visual engineering
LIGHTWARE

HDMI-OPT-TX200R
HDMI-OPT-TX100R
HDMI-OPT-TX100
HDMI-OPT-RX200R
HDMI-OPT-RX100R
HDMI-OPT-RX100

User's Manual

SAFETY INSTRUCTIONS

Class II apparatus construction.

This 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 top cover will expose dangerous voltages. To avoid personal injury, do not remove the top 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.

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

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.

DECLARATION OF CONFORMITY

We,

Lightware Kft. 15 Peterdy Street, Budapest H-1071, HUNGARY

as manufacturer declare, that the products

HDMI-OPT-TX200R
HDMI-OPT-TX100R
HDMI-OPT-TX100
HDMI-OPT-RX200R
HDMI-OPT-RX100R
HDMI-OPT-RX100
(Computer Monitor Extender)

in accordance with the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EEC is in conformity with the following standards:

EMI/EMC ..... EN 55022 Class B

Safety.....UL, CUL, GS, CR, RCM, PSE, Class II

Date: 12 April 2012

Name: Gergely Vida (Managing Director)

Signed:

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1. Introduction

Dear Customer,

Thank you for choosing Lightware HDMI-OPT series transmitters and receivers. HDMI-OPT-TX200R/100R/100 and HDMI-OPT-RX200R/100R/100 are HDMI over Multimode Fiber Cable extenders which allow deep color video signals of up to 2048x1080@60Hz resolution to be transmitted through 2600 meters of high quality fiber cables.

2. General description

2.1. Box contents

- HDMI-OPT unit (TX200R/TX100R/TX100/RX200R/RX100R/RX100)
- User's manual (this document)
- Quick Start Guide
- +5V wall plug adaptor

2.2. Transmitter features (HDMI-OPT-TX200R/TX100R/TX100)

- **Supports all HDTV resolutions** – 720p, 1080i and 1080p etc. with or without HDCP encoding. Signals with up to 225 MHz pixel clock frequency - regardless of the resolution - are passed through.
- **HDCP compliant** – The HDMI-OPT extenders support HDCP encrypted HDMI signal transmission.
- **Cross compatibility with any Lightware Fiber Optical device** – Cross compatibility between all the devices in the product series is ensured thanks to Lightware's attentive design. Any transmitter can be paired with any receiver without restriction. With Lightware's hybrid modular matrix concept, it is even possible to connect an extender box directly to the matrix router using an MX-HDMI-OPT series input or output board (MX-HDMI-OPT-IB or MX-HDMI-OPT-OB).
- **Front panel control** – EDID address selection with two decimal rotary switches and LEARN button are available for Advanced EDID Management. On the HDMI-OPT-TX200R and TX100R the BAUD RATE rotary switch allows selecting the appropriate speed of serial communication.
- **RS-232 control (TX200R and TX100R)** - The HDMI-OPT-TX200R and TX100R are controllable via the Lightware Matrix Controller PC software. Advanced EDID Management and firmware upgrades are available.
- **Advanced EDID Management (TX200R and TX100R)** – The user can emulate any EDID on the TX200R/TX100R's input. TX200R can read out and store any display device's EDID (attached to the local HDMI output, called MONITOR OUT) in 49 internal memory locations. Green and red EDID status LEDs show whether a valid address is selected.
- **Pixel Accurate Reclocking** – (removes jitter caused by long cables) Each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.
- **Bi-directional RS-232 pass-through (TX200R and TX100R) –** AV systems can also contain serial port controllers and controlled devices. Serial port pass-through supports any unit that works with standard RS-232.

- **Universal power adaptor** – HDMI-OPT transmitters are equipped with a universal +5V DC power adaptor, which accepts AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency.
- **Locking DC connector** – Special plug of wall adaptor ensures safe power supply. This type of connector prevents unwanted extractions.
- **Rack mounting options** – Several mounting methods ensure the universal usage. Units can be placed into standard racks or under flat surfaces.

2.3. Receiver features (HDMI-OPT-RX200R/RX100R/RX100)

- **Supports all HDTV resolutions** – 720p, 1080i and 1080p etc. with or without HDCP encoding. Signals with up to 225 MHz pixel clock frequency - regardless of the resolution - are passed through.
- **HDCP compliant** – The HDMI-OPT extenders support HDCP encrypted HDMI signal transmission.
- **Cross compatibility with any Lightware Fiber Optical device** – Cross compatibility between all the devices in the product series is ensured thanks to Lightware's attentive design. Any transmitter can be paired with any receiver without restriction. With Lightware's hybrid modular matrix concept, it is even possible to connect an extender box directly to the matrix router using an MX-HDMI-OPT series input or output board (MX-HDMI-OPT-IB or MX-HDMI-OPT-OB).
- **Pixel Accurate Reclocking** – (removes jitter caused by long cables) Each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.
- **Bi-directional RS-232 pass-through (RX200R and RX100R)** – AV systems can also contain serial port controllers and controlled devices. Serial port pass-through supports any unit that works with standard RS-232.
- **Universal power adaptor** – HDMI-OPT receiver units are equipped with a universal +5V power adaptor, which accepts AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency.
- **Locking DC connector** – Special plug of wall adaptor ensures safe power supply. This type of connector prevents unwanted extractions.
- **Rack mounting options** – Several mounting methods ensure the universal usage. Units can be placed into standard racks or under flat surfaces.

2.4. Applications

Application examples

- Long distance lossless HDMI or DVI signal transmission
- Ground loop isolation
- Multiroom video and audio control
- Professional AV systems, conference rooms
- High End home cinema
- Yacht installations

Info: *For the compatible Lightware products please see the compatibility table on the Lightware homepage.*

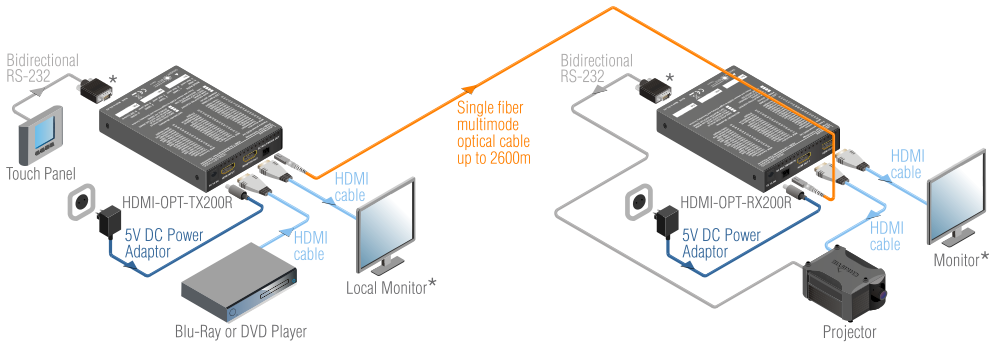


Figure 2-1. Typical stand-alone application for TX200R and RX200R

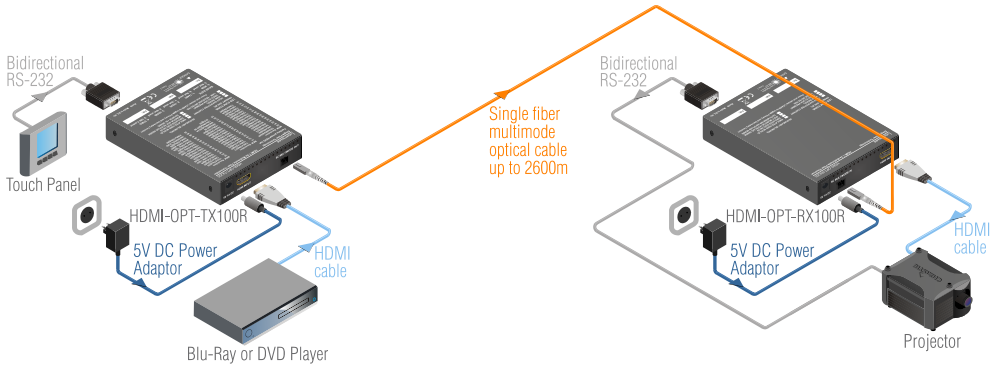


Figure 2-2. Typical stand-alone application for TX100R and RX100R

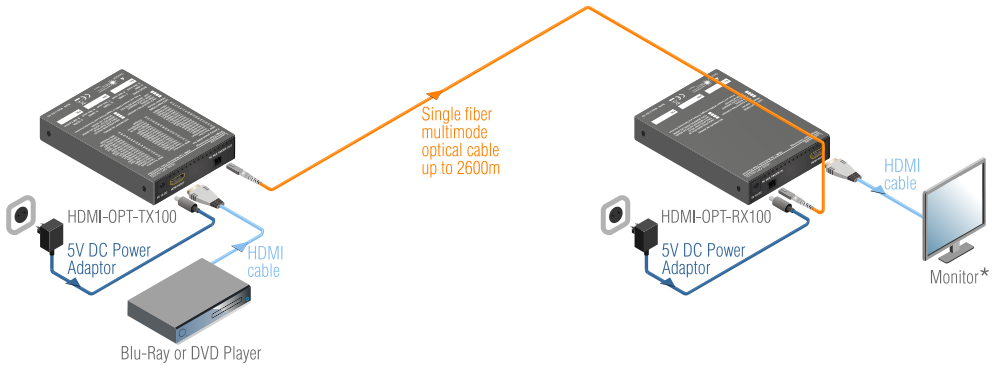


Figure 2-3. Typical stand-alone application for TX100 and RX100

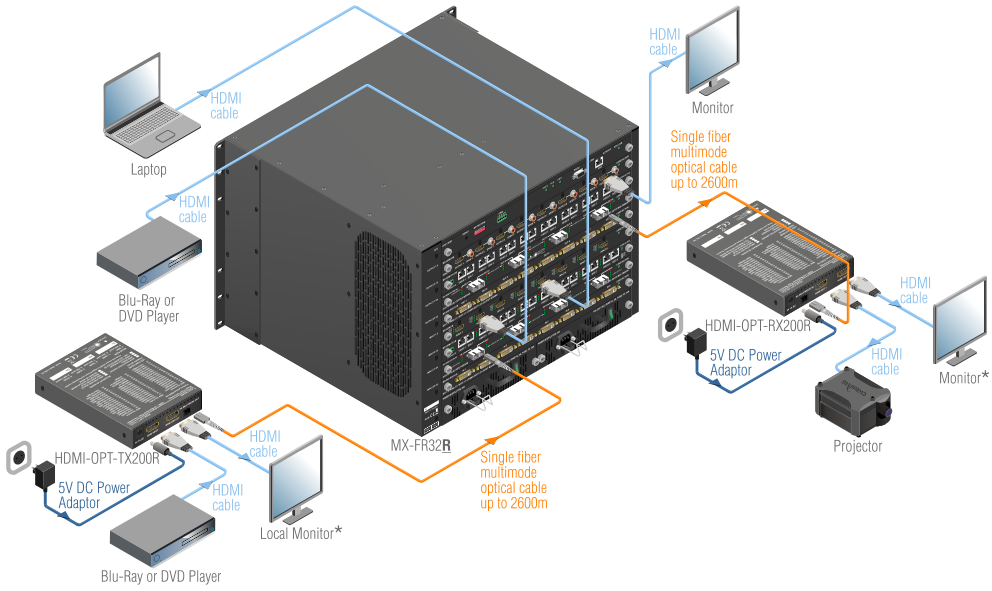


Figure 2-4. Integrated system operation for HDMI-OPT extenders

2.5. Understanding EDID

2.5.1. 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 HDMI source to a HDMI display, the source reads out the EDID to determine the resolution and refresh rate of the image to be transmitted.

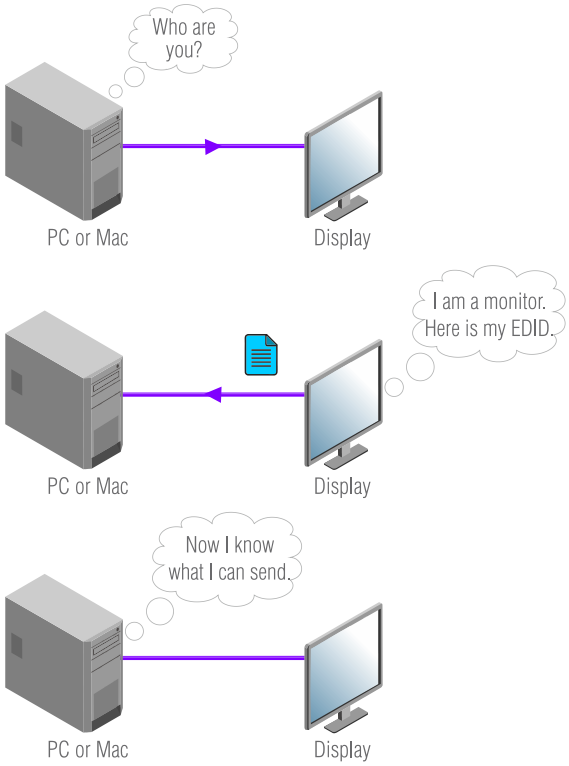


Figure 2-5. EDID communication

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 which have the extension are HDMI capable.

2.5.2. Common problems related to EDID

Problem: „My system consists of the following: a Blu-Ray player, then a Lightware HDMI-OPT-TX200R, a WUXGA (1920x1200) LCD as local monitor, then a HDMI-OPT-RX200R connected to an SXGA (1280x1024) projector and an UXGA (1600x1200) monitor. I would like to see the same image on the monitors and the projector. What EDID should I chose on the HDMI-OPT-TX200R?" See typical application in section 2.4.

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

Problem: „I turned the rotary switches on the HDMI-OPT-TX200R to have a different resolution but nothing happens."

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

Problem: „I have a HDMI-OPT-TX200R 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.

2.6. Advanced EDID Management

Each 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. HDMI standard makes use of EDID data structure for the identification of the monitor type and capabilities. Most HDMI sources (VGA cards, set top boxes, etc.) will output HDMI signal after accepting the connected sink's EDID information. In case of EDID readout failure or missing EDID the source will not output HDMI video signal.

HDMI-OPT-TX200R and TX100R provide Lightware's Advanced EDID Management function that helps system integration.

TX100R stores and emulates 99 EDIDs. TX200R stores and emulates 99 EDIDs plus the EDIDs of the display devices which connected to local HDMI output, called MONITOR OUT. Memory addresses #01..#50 are factory presets, while memories #51..#99 are user programmable in the case of both transmitters.

The EDID emulated on the HDMI input can be copied from the TX200R/TX100R's memory (static EDID emulation) or from the last attached monitor (dynamic EDID emulation) in case of TX200R. For example, the HDMI-OPT-TX200R can be set up to emulate the device, which is connected to local HDMI output, 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 HDMI cable to change an EDID as opposed to other manufacturer's products. EDID can be changed even if a source is connected to the input and it is powered ON.*

Info *When EDID has been changed, TX200R/TX100R/TX100 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.*

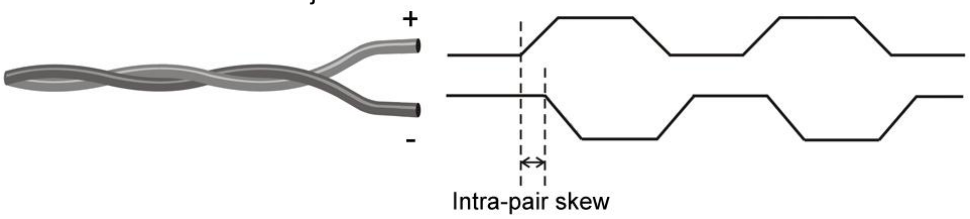
2.7. Pixel Accurate Reclocking

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

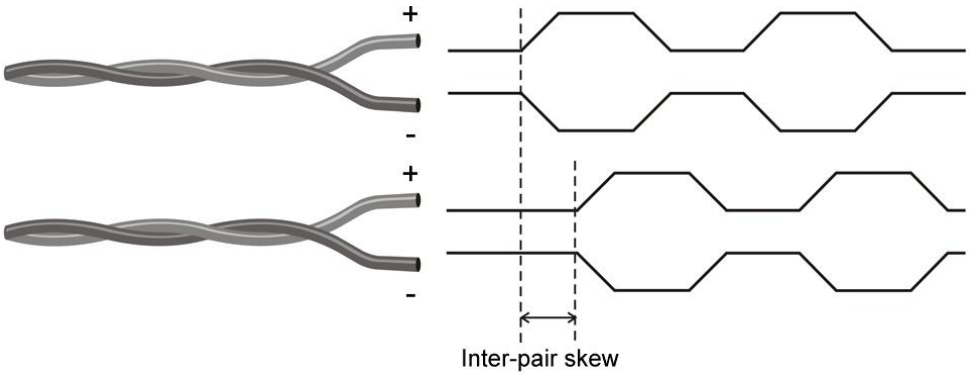
Lightware's sophisticated Pixel Accurate Reclocking technology fixes more problems than general TMDS reclocking. It removes not only intra-pair skew but inter-pair skew as well.

The Pixel Accurate Reclocking circuit eliminates the following errors:

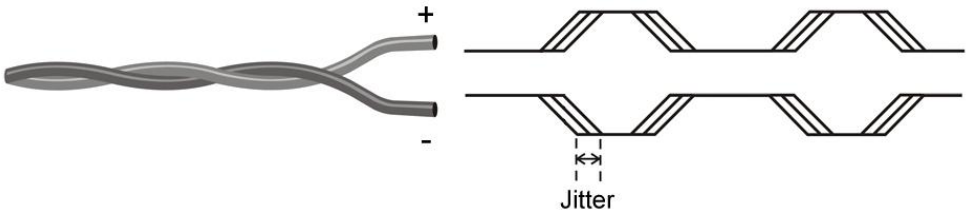
Intra-pair skew: skew between the + and - wires within a differential wire pair (e.g. Data2- and Data2+). It's caused by different wire lengths or slightly different wire construction (impedance mismatch) in HDMI cable. It results in jitter.



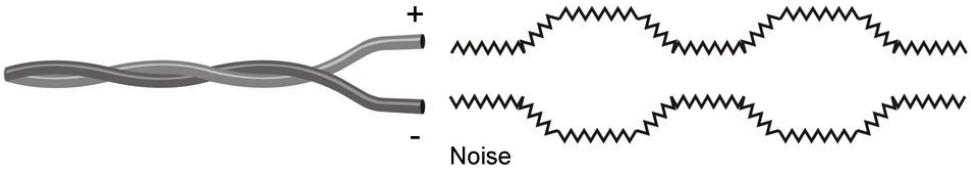
Inter-pair skew: skew between two differential wire pairs in a cable. It's caused by different wire pair lengths or different number of twists in the HDMI cable. Too much inter-pair skew results in color shift in the picture or sync loss.



