v i s u a l   e n g i n e e r i n g
LIGHTWARE

EDID manager V4

SIGNAL
PRESENT

MONITOR
HOTPLUG

DVI IN (COMPUTER)

DVI OUT (MONITOR)

SOURCE +5V

BURN   STATUS   LEARN

	EDID	HDCP
RED:	INVALID	N/A
GREEN:	VALID	ENABLED
ORANGE:	VALID	DISABLED

MEM01 + LEARN =
HDCP enable/disable

POWER

DC IN

EDID MEMORY

USB

x10   x1

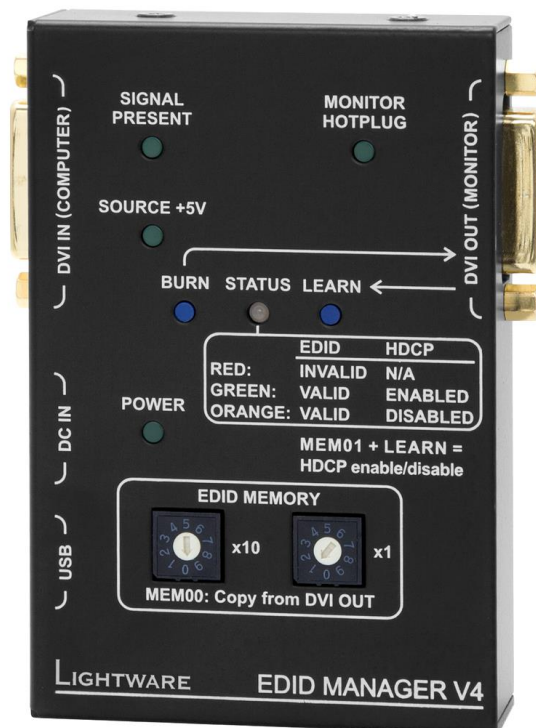MEM00: Copy from DVI OUT

LIGHTWARE   EDID MANAGER V4

User's Manual

SAFETY INSTRUCTIONS

Class II apparatus construction.

The equipment should be operated only from the power source indicated on the product.

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

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

The apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus. No naked flame sources, such as lighted candles, should be placed on the apparatus.

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

Ventilation

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

WARNING

To prevent injury, the apparatus is recommended to securely attach to the floor/wall or mount in accordance with the installation instructions.

WEEE (Waste Electrical & Electronic Equipment)

Correct Disposal of This Product
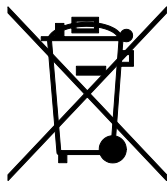
This marking shown on the product or its literature, indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.
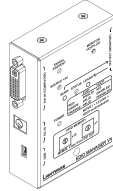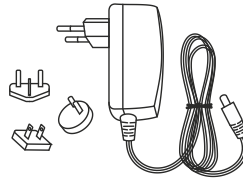
TABLE OF CONTENTS

visual engineering
LIGHTWARE

1. Introduction

Thank you for choosing Lightware EDID manager V4, our HDCP compatible HDMI/DVI EDID Emulator and cable extender with USB control.
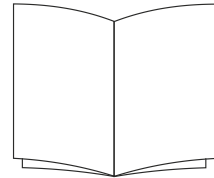
1.1. Box contents

EDID Manager V4 unit

+5V DC adaptor with interchangeable plugs

Quick Start Guide

1.2. Description

Lightware's EDID Manager V4 is an HDMI/DVI EDID emulator and repeater that can store 79 EDIDs. It emulates and keeps a fixed EDID for the source. Thanks to our Advanced EDID Management, the device can trick the DVI source (PC computer, laptop, etc.) by emulating any DVI/HDMI display (LCD monitor, projector) for continuous video output - even if the AV system is disconnected or powered down. With EDID emulation, the user can set up any DVI or HDMI output resolution, regardless of the used projector or monitor. This ensures that the overall system resolution can be controlled. There are 49 factory and 29 user programmable presets available, and the last attached display device's EDID is also stored separately on address 00#, to be able to clone it to the input (repeater mode).

HDCP enable/disable function turns off the unit's HDCP capability. Some computers choose to encrypt their output even when non-protected content is displayed, such as desktop images or presentations. This function forces the source to send an unencrypted signal, if the content itself is also unprotected. It therefore helps technicians to integrate such sources into a partially HDCP compliant AV environment.

The EDID Manager automatically compensates for up to 60 meters of DVI copper cable (22AWG).

With the Easy EDID Creator (PC software) the users can create their own EDID by completing four simple steps. More experienced users can use the Advanced EDID Editor software to manage every possible setting in the EDID, which they can upload to the memory of the EDID Manager.

1.3. Features

- **Advanced EDID Management –** The user can emulate any EDID on the device's input by using the 49 factory or 29 user presets. Any attached monitor's EDID can be read out, edited and stored as user presets by the Lightware Device Controller Software.

- **HDCP Management –** HDCP communication between source and display devices can be permitted or prohibited by the unit. Lightware is a legal HDCP adopter.

- **60 meter input cable compensation –** Using 22AWG high quality DVI cable, the input is automatically compensated for up to 60 meter cable length, which extends installation possibilities even on highest HDTV or computer resolutions. In case of lower pixel resolutions, this length can be even higher.

- **Various status indicator LEDs –** See the status of the device in one second:
    - Input signal present,
    - Source +5V,
    - Monitor hotplug,
    - EDID emulation & HDCP pass-through status,
    - Power LED,

- **Front panel control –** EDID address selection with two decimal rotary switches, Learn EDID and Burn EDID buttons are available for Advanced EDID Management.

- **USB control –** The EDID Manager V4 is controllable via the Lightware Device Controller PC software. Advanced EDID Management and firmware upgrades are available.

- **Supports all HDTV resolutions –** Supports HDCP encrypted and unencrypted HDTV signals up to 165 MHz pixel clock frequency regardless of the resolution being passed through. (720p, 1080i and 1080p etc.)

- **Fiber cable support –** Self-powered DVI fiber cables using +5V from DVI sources (VGA cards, etc.) usually consuming more than 50 mA (maximum suggested by DVI 1.0 standard). Lightware devices support +5V 500 mA constant current output on the DVI outputs to power long distance fiber optical cables.

- **Universal power supply –** EDID Manager V4 is equipped with a universal +5V power adaptor, which accepts AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency.
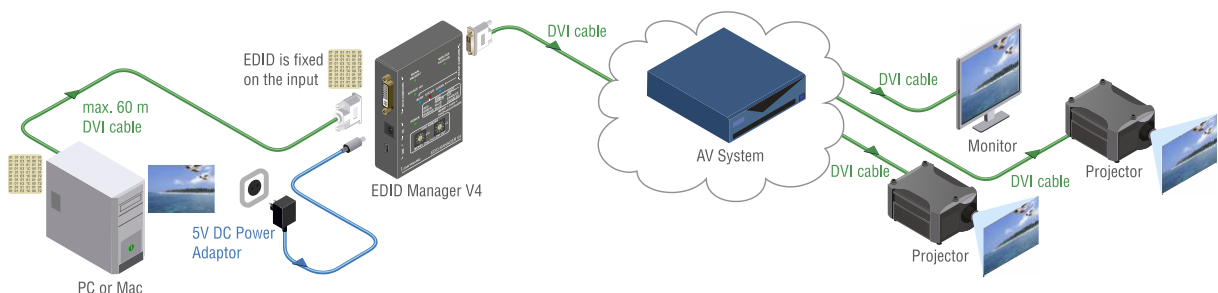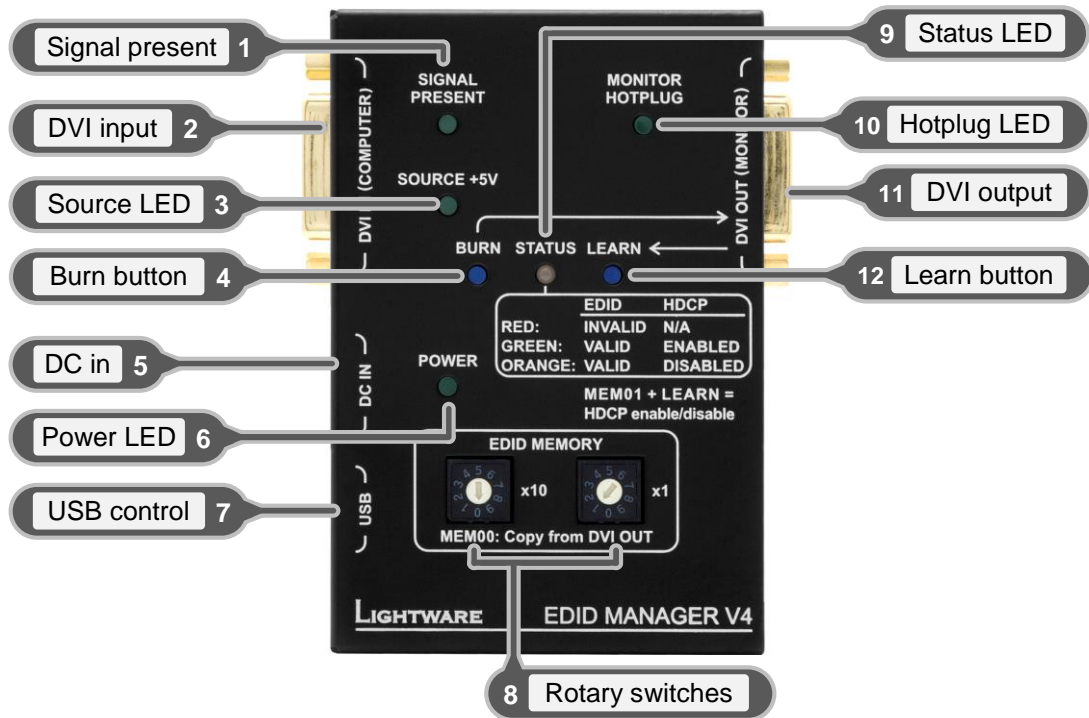
1.4. Typical application

