names

Format	Example
Command {PNAME#<id>=!}	→ {pname#2=!}
Response (PNAME#<id>=Preset●<id>)CrLf	← (PNAME#2=Preset 2)CrLf

Explanation: All preset names are set to default: "Preset 1", "Preset 2", and so on.

8.8.20. Reload default input names

Format	Example
Command {INAME#<id>=!}	→ {iname#4=!}
Response (INAME#<id>=Input●<id>)CrLf	← (INAME#4=Input 4)CrLf

Explanation: All input names are set to default: "Input 1", "Input 2", and so on.

8.8.21. Reload default output names

Format	Example
Command {ONAME#<id>=!}	→ {oname#3=!}
Response (ONAME#<id>=Output●<id>)CrLf	← (ONAME#3=Output 3)CrLf

Explanation: All output names are set to default: "Output 1", "Output 2", and so on.

8.9. Port status commands

8.9.1. Input port status

Description: Shows the actual status of the input ports.

Format	Example
Command { :ISD }	→ { :isd }
Response (ISD●<INPUT_D>)CrLf	← (ISD 9173)CrLf

Legend: <INPUT_D> contains 4 decimal numbers. Each number represents the state for the corresponding input port.

The binary representation of the responded decimal numbers is shown below.

3. bit (MSB)	2. bit	1. bit	0. bit (LSB)
analog signal	HDCP active	digital signal	source 5V

- Source 5V: The connected source sends 5V
- Digital signal: Video signal is present on digital input.
- HDCP active: Incoming signal is encrypted
- Analog signal: Video signal is present on analog input

Explanation: Input 1 has an analog signal. Input 2 has a connected source but no signal. Input 3 has a digital signal with HDCP encryption. Input 4 has a DVI signal.

8.9.2. Output port status

Description: Shows the actual status of the output ports.

Format	Example
Command { :OSD }	→ { :osd }
Response (OSD●<OUTPUT_D>)CrLf	← (OSD 3030)CrLf

Legend: <OUTPUT_D> contains 4 decimal numbers. Each number represents the state for the corresponding output port.

The binary representation of the responded decimal numbers is shown below.

3. bit (MSB)	2. bit	1. bit	0. bit (LSB)
0	0	hotplug detect	receiver sense

- Receiver Sense: TMDS termination present in connected device
- Hotplug Detect: Hotplug signal is presented by the connected device

Explanation: There are two DVI sinks connected on ports 1 and 3. No other output port is connected.

Info: Both Receiver Sense or Hotplug Detect can be used to determine if there is an attached monitor or other sink device.

8.9.3. All port status

Description: Shows the actual status of all input and output ports.

Format	Example
Command { PS }	→ { ps }
Response (PS●<INPUT_D>, <OUTPUT_D>)CrLf	← (PS 9173,3030)CrLf

Legend: <INPUT_D> and <OUTPUT_D> is the same as for { :ISD } and { :OSD } commands. The input and output state tables are separated with a comma “,”. See [8.9.1](#) and [8.9.2](#) for detailed legend.

8.10. Input properties

The following commands are setting up the properties of the input ports. If only one or a few parameters have to be modified, the protocol enables to mask the other parameters, so they can stay untouched. To mask a parameter use "x" or "X" as its value.

Example: `{:DVII#1@SI=D;x;x;x}` Set input port no. 1 to digital.

8.10.1. Set input port properties

Description: This command changes the setup of the input ports.

	Format	Example
Command	<code>{:DVII#<in>@<S/A>I= <VIDEO>; <X>; <AUDIO>; <HDCP>}</code>	<code>→ {:dvii#1@si= d; x; h; 0}</code>
Response	<code>(DVII#<in>@<S/A>I= <VIDEO> <X>; <AUDIO>; <HDCP>; <STATUS>; <SOURCE>; <ATIM1/DCS>; <ATIM2/DRES>; <ARES/HAUDIO>; <HASAMP> <HCH>)CrLf</code>	<code>← (DVII#1@SI= D; A; H; 0; 0; D; 00; 720x480p58;)CrLf</code>

Legend:

- `<S/A>:` **Affected ports:**
S = single selected input
A = all inputs
- `<VIDEO>` **Video source:**
R = Analog RGB (sync embedded or separate HV)
Y = Analog YUV (sync embedded or separate HV)
A = Automatic analog (color space detected by sync)
D = Digital (HDMI / YPbPr)
S = Automatic source selection
- `<X>:` Reserved for compatibility reasons. Don't care.
- `<AUDIO>:` **Audio source:**
0 = No audio,
H = HDMI audio (only with digital interface)
A = Analog input
S = SPDIF input

The following parameters are available above 1.2.2 firmware version

- 1 Autosense (Priority order: HDMI, SPDIF, Analog)
- 2 Autosense (Priority order: SPDIF, HDMI)
- 3 Autosense (Priority order: HDMI, Analog)
- 4 Autosense (Priority order: SPDIF, Analog)

The following parameters cannot be set, they only appear in response.

`<STATUS>` **Status** (hexadecimal):

- bit 0: (LSB): Power 5V
0 = not detected
1 = detected
- bit 1: Source signal HDCP:
0 = not protected
1 = protected
- bit 2: Don't care
- bit 3: Don't care

<SOURCE> **Actual video source:**

H = HDMI
D = DVI
R = RGBHV (analog signal, separate HV sync)
C = Component signal (analog signal, embedded sync)
- = No video detected.

Above 1.2.2 firmware version the <SOURCE> parameters are two characters. The second one is the active audio source.

0 = No audio
H = Audio from HDMI source
A = Analog audio from analog input
S = Digital audio from SPDIF input

Source dependent parameters:

Analog signal properties are displayed, when <SOURCE> = R / C:

<ATIM1> **Analog timing1:**

0 = SMTPE standard
1 = User saved preset
2 = EDID detailed timing
3 = Factory preset
4 = GTF formula
5 = User modified (not saved)

<ATIM2> **Analog timing2:** (depending on <ATIM1>)

<ATIM1> = 0 -> SMTPE record number
<ATIM1> = 1 -> User preset number
<ATIM1> = 2 -> Detailed timing number
<ATIM1> = 3 -> Factory preset number
<ATIM1> = 4 -> Fixed zero.

<ARES> **Resolution string.** (example: 1600x1200p60)

Digital signal properties are displayed, when <SOURCE> = H / D:

<DCS> 2 byte hexadecimal number:

bit 0 = 1: Color depth: 30 bit/pixel (not supported)
bit 1 = 1: Color depth: 36 bit/pixel
bit 2 = 1: Color depth: 48 bit/pixel (not supported)
bit 0&1&2 = 0: Color depth: 24 bit/pixel
bit 4: Color space: YCbCr422
bit 5: Color space: YCbCr444

<DRES> **Incoming resolution string.** (example: 1600x1200p60)

If HDMI signal present <SOURCE> = H, there are more HDMI specific parameters:

<HAUDIO> **HDMI Audio properties:**

0 = no audio
P = 2 channel stereo (L-PCM)
M = Multichannel-PCM (M-PCM)
S = Compressed audio
H = HBR audio
D = DST audio (not supported)
E = DSD audio (not supported)

<HASAMP> If <HAUDIO> not S or H: HDMI audio sample rate in kHz.

<HAUDIO> = S (Compressed) multiply by 32,
<HAUDIO> = H (HBR) multiply by 4

32	32	kHz
44	44,1	kHz
48	48	kHz
88	88,2	kHz
96	96	kHz
176	176,4	kHz
192	192	kHz

<HCH> Contains CEA-861 compatible channel assignment, if M-PCM signal present:

0x00	-	-	-	-	-	-	FR	FL
0x01	-	-	-	-	-	LFE	FR	FL
0x02	-	-	-	-	FC	-	FR	FL
0x03	-	-	-	-	FC	LFE	FR	FL
0x04	-	-	-	RC	-	-	FR	FL
0x05	-	-	-	RC	-	LFE	FR	FL
0x06	-	-	-	RC	FC	-	FR	FL
0x07	-	-	-	RC	FC	LFE	FR	FL
0x08	-	-	RR	RL	-	-	FR	FL
0x09	-	-	RR	RL	-	LFE	FR	FL
0x0A	-	-	RR	RL	FC	-	FR	FL
0x0B	-	-	RR	RL	FC	LFE	FR	FL
0x0C	-	RC	RR	RL	-	-	FR	FL
0x0D	-	RC	RR	RL	-	LFE	FR	FL
0x0E	-	RC	RR	RL	FC	-	FR	FL
0x0F	-	RC	RR	RL	FC	LFE	FR	FL
0x10	RRC	RLC	RR	RL	-	-	FR	FL
0x11	RRC	RLC	RR	RL	-	LFE	FR	FL
0x12	RRC	RLC	RR	RL	FC	-	FR	FL
0x13	RRC	RLC	RR	RL	FC	LFE	FR	FL
0x14	FRC	FLC	-	-	-	-	FR	FL
0x15	FRC	FLC	-	-	-	LFE	FR	FL
0x16	FRC	FLC	-	-	FC	-	FR	FL
0x17	FRC	FLC	-	-	FC	LFE	FR	FL
0x18	FRC	FLC	-	RC	-	-	FR	FL
0x19	FRC	FLC	-	RC	-	LFE	FR	FL
0x1A	FRC	FLC	-	RC	FC	-	FR	FL
0x1B	FRC	FLC	-	RC	FC	LFE	FR	FL
0x1C	FRC	FLC	RR	RL	-	-	FR	FL
0x1D	FRC	FLC	RR	RL	-	LFE	FR	FL
0x1E	FRC	FLC	RR	RL	FC	-	FR	FL
0x1F	FRC	FLC	RR	RL	FC	LFE	FR	FL

Where:

FL	Front Left
FC	Front Center
FR	Front Right
FLC	Front Left Center
FRC	Front Right Center
RL	Rear Left
RC	Rear Center
RR	Rear Right
RLC	Rear Left Center
RRC	Rear Right Center
LFE	Subwoofer

8.10.2. Query input port properties

Description: Check status of the input ports.

Format	Example
Command { :DVII#<in>@<S/A>I=?} Response (DVII#<in>@<S/A>I= <VIDEO>; <X>; <AUDIO>; <HDCP>; <STATUS>; <SOURCE>; <ATIM1/DCS>; <ATIM2/DRES>; <ARES/HAUDIO>; <HASAMP>; <HCH>;)CrLf	→ { :dvii#1 @si=?} ← (DVII#1 @SI= S; A; H; 0; 1; HH; 20; 1920x1080p24; M; 48; 0B;)CrLf

Legend: Please read section [8.10.1. \(Set input port properties\)](#)

8.10.3. Reload factory defaults of input port properties

Description: This command resets the properties of the input ports.