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



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



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

3. Controls and connections

3.1. HDMI-OPT-TX200R front view

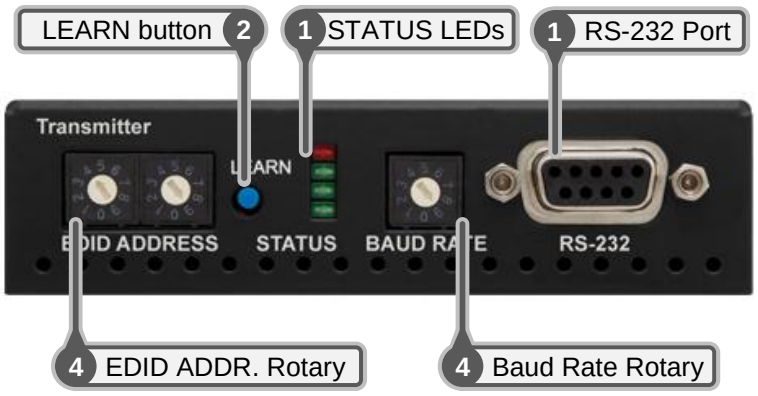


Figure 3-1. Front view

1	**Status LEDs**	The LEDs give feedback about the state of units and video signal. For more information about names and meanings of the Status LEDs see chapter *4.4.1.*
2	**LEARN button**	Stores the EDID of the display device attached to local HDMI output, called MONITOR OUT in the selected memory address between #51..#99. To learn the EDID, select an appropriate address with the rotary switches and press and hold the Learn button for two seconds. For more information see chapter *4.4.2.* Toggles the LED functions between PRIMARY (SOLID) and SECONDARY (BLINKING). For more information see chapter *4.4.1.*
3	**RS-232 Port**	9-pole D-sub female connector. Connect a serial cable between the transmitter unit and the desired serial device. See sections *3.13.2* and *4.2* for more information about usage of serial port.
4	**Rotary switches**	The rotary switches select one of 99 addresses. EDID memories #1..#50 contain factory presets and #51..#99 are user programmable. Address #00 enables dynamic EDID emulation which copies EDID from local HDMI output, called MONITOR OUT. For more information, see chapter *4.4.3.*
5	**Baud Rate Rotary**	The rotary switch selects one of 5 speeds of the serial communication (#0..#4) or the Software Control mode (#9). For more information see chapter *4.2.4.*

Info: *Use a flat head screwdriver that fits into the rotary switches' actuator. Avoid the use of keys, coins, knives and other sharp objects because they might cause permanent damage to the rotary switches.*

3.2. HDMI-OPT-TX200R rear view

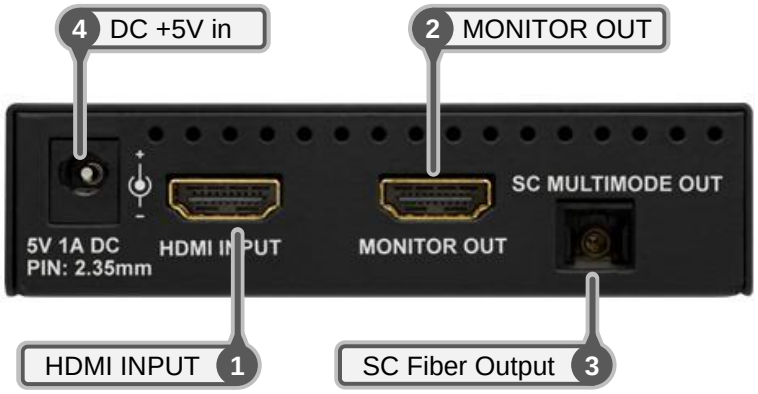


Figure 3-2. Rear view

1	**HDMI INPUT**	Connect one HDMI cable between the HDMI source and the transmitter unit. For more information see chapter *3.13.1.*
2	**MONITOR OUT**	Connect one HDMI cable between the local display device and the transmitter unit. For more information see chapter *3.13.1.*
3	**SC Fiber Output**	Connect a multimode single fiber optical cable between the transmitter unit and the receiver unit (or a Lightware Hybrid Modular Matrix equipped with optical input card).
4	**DC +5V in**	Connect the output of the supplied +5V DC power adaptor. **CAUTION! Warranty void if damage occurs due to use of a different power source.** For more information see chapter *4.3.*

3.3. HDMI-OPT-RX200R front view

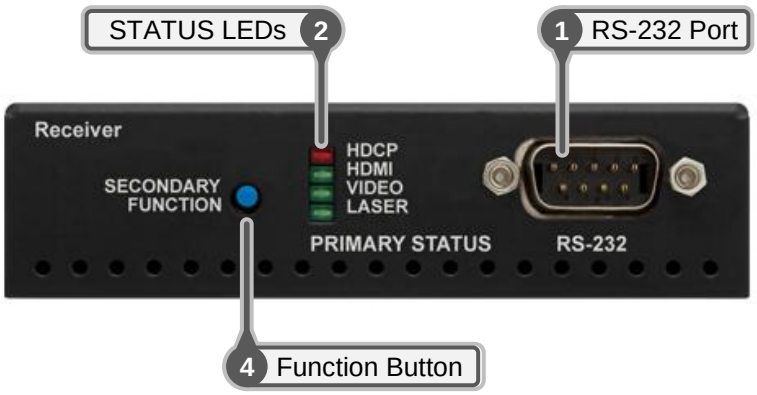


Figure 3-1. Front view

1	**Status LEDs**	The LEDs give feedback about the state of units and video signal. For more information about names and meanings of the Status LEDs see chapter 4.4.1.
2	**RS-232 Port**	9-pole D-sub male connector. Connect a serial cable between the receiver unit and the desired serial device. See sections 3.13.2 and 4.2 for more information about usage of serial port.
3	**Function Button**	Toggles the LED functions between PRIMARY (SOLID) and SECONDARY (BLINKING). For more information see chapter 4.4.1.

3.4. HDMI-OPT-RX200R rear view

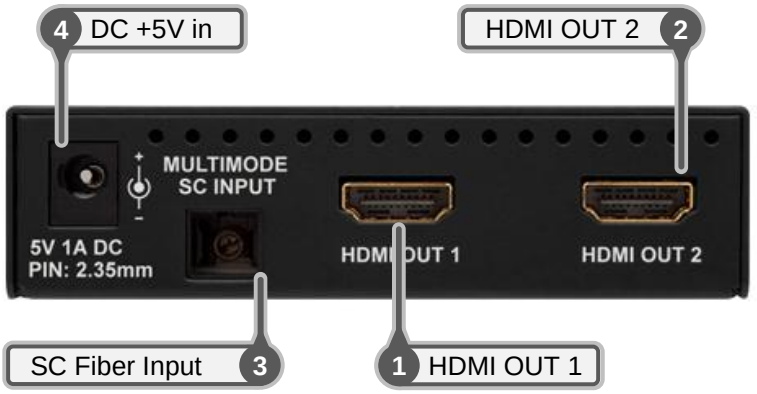


Figure 3-2. Rear view

1	**HDMI OUT 1**	Connect one HDMI cable between the receiver and the first display device. For more information see chapter 3.13.1.
2	**HDMI OUT 2**	Connect one HDMI cable between the receiver and the second display device. For more information see chapter 3.13.1.
3	**SC Fiber Input**	Connect a multimode single fiber optical cable between the receiver and the transmitter (or a Lightware Hybrid Modular Matrix equipped with optical output card).
4	**DC +5V in**	Connect the output of the supplied +5V DC power adaptor. **CAUTION! Warranty void if damage occurs due to use of a different power source.** For more information see chapter 4.3.

3.5. HDMI-OPT-TX100R front view

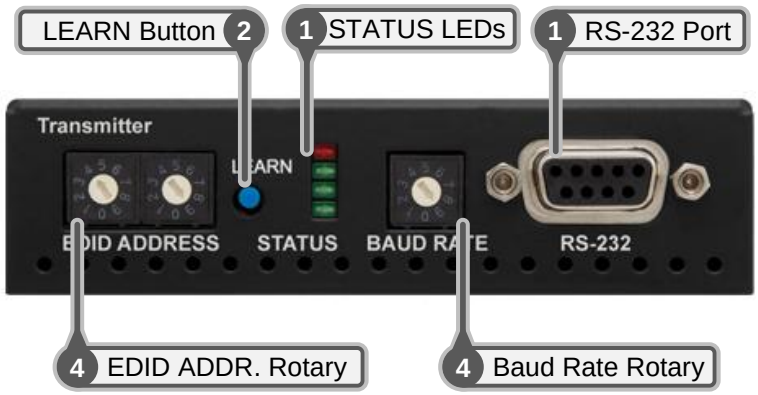


Figure 3-3. Front view

1	**Status LEDs**	The LEDs give feedback about the state of units and video signal. For more information about names and meanings of the Status LEDs see chapter *4.4.1.*
2	**LEARN button**	Toggles the LED functions between PRIMARY (SOLID) and SECONDARY (BLINKING). For more information see chapter *4.4.1.*
3	**RS-232 Port**	9-pole D-sub female connector. Connect a serial cable between the transmitter unit and the desired serial device. See sections *3.13.2* and *4.2* for more information about usage of serial port.
4	**Rotary switches**	The rotary switches select one of 99 addresses. EDID memories #1..#50 contain factory presets and #51..#99 are user programmable. For more information, see chapter *4.4.3.*
5	**Baud Rate Rotary**	The rotary switch selects one of 5 speeds of the serial communication (#0..#4) or the Software Control mode (#9). For more information see chapter *4.2.4.*

Info: *Use a flat head screwdriver that fits into the rotary switches' actuator. Avoid the use of keys, coins, knives and other sharp objects because they might cause permanent damage to the rotary switches.*

3.6. HDMI-OPT-TX100R rear view

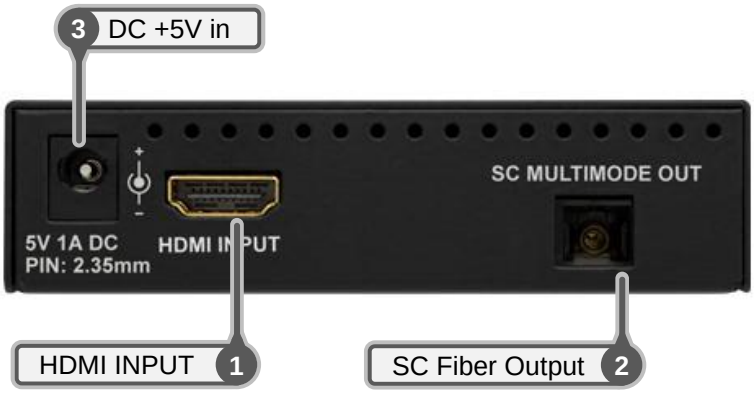


Figure 3-4. Rear view

1	**HDMI INPUT**	Connect one HDMI cable between the HDMI source and the transmitter unit. For more information see chapter *3.13.1.*
2	**SC Fiber Output**	Connect a multimode single fiber optical cable between the transmitter unit and the receiver unit (or a Lightware Hybrid Modular Matrix equipped with optical input card).
3	**DC +5V in**	Connect the output of the supplied +5V DC power adaptor. **CAUTION! Warranty void if damage occurs due to use of a different power source.** For more information see chapter *4.3.*

3.7. HDMI-OPT-RX100R front view

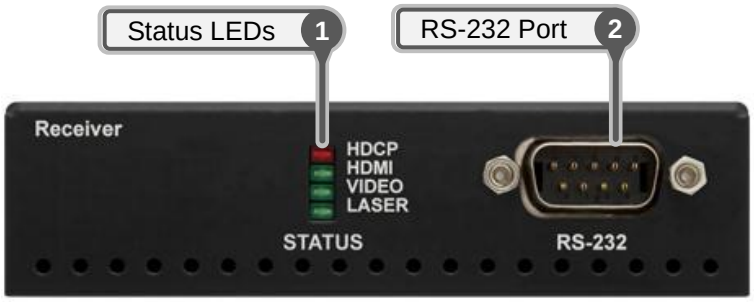


Figure 3-5. Front view

1	**Status LEDs**	The LEDs give feedback about the state of units and video signal. For more information about names and meanings of the Status LEDs see chapter *4.4.1.*
2	**RS-232 Port**	9-pole D-sub male connector. Connect a serial cable between the transmitter unit and the desired serial device. See sections *3.13.2* and *4.2* for more information about usage of serial port.

3.8. HDMI-OPT-RX100R rear view

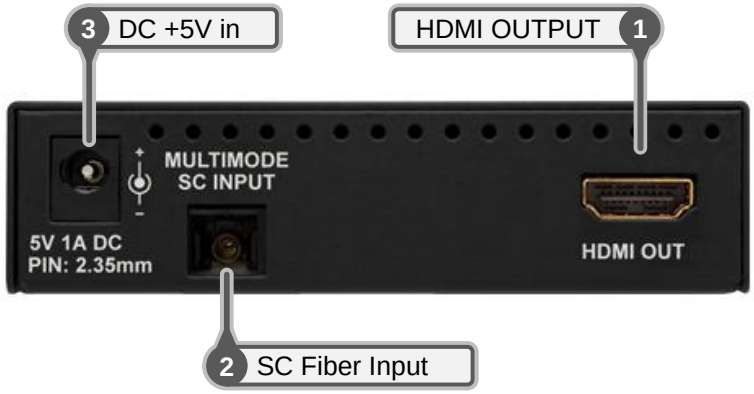


Figure 3-6. Rear view

1	**HDMI OUT**	Connect one HDMI cable between the receiver unit and the display device. For more information see chapter *3.13.1.*
2	**SC Fiber Input**	Connect a multimode single fiber optical cable between the receiver unit and the transmitter unit (or a Lightware Hybrid Modular Matrix equipped with optical output card).
3	**DC +5V in**	Connect the output of the supplied +5V DC power adaptor. **CAUTION! Warranty void if damage occurs due to use of a different power source.** For more information see chapter *4.3.*

3.9. HDMI-OPT-TX100 front view

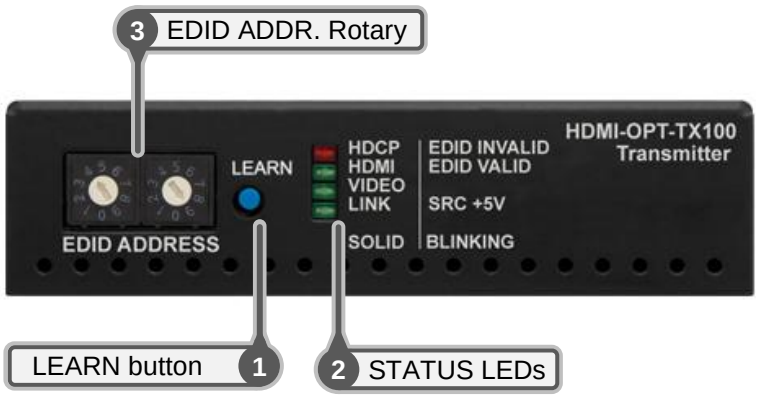


Figure 3-7. Front view

1	**Status LEDs**	The LEDs give feedback about the state of units and video signal. For more information about names and meanings of the Status LEDs see chapter *4.4.1.*
2	**LEARN button**	Toggles the LED functions between PRIMARY (SOLID) and SECONDARY (BLINKING). For more information see chapter *4.4.1.*
3	**Rotary switches**	The rotary switches select one of 99 addresses. EDID memories #1..#50 contain factory presets and #51..#99 are user programmable. For more information, see chapter *4.4.3.*

Info: *Use a flat head screwdriver that fits into the rotary switches' actuator. Avoid the use of keys, coins, knives and other sharp objects because they might cause permanent damage to the rotary switches.*

3.10. HDMI-OPT-TX100 rear view

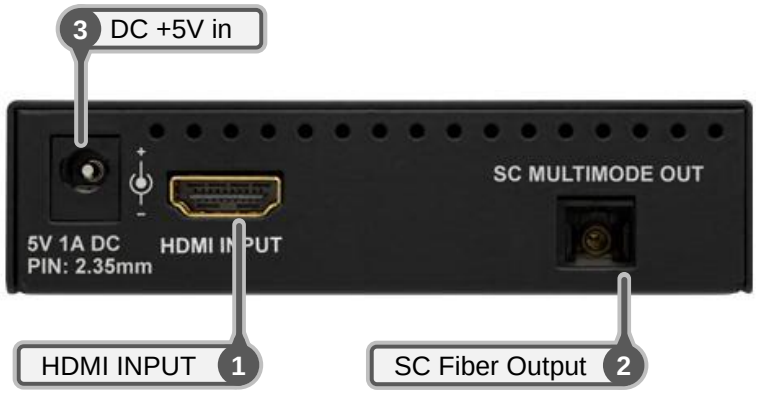


Figure 3-8. Rear view

1	**HDMI INPUT**	Connect one HDMI cable between the HDMI source and the transmitter unit. For more information see chapter *3.13.1.*
2	**SC Fiber Output**	Connect a multimode single fiber optical cable between the transmitter unit and the receiver unit (or a Lightware Hybrid Modular Matrix equipped with optical input card).
3	**DC +5V in**	Connect the output of the supplied +5V DC power adaptor. **CAUTION! Warranty void if damage occurs due to use of a different power source.** For more information see chapter *4.3.*

3.11. HDMI-OPT-RX100 front view

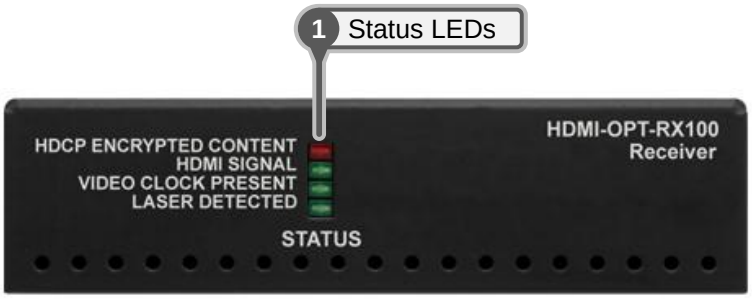


Figure 3-9. Front view

1	**Status LEDs**	The LEDs give feedback about the state of units and video signal. For more information about names and meanings of the Status LEDs see chapter *4.4.1.*

3.12. HDMI-OPT-RX100 rear view

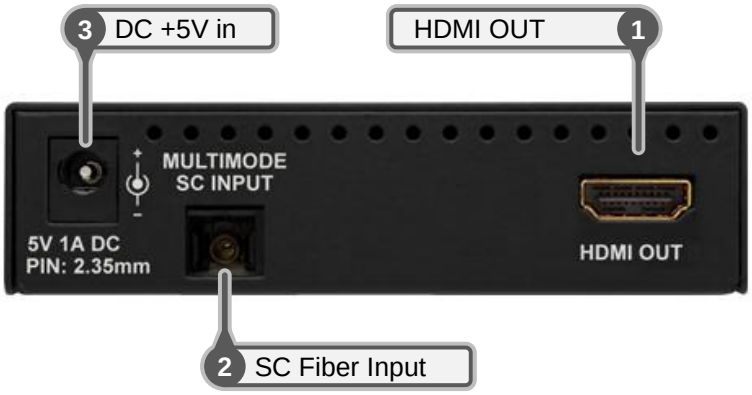


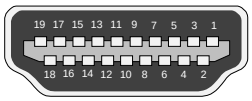
Figure 3-10. Rear view

1	**HDMI OUT**	Connect one HDMI cable between the receiver unit and the display device. For more information see chapter *3.13.1.*
2	**SC Fiber Input**	Connect a multimode single fiber optical cable between the receiver unit and the transmitter unit (or a Lightware Hybrid Modular Matrix equipped with optical output card)
3	**DC +5V in**	Connect the output of the supplied +5V DC power adaptor. **CAUTION! Warranty void if damage occurs due to use of a different power source.** For more information see chapter *4.3.*

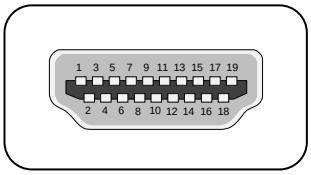
3.13. Electrical connections

3.13.1. HDMI Inputs and Outputs

HDMI-OPT units provide standard 19 pole HDMI connectors for inputs and outputs. Always use high quality HDMI cable for connecting sources and displays.