Figure 1-1. EDID emulation

2. Controls and connections

2.1. Top view

| 1	**Signal present**	Indicates if a valid DVI clock signal is present on the DVI IN connector.
2	**DVI input**	Connect one single link DVI-D or DVI-I cable (only digital pins are connected internally) between the DVI source and EDID Manager. The built-in automatic cable equalization circuit compensates for up to 60 meters at 1920x1080p 60 Hz resolution. For lower resolutions, even longer cables can be used. See more information in section 2.2.1 on page 10.
3	**Source LED**	Indicates if +5V power signal is sent to pin 14 of the input DVI connector by the DVI source (PC, Laptop, etc).
4	**Burn button**	Reprograms the attached DVI Matrix switcher's input EDID data. See more information in section 4.3 on page 16.
5	**DC in**	Connect the output of the supplied +5V power adaptor or use Lightware's rack mountable power supply.
6	**Power LED**	The LED indicated the proper power supply voltage.
7	**USB control**	Advanced EDID management and firmware upgrades are available via the USB interface.
8	**Rotary switches**	The rotary switches select one of the EDID memory addresses. Addresses 01#..49# are factory presets and 51#..79# are user programmable presets. Address 00# enables transparent mode. Address 01# is also used for HDCP status change. See more information in section 4.3 on page 16 and section 4.4 on page 17. Use a flat head screwdriver that fits into the actuator. Avoid the use of keys, coins, knives and other sharp objects because they might cause permanent damage to the rotary switches.

(9) Status LED

green: during the EDID reading process the LED is blinking. If the selected EDID is valid and HDCP pass-through is **enabled** the LED lights green.

orange: during the EDID reading process the LED is blinking. If the selected EDID is valid and HDCP pass-through is **disabled** the LED lights orange.

red: during the EDID reading process the LED is blinking. If the selected EDID is invalid the LED lights red.

FW version display: during startup it displays the firmware version of the device.

Learn process status: after pressing the Learn button, this LED indicates whether the learn process was successful (blinking green) or unsuccessful (blinking red).

Burn process status: after a burn process, this LED indicates whether it was successful (blinking green) or unsuccessful (blinking red).

Firmware upgrade status: during firmware upgrade this LED flashes red and green.

See more information in chapter 4 on page 14.

(10) Hotplug LED

Indicates if a powered display device (or matrix switcher, repeater, etc.) is connected to the DVI output connector and sends a valid hotplug signal on pin 16 through the DVI cable.

(11) DVI output

Connect one single link DVI-D or DVI-I cable (only digital pins are connected internally) between EDID Manager and display device. The output connector is able to supply 500 mA current on pin 14 to power fiber optical DVI extenders like DVI-OPT-TX110. See more information in section 2.2.1 on page 10.

(12) Learn button

Stores the EDID of the display device attached to DVI OUT in the selected memory address between 51#..79#. To learn the EDID, select an appropriate address with the rotary switches and press and hold the Learn button for two seconds. See more information in section 4.3 on page 16.

2.2. Electrical connections

2.2.1. DVI connectors

EDID Manager V4 provides 29 pole „digital only" DVI-I connectors (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.
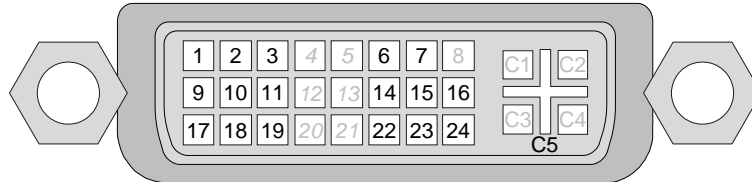
Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	**9**	TMDS Data1-	**17**	TMDS Data0-
2	TMDS Data2+	**10**	TMDS Data1+	**18**	TMDS Data0+
3	TMDS Data2 Shield	**11**	TMDS Data1 Shield	**19**	TMDS Data0 Shield
4	nc	**12**	nc	**20**	nc
5	nc	**13**	nc	**21**	nc
6	DDC Clock	**14**	+5V Power	**22**	TMDS Clock 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 Single Link digital only connector pin assignments

DVI output

Monitor hotplug is detected on the output port (Monitor hotplug LED lights green). After a hotplug event, the EDID Manager V4 tries to read the EDID of the connected device.

No output reclocking is provided. If a long DVI cable is connected then equalization and reclocking may be necessary at the receiver end of the cable.

DVI input

The input has a built-in signal detection circuit with a LED indicator. The DVI Signal present LED lights green, if the INPUT connector senses an active DVI signal.

Cable length at inputs

The unit has an advanced built-in cable equalization circuit, which automatically provides cable length compensation. This circuit extends the maximum usable cable length to 60 meters using high quality 22AWG copper cable at WUXGA 1920x1200 graphics resolution.

Fiber Cable powering

As a special feature, the device is able to supply 500 mA current on DDC +5V output (pin 14 on output connector) to power fiber optical DVI transmitters. 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 device does not check if the connected sink (monitor, projector or other equipment) supports hotplug or EDID signals but outputs the input signal directly.

Cable type / Signal	22 AWG Reference type DVI GEAR: SHR DVI	24 AWG Reference type TASKER: TSK 1060
Resolution	Max length (meter)	Max length (meter)
1920x1200; 1600x1200; 2048x1080p; 1080p	60 m	50 m
1680x1050; 1400x1050; 1280x1024	75 m	62 m
1024x768; 1365x768; 720p; 1080i;	92 m	77 m
800x600	100 m (calculated)	84 m (calculated)
640x480; 480p; 576p	120 m (calculated)	100 m (calculated)

Table 2-2. Maximum DVI cable lengths at the input

2.2.2. DC +5V connection

The device has a locking DC connector to establish robust and safe power connection. After plugging it in, turn the plug clockwise as you can see in the picture below.
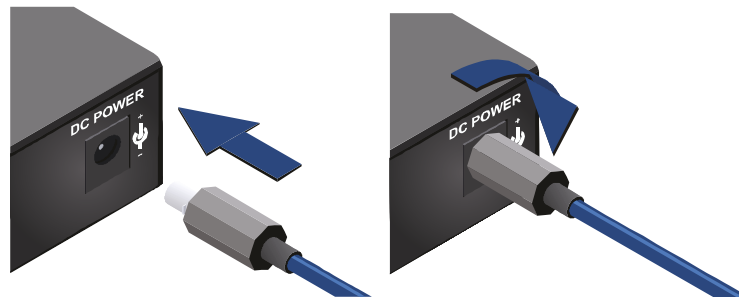

Figure 2-1. Locking DC connector

Do not forget to turn the connector counterclockwise before trying to disconnect the power adaptor.

Warranty void if damage occurs due to use of a different power source.

Always use the supplied +5V power adaptor or Lightware's rack mountable power supply.

3. Technologies

3.1. Understanding EDID

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.
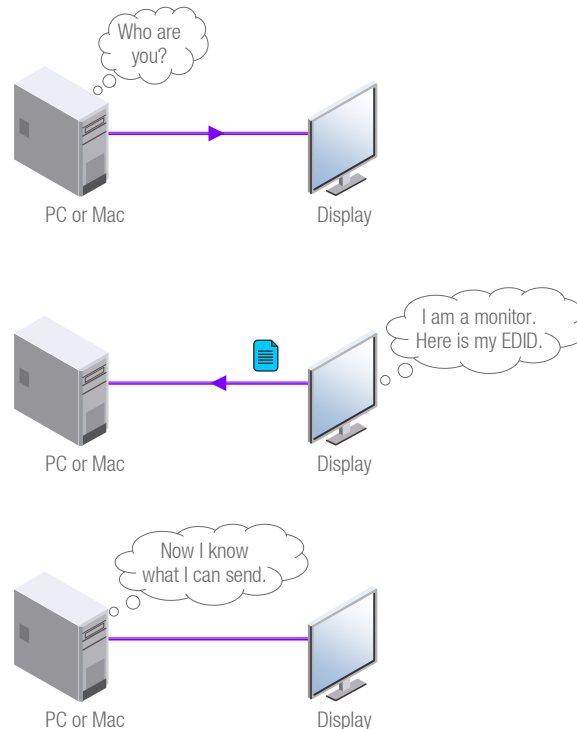
Figure 3-1. EDID communication

Most DVI computer displays have 128-byte long EDID structure. However, Digital Televisions and HDMI capable displays may have another 128 bytes, which is called E-EDID and 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.

3.2. Common problems related to EDID

Problem: „My system consists of the following: a computer, a Lightware EDID Manager V4 and a third party Distribution Amplifier, then an SXGA (1280x1024) LCD monitor and an XGA (1024x768) projector. I would like to see the same image on the monitor and the projector. What EDID should I chose on the EDID Manager V4?"

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

Problem: „I turned the Rotary switch on the EDID Manager V4 to have a different resolution but nothing happens."

Solution: Some graphics cards and video sources read out the EDID only after power-up and later they don't sense that EDID has been changed. You need to restart your source to make it read out the EDID again.

Problem: „I have an EDID Manager V4 and I'm using a Lightware factory preset EDID. I would like to be able to choose from different resolutions, but my source allows only one resolution."

