

**MX12x12DVI-Slim**  
**MX16x16DVI-Slim**





# 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.



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## 1. Introduction

Thank you for choosing Lightware DVI matrix routers. The MX16x16DVI-Slim and MX12x12DVI-Slim router are able to switch 16 inputs to 16 outputs or 12 inputs to 12 outputs in a non-blocking crosspoint configuration respectively.

### 1.1. Box contents

#### 1.1.1. Supplied Accessories

- Routing switcher
- Power supply rack mounting ears
- IEC power cable
- RS-232 9 pole D-SUB Male to Female cable

#### 1.1.2. Optional Accessories

- Power supply unit
- Speakon DC power cable

The external PSU and the cable is only available for purchase as a separate accessory. For the details, please contact [sales@lightware.com](mailto:sales@lightware.com).

### 1.2. Description

Lightware MX16x16DVI-Slim and MX12x12DVI-Slim are single link DVI matrix switchers with 16 DVI inputs and 16 DVI outputs or 12 DVI inputs and 12 DVI outputs respectively, which routes any input(s) to any combination of output(s).

The router conforms to DVI 1.0 specification, and switches signals between 25 - 165 MHz pixel clock frequency: from 640x480@60Hz to 1920x1200@60Hz or 2048x1080@60Hz PC resolutions.

The input signals are compensated for 12dB loss and outputs are preemphasized by +6dB, this way cable lengths up to 20 meters (65 feet) can be used.

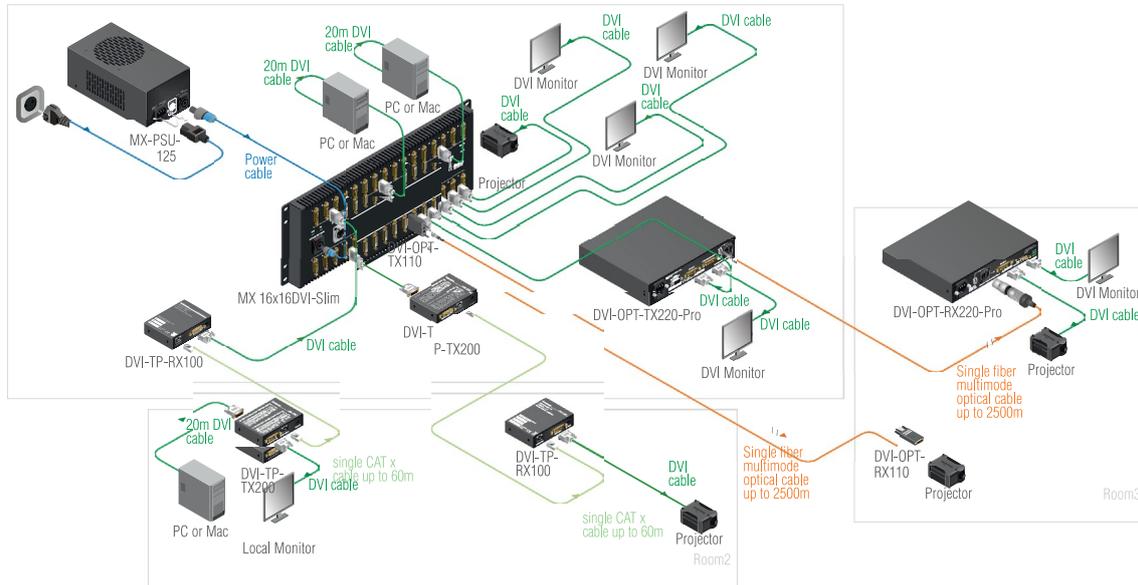
The switcher has an RS-232 (or RS-422 optional) and an RJ45 LAN port for remote control applications and a control panel for local control operation. Front panel buttons are illuminated and easily relegendable with text for informative system integration.

### 1.3. 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 100 internal memory locations, upload and download EDID files using Matrix Control Software.
- **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 and HDMI1.3a signal between 25 and 225 MHz TMDS clock frequency conforming to DVI 1.0 standard.
- **Supports all HDTV resolutions** – 720p, 1080i and 1080p etc. without HDCP encryption - Unencrypted HDTV signals up to 165 MHz pixel clock frequency regardless of resolution are passed through.
- **Supports HDMI signals** – non HDCP encrypted HDMI 1.3a signals (with embedded audio) are handled properly.
- **Cable equalization** – DVI cables up to 20 meters can be used on all inputs thanks to the +12dB compensation.
- **Output boost** – DVI cables up to 15 meters can be used on all outputs thanks to the +6dB preemphasizing circuit.
- **Front panel buttons control** – 16 or 12 source select, 16 or 12 destination select, Take, Load preset, Save preset, Control Lock, Output Lock
- **Relegendable buttons** – Each button has an easy removable flat cap and a translucent label which can be inserted under it to identify sources and destinations.
- **RS-232 or RS-422 control** – Simple ASCII based 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
- **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. Lightware routers support +5V 500 mA constant current output on each DVI output to power long distance fiber optical cables.
- **Universal power supply** – Accepting 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.
- **Ultra thin & light** – only 32.8 mm (1.3 inch) deep, 4U high rack mountable housing. Thanks to the aluminum alloy body, the matrix router weighs only 1.85 kg (4.1 lbs). For full equipment weight see specification in section [10](#) On page [76](#) .

## 1.4. Applications

Some typical connection variations with the matrix router are shown on Figure 1-1.



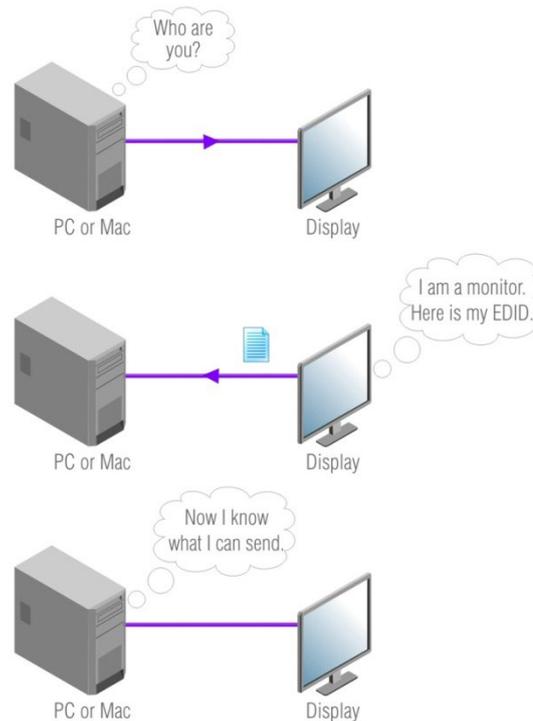
**Figure 1-1. Typical application**

## 1.5. Understanding EDID

### 1.5.1. 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 1-2. EDID communication**

Most DVI computer displays have 128-byte long EDID structure. However, Digital Televisions and HDMI capable displays may have another 128 bytes, which is called E-EDID and defined by CEA (Consumer Electronics Association). This extension contains information about additional Detailed Timings, audio capabilities, speaker allocation and HDMI capabilities. It is important to know, that all HDMI capable devices must have CEA extension, but not all devices are HDMI capable which have the extension.

### 1.5.2. Common problems related to EDID

**Problem:** „My system consists of the following: a computer, a Lightware MX16x16DVI-Slim matrix, a WUXGA (1920x1200) LCD monitor, and a SXGA (1280x1024) projector. I would like to see the same image on the monitor and the projector. What EDID should I chose on the router?”

**Solution:** If you want to see the image on both displays, you need to select the resolution of the smaller display (in this case SXGA), otherwise the smaller display may not show the higher resolution image.

Problem: „I have changed to a different EDID on an input port of the 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.

## 1.6. 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. DVI 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.

MX16x16DVI-Slim and MX12x12DVI-Slim provide Lightware's Advanced EDID Management function that helps system integration. The built in EDID Router stores and emulates 100 EDID data plus all monitor's EDID that are connected to the output connectors. First 50 EDID are factory presets, while memories 51 to 100 are user programmable. 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 input has it's own EDID circuit. EDID Router 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 source is connected to the input and powered ON.*

*Info*     *When EDID has been changed, the router toggles the HOTPLUG signal for 2 seconds. Some sources do not 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.*

## 2. Controls and connections

### 2.1. Front panel view

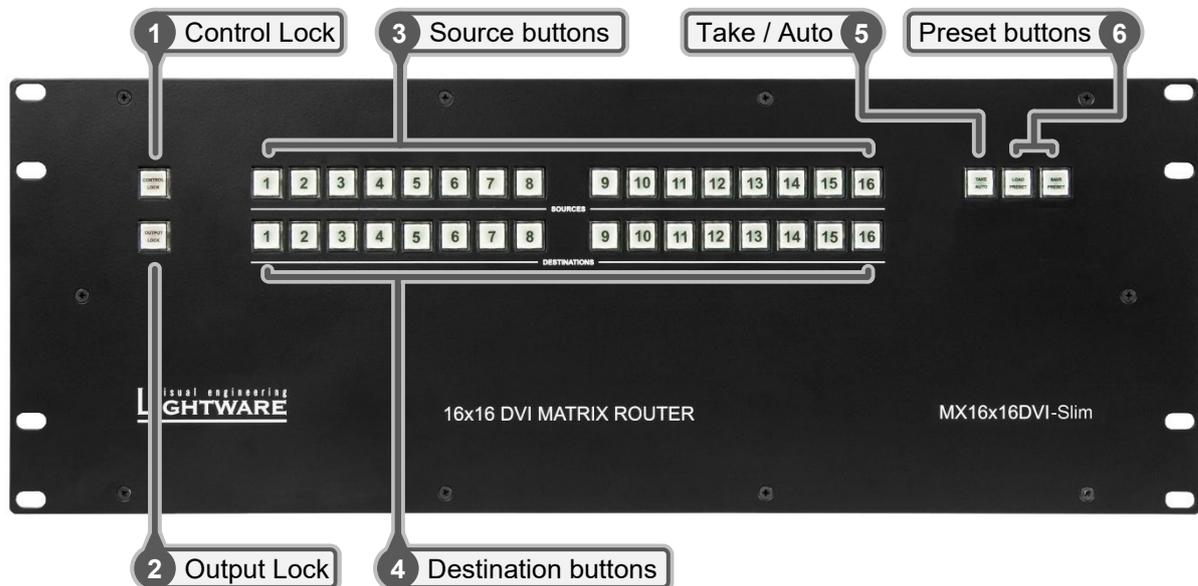
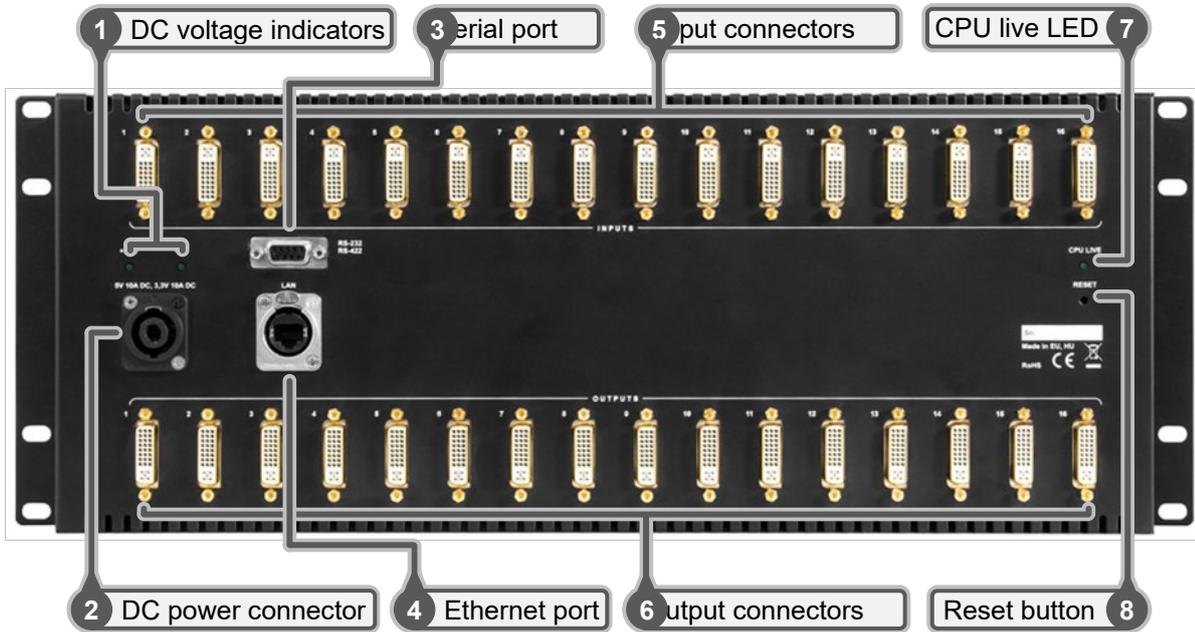


Figure 2-1. Front panel view

- |                                     |  |
|-------------------------------------|--|
| <p><b>1 Control Lock</b></p>        | <p>Disables or enables front panel operation. When red illuminated, all operations on front panel are prohibited. See section <a href="#">3.2.1</a> on page <a href="#">19</a> for more information.</p>   |
| <p><b>2 Output Lock</b></p>         | <p>Locks and protects one (or more) outputs. Inhibits accidental input changing on protected output. See section <a href="#">3.2.7</a> on page <a href="#">23</a> for more information.</p>  |
| <p><b>3 Source buttons</b></p>      | <p>Source buttons have three functions: to select an input, to select a preset and to view the selected input's state (only in TAKE mode). See section <a href="#">3.2.3</a> on page <a href="#">20</a> for more information.</p>                  |
| <p><b>4 Destination buttons</b></p> | <p>Destination buttons have two functions: to select an output, or to view the selected output's state. See section <a href="#">3.2.4</a> on page <a href="#">21</a> for more information.</p>   |
| <p><b>5 Take / Auto</b></p>         | <p>Displays the actual switching mode of the router (TAKE or AUTOTAKE). Long press toggles the switching mode, short press executes switching in TAKE mode. See section <a href="#">3.2.2</a> on page <a href="#">19</a> for more information.</p> |
| <p><b>6 Load Preset</b></p>         | <p>Loads and executes a previously saved preset from one of the preset memories.</p>   |
| <p><b>6 Save Preset</b></p>         | <p>Stores actual matrix state, in one of the preset memories. See section <a href="#">3.2.6</a> on page <a href="#">23</a> for more information.</p>   |

*Info* MX12x12DVI-Slim front panel differs only in that it has only 12 source and 12 destination buttons.

## 2.2. Rear view

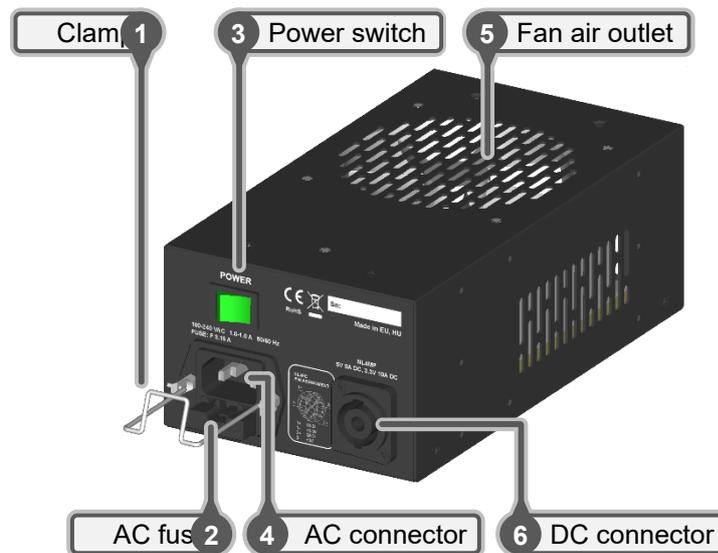


**Figure 2-2. Rear view**

- 1 DC voltage indicators** LED indicators for internal DC power voltages.
- 2 DC power connector** Speakon 4 pole receptacle. Connect ONLY to matching power supply (MX-PSU-125) supported by Lightware. See section [2.4.1](#) for more information.
- 3 Serial port** 9 pole D-SUB female connector. Can be ordered with RS-232 or RS-422 control.
- 4 Ethernet port** RJ45 connector. Remote control port for connecting the unit to Local Area Network (LAN).
- 5 Input connectors** 29 pole DVI-I digital-only female receptacle connectors. Connect DVI source devices to these connectors.
- 6 Output connectors** 29 pole DVI-I digital-only female receptacle connectors. Connect DVI sink devices to these connectors.
- 7 CPU live LED** Continuously blinking LED if the CPU works properly.
- 8 Reset button** Resets all internal hardware elements.

*Info* MX12x12DVI-Slim rear panel differs only in that it has only 12 input and 12 output connectors.