HDMI Type A receptacle



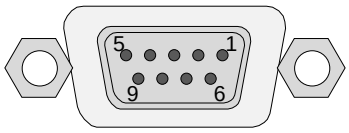
HDMI Type A Plug

Pin	Signal	Pin	Signal
1	TMDS Data2+	**11**	TMDS Clock Shield
2	TMDS Data2 Shield	**12**	TMDS Clock–
3	TMDS Data2–	**13**	CEC
4	TMDS Data1+	**14**	Reserved
5	TMDS Data1 Shield	**15**	SCL
6	TMDS Data1–	**16**	SDA
7	TMDS Data0+	**17**	DDC/CEC/HEC Ground
8	TMDS Data0 Shield	**18**	+5 V Power (max 50 mA)
9	TMDS Data0–	**19**	Hot Plug Detect
10	TMDS Clock+		

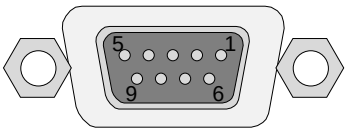
Table 3-11. HDMI connector pin assignments

3.13.2. RS-232 connectors

HDMI-OPT-TX200R/TX100R and HDMI-TP-RX200R/RX100R have standard 9 pin female and male D-subminiature receptacle.



D-sub 9-pin female (DE9F)



D-sub 9-pin male (DE9M)

Pin nr.	RS-232 straight pin-out	RS-232 cross pin-out
1	NC - non connected	NC - non connected
2	**TX data transmit (output)**	**RX data receive (input)**
3	**RX data receive (input)**	**TX data transmit (output)**
4	DTR (Internally connected to Pin 6)	DTR (Internally connected to Pin 6)
5	**GND signal ground (shield)**	**GND signal ground (shield)**
6	DSR (Internally connected to Pin 4)	DSR (Internally connected to Pin 4)
7	RTS (Internally connected to Pin 8)	RTS (Internally connected to Pin 8)
8	CTS (Internally connected to Pin 7)	CTS (Internally connected to Pin 7)
9	NC - non connected	NC - non connected

Table 3-12. D-sub connector pin assignment for standard RS-232

4. Installation and operation

4.1. Mounting of HDMI-OPT units

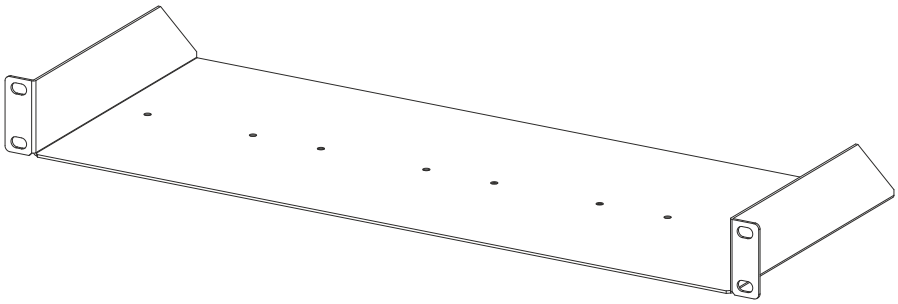
To fix extender units Lightware ensures optional accessories for different usage. All kind of mounting kits have the similar fixing method. OPT fiber extender units have two mounting hole with inner thread on the bottom side. Fasten the device by screwing the enclosed M3x6 mm cross recessed, countersunk head screws (DIN 965A) through two holes of the shelf into the OPT's mounting hole.

To order mounting accessories please contact Lightware LLC.

4.1.1. Rack shelf

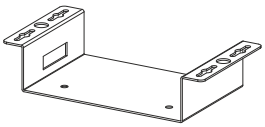
Allows rack mounting for half-rack, quarter-rack and pocket sized units.

1U high rack shelf provides mounting holes for fastening two half-rack or four quarter-rack sized units. Pocket sized devices can also be fastened on the self.



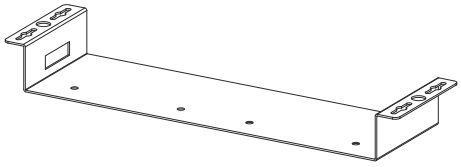
4.1.2. Under desk mounting kit

The UD kit allows pocket sized units to be easily mounted on any flat surface (e.g. furniture)



4.1.3. Under desk mounting kit double

The UD-kit double makes it easy to mount a single device or multiple devices on any flat surface (e.g. furniture).



4.2. Connecting serial devices

4.2.1. General information about serial communication

There are two type of devices in general serial communication:

- **Data Terminal Equipment** – Data Terminal Equipment (DTE) is an end instrument that converts user information into signals or reconverts received signals. Typical DTE devices: computers, LCD touch panels and control systems.
- **Data Circuit-terminating Equipment –** Data Circuit-terminating Equipment (DCE) is a device that sits between the DTE and a data transmission circuit. It also called data communication equipment and data carrier equipment. Typical DCE devices: projectors, industrial monitors and amplifiers.

Among others the pin assignment is different between DTE and DCE.

	DTE	**DCE**
Pin 2:	RD	TD
Pin 3:	TD	RD

RD: Received Data (digital input)
TD: Transmitted Data (digital output)

Info: *HDMI-OPT transmitters (TX200R, TX100R) are DCE units and receivers (RX200R, RX100R) are DTE units according to their pin-out.*

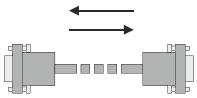
Different type of serial cables must be used between different serial devices.

	DTE	**DCE**
DTE	Null-modem	Straight
DCE	Straight	Null-modem*

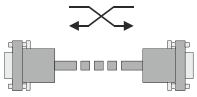
* in general contact DCE with DCE by tail-circuit serial cable.

4.2.2. Type of serial cables

- **Straight serial cable –** straight pin-outs both ends



- **Null-modem serial cable –** straight pin-out at the one end and cross pin-out at the other end. (Interchange lines of TX and RX). For the detailed pin-outs see section *3.13.2.*



Serial cables between devices may have male or female plugs and their type may be straight or null-modem in usual.

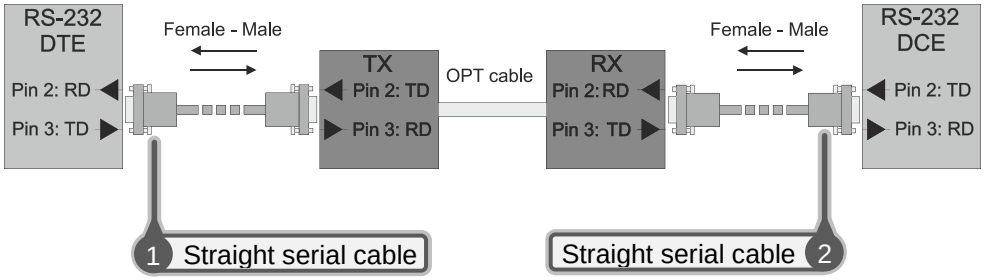
Info *The cable type does not depend on the plug type.*

4.2.3. Example connection diagrams

The following cases are examples. Devices may have different receptacles and pin-outs.

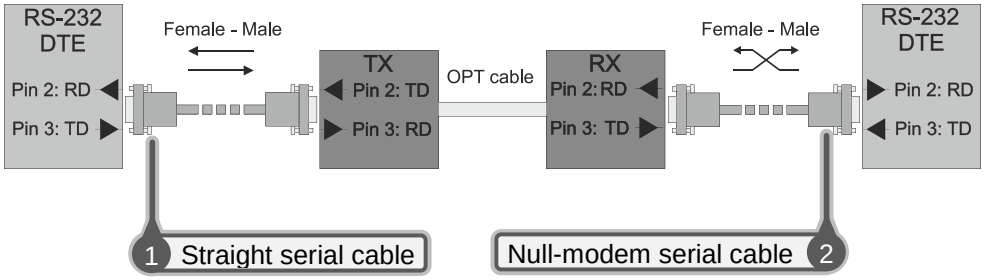
- **To extend RS-232 between controller system (DTE) and projector (DCE).**

  Connect straight serial cable between controller system (DTE) and the transmitter (DCE) and straight serial cable between receiver (DTE) and projector (DCE).



- **To extend RS-232 between computer (DTE) and computer (DTE).**

  Connect straight serial cable between controller system (DTE) and the transmitter (DCE) and null-modem serial cable between receiver (DTE) and computer (DTE).



4.2.4. Setting up the baud rate (TX200R/TX100R)

HDMI-OPT units use some of the standard timings for the RS-232 pass-through. To work the bidirectional serial communication well between serial ending devices users must choose the proper baud rate on the transmitter units. Please read the serial devices' user's manual to find the appropriate baud rates. The best one is both devices' most common value.

If the communication speed ability of a serial device is unknown use the lowest (#0: 9600) value.

To use Lightware Matrix Controller or Lightware Bootloader software select the #9 position (SW Control).

BAUD RATE

0: 9600	**1: 14400**	**2: 19200**	**3: 38400**	**4: 57600**
5: Not used	**6: Not used**	**7: Not used**	**8: Not used**	**9: SW Control**

4.3. Powering devices

4.3.1. Powering HDMI-OPT extender units

Warning! *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.*

4.3.2. Boot up of HDMI-OPT extender units

After the system is complete, connect the output of the +5V Power Adaptor to the HDMI-OPT unit.

The special locking DC plug provides safe connection. Plug the connector into the +5V 1A DC IN receptacle and twist 90° clockwise to lock it. Plug the adaptor into the electric outlet. The unit is immediately powered ON.

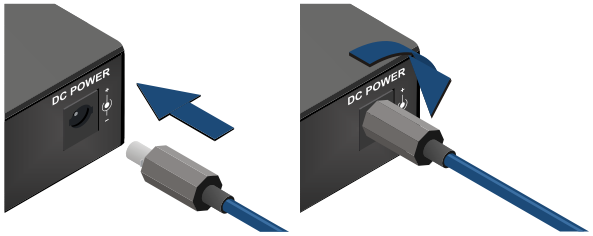


Figure 4-1. Locking DC plug

After being powered on, the HDMI-OPT unit flashes two times all the LEDs one by one.

After the LED flashing, HDMI-OPT unit checks the video output(s): reads EDID if there is a Hot Plug signal and authenticates devices in case of HDCP encryption. This procedure takes approximately two seconds.

HDMI-OPT unit does not store the LED function setting so after booting it starts with the PRIMARY (SOLID) mode.

After the HDMI-OPT unit is initialized, the attached HDMI source and monitor(s) can be powered on.

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*

4.4. Operation of HDMI-TX200R/RX200R/RX100RA

4.4.1. Front panel LEDs

To save space and simplify readability HDMI-OPT unit uses only four LEDs to inform users about the connections and the video signals. Because of the low numbers of LEDs two modes and several functions are used for display information.

Modes:

Two modes are available. In PRIMARY (SOLID) mode LEDs light continuously and give information about the incoming connection and video signal. In SECONDARY (BLINKING) mode LEDs blink and give information about EDID management and outgoing connections. Push down and release the LEARN button to change between PRIMARY and SECONDARY mode.

Info: *LED modes were made for only showing information and do not affect applying changes with front panel's controls. The user can choose or learn EDID in either LED modes, even though the actual state is not visible.*

Legends:

The legend shows the LEDs' color and short description about the meaning can be found on the device's metal housing:

HDMI-OPT-TX200R

PRIMARY (SOLID)	SECONDARY (BLINKING)
R HDCP ENCRYPTED CONTENT	R EMULATED EDID INVALID
G HDMI SIGNAL	G EMULATED EDID VALID
G VIDEO CLOCK PRESENT	G MONITOR OUT HOTPLUG SENSE
G LINK - RECEIVER DETECTED	G SOURCE +5V SENSE

HDMI-OPT-TX100R

PRIMARY (SOLID)	SECONDARY (BLINKING)
R HDCP ENCRYPTED CONTENT	R EMULATED EDID INVALID
G HDMI SIGNAL	G EMULATED EDID VALID
G VIDEO CLOCK PRESENT	G
G LINK - RECEIVER DETECTED	G SOURCE +5V SENSE

HDMI-OPT-TX100

PRIMARY (SOLID)	SECONDARY (BLINKING)
R HDCP ENCRYPTED CONTENT	R EMULATED EDID INVALID
G HDMI SIGNAL	G EMULATED EDID VALID
G VIDEO CLOCK PRESENT	G
G LINK - RECEIVER DETECTED	G SOURCE +5V SENSE

HDMI-OPT-RX200R

PRIMARY (SOLID)	SECONDARY (BLINKING)
R HDCP ENCRYPTED CONTENT	R
G HDMI SIGNAL	G
G VIDEO CLOCK PRESENT	G OUT1 MONITOR HOTPLUG SENSE
G LASER DETECTED	G OUT2 MONITOR HOTPLUG SENSE

HDMI-OPT-RX100R

HDCP
HDMI
VIDEO
LASER

HDMI-TP-RX100

HDCP ENCRYPTED CONTENT
HDMI SIGNAL
VIDEO CLOCK PRESENT
LASER DETECTED

PRIMARY (SOLID) mode

- **HDCP ENCRYPTED CONTENT or HDCP —** Indicates if the source signal is HDCP encrypted.
- **HDMI SIGNAL or HDMI —** Indicates the type of the video signal. In case of existing HDMI signal the LED lights continuously. In case of existing DVI signal the LED is off and the VIDEO CLOCK PRESENT LED is lights continuously.
- **VIDEO CLOCK PRESENT or VIDEO —** Indicates if a valid HDMI clock signal is present on the transmitters' HDMI INPUT or the receivers' SC MULTIMODE IN connector.
- **LINK – RECEIVER DETECTED —** Indicates if a powered receiver (e.g. HDMI-OPT-RX200R) is connected to the transmitter and they can communicate over the fiber optical cable.
- **LASER DETECTED or LASER —** Indicates if a powered transmitter (e.g. HDMI-OPT-TX200R) is connected to the receiver and they can communicate over the fiber optical cable.

SECONDARY mode

- **EMULATED EDID INVALID (TX200R/TX100R/TX100)**

  Function 1: The LED lights red if the selected EDID is invalid or empty memory selected.

  Function 2: After applying a Hot Plug signal(s) to the OUTPUT(s), this LED indicates that the unit is trying to read the EDID from the connected display device, but the EDID is invalid or missing.

  Function 3: After pressing the LEARN button, this LED's blinking indicates if the learn process was unsuccessful.

- **EMULATED EDID VALID (TX200R and RX200 and RX100RA)**

  Function 1: The LED lights green if the selected EDID is valid.

  Function 2: After applying a Hot Plug signal(s) to the OUTPUT(s), this LED indicates that the unit is reading the EDID from the connected display device and the EDID is valid.

  Function 3: After pressing the LEARN button, this LED's blinking indicates if the learn process was successful.

- **MONITOR OUT HOTPLUG SENSE / OUT1 MONITOR HOTPLUG SENSE and OUT2 MONITOR HOTPLUG SENSE**

  Function 1: Indicates if a powered display device (or matrix switcher, repeater, etc.) is connected to the HDMI output connector and sends a valid hotplug signal on pin 19 through the HDMI cable.

- **SOURCE +5V SENSE**

  Function 1: Indicates if a powered source unit (computer, DVD or Blu-Ray player, etc.) is connected to the HDMI INPUT connector and sends a valid +5V signal on pin 18 through the HDMI cable.

4.4.2. Learning the EDID (TX200R)

The factory preset EDIDs cannot be changed by the user. Only addresses #51..#99 are user programmable.

Info *HDMI-OPT-TX200R can learn EDID with LEARN BUTTON from local HDMI output called MONITOR OUT.*

After connecting the sink device to the TX200R's MONITOR OUT use a screwdriver to select an empty memory address. EDIDs are stored in a multiple programmable non-volatile memory.

If the red EDID status LED (EMULATED EDID INVALID LED) is illuminated, then the memory slot is empty and ready to be programmed. If the green EDID status LED (EMULATED EDID VALID LED) is illuminated, the memory was already used before, but still available for programming.

Push the LEARN button on the front side of the device and hold it down for approximately 3 seconds.

Once the button is pushed the EDID status LEDs go dark. If the EDID storing was successful, the green EDID status LED blinks four times and stays illuminated. Now the stored EDID is automatically emulated.

If the storing was unsuccessful, the red EDID status LED blinks four times and either the red or green EDID status LED becomes illuminated, depending on the previous status of the selected EDID address.

Info *The last attached monitor's EDIDs are stored automatically, until a new monitor is attached to the MONITOR OUT. In case of powering the unit off, the last attached monitor's EDID remains in non-volatile memory.*

Info *As a matter of fact TX200R always learns the stored last attached monitor's EDID into the user programmable EDID memory.*

4.4.3. Switching the EDID

Use a screwdriver to change the memory address on the front side of the HDMI-OPT-TX200R/TX100R/TX100.

After either one of the rotary switches has been rotated, the unit waits approximately 2 seconds before the selected EDID becomes active. If the EDID status is unchanged the EDID status LEDs do not blink, but stay continuously lit.

The address #00 has a special function in case of TX200R. If a monitor is connected to the MONITOR OUT, then its EDID is copied to the HDMI INPUT connector. If no monitor is connected to the MONITOR OUT then the EDID transmitted to the INPUT connector is the EDID of the last connected monitor.

Info *If an invalid EDID is selected, the TX200R/TX100R/TX100 does NOT give a HOT PLUG signal to the HDMI INPUT.*

Info *After every EDID change, TX200R/TX100R/TX100 toggles the HOT PLUG signal for approx. 1 second. Some graphic 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.*

4.4.4. Factory preset EDID list

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

All of the memories (also include #49 - universal EDID) contain EDIDs supporting various embedded audio formats for HDMI audio.

Lightware 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 recommended for fast and easy system setup.

