visual engineering
LIGHTWARE

User's Manual

HDMI-TPS-TX210, HDMI-TPS-TX220
DVI-HDCP-TPS-TX210, DVI-HDCP-TPS-TX220
DP-TPS-TX210, DP-TPS-TX220
SW4-TPS-TX240, SW4-TPS-TX240-Plus

HDBaseT™ Multimedia Extender

v3.0 09-06-2020

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

Ventilation

For the correct ventilation and to 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. 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.

Waste Electrical & Electronic Equipment WEEE

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.

Common Safety Symbols

Symbol	Description
	Direct current
	Alternating current
	Double insulation
	Caution, possibility of eletric shock
	Caution

Symbol Legend

The following symbols and markings are used in the document:

WARNING! Safety-related information which is highly recommended to read and keep in every case!

ATTENTION! Useful information to perform a successful procedure; it is recommended to read.

DIFFERENCE: Feature or function that is available with a specific firmware/hardware version or product variant.

INFO: A notice which may contain additional information. Procedure can be successful without reading it.

DEFINITION: The short description of a feature or a function.

TIPS AND TRICKS: Ideas which you may have not known yet but can be useful.

Navigation Buttons

Go back to the previous page. If you clicked on a link previously, you can go back to the source page by the button.

Navigate to the Table Contents.

Step back one page.

Step forward to the next page.

Document Information

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

Item	Version
Lightware Device Controller (LDC) software	2.2.0
Lightware Device Updater V2 (LDU v2) software	2.2.2
Firmware package version	1.2.0
Hardware	1.2

Document revision: **v3.0**

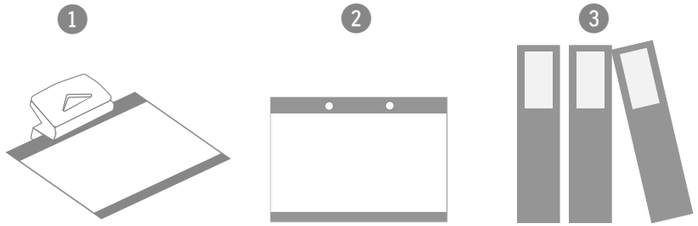
Release date: **09-06-2020**

Editor: Laszlo Zsedenyi

About Printing

Lightware Visual Engineering supports green technologies and Eco-friend mentality. Thus, this document is made for digital usage primarily. If you need to print out few pages for any reason, follow the recommended printing settings:

- Page size: A4
- Output size: Fit to page or Match page size
- Orientation: Landscape



TIPS AND TRICKS: Thanks to the size of the original page, a border around the content (gray on the second picture below) makes possible to organize the pages better. After punching the printed pages, they can be placed easily into a ring folder.

Hashtag (#) Keywords in the Document

This user's manual contains keywords with hashtag (#) to help you to find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the # (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP setting command in the LW3 Programmer's reference section

Table of Contents

1

Introduction

Thank You for choosing Lightware's HDMI-TPS-TX200 series HDBaseT™-compatible device. In the first chapter we would like to introduce the device highlighting the most important features.

1.1. Description

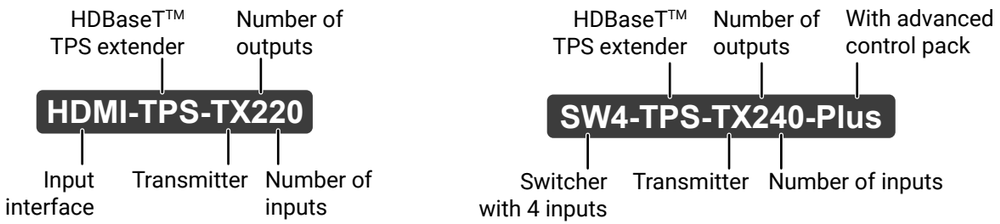
This transmitter family was designed to extend digital video signals (e.g. HDMI 1.4 and DP 1.1) and audio signals (analog stereo audio from local input or embedded 7.1 HBR audio). Video signals with HDCP encryption are also supported. Many combinations of the audio/video signals are available to transmit.

Using the factory, custom or transparent EDID emulation the user can fix and lock EDID data on each input connector. Advanced EDID Management forces the required resolution from any video source and fixes the output format conforming to the system requirements. The unit offers bi-directional and transparent IR, RS-232 and Ethernet transmission. Furthermore, the IR and RS-232 connection support command injection, allowing them to send any IR or RS-232 control command directly from the LAN connection.

PoE-compatible remote powering (Power over Ethernet) is available through a single CAT cable, but local power supply can also be used. The device can be mounted on a rack shelf or used standalone. HDMI-TPS-TX200 series is compatible with both the HDBaseT™ extenders and matrix switchers.

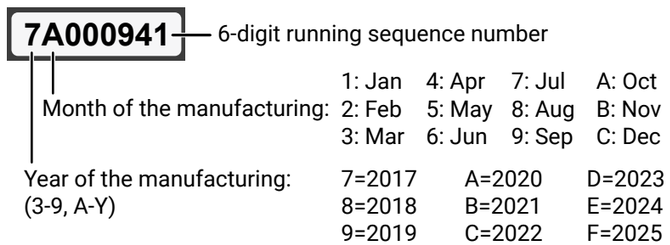
Advanced models contain an 8-pole Phoenix® connector with user-configurable General Purpose Input and Output pins. Using the built-in Event manager with the GPIO pins, many controlling functions can be established in a simple way.

Model Denomination



About the Serial Number *#serialnumber*

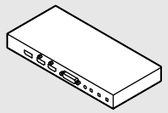
Lightware devices contain a label indicating the unique serial number of the product. The structure is the following:

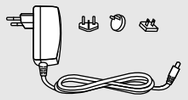


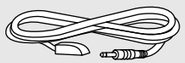
1.2. Compatible Devices

The transmitter is compatible with other Lightware TPS receivers, matrix TPS and TPS2 boards, 25G TPS2 boards, as well as third-party HDBaseT-extenders, displays, but not compatible with the phased out TPS-90 extenders.

1.3. Box Contents

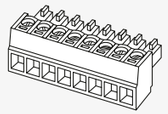

HDMI-TPS-TX200 series transmitter


12V DC adaptor with interchangeable plugs


Infrared emitter unit


Phoenix® Combicon 3-pole connector

Safety & warranty info, Quick Start Guide


Phoenix® Combicon 8-pole connector *

* Only for the following models: HDMI-TPS-TX220, DP-TPS-TX220, DVI-HDCP-TPS-TX220, SW4-TPS-TX240, SW4-TPS-TX240-Plus.

1.4. Optional Accessories

The following not-supplied accessories can be purchased and used with the device; please contact sales@lightware.com. *#new*


RAP-B511, Room Automation Panel


TBP6, Button panel


TPS-PI-1P1, Remote power injector


PSU2x rack-mountable Power supply unit


1U high rack shelf


UD-kit double for under-desk mounting

1.5. Features

3D and 4K Support

High bandwidth allows extension of resolutions up to 4K and even 3D sources and displays are supported.

Signal Transmission up to 170 m

Video and audio signal transmission (HDMI, Ethernet, RS-232, and Infra-Red over a single CAT5e…CAT7e cable.

Deep Color Support and Conversion

It is possible to transmit the highest quality 36-bit video streams for perfect color reproduction.

Pixel Accurate Reclocking

Each output has a clean, jitter free signal, eliminating signal instability and distortion caused by long cables or connector reflections.

HDCP-compliant

The receiver fulfills the HDCP standard. HDCP capability on the digital video inputs can be disabled when non-protected content is extended.

GPIO Control Port

7 GPIO pins operating at TTL digital signal levels and can be controlled with both LW2 and LW3 commands.

Remote Power

The transmitters are PoE-compatible and can be powered remotely via the TPS connection (through the CATx cable) with a compatible power source equipment.

Autoselect Function for Video Inputs

The Autoselect feature can sense the port status on the video input ports and select automatically one of them.

Bi-directional RS-232 Pass-through

AV systems can also contain serial port controllers and controlled devices. Serial port pass-through supports any unit that works with standard RS-232.

Built-in Event Manager

The Event Manager reacts to internal status changes or user interactions without an external device. The detected event is the Condition, the response is the Action.

1.5.1. Smart Features

DIFFERENCE: Below listed features are available from firmware package v1.2.0.

Dark Mode

The LEDs can be unlit to hide the device when it is placed in a light-sensitive place.

Forced Button Lock

The front panel buttons can be locked and unlock is only possible via LW3 protocol command.

Built-in Mini Web

The Miniweb is able to display an adaptive surface with a virtual crosspoint and buttons for Event manager Actions.

1.5.2. Advanced Control Pack

DIFFERENCE: The features of the Advanced Control Pack are available in SW4-TPS-TX240-Plus device only with firmware package v1.2.0 or newer version.

IR Code Sending

IR code sending in Pronto Hex format – in Command injection mode, too. The code sending is available as an Action in Event manager, too.

CEC Support

Supporting standard CEC commands in order to remote control the source or sink device over HDMI cable.

RS-232 Recognizer

Supports recognizing the incoming RS-232 messages to integrate with 3rd party devices e.g. Video Codec.

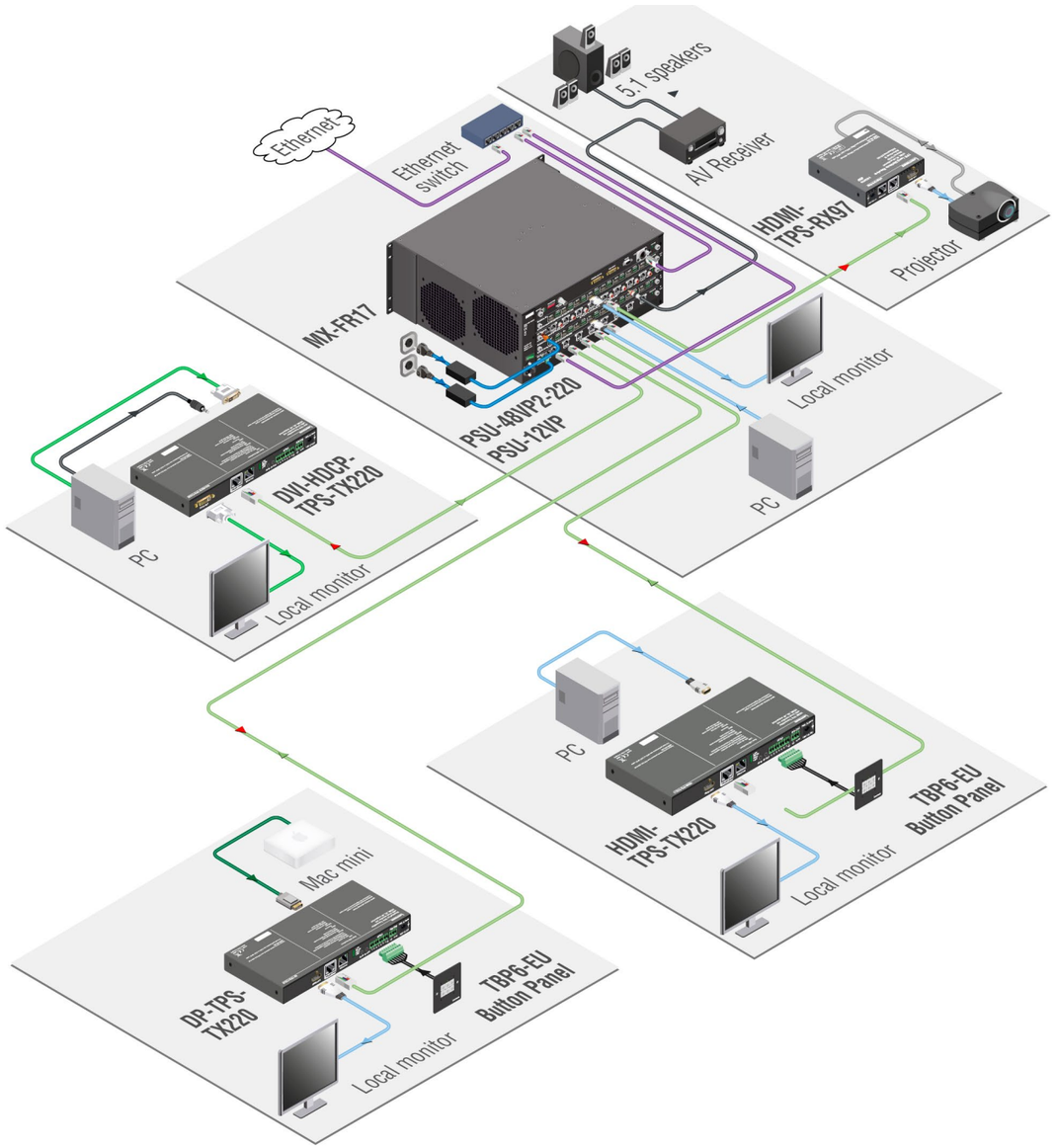
1.6. Model Comparison

The available models have different features depending on their design, see the table below:

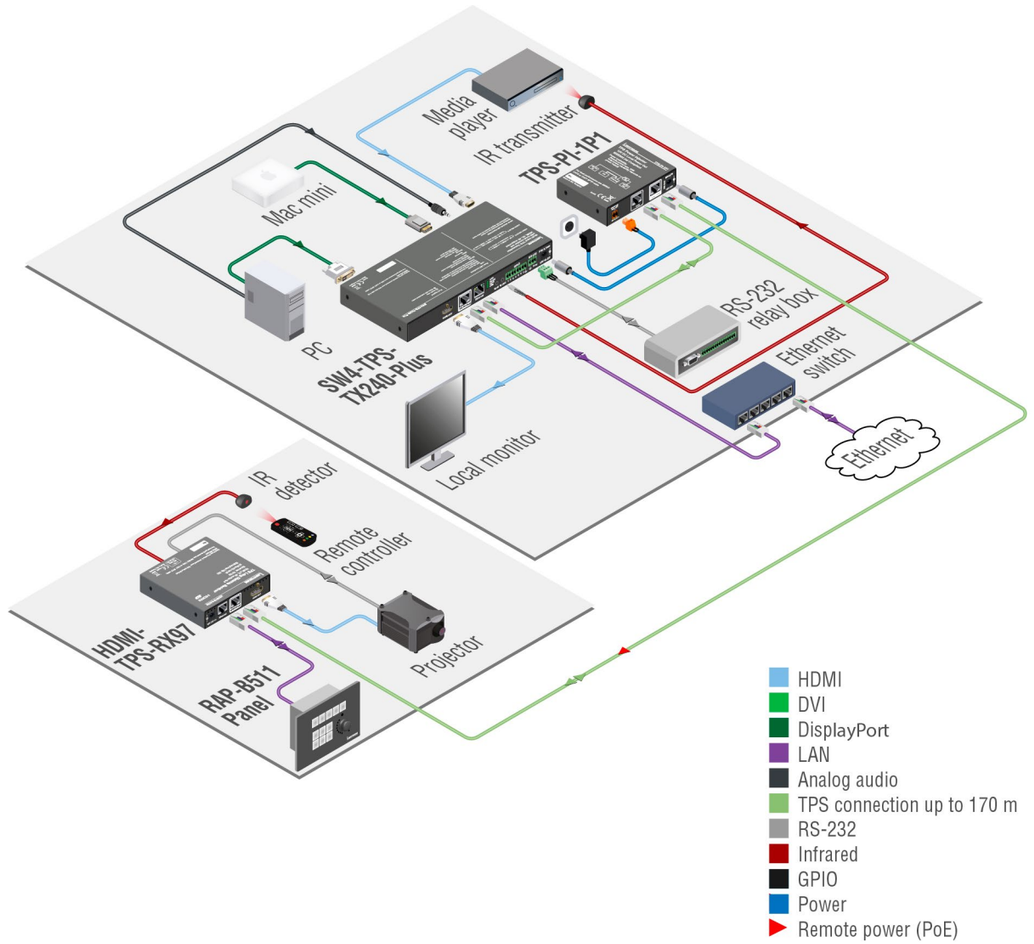
	Power supply		Inputs				Outputs			Interface ports				Software-related components			
	12V DC	PoE	HDMI	DVI-D	DP	Analog audio	HDMI	DVI-D	TPS	Ethernet	IR in/out	RS-232	GPIO	Number of Events in Event Manager	Built-in miniweb size limit	Smart Features	Advanced Control Pack
HDMI-TPS-TX210	✔	✔	✔	-	-	-	✔	-	✔	✔	✔	✔	-	20	10 kB	✔	-
HDMI-TPS-TX220	✔	✔	✔	-	-	✔	✔	-	✔	✔	✔	✔	✔	20	10 kB	✔	-
DVI-HDCP-TPS-TX210	✔	✔	-	✔	-	-	-	✔	✔	✔	✔	✔	-	20	10 kB	✔	-
DVI-HDCP-TPS-TX220	✔	✔	-	✔	-	✔	-	✔	✔	✔	✔	✔	✔	20	10 kB	✔	-
DP-TPS-TX210	✔	✔	-	-	✔	-	✔	-	✔	✔	✔	✔	-	20	10 kB	✔	-
DP-TPS-TX220	✔	✔	-	-	✔	✔	✔	-	✔	✔	✔	✔	✔	20	10 kB	✔	-
SW4-TPS-TX240	✔	✔	✔(2x)	✔	✔	✔	✔	-	-	✔	-	✔	✔	20	10 kB	✔	-
SW4-TPS-TX240-Plus	✔	✔	✔(2x)	✔	✔	✔	✔	-	-	✔	-	✔	✔	100	80 kB	✔	✔

1.7. Typical Applications

Integrated System Diagram



Standalone Application



2

Product Overview

The following sections are about the physical structure of the device, input/output ports, connectors, status LEDs and front panel button functions.

2.1. Front Views

HDMI-TPS-TX210

HDMI-TPS-TX220

DVI-HDCP-TPS-TX210

DVI-HDCP-TPS-TX220

DP-TPS-TX210

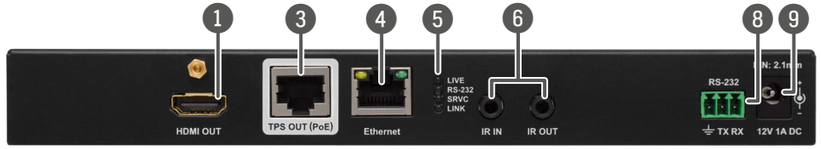
DP-TPS-TX220

SW4-TPS-TX240 and SW4-TPS-TX240-Plus

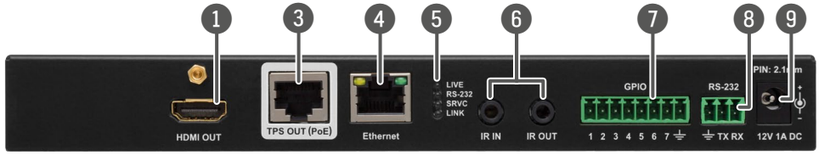
1	**HDCP LED**	LED gives feedback about the HDCP status of the output signal. See the details in the Front Panel LEDs section.
2	**Autoselect LED**	LED gives feedback about the current Autoselect status. See the details in the Front Panel LEDs section. You can find more information about Autoselect feature in The Autoselect Feature section.
3	**DisplayPort input**	DisplayPort connector for DisplayPort audio/video signal.
4	**HDMI input**	HDMI connector for DVI video or HDMI video and audio.
5	**DVI-D input**	DVI-I connector for DVI-D video and audio.
6	**Audio input**	3.5 mm Jack connector for asymmetric analog audio input signal.
7	**Video Select button**	Button for switching between video sources. See the details in the Video Select Button section.
8	**Reset button**	Pushing the button reboots the unit.
9	**Audio Select button**	Button for switching between audio sources. See the details in the Audio Select Button section.
10	**Show Me button**	Special functions can be reached using this button (firmware upgrade (bootload) mode, DHCP settings, restore factory default settings, condition launching in Event Manager).

2.2. Rear Views

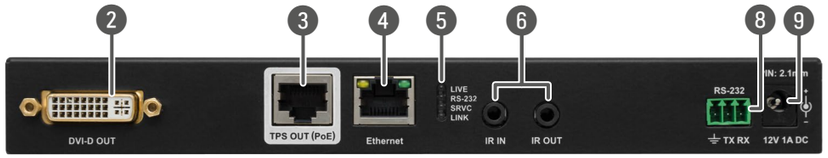
HDMI-TPS-TX210



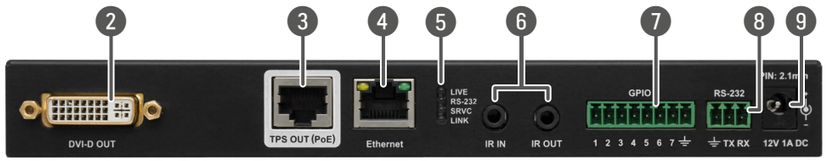
HDMI-TPS-TX220



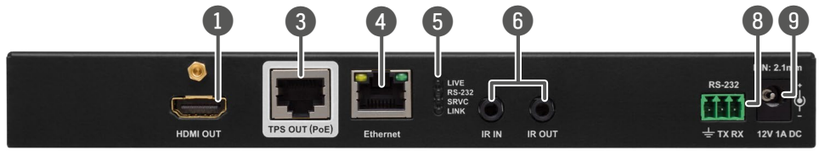
DVI-HDCP-TPS-TX210



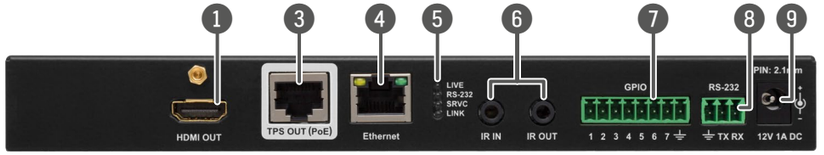
DVI-HDCP-TPS-TX220



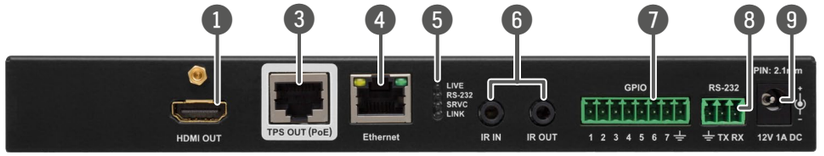
DP-TPS-TX210



DP-TPS-TX220



SW4-TPS-TX240 and SW4-TPS-TX240-Plus



1	**HDMI output**	Local HDMI output with the same A/V content as the TPS output.
2	**DVI-D output**	Local DVI-D output with the same A/V content as the TPS output.
3	**TPS output**	Locking RJ45 connector for HDBaseT™ signal transmission. Maximum CATx cable distances can be found in the Maximum Extension Distances section.
4	**Ethernet**	Locking RJ-45 connector for configuring the device using Lightware Device Controller (LDC), or upgrading it using Lightware Device Updater (LDU). Any third-party control system can use this port to control the device.
5	**Status LEDs**	The LEDs give feedback about the actual state of the device. See the details in the Rear Panel LEDs section.
6	**IR IN and OUT**	3-pole TRS connector, also known as 3.5 mm (1/8") jack plug for optional IR receiver (IR IN) and transmitter (IR OUT) connection. Pin assignments can be found in the IR Connector section.
7	**GPIO**	8-pole Phoenix connector for configurable general purpose input/output ports. Pin assignment can be found in the GPIO - General Purpose Input/Output Ports section.
8	**RS-232 connector**	3-pole Phoenix connector for controlling the device with LDC or third-party control systems, or third-party device control. Pin assignment can be found in the RS-232 Connector section.
9	**12V DC connector**	12V DC input for local powering. For more details see the 12V DC Connection section or see all the available Powering Options.

2.3. Front Panel LEDs

VIDEO INPUT LEDs			
○		off	The video source is not selected.
☼	**green**	blinking	The video source is selected but signal is not detected.
●	**green**	on	The video source is selected and signal is detected.
AUDIO INPUT LEDs			
○		off	The audio source is not selected.
☼	**green**	blinking slow	Audio source is selected, the audio is embedded to the output video stream.
☼	**green**	blinking fast	The audio source is selected but no signal is detected, regardless of the output mode (e.g. DVI EDID is emulated on the port with HDMI signal).
●	**green**	on	Audio source is selected, the port is active but audio is not embedded in the video stream (e.g. the output mode is DVI).
HDCP LED			
○		off	Video output signal is not encrypted with HDCP.
●	**green**	on	Video output signal is encrypted with HDCP.
AUTOSELECT LED			
○		off	Autoselect function is disabled.
☼	**green**	blinking	Autoselect function is enabled, searching for signal (the video input LEDs are also blinking).
●	**green**	on	Autoselect function is enabled, the active video signal is found (the selected video input's LED is also ON).

2.4. Rear Panel LEDs

LIVE LED			
○		off	The device is not powered.
☼	**green**	blinking slow	The device is powered and operational.
☼	**green**	blinking fast	The device is in firmware upgrade (bootload) mode. *#bootload*
●	**green**	on	The device is powered but not operational.
RS-232 LED			
○		off	RS-232 ports (Local and Link) are in Pass-through Mode.
☼	**green**	blinking	Command Injection Mode is active.
●	**green**	on	RS-232 ports (Local and Link) are in Control Mode.
SRVC LED			
Reserved for future developments.			
LINK LED			
○		off	No TPS link between the transmitter and the receiver.
☼	**green**	blinking slow	Low power mode (LPPF1 or LPPF2) is active.
☼	**green**	blinking fast	Ethernet fallback mode is active.
●	**green**	on	TPS link is established, HDBaseT or Long Reach mode is active.

See more details about the TPS modes in the TPS Interface section

2.5. Front Panel Buttons

2.5.1. Video Select Button

DIFFERENCE: Only for SW4-TPS-TX240 and TX240-Plus models: desired video input can be selected by the **Video Select button** from the front panel. The selection order of the inputs is the following:

SW4-TPS-TX240 and SW4-TPS-TX240-Plus:

DP → HDMI 1 → HDMI 2 → DVI-D → Autoselect → DP

2.5.2. Audio Select Button

Desired audio input can be selected by the **Audio Select button** from the front panel. The selection order of the inputs depends on the model as follows:

HDMI-TPS-TX220:
DVI-HDCP-TPS-TX220:
DP-TPS-TX220:
SW4-TPS-TX240:
SW4-TPS-TX240-Plus:

Embedded digital audio → Analog audio → Embedded digital audio

2.5.3. Programmable Show Me Button

Action or an operation can be assigned to the Show Me button. **"Show Me button pressed"** is a condition that can be selected in the Event Manager. See more details in the Event Manager section. *#function #showme*

2.5.4. Enable DHCP (Dynamic) IP Address

The device has a static IP address as a factory default setting. If this setting does not fit to the circumstances during install or usage, DHCP can be enabled from the front panel:

Step 1. Make sure the device is powered on and operational.
Step 2. Press and keep pressed the **Show Me** button for 5 seconds.
Step 3. After 5 seconds front panel LEDs start blinking; release the button and press it 3 times again quickly (within 3 seconds).
Step 4. The LEDs get dark, DHCP gets enabled.

#dhcp #ipaddress #network

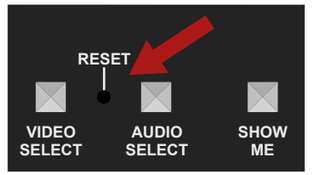
2.5.5. Reset to Factory Default Settings

To restore factory default values, do the following steps:

Step 1. Make sure the device is powered on and operational.
Step 2. Press and keep pressed the **Show Me** button for 10 seconds. After 5 seconds front panel LEDs start blinking but keep on pressing the button.
Step 3. After 10 seconds the LEDs start blinking faster; release the button and press it 3 times again quickly (within 3 seconds).
Step 4. The LEDs get dark, the device restores the factory default settings and reboots.

Factory default settings are listed in the Factory Default Settings section.

2.5.6. Reseting the Device

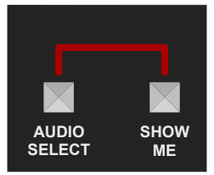


In few cases (after firmware upgrade, etc) you may need to reset the device. Pushing the reset button results the same as you disconnect and reconnect the power adaptor to the transmitter. To reseting the device follow the steps:

Step 1. Push the button with a thin object for a second.
Step 2. Wait until the device reboots. You can use the transmitter when the LIVE LED is blinking slowly again.

ATTENTION! Reseting the device does not reset the settings to factory defaults. To reset factory default settings see previous section.

2.5.7. Control Lock



Press the Fron panel buttons **together** (within 100 ms) to disable/enable the buttons; front panel LEDs blink 4 times when locking/unlocking. If the control lock is enabled and a button is pressed, front panel LEDs blink 3 times.

2.5.8. Entering Firmware Upgrade Mode

It may happen that the firmware upgrade process is not successful and the device cannot be switched to bootload mode automatically. In this case, the device can be forced into firmware upgrade mode as follows: *#bootload*

Step 1. Make sure the transmitter is powered off.
Step 2. Press and keep pressed the **Show Me** button.
Step 3. Power on the transmitter while the **Show Me** button is being pressed. If the device is switched to firmware upgrade mode the LIVE LED is blinking quickly (less than 500 ms duty cycle). The other LEDs are off.

The procedure of firmware upgrade can be found in the Firmware Upgrade chapter.

#buttonlock #lockbutton

3

Installation

The chapter is about the installation of the device and connecting to other appliances, presenting also the mounting options and further assembly steps.

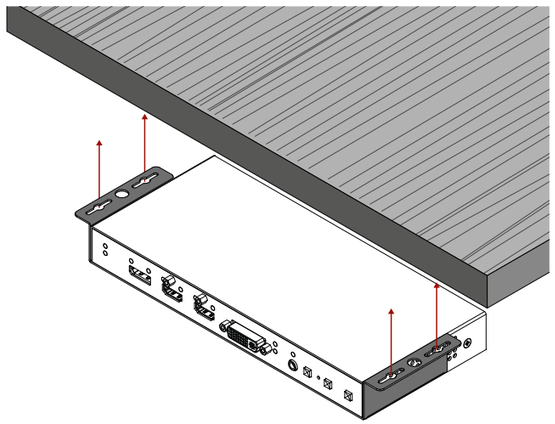
3.1. Mounting Options

To mount the transmitter Lightware supplies optional accessories for different usage. There are two kinds of mounting kits with similar fixing method. The device has two mounting holes with inner thread on the bottom side; see the bottom view in the Mechanical Drawings section. Fasten the device by the screws enclosed to the accessory:

3.1.1. Under-desk Double Mounting Kit

Under-desk double mounting kit

The Under-desk double mounting kit makes easy to mount a single device on any flat surface, e.g. furniture. 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 shelf. To order mounting accessories please contact sales@lightware.com.



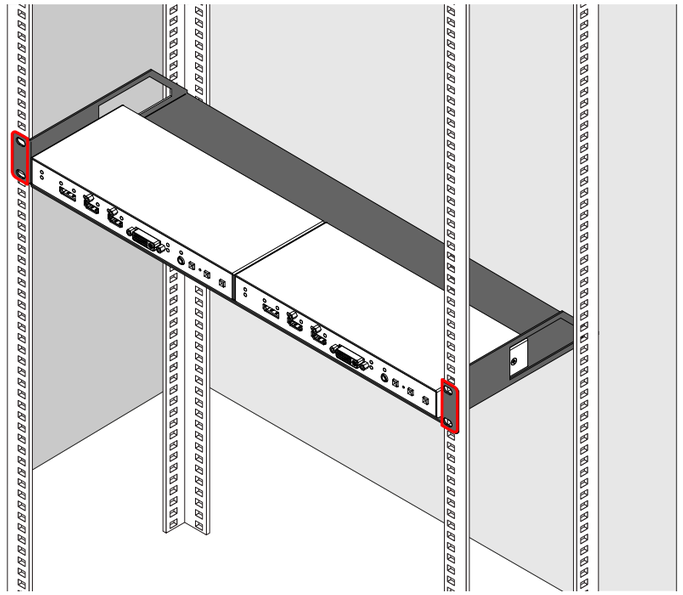
WARNING! Always use the supplied screws. Using different (e.g. longer) ones may cause damage to the device.

INFO: The chipboard screws are not supplied with the mounting kit.

3.1.2. 1U High Rack Shelf

1U high rack shelf

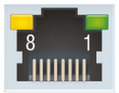
The rack shelg allows rack mounting for half-rack, quarter-rack and pocket sized units. 1U high rack shelf provides mounting holes for fastening two half-rack or four quarter-rack sized units. Pocket sized devices can also be fastened on the self.



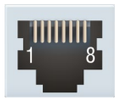
3.2. Electrical Connections

3.2.1. RJ45 Connectors (TPS and LAN Ports)

The extender provides standard RJ45 connectors for TPS IN and LAN ports. Always use high quality Ethernet cable for connecting transmitters and receivers. Maximum CATx cable distances can be found in the Maximum Extension Distances section.



LAN connector



TPS connector

RJ45 Plug

Top Bottom Side

The Wiring of TPS and LAN Cables

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

Pin	TIA/EIA T568A	Wire color	TIA/EIA T568A	Wire color
1		white/green		white/orange
2		green		orange
3		white/orange		white/green
4		blue		blue
5		white/blue		white/blue
6		orange		green
7		white/brown		white/brown
8		brown		brown

Pin assignments of RJ45 connector types

You can find more information about TPS interface in the TPS Interface section.

3.2.2. DVI-I Connector

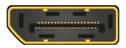
DVI-HDCP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus transmitters provide 29-pole „digital only" DVI-I Dual-Link connectors (only digital pins are internally connected) for input and local output. This way, users can plug in any DVI connector, but keep in mind that analog signals (such as VGA or RGBHV) are not processed.

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

3.2.3. HDMI Connector

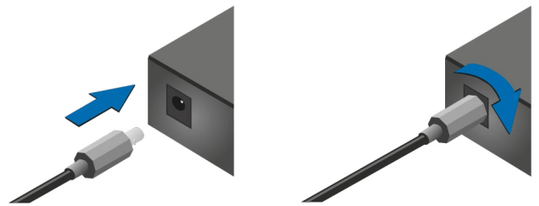
The extender provides standard 19 pole HDMI connector for input and local output. Always use high quality HDMI cable for connecting sources and displays.

3.2.4. DisplayPort Connector



DP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus models provide standard 20-pole DisplayPort connector for input. Always use high quality DP cable for connecting DisplayPort devices.

3.2.5. 12V DC Connection



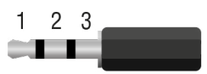
Locking DC connector

The transmitters are built with locking 12V DC connector. Do not forget to turn the plug clockwise direction before disconnecting the power adaptor.

WARNING! Always use the supplied 12V power adaptor. Warranty void if damage occurs due to use of a different power source.

3.2.6. Analog Stereo Audio

The connector is used for receiving unbalanced analog audio signal. It is also known as (3.5 mm or approx. 1/8") audio jack, phone jack, phone plug and mini-jack plug.



Pin no.	Signal
1	Left
2	Right
3	Ground

Jack audio plug pin assignments

You can find more information about audio functions in the Audio Interface section.

3.2.7. RS-232 Connector

The extender contains a 3-pole Phoenix connector which is used for RS-232 serial connection.

Pin no.	Signal
1	Ground
2	TX data
3	RX data

RS-232 connector pin assignments

Compatible Plug Type

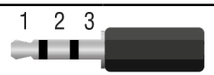
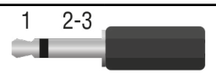
Phoenix® Combicon series (3.5mm pitch, 3-pole), type: MC 1.5/3-ST-3.5.

You can find more information about RS-232 interface in the Serial Interface section.

Typical wiring examples can be found in the Wiring Guide for RS-232 Data Transmission section.

3.2.8. IR Connector

IR detector and IR emitter can be connected to the HDMI-TPS-TX100 series extenders with TRS (Tip, Ring, and Sleeve) connectors. They are also known as (3,5 mm or approx. 1/8”) audio jack, phone jack, phone plug, and mini-jack plug. The pin assignments are the following for the detector and the emitter:

 Detector – 3-pole-TRS		 Emitter – 2-pole-TS	
1 Tip	IR Input -	1 Tip	IR Output +
2 Ring	GND	2 Ring	IR Output -
3 Sleeve	IR Input +	3 Sleeve	IR Output -

INFO: Ring pole of the emitter is optional. If your IR emitter has three-pole TRS plug, then the Ring and the Sleeve are the same signal (Output -).

You can find more information about Infrared interface in the Infrared Interface section.

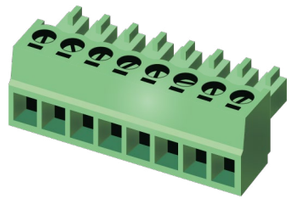
3.2.9. GPIO - General Purpose Input/Output Ports

The TPS-TX220 series, the SW4-TPS-TX240 and TX-240-Plus transmitters contain a 8-pole Phoenix connector with seven GPIO pins, which operates at TTL digital signal levels and can be set to high or low level (Push-Pull). The direction of the pins can be input or output (adjustable). Voltage ranges for GPIO inputs are the following:

	Input voltage [V]	Output voltage [V]	Max. current [mA]
Logical low level	0 - 0,8	0 - 0.5	30
Logical high level	2 - 5	4.5 - 5	18

INFO: The maximum total current for the seven GPIO pins is 180 mA.

Pin no.	Level and direction
1	Configurable
2	
3	
4	
5	
6	
7	
Ground	



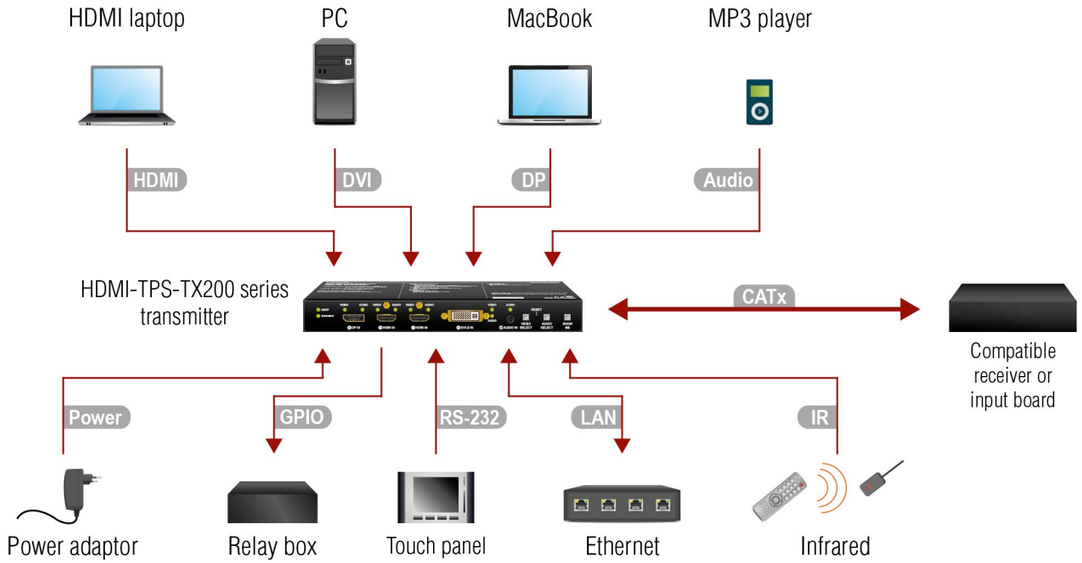
GPIO connector and plug pin assignments

Compatible plug type

Phoenix® Combicon series (3.5mm pitch 8-pole), type: MC 1.5/8-ST-3.5.

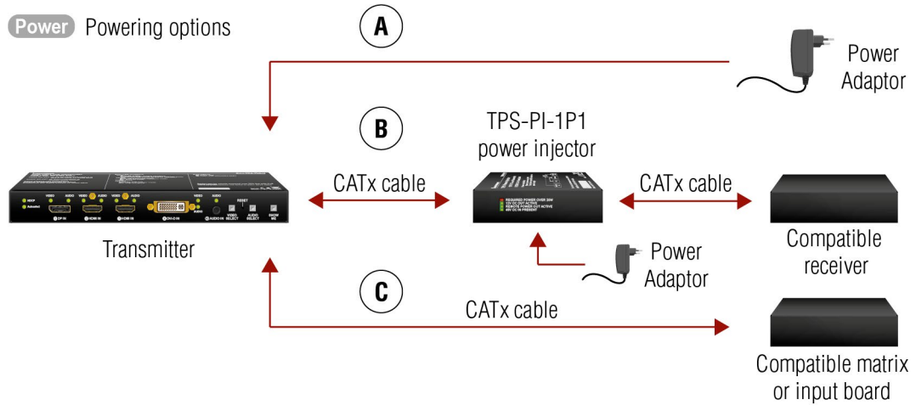
You can find more information about GPIO interface in the GPIO Interface section.

3.3. Connecting Steps



CATx	Connect the the transmitter and a compatible receiver or the matrix input board by a CATx cable via the TPS connectors.
DVI HDMI DP	Connect the transmitter and the sources using the inputs and DVI-I / HDMI / DisplayPort cables.
Audio	Optionally connect an asymmetric audio device with unbalanced audio signal (e.g. a MP3 player) to the 2.5" TRS (Jack) audio input port.
IR	Optionally for Infrared control: - Connect the IR emitter to the IR OUT port of the device. - Connect the IR detector to the IR IN port of the device.
LAN	Optionally connect the transmitter to a LAN network in order to control the device.
RS-232	Optionally for RS-232 control: connect a controller/controlled device (e.g. touch panel) to the RS-232 port.
GPIO	Optionally connect a controller/controlled device (e.g. relay box) to the GPIO port.
Power	See powering options in the next section.

3.4. Powering Options



A **Using local PSU**: connect the power adaptor to the DC input on the transmitter first, then to the AC power socket.

B **Using PoE with connecting a transmitter**: connect the TPS OUT (PoE) port of the transmitter to the TPS+PoE port of the TPS-PI-1P1 power injector by a CATx cable, and connect the TPS input port of the compatible receiver to the TPS port of the TPS-PI-1P1 by a CATx cable.

C **Using PoE with connecting a matrix or an input board**: connect the TPS OUT (PoE) port of the transmitter to the PoE-compatible TPS input port of the matrix or input board by a CATx cable.

ATTENTION! In case of connecting the transmitter to an input board of the matrix always connect an external PSU to the board. For the detailed information please read the user's manual of the matrix.

ATTENTION! The Ethernet port does not support PoE. Only the TPS port support PoE function.

INFO: If both remote and local power sources are connected, the remote power will be used.

4

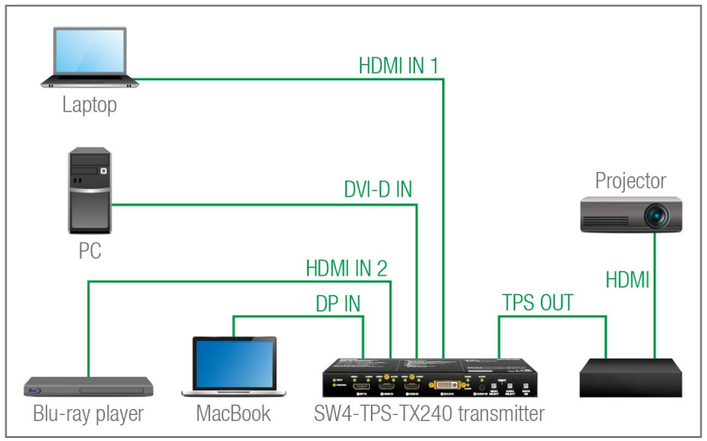
Device Concept

The following chapter describes the features of the device with a few real-life examples.

4.1. TPS Extender Concept

The HDMI-TPS-TX200 series transmitters are able to receive digital (DP, HDMI, DVI-D) video signals and analog audio signal as well and transmit HDBaseT (TPS) signal including HDMI/DVI audio/video signals, Ethernet, RS-232, and Infrared signals. Analog audio signals can be received via the 3.5" TRS (jack).