## 2.3. Power supply unit



**Figure 2-3. Power supply**

- |          |                       |   |
|----------|-----------------------|---|
| <b>1</b> | <b>Clamp</b>          | Prevents the IEC plug from losing, or slipping out.   |
| <b>2</b> | <b>AC fuse</b>        | Replace with F 3.15 A type only.  |
| <b>3</b> | <b>Power switch</b>   | Power supply can be switched OFF/ON with this switch.   |
| <b>4</b> | <b>AC connector</b>   | Standard IEC power connector. Works with 100 to 240 Volts, 50 or 60 Hz power sources.                                     |
| <b>5</b> | <b>Fan air outlet</b> | Low noise fan. Never block air flow!  |
| <b>6</b> | <b>DC connector</b>   | Speakon 4 pole connector. Connect to router with supported cable. See section <a href="#">2.4.1</a> for more information. |

*Info* There are several mounting possibilities with the provided rack mounting ears. See section [10.3](#) on page [81](#) for suggested examples.

## 2.4. Electrical connections

### 2.4.1. Power connector

Neutrik Speakon locking connector is used to connect the power supply unit with the router. The connector is made with custom pin assignment. Using the DC power cable provided with the router is always recommended.

**Warning** *Never use the cable of other electronic equipment that seems to be compatible with this connector!*

#### DC power connector pin assignment

If a custom length DC power cable has to be made, follow the below specification.

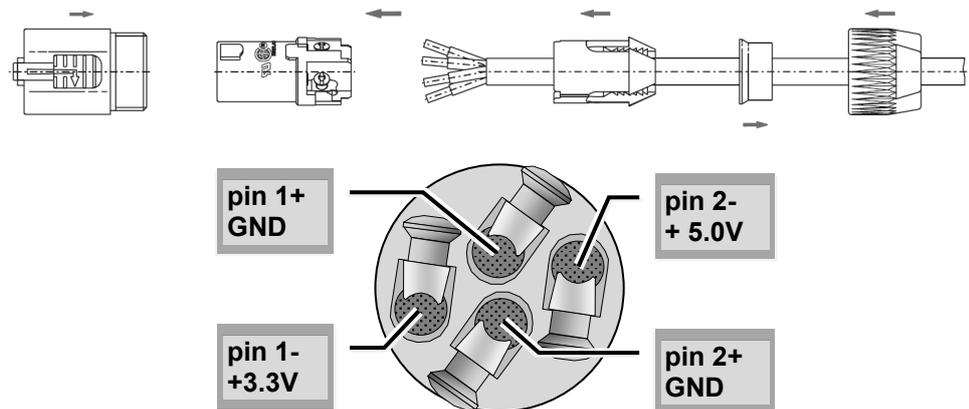
**Recommended cable:** 4 wire, each 4 mm<sup>2</sup> (4×AWG12)

Maximum length 1.5 meters (5 feet)

**Current:** 10 A @ 3.3 V DC

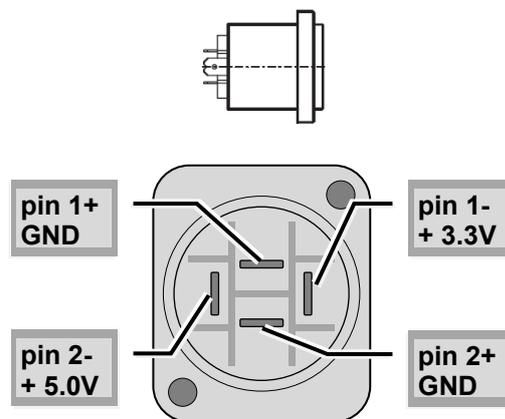
10 A @ 5 V DC

**Cable connector type:** Neutrik Speakon **NL4FC**



**Figure 2-4. DC power cable connector pin assignments**

**Chassis connector type:** Neutrik Speakon **NL4MP**



**Figure 2-5 DC chassis connector pin assignments**

### 2.4.2. DVI inputs

MX16x16DVI-Slim and MX12x12DVI-Slim provide 29 pole DVI-I connectors, however only digital pins are 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 processed.

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

Fix +12 dB cable equalization is provided, this way DVI cables up to 20 meters can be used on all inputs.

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	nc	12	nc	20	nc
5	nc	13	nc	21	nc
6	DDC Clock	14	+5V Power	22	TMDS Clock Shield
7	DDC Data	15	GND (for +5V)	23	TMDS Clock+
8	nc	16	Hot Plug Detect	24	TMDS Clock-
C1	nc	C2	nc	C3	nc
C4	nc	C5	GND		

Table 2-1. DVI-I digital only connector Single Link pin assignments

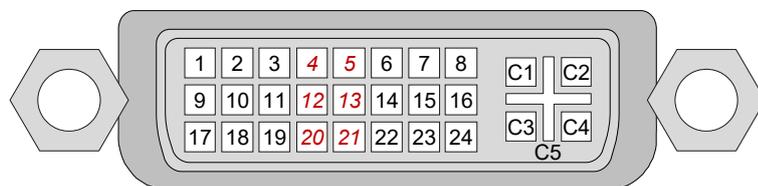


Figure 2-6. DVI connector

### 2.4.3. DVI outputs

MX16x16DVI-Slim and MX12x12DVI-Slim provide 29 pole DVI-I connectors for outputs, however only digital pins are 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 processed.

Thanks to the fix +6 dB pre-emphasizing circuit, DVI cables up to 15 meters can be used. For using longer cable runs at outputs, use fiber optical DVI transmitters (like Lightware DVI-OPT-TX100) or active DVI repeaters/extenders.

No output reclocking is provided.

#### Fiber Cable powering

As special feature MX16x16DVI-Slim and MX12x12DVI-Slim are able to supply 500 mA current on DDC +5V output (pin 14 on output connectors) to power fiber optical DVI cables. Standard DVI outputs or VGA cards supply only 55 mA current on +5V output, thus unable to power directly 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.

#### 2.4.4. RS-232 / RS-422 control port

Lightware MX16x16DVI-Slim and MX12x12DVI-Slim can be remote controlled through industry standard 9 pole D-SUB female connector located on the rear panel of the unit. The router can be ordered with RS-232 or RS-422 control port.

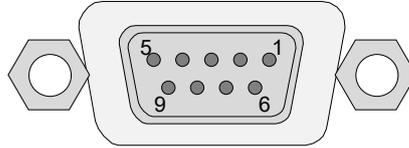


Figure 2-7. D-SUB 9 pole connector

Pin nr.	RS-232	RS-422
1	NC non connected	TX- data transmit complement
2	<b>TX data transmit</b>	TX+ data transmit true
3	<b>RX data receive</b>	RX+ data receive true
4	DTR internally connected to Pin 6	RX- data receive complement
5	<b>GND signal ground (shield)</b>	GND signal ground (shield)
6	DSR internally connected to Pin 4	NC non connected
7	RTS internally connected to Pin 8	NC non connected
8	CTS internally connected to Pin 7	NC non connected
9	NC non connected	NC non connected

Table 2-2. D-SUB 9 pole pin assignments

#### 2.4.5. Ethernet port

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!

See section 3.3 about remote operation on page 25 for more information.

	LED1	LED2	Pin nr.	Name	Wire color
<b>OFF</b>	no activity	no link	1	TX +	Green stripe
<b>Amber</b>	half duplex	10 Mbps	2	TX -	Green
<b>Green</b>	full duplex	100 Mbps	3	RX +	Orange stripe
<b>Blink</b>	activity	N/A	4	Not used	Blue
			5	Not used	Blue stripe
			6	RX -	Orange
			7	Not used	Brown stripe
			8	Not used	Brown

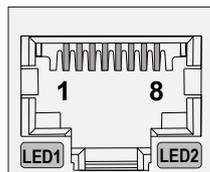


Figure 2-8. RJ45 connector

Figure 2-3. Ethernet pin connections

## 3. Operation

### 3.1. Powering on

Connect the power cord to the power supply unit's IEC standard AC power input connector. The unit can be switched ON/OFF with a rocker switch. When it is on, the switch illuminates, and the fan operates.

Connect the router to the power supply with the supplied DC power cable. The router itself does not have a power switch, it remains powered on until the power supply unit is on.

After powered on, the unit performs a self test, and then all front panel buttons light up for one second. After the self test the CPU live LED starts blinking, the router reloads its last configuration and it is ready to use.

*Info* At switching ON, the router reloads the latest settings which were used before it was turning off. The unit has an internal emergency memory which stores all current settings, and ties 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 accidentally powering down.

### 3.2. Front panel operations

#### 3.2.1. CONTROL LOCK

Front panel button operations can be enabled or disabled using CONTROL LOCK button, while RS-232 / RS-422 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.

Press and hold the CONTROL LOCK button for 3 seconds to toggle the control lock state.

#### 3.2.2. 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 button for three seconds to toggle between TAKE and AUTOTAKE modes.

TAKE mode allows the user to make multiple connections and disconnections 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.

### 3.2.3. 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.

*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. 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**, 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**, 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.

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 in muted state. By pressing another destination button, the state of that destination can be seen.

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

### 3.2.4. Switching

#### Creating a connection or multiple connections in TAKE mode

- Step 1.** First 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 2.** Press and release the selected destination button or buttons which has to be connected to the selected source. The preselected destination button(s) start(s) blinking.
- Step 3.** Press and release TAKE button to execute the tie or ties. Now the selected input is switched to the selected output or to the multiple outputs.

#### Disconnecting or muting in TAKE mode

- Step 1.** First 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 2.** 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 3.** Press and release TAKE button to execute disconnection.

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

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

#### Creating a connection in AUTOTAKE mode

- Step 1.** Press and release the selected 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 2.** Press and release the selected input button. The switch action will be executed immediately. Switching between sources to the selected destination can be done directly.

#### Deselecting or muting in AUTOTAKE mode

- Step 1.** Press and release the selected destination button. The pressed destination button, and the actually connected source button are lighting green. If no source is connected (the output is muted) no source button will light up.
- Step 2.** Press and release the active green lighting source button. The output is muted.

*Info* Deselected destinations are disconnected from any source, thus output devices will display black or blue image or "no signal" message and may automatically turn off.

### 3.2.5. Switching operations flowchart

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

#### TAKE mode

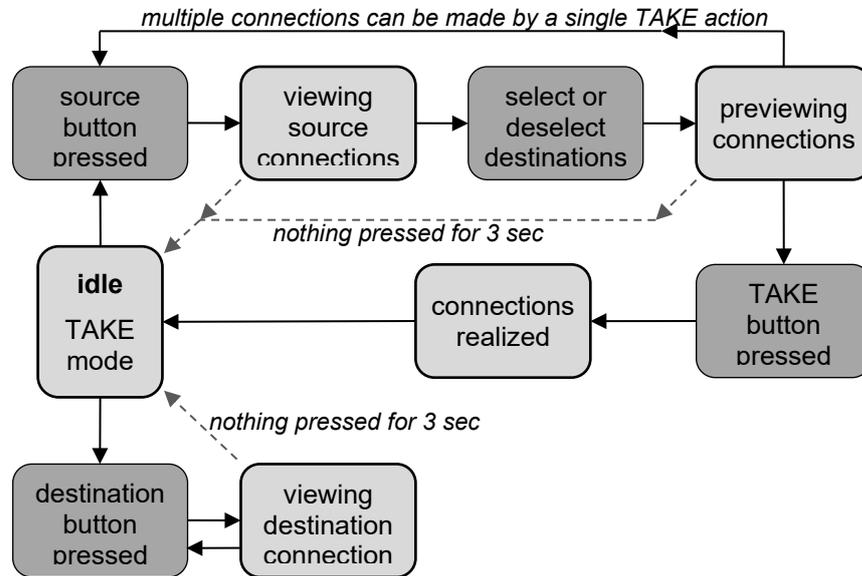


Figure 3-1. Switching flowchart in TAKE mode

#### AUTOTAKE mode

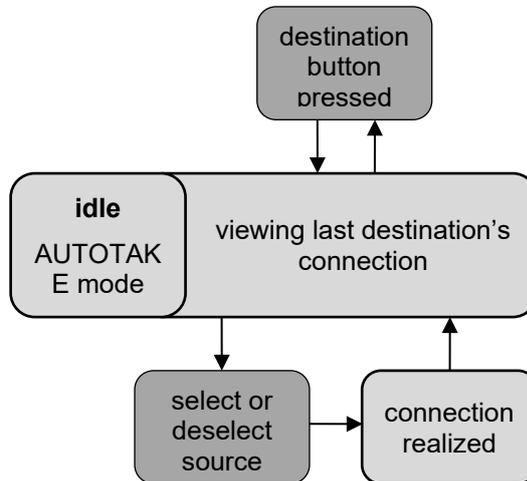


Figure 3-2. Switching flowchart in AUTOTAKE mode

### 3.2.6. Preset operations

The unit has 32 user programmable presets. Each preset stores a configuration regarding all input connections and mute state for all outputs. 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 16. The other presets are accessible only through software control (Serial or Ethernet).

#### Saving a Preset in TAKE mode

- Step 1.** Create the desired connections which have to be saved.
- Step 2.** Press and release the SAVE PRESET button.
- Step 3.** Press and release a source button according to the desired memory address (source 1 to 16 or to 12).
- Step 4.** 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 16 or to 12).
- 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.** Create the desired connections which have to be saved.
- Step 2.** Press and release SAVE PRESET button.
- Step 3.** Press and release a source button according to the desired memory address (source 1 to 16). 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 16). Now the selected preset is loaded.

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

### 3.2.7. 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 selection or muting can be executed on that particular destination.

Destinations can be independently locked or unlocked. Locking a destination does not affect other destinations.

### **View locked outputs in TAKE mode**

- Step 1.** Press and release the Output Lock button.
- Step 2.** The Output Lock button and all the buttons of any locked destinations lights up, and remain illuminated for two seconds.

### **Lock an output in TAKE mode**

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

### **Unlock an output in TAKE mode**

- Step 1.** Press and release the Output Lock button.
- Step 2.** Now the Output Lock button lights up in red and all the locked output's buttons illuminate green (view state).
- Step 3.** If no button is pressed for three seconds, the router returns to idle state.
- Step 4.** If an illuminating output button is pressed, it goes off, to indicate that it is preselected for unlocking.
- Step 5.** 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.** Press and release the required destination button. Now the selected destination button and the currently configured source button light up (view mode).
- Step 2.** Press and release the Output Lock button. Now the Output Lock button lights up in red, and lock function is activated at once. No source can be changed at the locked destination.

### **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.

### 3.3. Remote operation

Lightware matrix routers can be controlled through various interfaces remotely. This makes possible to use such 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.

**Available connections:**

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

User interface	Connection type		further information
	Ethernet port	RS-232 serial port	
Lightware matrix controller software	✓	✓	chapter 4 page <a href="#">26</a>
built-in website	✓	no	chapter 5 page <a href="#">41</a>
third party control system	✓	✓	chapter 7 page <a href="#">51</a>

**Table 3-1. 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 cross UTP cable has to be used!*

**User interface comparison**

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

Function	Matrix controller software	Built-in website
platform	Windows only	ANY ✓
installation	installation required	web browser needed only ✓
I/O and preset names	✓	no
Preview presets	✓	no
Easy EDID creator	✓	no
EDID editor	✓	no
EDID upload / download	✓	no

**Table 3-2. User interface comparison**

### 3.3.1. Serial port settings

MX16x16DVI-Slim and MX12x12DVI-Slim can be ordered with either RS-232 or RS-422 communication port. The port settings are done in the factory. D-SUB connector pin assignments can be found in chapter [2.4.4](#) on page [18](#).

The device uses standard RS-232 interface with the following settings:

- 9600 Baud
- 8 data bit
- 1 stop bit
- no parity
- null modem cable

### 3.3.2. Resetting the IP address

The unit's Ethernet port can be set to factory default IP configuration or to DHCP mode with front panel buttons. To set the IP configuration perform the following:

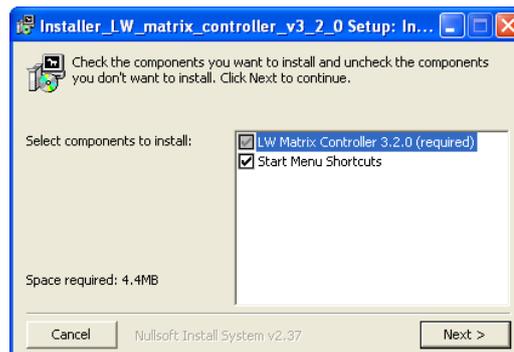
- Step 1.** Ensure that there is no active connection on the Ethernet port. (unplugging the LAN cable is the most secure)
- Step 2.** Switch the router to TAKE mode if used previously in AUTOTAKE mode by pressing TAKE button for 4 seconds (light will go off).
- Step 3.** Press and release Control Lock (Control Lock button lights in up red continuously).
- Step 4.** Press and keep pressed the Output Lock button (the current protocol indication will light up).
- Step 5.** 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: unchanged
    - gateway: unchanged
- Step 6.** 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 7.** Reinsert the LAN cable to the Ethernet port if it was unplugged.
- Step 8.** Wait about 20 seconds before connecting the router via Ethernet.