Format	Example
Command { :DVII#<in>@<S/A>I=FACTORY} Response (DVII#<in>@<S/A>I= <VIDEO>; <X>; <AUDIO>; <HDCP>; <STATUS>; <SOURCE>; <ATIM1/DCS>; <ATIM2/DRES>; <ARES/HAUDIO>; <HASAMP>; <HCH>;)CrLf	→ { :dvii#1 @si=factory} ← (DVII#1 @SI= S; A; H; 0; 1; HH; 20; 1920x1080p24; M; 48; 0B;)CrLf

Legend: Please read section [8.10.1. \(Set input port properties\)](#)

8.10.4. Set analog timing properties

Description: This command changes the setup of the analog timing data.

Format	Example
Command {: ANALOG# <in>@< S/A >I= <PHS>; <FHS>; <HS>; <VS>; <HP>; <VP>;} Response (DVII# <in>@< S/A >I= <PHS>; <FHS>; <HS>; <VS>; <HP>; <VP>; < LCF >; < FORM >; < VSP >; < HSP >; < FPS >);CrLf	→ {: analog#4 @si= 10; 800; 640; 480; 75; 18;} ← (ANALOG#4 @SI= 0; 2640; 1920; 1080; 192; 41; 1124; P; +; -; 50);CrLf

Legend: <**S/A**>: **Affected ports:**
 S = single selected input
 A = all inputs
 <PHS> Phase
 <FHS> Full Horizontal Size
 <HS> Horizontal Size
 <VS> Vertical Size
 <HP> Horizontal Position
 <VP> Vertical Position

Info: The following parameters cannot be set, they only appear in response.

 <**LCF**> Full Vertical Size (Line Count per Field)
 <**FORM**> Format: Progressive or Interlaced
 <**VSP**> Vertical Sync. Polarity
 <**HSP**> Horizontal Sync. Polarity
 <**FPS**> Frame Per Sec in Hz

8.10.5. Query analog timing properties

Description: Check analog timing data of the input ports.

Format	Example
Command {: ANALOG# <in>@< S/A >I=?} Response (ANALOG# <in>@< S/A >I= <PHS>; <FHS>; <HS>; <VS>; <HP>; <VP>; < LCF >; < FORM >; < VSP >; < HSP >; < FPS >);CrLf	→ {: analog#4 @si=?} ← (ANALOG#4 @SI= 0; 2640; 1920; 1080; 192; 41; 1124; P; +; -; 50);CrLf

Legend: Please read section [8.10.4. \(Set analog timing properties\)](#)

8.10.6. Reset analog timing properties

Description: This command resets the analog timing properties.

Format	Example
Command {: ANALOG# <in>@<S/A>I=RESET}	→ {: analog#4 @si=reset}
Response (ANALOG# <in>@<S/A>I= <PHS>; <FHS>; <HS>; <VS>; <HP>; <VP>; <LCF>; <FORM>; <VSP>; <HSP>; <FPS>) CrLf	← (ANALOG#4 @SI= 0; 2640; 1920; 1080; 192; 41; 1124; P; +; -; 50;) CrLf

Legend: Please read section [8.10.4](#). ([Set analog timing properties](#))

8.10.7. Set analog color properties

Description: Set analog color properties of the input ports.

Format	Example
Command {: PICTURE# <in>@<S/A>I= <DF_CHA>;<DF_CHB>;<DF_CHC>; <G_CHA>;<G_CHB>;<G_CHC>; <O_CHA>;<O_CHB>;<O_CHC>; <CONT>;<SAT>;<BRIGHT>;<HUE>;) CrLf	→ {: picture#3 @si= 1023;1023;1023; 1023;1023;1023; 1023;1023;1023; 128;128;0;0;}
Response (PICTURE# <in>@<S/A>I= <DF_CHA>;<DF_CHB>;<DF_CHC>; <G_CHA>;<G_CHB>;<G_CHC>; <O_CHA>;<O_CHB>;<O_CHC>; <CONT>;<SAT>;<BRIGHT>;<HUE>;) CrLf	← (PICTURE#3 @SI= 1023;1023;1023; 1023;1023;1023; 1023;1023;1023; 128;128;0;0;) CrLf

Legend: <S/A>: **Affected ports:**
 S = single selected input
 A = all inputs

<DF_CHA>	Digital fine-clamp for CH-A:	0-4096
<DF_CHB>	Digital fine-clamp for CH-B:	0-4095
<DF_CHC>	Digital fine-clamp for CH-C:	0-4095
<G_CHA>	Gain for CH-A:	0-1023
<G_CHB>	Gain for CH-B:	0-1023
<G_CHC>	Gain for CH-C:	0-1023
<O_CHA>	Offset for CH-A:	0-1023
<O_CHB>	Offset for CH-B:	0-1023
<O_CHC>	Offset for CH-C:	0-1023
<CONT>	Contrast:	0-255
<SAT>	Saturation:	0-255
<BRIGHT>	Brightness:	0-255
<HUE>	Hue:	0-127

Info: Analog color setting will not be saved automatically. User can save it with the next command.

8.10.8. Save analog color properties

Description: Save analog color properties of the input ports.

	Format	Example
Command	{:PICTURE#<in>@<S/A>I=SAVE}	→ {:picture#3@si=save}
Response	(P●SAVED)CrLf (PICTURE#<in>@<S/A>I= <DF_CHA>;<DF_CHB>;<DF_CHC>; <G_CHA>;<G_CHB>;<G_CHC>; <O_CHA>;<O_CHB>;<O_CHC>; <CONT>;<SAT>;<BRIGHT>;<HUE>;)CrLf	← (P SAVED)CrLf ← (PICTURE#3@SI= 1023;1023;1023; 1023;1023;1023; 1023;1023;1023; 128;128;0;0;)CrLf

Legend: Please read section [8.10.7. \(Set analog color properties\)](#)

8.10.9. Query analog color properties

Description: Check analog color properties data of the input ports.

	Format	Example
Command	{:PICTURE#<in>@<S/A>I=?}	→ {:picture#3@si=?}
Response	(PICTURE#<in>@<S/A>I= <DF_CHA>;<DF_CHB>;<DF_CHC>; <G_CHA>;<G_CHB>;<G_CHC>; <O_CHA>;<O_CHB>;<O_CHC>; <CONT>;<SAT>;<BRIGHT>;<HUE>;)CrLf	← (PICTURE#3@SI= 1023;1023;1023; 1023;1023;1023; 1023;1023;1023; 128;128;0;0;)CrLf

Legend: Please read section [8.10.7. \(Set analog color properties\)](#)

8.10.10. Reset analog color properties

Description: Reset analog color properties of the input ports.

	Format	Example
Command	{:PICTURE#<in>@<S/A>I=FACTORY}	→ {:picture#3@si=factory}
Response	(P●SAVED)CrLf (PICTURE#<in>@<S/A>I= <DF_CHA>;<DF_CHB>;<DF_CHC>; <G_CHA>;<G_CHB>;<G_CHC>; <O_CHA>;<O_CHB>;<O_CHC>; <CONT>;<SAT>;<BRIGHT>;<HUE>;)CrLf	← (P SAVED)CrLf ← (PICTURE#3@SI= 1023;1023;1023; 1023;1023;1023; 1023;1023;1023; 128;128;0;0;)CrLf

Legend: Please read section [8.10.7. \(Set analog color properties\)](#)

8.10.11. Set analog input audio parameters

Description: This command changes the setup of the ADC on the audio board.

	Format	Example
Command	{:ADC#<in>@<S/A>I=<GAIN>}	→ {:adc#1@si=9}
Response	(ADC#<in>@<S/A>I=<GAIN>)CrLf	← (ADC#1@SI=9;)CrLf

Legend: <S/A>: **Affected ports:**
S = single selected output
A = all outputs
<GAIN>: **Gain** on the input port: (default value: 0)
0, 3, 6, 9, 12, 15, 18, 21, 24 dB

8.10.12. Query analog input audio properties

Description: This command reads the setup of the ADC on the audio board.

Format	Example
Command { :ADC#<in>@<S/A>I=?}	→ { :adc#1 @si=?}
Response (ADC#<in>@<S/A>I=<GAIN>;)CrLf	← (ADC#1 @SI=9;)CrLf

Legend: Please read section [8.10.11](#). ([Set analog input audio parameters](#))

8.10.13. Reset analog input audio properties

Description: Reset analog audio properties of the input ports.

Format	Example
Command { :ADC#<in>@<S/A>I=FACTORY}	→ { :adc#1 @si=factory}
Response (ADC#<in>@<S/A>I=<GAIN>;)CrLf	← (ADC#1 @SI=0;)CrLf

Legend: Please read section [8.10.11](#). ([Set analog input audio parameters](#))

8.10.14. Set the color of 'no sync' picture

Description: If there is no incoming video signal router gives a monochrome 640x480p60 picture to the output. This command enables and sets the color of the 'no sync' picture with an RGB color code.

Format	Example
Command {SETBG=<EN>;<RED>;<GREEN>;<BLUE>;}	→ {setbg=1;255;255;0;}
Response (SETBG=<EN>;<RED>;<GREEN>;<BLUE>;)CrLf	← (SETBG=1;255;255;0;)CrLf

Legend:

- <EN>: Function enable
- <RED> Red component of RGB value.
- <GREEN> Green component of RGB value.
- <BLUE> Blue component of RGB value.

Explanation: The example shows how to enable and set yellow colored monochrome 'no sync' picture.

8.10.15. Query the color of 'no sync' picture

Description: This command reads the status and RGB color code of the 'no sync' picture.

Format	Example
Command {SETBG=?}	→ {setbg=?}
Response (SETBG=<EN>;<RED>;<GREEN>;<BLUE>;)CrLf	← (SETBG=1;255;255;0;)CrLf

Legend: Please read section [8.10.14](#). ([Set the color of 'no sync' picture](#))

Explanation: The 'no sync' picture is enabled and the color of it is yellow. (RGB code: 255, 255, 0).

8.10.16. Reset the status and the color of 'no sync' picture

Description: Reset the status and the color of 'no sync' picture of the input ports.

Format	Example
Command {SETBG=FACTORY}	→ {setbg=factory}
Response (SETBG=<EN>;<RED>;<GREEN>;<BLUE>;)CrLf	← (SETBG=1;15;15;15;)CrLf

Legend: Please read section [8.10.14](#). ([Set the color of 'no sync' picture](#))

8.10.17. Query timings of the incoming signal

Description: This command reads out the properties of the incoming signal on the selected input ports.

