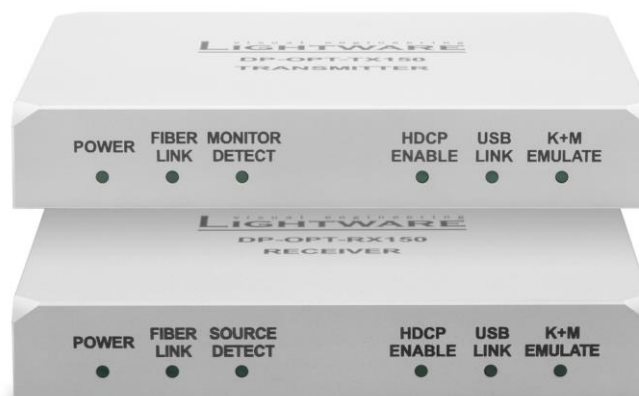*visual engineering*

LIGHTWARE

DP-OPT-TX150
DP-OPT-RX150

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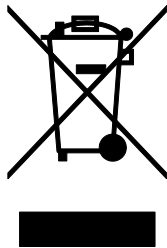
This marking shown on the product or its literature indicates that it should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle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

Caution: Laser product

INVISIBLE LASER RADIATION
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
Radiated wavelength:
778nm, 800 nm, 825 nm, 850 nm, 911 nm, 980 nm
Output power <= 1 mW
Classified by EN 60825-1:2008

Limited Warranty Statement

1. Lightware Visual engineering LLC (Lightware) warrants to all trade and end user customers that any Lightware product purchased will be free from manufacturing defects in both material and workmanship for three (3) years from purchase unless stated otherwise below. The warranty period will begin on the latest possible date where proof of purchase/delivery can be provided by the customer. In the event that no proof can be provided (empty 'Date of purchase' field or a copy of invoice), the warranty period will begin from the

point of delivery from Lightware.

1.1. 25G and MODEX product series will be subject to a seven (7) year warranty period under the same terms as outlined in this document.

1.2. If during the first three (3) months of purchase, the customer is unhappy with any aspect of a Lightware product, Lightware will accept a return for full credit.

1.3. Any product that fails in the first six (6) months of the warranty period will automatically be eligible for replacement and advanced replacement where available. Any replacements provided will be warranted for the remainder of the original unit's warranty period.

1.4. Product failures from six (6) months to the end of the warranty period will either be repaired or replaced at the discretion of Lightware. If Lightware chooses to replace the product then the replacement will be warranted for the remainder of the original unit's warranty period.

2. The above-stated warranty and procedures will not apply to any product that has been:

2.1. Modified, repaired or altered by anyone other than a certified Lightware engineer unless expressly agreed beforehand.

2.2. Used in any application other than that for which it was intended.

2.3. Subjected to any mechanical or electrical abuse or accidental damage.

2.4. Any costs incurred for repair/replacement of goods that fall into the above categories (2.1., 2.2., 2.3.) will be borne by the customer at a pre-agreed figure.

3. All products to be returned to Lightware require a return material authorization number (RMA) prior to shipment and this number must be clearly marked on the box. If an RMA number is not obtained or is not clearly marked on the box, Lightware will refuse the shipment.

3.1. The customer will be responsible for in-bound and Lightware will be responsible for out-bound shipping costs.

3.2. Newly repaired or replaced products will be warranted to the end of the originally purchased products warranty period.

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

Lightware Visual Engineering

Peterdy 15, Budapest H-1071, Hungary

E-mail: support@lightware.eu

Table of contents

DOCUMENT INFORMATION

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

Lightware software	Version
Lightware Device Controller software	1.10.1b0
Lightware Device Updater software	1.3.1b0

| Product	Firmware version	Hardware version
DP-OPT-TX150	1.1.11	PCB 1.1
DP-OPT-RX150	1.1.11	PCB 1.1

Document revision: **1.4**

Release date: 06-10-2016

Editor: Tamas Forgacs

1. Introduction

Thank you for choosing Lightware DP-OPT extenders. DP-OPT-TX150 and DP-OPT-RX150 devices extend Dual-mode DisplayPort 1.1a high-resolution video and embedded audio with optional HDCP encryption plus USB HID (Human Interface Device) over one multimode fiber up to 1100 m.
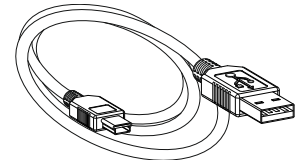
1.1. Box contents
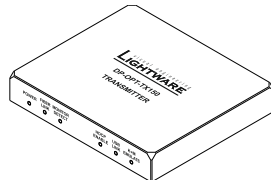
DP-OPT transmitter or receiver
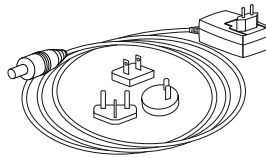
DC adaptor with interchangeable plug

USB cable with mini-B and Type-A connector (1 pc. / extender pair)

Safety and warranty info, Quick Start Guide

1.2. Description

DisplayPort is one of the newest video interface standards. Using DisplayPort, high-resolution video and excellent quality audio can be transmitted. The interface's 10.8 Gbps bandwidth is capable of transmitting 2560x1600@60Hz pixel resolution video with full support of content protection (HDCP). UHD and 4Kx2K resolution can be achieved up to 30Hz frame rate.

Intelligent HID Emulation is provided for two devices with full transparency. The special HID devices – including keyboard and mouse – are emulated by the extender and transparently transferred to the computer with the result that no extra drivers are required for the proper functionality, it's as easy as Plug & Play. DP-OPT-TX150 has 2 extra local USB ports with a built-in HUB and can be connected to the PC/Mac with a single USB cable.

When connecting a DVI or HDMI display through an adaptor cable, Dual-mode DisplayPort graphic cards reconfigure their outputs to DVI or HDMI accordingly. Lightware DisplayPort extenders support Dual-mode port extension and adaptor cables.

Lightware's DisplayPort extenders can be used with Thunderbolt sources and devices. The extender pair and the DisplayPort monitor have to be placed at the end of the Thunderbolt chain. Apple Thunderbolt Display is not supported.

Single Fiber Technology makes these units fully DisplayPort 1.1a and HDCP 1.1 compliant without the need of a second fiber cable or copper connections. To simplify cabling, the bi-directional communication - necessary for DisplayPort Link Training, HDCP handshaking and USB transfer - is performed on the same fiber core that transmits the video signal. Both receiver and transmitter are remotely configurable from either side through the mini USB connector.

1.3. Extender features

- **Supports highest resolutions** – Transmitting DisplayPort 1.1a video signals up to 10.8 Gbps bandwidth, e.g. 2560x1600 pixels at 60 Hz or 4096x2400 pixels at 30 Hz.

- **One multimode fiber cable** – DisplayPort signal is transmitted using only one multimode 50/125 fiber optical cable with SC connector.

- **Zero frame delay** – The extenders add no frame delay to the signal. The overall transmission delay is only a few pixels.

- **Dual-mode DisplayPort** – DVI or HDMI display device can be connected to DP-OPT-RX150 through a passive adaptor thus forces the source to send DVI/HDMI signal.

- **HDCP enable / disable** – When the extenders are in HDMI mode, HDCP can be enabled or disabled by a function button or by Lightware Controller Software. This helps to prevent unnecessary encryption to ensure compatibility.

- **USB KVM extension** – The source computer can be controlled remotely by USB HID devices (e.g. mouse, keyboard) connected to DP-OPT-RX150, as their signal is transmitted through the fiber cable.

- **USB 2.0 HUB** – DP-OPT-TX150 connected to a computer via USB can be used as a local USB HUB with two USB 2.0 ports.

- **Thunderbolt** – Sources with Thunderbolt port are also supported – just connect a miniDP-DP cable between the source and DP-OPT-TX150.

- **Front panel LEDs** – Immediate feedback about the status of connected DP source and monitor. Fiber link-, USB- and HDCP-status are also shown on the front panel.

- **USB control** – USB management, information about connected devices and firmware upgrade can be accessed with Lightware software via USB connection.

- **Universal power adaptor** – Equipped with a universal +5V DC power adaptor, which accepts AC voltages from 100 to 240 Volts with 50 or 60 Hz line frequency.

- **Kensington lock support** – A Kensington-compatible security slot can be found on the side of the units for theft protection.
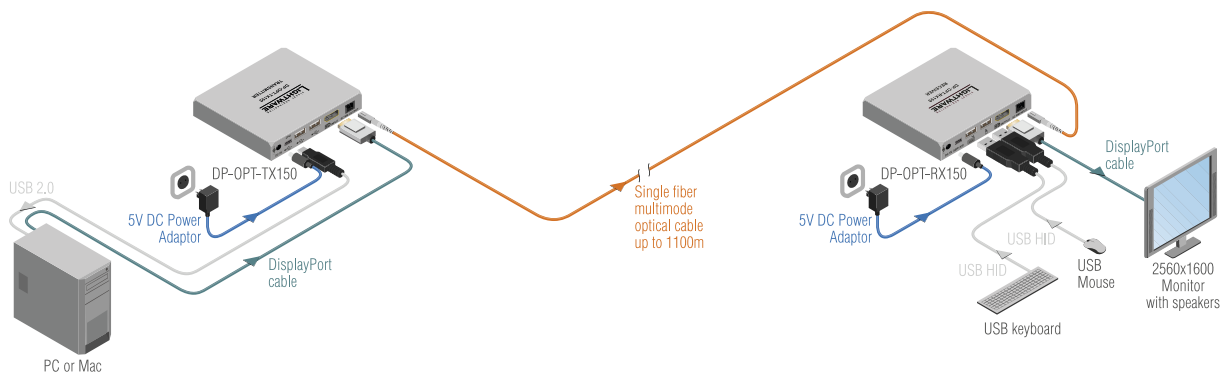
1.4. Applications

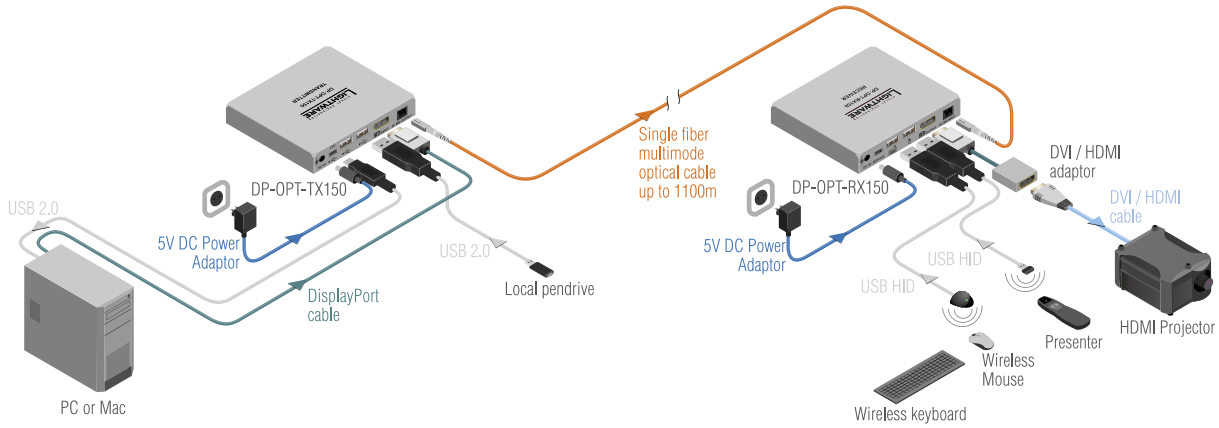*Figure 1-1. Stand-alone diagram with high-resolution DP monitor*

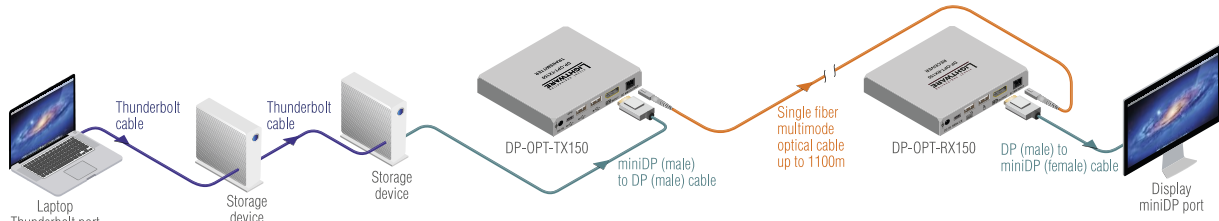*Figure 1-2. Stand-alone diagram with HDMI projector*
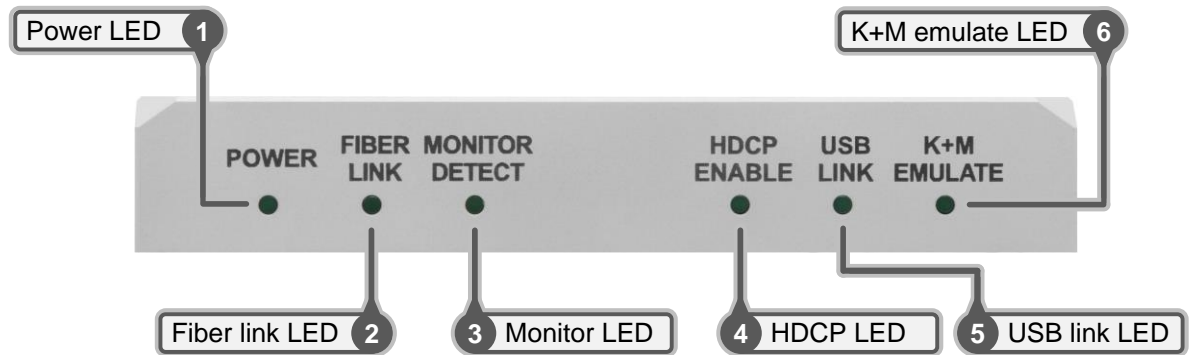