Solution: Most Lightware factory preset EDIDs allow only one resolution, forcing the sources to output only that particular signal. You need to select the Universal EDID (address 49#). It supports all common VESA resolutions. Additionally it also features audio support.

3.3. Advanced EDID Management

Each DVI/HDMI 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/HDMI standard makes use of EDID data structure for the identification of the monitor type and capabilities. Most DVI/HDMI sources (VGA cards, set top boxes, etc) will output DVI/HDMI 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.

EDID Manager V4 provides Lightware's Advanced EDID Management function which helps system integration. The EDID Manager V4 stores and emulates 78 EDID data plus the EDID of the last attached monitor connected to the output. First 49 EDID are factory presets, while memories 51#..79# are user programmable. The device stores the EDIDs in non-volatile memory. This way the EDID from the monitor is available when the monitor is unplugged, or switched off.

The EDID emulated on the input can be copied from the EDID Manager's memory (static EDID emulation) or from the attached monitor (dynamic EDID emulation). For example, the EDID Manager can be set up to emulate the device, which is connected to DVI OUT, and the EDID automatically changes, if the monitor is replaced with another display device (as long as it has a valid EDID).

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 the emulated EDID has been changed, the device 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.*

Info: *If a new sink device (monitor) is connected while HDCP is enabled, the EDID Manager V4 virtually reconnects the source device to ensure HDCP functionality. This may cause the picture disappear for a few seconds.*

4. Operation

4.1. Powering on

When building an electronic system, make sure that all of the devices are powered down before connecting them. Powered on devices may have dangerous voltage levels that can damage sensitive electronic circuits.

Step 1. After the system is complete, connect the output of the +5V power adaptor to the EDID Manager V4. The unit is immediately powered ON.

Step 2. After the EDID Manager V4 is initialized, the attached DVI source and monitor can be powered on.

Startup process

Step 1. After being powered on, the EDID Manager V4 displays its firmware version using the Status LED.

The following example shows this process for a firmware version of 1.1.8:

Red blinks once → Short pause → Green blinks once → Short pause → Green blinks eight times

Step 2. After indicating the firmware version, the Status LED lights red for 2-3 seconds, then turns green or orange if the selected EDID is valid, or remains red, if the selected EDID is invalid. Green indicates that HDCP pass-through is enabled; orange indicates that HDCP pass-through is disabled.

Step 3. If a display device is connected to DVI OUT, the EDID Manager reads the EDID from the attached monitor's EDID memory.

- If the read process is successful, the Status LED blinks green four times.
- If the read process is unsuccessful, the Status LED blinks red four times.

Step 4. The normal function of the LED is in effect.

Info: *If none of the LEDs light up upon power-up, the unit is most likely damaged and further use is not advised. Please contact support@lightware.eu.*

The EDID Manager V4 ensures HDCP functionality, when the HDCP pass-through is enabled. If a new sink device (monitor) is connected while HDCP is enabled, the EDID Manager V4 virtually reconnects the source device to ensure HDCP functionality.

Switching the Hotplug signal off and on again indicates to the source device, that the sink is ready to communicate.

This may cause the picture disappear for a few seconds. The signal stays stable if HDCP pass-through is disabled.

Step 5. If HDCP is not necessary turn off the HDCP pass-through. See more information in section on page .

4.2. About EDID memory

Lightware factory preloaded EDIDs are specially provided to force graphic cards to output only the exact pixel resolution and refresh rate.

Universal EDID (address 49#) allows multiple resolutions including all common VESA defined resolutions. In addition, it also features audio support. The use of universal EDID is advised for fast and easy system setup.

EDID manager V4 contains a 79 block non-volatile memory bank. EDID memory is structured as follows:

Rotary switch state	Memory bank number	
01#..49#	F01#..F49#	Factory Preset EDID list
51#..79#	U01#..U29#	User programmable slots
00#	D01..	Last attached monitor's EDID

Info: *Address 50# is reserved.*

Info: *The Factory Preset EDID list cannot be modified. These are the most commonly used resolutions.*

Info: *The device 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 connected to the output. In case of powering the unit off, the last attached monitor's EDID remains in non-volatile memory.*

Mem.	Resolution	Type	Mem.	Resolution	Type
01#	640 x 480 @ 60.0 Hz	D	26#	1600 x 1200 @ 50.0 Hz	D
02#	640 x 480 @ 75.0 Hz	D	27#	1600 x 1200 @ 60.0 Hz	D
03#	848 x 480 @ 60.0 Hz	D	28#	1920 x 1200 @ 59.55 Hz	D
04#	800 x 600 @ 50.0 Hz	D	29#	1920 x 1200 @ 50.0 Hz	D
05#	800 x 600 @ 60.30 Hz	D	30#	1440 x 480i @ 60.3 Hz	H
06#	800 x 600 @ 74.99 Hz	D	31#	640 x 480 @ 59.94 Hz	H
07#	1024 x 768 @ 49.98 Hz	D	32#	720 x 480 @ 59.92 Hz	H
08#	1024 x 768 @ 60.0 Hz	D	33#	1440 x 576i @ 50.6 Hz	H
09#	1024 x 768 @ 75.2 Hz	D	34#	720 x 576 @ 50.0 Hz	H
10#	1152 x 864 @ 75.0 Hz	D	35#	1280 x 720 @ 50.0 Hz	H
11#	1280 x 768 @ 50.0 Hz	D	36#	1280 x 720 @ 60.0 Hz	H
12#	1280 x 768 @ 59.92 Hz	D	37#	1920 x1080i @ 50.3 Hz	H
13#	1280 x 768 @ 75.0 Hz	D	38#	1920 x1080i @ 50.0 Hz	H
14#	1360 x 768 @ 60.1 Hz	D	39#	1920 x1080i @ 60.5 Hz	H
15#	1364 x 768 @ 50.0 Hz	D	40#	1920 x 1080 @ 24.0 Hz	H
16#	1364 x 768 @ 59.93 Hz	D	41#	1920 x 1080 @ 24.99 Hz	H
17#	1364 x 768 @ 74.98 Hz	D	42#	1920 x 1080 @ 30.0 Hz	H
18#	1280 x 1024 @ 50.0 Hz	D	43#	1920 x 1080 @ 50.0 Hz	H
19#	1280 x 1024 @ 60.1 Hz	D	44#	1920 x 1080 @ 49.99 Hz	H
20#	1280 x 1024 @ 75.1 Hz	D	45#	1920 x 1080 @ 60.0 Hz	H
21#	1366 x 1024 @ 59.99 Hz	D	46#	2048 x 1080 @ 49.99 Hz	D
22#	1400 x 1050 @ 49.99 Hz	D	47#	2048 x 1080 @ 50.0 Hz	D
23#	1400 x 1050 @ 59.99 Hz	D	48#	2048 x 1080 @ 59.99 Hz	D
24#	1400 x 1050 @ 75.0 Hz	D	49#	Universal EDID	D
25#	1680 x 1050 @ 59.99 Hz	D	00#	Copy from DVI out	

EDID types: D=DVI EDID; **H**=HDMI EDID

Table 4-1. Factory preset EDID list

4.3. EDID operations

Switching the EDID

Step 1. Use a screwdriver to change the memory address on the Rotary switches.

Step 2. After either one of the Rotary switches has been rotated the unit waits approximately 2 seconds before the selected EDID becomes active.

Step 3. Check the state of the device:

- Status LED is green: EDID valid & HDCP pass-through enabled
- Status LED is orange: EDID valid & HDCP pass-through disabled
- Status LED is red: The selected EDID memory is invalid (wrong address / empty user memory)

The address 00# has a special function. If a monitor is connected to DVI OUT, then its EDID is copied to the DVI IN connector. If no monitor is connected to the output then the EDID transmitted to the DVI IN connector is the EDID of the last connected monitor. While the 00# memory is selected pressing the Learn button will turn HDCP pass-through on.

Info: *If an invalid EDID is selected, the EDID Manager V4 does NOT give a HOT PLUG signal to the source connected to DVI input.*

Info: *After every EDID change, EDID Manager V4 toggles the HOT PLUG signal for approximately 2 seconds. Some graphics cards or DVD players do not sense the HOT PLUG signal, and even if EDID has been changed, the set resolution is not affected. In this case the source device must be restarted, or powered OFF and ON again.*

Learning the EDID

EDIDs can be saved to the memory addresses from 51# to 79# as follows:

Step 1. After connecting the sink device to DVI output, use a screwdriver to select a user memory address. EDIDs are stored in non-volatile memory. If the Status LED lights red, the memory slot is empty and can be programmed. If it is green, the memory is not empty, but still available for reprogramming.

Step 2. Push the Learn button on the top side of the EDID Manager V4 and hold it down for approximately 2 seconds. Once the button is pushed the Status LED goes dark. If the teaching is successful, the Status LED blinks four times green, if the teaching is unsuccessful, the Status LED blinks four times red.

Step 3. The normal function of the LED is in effect.

Burning the EDID

Sink devices store their EDID information in a non-volatile memory (EEPROM). Normally this memory is write-protected in monitors and projectors, thus impossible to be modified by the Burn EDID function of the EDID Manager V4. Some of them however are not write protected, so users must be very careful when using this function.

Caution! *Burning a wrong EDID can damage the display!*

Users can burn EDID in the inputs of any DVI Matrix Switcher that doesn't have built-in EDID management function as long as its EEPROMs are not write protected.