MEMORY	Resolution		MEMORY	Resolution
#01	640x480 @60 Hz		**#26**	1600x1200 @50 Hz
#02	640x480 @75 Hz		**#27**	1600x1200 @60 Hz
#03	848x480 @60 Hz		**#28**	1920x1200 @60 Hz
#04	800x600 @50 Hz		**#29**	1920x1200 @50 Hz
#05	800x600 @60 Hz		**#30**	480i @59.94 Hz
#06	800x600 @75 Hz		**#31**	640x480 @59.94 Hz
#07	1024x768 @50 Hz		**#32**	720x480p @60 Hz
#08	1024x768 @60 Hz		**#33**	576i @50 Hz
#09	1024x768 @75 Hz		**#34**	720x576p @50 Hz
#10	1152x864 @75 Hz		**#35**	1280x720p @50 Hz
#11	1280x768 @50 Hz		**#36**	1280x720p @60 Hz
#12	1280x768 @60 Hz		**#37**	1920x1080i1 @50 Hz
#13	1280x768 @75 Hz		**#38**	1920x1080i2 @50 Hz
#14	1360x768 @60 Hz		**#39**	1920x1080i @60 Hz
#15	1364x768 @50 Hz		**#40**	1920x1080p @24 Hz
#16	1364x768 @60 Hz		**#41**	1920x1080p @25 Hz
#17	1364x768 @75 Hz		**#42**	1920x1080p @30 Hz
#18	1280x1024 @50 Hz		**#43**	1920x1080p1 @50 Hz
#19	1280x1024 @60 Hz		**#44**	1920x1080p2 @50 Hz
#20	1280x1024 @75 Hz		**#45**	1920x1080p @60 Hz
#21	1366x1024 @60 Hz		**#46**	2048x1080p1 @50 Hz
#22	1400x1050 @50 Hz		**#47**	2048x1080p2 @50 Hz
#23	1400x1050 @60 Hz		**#48**	2048x1080p @60 Hz
#24	1400x1050 @75 Hz		**#49**	UNIVERSAL EDID
#25	1680x1050 @50 Hz		**#50**	2560x1600 @60 Hz

Table 4-2. Factory Preset EDID list

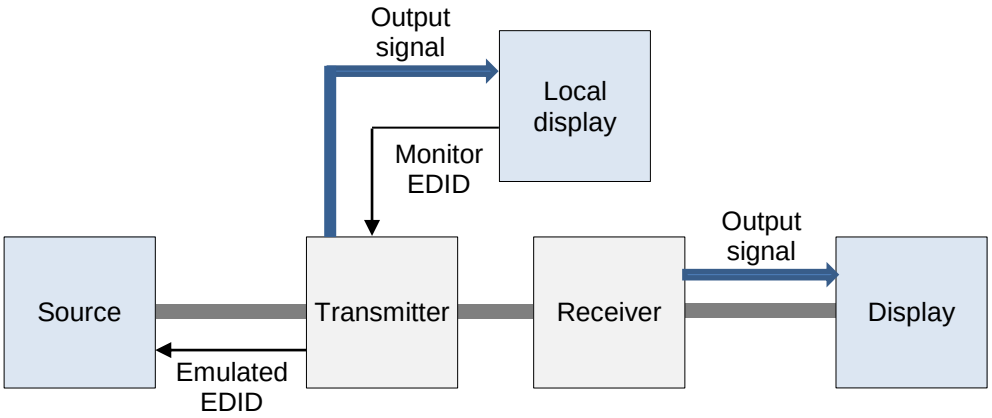
Info *The first 50 EDID (#1..#50 inclusive) are factory preprogrammed and cannot be modified. These are the most commonly used resolutions.*

Info *HDMI-OPT units can handle both 128 Byte EDID and 256 Byte extended EDID structures.*

4.5. Output Settings

HDMI-OPT unit is able to recognize the type of the incoming video signal and set automatically the proper one to the output.

Auto output mode function determines the output signal (DVI or HDMI) by the source, emulated EDID and the connected device's EDID on the local MONITOR OUT. Table below text contains the possible cases of the signals' type.



	Source	Emulated EDID	Loc. monitor EDID	Output signal will be
1	DVI	DVI or HDMI	DVI or HDMI	DVI
2	HDMI	DVI	DVI or HDMI	DVI
3	HDMI	HDMI	DVI	DVI
4	HDMI	HDMI	HDMI	HDMI

In the case of the highlighted row (HDMI source, HDMI emulated EDID but only DVI capable monitor) colorspace converting problems can appear. HDMI standard supports RGB and YUV (also known YCbCr) colorspaces but DVI supports only the RGB. HDMI-OPT units do not support colorspace conversion between HDMI YUV and RGB. If the source sends HDMI signal with YUV colorspace settings and the sink device can work only in RGB mode the color components can be mismatched during the process. Monitor recognize Y component as R, Cb as G and Cr as B. It causes wrong colors and the embedded audio frame of HDMI will be lost.

In Most of the HDMI sources the colorspace can be set manually by the user. If not, an EDID must be used which does not support YUV colorspace. This kind of EDID can be made easily with Lightware Matrix Controller software. For the detailed instructions see chapter *5.5.3.*

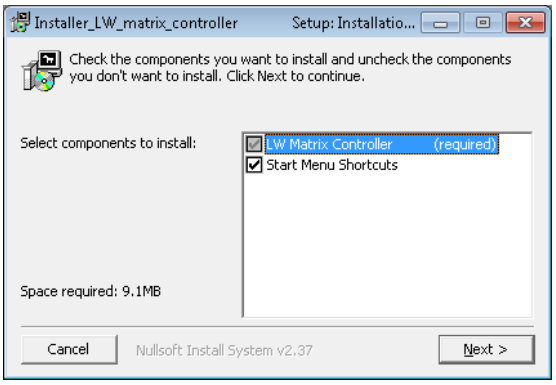
Info: *EDIDs without CEA extension effect RGB colorspace but these EDIDs do not support HDMI embedded audio.*

5. Software control – Using Lightware Matrix Controller

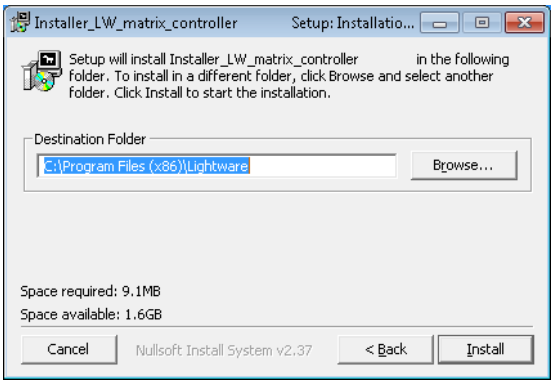
The device can be controlled using Lightware Matrix Controller from a Windows PC or Laptop through USB connection.

5.1. Installing the Matrix Controller software

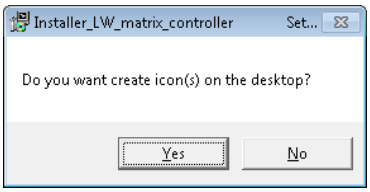
Step 1. Run Installer_LW_matrix_controller_vXXX.exe



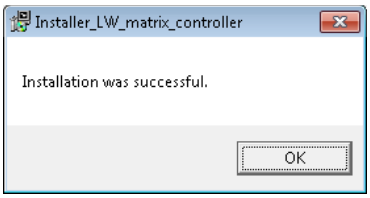
Step 2. Select destination folder and click Install (Using the default path is highly recommended)



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:



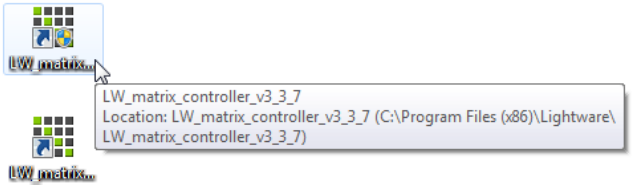
Uninstalling

To uninstall the control software click on: Start menu → Programs → Lightware → Uninstall_LW_matrix_controller_vXXX.exe

5.2. Establishing the connection

Step 1. Connect the transmitter unit and the computer via straight serial cable or the receiver unit and the computer via null-modem serial cable.

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.

Step 3. After the welcome screen a Device discovery dialog appears automatically. Double click on the COM1 port and the HDMI-OPT-TX200R/TX100R with serial number is going to appear in a few seconds.

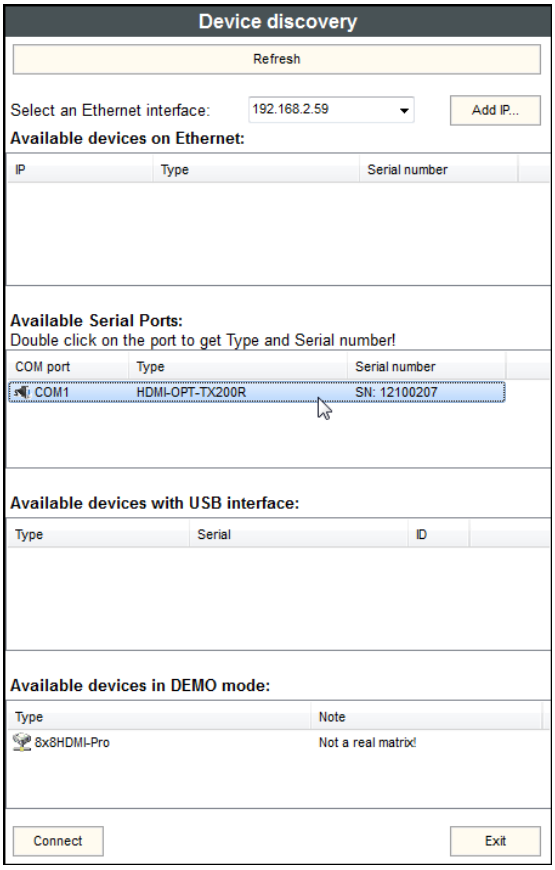


Figure 5-2. Serial Port connection

Step 4. Select the device, and click on the Connect button.
When the Lightware Matrix Controller finds the hardware, it determines the product type, and the control menu appears.

Info: *If the device is not listed, try searching again, or reconnect the device and restart the application.*

5.3. Control menu

Figure 5-3. Control menu (input and output connected)

This menu displays the current state of the device. The input port (I1) of the device is on the top, the output ports (O1 and O2) is on the right side.

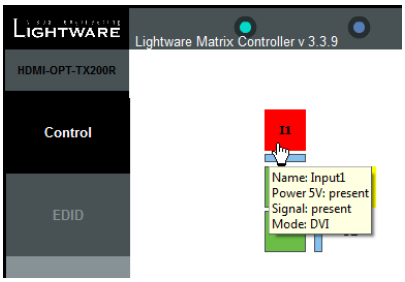
Please see the color code legend below:

	Background color	Status	Signal
Input (I)	white	no source detected	-
	yellow	source connected	+5V from the source present
	orange	source signal detected	DVI signal present
	blue	source signal detected	HDMI signal present
Output(O)	white	no sink device detected	-
	yellow	sink connected	Monitor hotplug present

Table 5-1. Control Software color codes

5.4. Input Properties (TX200R)

To show the input properties move the mouse over the input (I1). The popup window appears automatically.



Name	Name of the Input.
Power 5V	Shows if the source is connected and sends the +5V DC. (present / none)
Signal	Shows if video signal is available on the input. (present / none)
Mode	Shows the kind of video signal (HDMI/DVI/?)

5.5. EDID menu (TX200R/TX100R)

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 on the green arrow in the top left corner. This segment contains the EDID editor. The lower segment is the EDID preset 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 device. It may take a few seconds.*

5.5.1. EDID 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 EDID for the HDMI INPUT. It contains the resolution, manufacturer and vendor name of the EDID reported to the source. The emulated EDID can only be selected by the rotary switches on the INPUT, to keep consistency.

The **Last attached Monitor's EDID List** contains the resolution, manufacturer and vendor name of the display device connected to the device's MONITOR OUT. The unit remembers the last display devices' EDID on the output, so there is an EDID shown even if there is no display device attached to the HDMI-OPT-TX200R's MONITOR OUT at the moment.

The **Factory EDID List** shows the factory preprogrammed EDID information on the #01..#50 memory locations. These locations can be reached by selecting #01..#50 on the EDID ADDRESS rotary switches.

The **User Memory** shows the user programmable, custom EDID information on the #51..#99 memory locations. These locations can be reached by selecting the EDID ADDRESS rotary switches.

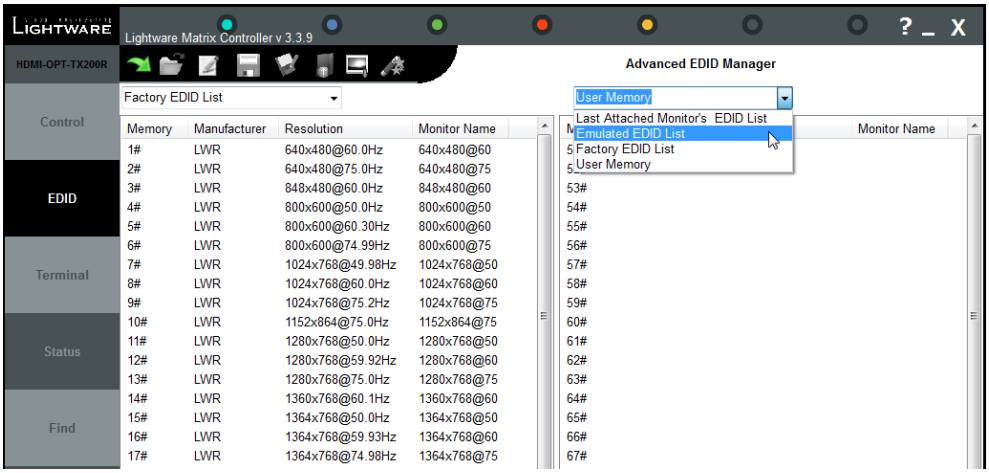


Figure 5-1. EDID Management menu

The HDMI source reads the EDID from the Emulated EDID memory on the HDMI 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 EDID ADDRESS 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.

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 HDMI INPUT every time a new monitor is connected to the MONITOR OUT. 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.*

Learning EDID from attached display device via software

The HDMI-OPT-TX200R/RX100R 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 device and to save it as an EDID file in .dat, .bin and .edid (Christie X20) file formats.

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, select the file type, and press Save button. After the process is completed, an “EDID saved!” message confirms the command.

Load EDID from file to memory

The HDMI-TP-TX200R/RX200R/RX100RA is able to load EDID from a file located on the computer and store it. EDIDs 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, an “EDID Upload completed” message appears.

5.5.2. 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 makes it 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 device’s memory or a saved EDID file can be loaded in the editor. The software translates 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 device’s memory.

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

Figure 5-2. Open Advanced EDID Editor

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

All EDID in the unit’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.

Info: *Software & manual: http://www.lightware.eu/index.php/support-/downloads*

5.5.3. Make an EDID without YUV colorspace supporting

Step 1. Open Advanced EDID Editor.

Step 2. Open an EDID which has CEA extension.

Step 3. Left click General line in the CEA category

Step 4. Choose NO for YUV444 support and YUV422 support

Step 5. Save the EDID to a file.

Step 6. Upload the saved EDID into User Memory

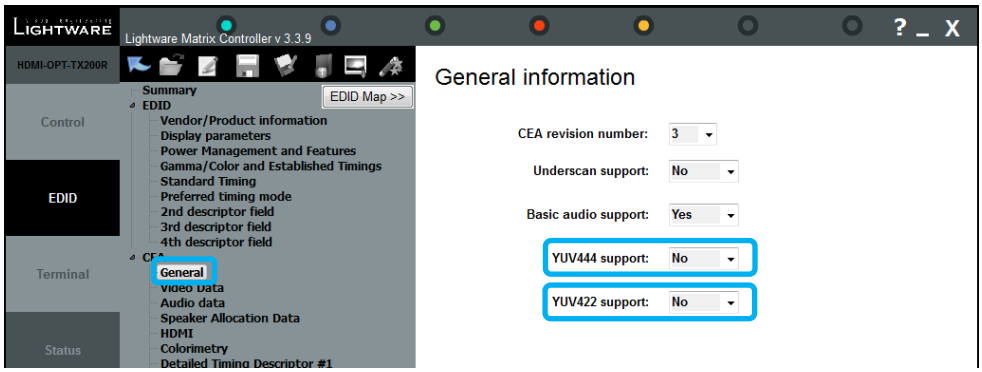


Figure 5-3. General settings

5.5.4. 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.

Figure 5-4. Open Easy EDID Creator

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

Info: *Software & manual: http://www.lightware.eu/index.php/support-/downloads*

5.6. Terminal menu

This general-purpose terminal is intended mainly for test and debug purposes. After a successful connection is established with a device it can be used via the COM1 serial connection.

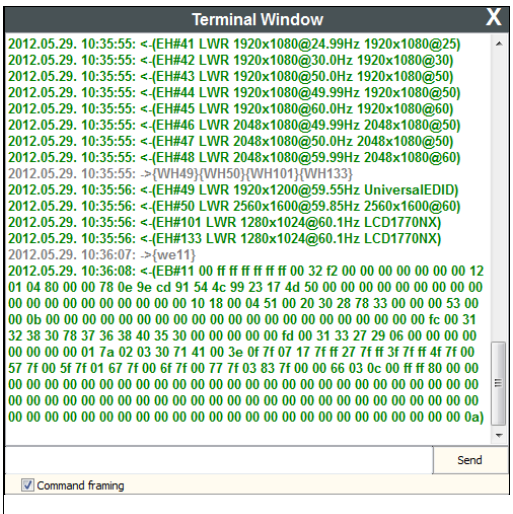


Figure 5-5. Terminal window

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.

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

5.7. Status menu

The firmware and hardware revisions are displayed in this window.

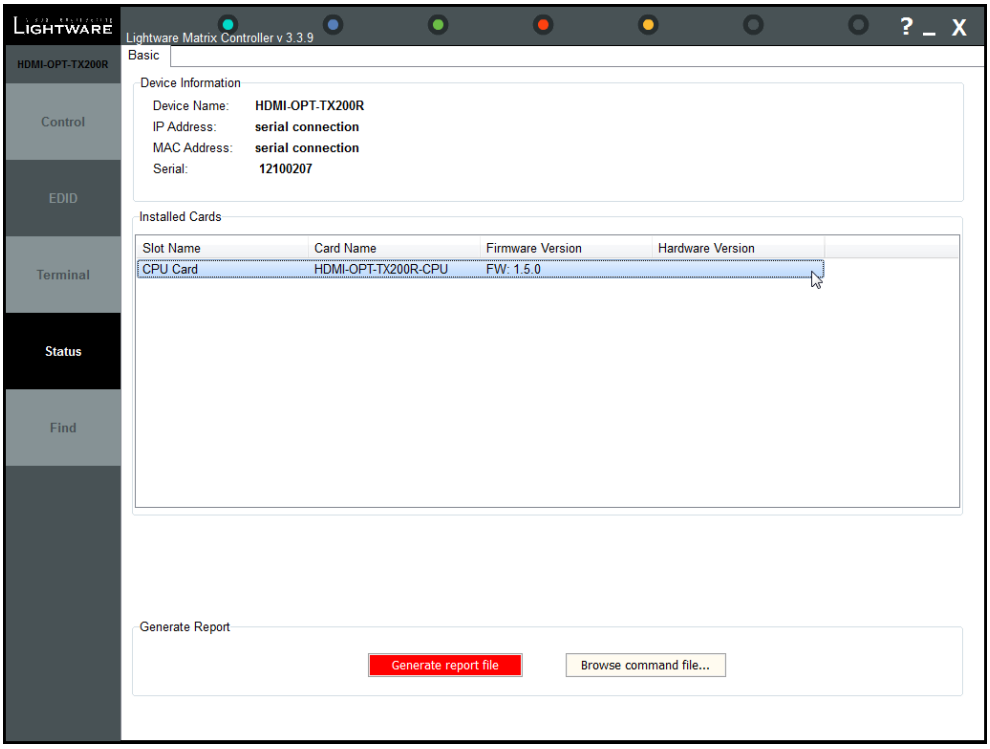


Figure 5-6. Status menu

5.8. Find menu

By clicking on this menu, the available devices can be rescanned on the serial port, USB 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 on Yes will open the Find window. See section 5.2 (*Establishing the connection*).