Figure 1-3. Daisy chained Thunderbolt devices and LED Cinema Display

2. Controls and connections

2.1. DP-OPT-TX150 (transmitter) front view

1	**Power LED**	**The LED lights green:** the unit is powered on. **The LED is blinking:** an error has occurred and the device is out of normal operation, or it is in bootload mode (during firmware upgrade).
2	**Fiber link LED**	**The LED lights green**: the link is active between the transmitter and receiver and they are ready to be used. **The LED is blinking:** There is no connection between the devices.
3	**Monitor LED**	**The LED lights green:** a sink device is connected to the DisplayPort output of the receiver.
4	**HDCP LED**	**The LED lights green:** DP signal transmission is in progress or HDCP encryption is enabled during DVI/HDMI transmission. **The LED is OFF:** a DVI or HDMI display is connected to the receiver (via an adaptor cable) and HDCP is disabled (thus the source is forced to send non-encrypted stream). For more information about HDCP setting, see section 5.3 on page 20.
5	**USB link LED**	**The LED lights green:** HID extension is active. **The LED is blinking:** the USB channel is ready to be used but HID extension is not active (e.g. there is no USB HID device connected to the receiver or the computer is powered off). **The LED is OFF:** the USB channel between the transmitter and the receiver is not ready to be used.
6	**K+M emulate LED**	**The LED is OFF:** the devices are in transparent USB mode (default). **The LED is blinking:** the extender pair is in configuration USB mode (see section 5.1 on page 18 for more information about USB modes).

2.2. DP-OPT-TX150 (transmitter) rear view
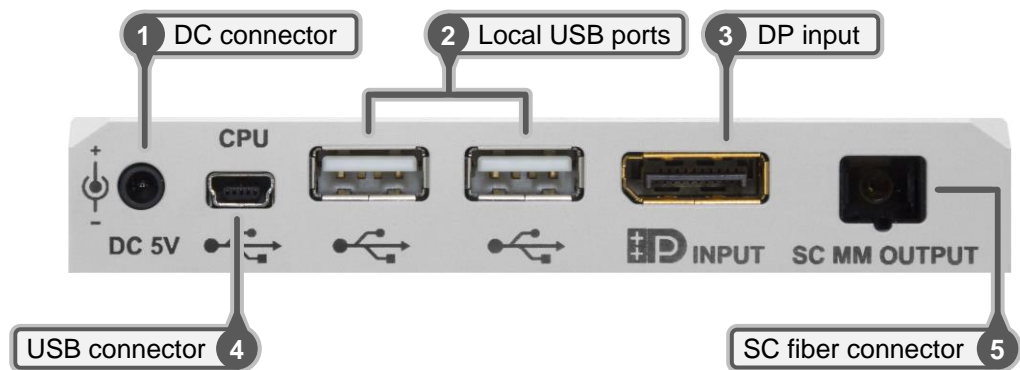
1	**DC connector**	Connect the output of the supplied 5 V power adaptor. Lightware's rack-mountable power supply can also be used (PSUx10-200 or PSUx20-400).
2	**Local USB ports**	The transmitter has a built-in USB HUB. These local USB 2.0 ports can be used as extra USB ports connected to your computer but without extension.
3	**DP input**	DisplayPort 1.1a input connector. Applied cable shall not be more than 2 m. See section 2.5.2 on page 14 for more information about the connector.
4	**USB connector**	USB mini-B type connector. Connect to the computer if USB HUB or USB KVM (HID) features are used. Control functions (with Lightware Device Controller) and firmware upgrade are also performed through this connector.
5	**SC fiber connector**	SC fiber optical output connector. Connect to the receiver by a multimode fiber cable.

2.3. DP-OPT-RX150 (receiver) front view

Power LED ①   K+M emulate LED ⑥

POWER   FIBER LINK   SOURCE DETECT   HDCP ENABLE   USB LINK   K+M EMULATE

② Fiber link LED   ③ Source LED   ④ HDCP LED   ⑤ USB link LED

① Power LED

The LED lights green: the unit is powered on.
The LED is blinking: an error has occurred and the device is out of normal operation, or it is in bootload mode (during firmware upgrade).

② Fiber link LED

The LED lights green: the link is active between transmitter and receiver and they are ready to be used.
The LED is blinking: there is no connection between transmitter and receiver.

③ Source LED

The LED lights green: a powered DP source is connected to the transmitter.
The LED is blinking: an HDMI adaptor cable is connected to the receiver to indicate HDMI mode operation.

④ HDCP LED

The LED lights green: DP signal transmission is in progress or HDCP encryption is enabled during DVI/HDMI transmission.
The LED is OFF: a DVI or HDMI display is connected to the receiver (via an adaptor cable) and HDCP is disabled (thus the source is forced to send non-encrypted stream). For more information about HDCP setting, see section 5.3 on page 20.

⑤ USB link LED

The LED lights green: HID extension is active.
The LED is blinking: the USB channel is ready to be used but HID extension is not active (e.g. there is no USB HID device connected to the receiver or the computer is powered off).
**The LED is OFF:** the USB channel between the transmitter and the receiver is not ready to be used.

⑥ K+M emulate LED

The LED is blinking: the extender pair is in configuration USB mode (see section 5.1 on page 18 for more information about USB modes).
The LED is OFF: the devices are in transparent USB mode (default).

2.4. DP-OPT-RX150 (receiver) rear view

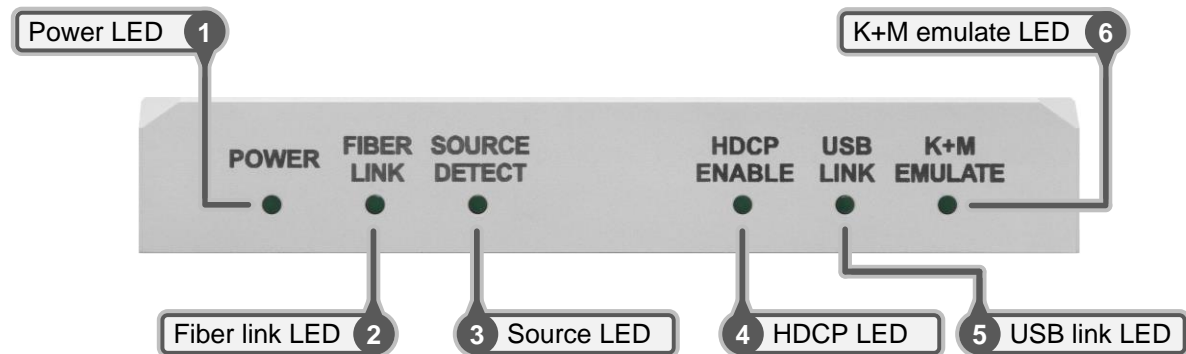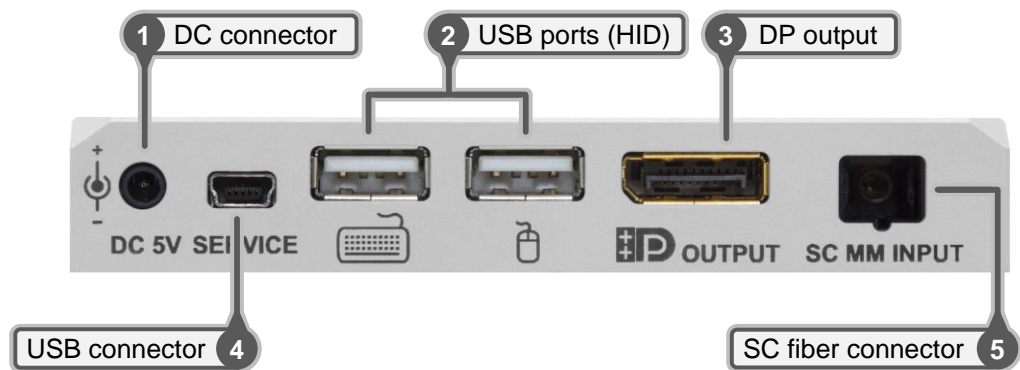|		
1	**DC connector**	Connect the output of the supplied 5 V power adaptor. Lightware's rack-mountable power supply can also be used (PSUx10-200 or PSUx20-400).
2	**USB ports**	Ports for USB HID (Human Interface Device, e.g. mouse, keyboard, or presenter) and USB HUB devices (e.g. keyboard with built-in USB HUB). Only HID devices are extended to the source computer. (The symbols are just recommendations; mouse can be plugged into the port indicated with keyboard-symbol and vice versa.)
3	**DP output**	DisplayPort 1.1a output connector for display devices with DisplayPort connector. The applied DP-DP cable shall not be more than 2 m. DP adapters with DVI or HDMI connector are also supported. See section 2.5.2 on page 14 for more information about the connector.
4	**USB connector**	USB mini-B type connector for control functions (with Lightware Device Controller) and firmware upgrade.
5	**SC fiber connector**	SC fiber optical input connector. Connect to the transmitter by a single multimode fiber cable.

2.5. Electrical connections

2.5.1. Fiber optical connector

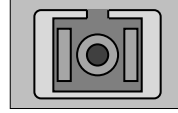The extenders are assembled with standard SC receptacles.

Figure 2-1. SC receptacle

2.5.2. DP inputs and outputs

DP-OPT-TX150 and DP-OPT-RX150 provides DisplayPort connectors with Dual-mode support. When a passive adapter is connected to the receiver, the source device is forced to switch to DVI/HDMI mode.
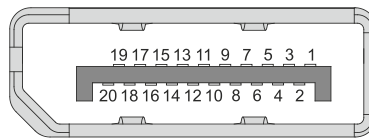

Figure 2-2. DisplayPort connector

INPUT				OUTPUT			
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	ML_Lane 3 (n)	**11**	GND	**1**	ML_Lane 0 (p)	**11**	GND
2	GND	**12**	ML_Lane 0 (p)	**2**	GND	**12**	ML_Lane 3 (n)
3	ML_Lane 3 (p)	**13**	Config1	**3**	ML_Lane 0 (n)	**13**	Config1
4	ML_Lane 2 (n)	**14**	Config2	**4**	ML_Lane 1 (p)	**14**	Config2
5	GND	**15**	AUX CH (p)	**5**	GND	**15**	AUX CH (p)
6	ML_Lane 2 (p)	**16**	GND	**6**	ML_Lane 1 (n)	**16**	GND
7	ML_Lane 1 (n)	**17**	AUX CH (n)	**7**	ML_Lane 2 (p)	**17**	AUX CH (n)
8	GND	**18**	Hot Plug	**8**	GND	**18**	Hot Plug
9	ML_Lane 1 (p)	**19**	Return	**9**	ML_Lane 2 (n)	**19**	Return
10	ML_Lane 0 (n)	**20**	DP_PWR	**10**	ML_Lane 3 (p)	**20**	DP_PWR

Table 2-1. DisplayPort connector pin assignments

2.5.3. USB connectors

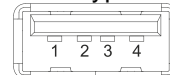Standard USB connectors are built in the extenders supporting different features, but the pinout of the connectors are the same.
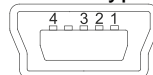
Mini B-type		B-type	
Pin	**Signal**	**Pin**	**Signal**
1	VCC	**1**	VBUS
2	D-	**2**	D-
3	D+	**3**	D+
4	GND	**4**	GND

Table 2-2. USB Mini B-type and B-type connector pin assignments

3. Technologies

3.1. DisplayPort

DisplayPort is one of the newest audio/video interface standard designed by VESA (Video Electronics Standard Association) in 2006. The aim was to create such an interface that would be the connection between graphic cards and display devices. The standard is available and free thus it can be implemented widely, which could help replacing the previously used interfaces, such as VGA or DVI.

Lightware's DP-OPT extenders are designed according to DisplayPort standard 1.1a. The maximum allowed bandwidth is 10.8 Gbps, which means e.g. 2560x1600 pixel resolution at 60 Hz or 4096x2400 pixels at 30 Hz. Color depth until 16 bits per color and 8-channel embedded LPCM audio is supported.

Dual mode

Mentioned standard was designed to support HDMI/DVI display devices too. If the sink is assembled with DVI or HDMI input connector, it can be connected to a dual-mode DisplayPort source by a passive adaptor (DP++). In this case, source switches to DVI/HDMI mode and the signal is changed to be in line with DVI/HDMI requirements.