	Format	Example
Command	{GETTIMINGS#<in>@<S/A>=?}	→ {:gett timings#1@si=?}
Response	(GETTIMINGS#<in>@<S/A>= <TLW>; <LW>; <HFP>; <HW>; <HBP>; <TH>; <H>; <VFP>; <VW>; <VBP>; <TMDS>; <BPP>;)CrLf	← (GETTIMINGS#1@SI= 2160; 1600; 105; 0; 455; 1242; 1200; 2; 3; 37; 162134; 24;)CrLf

Legend:

<S/A>:	Affected ports:
	S = single selected input
	A = all inputs
<TLW>:	Total Line Width
<LW>:	Line Width
<HFP>:	Hsync Front Porch
<HW>:	Hsync Width
<HBP>	Hsync Back Porch
<TH>	Total Height
<H>	Height
<VFP>	Vsync Front Porch
<VW>	Vsync Width
<VBP>	Vsync Back Porch
<TMDS>	TMDS clock in kHz
<BPP>	Bit/Pixel
<HPOL>	Hpolarity
<VPOL>	Vpolarity

Info: If there is no incoming video signal, the device responds (GETTIMINGS#1@SI=N/A;).

8.11. Output properties

The following commands are setting up the properties of the output ports. If only one or a few parameters have to be modified, the protocol enables to mask the other parameters, so they can stay untouched. To mask a parameter use “x” or “X” as its value.

Example: `{:HDMI#2@SO=H;x;x;1;}` Sets output port no. 2 to HDMI.

8.11.1. Set output video properties

Description: This command is for configuring output port settings.

	Format	Example
Command	<code>{:HDMI#<out>@<S/A>O=<MODE>;<CSPAC>;<CRANG>;<SUBS>;<HDCP>;}</code>	<code>→ {:hdmi#2@so=h;x;x;1;}</code>
Response	<code>(HDMI#<out>@<S/A>O=G<CON><MODE><SIG><HDCP><HPD>;O<MODE><CSPAC><CRANG>;<SUBS> <HDCP>M<HSUP><AUTH><REP><YUV4><YUV2><AUD><PCM><DC>)CrLf</code>	<code>← (HDMI#2@SO=G1H101;OHAAAA;M100111750)CrLf</code>

Legend for command:

- <S/A>: Affected ports:**
S = single-selected output
A = all outputs
- <MODE>: Output signal mode:**
A = Automatic (this setting gives a response as D/H/1/2),
D = DVI,
H = HDMI (24bit),
- <CSPAC>:** Reserved for legacy reasons. Set ‘X’ here.
- <CRANG>:** Reserved for legacy reasons. Set ‘X’ here.
- <SUBS>:** Reserved for legacy reasons. Set ‘X’ here.
- <HDCP>: HDCP encryption:**
A = automatic,
1 = always use.

Legend for response:

- G block:** General status information
- <CON>: Connection sense:**
0 = There is no attached sink device,
1 = Sink device attached (termination is present)
- <MODE>: Output signal mode**
D = DVI,
H = HDMI (24bit),
- <SIG>: Signal present**
0 = No valid signal is routed to this port,
1 = Valid video signal is present.
- <HDCP>: HDCP encryption status**
0 = HDCP encryption is inactive,
1 = HDCP encryption is active.
- <HPD>: Hotplug detection**
0 = Hotplug detect signal is low,
1 = Hotplug detect signal is high.

O block: Actual output settings

- <MODE>: Same as in G block.
- <CSPAC>: Reserved for legacy reasons. Response is always 'A'.
- <CRANG>: Reserved for legacy reasons. Response is always 'A'.
- <SUBS>: Reserved for legacy reasons. Response is always 'A'.
- <HDCP>: Same as in G block.

M block: Attached device (monitor) information

- <HSUP>: 0 = Sink device does not support HDMI
1 = Sink device supports HDMI
- <AUTH>: 0 = HDCP authentication failed
1 = HDCP authentication is successful
- <REP>: 0 = Attached device is not an HDCP repeater
1 = Attached device is an HDCP repeater
- <YUV4>: 0 = Attached device does not support YUV 4:4:4
1 = Attached device supports YUV 4:4:4
- <YUV2>: 0 = Attached device does not support YUV 4:2:2
1 = Attached device supports YUV 4:2:2
- <AUD>: 0 = Attached device has no audio capabilities
1 = Attached device has audio capabilities
- <PCM>: This field represents a byte in hexadecimal format.
The binary bits show support for different audio bit rates.
bit 0 - Sink device supports 32kHz PCM audio
bit 1 - Sink device supports 44kHz PCM audio
bit 2 - Sink device supports 48kHz PCM audio
bit 3 - Sink device supports 88kHz PCM audio
bit 4 - Sink device supports 96kHz PCM audio
bit 5 - Sink device supports 176kHz PCM audio
bit 6 - Sink device supports 192kHz PCM audio
bit 7 - Reserved (Always 0 in this version of protocol)
- <DC>: This field is a number in decimal format.
The binary bits show support for different color modes.
bit 2 - HDMI deep color 30bits/pixel mode is supported
bit 1 - HDMI deep color 36bits/pixel mode is supported
bit 0 - YUV444 color space is supported in DC modes

Info: The M block can be missing if there is no attached device on output.

8.11.2. Query output video properties

Description: Displays the status for output port.

	Format	Example
Command	{:HDMI#<out>@<S/A>O=?}	→ {:hdmi#2@so=?}
Response	(HDMI#<out>@<S/A>O= G <CON><MODE><SIG> <HDCP><HPD>; O <MODE><CSPAC> <CRANG>;<SUBS> <HDCP> M <HSUP><AUTH><REP> <YUV4><YUV2> <AUD><PCM><DC>)CrLf	← (HDMI#2@SO=G1H101;OHAAAA; M100111750)CrLf

Legend: Please read section [8.11.1](#). ([Set output video properties](#))

8.11.3. Reset output video properties

Description: Reset the values of the output video port.

	Format	Example
Command	{:HDMI#<out>@<S/A>O=FACTORY}	→ {:hdmi#2@so=factory}
Response	(HDMI#<out>@<S/A>O= G<CON><MODE><SIG> <HDCP><HPD>; O<MODE><CSPAC> <CRANG>;<SUBS> <HDCP> M<HSUP><AUTH><REP> <YUV4><YUV2> <AUD><PCM><DC>)CrLf	← (HDMI#1@SO=G0H100; OAAAAA;)CrLf

Legend: Please read section [8.11.1](#). ([Set output video properties](#))

8.11.4. Set output audio properties

Description: Set audio properties for a single or multiple channels.

	Format	Example
Command	{:AUDIO#<out>@<S/A>O= <RVOL>;<LVOL>;}	→ {:audio#1@so=-500;-500;}
Response	(AUDIO#<out>@<S/A>O= <RVOL>;<LVOL>;)CrLf	← (AUDIO#1@SO=-500;-500;)CrLf

Legend: <S/A>: S = single-selected output,
A = all outputs
<RVOL>: set right volume in dB*100 (7800 = -78dBV, 0 = -0dBV)
<LVOL>: set left volume in dB*100 (7800 = -78dBV, 0 = -0dBV)

Explanation: The example sets a single output to:
right volume reduction: -5.00dBV,
left volume reduction: -5.00dBV

8.11.5. Query output audio properties

Description: Read audio output properties for a single or multiple channels.

	Format	Example
Command	{:AUDIO#<out>@<S/A>O=?}	→ {:audio#1@so=?}
Response	(AUDIO#<out>@<S/A>O= <RVOL>;<LVOL>;)CrLf	← (AUDIO#1@SO=-500;-500;)CrLf

Legend: Please read section [8.11.4](#). ([Set output audio properties](#))

8.11.6. Reset analog output audio properties

Description: Reset analog audio properties of the output ports.

	Format	Example
Command	{:AUDIO#<out>@<S/A>O=FACTORY}	→ {:audio#1@so=factory}
Response	(AUDIO#<out>@<S/A>O= <RVOL>;<LVOL>;)CrLf	← (AUDIO#1@SO=0;0;)CrLf

Legend: Please read section [8.11.4](#). ([Set output audio properties](#))

8.12. RICOD related commands

Important! RICOD works only with the Lightware protocol. The currently used protocol can be viewed or changed at any time via the matrix front panel (see section 6.1.6 on page 47) or via protocol commands (see sections 8.4.6, 8.4.7 from page 84).

8.12.1. Set RICOD MASTER status on inputs

Description: Enable or disable the RICOD MASTER status for the selected input port.

Format	Example
Command {:RICOD#<in>@<S/A>I=<A1><A2>;;<C>;}	→ {:ricod#1@si=10;2;1;}
Response (RICOD#<in>@<S>I=<A1><A2>;;<C>;)CrLf	← (RICOD#1@SI=10;2;1;)CrLf

Legend:

- <in>: **Input port number:**
Input number in 1 or 2 digit ASCII format (01,3,04 etc.)
- <S/A>: **Affected ports:**
S = single selected input
A = all inputs
- <A1> **RICOD enable parameter on the input:**
1: The RICOD function is enabled to this input port on the local device (where the command was given).
0: The RICOD function is disabled to this input port on the local device (where the command was given).
- <A2> **Remote lock enable parameter:**
1: The front panel buttons (in case of transmitters) or the output (in case of video matrix) is locked on the remote device.
0: The front panel buttons (in case of transmitters) or the output (in case of video matrix) is unlocked on the remote device.

Info: The remote lock function takes effect only if RICOD is enabled by <A1>.

- **The selected video input:**
“-“ (hyphen) = There is no video switch command.
“A” = Automatic input select must be performed on the remote device if available. (i.e. Autoselect function)
“0” (zero) = The output needs to be muted if available. (switch to zero)
“1”, “2”, .., “80” (number between 1 and 80) - Use the given input number if available.
- <C> **The selected audio input:**
“-“ (hyphen) = There is no audio switch command.
“A” = Automatic input select must be performed on the remote device if available. (i.e. Autoselect function)
“0” (zero) = The output needs to be muted if available. (switch to zero)
“1”, “2”, .., “80” (number between 1 and 80) - Use the given input number if available.

Info: If the first character of <A1><A2> is zero, then no command is sent, the RICOD function is disabled on this input.

Explanation: RICOD control is enabled on the first input port, which unlocks the remote device and selects the second video input and the first audio input port on it.

8.12.2. Query RICOD MASTER status on inputs

Description: Checks the status of the previously set RICOD command for the selected input port.

Format	Example
Command {: RICOD#<in>@<S/A>I=? }	→ {: ricod#1 @si=? }
Response (RICOD#<in>@<S>I=<A1><A2>;;<C>;)CrLf	← (RICOD#1 @SI=10;2;1;)CrLf

Legend: Please read section [8.12.1 \(Set RICOD MASTER status on input\)](#) on page [113](#).

Explanation: RICOD control is enabled on the first input port, which unlocks the remote device and selects the second video input and the first audio input port on it.

8.12.3. Set RICOD SLAVE status on output

Description: Enable or disable the reception of RICOD commands over the selected output port of the local device.