The device can be controlled via Ethernet, RS-232 or Infrared and is able to control third-party devices via the RS-232, Ethernet, Infrared interfaces.



The summary of the interfaces

[1] Only for HDMI-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus models.

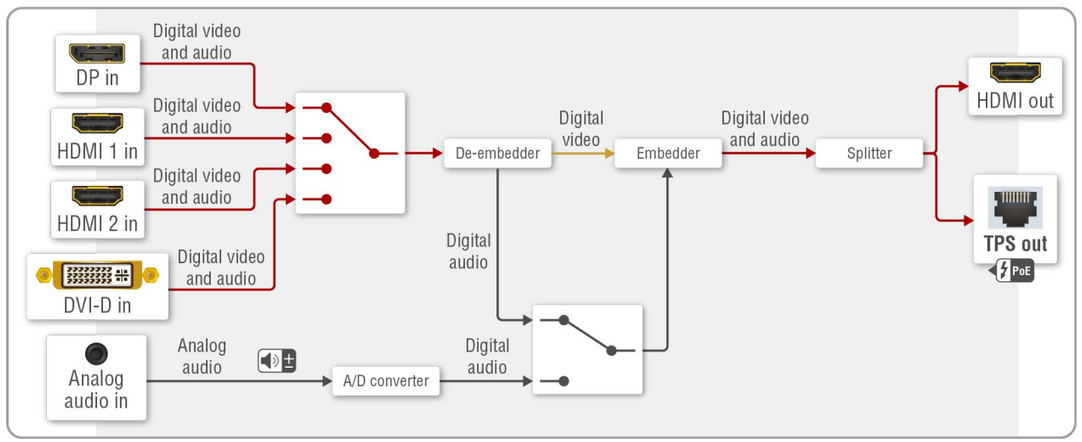
[2] Only for DP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus models.

[3] Only for DVI-HDCP-TPS-TX210/TX220, SW4-TPS-TX240 and TX240-Plus models.

[4] Only for TPS-TX220, SW4-TPS-TX240 and TX240-Plus models.

4.2. Port Diagram

The following diagram introduces the route of the different signal types (including the audio/ video and control signals as well) from the input to the output ports in the device. The diagram is about the SW4-TPS-TX240 transmitter. The principle of the operation is the same for all models.



Port diagram of SW4-TPS-TX240 transmitter

4.3. TPS Interface

The device is built with TPS (Twisted Pair Single) interface which are using HDBaseT™ technology. It means the unit transmits video, audio, Ethernet, RS-232, and Infrared signals via a single CATx cable.

TPS Interface Working Modes

The TPS working mode between the transmitter and the receiver is determined by the mode set in them. Both devices TPS mode settings together determine the finally established TPS transmission mode.

The following TPS modes are defined in the transmitter:

- **Auto**: The TPS mode is determined automatically.
- **HDBaseT**: Ideal for high resolution signals up to 4K.
- **Long reach**: Ideal for big distances up to 1080p@60Hz with extended cable lengths.
- **LPPF1***: Only RS-232 communication is transmitted (@ 9600 baud).
- **LPPF2***: Only RS-232 (@ 9600 baud) and Ethernet communication are transmitted.

* LPPF: Low Power Partial Functionality.

		Selected mode on RX side				
		LPPF1	**LPPF2**	**HDBaseT**	**Long reach**	**Auto**
Selected mode on TX side	**LPPF1**	LPPF1	LPPF1	LPPF1	LPPF1	LPPF1
	LPPF2	LPPF1	LPPF2	LPPF2	LPPF2	LPPF2
	HDBaseT	LPPF1	LPPF2	HDBaseT	Long reach	HDBaseT
	Long reach	LPPF1	LPPF2	Long reach	Long reach	Long reach
	Auto	LPPF1	LPPF2	HDBaseT	Long reach	HDBaseT **

** If there is valid HDMI/DVI signal is on the TX side, the TPS mode will be HDBaseT on both side. If the transmitter does not transmits HDMI/DVI signal, the TPS mode will be changed to LPPF2 or LPPF1 automatically. Long reach mode is not available when both sides are set to Auto mode.

When using automatic operation mode selection, the device determines the mode of operation. If both halves are set to Auto mode, the source side is the initiator. It will negotiate each state transition with its sink side partner.

When one of the devices is configured to manual operation mode selection, the other device may be placed in automatic mode. In this case, the mode transition negotiation is initiated by the host-managed device and the auto-mode device follows through. The allowed cable lengths and resolutions are listed in the Maximum Extension Distances section.

4.4. Ethernet Control Interface

The device can be controlled over front panel Ethernet standard RJ45 connector which connected to LAN. This interface supports both LW2 and LW3 protocols. The interface can be used to remote control the device with Lightware Device Controller and establish the connection to Lightware Device Updater software and perform firmware upgrade.

4.5. Audio Interface

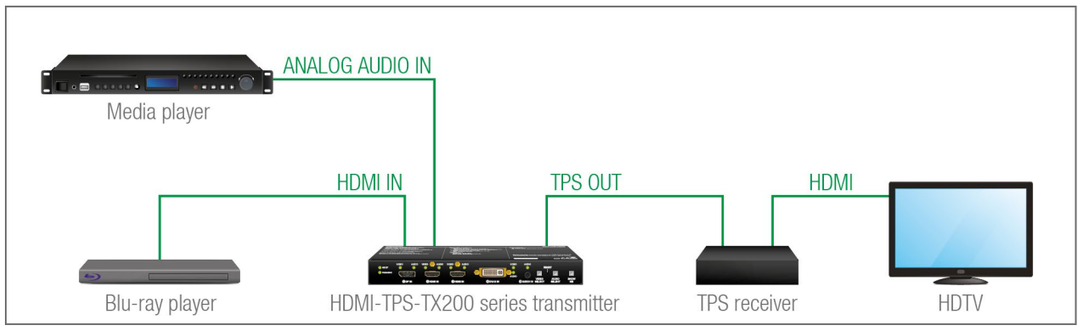
4.5.1. Audio Input Modes

The device can receive embedded digital audio signal on the HDMI, DisplayPort, and DVI-D input ports and analog audio signal on the Jack input ports.

Audio Embedding

The transmitter has a built-in audio embedder function which means the audio signal being received on the analog audio input port can be embedded to the TPS output.

4.5.2. Audio Options - Example



The Concept

Two audio sources are connected to the transmitter: a Blu-ray player on the HDMI input (embedded HDMI audio); and a Media player on the analog audio input (Jack). The transmitter is connected to a TPS receiver which transmits the A/V signal to a HDTV.

The following options are available for audio routing / signal selection:

The video input source of the **HDTV** is the **Blu-ray player**, you can select from the following audio sources:

- The original embedded HDMI audio from the **Blu-ray player**;
- The analog audio input from the **Media player**.

INFO: In case of the TPS-TX220 series transmitters you can use the Autoselect feature for audio input selection. For the details see The Autoselect Feature section.

4.6. Video Interface

4.6.1. Video Input Modes

The device can receive digital video signal on the HDMI, DisplayPort, and DVI-D input ports.

4.6.2. Input Source Selection Modes

Video input source can be selected the following ways:

- Pressing **Video Select** button on the device;
- Using Lightware Device Controller (LDC);
- Sending LW2 or LW3 protocol commands; or
- Using the **Autoselect** function.

4.7. The Autoselect Feature

4.7.1. Autoselect Modes

There are three types of Autoselect as follows.

- **First detect mode**: selected input port is kept connected to the output as long as it has an active signal.
- **Priority detect mode**: always the highest priority active input is selected to transmit.
- **Last detect mode**: always the last attached input is selected to transmit.

4.7.2. Automatic Input Selection - Example

The Concept

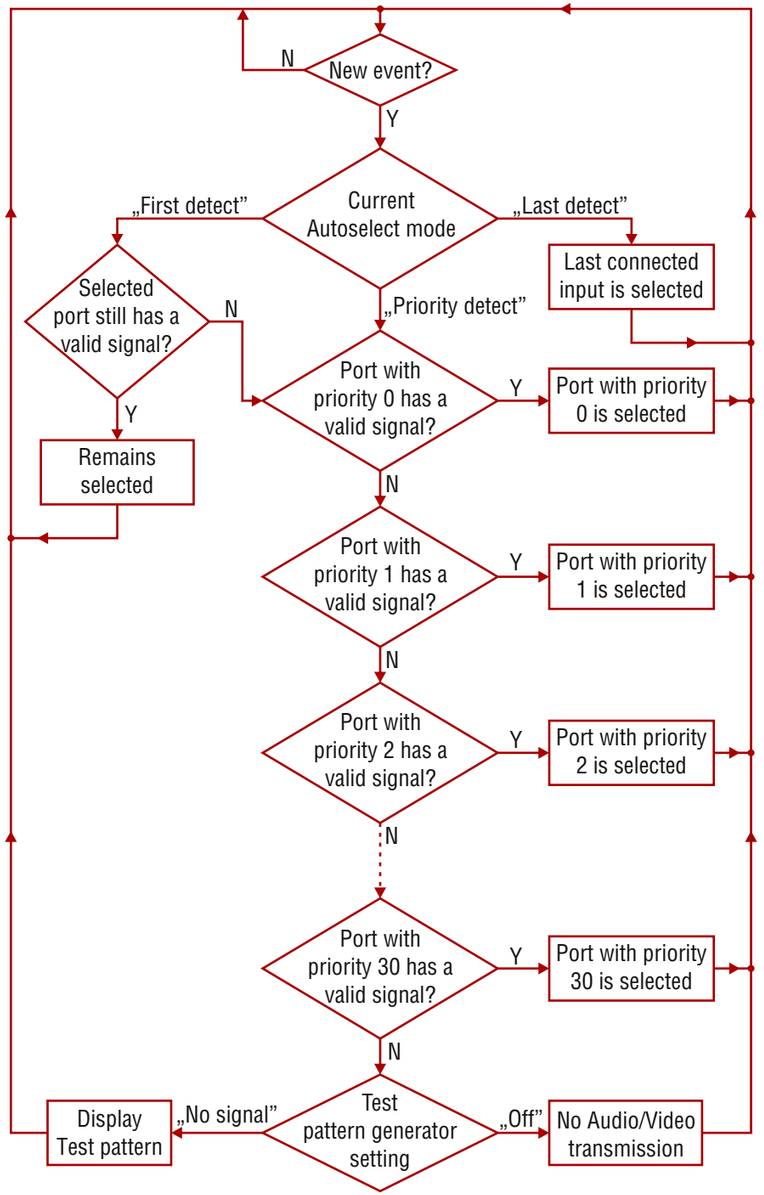
If there is no other source connected to the transmitter, but the Laptop, HDMI 1 input will be automatically switched to the TPS output. If the Laptop and the PC are also connected to the transmitter, DVI-D input will be switched to the TPS output. If the Blu-ray player is connected on the HDMI 2 input, and later the MacBook is connected on the DP input of the transmitter, it will be switched to the TPS output – independently of the presence of other video signals.

Settings

- **TPS output**: Set the Autoselect to **Enabled**. Set Autoselect mode to **Priority detect**. The priorities are the following (the lowest number means the highest priority):

Source device	Input interface	Input port	Priority
MacBook	DP IN	I1	**0**
Blu-ray player	HDMI IN 1	I2	**1**
PC	DVI-D IN	I4	**2**
Laptop	HDMI IN 2	I3	**3**

INFO: Priorities can be set in Lightware Device Controller software, see related settings in the Audio Outputs (TPS and HDMI) sections.

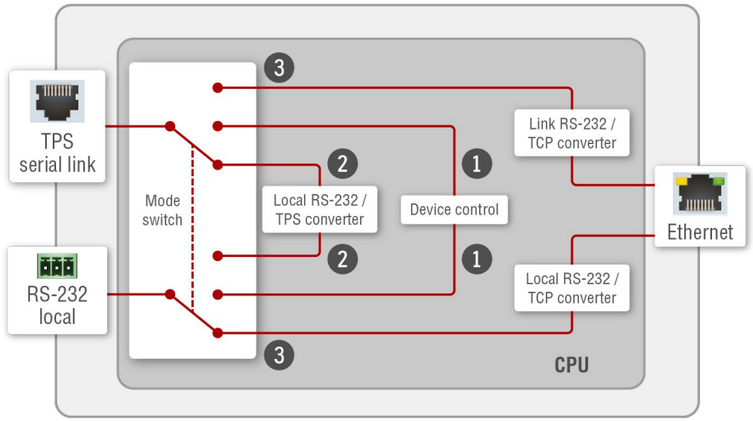


Flowchart of the Autoselect modes

4.8. Serial Interface

4.8.1. Technical Background

Serial data communication can be established via the local RS-232 port (Phoenix connector) or via the TPS lines. The RS-232 ports – which are connected to the CPU – can be configured separately (e.g. if the Baud rates are different, the CPU does the conversion automatically between the ports). The RS-232 port can be switched to Pass-through mode, Control mode, or Command Injection mode; see the figure below.



Block diagram of the serial interface

The following settings are defined:

1. The Local and the TPS serial ports are in **Control mode**.
2. The Local and the TPS serial ports are in **Pass-through mode**.
3. The Local and the TPS serial ports are in **Command Injection mode**.

INFO: All settings are available in the LDC software, see settings in the RS-232 section.

Only one mode can be used at the same time: Control mode, or Pass-through mode, or Command Injection mode. If you choose one of them, TPS serial link and local RS-232 port will operate in the same mode.

4.8.2. RS-232 Modes

Pass-through Mode

In pass-through mode, the given device forwards the data that is coming from one of its ports to another same type of port. The command is not processed by the CPU. Incoming serial data is forwarded from local RS-232 port to the TPS output port and vica versa inside the transmitter.

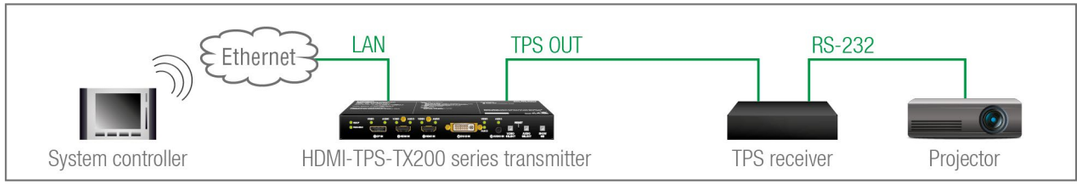
Control Mode

The incoming data from the given port is processed and interpreted by the CPU. The mode allows to control the transmitter directly. LW2 or LW3 protocol commands are accepted – depending on the current port setting.

Command Injection Mode

In this mode, the transmitter works as an RS-232 bidirectional converter. The TPS signal is converted to RS-232 data and vice versa. TCP/IP port numbers are defined for the serial ports (TPS and local) for this purpose. E.g. the default Command Injection port number of the local RS-232 port is 8001. If a command is coming from the TPS interface which addresses to the port no. 8001, it will be transmitted to the Tx pin of the local RS-232 port. That works in the opposite direction of course and the method is the same on the serial interface of the TPS port as well. *#commandinjection*

4.8.3. RS-232 Signal Transmission – Example



The Concept

The System controller can send commands to the transmitter and it is able to remote control the projector through the TPS receiver via RS-232.

Settings

- **System controller**: wireless IP connection to the same Ethernet as the transmitter is connected to. Use a dedicated software tool (e.g. a terminal) which is suitable for sending commands via TCP/IP to a certain IP:port address.
- **Transmitter**: set the RS-232 mode to Command Injection on TPS output port. Set the further parameters (Baud rate, Data bits, etc.) in accordance with the specifications of the projector. The transmitter will transmit the RS-232 data toward the receiver.
- **Receiver**: set the RS-232 mode to Pass-through on RS-232 port.
- **Projector**: note the RS-232 port setting that is specified by the Manufacturer. Connect a suitable serial cable with the proper wiring.

RS-232 Recognizer

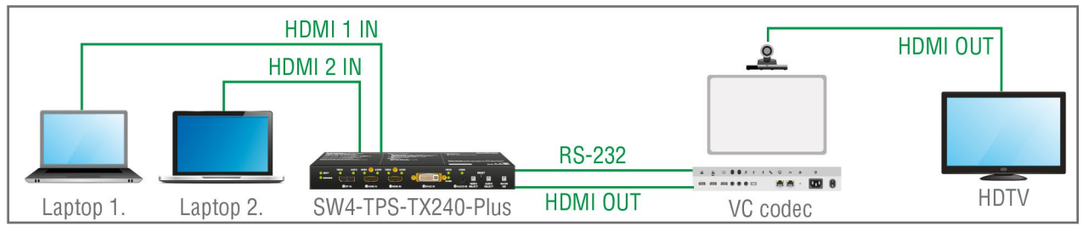
This tool is able to recognize and store the incoming RS-232 message until the previously defined string (delimiter) has arrived or the timeout has elapsed after the last data. The last incoming serial data is stored and it can trigger an action in Event Manager.

RS-232 Recognizer Example

DIFFERENCE: This feature is supported by SW4-TPS-TX240-Plus only.

The Concept

When the transmitter has an active video signal, the Video codec login is performed automatically.



Steps and Settings

Process	Settings
When signal presents on any HDMI input, SW4 sends a message: '**ping**'.	This condition and the action is set in Event manager.
↓	
Video codec sends a message: '**Login name:**'.	The serial communication is scanned continuously by the recoginzer in SW4 and gets the '**Login name**' string.
↓	
When '**Login name:**' is detected in the string, SW4 sends a message: '**Admin**'.	This condition and the action is set in Event manager.
↓	
Video codec sends a message: '**Password:**'.	The serial communication is scanned continuously by the recoginzer in SW4 and gets the '**Password**' string.
↓	
When '**Password:**' is detected in the string, SW4 sends a message: '**Admin**'.	This condition and the action is set in Event manager.
↓	
Login is established, Video codec is ready to use.	

First, configure the recognizer for the serial communication, after that, set the events in the Event Manager (for more details see the Event Manager section). The RS-232 recognizer settings has to be done with Lightware Device Controller Software (see the RS-232 section) or with LW3 protocol commands (see the RS-232 Recognizer section).

Settings in the Event manager

- **E1.** When the signal is present on O1 port of the UMX-HDMI-140-Plus, it sends a message **'PING'** on P1 port of RS-232 to the VC codec. For more details see Message Sending via RS-232 Serial Port section.
- **E2**. Set a condition where '**Login name:**' is the recognized RS-232 message. Action is sending serial message ('Admin') on the P1 port to the VC codec.
- **E3**. Set a condition where '**Password:**' is the recognized RS-232 message. Action is sending serial message ('Admin') on the P1 port to the VC codec.

4.9. Infrared Interface

4.9.1. Technical Background

IR signal transmission can be established via the local IR ports (3.5 mm Jack connector) or via the TPS lines. For the complete usage attach an IR emitter unit to the IR OUT and an IR detector unit to the IR IN connectors.

ATTENTION! The supported carrying frequency is 38 kHz.

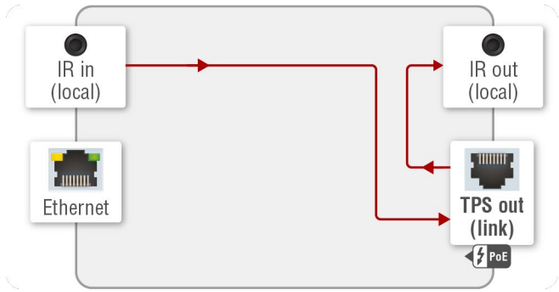
INFO: The modulation of the output IR signal can be turned off or on by LW3 command, see details in the Enable/Disable Output Signal Modulation section.

4.9.2. IR Functions

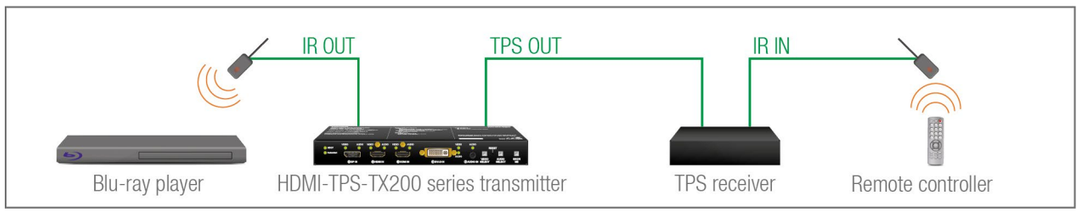
The IR functions are not separated but can be used in combination, as they are available at the same time.

Pass-through Transmission

The IR signal is transmitted between a local and a link port without interruption. Signal transmission is not working between the local input and local output ports, as well as between link input and link output ports.



Example



The Concept

The transmitter and the receiver are connected over TPS. An IR detector is attached to the IR input port of the TPS receiver and an IR emitter is connected to the IR output port of the transmitter. When the remote controller sends an IR signal, the code will be passed through the TPS line and the IR emitter sends the same IR light towards the Blu-ray player.

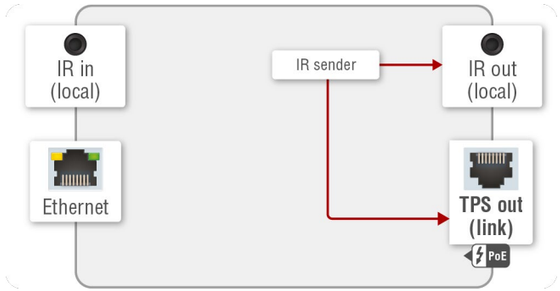
Settings

Special settings are not required, the transmission is enabled as default.

IR Code Sending

DIFFERENCE: This kind of IR code sending is available only in case of SW4-TPS-TX240-Plus device.

Custom IR code can be sent over the **IR output ports** e.g. as an Action in Event Manager. The outgoing IR code shall be in pronto HEX format.



Getting IR Codes

Getting IR code is possible from two sources:

- **Downloading** the desired code from a web database.
- **Capturing** the IR code as described in the How to Learn an IR Code? section.

The fingerprint of an IR code (hash code) can be stored and used as a condition in Event manager. Please see further details in the Infra section.

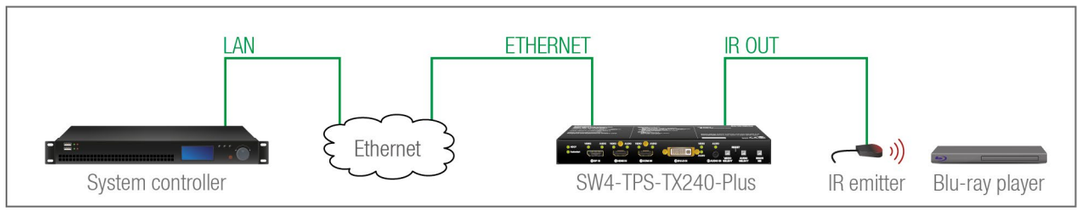
INFO: The pronto hex code which is learned by a Lightware device is **little-endian format**.

Sending IR Codes

IR code can be sent by:

- **LW3 command**, see the Sending Pronto Hex Codes in Little-endian Format via IR Port section. The maximum length of the code can be 765 characters/bytes (93 burst pairs).
- Applying an **Action in Event Manager**. The maximum length of the code can be 184 characters/bytes (21 burst pairs).

Example



The fingerprint of an IR code can be stored and used in Event Manager. See more details in the Infra section..

The Concept

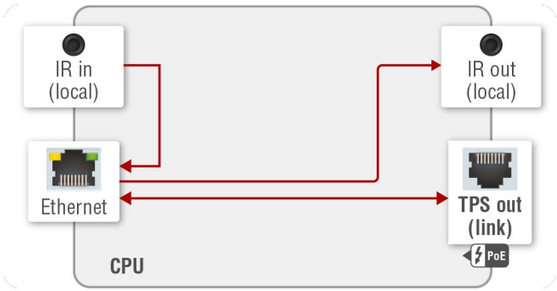
The System controller makes the transmitter sending out a code over the IR output port and the IR emitter towards the Blu-ray player.

Settings

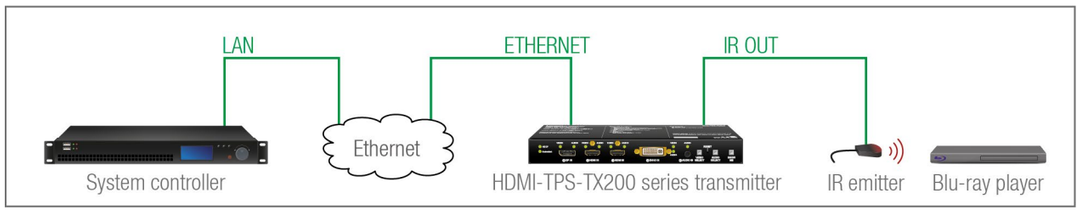
The System controller is connected to TCP/IP port no. 6107 of the transmitter. The controller calls an LW3 method to send out the IR code over the IR output port to the IR emitter.

Command Injection Mode

In this mode, the transmitter works as an Ethernet-IR bidirectional converter. The IR signal coming from the local or link IR input port is converted to TCP/IP data and forwarded to the Ethernet network. The same happens when IR code is coming from the Ethernet network: it will be converted and forwarded to the connected IR output port. TCP/IP port numbers are defined to address the IR ports directly, see the Port Numbering section.



Example



The Concept

The System controller sends out a code over the transmitter to the IR emitter towards the Blu-ray player.

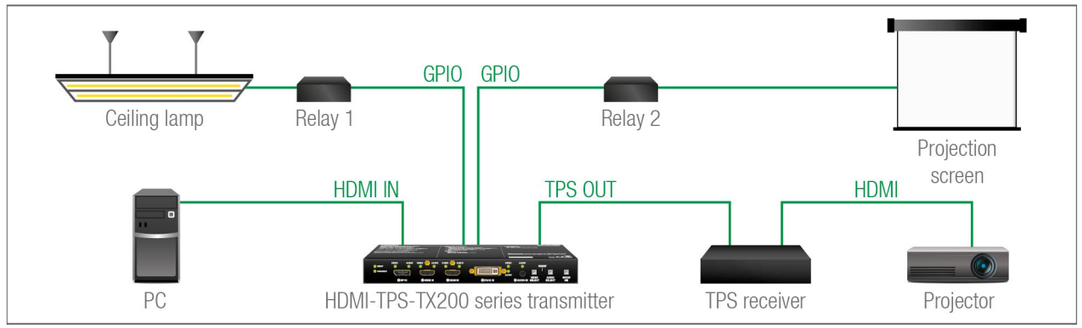
Settings

The layout is the same as in the previous example. But in this case, the IR output port of the transmitter is addressed directly (by using the command injection TCP port). The controller sends the IR code to the IR emitter.

4.10. GPIO Interface

The GPIO (General Purpose Input/Output) port is a multifunctional input/output interface to control the transmitter or third-party devices and peripherals. You can establish connection between the controller/ controllable device and the transmitter by the 8-pole Phoenix connector. Seven pin's direction is configurable independently based on needs of the application.

GPIO Options - Example



The Concept

Ceiling lamp is turned off by Relay 1 and projection screen is rolled down by Relay 2 when signal received from the PC over the VGA input. Both relays are controlled by the GPIO port.

Settings of the Transmitter

- **For Relay 1**: create an event in Event manager: when signal is present on Input 1 (I1) then set GPIO pins to low level for Relay 1 opening. Also create another event when signal is not present on Input 1 (I1) then set GPIO pins to high level for Relay 1 closing.
- **For Relay 2**: create an event in Event manager when signal is present on Input 1 (I1) then set GPIO pins to high level for Relay 2 closing. Also create another event when signal is not present on Input 1 (I1) then set GPIO pins to low level for Relay 2 opening.

When the PC starts to play the video presentation, the signal is received over the VGA input so GPIO pins send signal to Relay 1 to open which results turning off the lights. Furthermore GPIO pins also send signal to Relay 2 to close and the projection screen is rolled down. When the presentation is ended, signal ceases on the VGA input, so GPIO pins send signal to Relay 1 to close which results turning on the lights and sends signal to Relay 2 to open so projection screen returns to its enclosure.

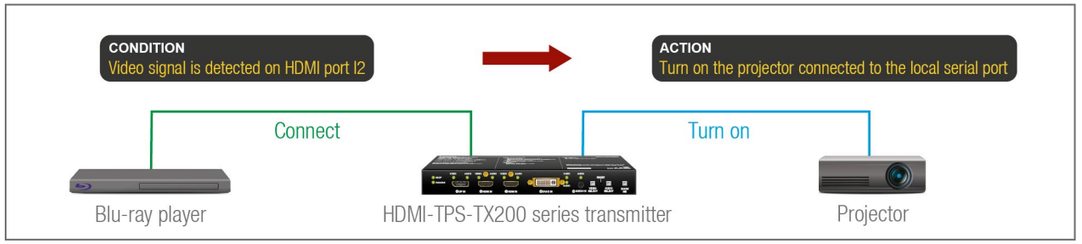
ATTENTION! Please always check the electrical parameters of the devices what you want to control. The maximum current of one GPIO pin is 30 mA, the maximum total current for the seven pins is 180 mA.

See the LDC settings for GPIO port in the GPIO section. See also the details about the Event Manager settings in the Event Manager section.

4.11. Further Built-in Features

4.11.1. Automatically Launched Actions – The Event Manager

The Event Manager feature means that the device can sense changes on its ports and is able to react according to the pre-defined settings. Lightware Device Controller contains a user-friendly software tool and allows to create Events by defining a Condition and an Action.



Event Manager example

See more information about the settings in the Event Manager section.

4.11.2. Transmitter Cloning – Configuration Backup and Restore

The transmitter (configuration) cloning of a HDMI-TPS-TX200 series transmitter is a simple method that eliminates the need to repeatedly configure certain devices to have identical (non-factory) settings. If the devices are installed in the same type of system multiple times then it is enough to set up only one device to fit the user's needs and then copy those settings to the others, thus saving time and resources.

See more information about the settings in the The Built-in Miniweb section.

4.11.3. Remote Firmware Upgrade of Connected Lightware Devices

The firmware of the Lightware TPS devices can be upgraded individually by Lightware Device Updater (LDU) software. HDMI-TPS-TX200 series transmitters contain a feature which allows having a faster and more comfortable firmware upgrade process. When the firmware of the connected extenders has to be upgraded the TPS connection is necessary towards the extenders – nothing else. The LDU will find the connected devices and can upgrade them.

5

Software Control - Lightware Device Controller

The device can be controlled by a computer through Ethernet and RS-232 interfaces by the Lightware Device Controller (LDC). The software can be installed on a Windows PC or macOS. The application and the User's Manual can be downloaded from www.lightware.com.

5.1. Install and Upgrade

ATTENTION! Please note that the minimum system requirement is 1 GB RAM.

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

Installation for Windows OS

Run the installer. If the User Account Control drops a pop-up message click **Yes**. During the installation you will be prompted to select the type of the installation: **normal** and the **snapshot** install:

Normal install	Snapshot install
Available for Windows and macOS	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

Comparison of installation types

ATTENTION! Using the Normal install as the default choice is highly recommended.

Installation for macOS

Mount the DMG file with double clicking on it and 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.

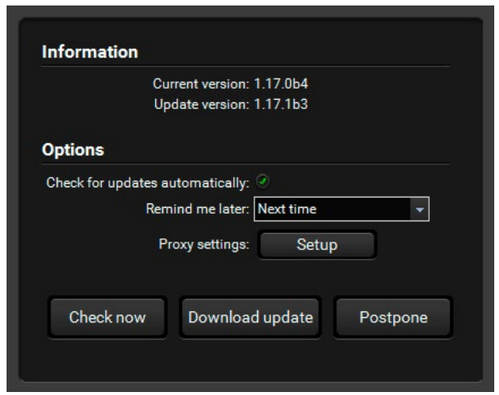
Upgrading of LDC

Step 1. Run the application.

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

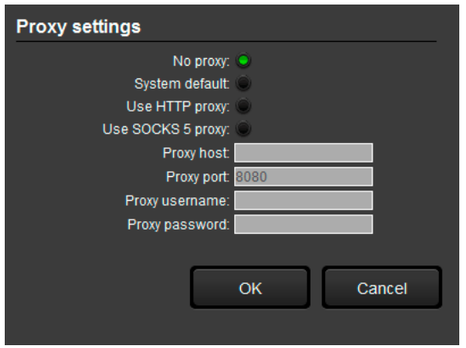
The current and the update version number can be seen at the top of the window and they are shown in this window even with the snapshot install.

The **Update** window can also be opened by clicking the **About icon** ? and the **Update** button.



Step 2. Set the desired update setting in the **Options** section.

- If you do not want to check for the updates automatically, uncheck **the circle**, which contains the green tick.
- If you want to postpone the update, a reminder can be set with different delays from the **drop down list**.
- If the proxy settings traverse the update process, set the proper values then click the **OK** button.

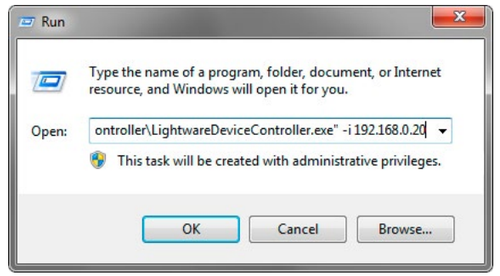


Step 3. Click the **Download update** button to start the upgrading.

The updates can be checked manually by clicking the **Check now** button.

5.2. Running the LDC

The common way to start the software is double-click on the LDC icon. But the LDC can be run by command line parameters as follows: #new



Connecting to a Device with Static IP Address

The LDC is connected to a device with the indicated static IP address directly; the Device Discovery window is not displayed. When the port number is not set, the default port is used: 10001 (LW2 protocol).

For LW3 devices use the 6107 port number.

Format: `LightwareDeviceController -i <IP_address>:<port>`

Example: `LightwareDeviceController -i 192.168.0.20:6107`

Connecting to a Device via a Serial Port

The LDC is connected to a device with the indicated COM port directly; the Device Discovery window is not displayed. If no Baud rate is set the application will detect it automatically.

Format: `LightwareDeviceController -c <COM_port>:<Baud>`

Example: `LightwareDeviceController -c COM1:57600`

Adjusting the Zoom

The window can be zoomed to a specific value to fit to the resolution of the desktop (higher/lower). '1' is the default value (100%).

Format: `LightwareDeviceController -z <magnifying_value>`

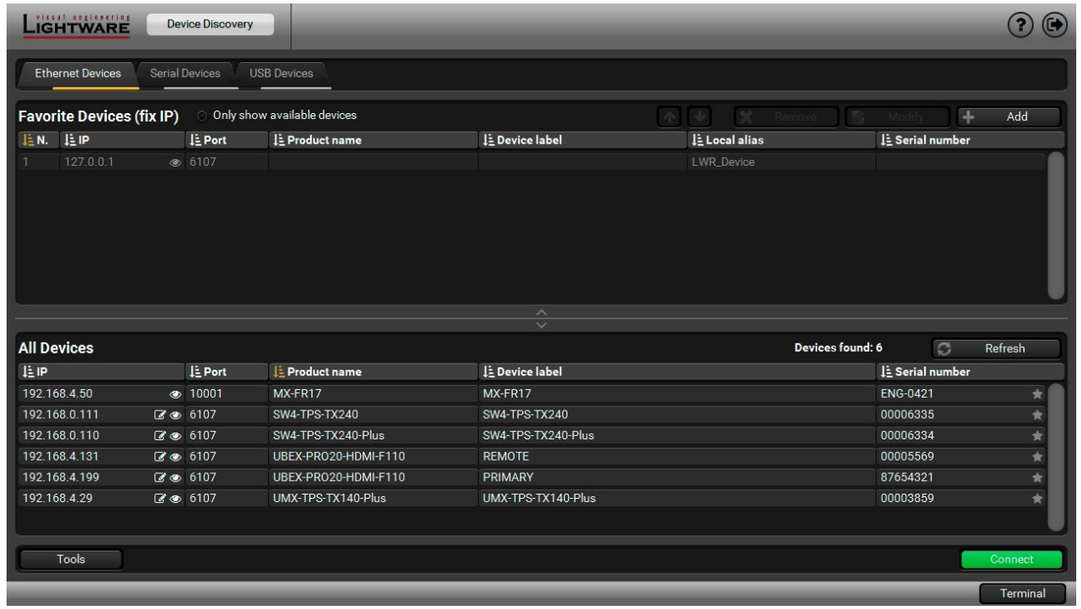
Example: `LightwareDeviceController -z 1.2`

ATTENTION! The last set value is stored and applied when LDC is started without a parameter.

5.3. Establishing the Connection

Step 1. Connect the device to a computer via Ethernet or RS-232.

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



Device discovery window in LDC

Changing the IP Address

To modify IP address settings quickly it is not necessary to enter the device's settings/network menu, you can set them by clicking the pencil icon beside the IP address.

You can see the new settings only in this window.

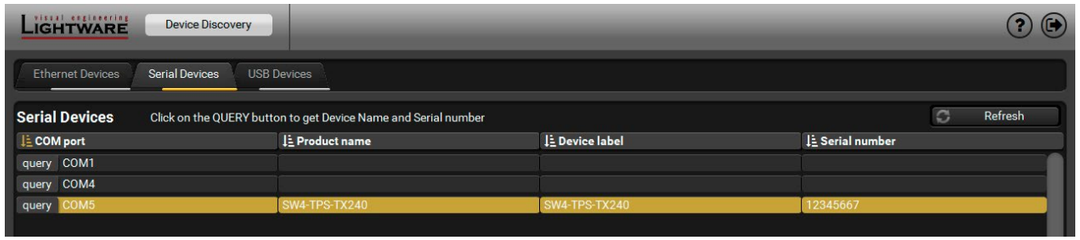
Favorite Devices

The symbol means the given device is marked as a Favorite device (the IP address is stored). When a device is connected with that IP address, it will be marked and will be listed in the upper list as well.

Identifying the Device

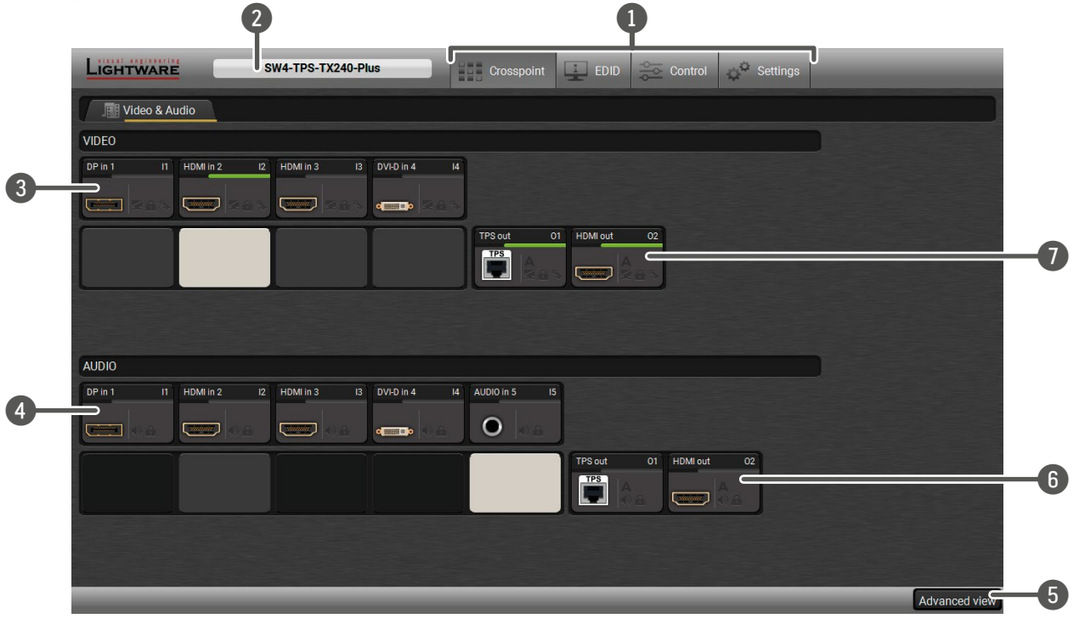
Clicking on the icon results the blinking of the front panel LEDs in green for 10 seconds. The feature helps to identify the device itself in a rack shelf.

Step 3. Select the unit from the discovered Ethernet devices or under Serial devices; when the device is connected through RS-232 click on the **Query** button next to the desired serial port to display the device's name and serial number. Double click on the transmitter or select the device and click on the **Connect** button.



ATTENTION! Before the device is connected via the local RS-232 port, make sure that **Control mode** and **LW3 protocol** are set on the serial port.

5.4. Crosspoint Menu



1	**Main menu**	The available menu items are displayed. The active one is showed with dark grey background color.
2	**Information ribbon**	The label shows the device label which can be edited in the Settings menu - Status tab. Device discovery window can be displayed by clicking on this ribbon.
3	**Video input ports**	Each tile represents a video input port. The tile below the port shows the current crosspoint setting; if the port is switched to the output, the color of the tile is white, otherwise grey.
4	**Audio input ports**	Each tile represents an audio input port. The tile below the port shows current crosspoint setting; if the port is switched to the output, the color of the tile is white, otherwise grey. Dark grey means the audio port is not allowed to embed in the current video input port.
5	**Advanced view**	Displaying the Advanced View Window, showing the Terminal window and the LW3 protocol tree.
6	**Audio output ports**	The audio output of the TPS out and HDMI out ports. Clicking on the tile opens the Audio Outputs (TPS and HDMI) port properties window.
7	**Video output ports**	The video output of the TPS out and HDMI out ports. Clicking on the tile opens the Audio Outputs (TPS and HDMI) port properties window.

Port Tiles *#crosspoint #switch*

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

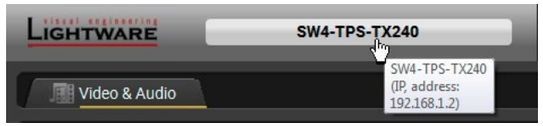
1. Port name
2. Port icon
3. Port number
4. Signal present indicator
   green: present
   grey: not present
5. State indicators

State Indicators

Following icons display different states of the port/signal: *#lock #unlock #mute #unmute*

Icon	Icon is grey	Icon is black	Icon is green
	Signal is not encrypted with HDCP	Signal is encrypted with HDCP	-
	Port is unmuted	Port is muted	-
	Port is unlocked	Port is locked	-
A	Autoselect is disabled	-	Autoselect is enabled

TIPS AND TRICKS: Hover the mouse cursor to the information ribbon; the device label and the IP address of the device will appear as a tooltip text.

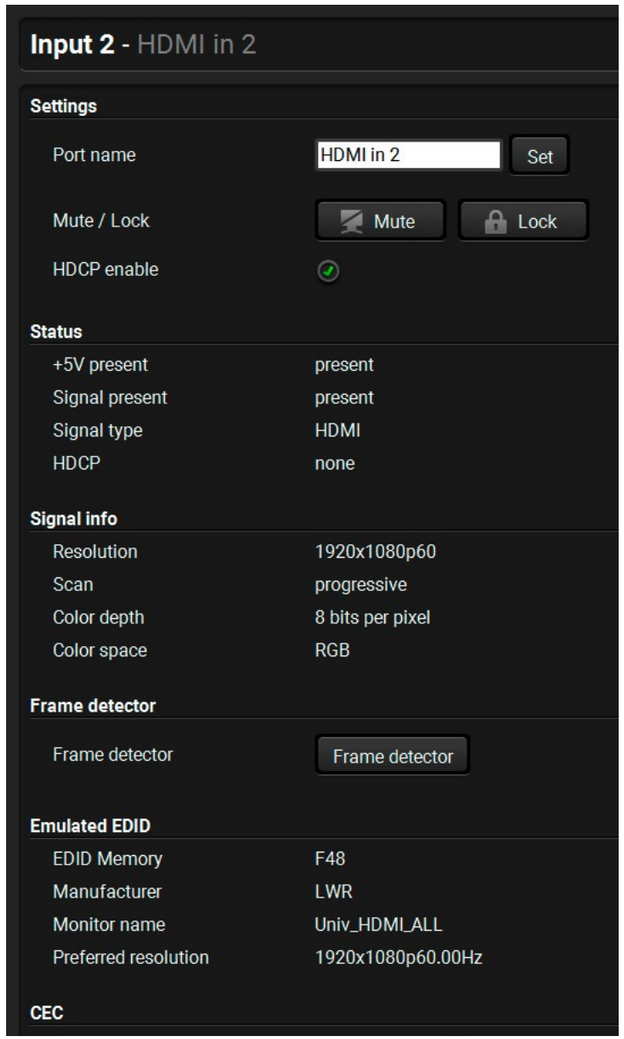


#label #devicelabel

5.5. Port Properties Windows

5.5.1. Digital Video Inputs

Clicking on the HDMI, DisplayPort, or DVI-D video input port icon results opening the **Port properties** window.