> **i** INFO
> *Most of the sources assembled with DisplayPort supports Dual mode, but if you are not sure to check the documentation of your device.*

Passive adaptor

Display device with HDMI or DVI connector can be connected by a passive DP-HDMI or DP-DVI adaptor to the source. The passive adaptor has two functions: sending a sign to the source if DVI or HDMI signal is required, and doing level shifting from +3.3V to +5V. The source switches to DVI/HDMI mode and sends the proper signal.

Figure 3-1. Passive DP-HDMI and DP-DVI adaptors

> **i** INFO
> *More information about adaptors can be found in 'VESA DisplayPort Interoperability Guideline' (www.displayport.org).*

3.2. HDCP management

Lightware Visual Engineering is a legal HDCP adopter. Several functions have been developed which help to solve HDCP-related problems. Complex AV systems often have both HDCP and non-HDCP components. DP-OPT extenders allow transmitting HDCP encrypted and unencrypted signals. The devices will be still HDCP compliant, as they will never output an encrypted signal to a non-HDCP compliant display device. If an encrypted signal is switched to a non-compliant output, muted screen will be shown.

3.2.1. Protected and unprotected content

Many video sources send HDCP protected signal if they detect that the sink is HDCP capable – even if the content is not copyrighted. This can cause trouble if an HDCP capable device (e.g. an extender-pair) is connected between the source and the display. In this case, the content can't be viewed on non-HDCP capable displays and interfaces like event controllers.

Rental and staging technicians often complain about Apple laptops, who always send HDCP encrypted signals if the receiver device (display, matrix router, etc.) reports HDCP compliancy. However, HDCP encryption is not required all the time (e.g. computer desktop image) MacBook and MacBookPro still do that.

To avoid unnecessary HDCP encryption, Lightware introduced the HDCP enabling/disabling function: the HDCP capability can be disabled on the extenders. If HDCP is disabled, the connected source will detect that the sink is not HDCP capable, and turn off authentication. The source will not be able to communicate with any of the devices (displays, repeaters, etc.) that are connected to the receiver's output, therefore it could not see if they are HDCP capable or not.

3.2.2. Real life examples
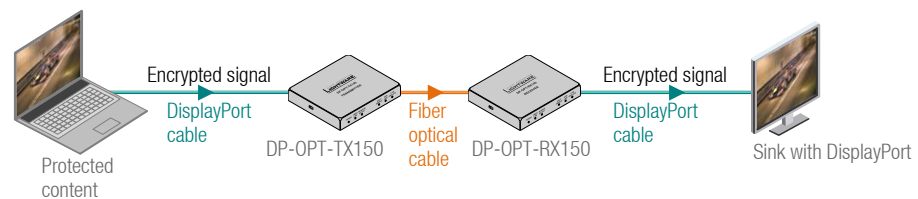
Sink with DisplayPort

Figure 3-2. Sink with DisplayPort

All the devices are HDCP-compliant, no manual setting is required, both protected and unprotected content is transmitted and displayed on the sink.
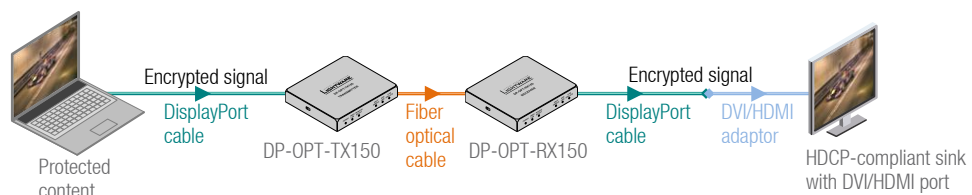
HDCP-compliant sink (HDMI/DVI)

Figure 3-3. HDCP-compliant sink (HDMI/DVI)

The display device is connected to the receiver through a passive DVI/HDMI adaptor. The sink is HDCP-compliant, so the situation is similar then in the first case: no manual setting is required, both protected and unprotected content transmitted and displayed.

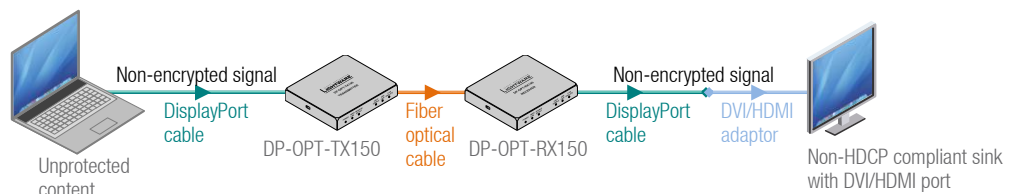**Non-HDCP-compliant sink (HDMI/DVI) 1.**

Figure 3-4. Non-HDCP compliant sink displaying unprotected content

The non-HDCP compliant display device is connected to the receiver through a passive DVI/HDMI adaptor. Some sources (e.g. computers) always send HDCP encrypted signals if the receiver device reports HDCP compliancy, however, HDCP encryption is not required all the time (e.g. computer desktop image). If the HDCP is enabled in the extenders, the image will not be displayed.

On DP-OPT extenders 'HDCP enable' function can be disabled (HDCP LED is dark), thus the source can be forced to send non-encrypted signal. Since the image content is unprotected, the source will send the signal and the sink will display the image.
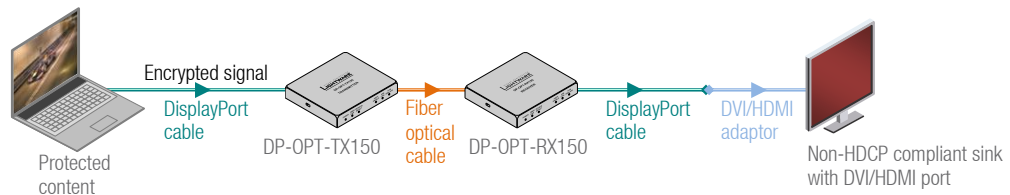
Non-HDCP-compliant sink (HDMI/DVI) 2.

Figure 3-5. Non-HDCP compliant sink and protected content

The layout is the same as in previous case: non-HDCP compliant display device is connected to the receiver. Now the difference is that the content is protected, thus the source is sending encrypted signal. In this case, the source does not send any signal because it detects non-compliant system. The display device will show muted screen or pop up an error message that the sink is not HDCP-compliant. The solution is to replace the display device to an HDCP-capable one.

3.3. EDID management

Display device's EDID can be read by the source in all kind of working modes. EDID pass-through is always enabled.

4. Installation

4.1. Rack shelf mounting

> **INFO**
> *The extenders are quarter-rack sized.*

Step 1. Turn the unit upside down.

Step 2. Put the rack shelf upside down on the unit, and position it to get the mounting holes aligned.

Step 3. Fasten the unit on the rack shelf with the provided screws.

Step 4. Mount the rack shelf in the rack.
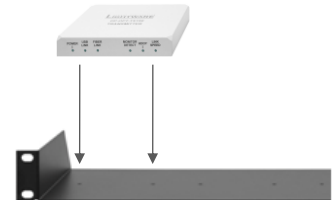
> **INFO**
> *The fixing method is the same when under-desk mounting kit double is used.*

4.2. Under desk mounting kit double

The UD-kit double makes easy to mount two devices on any flat surface (e.g. furniture).

4.3. Security slot

A Kensington-compatible security slot can be found on the side of the units for theft protection. (Security cable is not supplied with the extenders.)

5. Operation

5.1. Connecting devices

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 which can damage sensitive electronic circuits.

After the system is complete, connect the DC power cable to the extender unit and then to the power outlet. The unit is immediately powered ON.

After the extender units are initialized, the attached DP source and monitor can be powered on.

ATTENTION!
If the power LED does not light up upon power-up, the unit is most likely damaged and further use is not advised. Please contact support@lightware.eu.

INFO
The laser becomes enabled any time the transmitter is powered on. This is done to avoid accidental laser loss problems.

5.1.1. Cabling of fiber connection

Step 1. Connect the DP output of the source (e.g. a computer) to the DP INPUT connector of the transmitter.

Step 2. Connect the transmitter's fiber output connector to the fiber input connector of DP-OPT-RX150 receiver with a multimode fiber cable.

Step 3. Connect the DP display device to the DP OUTPUT connector of the receiver or use a DVI/HDMI display device with a passive adaptor.

Step 4. Connect the 5V power cable to the transmitter.

Step 5. Connect the 5V power cable to the receiver.

Step 6. Power on the DP source (computer).

Step 7. Power on the connected display device.

WARNING!
Do not look directly into the SC fiber optical connector if the cable is connected to the transmitter.

5.1.2. Setting up USB devices

DP-OPT-RX150 handles USB HID devices (Human Interface Device), which are input devices like mouse, keyboard, presenter, pointing device, etc. However USB HUBs are supported (like those keyboards, monitors that have built-in USB HUB), only two devices are available for extension at the same time.

When DP-OPT-TX150 is connected to the computer by the USB cable, it can be used as a local USB 2.0 HUB. To build the USB connection, do the following steps:

Step 1. Perform the steps described in the previous section (5.1.1).

Step 2. Connect the supplied USB cable to the transmitter's mini USB connector.

Step 3. Connect the other end of the USB cable into an empty USB slot on the computer.

Step 4. Connect the HID device(s) to the receiver.

INFO
If the previously used USB devices are connected through the extenders to the computer, they may be handled as new hardware by the operating system at the first time.

5.2. USB modes

Two channels are used for the USB communication between the extenders. Channel A1 is always transparent and one USB HID device is always operable. The other channel's state can be set which determines the current USB mode.

Transparent USB mode

Both channels are available for USB HID devices connected to the receiver. The default setting is transparent USB mode which means both USB HID devices connected to the receiver are transparently transmitted to the source computer.
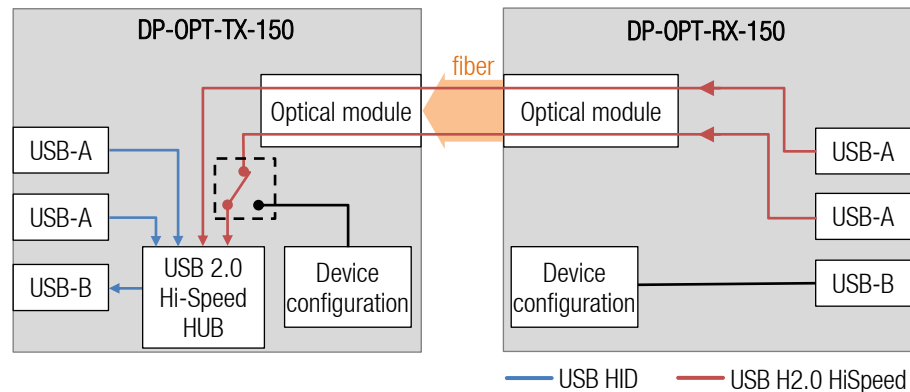

Figure 5-1. USB channels in Transparent mode

Configuration USB mode

Configuration USB mode is an option where the extenders' USB settings can be configured by using the Lightware Device Controller. One channel (A1) is available for a USB HID device, the other channel (A2) is reserved for communication.
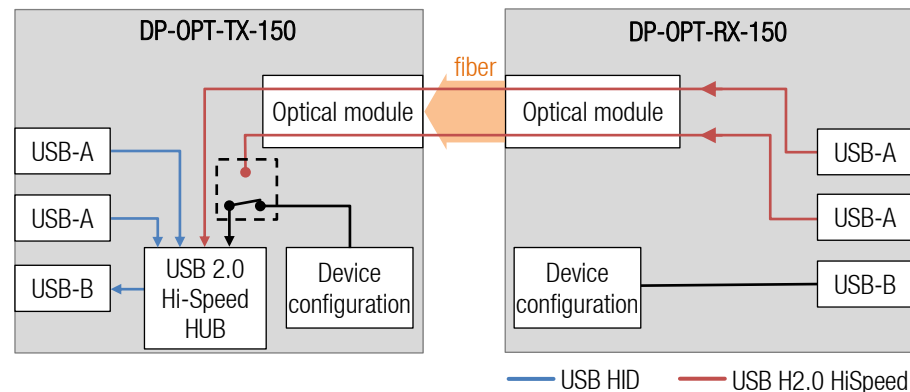

Figure 5-2. USB channels in Configuration mode

> **INFO**
> *The USB mode has an effect only on the transmitter's state. The receiver is always in configuration mode. Setting the USB mode on the receiver effects only the transmitter.*

For more information about USB working methods see section 6.5 on page 25 and section 6.6 on page 29.

Changing USB mode

The USB mode can be changed in the transmitter or in the receiver but in latter case make sure that the extenders are linked by the fiber cables.
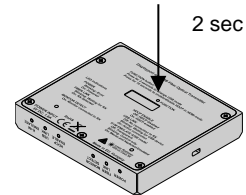
INFO
If the USB mode is changed in the receiver when the extenders are not connected by fiber cable, the setting is stored in the receiver and the USB mode will be changed after reconnecting.

Step 1. Power ON the extender(s) and locate the hidden function button on the bottom side.

Step 2. Press and keep pressed the button by a thin tool (e.g. paperclip) for about two seconds. Release the button, not more than five seconds.

Step 3. Current USB mode is visible on the front panel.

2 sec

ATTENTION!
When configuration mode is active, only one USB HID device can be used: the one that was connected to the receiver the earliest.