Format	Example
Command {: RICOD_SLEN#<out>@<S/A>O= <num> }	→ {: ricod_slen#1 @so=1 }
Response (RICOD_SLEN#<out>@<S>O= <num>)CrLf	← (RICOD_SLEN#1 @SO=1)CrLf

Legend:

- <out>** **Output port number:**
Output number in 1 or 2 digit ASCII format (01,3,04 etc.)
- <S/A>:** **Affected ports:**
S = single selected output
A = all outputs
- <num>** **RICOD enable parameter on output:**
1: The RICOD SLAVE functionality is enabled on the given output port. If a RICOD command is detected it will be executed. (If it is possible.)
0: The RICOD SLAVE functionality is disabled on the given output port.
Any incoming RICOD command will be rejected.

Explanation: RICOD SLAVE functionality is enabled on the first output port on the local device.

8.12.4. Query RICOD slave status on output

Description: Checks the previously set RICOD status for the selected output port of the local device.

Format	Example
Command {: RICOD_SLEN#<out>@<S/A>O=? }	→ {: ricod_slen#1 @so=? }
Response (RICOD_SLEN#<out>@<S>O= <num>)CrLf	← (RICOD_SLEN#1 @SO=1)CrLf

Legend: Please read section [8.12.3 \(Set RICOD SLAVE status on output\)](#) on page [114](#).

Explanation: RICOD functionality is enabled on the first output port on the local device.

8.13. Router initiated commands

8.13.1. EDID status changed

Description: This is sent after any command which changed the EDID table (EDID copy, EDID switch), or after a new EDID source e.g. a new display device is connected to the router.

Format	Example
Command various	a new monitor is connected to an output
Response (E_S_C)CrLf	← (E_S_C)CrLf

Explanation: When a new monitor is connected to an output port, its EDID is read. The message from the router shows that an EDID has changed.

Info: The router stores the last attached display device's EDID connected to the output. After disconnecting this device its EDID is still present at the router's memory, therefore no status change message is issued by the router if a display device having the same EDID is connected to that output. (The same display device is connected again, or another display device (same brand) from the same manufacturer).

Info: To keep your application in sync with the router it is recommended to issue a watch validity ({wvd}, {wvu}, {wve}) commands after receiving an EDID status changed response, and read all location indicating '2' or '3' in the table, as the change of these EDIDs triggered the (E_S_C) message.

8.13.2. Port status changed

Description: This message is sent when any value changes in the response for the {PS} command. The message means that an input or output port's state has changed e.g. a source or display device is connected or disconnected.

Format	Example
Command none	an input port loses signal
Response (PSC)CrLf	← (PSC)CrLf

Explanation: An input port (which had signal present before) detects no signal. The router sends a message to indicate port status change.

Info: The (PSC) message can be omitted by third party controller, or it can be used to trigger a {PS} command. In the latter case, the controller can be up to date with the port status without continuous queries.

8.14. Error responses

Invalid input number

Description: Given input number exceeds the maximum number of inputs or equals zero.

Response (ERR01)CrLf

Invalid output number

Description: Given output number exceeds the installed number of outputs or equals zero.

Response (ERR02)CrLf

Invalid value

Description: Given value exceeds the maximum allowed value can be sent.

Response (ERR03)CrLf

Invalid preset number

Description: Given preset number exceeds the maximum allowed preset number.

Response (ERR04)CrLf

9. Commands – Quick summary

Status and identification commands	Section	Command
View product type	8.4.1	{I}
View serial number	8.4.2	{S}
View Firmware version of the CPU	8.4.3	{F}
View CPU firmware compile time	8.4.4	{CT}
View installed controllers' firmware	8.4.5	{FC}
View current control protocol	8.4.6	{P_?}
Set current control protocol	8.4.7	{P_x}
View crosspoint size	8.4.8	{GETSIZE}
View LAN versions	8.4.9	{LAN_VER=?}
View router's health	8.4.10	{ST}
View installed I/O boards	8.4.11	{IS}
View error list	8.4.12	{ELIST=?}

System commands	Section	Command
Reload factory defaults	8.5.1	{FACTORY=<f1>;<f2>;...;<fx>}
Count HDCP keys	8.5.2	{:HDCPTEST<in>@<num>}
Clear HDCP key cache	8.5.3	{:HDCPRESET}
Restart matrix router	8.5.4	{RST}

Communication setup commands	Section	Command
Query IP settings	8.6.1	{IP_CONFIG=?}
Reload factory default IP settings	8.6.2	{IP_CONFIG=!}
Enable DHCP IP setting	8.6.3	{IP_CONFIG=D}
Query RS-232 baud rate	8.6.4	{RS232BAUD=?}
Change RS-232 baud rate	8.6.5	{RS232BAUD=<rate>}

EDID router commands	Section	Command
Change EDID on input	8.7.1	{Exx:<loc2>}
Change EDID on all inputs	8.7.2	{EA:<loc2>}
Save EDID to user memory (Learn EDID)	8.7.3	{Uxx:<loc2>}
View emulated EDIDs on all inputs	8.7.4	{VEDID}
Watch EDID validity table	8.7.5	{WV<type>}
View EDID header	8.7.6	{WH<loc>}
Download EDID content from the router	8.7.7	{WE<loc>}
Upload EDID content to the router	8.7.8	{WL#<loc> {WB#<n>●<Bn0>●<Bn1>●<Bn2>●<Bn3>●<Bn4> ●<Bn5>●<Bn6>●<Bn7>}
Delete EDID from memory	8.7.9	{DE<loc>}
View emulated EDIDs type	8.7.10	{WITE}

Control commands	Section	Command
Switch one input to one output	8.8.1	{<in>@<out>●<A/V/AV>}
Switch one input to all outputs	8.8.2	{<in>@O●<A/V/AV>}
Switch diagonal	8.8.3	{<in>@D●<A/V/AV>}
View connection on output	8.8.4	{?<out>}
View connection on all outputs	8.8.5	{VC●<A/V/AV>}
Mute specified output	8.8.6	{#<out>●<A/V/AV>}
Unmute specified output	8.8.7	{+<out>●<A/V/AV>}
Lock specified output	8.8.8	{#><out>●<A/V/AV>}
Unlock specified output	8.8.9	{+<<out>●<A/V/AV>}
Save preset to memory location	8.8.10	{\$<id>●<A/V/AV>}
Load preset from memory location	8.8.11	{%<id>●<A/V/AV>}
View preset	8.8.12	{VP#<id>=?}
Rename a preset	8.8.13	{PNAME#<id>=<preset_name>}
Rename an input	8.8.14	{INAME#<id>=<input_name>}
Rename an output	8.8.15	{ONAME#<id>=<output_name>}
Read a preset's name	8.8.16	{PNAME#<id>=?}
Read an input's name	8.8.17	{INAME#<in>=?}
Read an output's name	8.8.18	{ONAME#<out>=?}
Reload default preset names	8.8.19	{PNAME#<id>=!}
Reload default input names	8.8.20	{INAME#<id>=!}
Reload default output names	8.8.21	{ONAME#<id>=!}

Port status commands	Section	Command
Input port status	8.9.1	{:ISD}
Output port status	8.9.2	{:OSD}
All port status	8.9.3	{PS}

RICOD related commands	Section	Command
Set RICOD MASTER status on inputs	8.12.1	{:RICOD#<in>@<S/A>I=<A1><A2>;;<C>;}
Query RICOD MASTER status on inputs	8.12.2	{:RICOD#<in>@<S/A>I=?}
Set RICOD SLAVE status on output	8.12.3	{:RICOD_SLEN#<out>@<S/A>O=<num>}
Query RICOD slave status on output	8.12.4	{:RICOD_SLEN#<out>@<S/A>O=?}

Input settings	Section	Command
Set input port properties	8.10.1	{:DVII#<in>@<S/A>I=<VIDEO>;<X>;<AUDIO>;<HDCP>}
Query input port properties	8.10.2	{:DVII#<in>@<S/A>I=?}
Reload factory defaults of input port properties	8.10.3	{:DVII#<in>@<S/A>I=FACTORY}
Set analog timing properties	8.10.4	{:ANALOG#<in>@<S/A>I=<PHS>;<FHS>;<HS>;<VS>;<HP>;<VP>;}
Query analog timing properties	8.10.5	{:ANALOG#<in>@<S/A>I=?}
Reset analog timing properties	8.10.6	{:ANALOG#<in>@<S/A>I=RESET}
Set analog color properties	8.10.7	{:PICTURE#<in>@<S/A>I=<DF_CHA>;<DF_CHB>;<DF_CHC>;<G_CHA>;<G_CHB>;<G_CHC>;<O_CHA>;<O_CHB>;<O_CHC>;<CONT>;<SAT>;<BRIGHT>;<HUE>;}
Save analog color properties	8.10.8	{:PICTURE#<in>@<S/A>I=SAVE}
Query analog color properties	8.10.9	{:PICTURE#<in>@<S/A>I=?}
Reset analog color properties	8.10.10	{:PICTURE#<in>@<S/A>I=FACTORY}
Set analog input audio parameters	8.10.11	{:ADC#<in>@<S/A>I=<GAIN>}
Query analog input audio properties	8.10.12	{:ADC#<in>@<S/A>I=?}
Reset analog input audio properties	8.10.13	{:ADC#<in>@<S/A>I=FACTORY}
Set the color of 'no sync' picture	8.10.14	{SETBG=<EN>;<RED>;<GREEN>;<BLUE>;}
Query the color of 'no sync' picture	8.10.15	{SETBG=?}
Reset the status and the color of 'no sync' picture	8.10.16	{SETBG=FACTORY}
Query timings of the incoming signal	8.10.17	{GETTIMINGS#<in>@<S/A>=?}

Output settings	Section	Command
Set output video properties	8.11.1	{:HDMI#<out>@<S/A>O=<MODE>;<CSPAC>;<CRANG>;<SUBS>;<HDCP>;}
Query output video properties	8.11.2	{:HDMI#<out>@<S/A>O=?}
Reset output video properties	8.11.3	{:HDMI#<out>@<S/A>O=FACTORY}
Set output audio properties	8.11.4	{:AUDIO#<out>@<S/A>O=<RVOL>;<LVOL>;}
Query output audio properties	8.11.5	{:AUDIO#<out>@<S/A>O=?}
Reset analog output audio properties	8.11.6	{:AUDIO#<out>@<S/A>O=FACTORY}

10. Firmware upgrade

This chapter is meant to help customers perform firmware upgrades on our products by giving a few tips on how to start and by explaining the features of the Lightware Bootloader software.