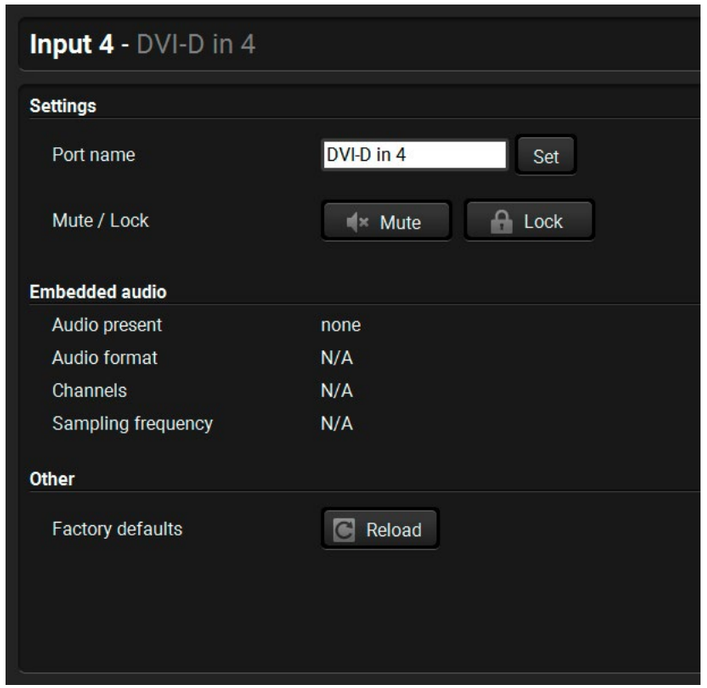
Port Properties Window of an HDMI input

Available settings:

- Set a unique name for the port (up to 15 characters).
- Mute/unmute and lock/unlock the port.
- HDCP setting (enable / disable). *#hdcp*
- Open the Frame Detector.
- Send and receive CEC commands by the CEC Tool * – only in case of SW4-TPS-TX240-Plus.
- Reloading factory default settings for the selected port.

5.5.2. Digital Audio Inputs

Clicking on the HDMI, DisplayPort, or DVI-D audio input port icon results opening the Port properties window. The most important information and settings are available from the panel.

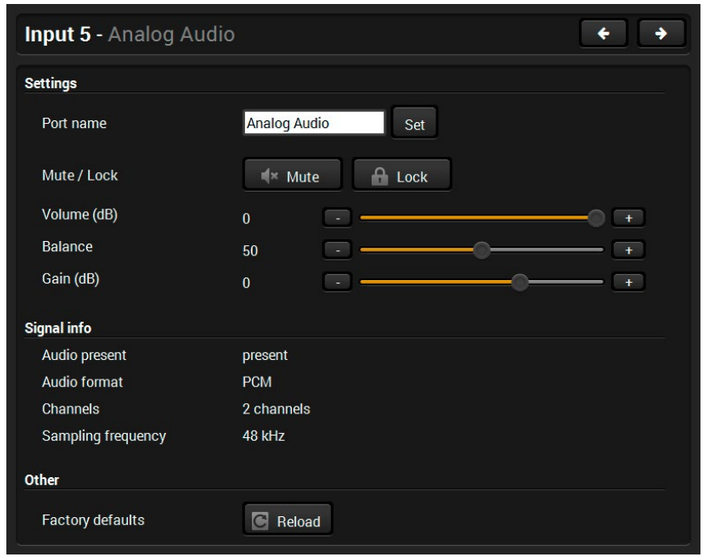


Port properties window of the DVI-D audio input

Certain parameters of the embedded audio input signal can be set as follows:

- Set a unique name for the port (up to 15 characters).
- Mute/unmute and lock/unlock the port.
- Reloading factory default settings for the selected port.

5.5.3. Analog Audio Input



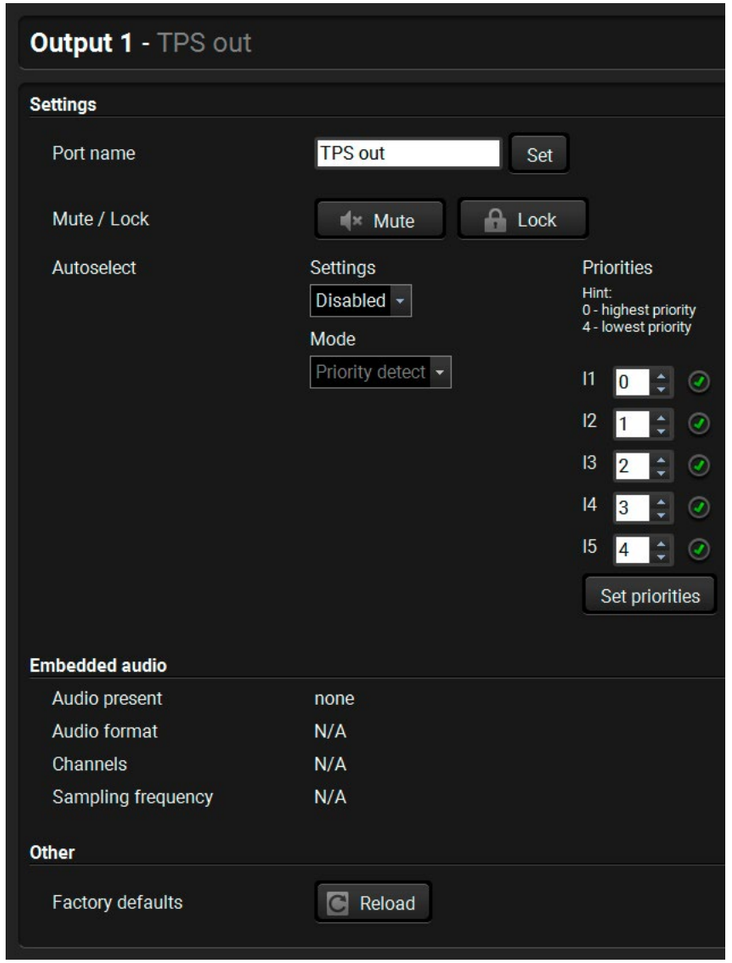
Port properties window of the Analog Audio (Jack) input

Certain parameters of the analog audio input signal can be set as follows:

- Set a unique name for the port (up to 15 characters).
- Mute/unmute the port.
- Lock/unlock the port.
- Volume: from 0 dB to -95.62 dB, in step 0.375 dB (default is 0 dB).
- Balance: from 0 to 100, in step 1 (default is 50 = center).
- Gain: -12 to 6 dB, in step 3 dB (default is 0 dB).
- Reloading factory default settings for the selected port.

 # #analogaudio #balance #volume

5.5.4. Audio Outputs (TPS and HDMI)

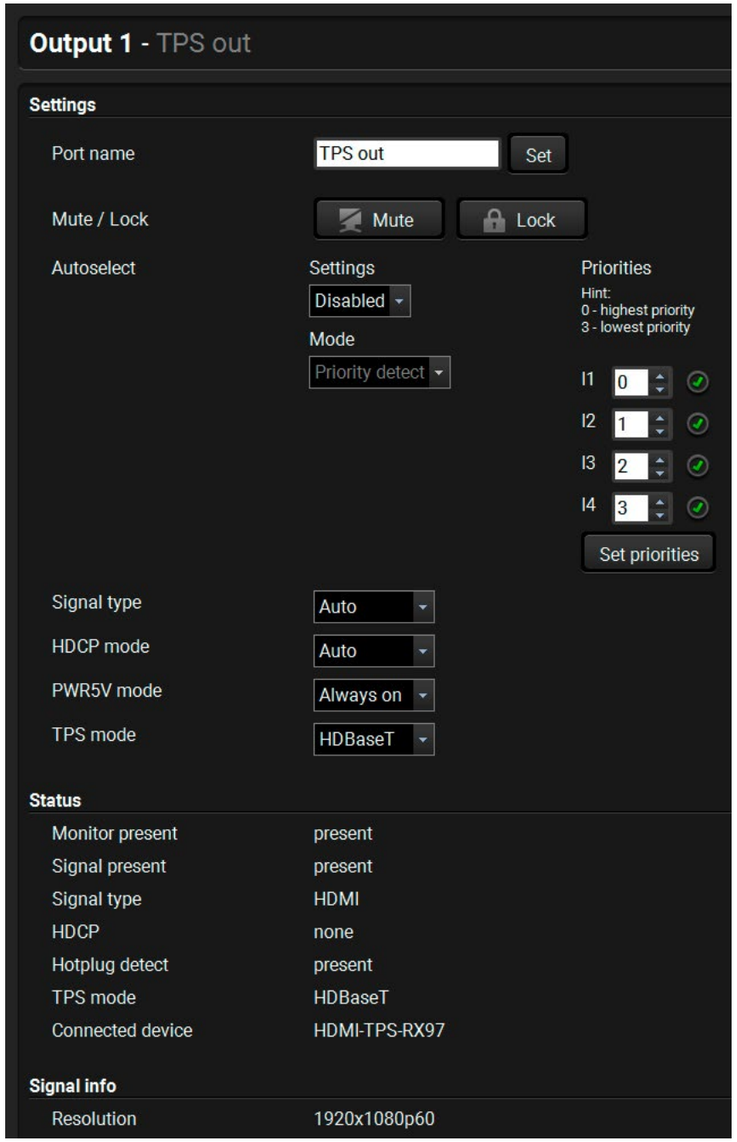


Port Properties Window of the TPS Audio Output

Available settings: *#autoselect*

- Set a unique name for the port (up to 15 characters).
- Mute/unmute and lock/unlock the port.
- **Autoselect settings**: enable / disable, mode, and priorities. (See more details about Autoselect feature in The Autoselect Feature section).
- Reloading factory default settings for the selected port.

5.5.5. Video Outputs (TPS and HDMI)



Port Properties Window of the TPS Video Output

Available settings:

- Set a unique name for the port (up to 15 characters).
- Mute/unmute and lock/unlock the port.
- **Autoselect settings**: enable / disable, mode, and priorities. (See more details about Autoselect feature in The Autoselect Feature section). *#signaltype*
- **Signal type**: Auto / DVI / HDMI - The outgoing signal format can be selected by a drop-down menu. The **Auto** mode means the outgoing signal type is based on the EDID of the sink connected to the given output port. If HDMI is supported by the EDID, the signal type will be HDMI, otherwise DVI.
- **HDCP mode**: Auto / Always - The transmitter forces the source sent the signal without encryption if the content allows when Auto mode is selected. *#hdcp*
- **Power 5V mode**: Auto / Always on / Always off - The setting lets the source and the sink devices be connected – independently from the transmitted signal.
- **TPS mode**: Auto / HDBaseT / Long reach / LPPF1 / LPPF2. See more information about TPS modes in the TPS Interface section. *#tpsmode*
- **No sync screen**: configuration settings of the test pattern. See more details in the No Sync Screen (Test Pattern) section.
- Open the Frame Detector.
- Open the Cable Diagnostics tool.
- Reloading factory default settings for the selected port.

5.6. CEC Tool

The SW4-TPS-TX240-Plus model is able to send and receive Consumer Electronic Control (CEC) commands. This feature is for remote control the source or sink device. CEC is a bi-directional communication via the HDMI cable. *#cec*

1	**Drop-down command list**	Containing the basic CEC commands, most of them are displayed on the graphical interface, too (on the left side). Click on the **Send** button to execute sending the command.
2	**Custom command textbox**	The text field is for sending hexadecimal commands to the source. The maximum allowed length is 30 characters (15 bytes). Click on the **Send** button to execute sending the command.
3	**OSD string textbox**	Unique text can be shown on the sink device up to 14 characters. The send OSD (On-screen display) command textbox is the input field of the string. Alphanumeric characters, glyphs and space are accepted. Click on the **Send** button to execute the command.
4	**Received Command box**	Displays all the sent (in red) CEC commands and the received answers (in blue) with a timestamp. **Legend of the received message:** < [10:33:17] ACK Answer for the acknowledged command. < [10:35:01] NACK Answer for the not acknowledged command. < [10:33:17] IN PROGRESS The command is being processed. < [10:33:17] FAILED Answer for other failure. *< [10:35:40] feature_abort_<*>* This is the most common answer from the third-party devices when the command is delivered, but the execution is refused. The cause of the refuse stands after 'feature_abort' expression.
5	**Clear button**	Click on the **Clear** button to erase the content of the terminal window.
6	**CEC command button panel**	This panel provides the quick and easy management of CEC commands. These buttons are pre-programmed with basic functions and sends commands towards the sink. The communication is displayed in the Received Command box. For the list of the commands see the Sending CEC Commands section. Both the layout and functionality are similar to the design of a remote control.

It can occur that the third-party device can receive, but not execute the command because it is not supported by the product. Check the accepted commands in the documentation of the device.

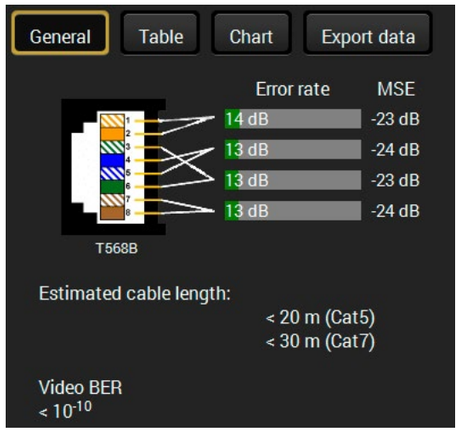
INFO: The first 2x2 bit of the CEC commands contains identification data of the source and destination address. In this case that is always 40.

ATTENTION! Make sure that the controlled unit is CEC-capable and this function is enabled.

5.7. Diagnostic Tools

5.7.1. Cable Diagnostics

The cable diagnostics is a useful tool to determine any cable related issues in case of TPS connection. The estimated cable length and the quality of the link are measured periodically and the diagnostic window shows the values in real-time. If the green bars hit the first line in the middle they turn into red. It means the number of the errors – during the extension – is higher than recommended. The link might be alive but recovering of the received data is not guaranteed. *#diagnostic #cablediagnostics*



INFO: Each bar represents a differential line in the CATx cable. The inappropriate termination of the cable usually causes high error rates. Check the cable terminations or change the cable.

Reference Values

Value	Explanation
10^{-10}-10^{-9}	Excellent image quality
10^{-8}	Minor error, not recognizable by eyes
10^{-7}	Sometimes recognizable flash on a special test pattern
10^{-6}	Small noise can be seen
10^{-5}	Easy to recognize image error
10^{-4}	Bad image quality

Above displayed Video Bit Error Ratio (BER) means that on average there is 1 bad pixel after 10^{10} pixels, which means the number of the bit errors is about 1 pixel in every 80 seconds at 1080p60 video signal.

INFO: See more details in Maximum Extension Distances section.

Table and Chart Views

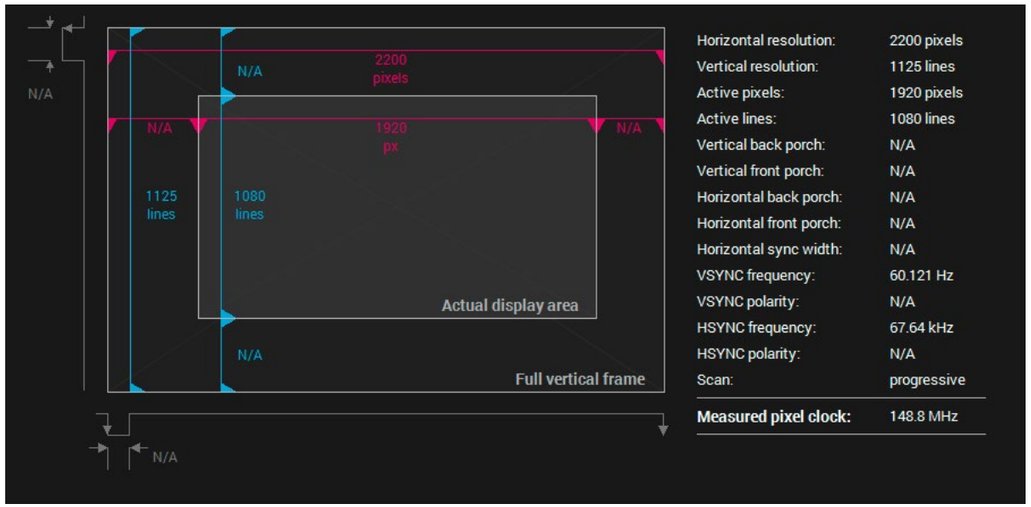
Cable diagnostics can be displayed in advanced modes as well. Two ways are available: **table view** and **chart view**. Data can be exported to a file on clicking on the **Export data** button.

Table view of cable diagnostics

Chart view of cable diagnostics

5.7.2. Frame Detector

The ports can show detailed information about the signal like full size and active video resolution. This feature is a good troubleshooter if compatibility problems occur during system installation. To access this function, open the port properties window and click on **Frame detector** button. #framedetector

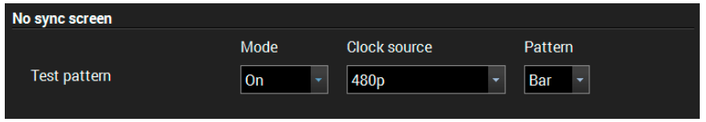


Frame detector window

Lightware's Frame Detector function works like a signal analyzer and makes possible to determine the exact video format that is present on the port, thus helps to identify many problems. E.g. actual timing parameters may differ from the expected and this may cause some displays to drop the picture.

Frame Detector measures detailed timings on the video signals just like a built-in oscilloscope, but it is much more easy to use. Actual display area shows the active video size (light grey). Dark grey area of the full frame is the blanking interval which can contain the info frames and embedded audio data for HDMI signals. Shown values are measured actually on the signal and not retrieved only from the HDMI info frames.

5.7.3. No Sync Screen (Test Pattern)



No sync screen options in the port properties window of TPS output

The No sync screen feature generates an image which can be displayed when there is no incoming signal on the port. The following settings can be set for the Test Pattern function:

Mode

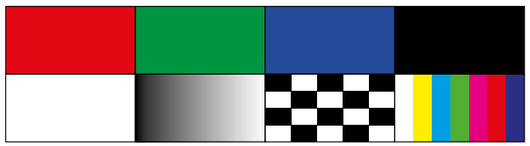
- **On**: the video output port always transmits the test pattern.
- **No signal**: the video output port transmits the test pattern if there is no incoming signal on the selected input port.
- **Off**: the test pattern function is disabled, the video output port transmits the video signal of the selected input port.

Clock Source

- 480p
- 576p
- Original video signal

Pattern

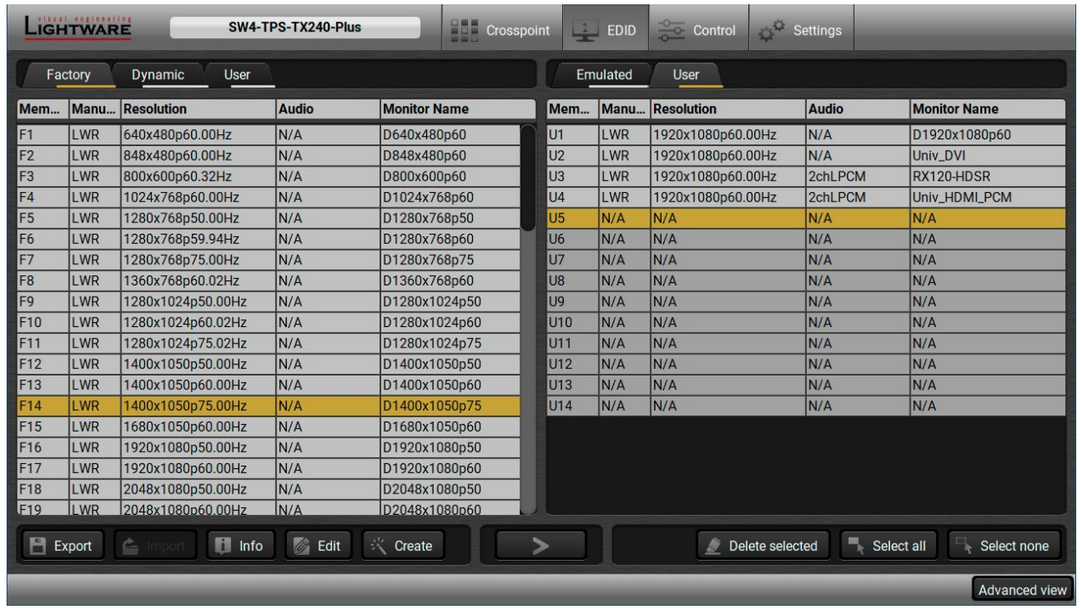
- Red / Green / Blue / Black / White / Ramp / Chess / Bar / Cycle



ATTENTION! However the mode of the Test pattern can be set at each port separately, the clock source and the pattern settings are common.

5.8. EDID Menu

Advanced EDID Management can be accessed by selecting the EDID menu. There are two panels: left one contains Source EDIDs, right one contains Destination places where the EDIDs can be emulated or copied.



Mem...	Manu...	Resolution	Audio	Monitor Name
F1	LWR	640x480p60.00Hz	N/A	D640x480p60
F2	LWR	848x480p60.00Hz	N/A	D848x480p60
F3	LWR	800x600p60.32Hz	N/A	D800x600p60
F4	LWR	1024x768p60.00Hz	N/A	D1024x768p60
F5	LWR	1280x768p50.00Hz	N/A	D1280x768p50
F6	LWR	1280x768p59.94Hz	N/A	D1280x768p60
F7	LWR	1280x768p75.00Hz	N/A	D1280x768p75
F8	LWR	1360x768p60.02Hz	N/A	D1360x768p60
F9	LWR	1280x1024p50.00Hz	N/A	D1280x1024p50
F10	LWR	1280x1024p60.02Hz	N/A	D1280x1024p60
F11	LWR	1280x1024p75.02Hz	N/A	D1280x1024p75
F12	LWR	1400x1050p50.00Hz	N/A	D1400x1050p50
F13	LWR	1400x1050p60.00Hz	N/A	D1400x1050p60
F14	LWR	1400x1050p75.00Hz	N/A	D1400x1050p75
F15	LWR	1680x1050p60.00Hz	N/A	D1680x1050p60
F16	LWR	1920x1080p50.00Hz	N/A	D1920x1080p50
F17	LWR	1920x1080p60.00Hz	N/A	D1920x1080p60
F18	LWR	2048x1080p50.00Hz	N/A	D2048x1080p50
F19	LWR	2048x1080p60.00Hz	N/A	D2048x1080p60

Mem...	Manu...	Resolution	Audio	Monitor Name
U1	LWR	1920x1080p60.00Hz	N/A	D1920x1080p60
U2	LWR	1920x1080p60.00Hz	N/A	Univ_DVI
U3	LWR	1920x1080p60.00Hz	2chLPCM	RX120-HDSR
U4	LWR	1920x1080p60.00Hz	2chLPCM	Univ_HDMI_PCM
U5	N/A	N/A	N/A	N/A
U6	N/A	N/A	N/A	N/A
U7	N/A	N/A	N/A	N/A
U8	N/A	N/A	N/A	N/A
U9	N/A	N/A	N/A	N/A
U10	N/A	N/A	N/A	N/A
U11	N/A	N/A	N/A	N/A
U12	N/A	N/A	N/A	N/A
U13	N/A	N/A	N/A	N/A
U14	N/A	N/A	N/A	N/A

EDID menu

5.8.1. EDID Memory Structure

The EDID memory consists of four parts: *#edid*

- **Factory EDID list** (**F1-F#**) shows the pre-programmed EDIDs .
- **Dynamic EDID list** (**D1-D#**) shows the EDIDs of the display devices connected to the output ports. The device stores the EDID of the sink connected to each output port for the last time, thus, there is an EDID shown even if there is no display device attached to the output port at that moment.
- **User memory locations** (**U1–U#**) can be used to save custom EDIDs. Any EDID from any of the User/ Factory/Decoder EDID lists can be copied to the user memory.
- **Emulated EDID** (**E1-E#**) shows the currently emulated EDID on the given input port. The source column displays the memory location where the current EDID is routed from.

5.8.2. EDID Operations

Changing Emulated EDID

Step 1. Choose the desired **EDID list** on the source panel and select an **EDID**.

Step 2. Press the **Emulated** button on the top of the Destination panel.

Step 3. Select the desired **port** on the right panel (one or more ports can be selected); the EDID(s) will be highlighted with a yellow cursor.

Step 4. Press the **Transfer** button to change the emulated EDID.

Learning an EDID

The process is the same as changing the emulated EDID; the only difference is the Destination panel: press the **User** button. Thus, one or more EDIDs can be copied into the user memory either from the factory memory or from a connected sink (Dynamic).

Exporting an EDID

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

Step 1. Select the desired **EDID** from the Source panel (line will be highlighted with yellow).

Step 2. Press the **Export** button to open the dialog box and save the file to the computer.

Importing an EDID

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

Step 1. Press the **User** button on the top of the Source panel and select a **memory** slot.

Step 2. Press the **Import** button below the Source panel.

Step 3. Browse the file in the opening window then press the **Open** button. Browsed EDID is imported into the selected User memory.

ATTENTION! The imported EDID overwrites the selected memory place even if it is not empty.

Deleting EDID(s)

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

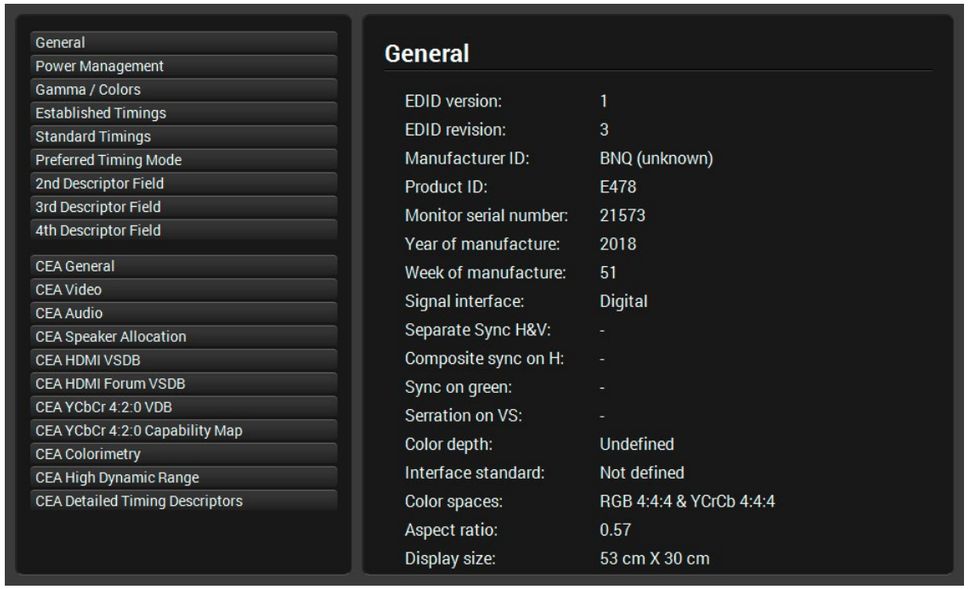
Step 1. Press **User** button on the top of the Destination panel.

Step 2. Select the desired **memory** slot(s); one or more can be selected (**Select All** and **Select None** buttons can be used). The EDID(s) will be highlighted with yellow.

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

5.8.3. EDID Summary Window

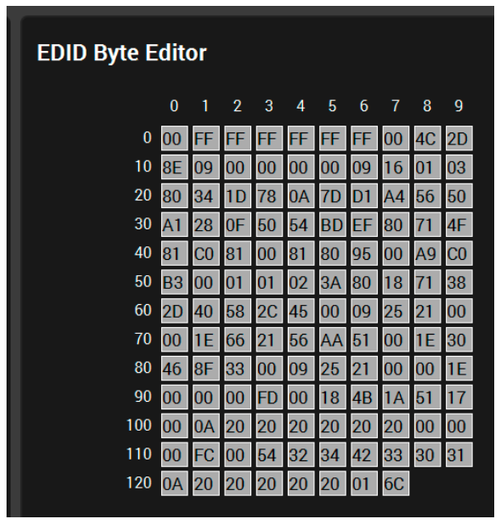
Select an EDID from Source panel and press **Info** button to display EDID summary.



EDID summary window

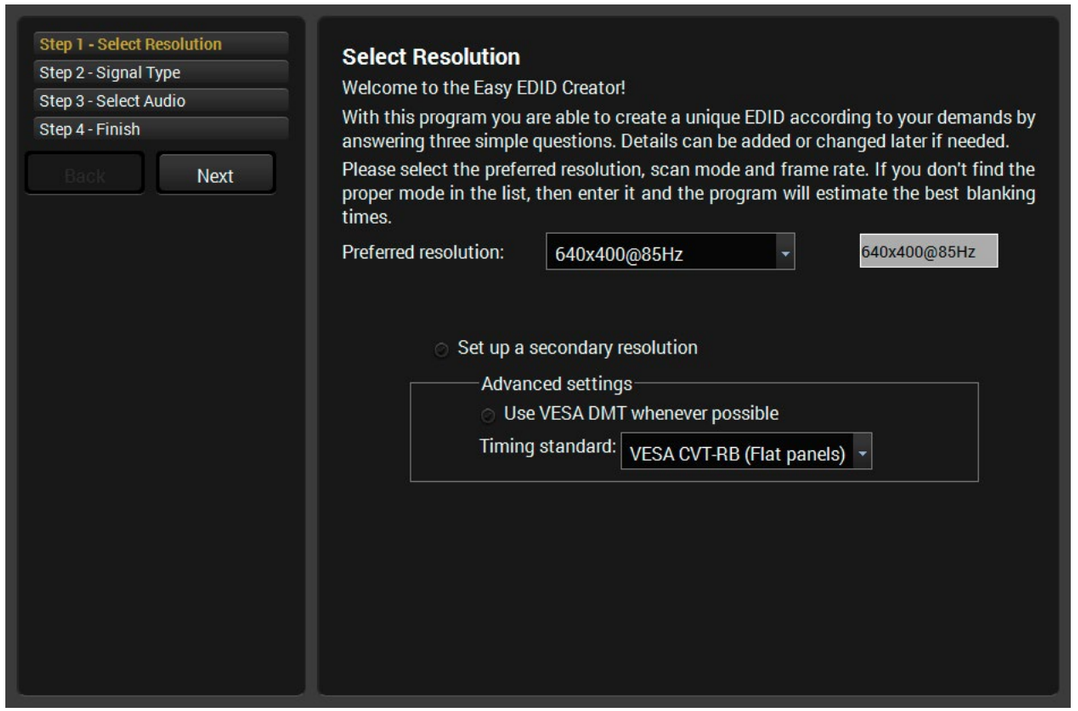
5.8.4. Editing an EDID

Select an EDID from Source panel and press Edit button to display Advanced EDID Editor window. The editor can read and write all descriptors, which are defined in the standards, including the additional CEA extensions. Any EDID from the device's memory or a saved EDID file can be loaded into the editor. The software resolves the raw EDID and displays it as readable information to the user. All descriptors can be edited, and saved in an EDID file, or uploaded to the User memory. For more details about EDID Editor please visit our website and download EDID Editor Application note.



5.8.5. Creating an EDID - Easy EDID Creator

Since above mentioned Advanced EDID Editor needs more complex knowledge about EDID, Lightware introduced a wizard-like interface for fast and easy EDID creation. With Easy EDID Creator it is possible to create custom EDIDs in four simple steps. By clicking on the **Create** button below Source panel, **Easy EDID Creator** is opened in a new window. For more details about EDID Editor please visit our website and download EDID Editor Application note.



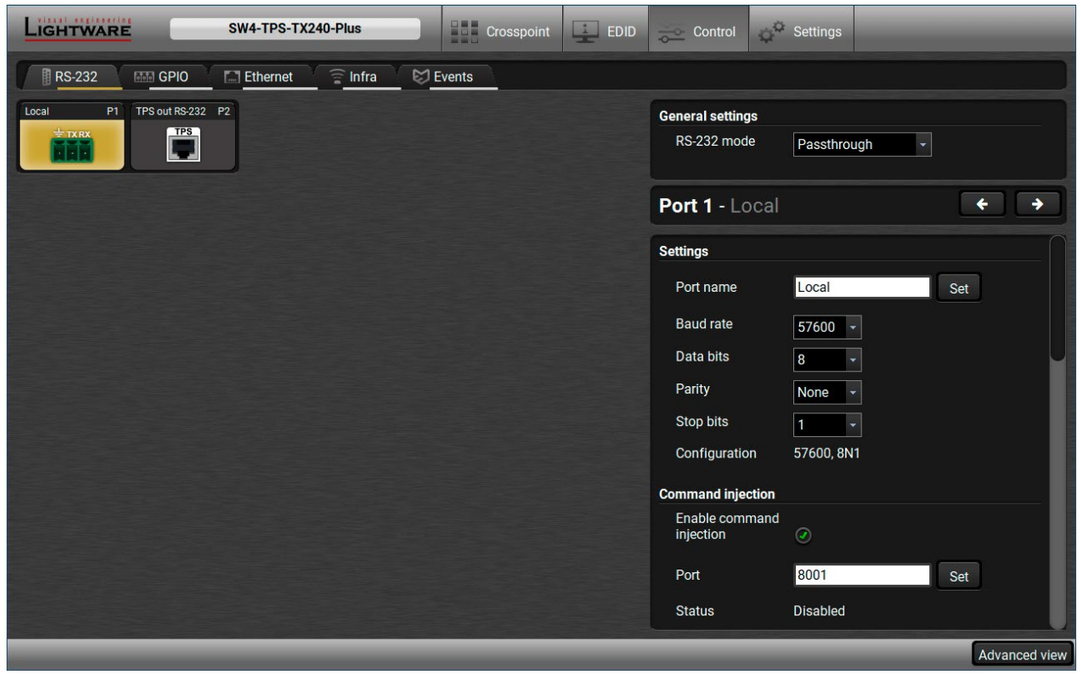
EDID Creator window

5.9. Control Menu

5.9.1. RS-232

All the serial settings available in this menu, including the operation mode setting; see more information in the Serial Interface section. #rs232 #rs-232 #serial

ATTENTION! The RS-232 **Operation mode** is mirrored on the Local and Link serial port. The other settings can be adjusted separately on the two ports.



RS-232 Tab in the Control menu

Settings

The following settings and functions are available:

- RS-232 mode;
- Baud rate;
- Data bits;
- Parity;
- Stop bits;

See more details in the RS-232 Modes section.

Command Injection

In this mode, the transmitter works as an RS-232 bidirectional converter. To use this mode, enable the option and set the RS-232 mode to Command Injection. #commandinjection

Control Protocol

The serial command interpreter can accept only one set of commands, therefore, the desired protocol must be set:

- **LW2:** LW2 protocol commands are accepted, see the LW2 Programmer's Reference chapter.
- **LW3:** LW3 protocol commands are accepted, see the LW3 Programmer's Reference chapter.

Send Message

The message in the field can be sent out via the current RS-232 port. Response cannot be seen in the surface.

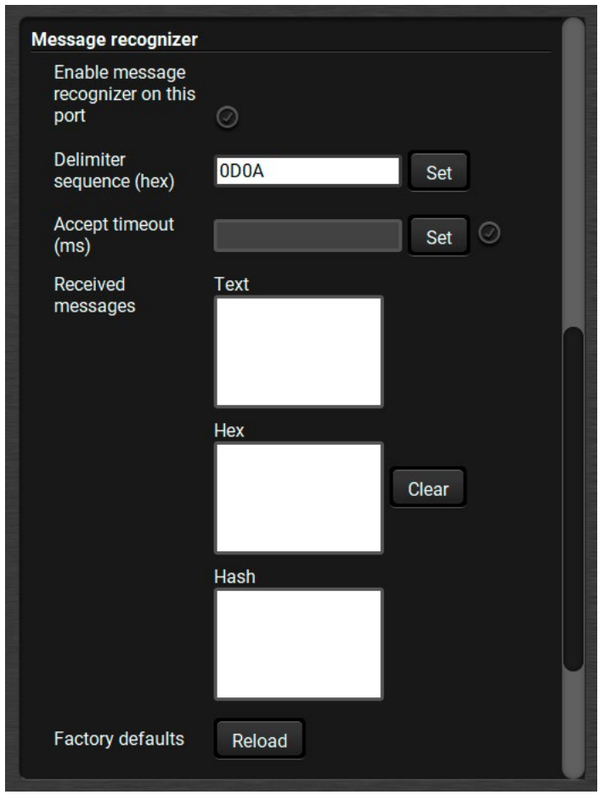
ATTENTION! The escaping is done automatically when sending a message via this surface. When the command is an LW3 message it has to be closed by Carriage return and Line feed, e.g: CALL /MEDIA/VIDEO/XP:switch(I1:O1)\x0d\x0a.

#message

Message Recognizer

DIFFERENCE: Below section refers to the SW4-TPS-TX240-plus model only.

SW4-TPS-TX240-Plus device is able to analyze and store the received serial data. For more information see the Serial Interface section. Check **Enable message** recognizer on this port to switch the recognizer on.



Delimiter sequence text box is for setting the delimiter string in hex format. When this string is detected in the incoming serial data, the device saves the RS-232 message data from the first bit, to the delimiter (or the data between the two delimiters).

> INFO: 0D0A is the factory default value, this is the hexadecimal code of Carriage Return and Line Feed. LW3 protocol commands end with this formula, thus, the last received LW3 command is stored automatically - as default.

If the **Timeout** is enabled and set, the received data is saved when the timeout is elapsed after the last received message.

Received messages box shows the last received and stored message in Text (RECOGNIZER.Rx), Hex (RECOGNIZER.RxHex), and Hash (RECOGNIZER.Hash) format. The Hex and Hash contains the delimiter.

Press the **Clear** button to erase this storage.

Clicking on **Reload** restores the Factory Default Settings of the recognizer.

> INFO: Message recognizer operates independently of the RS-232 mode.

Configuration Example for the Message Recognizer

The detailed description below shows how to configure the message recognizer in RS-232 Recognizer Example. *#message #recocgnizer #rs232recognizer #rs-232recognizer*

When an active video signal is present, the login procedure in the VC codec is done automatically by the LW devcice. The signal presence triggers a bi-directional communication with the VC codec via RS-232:

Step 1. Turn on the recognizer: Enable it on the P1 serial port.

Step 2. Set the delimiter (in hex format). In this case, the delimiter character is '**:**', which is '**3a**' in hex format. When the delimiter string is detected in the incoming serial data, the serial message is stored in string (in Rx and ActiveRx property), hex (in RxHex and ActiveHex property) and hash (in Hash and ActiveHash property) format. These stored content can be set as a condition in the event manager.

> INFO: The stored content is the incoming data which arrives **before** the delimiter or **between** the two delimiters.

Step 3. Set the Active timeout 100. This property is responsible for erasing the temporary storage (ActiveRx, ActiveRxHex, ActiveHash) after the elapsing time. In the below example, it can be seen how does the recognizer properties change during the communication:

SW4-TPS-TX240-Plus: ▸ **PING**

Rx	RxHex	Hash	ActiveRx	ActiveRxHex	ActiveHash

Video Codec: ◂ **Login:**

Rx	RxHex	Hash	ActiveRx	ActiveRxHex	ActiveHash
Login:	4C6F67696E3A	2D8A5E38	Login:	4C6F67696E3A	2D8A5E38

SW4-TPS-TX240-Plus: ▸ **Admin**

Active timeout is elapsed, so the values of the Active- prefixed properties are deleted.

Rx	RxHex	Hash	ActiveRx	ActiveRxHex	ActiveHash
Login:	4C6F67696E3A	2D8A5E38			

Video Codec: ◂ **Password:**

Rx	RxHex	Hash	ActiveRx	ActiveRxHex	ActiveHash
Password:	50617373776F72643A	79059B26	Password:	50617373776F72643A	79059B26

SW4-TPS-TX240-Plus: ▸ **Admin**

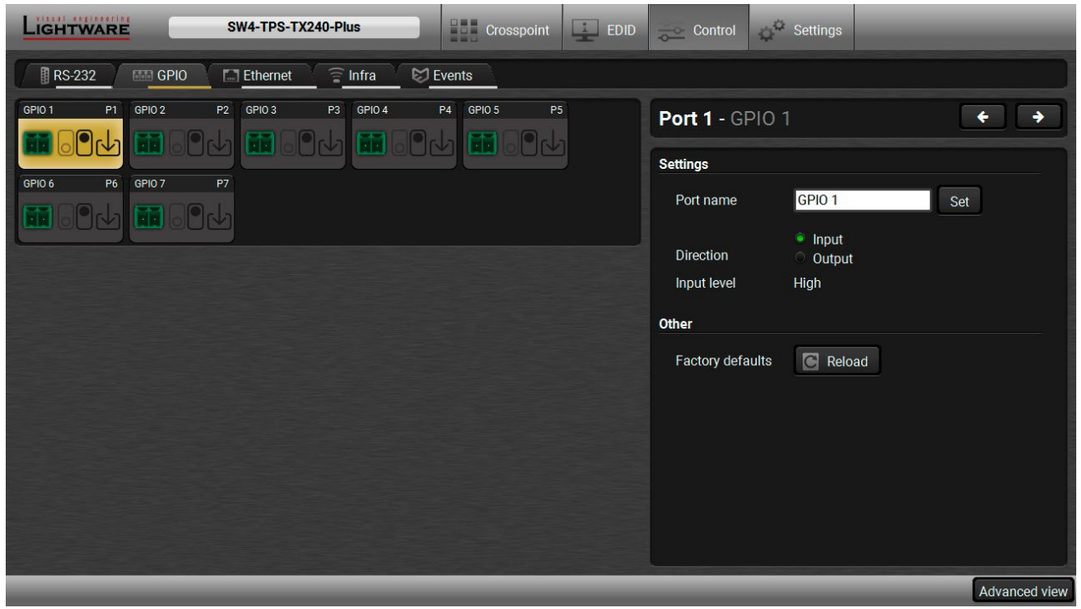
Active timeout is elapsed, so the values of the Active- prefixed properties are deleted.

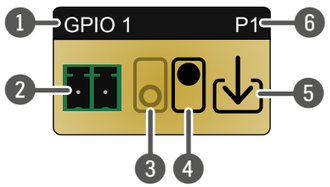
Rx	RxHex	Hash	ActiveRx	ActiveRxHex	ActiveHash
Password:	50617373776F72643A	79059B26			

See the RS-232 Recognizer section for the corresponding LW3 command and further details.

5.9.2. GPIO

The GPIO port has 7 pins, which operate at TTL digital signal levels and can be controlled by LDC or protocol commands. Select a GPIO pin and under the Port settings section; the settings (pin direction and input level) are displayed on the port tiles as well.