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

6. Firmware upgrade

Warning: *All EDIDs in the User Memory will be lost after the firmware upgrade. Save the user EDIDs before processing the upgrade.*

Using Lightware bootloader application to upgrade the firmware

The HDMI-OPT-TX200R/TX100R/RX200R/RX100R is upgradeable via serial connection. During the update process do not to disconnect the serial 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 transmitter unit with a serial cable to the computer.

Step 4. Start the transmitter unit in bootload mode:

a) Turn the EDID ADDRRESS rotary switches into #99 position

b) Turn the BAUD RATE rotary switch into #9 position

c) Connect the +5V DC to the transmitter unit

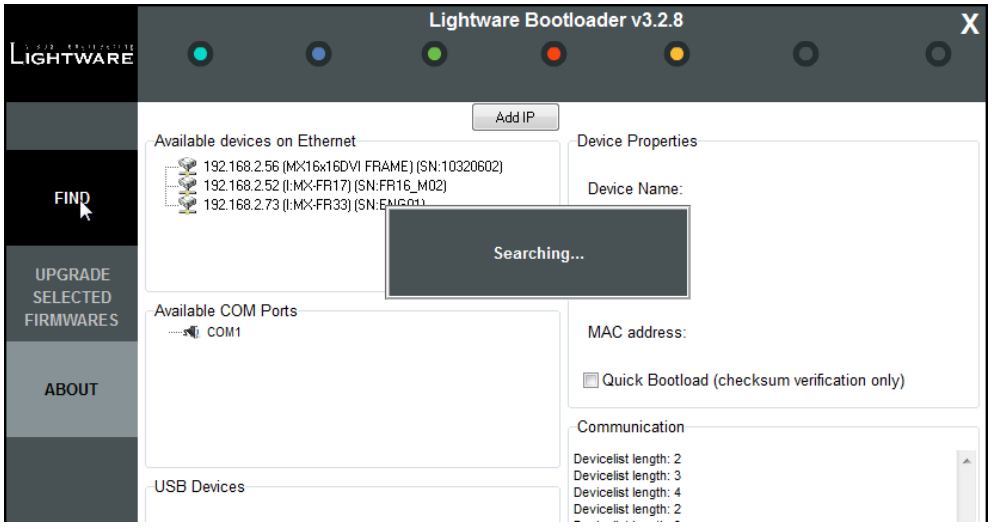
d) While pressing and holding the LEARN button plug the +5V DC wall adaptor to the electric outlet.

Info: *During bootload mode all the status LEDs light continuously.*

Step 5. Run the application from

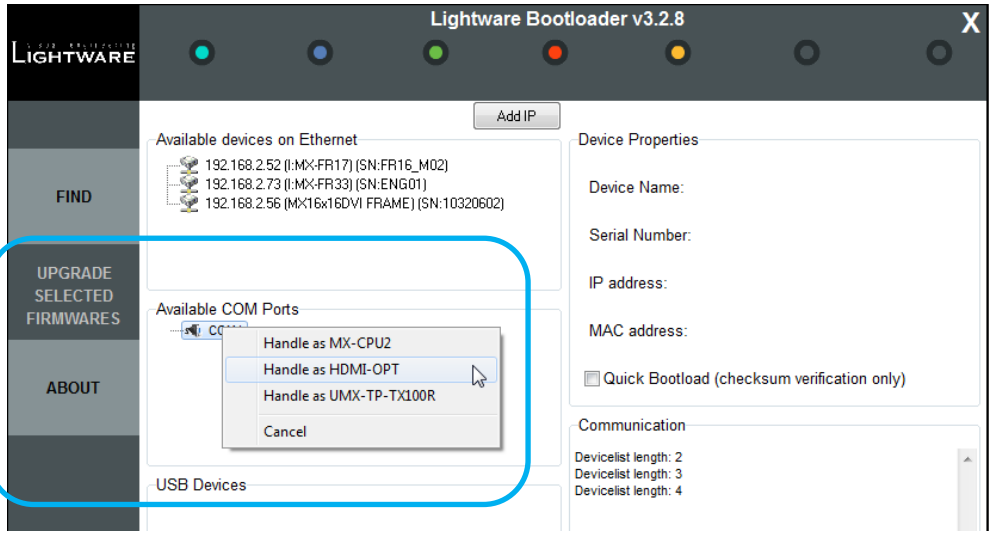
Start Menu → Programs → Lightware → LW_bootloader.

Step 6. Click the FIND menu to discover available ports and devices. Wait until "Searching…" message disappears.

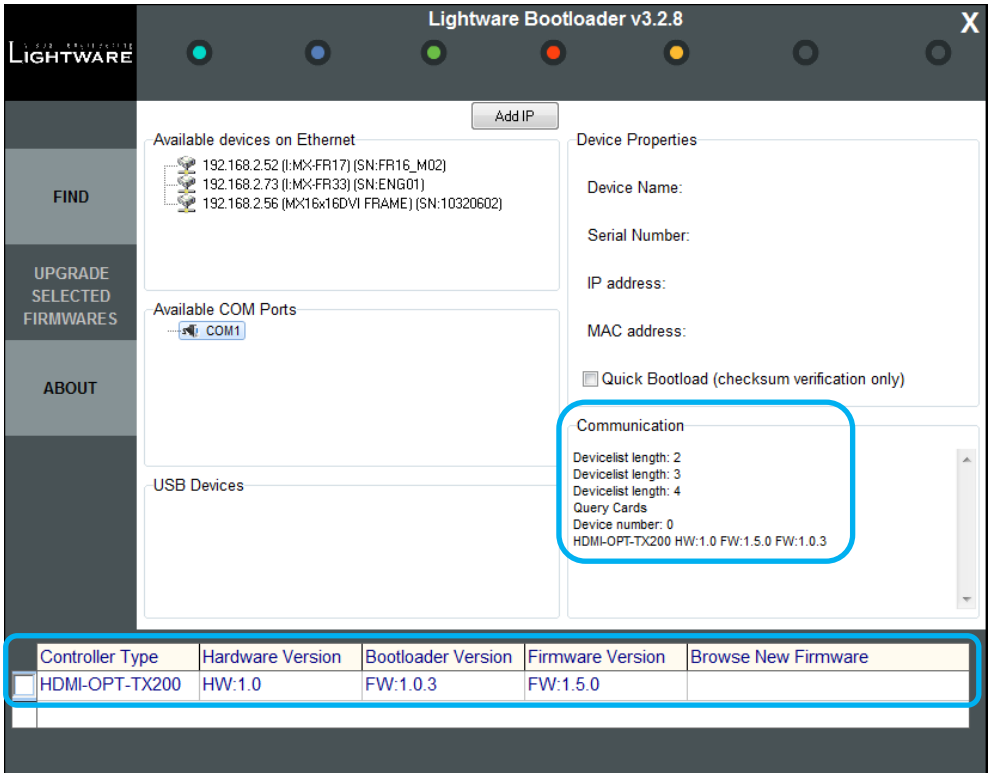


Step 7. Select the appropriate COM port with a single left click.

Step 8. Right click to the appropriate COM port and select the "Handle as HDMI-OPT" option from the local submenu.



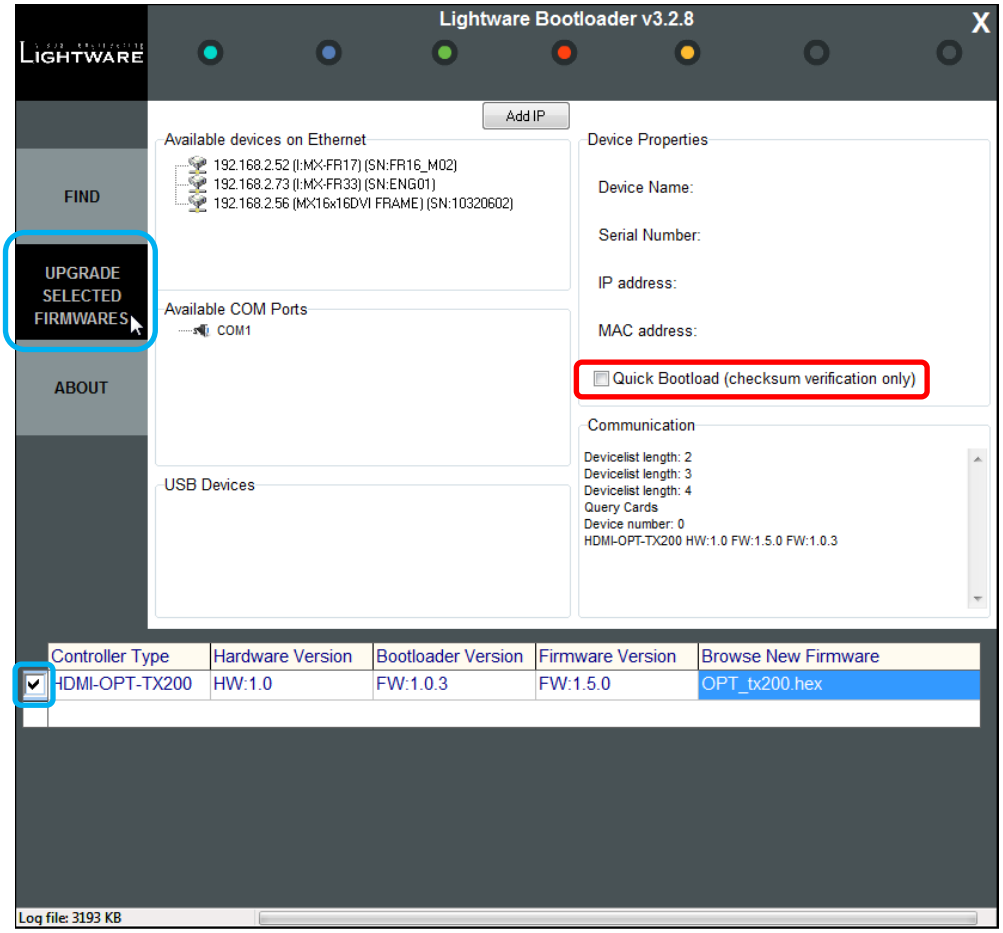
Step 9. After the connection is made, the device properties are displayed.



Step 10. Browse for 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.

Step 11. Click in the checkbox next to the device name to enable the firmware upgrade.

Step 12. Click the “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.

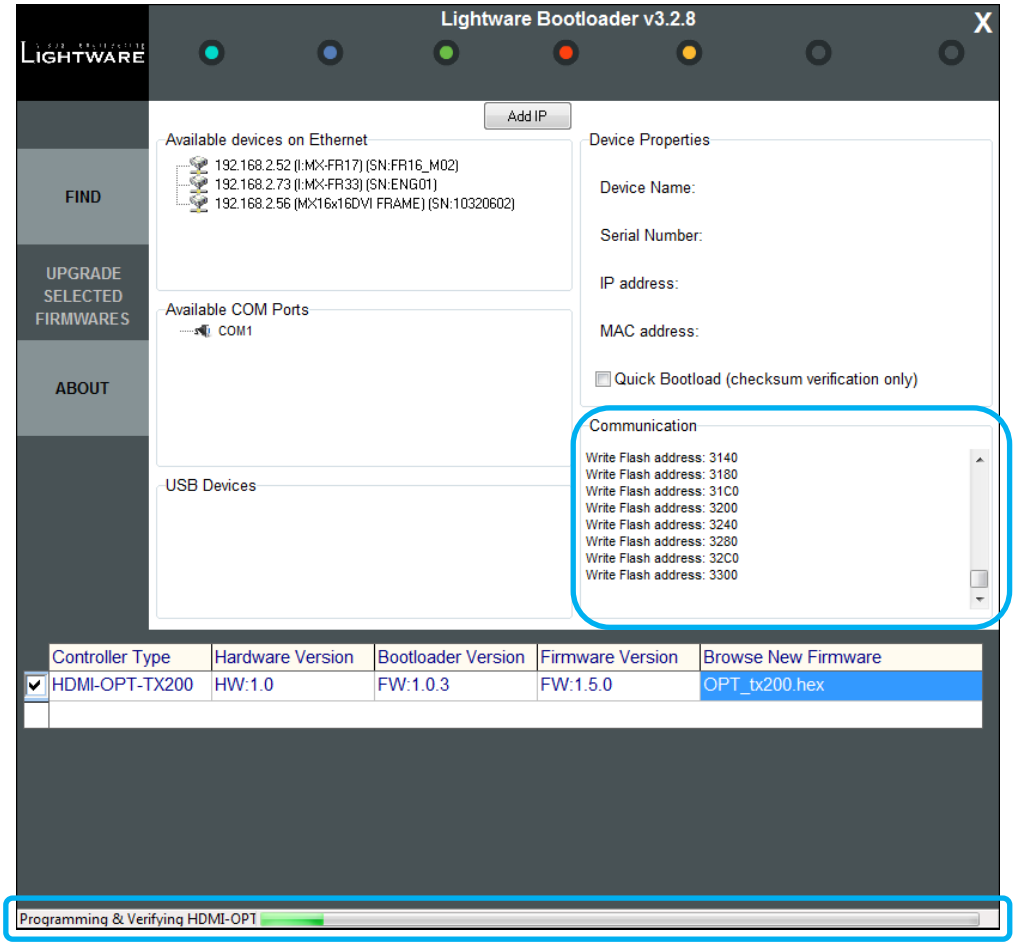


Step 13. Upgrade firmware

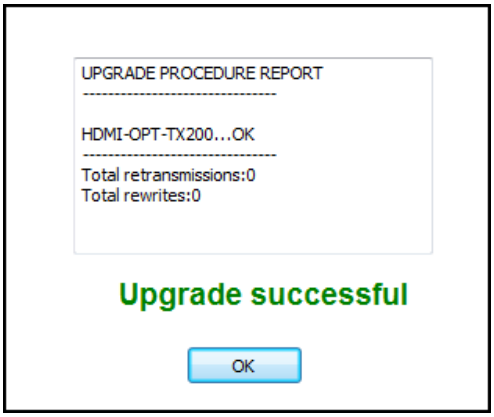
Click "UPGRADE SELECTED FIRMWARES" button. A confirmation message appears. After clicking on the "Yes" button the selected controllers will be reprogrammed with the firmware you selected. If you select a file that doesn't fit the selected controller, you will get an information message.

Info: *There are two ways that the Lightware Bootloader Software verifies the written data during the firmware upgrade. The first method is the reading and comparing all bytes. In case of the full read-back the reprogramming can take approximately 12 minutes. The second one is the Quick Bootload. It means Lightware Bootloader Software reads and compares only the written checksum. It takes approximately 2 minutes.*

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



Step 14. Done! If the upgrade was successful, the following window pops up:



The application closes the connection. Now you can close the application, or you can select another Lightware device to upgrade.

Step 15. After a restart the unit is ready to be used with the new firmware!

7. Troubleshooting

7.1. General problems

Check the device

Check whether the HDMI-OPT unit is properly powered. Try performing a reset by unplugging and reconnecting the power adaptor. For more information see chapter *4.3.*

7.2. There is no picture

Check the cables

Due to the high data rates, the cables must fit very well. If your source or display has more connectors then make sure that the proper interface is selected.

Check if the fiber optical cable is connected properly between the transmitter and receiver.

Check the source equipment (TX200R, TX100R, TX100)

Check the VIDEO CLOCK PRESENT (in PRIMARY mode) and SOURCE +5V SENSE LED (in SECONDARY mode) on the front side of the HDMI-OPT-TX200R. These LEDs indicate the presence of the video clock and +5V signal coming from the HDMI source. If they are not illuminated, then your HDMI source is not working properly. Please refer to the user's manual of your HDMI source.

If the source is a computer, then verify that the HDMI 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.

Check the incoming signal (RX200R, RX100R, RX100)

Check the VIDEO CLOCK PRESENT (in PRIMARY mode) on the front side of the HDMI-TP-RX200R/RX100R/RX100. This LED indicates the presence of an active incoming HDMI clock signal. If it is not illuminated, then no HDMI clock signal is present at the SC MULTIMODE IN connector.

Check the display status (RX200R)

Check the OUT1 - and OUT2 MONITOR HOTPLUG SENSE (in SECONDARY mode) on the front side of the HDMI-OPT-RX200R. This LED indicates the presence of the Hotplug signal coming from the attached display devices. If it is not illuminated, then your displays are not powered or not configured properly.

Check EDID related problems (TX200R, TX100R, TX100)

Check the EMULATED EDID INVALID and the EMULATED EDID VALID LEDs (in SECONDARY mode) on the front side of the HDMI-OPT-TX200R/TX100R/TX100. These LEDs indicate whether a valid EDID is selected. If the red LED is illuminated, then an invalid EDID or an empty memory address is selected. Please select a valid EDID.

If the green EMULATED EDID LED is illuminated, then 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 to this process in section *4.4.3.* If you get a picture now, you have an EDID related issue, please read chapter *2.5* for more details.

Check the EDID

Maybe the data rate is too high for that type of cable. Try switching another EDID to the inputs with lower resolution. If the source is a computer and you are an expert user, you can try modifying the refresh rate, so you would be able to get it to work at higher resolutions over a noisy connection. Factory preset EDID list can be found in chapter *4.4.4.*

7.3. Picture is available but strange colored

Check the colorspace settings

HDMI-OPT units do not support colorspace conversion between HDMI YUV and RGB. Change the colorspace on the HDMI source manually or modify an EDID with the Lightware Control Software to not support YUV colorspace. For more information see chapter *4.5.* and *5.5.3.*

EDIDs without CEA extension effect RGB colorspace but these EDIDs do not support HDMI embedded audio.

8. Specifications

Video

Standard .....HDMI standard which supports:
.....Deep color,
.....Embedded audio
.....Blu-ray Disc and HD DVD video and audio at full resolution,
.....Consumer Electronic Control (CEC),
.....Updated list of CEC commands,
.....Dolby TrueHD bitstream capable,
Color depth ..... maximum 36 bits, 12 bit/color
Format ..... sRGB, YCbCr, xvYCC digital video
Maximum data rates ..... 6.75 Gbps (2.25 Gbps /TMDS channel)
Maximum pixel clock .....225 MHz
Video delay.....0 frame
Resolutions..... all between 640x480 and 2048x1080 deep color
HDTV resolutions 720p, 1080i, 1080p
HDCP compliant .....Yes
EDID Support..... Advanced EDID management
Reclocking ..... Pixel Accurate Reclocking
EDID Emulation (Transmitters).....Yes, 50 factory preset, 49 user programmable
Output mode ..... Automatic (DVI or HDMI)
Colorspace conversion .....No

Optical

Fiber..... 50/125 SC Multimode (preferred) 62.5/125 SC Multimode
Laser wavelengths - high speed..... 4ch. CWDM: 778; 800; 825; 850 nm
Laser wavelengths - low speed .....2ch. CWDM: 911; 980 nm
Laser class specification.....Class 3R
Transmitter output OMA*.....-6.25 dBm (worst case)
Receiver OMA* sensitivity .....-14.25 dBm (worst case)
Optical loss budget .....8 dBm (worst case)
Transmission distance..... 2600 meters (using OM4 type fiber)
OMA*: Optical Modulation Amplitude

Serial port

Direction ..... Bidirectional

Baud rate ..... 9.6, 14.4, 19.2, 38.4, 57.6 kBauds

General

Cooling ..... Convection only

Mounting ..... 1U high rack shelf (optional)

..... UD-kit (Under Desk) (optional)

..... Double UD-kit (optional)

Operating temperature ..... 0 to +55°C (+32 to +122°F)

Operating humidity ..... 10% to 90%, noncondensing

Warranty ..... 3 years

Connectors / ESD protection (HBM EIA/JESD22-A114F)

HDMI input and output ..... 19-pole HDMI Type A socket / 8 kV

Serial port on TX200R ..... DE-9F (9-pole D-sub Female) / 15 kV

Serial port on RX200R ..... DE-9M (9-pole D-sub Male) / 15 kV

Optical fiber input and output ..... Standard simplex SC socket / n.a.