## 4. Software control – Using Lightware Matrix Controller

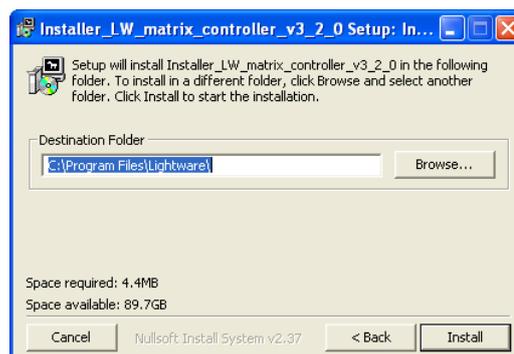
The matrix router unit can be controlled using Lightware Matrix Controller from a Windows PC or Laptop through RS-232 or Ethernet port.

### 4.1. Installing the Matrix Controller software

**Step 1.** Run Installer\_LW\_matrix\_controller\_v3\_2\_0.exe



**Step 2.** Select destination folder and click Install (Using the default path is highly recommended)



**Step 3.** If you want to create desktop icon click Yes in the next pop-up window:



**Step 4.** After finishing the installation the following message appears:



**Step 5.** To run Lightware matrix control software find the shortcut icon in Start menu → Programs → Lightware → LW\_matrix\_controller\_vXXX or on the desktop, and double click:



### Uninstalling

To uninstall the control software double click on: Start menu → Programs → Lightware → Uninstall\_LW\_matrix\_controller\_vXXX.exe

## 4.2. Establishing the connection

The unit can be controlled from a Windows computer using Lightware Matrix Controller software through RS-232 connection or Ethernet port.

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

- serial port, with standard RS-232 Male to Female cable
- Ethernet (with a HUB or to a simple endpoint)
- Ethernet directly (with cross UTP cable)

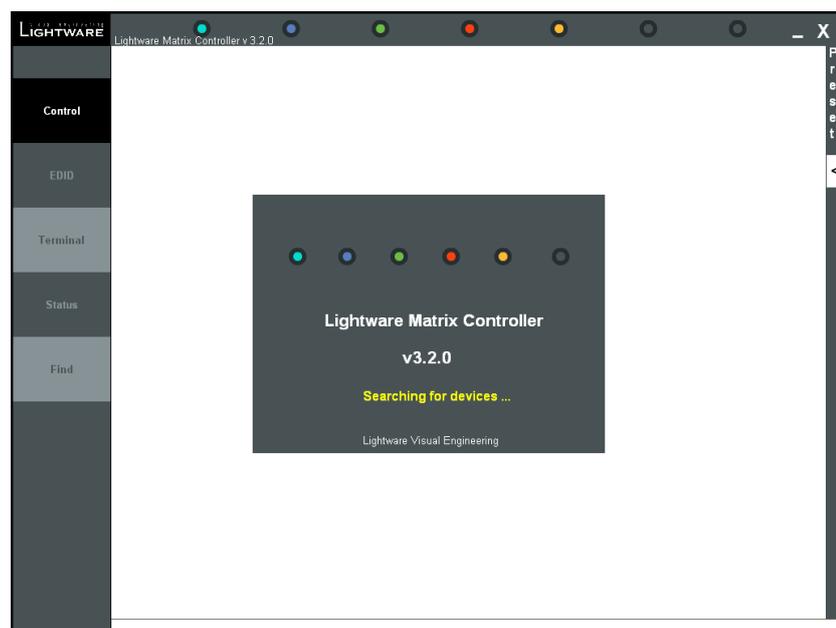
*Info* If the connection is made through the router's Ethernet port, be sure that the computer is in the same network as the router.

*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.** Start the application



To run the CONTROL SOFTWARE double click on the icon of the software on the desktop or select proper shortcut from Start Menu → Programs → Lightware folder.



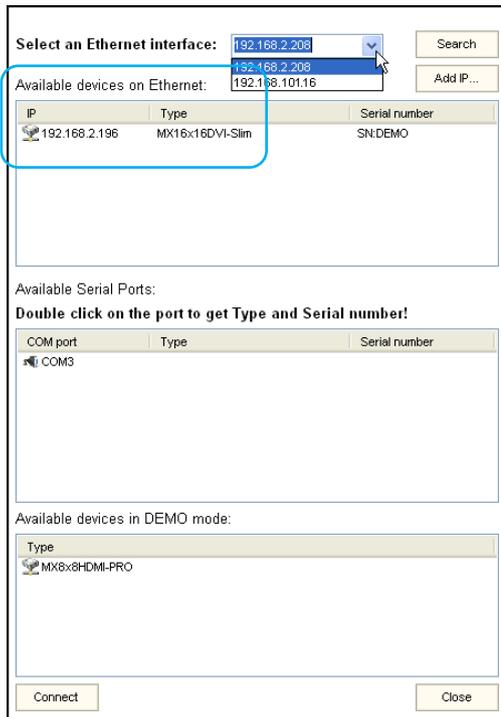
**Figure 4-1. Matrix Controller software startup**

**Step 3.** The Find dialog appears automatically

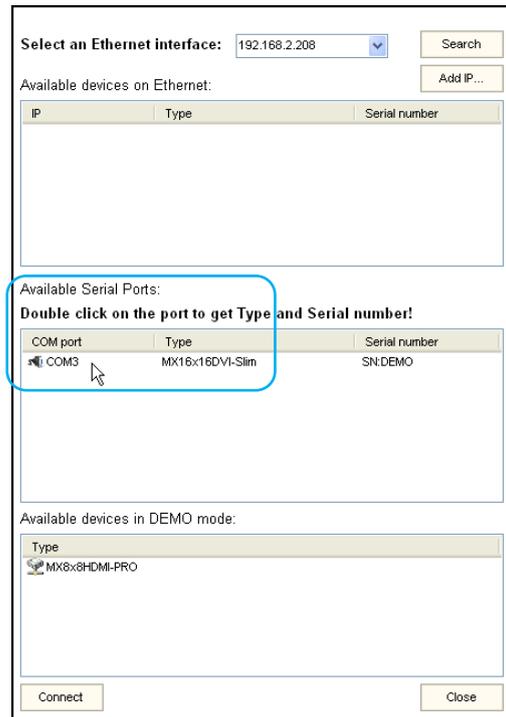
If the connection has been made via **Ethernet**, the software picks the primary Ethernet interface, and shows the available Lightware devices on that port. The device type and the serial number are displayed automatically. Click the desired device, to highlight it.

If the computer has more Ethernet ports (for example WiFi 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.

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.



**Figure 4-2. Ethernet connection**



**Figure 4-3. Serial connection**

**Step 4.** Click on the Connect button to connect to the device

*Info:* If the router is not listed in the “available devices on Ethernet” box, try searching again, or see the trouble shooting guide in section 9.3 about TCP/IP connection problems on page 74.

*Info:* Only one user is allowed to connect to the matrix switcher via Ethernet.

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

When the Lightware Matrix Controller finds the hardware, it determines the product type, and the control menu appears. The current state of the crosspoint switch is displayed.

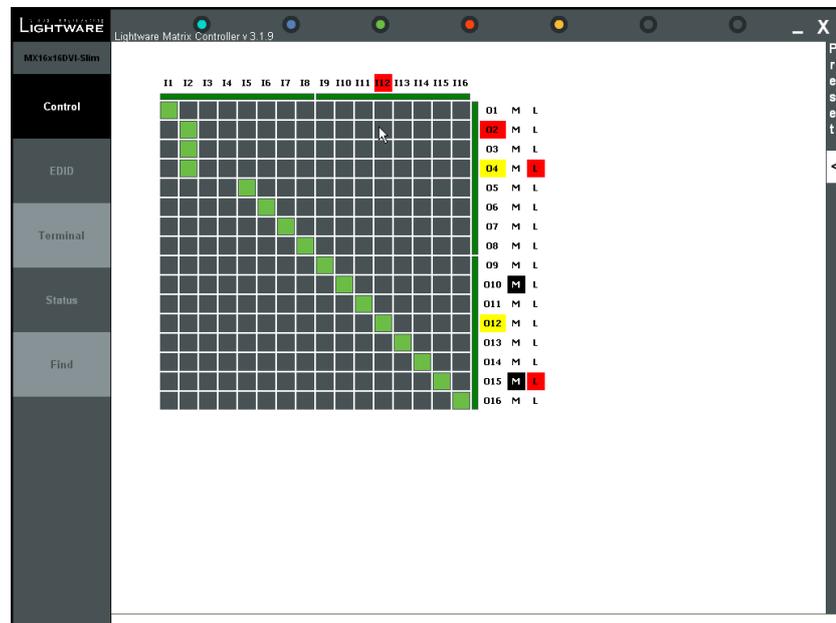


Figure 4-4. Matrix controller crosspoint array

## 4.3. Control menu

This menu contains the crosspoint area and the preset area. After connecting to a new device, this menu appears by default.

This view adapts to the input and output numbers of the router. I1; I2; I3... columns represent the inputs, the O1; O2; O3...rows represent the outputs. Each green square represents a valid connection. Since an input can be routed to more outputs simultaneously, there can be one or more green squares in one column. However an output can be switched to only one input, so there can be only one green square in any row.

### 4.3.1. Switch, mute and lock

For making a connection click on the desired square. If the output port is not locked or muted, the connection will be made. For switching an input to all outputs, click with the left mouse button on the input label, and click "Switch to all outputs" from the popup menu.

Outputs can be easily muted by clicking on the button titled 'M' beside the output. This means that no signal is present at this output. If mute is active, the color of the button's background changes to black.

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 red.

*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.

### 4.3.2. Input and output card types

With Lightware Hybrid Technology the matrix frames can be equipped with different types of cards. The colored bars near the crosspoint area display the type of the card in each slot. Whether it is an optical, a twisted pair or other kind of card, a different color represents its type.

*Info* Since this product model is a compact built system, the cards cannot be changed.

#### Legend for card types:

 MX-DVI-D card

### 4.3.3. Input and output names

To help memorizing the connected sources and destinations, names can be assigned to inputs and outputs. I/O names can be maximum 16 characters long, and can contain any ASCII characters except: ( ) { }. All characters are converted to uppercase.

*Info:* If the CPU firmware version is above 2.4.3 then the I/O names are stored in the router's memory so they can be read by any other computer. Otherwise, the I/O names are stored locally in a file on the computer that was used to save the I/O names. (By default this file can be found as C:\Program Files\Lightware\LW\_matrix\_controller\_v3\_2\_0\settings.ini)

#### Rename I/O port

- Step 1.** Click on the desired input or output.
- Step 2.** Click RENAME in the popup menu. The Rename window appears.
- Step 3.** Type the desired name, and click Apply.

#### Read I/O names

I/O names are loaded automatically when connection to the router is established. However I/O names can be re-read manually as well.

- Step 1.** Click on any input or output.
- Step 2.** In the popup menu click Read I/O names.

### 4.3.4. PRESET operations

Preset operations can be done on the PRESET panel. The panel can be accessed by clicking on the arrow at the right margin of the software window. Each Lightware 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.

### Load preset

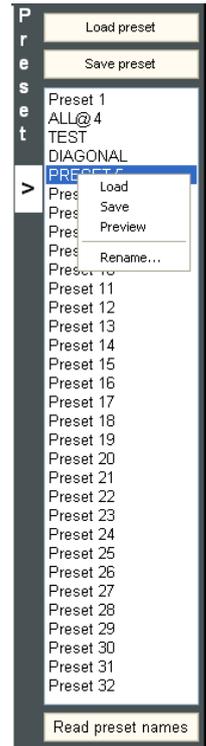
- Step 1.** Select the preset memory (Preset1...Preset32) you want to load as the next configuration.
- Step 2.** Press LOAD PRESET button or right click on the desired preset, and click Load in the popup menu. Now the preset is loaded.
- Step 3.** The new I/O configuration is displayed on the matrix switching area.

### Save preset

- Step 1.** Make the desired configuration on the matrix switching area.
- Step 2.** Select the preset memory (Preset1...Preset32) where you want to save your current configuration.
- Step 3.** Press SAVE PRESET button or right click on the preset and click Save in the popup menu. Now the preset is stored.

### Preview preset

- Step 1.** Right click on the desired preset, and click Preview in the popup menu.
- Step 2.** The preset's I/O configuration is displayed on the matrix switching area with yellow squares for two seconds.



### 4.3.5. Preset names

To help memorizing the preset configurations, names can be assigned to saved presets. Preset names can be maximum 16 characters long, and can contain any ASCII characters except: ( ) { }. All characters are converted to uppercase.

*Info:* If the CPU firmware version is above 2.0.0 then the preset names are stored in the router's memory so they can be read by another computer. Otherwise, the preset names are stored locally in a file on the computer that was used to save the preset names. (By default this file can be found as C:\Program Files\Lightware\LW\_matrix\_controller\_v3\_2\_0\settings.ini)

### Rename preset

- Step 1.** Select the preset memory (Preset1...Preset32) you want to rename.
- Step 2.** Click RENAME... in the popup menu. The Rename window appears.
- Step 3.** Type in the desired name and click APPLY. Now the new preset name is stored.



### Read preset names

The control software downloads the names automatically upon establishing connection to the matrix. Preset names can be re-read manually by clicking on the READ PRESET NAMES button in the preset area.

#### 4.3.6. Output parameter settings

By right clicking on an output label a dialog window appears showing the parameters for the corresponding output. Some settings are only accessible with Lightware PRO series routers.

##### 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.

##### Drive current

It specifies the drive current of the internal crosspoint circuit. It is strongly recommended to leave this value at the default 12 mA setting.

This setting does not affect the output directly, only an internal signal. Modifications are done promptly when selecting a value from the drop down list.

**Warning**  Drive currents over 24 mA should be used with extreme caution since this could damage TMDS transceivers in DVI devices!

## 4.4. EDID menu

Advanced EDID Management can be accessed by clicking on the EDID menu. This view is divided in two segments. The upper segment can be opened by clicking the green arrow. This segment contains the EDID editor. The lower segment is the EDID router area. This consists of two list windows, which can display a selected part of the EDID memory.

*Info* When the user enters the menu for the first time, the software starts to download the whole EDID list from the matrix. It may take about 30-40 seconds.

### 4.4.1. EDID Router operation

After the list is downloaded, the current status is shown. The EDID memory consists of four parts. Any memory part can be displayed on either side by using the drop down lists.

The **Emulated EDID List** shows the currently emulated EDIDs for each input. It contains the resolution, manufacturer and vendor name of the EDID reported to the sources for each input separately. The source column displays the memory location that the current EDID was routed from (Mem0 is shown as source if the source was changed after it was copied to an input). The rows with red background are dynamically routed to the input.

The **Last attached Monitor's EDID List** contains the resolution, manufacturer and vendor name of the display devices connected to matrix switcher's output. The matrix remembers the last display device's EDID, so there is an EDID shown even if there is no device attached to the router's output at the moment.

The **Factory EDID List** shows the factory memory locations (01# - 50#) with preprogrammed EDID.

The **User EDID List** shows the memory locations (51# - 100#) which can be used by the user to save custom EDIDs.

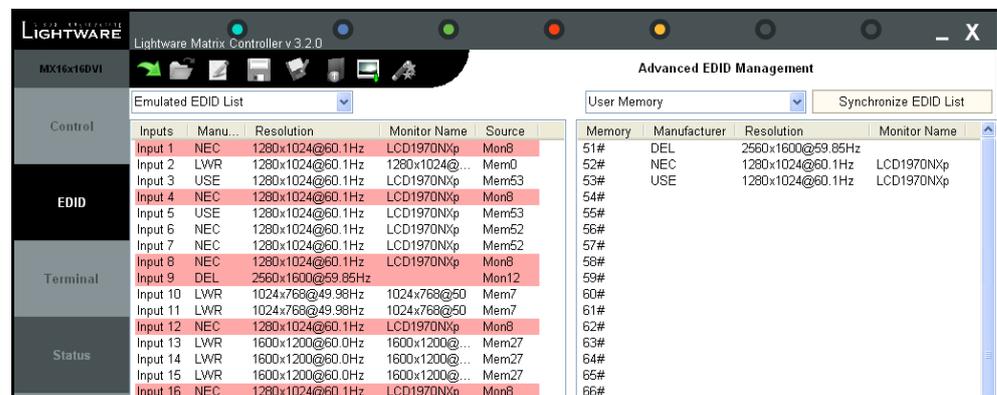


Figure 4-5. EDID Management menu

Any DVI source reads the EDID from the Emulated EDID memory for the corresponding port. The user can copy an EDID from any of the three EDID lists to the desired input's memory location. This is called EDID routing. There are two types of the emulation: static and dynamic.

- Static EDID emulation happens, when an EDID from the Factory or User EDID list is routed to an input
- Dynamic EDID emulation occurs, when an attached monitor's EDID is routed to an input. In this case the emulated EDID changes automatically, if a new monitor is attached to the output, by simply copying the data from the monitor.