Step 1. After connecting the sink device to DVI OUT of the unit, use a screwdriver to select the memory address of the EDID to be burnt. If the Status LED lights green or orange, the memory slot contains a valid EDID and it is ready to be burnt.

Step 2. Push the Burn button and hold it down for approximately 10 seconds. Once the button is pushed the Status LED goes dark. After the 10 seconds, the Status LED becomes orange. Once the LED becomes orange, push and release the Burn button 3 times within 5 seconds. Now the burn process starts. If the Status LED blinks green, then the burn process was successful. If it blinks red, then the burn process failed.

4.4. HDCP management

HDCP capable and non-capable sinks in one system can lead to improper setup; there can be monitors/projectors, which cannot display the signal from the source. To force the signal sources to output non-encrypted signal, HDCP pass-through can be disabled. If the content is not copyrighted the source will output non-encrypted signal.
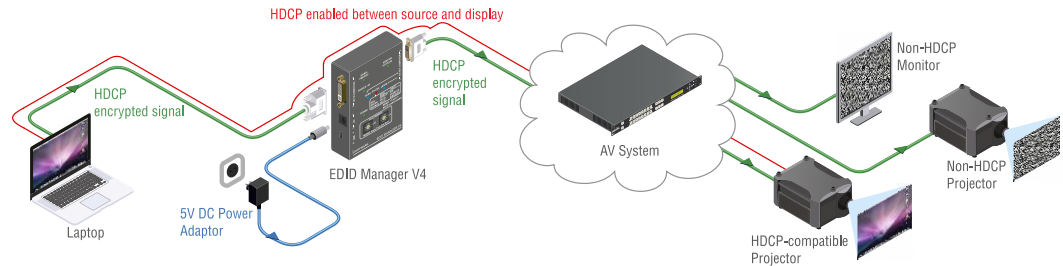

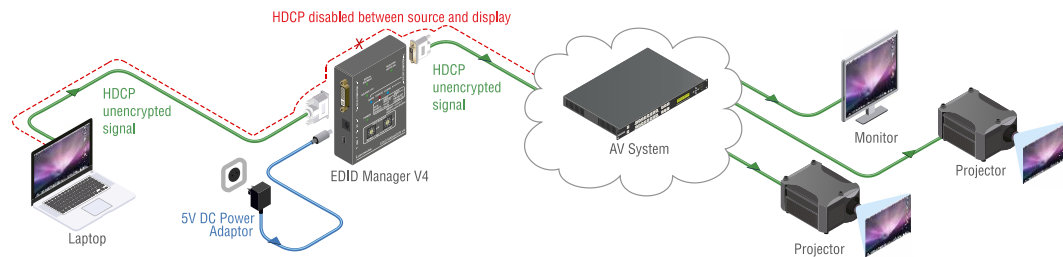***Figure 4-1. HDCP pass-through enabled***

Figure 4-2. HDCP pass-through disabled

The EDID Manager V4 can act as non-HDCP compliant sink: the HDCP pass through can be toggled by the following process.

Certain laptops, computers use HDCP encryption on their outputs, whenever it is possible. If there is a HDCP compliant sink connected to them, they output encrypted signal irrespective of the content. So both copyrighted and not copyrighted content is forced to be encrypted. The sink can be a HDCP-compliant matrix (HDCP repeater), which will route the signal to various sinks (monitors, projectors, etc.) using HDCP, which means that only HDCP compliant devices will be able to display the signal.

Our HDCP disable function ensures the EDID Manager V4 is seen as a non-HDCP compliant device to the source and therefore no encryption is attempted, when it is not mandatory.

Info: *In HDCP disable mode, protected content (e.g. Blu-ray) will not be displayed, thus maintaining the rules set by the HDCP standard.*

Step 1. Check the state of the device

- ▪ Status LED illuminated green: HDCP pass-through enabled.
- ▪ Status LED illuminated orange: HDCP pass-through disabled.

Step 2. To enable or disable the HDCP pass-through turn the Rotary switches to address 01#, and press and hold the Learn button for approximately 3 seconds. The status change appears on the Status LED.

5. Software control – Using Lightware Device Controller

The unit can be controlled by a computer through the USB port using Lightware Device Controller. The software can be installed to a Windows PC or MAC OS X. The application and the User's manual can be downloaded from www.lightware.eu. The Windows and the Mac versions have the same look and functionality.

5.1. Steps of the installation in case of Windows OS

Step 1. Run *Install_LDC_v1.0.4b2.exe*
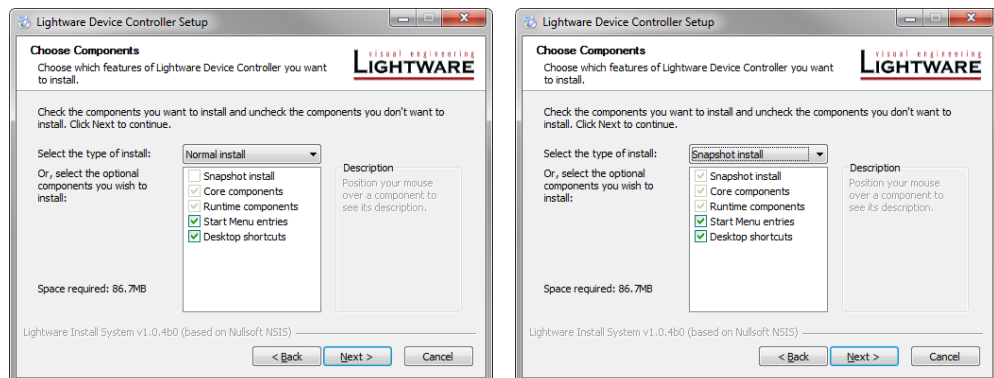If the User Account Control drops a popup message click Yes.
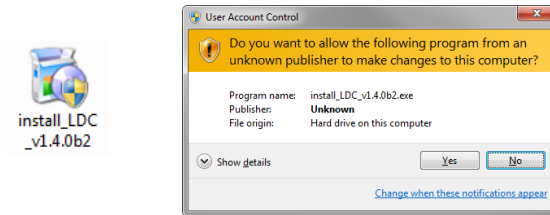
**Step 2.** A welcome window opens. Click Next.

Step 3. Select the type of the installation. Here can be chosen the normal and the snapshot install. Select the optional components then click Next.
(Using the Normal install as the default value is highly recommended.)

| Normal install	Snapshot install
Available for Windows and MAC OS X	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different version can be installed for all users
Does not contain the version in its name	Version number is displayed in the name

Step 4. Select the destination folder and click Next. (Using the default path is highly recommended.)
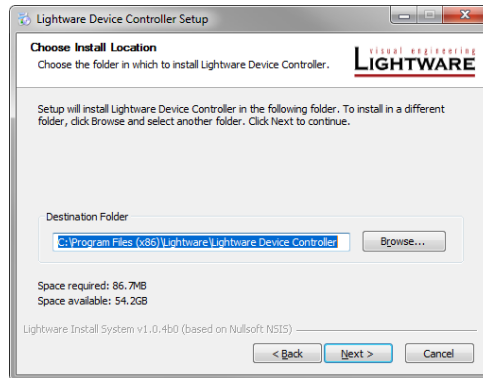
**Step 5.** Select the Start Menu Folder and click Next. (Using the default folder is highly recommended. If the Start menu entries was not checked in the Step 2. this window will be skipped.)
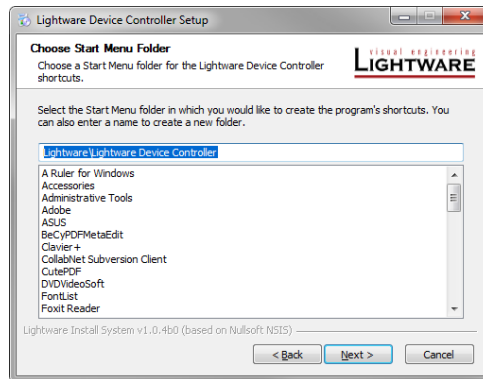
Step 6. Verify the settings and if they are correct click Install. (If not, click Back and change the setting.)
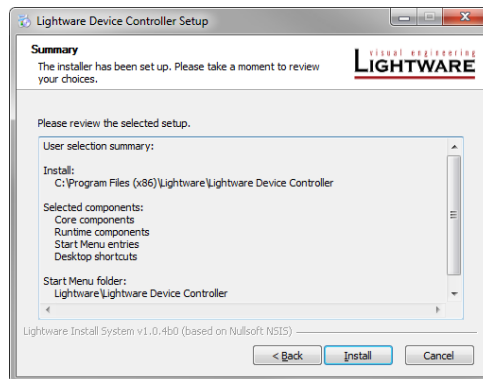
Step 7. After the installation of the last component the Next button is activated. Click on it.
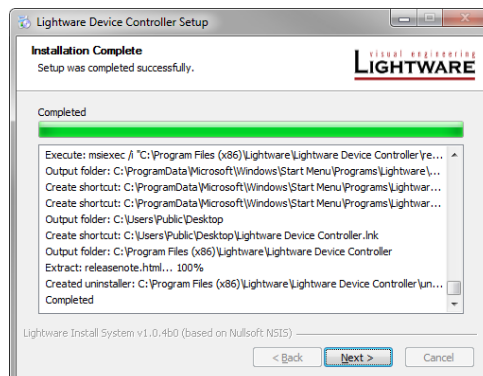
Step 8. If the installation is complete, click Finish. (Uncheck the box if the running of the LDC will be delayed.)