Power connector ..... locking DC connector (2.5/5.5 mm) / 2 kV

Powering

Power consumption: TX units ..... 4 W (typ) 6W (max)

Power consumption: RX units ..... 4 W (typ) 9W (max)

Power adaptor ..... External

Input ..... 100-240 V AC 50/60 Hz

Output ..... +5V DC 1 A

Compliance ..... CE

EMI/EMC ..... EN 55022 Class B

Safety ..... UL, CUL, GS, CR, RCM, PSE, Class II

Enclosure

Rack mountable ..... Yes

Material ..... 1 mm Metal

Dimensions in mm ..... 100,4 x 131,9 x 26 mm (excluding connectors)

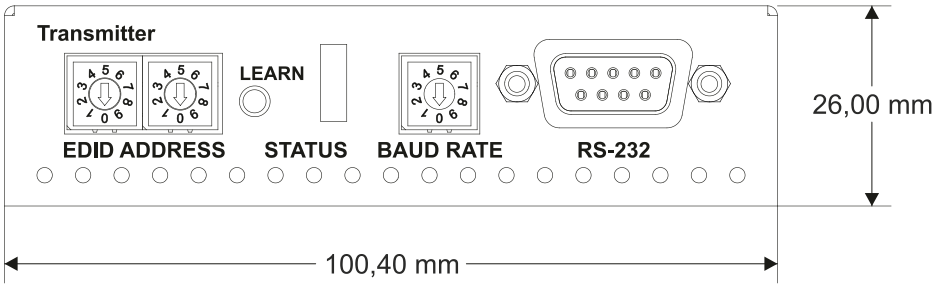
Net Weight (TX200R/RX200R) ..... 410 g / product