### Changing the emulated EDID at one or all inputs

- Step 1.** Select the Emulated EDID List in one of the list window areas in the drop down list.
- Step 2.** Select the desired EDID list in the other list window from which you want to copy (route) the EDID.
- Step 3.** To change the emulated EDID at
  - a) one input, drag and drop the EDID to the desired input location.
  - b) all inputs at the same time, right click on the desired new EDID and select "Switch to all Inputs" from the pop-up menu.
- Step 4.** Click Yes in the pop-up dialog window to confirm EDID change.

*Info: If dynamic emulation is established, the emulated EDID will be changed on all inputs that are affected, every time a new monitor is connected to the output which was the source of the dynamic EDID routing. If the monitor is disconnected from the output, the last EDID remains emulated for the sources. This feature helps especially rental technicians or system integrators to keep the source continuously transmitting the signal, and adopt the system for new incoming display devices.*

*Info: Power ON/OFF cycle will not affect the emulated EDID or other settings.*

*Info: EDID routing procedure causes a status change, hence it is reported back to the CONTROL SOFTWARE within 2-3 seconds.*

### Learning EDID from attached display device

The system is able to learn the EDID from a connected display device and store it in one of the user programmable memory locations.

- Step 1.** Select the User Memory in the drop-down menu in one of the list windows.
- Step 2.** Select the EDID to be saved from the other list window.
- Step 3.** Drag and drop the selected EDID to the desired User Memory location.
- Step 4.** Click Yes in the pop-up dialog window to confirm EDID change.

### Saving EDID from memory to file

The control software is able to download EDID from the matrix and to save it as an EDID file (.dat file extension).

- Step 1.** Right click on the EDID to be saved.
- Step 2.** Click on the "Save to file" in the pop-up window.
- Step 3.** The Matrix Controller Software downloads the desired EDID and a save dialog appears. It may take a few seconds to download the EDID. If the save dialog is shown, type in the file name, and press Save button. After the process was completed, an "EDID saved!" message confirms the command.

### Load EDID from file to memory

The system is able to load EDID from a file located on the computer and store it in the matrix. EDID are stored in \*.dat files.

- Step 1.** Select the User Memory list in one of the list windows
- Step 2.** Right click on the desired memory location. Then select "Load from file" from the pop-up menu.
- Step 3.** Browse your hard drive to find the desired EDID file. The software checks whether the selected file is a valid EDID file.

**Step 4.** Click Open in the browser window. After the process finished, "EDID Upload completed" message appears.

### Synchronizing EDID lists

By clicking "Synchronize EDID List" button the Lightware Matrix Controller software rereads all EDID information from the connected matrix switcher. During normal operation it is not necessary to use this function because the matrix switcher always reports every status change automatically.

*Info:* There is always a small delay in responses. So if a new monitor is connected to the output its new EDID is not shown immediately but in 2-3 seconds!

*Info:* As the matrix switcher reports status change nothing will happen if you select the same EDID to a given input or connect the same display device to a given output!

### 4.4.2. Advanced EDID Editor

This powerful tool is essential for AV professionals. The Lightware Advanced EDID Editor is integrated into the Lightware Matrix Controller software, and it makes possible to manage every setting in the EDID on an intuitive user interface. The editor can read and write all descriptors, which are defined in the standards, including the additional CEA extensions.

Any EDID from the router'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 router's memory.

By clicking on the green arrow, the editor area rolls down.



When the user enters the menu for the first time, an empty EDID is loaded into the editor's memory.

All EDID in the router's memory can be edited in the following way:

**Step 1.** Right click on the desired EDID to be loaded to the EDID Editor.

**Step 2.** In the pop-up menu, click on Edit EDID. The editor area automatically rolls down, and the EDID is loaded into the editor area.

For further information, see the user's manual of Advanced EDID Editor.

### 4.4.3. Easy EDID Creator

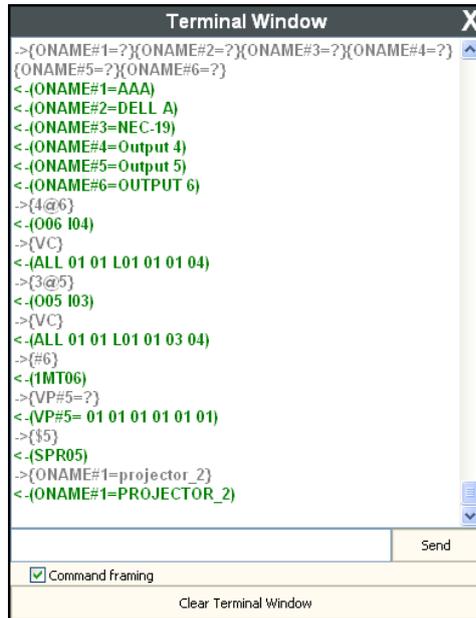
Since the above mentioned advanced editor needs more complex knowledge about EDID, Lightware introduced a wizard like interface for fast and easy EDID creation. With Lightware Easy EDID Creator it is possible to create custom EDIDs in four simple steps.

By clicking on the wizard icon, the Easy EDID Creator opens in a new window.



For further information, see the user's manual of Easy EDID Creator.

## 4.5. Terminal menu



This general-purpose serial terminal is intended mainly for test and debug purposes. After a successful connection is established with a router this terminal can be used either via serial or TCP/IP connection. All commands can be used here that are discussed in [Programmer's reference](#), chapter 7, on page 51. The text can be typed directly.

By default commands are automatically surrounded by framing brackets. Every sent command and every received response gets an arrow (-> or <-) prefix, and has different font colors in order to help distinguishing.

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.

Figure 4-6. Terminal window

## 4.6. STATUS menu

Basic device information, such as the installed cards' firmware and hardware revisions are displayed in this window.

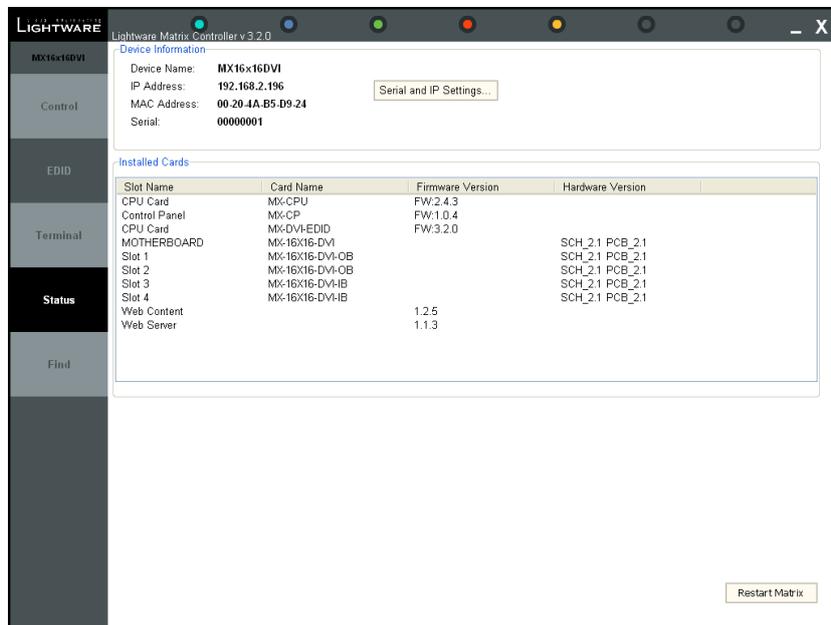


Figure 4-7. Status menu

**Info:** If the device is connected via RS-232, the IP address field shows "serial connection" instead of the IP address.

If the matrix is connected via IP connection, the serial and IP settings can be viewed by clicking on the "Serial and IP Settings..." button.

### 4.6.1. IP settings

#### Obtain IP address automatically

By selecting the “Obtain IP address automatically” option, the matrix gets the IP address from the DHCP server on the LAN, or if DHCP server is not present, it gets an AutoIP address from the 169.254.xxx.xxx domain.

#### Fix IP configuration

In this case, the matrix has an IP address configuration set up by the user/administrator. The earlier saved configuration is shown in brackets.

**Step 1.** Select the “Fix IP configuration” option.

**Step 2.** Type in the IP address, select the desired subnet mask and type in the gateway IP address.

**Step 3.** Click on “Apply Settings” button. Depending on the modified settings, you might need to restart the router and the Matrix Controller Software.

**Info:** The “Load Default” button loads the factory default IP settings to the fields, which contain a fix configuration:

IP Address: 192.168.254.254  
Subnet Mask: 255.255.0.0  
Default Gateway: 0.0.0.0

#### IP port settings

The router can be accessed via this TCP/IP port number with TCP connection. This number can be modified to any number between 1025 - 65535 except the followings: 9999, 14000 - 14009, 30704, and 30718.

The port 23 is accepted for Barco Encore. To use the matrix with the Vista Spyder set port to 10001.

**Info:** The IP port number is 10001 by default.

### **TCP-serial configuration**

For informational purposes, the properties of the TCP-serial interface are displayed. This is a communication interface from the embedded Ethernet device towards the main CPU.

The “Reset” button resets these values to the factory default, and has a safety purpose only.

In the normal operation there is no need to reset these values. The above picture shows the factory default values in normal operation.

## **4.7. Find menu**

By clicking this menu, the available devices can be rescanned on the serial port and on the Ethernet. If the Matrix Controller Software has a live connection to a device on a port, a question window appears, asking if you really want to search for devices.

Clicking Yes will open the Find window. See section [4.2](#) about [establishing the connection](#) on page [29](#).

Clicking No will close the pop up window, the original connection remains active.

## 5. Web control – Using built-in website

### 5.1. Accessing the router's built-in website

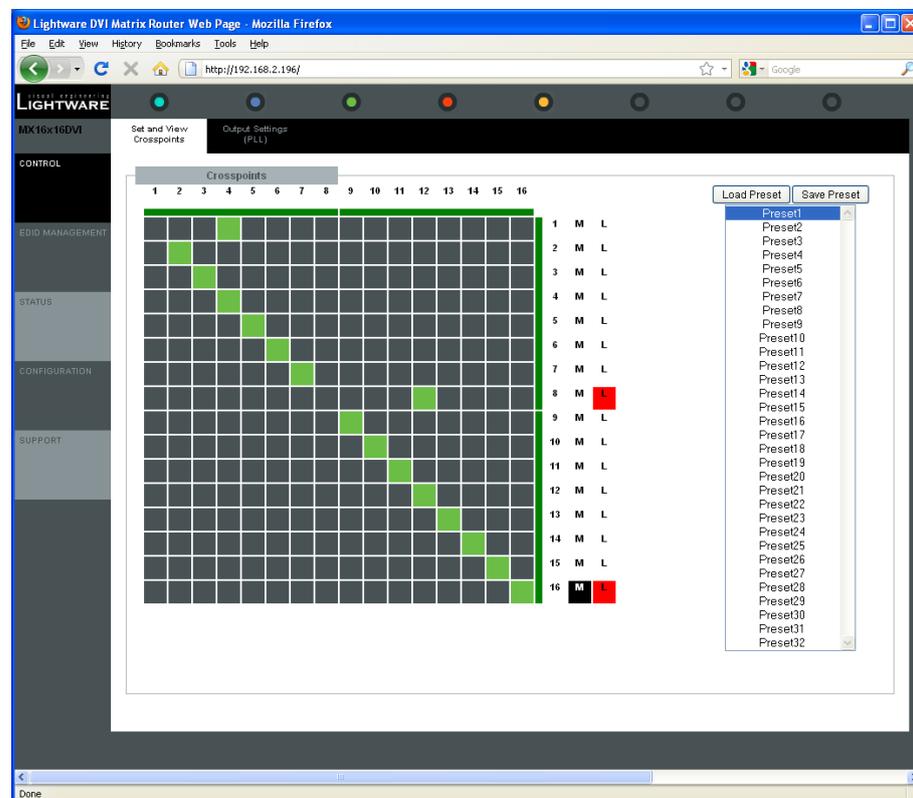
Lightware matrices have a built-in web page, which can be accessed over TCP/IP protocol and offers you full control over all settings even if you don't have the opportunity to install new programs. The router's built-in website is compatible with most widely spread browsers and requires no additional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

- Mozilla Firefox 2 and 3 (recommended)
- Internet Explorer 6, 7 and 8
- Opera 8 and 9
- Safari 3
- Google Chrome 2.0

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 Matrix 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 [3.3.2](#) on page [26](#) 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.



**Figure 5-1. Built-in website main page**

## 5.2. Menu description

The built-in website contains the following menus and submenus:

### **Control**

The Control Menu has two submenus.

#### **Set and View Crosspoints**

This menu appears by default, when accessing the website.

It contains a matrix button area according to the input and output numbers of the router. Columns are representing the inputs, while rows are the outputs. The green squares represent the state of the matrix switcher.

The Preset selection box is on the right side of this page.

#### **Output Settings**

This menu contains advanced settings for output parameters. Some settings are only accessible with Lightware PRO series routers.

### **EDID Management**

By clicking on this menu, the built-in website downloads the EDID list from the matrix. The user can view and modify the EDIDs.

### **Status**

Basic device information such as the serial number, installed cards firmware, and hardware versions are displayed on this page.

### **Configuration**

This page shows the current network configuration of the matrix, such as IP settings and port number.

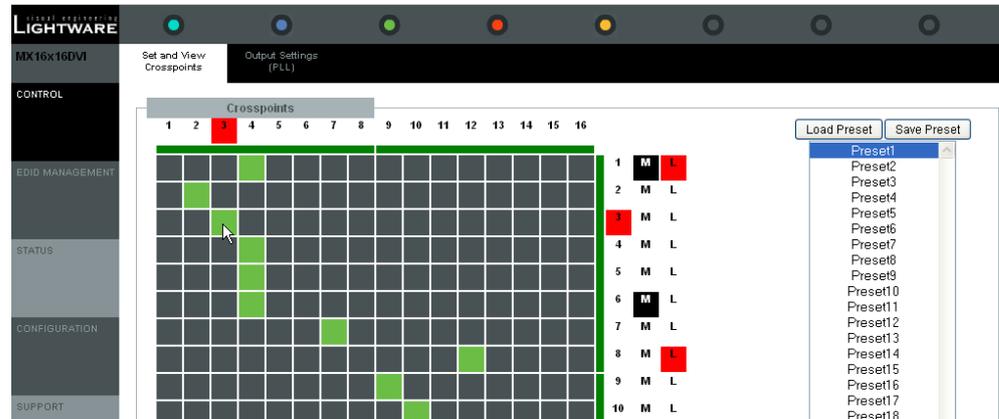
### **Support**

The contact information to Lightware Visual Engineering is shown in this page.

## 5.3. Control menu

### 5.3.1. Crosspoint switching

Click on **Control** menu then select **Set and View Crosspoints**.



**Figure 5-2. Built-in website crosspoint array**

1; 2; 3... columns represent the inputs, and the 1; 2; 3... rows represent the outputs. Each green square represents a live connection. For making a connection click on the desired grey square. When the mouse pointer hovers over the array, the corresponding input and output numbers are highlighted in red to help switching.

#### Mute outputs

Outputs can be easily muted by clicking the button titled 'M' beside the output. This means that no signal will be present at this output. If muting is active the background turns to black.

#### Lock outputs

Outputs can be locked to any inputs. After locking an input to an output no switching is permitted for this output unless it is unlocked again. If lock is active, background turns to red.

*Info Loading a preset doesn't change neither the lock state nor the switch state of a locked output. If an output is locked to an input before preset loading, it will also be locked that input after preset loading, so locked outputs ignore the preset.*

### 5.3.2. Preset operations

Preset operations can be done in the right panel of the **Control → Set and View Crosspoints** page. Each Lightware matrix switcher has 32 preset memories that can be loaded and saved any time.

Front panel Preset operations effect only the first 16 preset memories, all others from 17 to 32 are available only via the Matrix Controller software or the router's built-in website.

#### Save Preset

- Step 1.** Make the desired configuration on matrix switching area.
- Step 2.** Select the preset memory location (Preset1...Preset32) where you want to save your configuration to.
- Step 3.** Press the Save Preset button. A message box confirms that the preset is stored.

### Load Preset

- Step 1.** Select the preset memory location (Preset1...Preset32) you want to load as next configuration.
- Step 2.** Press the Load Preset button. Now the preset is loaded
- Step 3.** The new I/O configuration is displayed on the matrix switching area.

### 5.3.3. Output settings

**Control** menu → **Output settings** page contains advanced settings for output parameters. Some settings are only accessible with Lightware PRO series routers.

#### Scope of changes

The affected output can be selected in the top box, or changes can be applied to all outputs. 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.

#### Drive current

It specifies the drive current of the internal crosspoint circuit. It is strongly recommended to leave this value at the default 12 mA setting.

This setting does not affect the output directly, only an internal signal. Modifications are done promptly when selecting a value from the drop down list.