INFO
The default setting (transparent mode) is restored when the device is powered on.
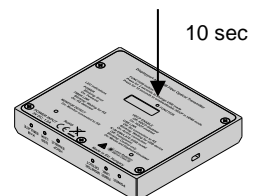
5.3. HDCP setting

When a non-HDCP compatible sink is connected to the receiver, the source can be forced to output non-encrypted signal if the content is not protected. For more information about HDCP management, see section 3.1 on page 15.

HDCP is enabled as a default setting but can be changed as follows:

Step 1. Locate the hidden function button on the bottom side of the extender (either on TX150 or RX150).

Step 2. Press and keep pressed the hidden function button by a thin tool (e.g. paperclip) for at least 10 seconds (pressing the button for a shorter period changes the USB mode instead). If the extenders are in HDMI mode the 'HDCP enable' LED status is changed before releasing the button.

10 sec

INFO
HDCP setting can be changed in DP mode, but in this case, the 'HDCP enable' LED will not show the change. The setting will be effective only after switching to HDMI mode. In DP mode HDCP is always enabled.

INFO
HDCP can be set either on the transmitter or on the receiver.

5.4. DP mode and HDMI mode

The extenders work in two modes according to the connected display device:

DisplayPort mode (DP-DP cable)

When the DP output port of the transmitter is connected to the DP input port of the display device, the extenders are in DP mode. In this case, the source sends DP signal.

Display device connected by a passive adaptor

When the DP output port of the transmitter is connected to the DVI/HDMI port of the display device through a passive adaptor, the extenders and the source are in HDMI mode. In this case, the source sends DVI/HDMI signal. See more information about the Dual mode in section 3.1 on page 15.

6. Software control – Using Lightware Device Controller (LDC)

The extenders can be controlled by a computer 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. After the installation, the Windows and the Mac application has the same look and functionality.

6.1. Steps of the installation in case of Windows OS

Step 1. Run LDC installer.
If the User Account Control drops a pop-up message click **Yes**.
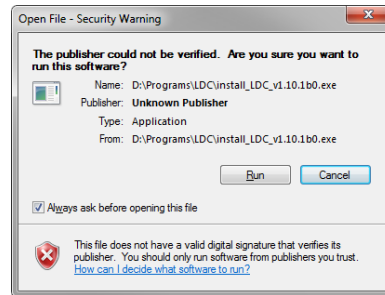
Step 2. A welcome window opens. Click **Next**.

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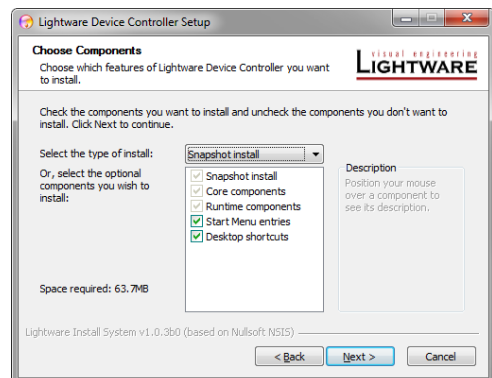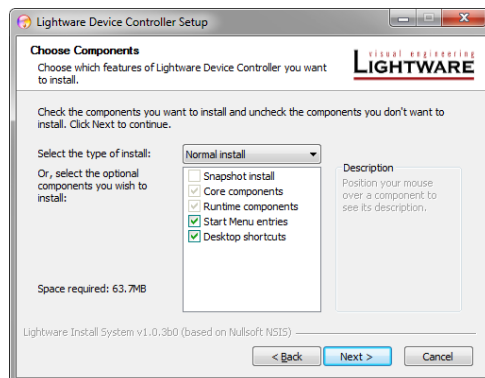
Normal install	Snapshot install
Available for Windows and MAC OS X	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different version can be installed for all users

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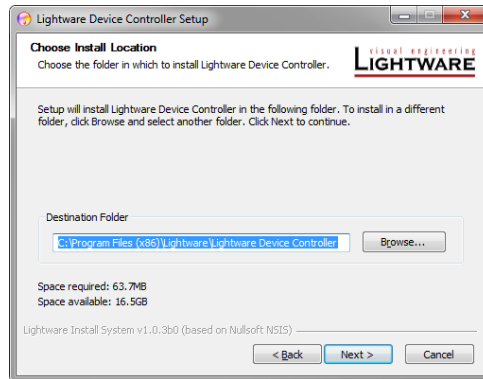
Step 5. Select the Start Menu Folder and click **Next**. (Using the default folder is highly recommended. If the Start menu entries were not checked in Step 2. this window will be skipped.)
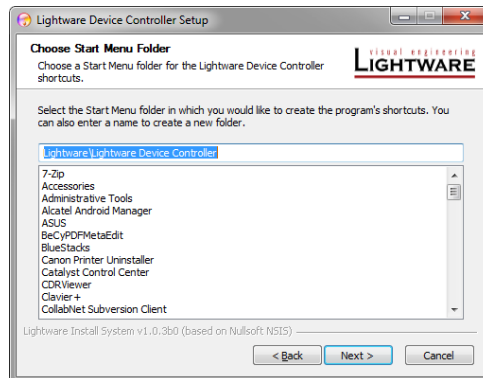
Step 6. Verify the settings and if they are correct click **Install**. (If not, click **Back** and change the setting.)
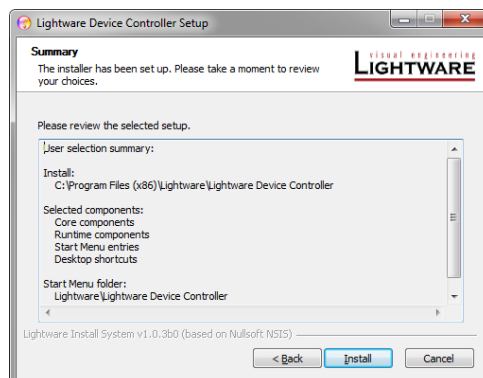
Step 7. After the installation of the last component, the **Next** button is activated. Click on it.
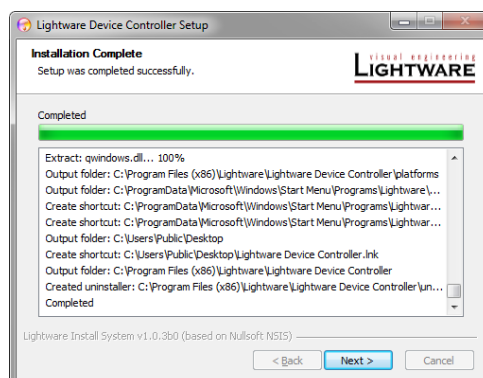
Step 8. If the installation is complete, click **Finish**. (Uncheck the box if the running of the LDC will be delayed.)

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

i *INFO*
After the installation, the Windows and the Mac application has the same look 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.
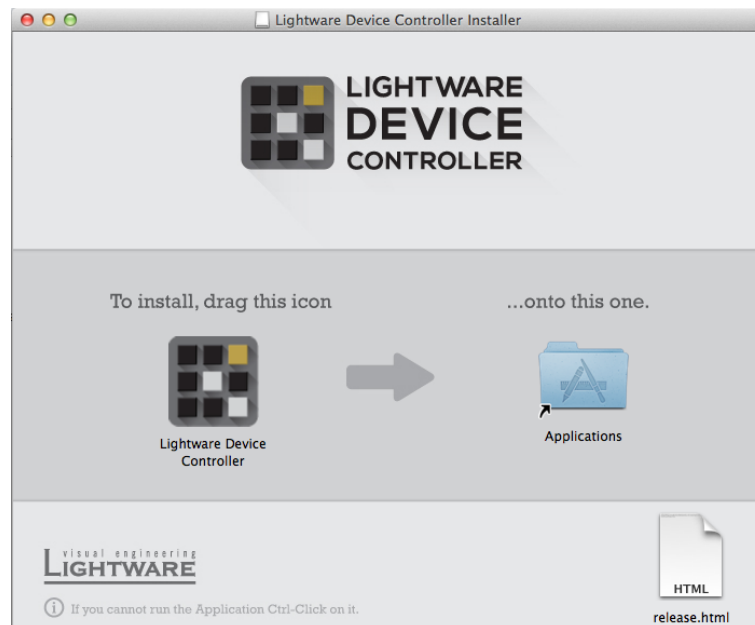
i *INFO*
This type of the installer is equal with the Normal install in case of Windows This is an updateable version with the same attributes.

6.3. LDC Upgrade
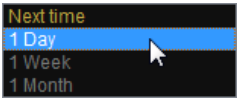
Step 1. Start the application.

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

Information

Current version: 1.10.1b0
Update version: No update available

Options

Check for updates automatically: ✓
Remind me later: Next time
Proxy settings: Setup

Check now | Download update | Postpone

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

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

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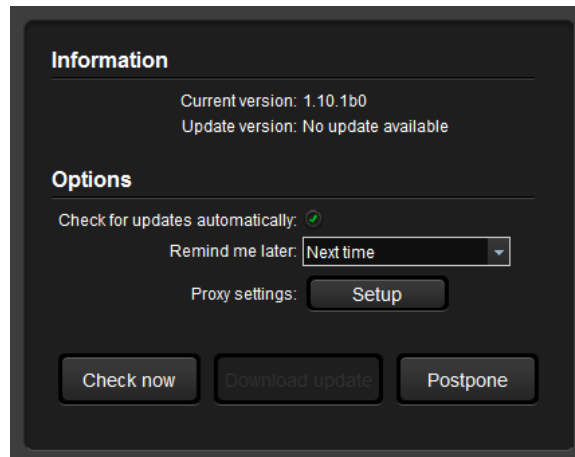
b) If the postponing is the desired choice for the updating, the reminder can be set for the different duration with the drop-down list.

Next time
1 Day
1 Week
1 Month

c) If the proxy settings traverse the update process, set the proper values then click the **OK** button.

Proxy settings

No proxy: ○
System default: ●
Use HTTP proxy: ○
Use SOCKS 5 proxy: ○
Proxy host:
Proxy port: 8080
Proxy username:
Proxy password:

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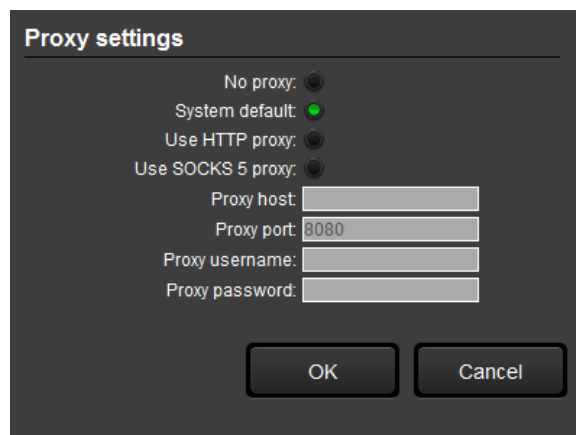
Step 3. Click the **Download update** button to start the upgrading.

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

6.4. Establishing the connection

Step 1. Set the USB mode on the extender to configuration mode; see section 5.1 on page 18 about the changing method.

Step 2. Connect the device to the computer by the USB cable.

Step 3. Run the Controller Software.

Step 4. Device discovery window appears automatically. Select the **USB Devices** tab to find the device you want to connect to.
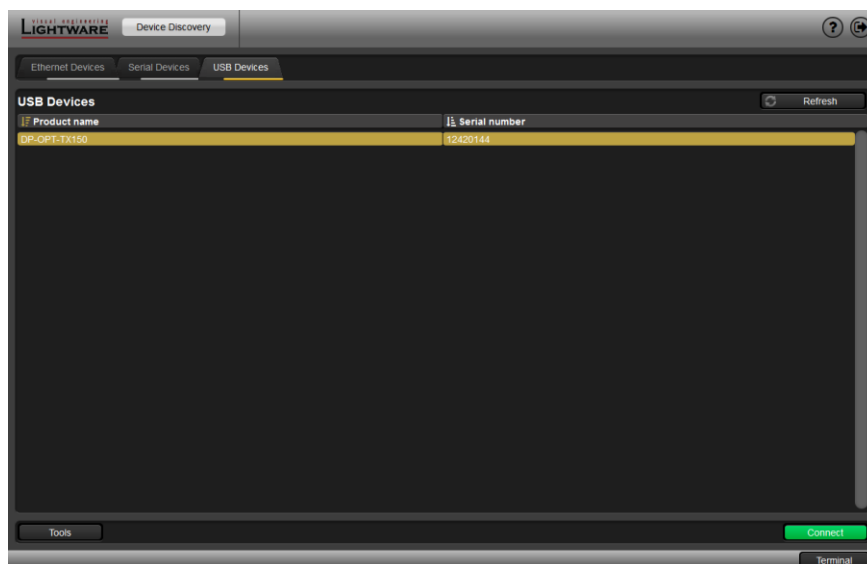
Figure 6-1. USB device in Device Discovery window

Step 5. The device name and serial number are displayed in the list. Select the device and click on the **Connect** button.