1. GPIO pin name
2. GPIO port icon
3. Low level indicator *
4. High level indicator *
5. Pin direction:
   Input: down arrow
   Output: up arrow
6. GPIO port number

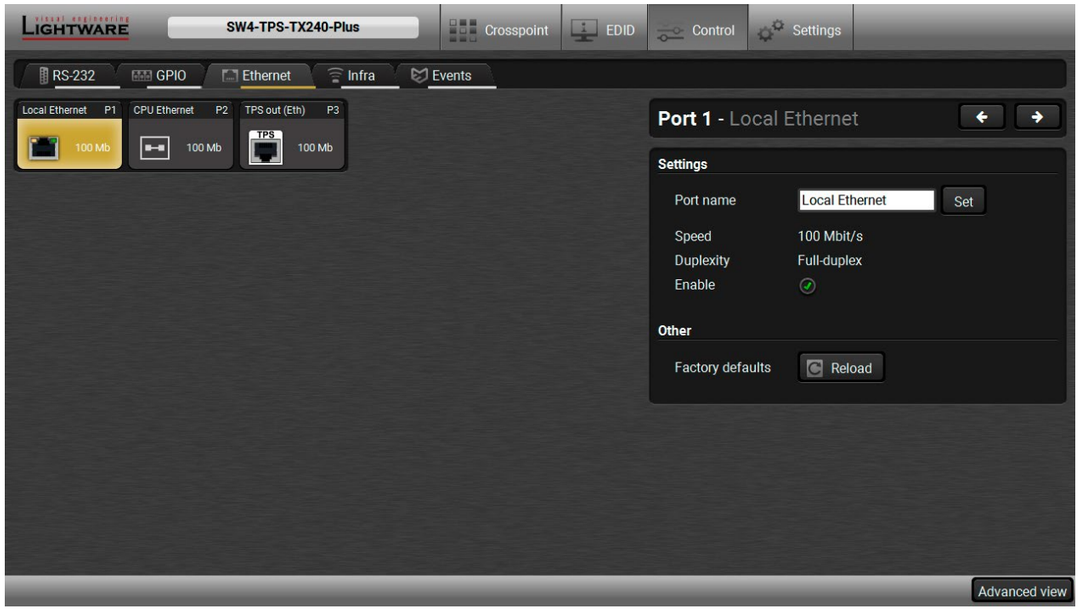
* The black-highlighted symbol means the current setting.

INFO: Output level can be set only in case of setting the pin direction to Output. In case of input direction the output level setting and the Toggle button is not available.

For more details about GPIO interface see the GPIO Interface section.

5.9.3. Ethernet

Two ports are displayed in the Ethernet settings: Local, CPU, and TPS. You can check the status of the Ethernet line by each ports: the speed and the duplexity of the connection.



The following settings are available for the local port:

- Enable / disable the port;
- Reloading factory defaults.

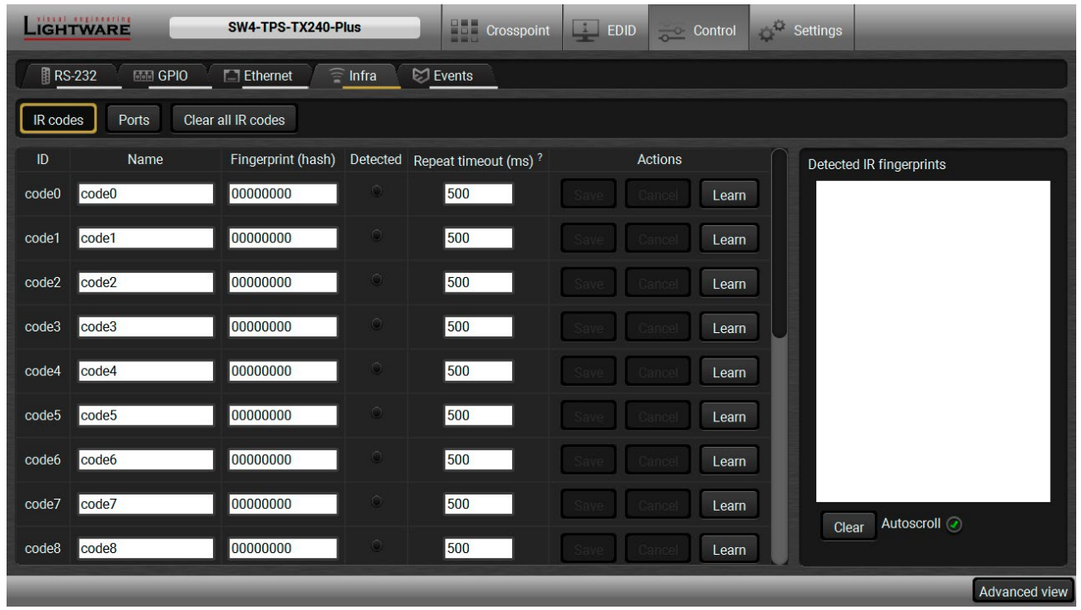
ATTENTION! Setting the Ethernet port **disabled** may break the connection with the device.

INFO: CPU Ethernet port cannot be disabled.

5.9.4. Infra

ATTENTION! The device has no built-in Infrared receiver and transmitter. For the complete usage attach an IR emitter unit to the IR OUT and an IR detector unit to the IR IN connectors.

Infra-Red (IR) receiver and transmitter options can be found on this tab. There are three submenus are available under it: **IR codes**, **Ports**, and **Clear all IR codes**.



#infra #infrared

IR Codes

The user can set the name of the IR code, the fingerprint (hash), and the repeat timeout in ms, actions can be ordered to each IR code as well.

Description	Function
ID	Code number.
Name	You can give an unique name for the desired code.
Fingerprint (hash)	Fingerprint code in pronto hexa format.
Detected	Indicator gives feedback about the given IR code is detected currently.
Repeat timeout (ms)	You can set a timeout to avoid the involuntary code recurrence.
Actions	Action buttons for the desired IR code: **Save**: saving the fingerprint. **Cancel**: canceling the fingerprint. **Learn**: learning the detected IR code.
Detected IR fingerprints	You can check the detected IR codes in this panel. Pushing **Clear** button deleting all current fingerprints and switch on or off the automatic scrolling with the **Autoscroll** pipe.

20 fingerprints can be stored in the device at the same time. Each of them can be ordered to a condition in Event Manager.

Storing the Fingerprint of an IR Code

Step 1. Connect the IR detector unit to the IR IN port of the transmitter.

Step 2. Click on the **Learn** button.

Step 3. Turn the remote controller to the IR detector. A pop-up window appears in LDC - press your remote button to learn.

Step 4. Once the code is received, a new window pops up in LDC - learning completed. Click **OK** to continue.

Step 5. Optionally type a unique name for the code in the **Name** text box. The default name is code#, e.g. code0.

Ports

User can set the name and command injection port to each sources and destinations. For more details about IR interface see the Infrared Interface section.

Clear all IR codes

Clicking on the button results deleting all stored IR fingerprints.

5.10. Event Manager

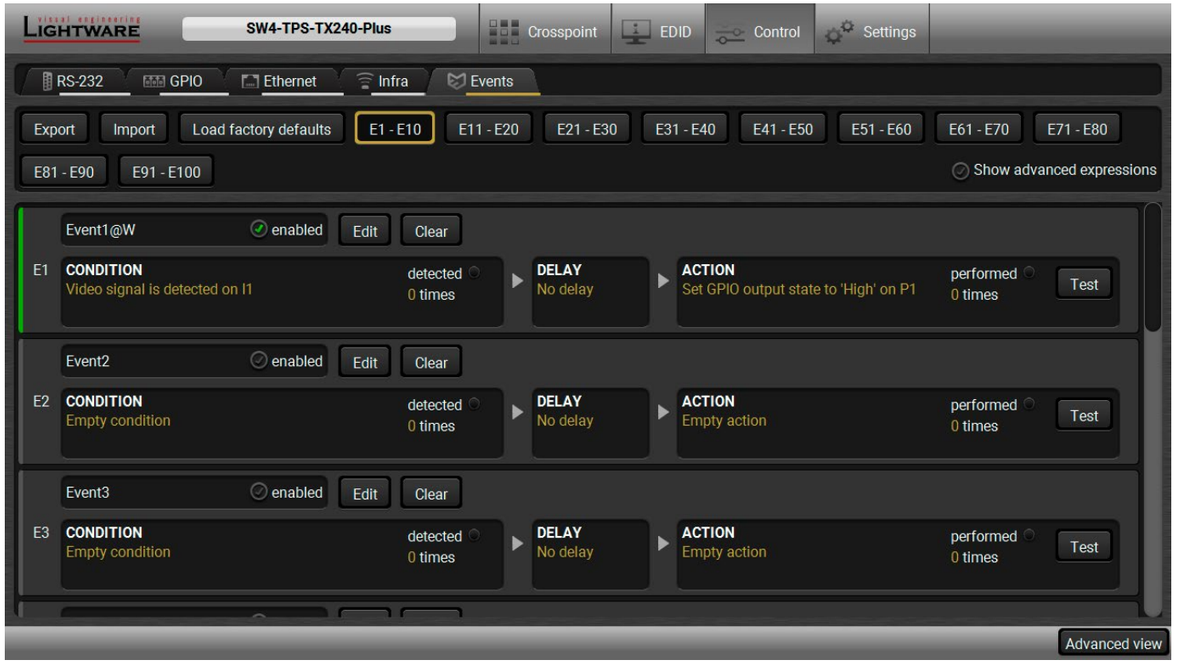
The feature means that the device can sense changes on its ports and able to react according to the pre-defined settings. The development idea of the Event manager is based on users' feedbacks. In many cases internal events (such as signal present or HDCP active) are necessary to display but it is not easy when the device is hard to access (e.g. built under the desk).

The Event manager can be configured to perform an action if a condition has been detected. E.g. the desired setup is that after a certain type of signal has been detected on I1 port, the port has to be switched to O1. The settings can be done via the LDC in the Control/Events tab, or by LW3 protocol commands. Configurable events number depends on the device what you are using actually.

Numerous new ideas and requests have been received in connection with the features and settings of the Event manager since the first release. Therefore, the user interface has been re-designed and many new functions implemented. The Event editor can be opened by pressing the **Edit** button at each Event.

There is a **grey bar** on the left of the Event panel in each line. If a condition and an action are set and the Event is enabled, the bar is displayed **in green**.

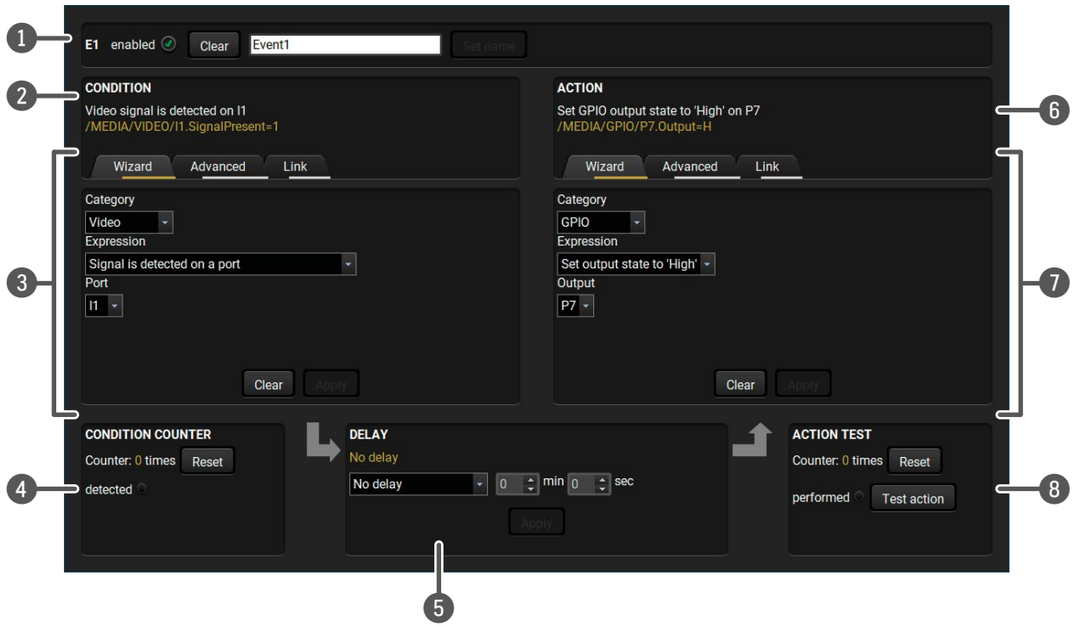
#eventmanager



Control menu, Event Manager tab

5.10.1. The Event Editor

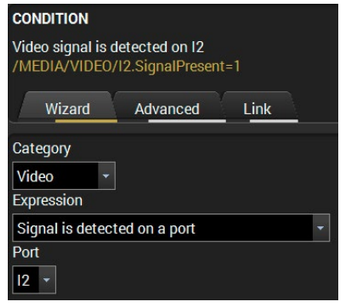
Press the **Edit** button in the desired Event line to open the Event editor window.



1	**Event header**	The name of the Event is displayed. Type the desired name and press the Set name button. The Event can be cleared by the Clear button. Use the tick mark to enable/disable the Event.
2	**Condition header**	If the condition is set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If the advanced mode was used the description is “Custom condition”.
3	**Condition panel**	The Wizard, the Advanced or the Link tool is available to set the condition. The parameters and settings are displayed below the buttons.
4	**Condition Counter**	The set condition can be tested to see the working method in the practice.
5	**Delay settings**	The action can be scheduled to follow the condition after the set time value.
6	**Action header**	If the action is set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If the advanced mode was used the description is “Custom action”.
7	**Action panel**	The Wizard, the Advanced or the Link tool is available to set the action. The parameters and settings are displayed below the buttons.
8	**Action test**	The set action can be tested to see the working method in the practice.

5.10.2. Create or Modify an Event

Wizard Mode



The wizard mode lists the most common conditions and actions, so the user does not have to look for LW3 nodes and properties.

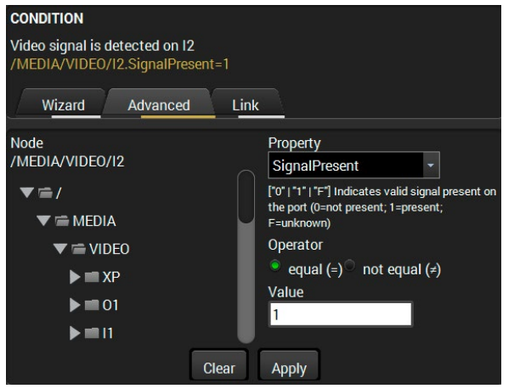
Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is displayed as default. Select the desired **Category** first (e.g. Audio or Video).

Step 3. Select the desired **Expression** from the drop-down menu. If any other parameter is necessary to set, it is going to be displayed.

Step 4. Press the **Apply** button to store the settings of the Condition.

Advanced Mode



The goal of this mode is the same as of the wizard: set the properties and methods for conditions and actions. The difference is the number of the available and usable properties and methods of the LW3 protocol. Advanced mode allows almost all of it.

Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

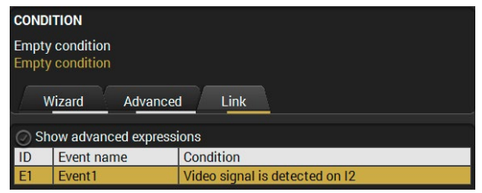
Step 2. The wizard mode is the default, press the **Advanced** button. The LW3 protocol tree is displayed showing the list of the properties in the drop-down menu. Navigate to the desired node.

Step 3. Select the desired **Property** from the menu. The **manual** of the property is displayed below to help to select the necessary property and to set the value.

Step 4. Set the desired **value** and **operator**, then press the **Apply** button to store settings.

The Link Tool

The new interface allows creating more actions for the same condition. In that case, a condition can trigger more actions. To set such an Event, the Link tool has been introduced.



Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is displayed as default, press the **Link** button.

Step 3. All the saved Events are analyzed and the **conditions** are listed (it takes some seconds to finish). The **Show advanced expressions** option allows showing the exact path and set the value of the given property.

Step 4. Select the desired **Condition** and press the **Apply** button to store the settings.

5.10.3. Special Tools and Accessories

The Name of the Event

The name of a port can be changed by typing the new name and clicking the **Set** button. The following characters are allowed when naming: letters (A-Z) and (a-z), numbers (0-9), special characters: hyphen (-), underscore (_), and space ( ).

Enable or Disable an Event

The set Event can be enabled or disabled in the Event list, or directly in the Event editor window by setting the **tick mark** beside the name.

Testing the Condition

When the desired Condition is arranged, the setting can be tested. The Event list and the Event editor contains a small panel that shows if the set condition is detected and how many times. The **Counter** can be reset by the button in Event editor. If the Condition is true, the **detected** mark turns green for two seconds and the **Counter** is increased.

Testing the Action

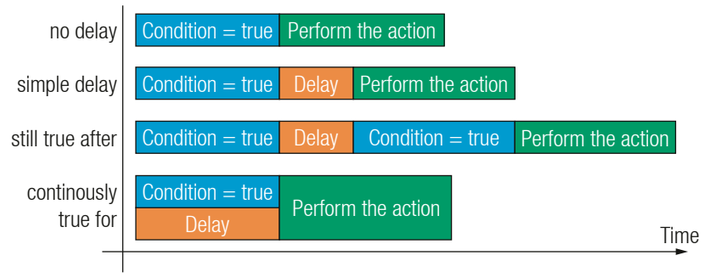
The method is the same as testing the Condition, but in this case, the Action can be triggered manually by pressing the **Test** button.

TIPS AND TRICKS: The Test button is also placed on the Action panel in the Event list. Thus, you can check the Actions without opening the Event editor.

Delay the Action

In most cases the Action is performed immediately after the Condition is detected. But sometimes a delay is necessary between the Condition and the Action. Therefore, the new Event manager contains the Delay panel which allows that feature with below settings:

- **No delay**: when the Condition is detected, the Action is launched.
- **Simple delay**: when the Condition is detected, the Action is launched after the set time interval.
- **Still true after**: when the Condition is detected, the Action is launched after the set time interval only if the Condition still exists.
- **Continuously true for**: when the Condition is detected, the Action is launched after the set time interval only if the Condition has been existing continuously.



TIPS AND TRICKS: **Show advanced expressions** option is a useful tool when you look for the path or value of a property but just the expression is displayed. The option is available in the Event list window or when Link tool is used.

5.10.4. Clear One or More Event(s)

Clear an Event

Press the **Clear** button in the Event list or in the header section in the Event editor.

Clear all Events

When all the Events must be cleared press the **Load factory defaults** button above the Event list. You will be prompted to confirm the process.

5.10.5. Export and Import Events

The feature allows saving all the Events. The backup file can be uploaded to another HDMI-TPS-TX200 series transmitter.

Export all the Events

Step 1. Press the **Export** button above the Event list.

Step 2. The Save as dialog box will appear. Set the desired folder and file name, then press the **Save** button.

The generated file is a simple text file which contains LW3 protocol commands. The file can be viewed by a simple text editor, e.g. Notepad.

ATTENTION! Editing the file is recommended only for expert users.

Import all the Events

Step 1. Press the **Import** button above the Event list.

Step 2. The Open dialog box will appear. Select the desired folder and file, then press the **Open** button.

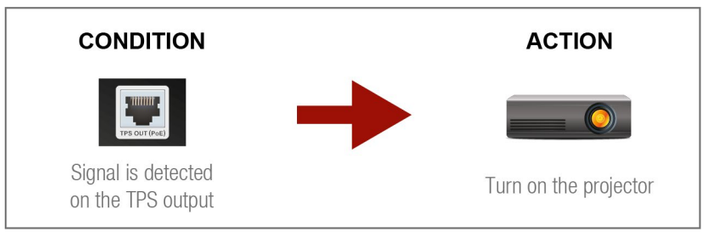
5.10.6. Event Creating - Example

The following example shows you on a real-life situation how to set up an Event.

The Concept

The SW4-TPS-TX240 is connected to a projector by the TPS output port. The transmitter is also connected to the projector by the RS-232 port and can send commands via the serial line.

The task is to turn on the projector when signal is detected on the TPS output port.



RS-232 Settings

Make sure that the serial line is established between the transmitter and the projector. Check that the RS-232 settings of the transmitter is set exactly the same which required for the projector: baud rate, data bits, parity, stop bits. The transmitter needs to be set to: Control protocol: LW3; and RS-232 mode: Pass-through. See the relevant LDC settings in the RS-232 section.

Setting the Event

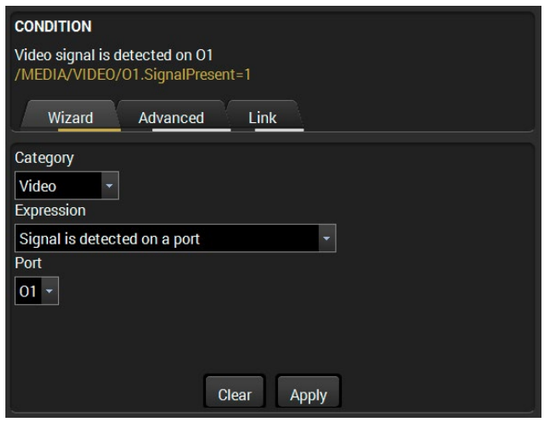
You can create the Event in the Wizard in few simple steps:

Step 1. Set the condition.

Select the required parameters to set the condition:

- **Category**: Video;
- **Expression**: Signal is detected on a port;
- **Port**: O1.

Click on the **Apply** button to complete the procedure. When it is done, the condition appears on the upper side in textual and LW3 command format as well.



Step 2. Set the action.

If the condition is fulfilled, the following action needs to be launched: the receiver sends a command to the projector over the serial line:

- **Power on** - the required command which is accepted by the projector: PWR0<CR><LF>

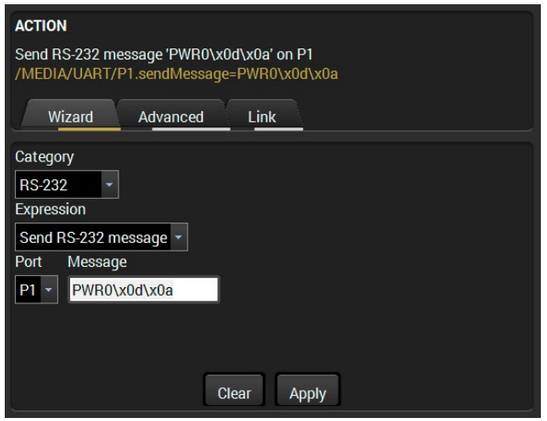
For this instance the command has to be closed with the <CR><LF> characters so they need to be escaped. You can use the following format for escaping:

<command$_1$><\x0d\x0a><command$_2$><\x0d\x0a>...
...<command$_n$><\x0d\x0a>

In the current case the command is: PWR0\x0d\x0a

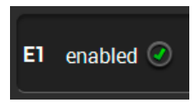
Select the required parameters to set the action:

- **Category**: RS-232;
- **Expression**: Send RS-232 message;
- **Port**: P1;
- **Message**: PWR0\x0d\x0a



Step 3. Enable the Event.

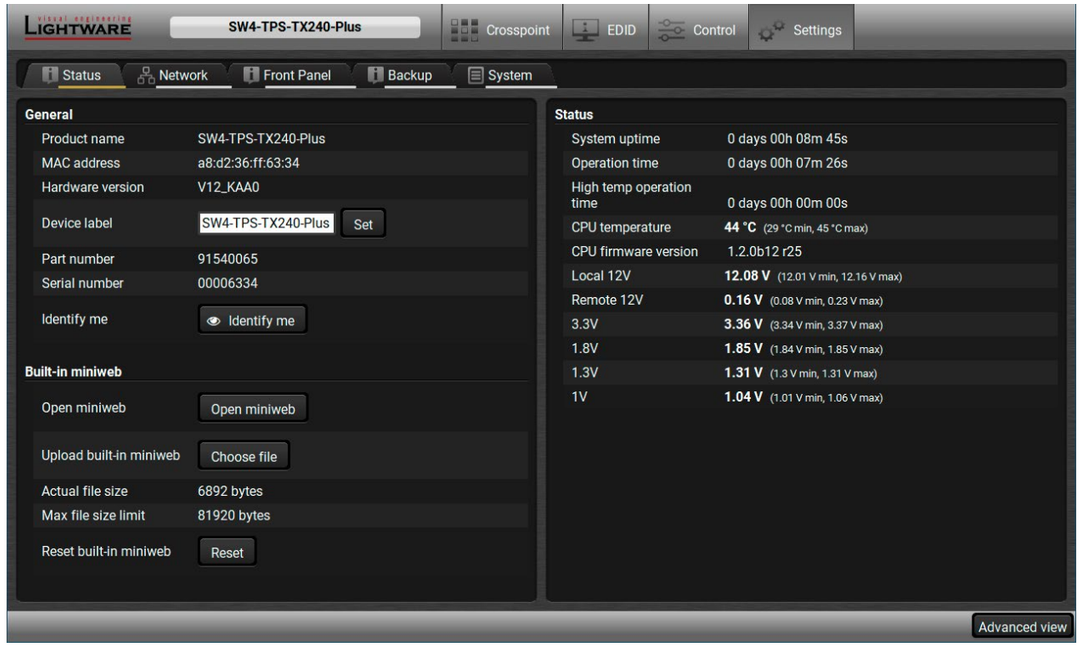
Select the **E1 enabled** pipe in upper left corner to set the Event as launched.



INFO: If you do not find the required category/expression/etc what you need, choose the Advanced mode in the Wizard where the entire LW3 structure tree is available. For example instead of signal detection you can set a specified resolution or color range either as a condition.

5.11. Settings Menu

5.11.1. Status



Status tab in Settings menu

The most important hardware and software related information can be found on this tab: hardware and firmware version, serial numbers, temperatures, operation time, and voltage information. Device label can be changed to unique description by the **Set** button.

> INFO: The **Device label** is a user-editable name displayed next to the main menu. The **Product name** is a read-only property.

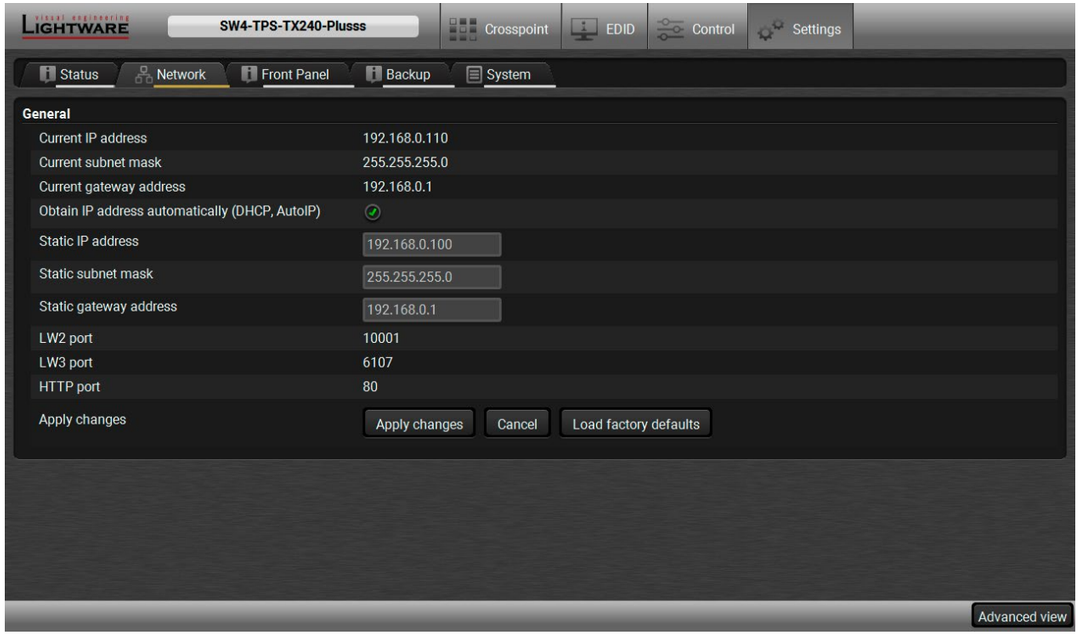
Please note that the Miniweb-related descriptions can be found in The Built-in Miniweb section.

You can disable the functionality of the front panel buttons with marking the **Button lock** option. This is same method of the control lock made by the front panel buttons. See the details in the Control Lock section.

#firmwareversion #label #devicelabel

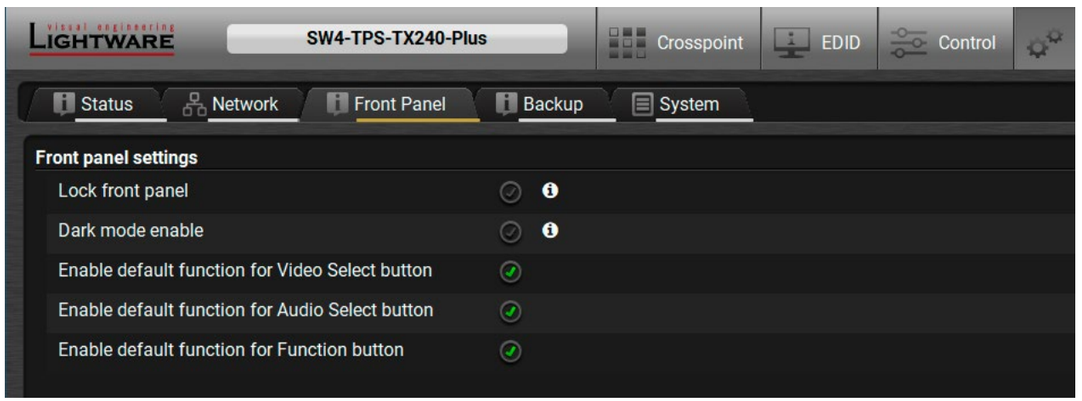
5.11.2. Network

IP address and DHCP settings can be set on this tab. Always press the **Apply settings** button to save changes. Factory defaults settings can be recalled with a dedicated button. *#dhcp #ipaddress #network*



Network tab in Settings menu

5.11.3. Front Panel



The following settings are available: *#buttonlock #lockbutton #darkmode*

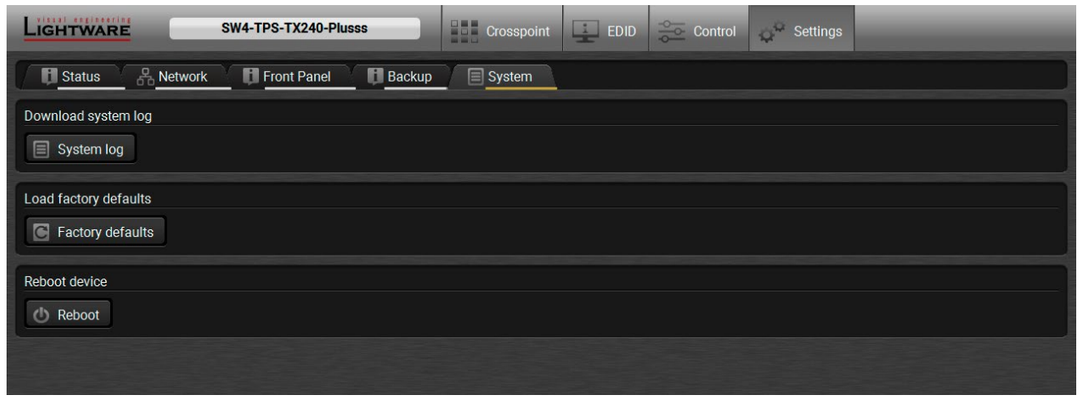
- **Lock front panel:** enable/disable the front panel buttons. The enable again disable this option, or press the Audio select and Show me button together or send an LW3 command to the device.
- **Dark mode:** all LEDs are switched off after one minute delay if no buttons are pressed. Pressing any button the LEDs will show the current status again – without performing the function of the button itself.
- **Enable default function for the buttons:** the default function can be changed, thus, the button press can be used as a condition in the Event manager.

> INFO: Locking/unlocking the buttons by the front panel buttons work only when the buttons are set to the default function.

5.11.4. Backup

Details about this function can be found in the Configuration Cloning (Backup Tab) section.

5.11.5. System



System tab in Settings menu

Three functions are available under System tab:

- **Download system log** - saving the file of the device. *#log #systemlog*
- **Load factory defaults** - recalling factory defaults settings and values. All factory default settings are listed in the Factory Default Settings section. *#factory*
- **Reboot** - rebooting the system. *#reboot #restart*

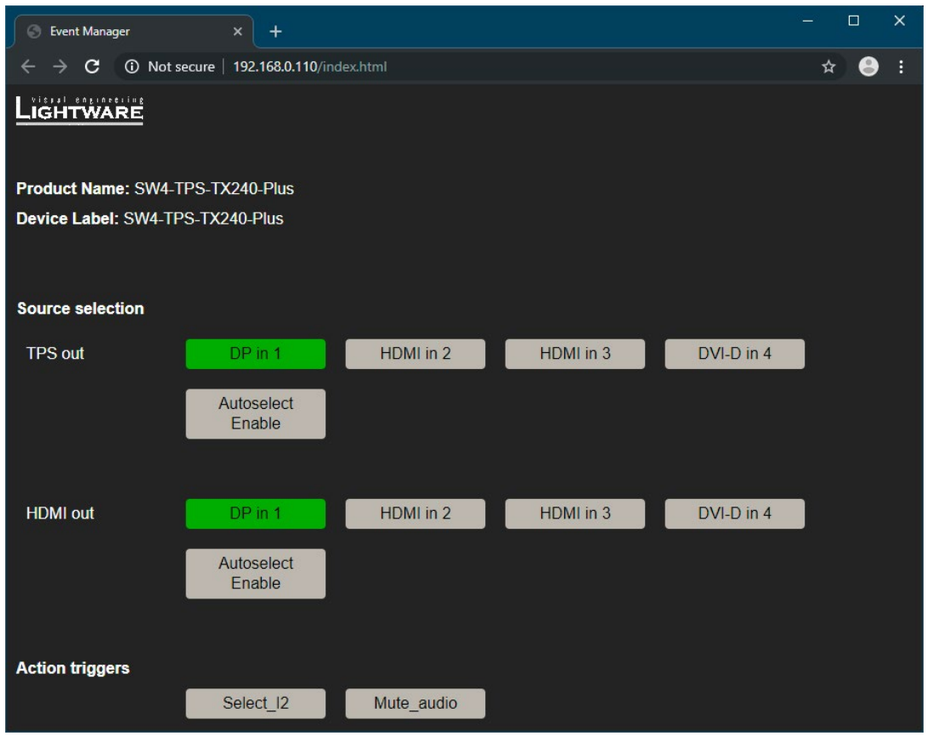
5.12. The Built-in Miniweb

DEFINITION: The miniweb is a dedicated location in the memory where an HTML file can be uploaded to. If the `<IP_address>/index.html` page is opened in a web browser the file is displayed.

ATTENTION! The Miniweb is available from firmware package v1.2.0. The default control page can installed in the device during the first firmware upgrade process by the user if the necessary parameter is enabled. See the Step 3. Check the upgrade parameters. section.

The default control page allows the followings: *#builtinweb #miniweb #web*

- **Source selection:** This block can be used to select an input or enable/disable the Autoselect remotely e.g. from a mobile device.
- **Action triggers:** The action trigger buttons can be used to perform a configured Event Action without waiting for the condition to occur. This can be done remotely by a mobile device, too.

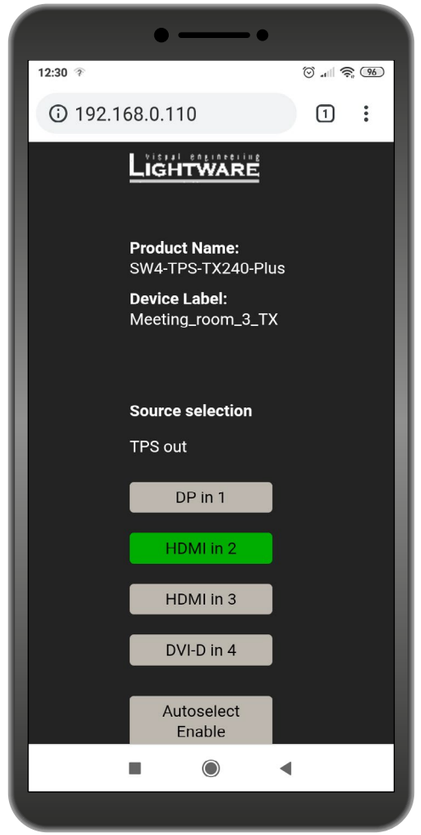


The Control Page Displayed in a Desktop Browser (with Action Trigger Buttons)

5.12.1. Opening the Miniweb

The Miniweb is available by:

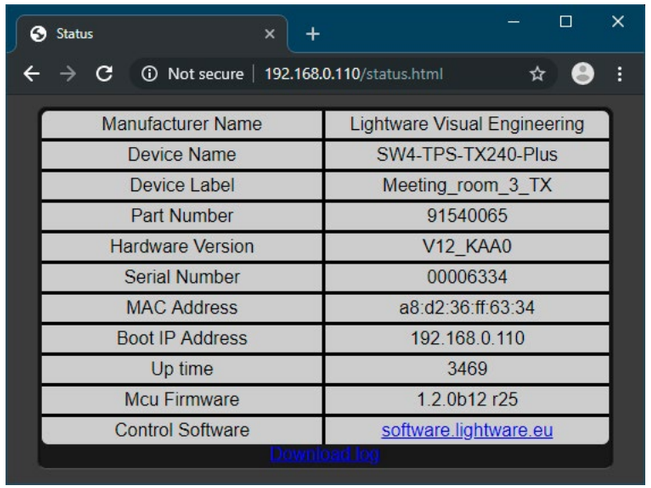
- Opening the **web browser** and typing the **IP address** of the desired device in the address line,
- Launching the **LDC**, connecting to the device, navigating to **Settings/Status** and pressing the **Open miniweb** button.



The Control Page Displayed in a Smartphone Browser

5.12.2. The Default Status Page

If there is no control page uploaded, the default status page will be displayed (which is also available by opening the **<IP_address>/status.html** address).



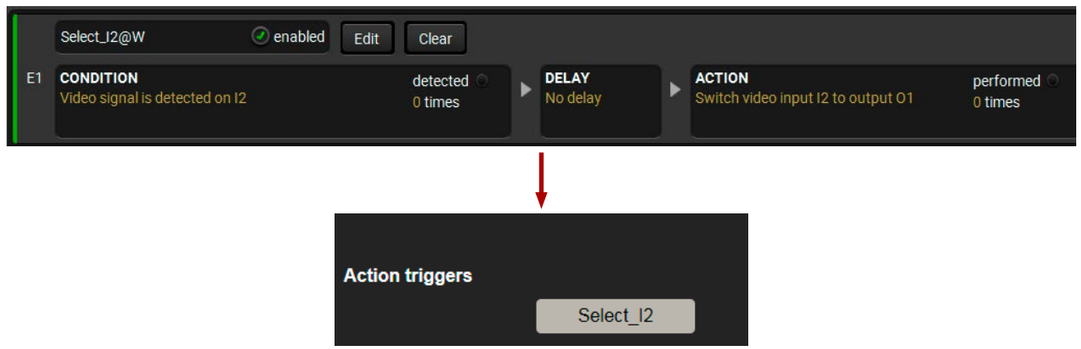
The Factory Default Status Page (status.html)

5.12.3. Miniweb Customization

The buttons of **Action triggers** section are linked to Actions of certain Events in the Event Manager. These buttons are displayed **only** for specific events:

- Any Event which does **not** have the **@W** suffix in its name will **not** be displayed as a trigger button.
- The displayed trigger buttons will get a **text label** with the **event name** except the suffix.

To add the desired Action as a button, **append the name** of the desired Event with the **@W** characters - see below:



Action Trigger Button added in the Event Manager and dispalyed in the Control Page

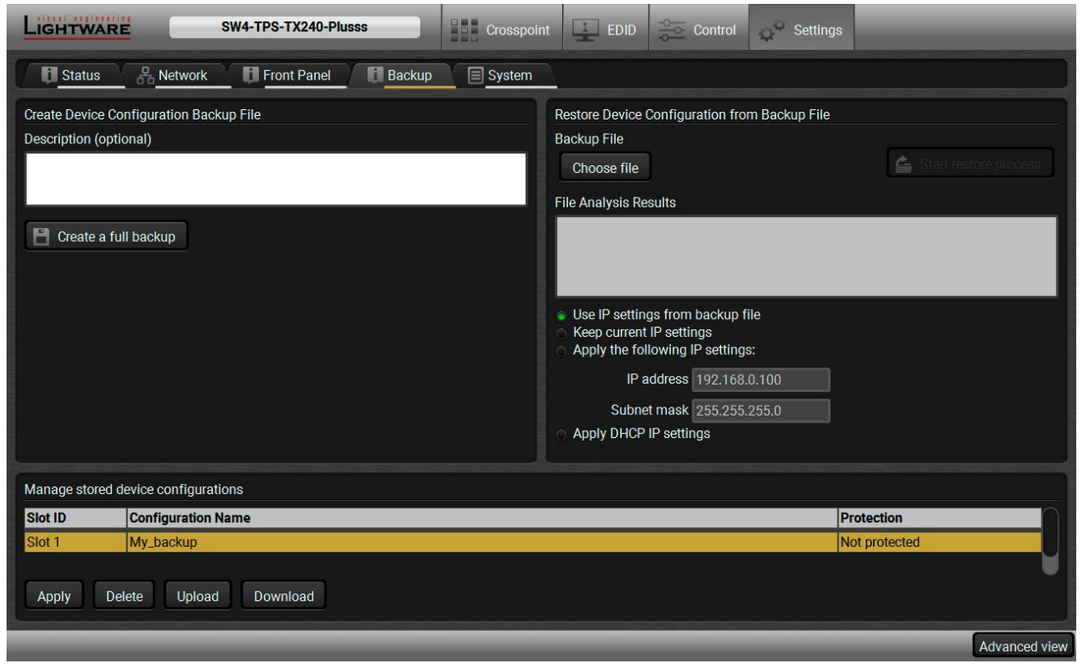
Customized HTML

The default control page can be replaced in the LDC; navigate to the **Settings/Status** page. Custom HTML file can be uploaded by pressing the **Choose file** button. Pay attention to the size of the HTML file. Only one file is allowed and the maximum file size is 10 KB (in case of SW4-TPS-TX240-Plus it's 80 KB).

Press the **Reset** button to remove the control page. The default control page can be restored during a firmware upgrade process, see the Step 3. Check the upgrade parameters. section.

The Built-in Miniweb Section in LDC

5.13. Configuration Cloning (Backup Tab)



Backup tab

Configuration cloning of Lightware LW3 devices is a simple method that eliminates the need to repeatedly configure certain devices to have identical (non-factory) settings. If the devices are installed in the same type of system multiple times then it is enough to set up only one device to fit the user's needs and then copy those settings to the others, thus saving time and resources. #backup #configurationcloning

5.13.1. Steps in a Nutshell

Installing multiple devices with the same customized configuration settings can be done in a few easy steps:

Step 1. Configure one device with all your desired settings using the LDC software.

Step 2. Backup the full configuration file to your computer.

Step 3. If needed, make some modifications to the configuration file using a text editor (e.g. Notepad). E.g. modifying the static IP address is necessary when DHCP is not used.

Step 4. Connect to the other device which has to be configured and upload (restore) your configuration file.

Step 5. Done! You can have as many totally identical, customized devices as you like.

5.13.2. Save the Settings of a Device (Backup)

Step 1. Apply the desired settings in the transmitter (port parameters, crosspoint, etc.)

Step 2. Select the **Settings** / **Backup** tab from the menu.

Step 3. Write a short **description** in the text box on the left (optional).