*Warning* Drive currents over 24 mA should be used with extreme caution since this could damage TMDS transceivers in DVI devices!



## 5.4. EDID Router operation

By clicking on the **EDID Management** menu, the EDID router page appears.

When the user enters the menu first, the whole EDID list is being downloaded from the matrix. It may take up to 20 seconds for the first time. After the list is downloaded, the current status of the router's EDID is shown in the three boxes.

The **Emulated EDIDs** box contains the resolutions and the vendor names of the EDID reported to the source for each input separately.

The **Last attached Monitor's EDIDs** box contains the resolutions and vendor names of the display devices connected to matrix switcher's output.

The **EDID list** box contains all the available EDIDs stored in the matrix memory.

### 5.4.1. Change emulated EDID at one or all inputs

All EDIDs are enumerated in the **EDID list** window.

- Step 1.** Select the desired EDID from this list with a left mouse click, a popup menu appears.
- Step 2.** Click the "Switch this EDID to" item. A popup menu appears with an input name list.
- Step 3.** Click on the desired input, or on the ALL text. Now the EDID has been changed on selected input as the message box shows on the left corner.

The screenshot displays three windows from the EDID Management interface:

- Emulated EDIDs:** A table listing 16 inputs with their respective manufacturer, resolution, and monitor name.
- Last Attached Monitors EDIDs:** A table listing 6 monitors with their manufacturer, resolution, and monitor name. A context menu is open over the 'ALL' option, listing various EDID entries.
- EDID List:** A table listing 16 memory addresses with their corresponding monitor names and manufacturers. Entry 19 (1280x1024@60.1Hz) is selected, and a context menu is open over it, showing 'Switch this EDID to' and 'Learn this EDID to' options.

Figure 5-3. Static EDID routing

**Info:** Switching an EDID to ALL inputs may take several seconds.

The user can switch and learn EDIDs also in the **Last Attached Monitors EDIDs** window. Switching an EDID from this list to an input results dynamic EDID routing. This means that the emulated EDID changes automatically, if a new monitor is attached to the output, by simply copying the data from the monitor.

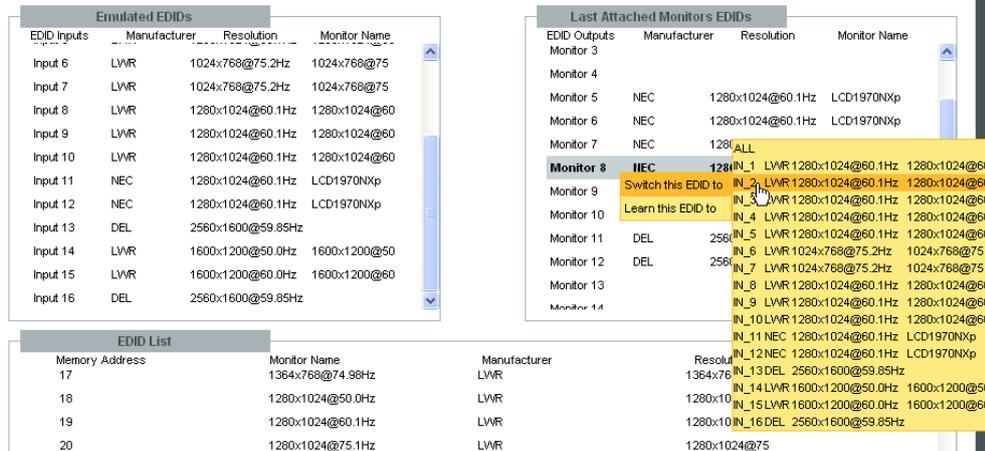


Figure 5-4. Dynamic EDID routing

### 5.4.2. Learn EDID from attached display device

The matrix switcher can learn the EDID from a connected display device and store it in one of the user programmable memory locations. All the monitor's EDIDs are listed in the **EDID list** window, and also in the **Last Attached Monitors EDIDs** window.

- Step 1.** Click the desired monitor's EDID from the list.
- Step 2.** Click the Learn this EDID to submenu item. A popup window will show the memory locations from 51 to 100, which are available for the user.
- Step 3.** Click on the desired memory location. The lists are refreshed in a few seconds, and a message box indicates the change.

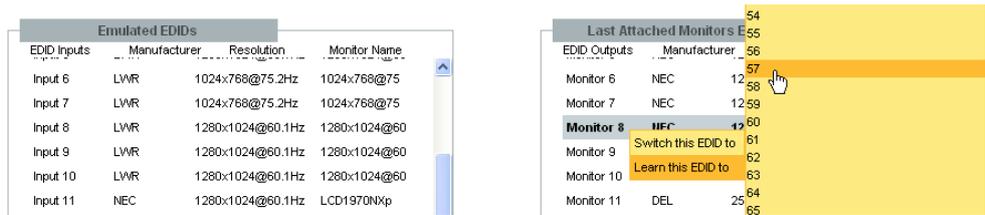


Figure 5-5. Learning EDID from display device

## 5.5. Status

Basic device information, such as the installed cards' firmware and hardware revisions are displayed in this window.

## 5.6. Network Configuration

The unit's network values are displayed when you select **Configuration → Network Settings**.

*Info:* It is possible to reload factory default IP setup using the front panel buttons. See section [3.3.2](#) on page [26](#) about this.

### 5.6.1. Automatic IP Address Configuration

The matrix switcher supports three of the most used automatic IP configuration protocols.

**To assign IP address automatically:**

**Step 1.** Click on Configuration menu

**Step 2.** Select Network Settings

**Step 3.** Select Obtain IP address automatically

**Step 4.** Enter the following (as necessary):

**BOOTP** Select **Enable** to permit the Bootstrap Protocol (BOOTP) server to assign the IP address from a pool of addresses automatically.

**DHCP** Select **Enable** to permit the Dynamic Host Configuration Protocol (DHCP) server to assign leased IP address to the matrix unit automatically.

**AutoIP** Select **Enable** to permit the matrix to generate an IP in the 169.254.x.x address range with Class B subnet.

*Info:* Disabling **BOOTP**, **DHCP**, and **AutoIP** (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.

**Step 5.** When you are finished, click Apply Settings button

*Info:* To continue using the built-in website, you must type in the IP address in your browser.

### 5.6.2. Static IP address configuration

The user can manually assign an IP address to the unit, and enter related network settings.

**To assign an IP address manually:**

**Step 1.** Click on Configuration menu

**Step 2.** Select Network Settings

**Step 3.** Select Fix IP Configuration

**Step 4.** Enter the following (as necessary):

<b>IP Address</b>	If DHCP is not used to assign IP addresses, enter it manually in decimal-dot notation. The IP addresses must be set to a unique value in the network.
<b>Subnet Mask</b>	A subnet mask defines the number of bits taken from the IP address that are assigned for the host part.
<b>Default Gateway</b>	The gateway address, or router, allows communication to another LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the matrix. The gateway address must be within the local network.

**Step 5.** When you are finished, click Apply Settings button

*Info:* To continue using the built-in website, you must type in the IP address in your browser.

### 5.6.3. Loading the default IP settings

**Step 1.** Click on the Load Default button. Now the factory default IP address, Subnet Mask and Gateway address is loaded into the input boxes. But they are not saved.

**Step 2.** To save the settings, click on Apply Settings button.

**Step 3.** The default fix IP settings are applied:

IP Address:	192.168.254.254
Subnet Mask:	255.255.0.0
Default Gateway:	0.0.0.0

### 5.6.4. TCP Port Configuration

The user can configure the TCP port number, which is used to communicate with the matrix router through LAN. The input box initially contains the current setting.

**Step 1.** Type the desired TCP port number into the input box

**Step 2.** Press the Apply Settings button. The new port will be active after the next connection.

### 5.6.5. Loading the default TCP Port settings

**Step 1.** Click on Load Default button. Now the factory default value is in the input box, but it is not saved.

**Step 2.** To save, click on Apply Settings button. The new port will be active after the next connection.

## 5.7. Support

For technical support, please don't hesitate to contact Lightware Visual Engineering at [support@lightware.hu](mailto:support@lightware.hu).

## 6. About EDID memory

EDID router contains a 164 block non volatile memory bank. EDID memory is structured as follows:

- 1..50 ..... Factory Preset EDID list
- 51..100 ..... User programmable memories
- 101..116 ( DVI\_OUT\_1...16)..... Last attached monitor's EDID list
- 133..148 ( DVI\_IN\_1...16)..... Emulated EDID at input connectors

All EDID (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 first 50 EDID (1...50 inclusive) are factory preprogrammed and cannot be modified. These are the most commonly used resolutions.

*Info* Memory locations 117..132 and 148..164 are reserved for 32x32 matrix configurations only, therefore not accessible in this matrix router.

*Info* MX16x16DVI-Slim and MX12x12DVI-Slim 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.

MEMORY	Resolution	MEMORY	Resolution
01	640 x 480 @ 60.0 Hz	26	1600 x 1200 @ 50.0 Hz
02	640 x 480 @ 75.0 Hz	27	1600 x 1200 @ 60.0 Hz
03	848 x 480 @ 60.0 Hz	28	1920 x 1200 @ 59.55 Hz
04	800 x 600 @ 50.0 Hz	29	1920 x 1200 @ 50.0 Hz
05	800 x 600 @ 60.30 Hz	30	1440 x 480i @ 60.3 Hz
06	800 x 600 @ 74.99 Hz	31	640 x 480 @ 59.94 Hz
07	1024 x 768 @ 49.98 Hz	32	720 x 480 @ 59.92 Hz
08	1024 x 768 @ 60.0 Hz	33	1440 x 576i @ 50.6 Hz
09	1024 x 768 @ 75.2 Hz	34	720 x 576 @ 50.0 Hz
10	1152 x 864 @ 75.0 Hz	35	1280 x 720 @ 50.0 Hz
11	1280 x 768 @ 50.0 Hz	36	1280 x 720 @ 60.0 Hz
12	1280 x 768 @ 59.92 Hz	37	1920 x1080i @ 50.3 Hz
13	1280 x 768 @ 75.0 Hz	38	1920 x1080i @ 50.0 Hz
14	1360 x 768 @ 60.1 Hz	39	1920 x1080i @ 60.5 Hz
15	1364 x 768 @ 50.0 Hz	40	1920 x 1080 @ 24.0 Hz
16	1364 x 768 @ 59.93 Hz	41	1920 x 1080 @ 24.99 Hz
17	1364 x 768 @ 74.98 Hz	42	1920 x 1080 @ 30.0 Hz
18	1280 x 1024 @ 50.0 Hz	43	1920 x 1080 @ 50.0 Hz
19	1280 x 1024 @ 60.1 Hz	44	1920 x 1080 @ 49.99 Hz
20	1280 x 1024 @ 75.1 Hz	45	1920 x 1080 @ 60.0 Hz
21	1366 x 1024 @ 59.99 Hz	46	2048 x 1080 @ 49.99 Hz
22	1400 x 1050 @ 49.99 Hz	47	2048 x 1080 @ 50.0 Hz
23	1400 x 1050 @ 59.99 Hz	48	2048 x 1080 @ 59.99 Hz
24	1400 x 1050 @ 75.0 Hz	49	1920 x 1200 @ 59.55 Hz
25	1680 x 1050 @ 59.99 Hz	50	2560 x 1600 @ 59.85 Hz

**Table 6-1. Factory preset EDID list**



## 7. Programmer's reference

Users can connect the matrix through Ethernet, or serial port as well. 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.

### 7.1. Changing and viewing protocols

The router is equipped with multiple router protocols.

**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 and release Control Lock (Control Lock button lights in up red continuously)

**Step 3.** Press and keep pressed the Output Lock button. Now one of the source buttons will light up according to the current protocol (view protocol):

- a) If Source#1 button lights: Lightware protocol is active
- b) If Source#2 button lights: Protocol#2 is active

**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, accordingly to the new protocol. The desired Source button starts blinking, the router performs a reset straight away and all buttons light up for 3 seconds. Now the new protocol is active.

### 7.2. Protocol description

The protocol description hereinafter stands for Lightware protocol.

The matrices accept commands surrounded by curly brackets - { } - and responds 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 <sup>2</sup> >	=	input number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<out <sup>2</sup> >	=	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 <sup>2</sup> >	=	id number in 2 digit ASCII format
CrLf	=	Carriage return, Line feed (0x0D, 0x0A)
•	=	space character (0x20)

→ = each command issued by the controller  
← = each response received from the router

## 7.3. Switching and control commands

### 7.3.1. Switch one input to one output

**Description:** Switch input <in> to output <out>.

Format	Example
Command {<in>@<out>}	→ {1@5}
Response (O<out>●I<in>)CrLf	← (O05 I01)CrLf

**Explanation:** Input 1 is switched to output 5.

### 7.3.2. Switch one input to all outputs

**Description:** Switch input <in> to all outputs.

Format	Example
Command {<in>@O}	→ {?05}
Response (I<in>●ALL)CrLf	← (I01 ALL)CrLf

**Explanation:** Input 2 is switched to all outputs.

### 7.3.3. View connection on the specified output

*Info* **Obsolete!** Use {VC} instead

**Description:** View connection on output <out>.

Format	Example
Command {?<out>}	→ {?05}
Response (O<out>●I<in>)CrLf	← (O05 I01)CrLf

**Explanation:** Viewing connection for output 5. The connected input is 1.

*Info* If the output is locked, muted, or both locked and muted, the response format changes. If the output is muted you get a letter 'M', if locked a letter 'L' and if muted and locked at the same time 'U' before the 2 digit numbers (e. g. O05 IL01).

### 7.3.4. View connection on all outputs

**Description:** Viewing all outputs' connection results in different response length, because it depends on the router's type (length = 16 for MX16x16DVI-Slim, length = 12 for MX12x12DVI-Slim). The response below supposes a router having 16 outputs.

Format	Example 1 (MX16x16DVI-Slim)
Command {VC}	→ {VC}
Response (ALL●<O1>●<O2>●<O3> ●<O4>●<O5>●<O6>●<O7> ●<O8>●<O9>●<O10> ●<O11>●<O12>●<O13> ●<O14>●<O15>●<O16> )CrLf	← (ALL 02 02 02 05 05 05 08 08 08 08 08 08 08 08 08 08)CrLf

**Legend 1:** All <Ox> indexes show the corresponding output's connection state. If value <O5> equals 04 it means that output 5 is connected to input 4. <O1>..<O8> are two digit ASCII characters (01, 02, 04, etc.).

**Explanation 1:** Viewing connection for all outputs. Input 2 is connected to outputs 1, 2 and 3. Input 5 is connected to outputs 4, 5 and 6. Input 8 is connected to outputs 7 through 16.

*Info* If an output is locked, muted, or both locked and muted, the response format changes. If outputs are muted you get a letter 'M', if locked a letter 'L' and if muted and locked at the same time 'U' before the 2 digit numbers.

Format	Example 2 (MX16x16DVI-Slim)
Command {VC}	→ {VC}
Response (ALL●<O1>●<O2>●<O3> ●<O4>●<O5>●<O6>●<O7> ●<O8>●<O9>●<O10> ●<O11>●<O121>●<O13> ●<O14>●<O15>●<O16> )CrLf	← (ALL M02 L02 U02 05 05 05 08 08 08 08 08 08 08 08 08 08)CrLf

**Legend 2:** Any <Ox> indexes can be a two digit number, or there can be a leading character showing the mute and/or lock state for the corresponding output.

Index	Legend	Explanation
<Ox>	<in <sup>2</sup> >	<Ox> is connected to <in <sup>2</sup> >, <Ox> neither muted nor locked.
<Ox>	M<in <sup>2</sup> >	<Ox> is connected to <in <sup>2</sup> >, <Ox> is muted, and unlocked.
<Ox>	L<in <sup>2</sup> >	<Ox> is connected to <in <sup>2</sup> >, <Ox> is not muted, but locked.
<Ox>	U<in <sup>2</sup> >	<Ox> is connected to <in <sup>2</sup> >, <Ox> is muted and locked.

**Explanation 2:** Viewing connection for all outputs. Input 2 is connected to outputs 1, 2 and 3. Output 1 is muted. Output 2 is locked. Output 3 is muted and locked. Input 5 is connected to outputs 4, 5 and 6. Input 8 is connected to outputs 7 through 16.

### 7.3.5. View mutes on all outputs

**Description:** Viewing all outputs' connection results in different response length, because it depends on the router's type (length = 16 for MX16x16DVI-Slim, length = 12 for MX12x12DVI-Slim). The response below supposes a router having 16 outputs.

Format	Example (MX16x16DVI-Slim)
Command {VM}	→ {VM}
Response (MUT●<M1>●<M2>●<M3> ●<M4>●<M5>●<M6>●<M7> ●<M8>●<M9>●<M10> ●<M11>●<M12>●<M13> ●<M14>●<M15>●<M16> )CrLf	← (MUT 1 0 1 1 0 0 0 0 0 0 0 0 0 0 0)CrLf

**Legend:** All <Mx> indexes are one digit numbers, showing the mute state for the corresponding output. If <Mx> equals 0 the output x is unmuted. If <Mx> equals 1, the output x is muted.