6.5. Control menu

The Control menu shows basic information about the extender(s) in three panels: Video and link, TX (DP-OPT-TX150) and RX (DP-OPT-RX150). 'Connected' is displayed in the extender's title that is connected to the computer directly.
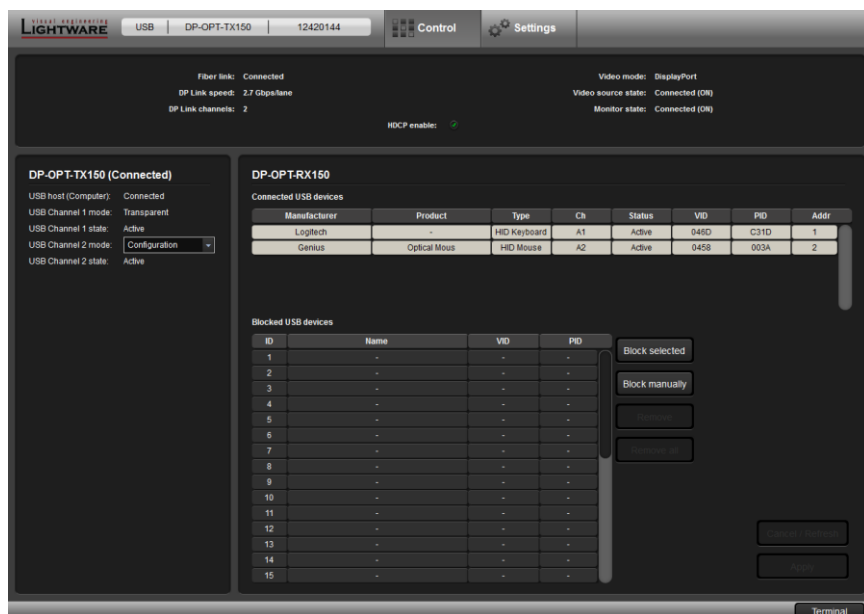
Figure 6-2. Control menu view (DP-OPT-TX150)

6.5.1. Video and link panel

Basic information is displayed about the extenders and the video signal. If the extenders are linked by fiber cable, they can read information about each other and display.

Fiber link: - Connected: Transmitter and receiver are linked

- Disconnected: no fiber connection

DP link speed and channels: - According to the incoming signal (only in DP mode)

Video mode: - DisplayPort

- HDMI: passive adaptor is connected to receiver

Video source state: - ON: source is present in DP mode

- Not connected: source is not connected

- n/a: no information about the signal (HDMI mode)

Monitor state: - ON: DP or HDMI display device is connected

- OFF: display device is not connected

HDCP enable: - checked: HDCP enabled

- unchecked: HDCP disabled

> **i** *INFO*
> *'HDCP enable' setting can be changed in DP and HDMI mode also, but effects only when DVI/HDMI adaptor is connected. When HDCP is changed in DP mode, the setting is stored and will be applied when an adaptor is connected.*

> **☀** *TIPS AND TRICKS*
> *The source can be forced to send unencrypted signal (when the content is not protected) by unchecking 'HDCP enable' setting.*

6.5.2. Transmitter panel

Two channels are used for the USB communication, which can be set as described in section 5.1 on page 18. Channel 1 is always transparent, Channel 2 can be set to transparent or configuration mode.

USB host (Computer): - Connected

USB Channel 1 mode: - Transparent (always)

USB Channel 1 state: - Active

- Not connected (it depends on the HID devices)

USB Channel 2 mode: - Configuration

- Transparent
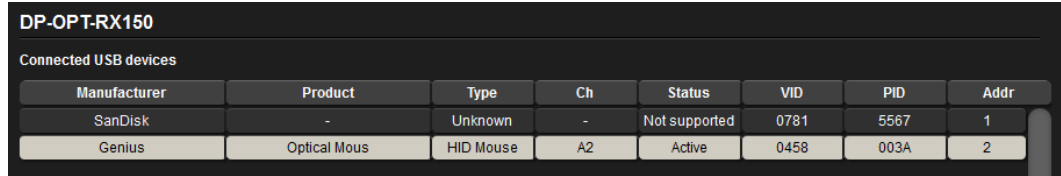
USB Channel 2 status: - Active

> **☝** *ATTENTION!*
> *USB Channel 2 mode can be changed by a drop-down menu. When switched to transparent mode, the extender is disconnected from the LDC immediately.*

6.5.3. Receiver panel

The panel consists of the lists that are showing connected and blocked USB devices.

Connected USB devices

The listed devices are connected to the receiver's USB ports.

DP-OPT-RX150

Connected USB devices

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
SanDisk	-	Unknown	-	Not supported	0781	5567	1
Genius	Optical Mous	HID Mouse	A2	Active	0458	003A	2

Figure 6-3. USB devices connected to the receiver

Manufacturer, Product, and Type

Ch (Channel)

Channel A1 and A2 are used for USB communication. A1 is always transparent, A2 can be switched. The USB device on Channel A1 was connected to the receiver the earliest.

Status

Active: the device is ready to use in transparent mode.

Supported: the device is supported, but not active (no channel is available for extension).

Unsupported: the device is not USB HID (e.g. pen drive).

VID, PID
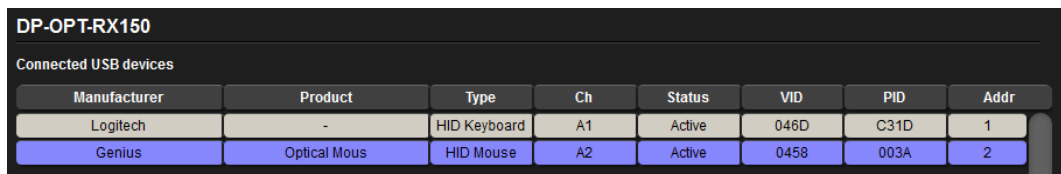
Vendor ID and Product ID

Address (see Figure 6-4)

Address of the device plugged in ⌨ = 1 and the device plugged in 🖱 = 2. Since USB HUB can be connected to the receiver, the addresses are determined as follows:

Address of the USB HUB: 100 (not visible)

Address of the USB device connected to the first port of the USB HUB: 101

DP-OPT-RX150

Connected USB devices

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
Logitech	-	HID Keyboard	A1	Active	046D	C31D	1
Genius	Optical Mous	HID Mouse	A2	Active	0458	003A	2

Figure 6-4. Address allocation for connected USB devices

Above example shows a mouse that is connected to the 🖱 USB port (Ch A1, Addr 2). The other device is a keyboard, which is connected via a USB HUB – that is why its address is not 1 but 101. Since the extenders are in configuration mode, only one device can be used: the one on channel A1 (the mouse).

However USB HUBs are supported by the receiver, only two devices are active at the same time in transparent mode: the devices which are closest to the root address. If an active device is disconnected, the next valid device (that is the closest to the root) will be active. See more information in section 6.6 on page 29.

ℹ️ *INFO*
Channel A1 and A2 are assigned to the devices automatically when a new device is connected; they cannot be changed manually.

> **INFO**
> *The port numbers of the USB HUB determines the priority of the devices. When more devices are connected to a USB HUB, the USB port number determines the priority of the connected devices: the lower number, the higher priority. This priority has an effect when the channels are assigned to the devices.*

Blocked USB devices

The USB blocking feature allows you to set the devices that are allowed to work; if more than two USB HID devices are connected to the receiver (through a USB HUB), only two of them will work. By blocking devices, you can control which ones are allowed to work. A typical example is shown in the third example in section 6.6 on page 29. The devices can be added or removed to/from the list by the buttons.

Blocking a device

Step 1. Click on **Block manually** button, or select a device from the 'Connected USB devices' list and click on **Block selected** button.

Step 2. Check the fields in the appearing window (Device name, Vendor ID, Product ID) and click on **Save** button. The ID is the number of the blocked device in the list.

Figure 6-5. Block a USB device

Step 3. Click the **Apply** button at the bottom of the window to save changes.

Step 4. The desired device is added to the **Blocked USB devices** list and next time when you connect it to the receiver, its status will be displayed as **Blocked**.

Removing blocked devices

Step 1. Select the device from the 'Blocked USB devices' list.

Step 2. Click on **Remove** button.

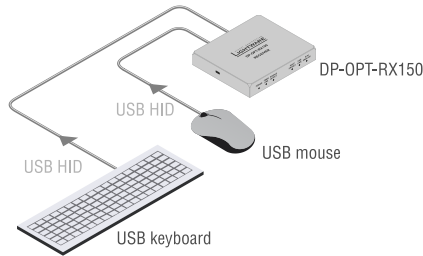**Step 3.** Click on **Apply** button on the bottom of the screen to save changes.

> **INFO**
> *'Remove all' button will empty the list of blocked devices.*

6.6. Real-life examples (USB devices and modes)

The background of the USB modes, connected USB devices, displayed information can be understood easier by presenting examples.

Example 1: Connecting two USB HID devices

Device tree structure: (showing the addresses)
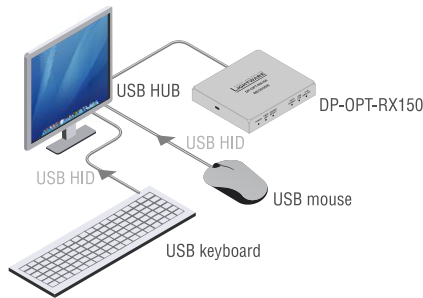
Root
- 1 (Keyboard)
- 2 (Mouse)

Shown in LDC:

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
Logitech	-	HID Keyboard	A1	Active	046D	C31D	1
Genius	Optical Mous	HID Mouse	A2	Active	0458	003A	2

In a simple case, a keyboard and a mouse are connected to the receiver.

In Transparent mode both devices are operable.

In Configuration mode only one of them is available (as seen on the screenshot), the keyboard on channel A1. The second row (the mouse) is blinking, showing that the device is not available.

Example 2: Connecting two USB HID devices via a USB HUB

Device tree structure: (showing the addresses)

Root
- 200 (USB HUB)
  - 202 (Keyboard)
  - 204 (Mouse)

Shown in LDC:

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
Logitech	-	HID Keyboard	A1	Active	046D	C31D	1
Genius	Optical Mous	HID Mouse	A2	Active	0458	003A	2

This case is similar than the first, but now the mouse and the keyboard are connected to a local USB HUB. The HUB (with 4 available USB ports) is built into the monitor and connected to the receiver (the address of the HUB is 200). The keyboard is connected to the 2nd port (Addr. 202) and the mouse is connected to the 4th port of the HUB (Addr. 204).

In Transparent mode both devices are operable.

In Configuration mode only one USB HID device is available (as seen on the screenshot), the keyboard on channel A1. The second row (the mouse) is blinking, showing that the device is out of operation currently – due to the USB mode.

Example 3: Connecting three USB HID devices and a HUB
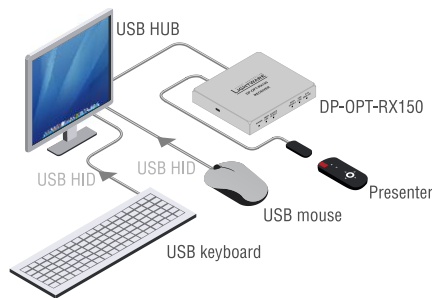
Device tree structure: (showing the addresses)

Root
```
├─1 (Presenter)
└─200 (USB HUB)
     ├─203 (Mouse)
     └─204 (Keyboard)
```
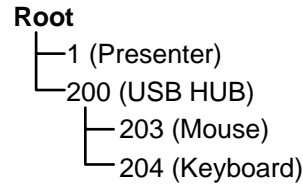
Shown in LDC:

DP-OPT-RX150 (Connected)

Connected USB devices

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
Logitech	-	HID Mouse	A1	Active	046D	C05A	1
Genius	Optical Mous	HID Mouse	A2	Active	0458	003A	203
Logitech	-	HID Keyboard	-	Supported	046D	C31D	204

On the third example, three USB devices can be seen. A mouse and a keyboard are connected to the USB HUB that is connected to one of the receiver's USB port. A presenter device is connected to the other USB port (the presenter is listed as "Keyboard").

In Transparent mode two devices are operable: the presenter (on channel A1) and the keyboard (on channel A2). The presenter was connected to the receiver the earliest, that is why channel A1 is assigned to the presenter. The address number of the keyboard is lower than the mouse, that is why channel A2 is assigned to the keyboard. If you want to use the mouse, you have to block the presenter or the keyboard (the other option is to disconnect one of them).

In Configuration mode only one device is operable: the presenter on channel A1. Second row (the keyboard) is blinking, showing the device is not available – due to the USB mode.

INFO
Channel A1 and A2 are assigned to the devices automatically when a new device is connected; they cannot be changed manually.
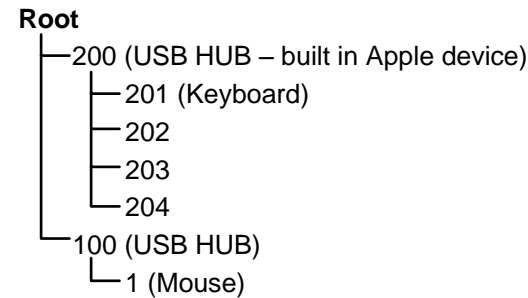
INFO
The port numbers of the USB HUB determines the priority of the devices. When more devices are connected to a USB HUB, the USB port number determines the priority of the connected devices: the lower number, the higher priority. This priority has an effect when the channels are assigned to the devices.