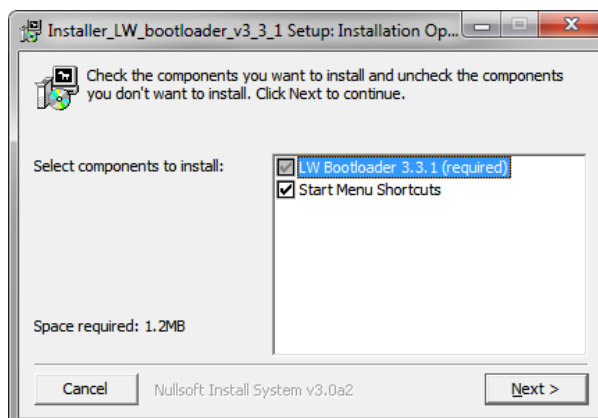
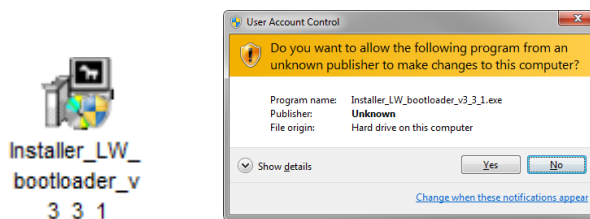
10.1. Installing the Bootloader

UMX4x4-Pro2 can be upgraded using Lightware Bootloader from a Windows based PC or Laptop via Ethernet.

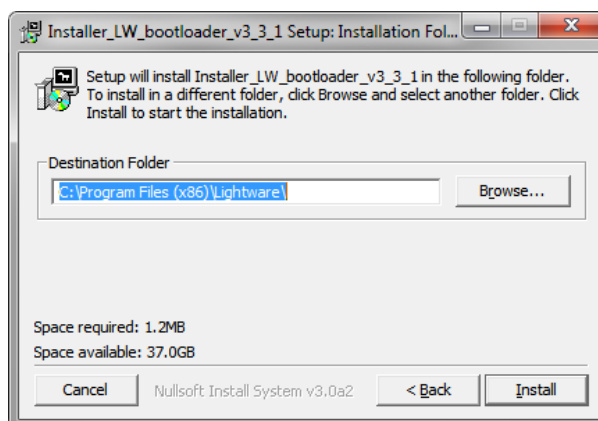
10.1.1. Installing and launching the Bootloader software

Step 1. Run Installer_LW_bootloader_v3_3_1.exe (3_3_1 means the 3-digit firmware version of the Bootloader)

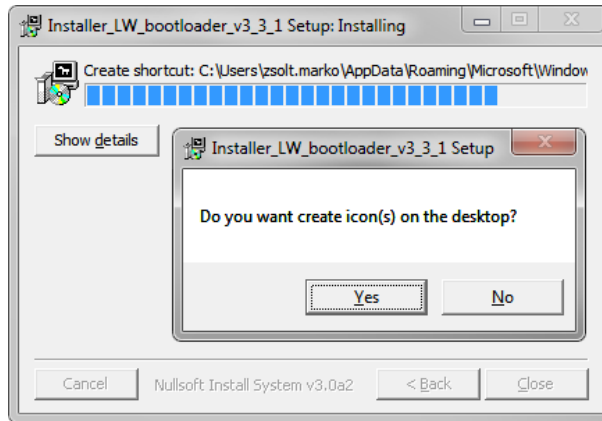
If the User Account Control drops a popup message click Yes.



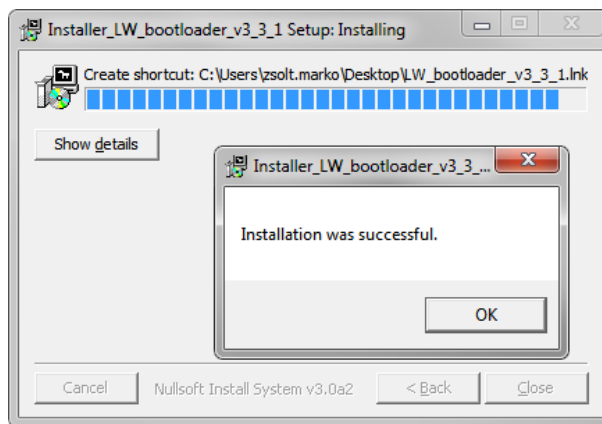
Step 2. Select destination folder and select Install (Using the default path is highly recommended)



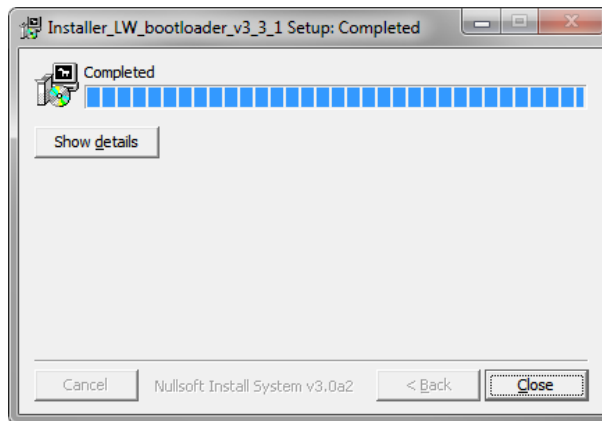
Step 3. If you want to create desktop icon select Yes in the next pop-up window:



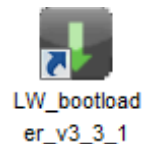
Step 4. After the files have been copied, the following message appears:



Step 5. To finish the installation process, click on the Close button.



Step 6. To run Lightware Bootloader, find the shortcut icon in
Start menu → Programs → Lightware → LW_bootloader_v3_3_1
or on the desktop, and double click on it:



Uninstalling

To uninstall the Bootloader software, find the shortcut icon in
Start menu → Programs → Lightware → Uninstall_LW_bootloader_v3_3_1.exe
and follow the instructions.

10.2. Upgrade process

10.2.1. Tips for the upgrade process

Cross UTP connection

To avoid packet loss caused by an overloaded network, it is recommended to use cross UTP connection directly from the upgrading PC to the Lightware device.

Disable other Ethernet devices

The Bootloader software always queries the PC's primary Ethernet adapter (which is usually the adapter that is connected to the Internet) for available Lightware devices. It is recommended to disable every other Ethernet device (secondary LAN, Wi-Fi, 3G modem) for the time of the upgrade. If the Bootloader cannot find the Lightware device because the device is connected to the secondary Ethernet adapter (cross UTP connection), you need to disable the primary adapter (Internet). This way the Ethernet adapter which is connected to the Lightware device will become the primary adapter and the Bootloader can query it for Lightware devices. If you disable an Ethernet adapter while the Bootloader is running, you need to restart the Bootloader to be able to query the Ethernet adapter again.

A second option in this case is that if you know the IP address and port number of the Lightware device, you may use the Add IP button.

Remove I/O connections

It is recommended to remove all video input and output connections from the Lightware device. Video sources and display devices may try to communicate with the Lightware device or send noise through the cable which may interfere with the upgrade process.

Latest Bootloader

Always perform the firmware upgrade with the latest Bootloader software. To get the latest Bootloader software, contact your local sales representatives or Lightware's support team at support@lightware.eu

Finishing the process with older versions of the Bootloader

Bootloader versions that are older than v3.1.8 do not close the connection with the Lightware device automatically upon finishing the upgrade process. With these versions, if you remove the UTP cable or restart the Lightware device before you properly exit the Bootloader, the Lightware device will stay in a so called 'bootload mode' and will not return to normal operating mode. In such cases connect to the Lightware device with the Bootloader again and exit from it properly.

Restart the device

After a successful firmware upgrade, the device will restart itself but it is recommended to power down and up the device after finishing the upgrade.

10.2.2. Firmware upgrade

Step 1. Connect the Lightware device and the computer via Ethernet (hub, switch, router) or Ethernet directly (with cross UTP cable).

If you are connecting via **hub, switch or router**, then you can either set the Lightware device to have a fix IP (in which case make sure that there is no IP conflict on the network) or you can set the Lightware device to DHCP mode (in which case the Lightware device will acquire an IP address automatically). In this case the network must have a DHCP server. These settings can be done from the front panel LCD menu or via the supplied Lightware Device Controller software. If you are connecting directly, via a cross UTP cable, you need to set up a fix IP and subnet mask on the Lightware device and the PC.

Step 2. Start the application

To run the Bootloader software, double click on the icon of the software on the desktop or select proper shortcut from

Start Menu → Programs → Lightware folder.

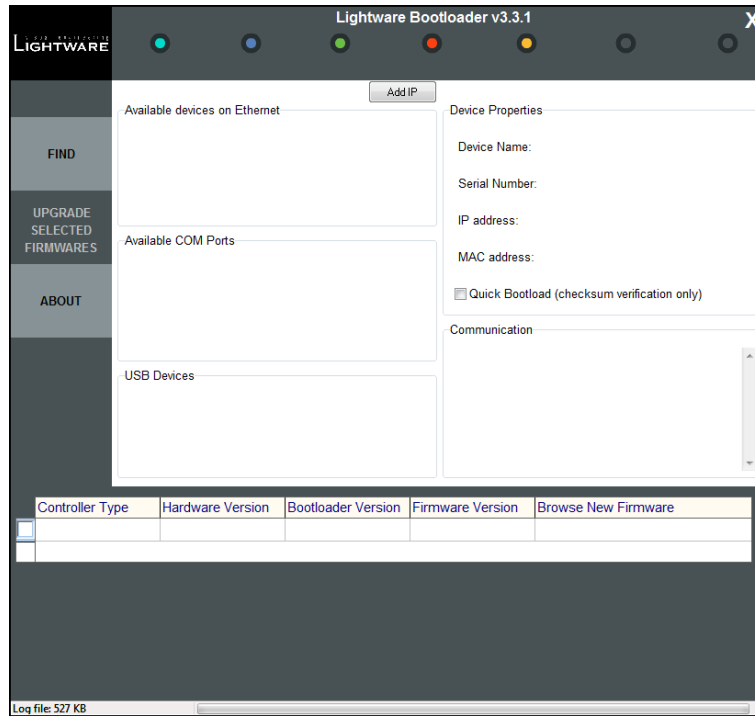
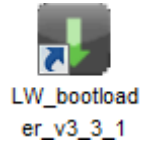


Figure 10-1. Bootloader software startup

Step 3. Find devices

Make sure that no active connection is made to the device (Lightware Device Controller software or web browser connected to the built-in website). Then click on the **FIND** button to query the Ethernet for Lightware devices.

Info: COM ports do not list any information about the connected devices, users must know which COM port is connected to the Lightware device.