**Explanation:** Output 1, 3 and 4 are muted, the other outputs are not muted.

### 7.3.6. Mute specified output

**Description:** Mute output <out>.

Format	Example
Command {#<out>}	→ {#03}

Response (1MT<out <sup>2</sup> >)CrLf	← (1MT03)CrLf
---------------------------------------	---------------

**Explanation:** Output 3 is muted. Now no signal presents on output 3.

### 7.3.7. Unmute specified output

**Description:** Unmute output <out>.

Format	Example
Command {+<out>}	→ {+03}
Response (0MT<out <sup>2</sup> >)CrLf	← (0MT03)CrLf

**Explanation:** Output 3 is unmuted. Now output 3 is switched to the input it was connected to prior to the mute command.

### 7.3.8. Lock specified output

**Description:** Lock output <out>. Output's state cannot be changed until unlocking.

Format	Example
Command {#><out>}	→ {#>05}
Response (1LO<out <sup>2</sup> >)CrLf	← (1LO05)CrLf

**Explanation:** Output 5 is locked.

### 7.3.9. Unlock specified output

**Description:** Unlock output <out>. Now output 3 state can be changed.

Format	Example
Command {+<<out>}	→ {+<05}
Response (0LO<out <sup>2</sup> >)CrLf	← (0LO05)CrLf

**Explanation:** Output 5 is unlocked.

*Info* The router issues the above response regardless of the previous state of the output (either it was locked or unlocked).

### 7.3.10. Save preset to the specified memory location

**Description:** Save current crosspoint configuration (output states) to preset <id>.

Format	Example
Command {\$<id>}	→ {\$4}
Response (SPR<id <sup>2</sup> >)CrLf	← (SPR04)CrLf

**Explanation:** Current crosspoint state is saved to preset 4, including the mute state of the outputs.

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

### 7.3.11. Load preset from the specified location

**Description:** Load preset <id>.

Format	Example
Command {%<id>}	→ {%4}
Response (LPR<id <sup>2</sup> >)CrLf	← (LPR04)CrLf

**Explanation:** Current crosspoint state is changed according to preset 4, including the mute state of the outputs.

*Info: Locked outputs are left unchanged. Presets don't affect output locks.*

### 7.3.12. Preview preset

**Description:** Preview preset <id> without loading.

Format	Example (MX8x8)
Command {VP#<id>=?}	→ {VP#3=?}
Response (VP#<id>=●<O1>●<O2> ●<O3>●<O4>●<O5>●<O6> ●<O7>●<O8>●<O9>●<O10> ●<O11>●<O121>●<O13> ●<O14>●<O15>●<O16>)CrLf	← (VP#3= 02 M02 M01 02 02 01 01 01 01 01 01 01 01 01 01 01)CrLf

**Legend:** Any <Ox> indexes can be a two digit number, or there can be a leading character showing the mute state for the corresponding output.

**Explanation:** Viewing connections for preset 3. Input 2 is connected to outputs 1, 2, 4 and 5. Input 1 is connected to all other outputs. Outputs 2 and 3 are muted. The shown input connections for these outputs are not active, but the last connection that was routed to that output before it was muted.

Index	Legend	Explanation
<Ox>	<in <sup>2</sup> >	<Ox> is connected to <in <sup>2</sup> >, <Ox> is not muted.
<Ox>	M<in <sup>2</sup> >	<Ox> is connected to <in <sup>2</sup> >, <Ox> is muted.

### 7.3.13. Renaming Presets / Inputs / Outputs

**Description:** Allows storing names for each preset / input / output. Any 16-byte long string is allowed. All characters are converted to uppercase! The router accepts <id> greater than the current I/O setup but treats it as modulo output. So if <id> = 17 on a 16x16 router, then it will be treated as 1. All router models have 32 presets memories.

#### 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”.

#### 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”.

### 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”.

### 7.3.14. Query names of Presets / Inputs / Outputs

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

#### 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”.

#### Read an input's name

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

**Explanation:** Name for input 3 is “media player”.

#### Read an output's name

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

**Explanation:** Name for output 2 is “monitor\_no2”.

### 7.3.15. Set default names of Presets / Inputs / Outputs

**Description:** Renames **all** preset / input / output names to the default: Preset 1..32 / Input 1..16 / Output 1..16 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.

#### Reload default preset names

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

#### Reload default input names

Format	Example
Command {INAME#<id>=!}	→ {INAME#4=!}

Response (INAME#<id>= Input<id>)CrLf	← (INAME#4=Input 4)CrLf
---	-------------------------

### Reload default output names

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

### 7.3.16. Reload factory default output setup

**Description:** Reload factory default output drive currents.

Format	Example
Command {r00}	→ {r00}
Response (APWSE)CrLf	← (APWSE)CrLf

### 7.3.17. Query IP settings

**Description:** IP setup 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=0 192.168.2.106 10001 255.0.0.0 192.168.2.1)CrLf

**Legend:**

Identifier	Description	Default value
<id>	0-fix IP, 7-DHCP	0
<ip_address>	IP address	192.168.254.254
<port>	IP port of the router	10001
<mask>	subnet mask	255.255.0.0
<gateway>	gateway address	0.0.0.0

**Explanation:** The router has a fix 192.168.2.106 IP address on the 255.0.0.0 subnet with a gateway on 192.168.2.1 and communicates over port no. 10001.

*Info* If the matrix responds only zeros for this command, please unplug from power source, reconnect and try again.

### 7.3.18. Reload factory default IP settings

**Description:** After issuing this command over serial connection the router will reload the factory default IP setup.

Format	Example
Command {IP_CONFIG=!} Response (Changing IP configuration...)CrLf (DONE!)CrLf or (FAILED!)CrLf	→ {IP_CONFIG=!} ← (Changing IP configuration...)CrLf  (DONE!)CrLf or (FAILED!)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* IP settings can NOT be changed with this protocol command via Ethernet connection, only via serial port. To change the IP settings via Ethernet, use the Matrix Controller software (section [4.6.1](#)) or the built-in website (section [5.6](#)). Default setting can be reloaded by the front panel buttons as well (section [3.3.2](#)).

### 7.3.19. Load DHCP IP settings (only IP address!)

**Description:** After issuing this command over serial connection the router will inquire IP address with DHCP.

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

Parameters after successful command execution:

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

*Info* IP settings can NOT be changed with this protocol command via Ethernet connection, only via serial port. To change the IP settings via Ethernet, use the Matrix Controller software (section [4.6.1](#)) or the built-in website (section [5.6](#)). Default setting can be reloaded by the front panel buttons as well (section [3.3.2](#)).

## 7.4. Router Status commands

### 7.4.1. View product type

**Description:** The router responds its name.

Format	Example
Command {i}	→ {i}
Response (<PRODUCT_TYPE>)CrLf	← (MX16x16DVI-Slim)CrLf

**Legend:**

<PRODUCT_TYPE>	inputs	outputs	interface
MX12x12DVI-Slim	12	12	single link
MX16x16DVI-Slim	16	16	single link

### 7.4.2. View serial number

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

Format	Example
Command {s}	→ {s}
Response (<SERIAL_NUMBER>)CrLf	← (SN:10170142)CrLf

*Info*      Only the last 4 numbers are written onto the back of the router

### 7.4.3. View Firmware version of the CPU

**Description:** View the CPU firmware revision. To view other controller's firmware version see [{FC} command](#).

Format	Example
Command {f}	→ {f}
Response (<FW_VERSION>)CrLf	← (FW:2.4.4)CrLf

#### 7.4.4. View Installed I/O cards' hardware

**Description:** Shows the hardware name and revision of the installed cards.

*Info* This router model is a compact type, so there are no separate input / output cards. Separate card slot descriptors are listed only because of compatibility issues.

Format	Example
Command {is}	→ {is}
Response (SL# 0 <MB_DESC>)CrLf (SL# 1 <OB_DESC>)CrLf (SL# 2 <OB_DESC>)CrLf (SL# 3 <OB_DESC>)CrLf (SL# 4 <OB_DESC>)CrLf (SL# 5 <IB_DESC>)CrLf (SL# 6 <IB_DESC>)CrLf (SL# 7 <IB_DESC>)CrLf (SL# 8 <IB_DESC>)CrLf	← (SL# 0 MX-16X16-DVI-SLIM SCH_2.1 PCB_2.1)CrLf ← (SL# 1 MX-16x16-DVI-OB SCH_2.1 PCB_2.1)CrLf ← (SL# 1 MX-16x16-DVI-OB SCH_2.1 PCB_2.1)CrLf ← Empty Slot ← Empty Slot ← (SL# 1 MX-16x16-DVI-IB SCH_2.1 PCB_2.1)CrLf ← (SL# 1 MX-16x16-DVI-IB SCH_2.1 PCB_2.1)CrLf ← Empty Slot ← Empty Slot

**Explanation (MX16x16DVI-Slim router):** The router reports as if it has two output and two input cards.

#### 7.4.5. View installed controllers' firmware

**Description:** Shows the firmware revisions of the installed controllers.

Format	Example
Command {fc}	→ {fc}
Response (<CARD_FIRMWARE>)CrLf	← (CF MX-CP FW:1.0.4 @ 0x10)CrLf ← (CF MX-DVI-EDID FW:3.2.0 @ 0x50)CrLf

#### 7.4.6. View current control protocol

**Description:** Shows the RS-232, TCP/IP control protocol.

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.

#### 7.4.7. Set current control protocol

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

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

**Legend:** <x> stands for the selected protocol.

**Explanation:** Protocol 1 is activated.



## 7.5. EDID router commands

The EDID router manipulates the EDID memory, which has memory locations that are assigned to specific input or output ports. Please see section 6 on page 49 about EDID memory structure.

### 7.5.1. Route EDID to the selected input (static)

**Description:** Copies EDID from location <loc> to input <in>. <loc> must be 1..100.

Format	Example
Command {<in>:<loc>}	→ {5:10}
Response (E_SW_OK)CrLf ...delay... (E_S_C) CrLf	← (E_SW_OK)CrLf ...delay... ← (E_S_C) CrLf

**Explanation:** EDID from memory location 10 is copied to input 5.

*Note:* The router sends (E\_S\_C) only if the new EDID is different from the earlier one.

### 7.5.2. Route EDID to the selected input (dynamic)

**Description:** Copies EDID from location <loc> to input <in>. Location <loc> should be 101..116 (MX16x16DVI-Slim) or 101..112 (MX12x12DVI-Slim) as opposed to static routing where <loc> should be between 1..100.

Format	Example
Command {<in>:<loc>}	→ {4:102}
Response (E_SW_OK)CrLf ...delay... (E_S_C) CrLf	← (E_SW_OK)CrLf ...delay... ← (E_S_C) CrLf

*Info* Outputs 1..16 are mapped to logical addresses 101..116.

**Explanation:** EDID from output 2 is copied to input 4.

After choosing dynamic EDID routing to one (or all inputs) the router will follow the EDID changes occurring on the output it was connected to. Every time a different EDID is recognized on the output, it is copied instantly to the input.

### 7.5.3. Route one EDID to all inputs

**Description:** Copies EDID from the selected location <loc> to all inputs. Location <loc> should be between 1..100 for static routing and between 101..116 for dynamic routing.

Format	Example
Command {A:<loc>}	→ {A:48}
Response (E_SW_OK)CrLf ...delay... (E_S_C) CrLf	← (E_SW_OK)CrLf ...delay... ← (E_S_C) CrLf

**Explanation:** EDID from memory location 48 is copied to all inputs.

*Info* This operation takes about 8 seconds.

### 7.5.4. View EDID switch status on all inputs

**Description:** Indexes show the actual input and the number at the given index (<in1>..<inN>) shows which EDID is switched to that particular input where N represents the maximal input number of the given configuration.

Format	Example 1 (MX16x16DVI-Slim)
Command {VEDID}	→ {VEDID}
Response (VEDID●<IN1>●<IN2>●<IN3>●<IN4>●<IN5>●<IN6>●<IN7>●<IN8>●<IN9>●<IN10>●<IN11>●<IN12>●<IN13>●<IN14>●<IN15>●<IN16>)CrLf	← (VEDID 048 048 053 101 101 101 101 101 101 101 101 101 101 101 101)CrLf

**Legend:** Any <INx> indexes are **three digit** numbers showing the current EDID that is routed to the corresponding input. Respond length depends on input number of the router.

**Explanation:** Factory preset EDID from memory location 48 is emulated on inputs 1 and 2. User saved EDID from memory location 53 is emulated on input 3. EDID from output 1 is dynamically emulated on all other inputs.

### 7.5.5. Save EDID from output to memory location (Learn EDID)

**Description:** Learn EDID from the specified output <out> to the specified location <loc>. Memory locations 51..100 are available for saving learned EDIDs.

Format	Example
Command {<out><loc>}	→ {4>51}
Response (E_SW_OK)CrLf	← (E_SW_OK)CrLf
(E_S_C) CrLf	← (E_S_C) CrLf

**Explanation:** EDID from output 4 is saved to EDID memory location 51.

### 7.5.6. View EDID validity table

**Description:** Shows EDID validity table, which contains information about the EDID states.

Format	Example
Command {wv}	→ {wv}
Response (EV●<VALIDITY_TABLE>)CrLf	← (EV <b>11111111111111111111111111111111</b> ← <b>11111111111111111111111111111111</b> 00000000000000000000000000000000 000000000000000000000000101111111111 <i>11111111000000000000000000000000</i> <b>11113</b> <b>11111111111100000000000000000000</b> )CrLf

**Legend:** Response length is 164 characters . Each number represents the EDID validity state for the corresponding memory location. The first 50 numbers (bold) are representing the factory preset EDIDs, the second 50 numbers are representing the User saved EDIDs. Next 16 numbers (italic) are showing the outputs' EDID state, and the last 16 numbers (bold and italic) are showing the emulated EDIDs on the inputs.

Value	Description
'0'	invalid EDID
'1'	valid EDID
'3'	changed EDID

If a changed EDID is queried by the {wh} command (see the next section), its value returns to '1'.

**Explanation:** There is one '3' in the table on the 137<sup>th</sup> position. This means that the emulated EDID on input 5 is changed since the last EDID query on that port.

### 7.5.7. View EDID header

**Description:** EDID\_HEADER consists of 3 fields:

- 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.

Format	Example
Command {wh<loc>}	→ {wh104}
Response (EH#<loc>●<EDID_HEADER>)CrLf	← (EH#104 NEC 1280x1024@60 LCD1970NXp)

**Explanation:** Shows the EDID from memory location 104.

### 7.5.8. 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>}	→ {we1}
Response (EB#<loc>●<B1>●<B2>●...●<B256>)CrLf	← (EB#1 00 FF FF FF FF FF FF 00 32 F2 00 00 00 ... .. 00 92) CrLf

**Legend:** <B1>..<B256> are space separated hex characters represented in ASCII format.

**Explanation:** Full EDID from memory location 1 is downloaded.

### 7.5.9. Upload EDID content to the router

**Description:** EDID hex bytes can be written directly to the user programmable memory locations (locations #51...#100).

**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>●<B1>●<B2>●<B3>●<B4>●<B5>●<B6>●<B7>●<B8>}
- 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#53}
Response (E_L_S)CrLf	← (E_L_S) CrLf
Command {WB#1●<B1>●<B2>●<B3> ●<B4>●<B5>●<B6>●<B7> ●<B8>}	→ {WB#1 00 FF FF FF FF FF FF 00}
Response (EL#<num>)CrLf	← (EL#1) CrLf
Command {WB#2●<B9>●<B10> ●<B11>●<B12>●<B13> ●<B14>●<B15>●<B16>}	→ {WB#2 38 A3 8E 66 01 01 01 01}
Response (EL#<num>) CrLf	← (EL#2) CrLf
⋮	⋮
Command {WB#32●<B249>●<B250> ●<B251>●<B252>●<B253> ●<B254>●<B255>●<B256>}	→ {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. <B1>..

**Explanation:** Full EDID uploaded to memory location 53.

## 7.6. Router initiated commands

### 7.6.1. EDID status changed

**Description:** This is sent after all commands which changes the EDID (EDID copy, EDID switch), or after a new EDID source e.g. a new display device is connected to the router.

Format	Example
Command <i>various</i>	→ {5:101}
Response (E_S_C) CrLf	← (E_SW_OK)CrLf ← (E_S_C) CrLf

**Explanation:** Copy EDID from output 1 to input 5 (dynamic emulation). First response confirms the EDID routing command. (E\_S\_C) response is an automatic message that is sent because 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 show validity ( {wv} ) command after receiving an EDID status changed response, and read all location indicating '3' in the table, as the change of these EDID triggered the EDID status changed response.