Example 4: Using an Apple LED cinema display
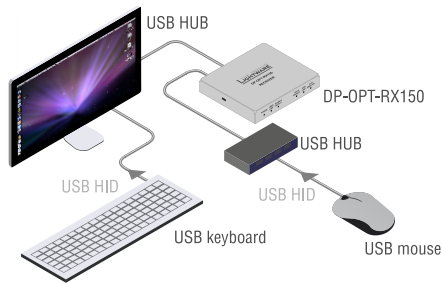
Device tree structure: (showing the addresses)

Root
├─200 (USB HUB – built in Apple device)
│ ├─201 (Keyboard)
│ ├─202
│ ├─203
│ └─204
└─100 (USB HUB)
   └─1 (Mouse)

Shown in LDC:

DP-OPT-RX150 (Connected)

Connected USB devices

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
Logitech	-	HID Mouse	A1	Active	046D	C05A	1
Logitech	-	HID Keyboard	A2	Active	046D	C31D	201
Genius	Optical Mous	HID Mouse	-	Supported	0458	003A	202
-	USB Keyboard	HID Keyboard	-	Supported	0461	0010	203
SanDisk	-	HID Keyboard	-	Not supported	0781	5567	204

The last example shows a special layout, where an Apple LED cinema display (with built-in USB HUB), a mouse, a keyboard and another simple USB HUB are installed. The layout could cause a headache since the display contains three components which report themselves as HID devices. The result is that the keyboard's address is lower than the components in the display device and the keyboard will be operable neither in configuration-, nor in transparent mode.

The solution, in this case, is to block the unnecessary devices, shown in the 2nd and 3rd rows. (The device in the 5th row is not supported, it is not necessary to block.) Block the two devices:
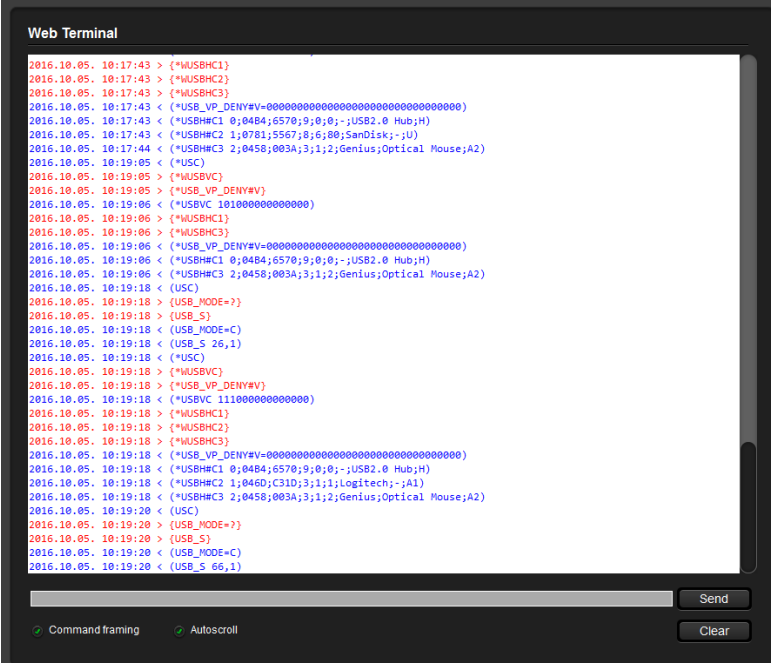
DP-OPT-RX150 (Connected)

Connected USB devices

Manufacturer	Product	Type	Ch	Status	VID	PID	Addr
Logitech	-	HID Mouse	A1	Active	046D	C05A	1
Logitech	-	HID Keyboard	-	Blocked	046D	C31D	201
Genius	Optical Mous	HID Mouse	-	Blocked	0458	003A	202
-	USB Keyboard	HID Keyboard	A2	Active	0461	0010	203
SanDisk	-	HID Keyboard	-	Not supported	0781	5567	204

Thus in Transparent mode the mouse and the keyboard will be operable.

In Configuration mode only the mouse is available, that is why the last row is blinking.

6.7. Terminal menu

The general purpose of this serial terminal is intended mainly for testing and debugging purposes. Nevertheless, when the window is open, the automatically executed commands can be followed on the screen.

Figure 6-6. Terminal Window

6.8. Settings menu

6.8.1. Device information

Basic information about the extender, such as type, serial number, firmware and hardware revisions are displayed on this tab.

Figure 6-7. Device information tab

6.8.2. Log tab
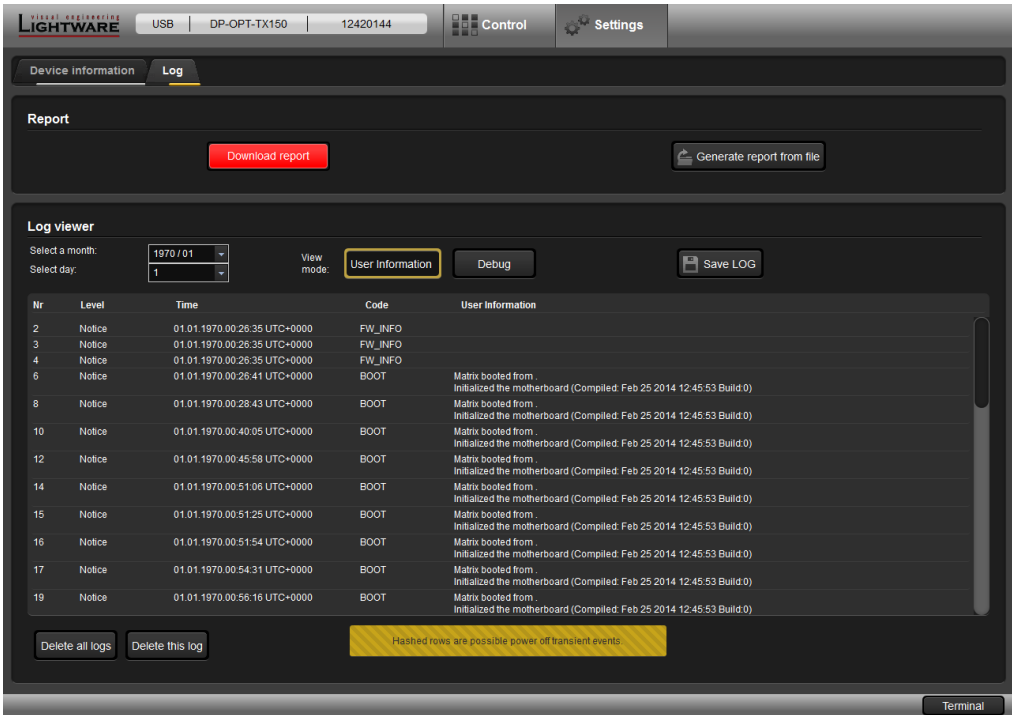
Figure 6-8. Log tab

Generate report

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

INFO
When a report is necessary to generate, always let devices (source, sink) be connected to the extenders, do not disconnect them. Lightware Device Controller will collect information about the USB devices and about their status.

Step 1. Press the big red button on the **Log** tab in **Settings** menu **Download report**.

> Download report

Step 2. LDC collects the needed information in a minute.

Step 3. When the process is finished, a **Save as** dialog box appears. Select the place where you want to save the report file. The default file name can be changed.

The report contains the following information:

- Current command protocol
- The equipment type and serial number
- Firmware version of the controller
- Installed I/O board type and version

Browse command file

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

> Generate report from file

INFO
This function is only for special troubleshooting cases.

Error log viewer

Log files saved by the devices can be downloaded and viewed with this function. The columns in the list are the followings: error level, time, error code, error parameter, processor task identifier, occurrences and extra information.

The device creates a new error log file every time it is started except if a log file exists for that day. The software allows selecting only those months and days, which have a log.

Step 1. Select the month of the error log.

Step 2. Select the day.

Step 3. The error log is downloaded and shown as a table.

Step 4. The error log can be saved in a CSV file on the computer by the Export to CSV file button.

There are two viewing modes are available: **User information** and **Debug**. User information contains user-friendly data, using this view mode is highly recommended.

Logs can be deleted one-by-one or all the logs at the same time with the **Delete all logs** and **Delete this log** buttons.

6.9. Device discovery (information ribbon)

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

USB	DP-OPT-TX150	0882-ENG

the connected device. The *Device discovery* window can be started by clicking on this ribbon. Clicking "Yes" will open the window. See section 6.4 on page 25 how to establish the connection. Clicking No will close the pop-up window and the current connection remains active.

7. Firmware upgrade – Using Lightware Device Updater (LDU)

DP-OPT extenders can be upgraded by connecting a Windows PC via LAN and using Lightware Device Updater software (LDU). The application can be downloaded from www.lightware.eu. In order to get the firmware pack with the necessary components (*.lfp file) for your specific product, please contact support@lightware.eu.

ATTENTION!
While the firmware is being upgraded, normal operation mode is suspended as the extender is switched to bootload mode. Signal transmission between the extenders is not available. Do not interrupt the firmware upgrade. If any problem occurs, switch off the extender and restart the process.

ATTENTION!
Always upgrade both extenders of a pair: if you upgrade the transmitter, use the same firmware package also on the receiver.

7.1. About firmware package

The approach of the firmware upgrading process using LDU is different than at Lightware Bootloader software 3.x versions. On the one hand, more devices can be upgraded at the same time by using LDU. On the other hand, the firmware package (the file with 'LFP' extension) contains all the necessary components, binary, and other files, you do not have to download separate files. In many cases a firmware package can be used for many devices; e.g. DP-OPT receiver and transmitter have a common package.

7.2. Short instructions

Step 1. Get the firmware pack and the LDU application.

Step 2. Install the LDU application.

Step 3. Connect the extender via USB.

Step 4. Start the LDU and follow the instructions shown on the screen.

7.3. Detailed instructions

7.3.1. Get the firmware pack and the LDU application

In order to get the firmware pack with the necessary components (*.lfp file) for your device(s), please contact support@lightware.eu. The LDU application can be downloaded from www.lightware.eu.

7.3.2. Install the LDU application

Step 1. Run LDU installer.

Step 2. Click **Next** in the opening Welcome window.

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.)
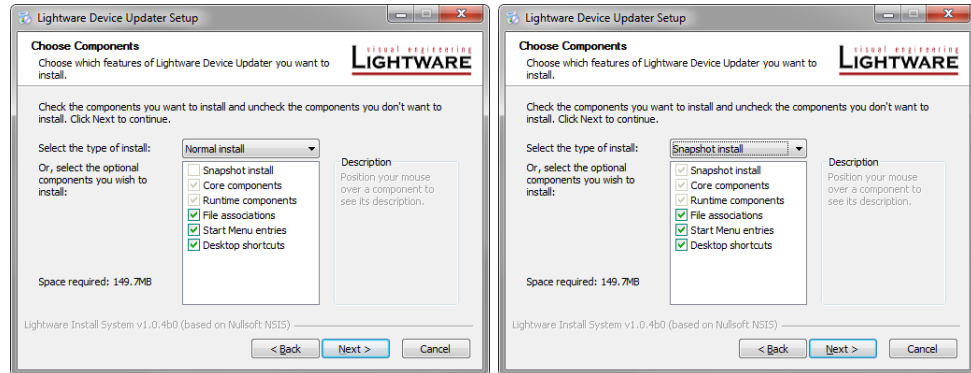
Normal install (recommended)	Snapshot install
Available for Windows and MAC OS X	Available for Windows
The installer can update only this instance.	Cannot be updated.
One only updateable instance can exist for all users.	More than one different version can be installed for all users.

Step 4. Select the destination folder and click **Next**. (Using the default path is highly recommended.)
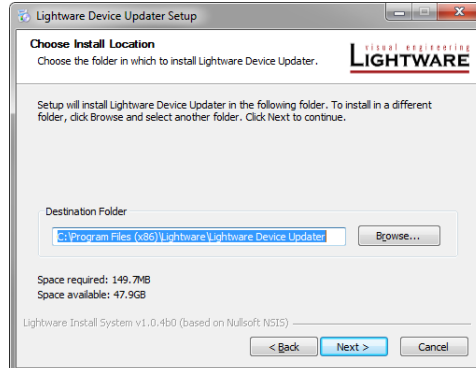
Step 5. Select the Start menu folder and click **Next**. (Using the default folder is highly recommended. If the Start menu entries were not checked in Step 2, this window will be skipped.)
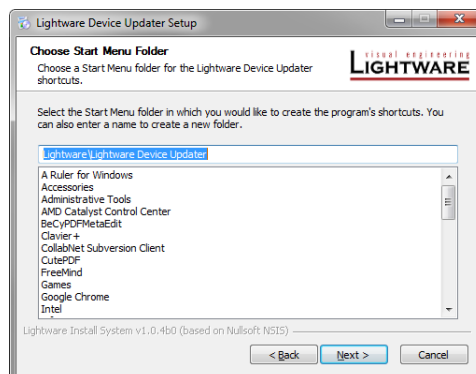
Step 6. Verify the settings and click **Install**, or click **Back** and change the settings.
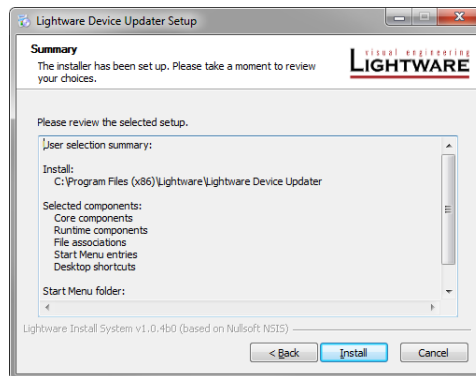
Step 7. After the last component is installed, click the **Next** button.
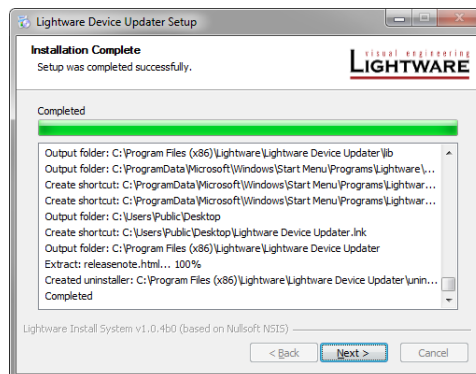
Step 8. If the installation is complete, click **Finish**.