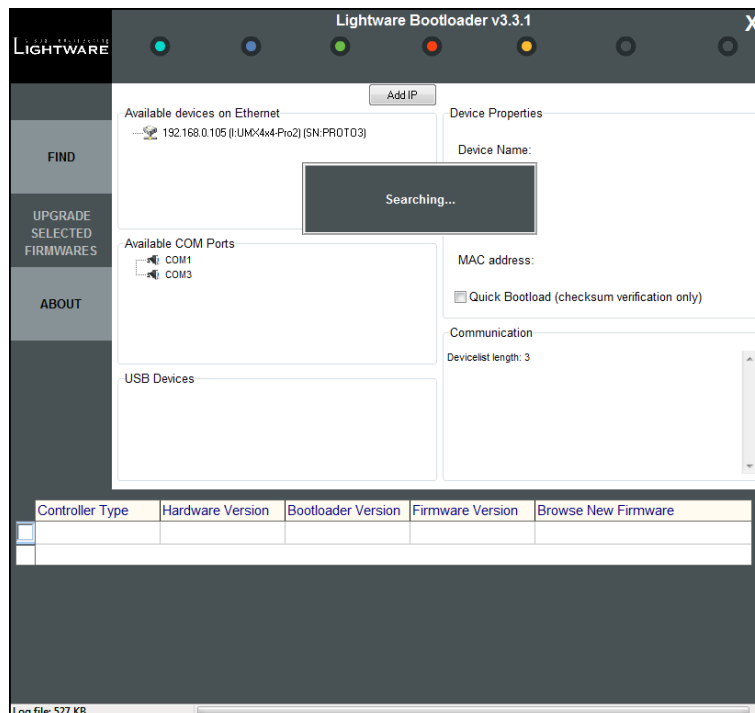


Figure 10-2. Searching for devices

The Bootloader software always queries the PC's primary Ethernet adapter (which is usually the adapter that is connected to the Internet) for available Lightware devices. It is recommended to disable every other Ethernet device (secondary LAN, Wi-Fi, 3G modem) for the time of the upgrade. If the Bootloader cannot find the Lightware device because the device is connected to the secondary Ethernet adapter (cross UTP connection), you need to disable the primary adapter (Internet). This way the Ethernet adapter which is connected to the Lightware device will become the primary adapter and the Bootloader can query it for Lightware devices. If you disable an Ethernet adapter while the Bootloader is running, you need to restart the Bootloader to be able to query the Ethernet adapter again.

A second option in this case is that if you know the IP address and port number of the Lightware device, you may use the Add IP button above the Available Devices on Ethernet window.

If the Lightware device is connected to the secondary Ethernet adapter (or for any other reason) and the Bootloader doesn't list it in the available devices window, you can manually add its IP address and TCP Port number. This way the device name and IP address won't be displayed, but double clicking on the IP address will establish the connection.

Step 4. Connect to a device

If the Bootloader finds one or more Lightware devices then they will be listed in the tree view window. This window shows the device type, IP address and serial number of the found Lightware devices. COM ports do not query these information, users must know which COM port is connected to the Lightware device. Double click on one of the available devices. The Bootloader will ask if you really want to connect to the device. Select **YES** to establish the connection. It will take 10-15 seconds to get all the information from the Lightware device. After establishing the connection the device enters bootload mode and suspends normal operation.

Warning! *The bootloader application will hold the router in reset state when it establishes the connection. All connected DVI sources and monitors will act as if the router was powered down.*

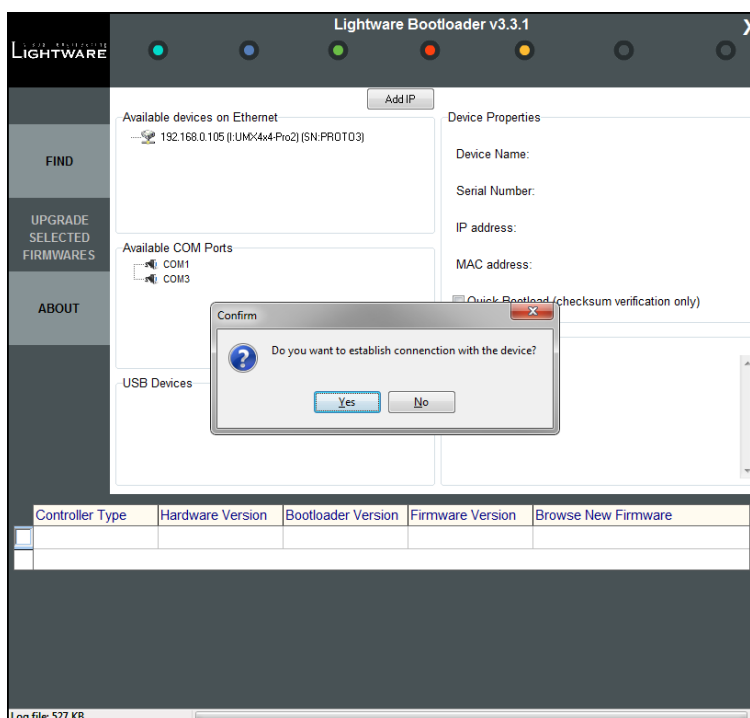


Figure 10-3. Establishing connection

Step 5. Requesting device information

After clicking on the YES button, the device name, serial number, IP address, MAC Address and current firmware versions are displayed.

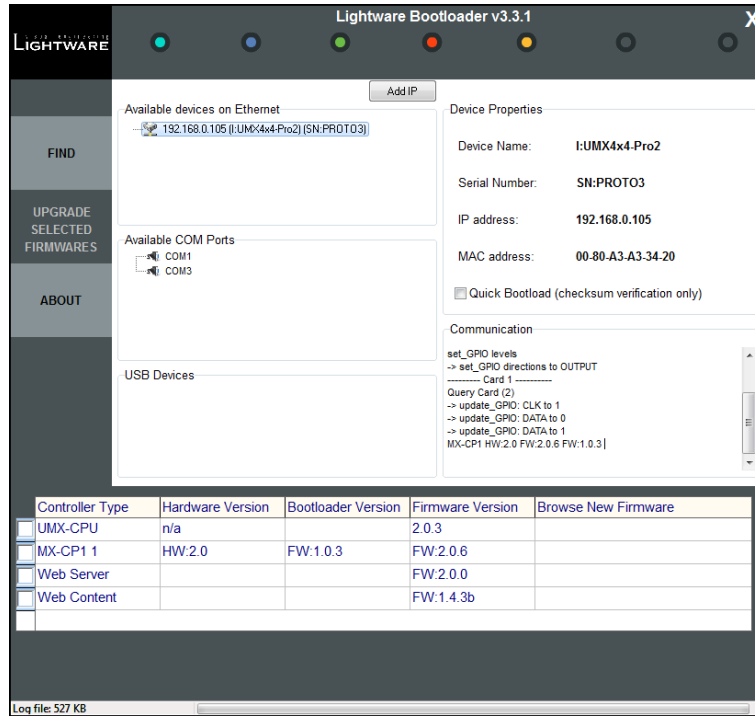


Figure 10-4. Details of the device

Step 6. Select firmwares to upgrade

To upgrade a firmware, click in the field in the line of the controller (marked with pink in the picture below). Click on **YES** in the pop-up window to modify the path to the new firmware file. Controller types are described in the table below. Now you can browse for the new firmware file to upload. After opening the new file, the new firmware field will contain the name of the firmware file.

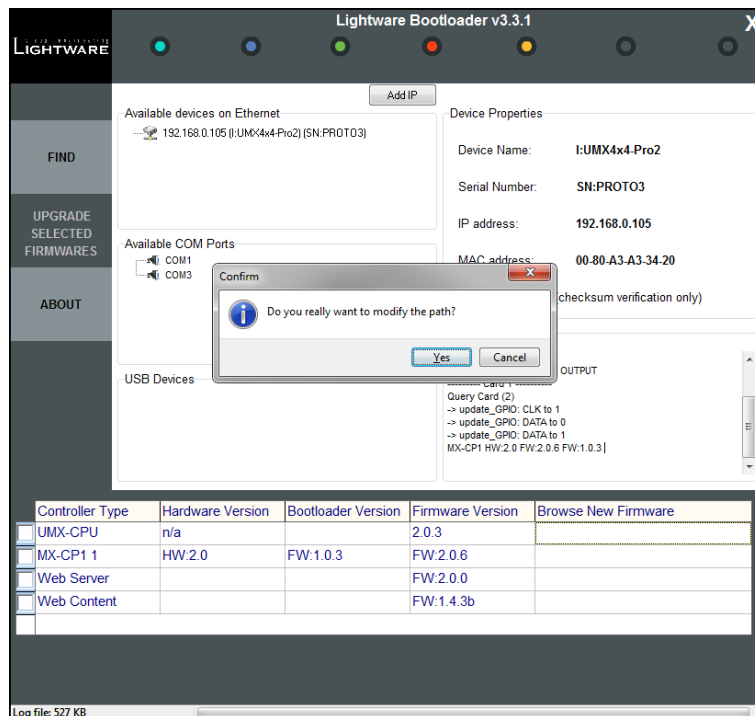


Figure 10-5. Selecting new firmware files

Controller name	Description
UMX-CPU	The main processor in the matrix.
MX-CP1 1	Front side control panel for the matrix.
Web Server	The controller that handles Ethernet communication in devices with Ethernet port.
Web Content	The controller that handles the built-in website in devices with Ethernet port.

Step 7. Enable the upgrade and Quick Bootload mode

After selecting the new firmware file, you must enable the upgrade by clicking the checkbox left to the controller type (marked with a red circle in the picture below). You may enable Quick Bootload mode by clicking the checkbox next to it (marked with a red rectangle in the picture below). Quick Bootload mode speeds up the process by not reading back the written data, only verifying the checksum. It can be enabled and disabled any time during the upgrade process.

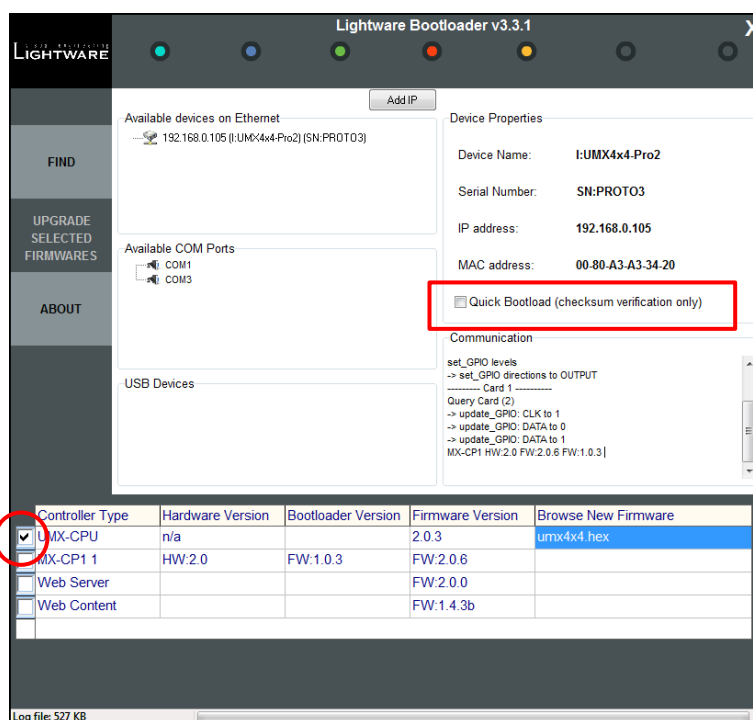


Figure 10-6. Enabling the upgrade and Quick Bootload mode

Step 8. Starting the upgrade process

After selecting all the firmwares that need to be upgraded, click on the **UPGRADE SELECTED FIRMWARES** button. Then click on **YES** in the appearing window to start the process.