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

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

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

LightwareDeviceContro
llerInstaller.dmg

Step 2. Drag the LDC icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDC into another location just drag the icon over the desired folder.
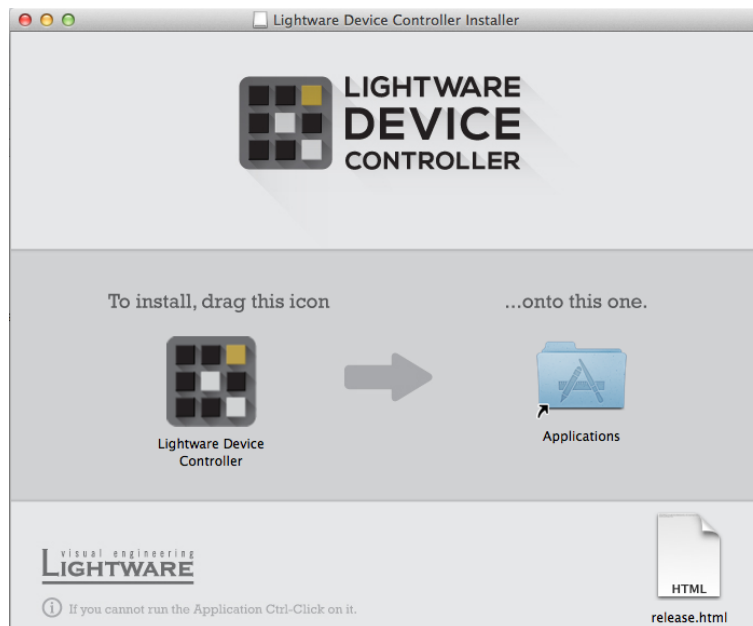
Info: This type of the installer is equal with the Normal install in case of Windows This is an updateable version with the same attributes.

5.3. LDC Upgrade

Step 1. Run the application.

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

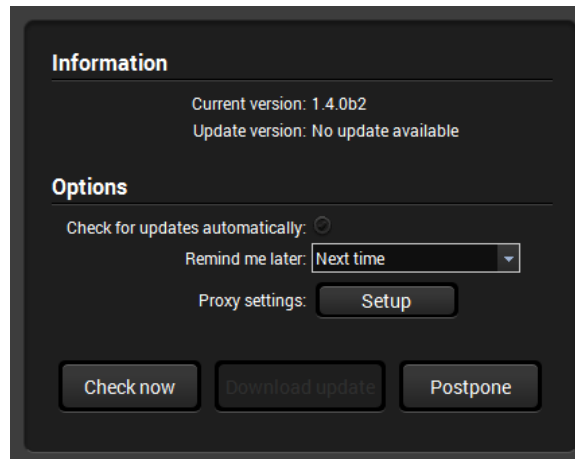The current and the update version number can be seen in the top of the window and they are shown in this window even with the snapshot install.

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

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

a)   If you do not want to check for the updates automatically, uncheck the circle, which contains the green tick.

b)   If you want to postpone the update, a reminder can be set with different delays from the drop-down list.

c)   If the proxy settings traverse the update process, set the proper values then click the OK button.
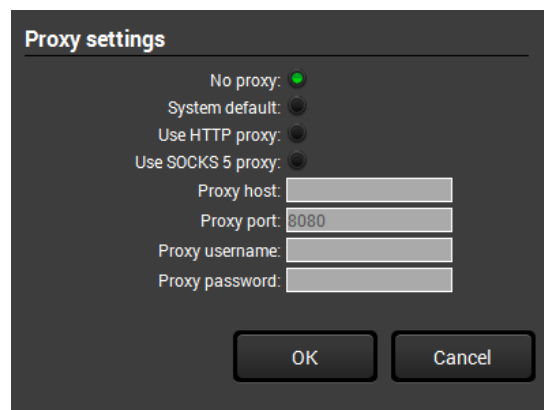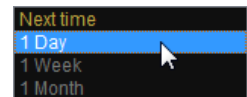
Step 3. Click the Download update button to start the upgrading.

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

5.4. Establishing the connection

Step 1. Connect the device to a computer via an USB cable.

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

Figure 5-1. Ethernet connection in Device discovery window

Step 3. Select the unit from the discovered devices under USB devices; click on the Connect button.

5.5. I/O Parameters menu

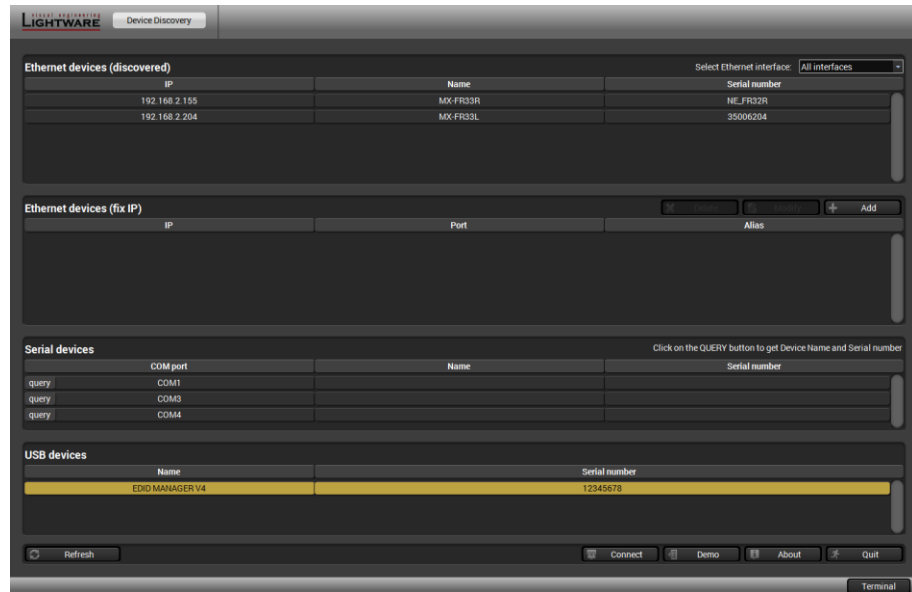After connecting to the device, this menu appears by default showing the current state of input port. Click on the desired port in the bar on the right side to show its properties.
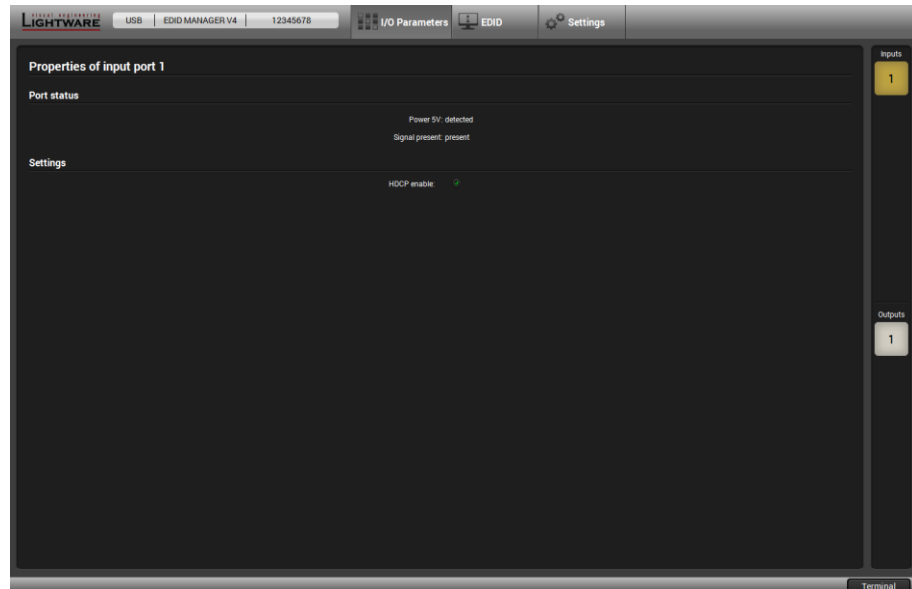

Figure 5-2. I/O Parameters menu

5.6. EDID menu

There are two panels: left one contains Source EDIDs, right one contains Destination places where the EDIDs can be emulated or copied.

Info: *When the user enters the menu for the first time, the software starts to download the whole EDID list from the device, which may take up to 30 seconds.*
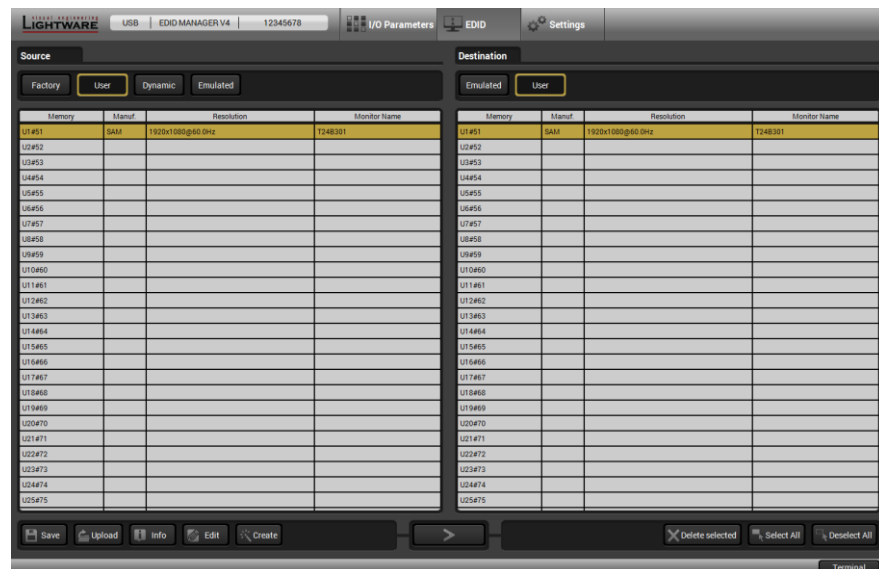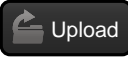
Figure 5-3. EDID Management menu

Control buttons

Save	Exporting an EDID (save to a file)	>	Copying an EDID (Transfer button)
Upload	Importing an EDID (load from a file)	Delete selected	Deleting EDID (from user memory)
Info	Display EDID Summary window	Select All	Selecting all memory places in the right panel
Edit	Opening Advanced EDID Editor with the selected EDID	Deselect All	Selecting none of the memory places in the right panel
Create	Opening Easy EDID Creator		

5.6.1. Sources and Destinations

After the list is downloaded, current status is shown. The EDID memory consists of four parts:

Factory EDID list shows the factory memory locations (Factory 1 – 49) with pre-programmed EDIDs.