Upgrade the LDU

Step 1. Run the application.

Step 2. In the welcome screen click on the ⟨?⟩ button in the top right corner – the About window will appear. Click on the Update button.

Step 3. The program checks the available updates on Lightware website and shows its version. Set the desired update settings in the Options section.
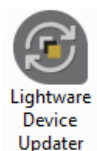
7.3.3. Connect the extender

Step 1. Connect the transmitter/receiver to the PC via the mini USB-B port (CPU/Service).

Step 2. Disconnect the source/sink devices from the extender.

Step 3. Connect the power adaptor to the extender.

7.3.4. Start the LDU and follow the instructions shown on the screen
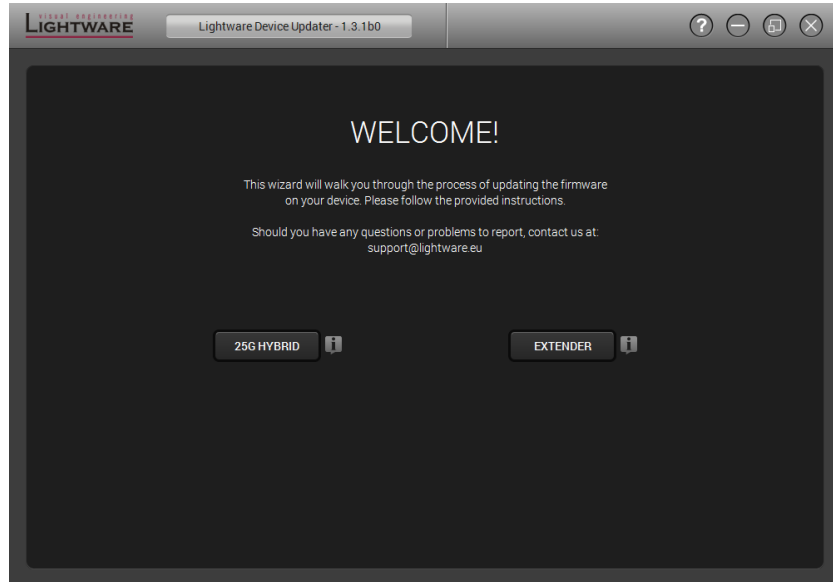
The welcome screen appears, select the **Extender** button.

Step 1. Select package.
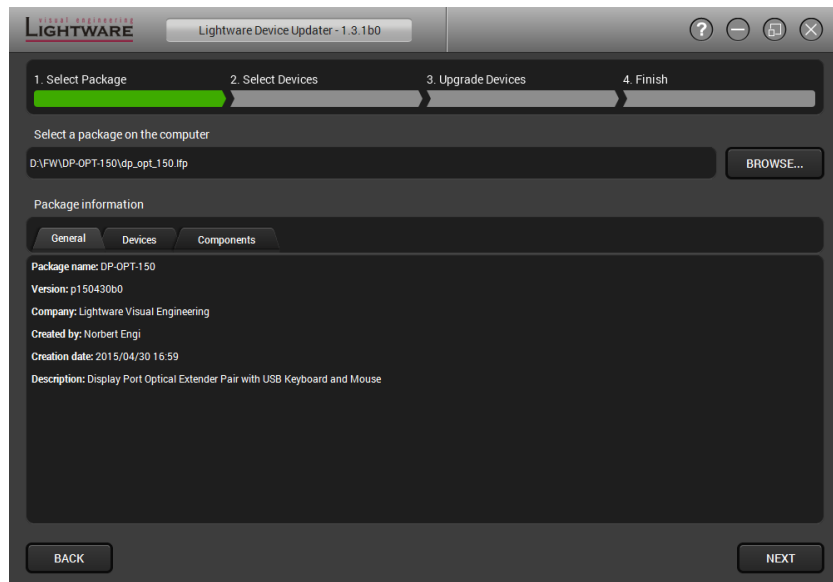
Click on Browse button and select the *.lfp file; package information is loaded:

- **General** version info, creation date, short description,
- **Devices** which are supported by the package,
- **Components** in the package with release notes.

Click on **Next** button and follow the instructions shown on the screen.
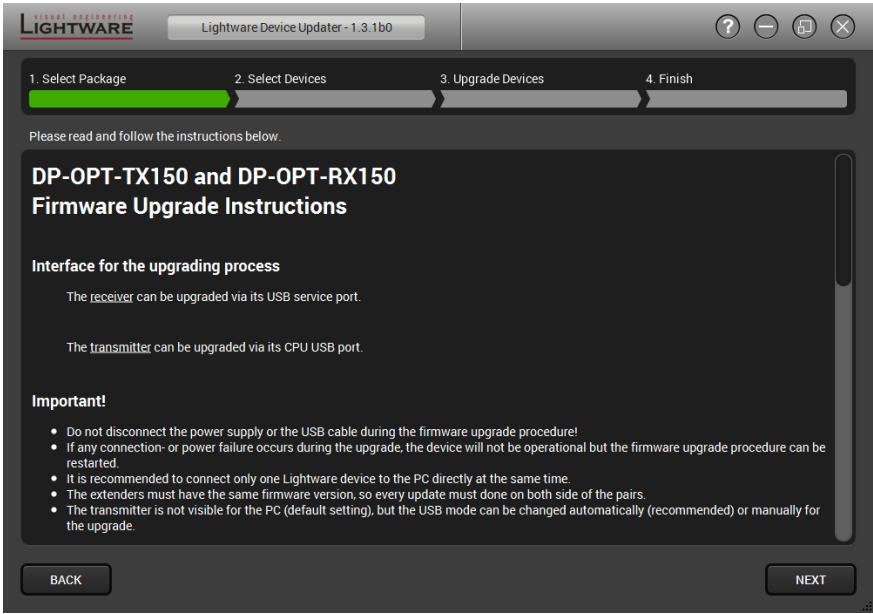
INFO
Files with ".lfp" extension are associated to LDU during installation. If you double click on the ".lfp" file, the application is launched and above screen is shown.

Step 2. Select devices.
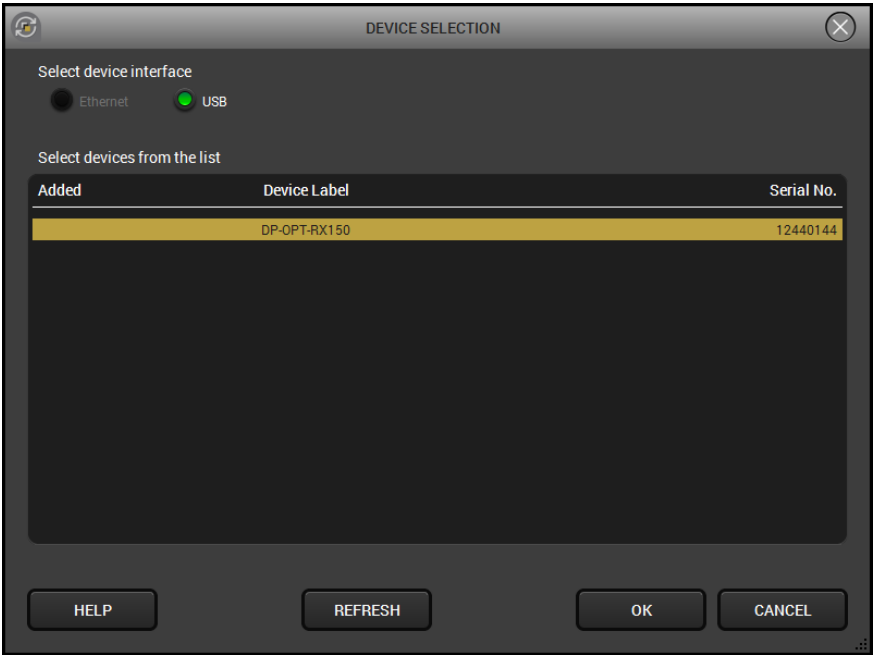
The available and supported devices are listed automatically. DP-OPT extenders can be updated via USB. If the desired device is not listed, check the cables and the devices, then update the list by clicking the **Refresh** button.

The firmware components of the devices are listed on the following screen. Installed firmware version and the available Update version are listed. Updated versions will be uploaded into the device(s). Select the desired device: highlight it with yellow cursor, then click **OK**.

INFO
More devices can be upgraded at the same time, but in this case, all devices have to be connected to the computer by separate USB cables.
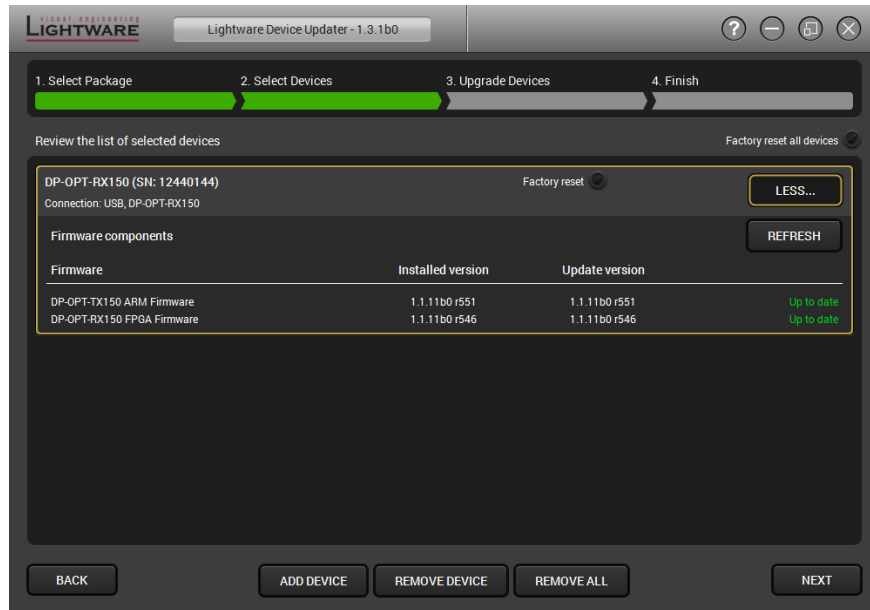
Add a device by clicking on the **Add device** button. The previous screen will be shown; devices, which have already been added are marked in the first column. Select the desired device(s) and click on **OK**.

Remove a device by selecting it (highlight with yellow) and click on **Remove device** button; or click on **Remove all** button to empty the list.

Factory reset can be performed after the firmware upgrade if the option is checked.

ATTENTION!
In some cases, the factory reset option is ticked automatically and cannot be modified due to compatibility reasons.

Click on **Next** button to step forward.

Step 3. Update devices.
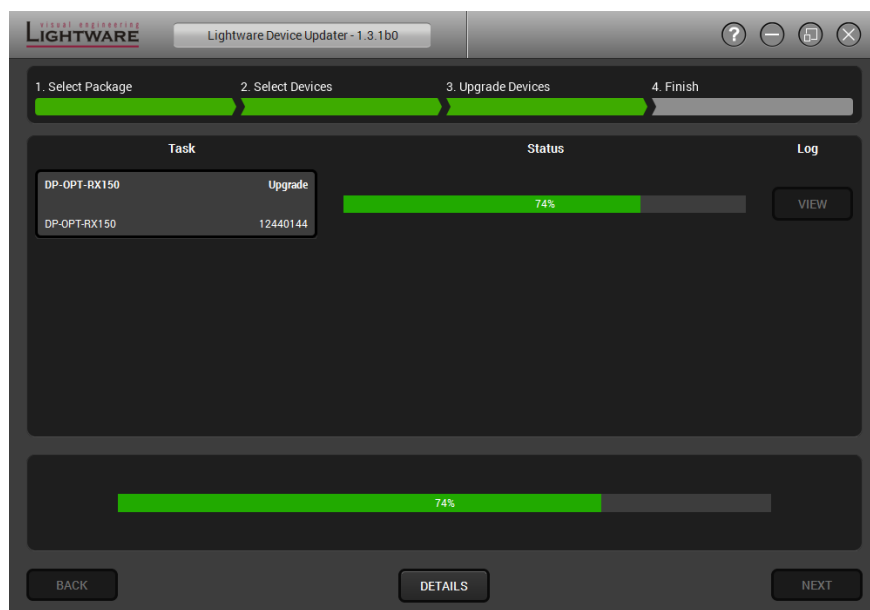
Start button begins the upgrade process.