### 7.6.2. 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

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

## 7.7. Commands – Quick summary

### Control commands

Command description	See in chapter	Command
<a href="#">Switch one input to one output</a>	<a href="#">7.3.1</a>	{<in>@<out>}
<a href="#">Switch one input to all outputs</a>	<a href="#">7.3.2</a>	{<in>@O}
<a href="#">View connection on the specified output</a>	<a href="#">7.3.3</a>	{?<out>}
<a href="#">View connection on all outputs</a>	<a href="#">7.3.4</a>	{VC}
<a href="#">View mutes on all outputs</a>	<a href="#">7.3.5</a>	{VM}
<a href="#">Mute specified output</a>	<a href="#">7.3.6</a>	{#<out>}
<a href="#">Unmute specified output</a>	<a href="#">7.3.7</a>	{+<out>}
<a href="#">Lock specified output</a>	<a href="#">7.3.8</a>	{#><out>}
<a href="#">Unlock specified output</a>	<a href="#">7.3.9</a>	{+<<out>}
<a href="#">Save preset to the specified memory location</a>	<a href="#">7.3.10</a>	{\$<id>}
<a href="#">Load preset from the specified location</a>	<a href="#">7.3.11</a>	{%<id>}
<a href="#">Preview preset</a>	<a href="#">7.3.12</a>	{VP#<id>=?}
<a href="#">Renaming Presets</a>	<a href="#">7.3.13</a>	{PNAME#<id>= <name>}
<a href="#">Renaming Inputs</a>	<a href="#">7.3.13</a>	{INAME#<id>= < name>}
<a href="#">Renaming Outputs</a>	<a href="#">7.3.13</a>	{ONAME#<id>= < name>}
<a href="#">Query names of Presets / Inputs / Outputs</a>	<a href="#">7.3.14</a>	{PNAME#<id>= ?}
<a href="#">Set default names of Presets / Inputs / Outputs</a>	<a href="#">7.3.15</a>	{PNAME#<id>= !}
<a href="#">Reload factory default output setup</a>	<a href="#">7.3.16</a>	{r00}
<a href="#">Query IP settings</a>	<a href="#">7.3.17</a>	{IP_CONFIG=?}
<a href="#">Reload factory default IP settings</a>	<a href="#">7.3.18</a>	{IP_CONFIG=!}
<a href="#">Load DHCP IP settings (only IP address!)</a>	<a href="#">7.3.19</a>	{IP_CONFIG=D}

**Router Status commands**

Command description	See in chapter	Command
<a href="#">View product type</a>	<a href="#">7.4.1</a>	{i}
<a href="#">View serial number</a>	<a href="#">7.4.2</a>	{s}
<a href="#">View Firmware version of the CPU</a>	<a href="#">7.4.3</a>	{f}
<a href="#">View Installed I/O cards' hardware</a>	<a href="#">7.4.4</a>	{is}
<a href="#">View installed controllers' firmware</a>	<a href="#">7.4.5</a>	{fc}
<a href="#">View current control protocol</a>	<a href="#">7.4.6</a>	{p_?}
<a href="#">Set current control protocol</a>	<a href="#">7.4.7</a>	{p_x}

**EDID router commands**

Command description	See in chapter	Command
<a href="#">Route EDID to the selected input (static)</a>	<a href="#">7.5.1</a>	{<in>:<loc>}
<a href="#">Route EDID to the selected input (dynamic)</a>	<a href="#">7.5.2</a>	{<in>:<loc>}
<a href="#">Route one EDID to all inputs</a>	<a href="#">7.5.3</a>	{A:<loc>}
<a href="#">View EDID switch status on all inputs</a>	<a href="#">7.5.4</a>	{VEDID}
<a href="#">Learn EDID to memory location</a>	<a href="#">7.5.5</a>	{<out>><loc>}
<a href="#">View EDID validity table</a>	<a href="#">7.5.6</a>	{wv}
<a href="#">View EDID header</a>	<a href="#">7.5.7</a>	{wh<loc>}
<a href="#">Download EDID content from the router</a>	<a href="#">7.5.8</a>	{we<loc>}
<a href="#">Upload EDID content to the router</a>	<a href="#">7.5.9</a>	{WL#<loc>}

## 8. Firmware upgrade

### Using Lightware bootloader application to upgrade router's firmware

The matrix router can only be upgraded via LAN, so connect the matrix router to the local subnet. Be sure that there is no other active connection with the router via Ethernet.

**Step 1.** Install the bootloader application with "Installer\_LW\_bootloader.exe"

**Step 2.** Download and save all the firmware files that you want to load. If you have a zipped archive, extract it.

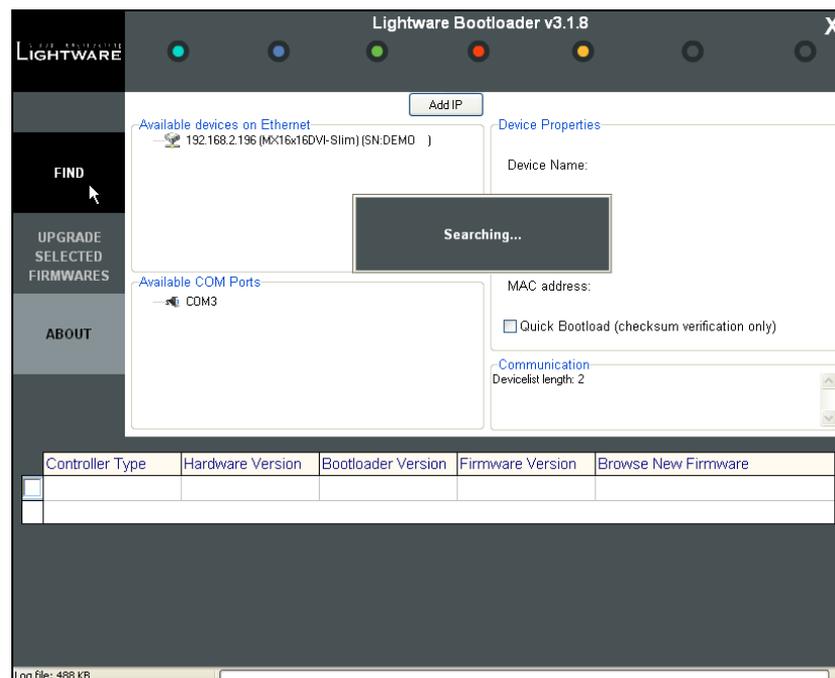
**Step 3.** Run the application from

Start Menu → Programs → Lightware → LW\_bootloader.

**Step 4.** Click "FIND" Button!

If the bootloader finds one or more routers their IP addresses will be listed in the tree view window. On the tree view, device type and serial number is shown after the IP address.

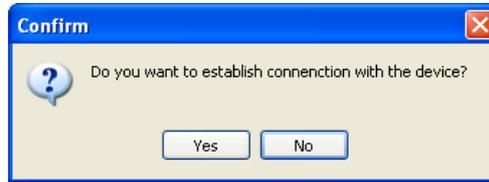
*Info* Note, that you must wait until all the devices on the network completely start up, before pressing FIND button.



**Figure 8-1. Bootloader searches for devices**

**Step 5.** Select the desired device

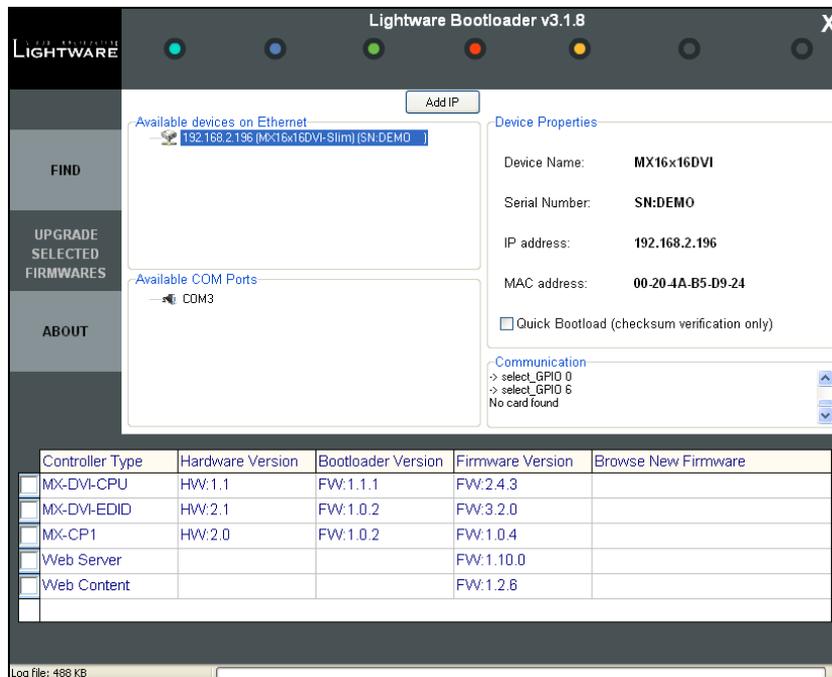
Double click on the IP address, then click “YES” to establish connection with the matrix router. It will take 10-15 seconds to get all information from the router.



**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.

**Step 6.** Review the firmware versions

After the connection is made, the device properties, and the installed hardware parts are displayed.



Select the one or more controllers that need firmware upgrade by clicking the checkbox next to it.

MX-DVI-CPU is the main processor’s firmware, while MX-DVI-EDID is the firmware for the processor that handles EDID management. MX-CP1 is the firmware for the front panel.

**Step 7.** Browse for the new firmware(s)

Click the corresponding cell in the “Browse New Firmware” column. A dialog pops up, to confirm if you really want to modify the path. 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.

Controller Type	Hardware Version	Bootloader Version	Firmware Version	Browse New Firmware
<input checked="" type="checkbox"/> MX-DVI-CPU	HW:1.1	FW:1.1.1	FW:2.4.3	mx_dvi_cpu_v_2_4_4.hex
<input type="checkbox"/> MX-DVI-EDID	HW:2.1	FW:1.0.2	FW:3.2.0	
<input type="checkbox"/> MX-CP1	HW:2.0	FW:1.0.2	FW:1.0.4	
<input type="checkbox"/> Web Server			FW:1.10.0	
<input type="checkbox"/> Web Content			FW:1.2.6	

### Step 8. Upgrade firmware(s)

Click “UPGRADE SELECTED FIRMWARES” button. A confirmation message appears. After clicking the “YES” button the selected controllers are being reprogrammed, with the firmware you selected. If you select a file that doesn't fit for the selected controller, you will get an information message about which file is wrong. If you selected a controller to upgrade, but you had not selected a file for it, then you will also get an information message about which file is missing.

**Quick Bootload** mode can be switched on or off any time. It makes the bootloader software faster by only checking the checksum of the controller. No data verification is done after writing if the checksum was correct.

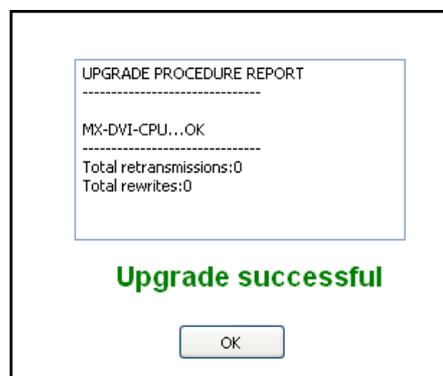
*Info:* The reprogramming can take between 3-8 minutes per controller.

A progress bar will show the current state of the reprogramming. An erasing process will take place first, and then the programming is done, so the progress bar runs up twice.

When the reprogramming is finished, a “Done!” message will appear in the bottom left corner. The application closes the connection, and the router restarts.

### Step 9. Done!

If the upgrade was successful, the following window pops up:



Now you can close the application, or you can select another matrix router to upgrade. After closing the bootloader application, switch the upgraded devices off and then on. Now the router is ready to be used with the new firmware!

## 9. Troubleshooting

### 9.1. 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 controller software, or unplug and reconnect the router's power cable.

### 9.2. Serial connection problems

#### Check the protocol

Check whether the proper protocol is selected (see section [7.1](#) about [changing and viewing protocols](#) on page [51](#)). Select Protocol #1 in order to use the matrix with the controller software.

#### Check the cable and software settings

Check whether your null-modem 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 with **9600** Baud, **8** data bit, **No** parity, **1** stop bit.

### 9.3. 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 Matrix Controller software (see section [4.2 Establishing the connection](#) on page [29](#)).

#### 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. See section [3.3.2](#) about how to reset the IP address with the front panel buttons on page [26](#).

Check whether your computer's firewall blocks the selected port.

#### Check the protocol

Check whether the proper protocol is selected (see section [7.1](#) about [changing and viewing protocols](#) on page [51](#)). Select Protocol #1 in order to use the matrix with the controller software.

#### Check alive 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.

## 9.4. Picture is not displayed or distorted

### Check the cables

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 interface is selected.

Although the router is equipped with DVI-I connectors, analog signals are not supported. You cannot use VGA cables with DVI-VGA adapter plugs.

### 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. You will find help on this process in section [4.4.1](#) about EDID router operation with control software on page [35](#), or in section [5.4](#) about EDID router operation with built-in website on page [45](#). If you get a picture now, you have an EDID related issue, please read section [1.5](#) about understanding EDID on [11](#) for more details.

### 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.

## 10. Specifications

### General

Power .....	100-240 V AC; 50~60 Hz; 0.8 A
Power consumption .....	75 W (256 BTU/hour)
Compliance .....	CE, UL, FCC
EMI/EMC .....	EN 55103-1, EN 55103-2
Safety .....	EN 60065 Class I
Warranty .....	3 years
Operating temperature .....	-20°C ~ +50°C
Humidity .....	10 ~ 90% RH

### Enclosure (router)

Rack mountable .....	Yes, 4U high
DC power connector .....	Neutrik 4 pole Speakon NL4MP
Material .....	2 mm aluminum alloy (AlMg3)
Dimensions .....	482W x 32.8D x 176.5H mm (19W x 1.3D x 7H inch)
Net Weight .....	1.85 kg (4.1 lbs)

### Enclosure (power supply)

Rack mountable .....	Yes
Material .....	1 mm metal
AC power connector .....	IEC receptacle (filtered)
DC power connector .....	Neutrik 4 pole Speakon NL4MP
Dimensions .....	200W x 110D x 86H mm (7.9W x 4.3D x 3.4H inch)
Net Weight (power supply) .....	1.42 kg (3.1 lbs)
Net Weight (power cable) .....	0.35 kg (0.8 lbs)

### Inputs

Connectors .....	29-pole DVI-I digital only
Input cable equalization .....	Yes, +12dB fixed
EDID emulation .....	Yes, for each input connector

### Outputs

Connectors .....	29 pole DVI-I digital only
Output preemphasis .....	Yes, +6dB fixed
Reclocking .....	No
+5V output current .....	500 mA continuous each, with overcurrent protection

**Signal**

Data rate: ..... all between 25 Mbps and 2.25 Gbps / TMDS channel  
 Channels: ..... 1x TMDS Clock + 3x TMDS Colors  
 Resolutions: all between 640x480 and 1920x1200@60Hz or 2048x1080@60Hz  
 Color depth: ..... maximum 36 bits, 12 bit/color  
 Color format ..... RGB, YCbCr 4:4:4  
 HDTV resolutions: ..... 720p, 1080i, 1080p  
 HDMI 1.3a compatible: ..... Yes (embedded audio)  
 HDCP compliant: ..... No

Resolution	Vertical frequency (Hz)	Horizontal frequency (KHz)	TMDS Clock frequency (MHz)	Comment
<b>640x480</b>	60.00	31.47	25.18	<b>DOS VGA</b>
<b>800x600</b>	60.32	37.88	40	<b>VESA SVGA</b>
<b>800x600</b>	75.00	46.87	49.5	<b>VESA SVGA</b>
<b>832x624</b>	74.55	49.72	57.29	<b>MACINTOSH</b>
<b>1280x720</b>	60.00	45.00	74.25	<b>HDTV 720p</b>
<b>1024x768</b>	60.00	48.36	65	<b>VESA XGA</b>
<b>1024x768</b>	75.00	60.02	78.75	<b>VESA XGA</b>
<b>1360x768</b>	47.7	60.00		<b>WIDE-XGA</b>
<b>1152x870</b>	75.06	68.68	100	<b>MACINTOSH</b>
<b>1280x1024</b>	75.00	80.00	135.00	<b>VESA SXGA</b>
<b>1400x1050</b>	60.00	65.64	121.82	<b>SXGA+</b>
<b>1920x1080i</b>	60.00	67.50	74.25	<b>1080i</b>
<b>1920x1080</b>	60.00	67.50	148.5	<b>HDTV 1080p</b>
<b>1920x1080</b>	60.00	67.50	185.6	<b>1080p 10bit</b>
<b>1920x1080</b>	60.00	67.50	222.75	<b>1080p 12bit</b>
<b>2048x1080</b>	60.00	67.50	157.3	<b>2K</b>
<b>1600x1200</b>	60.00	75.00	162	<b>VESA UXGA</b>
<b>1920x1200</b>	60.00	75.00	162	<b>VESA</b>