Net Weight (TX100R/TX100/RX100R/RX100) ..... 400 g / product

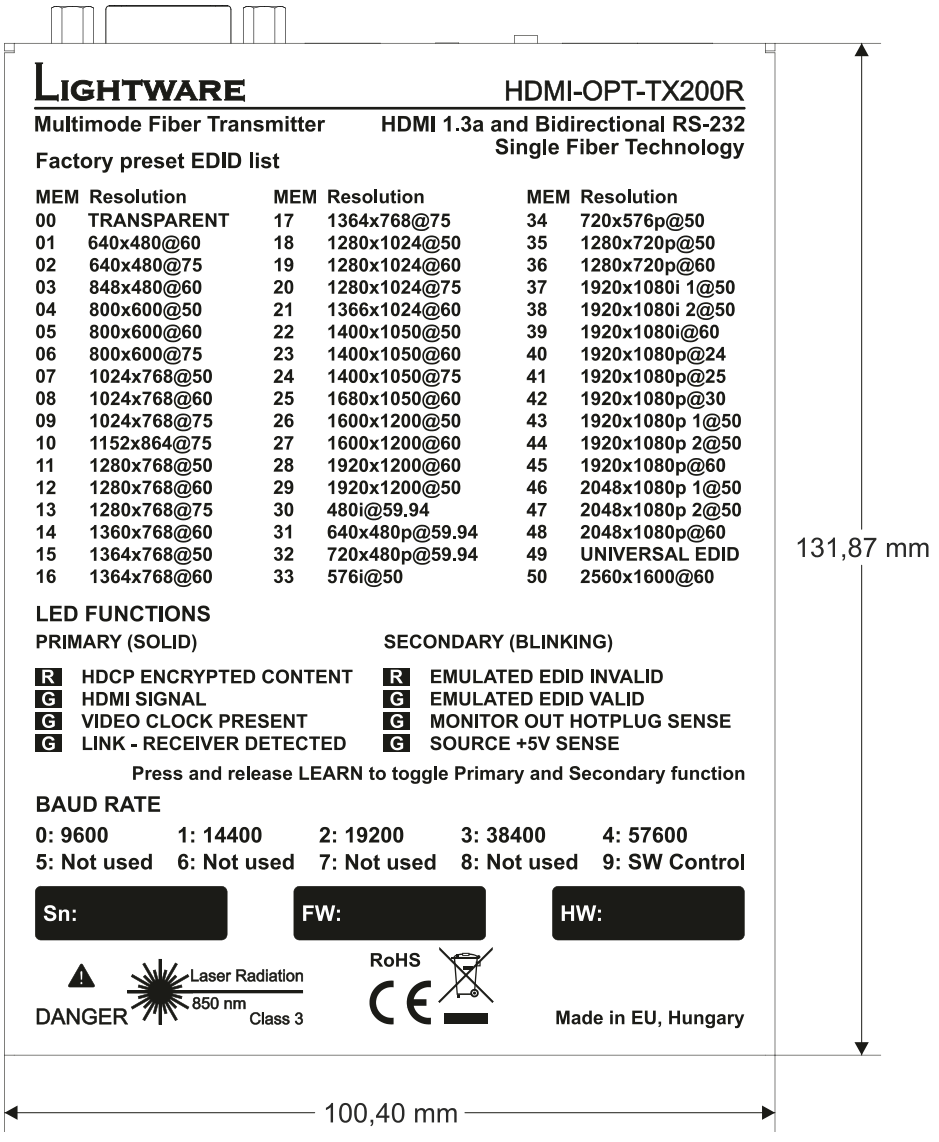
9. Mechanical Drawings

9.1. HDMI-OPT-TX200R

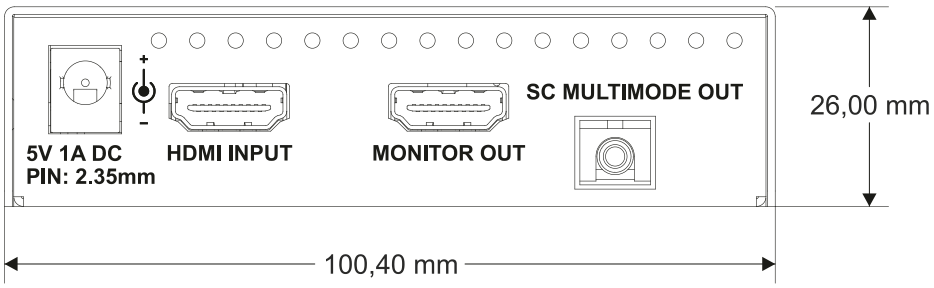
Front view



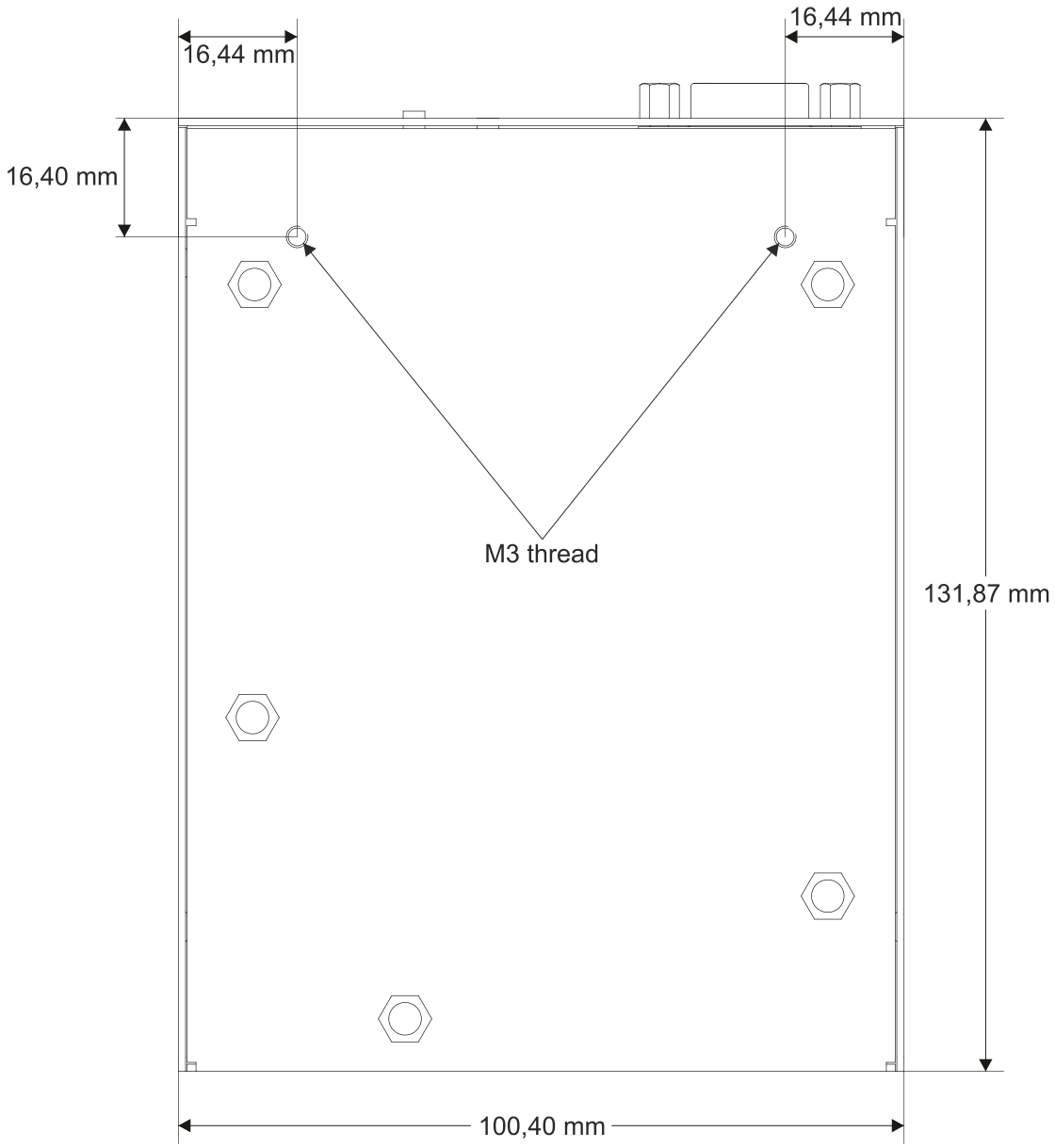
Top view



Rear view

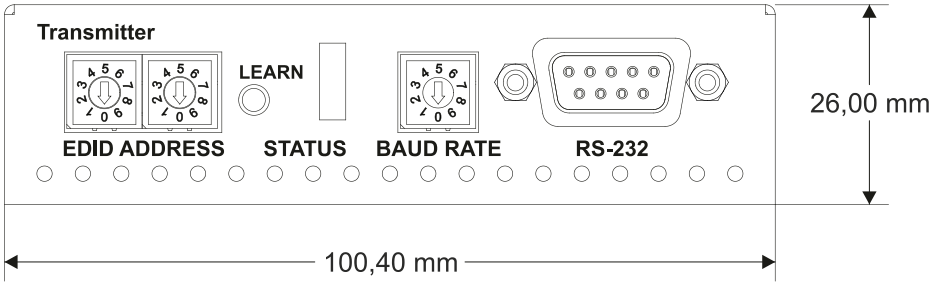


Bottom view

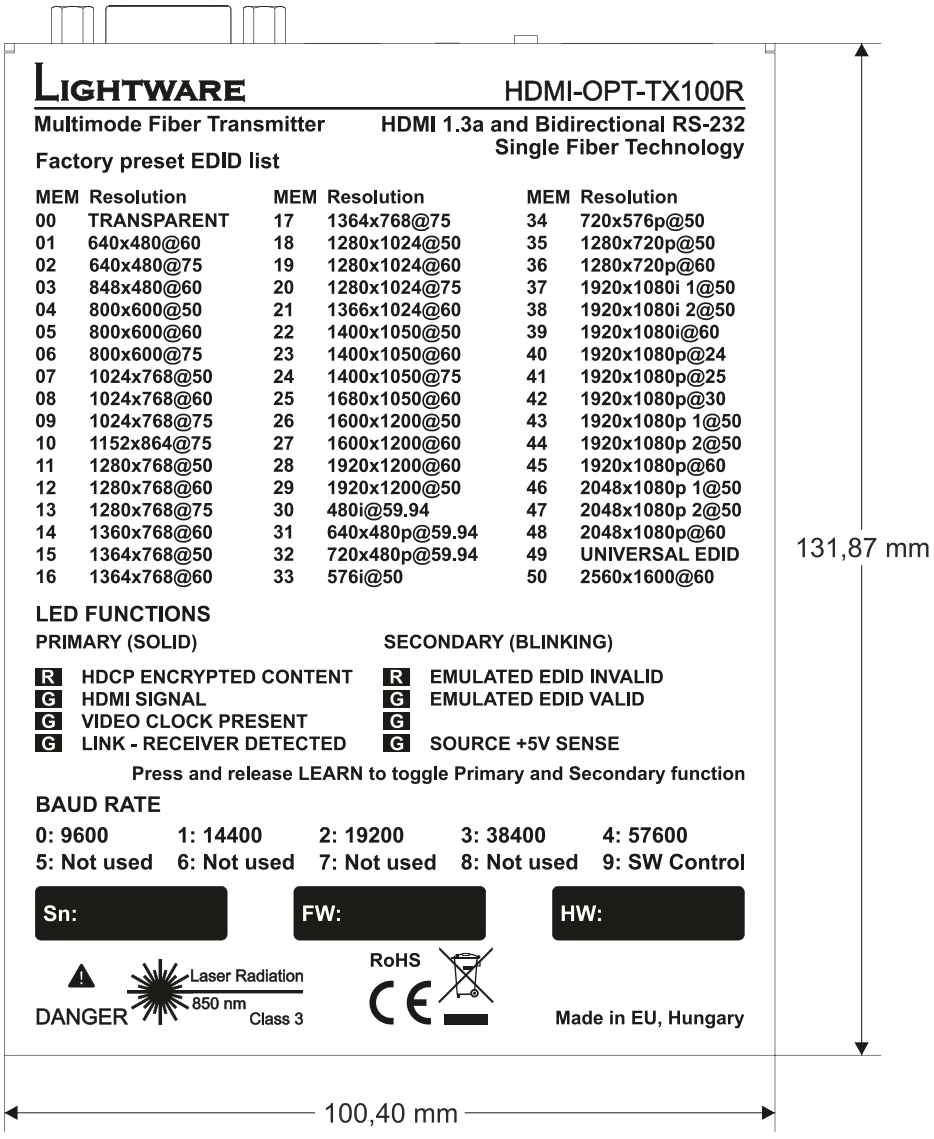


9.2. HDMI-OPT-TX100R

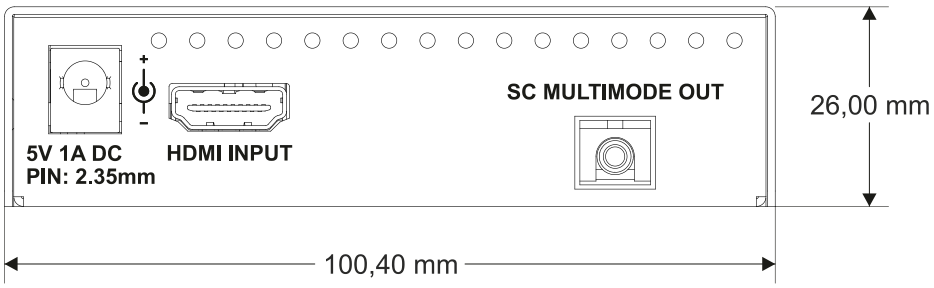
Front view



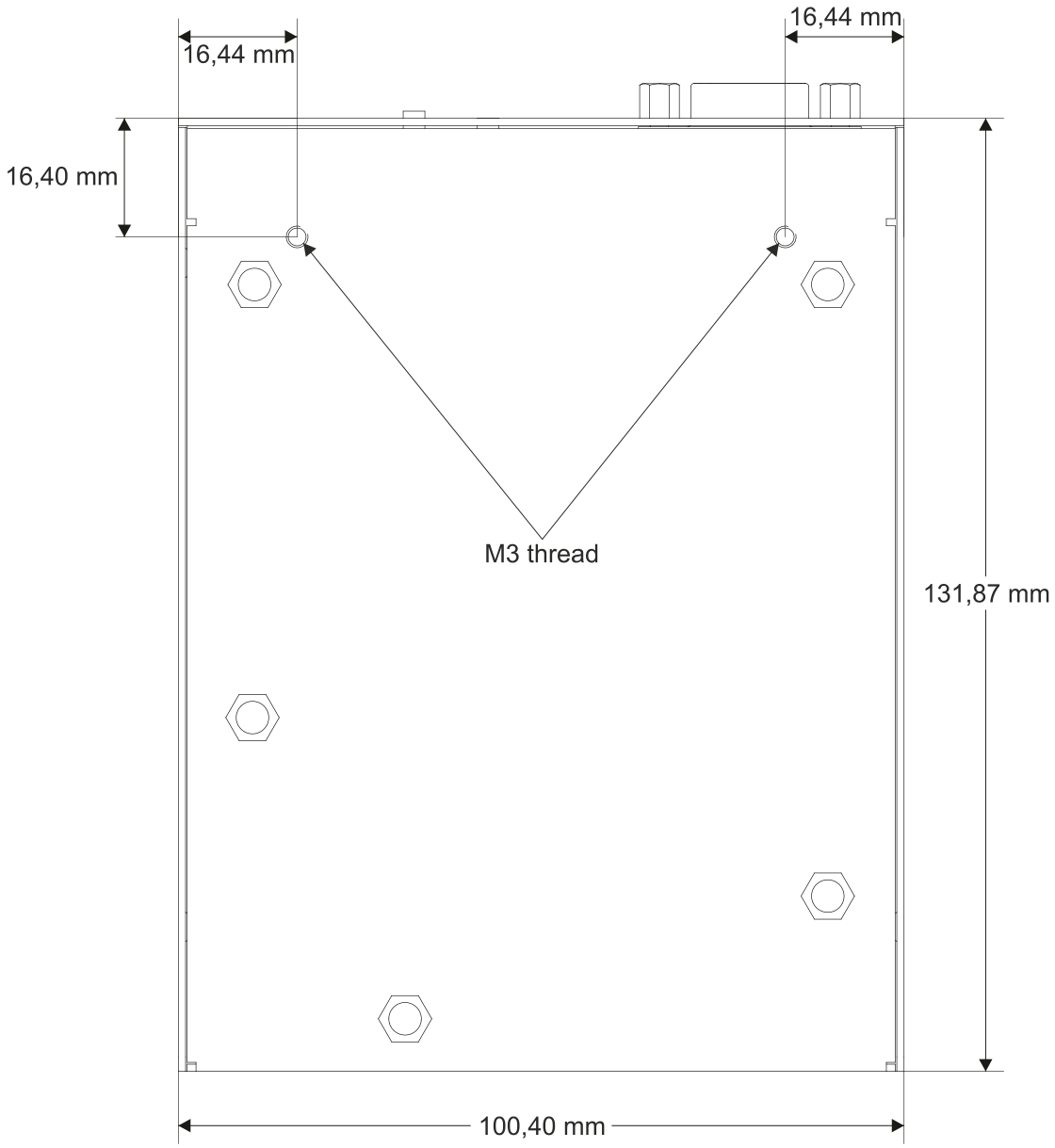
Top view



Rear view

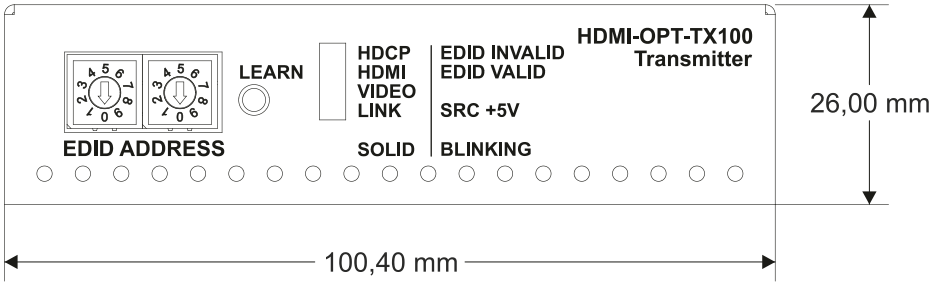


Bottom view

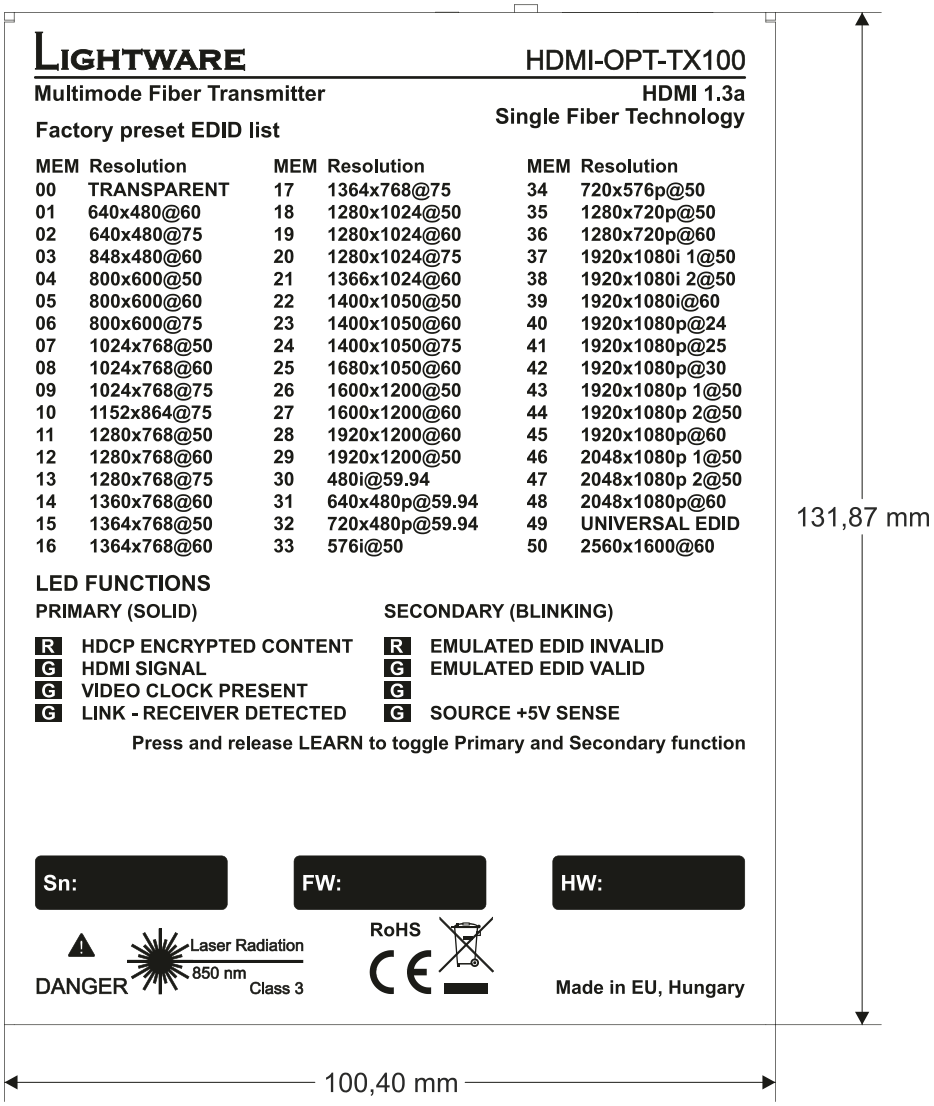


9.3. HDMI-TP-TX100

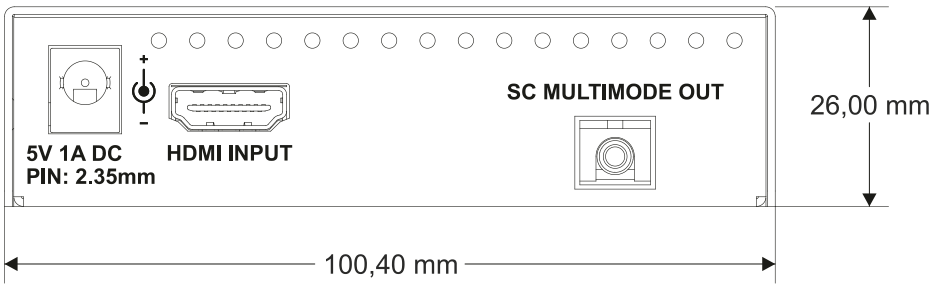
Front view



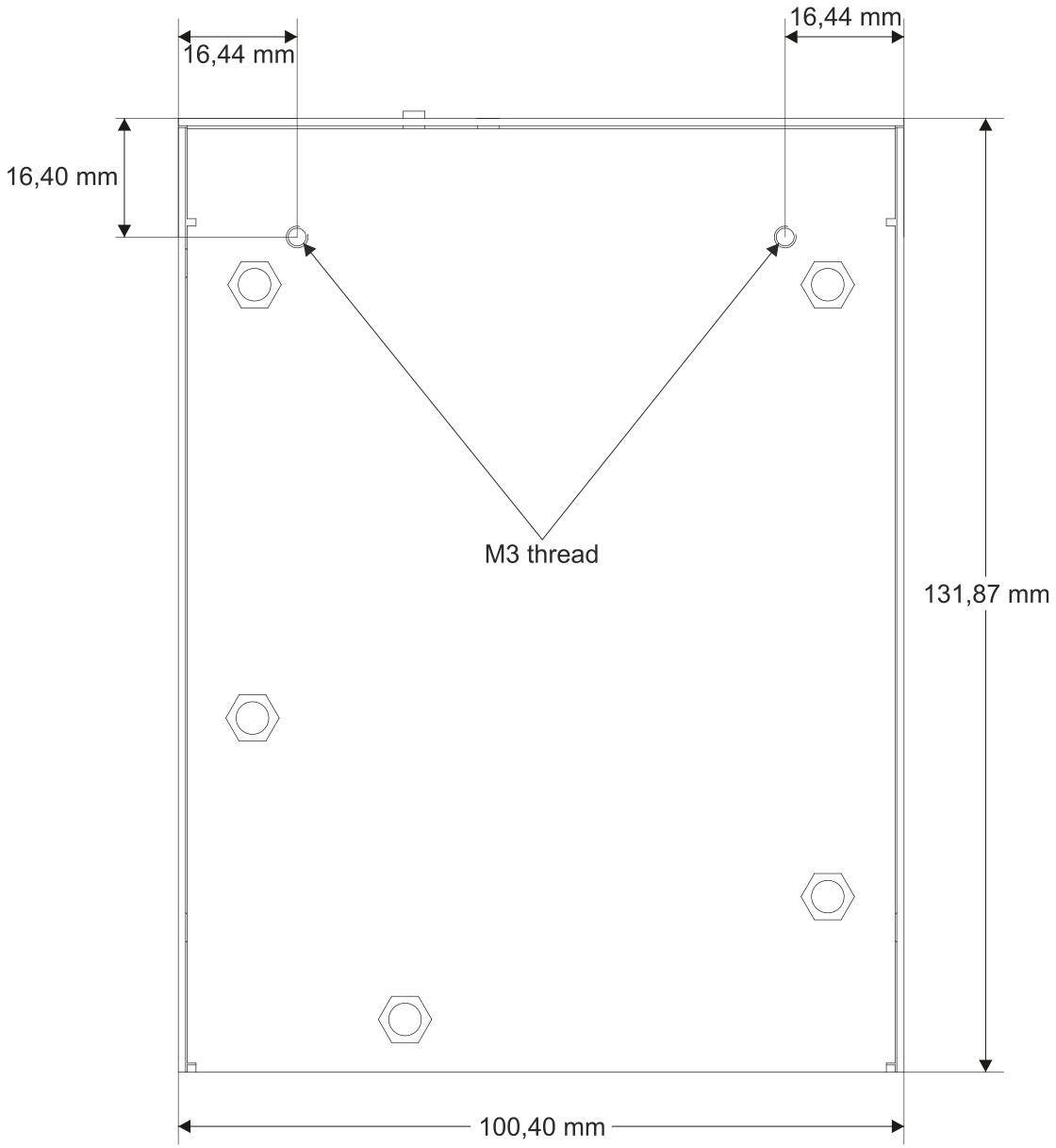
Top view



Rear view

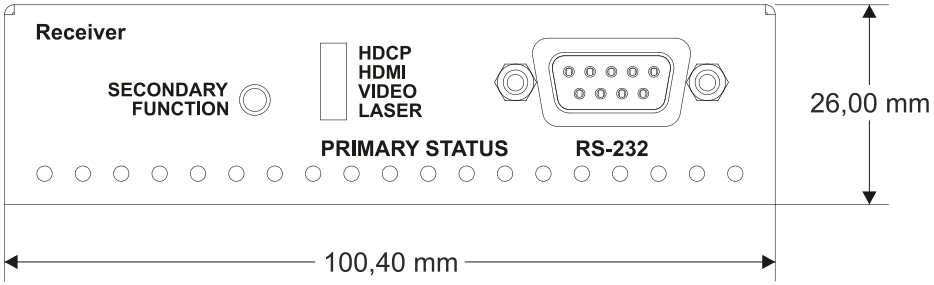


Bottom view

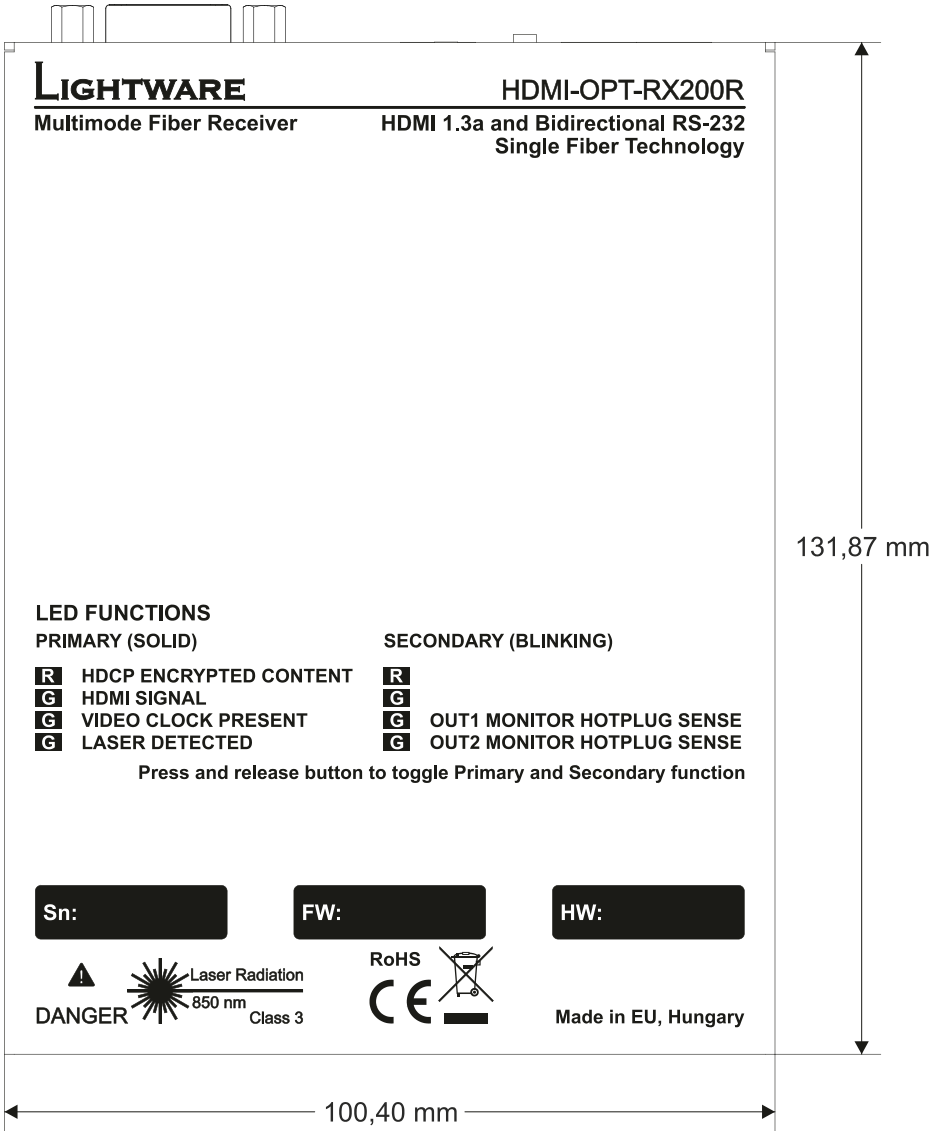


9.4. HDMI-OPT-RX200R

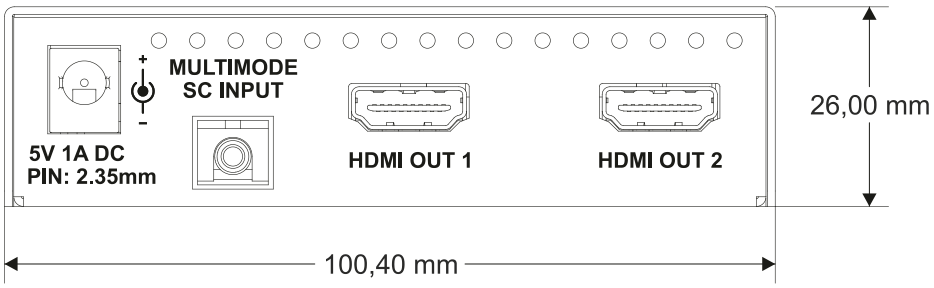
Front view



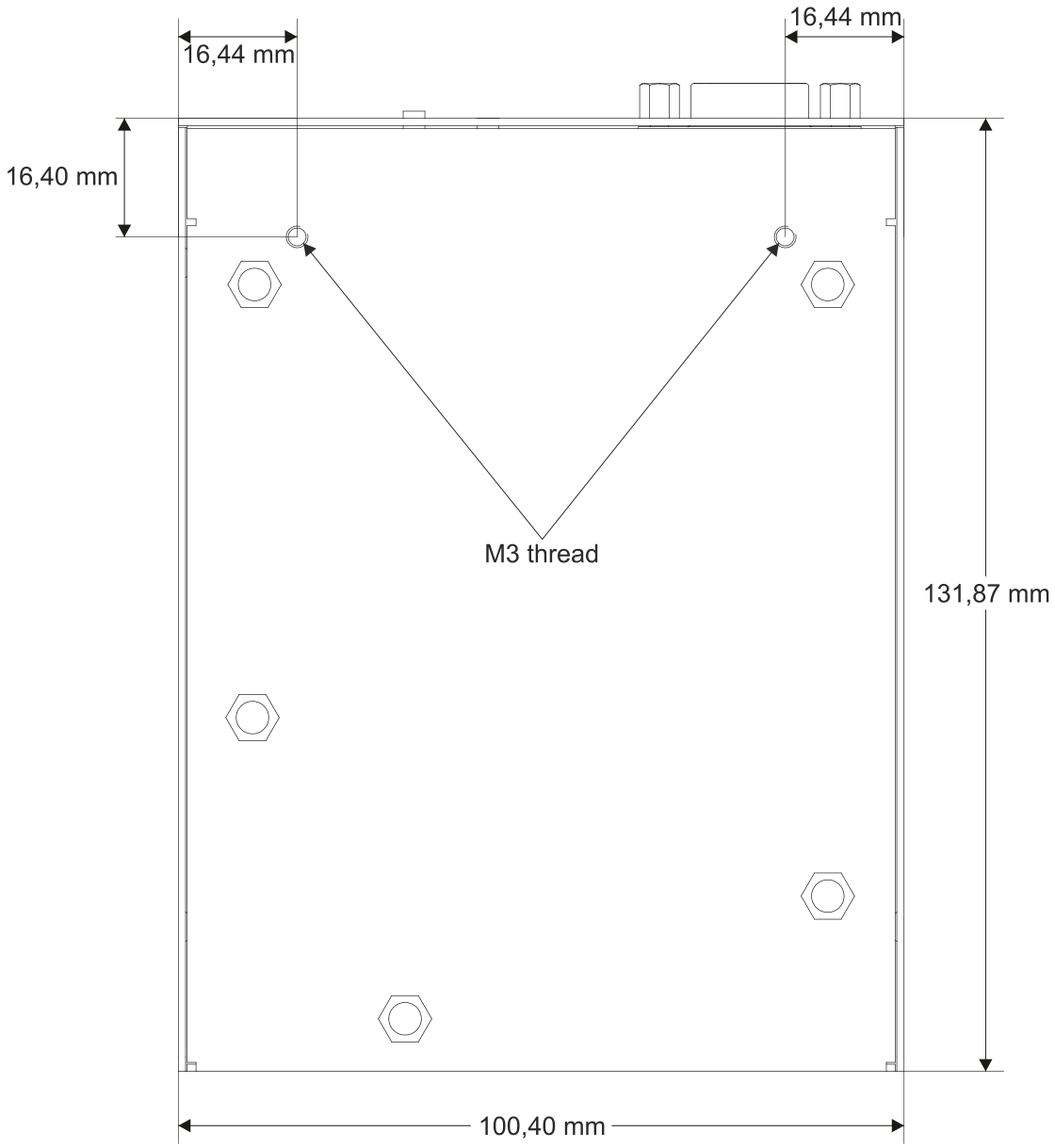
Top view



Rear view

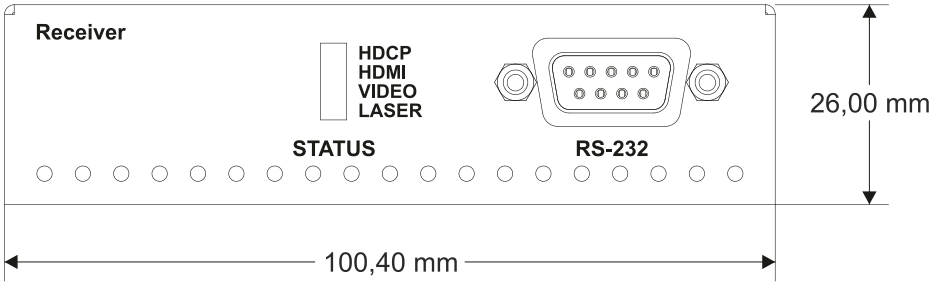


Bottom view

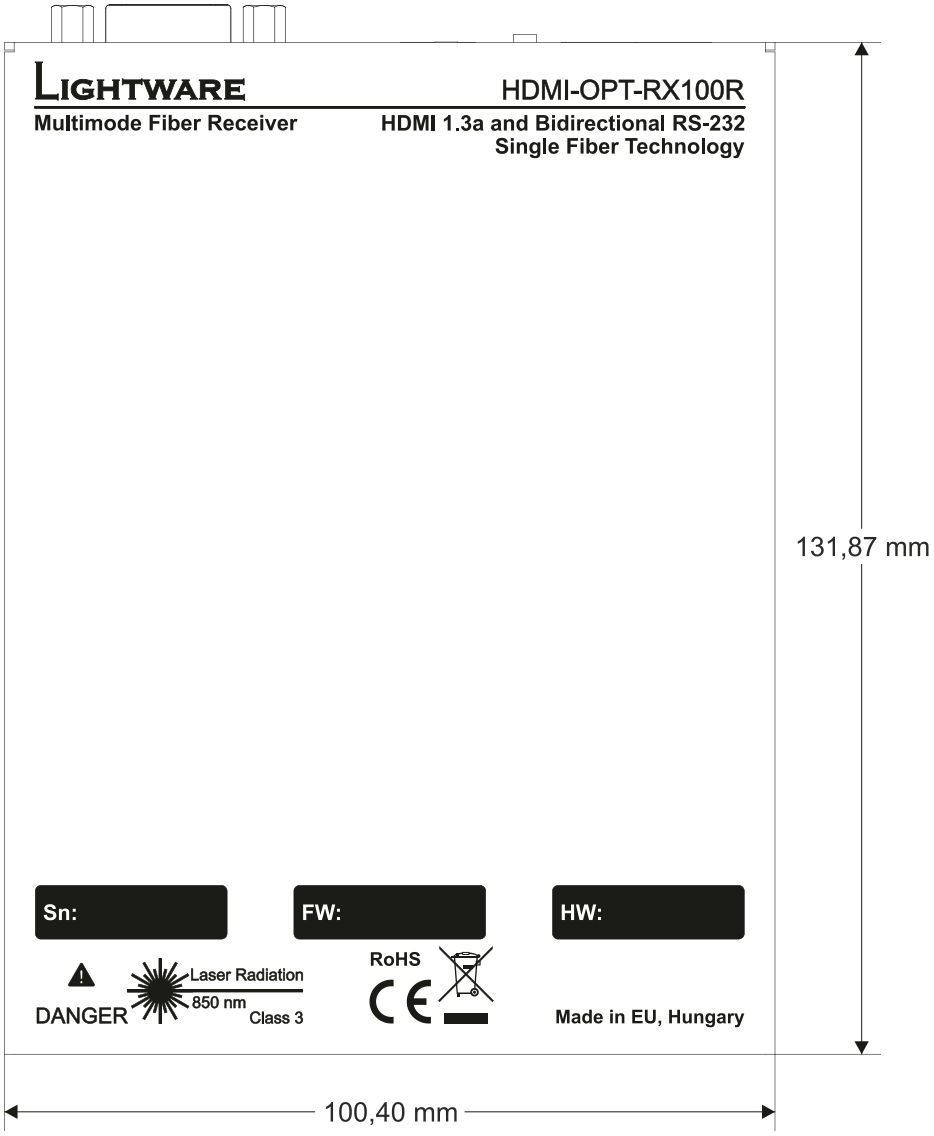