Step 4. Press the **Create a full backup** button. You will be prompted to save the file to the computer. The default file name is the following:

```
BACKUP_<DEVICE LABEL>_SN<SERIAL NUMBER>.LW3
```

Step 5. Set the desired **file name**, select the folder and **save** the file.

> TIPS AND TRICKS: Using the exact product type in the filename is recommended since it makes the file usage more comfortable.

About the Backup File

The backup file is a simple text file which contains LW3 protocol commands. The first line is the description and the further lines are the commands which will be executed during the restore process. The file can be viewed (and/or edited) by a simple text editor, e.g. Notepad.

See the entire list of saved data in the Specifications subject to change without notice. section.

> **ATTENTION!** Editing the command lines is only recommended for expert users.

5.13.3. Upload the Settings to a Device (Restore)

> **WARNING! Please note that the settings will be permanently overwritten with the restored parameters in the device. Undo is not available.**

> **ATTENTION!** The cloning is successful when the backup file is downloaded from the same type of source device as the destination device.

The Restoring Process

Step 1. Select the **Settings** / **Backup** tab from the menu.

Step 2. Click on the **Choose file** button on the right panel and **browse** to the desired file.

Step 3. The file is verified and the result will be displayed in the textbox below. If the file is correct, then the settings can be restored.

Step 4. Choose **IP settings** what you want to use after backup. You can apply settings from the backup file, keep actual settings, set it manually in a dialog box or apply DHCP.

Step 5. Press the **Start restore process** button and click on the **Yes** button when asked.

Step 6. Reboot the device to apply the network settings after finishing.

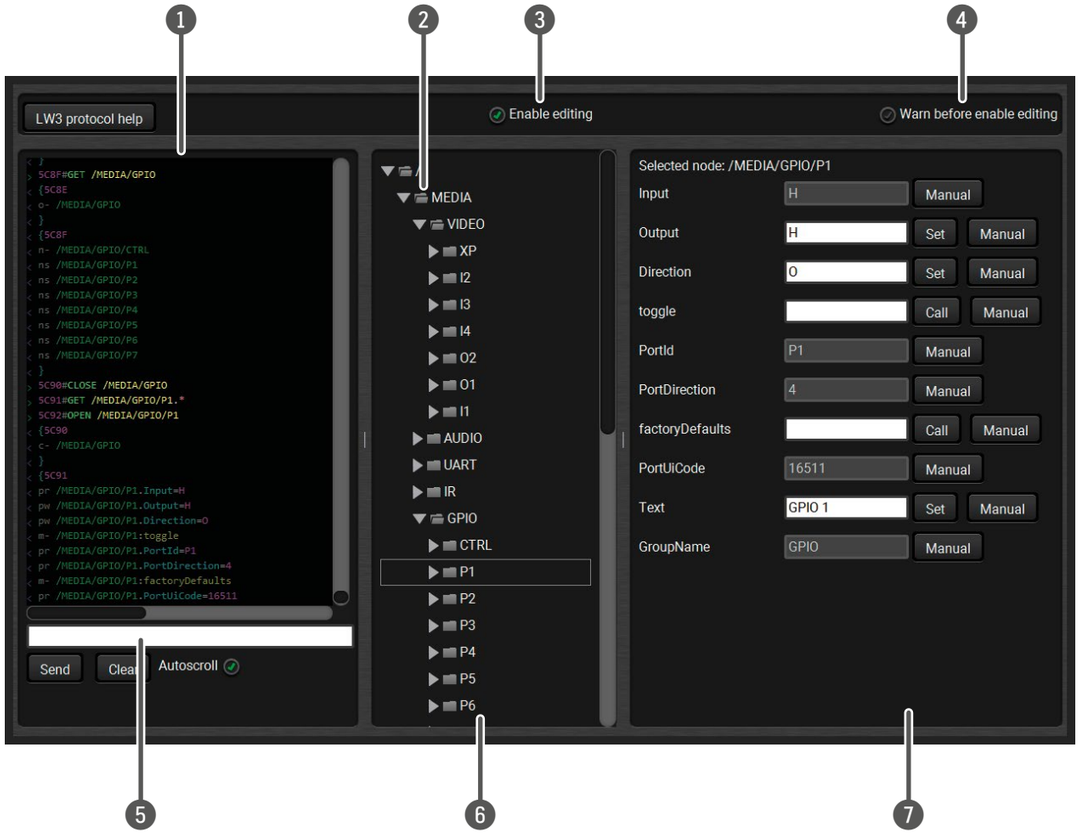
5.13.4. Create and Restore Backups from the Device Memory

The transmitter is able to store one backup in its own memory which can be recalled. At first, save the desired settings as a file (see above) then upload it by the Upload button.

> **WARNING! Loading factory default settings will erase all presets which has been saved in the device memory!**

5.14. Advanced View Window

This window is the surface of the Lightware Protocol 3 (LW3) tree with a terminal window. Commands and specific parameters (which are not available on the graphical user interface of the LDC) can be run and set. The introduction of the LW3 protocol and the most important commands can be found in the Programmers' Reference section. *#advancedview* *#terminal*



1 **LW3 protocol help** — Pushing the button results a help window opening which describes the most important information about LW3 protocol commands in HTML format.

2 **Edit mode** — The default appearance is the read-only mode. If you want to modify the values or parameters, tick the option. You will be prompted to confirm your selection.

3 **Warning mode** — If this is checked, a warning window pops up when you enable Edit mode.

4 **Terminal window** — Commands and responses with time and date are listed in this window. Sent command starts with '>' character, received response starts with '<' character. The color of each item depends on the type of the command and response. The content of the window can be emptied by the **Clear** button. If the **Autoscroll** option is ticked, the list is scrolled automatically when a new line is added.

5 **Command line** — Type the desired command and execute it by the **Send** button. Clear all current commands and responses in the Terminal window by the **Clear** button.

6 **Protocol tree** — LW3 protocol tree; select an item to see its content.

7 **Node list** — Correspondent parameters and nodes are shown which are connected to the selected item in the protocol tree.

Manual button: Manual (short description) of the node can be called and displayed in the terminal window.

Set button: Saves the value/parameter typed in the textbox.

Call button: Calls the method, e.g. reloads factory default settings.

6

LW2 Programmer's Reference

The device can be controlled through a reduced command set of LW2 protocol commands to ensure the compatibility with other Lightware products. The supported LW2 commands are described in this chapter.

6.1. Protocol Description

The protocol description hereinafter stands for Lightware protocol. The commands can be sent to the device in RAW format via the TCP/IP port no. 10001.

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

Legend for Control Commands

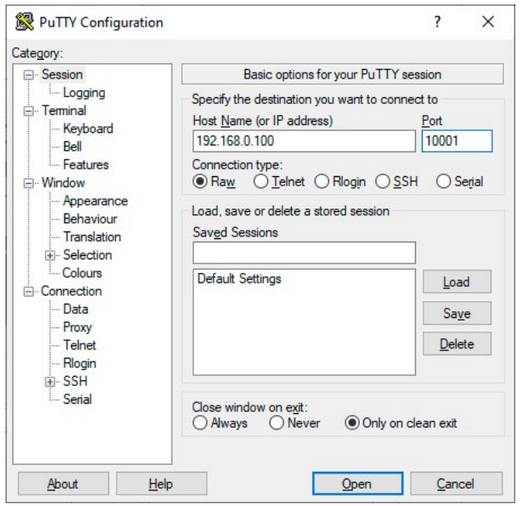
Format	Explanation
<in>	Input number in 1 or 2 digit ASCII format (01, 5, 07, 16, etc.)
<out>	Output number in 1 or 2 digit ASCII format
<in/out>	input or output port number in 1 or 2 digit ASCII format *
<in2>	Input number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<out2>	Output number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<in2/out2>	input or output number in 2 digit ASCII format*
<loc>	Location number in 1, 2 or 3 digit ASCII format
<id>	id number in 1 or 2 digit ASCII format
<id2>	id number in 2 digit ASCII format
CrLf	Carriage return, Line feed (0x0D, 0x0A)
.	Space character (0x20)
⇉	Each command issued by the controller
←	Each response received from the router

* The command has the same arguments on the input ports and the output port, as well.

6.2. Instructions for the Terminal Application Usage

Terminal Application

The LW2 protocol commands can be applied to the receiver using a terminal application. You need to install one of them to your control device, for example **Putty** or **CLI**. *#terminal #new*



Establishing Connection

Follow the steps for establishing connection to the receiver:

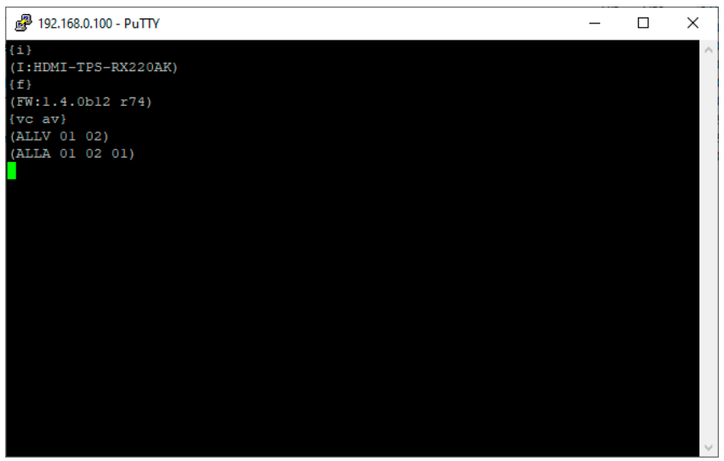
Step 1. Connect the receiver to a LAN over Ethernet.

Step 2. Open the terminal application (e.g. Putty).

Step 3. Add the **IP address** of the device (default: 192.168.0.100) and the **port number (10001)**.

Step 4. Select the **Raw** connection type, and open the connection.

Once the terminal window is opened, you can enter the LW2 protocol commands which are listed in the following sections.



LW2 protocol command communication in a terminal window

6.3. General LW2 Commands

6.3.1. View Product Type

The device responds its name.

Command and Response

→ {i}
← (I:<PRODUCT_TYPE>)CrLf

Example

→ {i}
← (I:SW4-TPS-TX240)

6.3.2. Query Control Protocol

The device can be controlled with different control protocols. This command queries the active protocol of the currently used control interface.

Command and Response

→ {P_?}
← (CURRENT•PROTOCOL•=•#<protocol>)CrLf

Example

→ {P_?}
← (CURRENT PROTOCOL = #1)

The device communicates with LW2 protocol.

6.3.3. View Firmware Package Version

DIFFERENCE: This command has been changed in firmware package v1.2.0. The response was the firmware of the CPU in the previous firmwares.

View the installed firmware package version. *#firmwareversion*

Command and Response

→ {f}
← (FW:<FW_VER>•<s>)CrLf

Parameters

<FW_VER> is the firmware package version. It is followed by <s> string which may indicate special versions.

Example

→ {f}
← (FW:1.2.0b12 r25)

6.3.4. Connection Test

Simple test to see if the connection is established successfully.

Command and Response

→ {PING}
← (PONG!)CrLf

Example

→ {ping}
← (PONG!)

6.3.5. View Serial Number

The device responds its 8-digit serial number. *#serialnumber*

Command and Response

→ {S}
← (SN:<SERIAL_N>)CrLf

Example

→ {s}
← (SN:5A003192)

6.3.6. Compile Time

Returns the date, when the microcontroller firmware was compiled.

Command and Response

→ {CT}
← (Complied: <DATE&TIME>)CrLf

Example

→ {ct}
← (Compiled: May 11 2016 11:01:27)

6.3.7. View Installed Board

Shows the hardware name and revision of the installed card.

Command and Response

→ {IS}
← (SL#•0•<MB_DESC>)CrLf
← (SL•END)CrLf

Example

→ {is}
← (SL# 0 SW4-TPS-TX240 V12_DAA0)
← (SL END)

The device reports its motherboard (slot 0).

6.3.8. View Firmware for All Controllers

DIFFERENCE: This command has been changed in firmware package v1.2.0. The response was the firmware of the CPU in the previous firmwares.

Shows the firmware package versions of all installed controllers.

Command and Response

→ {FC}
← (CF•<DESC>)CrLf
← (CF•<DESC>)CrLf
← …
← (CF•END)CrLf

Parameters

<FW_VER> is the firmware version. It is followed by <s> string which may indicate special versions.

Example

→ {fc}
← (CF SW4-TPS-TX240-Plus 1.2.0b12 r25)
← (SL END)

The device has one control panel.

#firmwareversion

6.3.9. Restart the Device

The device can be restarted without unplugging power. *#reboot #restart*

Command and Response

→ {RST}
←

Example

→ {rst}
←

The device reboots; no response is sent in this case.

6.3.10. Query Health Status

Internal voltages and measured temperature values are shown.

Command and Response

→ {ST}
← (ST•<DESC>)CrLf

Example

→ {st}
← (ST CPU 11.61V 5.03V 1.84V 1.28V 0.99V 42.24C 42.23C)

6.3.11. Restore Factory Default Settings

Settings can be reset to factory default values as follows: *#factory*

Command and Response

→ {FACTORY=ALL}
← (FACTORY ALL…)CrLf

Example

→ {factory=all}
← (FACTORY ALL…)

All settings and parameters are reset to factory default, see the table in the Factory Default Settings section.

6.4. A/V Port Settings

6.4.1. Switch an Input to the Output

Switching an input <in> to output <out>. Following commands with A, V, AV parameter value can take effect in multiple layers, according to their parameters. Depending on 'A' or 'V' it can change only the Audio or only the Video layer; or 'AV' changes both. *#crosspoint* *#switch*

Command and Response

→ {<in>@<out>•<layer>}

← (O<out2>•I<in2>•<layer>)CrLf

Parameters

Identifier	Parameter description	Parameter values
<layer>	Signal type of the layer	**A:** audio layer **V:** video layer **AV:** audio & video layer
<out>	Output port	**O1-O2**
<in>	Input port	**I1-I4** **0:** Using the '0' (zero) value the input will be disconnected and no signal will appear on the output

INFO: The <layer> parameter usually can be skipped for legacy purposes. In this case, the devices change all (Video & Audio) layers but using status commands it displays information about only the Video layer. Please use AV option, when available.

Example 1

→ {2@1 AV}

← (O01 I02 AV)

I2 audio and I2 video input ports are switched to O1 output port.

Example 2

→ {0@1}

← (O01 I00)

ATTENTION! The response of this command does not show if the output is muted. To check the mute status a separate query has to be used like {VC}.

ATTENTION! Analog video inputs does not contain embedded audio. If you use the AV option in case of VGA input (I1) the audio will be switched to the analog audio input 1 (I1) and in case of DVI-A input (I5) the audio will be switched to the analog audio input 2 (I5).

6.4.2. Mute Output

Mute the <out> output. The output signal is turned off.

Command and Response *#mute* *#lock* *#unmute* *#unlock*

→ {#<out>•<layer>}

← (1MT<out2>•<layer>)CrLf

Example

→ {#01 A}

← (1MT01 A)

ATTENTION! Muting does not change the state of the crosspoint but disables the output itself. This way the last connection can be easily restored with an unmute command. Switching a muted output does not unmute the output.

6.4.3. Unmute Output

Unmute the <out> output.

Command and Response

→ {+<out>•<layer>}

← (0MT<out2>•<layer>)CrLf

Example

→ {+01 V}

← (0MT01 V)

INFO: Unmuting an output makes the previous connection active as the crosspoint state has not been changed by the muting command, only the output was disabled.

6.4.4. Lock Output

Locking an output port. Output's state cannot be changed until unlocking.

Command and Response

→ {#><out>•<layer>}

← (1LO<out2>•<layer>)CrLf

Example

→ {#>01 A}

← (1LO01 A)

6.4.5. Unlock Output

Unlocking an output port. The connection on output can be changed.

Command and Response

→ {+<out>•<layer>}

← (0LO<out2>•<layer>)CrLf

Example

→ {+<01 V}

← (0LO01 V)

O1 video output port is unlocked.

INFO: The device issues the above response regardless of the previous state of the output (either it was locked or unlocked).

6.4.6. View Connection State on the Output

Viewing the crosspoint state of the device; showing the input port numbers connected to the outputs.

Command and Response *#crosspoint #switch*

→ {VC•<layer>}

← (ALL<layer>•<O01>•<O02>)CrLf

Parameters

O01 shows the corresponding output's connection state.

Identifier	Parameter description	Parameter values
<layer>	Signal type of the layer	**A:** audio layer **V:** video layer **AV:** audio & video layer

State letters

Letter	State	Example
L	Output is locked	L01
M	Output is muted	M01
U	Output is locked and muted	U01

Example

→ {VC AV}

← (ALLV M01 01)

← (ALLA 01 01)

I2 video input port is connected to the video output port and I5 audio input port is connected to the audio output port. AV is not used in the response. When AV is typed in the commands, the response will result two lines, one for the Video and one for the Audio port states.

6.4.7. View Crosspoint Size

Shows the physical crosspoint size.

Command and Response

→ {getsize•<layer>}

← (SIZE=<size>•<layer>)CrLf

Parameters

Identifier	Parameter description	Parameter values
<size>	Crosspoint size	<number_of_inputs>**x**<number_of _outputs>
<layer>	Signal type of the layer	See the previous section

Example

→ {GETSIZE AV}

← (SIZE=6x1 V)

← (SIZE=5x1 A)

The device reports that it has a video crosspoint with 6 inputs (Test pattern generator is the 6th input) and 1 output and an audio crosspoint with 5 inputs and 1 output.

6.4.8. Change the Video Autoselect Mode

The autoselect mode of the video outputs can be changed.

Command and Response

→ {AS_V<out>=<state>;<mode>}

← (AS_V<out>=<state>;<mode>)CrLf

Parameters

Identifier	Parameter description	Parameter values
<state>	Showing the Autoselect state	**E:** autoselect is enabled **D:** autoselect is disabled
<mode>	The autoselect mode setting	**F:** First detect mode **L:** Last detect mode **P:** Priority detect mode

Example

→ {as_v1=E;P}

← (AS_V1=E;P)

← (AS_V2=E;P)

The Autoselect mode of video output1 and output 2 is enabled and set to Priority mode. The output numbers are listed in the Port Numbering section.

INFO: The Autoselect mode can be queried by typing the {as_v<out>=?} command.

6.4.9. Change the Audio Autoselect Mode

The autoselect mode of the audio outputs can be changed.

Command and Response

→ {AS_A<out>=<state>;<mode>}
← (AS_A<out>=<state>;<mode>)CrLf

Parameters

See the previous section.

Example

→ {as_a1=E;P}
← (AS_A1=E;P)
← (AS_A2=E;P)

The Autoselect mode of audio output1 and output 2 is enabled and set to Priority mode.

INFO: The Autoselect mode can be queried by typing the {as_v<out>=?} command.

6.4.10. Change the Video Input Priorities

The settings of video input priority can be changed as follows.

Command and Response

→ {PRIO_V<out>=<in1_prio>;<in2_prio>;<in3_prio>;<in4_prio>}
← (PRIO_V<out>=<in1_prio>;<in2_prio>;<in3_prio>;<in4_prio>)CrLf

Parameters

Identifier	Parameter description	Parameter values
<in1_prio> <in2_prio> <in3_prio> <in4_prio>	Priority number of the input ports between 0 and 3	**0:** highest priority **3:** lowest priority

See more details about port numbering in the Port Numbering section.

Example

→ {prio_v1=1;0;2;3}
← (PRIO_V1=1;0;2;3)

Input 2 has the highest priority (0), Input 1 has the second highest (1). Input 4 has the lowest priority (3).

ATTENTION! Always set all the priority of the ports when changing, otherwise, the change will not be executed and the response will be the current setting (like querying the priority setting).

INFO: In this case, the outputs are linked; the change will affect both local and TPS output ports.

INFO: The video priorities can be queried by typing the {prio_v<out>=?} command.

6.4.11. Change Audio Input Priority

The settings of the audio input priority can be changed as follows.

Command and Response

→ {PRIO_A<out>=<in1_prio>;<in2_prio>;<in3_prio>;<in4_prio>;<in5_prio>}
← (PRIO_A<out>=<in1_prio>;<in2_prio>;<in3_prio>;<in4_prio>;<in5_prio>)CrLf

Parameters

See the previous section.

Example

→ {as_a1=1;0;2;3;4}
← (AS_A1=1;0;2;3;4)

Input 2 has the highest priority (0), Input 1 has the second highest (1). Input 5 has the lowest priority (4).

ATTENTION! Always set all the priority of the ports when changing, otherwise, the change will not be executed and the response will be the current setting (like querying the priority setting).

INFO: In this case, the outputs are linked; the change will affect both local and TPS output ports.

INFO: The audio priorities can be queried by typing the {prio_a<out>=?} command.

6.5. GPIO Configuration

6.5.1. Set Level and Direction for Each Pins

GPIO pins can be configured as follows. See more details about GPIO connector in the GPIO - General Purpose Input/Output Ports section and about the interface in the GPIO Interface section.

Command and Response

→ {GPIO<pin_nr>=<dir>;<level>}
← (GPIO<pin_nr>=<dir>;<level>)CrLf

Parameters

Identifier	Parameter description	Parameter values
<pin_nr>	GPIO pin number	**0 - 7**
<dir>	The direction of the communication	**I:** input; **O:** output
<level>	The level of the pin	**L:** low; **H:** high; **T:** toggle

Example

→ {gpio1=O;H}
← (GPIO1=O;H)

GPIO pin 1 is set to output with high level.

INFO: The current GPIO pin configuration can be queried by typing the {GPIO<pin_nr>=?} command.

6.6. Network Configuration

6.6.1. Query the Current IP Status

IP address settings can be queried as follows. *#dhcp #ipaddress #network*

Command and Response

→ {IP_STAT=?}

← (IP_STAT=<type>;<ip_address>;<subnet_mask>;<gateway_addr>)CrLf

Parameters

Identifier	Parameter description	Parameter values
<type>	Assignment of the IP address	**0:** static **1:** dynamic (DHCP)
<ip_addr>	IP address	(four decimal octets separated by dots)
<subnet_mask>	Subnet mask	(four decimal octets separated by dots)
<gateway_addr>	Gateway address	(four decimal octets separated by dots)

Example

→ {ip_stat=?}

← (IP_STAT=0;192.168.0.100;255.255.255.0;192.168.0.1)

The device has a static (fix) IP address: 192.168.0.100; the subnet mask is 255.255.255.0, the gateway address is 192.168.0.1.

6.6.2. Set the IP Address

IP address can be set as follows.

Command and Response

→ {IP_ADDRESS=<type>;<ip_address>}

← (IP_ADDRESS=<type>;<ip_address>)CrLf

Parameters

See the previous section.

Example

→ {ip_address=0;192.168.0.110}

← (IP_ADDRESS=0;192.168.0.110)

> INFO: The IP address can be queried by typing the “ip_address=?” command. The response contains the fix IP address that is stored in the device even if DHCP is enabled; in this case, this IP address is not valid.

6.6.3. Set the Subnet Mask

Subnet mask can be set as follows.

Command and Response

→ {IP_NETMASK=<subnet_mask>}

← (IP_NETMASK=<subnet_mask>)CrLf

Parameters

See the Query the Current IP Status section.

Example

→ {ip_netmask=255.255.255.0}

← (IP_NETMASK=255.255.255.0)

> INFO: The subnet mask can be queried by typing the “ip_address=?” command. The response contains the fix IP subnet mask that is stored in the device even if DHCP is enabled; in this case, this IP subnet mask is not valid.

6.6.4. Set the Gateway Address

Gateway address can be set as follows.

Command and Response

→ {IP_GATEWAY=<gateway_addr>}

← (IP_GATEWAY=<gateway_addr>)CrLf

Parameters

See the Query the Current IP Status section.

Example

→ {ip_gateway=192.168.0.50}

← (IP_GATEWAY=192.168.0.50)

> INFO: The gateway address can be queried by typing the “ip_gateway=?” command. The response contains the static IP gateway address that is stored in the device even if DHCP is enabled. In that case, the latest valid gateway address (for static IP) is stored.

6.6.5. Apply Network Settings

Apply the network settings and restart the network interface.

Command and Response

→ {ip_apply}

← (IP_APPLY)CrLf

Example

→ {ip_apply}

← (IP_APPLY)

6.7. LW2 Commands – Quick Summary

General LW2 Commands

View Product Type
→ {i}

Query Control Protocol
→ {P_?}

View Firmware Package Version
→ {f}

Connection Test
→ {PING}

View Serial Number
→ {S}

Compile Time
→ {CT}

View Installed Board
→ {IS}

View Firmware for All Controllers
→ {FC}

Restart the Device
→ {RST}

Query Health Status
→ {ST}

Restore Factory Default Settings
→ {FACTORY=ALL}

A/V Port Settings

Switch an Input to the Output
→ {<in>@<out>•<layer>}

Mute Output
→ {#<out>•<layer>}

Unmute Output
→ {+<out>•<layer>}

Lock Output
→ {#><out>•<layer>}

Unlock Output
→ {+<<out>•<layer>}

View Connection State on the Output
→ {VC•<layer>}

View Crosspoint Size
→ {getsize•<layer>}

Change the Video Autoselect Mode
→ {AS_V<out>=<state>;<mode>}

Change the Audio Autoselect Mode
→ {AS_A<out>=<state>;<mode>}

Change the Video Input Priorities
→ {PRIO_V<out>=<in1_prio>;<in2_prio>;<in3_prio>;<in4_prio>}

Change Audio Input Priority
→ {PRIO_A<out>=<in1_prio>;<in2_prio>;<in3_prio>;<in4_prio>;<in5_prio>}

GPIO Configuration

Set Level and Direction for Each Pins
→ {GPIO<pin_nr>=<dir>;<level>}

Network Configuration

Query the Current IP Status
→ {IP_STAT=?}

Set the IP Address
→ {IP_ADDRESS=<type>;<ip_address>}

Set the Subnet Mask
→ {IP_NETMASK=<subnet_mask>}

Set the Gateway Address
→ {IP_GATEWAY=<gateway_addr>}

Apply Network Settings
→ {ip_apply}

7

LW3 Programmer's Reference

The device can be controlled through Lightware 3 (LW3) protocol commands to ensure the compatibility with other Lightware products. The supported LW3 commands are described in this chapter.

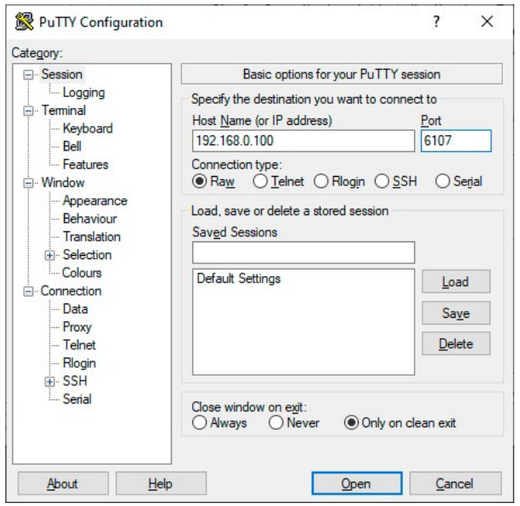
7.1. Overview

The Lightware Protocol #3 (LW3) is implemented in almost all new Lightware devices (matrix switchers, signal extenders and distribution amplifiers) since 2012. The protocol is ASCII-based and all commands are terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') pair. It is organized as a tree structure that provides outstanding flexibility and user-friendly handling with 'nodes', 'properties' and 'methods'. The **Advanced View** of the Lightware Device Controller software is the perfect tool for browsing and learning how the LW3 protocol can be used in practice.

7.2. Instructions for the Terminal Application Usage

Terminal Application

The LW2 protocol commands can be applied to the receiver using a terminal application. You need to install one of them to your control device, for example **Putty** or **CLI**. *#terminal #new*



Establishing Connection

Follow the steps for establishing connection to the receiver:

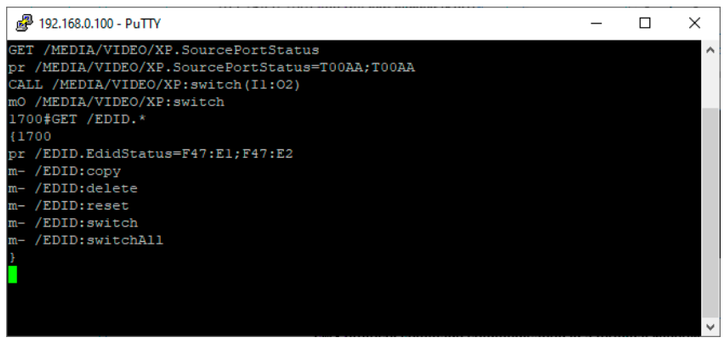
Step 1. Connect the receiver to a LAN over Ethernet.

Step 2. Open the terminal application (e.g. Putty).

Step 3. Add the **IP address** of the device (default: 192.168.0.100) and the **port number (6107)**.

Step 4. Select the **Raw** connection type, and open the connection.

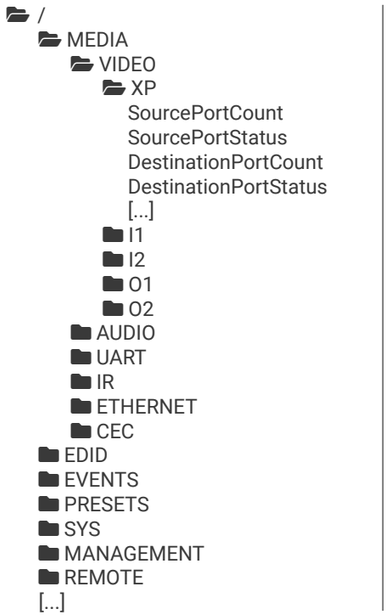
Once the terminal window is opened, you can enter the LW3 protocol commands which are listed in the following sections.

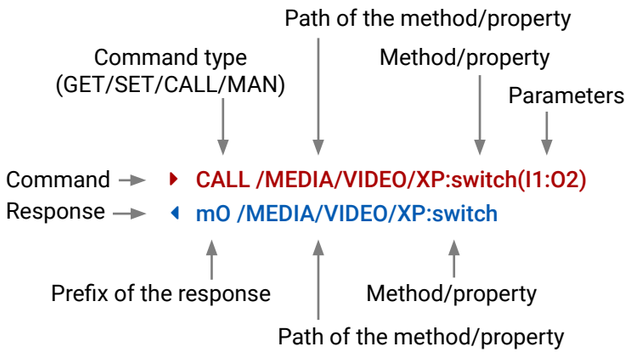


LW3 protocol command communication in a terminal window

7.3. Protocol Rules

7.3.1. LW3 Tree Structure and Command Structure (examples)





7.3.2. General Rules

- All names and parameters are **case-sensitive**.
- The nodes are separated by a slash ('/') character.
- The node name can contain the elements of the English alphabet and numbers.
- Use the **TCP port no. 6107** when using LW3 protocol over Ethernet.
- When a command is issued by the device, the received response cannot be processed by the CPU.
- The node paths describe the exact location of the node, listing each parent node up to the root.

7.3.3. Legend for the Control Commands

Command and Response – Example

- GET·/MEDIA/VIDEO/I2.SignalPresent
- pr·/MEDIA/VIDEO/I2.SignalPresent=<signal_present>

Format	Description
<in>	Input port number
<out>	Output port number
<port>	Input or output port number
<loc>	Location number
<parameter>	Variable defined and described in the command
<expression>	Batched parameters: the underline means that more expressions or parameters can be placed by using a semicolon, e.g. **I2;I4;I5** or **F27:E1;F47:E2**
▸	Sent command
◂	Received response
·	Space character

Further not listed <parameters> are defined at each commands.

7.3.4. Prefix Summary

DEFINITION: The prefix is a 2-character long code that describes the type of the response.

The following prefixes are defined in the LW3 protocol:

Prefix	Description
n-	a node
nE	an error for a node
nm	a manual of a node
ns	a child node of a node
pr	a read-only property
pw	read-write property
pE	an error for the property
pm	a manual for the property
m-	a method
mO	a response after a success method execution
mF	a response after a failed method execution
mE	an error for a method
mm	a manual for a method

7.3.5. Command Types

GET command

The **GET** command can be used to get the child nodes, properties and methods of a specific node. It can also be used to get the value of a property. Use the dot character (.) when addressing a property:

- GET /.SerialNumber
- pr /.SerialNumber=87654321

GETALL command

The **GETALL** command can be used to get all child nodes, properties and methods of a node with one command.

- GETALL /MEDIA/UART
- ns /MEDIA/UART/RECOGNIZER
- ns /MEDIA/UART/P1
- ns /MEDIA/UART/P2
- pr /MEDIA/UART.PortUi=P1:12209;P2:12224
- pr /MEDIA/UART.P1=Local
- pr /MEDIA/UART.P2=TPS out RS-232

SET command

The **SET** command can be used to modify the value of a property. Use the dot character (.) when addressing the property:

- SET /MEDIA/VIDEO/I2.HdcpEnable=true
- pw /MEDIA/VIDEO/I2.HdcpEnable=true

CALL command

A method can be invoked by the **CALL** command. Use the colon character (:) when addressing the method:

- CALL /MEDIA/AUDIO/XP:muteSource(I1)
- mO /MEDIA/AUDIO/XP:muteSource

MAN command

The manual is a human readable text that describes the syntax and provides a hint for how to use the primitives. For every node, property and method in the tree there is a manual, type the **MAN** command to get the manual:

- MAN /MEDIA/AUDIO/I2.Connected
- pm /MEDIA/AUDIO/I2.Connected ["0" | "1" | "F"] Indicates cable or device connected \(0=not present; 1=present; F=unknown\)

7.3.6. Error Messages

There are several error messages defined in the LW3 protocol, all of them have a unique error number.

- SET /MEDIA/UART/P1.Baudrate=9
- pE /MEDIA/UART/P1.Baudrate %E004:Invalid value

7.3.7. Escaping

> DEFINITION: An escape sequence is a sequence of characters that does not represent itself when used inside a character or string literal, but is translated into another character or a sequence of characters.

Property values and method parameters can contain characters which are used as control characters in the protocol. They must be escaped. The escape character is the backslash ('\') and escaping means injecting a backslash before the character that should be escaped (like in C language).

Control characters are the followings: \ { } # % ( ) \r \n \t

The **original** message:

CALL /MEDIA/UART/P1:sendMessage(Set(01))

The **escaped** message:

CALL /MEDIA/UART/P1:sendMessage(Set\(01\))

7.3.8. Notifications about the Changes of the Properties

When the value of a property is changed and the user is subscribed to the node, which the property belongs to, an asynchronous notification is generated. This is notification is called as the 'change message'. The format of such a message is very similar to the response for the **GET** command:

- CHG /EDID.EdidStatus=F48:E1

A Short Example of How to Use the Subscription

There are two independent users controlling the device through two independent connections (**Connection #1** and **Connection #2**). The events in the rows occur after each other.

- OPEN /MEDIA/VIDEO/I2
- o- /MEDIA/VIDEO/I2
- GET /MEDIA/VIDEO/I2.HdcpEnable
- pw /MEDIA/VIDEO/I2.HdcpEnable=true

Connection #1

- GET /MEDIA/VIDEO/I2.HdcpEnable
- pw /MEDIA/VIDEO/I2.HdcpEnable=true
- SET /MEDIA/VIDEO/I2.HdcpEnable=false
- pw /MEDIA/VIDEO/I2.HdcpEnable=false

Connection #2

- CHG /MEDIA/VIDEO/I2.HdcpEnable=true → **Connection #1**

The first user (**Connection #1**) set a subscription to a node. Later the other user (**Connection #2**) made a change, and thanks for the subscription, the first user got a notification about the change.

7.3.9. Subscription

> DEFINITION: Subscribe to a node means that the user will get a notification if any of the properties of the node is changed.

A user can subscribe to any node. These notifications are asynchronous messages and they are useful to keep the client application up to date, without receiving any unwanted information. When the user does not want to be informed about the changes anymore, he can simply unsubscribe from the node.

> **ATTENTION!** The subscriptions are handled separately for connections. Hence, if the connection is terminated all registered subscriptions are deleted. After closing a connection the subscribe command has to be sent in order to get the notifications of the changes on that connection.

Subscribe to a Node

- OPEN /MEDIA/VIDEO
- o- /MEDIA/VIDEO

Get the Active Subscriptions

- OPEN
- o- /MEDIA/VIDEO
- o- /EDID
- o- /DISCOVERY

Subscribe to Multiple Nodes

- OPEN /MEDIA/VIDEO/*
- o- /MEDIA/VIDEO/*

Unsubscribe from a Node

- CLOSE /MEDIA/VIDEO
- c- /MEDIA/VIDEO

Unsubscribe from Multiple Nodes

- CLOSE /MEDIA/VIDEO/*
- c- /MEDIA/VIDEO/*

7.3.10. Signature

DEFINITION: The signature is a four-digit-long hexadecimal value that can be optionally placed before every command to keep a command and the corresponding responses together as a group.

Each line is terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') characters. In several cases the number of the lines in the response cannot be determined in advance, e.g. the client is intended waiting for the whole response and also wants to be sure, that the received lines belong together and to the same command. In these cases, a special feature the 'signature' can be used. In these cases, the response to that particular command will also be preceded by the signature, and the corresponding lines will be between brackets:

- 1700#GET /EDID.*
- {1700
- pr /EDID.EdidStatus=D1:E1;D1:E2;D1:E3;D1:E4
- m- /EDID:copy
- m- /EDID:delete
- m- /EDID:reset
- m- /EDID:switch
- m- /EDID:switchAll
- }

INFO: The lines of the signature are also Cr and Lf terminated.

7.4. System Commands

7.4.1. Querying the Product Name

Command and Response *#producttype*

- GET·/.ProductName
- pr·/.ProductName=<Product_name>

Parameters

The <Product_name> is the type of the device: read-only parameter and cannot be modified.

Example

- GET /.ProductName
- pr /.ProductName=SW4-TPS-TX240-Plus

7.4.2. Setting the Device Label

> **ATTENTION!** The device label can be changed to a custom text in the Status tab of the LDC software. This writable parameter is not the same as the ProductName parameter. *# #label #devicelabel*

Command and Response

- SET·/MANAGEMENT/UID.DeviceLabel=<device_label>
- pw·/MANAGEMENT/UID.DeviceLabel=<device_label>

The <device_label> length can be 39 character and ASCII characters are allowed. Longer names are truncated.

Example

- SET /MANAGEMENT/UID.DeviceLabel=Control_room_TX
- pw /MANAGEMENT/UID.DeviceLabel=Control_room_TX

7.4.3. Querying the Serial Number

Command and Response

- GET·/.SerialNumber
- pr·/.SerialNumber=<Product_name>

Example

- GET /.SerialNumber
- pr /.SerialNumber=00006334

#serialnumber

7.4.4. Querying the Firmware Version

Command and Response *#firmwareversion*

- GET·/SYS/MB.FirmwareVersion
- pr·/SYS/MB.FirmwareVersion=<FW_version>

Parameters

The <Product_name> is the type of the device: read-only parameter and cannot be modified.

Example

- GET /SYS/MB.FirmwareVersion
- pr /SYS/MB.FirmwareVersion=1.2.0b11 r23

7.4.5. Resetting the Device

Command and Response

- CALL·/SYS:reset(1)

The transmitter is restarted, the current connections (LAN, RS-232) are terminated. There is no reply in this case. *#restart #reboot*

Example

- CALL /SYS:reset(1)

7.4.6. Restoring the Factory Default Settings

Command and Response

- CALL·/SYS:factoryDefaults()

Example

- CALL /SYS:factoryDefaults()

The device is restarted, current connections are terminated, and the default settings are restored. There is no reply in this case. See the complete list in the Factory Default Settings section. *#factory*

7.5. Video Port Settings

INFO: Video port numbering can be found in the Port Numbering section.

7.5.1. Querying the Status of the Input Ports

Command and Response *#crosspoint #hdcp #portstatus #switch*

- GET·/MEDIA/VIDEO/XP.SourcePortStatus
- pr·/MEDIA/VIDEO/XP.SourcePortStatus=<l1_state>;<l2_state>;...;<ln_state>

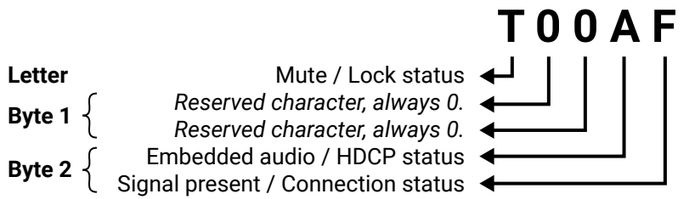
The response contains 5 ASCII characters for each port. The first character indicates the mute/lock state, the next four characters represent a 2-byte HEX code showing the current state of the input ports.

Example *#mute #lock #unmute #unlock*

- GET /MEDIA/VIDEO/XP.SourcePortStatus
- pr /MEDIA/VIDEO/XP.SourcePortStatus=T00AA;T00EF;T00AA;T00AA

Parameters

Letter (Character 1)		
	Mute state	**Lock state**
T	Unmuted	Unlocked
L	Unmuted	Locked
M	Muted	Unlocked
U	Muted	Locked



	Byte 1				Byte 2			
	Character 2		Character 3		Character 4		Character 5	
	BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0	BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0
	Reserved	**Reserved**	**Reserved**	**Reserved**	**Embedded audio status**	**HDCP status**	**Signal present status**	**Connection status**
0 0	Reserved	Reserved	Reserved	Reserved	Unknown			
0 1					Reserved			
1 0					No embedded audio	Not encrypted	No signal	Not connected
1 1					Embedded audio presents	Encrypted	Signal presents	Connected

Example and Explanation (for input 2, T00EF):

T	0		0		E		F	
Unlocked, Unmuted	0 0	0 0	0 0	0 0	1 1	1 0	1 1	1 1
	Reserved	Reserved	Reserved	Reserved	Emb. audio presents	Not encrypted	Signal presents	Connected

The Most Common Received Port Status Responses

	T	0		0		A		A	
T00AA	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 0	1 0	1 0
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Not encrypted	No signal	Not connected

	T	0		0		A		B	
T00AB	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 0	1 0	1 1
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Not encrypted	No signal	Connected

	T	0		0		A		F	
T00AF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 0	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Not encrypted	Signal presents	Connected

	T	0		0		E		F	
T00EF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 1	1 0	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	Emb. audio presents	Not encrypted	Signal presents	Connected

	T	0		0		B		F	
T00BF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 0	1 1	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	No emb. audio	Encrypted	Signal presents	Connected

	T	0		0		F		F	
T00FF	Unlocked, unmuted	0 0	0 0	0 0	0 0	1 1	1 1	1 1	1 1
		Reserved	Reserved	Reserved	Reserved	Emb. audio presents	Encrypted	Signal presents	Connected

7.5.2. Querying the Status of the Output Ports

Command and Response

- GET·/MEDIA/VIDEO/XP.DestinationPortStatus
- pr·/MEDIA/VIDEO/XP.DestinationPortStatus=<O1_state>;<O2_state>

The response contains 5 ASCII characters for each output port. The first character indicates the mute/lock state, the next 2-byte long HEX code showing the current state of the output ports. #portstatus

Parameters

See in the previous section.

Example

- GET /MEDIA/VIDEO/XP.DestinationPortStatus
- pr /MEDIA/VIDEO/XP.DestinationPortStatus=M00BF;T00AE

M	0		0		B		F	
Unlocked, Muted	0 0	0 0	0 0	0 0	1 0	1 1	1 1	1 1
	Reserved	Reserved	Reserved	Reserved	No emb. audio	Encrypted	Signal presents	Connected

7.5.3. Querying the Video Crosspoint Setting

Command and Response

- GET·/MEDIA/VIDEO/XP.DestinationConnectionList
- pr·/MEDIA/VIDEO/XP.DestinationConnectionList=<in>

The response shows the input port that is switched to the TPS output port (and local HDMI if exists).