Details button opens a new window that displays the process.

If the upgrade of a device is finished, its log can be opened by the **View** button on the right. When all the tasks are finished, a window appears. Click **OK** to close and **Next** to display the summary page.
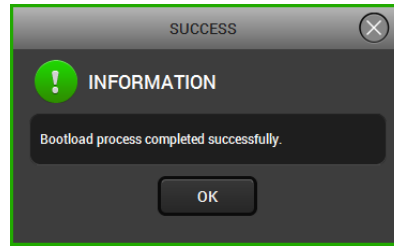
Step 4. Finish.
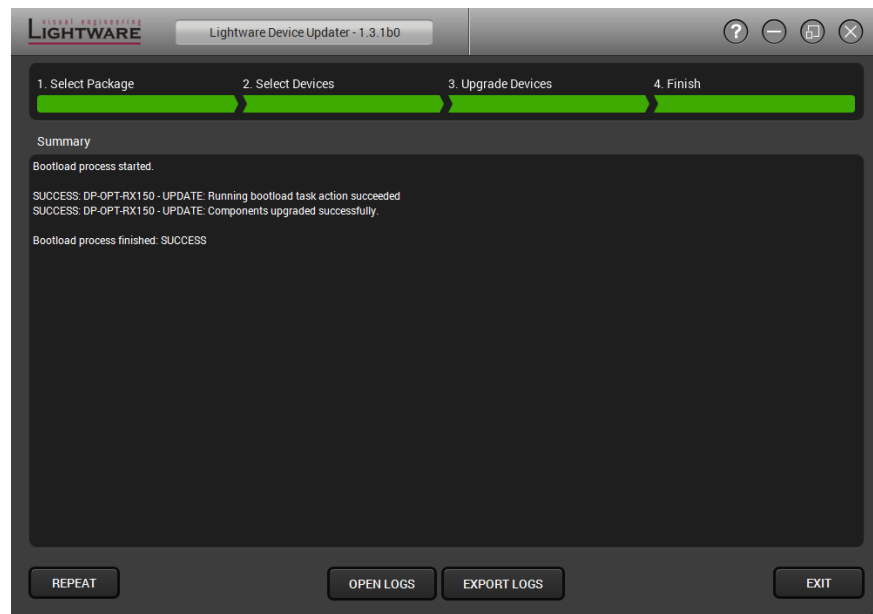
Repeat button starts the process again with the selected device(s).

Open logs button shows the temporary folder where the logs can be found.

Export logs by saving them as a zipped file.

Press **Exit** to close the program.

ATTENTION!
However, the devices are rebooted after the firmware upgrade, switching off and on again is recommended. If the upgrade is failed, restart the device(s) and repeat the process.

8. Troubleshooting

8.1. Picture is not displayed or distorted

Usually, if the system seems not to transport the video signal as expected, the best strategy for troubleshooting is to check the signal integrity through the whole signal chain starting from the source side and moving forward to the receiver end. The following steps help technicians to check the system step by step in right order.

Step 1. Check the cables

Check whether the extenders are properly powered and whether POWER LED is lit continuously green. Try to unplug and reconnect the extender's power cable.

Due to the high data rates, cables must fit very well. DisplayPort connectors have to be in place fixed by the latches; DVI connector has to be locked with screws and HDMI connector has to be fixed into the correct position. No tensions or breaches are allowed. Signal is sensitive for cable quality especially when high bandwidth is necessary because of the video content.

Fiber optical cables must also fit very well to avoid insertion loss. The user should ensure that any gap or misalignment between the fiber optical connectors is eliminated. If the end face surface of the fiber optical cable becomes contaminated, use special fiber optical cable cleaning equipment or a soft cloth to carefully clean it.

Step 2. Check the source device

In DP mode the SOURCE DETECT LED on the front side of the receiver lights green if the source device is powered on, sends the signal and the optical cable is well connected (as seen in Figure 1-1 on page 8). If it is not illuminated, then your source is either powered off or not working properly. The other option is that the cable between the source and the transmitter is damaged; test the system with another one.

If the source is a computer, then verify that the DP output is selected and active. Try restarting your computer; if you only get a picture during the booting process, you have to review the driver settings.

If you connect a DVI/HDMI adaptor and a DVI/HDMI display device, the source is forced to switch to HDMI mode; check your source if Dual-mode is supported.

Step 3. Check the incoming laser signal on the receiver

Check the FIBER LINK LEDs on the front side of the extenders. When both LEDs light green, the fiber link is established between the extenders. All other cases mean that no laser is present at the fiber optical input connector, or the incoming optical signal has a very low level in the receiver. A low laser level can be caused by high fiber attenuation or dust between fiber connectors.

Step 4. Check the display status

Check the MONITOR DETECT LED on the front side of the transmitter. This LED indicates the presence of the Hotplug signal coming from the attached display device. If it is not illuminated, then your display is not connected, not powered on or not functioning properly. If your source or display has more connectors then make sure that the proper interface is selected.

Check the capabilities of the display device and make sure that the desired image resolution is supported.

Step 5. HDMI mode

Check the connected HDMI adaptor if it is in line with the description about passive adaptors in section 3.1 on page 15.

When the extenders are in HDMI mode, the HDCP can be enabled or disabled according to the incoming signal. Check if the incoming signal is protected, the display device is HDCP-capable and the HDCP status of the extenders.

8.2. No audio is present

Audio is supported by the extenders in both DP and HDMI mode. If the source is a computer, check the properties of the audio devices on the control panel and select the desired one as a default device for sound playback. Check the source, the sink, the playback software or the audio channel whether they are muted.

8.3. Extended USB device does not work

Step 1. Check the cables

Make sure that the computer that is desired to remote control and the transmitter are connected by the supplied USB cable. Check if the extenders are linked by fiber cable and USB HID devices are connected to the receiver.

Step 2. USB mode

Check the USB mode of the extenders: when the transparent mode is selected, both devices are allowed to work. When configuration mode is selected, only one device works. See section 5.1 on page 18 about USB modes.

Step 3. HID devices

When USB device is connected to the receiver, keep in mind that only HID devices are supported (e.g. mouse, keyboard). If you are not sure that your device is supported or not, connect to one of the extenders by the LDC and check the status of your USB device on the Control tab; a detailed description is available in section 6.5.3 on page 27. See more information about USB HID settings in section 5.1.2 on page 18.

If a USB HUB is connected, make sure it is powered on (e.g. keyboard or monitor with built-in USB HUB).

Make sure that the USB device is supported by the computer and works properly: connect it directly to the computer.

Step 4. USB port

Unplug the HID device(s) from the USB port and reconnect again; try to connect the USB cable to another USB port on the computer.

The USB port must be enabled: check the BIOS settings of your computer: sometimes the USB port is disabled.

8.4. Local USB device does not work

At first make sure that the USB device is supported by the computer and works properly: connect it directly to the computer. Connect the supplied USB cable to the computer and to the transmitter. Connect the USB device to the transmitter. If necessary, unplug the device(s) from the USB port and reconnect again or try another USB port.

The USB port must be enabled: check the BIOS settings of your computer: sometimes the USB port is disabled.

9. Appendix

9.1. Specifications

General

Compliance .... CE

EMI/EMC...EN 55022 Class B

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

Warranty .... 3 years

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

Operating humidity.. 10% to 90%, noncondensing

Cooling.. Convection only

Power

Power supply ....External power adaptor

Power adaptor........................Input 100-240 V AC 50/60 Hz, Output 5V DC, 2 A

Power consumption: (TX150) ....2.75 W (typ); 3 W (max) without USB

.... 3.1 W (typ) with USB extension

.... 8.2 W (max) with 2x 500 mA for local USB devices

Power consumption: (RX150).................3.25 W (typ); 3.5 W (max) without USB

.... 3.75 W (typ) with USB extension

.... 8.25 W (max) with 2x 500 mA for local USB devices

Enclosure

Material .... Solid Aluminum body

Dimensions in mm .... 110W x 95D x 18H mm (excluding connectors)

Net Weight .... 300 g / product

Control

Function button ....Yes, one hidden button on the bottom

USB connector...USB mini B type

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

Video input / output................... Standard DisplayPort 20-pole connector / 8 kV

Optical fiber input/output... SC receptacle / 8 kV

USB port for devices.. USB-A receptacle / 4 kV

USB ports for control...USB Mini-B receptacle / 4 kV

Power connector ....DC connector (1.35 mm pin) / 2 kV

Digital video signal

Standard ....DisplayPort 1.1a (Dual-mode)

Color depth ....24, 30, 36, 48 bits deep color

Date rates ....1.62 / 2.7 Gbps (1.65 Gbps /lane), max. 10.8 Gbps total

Video delay ....0 frame

Max resolution at 60 Hz .... 2560x1600 pixels

Max resolution at 30 Hz .... 4Kx2K, 4096x2400 pixels

HDCP pass through .... Supported

Optical

Fiber type .... 50/125 SC Multimode (preferred), 62.5/125 SC Multimode

Laser wavelengths .... High speed lanes: 778; 800; 825; 850 nm

.... Low speed lanes: 911; 980 nm

Laser class specification .... Class 3R

Transmitter output OMA* .... -6.25 dBm (worst case)

Receiver OMA* sensitivity .... -14.25 dBm (worst case)

Transmission distance .... 1100 meters (using OM4 50/125 fiber)

.... 800 meters (using OM3 50/125 fiber)

.... 350 meters (using OM2 50/125 fiber)

.... 150 meters (using OM1 62.5/125 fiber)

*OMA: Optical Modulation Amplitude

USB support

USB control (TX150: labelled 'CPU') .... USB 2.0

USB control (RX150: labelled 'Service') .... USB 2.0

Local USB ports (TX150) .... USB 2.0 HiSpeed 480 Mbps

Extended USB ports (RX150) .... USB HID

9.2. Mechanical drawings

9.2.1. DP-OPT-TX150

The given values are in mm.

Front view

POWER FIBER MONITOR HDCP USB K+M
LINK DETECT ENABLE LINK EMULATE

110

18

Rear view

CPU

DC 5V   INPUT   SC MM OUTPUT

Top view

DP-OPT-TX150

TRANSMITTER

95

Bottom view

Displayport and USB Fiber Optical Transmitter

FUNCTION button:
Press for 2 seconds to change USB mode
Press for 10 seconds to enable/disable HDCP in HDMI mode

FUNCTION

LED indications

POWER
Blinking: Error
On: Powered
FIBER LINK
Blinking: Waiting for RX
On: RX detected
MONITOR DETECT
On: Monitor connected to RX

HDCP ENABLE
Off: HDCP disabled
On: HDCP enabled
USB LINK
Off: No connection to RX
Blinking: Waiting for USB device
On: Active connection
K+M EMULATE (USB mode)
Off: Transparent
Blinking: Control only
On: Mouse and Keyboard Emulated

RoHS

Laser Radiation
850 nm Class 3R

POWER INPUT
5V DC. 1.6A

Made in EU, Hungary

21,25   67,5   M3 thread

16,3

Left side view

9.2.2. DP-OPT-RX150

The given values are in mm.

Front view

110

Rear view

DC 5V SERVICE   OUTPUT SC MM INPUT

Top view

visual engineering
LIGHTWARE

DP-OPT-RX150

RECEIVER

95

Bottom view

Displayport and USB Fiber Optical Receiver

FUNCTION button:
Press for 2 seconds to change USB mode
Press for 10 seconds to enable/disable HDCP in HDMI mode

○ FUNCTION

LED indications

POWER
  Blinking: Error
  On: Powered
FIBER LINK
  Blinking: Waiting for TX
  On: TX detected

SOURCE DETECT
  Off: No source connected
  On: Source connected to TX
  Blinking: Unknown (HDMI mode)

HDCP ENABLE
  Off: HDCP disabled
  On: HDCP enabled
USB LINK
  Off: No connection to TX
  Blinking: Waiting for USB device
  On: Active connection
K+M EMULATE (USB mode)
  Off: Transparent
  Blinking: Control only
  On: Mouse and Keyboard Emulated

RoHS

POWER INPUT
5V DC 1.6A

Laser Radiation
850 nm Class 3R

Made in EU, Hungary

16,3

21,25   67,5   M3 thread

Left side view

10. Document revision history

Document	Release Date	Changes	Editor
Rev. 1.0	01-10-2013	Initial version	Laszlo Zsedenyi
Rev. 1.1	25-11-2014	Firmware upgrade process, Lightware Device Updater and Lightware Device Controller added	Laszlo Zsedenyi
Rev. 1.2	19-02-2015	DisplayPort connector pin assignments corrected	Laszlo Zsedenyi
Rev. 1.3	15-12-2015	Safety instructions updated, CE page pulled out	Laszlo Zsedenyi
Rev. 1.4	06-10-2016	Minor updates to the latest LDC and LDU software, updated warranty info	Tamas Forgacs