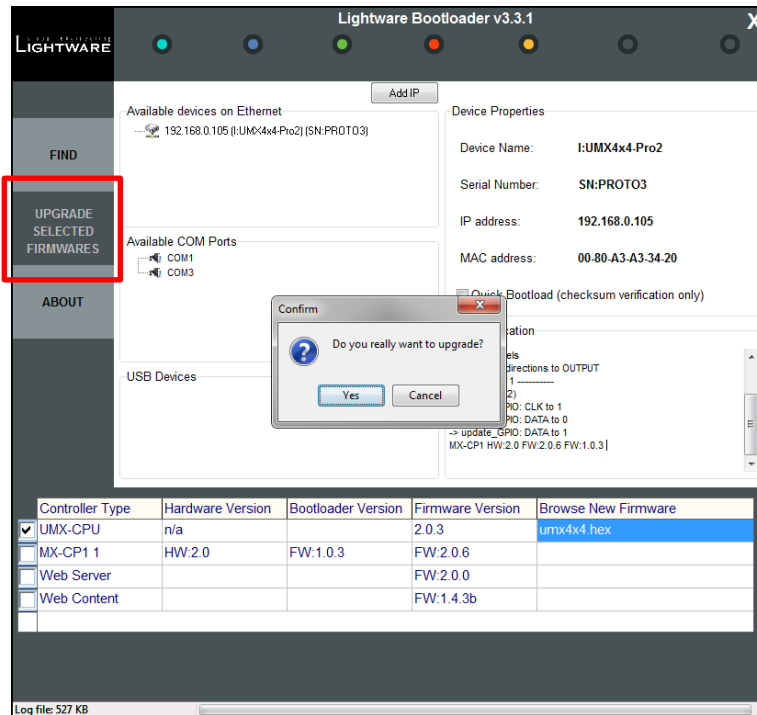


Figure 10-7. Starting the upgrade process

Step 9. Upgrading

The Bootloader will first erase the content of the controllers and then write the new firmware data. This process can be monitored in the communication window and the progress bar (both are marked with red rectangles in the picture below).

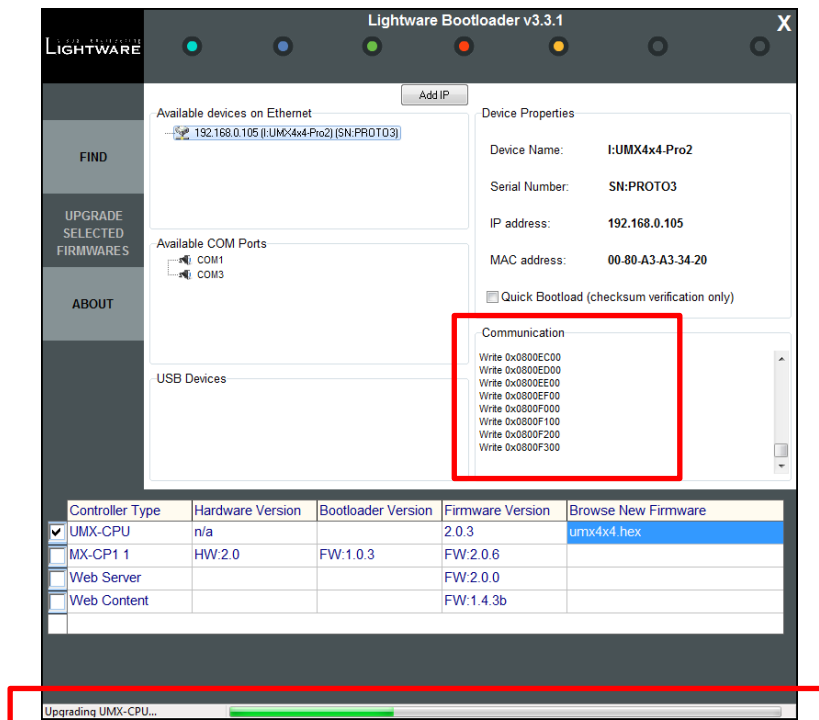


Figure 10-8. Upgrading

Step 10. Closing connections

After all controllers are upgraded, the Bootloader will close the connection with the Lightware device, which will reboot itself and return to its normal operating mode.

Warning! *Bootloader versions that are older than v3.1.8 will not close the connection and restore the Lightware device until you exit the Bootloader.*

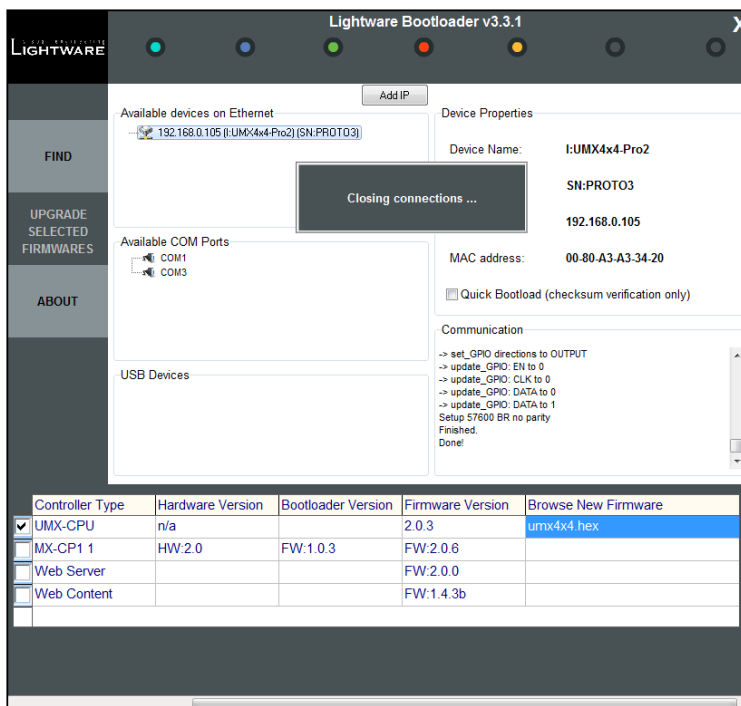


Figure 10-9. Closing connections

Step 11. Upgrade successful

If the connections are closed and no errors occurred, the firmware upgrade is SUCCESSFUL. Click on the **OK** button and then you may exit the Bootloader or connect to another Lightware device to perform firmware upgrades.

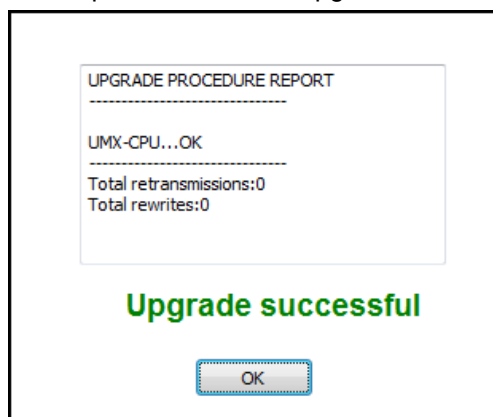


Figure 10-10. Upgrade successful

Step 12. Restart the device

The Lightware device will restart itself automatically, but it is recommended to completely power down and power up the device after exiting the Bootloader.

11. Troubleshooting

11.1. General problems

Check the router

Check whether the router is properly powered and whether CPU LIVE LED is blinking. Try performing a reset through the Lightware Device Controller software, or unplug and reconnect the router's power cable.

Important! Check whether the RESET button is released properly! If the plastic cap gets stuck under the back of the enclosure the matrix cannot work.

11.2. Serial connection problems

Check the protocol

Check whether the proper protocol is selected. Select Protocol #1 in order to use the matrix with the Lightware Device Controller software.

Check the cable and software settings

Check whether your male to female straight serial cable is properly connected. In most cases there are more COM ports present in the operating system. Please verify the connection settings of your software. The router communicates by default with **57600** Baud, **8** data bit, **No** parity, **1** stop bit.

11.3. TCP/IP connection problems

Check the LAN cable type

If you connect the router directly to your computer, you must use a cross-link cable. If the matrix is connected to an Ethernet hub, switch or router, you have to use a straight patch LAN cable.

Check the network connection

The computer and the router have to be in the same network. If your computer has multiple network connections (for example WiFi and LAN connections are used simultaneously), check which network the router is connected to. The appropriate Ethernet interface has to be selected in the Find dialog box of the Lightware Device Controller software.

Check the IP settings

If you connect the router directly to your computer, you have to set the router's IP address manually, since in this case there is no DHCP server that could assign an address to the matrix.

If the IP address is set manually, check if there is an IP address conflict. If there is a DHCP server on the network, try to set the matrix to DHCP mode.

Check whether your computer's firewall blocks the selected port.

Check the proxy settings

If the connection between the matrix and the computer cannot be created and a proxy server is used in your network please turn off the proxy or add the local network addresses to the proxy exceptions.

Check the live connections

Only one connection is allowed simultaneously. Check whether there is another open connection (e.g. opened router web interface, running control software over Ethernet). Try restarting the router if you have no other option.

11.4. Picture is not displayed or distorted

Check the cables (DVI)

Due to the high data rates, the cables must fit very well. DVI connectors have to be locked with screws, no tensions or breaches are allowed. If your source or display has more connectors then make sure that the proper input port is selected.

Check the cables (TP)

Due to the high data rates, high quality cables must be used. It is recommended to use Cat6 or Cat7 S/FTP cables.

Check the crosspoint matrix

Check the connection between the input and output port either on the front panel or from web or the control software. Check whether the output is muted or not.

Check EDID related problems

Maybe your display device is not capable of receiving the sent video format. Try emulating your display device's EDID to the source.

Check the source

Check whether your source is powered on and configured properly. The HDMI output can be turned off on most DVD players. If the source is a computer, then verify that the DVI output is selected and active. Try restarting your computer; if you get a picture during the booting process, you have to review the driver settings.