Example

- GET /MEDIA/VIDEO/XP.DestinationConnectionList
- pr /MEDIA/VIDEO/XP.DestinationConnectionList=I2;I2

I2 port is connected to the TPS output port as well as to the local HDMI output port.

7.5.4. Switching Video Input

Command and Response #switch

- CALL·/MEDIA/VIDEO/XP:switch(<in>:<out>)
- mO·/MEDIA/VIDEO/XP:switch

Example

- CALL /MEDIA/VIDEO/XP:switch(I2:O1)
- mO /MEDIA/VIDEO/XP:switch

I2 port is connected to O1 port.

INFO: When using the '0' value as an input, the output will be disconnected.

7.5.5. Querying the Video Autoselect Settings

Command and Response

- GET·/MEDIA/VIDEO/XP.DestinationPortAutoselect
- pr·/MEDIA/VIDEO/XP.DestinationPortAutoselect=<as_state><as_mode>

The response shows the autoselect setting of the TPS output port (and local HDMI if exists).

Parameters

Identifier	Parameter description	Parameter values
<as_state>	The state of the autoselect	**E:** the autoselect is **enabled** **D:** the autoselect is **disabled**
<as_mode>	The mode of the autoselect	**F: First** detect mode: the first active video input is selected. **P: Priority** detect mode: always the highest priority active video input will be selected. **L: Last** detect mode: always the last attached input is switched to the output automatically.

Example

- GET /MEDIA/VIDEO/XP.DestinationPortAutoselect
- pr /MEDIA/VIDEO/XP.DestinationPortAutoselect=EL

EL: the Autoselect is **Enabled** on the output, selected mode is **Last detect**.

INFO: For more information about the Autoselect feature see The Autoselect Feature section.

7.5.6. Changing the Autoselect Mode

Command and Response

- CALL·/MEDIA/VIDEO/XP:setDestinationPortAutoselect(<out>:<as_state><as_mode>)
- mO·/MEDIA/VIDEO/XP:setDestinationPortAutoselect

Parameters

See the previous section.

INFO: Both or just one parameter can be set as shown in the examples below.

Examples

- CALL /MEDIA/VIDEO/XP:setDestinationPortAutoselect(O1:D)
- mO /MEDIA/VIDEO/XP:setDestinationPortAutoselect

The Autoselect is switched off on both outputs. The mode setting is not changed.

- CALL /MEDIA/VIDEO/XP:setDestinationPortAutoselect(O1:EL)
- mO /MEDIA/VIDEO/XP:setDestinationPortAutoselect

The Autoselect is switched on, Last detect mode is selected.

7.5.7. Querying the Input Port Priority

Command and Response

- GET·/MEDIA/VIDEO/XP.PortPriorityList
- pr·/MEDIA/VIDEO/XP.PortPriorityList=<out1_list>;<out2_list>

Parameters

The response represents the priority for the source ports grouped by destinations.

Identifier	Parameter description	Parameter values
<out1_list>	The priority for the source ports on O1.	<I1_priority>,<I2_priority>,<I3_priority>,<I4_priority>
<out2_list>	The priority for the source ports on O2.	<I1_priority>,<I2_priority>,<I3_priority>,<I4_priority>

The priority number can be from 0 to 31. 0 is the highest- and 30 is the lowest priority, 31 means that the port is ignored. The input port numbers depend on the device.

Since the O2 is mirrored from O1, the settings are the same.

Example

- GET /MEDIA/VIDEO/XP.PortPriorityList
- pr /MEDIA/VIDEO/XP.PortPriorityList=0,1,2,3;0,1,2,3

Video input port	I1	I2	I3	I4
Priority	0	1	2	3

I1 has the highest priority with the 0 value, I4 has the lowest value (3).

ATTENTION! The same priority number can be set to different input ports. When the priority numbers match, the input port with the lowest port number will have the highest priority.

7.5.8. Changing the Input Port Priority

Command and Response

- CALL·/MEDIA/VIDEO/XP:setAutoselectionPriority(<in>(<out>):<priority>)
- mO·/MEDIA/VIDEO/XP:setAutoselectionPriority

Parameters

The priority number can be from 0 to 31. 0 is the highest- and 30 is the lowest priority, 31 means that the port is ignored.

Example

- CALL /MEDIA/VIDEO/XP:setAutoselectionPriority(I3\(O1\):0;I2\(O1\):31)
- mO /MEDIA/VIDEO/XP:setAutoselectionPriority

The priority of I3 has been set to 0 and I2 has been set to 31 on output 1. The example shows that control characters have been escaped: the backslash '\' character is inserted before the round brackets ( ). See more information about the escaping in the Escaping section.

7.5.9. Muting an Input Port

Command and Response *#mute #lock #unmute #unlock*

- CALL·/MEDIA/VIDEO/XP:muteSource(<in>)
- mO·/MEDIA/VIDEO/XP:muteSource

Example

- CALL /MEDIA/VIDEO/XP:muteSource(I1;I3)
- mO /MEDIA/VIDEO/XP:muteSource

7.5.10. Unmuting an Input Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unmuteSource(<in>)
- mO·/MEDIA/VIDEO/XP:unmuteSource

Example

- CALL /MEDIA/VIDEO/XP:unmuteSource(I1;I3)
- mO /MEDIA/VIDEO/XP:unmuteSource

7.5.11. Locking an Input Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:lockSource(<in>)
- mO·/MEDIA/VIDEO/XP:lockSource

Example

- CALL /MEDIA/VIDEO/XP:lockSource(I2;I4)
- mO /MEDIA/VIDEO/XP:lockSource

7.5.12. Unlocking an Input Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unlockSource(<in>)
- mO·/MEDIA/VIDEO/XP:unlockSource

Example

- CALL /MEDIA/VIDEO/XP:unlockSource(I2;I4)
- mO /MEDIA/VIDEO/XP:unlockSource

7.5.13. Muting an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:muteDestination(<out>)
- mO·/MEDIA/VIDEO/XP:muteDestination

Example

- CALL /MEDIA/VIDEO/XP:muteDestination(O1;O2)
- mO /MEDIA/VIDEO/XP:muteDestination

7.5.14. Unmuting Output

Command and Response

- CALL·/MEDIA/VIDEO/XP:unmuteDestination(<out>)
- mO·/MEDIA/VIDEO/XP:unmuteDestination

Example

- CALL /MEDIA/VIDEO/XP:unmuteDestination(O2)
- mO /MEDIA/VIDEO/XP:unmuteDestination

7.5.15. Locking an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:lockDestination(<out>)
- mO·/MEDIA/VIDEO/XP:lockDestination

Example

- CALL /MEDIA/VIDEO/XP:lockDestination(O1)
- mO /MEDIA/VIDEO/XP:lockDestination

7.5.16. Unlocking an Output Port

Command and Response

- CALL·/MEDIA/VIDEO/XP:unlockDestination(<out>)
- mO·/MEDIA/VIDEO/XP:unlockDestination

Example

- CALL /MEDIA/VIDEO/XP:unlockDestination(O1)
- mO /MEDIA/VIDEO/XP:unlockDestination

7.5.17. Querying the Encryption of the Incoming Signal

This is a read-only property showing if the signal is encrypted with HDCP.

Command and Response

- GET·/MEDIA/VIDEO/<in>.HdcpActive
- pr·/MEDIA/VIDEO/<in>.HdcpActive=<HDCP_state>

Parameters

Identifier	Parameter description	Parameter values
<HDCP_state>	The encryption level of the incoming signal.	**0:** the signal is not encrypted. **1:** the signal is encrypted with HDCP. **F:** unknown.

Example

- GET /MEDIA/VIDEO/I2.HdcpActive
- pr /MEDIA/VIDEO/I2.HdcpActive=0

7.5.18. Querying the HDCP Setting (Input Port)

HDCP capability can be enabled/disabled on the input ports, thus, non-encrypted content can be seen on a non-HDCP compliant display. See more information in the HDCP Management section.

Command and Response

- GET·/MEDIA/VIDEO/<in>.HdcpEnable=<HDCP_setting>
- pw·/MEDIA/VIDEO/<in>.HdcpEnable=<HDCP_setting>

Parameters

If the <HDCP_setting> parameter is **0** (or **false**) the HDCP is disabled on the port, thus, encrypted content will not be present. If the value is **1** (or **true**) the HDCP is enabled, thus, encrypted content can be received.

Example

- GET /MEDIA/VIDEO/I2.HdcpEnable=1
- pw /MEDIA/VIDEO/I2.HdcpEnable=true

#hdcp

7.5.19. Changing the HDCP Setting (Input Port)

Command and Response *#hdcp*

- SET·/MEDIA/VIDEO/<in>.HdcpEnable=<HDCP_setting>
- pw·/MEDIA/VIDEO/<in>.HdcpEnable=<HDCP_setting>

Parameters

If the <HDCP_setting> parameter is **0** (or **false**) the HDCP is disabled on the port, thus, encrypted content will not be present. If the value is **1** (or **true**) the HDCP is enabled, thus, encrypted content can be received.

Example

- SET /MEDIA/VIDEO/I2.HdcpEnable=0
- pw /MEDIA/VIDEO/I2.HdcpEnable=false

7.5.20. Querying the HDCP Setting (Output Port)

HDCP capability of the output port can be set to follow the input port or to encrypt the signal always. Latter case occurs if encrypted signal is accepted by the third-party device only. See more information in the HDCP Management section.

Command and Response

- GET·/MEDIA/VIDEO/<out>.HdcpModeSetting
- pw·/MEDIA/VIDEO/<out>.HdcpModeSetting=<HDCP_setting>

Parameters

If the <HDCP_setting> is **0** (or **false**) the port is in **Auto** mode, thus, the output port follows the setting of the connected input port. If the <HDCP_setting> is 1 (or true), the outgoing signal is encrypted always.

Example

- GET /MEDIA/VIDEO/O1.HdcpModeSetting
- pw /MEDIA/VIDEO/O1.HdcpModeSetting=0

7.5.21. Changing the HDCP Setting (Output Port)

Command and Response

- SET·/MEDIA/VIDEO/<out>.HdcpModeSetting=<HDCP_setting>
- pw·/MEDIA/VIDEO/<out>.HdcpModeSetting=<HDCP_setting>

Parameters

See the previous section.

Example

- SET /MEDIA/VIDEO/O1.HdcpModeSetting=0
- pw /MEDIA/VIDEO/O1.HdcpModeSetting=0

7.5.22. Test Pattern Generator

The output ports can send a special image towards the sink devices for testing purposes. The setting is available on output ports with the below-listed parameters.

ATTENTION! The Mode can be set individually on each port, but the Clock source and the Pattern settings are common on the TPS and HDMI output ports (O1 and O2).

7.5.22.1. Test Pattern Generator Mode Setting

Command and Response *#testpattern* *#nosyncscreen*

- SET·/MEDIA/VIDEO/<out>.TpgMode=<mode_setting>
- pw·/MEDIA/VIDEO/<out>.TpgMode=<mode_setting>

Parameters

Identifier	Parameter description	Parameter values
<mode_setting>	The current mode of the test pattern generator.	**0: disabled**, the test pattern is not displayed on the output. **1: enabled**, the test pattern is displayed on the output. **2: no signal mode**, the test pattern is displayed if there is no signal on the output port.

Example

- SET /MEDIA/VIDEO/O1.TpgMode=2
- pw /MEDIA/VIDEO/O1.TpgMode=2

7.5.22.2. Clock Source – The Clock Frequency of the Test Pattern

Command and Response

- SET·/MEDIA/VIDEO/<out>.TpgClockSource=<clk_freq>
- pw·/MEDIA/VIDEO/<out>.TpgClockSource=<clk_freq>

Parameters

Identifier	Parameter description	Parameter values
<clk_freq>	The clock frequency of the of the pattern generator.	**480:** 480p. **576:** 576p. **EXT:** external clock (from actual TMDS source).

Example

- SET /MEDIA/VIDEO/O1.TpgClockSource=576
- pw /MEDIA/VIDEO/O1.TpgClockSource=576

7.5.22.3. Test Pattern

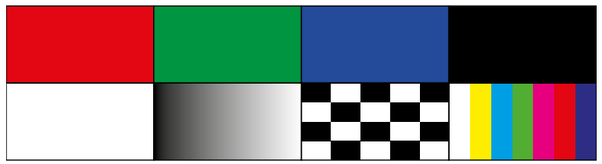
Command and Response

- SET·/MEDIA/VIDEO/<out>.TpgPattern=<pattern>
- pw·/MEDIA/VIDEO/<out>.TpgPattern=<pattern>

Parameters

Identifier	Parameter description	Parameter values
<pattern>	Selectable test image.	**RED / GREEN / BLUE / BLACK / WHITE / RAMP / CHESS / BAR / CYCLE**

Cycle setting means all patterns are changed sequentially approx. in every 2 seconds.



Example *#nosyncscreen #testpattern*

- SET /MEDIA/VIDEO/O1.TpgPattern=GREEN
- pw /MEDIA/VIDEO/O1.TpgPattern=GREEN

7.5.23. Querying the HDMI Mode Setting (Output Port)

Command and Response *#signaltype*

- GET·/MEDIA/VIDEO/<out>.HdmiModeSetting
- pw·/MEDIA/VIDEO/<out>.HdmiModeSetting=<HDMI_mode>

Parameters

Identifier	Parameter description	Parameter values
<HDMI_mode>	Current mode of the video port.	**0: Auto,** the signal type is based on the EDID - see below. **1: DVI** is the outgoing signal type. **2: HDMI** is the outgoing signal type.

The **Auto** mode means the outgoing signal type is based on the EDID of the sink connected to the given output port. If HDMI is supported by the EDID, the signal type will be HDMI, otherwise DVI.

Example

- GET /MEDIA/VIDEO/O1.HdmiModeSetting
- pw / MEDIA/VIDEO/O1.HdmiModeSetting=2

7.5.24. Setting the HDMI Mode Setting (Output Port)

Command and Response

- SET·/MEDIA/VIDEO/<out>.HdmiModeSetting=<HDMI_mode>
- pw·/MEDIA/VIDEO/<out>.HdmiModeSetting=<HDMI_mode>

Parameters

See the previous section.

Example

- SET /MEDIA/VIDEO/O1.HdmiModeSetting=0
- pw / MEDIA/VIDEO/O1.HdmiModeSetting=0

7.5.25. Querying the TPS Mode of the Transmitter

The finally established TPS working mode between the transmitter and the receiver is determined by the setting of the TPS ports of both devices. See more information in the TPS Interface section.

Command and Response *#tpsmode*

- GET·/REMOTE/D1.tpsModeSetting
- pw·/REMOTE/D1.tpsModeSetting=<TPS_mode>

Parameters

Identifier	Parameter description	Parameter values		
<TPS_mode>	Current mode of the TPS port.	**A:** Auto **H:** HDBaseT	**L:** Long reach **1:** LPPF1	**2:** LPPF2

Example

- GET /REMOTE/D1.tpsModeSetting
- pw /REMOTE/D1.tpsModeSetting=H

7.5.26. Setting the TPS Mode of the Transmitter

Command and Response

- SET·/REMOTE/D1.tpsModeSetting=<TPS_mode>
- pw·/REMOTE/D1.tpsModeSetting=<TPS_mode>

Parameters

See the previous section.

Example

- SET /REMOTE/D1.tpsModeSetting=H
- pw /REMOTE/D1.tpsModeSetting=H

7.5.27. Querying the Established TPS Mode

The finally established TPS working mode between the transmitter and the receiver is determined by the setting of the TPS ports of both devices. See more information in the TPS Interface section. Below command is for querying the currently valid TPS mode between the devices.

Command and Response

- GET·/REMOTE/D1.tpsMode
- pr·/REMOTE/D1.tpsMode=<TPS_mode>

Parameters

Identifier	Parameter description	Parameter values		
<TPS_mode>	Current mode of the TPS port.	**A:** Auto **H:** HDBaseT	**L:** Long reach **1:** LPPF1	**2:** LPPF2

Example

- GET /REMOTE/D1.tpsMode
- pr /REMOTE/D1.tpsMode=H

7.6. Audio Port Settings

INFO: Audio port numbering can be found in the Port Numbering section.

7.6.1. Querying the Status of the Input Ports

Command and Response *#crosspoint* *#switch*

- GET·/MEDIA/AUDIO/XP.SourcePortStatus
- pr·/MEDIA/AUDIO/XP.SourcePortStatus=<I1_state>;<I2_state>;...;<In_state>

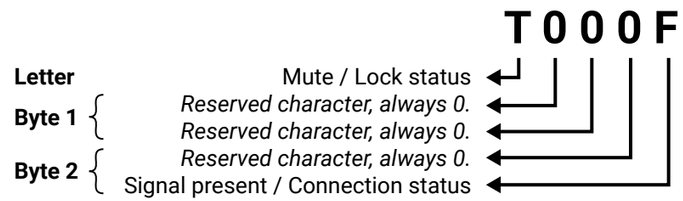
Parameters

The response contains 5 ASCII characters for each input port. The first character indicates the mute/lock state, the next four characters represent a 2-byte HEX code showing the current state of the input ports.

Example

- GET /MEDIA/AUDIO/XP.SourcePortStatus
- pr /MEDIA/AUDIO/XP.SourcePortStatus=T000F;M000B;T000A;T000A;T000F

Letter (Character 1)		
	Mute state	**Lock state**
T	Unmuted	Unlocked
L	Unmuted	Locked
M	Muted	Unlocked
U	Muted	Locked



	Byte 1	Byte 2			
		BIT 7-6	BIT 5-4	BIT 3-2	BIT 1-0
		Reserved		**Signal present status**	**Connection status**
0 0	Reserved	Reserved		Unknown	
0 1				Reserved	
1 0				No signal	Not connected
1 1				Signal presents	Connected

The Most Common Port Status Responses

Response	Binary format	Meaning
T000A	0000 0000 0000 1010	Cable not connected, Signal not present
T000B	0000 0000 0000 1011	Cable connected, Signal not present
T000F	0000 0000 0000 1111	Cable connected, Signal presents

7.6.2. Querying the Status of the Output Ports

Command and Response

- GET·/MEDIA/AUDIO/XP.DestinationPortStatus
- pr·/MEDIA/AUDIO/XP.DestinationPortStatus=<out1_state>;<out2_state>

Parameters

The response contains 5 ASCII characters for each port. The first character indicates the mute/lock state, the next 2-byte long HEX code showing the current state of the output ports. See the details in the previous section.

Example

- GET /MEDIA/AUDIO/XP.DestinationPortStatus
- pr /MEDIA/AUDIO/XP.DestinationPortStatus=T000F;T000A

7.6.3. Querying the Audio Crosspoint Setting

Command and Response

- GET·/MEDIA/AUDIO/XP.DestinationConnectionList
- pr·/MEDIA/AUDIO/XP.DestinationConnectionList=<out1_state>;<out2_state>

Parameters

The response shows the actual connection state (the connected input port) of the crosspoint in order of the destinations.

Example

- GET /MEDIA/AUDIO/XP.DestinationConnectionList
- pr /MEDIA/AUDIO/XP.DestinationConnectionList=I2;I2

I2 port is connected to O1 and O2 output ports. Two ports are in the response since current device has a TPS and an local HDMI output port.

7.6.4. Switching Audio Input

Command and Response

- CALL·/MEDIA/AUDIO/XP:switch(<in>:<out>)
- mO·/MEDIA/AUDIO/XP:switch

Example

- CALL /MEDIA/AUDIO/XP:switch(I2:O1)
- mO /MEDIA/AUDIO/XP:switch

I2 port is connected to O1 port.

7.6.5. Querying the Audio Autoselect Settings

Command and Response

- GET·/MEDIA/AUDIO/XP.DestinationPortAutoselect
- pr·/MEDIA/AUDIO/XP.DestinationPortAutoselect=<as_state><as_mode>

Parameters

Identifier	Parameter description	Parameter values
<as_state>	The state of the autoselect	**E:** the autoselect is **enabled.** **D:** the autoselect is **disabled.**
<as_mode>	The mode of the autoselect	**F: First** detect mode: the first active audio input is selected. **P: Priority** detect mode: always the highest priority active audio input will be selected. **L: Last** detect mode: always the last attached input is switched to the output automatically. **S: Static** mode: the audio selection follows the video, thus, the embedded audio of the selected video will be switched to the output.

INFO: An audio port is active if a valid signal is present. The only exception is the analog audio input (3.5mm Jack in): if a plug is connected, the signal present state also became true.

Example

- GET /MEDIA/AUDIO/XP.DestinationPortAutoselect
- pr /MEDIA/AUDIO/XP.DestinationPortAutoselect=EL;EL

EL: the Autoselect is **Enabled (E)** on the TPS and local HDMI outputs, the selected mode is **Last detect (L)**.

INFO: For more information about this function, see The Autoselect Feature section.

7.6.6. Changing the Autoselect Mode

Command and Response

- CALL·/MEDIA/AUDIO/XP:setDestinationPortAutoselect(<out>:<as_state><as_mode>)
- mO·/MEDIA/AUDIO/XP:DestinationPortAutoselect

Parameters

See the previous section.

Example

- CALL /MEDIA/AUDIO/XP:setDestinationPortAutoselect(O1:EF)
- mO /MEDIA/AUDIO/XP.setDestinationPortAutoselect=EF;EF

EF: The Autoselect is **switched on (E)** on the TPS and local HDMI outputs, the selected mode became **First detect (L)**.

INFO: For more information about the Autoselect feature see The Autoselect Feature section.

7.6.7. Querying the Input Port Priority

Command and Response

- GET·/MEDIA/AUDIO/XP.PortPriorityList
- pr·/MEDIA/AUDIO/XP.PortPriorityList=<out1_list>;<out2_list>

Parameters

The response represents the priority for the source ports grouped by destinations.

Identifier	Parameter description	Parameter values
<out1_list>	The priority for the source ports on O1.	<I1_priority>,<I2_priority>,<I3_priority>,<I4_priority>,<I5_priority>
<out2_list>	The priority for the source ports on O2.	<I1_priority>,<I2_priority>,<I3_priority>,<I4_priority>,<I5_priority>

The priority number can be from 0 to 31. 0 is the highest- and 30 is the lowest priority, 31 means that the port is ignored. The input port numbers depend on the device. Since the O2 is mirrored from O1, the settings are the same on both output ports.

Example

- GET /MEDIA/AUDIO/XP.PortPriorityList
- pr /MEDIA/AUDIO/XP.PortPriorityList=0,1,2,3,4;0,1,2,3,4

Audio input port	I1	I2	I3	I4	I5
Priority	0	1	2	3	4

I1 has the highest priority with the 0 value, I5 has the lowest value (4).

ATTENTION! The same priority number can be set to different input ports. When the priority numbers match, the input port with the lowest port number will have the highest priority.

7.6.8. Changing the Input Port Priority

Command and Response

- CALL·/MEDIA/AUDIO/XP:setAutoselectionPriority(<in>(<out>):<priority>)
- mO·/MEDIA/AUDIO/XP:setAutoselectionPriority

Parameters

See the previous section.

Example

- CALL /MEDIA/AUDIO/XP:setAutoselectionPriority(I3\(O1\):0;I2\(O1\):31)
- mO /MEDIA/AUDIO/XP:setAutoselectionPriority

The priority of I3 has been set to 0 and I2 has been set to 31 on output 1. The example shows that control characters have been escaped: the backslash '\' character is inserted before the round brackets ( ). See more information about the escaping in the Escaping section.

7.6.9. Muting an Input Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:muteSource(<in>)
- mO·/MEDIA/AUDIO/XP:muteSource

Example

- CALL /MEDIA/AUDIO/XP:muteSource(I1;I3)
- mO /MEDIA/AUDIO/XP:muteSource

7.6.10. Unmuting an Input Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:unmuteSource(<in>)
- mO·/MEDIA/AUDIO/XP:unmuteSource

Example

- CALL /MEDIA/AUDIO/XP:unmuteSource(I1;I3)
- mO /MEDIA/AUDIO/XP:unmuteSource

7.6.11. Locking an Input Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:lockSource(<in>)
- mO·/MEDIA/AUDIO/XP:lockSource

Example

- CALL /MEDIA/AUDIO/XP:lockSource(I2;I4)
- mO /MEDIA/AUDIO/XP:lockSource

7.6.12. Unlocking an Input Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:unlockSource(<in>)
- mO·/MEDIA/AUDIO/XP:unlockSource

Example

- CALL /MEDIA/AUDIO/XP:unlockSource(I2;I4)
- mO /MEDIA/AUDIO/XP:unlockSource

7.6.13. Muting an Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:muteDestination(<out>)
- mO·/MEDIA/AUDIO/XP:muteDestination

Example

- CALL /MEDIA/AUDIO/XP:muteDestination(O1;O2)
- mO /MEDIA/AUDIO/XP:muteDestination

7.6.14. Unmuting Output

Command and Response

- CALL·/MEDIA/AUDIO/XP:unmuteDestination(<out>)
- mO·/MEDIA/AUDIO/XP:unmuteDestination

Example

- CALL /MEDIA/AUDIO/XP:unmuteDestination(O2)
- mO /MEDIA/AUDIO/XP:unmuteDestination

7.6.15. Locking an Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:lockDestination(<out>)
- mO·/MEDIA/AUDIO/XP:lockDestination

Example

- CALL /MEDIA/AUDIO/XP:lockDestination(O1)
- mO /MEDIA/AUDIO/XP:lockDestination

7.6.16. Unlocking an Output Port

Command and Response

- CALL·/MEDIA/AUDIO/XP:unlockDestination(<out>)
- mO·/MEDIA/AUDIO/XP:unlockDestination

Example

- CALL /MEDIA/AUDIO/XP:unlockDestination(O1)
- mO /MEDIA/VIDEO/XP:unlockDestination

7.6.17. Analog Audio Input Level Settings

INFO: The following commands refer to the analog audio input only.

7.6.17.1. Querying the Volume (Exact Value)

Command and Response

- GET·/MEDIA/AUDIO/<in>.VolumedB
- pw·/MEDIA/AUDIO/<in>.VolumedB=<level>

Parameters

The response <value> is in dB.

Example

- GET /MEDIA/AUDIO/I5.VolumedB
- pw /MEDIA/AUDIO/I5.VolumedB=-15.000

7.6.17.2. Setting the Volume (Exact Value)

Command and Response

- SET·/MEDIA/AUDIO/<in>.VolumedB=<level>
- pw·/MEDIA/AUDIO/<in>.VolumedB=<level>

Parameters

The input volume <level> (attenuation) can be set between -95.625 dB and 0 dB in step of -0.375 dB. The value is rounded up if necessary to match with the step value.

Example

- SET /MEDIA/AUDIO/I5.VolumedB=-20
- pw /MEDIA/AUDIO/I5.VolumedB=-20.000

TIPS AND TRICKS: The volume can be also set by a step value calling the **stepVolumedB** method.

7.6.17.3. Querying the Volume (in Percentage)

Command and Response

- GET·/MEDIA/AUDIO/<in>.VolumePercent
- pw·/MEDIA/AUDIO/<in>.VolumePercent=<vol_percent>

Parameters

The response <vol_percent> is in percentage.

Example

- GET /MEDIA/AUDIO/I5.VolumePercent
- pw /MEDIA/AUDIO/I5.VolumePercent=100.00

7.6.17.4. Setting the Volume (in Percentage)

Command and Response

- SET·/MEDIA/AUDIO/<in>.VolumePercent=<vol_percent>
- pw·/MEDIA/AUDIO/<in>.VolumePercent=<vol_percent>

Parameters

The input volume <vol_percent> (attenuation) can be set between 0 and 100% in step of 0.01%. The value is rounded up if necessary to match with the step value.

Example

- SET /MEDIA/AUDIO/I5.VolumePercent=20
- pw /MEDIA/AUDIO/I5.VolumePercent=20.00

TIPS AND TRICKS: The volume can be also set by a step percent value calling the **stepVolumePercent** method.

7.6.17.5. Querying the Balance

Command and Response

- GET·/MEDIA/AUDIO/<in>.Balance
- pw·/MEDIA/AUDIO/<in>.Balance=<level>

Parameters

The input balance <level> can be set between -100 (left) and 100 (right). Center is 0 (default).

Example

- GET /MEDIA/AUDIO/I5.Balance
- pw /MEDIA/AUDIO/I5.Balance=

7.6.17.6. Setting the Balance

Command and Response

- SET·/MEDIA/AUDIO/<in>.Balance=<level>
- pw·/MEDIA/AUDIO/<in>.Balance=<level>

Parameters

See the previous section .

Example

- SET /MEDIA/AUDIO/I5.Balance=25
- pw /MEDIA/AUDIO/I5.Balance=25

7.6.17.7. Querying the Gain Level

Command and Response

- GET·/MEDIA/AUDIO/<in>.Gain
- pw·/MEDIA/AUDIO/<in>.Gain=<level>

Parameters

The input gain <level> can be set between -12 and 35.25 dB; default value is 0.

Example

- GET /MEDIA/AUDIO/I5.Gain
- pw /MEDIA/AUDIO/I5.Gain=-5.00

7.6.17.8. Setting the Gain Level

Command and Response

- SET·/MEDIA/AUDIO/<in>.Gain=<level>
- pw·/MEDIA/AUDIO/<in>.Gain=<level>

Parameters

See the previous section.

Example

- SET /MEDIA/AUDIO/I5.Gain=15
- pw /MEDIA/AUDIO/I5.Gain=15.00

7.7. Network Configuration

7.7.1. Querying the IP Address

Command and Response

- GET·/MANAGEMENT/NETWORK.IpAdress
- pr·/MANAGEMENT/NETWORK.IpAddress=<IP_address>

Example

- GET /MANAGEMENT/NETWORK.IpAddress
- pr /MANAGEMENT/NETWORK.IpAddress=192.168.0.100

7.7.2. Querying the DHCP State

Command and Response *#dhcp #ipaddress #network*

- GET·/MANAGEMENT/NETWORK.DhcpEnabled
- pw·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>

Parameters

If the <DHCP_state> parameter is **0** (or **false**) the device is set to apply a static IP address. If the value is **1** (or **true**) the device is set to get a dynamic IP address from the DHCP server in the network.

Example

- GET·/MANAGEMENT/NETWORK.DhcpEnabled
- pw·/MANAGEMENT/NETWORK.DhcpEnabled=true

7.7.3. Setting the DHCP State

Command and Response

- SET·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>
- pw·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>

Parameters

See the previous section.

Example

- SET /MANAGEMENT/NETWORK.DhcpEnabled=false
- pw /MANAGEMENT/NETWORK.DhcpEnabled=false
- CALL /MANAGEMENT/NETWORK:ApplySettings(1)
- mO /MANAGEMENT/NETWORK:ApplySettings

INFO: The **applySettings** method is necessary to save and apply the new setting, then the extender reboots.

7.7.4. Setting a Static IP Address

When the DhcpEnabled property is false you can set a static IP address (dot-decimal notation).

Command and Response

- SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>
- pw·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Example

- SET /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.110
- pw /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.110
- CALL /MANAGEMENT/NETWORK:ApplySettings(1)
- mO /MANAGEMENT/NETWORK:ApplySettings

INFO: The **applySettings** method is necessary to save and apply the new setting, then the extender reboots.

7.7.5. Querying the Subnet Mask

Command and Response

- GET·/MANAGEMENT/NETWORK.NetworkMask
- pr·/MANAGEMENT/NETWORK.NetworkMask=<subnet_mask>

Example

- GET /MANAGEMENT/NETWORK.NetworkMask
- pr /MANAGEMENT/NETWORK.NetworkMask=255.255.255.0

7.7.6. Setting a Static Subnet Mask

When the **DhcpEnabled** property is **false** you can set a static subnet mask (dot-decimal notation).

Command and Response

- SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<subnet_mask>
- pw·/MANAGEMENT/NETWORK.StaticNetworkMask=<subnet_mask>

Example

- SET /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
- pw /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
- CALL /MANAGEMENT/NETWORK:applySettings(1)
- mO /MANAGEMENT/NETWORK:applySettings

INFO: The **applySettings** method is necessary to save and apply the new setting, then the extender reboots.

7.7.7. Querying the Gateway Address

Command and Response

- GET·/MANAGEMENT/NETWORK.GatewayAddress
- pr·/MANAGEMENT/NETWORK.GatewayAddress=<gateway_address>

Example

- GET /MANAGEMENT/NETWORK.GatewayAddress
- pr /MANAGEMENT/NETWORK.GatewayAddress=192.168.0.1

7.7.8. Setting a Static Gateway Address

When the **DhcpEnabled** property is **false** you can set a static subnet mask (dot-decimal notation).

Command and Response

- SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gateway_address>
- pw·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gateway_address>

INFO: The **applySettings** method is necessary to save and apply the new setting, then the extender reboots.

Example

- SET /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
- pw /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5

7.8. RS-232 Port Configuration

ATTENTION! Below listed commands can be used to set the RS-232 port parameters. To query the current value of a parameter use the GET command, e.g.: **GET /MEDIA/UART/P1.BaudRate**.

ATTENTION! The RS-232 **Operation mode** is mirrored on the Local and Link serial port. The other settings can be adjusted separately on the two ports (P1 and P2).

INFO: RS-232 port numbering can be found in the Port Numbering section.

7.8.1. Protocol Setting

Command and Response *#protocol #rs232 #rs-232 #serial*

- SET·/MEDIA/UART/<port>.ControlProtocol=<protocol>
- pw·/MEDIA/UART/<port>.ControlProtocol=<protocol>

Parameters

If the <protocol> parameter is **0** the device is set to receive **LW2** commands. If the value is **1** the device is set to receive **LW3** commands.

Example

- SET /MEDIA/UART/P1.ControlProtocol=1
- pw /MEDIA/UART/P1.ControlProtocol=1

7.8.2. BAUD Rate Setting

Command and Response

- SET·/MEDIA/UART/<port>.BaudRate=<baud_rate>
- pw·/MEDIA/UART/<port>.BaudRate=<baud_rate>

Parameters

Identifier	Parameter description	Parameter values
<baud_rate>	The Baud rate of the serial port.	**0**: 4800, **1**: 7200, **2**: 9600, **3**: 14400, **4**: 19200. **5**: 38400, **6**: 57600, **7**: 115200

Example

- SET /MEDIA/UART/P1.BaudRate=6
- pw /MEDIA/UART/P1.BaudRate=6

7.8.3. Databit Setting

Command and Response

- SET·/MEDIA/UART/<port>.DataBits=<data_bits>
- pw·/MEDIA/UART/<port>.DataBits=<data_bits>

Parameters

The <data_bits> parameter can be **8** or **9**.

Example

- SET /MEDIA/UART/P1.DataBits=8
- pw /MEDIA/UART/P1.DataBits=8

7.8.4. Stopbit Setting

Command and Response

- SET·/MEDIA/UART/<port>.StopBits=<stop_bits>
- pw·/MEDIA/UART/<port>.StopBits=<stop_bits>

Parameters

Identifier	Parameter description	Parameter values
<stop_bits>	Stop bit value	**0**: 1; **1**: 1.5; **2**: 2

Example

- SET /MEDIA/UART/P1.StopBits=0
- pw /MEDIA/UART/P1.StopBits=0

7.8.5. Parity Setting

Command and Response

- SET·/MEDIA/UART/<port>.Parity=<parity_value>
- pw·/MEDIA/UART/<port>.Parity=<parity_value>

Parameters

Identifier	Parameter description	Parameter values
<parity_value>	Parity setting	**0**: no parity; **1**: odd; **2**: even

Example

- SET /MEDIA/UART/P1.Parity=0
- pw /MEDIA/UART/P1.Parity=0

7.8.6. RS-232 Operation Mode

ATTENTION! The RS-232 **Operation mode** is mirrored on the Local and Link serial port.

Command and Response *#commandinjection*

- SET·/MEDIA/UART/<port>.Rs232Mode=<mode>
- pw·/MEDIA/UART/<port>.Rs232Mode=<mode>

Parameters

Identifier	Parameter description	Parameter values
<mode>	The current operation mode of the RS-232 ports.	**0**: Pass-through, **1**: Control, **2**: Command injection

ATTENTION! For back-compatibility reasons another property has to be set in case of Command injection mode. See the following section.

Example

- SET /MEDIA/UART/P1.Rs232Mode=1
- pw /MEDIA/UART/P1.Rs232Mode=1

INFO: See more information about RS-232 modes in the Serial Interface section.

7.8.7. Command Injection Mode

When the port is to be operated in Command injection mode the following command must be also set.

Command and Response *#commandinjection*

- SET·/MEDIA/UART/<port>.CommandInjectionEnable=<CI_set>
- pw·/MEDIA/UART/<port>.CommandInjectionEnable=<CI_set>

Parameters

Set the <CI_set> parameter to **1** or **true** to enable the Command Injection mode.

Example

- SET /MEDIA/UART/P1.CommandInjectionEnable=1
- pw /MEDIA/UART/P1.CommandInjectionEnable=1

7.9. Infrared Port

INFO: Infrared input and output port numbering can be found in the Port Numbering section.

7.9.1. Enable Command Injection Mode

Command and Response *#infra* *#infrared*

- SET·/MEDIA/IR/<port>.CommandInjectionEnable=<CI_set>
- pw·/MEDIA/IR/<port>.CommandInjectionEnable=<CI_set>

Parameters

Set the <CI_set> parameter to **1** or **true** to enable the Command Injection mode.

Example

- SET /MEDIA/IR/S1.CommandInjectionEnable=1
- pw /MEDIA/IR/S1.CommandInjectionEnable=true

7.9.2. Enable/Disable Output Signal Modulation

Command and Response

- SET·/MEDIA/IR/<out>.EnableModulation=<mod_set>
- pw·/MEDIA/IR/<out>.EnableModulation=<mod_set>

Parameters

Set the <mod_set> parameter to **1** or **true** to enable the modulation on the destination IR port.

Example

- SET /MEDIA/IR/D1.EnableModulation=0
- pw /MEDIA/IR/D1.EnableModulation=false

Explanation

Signal modulation is turned off on IR output (D1).

7.9.3. Sending Pronto Hex Codes in Little-endian Format via IR Port

Command and Response

- CALL·/MEDIA/IR/D1:sendProntoHex(<hex_code>)
- mO·/MEDIA/IR/D1:sendProntoHex

Parameters

The <hex_code> can be max. 765 character-long in hexadecimal format (0-9; A-F; a-f) without space character in little-endian format.

INFO: This command can send exactly one pronto hex message. If the string is deficient, duplicated, or contains other than the code itself, it will result a syntax error.

Example

- CALL /MEDIA/IR/D1:sendProntoHex(00006D0025000300A900A80015003F0015003F0015003F0015003F00150015001500150015001500150015001500150015003F0015003F0015003F0015003F0015001500150015001500150015001500150015001500150015001500150015001500150015001500150015003F0015003F0015003F0015003F0015003F0015003F0015003F0015000207A900A80015001500150015006E0E)
- mO /MEDIA/IR/D1:sendProntoHex

How to Learn an IR Code?

IR codes sent by remote controllers can be learned and sent as a command by the above mentioned LW3 command. The get the requested IR code in hexa format, please do the following steps:

Step 1. Connect IR transmitter and IR receiver units to the IR ports of the transmitter.

Step 2. Install a terminal software on the control PC/laptop.

Step 3. Start a new terminal in Binary mode and connect to the IR input port of the transmitter over LAN (IP address and TCP/IP port no. 9001).

Step 4. Aim the remote controller towards the IR receiver and press the desired button. The received code should be visible in the terminal.

Step 5. Copy and clean the code by a simple text editor:

- Remove the **h**, **space**, and **enter** characters to have an unintermitted hexa string.
- If the string contains **0000** after the first 16 characters, delete them and all the following characters as well.

  For more information about the pronto hex format please visit the following web-site:
  http://www.remotecentral.com/features/irdisp2.htm

Step 6. Send the hexa code as described in the previous section.

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7.10. Message Sending Capabilities

7.10.1. Sending Message via TCP Port

The device can be used for sending a message to a certain **IP:port** address. Three different commands allow controlling the connected (third-party) devices. *#message*

7.10.1.1. Command Sending (tcpMessage)

The command is for sending a command in **ASCII-format** with an option for escaping special characters.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:tcpMessage

Example

- CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.20:5555=PWR0\x0d\x0a)
- mO /MEDIA/ETHERNET:tcpMessage

Escaping in the Message

When commands need to be separated by <CR><LF> characters to be recognized by the controlled device, then they need to be escaped. You can use the following format for escaping:

<command$_1$><\x0d\x0a><command$_2$><\x0d\x0a>...<command$_n$><\x0d\x0a>

7.10.1.2. Text Message Sending (tcpText)

The command is for sending a text message in ASCII-format.

INFO: Escaping will not be processed using the **tcpText** command.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:tcpText

Example

- CALL /MEDIA/ETHERNET.tcpText(192.168.0.20:5555=pwr_on)
- mO /MEDIA/ETHERNET:tcpText

7.10.1.3. Binary Message Sending (tcpBinary)

The command is for sending a binary message in HEX format.

INFO: Escaping will not be processed using the **tcpBinary** command.

Command and Response

- CALL·/MEDIA/ETHERNET:tcpBinary(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:tcpBinary

Example

- CALL /MEDIA/ETHERNET:tcpBinary(192.168.0.20:5555=01000000616200000cdcc2c40)
- mO /MEDIA/ETHERNET:tcpBinary

7.10.2. Sending Message via UDP Port

The device can be used for sending a message to a certain **IP:port** address. The three different commands allow controlling the connected (third-party) devices.

7.10.2.1. Command Sending (udpMessage)

The command is for sending a command in ASCII-format with an option for escaping special characters.

Command and Response

- CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:udpMessage

Example

- CALL /MEDIA/ETHERNET:udpMessage(192.168.0.20:5555=PWR0\x0d\x0a)
- mO /MEDIA/ETHERNET:udpMessage

Escaping in the Message

When commands need to be separated by <CR><LF> characters to be recognized by the controlled device, then they need to be escaped. You can use the following format for escaping:

$$<command_1><\x0d\x0a><command_2><\x0d\x0a>...<command_n><\x0d\x0a>$$

7.10.2.2. Text Message Sending (udpText)

The command is for sending a text message in ASCII-format.

INFO: Escaping will not be processed using the **udpText** command.

Command and Response

- CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:udpText

Example

- CALL /MEDIA/ETHERNET:udpText(192.168.0.20:5555=pwr_on)
- mO /MEDIA/ETHERNET:udpText

7.10.2.3. Binary Message Sending (udpBinary)

The command is for sending a binary message in HEX format.

INFO: Escaping will not be processed using the **udpBinary** command.

Command and Response

- CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<message>)
- mO·/MEDIA/ETHERNET:udpBinary

Example

- CALL /MEDIA/ETHERNET:udpBinary(192.168.0.20:5555=pwr_on)
- mO /MEDIA/ETHERNET:udpBinary

7.10.3. Sending Message via an RS-232 Port

The RS-232 ports can be used for sending a command message to a device which can be controlled over serial port. Both local RS-232 and extended link RS-232 ports can be used. The three different commands allow to use different message formats.

7.10.3.1. Command Sending (sendMessage)

The command is for sending a command in ASCII-format with an option for escaping special characters.

Command and Response

- CALL·/MEDIA/UART/<port>:sendMessage(<message>)
- mO·/MEDIA/UART/<port>:sendMessage

Example

- CALL /MEDIA/UART/P1.sendMessage(PWR0\x0d\x0a)
- mO /MEDIA/UART/P1:sendMessage

Escaping in the Message

When commands need to be separated by <CR><LF> characters to be recognized by the controlled device, then they need to be escaped. You can use the following format for escaping:

$$<command_1><\x0d\x0a><command_2><\x0d\x0a>...<command_n><\x0d\x0a>$$

7.10.3.2. Text Message Sending (sendText)

The command is for sending a text message in ASCII-format.