9.5. HDMI-OPT-RX100R

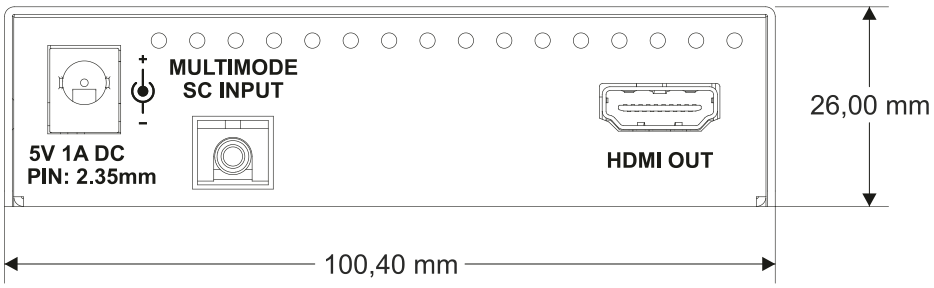
Front view



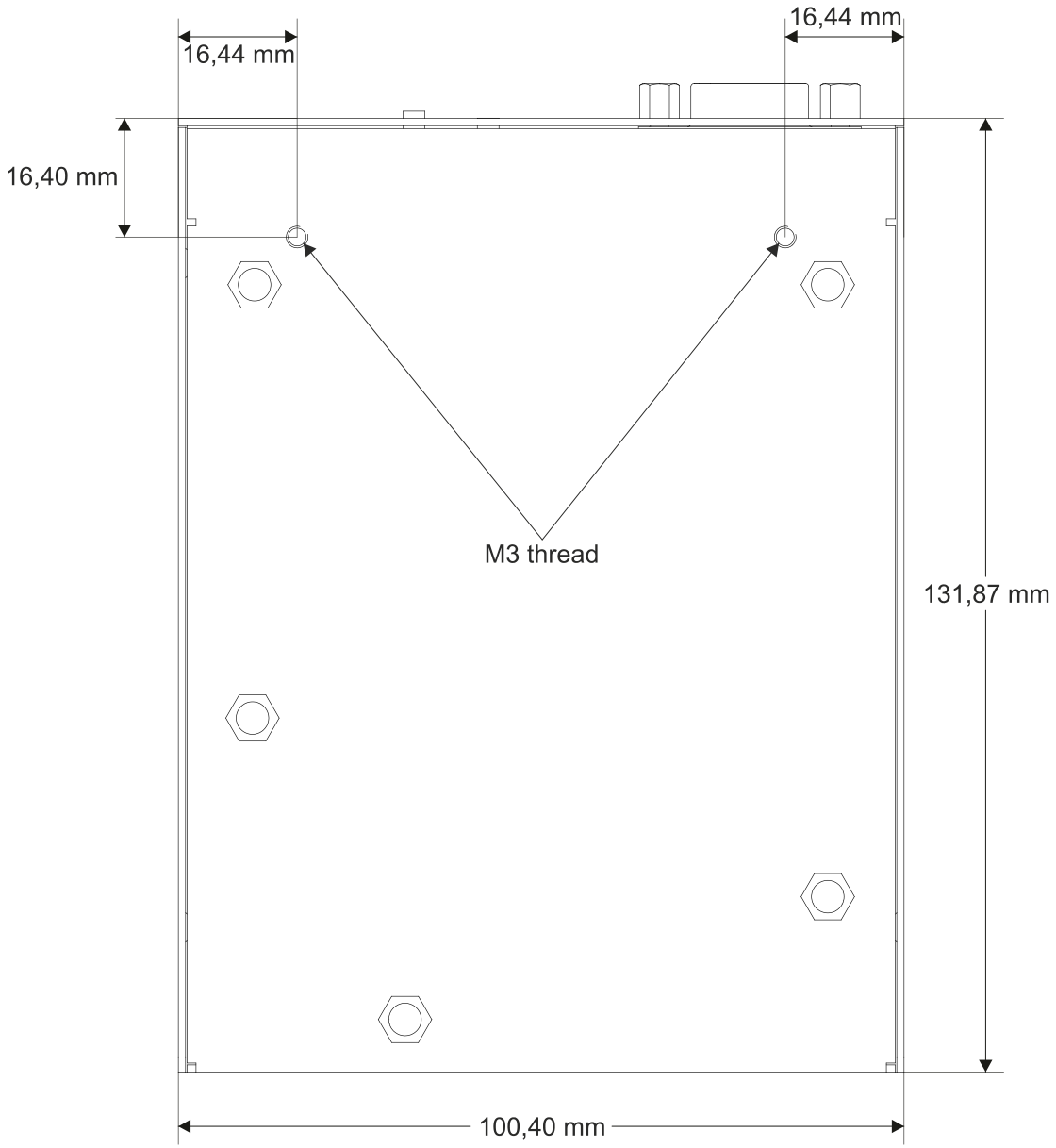
Top view



Rear view

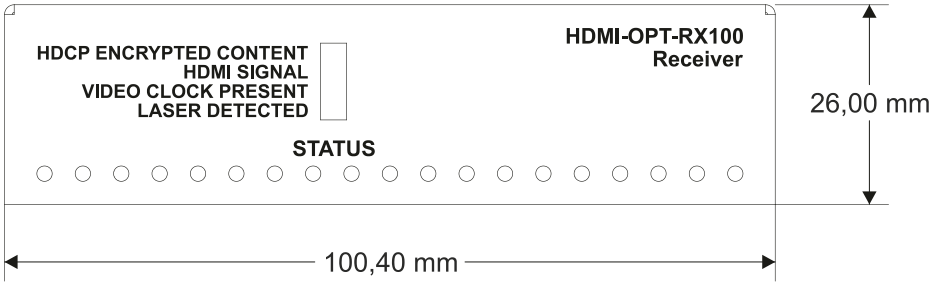


Bottom view

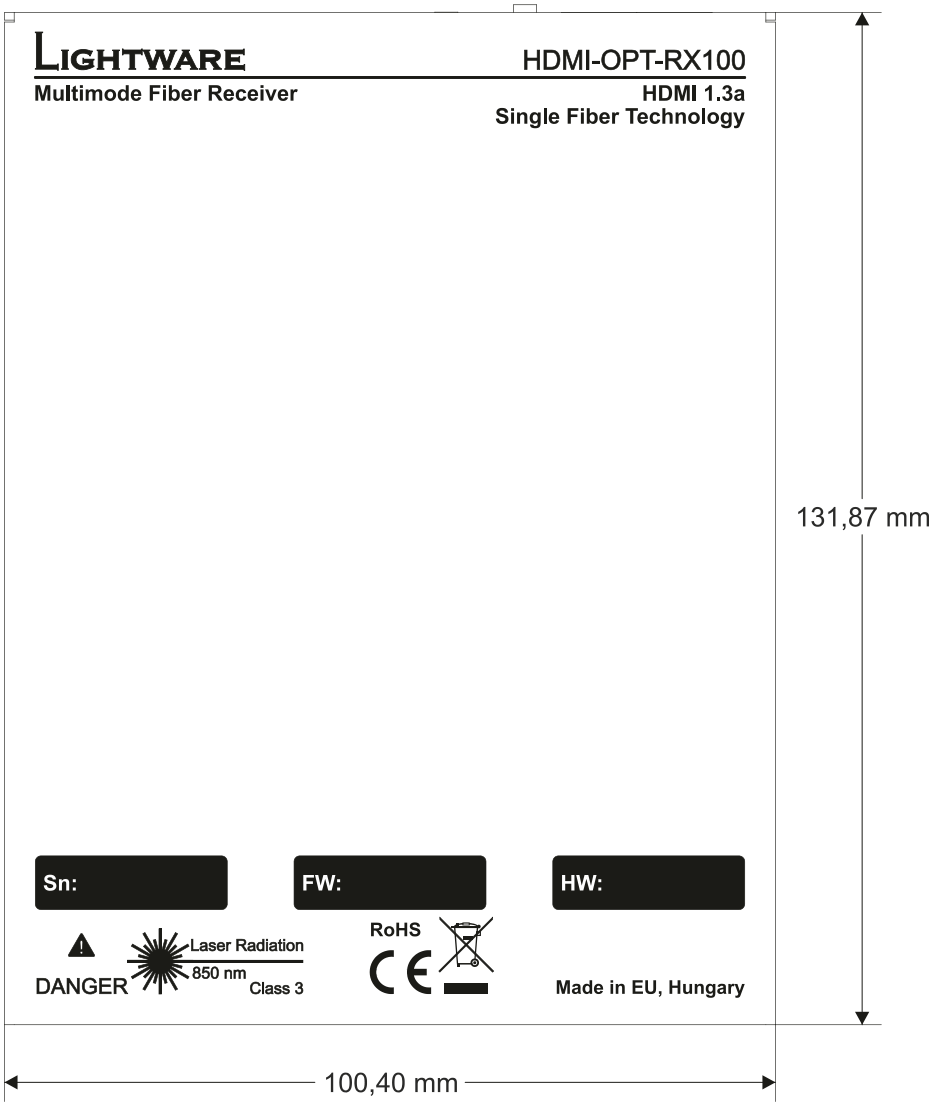


9.6. HDMI-OPT-RX100

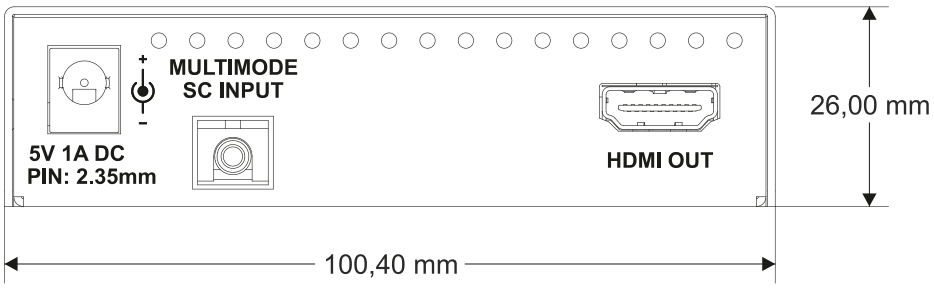
Front view



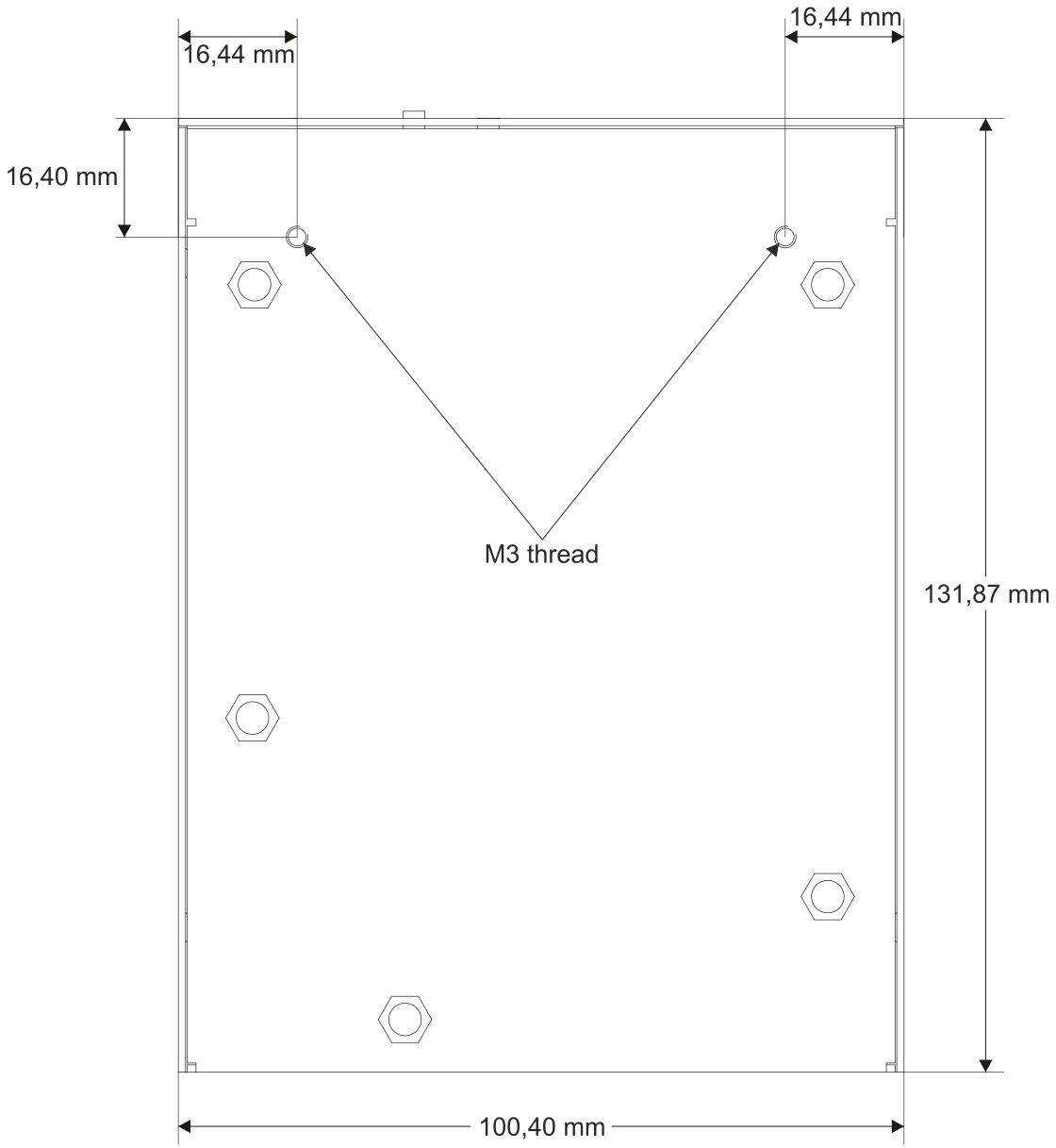
Top view



Rear view



Bottom view



10. Version applicability

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

Lightware software	Version
Lightware Matrix Controller software	3.3.9
Lightware Bootloader software	3.2.8

firmware and hardware:

Product	Firmware version	Hardware version
HDMI-OPT-TX200R	1.5.0	PCB 2.0
HDMI-OPT-RX200R	1.3.1	PCB 2.0
HDMI-OPT-TX100R	1.5.0	PCB 2.0
HDMI-OPT-RX100R	1.3.1	PCB 2.0
HDMI-OPT-TX100	1.5.0	PCB 2.0
HDMI-OPT-RX100	1.3.1	PCB 2.0

11. 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

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E-mail: support@lightware.eu

12. Document revision history

Document	Release Date	Changes	Checked by
Rev. 1.0	13-08-2012	Initial version	Zsolt Marko