11.5. Bootload

The Bootloader cannot find the matrix

The Bootloader software always queries the PC's primary Ethernet adapter (which is usually the adapter that is connected to the Internet) for available Lightware devices. It is recommended to disable every other Ethernet device (secondary LAN, Wi-Fi, 3G modem) for the time of the upgrade. If the Bootloader cannot find the Lightware device because the device is connected to the secondary Ethernet adapter (cross UTP connection), you need to disable the primary adapter (Internet). This way the Ethernet adapter which is connected to the Lightware device will become the primary adapter and the Bootloader can query it for Lightware devices. If you disable an Ethernet adapter while the Bootloader is running, you need to restart the Bootloader to be able to query the Ethernet adapter again.

A second option in this case is that if you know the IP address and port number of the Lightware device, you may use the Add IP button above the Available Devices on Ethernet window.

Upgrade FAILED

If the connection is unreliable and the Bootloader cannot communicate with the Lightware device, then the **"Upgrade failed!"** warning messages appears.

The Bootloader retries the transmission 3 times. If it doesn't succeed, then the upgrade procedure will have FAILED. In this case exit the Bootloader, try to establish a reliable connection with the Lightware device and repeat the upgrade process. It may happen that when you try to find the device again, the Available devices window will only show the IP

address of the Lightware device but not the device type and serial number. The reason for this is that the Lightware device may still be in bootload mode and the controllers cannot send any information about themselves. You can still double-click on the IP address and the Bootloader will establish the connection.

No controller selected to upgrade!

If you didn't check any checkboxes left to the controller types then the **"No controller selected to upgrade!"** message appears. Click at least one of the checkboxes before you click on the UPGRADE SELECTED FIRMWARES button.

The controller was not upgraded

Make sure that the checkbox next to the controller type is checked before you click on the **UPGRADE SELECTED FIRMWARES** button. These checkboxes enable the firmware upgrade on the different controller types.

An invalid file has been selected

The Bootloader checks if valid firmware files have been selected for the controllers. If an invalid file (not firmware file) has been selected, then the **"WARNING! Upgrade failed: Invalid checksum"** warning messages appears.

Please select a valid firmware file.

Firmware selected for the wrong controller

If an otherwise valid firmware file has been selected but for the wrong controller, the **"WARNING! Invalid controller type info for UMx4x4-Pro2"** warning message appears.

Please select the appropriate firmware file for the controller.

Corrupt firmware file

If the correct firmware file is selected for the controller but it somehow became corrupted (the checksum is incorrect), then the **"WARNING! Upgrade failed: Invalid checksum. Invalid controller type info for UMx4x4-Pro2. Invalid hardware info for UMx4x4-Pro2."** warning messages appear.

Please contact your local sales representative or Lightware's support team at support@lightware.eu and ask for the correct firmware files.

12. Specifications

General

Compliance	CE
EMI/EMC	EN 55022, EN 55024
Safety	EN 60065 Class I
Warranty	3 years
Cooling	Convention only
Operating temperature	-20°C ~ +50°C (-4°F to +122°F)
Operating humidity	10 ~ 90% RH, noncondensing

Power

Power source	100-240 V AC; 50~60 Hz; (max. 0.4 - 0.2 A)
Power adaptor	Internal
Power consumption	max 40 W (137 BTU/hour)
AC power connector	IEC C14 receptacle

Enclosure

Rack mountable	Yes, 1U high
Material	1 mm steel
Dimensions in mm	446 (482*)W x 302**D x 44.4H
Dimensions in inch	17.6 (19.0*)W x 11.9D x 1.75H
Net Weight	4600 g

* with rack mounting ears

** excluding connectors

Control

Front Panel buttons	Yes, 23 buttons
Serial port connector	DE-9F (9 pole D-SUB female for RS-232)
Baud rate	9600 - 115200 Baud, 8 bit, 1stop bit, no parity
Ethernet port connector	RJ45 female connector
Ethernet protocol	TCP/IP, HTTP, Telnet
IP address assignment	fixed, DHCP, BOOTP, and AutoIP

Video inputs

DVI connector 29 pole, DVI-I, digital and analog
 Input cable equalization Yes, digital only, max 20 m
 EDID emulation Yes, analog and digital

Video outputs

DVI connector 29 pole, DVI-I, digital only
 EDID read Yes, analog and digital
 +5V output current 500 mA continuous on each port

S/DPDIF audio ports

Number 4
 Connector type RCA

Analog audio ports

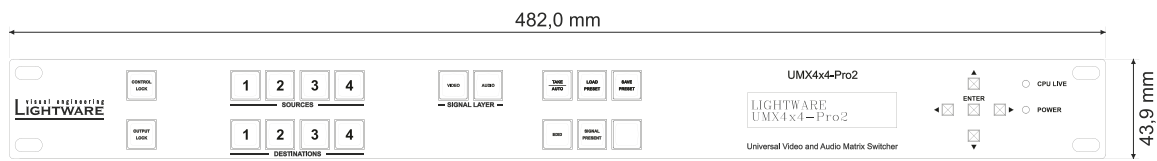
Number 4
 Signal type analog stereo, unbalanced
 Connector type RCA (for left and right channel)

Digital video signal

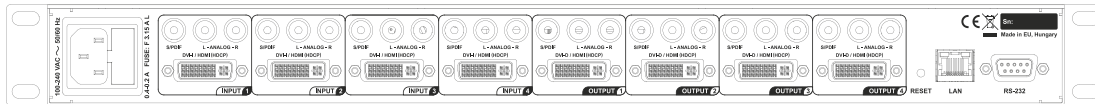
Signal standard DVI and HDMI standard which supports embedded audio
 Color format RGB, YCbCr 4:4:4, xvYCC digital video
 Color space conversion Yes, always from any to RGB
 Maximum data rates 6.75 Gbps (2.25 Gbps /TMDS channel)
 Maximum pixel clock 225 MHz
 Video delay 0 frame
 Resolutions all between 640x480 and 2048x1080@60 Hz
 HDTV resolutions 720p, 1080i, 1080p
 Reclocking Pixel Accurate Reclocking
 EDID Support Advanced EDID management (analog and digital)
 EDID Emulation Yes, 75 factory preset, 50 user programmable
 Output mode Automatic (DVI or HDMI)
 HDCP compliant Yes

12.1. Mechanical Drawings

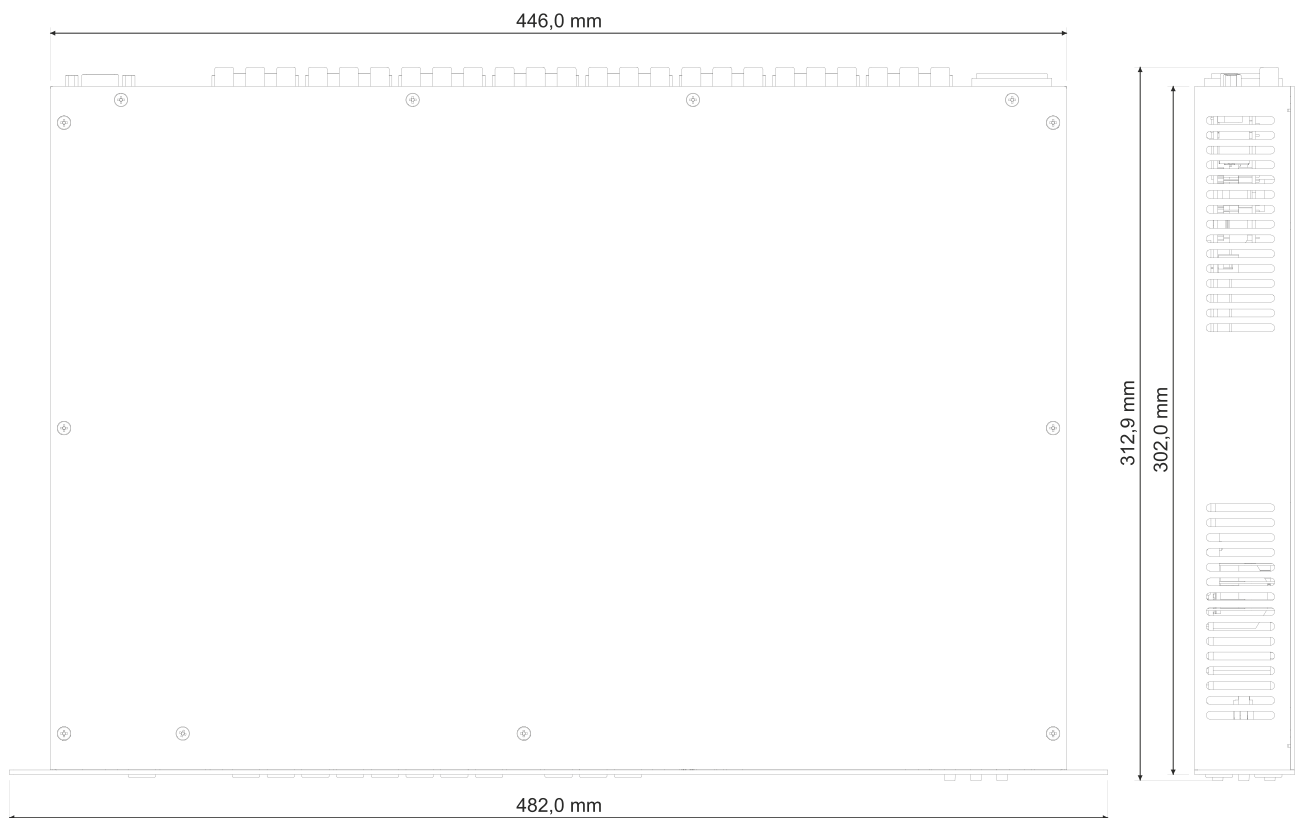
Front View



Rear View



Top and right View



13. Version applicability

This User's Manual applies to the following versions of the mentioned software, firmware and hardware:

Name	Version
Lightware Device Controller software	1.6.2b2
Lightware Bootloader software	3.3.1
Router CPU firmware (UMX-CPU)	2.0.3r
Router Control Panel firmware (MX-CP1 1)	2.0.6
Router Web Server	2.0.5
Router Web Content	1.4.3
Router Motherboard (UMX4x4-Pro2)	SCH_2.1 PCB_2.1
Router Slot 1	SCH_1.1 PCB_1.2
Router Slot 2	SCH_1.1 PCB_1.2

Info: The mentioned info in this manual may be applicable for other versions of HW and SW.

14. Warranty

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 from 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 copy of invoice), the warranty period will begin from 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

In case of defect please call your local representative, or contact Lightware at

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15. Document revision history

Document	Release Date	Changes	Editor
Rev. 1.1	04-02-2016	Minor changes	Zsolt Markó
Rev. 1.0	01-02-2016	Initial version	Zsolt Markó