INFO: This method does not allow sending message with control and non-printable characters.

Command and Response

- CALL·/MEDIA/UART/<port>:sendText(<message>)
- mO·/MEDIA/UART/<port>:sendText

Example

- CALL /MEDIA/UART/P1:sendText(pwr_on)
- mO /MEDIA/UART/P1:sendText

7.10.3.3. Binary Message Sending (sendBinaryMessage)

The command is for sending a binary message in HEX format.

INFO: This method does not require escaping the control and non-printable characters.

Command and Response

- CALL·/MEDIA/UART/<port>:sendBinaryMessage(<message>)
- mO·/MEDIA/UART/<port>:sendBinaryMessage

Example

- CALL /MEDIA/UART/P1:sendBinaryMessage(01000000616200000cdcc2c40)
- mO /MEDIA/UART/P1:sendBinaryMessage

7.10.4. Sending CEC Commands

The device is able to send and receive Consumer Electronic Control (CEC) commands. This feature is for remote control of the source or sink device. CEC is a bi-directional communication via HDMI cable.

ATTENTION! CEC is supported only by video ports which can carry HDMI signals (HDMI, DVI-D, TPS).

INFO: The hidden first 2 bytes of the CEC command is static, it refers to the logical address of the sender and the addressee. When the port is input, it is always 04 (from TV to Playback device 1.). When the port is output, it is always 40 (from Playback device 1. to TV). Broadcast addressing is also possible (in this case it is 0F or 4F).

7.10.4.1. Sending an OSD String

Sending the OSD string consists of two steps. First, set the **CEC.OsdString** property with the desired text, after that, call the **CEC.send(set_osd)** method.

Command and Response

- SET·/MEDIA/CEC/<port>.OsdString=<text>
- pw·/MEDIA/CEC/<port>.OsdString=<text>

Parameters

The <text> length can be 14 character and the followings are allowed: letters (A-Z) and (a-z), hyphen (-), underscore (_), numbers (0-9), and dot (.).

Example

- SET /MEDIA/CEC/I2.OsdString=Lightware
- pw /MEDIA/CEC/I2.OsdString=Lightware
- CALL /MEDIA/CEC/I2:send(set_osd)
- mO /MEDIA/CEC/I2:send

ATTENTION! As a second step, the **send(set_osd)** method is necessary to call to send the desired string.

7.10.4.2. Sending a CEC Command in Text Format

ATTENTION! The have a successful command processing, the connected device must support and accept CEC commands.

Command and Response

- CALL·/MEDIA/CEC/<port>:send(<command>)
- mO·/MEDIA/CEC/<port>:send

Parameters

The followings are accepted as <command>:

image_view_on	standby	ok	back	up
down	left	right	root_menu	setup_menu
contents_menu	favorite_menu	media_top_menu	media_context_menu	number_0
number_1	number_2	number_3	number_4	number_5
number_6	number_7	number_8	number_9	dot
enter	clear	channel_up	channel_down	sound_select
input_select	display_info	power_legacy	page_up	page_down
volume_up	volume_down	mute_toggle	mute	unmute
play	stop	pause	record	rewind
fast_forward	eject	skip_forward	skip_backward	3d_mode
stop_record	pause_record	play_forward	play_reverse	select_next_media
select_media_1	select_media_2	select_media_3	select_media_4	select_media_5
power_toggle	power_on	power_off	stop_function	f1
f2	f3	f4		

Example

- CALL /MEDIA/CEC/I2:send(power_on)
- mO /MEDIA/CEC/I2:send

7.10.4.3. Sending a CEC Command in Hexadecimal Format

- CALL·/MEDIA/CEC/<port>:sendHex(<hex_code>)
- mO·/MEDIA/CEC/<port>:sendHex

Parameters

The <hex_code> parameter can be max. 30 character long (15 byte) in hexadecimal format.

Example

- CALL /MEDIA/CEC/I2:sendHex(8700E091)
- mO /MEDIA/CEC/I2:sendHex

7.11. RS-232 Recognizer

This tool is able to recognize the incoming RS-232 message. It stores the incoming serial data from the first bit, until the previously defined string (delimiter) or the elapsing timeout after the last bit. The last incoming serial string is saved in different formats (string, hex, and hash).

7.11.1. Enable the Recognizer

- SET·/MEDIA/UART/<port>.RecognizerEnable=<rec_state>
- pw·/MEDIA/UART/<port>.RecognizerEnable=<rec_state>

Parameters *#recognizer #rs-232recognizer #rs232recognizer*

If the <rec_state> parameter is **true** or **1** the recognizer is enabled. If the <rec_state> parameter is **false** or **0**, the recognizer is disabled.

Example

- SET /MEDIA/UART/P1.RecognizerEnable=true
- pw /MEDIA/UART/P1.RecognizerEnable=true

7.11.2. Setting the Delimiter Hex

When the delimiter hex string is detected in the incoming serial data, the device saves the RS-232 message data from the first bit, until the delimiter (or the data between the two delimiter).

- SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>
- pw·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Parameters

<delimiter> can be max. 8 character long (or 16 hex digit) in **hex** format.

Example

- SET /MEDIA/UART/RECOGNIZER.DelimiterHex=3a
- pw /MEDIA/UART/RECOGNIZER.DelimiterHex=3a

7.11.3. Setting the Timeout

When the set time is elapsed after the last received message, the device saves the data. It can be applied, when there is no special or easily defined delimiter string in the incoming serial data, but there is a time gap between the messages.

- SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>
- pw·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Parameters

<timeout> is the timeout value in milliseconds. **0** means the timeout is disabled. Minimum value is **10**.

Example

- SET /MEDIA/UART/RECOGNIZER.TimeOut=20
- pw /MEDIA/UART/RECOGNIZER.TimeOut=20

7.11.4. Querying the Last Message

The recognized data is stored in string, hex and hash formats. They are stored until the next incoming message or until the RECOGNIZER:clear() method is called.

> TIPS AND TRICKS: When one of these properties are set as a condition in the Event Manager, and the same strings follow each other, the action **will execute once**.

7.11.4.1. Recognized Data in String Format

- GET·/MEDIA/UART/RECOGNIZER.Rx
- pr·/MEDIA/UART/RECOGNIZER.Rx=<recognized_string>

Parameters

The <recognized_string> max. 12 byte-long recognized data string.

Example

- GET /MEDIA/UART/RECOGNIZER.Rx
- pr /MEDIA/UART/RECOGNIZER.Rx=Login:

7.11.4.2. Recognized Data in Hex Format

- GET·/MEDIA/UART/RECOGNIZER.RxHex
- pr·/MEDIA/UART/RECOGNIZER.RxHex=<recognized_hex>

Parameters

<recognized_hex>: recognized data in hex format.

Example

- GET /MEDIA/UART/RECOGNIZER.RxHex
- pr /MEDIA/UART/RECOGNIZER.RxHex=FF1F4C6F67696E3A

7.11.4.3. Recognized Data Hash

- GET·/MEDIA/UART/RECOGNIZER.Hash
- pr·/MEDIA/UART/RECOGNIZER.Hash=<recognized_hash>

Parameters

<recognized_hash>: fingerprint code, max. 32 bit-long recognized data hash.

Example

- GET /MEDIA/UART/RECOGNIZER.Hash
- pr /MEDIA/UART/RECOGNIZER.Hash=997A659E

7.11.5. Clearing the Stored Last Recognized Serial Message

This method deletes all the stored received serial messages.

- CALL·/MEDIA/UART/RECOGNIZER:clear()
- mO·/MEDIA/UART/RECOGNIZER:clear

Example

- CALL /MEDIA/UART/RECOGNIZER:clear()
- mO /MEDIA/UART/RECOGNIZER:clear

7.11.6. Querying the Last Active Message

The recognized data is stored in string, hex and hash format in a **temporary** storage. They are erased when the Active Timeout elapsed.

> TIPS AND TRICKS: When these properties are set as a conditionin the Event Manager, and the same strings follow each other, the action will be executed every time if the active timeout has been set properly.

7.11.6.1. Recognized Data in String Format

- GET·/MEDIA/UART/RECOGNIZER.ActiveRx
- pr·/MEDIA/UART/RECOGNIZER.ActiveRx=<recognized_string>

Parameters

<recognized_string>: max. 12 byte-long recognized data string.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveRx
- pr /MEDIA/UART/RECOGNIZER.ActiveRx=Login:

7.11.6.2. Recognized Data in Hex Format

- GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex
- pr·/MEDIA/UART/RECOGNIZER.ActiveRxHex=<recognized _hex>

Parameters

<recognized _hex>: recognized data in hex format.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveRxHex
- pr /MEDIA/UART/RECOGNIZER.ActiveRxHex= 4C6F67696E3A

7.11.6.3. Recognized Data Hash

- GET·/MEDIA/UART/RECOGNIZER.ActiveHash
- pr·/MEDIA/UART/RECOGNIZER.ActiveHash=<recognized_hash>

Parameters

<recognized_hash>: fingerprint code, Max. 32 bit-long recognized data hash.

Example

- GET /MEDIA/UART/RECOGNIZER.ActiveHash
- pr /MEDIA/UART/RECOGNIZER.ActiveHash= 2D8A5E38

7.11.7. Setting the Active Timeout

This property is responsible for erasing the temporary storage (ActiveRx, ActiveRxHex, ActiveHash) after the elapsing time. Default value is 50ms.

- SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>
- pw·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Parameters

<a_timeout> active timeout value (ms) between 0 and 255.

Example

- SET /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255
- pw /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255

7.12. GPIO Port Configuration

INFO: Use the GET command to query a parameter.

7.12.1. Setting the Direction of a GPIO Pin

Command and Response

- SET·/MEDIA/GPIO/<port>.Direction(<dir>)
- pw·/MEDIA/GPIO/<port>.Direction(<dir>)

Parameters

Identifier	Parameter description	Parameter values
<dir>	The direction of the GPIO pin.	**I**: input, **O**: output

Example

- SET /MEDIA/GPIO/P1.Direction=I
- pw /MEDIA/GPIO/P1.Direction=I

7.12.2. Setting the Output Level of a GPIO Pin

Command and Response

- SET·/MEDIA/GPIO/<port>.Output(<value>)
- pw·/MEDIA/GPIO/<port>.Output(<value>)

Parameters

Identifier	Parameter description	Parameter values
<value>	The output value of the GPIO pin.	**H**: high level, **L**: low level

Example

- SET /MEDIA/GPIO/P1.Direction=I
- pw /MEDIA/GPIO/P1.Direction=I

7.12.3. Toggling the Level of a GPIO Pin

The output level can be changed from high to low and low to high by the command below.

Command and Response

- CALL·/MEDIA/GPIO/<port>:toggle()
- mO·/MEDIA/GPIO/<port>:toggle

Example

- CALL /MEDIA/GPIO/P1:toggle()
- mO /MEDIA/GPIO/P1:toggle

7.13. EDID Management

7.13.1. Querying the Emulated EDIDs

Command and Response *#edid*

- GET·/EDID.EdidStatus
- pr·/EDID.EdidStatus(<I1_state>;<I2_state>;...;<In_state>)

Parameters

The response represents the emulated EDID on the input ports grouped by destinations. The structure of the <I#_state> parameters is the same: <Emulated_EDID_loc>:<source_port>

Identifier	Parameter description	Parameter values
<Emulated_EDID_loc>	The location of the emulated EDID.	**D1-D#:** dynamic EDIDs **U1-U#**: User EDIDs **F1-F#**: Factory EDIDs See the EDID Memory Structure section.
<source_port>	The input port where the above EDID is emulated.	**E1-E#**: Input (source) port location See the Wiring Guide for RS-232 Data Transmission section.

Example

- GET /EDID.EdidStatus
- pr /EDID.EdidStatus=D1:E1;D1:E2;D1:E3;D1:E4

7.13.2. Querying the Validity of a Dynamic EDID

Command and Response

- GET·/EDID/D/<loc>.Valildity
- pr·/EDID/D/<loc>.Validity=<EDID_val>

Parameters

Identifier	Parameter description	Parameter values
<loc>	The location of the EDID.	**D1-D#:** dynamic EDID location
<EDID_val>	Shows if a valid EDID is stored in the given location.	**true**: the EDID is valid **false**: the EDID is invalid

Example

- GET /EDID/D/D1.Validity
- pr /EDID/D/D1.Validty=true

7.13.3. Querying the Preferred Resolution of a User EDID

Command and Response

- GET·/EDID/U/<loc>.PreferredResolution
- pr·/EDID/D/<loc>.PreferredResolution=<Resolution>

Example

- GET /EDID/U/U2.PreferredResolution
- pr /EDID/U/U2.PreferredResolution=1920x1080p60.00Hz

> INFO: Use the **Manufacturer** property to query the manufacturer and the **MonitorName** property to query the name/type of the monitor.

7.13.4. Emulating an EDID on an Input Port

Command and Response

- CALL·/EDID:switch(<source>:<destination>)
- mO·/EDID:switch

Parameters

Identifier	Parameter description	Parameter values
<source>	Source EDID memory place: Factory / User / Dynamic.	**D1-D#:** dynamic EDIDs **U1-U#**: User EDIDs **F1-F#**: Factory EDIDs See the EDID Memory Structure section.
<destination>	The emulated EDID memory of the desired input port.	**E1-E#**: Input (source) port location See the Wiring Guide for RS-232 Data Transmission section.

Example

- CALL /EDID:switch(F46:E2;F46:E3)
- mO /EDID:switch

7.13.5. Emulating an EDID to All Input Ports

Command and Response

- CALL·/EDID:switchAll(<source>)
- mO·/EDID:switchAll

Parameters

See the previous section.

Example

- CALL /EDID:switchAll(F49)
- mO /EDID:switchAll

7.13.6. Copying an EDID to the User Memory

Command and Response

- CALL·/EDID:copy(<source>:<user_mem>)
- mO·/EDID:copy

Parameters

Identifier	Parameter description	Parameter values
<source>	Source EDID memory place: Factory / User / Dynamic.	**D1-D#:** dynamic EDIDs **U1-U#**: User EDIDs **F1-F#**: Factory EDIDs
<user_mem>	The destination EDID memory location.	**U1-U#**: User EDID memory location See the Wiring Guide for RS-232 Data Transmission section.

Example

- CALL /EDID:copy(D1:U1)
- mO /EDID:copy

7.13.7. Deleting an EDID from User Memory

Command and Response

- CALL·/EDID:delete(<user_mem>)
- mO·/EDID:delete

Parameters

The <user_mem> is the location of the EDID to be deleted.

Example

- CALL /EDID:delete(U1)
- mO /EDID:delete

7.13.8. Resetting the Emulated EDIDs

Calling this method switches all emulated EDIDs to the factory default one. See the table in the Factory EDID List section.

Command and Response

- CALL·/EDID:reset()
- mO·/EDID:reset

Example

- CALL /EDID:reset()
- mO /EDID:reset

7.14. LW3 Commands - Quick Summary

System Commands

Querying the Product Name
- GET·/.ProductName

Setting the Device Label
- SET·/MANAGEMENT/UID.DeviceLabel=<device_label>

Querying the Serial Number
- GET·/.SerialNumber

Querying the Firmware Version
- GET·/SYS/MB.FirmwareVersion

Resetting the Device
- CALL·/SYS:reset(1)

Restoring the Factory Default Settings
- CALL·/SYS:factoryDefaults()

Video Port Settings

Querying the Status of the Input Ports
- GET·/MEDIA/VIDEO/XP.SourcePortStatus

Querying the Status of the Output Ports
- GET·/MEDIA/VIDEO/XP.DestinationPortStatus

Querying the Video Crosspoint Setting
- GET·/MEDIA/VIDEO/XP.DestinationConnectionList

Switching Video Input
- CALL·/MEDIA/VIDEO/XP:switch(<in>:<out>)

Querying the Video Autoselect Settings
- GET·/MEDIA/VIDEO/XP.DestinationPortAutoselect

Changing the Autoselect Mode
- CALL·/MEDIA/VIDEO/XP:setDestinationPortAutoselect(<out>:<as_state><as_mode>)

Querying the Input Port Priority
- GET·/MEDIA/VIDEO/XP.PortPriorityList

Changing the Input Port Priority
- CALL·/MEDIA/VIDEO/XP:setAutoselectionPriority(<in>(<out>):<priority>)

Muting an Input Port
- CALL·/MEDIA/VIDEO/XP:muteSource(<in>)

Unmuting an Input Port
- CALL·/MEDIA/VIDEO/XP:unmuteSource(<in>)

Locking an Input Port
- CALL·/MEDIA/VIDEO/XP:lockSource(<in>)

Unlocking an Input Port
- CALL·/MEDIA/VIDEO/XP:unlockSource(<in>)

Muting an Output Port
- CALL·/MEDIA/VIDEO/XP:muteDestination(<out>)

Unmuting Output
- CALL·/MEDIA/VIDEO/XP:unmuteDestination(<out>)

Locking an Output Port
- CALL·/MEDIA/VIDEO/XP:lockDestination(<out>)

Unlocking an Output Port
- CALL·/MEDIA/VIDEO/XP:unlockDestination(<out>)

Querying the Encryption of the Incoming Signal
- GET·/MEDIA/VIDEO/<in>.HdcpActive

Querying the HDCP Setting (Input Port)
- GET·/MEDIA/VIDEO/<in>.HdcpEnable=<HDCP_setting>

Changing the HDCP Setting (Input Port)
- SET·/MEDIA/VIDEO/<in>.HdcpEnable=<HDCP_setting>

Querying the HDCP Setting (Output Port)
- GET·/MEDIA/VIDEO/<out>.HdcpModeSetting

Changing the HDCP Setting (Output Port)
- SET·/MEDIA/VIDEO/<out>.HdcpModeSetting=<HDCP_setting>

Test Pattern Generator

Test Pattern Generator Mode Setting
- SET·/MEDIA/VIDEO/<out>.TpgMode=<mode_setting>

Clock Source – The Clock Frequency of the Test Pattern
- SET·/MEDIA/VIDEO/<out>.TpgClockSource=<clk_freq>

Test Pattern
- SET·/MEDIA/VIDEO/<out>.TpgPattern=<pattern>

Querying the HDMI Mode Setting (Output Port)
- GET·/MEDIA/VIDEO/<out>.HdmiModeSetting

Setting the HDMI Mode Setting (Output Port)
- SET·/MEDIA/VIDEO/<out>.HdmiModeSetting=<HDMI_mode>

Querying the TPS Mode of the Transmitter
- GET·/REMOTE/D1.tpsModeSetting

Setting the TPS Mode of the Transmitter
- SET·/REMOTE/D1.tpsModeSetting=<TPS_mode>

Querying the Established TPS Mode
- GET·/REMOTE/D1.tpsMode

Audio Port Settings

Querying the Status of the Input Ports
- GET·/MEDIA/AUDIO/XP.SourcePortStatus

Querying the Status of the Output Ports
- GET·/MEDIA/AUDIO/XP.DestinationPortStatus

Querying the Audio Crosspoint Setting
- GET·/MEDIA/AUDIO/XP.DestinationConnectionList

Switching Audio Input
- CALL·/MEDIA/AUDIO/XP:switch(<in>;<out>)

Querying the Audio Autoselect Settings
- GET·/MEDIA/AUDIO/XP.DestinationPortAutoselect

Changing the Autoselect Mode
- CALL·/MEDIA/AUDIO/XP:setDestinationPortAutoselect(<out>:<as_state><as_mode>)

Querying the Input Port Priority
- GET·/MEDIA/AUDIO/XP.PortPriorityList

Changing the Input Port Priority
- CALL·/MEDIA/AUDIO/XP:setAutoselectionPriority(<in>(<out>):<priority>)

Muting an Input Port
- CALL·/MEDIA/AUDIO/XP:muteSource(<in>)

Unmuting an Input Port
- CALL·/MEDIA/AUDIO/XP:unmuteSource(<in>)

Locking an Input Port
- CALL·/MEDIA/AUDIO/XP:lockSource(<in>)

Unlocking an Input Port
- CALL·/MEDIA/AUDIO/XP:unlockSource(<in>)

Muting an Output Port
- CALL·/MEDIA/AUDIO/XP:muteDestination(<out>)

Unmuting Output
- CALL·/MEDIA/AUDIO/XP:unmuteDestination(<out>)

Locking an Output Port
- CALL·/MEDIA/AUDIO/XP:lockDestination(<out>)

Unlocking an Output Port
- CALL·/MEDIA/AUDIO/XP:unlockDestination(<out>)

Analog Audio Input Level Settings

Querying the Volume (Exact Value)
- GET·/MEDIA/AUDIO/<in>.VolumedB

Setting the Volume (Exact Value)
- SET·/MEDIA/AUDIO/<in>.VolumedB=<level>

Querying the Volume (in Percentage)
- GET·/MEDIA/AUDIO/<in>.VolumePercent

Setting the Volume (in Percentage)
- SET·/MEDIA/AUDIO/<in>.VolumePercent=<vol_percent>

Querying the Balance
- GET·/MEDIA/AUDIO/<in>.Balance

Setting the Balance
- SET·/MEDIA/AUDIO/<in>.Balance=<level>

Querying the Gain Level
- GET·/MEDIA/AUDIO/<in>.Gain

Setting the Gain Level
- SET·/MEDIA/AUDIO/<in>.Gain=<level>

Network Configuration

Querying the IP Address
- GET·/MANAGEMENT/NETWORK.IpAdress

Querying the DHCP State
- GET·/MANAGEMENT/NETWORK.DhcpEnabled

Setting the DHCP State
- SET·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>

Setting a Static IP Address

- SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Querying the Subnet Mask

- GET·/MANAGEMENT/NETWORK.NetworkMask

Setting a Static Subnet Mask

- SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<subnet_mask>

Querying the Gateway Address

- GET·/MANAGEMENT/NETWORK.GatewayAddress

Setting a Static Gateway Address

- SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gateway_address>

RS-232 Port Configuration

Protocol Setting

- SET·/MEDIA/UART/<port>.ControlProtocol=<protocol>

BAUD Rate Setting

- SET·/MEDIA/UART/<port>.BaudRate=<baud_rate>

Databit Setting

- SET·/MEDIA/UART/<port>.DataBits=<data_bits>

Stopbit Setting

- SET·/MEDIA/UART/<port>.StopBits=<stop_bits>

Parity Setting

- SET·/MEDIA/UART/<port>.Parity=<parity_value>

RS-232 Operation Mode

- SET·/MEDIA/UART/<port>.Rs232Mode=<mode>

Command Injection Mode

- SET·/MEDIA/UART/<port>.CommandInjectionEnable=<CI_set>

Infrared Port

Enable Command Injection Mode

- SET·/MEDIA/IR/<port>.CommandInjectionEnable=<CI_set>

Enable/Disable Output Signal Modulation

- SET·/MEDIA/IR/<out>.EnableModulation=<mod_set>

Sending Pronto Hex Codes in Little-endian Format via IR Port

- CALL·/MEDIA/IR/D1:sendProntoHex(<hex_code>)

Message Sending Capabilities

Sending Message via TCP Port

Command Sending (tcpMessage)

- CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)

Text Message Sending (tcpText)

- CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<message>)

Binary Message Sending (tcpBinary)

- CALL·/MEDIA/ETHERNET:tcpBinary(<IP_address>:<port_no>=<message>)

Sending Message via UDP Port

Command Sending (udpMessage)

- CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)

Text Message Sending (udpText)

- CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<message>)

Binary Message Sending (udpBinary)

- CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<message>)

Sending Message via an RS-232 Port

Command Sending (sendMessage)

- CALL·/MEDIA/UART/<port>:sendMessage(<message>)

Text Message Sending (sendText)

- CALL·/MEDIA/UART/<port>:sendText(<message>)

Binary Message Sending (sendBinaryMessage)

- CALL·/MEDIA/UART/<port>:sendBinaryMessage(<message>)

Sending CEC Commands

Sending an OSD String

- SET·/MEDIA/CEC/<port>.OsdString=<text>

Sending a CEC Command in Text Format

- CALL·/MEDIA/CEC/<port>:send(<command>)

Sending a CEC Command in Hexadecimal Format

- CALL·/MEDIA/CEC/<port>:sendHex(<hex_code>)

RS-232 Recognizer

Enable the Recognizer

- SET·/MEDIA/UART/<port>.RecognizerEnable=<rec_state>

Setting the Delimiter Hex

- SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Setting the Timeout

- SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Querying the Last Message

Recognized Data in String Format

- GET·/MEDIA/UART/RECOGNIZER.Rx

Recognized Data in Hex Format

- GET·/MEDIA/UART/RECOGNIZER.RxHex

Recognized Data Hash

- GET·/MEDIA/UART/RECOGNIZER.Hash

Clearing the Stored Last Recognized Serial Message

- CALL·/MEDIA/UART/RECOGNIZER:clear()

Querying the Last Active Message

Recognized Data in String Format

- GET·/MEDIA/UART/RECOGNIZER.ActiveRx

Recognized Data in Hex Format

- GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex

Recognized Data Hash

- GET·/MEDIA/UART/RECOGNIZER.ActiveHash

Setting the Active Timeout

- SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

GPIO Port Configuration

Setting the Direction of a GPIO Pin

- SET·/MEDIA/GPIO/<port>.Direction(<dir>)

Setting the Output Level of a GPIO Pin

- SET·/MEDIA/GPIO/<port>.Output(<value>)

Toggling the Level of a GPIO Pin

- CALL·/MEDIA/GPIO/<port>:toggle()

EDID Management

Querying the Emulated EDIDs

- GET·/EDID.EdidStatus

Querying the Validity of a Dynamic EDID

- GET·/EDID/D/<loc>.Valildity

Querying the Preferred Resolution of a User EDID

- GET·/EDID/U/<loc>.PreferredResolution

Emulating an EDID on an Input Port

- CALL·/EDID:switch(<source>:<destination>)

Emulating an EDID to All Input Ports

- CALL·/EDID:switchAll(<source>)

Copying an EDID to the User Memory

- CALL·/EDID:copy(<source>:<user_mem>)

Deleting an EDID from User Memory

- CALL·/EDID:delete(<user_mem>)

Resetting the Emulated EDIDs

- CALL·/EDID:reset()

8

Firmware Upgrade

The devices can be upgraded by the Lightware Device Updater v2 (LDU2) software over Ethernet. The software and the firmware pack with the necessary components (*.lfp2 file) are available at www.lightware.com.

ATTENTION! While the firmware is being upgraded, the normal operation mode is suspended as the transmitter is switched to bootload mode. Signal processing is not performed. Do not interrupt the firmware upgrade. If any problem occurs, reboot the device and restart the process.

8.1. Introduction

Lightware Device Updater v2 (LDU2) software is the second generation of the LFP-based (Lightware Firmware Package) firmware upgrade process.

DIFFERENCE: The software can be used for uploading the packages with LFP2 extension only. LDU2 is not suitable for using LFP files, please use the LDU software for that firmware upgrade.

LDU

LDU2

8.2. Preparation

Most Lightware devices can be controlled over more interfaces (e.g. Ethernet, USB, RS-232). But the firmware can be upgraded usually over one dedicated interface, which is the Ethernet in most cases.

If you want to upgrade the firmware of one or more devices you need the following:

- **LFP2 file,**
- **LDU2 software** installed on your PC or Mac.

Both can be downloaded from www.lightware.com/downloads.

Optionally, you can download the **release notes** file in HTML format.

8.2.1. About the Firmware Package (LFP2 File)

All the necessary tools and binary files are packed into the LFP2 package file. You need only this file to do the upgrade on your device.

- This allows the use of the same LFP2 package for different devices.
- The package contains all the necessary components, binary, and other files.
- The release notes is included in the LFP2 file which is displayed in the window where you select the firmware package file in LDU2.

8.2.2. LDU2 Installation

ATTENTION! Minimum system requirement: 2 GB RAM.

INFO: The Windows and the Mac application has the same look and functionality.

Download the software from www.lightware.com/downloads.

Installation in case of Windows OS

Run the installer. If the User Account Control displays a pop-up message click **Yes**.

Installation Modes

Normal install	Snapshot install
Available for Windows and MacOS	Available for Windows
The installer can update only this instance	Cannot be updated
One updateable instance may exist for all users	Many different versions can be installed for all users

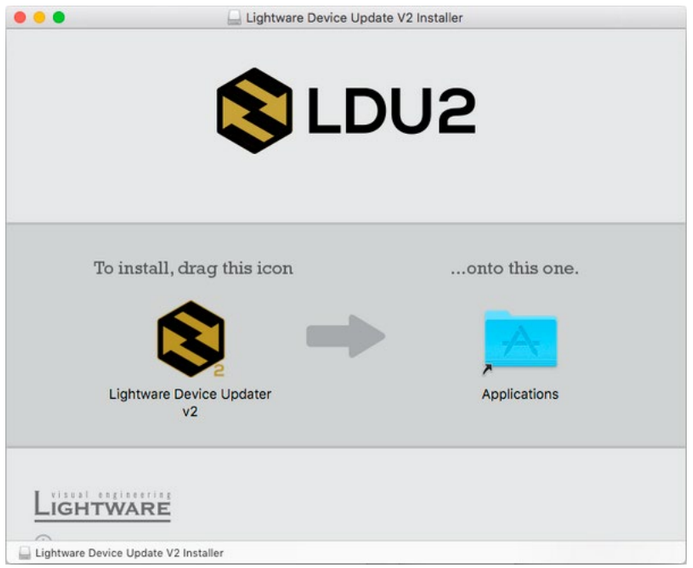
ATTENTION! Using the default Normal install is highly recommended.

INFO: If you have a previously installed version you will be prompted to remove the old version before installing the new one.

Installation in case of macOS X

Mount the DMG file with double clicking on it and drag the LDU2 icon over the Applications icon to copy the program into the Applications folder. If you want to copy LDU2 into another location just drag the icon over the desired folder.

INFO: This type of installer is equal with the **Normal install** of Windows.



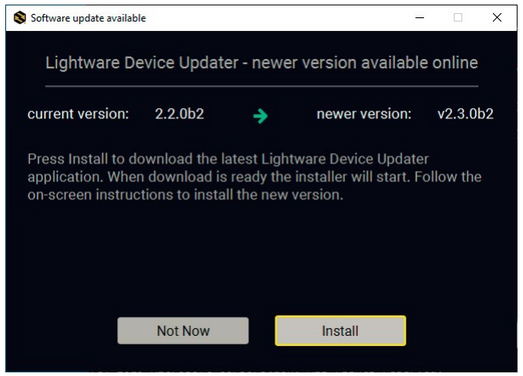
8.3. Running the Software

You have two options:

- **Starting the LDU2** by double-clicking on the shortcut/program file, or
- Double-clicking on an **LFP2 file**.

LDU2 Auto-Update

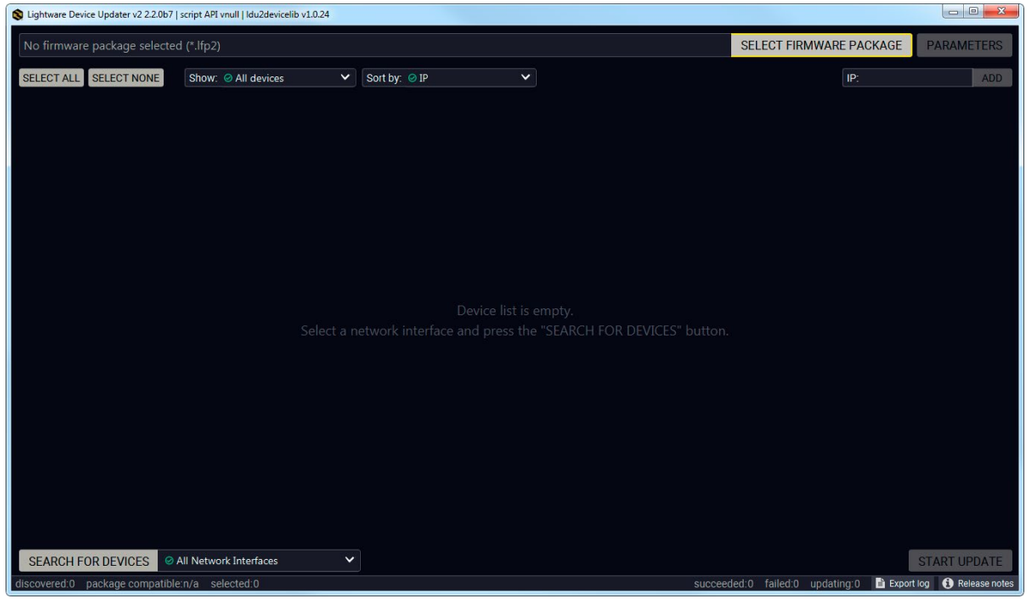
At startup, the software checks if a newer version is available on the web.



Main Screen

When the software is started by the shortcut, the device discovery screen appears. Press the **Search for devices** button to start finding the Lightware devices:

SEARCH FOR DEVICES

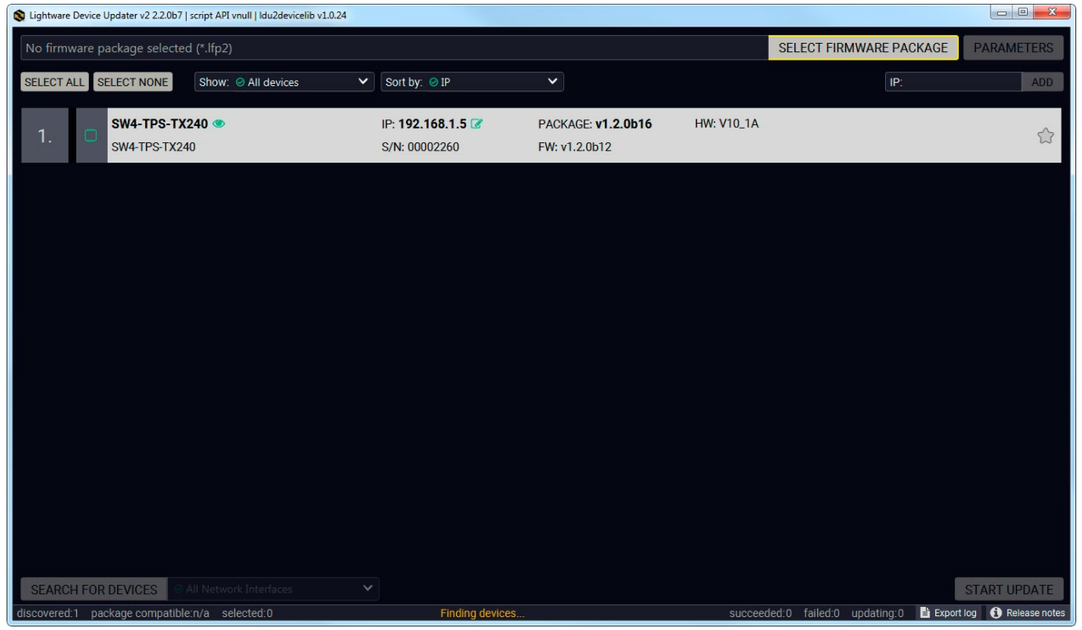


If you start the software by double-clicking on the LFP2 file, the firmware will be loaded. Press the **Search for devices** button; all the devices will be listed which are compatible with the selected firmware pack.

> INFO: If you press the **Select firmware package** button, the release notes of the LFP2 file will be displayed in the right panel; see the Step 1. Select the Firmware Package. section.

Device List

When the discovery has completed, the devices available on the network are listed in the application.



Legend of the Icons

	IP address editor	The IP address of the device can be changed in the pop-up window.
	Identify me	Clicking on the icon results the front panel LEDs blink for 10 seconds which helps to identify the device phisically.
	Favorite device	The device has been marked, thus the IP address is stored. When a device is connected with that IP address, the star will highlighted in that line.
	Further information available	Device is unreachable. Change the IP address using the front panel LCD menu or the IP address editor of the LDU2.

8.4. The Upgrading Steps

> **ATTENTION!** While the firmware is being upgraded, the normal operation mode is suspended as the device is switched to bootload mode. Signal processing is not performed. Do not interrupt the firmware upgrade. If any problem occurs, reboot the unit and restart the process.

Keeping the Configuration Settings

By default, device configuration settings are restored when firmware upgrade is finished. If factory reset has been chosen in the parameters window, all device settings will be erased. In the case of factory reset, you can save the settings of the device in the Lightware Device Controller software and restore it later.

The following flow chart demonstrates how this function works in the background.

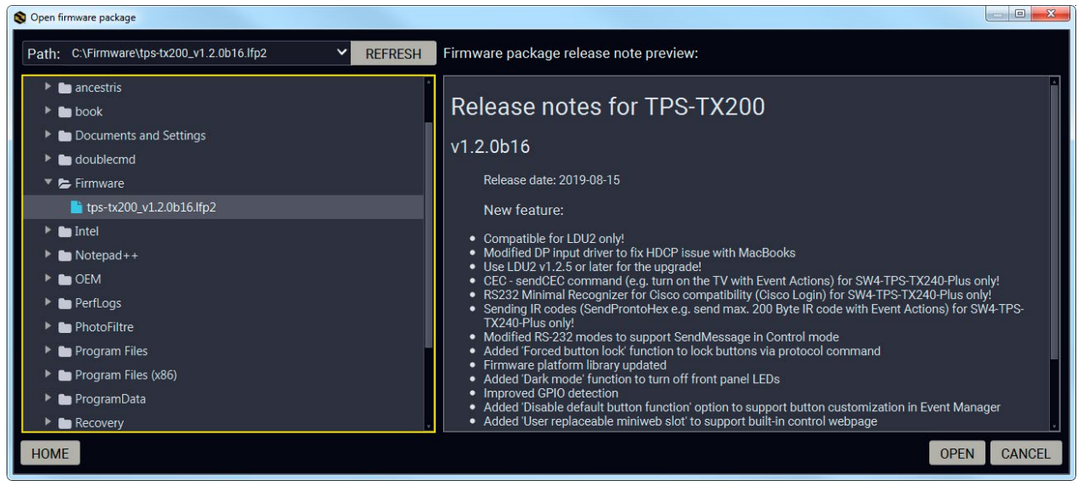
1. **Create a backup**
   The current configuration of the device is being saved into a configuration backup file on your computer.
2. **Start the Upgrade**
   The device reboots and starts in bootload mode (firmware upgrade mode).
3. **Upgrade**
   The CPU firmware is changed to the new one.
4. **Factory reset**
   All configuration settings are restored to the factory default values.
5. **Conversion / Restore**
   The firmware package checks the backup data before the restore procedure, and if it is necessary, a conversion is applied to avoid incompatibility problems between the firmware versions. All configuration settings are restored to the device after the conversion.

   If the factory default option is selected in the Parameters window, the conversion / restore procedure will not be performed!
6. **Finish**
   Once the firmware upgrade procedure is finished, the device reboots and is ready to use.

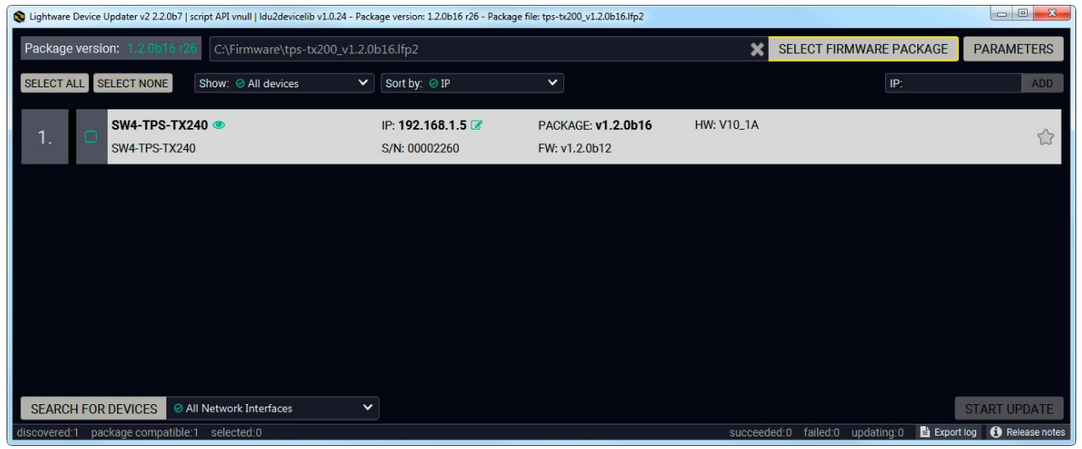
Step 1. Select the Firmware Package.

Click on the **Select Firmware Package** button and navigate to the location where the LFP2 file was saved. When you click on the name of package, the preview of the release notes are displayed in the right panel.

SELECT FIRMWARE PACKAGE



After the package file is loaded, the list is filtered to show the compatible devices only. The current firmware version of the device is highlighted in orange if it is different from the version of the package loaded.



INFO: If you start the upgrade by double-clicking on the LFP file, above screen will be loaded right away.

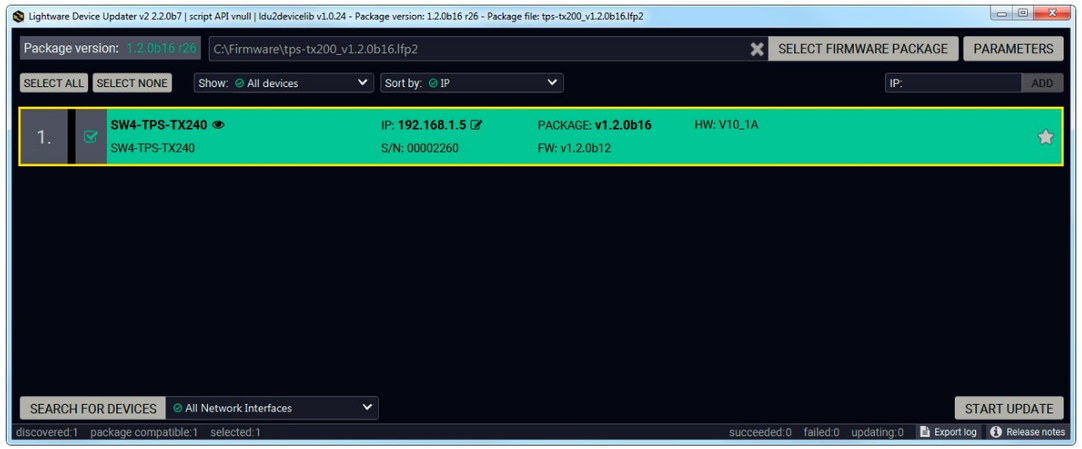
The Meaning of the Symbols

Show details	The log about the upgrading process of the device can be displayed in a new window.
Service mode	The device is in bootload mode. Backup and restore cannot be performed in this case.

Step 2. Select the desired devices for upgrading.

Select the devices for upgrading; the selected line will be highlighted in green.

If you are not sure which device to select, press the **Identify me** button. It makes the front panel LEDs blink for 10 seconds. The feature helps to find the device physically.



Step 3. Check the upgrade parameters.

DIFFERENCE: The appearing settings are device-dependent and can be different device by device.