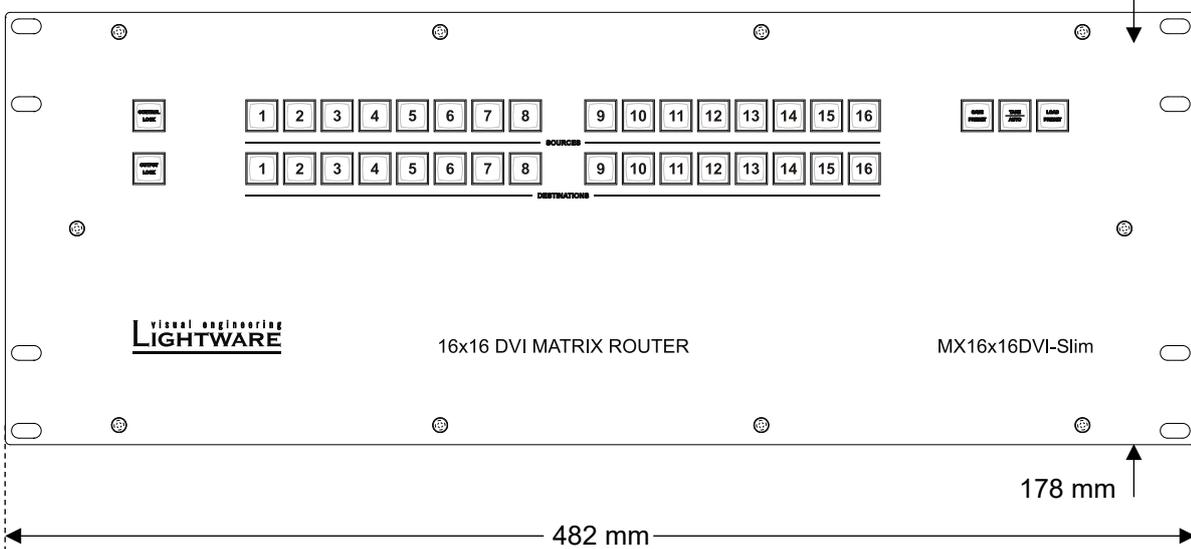
*Table 10-1. DVI timing examples for some typical supported resolutions*

**Control**

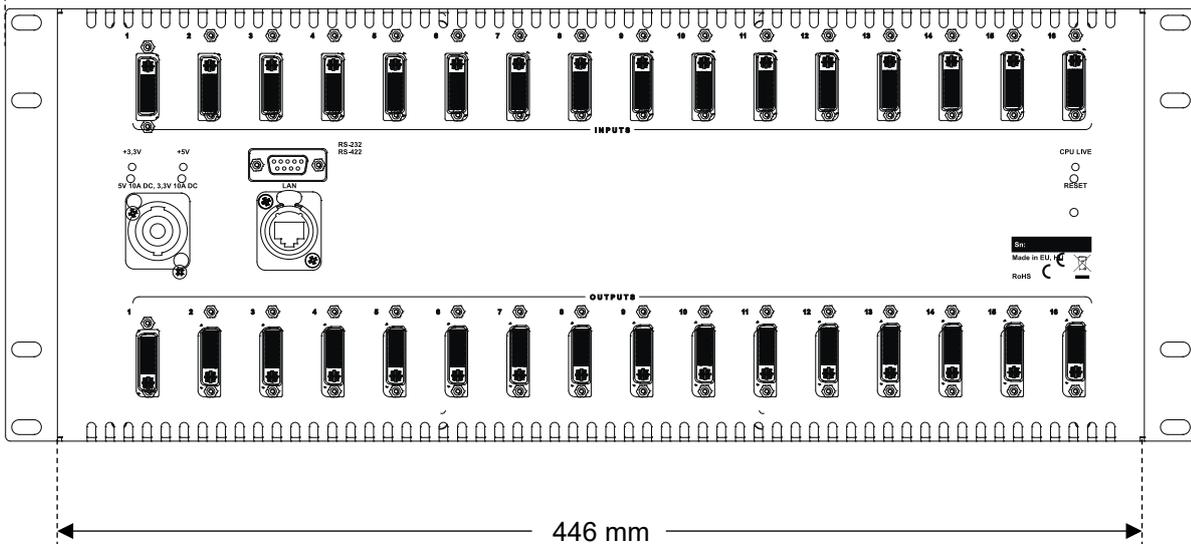
Front Panel buttons ..... Yes, 37 buttons  
 Serial port connector ..... 9 pole D-SUB female RS-232 or RS-422  
 Baud rate ..... 9600 Baud, 8 bit, 1stop bit, no parity  
 Ethernet port connector ..... RJ45 female connector  
 Ethernet protocol ..... TCP/IP, HTTP, TFTP, Telnet  
 IP address assignment ..... fixed, DHCP, BOOTP, and AutoIP

## 10.1. Mechanical Drawings (router)

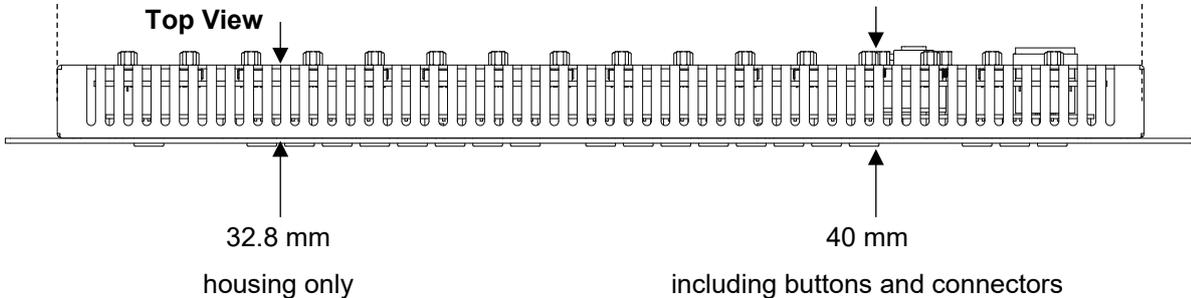
Front View



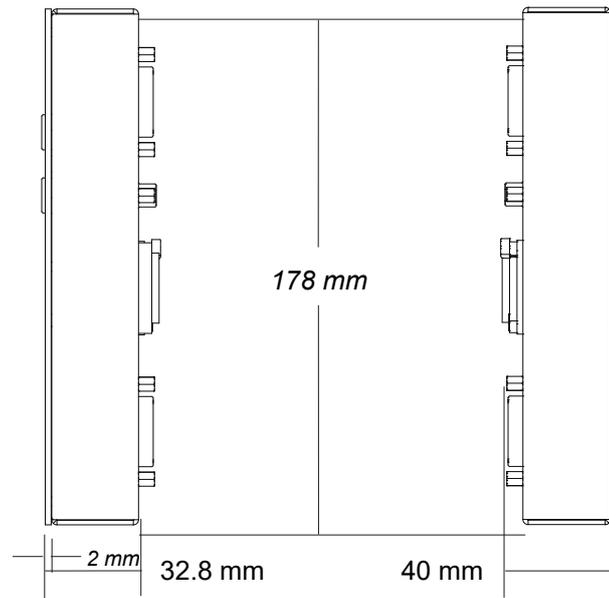
Rear View



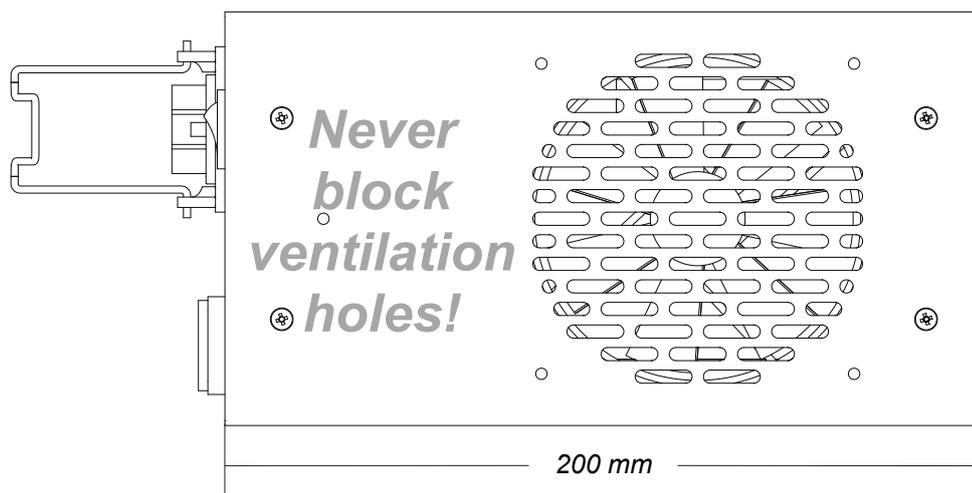
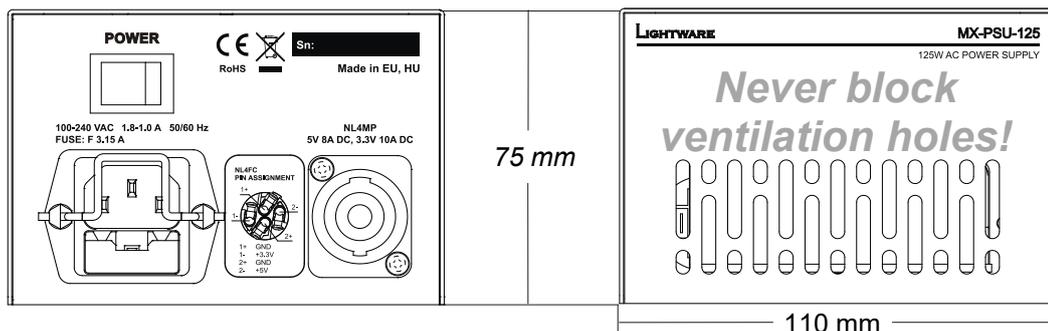
Top View

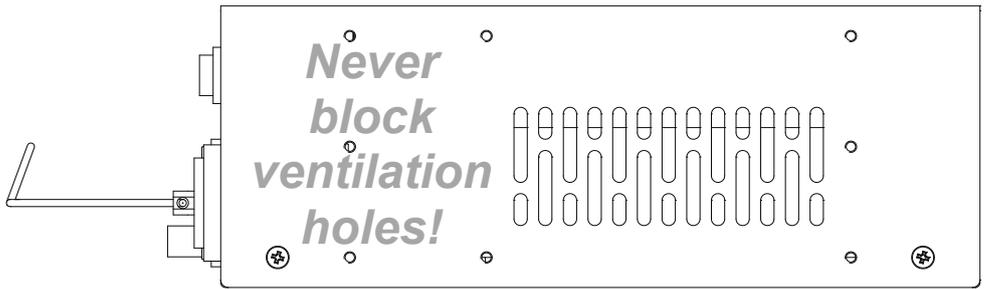


Side View

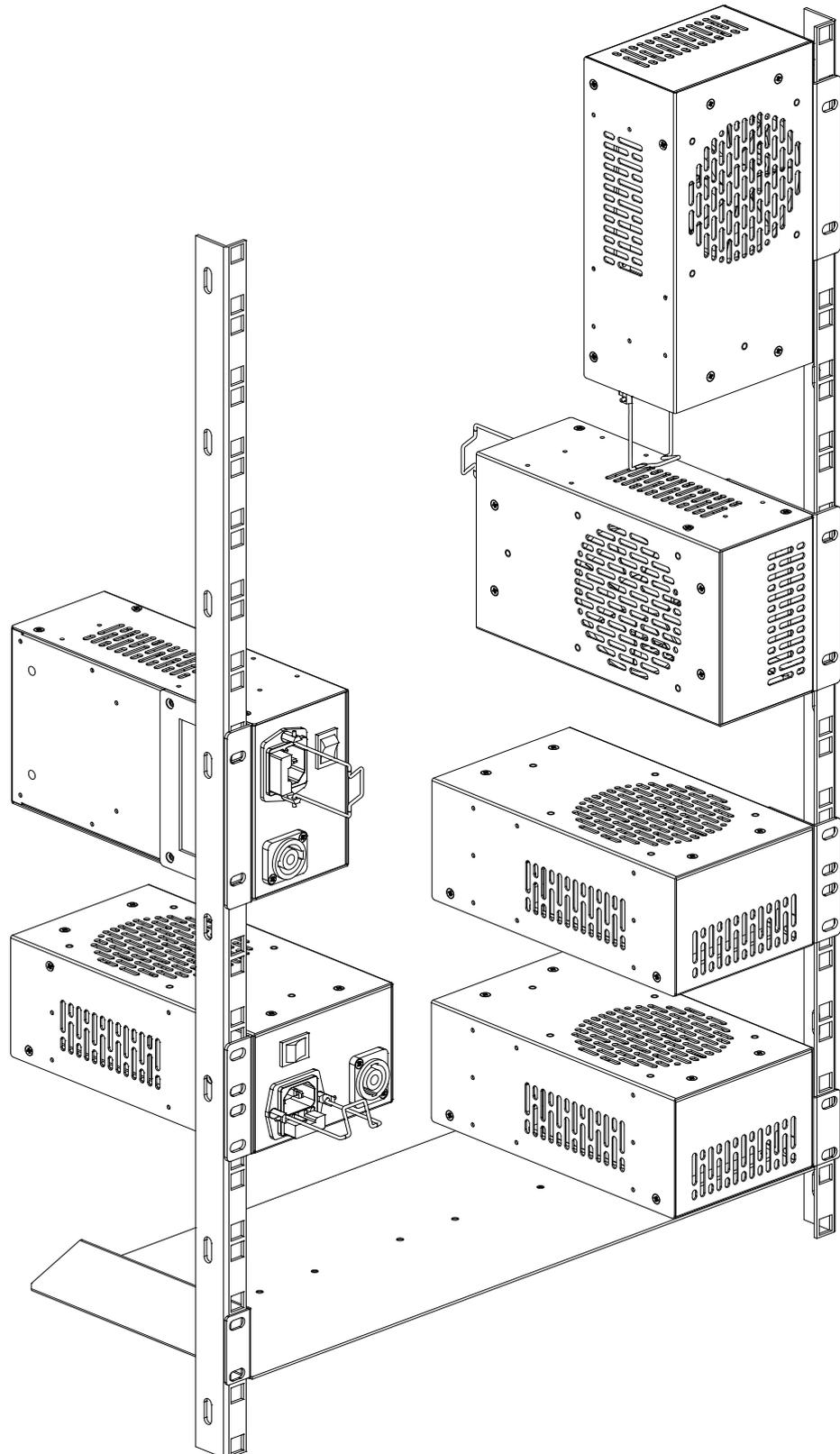


## 10.2. Mechanical drawings (power supply)





### 10.3. Rack mounting variations



## 11. Version applicability

This User's Manual applies to the following versions of the mentioned software, firmware and hardware:

	version
Lightware Matrix Controller software	3.2.0
router CPU firmware (MX-DVI-CPU)	2.4.4
router EDID firmware	3.2.1
router Control Panel firmware (MX-CP1)	1.0.4
router Web Server	1.1.3
router Web Content	1.2.6
router Motherboard	PCB 2.1
router enclosure	2.1
power supply enclosure	1.1

## 12. Warranty

Lightware Visual Engineering warrants this product against defects in materials and workmanship for a period of three years from the date of purchase.

The customer shall pay shipping charges when unit is returned for repair. Lightware will cover shipping charges for return shipments to customers.

In case of defect please call your local representative, or Lightware at

Lightware Visual Engineering  
1071. Budapest Peterdy str. 15, HUNGARY

Tel.: +36 1 889 6177  
Fax: +36 1 342 9903  
E-mail: [support@lightware.hu](mailto:support@lightware.hu)

## 13. Quality Check Record

Model name	Serial number	Date of manufacture	Checked

### Hardware

Module	Hardware	Firmware
Mother board		
CPU		
EDID management		
LAN control server		
WEB content		
MAC address	: : : : :	
Control Panel		
Power supply		

### Electrical check

GND/EARTH Safety	<input type="checkbox"/>	Inputs	<input type="checkbox"/>
+3.3V; +5V	<input type="checkbox"/>	Outputs	<input type="checkbox"/>
CPU Live	<input type="checkbox"/>	RS-232	<input type="checkbox"/>
Buttons	<input type="checkbox"/>	LAN	<input type="checkbox"/>

## 14. Document revision history

Document	Release Date	Changes	Checked by
Rev. 0.1	21-04-2010	draft	-
Rev. 0.8b	17-05-2010	first beta edition	Tamas Lehel
Rev. 1.0	01-07-2010	router enclosure dimensions power supply enclosure document outline	Tamas Lehel
Rev. 1.1	15-12-2015	Safety instructions updated, CE page pulled out	Laszlo Zsedenyi
Rev. 1.2	08-07-2022	Changes in the Box contents section	Tamas Forgacs