Dynamic EDID List contains the resolution, manufacturer and vendor name of the display device connected to the device's outputs. The unit stores the last display devices' EDID on the output, so there is an EDID shown even if there is no display device attached to the output at the moment.

User memory shows the memory locations (U1 – U29) which can be used by the user to save custom EDIDs. These locations can be reached by selecting #51..#79 on the Rotary switches.

Emulated EDID list shows the currently emulated EDID for the input. It contains the resolution, manufacturer and vendor name of the EDID reported to the source. The source column displays the memory location that the current EDID was routed from.

The DVI source reads the EDID from the Emulated EDID memory on the INPUT port. The user can copy an EDID from any of the three EDID lists to the user memory locations.

There are two types of emulation: static and dynamic.

- **Static EDID emulation** happens, when an EDID from the Factory or User EDID list is selected by the Rotary switches. In this case the Emulated EDID will remain the same until the user emulates another EDID.

- **Dynamic EDID emulation** can be enabled by selecting #00 on the Rotary switches. The attached monitor's EDID is copied to the INPUT, if a new monitor is attached to the output, the emulated EDID changes automatically.

5.6.2. Changing the emulated EDID

To change the emulated EDID use the Rotary switches on the front panel of the device.

Info: *If dynamic emulation is established, the emulated EDID will be changed on the INPUT every time a new monitor is connected to the OUTPUT. If the monitor is disconnected from the output, the last EDID remains emulated for the source. 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: *Front panel status change is reported back to the Controller Software.*

5.6.3. Learning an EDID

EDID Manager V4 is able to learn the EDID from a connected display device and store it in one of the user programmable memory locations.

Step 1. Click on the Dynamic button above left window.

Step 2. Click on the User button above right window to select the User EDID memory.

Step 3. Select the EDID from the Dynamic list to be saved.

Step 4. Select the target EDID memory in the User memory.

Step 5. Click on the Transfer button to copy (learn) the EDID.

5.6.4. Exporting an EDID

Source EDID can be downloaded as a file (*.bin, *.dat or *.edid) to the computer.

Step 1. Select the desired EDID from the Source panel (highlighted with yellow cursor).

Step 2. Press the Save button to open the dialog and download the file to the computer.

5.6.5. Importing an EDID

Previously saved EDID (*.bin, *.dat or *.edid file) can be uploaded to the user memory:

Step 1. Press the User button on the top of the Source panel.

Step 2. Select a memory slot from the Source panel.

Step 3. Press the Upload button below the Source panel.

Step 4. Browse the file in the opening window then press the Open button. Browsed EDID is imported into the selected User memory.

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

5.6.6. Deleting EDID(s)

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

Step 1. Press User button on the top of the Destination panel.

Step 2. Select desired memory slot(s); more can be selected (Select All and Deselect All buttons can be used). The EDID(s) will be highlighted with yellow cursor.

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

5.6.7. Creating an EDID

Lightware introduced a wizard-like interface for fast and easy EDID creation. With Easy EDID Creator it is possible to create custom EDIDs in four simple steps. By clicking on the Create button below Source panel, Easy EDID Creator is opened in a new window.
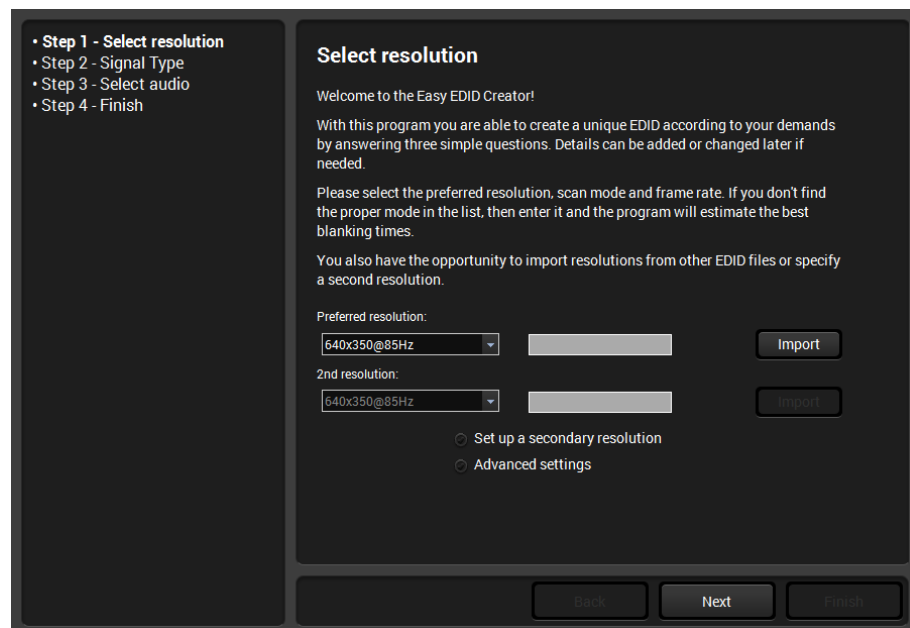
Figure 5-4. Easy EDID creator wizard

Step 1. Select resolution

The preferred resolution can be defined here. There are more ways to define the desired format. You are able to select one from the drop-down list where the most common resolutions are listed.

Step 2. Signal type

You have to decide whether you want to add HDMI support to your EDID or not. Please note that the use of audio, non-RGB color spaces and deep color requires the HDMI mode.

Step 3. Select audio

If you have selected HDMI support in the previous step, specify the desired audio format. The most common audio formats are listed, but the number of possible formats is greater. If you don't find your preferred audio, you are able to add it later by using EDID editor.

Step 4. Finish

You have to give a name to your new EDID as last step. This name will be fit into the display product descriptor, so it can be up to 13 alphanumeric characters long. You also have to select the desired operation: you are able to upload the new EDID to the actually used Lightware product or/and save it to a file or/and open it in the EDID editor.

Info: *For more information about creating and EDID by using EEC see the User's manual of the EDID Editor which is available at www.lightware.eu.*

5.6.8. EDID Summary window

Select an EDID from Source panel and press Info button to display the EDID summary.
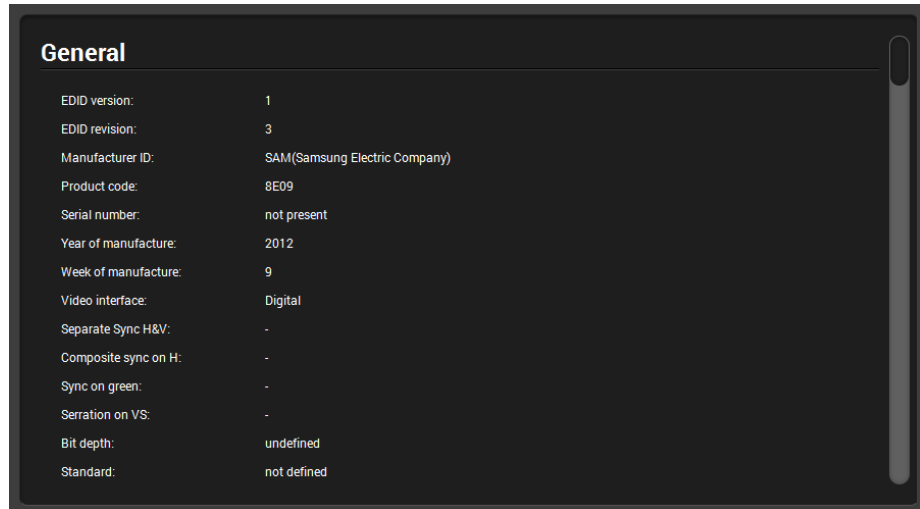
Figure 5-5. EDID Summary