Clicking on the **Parameters** button, special settings will be available like:

PARAMETERS

- Creating a backup about the configuration,
- Restore the configuration or reloading the factory default settings after the firmware upgrade,
- Uploading the default Miniweb (if available). *#miniweb* *#web*

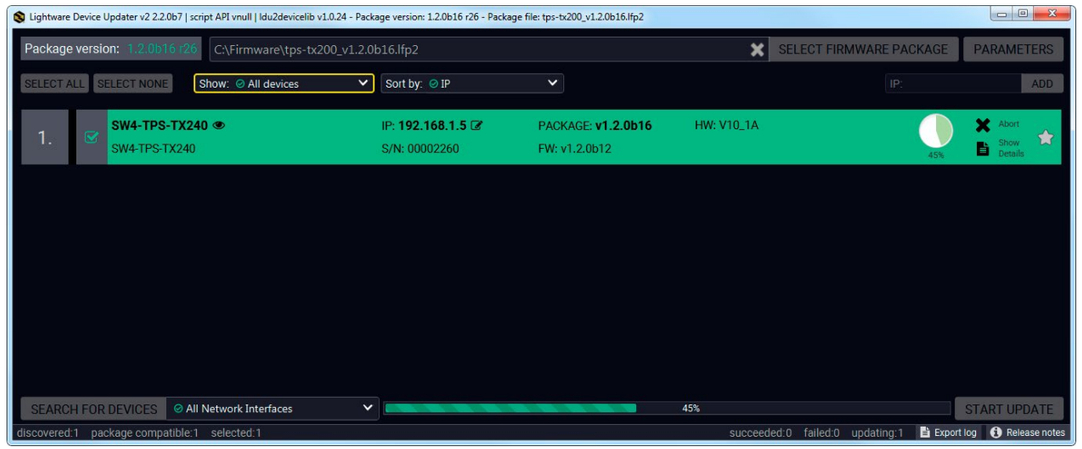
Please arrange the settings carefully.

Step 4. Start the update and wait until it is finished.

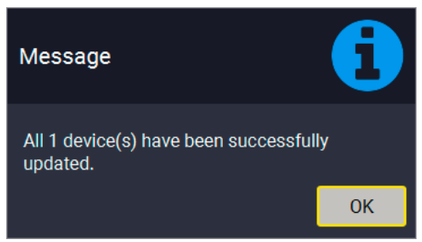
Click on the **Start Update** button to start the procedure. The status is shown in percent in the right side of the device line and the overall process in the bottom progress bar.

START UPDATE

INFO: The device might reboot during the firmware upgrade procedure.



When the progress bar reaches 100% (**Done** is displayed at all devices), the upgrade of all devices are finished successfully and a message appears; you can close the software.



Step 5. Wait until the unit reboots with the new firmware.

Once the firmware upgrade procedure is completed, the device is rebooted with the new firmware. Shutting down and restarting the device is recommended.

8.5. If the Upgrade is not succesful

- Restart the process and try the upgrade again.
- If the device cannot be switched to bootload (firmware upgrade) mode, you can do that manually as written in the User's manual of the device. Please note that backup and restore cannot be performed in this case.
- If the backup cannot be created for some reason, you will get a message to continue the process without backup or stop the upgrade. A root cause can be that the desired device is already in bootload (firmware upgrade) mode, thus, the normal operation mode is suspended and backup cannot be made.
- If an upgrade is not succesful, the **Export log** button becomes red. If you press the button, you can download the log file as a ZIP package which can be sent to Lightware Support if needed. The log files contain useful information about the circumstances to find the root cause. #bootload

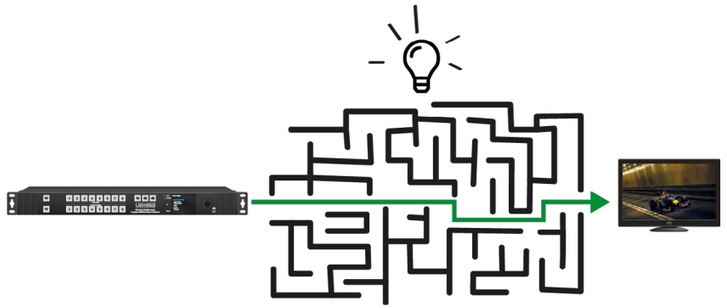
9

Troubleshooting

Usually, if the system seems not to transport the signal as expected, the best strategy for troubleshooting is to check signal integrity through the whole signal chain starting from source side and moving forward to the receiver end.

How to Speed Up the Troubleshooting Process

Lightware's technical support team is always working hard to provide the fastest support possible. Our team's response time is one of the best in the industry and in the toughest of cases we can directly consult with the hardware or software engineer who designed the product to get the information from the most reliable source.



However, the troubleshooting process can be even faster… with your help.

There are certain pieces of information that push us in the right direction to finding the root cause of the problem. If we receive most of this information in the first e-mail or it is gathered at the time when you call us, then there is a pretty high chance that we will be able to respond with the final solution right away. This information is the following:

- Schematic (a pdf version is preferred, but a hand drawing is sufficient).
- Serial number(s) of the device(s) (it is either printed somewhere on the box or you can query it in the Device Controller software or on the built-in website).
- Firmware versions of the devices (please note that there may be multiple CPUs or controllers in the device and we need to know all of their firmware versions, a screenshot is the best option).
- Cable lengths and types (in our experience, it's usually the cable).
- Patch panels, gender changers or anything else in the signal path that can affect the transmission.
- Signal type (resolution, refresh rate, color space, deep color).
- Emulated EDID(s) (please save them as file and send them to us).
- Actions to take in order to re-create the problem (if we cannot reproduce the problem, it is hard for us to find the cause).
- Photo or video about the problem ('image noise' can mean many different things, it's better if we see it too).
- Error logs from the Device Controller software.
- In the case of Event Manager issue the event file and/or backup file from the Device Controller software.
- The more of the above information you can give us the better. Please send these information to the Lightware Support Team (support@lightware.com) to speed up the troubleshooting process.

The First Step

Check front panel LEDs and take the necessary steps according to their states. For more information about status, LEDs refer to Front Panel LEDs and Rear Panel LEDs sections.

Legend

- Link to connections/cabling section.
- Link to front panel operation section.
- Link to LDC software section.
- LW2 Link to LW2 protocol commands section.
- LW3 Link to LW3 protocol commands section.

Symptom	Root cause	Action	Refer to
Video signal			
No picture on the video output	Device or devices are not powered properly	Check the extenders and the other devices if they are properly powered; try to unplug and reconnect them.	3.2.5
	Cable connection problem	Cables must fit very well, check all the connectors (video and TPS cables).	3.3
	TPS mode problem	Check the actual TPS mode and the selected modes of the extenders.	5.5.4 LW3 7.5.25
	The input port is muted	Check the mute state of input port.	5.5.1 LW3 7.5.1
	The output port is muted	Check the mute state of output port.	5.5.4 LW2 6.4.6 LW3 7.5.2
	Display is not able to receive the video format	Check the emulated EDID; select another (e.g. emulate the display's EDID on the input port).	5.8 LW3 7.13
	HDCP is disabled	Enable HDCP on the input and output ports.	5.5.1 5.5.4 LW3 7.5.17 LW3 7.5.19
Not the desired picture displayed on the video output	Video output is set to test pattern (no sync screen) statically	Check test pattern settings in the properties of the output ports.	5.5.4 LW3 7.5.22
	Video output is set to test pattern (no sync screen) as there is no picture on video source	Check video settings of the source.	
Audio signal			
No audio is present on output	Source audio volume is low or muted	Check the audio settings of the source.	
	Audio input port is muted	Check the audio input port properties	5.5.2 5.5.3 LW3 7.6.1
	Audio output port is muted	Check the output port properties.	5.5.4 LW2 6.4.6 LW3 7.6.2
HDMI output signal contains no audio	HDMI mode was set to DVI	Check the properties of the output port and set the signal type to HDMI or Auto.	5.5.4 LW3 7.5.23
	DVI EDID is emulated	Check the EDID and select and HDMI EDID to emulate.	5.8 LW3 7.13
RS-232 signal			
Connected serial device does not respond	Cable connection problem	Check the connectors to fit well; check the wiring of the plugs.	3.2.7
	RS-232 settings are different	Check the port settings of the transmitter and the connected serial device(s).	5.9.1 LW3 7.8
	RS-232 mode is not right	Check the RS-232 mode settings (control, command injection, or disconnected)	5.9.1 LW3 7.8.6

Symptom	Root cause	Action	Refer to
		Network	
No LAN connection can be established	Incorrect IP address is set (fix IP)	Use dynamic IP address by enabling DHCP option.	2.5.4 5.11.2 7.7.3
		Restore the factory default settings (with fix IP).	2.5.5 5.11.5 6.3.11 7.4.6
	IP address conflict	Check the IP address of the other devices, too.	
		GPIO	
Connected device does not respond	Cable connection problem	Check the connectors to fit well; check the wiring of the plugs.	3.2.9
Output level cannot be changed	The direction of the selected pin is set to input	Check and modify the direction setting of the desired pin	5.9.2 6.5.1 7.12
		Miscellaneous	
Front panel buttons are out of operation	Buttons are locked	Unlock the buttons	2.5.7 5.11.1
Error messages received continuously	Different protocol is set	Check the port protocol settings (LW2 / LW3) and use the proper protocol commands.	5.9.1 7.8.1
	Firmware package difference	The firmware of the device and the command description in the User's manual are based on different firmware package version. Check the versions and upgrade if necessary.	page 3 5.11.1

10

Technologies

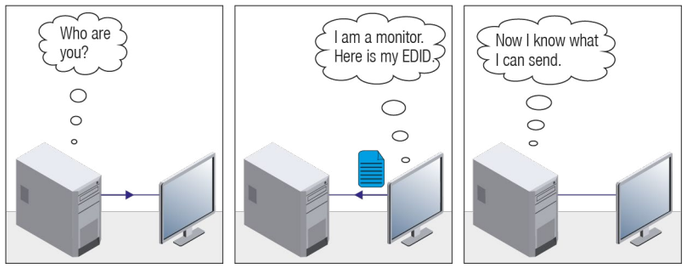
The following sections contain descriptions and useful technical information how the devices work in the background. The content is based on experiences and cases we met in the practice. These sections help to understand features and technical standards.

10.1. EDID Management

10.1.1. Understanding the EDID

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

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



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 with CEA extension are HDMI capable.

Common Problems Related to EDID

Problem: "My system consists of the following: a computer, a Lightware device, a WUXGA (1920x1200) LCD monitor, and an SXGA (1280x1024) projector. I would like to see the same image on the monitor and the projector. What EDID should I choose on the Lightware device?"

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

Problem: "I have changed to a different EDID on an input port of the Lightware device 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 do not sense that EDID has been changed. You need to restart your source to make it read out the EDID again.

10.1.2. Advanced EDID Management

Each DVI sink (e.g. monitors, projectors, plasma displays, etc...) must support the EDID data structure. Source BIOS and operating systems are likely to query the sink using DDC2B protocol to determine what pixel formats and interface are supported. DVI standard uses EDID data structure to identify the monitor type and capabilities. Most DVI sources (VGA cards, set top boxes, etc.) will output DVI signal after accepting the connected sink's EDID information. In the case of EDID readout failure or missing EDID, the source will not output DVI video signal.

Lightware devices provide the Advanced EDID Management function that helps system integration. The built-in EDID Router can store and emulate factory pre-programmed- and User programmable EDIDs. The EDID of the attached monitors or projectors for each output are stored in a non-volatile memory. This way the EDID of a monitor is available when the monitor is unplugged or switched off.

Any EDID can be emulated on any input. An emulated EDID can be copied from the EDID router's memory (static EDID emulation), or from the last attached monitor's memory (dynamic EDID emulation). For example, the Lightware device can be set up to emulate a sink device, which is connected to one of the outputs. In this case, the EDID automatically changes, if the monitor is replaced with another display device (as long as it has a valid EDID).

EDID is independently programmable for all inputs without affecting each other. All inputs have their own EDID circuit.

INFO: The user is not required to disconnect the video 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 powered ON.

INFO: When EDID has been changed, the router toggles the HOTPLUG signal for 2 seconds. Some sources do not sense this signal. In such cases, the source device must be restarted or powered OFF and ON again

10.2. HDCP Management

Lightware Visual Engineering is a legal HDCP adopter. Several functions have been developed which helps to solve HDCP related problems. Complex AV systems often have both HDCP and non-HDCP components. The matrix allows 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, a red screen alert or muted screen will appear.

10.2.1. 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 is connected between the source and the display. In this case, the content cannot be viewed on non-HDCP capable displays and interfaces like event controllers. Rental and staging technicians often complain about certain laptops, which are always sending HDCP encrypted signals if the receiver device (display, matrix router, etc.) reports HDCP compliancy. However, HDCP encryption is not required all the time e.g. computer desktop image, certain laptops still do that.

To avoid unnecessary HDCP encryption, Lightware introduced the HDCP enabling/disabling function: the HDCP capability can be disabled in the Lightware device. If HDCP is disabled, the connected source will detect that the sink is not HDCP capable, and turn off authentication.

10.2.2. Disable Unnecessary Encryption

HDCP Compliant Sink

All the devices are HDCP-compliant, no manual setting is required, both protected and unprotected contents are transmitted and displayed on the sink.

Not HDCP-compliant Sink 1.

Not-HDCP compliant sink is connected to the matrix. 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 HDCP is enabled in the matrix, the image will not be displayed on the sink.

Setting the HDCP parameter to Auto on the output port and disable HDCP on the input port, the transmitted signal will not be encrypted if the content is not protected. Thus, non-HDCP compliant sinks will display non-encrypted signal.

Not HDCP-compliant Sink 2.

The layout is the same as in the previous case: non-HDCP compliant display device is connected to the matrix but the source would send protected content with encryption. If HDCP is enabled on the input port of the matrix, the source will send encrypted signal.

The sink is not HDCP compliant, thus, it will not display the video signal but red screen will appear. If HDCP is disabled on the input port of the matrix, the source will not send the signal. The solution is to replace the display device to an HDCP-capable one

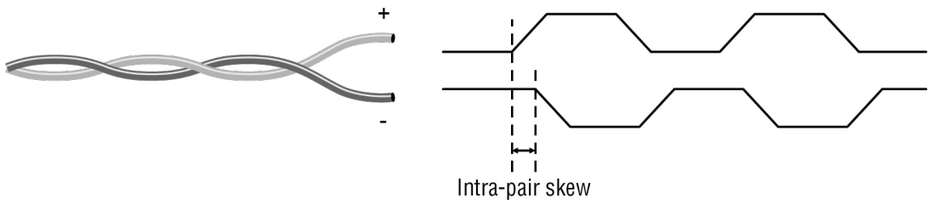
10.3. Pixel Accurate Reclocking

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

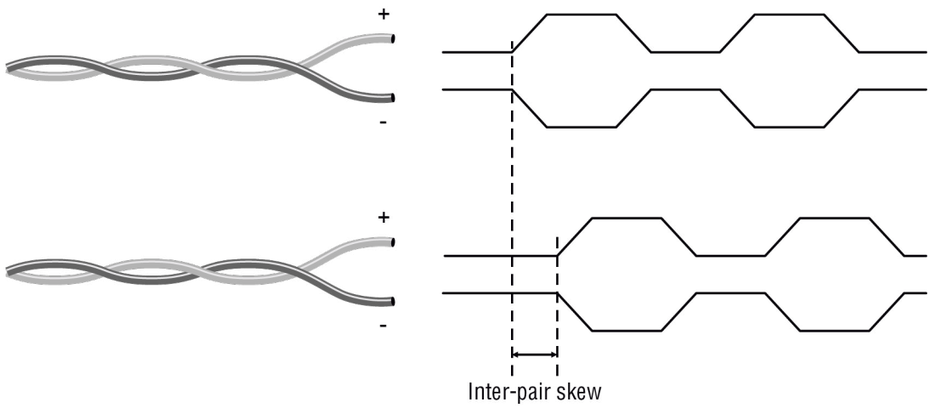
Intra-pair skew

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 DVI cable. It results in jitter.



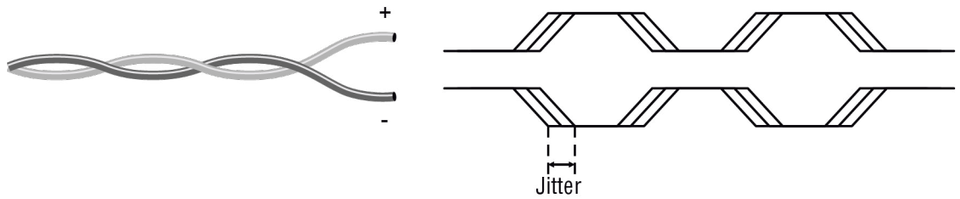
Inter-pair skew

Skew between two differential wire pairs in a cable. It is caused by different wire pair lengths or different number of twists in the DVI cable. Too much inter-pair skew results color shift in the picture or sync loss.



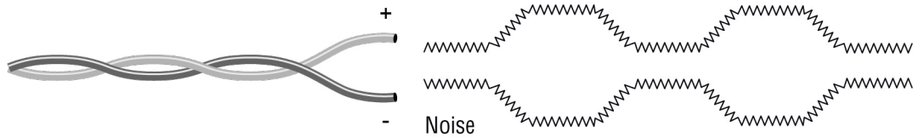
Jitter

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 DVI cable are coupled onto the signal. Too much noise results in increased jitter.



11

Appendix

Specifications, tables, drawings, guides, and further technical details.

11.1. Specifications

General

Compliance ..... CE
Electrical safety..... EN 62368-1:2014
EMC compliance (emission)..... EN 55032:2015
EMC compliance (immunity)..... EN 55035:2017
RoHS..... EN 50581:2012
Warranty ..... 3 years
Operating temperature ..... 0 to +50˚C (+32 to +122˚F)
Operating humidity ..... 10% to 90%, non-condensing
Cooling..... Passive

Power

Power supply option ..... Power adaptor or PoE remote powering
Power over Ethernet (PoE) ..... via TPS output (IEEE802.3af)

Power Adaptor

Supported power source ..... 100-240 V AC; 50/60 Hz
Supplied power ..... 12V 1A DC
AC power plug..... Interchangable (EU, UK, JP/US, AUS/NZ)
DC power plug..... Locking DC connector (5.5/2.1mm pin)

HDMI-TPS and DVI-HDCP-TPS series

Power Consumption (min) ..... 4.4 W
Power Consumption (max) ..... 6.5 W
Heat dissipation..... 15 BTU/h (min), 23 BTU/h (max)

DP-TPS series

HDMI-TPS series (min)..... 4.4 W
HDMI-TPS series (max)..... 7.6 W
Heat dissipation..... 15 BTU/h (min), 26 BTU/h (max)

SW4-TPS-TX240

HDMI-TPS series (min)..... 4.4 W
HDMI-TPS series (max)..... 7.7 W
Heat dissipation..... 15 BTU/h (min), 27 BTU/h (max)

Enclosure

Enclosure material..... 1 mm steel
Dimensions in mm..... 221W x 100.4D x 26H
Dimensions in inch ..... 8.7 W x 3.95 D x 1.02 H
Weight (HDMI and DVI-HDCP series) ..... 610 g
Weight (DP series) ..... 620 g
Weight (SW4 series) ..... 647 g

Video Input Ports

HDMI Input

Connector type..... 19-pole HDMI Type A receptacle
A/V Standard..... DVI 1.0, HDMI 1.4
HDCP compliance..... Yes, 1.4
Color space ..... RGB, YCbCr
Video delay..... 0 frame
Supported resolutions at 8 bits/color *.....
..... up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
..... up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
..... 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking..... Pixel Accurate Reclocking
3D support..... Yes
Audio formats ..... 8 channel PCM, Dolby TrueHD,
..... DTS-HD Master Audio 7.1

DisplayPort Input

Connector type..... 20-pole, DP 1.1a receptacle
A/V Standard..... DisplayPort 1.2a
HDCP compliance..... Yes, 1.4
Color space ..... RGB, YCbCr
Video delay..... 0 frame
Supported resolutions at 8 bits/color *.....
..... up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
..... up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
..... 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking..... Pixel Accurate Reclocking
3D support..... Yes

DVI-D Input

Connector type..... 29-pole DVI-I, digital only
Standard ..... DVI 1.0, HDMI 1.4
HDCP compliance..... Yes, 1.4
Color space ..... RGB, YCbCr
Video delay..... 0 frame
Supported resolutions at 8 bits/color *.....
..... up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
..... up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
..... 1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking..... Pixel Accurate Reclocking
3D support..... Yes
Audio formats ..... 8 channel PCM
..... Dolby TrueHD, DTS-HD Master Audio 7.1

EDID management

EDID emulation ..... yes, advanced EDID management
EDID memory ..... 120 factory presets, 15 programmable
Supported standard..... EDID v1.3

Video Output Ports

HDMI Output

Connector type..... 19-pole HDMI Type A receptacle
A/V standard..... DVI 1.0, HDMI 1.4
HDCP compliance..... Yes, 1.4
Color space ..... RGB, YCbCr
Video delay..... 0 frame
Supported resolutions at 8 bits/color *.....
..... up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
..... up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)

1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking Pixel Accurate Reclocking
Audio formats 8 channel PCM, Dolby TrueHD
DTS-HD Master Audio 7.1

DVI-D Output

Connector type 29-pole DVI-I, digital only
A/V standard DVI 1.0, HDMI 1.4
HDCP compliance Yes, 1.4
Color space RGB, YCbCr
Video delay 0 frame
Supported resolutions at 8 bits/color *
up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
1920x1080@60Hz (4:4:4) up to 12 bits/color
Reclocking Pixel Accurate Reclocking
Audio formats 8 channel PCM, Dolby TrueHD
DTS-HD Master Audio 7.1

TPS Output Port

Connector type RJ45 connector
Power over Ethernet (PoE) yes (IEEE 802.3af)
Compliance HDBaseT™
Transferred signals Video, Audio, RS-232, Infrared, Ethernet
Color space RGB, YCbCr
Video delay 0 frame
Supported resolutions at 8 bits/color *
up to 4096x2048@30Hz (4:4:4) or 4096x2048@60Hz (4:2:0)
up to 3840x2160@30Hz (4:4:4) or 3840x2160@60Hz (4:2:0)
1920x1080@60Hz (4:4:4) up to 12 bits/color
Audio formats 8 channel PCM
Dolby TrueHD, DTS-HD Master Audio 7.1

Analog Audio Input Port

Connector type 3.5 mm TRS (1/8" jack)
Audio formats 2-ch PCM
Sampling frequency 48 kHz
Maximum input level +0 dBu, 0.77 Vrms, 2.19 Vpp
Signal transmission Unbalanced signal
Volume -95.62 – 0 dB
Gain -12 dB – +6 dB

Control Ports

RS-232

Connector type 3-pole Phoenix connector
Baud rates between 4800 and 115200 Baud
Data bits 8 or 9
Parity None / Odd / Even
Stop bits 1 / 1.5 / 2

Ethernet

Connector type RJ45 female connector
Ethernet data rate 10/100Base-T, full duplex with autodetect
Power over Ethernet (PoE) Not supported

GPIO

Connector type 8-pole Phoenix connector
Number of configurable pins 7
Port direction Input or output

Infrared

Input connector type 3.5 mm TRS (approx. 1/8" jack)
Output connector type 3.5 mm TS (approx. 1/8" jack)
Input carrier frequency 38 kHz
Output signal modulated (38 kHz)

INFO: Specifications subject to change without notice.

11.2. Content of Backup File

The backup file contains numerous settings and parameters saved from the device. When the file is uploaded to a device, the followings will be overwritten: *#configurationcloning*

Digital video input ports (HDMI, DP, DVI-D)
Video port name, Audio port name, HDCP setting, Mute/lock states, CEC settings
Output ports (TPS and HDMI/DVI-D)
Port name, HDCP mode, HDMI mode, Power +5V mode, Color space setting, Mute/lock states, Autoselect settings, Test pattern settings, CEC settings
Analog audio input port
Port name, Volume, Balance, Gain
Crosspoint settings
Video crosspoint settings, audio crosspoint settings
Autoselect (enable/disable, delay settings, priority list)
Mute/lock state of video ports, Mute/lock state of audio ports
Serial ports (local and TPS)
RS-232 mode, Control protocol, Baud rate, Data bits, Stop bits, Parity
Port name and Command Injection (CI) port number
RS-232 recognizer settings
IR port
Port status (enable / disable), Code length, Repetition code, Modulation state
Input port name, Output port name
CI status (enable / disable), CI port number
Network settings
DHCP status (enable / disable), Static IP address, Network mask, Gateway address, LW2/LW3/HTTP port no
Further settings
Device label, Control lock state, Dark mode state
User EDID data (U1-U14), Event Manager: settings of all Events (E1-E20)
GPIO port configuration (pin 1-7) and pin states

11.3. Maximum Extension Distances

Resolution	Pixel clock rate	Cable lengths (Auto / Longreach TPS mode)		
		CAT5e AWG24	CAT7 AWG26**	CAT7 AWG23
1024x768@60Hz	65 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1280x720p@60Hz	73.8 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1080p@60Hz / 24bpp	148.5 MHz	100 m / 130 m*	90 m / 120 m*	120 m / 170 m*
1920x1200@60Hz	152.9 MHz	100 m / NA	90 m / NA	120 m / NA
1600x1200@60Hz	162 MHz	100 m / NA	90 m / NA	120 m / NA
1920x1080@60Hz / 36bpp	223.6 MHz	70 m / NA	70 m / NA	100 m / NA
3840x2160@30Hz UHD	297 MHz	70 m / NA	70 m / NA	100 m / NA
4096x2160@30Hz 4K	297 MHz	70 m / NA	70 m / NA	100 m / NA

* With Long reach operation mode which supports pixel clock frequencies up to 148.5 MHz.

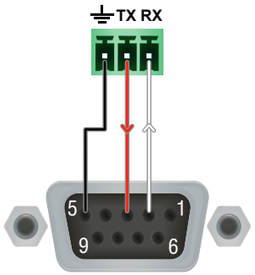
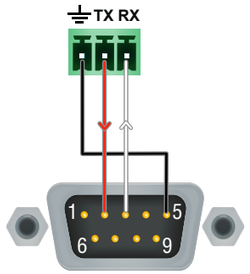
** When remote powering is used with AWG26 cables, distances are 20% shorter.

11.4. Factory Default Settings

Parameter	Setting/Value
Crosspoint settings (for SW4-TPS-TX240)	
Video	I1 (DP in)
Audio	I1 (DP in)
Video input port settings (HDMI, DVI-D, DP)	
HDCP	Enabled
Emulated EDID	Dynamic #1: The EDID of the connected sink device.
Video output port settings (TPS, HDMI)	
Autoselect	Disabled
Test pattern mode	Off
Test pattern resolution	640x480p
Test pattern	Bar
Signal type	Auto
HDCP mode	Auto
Power 5V mode	Always on
TPS mode	Auto
Analog audio input port settings	
Volume	0.00 dB
Balance	50 (center)
Gain	0 dB
Network settings	
IP address	192.168.0.100
Subnet mask	255.255.255.0
Static gateway	192.168.0.1
DHCP	Disabled
LW2 port number	10001
LW3 port number	6107
HTTP port number	80
RS-232 settings	
Control protocol	LW2
Baud rate	57600
Databits	8
Parity	None
Stopbits	1
Operation mode	Pass-through
Command injection status	Enabled
Command injection port no. - Local	8001
Command injection port no. - TPS	8002
IR port settings	
Command injection status	Enabled
Comm. inj. input port no. - Local	9001
Comm. inj. output port no. - Local	9002
Comm. inj. input port no. - TPS	9003
Comm. inj. output port no. - TPS	9004
GPIO port settings	
Direction	Input
Output level	High

11.5. Wiring Guide for RS-232 Data Transmission

The standalone transmitters are built with 3-pole Phoenix connector. See the examples below of the most common connecting cases.

Matrix and a DCE (Data Circuit-terminating Equipment)	Matrix and a DTE (Data Terminal Equipment)
D-SUB 9 and Phoenix	**D-SUB 9 and Phoenix**
 2: TX data 3: RX data 5: Ground	 2: RX data 3: TX data 5: Ground

#factory

11.6. Firmware Release Notes

Below list shows the released firmware packages with important notes.

v1.2.0b16

Release date: 2019-08-15

New feature:

- Compatible for LDU2 only!
- Modified DP input driver to fix HDCP issue with MacBooks
- Use LDU2 v1.2.5 or later for the upgrade!
- CEC - sendCEC command (e.g. turn on the TV with Event Actions) for SW4-TPS-TX240-Plus only!
- RS232 Minimal Recognizer for Cisco compatibility (Cisco Login) for SW4-TPS-TX240-Plus only!
- Sending IR codes (SendProntoHex e.g. send max. 200 Byte IR code with Event Actions) for SW4-TPS-TX240-Plus only!
- Modified RS-232 modes to support SendMessage in Control mode
- Added 'Forced button lock' function to lock buttons via protocol command
- Firmware platform library updated
- Added 'Dark mode' function to turn off front panel LEDs
- Improved GPIO detection
- Added 'Disable default button function' option to support button customization in Event Manager
- Added 'User replaceable miniweb slot' to support built-in control webpage

Bugfix:

- The problem with HDCP LED lighting on TPS link was fixed.
- Problem with EEPROM production test was fixed.

11.7. Port Numbering

11.7.1. For All Models

Port name	Port no. (LW2 / LW3)
Local IR input	S1
Local IR output	D1
TPS IR input	S2
TPS IR output	D2

Port name	Port no. (LW2 / LW3)
Local serial port	P1
TPS serial link	P2

11.7.2. SW4-TPS-TX240

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
DP in	I1	P1	I1	E1	I1	P1	I1
HDMI 1 in	I2	P2	I2	E2	I2	P2	I2
HDMI 2 in	I3	P3	I3	E3	I3	P3	I3
DVI-D in	I4	P4	I4	E4	I4	P4	I4
Audio in	-	-	-	-	I5	P5	I5
TPS out	O1	P5	O1	-	O1	P6	O1
HDMI out	O2	P6	O2	-	O2	P7	O2

11.7.3. HDMI-TPS-TX210

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
HDMI in	I1	P1	I1	E1	I1	P1	I1
TPS out	O1	P2	O1	-	O1	P2	O1
HDMI out	O2	P3	O2	-	O2	P3	O2

11.7.4. HDMI-TPS-TX220

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
HDMI in	I1	P1	I1	E1	I1	P1	I1
Audio in	-	-	-	-	I2	P2	I2
TPS out	O1	P2	O1	-	O1	P3	O1
HDMI out	O2	P3	O2	-	O2	P4	O2

11.7.5. DVI-HDCP-TPS-TX210

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
DVI-D in	I1	P1	I1	E1	I1	P1	I1
TPS out	O1	P2	O1	-	O1	P2	O1
DVI-D out	O2	P3	O2	-	O2	P3	O2

11.7.6. DVI-HDCP-TPS-TX220

Audio/Video Ports

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
DVI-D in	I1	P1	I1	E1	I1	P1	I1
Audio in	-	-	-	-	I2	P2	I2
TPS out	O1	P2	O1	-	O1	P3	O1
DVI-D out	O2	P3	O2	-	O2	P4	O2

11.7.7. DP-TPS-TX210

Audio/Video Ports

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
DP in	I1	P1	I1	E1	I1	P1	I1
TPS out	O1	P2	O1	-	O1	P2	O1
HDMI out	O2	P3	O2	-	O2	P3	O2

11.7.8. DP-TPS-TX220

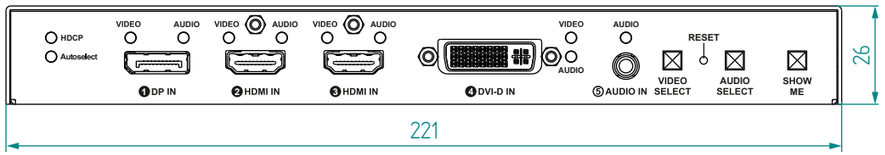
Audio/Video Ports

Port name	Video port no. (LW2)	Video port no. (LW3)		Emulated EDID memory	Audio port no. (LW2)	Audio port no. (LW3)	
		Till fw v1.0.3	From fw v1.1.0			Till fw v1.0.3	From fw v1.1.0
DP in	I1	P1	I1	E1	I1	P1	I1
Audio in	-	-	-	-	I2	P2	I2
TPS out	O1	P2	O1	-	O1	P3	O1
HDMI out	O2	P3	O2	-	O2	P4	O2

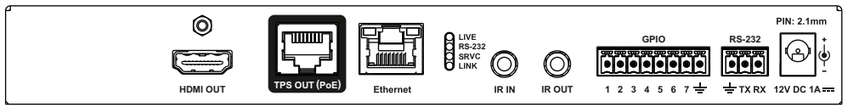
11.8. Mechanical Drawings

SW4-TPS-TX240 can be seen in the pictures, but the dimensions are the same for all models. Dimensions are in mm.

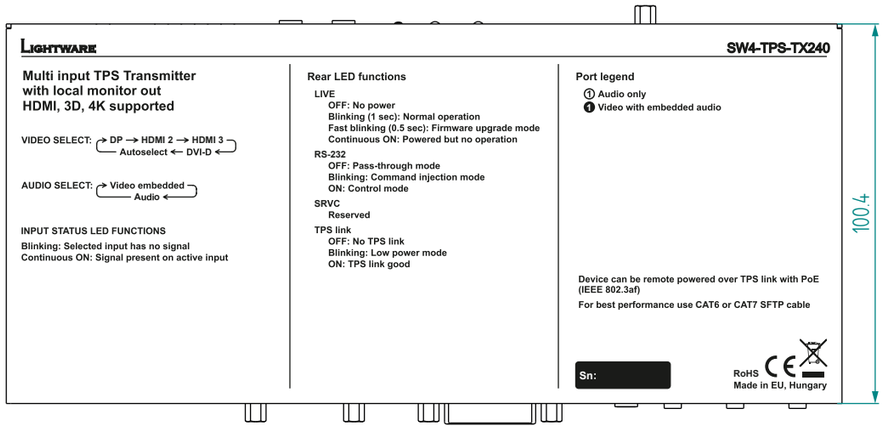
Front View



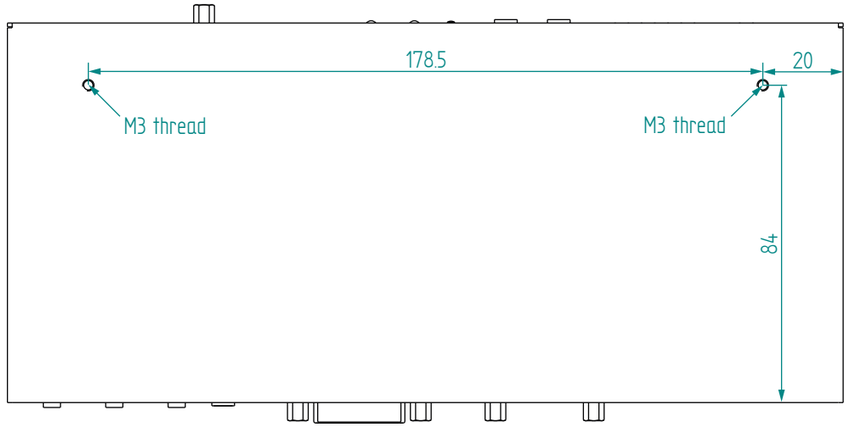
Rear View



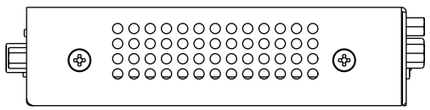
Top View



Bottom View



Side View



11.9. Factory EDID List

Mem.	Resolution				Scan	Type
F1	640 x	480	@ 60.00	Hz	p	D
F2	848 x	480	@ 60.00	Hz	p	D
F3	800 x	600	@ 60.32	Hz	p	D
F4	1024 x	768	@ 60.00	Hz	p	D
F5	1280 x	768	@ 50.00	Hz	p	D
F6	1280 x	768	@ 59.94	Hz	p	D
F7	1280 x	768	@ 75.00	Hz	p	D
F8	1360 x	768	@ 60.02	Hz	p	D
F9	1280 x	1024	@ 50.00	Hz	p	D
F10	1280 x	1024	@ 60.02	Hz	p	D
F11	1280 x	1024	@ 75.02	Hz	p	D
F12	1400 x	1050	@ 50.00	Hz	p	D
F13	1400 x	1050	@ 60.00	Hz	p	D
F14	1400 x	1050	@ 75.00	Hz	p	D
F15	1680 x	1050	@ 60.00	Hz	p	D
F16	1920 x	1080	@ 50.00	Hz	p	D
F17	1920 x	1080	@ 60.00	Hz	p	D
F18	2048 x	1080	@ 50.00	Hz	p	D
F19	2048 x	1080	@ 60.00	Hz	p	D
F20	1600 x	1200	@ 50.00	Hz	p	D
F21	1600 x	1200	@ 60.00	Hz	p	D
F22	1920 x	1200	@ 50.00	Hz	p	D
F23	1920 x	1200	@ 59.56	Hz	p	D
F24	2048 x	1200	@ 59.96	Hz	p	D
F29	1920 x	1080	@ 60.00	Hz	p	U
F30	1440 x	480	@ 60.05	Hz	i	H
F31	1440 x	576	@ 50.08	Hz	i	H
F32	640 x	480	@ 59.95	Hz	p	H
F33	720 x	480	@ 59.94	Hz	p	H
F34	720 x	576	@ 50.00	Hz	p	H
F35	1280 x	720	@ 50.00	Hz	p	H
F36	1280 x	720	@ 60.00	Hz	p	H
F37	1920 x	1080	@ 50.04	Hz	i	H
F38	1920 x	1080	@ 50.00	Hz	i	H
F39	1920 x	1080	@ 60.05	Hz	i	H
F40	1920 x	1080	@ 60.05	Hz	i	H
F41	1920 x	1080	@ 24.00	Hz	p	H
F42	1920 x	1080	@ 25.00	Hz	p	H
F43	1920 x	1080	@ 30.00	Hz	p	H
F44	1920 x	1080	@ 50.00	Hz	p	H
F45	1920 x	1080	@ 59.94	Hz	p	H
F46	1920 x	1080	@ 60.00	Hz	p	H
F47	1920 x	1080	@ 60.00	Hz	p	U
F48	1920 x	1080	@ 60.00	Hz	p	U
F49	1920 x	1080	@ 60.00	Hz	p	U
F90	1920 x	2160	@ 59.99	Hz	p	D
F91	1024 x	2400	@ 60.01	Hz	p	D
F94	2048 x	1536	@ 60.00	Hz	p	D
F96	2560 x	1600	@ 59.86	Hz	p	D
F97	3840 x	2400	@ 24.00	Hz	p	D
F98	1280 x	720	@ 60.00	Hz	p	H
F99	1920 x	1080	@ 60.00	Hz	p	H
F100	1024 x	768	@ 60.00	Hz	p	H
F101	1280 x	1024	@ 50.00	Hz	p	H
F102	1280 x	1024	@ 60.02	Hz	p	H
F103	1280 x	1024	@ 75.02	Hz	p	H
F104	1600 x	1200	@ 50.00	Hz	p	H
F105	1600 x	1200	@ 60.00	Hz	p	H
F106	1920 x	1200	@ 59.56	Hz	p	H
F107	2560 x	1440	@ 59.95	Hz	p	H

Legend

Mem.	Resolution				Scan	Type
F108	2560 x	1600	@ 59.86	Hz	p	H
F109	3840 x	2400	@ 24.00	Hz	p	H
F110	3840 x	2160	@ 24.00	Hz	p	H
F111	3840 x	2160	@ 25.00	Hz	p	H
F112	3840 x	2160	@ 30.00	Hz	p	H
F118	3840 x	2160	@ 30.00	Hz	p	U
F119	3840 x	2160	@ 30.00	Hz	p	U
F133	4096 x	2160	@ 60.00	Hz	p	4

p: progressive

i: interlaced

D: DVI EDID

H: HDMI EDID

U: Universal EDID (supporting many standard resolutions)

Please note that minor changes in the factory EDID list may be applied in farther firmware versions.

Universal EDIDs

The Universal EDIDs include many common resolutions with the below features:

- **F29**: Universal EDID for DVI signals (no audio support).
- **F47**: HDMI EDID with supporting PCM audio.
- **F48**: HDMI EDID with supporting all type of audio.
- **F49**: HDMI EDID with supporting all type of audio and deep color.
- **F118**: HDMI EDID with supporting PCM audio and 4K@30 Hz signals.
- **F119**: HDMI EDID with supporting all type of audio and 4K@30 Hz signals.
- **F133**: HDMI EDID with supporting 4K@60 Hz signals with 4:2:0 sampling.

11.10. Hashtag Keyword List

This user's manual contains keywords with hashtag (#) to help you to find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the **#** (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP (dynamic IP address) setting in the front panel operation, the Lightware Device Controller (LDC) and the LW3 programmer's reference section.

The following list contains all hashtag keywords placed in the document with a short description belonging to them. The list is in **alphabetical order** by the hashtag keywords.

Hashtag Keyword	Description
#advancedview	Advanced view / Terminal window
#terminal	Advanced view / Terminal window
#analogaudio	Analog audio related settings
#balance	Balance (for analog audio) setting
#volume	Volume (for analog audio) setting
#autoselect	Autoselect feature settings
#backup	Configuration cloning (backup)
#bootload	Bootload mode setting
#builtinweb	Built-in miniweb
#miniweb	Built-in miniweb
#web	Built-in miniweb
#buttonlock	Front panel button lock setting
#lockbutton	Front panel button lock setting
#darkmode	Dark mode setting
#cec	CEC related settings
#commandinjection	RS-232 command injection settings
#configurationcloning	Configuration cloning (backup)
#crosspoint	Crosspoint switch setting
#switch	Crosspoint switch setting
#dhcp	Dynamic IP address (DHCP) setting
#ipaddress	IP address related settings
#network	Network (IP address) related settings
#diagnostic	Failure diagnostic related tool/information
#cablediagnostics	Cable diagnostics tool in LDC
#edid	EDID related settings
#eventmanager	Event manager
#factory	Factory default settings
#firmwareversion	Firmware version query
#framedetector	Frame detector in LDC
#function	Function button
#showme	Function button
#hdcp	HDCP-encryption related setting
#infra	Infrared port related settings
#infrared	Infrared port related settings
#label	Device label
#devicelabel	Device label
#producttype	Product type query
#lock	Port lock setting
#unlock	Port unlock setting
#mute	Port mute setting
#unmute	Port unmute setting
#log	System log
#systemlog	System log
#message	Message sending via communication ports
#recognizer	RS-232 recognizer related settings
#rs232recognizer	RS-232 recognizer related settings
#rs-232recognizer	RS-232 recognizer related settings
#nosyncscreen	Test pattern (no sync screen) settings
#testpattern	Test pattern (no sync screen) settings
#portstatus	Source/destination port status query
#protocol	RS-232 protocol setting
#reboot	Restarting the device
#restart	Restarting the device
#rs232	RS-232 related settings
#rs-232	RS-232 related settings
#serial	RS-232 related settings
#serialnumber	Serial number query
#signaltype	HDMI/DVI signal type setting
#tpsmode	TPS (HDBaseT) mode setting

11.11. Further Information

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.

Document Revision History

Rev.	Release date	Changes	Editor
1.0	03-07-2015	Initial version	Laszlo Zsedenyi
1.1	15-12-2015	Safety instructions updated, CE page pulled out	Laszlo Zsedenyi
1.2	10-06-2016	Major updates for LDC 1.8.0 and LDU 1.3.0, updated Event Manager, changes in LW3 structure.	Tamas Forgacs
2.0	19-09-2017	New document format, updated LW3 prog. ref. chapter	Tamas Forgacs
2.1	14-03-2018	Minor corrections.	Laszlo Zsedenyi
2.2	31-10-2018	1080p120Hz signal support info added.	Laszlo Zsedenyi
2.3	18-09-2019	SW4-TPS-TX240-Plus device added. Application diagrams changed; Model comparison added; Smart features and Advanced control pack - related descriptions added; Firmware upgrade section (LDU v2) revised; Firmware release notes added.	Laszlo Zsedenyi
3.0	09-06-2020	Document re-structured; hashtag (#) keywords added; List of optional accessories added; LW2 prog ref chapter remade; minor additions.	Laszlo Zsedenyi

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