5.6.9. Editing an EDID

Select an EDID from Source panel and press the Edit button to display Advanced EDID Editor window. The editor can read and write all descriptors, which are defined in the standards, including the additional CEA extensions. Any EDID from the device's memory can be loaded in the editor. The software resolves the raw EDID, and displays it as readable information to the user. The modified EDID can be saved to the User memory.
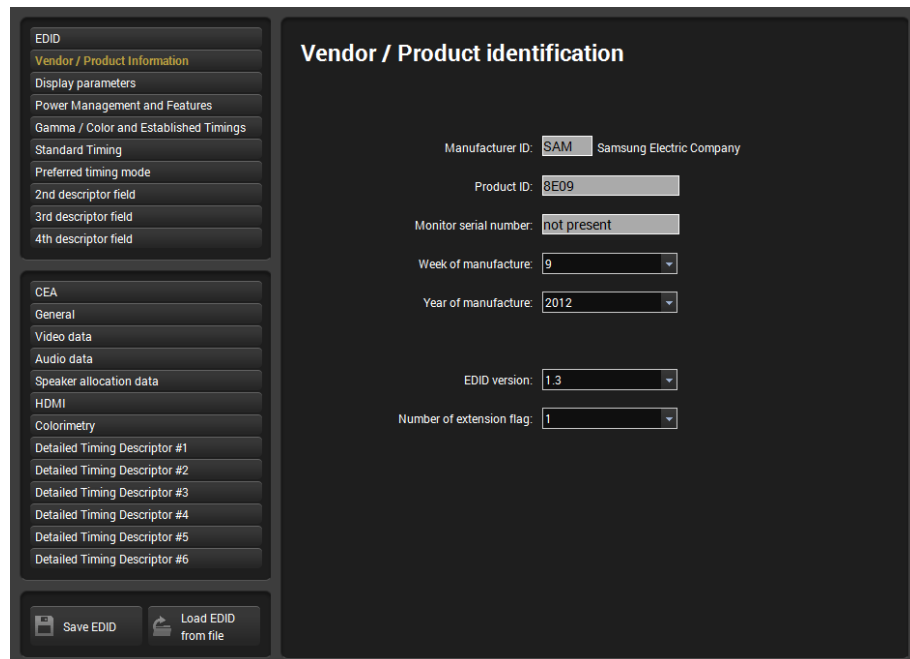
Figure 5-6. Advanced EDID Editor

5.7. Settings menu

5.7.1. Device information tab

Basic information are displayed about the device in this menu: Device type with serial number and installed cards' type with firmware and hardware version.
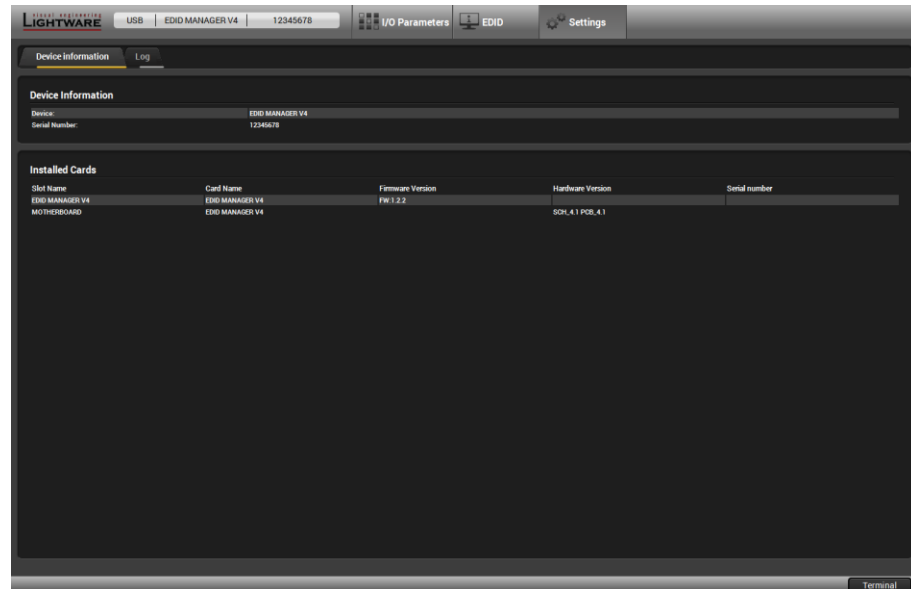
Figure 5-7. Settings menu

5.7.2. Log tab

Report section

Generate report

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

Info: *When a report is necessary to generate, always let the devices be connected to the device, do not disconnect them. The Controller Software will collect information about the devices and about their status.*

Step 1. Press the big red button on the Log tab in the Settings menu: Generate report file.

> Generate report

Step 2. The Save as dialog box appears. Select the place where you want to save the report file. The default file name can be changed.

Step 3. LDC collects the needed information. This may take up to 5 minutes.

Step 4. When the process is finished, the folder is opened, where the file was saved.

The report contains the following information:

- Current command protocol
- The equipment type and serial number
- All EDID headers and status (emulated, dynamic, factory, user)
- Installed I/O board types and firmware with versions

Browse command file

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

> Generate report from file

Info: *This function is only for special troubleshooting cases.*

5.8. Terminal

The terminal is created mainly for testing and debugging purposes. The command text can be typed directly. Press Terminal button in the right bottom corner to open the window.
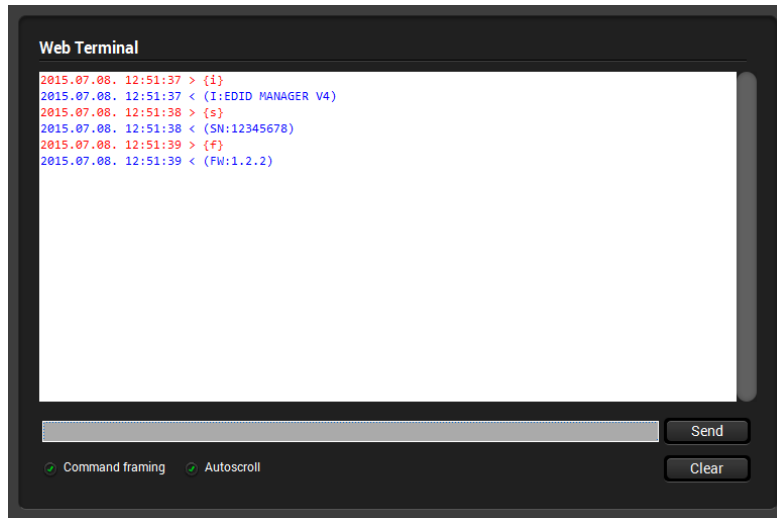
Figure 5-8. Terminal window

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

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

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

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

The window can be emptied by pressing the Clear button.

5.9. Device discovery (information ribbon)

This label shows the interface type, the name and the serial number of

| USB | EDID MANAGER V4 | 12345678 |

the connected device. The Device discovery window can be started by clicking on this ribbon. Clicking Yes will open the window. See section 5.4 on page 22 how to establish the connection. Clicking No will close the pop up window and current connection remains active.

6. Firmware upgrade – Using Lightware Bootloader

EDID Manager V4 can be upgraded via USB connection. During the update process do not to disconnect the USB cable and power adaptor of the device.

Step 1. Install the Lightware Bootloader software: "Installer_LW_bootloader.exe".

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

Step 3. Connect the device with an USB cable to the computer. Wait for the operating system, while it connects to the device.

Info: *If the device is connected the first time, the operating system should recognize it and display "Installing device driver". After the successful installation the device is connected properly. The whole process may take a few seconds.*

Warning! *The user EDID memory will be erased during the upgrade. Make sure to save them before starting the process. Please see section 5.6.4 on page 24.*

Step 4. Run the application from Start Menu → Programs → Lightware → LW_bootloader.

If the device is properly connected, it will be listed under "USB Devices" header.

Warning! *The Bootloader application will hold the device in bootload mode during the bootload process. Once the connection is established with the device (double clicked in the Find window) the firmware must be flashed successfully.*

Step 5. Double click on the EDID MANAGER V4 text, then click on "Yes" to establish connection. It will take a few seconds to download all information.

Info: *During bootload mode the STATUS LED flashes quickly red and green.*

Step 6. Review the firmware versions

After the connection is made, the device properties are displayed.
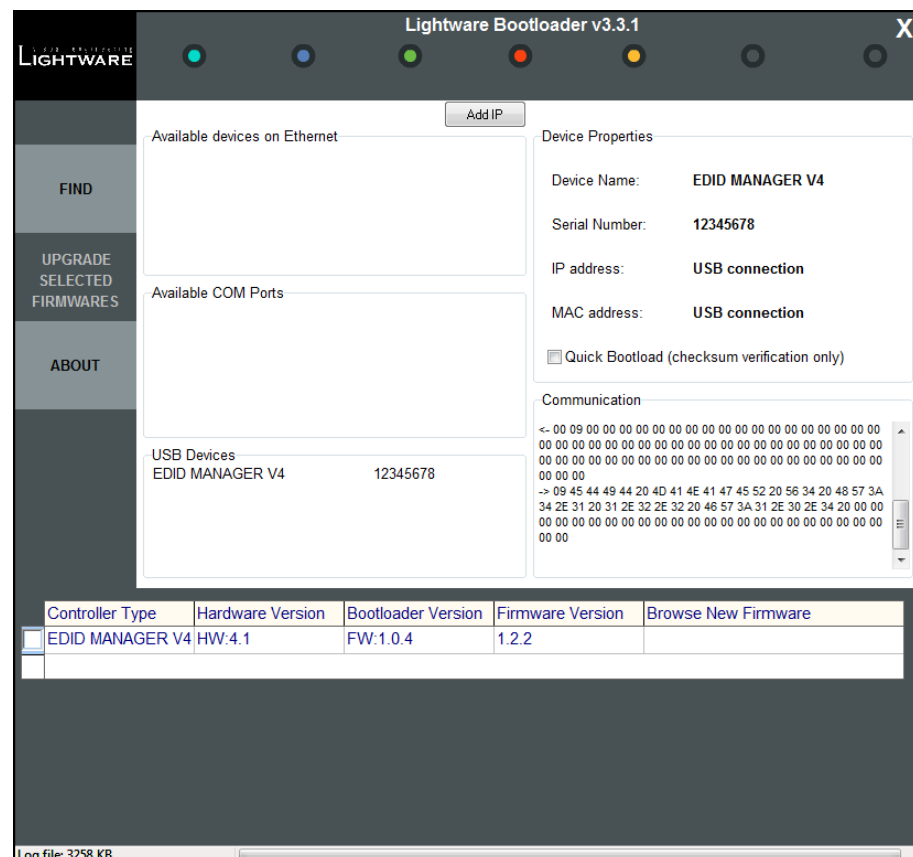
Figure 6-1. Lightware Bootloader Software

Step 7. Browse the new firmware

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.

Click in the checkbox next to the device name to enable the firmware upgrade.

	Controller Type	Hardware Version	Bootloader Version	Firmware Version	Browse New Firmware
☑	EDID MANAGER V4	HW:4.1	FW:1.0.4	1.2.2	EDID_MANAGER_V4_v1.2.2.hex

Figure 6-2. Device and firmware selection

Step 8. Upgrade firmware(s)

Click "UPGRADE SELECTED FIRMWARES" button. A confirmation message appears. After clicking on the "Yes" button the selected controllers will be reprogrammed with the firmware you selected. If you select a file that doesn't fit the selected controller, you will get an information message.

Info: *The reprogramming can take approximately 1 - 2 minutes.*

A progress bar will show the current state of the reprogramming.

	Controller Type	Hardware Version	Bootloader Version	Firmware Version	Browse New Firmware
☑	EDID MANAGER V4	HW:4.1	FW:1.0.4	1.2.2	EDID_MANAGER_V4_v1.2.2.hex

Program/Verify EDID MANAGER V4…

Figure 6-3. Firmware upgrading process

Step 9. Done! If the upgrade was successful, the following window pops up:

UPGRADE PROCEDURE REPORT

EDID MANAGER V4…OK

Total retransmissions:0
Total rewrites:0

Upgrade successful

OK
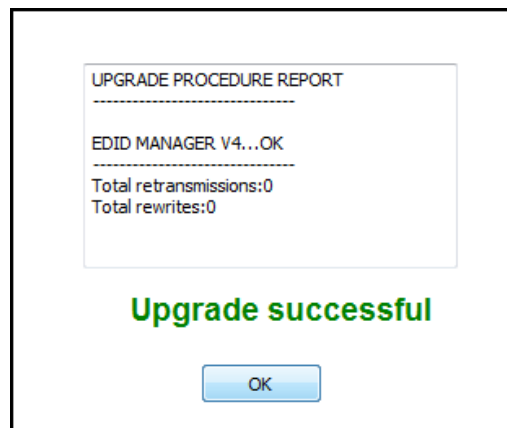
Figure 6-4. Upgrade successful

The application closes the connection, the device state changes back to normal operation. Now you can close the application, or you can select another Lightware device to upgrade. The unit is ready to be used with the new firmware!

7. Troubleshooting

7.1. General problems

Check the device

Check whether the EDID Manager V4 is properly powered and the Power LED is green. Try performing a reset by unplugging and reconnecting the power adaptor.

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

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 by selecting 00# on the front panel Rotary switch. If you get a picture now, you have an EDID related issue, see more information in section 3.1 on page 12.

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 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.

Signal disappears temporally

EDID Manager V4 ensures HDCP functionality, when the HDCP pass-through is enabled. If a new sink device (monitor) is connected while HDCP is enabled, the EDID Manager V4 virtually reconnects the source device to ensure HDCP functionality.

This may cause the picture disappear for a few seconds. The signal stays stable if HDCP pass-through is disabled. If HDCP is not necessary, turn off the HDCP pass-through. See more information in section 4.4 on page 17.

7.3. HDCP issues

Non HDCP compliant display

Many video sources send HDCP protected signal if they detect that the sink is HDCP capable – even if the content is not copyrighted. This can cause trouble if a HDCP capable device (e.g. DVI matrix) is connected between the source and the display. In this case the content can't be viewed on non-DCP capable displays.

Disable HDCP pass-through on the device by switching the rotary switches to address 01# and holding the learn button.

8. Specifications

Supplied power adaptor

Input .... AC 100-240 V, 50~60 Hz, 0.6 A

Output .... DC 5V, 2.6 A

General

Required power supply .... DC 5V, 1.0 A

Power consumption ....1.4 W (typ)

Compliance .... CE

EMI/EMC...EN 55022 Class B

Safety .... Class II

Warranty .... 3 years

Enclosure

Rack mountable ....No

DC power connector ....locking DC connector, 2.5 / 5.5 mm

Material .... 1 mm metal

Dimensions .... 100.4 W x 67.6 D x 26 H mm (3.95 W x 2.66 D x 1.02 H inch)

Net Weight .... 225 g (0.496 lbs)

Input

Connector ....29-pole DVI-I digital only

Input cable equalization ....Yes, +40dB max

EDID emulation.. Yes

HDCP pass-through... Yes

Output

Connector .... 29 pole DVI-I digital only

Reclocking ....No

+5V output current ....500 mA

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 .... Yes

8.1. Mechanical drawings

Dimensions are in mm.

Top view
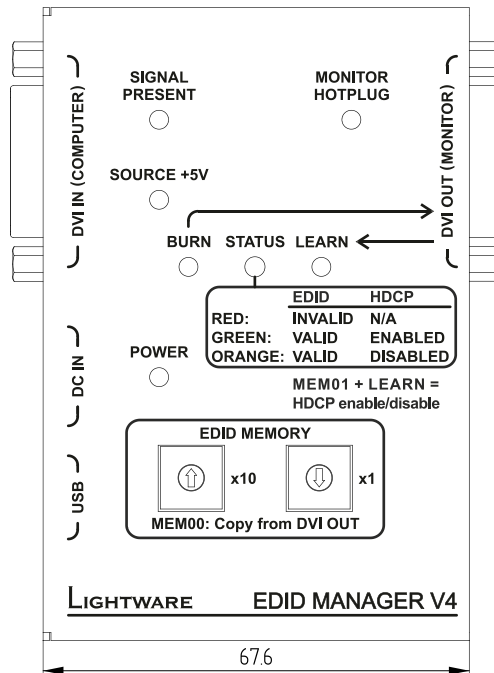
Side view

Bottom view

Side view

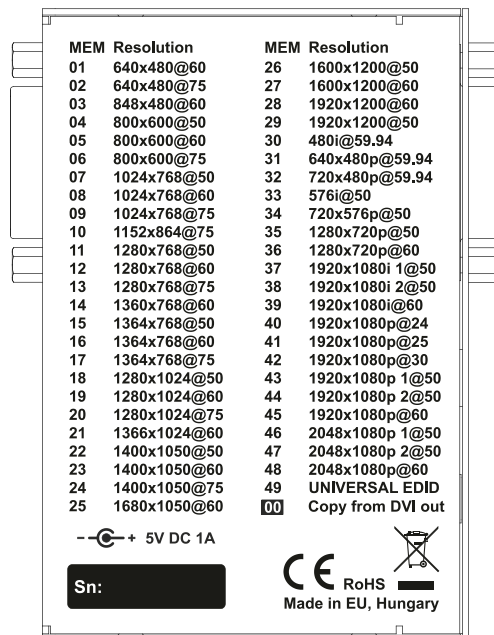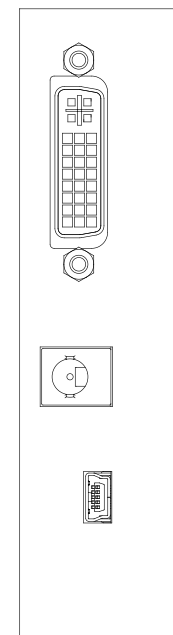| MEM	Resolution	MEM	Resolution
01	640x480@60	26	1600x1200@50
02	640x480@75	27	1600x1200@60
03	848x480@60	28	1920x1200@60
04	800x600@50	29	1920x1200@50
05	800x600@60	30	480i@59.94
06	800x600@75	31	640x480p@59.94
07	1024x768@50	32	720x480p@59.94
08	1024x768@60	33	576i@50
09	1024x768@75	34	720x576p@50
10	1152x864@75	35	1280x720p@50
11	1280x768@50	36	1280x720p@60
12	1280x768@60	37	1920x1080i 1@50
13	1280x768@75	38	1920x1080i 2@50
14	1360x768@60	39	1920x1080i@60
15	1364x768@50	40	1920x1080p@24
16	1364x768@60	41	1920x1080p@25
17	1364x768@75	42	1920x1080p@30
18	1280x1024@50	43	1920x1080p 1@50
19	1280x1024@60	44	1920x1080p 2@50
20	1280x1024@75	45	1920x1080p@60
21	1366x1024@60	46	2048x1080p 1@50
22	1400x1050@50	47	2048x1080p 2@50
23	1400x1050@60	48	2048x1080p@60
24	1400x1050@75	49	UNIVERSAL EDID
25	1680x1050@60	00	Copy from DVI out

Side view

9. Version applicability

This User's Manual applies to the following versions of the mentioned software:

	Version
Lightware Device Controller software	1.4.0b2
Lightware Bootloader software	3.3.1
EDID Manager V4 firmware	1.2.2

10. 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 contact your local representative, or Lightware at

Lightware Visual Engineering

H-1071 Budapest, Peterdy Street 15, HUNGARY

E-mail: support@lightware.eu

11. Document revision history

Document	Release Date	Changes	Editor
Rev. 1.0	21-03-2012	Initial version	Gergely Zubán
Rev. 1.1	10-07-2015	Lightware Device Controller added, Bootloader upgraded, Typographical corrections and minor changes in the formatting.	Laszlo Zsedenyi
Rev. 1.2	15-12-2015	Safety instructions updated, CE page pulled out	Laszlo Zsedenyi